

# Revisions of British and Irish Lichens



*British  
Lichen  
Society*

**Volume 24**

**April 2022**



**Caliciales: Physciaceae**

Cover image: *Physcia aipolia*, on a wooden fence paling, National Botanic Garden of Wales, Carmarthenshire.

*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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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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ISSN 2634-7768

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# *Revisions of British and Irish Lichens* vol. 24

## **Caliciales: Physciaceae**

including the genera *Anaptychia*, *Heterodermia*, *Hyperphyscia*, *Mischoblastia*, *Phaeophyscia*, *Physcia*, *Physciella*, *Physconia*, *Rinodina* and *Tornabea*

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**This publication can be cited as:**

**Cannon, P., Thüs, H., Aptroot, A., Coppins, B., Orange, A., Sanderson, N. & Simkin, J.** (2022). Caliciales: Physciaceae, including the genera *Anaptychia*, *Heterodermia*, *Hyperphyscia*, *Mischoblastia*, *Phaeophyscia*, *Physcia*, *Physciella*, *Physconia*, *Rinodina* and *Tornabea*. *Revisions of British and Irish Lichens* **23**: 1–37.

## PHYSICIACEAE Zahlbr. (1898)

**Thallus** crustose, squamulose, foliose or fruticose, rarely parasitic on other lichens, the lobes sometimes maculate, rhizines sometimes present. **Photobiont** trebouxioid. **Ascomata** apothecia, sessile or shortly stalked, occasionally immersed, usually with a distinct thalline margin. **Hamathecium** composed of ± branched and anastomosing paraphyses, often with swollen and/or pigmented apices. **Asci** *Lecanora*-type, with an I+ apical cap and a conical or funnel-shaped more weakly staining apical cushion, usually with a I+ gelatinized outer layer. **Ascospores** usually septate, usually dark brown with thickened walls and septa. **Anamorphs** pycnidial, the conidia mostly filiform.

The Physciaceae and Caliciaceae are the two largest families of the Caliciales. The traditional circumscription of the Caliciaceae as mazaedial lichens is not supported by phylogenetic analysis; a number of non-mazaedial forms including *Buellia* and *Diploicia* belong to that family. This makes the distinction between the Caliciaceae and Physciaceae problematic in morphological terms. The treatment here follows that of Lücking *et al.* (2016), except that *Heterodermia*, *Leucodermia* and *Polyblastidium* are kept together until more detailed studies are concluded. *Mischoblastia* and *Rinodina* are separated at generic level based on phylogenetic studies, but the circumscription of the former genus needs further research.

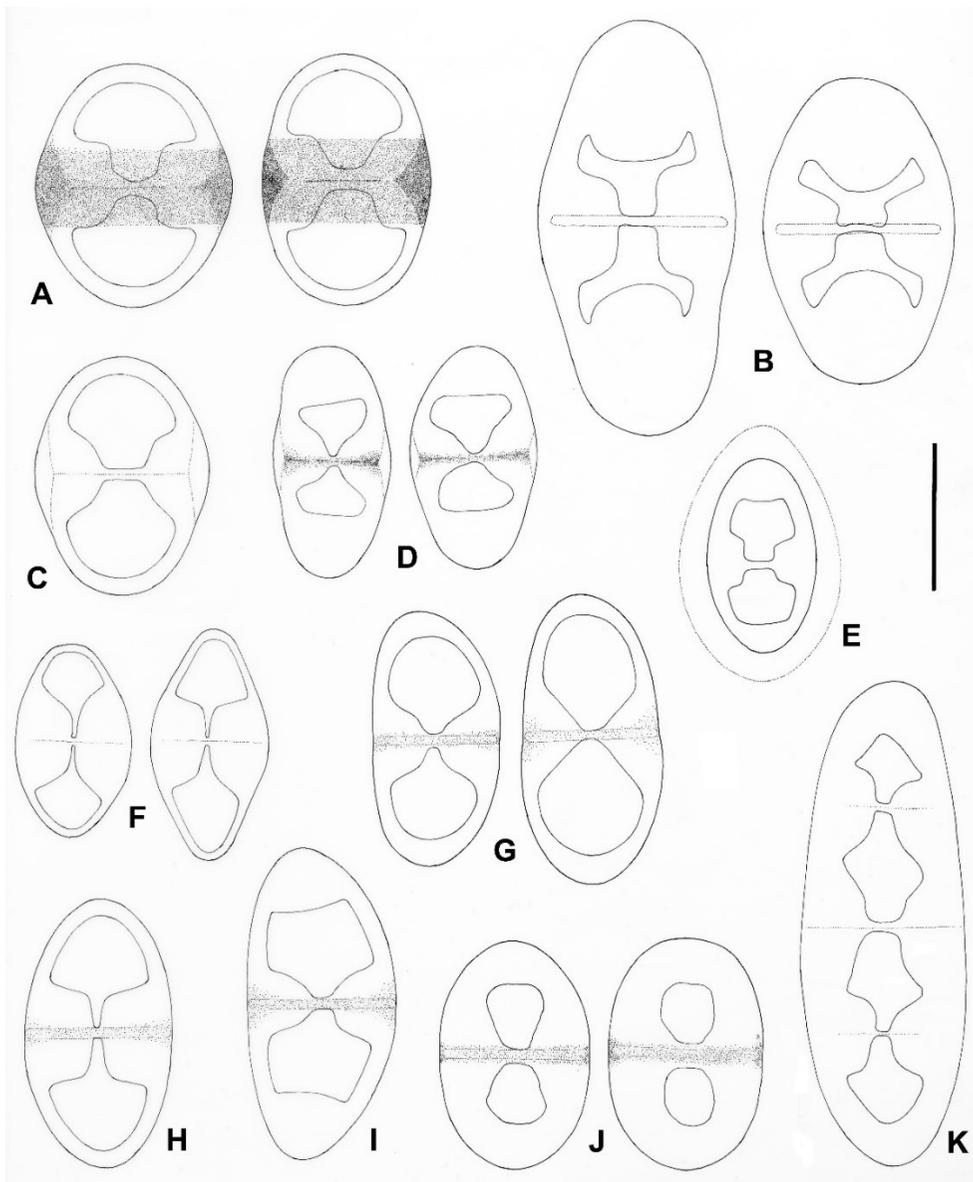
Kondratyuk *et al.* (2021) contributed a phylogeny of the family and introduced seven new genera. While some of these may be accepted in time, the data presented could be described as preliminary, and further research is needed to confirm their findings.

### Literature

Gaya *et al.* (2012), Grube & Arup (2001), Hafellner *et al.* (1979), Helms *et al.* (2003), Kondratyuk *et al.* (2021), Lücking *et al.* (2016), Mayrhofer (1982), Moberg (1977), Mongkulsuk *et al.* (2015), Nadyeina *et al.* (2010), Prieto & Wedin (2016), Rambold *et al.* (1994), Wedin *et al.* (2000, 2002).

|       |   |                     |
|-------|---|---------------------|
| 1     | Thallus foliose.....  | 2                   |
|       | Thallus squamulose (often placodioid) or crustose .....   | 8                   |
|       | Thallus fruticose, tufted and often with entangled branches [extinct in Britain].....   | <i>Tornabea</i>     |
| 2 (1) | Lobes strap-like, erect or decumbent, elongate and narrowly linear, lower cortex absent or<br>hyphal in construction and then with rhizines ..... | 3                   |
|       | Lobes rounded or if linear, branching regularly, adnate, forming rosette-like thalli .....  | 4                   |
| 3(2)  | Lobes grey-green to white; thallus K+ yellow (atranorin) .....  | <i>Heterodermia</i> |
|       | Lobes pale to dark brown; thallus K- .....  | <i>Anaptychia</i>   |
| 4(2)  | Thallus whitish to bluish grey, often maculate and sorediate or with isidia or lobules .....  | 5                   |
|       | Thallus grey brown to brown, not maculate .....   | 6                   |
| 5(4)  | Upper cortex with hyphae running parallel to the upper surface (microscope needed) .....  | <i>Heterodermia</i> |
|       | Upper cortex composed of isodiametric or elongate cells, but not hyphal in construction.....  | <i>Physcia</i>      |
| 6(4)  | Thallus ± loosely appressed to the substratum, lobes pruinose at the tips .....   | <i>Physconia</i>    |
|       | Thallus closely appressed to the substratum, lobes not pruinose at the tips .....   | 7                   |
| 7(6)  | Rhizines absent or sparse; lower surface of thallus pale, the lower cortex composed of<br>intertwined hyphae .....                                | <i>Physciella</i>   |
|       | Rhizines numerous; lower surface of thallus blackened, the lower cortex cellular<br>in construction .....   | <i>Phaeophyscia</i> |

- 8(1) Thallus with numerous soralia, consisting of agglutinated lobes .....*Hyperphyscia*  
 Thallus rarely with soredia and when sorediate, thallus continuous ..... 9
- 9(8) Asci *Bacidia*-type; ascospores with strongly angular lumina (*Mischoblastia*-type).....*Mischoblastia*  
 Asci *Lecanora*-type; ascospores with thickened walls but usually rounded lumina..... *Rinodina*



**Fig. 1.** Ascospores of selected members of the Caliciaceae and Physciaceae; mounted in 10% K. **A.** *Rinodina bischoffii* (*Bischoffii*-type). **B.** *Mischoblastia oxydata* (*Mischoblastia*-type). **C.** *Rinodina dubyana* (*Dubyana*-type; not a British species). **D.** *Rinodina oleae* (*Dirinaria*-type). **E.** *Rinodina pityrea* (*Tunicata*-type). **F.** *Orcularia insperata* (*Orcularia*-type). **G.** *Rinodina sophodes* (*Milvina*-type). **H.** *Rinodina sicula* (*Physconia*-type). **I.** *Rinodina luridescens* (*Physcia*-type). **J.** *Rinodina atrocinerea* (*Pachysporaria*-type). **K.** *Rinodina conradii* (*Conradii*-type). Scale bar = 10  $\mu$ m.

## ANAPTYCHIA Körb. (1848)

**Thallus** foliose or shrubby, dorsiventral, closely appressed throughout or ascending at the apices; lobes branched, elongate. **Upper surface** matt, at times tomentose and with marginal cilia. **Lower surface** with rhizines when a lower cortex is present. **Soredia** and **isidia** absent. **Upper cortex** composed of conglutinated thick-walled hyphae, orientated mostly parallel to the surface, overlain by a colourless ± transparent layer. **Photobiont** trebouxioid. **Ascomata** apothecia, ± stalked, rather rare. **Thalline margin** persistent, concolorous with the thallus. **Asci** 8-spored, *Lecanora*-type. **Ascospores** *Physconia*-type, dark brown, ellipsoidal with rounded apices, uniformly thin-walled except at the septum, sculptured with minute spines or ridges. **Conidiomata** pycnidia, forming small warts. **Conidia** bacilliform, straight, colourless. **Chemistry**: no lichen products detected by TLC in British material. **Ecology**: on rock, bark, lignum and over soil.

*Anaptychia* is clearly separated from *Physconia* and other related genera by the longitudinally arranged hyphae of the upper cortex, which can be recognized in both transverse and longitudinal sections; from *Heterodermia* by its relatively uniformly thin-walled ascospores, the surface of which are sculptured with minute spines or ridges and the absence of atranorin in the cortex; and from *Tornabea* in which the lobes are corticated above and below, are not dorsiventral, and lack marginal cilia.

### Literature

Edwards & Purvis (2009a), Esslinger (2007), Lohtander *et al.* (2008).

- 1 Lobes closely appressed, dark brown, attached by rhizines below; marginal cilia absent.....*runcinata*  
Lobes ± ascending, white to grey-brown, partly unattached, not attached by rhizines below;  
with pale grey-white marginal cilia ..... 2
- 2(1) Lobes white-grey to pale fawn, >2 mm broad; predominantly epiphytic ..... *ciliaris*  
Lobes dark grey-brown, green when wet, ca 2 mm broad; on coastal turf and rocks..... *mamillata*

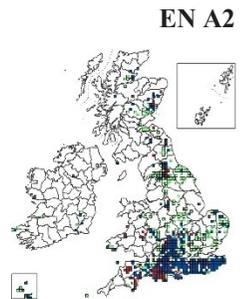
### *Anaptychia ciliaris* (L.) Körb. ex A. Massal. (1853)

Thallus 3–5 (–10) cm diam., ± strap-shaped, loosely attached; lobes elongate, to 3–5 cm long, irregularly branched, ± spreading horizontally with ascending apices and numerous conspicuous pale entangled cilia along their margins. Upper surface ± finely tomentose. Lower surface pale brownish white, without rhizines or lower cortex. Apothecia occasional, 2–5 mm diam.; disc brown-black, often blue-grey pruinose; thalline margin smooth, even to conspicuously and deeply crenulate. All spot tests negative. **BLS 0045**.

Predominantly on bark of nutrient-rich well-lit mature broad-leaved, trees particularly *Acer* and *Fraxinus* (and formerly *Ulmus*), in parklands, pastures and along roadsides; also on rocks and gravestones. Formerly widespread and locally frequent throughout England, from Devon north into eastern Scotland, but now scattered with the main centre of population in the Dorset-Cotswolds area. Very rare in Wales, Scotland and Ireland.

Easily recognized by its pale grey, strap-shaped lobes with numerous pale lateral cilia, and large apothecia with ± crenulate margins. Sterile thalli could conceivably be confused with *Heterodermia leucomelos*, but that species occupies a quite different habitat and has a different chemistry. Formerly widespread in pasture and on roadside trees, it decreased in many areas during the twentieth century due to Dutch Elm Disease, SO<sub>2</sub> pollution and latterly also from high ammonia levels emanating from intensive agriculture.

Lichenicolous fungi on *Anaptychia ciliaris* include *Monodictys anaptychiae* (Lindau) D. Hawksw. (1975) and *Stigidium hageniae* (Rehm) Hafellner (1988); the latter occurs more frequently now on *A. mamillata* (see below).



### **Anaptychia mamillata** (Taylor) D. Hawksw. (1973)

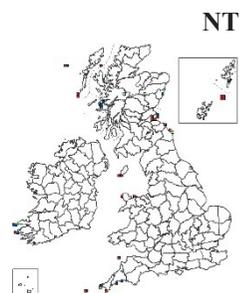
*Anaptychia ciliaris* subsp. *mamillata* (Taylor) D. Hawksw. & P. James (1980)

Differs from *Anaptychia ciliaris* in the consistently narrower thallus lobes, ca 2 mm broad, dark grey to brown when dry and dark olive-green coloration when wet, and absence of any tomentum on the upper surface. **BLS 0046**.

Predominantly on sheltered coastal rocks and rock-turf interfaces in the xeric-supralittoral zone; rare and very local. Scattered sites in the west from Devon and Isles of Scilly north to Shetland and along the east coast south to Berwickshire; S.W. Ireland.

Thalli may be confused with *Anaptychia runcinata* (found in similar habitats) but have marginal cilia. Morphs in coastal turf tend to be smaller and much paler than those directly on maritime rocks; they could represent a different taxon. *A. mamillata* was treated as a subspecies of *A. ciliaris* by Edwards & Purvis (2009a), but preliminary molecular data (Lohtander *et al.* 2008) suggest that they represent distinct species, and they are distinguishable in both morphological and ecological terms.

*A. mamillata* is often parasitized by *Stigmidium hageniae*, seen as numerous minute black dots on the lobes.



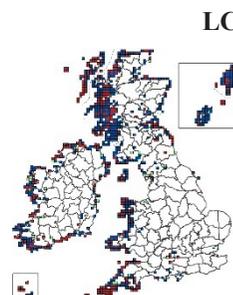
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### **Anaptychia runcinata** (With.) J.R. Laundon (1984)

Thallus to 10 cm diam., foliose, spreading, ± forming rosettes, or as scattered fragments amongst or upon other lichens, closely appressed throughout, rather thick; lobes 0.3–2.5 mm broad, often slightly wider at the apices, flat to convex, contiguous, densely overlapping towards the centre of the thallus; upper surface dark brown, dull, white to pale grey in shade, dull olive-green when moist, lobe tips often bleached white; lower surface pale to dark brown-black, with unbranched brown to black rhizines that are scattered or form a ± thick weft. Apothecia 1–3 mm diam., frequent; disc black-brown, roughened, with a coarsely crenulate thalline margin. **BLS 0047**.

Abundant on hard coastal rocks, also on turf and soil, decaying *Armeria* tufts and occasionally on boles of wayside trees; in a few inland sites on rock outcrops, lakesides, standing stones, church walls and hedgerow trees. Throughout Britain in the west and north, all around Ireland.

Distinguished by the appressed orbicular light to dark brown thalli, olive-green when moist. Dark morphs of *A. mamillata* have marginal cilia. Host to *Pronectria santessonii* (Lowen & D. Hawksw.) Lowen (1990), which has immersed red perithecia formed in bleached areas of the thallus.



LC

## **HETERODERMIA** Trevis. (1868)

**Thallus** small, foliose, in rosettes or irregular, sometimes combining to form extensive radiating mats; marginal lobes discrete or contiguous and closely adpressed or ribbon-like, sometimes ascending and loosely attached, white to greyish, almost always fringed with cilia that are unbranched or abundantly branched. **Soredia**, lobules or isidia usually present. **Upper cortex** of periclinal hyphae. **Photobiont** chlorococcoid. **Lower surface** pale or darkening, yellowish in part or completely, with or without a cortex; when present of periclinal hyphae and with unbranched or branched pale to black rhizines, marginal and sometimes long, extending beyond the thallus margin. **Ascomata** apothecia, very rare in most species; disc brown-black. **Thalline margin** thick, incurved, subhymenium pale. **Asci** 8-spored, *Lecanora*-type. **Ascospores** very thick-walled, 1-septate, often with 1–3 additional small locules beyond the main locules, brown, cylindric-ellipsoidal, surface smooth, *Pachysporaria*-type (Fig. 1j). **Conidiomata** pycnidial, blackened, immersed. **Conidia** bacilliform to short-cylindrical. **Chemistry**: atranorin (upper cortex), zeorin and other terpenes, β-orcinol depsides and depsidones and pigments occasionally also present (medulla). **Ecology**: on trees or rock, rarely on soil.

Distinguished from *Anaptychia* by the spore type, the more complex chemistry, including atranorin in the cortex, and the generally paler coloured thallus. All species are rare in Britain and Ireland.

Preliminary molecular data (Lücking *et al.* 2008) suggest that *H. leucomelos* should be separated from the genus. Mongkolsuk *et al.* (2015) introduced the new genus *Leucodermia* for this and several other species, and adopted *Polyblastidium* for taxa including *H. propagulifera* and the *H. japonicum* group. Kondratyuk *et al.* (2021) suggested further changes, but De Souza *et al.* (2022) found that none of the segregates as defined by those authors are monophyletic, and more data are needed to confirm a new generic structure.

### Literature

De Souza *et al.* (2022), Edwards & Purvis (2009b), Kondratyuk *et al.* (2021), Lendemer (2009), Lücking *et al.* (2008), Moberg (2011), Moberg & Purvis (1997), Mongkolsuk *et al.* (2015), Weerakoon & Aptroot (2013), Wei *et al.* (2008).

- 1 Thallus ± loosely attached; lobes elongate, entangled, ascending, with long, black, marginal cilia; soredia absent or confined to a central furrow on the underside of the lobes .....*leucomelos*  
Thallus firmly attached; lobes rosette-forming, marginal cilia short or absent; lacking isidia, but soralia or lobules present ..... 2
- 2(1) Lower surface corticate, white to tan-coloured ..... *speciosa*  
Lower surface non-corticate, with yellow spots or ochraceous arachnoid layer ..... 3
- 3(2) Thallus 3–8 cm diam.; K± yellow, Pd–; on mossy trunks and branches, occasionally on walls; not strongly coastal ..... *obscurata*  
Thallus usually smaller, irregular in form; K+ yellow→red (crystals), Pd+ orange; in coastal turf .....*propagulifera*

### *Heterodermia leucomelos* (L.) Poelt (1965)

Thallus 5–15 cm across, often in loose rosettes or forming entangled mats, loosely attached; lobes 0.5–3 mm broad, elongate ribbon-like, mostly dichotomously branched, entangled, ± ascending with sometimes reflexed apices, with conspicuous long grey to black unbranched or sparsely branched marginal cilia, 5–9 mm long; upper surface ivory-white, smooth; lower surface white, channelled, the central part arachnoid or powdery and then sorediate; non-corticate. Apothecia not observed in British material. Medulla C–, K+ yellow→red, KC+ yellow→red, Pd+ yellow (zeorin and salazinic acid). **BLS 0558.**

On mossy rocks or moss-lichen turf on sunny exposed coastal cliffs, very rarely on the branches of broad-leaved trees; rare, local and declining. S.W. England (Cornwall, Is. of Scilly, formerly in Devon, Dorset, Sussex), Channel Is., S.W to N. Wales, S.W. Ireland.

The white ascending ribbon-like lobes with long, often intertwined, dark marginal cilia are characteristic. The development of soredia is variable; in some specimens they are absent and the lower cortex remains arachnoid, but frequently at least the distal part of the underside is sorediate and then strongly reflexed and exposed by an upward curling of the lobes.

The epithet has been spelled in different ways in the past, including *leucomela* and *leucomelaena*.



### *Heterodermia obscurata* auct. brit., *non* (Nyl.) Trevis. (1869)

NT

*Heterodermia japonica* auct. brit., *non* (M. Satô) Swinscow & Krog (1976)

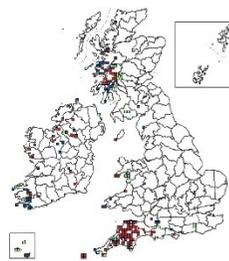
Thallus 3–8 cm diam., forming neat rosettes or more rarely widely spreading; lobes 0.7–2 mm broad, ± flat, contiguous, not ascending or rarely raised at the tips, ± palmately branched; upper surface ivory white to grey, smooth or rarely with abundant minute crowded granular lobes at the centre of the thallus; lip-shaped soralia on recurved apices of the lobes; marginal cilia short and dark; lower surface non-corticate (matt, minutely fibrous), greyish to white, with pale yellow to pale orange or dark ochraceous spots, rarely covering most of the undersurface, but not in a thick continuous layer. Apothecia not known. Upper surface C–, K± yellow, KC–, Pd– (zeorin, atranorin), pigment K+ purple. **BLS 0560.**

On trunks, branches and twigs of trees in ancient woodlands, willow carr and parklands; occasionally on walls; local and rare. S.W. England (East to Dorset & Wilts.), W. Wales, W. Scotland, C. & W. Ireland.

*H. propagulifera* differs in its chemistry, and no occurrences of this species on trees are known from Britain. *H. speciosa* auct. brit. differs in its corticate lower surface and isidium-like outgrowths on the upper surface. Both of these species are rare and very restricted in distribution in our area.

The correct name for this taxon in Britain and Ireland still needs to be resolved, and both *Heterodermia japonica* and *H. obscurata* are species aggregates and need more robust definition on a global basis. *H. japonica* s.str. is characterized by the absence of yellow or orange pigments on its lower surface, but British specimens do have varying amounts of such pigments and are unlikely to be identical with this species. Genetically however, two samples from the UK have been placed in the *H. japonica* group and not in the *H. obscurata* aggregate. The two species groups are thus easily confused and specimens with patchy orange pigment need DNA barcoding for confirmation. Usually the pigment layer in *H. obscurata* is more continuous, much thicker and the pigment bright orange to rusty orange. In Europe specimens which belong to the *H. obscurata* group have been sequenced from Spain and Italy. Specimens from the Netherlands fit well with the morphological concept of *H. obscurata*, but no sequence data are available yet. The *H. obscurata* group is generally widespread in the tropics and subtropics.

Reported as host to *Heterocephalacria physciacearum* (Diederich) Millanes & Wedin (2015) and *Lichenocodium lecanorae* (Jaap) D. Hawksw. (1979).



### **Heterodermia propagulifera** (Vain.) Dey (1977)

Differs from other *Heterodermia* species in Britain and Ireland by its chemistry (norstictic acid, atranorin, zeorin), which is C-, K+ yellow→red (crystals), KC+ red, Pd+ orange, UV-. Thalli growing side by side with *H. obscurata* auct. brit. are more robust with larger lobes. **BLS 2558.**

Confined to coastal turf on the Isles of Scilly. Collections need further study, including molecular techniques. According to Lendemer *et al.* (2007), the type of *H. propagulifera* does not correspond to the description, but Mongkolsuk *et al.* (2015) state the contrary and retain *H. propagulifera* for specimens which resemble the British material. In France the name *H. subneglecta* Elix (2011) is used for lichens with the same morphology and spot test reactions.

### **VU D1,2 IR**



### **Heterodermia speciosa** auct. brit., *non* (Wulfen) Trevis. (1868)

Closely resembles *H. obscurata* auct. brit. and *H. propagulifera*, but differs in the white to tan-coloured, corticate (smooth, often shiny) lower surface; soralia apical on the main and lateral lobes, labriform, producing farinose isidia. Apothecia unknown. Medulla C-, K+ yellow, KC± yellow, Pd- (atranorin and zeorin). **BLS 2348.**

Overgrowing *Frullania* on serpentine rocks near the coast, and formerly on trees; very rare. W. Cornwall (Lizard Peninsula), formerly S.W. Ireland (Killarney).

The material from The Lizard differs from other European collections in the numerous isidium-like growths in the centre of the thallus, and the absence of apothecia; it should probably be considered a separate, endemic species. Some forms of *Physcia clementei* overgrowing mosses on sheltered rocks have particularly long isidia that seldom break down and thus have been mistaken for this very rare species.

### **CR D**



## **HYPERPHYSICIA** Müll. Arg. (1894)

**Thallus** placodioid to squamulose, very closely appressed. **Lobes** ± radiating, pale brownish grey to dark brown, not pruinose, matt; underside pale, with a few inconspicuous, very short rhizines. **Upper**

**cortex** composed of  $\pm$  isodiametric cells, with lumina 3–7  $\mu\text{m}$  diam. **Lower cortex** present only at lobe tips, brownish, hyphal in construction, the cells with lumina *ca* 2  $\mu\text{m}$  diam., inner parts joining with the substratum. **Soralia** present in some species. **Photobiont** trebouxoid. **Ascomata** apothecia, laminal, sessile; disc brown, not pruinose. **Thalline margin** present. **Epithecium** pale brown. **Hymenium** colourless, I+ blue. **Hamathecium** of paraphyses, often branched above; apices clavate, light brown with a thin, dark brown cap. **Asci** 8-spored, cylindric-clavate, *Lecanora*-type. **Ascospores** brown, 1-septate, thick-walled. **Conidiomata** pycnidia, immersed; walls colourless except for a brown zone around the ostiole. **Conidiogenous cells** arising in branched chains, barrel-shaped to subcylindrical. **Conidia** colourless, thread-like. **Chemistry**: lichen products not detected by TLC, although the pigment skyrin is present in some species. **Ecology**: on bark or rarely rock.

There is only one British species. Of similar genera, *Phaeophyscia* is appressed but not tightly so, with unbranched rhizines and ellipsoidal conidia. *Physcia* has a K+ yellow cortex (atranorin) and bacilliform/subcylindrical conidia.

#### Literature

Edwards & Coppins (2009a), Esslinger *et al.* (2012).

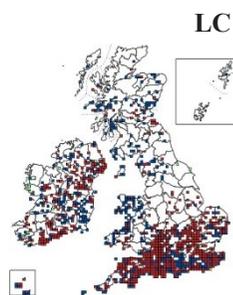
#### **Hyperphyscia adglutinata** (Flörke) H. Mayrhofer & Poelt (1979)

Thallus very small, <1 mm to 2 cm diam., orbicular or irregular; usually confluent, often forming extensive patches; lobes minute, 0.2–0.5 mm broad, markedly flattened, separate or sometimes marginally overlapping, green-grey when wet and brown-grey when dry; soralia laminal, 0.15–0.3 mm diam., spot-like, sometimes confluent at the centre of the thallus, concolorous or paler. Apothecia rare; thalline margin  $\pm$  smooth. Ascospores 13–19  $\times$  7–9  $\mu\text{m}$ , but often poorly formed. Pycnidia rare; conidia 11–21  $\times$  *ca* 0.5  $\mu\text{m}$ . **BLS 1125**.

On basic, nutrient-rich or -enriched (especially dust-impregnated), often sheltered or shaded tree trunks in parkland and wayside situations, rarely also on shaded, vertical surfaces of calcareous or nutrient-rich siliceous rocks and walls; locally frequent. Throughout lowland Britain and Ireland but most common in the south.

Resembles diminutive morphs of *Phaeophyscia orbicularis* but is distinguished by the very appressed lobes that are difficult to detach, the colourless, hyphal lower cortex and the thread-like conidia. See also *Phaeophyscia nigricans*. Specimens with few or dispersed marginal lobes are easily mistaken for *Rinodina* species. It may be confused with *Parmeliopsis hyperopta* which has a K+ yellow cortex.

Host to *Lichenochora hyperphysciae* Etayo (2011) and the generalist *Paranectria oropensis* (Ces.) D. Hawksw. & Piroz. (1977).



## MISCHOBLASTIA A. Massal. (1852)

There is only one species in this genus confirmed using molecular data (*M. oxydata*), so the description below constitutes that of the genus.

*Mischoblastia* is distinguished from *Rinodina* in morphological terms by the narrow and sometimes excluded thalline margin and a true exciple that is concolorous with the disc, giving the apothecia a lecideine appearance. In addition the asci are *Bacidia*-type rather than *Lecanora*-type and the ascospores have angular lumina (referred to as *Mischoblastia*-type). Several species currently remaining in *Rinodina* share some of these characteristics, and more detailed phylogenetic studies may justify expansion of the genus.

#### Literature

Grube & Arup (2001), Helms *et al.* (2003), Mayrhofer (1982), Rambold *et al.* (1994).

## **Mischoblastia oxydata** A. Massal. (1852)

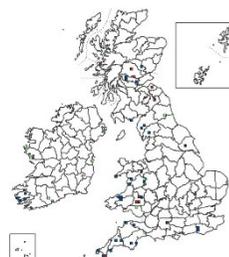
*Rinodina oxydata* (A. Massal.) A. Massal. (1854)

Thallus thin (to 0.3 mm thick), pale grey to ochraceous, rimose or sometimes discrete or of contiguous areoles, flat, effuse (rimose/areolate); prothallus sometimes limiting, dark, entire. Apothecia 0.3–0.45 mm diam., sessile, frequent and sometimes contiguous; thalline exciple 50–100 µm thick, concolorous with disc but frequently becoming excluded, true exciple entire and persistent, concolorous with the disc, with an olivaceous to aeruginose N+ red pigment; disc dark brown, becoming black, persistently flat; epithecium pale brown; hymenium 70–115 µm high; hypothecium 20–90 µm high. Asci 60–90 × 18–26 µm, asci *Bacidia*-type. Ascospores 19–25 × 9–14 µm with thick walls, the lumina very strongly angular, *Mischoblastia*-type (Fig. 1b). Thallus K± yellow (atranorin). **BLS 1295.**

On somewhat shaded or frequently inundated hard siliceous rocks, especially when metal-rich; scattered. W. & N. Britain and Ireland.

A rather variable species, which may have an ochraceous thallus when on iron-rich substrata. The only British *Rinodina*-like species with a pigmented thalline margin the same colour as the disc and *Mischoblastia*-type ascospores. *Rinodina occulta* is similar but has smaller ascospores that are intermediate between the *Physcia*- and *Milvina*-types (Fig. 47i, g). There are no molecular data for that species.

Nb



## **PHAEOPHYSCIA** Moberg (1977)

**Thallus** foliose, lobate or sometimes ± shrubby. **Lobes** often radiating, short or usually elongate, ± closely appressed, mostly <1.5 mm broad, pale grey or greenish grey to dark brown and often dark green when wet, matt, not pruinose, not or only weakly maculate, without marginal cilia; underside whitish or more usually black with concolorous, unbranched rhizines often projecting beyond lobe tips and then resembling cilia. **Soredia** or **isidia** present in some species. **Upper and lower cortex** pseudoparenchymatous (lumina 3–7 µm diam.) **Photobiont** trebouxoid. **Ascomata** apothecia, laminal, ± sessile, usually with a ring of rhizines on the lower outer surface; disc brown to black, not pruinose. **Thalline exciple** smooth, rarely lobulate. **Epithecium** brown. **Hymenium** and **hypothecium** colourless. **Hamathecium** of paraphyses, slender, often forked above; apices clavate, pale brown with a thin dark brown cap. Asci ± cylindric-clavate, 8-spored, *Lecanora*-type. **Ascospores** brown, 1-septate, thick-walled and distoseptate (*Physcia*-type). **Conidiomata** pycnidia, immersed, with colourless walls except for a brown zone around the ostiole. **Conidia** ellipsoidal. **Chemistry**: cortex and medulla K– (atranorin absent), some species with yellow to orange-red, K+ purple pigments (skyrin) or terpenoids. **Ecology**: nutrient-rich or -enriched substrata in well-lit situations.

Distinguished from *Hyperphyscia* by the ellipsoidal, not thread-like, conidia. *Physcia* has bacilliform conidia.

### **Literature**

Edwards *et al.* (2009b), Liu & Hur (2019).

- |      |  |                    |
|------|--|--------------------|
| 1    | Thallus sorediate or isidiate; usually without apothecia, zeorin absent .....  | 2                  |
|      | Thallus not sorediate or isidiate; usually with apothecia, zeorin present .....  | <i>endococcina</i> |
| 2(1) | Lobes with marginal or laminal soralia .....   | 3                  |
|      | Lobes with marginal (or laminal at thallus centre) isidia, though some older isidia may break down to form soralia ..... | 4                  |

- 3(2) Lower part of medulla orange, K+ purple; soralia marginal, rarely a few also laminal, ± lip-shaped ..... *endophoenicea*  
 Medulla white (K-), or ± yellow to orange (K± purple) only in uppermost part; soralia mostly laminal, a few sometimes ± marginal, ± orbicular ..... *orbicularis*
- 4(2) Thallus <1 cm diam., often ± shrubby; lobes 0.05–0.3 mm wide, ascending; underside pale; isidia often dissolving into granular soredia ..... *nigricans*  
 Thallus <5 cm diam., not shrubby; lobes 0.2–0.5 mm wide, appressed; underside black; isidia rarely sorediose ..... *sciastra*

**Phaeophyscia endococcina** (Körb.) Moberg (1977)

Thallus to 3 cm diam., orbicular or confluent with others, closely appressed, lobes 0.3–1 mm broad, ± radiating, ± separate, dark grey or grey-brown, not sorediate or isidiate, centre of the thallus often with ± overlapping, secondary lobules; underside black with black rhizines; medulla white, or usually (especially in older parts) with orange-red pigment in the lower part. Apothecia to 1 mm diam., numerous; thalline exciple crenulate or lobulate. Ascospores 17–24 × 7–11 µm. Pycnidia frequent; conidia 2–5 × 1–1.5 µm. Medulla orange-red pigment, K+ purple (skyrin) and zeorin. **BLS 1669.**

On ± nutrient-rich (bird-perch) boulders on a lake shore and in and by streams; very rare; Scotland (Ben Lawers, Caenlochan, Beinn Dearg, Assynt), N.W. England (Lake District).

Distinguished from *Phaeophyscia orbicularis* and *P. sciastra*, which may grow in similar situations, by the numerous apothecia, lack of soredia or isidia and the orange-red pigment, skyrin, in lower part of the medulla. *P. ciliata* (Hoffm.) Moberg (1977) is similar in being richly fertile without isidia or soredia but occurs exclusively on bark (usually of *Populus tremula*), and has an entirely white medulla and lacks zeorin (TLC); a single ‘British’ specimen, supposedly from central Scotland (Perth, Killin), is of doubtful origin as this is a boreal-alpine, continental species.

VU D2



**Phaeophyscia endophoenicea** (Harm.) Moberg (1977)

Like broad-lobed morphs of *P. endococcina* (lobes 0.6–1.5 mm broad), but distinguished by the predominantly marginal, ± lip-shaped soralia (occasionally a few also laminal and orbicular) and confinement of orange-red pigment to the lower part of the medulla. Apothecia and pycnidia not present in British material. Medulla orange-red pigment K+ purple (skyrin). **BLS 1105.**

On bark at base of mature tree boles and major boughs, in parklands, also often along woodland edges and shelter belts; local. C & N. England to C & E. Scotland.

Very close to the common *P. orbicularis*, but separated by the predominantly marginal soralia and the presence of orange-red skyrin in the lower part of the medulla.

Nb



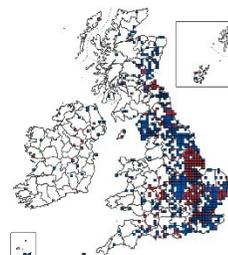
**Phaeophyscia nigricans** (Flörke) Moberg (1977)

Thallus to 1 cm diam., often confluent with other thalli, orbicular, often ± shrubby; lobes 0.05–0.3 mm wide, ascending, grey-brown to dark brown, grey-green and ± translucent when wet; isidia marginal, fragile, often ± dissolving into soredia; underside whitish, pinkish or pale brown-white, with sparse, generally pale rhizines; medulla very thin, white. Apothecia not known in British material. Pycnidia rare; conidia 2–4.5 × ca 1 µm. Lichen products not detected by TLC. **BLS 1106.**

Mainly on calcareous stonework and asbestos-cement, more rarely on nutrient-enriched, dust-impregnated tree bases in open parkland and wayside situations; local but easily overlooked. Scattered throughout lowland Britain but more frequent in the east, rare in Ireland.

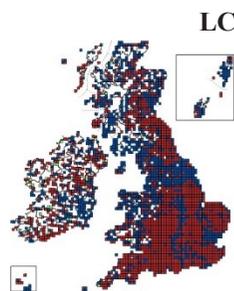
An inconspicuous but easily identified species due to the minutely shrubby growth form, not to be confused with small specimens of *P. orbicularis* which have a blackish undersurface. *Hyperphyscia adglutinata* is notably flattened and appressed throughout.

LC



### **Phaeophyscia orbicularis** (Neck.) Moberg (1977)

Thallus to 3 cm diam., orbicular, or irregular and confluent with others, ± closely appressed; lobes 0.2–1.2 mm broad, usually ± radiating, separate to ± overlapping, pale grey or greenish grey to grey- or dark brown, occasionally yellowish, sometimes weakly white-spotted in pale, wide-lobed morphs; soralia mostly orbicular, ± convex and laminal, sometimes marginal, grey to blackish or whitish (especially if abraded), occasionally yellowish; underside black with unbranched black rhizines (some of these pale, or white-tipped at the margin of lobes) that often project beyond the lobe margins; medulla white or yellow-orange in uppermost part. Apothecia occasional, to 1.5 (–2.5) mm diam.; thalline margin smooth or rarely lobulate. Ascospores 17–26 × 7–11 µm. Pycnidia frequent; conidia 2–4 × 1–1.5 µm. Upper cortex with patches of yellow or orange pigment, K+ purple (skyrin), or no lichen products detectable (K–). **BLS 1107.**



Corticolous and saxicolous on most nutrient-rich or -enriched substrata, extending into urban and moderately polluted areas on calcareous substrata (concrete, asbestos, etc.); very common. Throughout Britain and Ireland.

Very variable. Morphs with conspicuous amounts of skyrin have been called var. *hueana* (Harm.) Clauz. & Roux (1985). Pale coloured, wide-lobed thalli, corticolous on bark, sometimes erroneously called *Physcia labrata* Meresch. (1919), closely resemble *P. endophoenicea* but that species has an orange-red lower part of the medulla. A black underside distinguishes small, narrow-lobed morphs of *P. orbicularis* from *Hyperphyscia adglutinata*; the latter has thread-like conidia.

Host to the black fruiting *Arthonia phaeophysciae* (q.v.) and *Buelliella physciicola* Poelt & Hafellner (1979), the gall-forming basidiomycete *Tremella phaeophysciae* Diederich & M.S. Christ. (1996), the gall-forming ascomycete *Lichenochora obscuroides* (Linds.) Triebel & Rambold (1992), and the hyphomycetous *Sclerococcum phaeophysciae* Diederich & van den Boom (2017) and *Taeniolella phaeophysciae* D. Hawksw. (1979). Also recorded are *Athelia arachnoidea* (Berk.) Jülich (1972), *Erythricium aurantiacum* (Lasch) D. Hawksw. & A. Henrici (1982), *Illosporopsis christiansenii* (B.L. Brady & D. Hawksw.) D. Hawksw. (2001), *Laeviomycetes fallaciosus* Hafellner & Kalb (1990), *Monodictys cellulosa* S. Hughes (1958) and *Paranectria oropensis*.

### **Phaeophyscia sciastra** (Ach.) Moberg (1977)

Thallus to ca 5 cm across, orbicular or irregular, closely appressed or in part ascending; lobes 0.2–0.5 mm broad, radiating, grey- to blackish brown, mostly separate; isidia marginal, often also laminal and densely clustered in centre of thallus; underside black with blackish rhizines; medulla white. Apothecia not known in Britain or Ireland. Pycnidia rare; conidia 2.5–4 × ca 1 µm. Lichen products not detected by TLC. **BLS 1108.**



In or at the edges of moist hollows on ± nutrient-enriched (bird-perch) siliceous boulders protruding from, or at edge of, streams or lakes and very rarely on old tarmac; mainly in upland districts; rather rare. S.W. England (Devon, Stonehenge, Wiltshire), C. & S. Wales, N.W. England (Lake District), N. Scotland (Highlands), W. Ireland (Connemara).

Distinguished from *P. orbicularis* and *P. endococcina* by the presence of isidia and absence of any orange pigmentation in the medulla.

*Buelliella physciicola* has been found on the population at Stonehenge.

## **PHYSICIA** (Schreb.) Michx. (1803)

**Thallus** foliose, lobate, often orbicular in outline with radiating lobes. **Lobes** short to elongate, mostly <3 mm broad; upper side whitish, bluish grey to dark grey, matt or slightly glossy, sometimes with minute white flecks (pseudocypheallae, ×20 lens) due to breaks in the photobiont layer, occasionally white-pruinose, with or without marginal cilia; underside whitish, pale tan, pale grey or pinkish, with

few to many unbranched or irregularly furcate rhizines. **Soralia** present in many species. **Upper cortex** of  $\pm$  isodiametric cells. **Lower cortex** hyphal in construction (lumina  $<2.5 \mu\text{m}$  diam.) or pseudoparenchymatous (lumina  $4\text{--}7 \mu\text{m}$  diam.), pale. **Photobiont** trebouxoid. **Ascomata** apothecia, laminal, sessile or short-stalked, without rhizines below; disc brown to black, often white-pruinose. **Thalline margin** present. **Epithecium** pale brown. **Hymenium** and **hypothecium** colourless. **Hamathecium** of paraphyses, slender, unbranched or forked above; apices clavate, pale brown with a thin, dark brown cap. **Asci**  $\pm$  cylindrical-clavate, 8-spored; in K/I apical dome  $\pm$  evenly blue with colourless apical cushion, wall colourless, surrounded by a blue outer layer (*Lecanora*-type). **Ascospores** brown, 1-septate, thick-walled. **Conidiomata** pycnidia, immersed with colourless walls except for a dark ostiolar region (seen as black dots on lobe surface). **Conidiogenous cells** arranged in branched chains, short, cylindrical, enteroblastic, acrogenous or pleurogenous. **Conidia** aseptate,  $\pm$  bacilliform, colourless. **Chemistry**: with atranorin in the cortex, often with zeorin or other terpenoids. **Ecology**: characteristic of nutrient- rich or -enriched sites. Some species currently showing rapid increases in urban sites previously affected by  $\text{SO}_2$  pollution.

*Physcia* is distinguished from other related light grey foliose species by its K+ yellow cortex, pale undersurface and bacilliform conidia.

#### Literature

Edwards & Coppins (2009c), Hafellner & Zimmermann (2012), Lohtander *et al.* (2009).

|      |   |                     |
|------|---|---------------------|
| 1    | Thallus sorediate or isidiate; apothecia usually absent .....   | 2                   |
|      | Thallus not sorediate or isidiate; apothecia usually present .....  | 9                   |
| 2(1) | Lobes with marginal cilia, $\pm$ ascending .....  | 3                   |
|      | Lobes without marginal cilia (but often with protruding rhizines), $\pm$ appressed .....  | 4                   |
| 3(2) | Soralia lip-shaped on the underside of the spreading lobe ends .....  | <i>tenella</i>      |
|      | Soralia inside $\pm$ inflated, helmet-shaped lobe ends .....  | <i>adscendens</i>   |
| 4(2) | With delimited soralia or marginal, granular soredia .....  | 5                   |
|      | Thallus surface $\pm$ densely covered with isidia-like pustules that may dissolve or become abraded to a granular sorediate crust in the centre of the thallus .....                  | <i>clementei</i>    |
| 5(4) | Lobes bluish grey with numerous, distinct white flecks when moist; soralia indigo-blue; medulla K+ yellow; lower cortex hyphal in construction .....                                  | 6                   |
|      | Lobes whitish to pale grey, without distinct bluish tinge or white flecks when moist; soralia uniform in colour; medulla K $\pm$ yellow; lower cortex various .....                   | 7                   |
| 6(5) | Soralia laminal, or mostly so.....  | <i>caesia</i>       |
|      | Soralia mostly apical or marginal, lip-shaped .....   | <i>subalbinea</i>   |
| 7(5) | Soralia lip-shaped or lobes with marginal granular soredia; medulla K-; lower cortex various .....  | 7                   |
|      | Soralia mostly laminal, hemispherical; medulla K+ yellow; lower cortex composed of $\pm$ isodiametric cells .....   | <i>tribacioides</i> |
| 8(7) | Soredia formed in $\pm$ confined, lip-shaped soralia, mostly apical on lateral branches (occasionally laminal, crater-like soralia also present); lower cortex hyphal .....           | <i>dubia</i>        |
|      | Soredia usually developed on underside of scattered or contiguous, marginal protuberances, only rarely confined in lip-shaped soralia; lower cortex of $\pm$ isodiametric cells ..... | <i>tribacia</i>     |
| 9(1) | Lobes without marginal cilia but rhizines sometimes protruding beyond the margin of the thallus, $\pm$ closely appressed .....  | 10                  |
|      | Lobes with pale, marginal cilia, $\pm$ ascending and in part loosely attached .....   | <i>leptalea</i>     |

- 10(9) Lobe surface with distinct white flecks when moist ( $\times 10$  lens); medulla K+ yellow (often weak) ..... *aipolia*  
 Lobe surface without distinct white flecks when moist ( $\times 10$  lens); medulla K- ..... *stellaris*

**Physcia adscendens** H. Olivier (1882)

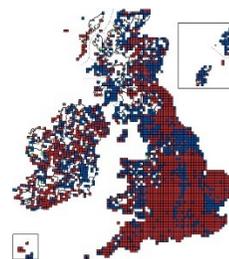
Thallus 2–4 (–6) cm diam., orbicular, sometimes confluent with others, loosely appressed; lobes 0.3–1 mm broad, ascending, whitish to pale grey or rarely dark ash-grey, not pruinose,  $\pm$  white-spotted in older parts, with pale marginal cilia 0.4–2 mm in length, that are often grey- or dark brown at their tips; underside whitish with sparse, whitish, often brown-tipped, slender rhizines; soralia apical, helmet-shaped, margins of ‘helmet’ often upwardly recurved; old specimens sometimes with additional crater-like soralia bursting through the upper surface of lobes; lower cortex hyphal in construction. Apothecia to 2 mm diam., uncommon,  $\pm$  stalked; disc sometimes thinly pruinose. Ascospores  $16\text{--}23 \times 7\text{--}10 \mu\text{m}$ . Pycnidia frequent, especially abundant on fertile thalli; conidia  $4\text{--}6 \times ca 1 \mu\text{m}$ . Cortex K+ yellow (atranorin); medulla K-. **BLS 1112.**

On well-lit and nutrient-rich and -enriched substrata, including limestone, concrete, asbestos-cement, timberwork, tree trunks, branches and twigs; common and increasing. Throughout Britain and Ireland.

Juvenile or eroded specimens are easily confused with *P. tenella* or *P. leptalea* and may be impossible to determine with certainty. Both *P. adscendens* and *P. tenella* can grow intermixed and care should be taken in separating the two species; *P. tenella* has labriform soralia and in *P. adscendens* the soralia are inside  $\pm$  inflated lobe tips.

Host to *Arthonia epiphyscia* (q.v.), *Didymocyrtis epiphyscia* Ertz & Diederich (2015), *Erythricium aurantiacum*, *Heterocephalacria physciacearum*, *Illosporiopsis christiansenii*, *Laetisaria lichenicola* Diederich, Lawrey & Van den Broeck (2011), *Lichenochora aipoliae* Etayo, Nav.-Ros. & Coppins (2008), *L. galligena* R. Sant. & Hafellner (1989), *L. physciicola* (Ihlen & R. Sant.) Hafellner (2012), *Lichenocodium lichenicola* (P. Karst.) Petr. & Syd. (1927), *L. usneae* (Anzi) D. Hawksw. (1977), *Lichenotubeufia heterodermiae* (Etayo) Etayo (2017), *Marchandiomyces corallinus* (Roberge) Diederich & D. Hawksw. (1990), *Nectriopsis physciicola* D. Hawksw. & Earl.-Benn. (2006), and the generalists *Athelia arachnoidea* and *Paranectria oropensis*.

LC



**Physcia aipolia** (Ehrh. ex Humb.) Fűrnr. (1839)

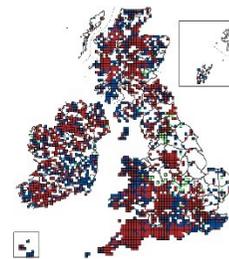
Thallus to 6 (–10) cm diam., usually  $\pm$  orbicular,  $\pm$  closely appressed; lobes 0.6–1.5 (–2) mm broad, radiating, usually partly overlapping but sometimes separate, whitish to pale grey, often with a bluish tinge, usually distinctly white-flecked (especially evident when moist), not pruinose or rarely weakly pruinose, without soredia or isidia; bullate warts or small secondary lobes sometimes at the centre of the thallus and on margins of all apothecia; underside whitish to pale tan or pale grey, with numerous unbranched to irregularly forked whitish to dark brown or grey rhizines that sometimes protrude beyond the margins; lower cortex composed of hyphal cells. Apothecia to 2.5 (–3) mm diam., abundant, often crowded, the disc often grey-white pruinose. Ascospores ( $15\text{--}18\text{--}24$  (–26)  $\times 7\text{--}10$  (–11)  $\mu\text{m}$ ). Pycnidia frequent; conidia  $4\text{--}6 \times ca 1 \mu\text{m}$ . Cortex and medulla K+ yellow (atranorin, zeorin). **BLS 1113.**

On nutrient-rich or base-rich bark of tree trunks, branches and twigs, also on worked timber, rarely on coastal rocks and old walls; frequent and possibly increasing. Throughout Britain and Ireland.

*P. stellaris* is very similar, but has less conspicuous, or no white flecks on the thallus and has a K- medulla; *P. leptalea* has loosely attached lobes and conspicuous marginal cilia (not to be confused with protruding rhizines). *Physconia distorta* can be similar in appearance but has a K- cortex, black, bottle-brush-like rhizines, pruinose lobe ends and larger ascospores.

Host to *Didymocyrtis epiphyscia*, *Erythricium aurantiacum*, *Heterocephalacria physciacearum*, *Illosporiopsis christiansenii*, *Lichenochora aipoliae*, *L. galligena*, *L. pulvinatum* (Linds.) Triebel & Rambold (1992), *Lichenocodium erodens*, *L. lichenicola*, *L. usneae*, *Lichenotubeufia heterodermiae*, *Marchandiomyces corallinus*, *Polycoccum pulvinatum* (Eitner) R. Sant. (1993), *Pronectria echinulata* Lowen (1990), *Sphaerellothecium pumilum* (Lettau) Nav.-Ros., Cl. Roux & Hafellner (2018), *Tetramelas pulverulentus* (q.v.) and *Xenonectriella physciacearum* F. Berger, E. Zimm. & Brackel (2020).

LC



### **Physcia caesia** (Hoffm.) Fűrnr. (1839)

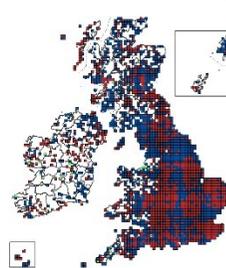
Thallus 4–6 (–10) cm diam., usually ± orbicular, ± closely appressed; lobes 0.6–1.0 (–1.5) mm broad, radiating, separate but usually overlapping towards the tips, whitish to pale grey, often with a bluish tinge, usually distinctly white-flecked especially when moist; soralia numerous, to 2 mm diam., blue-grey (pigment in external soredia), variable in development, mostly laminal and markedly convex (sometimes eroded and crater-like). Apothecia rare, disc to 2 mm diam., black, grey-pruinose. Ascospores  $18\text{--}25 \times 6\text{--}10 \mu\text{m}$ . Cortex and medulla K+ yellow (atranorin, zeorin). **BLS 1114.**

On well-lit nutrient-rich basic substrata, including tops of walls, memorials, concrete roofs, asphalt pavements and calcareous rocks, rarely on siliceous rocks, especially in coastal districts or boulders in or by upland streams and lake margins, less often on dust-impregnated timberwork and tree bases; common and pollution-tolerant. Throughout Britain and Ireland.

Laminal, apical and marginal soralia are often present on the same thallus, but the relative proportions vary. Morphs with mostly apical or marginal lip-shaped soralia are distinguished as *P. subalbinea*. Robust specimens of *P. dubia* are distinguished by a K– medulla and a preference for more acidic conditions. *P. tribacioides* lacks white-flecked lobes and always has uniformly pale, mostly laminal soralia and a pseudoparenchymatous lower cortex.

Host to the lichenicolous fungi *Arthonia epiphyscia*, *Polycoccum pulvinatum*, *Sphaerellothecium pumilum* and *Zwackhiomyces physciicola* Alstrup (1993) as well as *Erythricium aurantiacum*, *Intralichen* aff. *lichenicola*, *Lichenocodium xanthoriae* M.S. Christ. (1956), *Marchandiomyces corallinus* and *Paranectria oropensis*. There are also at least five collections of an undescribed *Pronectria* (ascospores  $8/\text{ascus}$ ,  $17\text{--}19 \times 6.5\text{--}7 \mu\text{m}$ ), sometimes accompanied by its *Acremonium*-like anamorph.

LC



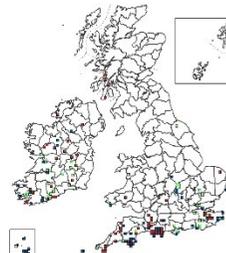
### **Physcia clementei** (Sm.) Maas Geest. (1952)

Thallus to 3 cm diam., ± orbicular, often coalescing with others to form extensive swards; lobes 0.3–0.6 (–1) mm broad, ± radiating, mostly contiguous and ± overlapping, closely appressed especially at the apices, white to pale grey, not pruinose or white-flecked, the centre with numerous short papilla-like isidium-like pustules that often break down or become eroded into granular soredia, then tending to form a ± continuous sorediate crust; underside whitish or with a brownish tinge, with a few unbranched whitish to pale brown rhizines; lower cortex composed of ± isodiametric cells. Apothecia to 1.6 mm diam., very rare; disc sometimes thinly pruinose. Ascospores  $15\text{--}20 \times 8\text{--}10 \mu\text{m}$ . Pycnidia rare. Cortex and medulla K+ yellow (atranorin, two unidentified terpenoids). **BLS 1115.**

On nutrient-rich, well-lit trunks of wayside and parkland trees, particularly *Acer* and *Fraxinus*, and on steeply sloping ± base-rich rock faces (esp. serpentine) often near the sea and inland in churchyards; rare and local. S. England (especially the S.W., The Lizard), Wales (Pembrokeshire), with a few sites on rock northwards to Scotland (S. Argyll, Kintyre), S. Ireland.

Superficially resembles *Imshaugia aleurites* which has a Pd+ deep yellow to orange medulla with broader lobes and occurs in a different habitat. Morphs of *P. clementei* overgrowing mosses on sheltered rocks have particularly long isidia that seldom break down and thus have been mistaken for the very rare *Heterodermia speciosa*.

NT

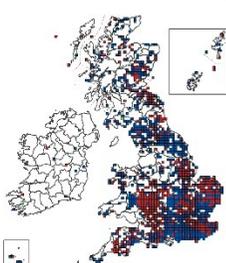


### **Physcia dubia** (Hoffm.) Lettau (1912)

Thallus to 5 cm diam., ± orbicular or irregular in outline, ± closely appressed but sorediate lobes often ± ascending; lobes 0.2–1 mm broad, usually radiating, very short and crowded to slender and distinctly discrete, grey-white to darkish grey, not or only faintly white-flecked, occasionally weakly pruinose; soralia terminal, whitish to dark grey, usually lip-shaped and rarely a few also laminal and crater-like (to 1 mm diam.) which may become confluent; underside white to pale tan, with rather sparse, whitish to brown, mostly simple rhizines; lower cortex hyphal in construction. Apothecia to 2 mm diam., very rare; thalline exciple often sorediate. Ascospores  $16\text{--}24$  (–28)  $\times 6\text{--}10 \mu\text{m}$ . Pycnidia rare; conidia  $4\text{--}6 \times ca 1 \mu\text{m}$ . Cortex K+ yellow (atranorin), medulla K–. **BLS 1116.**

On various types of non-calcareous rocks and building materials in well-lit, nutrient-rich and -enriched

LC



situations, e.g. tops of siliceous rock gravestones, roofs, bird-perch stones; occasional on timberwork and dust-impregnated bark. Throughout Britain, more frequent in the east; apparently rare in Ireland.

Very variable, especially in the length, width and degree of separation of lobes; extreme morphs with slender, elongate lobes were previously called *P. teretiusscula* (Ach.) Lynge (1916). *P. dubia* resembles *P. tenella* but lacks the marginal cilia of that species. Distinguished from weakly flecked morphs of *P. caesia* with lip-shaped soralia by the K– medulla and preference for non-calcareous substrata. Rare morphs of *P. tribacia* with lip-shaped soralia can only be distinguished from broad-lobed morphs of *P. dubia* in vertical sections of the lower cortex: ± isodiametric cells in the former, hyphae in the latter.

Host to *Arthonia epiphyscia* and *Illosporiosis christiansenii*.

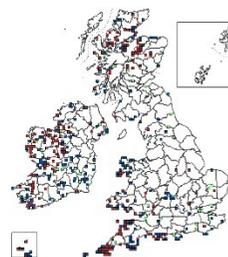
### **Physcia leptalea** (Ach.) DC. (1805)

Like *P. adscendens* and *P. tenella*, but entirely lacking soralia and often with abundant apothecia when mature. Apothecia often larger, to 3 mm diam., disc usually thinly grey-pruinose; spores 15–22 × 6–9 µm. Thalli more frequently orbicular and the lobes are more distinctly white-flecked, tend to be narrower and have abundant cilia on the ends. Cortex K+ yellow, medulla K– (atranorin). **BLS 1118.**

Mostly on bark, especially on shrubs or tree branches, rarely on rocks; local. Scattered throughout Britain and Ireland, but most frequent in the S. & W., especially near coasts, rare elsewhere due to SO<sub>2</sub> pollution and excessive bark enrichment.

The numerous pale marginal cilia and loosely attached lobes distinguish *P. leptalea* from *P. aipolia* and *P. stellaris*. *Anaptychia ciliaris* has larger, minutely tomentose, fawn-grey lobes that are K– and lack a lower cortex.

LC



### **Physcia stellaris** (L.) Nyl. (1856)

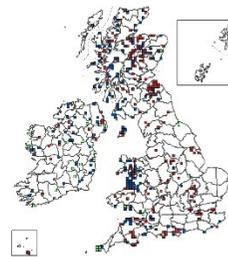
Thallus to 3 (–6) cm diam., usually ± orbicular, ± closely appressed; lobes 0.5–1.5 mm broad, radiating, ± separate, white- to darkish grey, rarely with a bluish tinge, not or indistinctly white-flecked, not pruinose, without soredia or isidia; bullate warts or secondary lobules sometimes at the centre of the thallus and on apothecium margins; underside whitish to pale brown-white or pale grey, with numerous unbranched or branched whitish to dark brown or grey rhizines that often protrude beyond the lobe margins; lower cortex composed of hyphal tissue. Apothecia to 3 (–4) mm diam., abundant, often crowded and shortly stalked, disc sometimes pruinose. Ascospores 15–22 × 7–11 µm. Pycnidia frequent; conidia 4–6 × ca 1 µm. Cortex K+ yellow (atranorin), medulla K–. **BLS 1119.**

On branches or twigs of deciduous trees in wayside or woodland edge situations, rarely on slate roofs, gravestones or boulders; local, mainly in little-polluted areas. W. & N. Britain and Ireland, spreading into lowland England with the decline of SO<sub>2</sub> pollution.

Frequently confused with *P. aipolia*, with which it often grows, but distinguished by its less conspicuous or lack of white flecking on the thallus lobes (×10 lens; best seen when moist), K– medulla and absence of zeorin. Differs from *P. leptalea* in having more appressed lobes without cilia, although some rhizines may often protrude beyond the lobe margins.

Host to *Arthonia epiphyscia*, *Didymocyrtis epiphyscia*, *Heterocephalacria physciacearum*, *Lichenochora aipoliae*, *Spirographa tricupulata* (F. Berger & E. Zimm.) Flakus, Etayo & Miádl. (2019) [syn. *Cornutispora tricupulata*] and *Xenonectriella physciacearum*, as well as *Illosporiosis christiansenii* and *Lichenocodium erodens*.

LC



### **Physcia subalbinea** Nyl. (1874)

Like *P. caesia*, but with mostly apical or marginal lip-shaped soralia.

The status of this species in Britain and Ireland is uncertain; there are many records (as a “*P. wainioi*” morph) from Highland Scotland from both corticolous and saxicolous habitats, but their identity needs to be confirmed. The distinction from *P. caesia* was demonstrated using molecular methods by Lohtander *et al.* (2009).

NE

### **Physcia tenella** (Scop.) DC. (1805)

Thallus orbicular to irregular, to 3 cm diam., often confluent with other thalli and forming larger patches, loosely attached. Upper side whitish grey to brownish or blackish (on seashores), without pruina. Lobes ascending,

LC

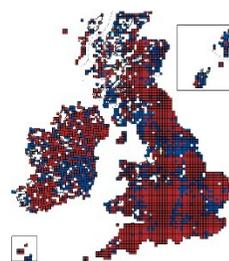
narrow, to 1 mm broad, the tips to 2 mm, margins with grey to (mainly at tips) black cilia. Soralia terminal, labiate, usually causing the lobe tip to widen. Underside white to brownish with few white to black rhizines. Apothecia not uncommon, shortly stipitate, to 2.5 mm diam. Ascospores 17–21×7–10 μm. Conidiomata sparse to abundant. Cortex K+ yellow (atranorin). **BLS 1120.**

In similar habitats to *P. adscendens*, but most usually on bark; common and increasing. Throughout Britain and Ireland.

Like *P. adscendens*, but with lip-shaped soralia. Apothecia are more frequent than in *P. adscendens*.

A morph with a dark grey thallus and dark grey-brown marginal cilia on coastal rocks is sometimes recognized as subsp. *marina* (A. Nyl.) D. Hawksw. (1980); it should be compared with *Anaptychia ciliaris* subsp. *mamillata*. *P. dubia* lacks marginal cilia. *P. adscendens* and *P. tenella* are both pioneer species increasing in abundance in response to rising levels of nitrogenous compounds and lowered levels of SO<sub>2</sub> pollution.

Host to *Arthonia epiphyscia*, *Didymocyrtis epiphyscia*, *Erythricium aurantiacum*, *Heterocephalacria physciacearum*, *Illosporioropsis christiansenii*, *Laetisaria lichenicola*, *Lichenochora aipoliae*, *L. galligena*, *L. physciicola*, *Lichenocodium erodens*, *L. lichenicola*, *Lichenotubeufia heterodermiae*, *Marchandiomyces corallinus*, *Nectriopsis physciicola*, and the generalists *Athelia arachnoidea* and *Paranectria oropensis*.

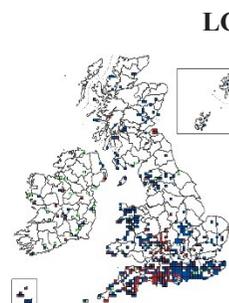


### **Physcia tribacia** (Ach.) Nyl. (1874)

Thallus usually irregular in outline, lobes not distinctly radiating, 0.5–1.5 mm broad, pale white to whitish grey, often faintly pruinose, not white-flecked, usually appearing ± flattened, with marginal crenulations or horizontal lobules, the apices of which often dissolve into granular soredia; when soredium development is abundant ± lip-shaped soralia may be formed (usually when on rocks); underside whitish or with faint pinkish, creamy yellow or brownish tinge; rhizines rather sparse, mostly unbranched, white to pale brown. Lower cortex composed of ± isodiametric cells. Apothecia to 1.5 mm diam., very rare. Ascospores 15–24 × 9–11 (–13) μm. Pycnidia rare. Cortex K+ yellow (atranorin), medulla K–. **BLS 1122.**

On nutrient-rich bark of wayside and parkland trees and on ± vertical surfaces and seepage tracks of ± calcareous walls, or coastal siliceous rocks. Frequent in S. Britain, rarer northwards with scattered sites in E. & W. Scotland, especially on the coast; scattered in Ireland.

See also *P. dubia*.



### **Physcia tribacioides** Nyl. (1874)

Thallus usually irregular in outline, forming radiating patches or extensive streaks, lobes rather short, 0.5–1.5 mm broad, grey-white, never bluish, not pruinose, not distinctly white-flecked, closely appressed, crowded and usually ± overlapping, marginal lobes usually with distinctly flared and crenately incised apices; soralia to 1.2 mm diam., mostly laminal, strongly convex, hemispherical, often confluent, white (never blue-grey), a few soralia sometimes apical and capitate on short side lobes; underside whitish to pale brown-white, with rather sparse unbranched whitish to brown rhizines; lower cortex composed of ± isodiametric cells. Apothecia to 1.6 mm diam., very rare; disc red-brown, not pruinose. Ascospores 17–22 × 7–10 μm. Pycnidia not seen. Cortex and medulla K+ yellow (atranorin). **BLS 1123.**

On nutrient-rich bark of wayside and parkland trees in well-lit situations, especially of *Acer* spp., *Fraxinus*, *Quercus* spp. and formerly *Ulmus*, also exceptionally on birds' perching stones or walls near the coast; much declined with the demise of elms but now showing some signs of recovery; rare and local. S.W. England (Cornwall to Dorset, recently recolonized in Hampshire and formerly the Isle of Wight), S. Wales (Pembroke, Orierton, on *Quercus ilex*), S.W. Ireland.

Distinguished from morphs of *P. caesia* with convex uniformly coloured pale soralia, by the ± non-white-flecked lobes and pseudoparenchymatous lower cortex.



## PHYSICIELLA Essl. (1986)

**Thallus** foliose, small to medium sized, ± appressed, from almost white to (more often) grey or grey-brown on the upper surface, white to pale tan on the lower surface with usually sparse concolorous rhizines; lobes elongate to rounded, rarely over 1–2 mm broad. **Upper cortex** cellular in construction, the **medulla** of loosely interwoven hyphae, **lower cortex** of tightly intertwined hyphal tissue. **Apothecia** (not seen in British material) lecanorine, laminal, sessile to shortly stipitate, lacking rhizines on the lower surface of the exciple. **Hymenium** colourless. **Hypothecium** colourless to pale brown. **Asci** 8-spored. **Ascospores** 1-septate, greyish brown to brown, varying in morphology from *Physcia*-type to *Pachysporaria*-type. **Conidiomata** pycnidia, laminal, immersed. **Conidia** small, ellipsoidal, aseptate. **Chemistry**: lichen products not detected by TLC. **Ecology**: corticolous or on rock.

Similar to *Phaeophyscia*, but the lower cortex is pale with sparse ± colourless rhizines rather than blackened with dark rhizines, and is composed of tightly packed intertwined hyphae rather than the cellular construction seen in *Phaeophyscia*. Lichen products are largely absent. There is only one British species.

### Literature

Esslinger (1978), Liu & Hur (2019).

### **Physciella melanchra** (Hue) Essl. (1978)

NE

Thallus ± orbicular, to 3.5 cm diam. Lobes 0.5–1.5 (–2) mm broad, short and rounded to rather elongate, appressed or sometimes somewhat ascending; usually with numerous round to irregular laminal soralia, occasionally also with some submarginal or marginal (but not distinctly labriform) soralia. Lower surface white to pale tan with mostly sparse, concolorous rhizines. Apothecia not seen in British material, to 2 mm diam., sessile to very shortly stipitate, the margin entire to somewhat crenate or rarely becoming sorediate. Ascospores (14–) 16–21 (–24) × (6–) 7–10 μm, *Physcia*-type although the lumina often become rounded with maturity. Conidia ellipsoidal, 2.5–3.5 × 1–1.5 μm. Cortex and medulla K–. Lichen products not detected. **BLS 2805**.

On stonework of an old windmill, Cornwall (Lizard Peninsula).

Similar to *Phaeophyscia orbicularis*, but with a pale lower cortex composed of hyphal tissue. The identity of the British population still needs study; it corresponds in morphological characteristics to *Physciella melanchra* but DNA evidence suggests an affinity to *P. chloantha* (Ach.) Essl. (1986). However, that species appears to be polyphyletic (Esslinger *in litt.*) and further research is in progress.

## PHYSCONIA Poelt (1965)

**Thallus** foliose, lobate, sometimes ± orbicular in outline, often irregular and confluent with other thalli, appressed or ± loosely appressed. **Lobes** short to elongate, mostly <3 mm broad, without cilia on the margins, dull grey to dark brown, matt or slightly glossy, usually pruinose at least at the tips; underside whitish to brown-black. **Soredia** present in some species. **Upper cortex** composed of ± isodiametric cells (lumina 3–7 μm diam.) or densely packed hyphae (lumina <2.5 μm diam.). **Lower cortex** hyphal (lumina <2.5 μm diam.), sometimes absent at lobe tips. **Photobiont** trebouxoid. **Ascomata** apothecia, laminal, without rhizines on the lower surface; disc brown but usually white-pruinose. **Thalline margin** present, persistent, often incurved, sometimes with lobules or soredia. **Epithecium** brown. **Hymenium** and **hypothecium** colourless. **Hamathecium** of paraphyses, unbranched or branched above; apices clavate, light brown with a thin, dark brown cap. **Asci** cylindric-clavate, 8-spored, *Lecanora*-type. **Ascospores** *Physconia*-type (Fig. 1h), brown, finely

warted, 1-septate, thick-walled, with a strong, thickened broad septum, not thickened at the apices. **Conidiomata** pycnidia, immersed in the lobe surface or in small warts, walls colourless except for a brownish ostiolar region. **Conidiogenous cells** arising in branched chains, short-cylindrical, enteroblastic, acrogenous or pleurogenous. **Conidia** bacilliform, aseptate, colourless. **Chemistry**: lichen products not detected by TLC or with one or more unidentified substances (atranorin absent). **Ecology**: on basic or nutrient-enriched bark and rocks.

The genus is primarily separated from *Physcia* by the absence of apical thickening in the ascospores, the thick and broad septum, and pruinose lobes, at least at the tips.

#### Literature

Cubero *et al.* (2004), Divakar *et al.* (2007), Edwards & Coppins (2009d), Starosta & Svoboda (2020).

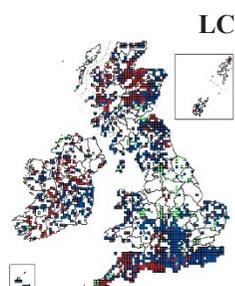
- |      |   |                     |
|------|---|---------------------|
| 1    | Soredia present; apothecia rarely present .....   | 2                   |
|      | Soredia absent; apothecia often present .....   | <i>distorta</i>     |
| 2(1) | Medulla white, K- .....   | 3                   |
|      | Medulla yellowish, K+ yellow .....  | <i>enteroxantha</i> |
| 3(2) | Rhizines ± cylindrical, pale to dark grey-brown, sometimes frayed but never bottlebrush-like..... | <i>grisea</i>       |
|      | Rhizines bottlebrush-like, black .....  | <i>perisidiosa</i>  |

#### **Physconia distorta** (With.) J.R. Laundon (1984)

Thallus to 10 (–15) cm diam., discrete, usually ± orbicular, ± appressed; lobes 0.6–2 mm broad, usually radiating, ± separate to overlapping, grey- to dark brown, usually white-pruinose at least towards the lobe ends, sometimes with secondary lobules in the centre of the thallus, without soredia or isidia; underside whitish at lobe tips, becoming blackish towards the centre, with black bottle-brush-like rhizines often forming a dense, interwoven mat (Fig. 2a); upper cortex composed of tightly interwoven hyphae. Apothecia to 5 mm diam., numerous, the margin often with secondary lobules; disc often grey-white pruinose. Ascospores (25–) 27–38 × 13–20 µm. Pycnidia frequent, immersed or in small warts 0.2–0.3 mm diam.; conidia 5–7 × 1–1.5 µm. Cortex and medulla K–. **BLS 1130**.

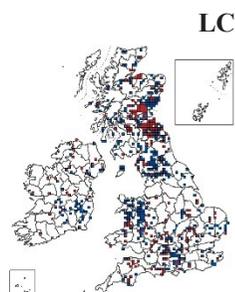
On basic or nutrient-enriched bark of tree trunks and branches, usually in well-lit situations or in the canopy, occasionally on enriched limestones or stonework, or birds' perching stones; widespread. Throughout Britain and Ireland.

Sometimes confused with *Physcia aipolia*, which has a maculate, but not pruinose, K+ yellow cortex, unbranched or only forked rhizines, and smaller ascospores. *P. muscigena* (Ach.) Poelt (1965) also lacks soredia but has irregularly arranged, ± ascending lobes and a pseudoparenchymatous upper cortex; an arctic-alpine species growing over mosses, with one dubious British nineteenth century record from C. Scotland (Perth, Blair Atholl). The lichenicolous taxa *Opegrapha rotunda* (q.v.), *Reconditella physconiarum* Hafellner & Matzer (1990) and *Tetramelas pulverulentus* (q.v.) have been found on some Scottish specimens of *P. distorta*. Other lichenicolous species are *Illosporopsis christiansenii* and *Taeniolella phaeophysciae*.



#### **Physconia enteroxantha** (Nyl.) Poelt (1966)

Thallus usually irregular in outline or confluent with others, rarely orbicular, to 5 cm diam; lobes 0.6–2 mm broad, discrete to partly overlapping, grey- or greenish brown, usually pruinose at the lobe ends, sometimes totally pruinose, non-pruinose parts matt, marginal secondary lobules sometimes present in older parts; soralia marginal, rarely a few lip-shaped, sometimes extending on to the lobe surface in central parts, often tinged ± yellowish, sometimes soredia are fragile, isidiate and brownish; underside whitish at tips, becoming brown to black within, with numerous black bottle-brush-like rhizines, sometimes forming a dense mat; medulla dull yellow; upper cortex composed of ± isodiametric cells. Apothecia very rare, margin often sorediate. Ascospores 25–37 × 16–21 µm. Pycnidia rare; conidia 4–6 × ca 1 µm. Cortex K–;



medulla C-, K+ yellow (unidentified yellow pigment), KC+ orange, K/UV+ orange-yellow. **BLS 1126.**

On well-lit, nutrient-rich bark of tree trunks in parkland and wayside situations, occasionally on old walls and memorials; common. Throughout Britain and Ireland, especially the north.

Recognized by the ± yellowish, K+ yellow medulla. *P. grisea* differs in having pale, unbranched rhizines, and *P. perisidiosa* in the often overall striking mauve tinge, the mainly lip-shaped soralia and hyphal upper cortex.

Host to the lichenicolous fungus *Lichenochora weillii* (Werner) Hafellner & R. Sant. (1989).

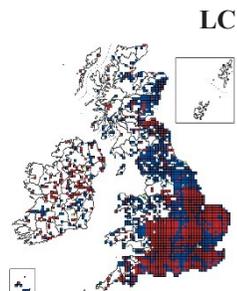
### **Physconia grisea** (Lam.) Poelt (1965)

Thallus irregular and often confluent with others, sometimes orbicular to 8 cm diam., ± closely attached; lobes 0.6–2 mm broad, ± radiating and partly overlapping, grey, grey-brown to brown (particularly when wet), usually spotted pruinose, at least towards the lobe ends, non-pruinose areas matt; fragile isidia or granular soredia present along lobe margins or on the surface towards the centre of the thallus, sometimes forming a dense uniform granular crust; upper cortex composed of ± isodiametric cells; medulla white; underside whitish or pale brown in central parts, with whitish to brownish or dark grey, unbranched or frayed rhizines (Fig. 2b). Apothecia to 3 mm diam., uncommon; thalline exciple sorediate; disc usually pruinose. Ascospores 22–34 × 12–17 µm. Pycnidia frequent but inconspicuous; conidia 4–7 × 1–2 µm. Medulla K– (4 unidentified substances by TLC). **BLS 1127.**

On basic, usually dust-impregnated, nutrient-enriched bark of tree trunks in parklands and waysides, also frequently on rocks, and especially on calcareous walls and memorials; common and increasing in lowland areas, even where moderately polluted. Throughout Britain and Ireland, but rare in N. Scotland and there apparently eastern.

Distinguished from other *Physconia* species by the pale, unbranched rhizines, but often confused with the superficially similar *P. enteroxantha* and *P. perisidiosa*.

Host to *Erythricium aurantiacum*, *Heterocephalacria physciacearum*, *Lichenochora weillii*, *Paranectria oropensis* and *Taeniolella phaeophysciae*.



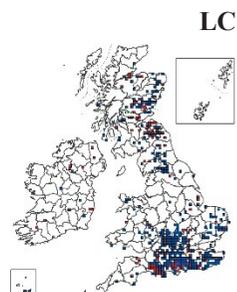
### **Physconia perisidiosa** (Erichsen) Moberg (1977)

Thallus usually irregular in outline, ± loosely attached; lobes 0.5–1.2 mm broad, usually short, ± imbricate, dark brown, pruinose especially at the tips, usually with a marked mauve or purplish tinge, non-pruinose areas ± glossy; soralia lip-shaped on central lobes, marginal lobes usually not sorediate, often confluent and densely isidiate in the centre of the thallus; upper cortex composed of tightly intertwined hyphae; medulla white; underside whitish and not corticate at the tips, becoming blackish and corticate within, with black bottle-brush-like rhizines. Apothecia very rare, thalline margin often with sorediate lobules. Ascospores (24–) 28–35 × 16–21 µm. Pycnidia rare; conidia 4–6 × ca 1 µm. Lichen products not detected by TLC. Cortex and medulla K–. **BLS 1129.**

On basic-barked trees, particularly *Acer*, *Fraxinus*, and *Ulmus*, often overgrowing or intermixed with mosses, in parklands, avenues and woodland margins; occasionally on old walls or memorials; rather local. Throughout Britain and Ireland. Generally scarcer than *P. grisea* (in S. Britain) and *P. enteroxantha* (in N. Britain), and less tolerant of polluted or excessively nutrient-enriched conditions.

Usually distinguished from *P. grisea* and *P. enteroxantha* by the short, imbricate lobes with lip-shaped soralia, the overall purple or mauve hue, and the structure of the upper cortex. *P. grisea* also has unbranched or frayed, often pale rhizines, and *P. enteroxantha* a yellowish medulla. Superficially resembles *Fuscopannaria mediterranea* which has *Nostoc* as its photobiont.

Host to *Lichenochora weillii*.



## RINODINA (Ach.) Gray (1821)

**Thallus** crustose (or rarely lichenicolous), thick, thin or evanescent, pale to dark grey, ochraceous to dark brown, continuous, rimose or areolate, occasionally granular, occasionally sorediate, rarely isidiate; prothallus absent, limiting, or entire and dark. **Photobiont** trebouxioid. **Ascomata** apothecia, immersed to sessile, usually frequent, contiguous or not. **Thalline margin** usually present, concolorous with the disc or thallus, entire or crenulate, persistent or more rarely excluded at maturity, with or without a distinct cortex; cortex when present cellular, occasionally pigmented, sometimes columnar below or structure obscured by pigment, peripheral hyphae usually pigmented. **True exciple** colourless or rarely brown. **Disc** brown to black, flat or convex at maturity, rarely pruinose. **Epithecium** brown, rarely blue-black (*R. pityrea*). **Hymenium** colourless, rarely shades of brown, I+ blue. **Hypothecium** colourless, rarely brownish or dark brown, stipe not usually present, colourless or dark. **Hamathecium** of paraphyses, mostly unbranched except near the apices, apices expanded, brown-capped. **Asci** 8-spored, clavate, *Lecanora*-type, rarely *Bacidia*-type. **Ascospores** 1- (rarely 3-5)-septate, mainly double-walled, walls variously thickened, septum well-developed at maturity, structure often complex (Fig. 1), grey-green or pale to dark brown; surface smooth or ornamented ( $\times 1000$  – oil immersion lens). **Conidiomata** pycnidia. **Conidia** bacilliform. **Chemistry**: cortex  $\pm$  atranorin, depsides,  $\pm$  depsidones, triterpenes, xanthonones present in some species, but more chemical investigation needed. **Ecology**: on a wide variety of substrata. **Distribution**: ca 300 species, cosmopolitan.

*Rinodina* is a morphologically complex and polymorphic genus, and a comprehensive multigene phylogenetic revision is needed. Considerable interest has been shown in variations in ascospore type, and their possible relevance to infrageneric taxonomy. Molecular data presented by Kondratyuk *et al.* (2021) suggest that the genus is polyphyletic and that it should be restricted to a small group of species around *R. sophodes* (the type of the genus), but their results could be described as preliminary and further studies are needed.

In morphological terms, *Rinodina* is separated from *Buellia* mainly by the presence of a thalline exciple, a mostly unpigmented hypothecium, a *Lecanora*-type ascus and spores with  $\pm$  unequally thickened walls. The relationships between *Amandinea*, *Buellia* and *Rinodina* are in need of further critical investigation and evaluation.

*Endohyalina* Marbach (2000) was taken up by Giralt *et al.* (2010) for a group of species centred around *Rinodina ericina*. This has *Bacidia*-type asci, and the ascospores are *Dirinaria*-type. *E. ericina* and *E. insularis* occur in our area. There is some phylogenetic evidence supporting its separation, but only one species has been sequenced (Nadyeina *et al.* 2010) and its position was not entirely clear from their data. It was accepted as a separate genus by Lücking *et al.* (2016) and transferred to the Caliciaceae, where it is to be found in this publication.

*Mischoblastia* A. Massal. (1852) is based on *Rinodina oxydata*. It may be distinguished from *Rinodina* in morphological terms by the narrow and sometimes excluded thalline margin and a true exciple that is concolorous with the disc, giving the apothecia a lecideine appearance. In addition the asci are *Bacidia*-type rather than *Lecanora*-type and the ascospores have angular lumina (referred to as *Mischoblastia*-type).

*Orcularia* (Malme) Kalb & Giralt (2011) was introduced for species from Malme's *Rinodina* sect. *Orcularia*. This has *Bacidia*-type asci, *Orcularia*-type ascospores and filiform conidia; it seems to be more closely related to *Buellia* than *Rinodina* and was placed in the Caliciaceae by Lücking *et al.* (2016). One species occurs in our region, *O. insperata* (Nyl.) Kalb & Giralt (syn. *Rinodina biloculata* (Nyl.) Sheard).

The form and distribution of the thickening of the ascospore walls is a diagnostic feature of many *Rinodina* species. The list below ascribes the particular spore types (see Fig. 1 above) which occur in British species. However, special care must be taken to examine a range of spores from each sample specimen as immature or overmature spores can give misleading information.

## Spore types in British species of *Rinodina* and similar species

|  |  |
|--|--|
| <i>Bischoffii</i> -type                              | <i>bischoffii</i> , <i>immersa</i> .   |
| <i>Conradii</i> -type                                | <i>conradii</i> , <i>intermedia</i> .  |
| <i>Dirinaria</i> -type                               | <i>Endohyalina ericina</i> , <i>E. insularis</i> (P), <i>R. subpariata</i> (S).  |
| <i>Dirinaria</i> - to <i>Physcia</i> -type           | <i>oleae</i>   |
| <i>Milvina</i> -type                                 | <i>efflorescens</i> (S), <i>laevigata</i> , <i>milvina</i> , <i>sophodes</i> .   |
| <i>Milvina</i> - to <i>Physcia</i> -type             | <i>luridescens</i> , <i>occulta</i> .  |
| <i>Mischoblastia</i> -type                           | <i>fimbriata</i> , <i>oxydata</i> .  |
| <i>Mischoblastia</i> - to <i>Pachysporaria</i> -type | <i>teichophylla</i>  |
| <i>Orcularia</i> -type                               | <i>Orcularia insperata</i> .   |
| <i>Pachysporaria</i> -type                           | <i>aspera</i> (S), <i>atrocinerea</i> , <i>beccariana</i> , <i>colobinoides</i> (S),<br><i>griseosoralifera</i> (S), <i>isidioides</i> (I), <i>roboris</i> . |
| <i>Physcia</i> -type                                 | <i>cinnamomea</i> , <i>confragosa</i> , <i>exigua</i> , <i>mniaeraeiza</i> , <i>parasitica</i> (P).  |
| <i>Physconia</i> -type                               | <i>interpolata</i> , <i>pyrina</i> , <i>sicula</i> .   |
| <i>Tunicata</i> -type                                | <i>calcareae</i> , <i>pityrea</i> .  |
| Unknown, spores immature                             | <i>flavosoralifera</i> (S).  |

(S= soorediate, I= isidiate, P= parasitic).

### Literature

Giavarini *et al.* (2009), Giralt (2001, 2010), Giralt *et al.* (1995, 2010), Grube & Arup (2001), Kalb & Giralt (2011), Kondratyuk *et al.* (2021), Lücking *et al.* (2016), Mayrhofer *et al.* (2001), Nadyeina *et al.* (2010), Resl *et al.* (2016), Sheard (2010, 2018), Sheard *et al.* (2017), van den Boom *et al.* (2009).

|      |   |  |
|------|---|--|
| 1    | Lichenicolous .....   | 2  |
|      | Not lichenicolous .....   | 3  |
| 2(1) | Thallus showing as small, dark brown patches on <i>Circinaria (Aspicilia) caesiocinerea</i> ;<br>montane; spores <i>Physcia</i> -type ..... | <i>parasitica</i>                          |
|      | Thallus not formed; apothecia ± immersed in host, <i>Lecanora rupicola</i> ; coastal; spores<br><i>Dirinaria</i> -type .....                | [Caliciaceae] <i>Endohyalina insularis</i> |
| 3(1) | On soil, terricolous mosses or decaying plant debris, rarely on plastic, rubber etc. ....   | 4  |
|      | On trees, wood, or on rock .....  | 9  |
| 4(3) | Ascospores with >2 and typically four lumina; thallus K- .....  | 5  |
|      | Ascospores with two lumina; thallus K± yellow .....   | 6  |
| 5(4) | Ascospores submuriform, internal apical wall thickenings not formed before the septa<br>develop.....  | <i>intermedia</i>                          |
|      | Ascospores transversely septate, with internal apical wall thickenings formed before the septa<br>develop.....                              | <i>conradii</i>                            |
| 6(4) | Ascospores <25 µm long .....  | 7  |
|      | Ascospores mostly >25 µm long, <i>Physcia</i> -type; montane .....  | 8  |
| 7(6) | Ascospores between <i>Dirinaria</i> - and <i>Physcia</i> -types, on every imaginable substrate .....  | <i>oleae</i>                               |
|      | Ascospores <i>Pachysporaria</i> -type; coastal, on moribund <i>Armeria</i> tufts .....  | <i>roboris</i> var. <i>armeriicola</i>     |
| 8(6) | Medulla ± with orange pigment, K+ purple; thallus grey-brown; cortex K- .....   | <i>cinnamomea</i>                          |
|      | Medulla without orange pigment, K-; thallus pale; cortex K+ yellow (atranorin).....   | <i>mniaeraeiza</i>                         |
| 9(3) | Soredia, blastidia or isidia present .....  | 10   |
|      | Soredia or isidia absent .....  | 18   |

|        |  |  |    |
|--------|--|--|----|
| 10(9)  | Thallus with white to pale grey, finger-like or coralloid isidia; K+ yellow (atranorin) .....  | <i>isidioides</i>                        |    |
|        | Thallus sorediate or with eroded blastidia .....   |  | 11 |
| 11(10) | Thallus C+ red or orange .....   |  | 12 |
|        | Thallus C- .....   |  | 13 |
| 12(11) | Thallus C+ red; saxicolous .....   | <i>aspersa</i>                           |    |
|        | Thallus C+ orange, UV+ orange-red; corticolous .....   | <i>flavosoralifera</i>                   |    |
| 13(11) | Thallus Pd+ red (pannarin); soralia mostly scattered, discrete, greenish yellow often tinged<br>brown, never bluish .....  | <i>efflorescens</i>                      |    |
|        | Thallus Pd± yellow or Pd-; soredia or blastidia never brownish .....   |  | 14 |
| 14(13) | Soralia pure white arising on the margins of the areoles; thallus Pd+ yellow, K+ yellow<br>(atranorin) .....   | <i>subpariata</i>                        |    |
|        | Soralia or blastidia yellow, green or blue-grey; thallus Pd- .....   |  | 15 |
| 15(14) | Soredia greenish, derived from eroded blastidia, or with dull green blastidia.....   |  | 16 |
|        | Soralia blue-grey, convex; thallus interior K- or K± faint yellow; yellow-orange pigment absent .....  |  | 17 |
| 16(15) | Thallus with an internal yellow-orange, K+ purple-rose pigment .....   | <i>colobinoides</i>                      |    |
|        | Thallus medulla pale, K- .....   | <i>furfuracea</i>                        |    |
| 17(15) | Soralia discrete .....   | <i>griseosoralifera</i>                  |    |
|        | Soralia diffuse .....  | <i>pityrea</i>                           |    |
| 18(9)  | On bark or wood .....  |  | 19 |
|        | On rock .....  |  | 28 |
| 19(18) | Thallus K+ yellow to orange, K/UV (dry)+ bright yellow (atranorin) .....   |  | 20 |
|        | Thallus K- .....   |  | 23 |
| 20(19) | Thallus of small, ± discrete, whitish, convex verrucae; ascospores <i>Dirinaria</i> -type;<br>hymenium with oil droplets .....   | [Caliciaceae] <i>Endohyalina ericina</i> |    |
|        | Thallus thick, ± uneven-granular, green-grey; ascospores <i>Physcia</i> - or <i>Pachysporaria</i> -type;<br>hymenium without oil droplets .....  |  | 21 |
| 21(20) | Ascospores <i>Physcia</i> -type, with angular lumina; apothecia 0.3–0.7 mm diam.....   |  | 22 |
|        | Ascospores <i>Pachysporaria</i> -type, with rounded lumina; apothecia 1–1.6 mm diam.....   | <i>roboris</i>                           |    |
| 22(21) | Thalline margin persistent, the cortex to 50 (–80) µm thick, I+ blue; apothecia sessile; ascospores<br>18–23 (–27) × 8–12 µm [not confirmed as British] .....  | <i>capensis</i>                          |    |
|        | Thalline margin often ± excluded, the cortex indistinct, 10–20 µm thick, I-; apothecia ± semi-<br>immersed; ascospores 13–18×6.5–9 µm .....  | <i>exigua</i>                            |    |
| 23(19) | Thallus of small, olive-green to olive-brown patches, mostly obscured by ± contiguous<br>apothecia; on twigs and small branches .....  |  | 24 |
|        | Thallus with sparsely scattered apothecia or forming wide-spreading crusts; on various substrata<br>including nutrient-enriched bark, wood, rock etc.; ascospores <i>Dirinaria</i> - or <i>Physcia</i> -type ..... | <i>oleae</i>                             |    |
| 24(23) | Ascospore walls not strongly thickened at the apices ( <i>Milvina</i> -, <i>Orcularia</i> - or <i>Physconia</i> -type) .....   |  | 25 |
|        | Ascospore walls strongly thickened at the apices ( <i>Physcia</i> -type) .....   | <i>freyi</i>                             |    |
| 25(24) | Ascospores <i>Orcularia</i> -type, thin-walled except at the septum; thalline margin often excluded<br>.....   | [Caliciaceae] <i>Orcularia insperata</i> |    |
|        | Ascospores <i>Milvina</i> - or <i>Physconia</i> -type, thick-walled in all parts; thalline margin persistent .....   |  | 26 |

|        |   |                    |
|--------|---|--------------------|
| 26(25) | Ascospores <i>Milvina</i> -type, not curved.....  | 27                 |
|        | Ascospores <i>Physconia</i> -type, 13–15×6–7 µm, often slightly curved.....   | <i>pyrina</i>      |
| 27(26) | Ascospores narrowly ellipsoidal, 13–19 × 6.5–9 µm, with convex outer ends to the spore lumina .....                                     | <i>sophodes</i>    |
|        | Ascospores broadly ellipsoidal, 18–22 × 13–19 µm with concave outer ends to the spore lumina .....                                      | <i>laevigata</i>   |
| 28(18) | On limestone or nutrient-enriched substrata; ascospores <i>Dirinaria</i> -, <i>Tunicata</i> - or <i>Bischoffii</i> -type .....          | 29                 |
|        | On siliceous rock; ascospores various, not <i>Tunicata</i> - or <i>Bischoffii</i> -type .....   | 32                 |
| 29(28) | Ascospores between <i>Dirinaria</i> - and <i>Physcia</i> -type .....  | <i>oleae</i>       |
|        | Ascospores <i>Tunicata</i> - or <i>Bischoffii</i> -type .....   | 30                 |
| 30(29) | Thallus grey-brown, thick; ascospores double-walled, <i>Tunicata</i> -type .....  | <i>calcarea</i>    |
|        | Thallus grey, thinly granular or immersed and inapparent; ascospores not double-walled, <i>Bischoffii</i> -type .....                   | 31                 |
| 31(30) | Apothecia sessile, disc plane, becoming ± convex; hymenium with oil droplets .....  | <i>bischoffii</i>  |
|        | Apothecia deeply immersed in pits in substrate, disc plane; hymenium without oil droplets .....   | <i>immersa</i>     |
| 32(28) | Thallus C+ red (gyrophoric acid), often flecking .....  | 33                 |
|        | Thallus C– .....  | 34                 |
| 33(32) | Thallus distinctly areolate on a black prothallus, areoles pale to ochraceous, rarely brownish, K+ yellow, Pd+ yellow .....             | <i>atrocinerea</i> |
|        | Thallus thick, continuous or rimose, dark brown with a purple tinge, K–, Pd–; prothallus inconspicuous.....                             | <i>luridescens</i> |
| 34(32) | Ascospores <i>Mischoblastia</i> - to <i>Pachysporaria</i> -type, generally over 20 µm long .....  | 35                 |
|        | Ascospores generally under 20 µm long, not <i>Mischoblastia</i> - or <i>Pachysporaria</i> type .....                                    | 38                 |
| 35(34) | Thalline exciple concolorous with apothecial disc or inconspicuous, ascospores true <i>Mischoblastia</i> -type .....                    | 36                 |
|        | Thalline exciple concolorous with the thallus; ascospores <i>Mischoblastia</i> - to <i>Pachysporaria</i> -type.....                     | 37                 |
| 36(35) | Thallus K–, 0.4–0.7 mm thick .....  | <i>fimbriata</i>   |
|        | Thallus K+ yellow, to 0.3 mm thick (atranorin) .....  | <i>oxydata</i>     |
| 37(35) | Thallus white or pale grey to greenish, K+ yellow (atranorin); thalline margin ± crenulate; ascospores <i>Pachysporaria</i> -type ..... | <i>beccariana</i>  |
|        | Thallus dark grey to greenish, K–; thalline margin not crenulate; ascospores <i>Mischoblastia</i> - to <i>Pachysporaria</i> -type ..... | <i>teichophila</i> |
| 38(34) | Thallus white or pale grey to greenish, K+ yellow (atranorin) .....   | 39                 |
|        | Thallus dark grey to greenish or grey to blackish with a mauve tinge, K– .....  | 40                 |
| 39(38) | Apothecia <0.3 mm diam. ....  | <i>occulta</i>     |
|        | Apothecia >0.5 mm diam. ....  | <i>confragosa</i>  |
| 40(39) | Ascospores nearly uniformly thin-walled with rounded lumina, <i>Milvina</i> -type .....   | <i>milvina</i>     |
|        | Ascospores evenly to unevenly thick-walled, not <i>Milvina</i> -type .....  | 41                 |
| 41(40) | Thallus often with a mauve tinge; ascospores <i>Physconia</i> -type .....   | 42                 |
|        | Thallus lacking mauve tinge; ascospores <i>Dirinaria</i> - to <i>Physcia</i> -type .....  | <i>oleae</i>       |

- 42(41) Ascospores 17–23  $\mu\text{m}$  long ..... *sicula*  
 Ascospores 13–18  $\mu\text{m}$  long ..... *interpolata*

**Rinodina aspersa** (Borrer) J.R. Laundon (1986)

Thallus poorly developed, small, of scattered or  $\pm$  contiguous areoles, greyish; prothallus usually conspicuous, sometimes marginally fimbriate, black; soralia *ca* 0.5 mm diam., greenish-white (becoming yellowish at the margin when dry), delimited, punctiform, mostly discrete, flat, superficial, somewhat elevated; soredia farinose. Apothecia rare in Britain, to 1 mm diam.; thalline exciple well-developed; hymenium 80–100  $\mu\text{m}$  high; hypothecium colourless; disc brown to black. Ascospores 15–20  $\times$  13–20  $\mu\text{m}$ , *Pachysporaria*-type (Fig. 1j). Soralia C+ fleeting red, K $\pm$  yellow, Pd $\pm$  yellow, UV– (atranorin, gyrophoric acid, ovoid, umbilicatic and 5-*O*-methylthiassic acids). **BLS 0201.**

On siliceous pebbles and flints, usually with *Porpidia* species, on stabilised coastal shingle beaches; very local. S. England, Wales and E. Scotland (Angus).

Care is needed when separating this species from *Lecidella scabra*, which lacks a defining prothallus, has a different chemistry (spot test C+ orange; xanthenes) and has a continuous or  $\pm$  rimose (not areolate) thallus.

NT



**Rinodina atrocinerea** (Hook.) Körb. (1855)

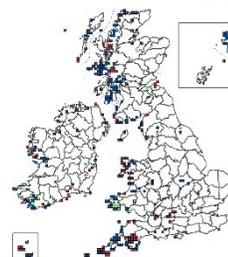
Thallus wide-spreading, thin, rather smooth, whitish, pale grey to ochraceous, rarely brown-grey, distinctly angular-areolate; areoles 0.45–1.25 mm diam., flat, discrete, scattered to  $\pm$  contiguous; prothallus  $\pm$  conspicuous, black, occasionally fimbriate at the margin. Apothecia 0.2–0.7 (–1) mm diam. usually present,  $\pm$  immersed, later becoming sessile; thalline margin thin, even, scarcely prominent, concolorous with the thallus; hymenium 75–140  $\mu\text{m}$  high; hypothecium colourless; disc brown to brown-black, paler when moist, persistently flat or becoming weakly convex. Asci 50–90  $\times$  19–23  $\mu\text{m}$ . Ascospores 16–21  $\times$  8.5–13.5  $\mu\text{m}$ , with very thick, uniform walls, locules rounded, never angular, *Pachysporaria*-type (Fig. 1j). Pycnidia frequent; conidia 4–6  $\times$  0.5–0.8  $\mu\text{m}$ , bacilliform. Cortex C+ red, K+ yellow, Pd+ yellow, UV– (atranorin, chloroatranorin, gyrophoric, ovoid, umbilicatic and 5-*O*-methylthiassic acids). The C reaction may be faint and evanescent. **BLS 1281.**

On coarse hard siliceous rocks, particularly granite; locally abundant, especially near the coast. Predominantly in W. & S.W. Britain and Ireland.

The pale-coloured, markedly areolate thallus on a contrasting black prothallus, together with the colour reactions, are diagnostic.

Host to an *Endococcus* species that resembles *E. perpusillus* but has smaller ascospores.

LC



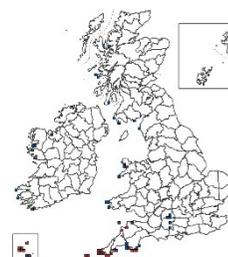
**Rinodina beccariana** Bagl. (1871)

Thallus wide-spreading, thin to thick, white, pale glaucous-grey to greenish, continuous, often becoming uneven-granular or irregularly cracked,  $\pm$  flat, effuse or not; prothallus inconspicuous or occasionally well-developed, black. Apothecia to 0.7–1.25 mm diam., frequent, immersed or more usually sessile, sometimes contiguous; thalline margin 0.05–0.2 mm thick, concolorous with the thallus, entire, becoming distinctly crenulate, persistent; disc persistently flat, black; hymenium 90–100  $\mu\text{m}$  high; hypothecium 70–140  $\mu\text{m}$  tall. Asci 60–95  $\times$  15–25  $\mu\text{m}$ , inner walls uniform. Ascospores 16.5–23  $\times$  8.5–14  $\mu\text{m}$ , with thick walls and rounded lumina, *Pachysporaria*-type (Fig. 1j). Thallus K $\pm$  yellow, Pd– (atranorin, chloroatranorin, zeorin). **BLS 1299.**

Often low down on  $\pm$  sheltered sides of siliceous rocks, coastal; locally common. W. & S. W. Britain and Ireland, rarely inland.

Previously confused with *R. confragosa* which is Pd+ yellow and has *Physcia*-type spores. Specimens on compacted soil and moribund *Armeria* tufts are now referred to *R. roboris* var. *armericola*.

Nb



### **Rinodina bischoffii** (Hepp) A. Massal. (1855)

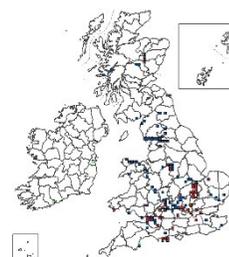
Thallus pale grey or inconspicuous, of discrete scurfy granules, or rarely thin, grey to ochraceous, ± rimose and even. Apothecia 0.45–0.6 mm diam., sessile, sometimes contiguous; thalline margin 50–100 µm broad, entire but becoming excluded, at first concolorous with the thallus, later becoming darker and concolorous with the disc; disc black, flat becoming convex; hymenium 85–115 µm high, interspersed with oil droplets; hypothecium 75–100 µm high, a colourless stipe sometimes developing below. Asci 50–70 × 18–22 µm. Ascospores 14.5–20 × 10–12.5 µm, thin-walled at the apices with a heavily pigmented band around the central part, *Bischoffii*-type (Fig. 1a). Lichen products not detected by TLC. **BLS 1283.**

On calcareous substrata, particularly limestone; widespread but local. Throughout Britain in suitable habitats, rare in Ireland.

The only other species with this ascospore type is *R. immersa*, distinguished by the apothecia immersed in deep pits in the substratum and lack of hymenial oil droplets. *Pyrenodesmia variabilis* resembles *R. bischoffii*, but has a K<sup>+</sup> mauve-purple exciple and epithecium, and colourless polarilocular spores.

Host to the plurivorous *Muellerella lichenicola* (Sommerf.) D. Hawksw. (1979).

Nb



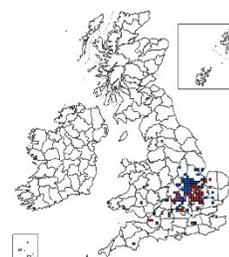
### **Rinodina calcarea** (Arnold) Arnold (1879)

Thallus cracked-areolate, pale grey to grey-brown; areoles very thick and swollen in places. Apothecia to 1 mm diam., at first immersed, becoming sessile; thalline exciple entire, slightly notched, concolorous with the thallus; disc flat to slightly convex, dark brown to black, often irregular in outline; epithecium 10–20 µm tall, brown; hymenium 90–130 µm tall; hypothecium to 200 µm tall, colourless. Ascospores 17–25 × 10–16 µm, wall two-layered, with a uniformly thickened outer wall and unevenly thickened inner wall, *Tunicata*-type (Fig. 1e). Lichen products not detected by TLC. **BLS 1801.**

On limestone monuments and Carboniferous limestone outcrops (N. Somerset); locally frequent. Concentrated in S.C. England.

Distinguished by the double-walled ascospores, otherwise found only in the mainly epiphytic *R. pityrea*. The outer ascospore wall layer swells markedly in K.

LC NR



### **Rinodina cinnamomea** (Th. Fr.) Räsänen (1931)

*Rinodina mniaraea* var. *cinnamomea* Th. Fr. (1860)

Thallus coarsely warted, granular, pale to dark grey or brownish; medulla partly orange due to a K<sup>+</sup> purple pigment. Apothecia 0.5–0.1 mm diam., flat, soon becoming convex; exciple excluded, dark brown-black; epithecium pale brown; hymenium 100–150 µm high. Ascospores (19–) 25–35 (–38) × (10–) 11–12 (–16) µm, *Physcia*-type (Fig. 1i). Unknown K<sup>+</sup> purple pigment in medulla. Cortex K<sup>–</sup>. **BLS 1804.**

In grazed, mossy grassland at 850 m., arctic-alpine; very rare. N. Scotland (W. Ross).

Easily recognised by the terricolous habitat, large *Physcia*-type ascospores, orange K<sup>+</sup> purple pigment and convex apothecia.

EN D



### **Rinodina colobinoides** (Nyl.) Zahlbr. (1931)

Thallus greenish-white to olivaceous, almost entirely blastidiate; blastidia smooth, eroding to form soredia; prothallus absent. Apothecia (0.3–) 0.7–1 (–1.3) mm diam., plane, becoming convex; thalline margin concolorous with the thallus, thick, prominent, entire to renulate or blastidiate, becoming excluded; disc dark brown to black; epithecium yellowish brown to olivaceous brown; hymenium 65–80 µm high; hypothecium yellowish, 60–70 µm high; asci 55–65 × 10–15 µm. Ascospores 15–19 (–21) × 6.5–8.5 (–10) µm, *Pachysporaria*-type (Fig. 1j) with slight tendency to *Physcia*-type (Fig. 1i), smooth. Lichen products not detected by TLC. Both thallus and apothecia contain a yellow-orange pigment of variable intensity that reacts K<sup>+</sup> purple-rose. **BLS 1928.**

On parkland trees, very local. S & S.W. England (New Forest, N. Devon).

VU D1,2



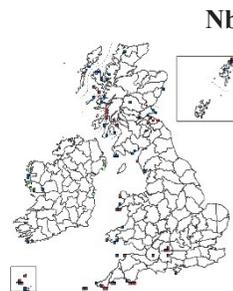
Distinguished by the presence of a yellow-orange pigment (K<sup>+</sup> purple-rose) in the thallus and apothecia. The blastidia may ± disintegrate to form soredia in British material.

### **Rinodina confragosa** (Ach.) Körb. (1855)

Thallus thick or thin, whitish, pale grey to ochraceous, rimose and flat or of discrete warts, often with slightly indented edges, effuse; prothallus inconspicuous. Apothecia to 0.6–1.5 mm diam., sessile, sometimes contiguous; thalline margin 50–100 µm broad, concolorous with the thallus, entire and persistent; disc black, flat, becoming slightly convex; hymenium 80–100 µm high; hypothecium 60–135 µm, high, hypothecium and hymenium I<sup>+</sup> blue. Asci 75–80 × 16–19 µm, inner walls uniform. Ascospores 17–27 × 8–13 µm, locules persistently angular with thick apical walls, *Physcia*-type (Fig. 1i). Thallus K<sup>+</sup> yellow, Pd<sup>+</sup> yellow (atranorin, chloratranorin, zeorin). **BLS 1285.**

On coastal siliceous rocks, also widespread on overhanging rocks at high altitudes and inland on standing stones. Widely dispersed but scattered throughout Britain and Ireland.

Easily overlooked as less well-developed colonies of *Lecanora gangaleoides* or *Tephromela atra* with which it often grows. Morphotypes of *R. beccariana* on rock can be distinguished by the *Pachysporaria*-type ascospores.

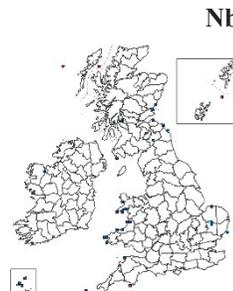


### **Rinodina conradii** Körb. (1855)

Thallus thin and disappearing, pale grey to brown-grey, continuous, flat, cracked, commonly of discrete warts, effuse; prothallus inconspicuous. Apothecia 0.3–0.85 mm diam., sessile, often contiguous; thalline margin ca 50 µm broad, concolorous with the thallus, entire and persistent; disc often dark brown, soon becoming black, flat, sometimes becoming convex; epithecium brown or more usually red-brown; hymenium 90–130 µm high; hypothecium 25–75 µm high. Asci 65–95 × 23–28 µm. Ascospores 18–30 × 8.5–14 µm, (1–)3(–5) septate, lumina rounded, uniformly thick-walled, *Conradii*-type (Fig. 1k). No lichen products detected by TLC. **BLS 1286.**

On soil, mosses, bark or wood, particularly on decaying turf, *Armeria*, *Calluna* stems, dry moss or old rabbit pellets in undisturbed localities, especially on or near the coast; local and often ephemeral. W. & N. Britain and Ireland, extending to the Channel Islands, E. Anglia, Pembroke (Skomer) and the Moray Firth.

The (1–)3(–5)-septate ascospores are only found otherwise in the similar *R. intermedia*; see that species for differential features.

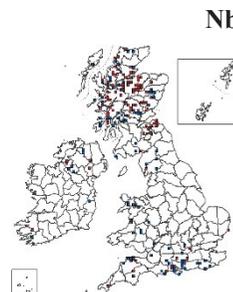


### **Rinodina efflorescens** Malme (1927)

Thallus effuse, often occurring as small patches among other lichens, composed of scattered to contiguous areoles; areoles 0.1–0.5 mm diam., brown-white or brown-grey, sometimes with a greenish tinge, matt, ± flat or slightly convex, usually remaining discrete and appearing as minute flattened squamules, ca 80–100 µm thick; prothallus usually indistinct, only occasionally visible as a brown stain between areoles; soralia scattered, sometimes becoming confluent but not forming a continuous leprose crust, erupting from the surface or margins of the areoles; soredia whitish, pale greenish or dull greenish yellow, often tinged brown. Apothecia not known in Britain and Ireland, 0.3–0.5 mm diam., flat, narrowed at the base; thalline margin thick, concolorous with the thallus; epithecium red-brown; hymenium 60–75 µm high; hypothecium colourless. Asci 55–60 × 14–17 µm, 8-spored, clavate. Ascospores 15–22 × 7–10 µm, seldom mature, *Milvina*-type (Fig. 1g). Thallus C<sup>-</sup>, K<sup>-</sup>, Pd<sup>+</sup> red, UV<sup>-</sup> (pannarin, secalononic acid A). **BLS 1287.**

On acid bark, especially of horizontal branches, in moist woodlands and carrs, pollution-tolerant; locally frequent. Throughout Britain and Ireland but rare in E. England.

Easily separated from *R. griseosoralifera* which is sometimes Pd<sup>+</sup> yellow but never Pd<sup>+</sup> red. *R. efflorescens* is easily confused with *Halecania viridescens*; that species has smaller (50–100 µm diam.), very fragile areoles (disintegrating when touched with a needle). *Trapelia corticola* which occurs in similar habitats, has soralia which are Pd<sup>-</sup>, C<sup>+</sup> red. *Fuscidea lightfootii* is often fertile but Pd<sup>-</sup>, UV<sup>+</sup> bluish-white (divaricatic acid).



### **Rinodina exigua** (Ach.) S. Gray (1821)

Thallus rather thin, irregularly cracked, flat, uneven-granular and often slightly squamulose, pale grey-green, effuse; prothallus indistinct. Apothecia 300–460 µm diam., conspicuous, sessile to semi-immersed, frequent, often contiguous; thalline margin 20–30 µm wide, concolorous with the thallus, entire, sometimes becoming weakly crenulate, persistent; disc black, initially flat but becoming convex when old; hymenium 160–200 µm high, I+ blue; hypothecium 120–140 µm high, I–, pale yellow. Asci 130–160 × 15–19 µm, inner walls uniform. Ascospores (12.5–) 14–17.5 × (7–) 8–10 µm, dark brown, with thick walls, the locules rounded to conical, ± *Physcia*-type, the septum thickened and pigmented in the centre, without a gelatinous sheath. Pycnidia not known. Chemistry: thallus K+ yellow to orange, Pd+ yellowish. **BLS 2720.**

On bark of old *Fraxinus* and *Quercus* in parklands, Dorset, Hampshire, Herefordshire and Surrey.

British collections have been dismissed as misidentified *R. oleae*, but the genuine species has now been confirmed from southern England.



### **Rinodina fimbriata** Körb. (1859)

Nb

Thallus crustose, pale grey to grey-brown, areolate, 0.4–0.7 mm thick. Apothecia 0.4–0.8 mm diam., ± immersed, disc brown to black, browner when wet; thalline margin weakly developed. Ascospores (19–) 21–24 (–31) × 11–17 µm, *Mischoblastia*-type (1b). Thallus K–, C–. Lichen products not detected by TLC. **BLS 1443.**

On periodically water-inundated siliceous rocks, uncommon, S.W. England (Exmoor), Cumbria, W. Wales, C. Scotland.

Readily identified by the immersed apothecia lacking a distinctive thalline margin, habitat of periodically inundated rocks and characteristic *Mischoblastia*-type spores.



### **Rinodina flavosoralifera** Tønsberg (1992)

NT

Thallus crustose, forming patches of dull yellow to yellow-greenish scattered areoles, often with a brownish tinge; areoles soon dissolving into soredia; prothallus indistinct; soralia punctiform or more rarely marginal on the areoles, yellow-green to yellow ± with a brown tinge. Apothecia rare, not known from Britain or Ireland, hemispherical to subglobose, with a pore-like opening; margin concolorous with the thallus; disc brown; thalline margin ca 70 µm thick; epithecium brown; hymenium colourless, 85–125 µm high. Asci (immature) 80 × 15 µm in K. Ascospores always immature, colourless or rarely brown, 14–15 × 6–10 µm. Thallus and soralia C+ orange, K–, Pd–, UV+ orange-red (arthothelin, thiophanic acid). **BLS 1914.**

On mossy trees in sheltered woodlands; uncommon. S.W. England, W. Wales, Scotland.

Characterised by the discrete, yellow, C+ persistent orange soralia. There is some uncertainty surrounding the generic placement of this species; arthothelin and thiophanic acid are otherwise unknown for the genus *Rinodina*.



### **Rinodina freyi** H. Magn. (1947)

NE

Thallus crustose, thin, dark grey to grey-green or grey-brown, often inconspicuous, continuous to areolate; prothallus lacking; soralia absent. Apothecia frequent, becoming contiguous, 0.4–0.6 mm diam.; disc dark brown (especially when wet), often becoming black, flat or rarely becoming convex; thalline margin prominent, 50–100 µm thick, persistent; paraphyses 1.5–3 µm diam., often conglutinate with apices to 3.5–6 µm diam., lightly or darkly pigmented, immersed in dispersed pigment forming a red–brown epihymenium; asci 45–65 × 12–18 µm, 8-spored. Ascospores *Physcia*-type, 16.5–20 × 7–9 (–10) µm, the apices remaining thick-walled, with a well-developed dark torus at the septum when mature. Thallus K–, C–. Lichen products not detected by TLC. **BLS 2775.**

On smooth bark of twigs and branches (mainly *Corylus*, *Fraxinus* and *Sorbus*), oceanic western Scotland.

*R. sophodes* occurs in similar habitats but has *Milvina*-type spores without thickened apices; a black prothallus is often present.

### **Rinodina furfuracea** H. Magn. (1947)

NE

Thallus crustose, thin and smooth, whitish with clusters of dull greenish blastidia. Blastidia to (12–) 20–30 nm diam. Apothecia broadly attached, frequent, mostly scattered but also confluent and then deformed by mutual pressure, 0.3–0.6 mm diam.; thalline margin concolorous with the thallus, thick, entire and prominent, becoming thinner, flexuose, and often blastidiate, finally completely excluded. Disc becoming strongly convex, dark brown. Epithecium brown. Hymenium (70–) 80–100  $\mu$ m tall. Hypothecium yellowish, 100–110  $\mu$ m deep. Paraphyses to 1.5 (–2)  $\mu$ m diam, apices to 3.5  $\mu$ m diam. Asci *Lecanora*-type. Ascospores *Physcia*-type (to *Physconia*-type), 15–18  $\times$  7–8  $\mu$ m, with a well-developed torus, constricted at the septum and warted when mature. Pycnidia not seen. Chemistry: all reactions negative.

On trunk of young mature *Fraxinus*, England (Oxfordshire); only known from a single record in Britain and Ireland.

Characterized by the whitish thallus with dull green blastidia that may initially form in patches but eventually spread over the entire thallus, apothecia with a thalline margin that may become excluded, and ascospores that are broadly *Physcia*-type. *Rinodina colobinoides* is similar but has an orange, K+ purplish medulla and *Pachysporaria*-type ascospores.

### **Rinodina griseosoralifera** Coppins (1989)

Nb

Thallus effuse, wide-spreading or forming patches among lichens and bryophytes, of scattered to contiguous areoles; areoles 80–200  $\mu$ m diam., slightly convex to hemispherical, sometimes almost subsquamulose, usually inconspicuous and often obscured by soralia and superficial algae etc., dull greenish-white to pale grey; prothallus brown, visible around the areoles; soralia 0.14–0.3 (–0.4) mm diam., numerous, discrete, sometimes a few confluent but never forming a continuous leprose crust, efflorescent, each erupting from the upper surface of an areole (never ulcerose), convex, blue-grey (fading in dried collections). Apothecia 0.3–0.4 mm diam., very rare, sessile; thalline margin *ca* 0.1 mm thick, whitish-grey, sometimes sorediate. Ascospores 24–28.5  $\times$  12–16.5  $\mu$ m, ellipsoidal, *Pachysporaria*-type (Fig. 1j). Thallus K $\pm$  faint yellow, UV– (atranorin, zeorin). **BLS 1638.**

On bark or amongst mosses overgrowing bark; local. S.W. England, Wales, C. & S.E. Scotland.

*Buellia griseovirens* has a less superficial thallus with soralia that appear yellowish when abraded, reacting K+ yellowish-red (crystals – norstictic acid), Pd+ yellow. *R. efflorescens* is Pd+ red (pannarin, secalonic acid).



### **Rinodina immersa** (Körb.) Zahlbr. (1906)

DD

Thallus immersed, or rarely thin, finely granular, whitish to pale grey. Apothecia to 1 mm diam., immersed in deep depressions in the substrate, with isolated groups of algae in the thalline exciple; epithecium dark brown; hymenium *ca* 100  $\mu$ m tall, without oil drops; hypothecium to 100  $\mu$ m high, colourless. Ascospores 15–20  $\times$  9–13  $\mu$ m, *Bischoffii*-type (Fig. 1a). No lichen products detected by TLC. **BLS 1802.**

On limestone; rare. S.W. England (Mendips), N. & S. Wales, Pennines.

*R. immersa*, previously included within *R. bischoffii*, has a similar spore type to that species but is separated by its notably immersed apothecia and a hymenium which lacks oil droplets.



### **Rinodina intermedia** Bagl. (1863)

DD

Similar to *Rinodina conradii* but with submuriform ascospores, with one or two of the central cells with a vertical or oblique subdivision. The spores have a somewhat different ontogeny, lacking the development of apical wall thickenings prior to septum formation, as in *R. conradii*. The presence of deoxylichesteric acid is diagnostic, according to Mayrhofer *et al.* (2001). **BLS 2565.**

In rock crevices, Sark (Channel Is.).

Apparently known only from a Larbalestier collection of 1866. Collections of *R. conradii* should be re-examined for overlooked material of *R. intermedia*.



### **Rinodina interpolata** (Stirt.) Sheard (1973)

Thallus thin, rimose or rimose-areolate, pale grey to dark brown, sometimes with a mauve tinge, occasionally appearing as if frosted; areoles 0.25–0.8 mm diam.; prothallus ± well-developed, black. Apothecia 0.3–0.4 mm diam., sessile, often widely scattered; thalline margin persistent, entire, concolorous with the thallus; disc flat to slightly convex, brown-black; epithecium 10–20 µm high, dark brown; hymenium 60–80 µm tall; hypothecium 50–80 µm tall, colourless. Asci ca 45 × 13–17 µm. Ascospores 13–18 × 6–9 µm, narrowly ellipsoidal, strongly thickened near the septum but also slightly thickened apically, outer surface roughened, *Physconia*-type (Fig. 1h). No lichen products reported by TLC. **BLS 1290.**

On hard siliceous rocks, usually on sheltered, ± vertical surfaces of cliff-faces or below overhangs; uncommon. N. & N.E. Scotland.

In similar habitats it may be confused with *R. occulta* which has a paler, K± yellow (± atranorin) thallus and *Physcia*- to *Milvina*-type spores. See also *R. milvina*.

NT



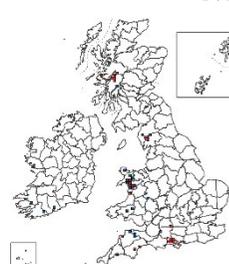
### **Rinodina isidioides** (Borrer) H. Olivier (1909)

Thallus effuse, composed of numerous minute coralloid-branched and thin ± cylindrical isidia. Isidia pale grey, green when wet, sometimes appressed or like folded squamules. Apothecia 0.9–1.15 mm diam., sessile, frequent, sometimes contiguous; thalline margin 0.1–0.15 mm thick, concolorous with the thallus, entire or crenulate, persistent; disc black, persistently flat; epithecium red-brown; hymenium 130–160 µm high; hypothecium 30–50 µm tall; paraphyses 1–2.5 µm diam., apices 4–5.5 µm diam. Asci 75–110 × 22–35 µm. Ascospores 21–31.5 × 11.5–17 µm, *Pachysporaria*-type (Fig. 1j). Thallus K+ yellow (atranorin). **BLS 1291.**

On bark, or more rarely amongst mosses overgrowing bark of mature *Quercus*, in ancient woodlands; rare. England (Somerset, New Forest, Herefordshire, Cumbria), S.W. & N. Wales, W. Scotland (Argyll), S.W. Ireland.

When sterile distinguished from *Agonimia octospora* by the pale grey colour when dry (*A. octospora* remains green when dry), the easily visible K+ yellow reaction on the isidia (*A. octospora* can show a fleeting K+ yellow effusion under the microscope), which are larger, more cylindrical and pointed and have a firm, even cortex without microscopic, peg-like extensions.

NT



### **Rinodina laevigata** (Ach.) Malme (1895)

Thallus very thin, mainly consisting of pale brown to brown dispersed areoles. Prothallus indistinct to dark brown. Apothecia abundant, 0.4–0.8 mm diam., broadly attached to sessile. Disc flat to slightly convex, brown to black. Cortex of the apothecium distinct, 50–70 µm thick, consisting of dense intricate hyphae, I–. Hymenium 80–100 µm tall. Epithecium red-brown. Hypothecium to 100 µm high, colourless. Ascospores *Milvina*-type (Fig. 1g), smooth to minutely warted, 18–22 × 13–19 µm, torus well-developed. Conidiomata not seen. No lichen substances detected. **BLS 2325.**

On *Populus tremula*, very rare. East Invernesshire (Clais Eich, Abernethy Forest).

Resembles *R. sophodes* but the apothecial cortex is I– and it has longer, *Milvina*-type ascospores (Fig. 1g). Collections from Scandinavia (Mayrhofer & Moberg 2002) have much narrower, *Physcia*-type ascospores, and the Scottish material may represent a different species.

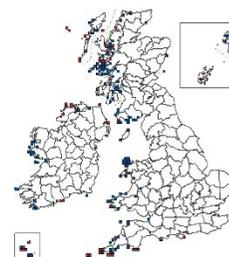
Nb



### **Rinodina luridescens** (Anzi) Arnold (1872)

Thallus thick, continuous or ± deeply rimose, dark grey to black-brown, usually with a distinctive purple tinge; areoles 1.25–2.7 mm broad, sometimes mosaic-forming; prothallus grey-black, often ± delimiting. Apothecia 0.8–1.5 mm diam. frequent, often contiguous, ± immersed; thalline margin thin, 50–100 µm thick, darker than the thallus, eventually becoming excluded; disc black, flat becoming slightly convex; epithecium brown; hymenium 75–155 µm high; hypothecium 70–155 µm high, pale brown. Asci 50–65 × 18–23 µm. Ascospores 15–23 × 7.5–12 µm, ellipsoidal, between *Physcia*- and

LC



*Milvina*-types (Fig. 47i,g). Thallus cortex C+ red (gyrophoric acid, zeorin). **BLS 1293.**

On maritime siliceous rocks, xeric supralittoral; locally common. W. Britain and Ireland.

A distinctive species with a thick, violet-grey thallus, C+ red and large, immersed apothecia lacking a visible thalline exciple.

### **Rinodina milvina** (Wahlenb.) Th. Fr. (1860)

Thallus usually matt, thick, areolate, grey, grey- to dark brown. Apothecia to 1 mm diam., crowded, slightly immersed to broadly superficial; thalline margin entire, in part swollen, prominent; hymenium 90–120 µm high; hypothecium to 200 µm high, ± colourless; disc flat to slightly convex. Ascospores 16–22 × 8–12 µm, with a finely ornamented surface, *Milvina*-type (Fig. 1g). Lichen products not detected by TLC.

**BLS 1803.**

On slaty, nutrient-rich rocks, particularly bird-perches; very rare. N.W. Scotland (Colonsay and Mingulay), Wales (Pembrokeshire).

*R. interpolata* has smaller *Physconia*-type ascospores. British material of *R. milvina* is in poor condition.



### **Rinodina mniaroeiza** (Nyl.) Arnold 1871

*Rinodina mniaroea* var. *mniaroeiza* (Nyl.) H. Magn. (1936)

Thallus continuous, thin, effuse, granular-verrucose, smooth, whitish, rarely pale brown to brown. Apothecia abundant. Ascospores *Physcia*-type, 20–32 × 9–15 µm, torus well-developed. Conidia bacilliform, 4–5 × ca 1 µm. Thallus K+ yellow. C-, P+ yellow (atranorin, ± variolaric acid). **BLS 1998.**

Terricolous, montane, very rare. N. Scotland (Angus).

Differs from *R. cinnamomea* in the absence of orange pigment in the medulla and in having a whitish K+ yellow (atranorin) surface to the thallus.

DD NR



### **Rinodina occulta** (Körb.) Sheard (1967)

Thallus thin, whitish, grey, pale brown to ochraceous, finely areolate; areoles to 0.2–0.7 mm broad, usually contiguous, flat, effuse; prothallus dark, entire, limiting. Apothecia 0.1–0.3 mm diam.; thalline margin ca 50 µm thick, concolorous with the thallus, entire, persistent or sometimes excluded; disc black, flat or becoming convex; hymenium 55–85 µm high; hypothecium 10–55 µm high. Asci 45–50 × 13–20 µm. Ascospores 11–16 × 5–9 µm, between the *Physcia*- and *Milvina*-types (Fig. 47i,g). Thallus K± yellow (atranorin). **BLS 1294.**

On well-lit, hard and sometimes metal-rich siliceous rocks; rare. W. England, N. Wales, Scotland.

Superficially resembles *R. oxydata* which has larger (19–25 × 9–14 µm), *Mischoblastia*-type ascospores. *R. interpolata* is K-.

Nb



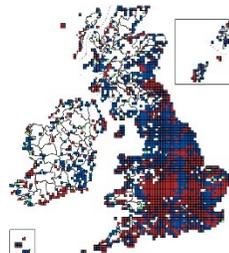
### **Rinodina oleae** Bagl. (1857)

Thallus thin, pale to dark grey, often tinged olive or brown, continuous or more usually rimose, flat, sometimes inconspicuous, effuse or not; prothallus indistinct or white. Apothecia 0.3–0.6 mm diam., sessile, rarely immersed, frequent and often contiguous and crowded; thalline margin ca 50 µm thick, concolorous with the thallus, entire, persistent or occasionally excluded; disc dark brown-black, flat, becoming convex; hymenium 70–110 µm high; hypothecium 25–115 µm high. Asci 45–70 × 13–21 µm. Ascospores 13–16 × 7–10 µm, tending to swell around the middle in K, *Dirinaria*- to *Physcia*-type (Fig. 47d,i). Conidia 4–5 × ca 1 µm. No lichen products detected by TLC. **BLS 1289.**

On calcareous, nutrient-rich and -enriched substrates, particularly rocks, mortar, concrete, asbestos-cement, rubbish, bark (especially when enriched) and wood, a pollution-tolerant species; common. Throughout Britain and Ireland.

This is the commonest species of the genus on rock and man-made substrates.

LC



There is a tentative identification of *Sphaerellothecium parietinarium* (Linds.) Hafellner & V. John (2006) from a specimen of this host from Essex.

### **Rinodina parasitica** H. Mayrhofer & Poelt (1979)

Thallus dark brown, forming small patches to *ca* 2 cm diam. on crustose lichens, areolate; areoles to 0.5 mm diam., rounded. Apothecia to 0.4 mm diam., sessile; thalline margin concolorous with the thallus; epithecium reddish brown; hymenium 70–80 µm high; hypothecium to 75 µm high; paraphyses 1.5–2 µm diam., apices 4–6 µm diam. Ascospores 14.5–20 × 7.5–11 µm, *Physcia*-type (Fig. 1i). Lichen products not detected by TLC. **BLS 1846.**

Facultatively lichenicolous on thalli of *Circinaria* (*Aspicilia*) *caesiocinerea* but subsequently developing an independent thallus; on tops of boulders in a mountain stream at *c.* 650 m alt.; very rare. Scotland (Angus, Caenlochan Glen).

*Endohyalina* (formerly *Rinodina*) *insularis* (Caliciaceae) is also lichenicolous, but on *Lecanora rupicola*. The lichenicolous habit is not otherwise known in *Rinodina* species from our area.

**DD**



### **Rinodina pityrea** Ropin & H. Mayrhofer (1995)

Thallus thin or evanescent, dark grey, continuous or more usually cracked, granular, indeterminate; prothallus inconspicuous. Apothecia 0.35–0.45 mm diam., sessile, infrequent, rarely contiguous; thalline margin *ca* 50 µm thick, entire and persistent, concolorous with the thallus or paler; disc black, becoming only slightly convex; epithecium blue-black, K+ violet, N+ violet; hymenium 60–95 µm high; hypothecium 70–115 µm high. Asci 50–70 × 13–19 µm. Ascospores 12.5–23.5 × 5.0–11.5 µm, thick and double-walled, lumina angular or irregular at first, becoming rounded, *Tunicata*-type (Fig. 1e). No lichen products detected by TLC. **BLS 1932.**

On nutrient-rich bark and wood, particularly *Fraxinus* and *Ulmus*, sometimes on calcareous stonework; rare or overlooked. E. England, E. Scotland.

Characterised by the dark thallus, blue-black, K+ violet, epithecium and *Tunicata*-type, double-walled ascospores with a uniformly thickened outer wall. When sterile easily confused with *Caloplaca chlorina* and resembles a bluish *Lecania erysibe*; cf. also *R. calcarea*.

**Nb**



### **Rinodina pyrina** (Ach.) Arnold (1881)

Thallus minutely warted or cracked, effuse, whitish to grey, cortex I–. Apothecia 0.2–0.4 mm diam., usually numerous and crowded, flat, often becoming convex; exciple distinct; epithecium dark brown; hymenium *ca* 65 µm high; hypothecium *ca* 40 µm high. Ascospores 13–15 × 6–7 µm, thin-walled, *Physconia*-type (Fig. 1h) and often slightly curved, lacking thickenings when mature. Lichen products not detected by TLC. **BLS 1296.**

Coastal, on wood; occasionally on vertical sides of marine timbers, also on *Acer pseudoplatanus*; rare. E. England, Scotland including the Hebrides.

Distinguished from *R. sophodes* by the paler, more wide-spreading thallus and from *R. oleae* by the smaller apothecia and thin-walled, somewhat curved ascospores.

**DD**

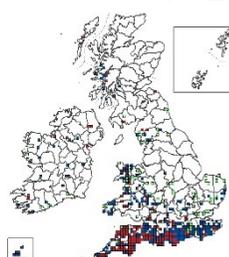


### **Rinodina roboris** (Duf. ex Nyl.) Arnold (1881)

Thallus usually thick, continuous or more often irregularly cracked, flat, uneven-granular and often slightly squamulose and pinkish at the margins, pale to green-grey, effuse; prothallus indistinct or grey. Apothecia 1.0–1.6 mm diam, conspicuous, sessile, frequent, often contiguous; thalline margin 0.1–0.5 mm wide, concolorous with the thallus, entire, often becoming crenulate, persistent; disc dark brown, becoming black, persistently flat; hymenium 95–115 µm high, I+ blue; hypothecium 95–175 µm high, I–. Asci 50–85 × 18–22 µm, inner walls uniform. Ascospores 14–22 × 8–12 µm, with thick walls, locules rounded, *Pachysporaria*-type (Fig. 1j). Thallus K+ yellow (atranorin). **BLS 1297.**

On well-lit bark, especially rough barked trees, such as *Quercus* and *Fraxinus* but also on *Fagus*; locally common. S. Britain, becoming rarer N. to Scotland (Argyll), W. Britain, Ireland.

**Nb IR**



Characterised by the usually pale grey, K<sup>+</sup> yellow thallus, the large, flat apothecia with a relatively thick, ± crenulate thalline exciple and by the *Pachysporaria*-type ascospores.

### **Rinodina roboris** var. **armeriicola** Matzer & Sattler (1993)

NT

As for var. *roboris*, but thallus nodulose-uneven, occasionally ± minutely papillate; apothecia sparse with a notably uneven thalline exciple. Its status needs further examination. **BLS 1962.**

Coastal, on moribund *Armeria maritima* and *Calluna*; uncommon. Pembroke (Castle Martin), Cornwall (Lizard Peninsula) and the Isles of Scilly.

### **Rinodina sicula** H. Mayrhofer & Poelt (1979)

Nb

*Rinodina orculariopsis* H. Mayrhofer (1984)

Thallus thin, grey- to black-brown, often with a ± mauve tinge, membranous, partly cracked-areolate, at times completely obscured by apothecia; prothallus black. Apothecia to 0.5 mm diam., sessile, not constricted at the base, often crowded and clustered; thalline margin thick, persistent; disc even, black-brown to black; true exciple ± distinct; epithecium dark brown; hymenium 90–110 µm tall; hypothecium colourless. Ascospores 17–23 × 8–12 µm, broadly ellipsoidal, only strongly thickened near the septum, surface minutely roughened, *Physconia*-type (Fig. 1h). Thallus C<sup>-</sup>, K<sup>-</sup>, Pd<sup>-</sup> (zeorin). **BLS 1727.**

On siliceous rocks, often in nutrient-rich crevices, also on gravestones, standing stones, sarsens, bird-perching rocks etc., mainly coastal; rare. Western Britain, also on megaliths in Wiltshire.



### **Rinodina sophodes** (Ach.) A. Massal. (1852)

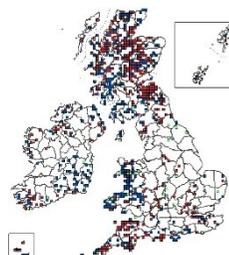
LC

Thallus in small patches, thick or thin, pale grey to olive-brown, irregularly rimose-cracked, flat, determinate; prothallus often present, thin, entire, grey-black. Apothecia 0.45–1.15 mm diam., immersed, sometimes becoming sessile, frequent, usually contiguous; thalline margin 50–150 µm thick, concolorous with the thallus, entire, persistent; disc dark brown, becoming black, persistently flat; hymenium 85–130 µm high, I<sup>+</sup> blue; hypothecium 60–130 µm high, I<sup>+</sup> blue. Asci 50–70 × 15–20 µm, inner walls uniform. Ascospores 13–19 × 6.5–9 µm, with thin walls and rounded lumina, *Milvina*-type (Fig. 1g). Lichen products not detected by TLC. **BLS 1298.**

Mainly on twigs of smooth-barked trees, particularly wayside *Fraxinus*, an early colonizer, usually associated with leaf and girdle scars, most common in upland and exposed districts; widespread. W. & N. Britain and Ireland, but rare in E. England.

Distinguished from *R. oleae*, a species of old tree trunks, by the darker olive-brown, well-delimited thallus with crowded apothecia and the thin-walled broadly ellipsoidal *Milvina*-type ascospores; cf. *R. pyrina*, *R. laevigata*.

*Lichenoconium erodens* and *Lichenodiplis lichenicola* Dyko & D. Hawksw. (1979) can inhabit the apothecia of this species.



### **Rinodina subpariata** (Nyl.) Zahlbr. (1931)

VU D1,2

*Rinodina degeliana* Coppins (1983)

Thallus crustose to subsquamulose, forming small round patches amongst other lichens; areoles grey-white, irregularly rounded, flat or slightly ascending, with pure white marginal soralia; prothallus indistinct. Apothecia absent in British material, 1 per areole, 0.3–0.6 mm diam., thalline margin 40–60 µm thick, soon prominent, concolorous with the disc; disc flat, blackish-brown, matt; epithecium reddish-brown; hymenium 75–85 µm high, hypothecium colourless, ca 70 µm high. Asci 75–80 × 15–20 µm. Ascospores 19–25 × 10–14 µm, brown, the apex of lumina usually rounded, *Dirinaria*-type (Fig. 1d). Thallus K<sup>+</sup> yellow, Pd<sup>+</sup> yellow (atranorin, chloroatranorin, zeorin, ± traces of unidentified terpenoids). **BLS 1215.**

Sterile on *Quercus* bark; very rare. N. Scotland (Aberdeen).

Characterised, when sterile, by the flat, grey-white areoles with pure white, ± lip-shaped marginal soralia and K<sup>+</sup> yellow, Pd<sup>+</sup> yellow reactions.



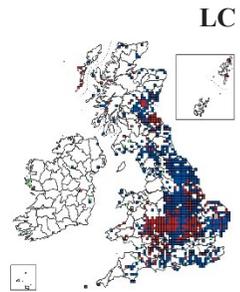
### **Rinodina teichophila** (Nyl.) Arnold (1863)

Thallus thin to thick, irregularly rimose, flat or more usually rather uneven, frequently  $\pm$  granular, effuse or not, dark grey to blackish, rarely pale grey, ochraceous or brown; prothallus indistinct. Apothecia 0.7–1.25 mm diam.,  $\pm$  immersed, frequent, often contiguous; thalline margin 50–100  $\mu$ m thick, concolorous with the thallus, entire, persistent; disc dark brown becoming black, persistently flat; epithecium brown; hymenium 80–145  $\mu$ m high, I+ blue; hypothecium 55–100  $\mu$ m high. Asci 75–90  $\times$  20–30  $\mu$ m. Ascospores 20–32  $\times$  11–19  $\mu$ m, thick-walled, lumina not angular, between *Pachysporaria*- and *Mischoblastia*-types (Fig. 1j,b). Thallus K $\pm$  yellow ( $\pm$  atranorin).

#### **BLS 1300.**

On siliceous to weakly basic rocks, particularly on ironstone walls, often on memorials, rarely on tree trunks; scattered. Throughout Britain and Ireland with a strong eastern (lowland) bias.

Characterised by the dark thallus, concolorous  $\pm$  immersed apothecia and large ascospores with a thick, internally uneven wall.



## **TORNABEA Østh. (1980)**

As this is a monotypic genus the description below (*T. scutellifera*) constitutes the generic description.

Closely resembles *Anaptychia* in the polarilocular, brown ascospores and longitudinal hyphae in the upper cortex, but the lobes are corticated above and below, are not dorsiventral and lack the marginal cilia present in *Anaptychia*.

#### **Literature**

Edwards & Purvis (2009c), Knudsen & Kocourková (2016), Nimis & Tretiach (1997), Rambold *et al.* (1994).

### **Tornabea scutellifera** (With.) J.R. Laundon (1984)

Thallus 2–3 cm tall, tufted, glaucous grey, pale grey- to red-brown; branches to 1 mm diam., dichotomous or irregularly branched, locally entangled, tomentose or finely pubescent, rounded or flattened and angular, occasionally somewhat channelled, gradually narrowing towards the apices; cortex of conglutinated, thick-walled hyphae mostly orientated longitudinally, sometimes covered with a colourless layer, present on both surfaces; photobiont trebouxoid. Ascumata apothecia, rare, sessile, to 1 mm diam.; disc black-brown, convex; thalline margin thin, entire, grey; paraphyses  $\pm$  thickened, branched, the apices brown. Asci 8-spored, elongate-clavate, *Lecanora*-type. Ascospores brown, ellipsoidal, polarilocular, 20–30  $\times$  10–15  $\mu$ m. Conidiomata pycnidia, immersed, upper part brown; conidia 3.5–4.5 (–5)  $\times$  ca 1  $\mu$ m. Lichen products not detected by TLC. **BLS 1430.**

On rocky and sandy cliffs, trunks of old trees and sides of old timber barns in coastal districts; not observed since the 19th century and probably extinct in Britain. S. England (Sussex).

Distinguished from related genera by the radial structure. The cortex comprises hyphae which run parallel with the long axis of the branch which give rise to short, lateral hyphae to the surface, giving the lichen a soft, pubescent appearance. *T. scutellifera* was formerly locally frequent in S. England (Hastings–Chichester area); landslip of cliffs, increasing pollution and over-zealous collecting may have hastened its extinction.



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