

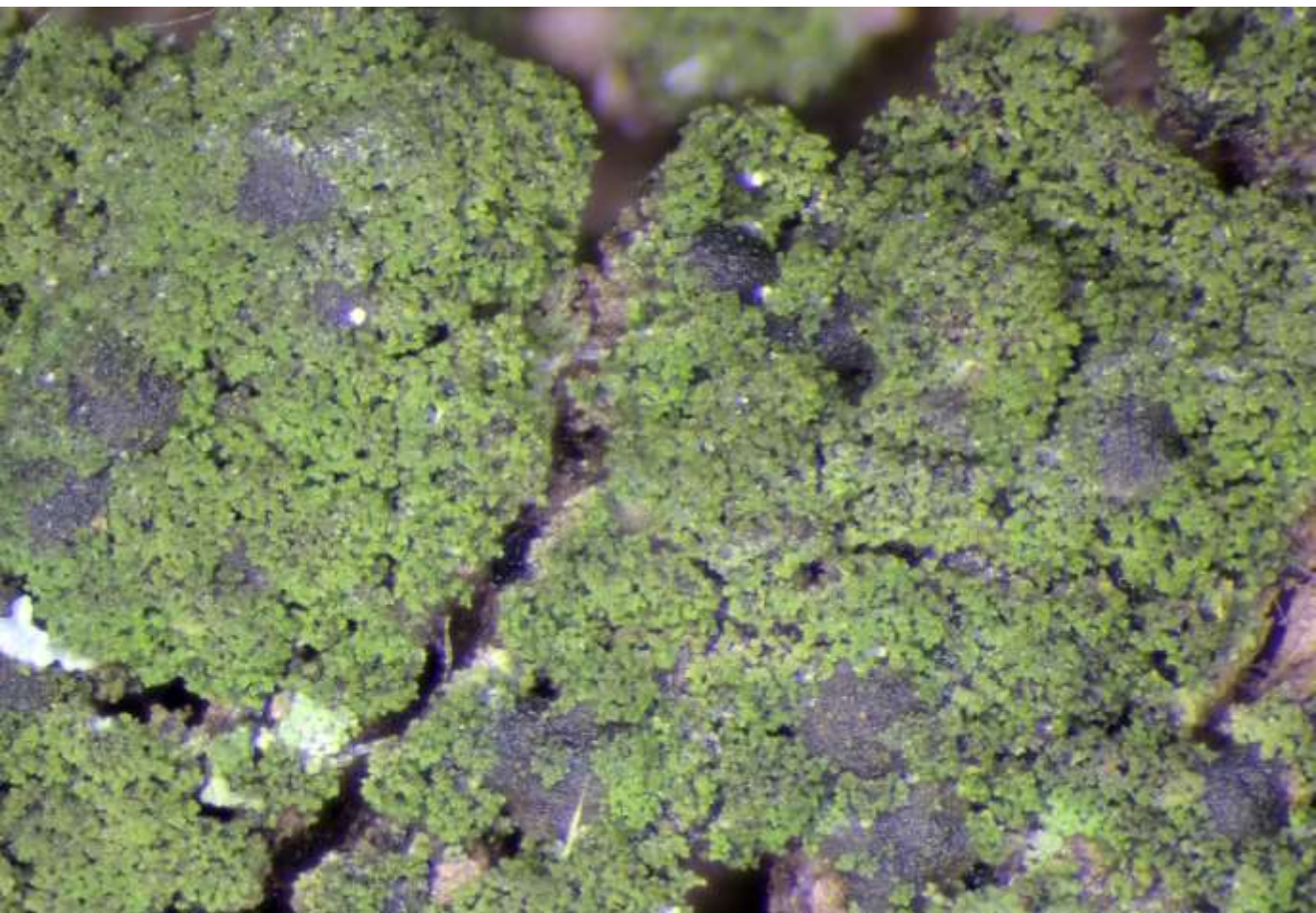
Revisions of British and Irish Lichens



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Lecanorales: Pilocarpaceae

Cover image: *Micarea atroviridis*, fertile thallus on lignum of a dead standing *Quercus* tree, Bignell Wood, New Forest, Hampshire, England.

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.

Key to map date classes

	2000–
	1960 - 1999
	1650 - 1959

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. Conservation assessments use the [codes](#) listed in the BLS website. The four-digit number at the end of each description refers to BLS numbers which are part of the recording scheme; they link to species rather than names, and are unchanged (with rare exceptions)

when names alter following improvements in taxonomy.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

including the genera *Aquacidia*, *Byssoloma*, *Fellhanera*, *Fellhaneropsis*, *Leimonis* and *Micarea*.

by

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PILOCARPACEAE Zahlbr. (1905)

Thallus crustose, often effuse and ecorticate, farinose, scurfy or granular, often sorediate and rarely isidiate. **Photobiont** chlorococcoid, rarely with cephalodia containing cyanobacteria. **Ascomata** apothecia, often strongly convex, sometimes immarginate, thalline exciple absent, true exciple often becoming excluded. **Hamathecium** of sparsely branched and anastomosed paraphyses, the apices hardly thickened. **Asci** with an amyloid apical dome with a darker apical cushion, surrounded by I+ gelatinous layer, 8-spored. **Ascospores** colourless, narrowly ellipsoidal, fusiform or cylindrical, usually multiseptate, without a gelatinous sheath. **Conidiomata** pycnidia (rarely sporodochia), immersed, sessile or stalked. **Conidia** sometimes di- or trimorphic, varied in shape.

The circumscription of the Pilocarpaceae includes the Micaraceae, following Lücking *et al.* (2016) with the addition of the more recently described *Aquacidia*. *Micareia* in particular is a complex and diverse group of lichens, and much work is currently taking place on its phylogenetic framework.

The anamorphs of the species of Pilocarpaceae are diverse, and in many the conidiomata are dominant and the apothecia rarely produced. A key to such species is therefore included below, in addition to a more traditional key to genera that emphasizes apothecial characters.

Literature:

Andersen & Ekman (2004, 2005), Coppins (2009), Ekman & Svensson (2014), Ekman *et al.* (2008), Halda *et al.* (2022), Lücking (2008), Lücking *et al.* (2016), Miądlikowska *et al.* (2014), Printzen *et al.* (2008), Wang *et al.* (2020a).

Key to genera of Pilocarpaceae

- | | | |
|------|--|-----------------------|
| 1 | Apothecia without a distinct margin, the exciple usually excluded at an early stage, composed of branched radiating hyphae | <i>Micareia</i> |
| | Apothecia with a distinct, usually persistent margin | 2 |
| 2(1) | Exciple often tomentose-arachnoid (byssoid), composed of loosely intricate thick-walled hyphae | <i>Byssolema</i> |
| | Exciple smooth, not composed of loosely intricate, thick-walled hyphae | 3 |
| 3(2) | Conidia pyriform..... | <i>Fellhanera</i> |
| | Conidia long and curved, bacillar or cylindrical | 4 |
| 4(3) | Exciple composed of vertically oriented ellipsoidal to polyhedral cells..... | <i>Fellhaneropsis</i> |
| | Exciple composed of thin-walled branching hyphae..... | 5 |
| 5(4) | Ascospores aseptate | <i>Leimonis</i> |
| | Ascospores normally 3- or 5-septate | <i>Aquacidia</i> |

Key to species of Pilocarpaceae with soredia or isidia, and to those where pycnidia are dominant

- | | | |
|------|---|----|
| 1 | Thallus sorediate or isidiate; pycnidia sometimes sparse or absent..... | 2 |
| | Thallus not sorediate or isidiate; pycnidia usually present and conspicuous (×20 lens)..... | 13 |
| 2(1) | Thallus sorediate | 3 |
| | Thallus isidiate | 11 |

- 3(2) Soralia crateriform, pustular and significantly raised above the thallus surface *Fellhanera viridisorediata*
Soralia erumpent from areoles or developing amongst gonocysts, not crateriform..... 4
[with roccellic acid (white crystals in acetone extract on a glass slide, observed under the microscope); when without roccellic acid, see *Bacidina* (Ramalinaceae)]
- 4(3) Thallus vivid green or green, sometimes with a bluish tinge, covered in finely granular gonocysts with POL+ crystalline granules, often with a powdery appearance,..... 5
Thallus grey, grey-green or grey-brown, soredia variously coloured..... 7
- 5(4) Thallus C+, KC+ pink, red or orange..... 6
Thallus C-, KC-; mesoconidia ca $3.8 \times 1.4 \mu\text{m}$ *Micarea microsorediata*
[algae are micareoid, 4–7 μm diam.; when algae chlorococoid, reaching 10 μm or more, see *Bacidina*]
- 6(5) Thallus C+ and KC+ persistent orange; pycnidia not seen..... *Micarea xanthonica*
Thallus C+ pink, KC+ red; mesoconidia $4.5\text{--}6 \times 1.3\text{--}2 \mu\text{m}$ *Micarea viridileprosa*
- 7(4) Thallus of fragile ash-grey, grey-green or grey-brown granular areoles, with blue-grey or blue-green soredia; UV- 7
Thallus thin, rimose or finely granular with patches of yellow-green, farinose soredia; UV+ pink-orange *Aquacidia viridifarinsa*
- 8(7) Thallus Pd+ red or yellow; soredia \pm granular, 20–50 μm diam.; pycnidia unknown..... 9
Thallus Pd-; pycnidia at least sometimes present 10
- 9(8) Thallus Pd+ red *Micarea leprosula*
Thallus Pd+ yellow *Micarea submilliaria*
- 10(8) Pycnidia 60–70 μm diam., with microconidia $4.5\text{--}6 \times 0.6\text{--}0.8 \mu\text{m}$, narrowly fusiform-cylindrical *Micarea coppinsii*
Pycnidia usually present, 80–150 μm diam., with microconidia $3\text{--}4 \times 1.3\text{--}1.7 \mu\text{m}$, pyriform *Fellhanera bouteillei*
- 11(2) With methoxymicareic acid; apothecia with Cinereorufa-green pigment *Micarea atroviridis*
With micareic acid; apothecia lacking Cinereorufa-green pigment..... 12
- 12(11) Apothecia with a hypothecium with Sedifolia-grey pigment [these two species are indistinguishable based solely on thallus characteristics]..... *Micarea aeruginoprasina*
Hypothecium colourless..... *Micarea isidioprasina*
- 13(1) Pycnidia stalked or sessile on the thallus surface 14
Pycnidia immersed in areoles, sometimes becoming emergent with gaping ostioles, or with small sessile apothecium-like sporodochia..... 26
- 14(13) Conidia (20–) $30\text{--}43 \times 0.5\text{--}1 \mu\text{m}$, filiform, curved *Fellhaneropsis vezdae*
Conidia bacilliform to cylindrical or pyriform..... 15
- 15(14) Pycnidia black 16
Pycnidia whitish to reddish brown or bluish grey, never black 19
- 16(15) Pycnidial wall olivaceous brown, K+ violet; mesoconidia $3.5\text{--}5 \times 1\text{--}1.5$ (–1.7) μm 17
Pycnidial wall K- or K+ olivaceous..... 18

- 17(16) Thallus Pd+ red (argopsin); pycnidia multichambered; photobiont cells 5–12 µm diam.
*Aquacidia trachona*
 Thallus Pd– (or entirely immersed); pycnidia not multichambered; photobiont cells 4–7 µm diam.
*Micarea misella*
- 18(16) Pycnidial wall and stalk dark purple-brown, K+ dark green; mesoconidia 3.4–4.3 × 1.2–1.6 µm
*Micarea nigella*
 Pycnidial wall dark olivaceous, K–; stalk fuscous or reddish-brown, K–*Micarea botryoides*
- 19(15) Thallus of pale to dark green goniocysts, 12–40 µm diam.; goniocysts containing purple oily
 substance in K; pycnidia brown with white tomentum; mesoconidia (4–) 4–5 (–6) × 1.3–1.7 µm
*Micarea hedlundii*
 Thallus indistinctly areolate or rimose, or endoxylic, without goniocysts, K– 20
- 20(19) Conidia pyriform or droplet-shaped 21
 Conidia bacilliform to cylindrical 22
- 21(20) Conidiomata pale, without crystals; conidia 3–4 µm long *Fellhanera subtilis*
 Conidiomata with brown or bluish, N+ red pigment (crystals); conidia 4–6 µm long *Fellhanera ochracea*
- 22(20) Pycnidia bluish grey (the colour most evident when damp), usually with a thin white tomentum, the
 wall blue-green (K–, N+ red); on living leaves *Byssoloma diderichii*
 Pycnidia whitish or reddish brown, sometimes pubescent; on smooth bark or rocks 23
- 23(22) Pycnidia whitish, C+ red (gyrophoric acid); mesoconidia 4–6 × 1–1.5 µm *Micarea pycnidiophora*
 Pycnidia C–, whitish or reddish brown 24
- 24(23) Pycnidia elongate and often distinctly stalked; thallus UV– 25
 Pycnidia ± sessile; conidia 4–5.7 × (1–) 1.5 µm; thallus UV+ pink-orange *Aquacidia antricola*
- 25(24) Pycnidia whitish, on stalks that are sometimes branched; conidia 6–8 × 1–1.8 µm, bacilliform
 to ellipsoidal *Micarea stipitata*
 Pycnidia grey-brown to dark grey, usually thinly white-tomentose, sessile to stalked; conidia
 3.5–4.7 × 1.5–2 µm, shortly cylindrical or wider at the proximal end *Micarea doliiformis*
- 26(13) With whitish pulvinate apothecium-like sporodochia 0.1–0.25 mm diam., bearing cylindric-
 ellipsoidal macroconidia 6–10 × 2–3 µm in size (immersed, inconspicuous pycnidia containing
 mesoconidia 4.5–3 × 1.2–1.5 µm may also be present); all parts C– *Micarea adnata*
 Sporodochia absent; thallus and/or pycnidia C+ red (gyrophoric acid) or C– 27
- 27(26) Conidia tetrahedral or bluntly ‘T’-shaped, 3–6.5 × 3.5–4 µm *Micarea angularis*
 Conidia bacilliform, cylindrical or elongate 28
- 28(27) Thallus of pale to dark green (sometimes K+ violet) goniocysts 29
 Thallus smooth, areolate, scurfy or endoxylic 30
- 29(28) Thallus pale to dark, somewhat greyish green (sometimes K+ violet); pycnidia, if present,
 30–80 µm diam, variously coloured; with micareic acid *Micarea prasina* s.l. (including *M. fallax*)
 Thallus pale green; pycnidia usually abundant, 50–130 µm diam., white to whitish cream with
 widely gaping ostioles; with methoxymicareic acid *Micarea micrococca*
 [if thallus with goniocysts and conidia long and curved or hook-like, see *Bacidina*]

- 30(28) Thallus areolate, or scurfy (invaded by dark hyphae and foreign algae), or \pm endoxylic; photobiont cells 4–7 μm diam.; thallus and/or pycnidia usually C+ red (gyrophoric acid); sometimes with curved or flexuose macroconidia 31
Thallus smooth, dark greyish, usually with a grey-black prothallus; photobiont cells 7–16 (–26) μm diam; thallus C–; macroconidia not present; usually on rock, especially pebbles, rarely on lignum..... *Leimonis erratica*
- 32(31) With numerous pycnidia containing mesoconidia, 3–5.5 (–6) \times 1.3–2 μm , often extruded as conspicuous white blobs; in addition, pycnidia containing microconidia (4.5–) 5–7.5 \times 0.7–1 μm , or curved macroconidia 12–24 \times ca 1 μm , sometimes present; pycnidial walls with pale olivaceous pigment, K+ violet; usually on lignum, commonly on worked timber 33
Pycnidia usually with longer, curved or flexuose macroconidia; smaller pycnidia with microconidia sometimes present; mesoconidia unknown; pycnidial walls colourless or greenish, K–; on various substrata, rarely on worked timber 34
- 33(32) Pycnidia immersed within thallus areoles; mesoconidia (3.5–) 4–5.5 (–6) \times 1–1.6 μm , cylindrical *Micarea nitschkeana*
Pycnidia immersed to emergent and then \pm shortly stalked; mesoconidia 3–4.2 (–5) \times 1.4–1.8 (–2) μm , shortly cylindrical or obovoid..... *Micarea denigrata*
- 34(32) Macroconidia curved or hamate, 21–40 \times 1–1.5 μm 35
Macroconidia flexuose, 50–110 \times ca 1 μm ; microconidia (3.8–) 4–5 \times 0.5–0.7 μm *Micarea cinerea*
- 35(34) Pycnidia present with microconidia (5–) 6–7 (–7.7) \times 0.4–0.7 μm , fusiform-cylindrical *Micarea peliocarpa*
Pycnidia present with mesoconidia 3.5–5 (–5.7) \times 1–1.5 μm , cylindric-ellipsoidal... *Micarea marginata*

AQUACIDIA Aptroot (2018)

Thallus extensive, often covering large areas of the substrate; crustose, thin and rimose or granular-leprose. **Photobiont** cells small (usually $<10 \mu\text{m}$ diam.). **Apothecia** lecideine, flat, with a persistent margin, composed of thin-walled branching hyphae. **Hamathecium** of branched paraphyses with swollen clavate tips. **Asci** *Micarea*-type, 8-spored. **Ascospores** cylindrical, colourless, (0-) 3- to 5-septate. **Pycnidia** often present, relatively large and conspicuous, often with a wide open ostiole. **Conidia** cylindrical, often biguttulate or with a median constriction. **Chemistry**: thallus with xanthenes (UV+ pink) or argopsin (Pd+ red); apothecia and pycnidia sometimes with anthraquinones (K+ purple). **Ecology**: in shaded conditions, on hard siliceous rocks or dry bark.

Recognized as atypical within *Bacidia* by Coppins & Aptroot (2009), belonging rather to the Pilocarpaceae. Molecular data are still sparse, but the genus appears to belong in a sister clade to *Fellhanera*.

Literature:

Aptroot *et al.* (2018), Coppins & Aptroot (2009), Svensson *et al.* (2017).

- 1 Thallus PD+ red, UV–; apothecia and pycnidia dark, K+ purple *trachona*
Thallus Pd–, UV+ pink-orange; apothecia and pycnidia pale 2
- 2(1) Thallus sorediate; apothecia unknown in the British Isles *viridifarinosa*
Thallus not sorediate; apothecia beige or pale pink..... *antricola*

Aquacidia antricola (Hulting) Aptroot (2018)*Bacidia antricola* Hulting (1872)*Bacidia carneoglauca* (Nyl.) A.L. Sm. (1911)

Thallus thin, rimose or finely granular, often with a felt-like appearance, glaucous- or grey-green, developed on a white prothallus which often forms a white bordering margin; photobiont cells 4–10 µm diam. Apothecia 0.4–0.6 mm diam., usually few or absent, sessile, the disc beige or pale pink; margin persistent, white-pubescent; true exciple colourless, of thin-walled hyphae 1.5–3(–4) µm diam.; hymenium 45–60 µm high, colourless; hypothecium colourless; paraphyses 1.5–2 µm diam., unbranched or forked above, not or only gradually widening to ca 3 µm at the apices. Ascospores (14–) 19–28 × 3–4 µm, 3- to 5-septate, ± cylindrical. Pycnidia 0.2–0.4 mm diam., ± sessile, white-pubescent; conidia 4–5.7 × (1–) 1.5 µm, ± cylindrical, biguttulate, often with a median constriction. Thallus UV+ pink-orange; coronatone, rarely traces of other xanthonenes. **BLS 0139.**

On hard siliceous rocks, rarely on exposed large roots, below dry, shaded overhangs, very rarely on veteran *Quercus* trunks by rivers, usually near the coast or by large rivers or lakes; local. N. & W. Britain, W. Ireland.

Easily recognized, even when sterile, by the white-pubescent pycnidia and UV+ pink-orange thallus. *A. viridifarinosa* has an effusely sorediate thallus and, when present, smaller pycnidia. Often occurring with sterile *A. trachona*, which has black pycnidia.

Treated as *Bacidia carneoglauca* by Coppins & Aptroot (2009), but the name *B. antricola* has priority and is widely used in Scandinavia (Svensson *et al.* 2017). *Variolaria torta* Taylor (1836) is the earliest name for this species, but has been proposed for rejection.



Nb

Aquacidia trachona (Ach.) Aptroot (2018)*Bacidia trachona* (Ach.) Lettau (1912)

Thallus thin, rimose, pale grey-green or fawn, surface minutely granular-warted, rarely thicker and minutely leprose-granular; photobiont cells 5–12 µm diam. Apothecia 0.2–0.5 mm diam., often absent, sessile, flat, marginate, black; true exciple and hypothecium dark red-brown, K+ purple; epithecium dark green, K–, N+ red; hymenium 40–50 µm high, pale red-brown below, pale green above; paraphyses 1–1.5 µm diam., contorted and often branched or anastomosing, the apices to 2 µm diam., not or only slightly swollen. Ascospores 11–17 × 3–4.5 µm, (0–) 3-septate, fusiform. Pycnidia 100–300 µm diam., ± sessile, black; multichambered, wall dark brown, K+ purple; conidia 3–5 × 1–1.5 µm, short-bacillar, often biguttulate. Thallus Pd+ red (argopsin). **BLS 0170.**

On deeply shaded hard siliceous rocks, rarely on large exposed tree roots, below overhangs and in caves. Throughout Britain, also recorded from N. Ireland.

Most often found sterile and recognized by its characteristic K+ purple pycnidia, the apothecia being rarely encountered.



Nb

Aquacidia viridifarinosa (Coppins & P. James) Aptroot (2018)*Bacidia viridifarinosa* Coppins & P. James (1992)

Like *A. antricola* in characters of the pycnidia (when present), conidia, photobiont and chemistry including the UV+ reaction. Differing in the effuse, irregular, often confluent patches of yellow-green, farinose soredia 10–30 (–40) µm diam. and less frequent pycnidia that are 0.15–0.26 mm diam. Apothecia very rare in Britain and Ireland, pale orange, becoming convex, the margin paler; epithecium very pale yellow; hypothecium pale yellow; ascospores fusiform-acicular, 6- to 8-septate, 33–44 × 3–4 µm. Chemistry: xanthonenes (coronatone), ± zeorin **BLS 1583.**

On shaded dry bark of mature deciduous trees, especially *Quercus* and *Ulmus*, in humid woodlands, also on shaded siliceous or slightly basic rock-faces, old walls and monuments, frequent. Throughout Britain and Ireland.

Considered as a sorediate counterpart of *A. antricola* by Aptroot *et al.* (2018), but molecular data are not available to confirm this. In the rare fertile thalli, soredia are suppressed by apothecia but appear at the edges of the thallus.



LC

BYSSOLOMA Trevis. (1853)

Thallus crustose, effuse, not corticate. **Photobiont** chlorococcoid. **Ascomata** apothecia, sessile, ± circular. **Thalline margin** absent. **True exciple** formed by loosely intricate hyphae, tomentose-arachnoid in some species. **Hymenium** I+ blue. **Hamathecium** of paraphyses, not or slightly thickened at the apices, unbranched or branched. **Hypothecium** dark red-brown, K± purple in European species. **Asci** 8-spored, rather thick-walled, with a K/I+ blue apical dome containing a darker blue tubular ring structure, and an amyloid gelatinous coat. **Ascospores** 3-septate (in European species), colourless. **Conidiomata** pycnidia, sessile, ± globose, usually covered by a layer of loosely interwoven hyphae. **Conidiophores** unbranched, with apically formed conidia. **Conidia** flask-shaped, bacillar or ± ellipsoidal and constricted at the middle. **Chemistry**: argopsin sometimes detected in one species, otherwise lichen products absent. **Ecology**: predominantly corticolous, also foliicolous.

Characterized by the distinctive ascus structure, byssoid true exciple in most species and mostly flask-shaped conidia. The key below has largely been derived from Breuss (2016a).

Literature:

Breuss (2016a, b), Giavarini & Sérusiaux (2009), Sérusiaux (1998), Sérusiaux *et al.* (2002), Van den Boom (2021), Wang *et al.* (2020b).

- | | |
|------|--|
| 1 | Conidia bacillar; apothecia (unknown in British material) minute (to 0.1 mm diam.) <i>diederichii</i>
Conidia pyriform or soleiform (or absent); apothecia larger, 0.3–0.6 (–0.8) µm diam.2 |
| 2(1) | True exciple arachnoid-woolly or, in well-developed specimens, spreading laterally as an
arachnoid whitish network of hyphae3
True exciple not arachnoid, smooth or shortly byssoid4 |
| 3(2) | Excipular hyphae embedded in a gelatinous matrix, without crystals, the margin thin but distinct,
pale grey; discs dark brown and often with a purplish tinge; ascospores 3-septate..... <i>marginatum</i>
Exciple composed of short hyphae at the margin, the inner part of polyhedral brown cells;
apothecial discs variable in colour (bluish grey to blackish when young, becoming brown
or greenish grey when mature, sometimes with a piebald mixture of these colours), margin
usually paler than the disc in old apothecia; ascospores 3-5 (-7)-septate <i>llimonae</i> |
| 4(2) | Apothecial margin comparatively thin but distinct, barely spreading laterally over the thallus
surface; exciple and epithecium interspersed with crystals <i>maderense</i>
Apothecial margin thick, spreading laterally over the thallus surface; exciple and epithecium
without crystals5 |
| 5(4) | Thallus in small irregular patches, whitish to whitish green; prothallus hardly apparent;
apothecial disc black, sometimes tinged bluish; apothecial margin usually white, rarely
grey-white <i>subdiscordans</i>
Thallus continuous, smooth or irregularly farinose, grey-green; prothallus sometimes
conspicuous, brown to black; apothecial disc orange-brown to dark brown, never black;
apothecial margin yellowish white to yellowish grey <i>leucoblepharum</i> |

Byssoloma diderichii Sérus. (1998)

LC

Thallus thin, inconspicuous, slightly scurfy, grey-green, forming small irregular spots usually no more than 1 mm diam., often with a bluish sheen; prothallus absent. Apothecia unknown in Britain (and often absent abroad), minute, 50–80 (–100) µm diam., usually circular, whitish to pale grey-blue, slightly byssoid; exciple composed of loosely intertwined colourless hyphae; hypothecium blue-green; mature ascospores not known. Pycnidia numerous, bluish grey (colour most evident when damp), usually with a thin white tomentum, 50–100 µm diam.; pycnidial wall blue-green (K–, N+



red). Conidia bacillar to ellipsoidal, $3\text{--}4 \times 1.2\text{--}2 \mu\text{m}$. **BLS 2497**.

On leaves of *Camellia* in East Suffolk; rare but probably overlooked; the conservation evaluation takes into account this supposition.

The bacillar conidia are distinct from the pyriform or soleiform conidia of the other British species of *Byssoloma*. The pycnidia are rather like those of *Fellhaneropsis myrtillicola*, but the microconidia of the latter are much narrower ($4\text{--}8 \times 0.5\text{--}1 \mu\text{m}$).

Byssoloma leucoblepharum (Nyl.) Vain. (1926)

NT

Thallus to 3 cm diam., continuous, grey to greenish grey, smooth or irregularly farinose, usually thin, sometimes rather thick and irregularly cracked; prothallus sometimes conspicuous, brown to black, sometimes bluish. Apothecia 0.3–0.5 mm diam., flat or slightly convex, sometimes clustered in groups and becoming \pm distorted; disc orange-brown to dark brown, sometimes with a bluish tinge, with a tomentose-arachnoid margin, yellowish white to yellowish grey. Ascospores $10\text{--}18 \times 2.5\text{--}4 \mu\text{m}$. Conidia \pm pyriform. Argopsin Pd⁺ (orange-red) sometimes detected in the apothecial margin and thallus. **BLS 1858**.

On old *Calluna* stems and on bark. S.W. England (Lundy), Ireland (Offaly, Clonmacnois); rare. The map includes records of *B. maderense* (see below).

Macroscopically very similar to *B. maderense*, which has its exciple and epithecium interspersed with small colourless crystals; records of *B. leucoblepharum* from the New Forest and Sussex all appear to refer to that species. Collections from Lundy and Ireland need re-examination. *B. leucoblepharum* is a polymorphic species (Breuss 2016b) and may represent an aggregate even after exclusion of *B. maderense*; molecular data (Wang *et al.* 2020b) support this hypothesis.



Byssoloma llimonae Serus., Gomez-Bolea, Longan & Lücking (2002)

NE

Fellhanera christiansenii auct. br., non Sérus. & Vězda (1994)

Thallus crustose, yellowish green when fresh, pale greenish when dry, with a slightly farinose appearance, to 100 μm thick. Apothecia rounded, 0.2–0.5 (–0.6) mm diam., sometimes proliferating from old apothecia and then forming clusters to 0.8 mm diam.; disc initially flat but becoming convex in old apothecia, variable in colour, usually bluish grey to blackish when young, becoming brown or greenish grey when mature, sometimes piebald, rarely slightly pruinose; margin at first distinct and rather thick, becoming thin or excluded, dark bluish or bluish grey when young but usually paler than the disc in old apothecia (sometimes almost white), smooth or shortly byssoid. Exciple 50–65 (–80) μm thick, composed of an outer layer of short hyphae with elongate or globose cells and an inner layer of polyhedral brown cells, K⁺ purple-brown; hypothecium 100–150 μm thick, orange to reddish brown, usually K⁺ darker; hymenium 60–75 μm thick; paraphyses rather coherent, \pm branched and anastomosed 1–1.5 μm diam., the apices to 3 μm diam. ascospores narrowly ellipsoidal to fusiform, sometimes slightly tapering towards the base, 3–5 (–7) septate, (13–) 15–25 \times (3–) 4–5 μm . Pycnidia abundant, flask-shaped, whitish to bluish grey or black, 0.1–0.15 mm diam., usually with a very wide ostiole. Conidia usually biclavate to obpyriform, sometimes almost bacillar, 3–4 (–5) $\times ca$ 1 μm . Lichen substances not detected. **BLS 2472**.

On *Corylus* bark; known only from two sites in N. Cornwall (The Dizzard) and N. Devon (Clovelly).

Formerly identified as *Fellhanera christiansenii*, prior to description of *B. llimonae*. The species is known elsewhere from N.E. Spain (Catalonia) and Macaronesia (Sérusiaux *et al.* 2002), and the description above is largely adapted from that work.



Byssoloma maderense Breuss (2014)

NE

Thallus thin, greyish to greenish, roughened but not distinctly farinose or granular, to 20 mm (or more) diam. Apothecia numerous, round, 0.25–0.6 mm diam. and 120–180 μm high, fully adnate or slightly constricted at the base; discs flat or slightly convex, brownish grey to black, irregularly pruinose, the exciple thin but distinct, persistent, white, barely extending laterally over the thallus surface, formed by loosely woven hyphae with abundant adhering colourless crystals; crystals K[–], not dissolving; hypothecium brown, contiguous with the pigmented central part of the apothecial base;



hymenium colourless, covered by a thin layer of small, colourless to brownish crystals; paraphyses ca 1.5 µm diam., unbranched, with barely thickened apices; ascospores 3-septate, cylindrical, not or slightly constricted at the septa, with a thin episporic, 10–15 × 3–4 µm. Conidiomata apparently absent (not recorded). **BLS 2791**.

On base-rich bark of *Quercus*, *Fagus* and *Salix* in old-growth pasture woodlands, Hampshire (New Forest), Isle of Wight, Sussex.

Similar to *B. leucoblepharum* but with the exciple and epithecium interspersed with small colourless crystals; see under that species for more information. The description has been adapted from Breuss (2016b).

Byssoloma marginatum (Arnold) Sérus. (1992)

Thallus to 4–5 cm diam., usually smaller, almost always continuous, greenish white to greenish, irregularly farinose, rather thin, sometimes indistinct, or of dispersed granules; prothallus absent. Apothecia 0.3–0.7 mm diam., flat to strongly convex, sometimes confluent and forming lobate aggregates; disc brownish to almost black, usually with a bluish tinge, with a slightly prominent (in young apothecia) persistent true exciple always paler than the disc; base of apothecia sometimes with a whitish rim of outwardly directed hyphae anchoring the apothecium to the substratum; hypothecium dark chocolate brown; ascospores 12–18 × 3–5 µm, 3-septate, ellipsoidal. Conidiomata usually conspicuous. Conidia 3.7–4.5 × 1.3–1.7 µm, pyriform or slightly constricted at the middle. **BLS 1557**.

In crevices of smooth bark (e.g. *Corylus*), rough bark or overgrowing mosses on bark (*Quercus*, *Salix*, etc.) in humid habitats; occasional. W. Britain and Ireland.

Poorly developed specimens of *B. marginatum* with numerous small apothecia can be very similar to *Fellhaneropsis myrtillicola*, and can only be distinguished by the exciple structure and the ascospore size. In *F. myrtillicola*, the exciple is made of hyphae with elliptical to polyhedral lumina, ± arranged in upright rows (in squash preparations it is usually possible to see fragments that can be described as paraplectenchymatous), whereas in *B. marginatum* the exciple is made of tightly interwoven hyphae that separate with difficulty in KOH.

Nb



Byssoloma subdiscordans (Nyl.) P. James (1971)

Thallus to 2 cm diam., of small irregular and dispersed patches, whitish to whitish green, the surface verrucose; prothallus present but hardly detectable. Apothecia 0.3–0.5 (–0.6) mm diam., flat, sometimes clustered in groups of two to four and becoming ± distorted; disc black, sometimes with a bluish tinge, matt with a tomentose-arachnoid margin, usually white, rarely greyish white. Ascospores 10–17 × 3–5 µm. Conidia regularly pyriform. **BLS 0221**.

On damp, shaded rocks, *Ulex* and *Calluna* stems, also on *Salix*; rare. S.W. England (Cornwall, Devon, Dorset), Isles of Scilly, W. & C. Ireland.

A widely distributed species, similar to *B. leucoblepharum* but with black apothecial discs that contrast strongly with the whitish margin.

NT



FELLHANERA Vězda (1986)

Thallus crustose, farinose to scurfy-granular, sometimes irregularly shallow-verrucose or rimose, not corticate, sometimes with soredia or blastidia, white- to grey-green or dull ochraceous; hypothallus absent or inconspicuous, white. **Photobiont** chlorococcoid, algal cells globose, 5–12 µm diam. **Ascomata** apothecia, sessile, flat or later convex, often thinly white-pruinose, white, beige or yellow- or dark brown. **Thalline margin** absent. **True exciple** of ellipsoidal to globose cells, often becoming excluded. **Hymenium** colourless, I+ blue. **Hypothecium** colourless or dull orange-brown. **Hamathecium** of sparse to numerous paraphyses, often branched and widening above or anastomosing. **Asci** 8-spored, clavate, with an amyloid apical dome containing a darker blue tubular ring-structure, and an amyloid gelatinous coat. **Ascospores** (0-) 1- to 7-septate, colourless, ovoid,

cylindric-ovoid to fusiform, smooth, sometimes with a gelatinous sheath. **Conidiomata** pycnidia, often numerous, ± immersed in the thallus, whitish or brown-orange; ostiole often gaping. **Conidia** pyriform. **Chemistry**: roccellic acid or usnic acid, zeorin and ± asemone or none. **Ecology**: foliicolous, corticolous and rarely saxicolous.

Most species are usually sterile, or only occur with pycnidia, in which case the pyriform conidia distinguish them from *Bacidia* (in that genus they are variously shaped but not pyriform, sometimes transversely septate) and *Fellhaneropsis* (needle-shaped). *Byssoloma* species differ in having a true exciple of loosely intricate, thick-walled hyphae. Species of *Micarea* with similar conidia have smaller (4–7 µm diam.) algal cells ('micareoid' type).

Small thalli of several species of *Fellhanera* often occur intermingled with each other and with *Bacidina* and *Fellhaneropsis* species on branches, twigs etc., but they can also form extensive green patches by themselves. Many species seem to be rapidly increasing in abundance and distribution, spreading onto additional substrata, possibly owing to changes in air quality or global warming. *Fellhanera* and *Bacidina* species are easily confusable in the field; a useful lab-based test is that *Bacidina* species have no lichen substances and *Fellhanera* species usually have. This can be best checked by putting a piece of thallus on an object glass and repeatedly dropping acetone on it. In *Fellhanera* a white ring of roccellic acid and/or zeorin will appear.

Fellhanera duplex was transferred by Svensson *et al.* (2017) to *Puttea*, a genus of uncertain position within the Lecanorales, and material identified as *F. christiansenii* has been re-identified as *Byssoloma llimonae*.

Literature:

Aptroot *et al.* (1998, 2009), Harris & Lendemer (2009), Sérusiaux (1996), Sparrus & Aptroot (2000), Svensson *et al.* (2017).

- | | | |
|------|---|---------------------------|
| 1 | Thallus more or less sorediate; ascospores 1-septate | 2 |
| | Thallus not sorediate; ascospores mostly 3- or more septate | 3 |
| 2(1) | Thallus with delimited soralia, grey-green, containing roccellic acid; apothecia dark with a pale margin..... | <i>viridisorediata</i> |
| | Thallus entirely sorediate or with dispersed soredia, bluish green, containing usnic acid, zeorin and ± asemone; apothecia pinkish | <i>bouteillei</i> |
| 3(1) | Apothecia black; ascospores 3- to 5- (to 7-) septate | <i>Byssoloma llimonae</i> |
| | Apothecia white, pinkish, ochraceous or pale brown; ascospores aseptate or 3-septate | 4 |
| 4(3) | Ascospores aseptate, 16 per ascus | <i>Puttea duplex</i> |
| | Ascospores septate, 8 per ascus | 5 |
| 5(4) | Apothecia white or pinkish; hypothecium colourless or pale brown; conidiomata pale, without crystals; conidia 3–4 µm long | <i>subtilis</i> |
| | Apothecia ochraceous to pale brown; hypothecium orange to dark orange-brown; conidiomata with brown or bluish, N+ red pigment (crystals); conidia 4–6 µm long | <i>ochracea</i> |

Fellhanera bouteillei (Desm.) Vězda (1986)

LC NS

Thallus thin to rather thick (up to 0.3 mm), verruculose-rimose, dispersed to continuous and entirely covered with farinose soredia, dull, bluish green to bluish grey. Apothecia rather common, pinkish, 0.1–0.3 mm diam, colourless in section; hypothecium colourless; hymenium 30–50 µm high; paraphyses numerous, often branched above, 0.5–1 µm diam., widening to 2 µm at the tips. Ascospores 9.5–14 (–16) × 3.5–7 µm, 1-septate, ovoid to ovoid-cylindrical, often constricted at the septum and sometimes ± soleiform. Conidiomata usually present, cupuliform to subglobose,



white to pale brown, 80–150 µm diam.; conidia pyriform, 3–4 × 1.3–1.7 µm. Chemical tests negative (usnic acid, zeorin and ± asemone). **BLS 0305**.

In sheltered situations, mostly on evergreen leaves and small twigs (especially *Buxus* and *Vaccinium*) but occasionally on other substrata, including the bark of various tree species and damp siliceous rocks or stones. Throughout Britain and Ireland.

Some records may be of *F. subtilis*, and examination of ascospores or (when sterile) TLC are required for certain determination.

Fellhanera ochracea Sparrius & Aptroot (2002)

Thallus effuse to thinly verrucose and smooth, or thicker and scurfy, not corticate, dull, not sorediate, staining the bark grey-green, often with a yellowish tinge. Apothecia rare, but abundant when present, ochraceous to pale brown, convex, 0.1–0.2 mm diam., often appearing slightly pruinose towards the margin owing to extruding hyphae; epithecium containing orange crystals; hypothecium pale to dark reddish to orange-brown; exciple poorly developed or even absent, interspersed with orange crystals; paraphyses sparse, branched and anastomosing, to 1 µm diam., without darkened tips. Asci filled with orange crystals when overmature. Ascospores clavate, often somewhat curved, colourless, 3-septate, 10–17 × 3–3.5 (–4) µm, thin-walled. Conidiomata always abundant, conspicuous, sessile, often of two colours: bluish grey and yellowish brown, globose when young, not pruinose, 50–200 µm diam.; crystals soluble in KOH to form a colourless solution, insoluble in acetone and HCl, N+ red; conidia pyriform or droplet-shaped, 4–6 × 1.0–1.7 (–2) µm. Lichen substances not detected by TLC. **BLS 1912**.

On sheltered trunks of *Acer campestre*, *Carpinus*, *Crataegus*, *Fraxinus*, *Larix* and *Ulmus*. Scattered throughout England, Wales and southern Scotland, rare or overlooked. Also on *Hedera* and on small twigs, e.g. of *Calluna* in rather exposed places like Skomer Island (Wales).

Closely related to *F. subtilis* which differs in the shorter conidia. *Fellhaneropsis vezdae* resembles *Fellhanera ochracea* but has longer, 3- to 7-septate ascospores and long filiform conidia.

LC NR



Fellhanera subtilis (Vězda) Diederich & Sérus. (1991)

Thallus grey to green, smooth to scurfy, often shiny, extremely variable in thickness from very thin to nearly 0.5 mm thick. Apothecia rather rare, white to pinkish, 0.15–0.4 mm diam., mostly colourless in section; hymenium 40–60 µm high; hypothecium colourless to pale brown; paraphyses numerous, often branched above, 0.5–1 µm diam. below, widening to ca 2 µm at the tips. Ascospores 11–16 × 2.5–4.5 µm, (1-) 3-septate, cylindrical, fusiform or clavate-fusiform. Conidiomata always present, 0.1–0.3 mm diam., pinkish, immersed when the thallus is thick but emergent when it is thin; conidia pyriform, 3–4 × 1.3–1.7 µm. Lichen substances not detected by TLC. **BLS 1754**.

In sheltered situations, on bases of various trees, on living stems of *Vaccinium myrtillus*, *Buxus* twigs and leaves, *Larix* and *Picea* twigs, pebbles and wood. The species has apparently spread in recent decades. Scattered throughout England, Ireland, Wales and S. Scotland, also Orkney.

A pollution-tolerant species which is spreading rapidly in Europe. Often confused with *F. bouteillei* (q.v.).

LC NR



Fellhanera viridisorediata Aptroot, M. Brand & Spier (1998)

Thallus corticolous, granular, grey-green to green, dull; soralia present on most thalli, initially crateriform, irregular in outline, often somewhat pustular and in all cases 0.1–0.2 mm high, diameter variable, starting as minute dots, often confluent, sometimes covering the thallus, grey-green with a bluish tinge, paler than the thallus; soredia farinose, 20–30 µm diam., the hyphae sometimes with a distinct K+ violet pigment. Apothecia rare, sessile or usually slightly stalked, rounded or with an irregularly flexuose outline, (0.1–) 0.3–0.7 mm diam., flat or slightly convex, disc dark brown, margin pale yellowish brown, persistent, flexuose; exciple well-developed, colourless, composed of hyphae with ± isodiametric lumina interspersed with tiny needle-like crystals; hymenium 40–80 µm high; hypothecium and epithecium pale brown, the latter with crystals that disappear in KOH and acetone; paraphyses thin (1–1.5 µm diam.), branched, the tips

LC NR



slightly swollen and containing pigments. Ascospores elongate-ellipsoidal, (0-) 1-septate, (12-) 14–17 × 3.5–5 µm, often constricted at the septum, ends rounded, surrounded by a gelatinous sheath *ca* 1 µm thick. Conidiomata rarely observed; conidia pyriform, 3–4 × 1.3–1.5 µm. Chemical tests negative (roccellic acid). **BLS 2285**.

Usually corticolous, especially on tree bases, most common on *Alnus*, *Quercus*, *Populus* and *Salix*, but often found on exotic trees in parks and cities and on pebbles in gardens. Also found on living leaves and needles (especially of *Abies* and *Picea*), dead wood, thatched roofs, pebbles, granite boulders and sheltered brick; southern and central England and S. Wales.

The rather regular raised ± crateriform soralia, which often have ± vertical sides and are much thicker than the thallus, are characteristic, although sterile morphs with K⁺ violet soredial hyphae are difficult to separate from *Rinodina pityrea*. *Bacidina adastrata* and *B. caligans* resemble *F. viridisorediata* when sterile but do not contain roccellic acid (white crystals in acetone extract on a glass slide, observed under microscope). Superficially similar to sterile *Caloplaca obscurella* which differs in the distinctly excavate soralia that remain strictly delimited, and in its preference for basic substrata.

FELLHANEROPSIS Sérus. & Coppins (1996)

Thallus crustose, thin, without a cortex. **Photobiont** chlorococcoid, algal cells globose. **Ascomata** apothecia, 0.1–0.4 mm diam., distinctly constricted at the base, with a thin, soon-disappearing margin. **Thalline margin** absent. **True exciple** thin but distinct, with ellipsoidal to polyhedral cells arranged in ± upright rows, not forming a typical paraplectenchymatous tissue. **Hamathecium** of branched and anastomosed paraphyses. **Asci** 8-spored, clavate, with an amyloid apical dome containing a darker blue tubular ring-structure, and an amyloid gelatinous coat. **Ascospores** cylindrical-fusiform to almost acicular, with 3–7 transverse septa. **Conidiomata** pycnidia with vertically aligned fimbriate hyphae surrounding the ostioles, producing conidia of one or two types: long and filiform, non-septate conidia, and in addition (in *F. myrtillicola* only) smaller bacilliform conidia. **Chemistry**: secondary lichen products unknown. **Ecology**: foliicolous, corticolous and rarely saxicolous.

Both British species usually occur with either pycnidia or apothecia only. The otherwise similar genus *Fellhanera* differs in having pyriform conidia. Species of *Bacidina* have different apothecia and ascus tips, but specimens with only conidia present may be difficult to distinguish from *Fellhaneropsis*. Species of *Micarea* with similar conidia often have smaller algal cells of a special (“micareoid”) type and a true exciple of elongate hyphae (best seen in K).

Sérusiaux *et al.* (2010) found that a sequence of *F. vezdae* clustered within *Micarea*, suggesting that *Fellhaneropsis* may be not monophyletic, but further work is needed to fully resolve their relationships. The species appears to have a *Micarea*-type photobiont.

Literature:

Aptroot (2012), Aptroot & Edwards (2009), Coppins & James (1978), Ekman (2015), Sérusiaux (1996), Sérusiaux *et al.* (2010).

- 1 Apothecia blue-grey to blue-black (rarely pale brown); ascospores usually 3- (to 5-) septate; conidia 4–8 µm long; if conidia 20–45 µm long then pycnidia arising from an apothecial margin, never pink-brown, <100 µm diam. *myrtillicola*
Apothecia pink- to reddish brown, never with bluish tinge; ascospores 3- to 7-septate; conidia (20-) 30–43 µm long; pycnidia arising from the thallus, often pink-brown, >100 µm diam *vezdae*

Fellhaneropsis myrtillicola (Erichsen) Sérus. & Coppins (1996)

LC

Thallus of small rounded patches that eventually merge to form a continuous thallus to several cm diam., mostly shiny, thin and smooth or slightly verrucose, or formed of ± agglutinated granules, green-grey to blue-grey (typical specimens have a distinct bluish tinge), usually with a bluish pellucid prothallus; photobiont cells 5–12

μm diam. Apothecia usually numerous, circular, distinctly constricted at the base, never tuberculate, 0.1–0.2 (–0.3) mm diam., less than 0.1 mm in height, at first \pm flat and with a thin and pale but nevertheless distinct margin, soon convex and immarginate; disc pale brown or more usually blue-grey to blue-black, sometimes almost mauve; true exciple thin but distinct, colourless, pale brownish or greenish adjacent to the hymenium; hypothecium less than 10 μm thick, dark brown, K+ green-brown to aeruginose, usually with the K+ reaction restricted to the central and basal parts; paraphyses 1–1.5 μm diam.; asci 30–40 \times 12–16 μm ; ascospores cylindrical-fusiform, straight or slightly curved, sometimes with a thin perispore, 3- (to 5-) septate, 16–28 (–34) \times 3–4 μm . Pycnidia blue-grey to blue-black, of two types: macroconidia usually present, 100–150 μm diam., formed on the apothecia, producing long filiform conidia 20–45 \times 1–1.5 μm .; and microconidia either abundant or totally absent, 50–80 μm diam., not on apothecia, producing small cylindrical conidia 4–8 (–13) \times 0.5–1 μm . **BLS 1829**.



On siliceous boulders in streams, in woodland on leaves of *Buxus*, *Hedera*, *Taxus*, *Skimmia* and *Rhododendron*, bamboo and *Corylus* stems, and twigs and needles of *Pseudotsuga*. Probably widely distributed in Britain and potentially also Ireland, but much overlooked; currently recorded from southern England and Wales and from southern Scotland.

This species occurs in three very different morphs: a) with (only or nearly only) numerous apothecia, b) with (only or nearly only) macroconidia or c) with (only or nearly only) microconidia. It is most easily confused with certain morphs of *Bacidina saxenii*, which differs by the large exciple cells, the ascus type and the simpler conidiomata (not arising from apothecial tissue), although the conidia are otherwise indistinguishable. Poorly developed specimens of *Byssoloma marginatum* with numerous small apothecia can be distinguished by the structure of the true exciple. *Byssoloma llimonae* is also similar, but has a reddish brown (K \pm purplish) hypothecium.

The hyphal structure of the pycnidial wall is diagnostic for the genus, with vertically aligned fimbriate hair-like hyphae surrounding the ostiole; see the account of *Bacidia vezdae* in Coppins & James (1978).

Fellhaneropsis vezdae (Coppins & P. James) Sérus. & Coppins (1996)

Thallus pale grey-green or pale grey, thin, scurfy, photobiont cells 4–7 μm diam. Apothecia 0.2–0.4 mm diam., sometimes absent, at first \pm top-shaped, some convex and becoming tuberculate, livid pink- or grey-brown; true exciple clearly apparent, colourless; epithecium red-brown, K–; hymenium 40–45 μm tall, colourless or pale brown; hypothecium darkish brown, K–; paraphyses 0.5–1 μm diam., branched and anastomosed, netted. Ascospores 30–35 (–42) \times 3–4.5 μm , (3-) 5- to 7-septate, acicular-fusiform to acicular. Pycnidia 180–200 μm diam., to 300 μm tall, usually numerous, sessile, \pm globose or elongated vertically, pink-brown to brown-black; conidia (20–) 30–43 \times 0.5–1 μm , curved. **BLS 0171**.

Usually on shaded acid bark, sometimes on bryophytes or other lichens, on deciduous trees in woodland including coppices and plantations, also on living conifer needles and twigs in sheltered situations and occasionally on sheltered mossy rocks, especially near the coast, tolerant of moderately polluted conditions; once common in S. but apparently declining, rare in N. Throughout Britain and Ireland.

Generally an inconspicuous but easily recognized species, often sterile with small groups of pycnidia. Reminiscent of *Fellhanera ochracea*, which has pyriform conidia and 3-septate ascospores.



LC

LEIMONIS R.C. Harris (2009)

Thallus thin, continuous or of scurfy scattered fragments or \pm immersed. **Prothallus** where present black, fimbriate and black. **Photobiont** chlorococcoid, large-celled. **Ascomata** apothecia, sessile, constricted at the base, the disc black or bluish grey when wet. **Thalline margin** absent. **True exciple** persistent, raised but sometimes becoming excluded, composed of radiating branched hyphae.

Epithecium dark greenish blue to olive green. **Hypothecium** colourless to dark brown. **Hamathecium** of sparsely branched and anastomosed paraphyses, not strongly swollen at the tips. **Asci** with a K/I+ blue apical dome penetrated by a darker tube-like structure. **Ascospores** ellipsoidal to ovoid, aseptate. **Conidiomata** pycnidia, black, scattered on the prothallus or partly immersed in the thallus. **Conidia** small, \pm cylindrical. **Chemistry**: lichen products not detected by TLC. **Ecology**: primarily on pebbles and small boulders in ephemeral habitats.

Leimonis differs from *Micarea* s.l. primarily by the well-developed true exciple (Harris 2009). Its phylogenetic position is uncertain but it appears to occupy a basal clade within the Pilocarpaceae. It is possibly related to a group of species including *Micarea assimilata*, *M. doliiformis* and *M. paratropha* (Andersen & Ekman 2005, Sérusiaux *et al.* 2010, Van den Boom *et al.* 2020) which should probably also be excluded from that genus. However, Schmuell *et al.* (2011) showed a different phylogenetic arrangement, and Miądlukowska *et al.* (2014) placed the genus within the Lecideales. Further research is certainly needed.

Literature:

Andersen & Ekman (2005), Coppins (2009), Harris (2009), Miądlukowska *et al.* (2014), Sérusiaux *et al.* (2010), Schmuell *et al.* (2011), Van den Boom *et al.* (2020).

- 1 Prothallus well-developed, black, often predominant; pycnidia abundant; conidia 1.2–1.8 μ m diam. *erratica*
 Prothallus weakly developed or absent; pycnidia sparse; conidia 0.8–1 μ m diam. *lynceola*

Leimonis erratica (Körb.) R.C. Harris (2009)

LC

Micarea erratica (Körb.) Hertel, Rambold & Pietschm. (1989)

Thallus grey, continuous or of scurfy scattered fragments, if on wood \pm immersed, hardly discoloring weathered grey wood; prothallus often predominant, fimbriate and black; photobiont cells 7–16 (–26) μ m diam. Apothecia (0.15–) 0.2–0.4 (–0.7) mm diam., sessile, constricted at the base, disc concave to \pm flat, rarely somewhat convex, black; true exciple persistent, raised, but sometimes becoming excluded. In section: blue-black at the outer edge, pale brownish (K+ reddish) within; epithecium dark greenish blue to greenish brown, K+ green intensifying, N+ purple-red; hymenium 35–50 μ m tall; hypothecium dark brown; paraphyses 1.5–2.5 (–3) μ m diam., sparsely branched and anastomosed, not strongly swollen or capitate at the tips. Asci 25–30 \times 7–10 μ m, with a K/I+ blue apical dome penetrated by a darker tube-like structure. Ascospores (6–) 7–9 (–10) \times (2–) 3–4 (–5) μ m, narrowly ellipsoidal, rather abruptly truncated at the ends. Pycnidia 80–150 μ m diam., often abundant, black, scattered on the prothallus or partly immersed in the thallus; mesoconidia 3–4.5 \times 1.2–1.8 μ m, \pm cylindrical. Lichen products not detected by TLC. **BLS 0719**.

On pebbles and small boulders, especially flints and stable shingle, rarely also on larger rock outcrops or worked timber; common. S. & E. England, extending locally to Scotland; rare in Ireland.

On pebbles etc., it can be confused with *Amandinea* species, *Catillaria atomarioides*, *C. chalybeia* or *Micarea lapillicola* without microscopic examination.

The lichenicolous *Lichenodiplis lecanorae* (Vouaux) Dyko & D. Hawksw. (1979) has been recorded on this host several times, as well as a single occurrence of *Lichenocodium lecanorae* (Jaap) D. Hawksw. (1979).



Leimonis lynceola (Th. Fr.) Aptroot (2017)

Nb

Micarea lynceola (Th. Fr.) Palice (1999)

Thallus very thin, scurfy and discontinuous, not forming discrete areoles or goniocysts, pale buff or dull greenish; photobiont cells 7–15 (–19) μ m diam. or 11–16 \times 9–14 μ m. Apothecia 0.15–0.4 mm diam., flat to slightly convex, \pm weakly marginate, black but bluish grey when wet; true exciple well-developed, olivaceous at the outer edge, colourless within, hyphae lax in K; epithecium olive-green, K–; hymenium 38–45 μ m tall, colourless; hypothecium colourless or faintly olivaceous; paraphyses rather sparse, sparingly branched, 1–1.3 μ m diam., sometimes to 1.7 μ m diam. at the apices. Asci



35–41 × 9–12 μm, in K/I with dark axial tube. Ascospores (6–) 7–10 × 3–4 (–5) μm, aseptate, ellipsoidal or ovoid. Pycnidia inconspicuous, ± immersed, 30–40 μm diam., black; wall dark green, K–; conidia (microconidia) 3–4.8 × 0.8–1 μm. Lichen products not detected by TLC. **BLS 1775.**

A pioneer lichen of loose stones, wood fragments and cardboard in waste-land and other disturbed habitats, also rocks in the flood zone of a river; rare or overlooked and ephemeral. N. England (Leeds & Sheffield), E. Scotland (Angus), S. Wales (Pembrokeshire), N. Ireland (Antrim).

Brianaria bauschiana (Psoraceae) differs in lacking a true exciple and *Micarea intrusa* in having more numerous paraphyses, 0- or 1-septate ascospores and asci that lack a dark axial tube in K/I.

MICAREA Fr. (1825)

Thallus crustose or immersed, effuse, of ± spherical granules (goniocysts), convex to ± globose areoles, or a rimose or scurfy crust, the areoles sometimes dissolving into soredia; very rarely isidiate; prothallus indistinct, ± ecorticate but sometimes with a colourless amorphous outer layer. **Photobiont** green, cells usually thin-walled, *ca* 4–7 μm diam. and often paired ('micareoid'); a few species with cephalodia containing *Nostoc* or *Stigonema*. **Ascomata** apothecia, mostly under 1 mm diam., whitish, grey, bluish, brown or black, not pruinose, usually immarginate, appressed, sessile or rarely ± stipitate. **Thalline margin** absent in almost all cases. **True exciple** absent to well-developed, composed of branched radiating hyphae, lax in K or bound by dense pigment. **Hymenium** gelatinized, I± blue. **Hypothecium** colourless or pigmented. **Hamathecium** of mostly branched paraphyses, some species also with stouter unbranched paraphyses; apices not or slightly swollen, without a dark brown apical cap. **Asci** 8-spored, clavate to cylindrical-clavate; in K/I with a blue outer layer and apical dome and unstained wall, the apical dome with an apical cushion that in some species is surrounded by a faint to distinct dark cylindrical tube-structure. **Ascospores** colourless, smooth, without a perispore, aseptate or transversely septate, ellipsoidal, ovoid, fusiform or acicular. **Conidiomata** pycnidia, or rarely sporodochia; pycnidia immersed, sessile or stalked. **Conidiogenous cells** short ampulliform to cylindrical, proliferating percurrently. **Conidia** colourless, of 3 types: (a) macroconidia, curved, thread-like or helicoid, often septate, rarely ellipsoidal; (b) mesoconidia, cylindrical, ellipsoidal or ovoid, aseptate, often biguttulate, mostly 1–2 μm diam.; (c) microconidia, ± cylindrical, aseptate, eguttulate, to 1 μm diam. **Chemistry:** for many species, no lichen products detected by TLC; or various, several species with gyrophoric acid. **Ecology:** on wide range of acidic substrata; rarely tolerant of nutrient enrichment.

Critical determination of many species of *Micarea* is dependent on careful evaluation of the colour reaction of the apothecial pigments. Some colour reactions are short-lived, even fleeting, particularly when using C. Sections should be mounted in water and the test chemical infused from one side (a small drop on the edge of the coverslip is generally sufficient) and any colour reactions noted as the chemical diffuses across the section. The key has been constructed as far as possible using readily available chemicals; see also the useful key to the *M. prasina* group by Kantelinen *et al.* (2021). The species descriptions list the spectrum of chemical reactions but nitric acid (N) should only be used in an appropriate laboratory. See Meyer & Printzen (2000) and Orange *et al.* (2001, pp. 18ff) for full details on the colour reactions.

Molecular phylogenetic studies suggested that *Micarea crassipes* should be treated separately in the genus *Helocarpon*, a genus of uncertain affinity, although Fryday *et al.* (2014) considered that the material sequenced was misidentified and was actually a species of *Bryobilimbia* (Lecideales: Lecideaceae). Nevertheless, the genus shows some morphological divergence with *Micarea* and has been accepted by some subsequent authors (e.g. Printzen *et al.* 2008, Lücking *et al.* 2016). It was

placed within the monotypic family Helocarpaceae by Hafellner (1984). More research is needed, but it is retained within *Micarea* in this treatment. Additionally, *M. sylvicola* and its relatives are now placed within the family Psoraceae, as *Brianaria* species (Ekman & Svensson 2014, Coppins *et al.* 2021). *Leimonis* (Harris 2009) has also been split from *Micarea*; its position is unresolved but appears to belong within a basal clade of the Pilocarpaceae.

Other taxa commonly mistaken for *Micarea* include some species of *Bryostigma* (especially *B. lapidicola*), *Byssoloma* (especially *B. marginatum*), *Psilolechia*, *Scoliciosporum* (especially *S. chlorococcum* and *S. pruinosum*), *Vezeadaea* (hymenial gel absent and asci with thickened lateral walls), as well as many species from other genera with small, \pm immarginate apothecia.

Literature:

Andersen & Ekman (2004, 2005), Coppins (1983, 2009), Coppins *et al.* (2021), Czarnota (2007), Czarnota & Guzew-Krzemińska (2010), Ekman & Svensson (2014), Guzew-Krzemińska *et al.* (2016, 2019), Hafellner (2004), Kantelinen *et al.* (2021), Konoreva *et al.* (2021), Launis & Myllys (2019), Launis *et al.* (2019a, b), Meyer & Printzen (2000), Miądlkowska *et al.* (2014), Orange *et al.* (2001), Van den Boom *et al.* (2017, 2018, 2020), Yahr *et al.* (2015).

1	Ascospores cylindrical-ellipsoidal to acicular, or 3- or more septate when mature	2
	Ascospores ellipsoidal, ovoid, cylindrical, fusiform or bean-shaped, mainly 0- to 1-septate	21
2(1)	Hypothecium colourless, pale or mottled brown or greenish	3
	Hypothecium dark purple-brown	<i>melaena</i>
3(2)	Upper hymenium and/or epithecium dull greenish or brownish, K+ violet ('sedifolia-grey')	4
	Upper hymenium colourless, greenish or brownish, K-	8
4(3)	Apothecial sections C- [except for C+ violet pigment]	5
	Apothecial sections C+ red [NB: the K+ violet pigment is also C+ violet]	6
5(4)	Ascospores ovoid to cylindrical	<i>subviridescens</i>
	Ascospores cylindrical to curved-acicular	<i>longispora</i>
6(4)	Ascospores fusiform to clavate, 9.5–17 (–19) \times 2.5–3 (–3.5) μm	7
	Ascospores cylindrical to curved-acicular, 13–26 \times 1.5–2.5 (–3) μm	<i>globulosella</i>
7(6)	Ascospores 10–17 (–19) μm long, often curved; with macro- and micropycnidia	<i>nitschkeana</i>
	Ascospores 9.5–12 μm long, straight or slightly curved; with mesopycnidia	<i>sambuci</i>
8(3)	Apothecial sections C+ red	9
	Apothecial sections C-	14
9(8)	Ascospores fusiform, more than 3 μm diam.; pycnidia \pm immersed or absent	10
	Ascospores acicular to sigmoid, less than 3 μm diam.; short-stalked pycnidia present.....	<i>pycnidiophora</i>
10(9)	Thallus of firm areoles or granules, sorediate or not, Pd-	11
	Thallus of fragile granules, often leprose-granular, Pd+ red	<i>leprosula</i>
11(10)	Thallus without soralia	12
	Thallus with numerous \pm delimited greenish to bluish soralia	<i>coppinsii</i>
12(11)	Ascospores (3-) 5- to 7-septate, (19-) 23–34 (–38) μm long; macroconidia 50–110 \times ca 1 μm ...	<i>cinerea</i>
	Ascospores 3(-5)-septate, mostly <26 μm long; macroconidia 20–50 \times ca 1 μm	13

- 13(12) Apothecia whitish *alabastrites*
 Apothecia pale grey to black (rarely whitish in extreme shade) *pelioearpa*
- 14(8) Apothecia grey, dark brown to black; ascospores fusiform; pycnidia absent or ± immersed to sessile but not stalked 15
 Apothecia whitish; ascospores needle-like to sigmoid, <3 µm diam.; stalked pycnidia present ... *stipitata*
- 15(14) Thallus Pd+ red or deep yellow 16
 Thallus Pd- 17
- 16(15) Thallus of fragile granules, often becoming leprose-granular, C+ red, Pd+ deep yellow..... *submilliaria*
 Thallus of firm granular areoles (or ± immersed when on wood), Pd+ red, C- *lignaria* var. *lignaria*
- 17(15) Thallus blackish, grey-brown or olivaceous, or inconspicuous, C- 18
 Thallus of yellowish white granular areoles, C+ persistent orange *lignaria* var. *endoleuca*
- 18(17) On wood or old bark; epithecium brown, K+ dissolving into solution *elachista*
 On rock or turf; epithecium, if brown, K- (not dissolving) 19
- 19(18) Hypothecium colourless to pale greenish, K- 20
 Hypothecium mottled reddish brown, K- or + orange-brown *turfosa*
- 20(19) Ascospores 0-1 (-3)-septate; true exciple absent *viridiatra*
 Ascospores (0-) 3-septate; true exciple distinct in section *ternaria*
- 21(1) Upper hymenium greenish or dull brown, K+ violet ('sedifolia-grey') 22
 Upper hymenium colourless, green or brown, K- or K+ dissolving (rarely purple-brown, K+ purple intensifying in *M. crassipes* and *M. inopinula*) 38
- 22(21) Hypothecium darkly pigmented 23
 Hypothecium colourless or pale straw, or with a greenish tinge 24
- 23(22) Hypothecium dark olive-green, K+ violet ('sedifolia-grey') *hypoviolasces*
 Hypothecium dark purple-brown, K+ purple or K+ green above *paratropa*
- 24(22) Pycnidia stalked, producing mesoconidia [immersed pycnidia producing microconidia may additionally be present] 25
 Pycnidia all immersed to ± emergent, or absent 26
- 25(24) Pycnidia brown, thinly tomentose; thallus superficial, dull green, of granules 20–40 µm diam.; apothecia brown *hedlundii*
 Pycnidia black, not tomentose; thallus immersed, rarely with pale greyish granular areoles 60–120 µm diam.; apothecia black *misella*
- 26(24) Thallus superficial, isidiate or of minute green to olive-green granules; apothecial sections C- 27
 Thallus immersed or formed of greenish grey to grey granular areoles; apothecial sections and thallus often C+ red 36
- 27(26) Thallus with methoxymicareic or prasinic acids by TLC; on various substrata 28
 Thallus with micareic acid by TLC; usually on old stumps in old-growth woodland 33
- 28(27) Thallus with methoxymicareic acid by TLC; on various substrata 29
 Thallus very bright UV+ blue-grey, with prasinic acid by TLC; usually terricolous *subviridescens*

- 29(28) Apothecia to 0.6 (–0.7) mm diam., often adnate *bysseea*
 Apothecia to 0.4 mm diam., rarely adnate 30
- 30(29) Thallus granular or isidiate, bright green, apothecia whitish, ascospores 3.0–4.5 µm diam. 31
 Thallus olive green, granular and/or continuous crust, ascospores
 2.0–3.2 (–3.5) µm *pseudomicrococca*
- 31(30) Thallus isidiate; hymenium and epithecium dark greenish (with *Cinereorufa*-green) *atroviridis*
 Thallus consisting exclusively of goniocysts; hymenium and epithecium colourless 32
- 32(31) Thallus vivid green or green, sometimes with a bluish tinge, becoming sorediate *microsorediata*
 Thallus light green or pale to dark grey-green, or granular goniocysts but not sorediate *micrococca*
- 33(27) Thallus isidiate, at least in part 34
 Thallus consisting exclusively of goniocysts 35
- 34(33) Hypothecium with *Sedifolia*-grey pigment *aeruginoprasina*
 Hypothecium colourless *isidioprasina*
- 35(33) POL+ crystals in the thallus and hymenium but not the epithecium *fallax*
 POL+ crystals present in the epithecium *prasina* s.str.
- 36(26) Ascospores often curved, (7–) 9–16 (–18) × 2–3 (–3.5) µm; apothecial and thallus sections
 usually C+ red [cf. *M. nitschkeana* if any 3-septate ascospores present] *denigrata*
 Ascospores not curved, 6.5–9.7 × 2–3 (–3.7) µm; apothecial and thallus sections usually C– 37
- 37(36) Ascospores mostly aseptate; pycnidia usually stalked; paraphyses very narrow (0.5–1 µm diam.)
 *misella*
 Ascospores usually 1-septate; pycnidia sessile or immersed in thallus granules; paraphyses
 1.2–1.4 µm diam. *herbarum*
- 38(21) Apothecia whitish to pale reddish brown, without distinct pigmentation in section 39
 Apothecia coloured, with obvious pigmentation in section 47
- 39(38) Thallus isidiate, the isidia abundantly branched and coralloid *isidioprasina*
 Thallus areolate or composed of goniocysts, true isidia absent 40
- 40(39) Thallus of minute scattered to densely aggregated goniocysts, C–, C+ red or C+ orange, usually
 with detectable substances by TLC; photobiont cells always <8 µm diam. 41
 Thallus ± smooth, rimose, scurfy, granular-areolate or leprose, C–, without detectable
 substances by TLC; photobiont cells diam. various 43
- 41(40) Thallus C– [TLC recommended] – check also couplet 27 *micrococca* [s.l.]
 Thallus C+ red, or C+ persistent orange 42
- 42(41) Thallus C+ red, UV– (gyrophoric acid) *viridileprosa*
 Thallus C+ persistent orange (xanthones) *xanthonica*
- 43(40) Thallus ± smooth, rimose, scurfy, granular-areolate, never leprose [beware superficial overgrowth
 of non-lichenized algae] 44
 Thallus farinose-leprose *farinosa*
- 44(43) Apothecia convex-hemispherical from the beginning, if tuberculate then clusters <0.7 mm
 diam.; ascospores aseptate, 6.5–11 × 2.5–4 µm; sporodochia absent 45
 Apothecia at first ± flat and appressed, later convex and often in large nodulose clusters
 to 2 mm across; ascospores 1-septate, 9–16 × 3–5 µm; sporodochia usually present *adnata*

- 45(44) Photobiont cells 5–14 μm diam., or ellipsoidal and up to $15 \times 10 \mu\text{m}$; pycnidia various..... 46
Photobiont cells 4–8 μm diam.; pycnidia immersed *lithinella*
- 46(45) Pycnidia sessile or \pm stalked; hypothecium reddish brown; on bark or wood *doliiformis*
Pycnidia immersed; hypothecium colourless to pale greenish in upper part; saxicolous,
usually in underhangs [Psoraceae] *Brianaria bauschiana*
- 47(38) Hypothecium colourless to pale yellow-straw, or pale greenish in the uppermost part 48
Hypothecium distinctly brownish, greenish or purplish 54
- 48(47) Ascospores curved, bean-shaped *curvata*
Ascospores ellipsoidal, ovoid or fusiform, not markedly curved 49
- 49(48) Ascospores aseptate; paraphyses rather scanty 50
Ascospores 0- to 1-septate; paraphyses numerous 52
- 50(49) True exciple distinct in sections 51
True exciple absent (sections) [Psoraceae] *Brianaria bauschiana*
- 51(50) Hyphae of true exciple lax in K; apothecia 150–400 μm diam. *Leimonis lynceola*
Hyphae of true exciple coherent in K; apothecia 80–200 μm diam. *polycarpella*
- 52(49) On wood or old bark; epithecium brown, K⁺ dissolving into solution *elachista*
On rock; epithecium, if brown, K⁻ (not dissolving) 53
- 53(52) Upper hymenium brown; photobiont cells 4–8 μm diam.; pycnidia containing helicoid conidia
usually present *subnigrata*
Upper hymenium green; photobiont cells 7–21 μm diam. *intrusa*
[see also “*Catillaria contristans*” (currently placed in Caliciales: Catillariaceae)]
- 54(47) Hypothecium fuscous or reddish brown, without distinct purple or green tinges; N⁻ or N⁺
orange-brown 55
Hypothecium with distinct purple or green tinges; N⁺ purple-red or rarely N⁺ violaceous
grey or N⁻ 64
- 55(54) Pycnidia inconspicuous and \pm immersed, or absent 56
Pycnidia conspicuous, sessile to stalked, black *botryoides*
- 56(55) Thallus lichenized, saxicolous or lignicolous 57
Thallus lichenicolous, on *Dibaeis baeomyces*, on soil *inquinans*
- 57(56) Ascospores <10 μm long 58
Ascospores >10 μm long 62
- 58(57) Apothecia 0.2–0.8 mm diam.; hypothecium dark reddish brown (blackish in thick sections);
hymenium colourless or greenish 59
Apothecia 0.1–0.25 mm diam.; hypothecium orange- or reddish brown (not blackish in thick
sections); hymenium colourless or tinged orange-brown *myriocarpa*
- 59(58) True exciple persistent, conspicuous in young apothecia 60
True exciple absent or soon reflexed and inconspicuous 61
- 60(59) Thallus continuous or of scurfy scattered fragments, usually with grey-black prothallus;
photobiont cells 7–16 (–26) μm diam. *Leimonis erratica*
Thallus of dispersed to confluent areoles, without distinct prothallus; photobiont cells
3–7 μm diam. *lapillicola*

- 61(59) Thallus smooth to scurfy granular; paraphyses 0.5–1 (–1.5) μm diam.....[Psoraceae] *Brianaria lutulata*
Thallus of convex, rounded areoles; paraphyses 1.5–2 μm diam. *subconfusa*
- 62(57) Thallus thin, inconspicuous or scurfy, without distinct areoles or cephalodia 63
Thallus of whitish to grey-brown, convex areoles; often with brown cephalodia; apothecia
0.3–1 mm diam. *incrassata*
- 63(62) Thallus pale grey-brown, saxicolous *parva*
Thallus blackish, terricolous *turfosa*
Thallus grey-white, lignicolous *vulpinaris*
- 64(54) Apothecia markedly constricted below, appearing turbinate or short-stalked 65
Apothecia sessile or partly immersed, never appearing short-stalked 66
- 65(64) Ascospores fusiform-ellipsoidal, (2.5–) 3.5–4.5 μm diam.; thallus C– in squash
preparations *crassipes*
Ascospores ellipsoidal to ovoid-ellipsoidal, 4.7–7 μm diam.; thallus C+ red in squash
preparations..... *inopinula*
- 66(64) Photobiont cells 4–8 μm diam..... 67
Photobiont cells 5–12 μm diam., or ellipsoidal to 15 \times 10 μm 77
- 67(66) Hypothecium with distinct green tinge in water, K– or K+ violet 68
Hypothecium red- or purplish brown in water, K–, K+ purple intensifying or K \pm green in part 71
- 68(67) Hypothecium K+ violet ('sedifolia-grey') *hypoviolasces*
Hypothecium K– or K+ green intensifying 69
- 69(68) Hypothecium dark green or purplish; ascospores 7–13 (–14) μm long 70
Hypothecium pale green; ascospores (10–) 12–17 (–19) μm long *viridiatra*
- 70(69) Paraphyses scanty, in mid-hymenium 0.6–0.8 μm diam. when not pigmented; hypothecium
green or purple (often intermixed); ascospores 3–4.5 μm diam. *contexta*
Paraphyses numerous, in mid-hymenium 1–1.5 μm diam. when not pigmented; hypothecium
green (never purple); ascospores 2.5–3.5 μm diam. *olivacea*
- 71(67) Pycnidia \pm immersed in the thallus or absent; ascospores aseptate or 0-1 (-3)-septate 72
Pycnidia sessile to stipitate; ascospores aseptate..... *nigella*
- 72(71) Thallus of distinct but often coalescing areoles; areoles 0.1–0.4 mm diam.; cephalodia
present or absent 73
Thallus immersed, scurfy or granular-areolate, the granules mostly <0.2 mm diam.;
cephalodia absent 74
- 73(72) Ascospores 0(-1)-septate; areoles whitish, often with brownish cephalodia; on soil *assimilata*
Ascospores 0-1(-3)-septate; areoles greenish buff or grey to brown grey, without cephalodia;
on rock *marginata*
- 74(72) Ascospores aseptate 75
Ascospores 1(-3)-septate 76
- 75(74) Thallus lignicolous; apothecia to 0.24 mm diam.; paraphyses scanty *deminuta*
Thallus saxicolous; apothecia to 0.4 mm diam.; paraphyses numerous *pseudomarginata*
- 76(74) Ascospores 3–4.5 μm diam. *contexta*
Ascospores 1.8–2.5 μm diam. *eximia*

- 77(66) Ascospores 0(-1)-septate, ellipsoidal or ovoid-ellipsoidal, (6-) 7–10 × (2.5-) 3–4.5 µm diam.; apothecia 0.2–0.5 mm diam., to 1.2 mm if tuberculate; conidia 3.5–6 (-7) × 1–2 µm [Psoraceae] *Brianaria sylvicola*
 Ascospores 0- to 1-septate, cylindric-ovoid or cylindric-ellipsoidal, 5.5–8 (-9) × 1.5–2.5 µm diam.; apothecia 0.1–0.3 mm diam., to 0.55 mm if tuberculate; conidia 3–4.5 × 1–1.5 µm [Psoraceae] *Brianaria tuberculata*

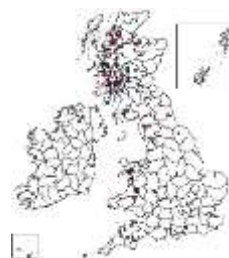
Micarea adnata Coppins (1983)

Thallus ± smooth or scurfy, pale grey-green, ± waxy; photobiont cells 4–7 µm diam. Apothecia pale straw-brown to pale reddish brown, at first ± flat with an appressed white rim, later convex, 0.2–0.4 (-0.6) mm diam. or in nodulose clusters to 2 mm across; true exciple indistinct but evident in young apothecia, colourless; hymenium 35–40 µm tall, colourless; hypothecium colourless; paraphyses 1–1.5 µm diam., numerous. Asci 30–35 × 10–12 µm. Ascospores 9–16 × 3–5 µm, ellipsoidal or ovoid to cylindrical, (0-)1-septate. Conidiomata: (a) 80–250 µm diam., whitish, convex sporodochia; with macroconidia 6.5–9.5 × 2.3–3 µm, ellipsoidal to cylindrical, aseptate; (b) 40–60 µm diam., immersed, white pycnidia; with mesoconidia 4–5.5 × 1–1.5 µm, cylindrical. Lichen products not detected by TLC. **BLS 0870.**

On wood and debris of old stumps, or on loose bark of old trees, in old *Betula*, *Quercus* or *Pinus* woodlands; rarely on dry peat hags; frequent. N.W. & S.W. England, Wales, W. Scotland, rare in S. England (S. Hampshire, W. Sussex), upland Ireland.

Distinguished from *M. prasina* and *M. micrococca* by the ± smooth, waxy thallus (no goniocysts), apothecium-like sporodochia and the absence of K⁺ violet pigment.

Nb



Micarea aeruginoprasina van den Boom, Guzew-Krzemińska, M. Brand & Sérus. (2019) NB

Thallus thin in non-isidiate parts, film-like to minutely granular, giving rise to abundant green to dull green, branched to coralloid isidia, with POL⁺ granules. Apothecia adnate to slightly convex, pale cream to pale brown, grey or aeruginose, 0.1–0.5 mm diam. Exciple indistinct. Hymenium colourless, or locally pale brown and then K⁺ violet, C⁺ violet (Sedifolia-grey). Hypothecium colourless or with Sedifolia-grey, with POL⁺ granules. Paraphyses sparse, branched, 1–1.2 (-1.5) µm diam. Ascospores ellipsoidal to ovoid, (0-)1-septate, 9–14 × 4.5–5.5 µm. Pycnidia not seen. Chemistry: K⁻, C⁻, Pd⁻. TLC: micareic acid. **BLS 2822.**

On bark of young to old *Quercus* in woodland; recent records from West Wales and New Forest, but probably much more common.

Distinguished by the isidiate thallus and the frequent presence of Sedifolia-grey in the apothecium (but probably absent in pale apothecia). *M. isidioprasina* is very similar; in the protologue it is said to lack Sedifolia-grey in the apothecium, but this pigment is locally present in the hymenium of at one British specimen.

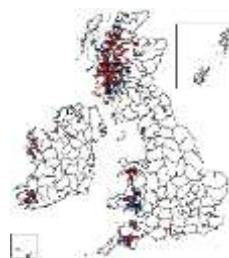
Micarea alabastrites (Nyl.) Coppins (1982)

Like *M. peliocarpa*, but apothecia and pycnidia not pigmented; apothecia 0.2–0.7 mm diam., to 1 mm when tuberculate, cream- or ivory-white; ascospores (16-) 18–26 (-29) × (4-) 4.5–5 (-6) µm, 3(-7)-septate. Thallus and apothecial sections C⁺ red (gyrophoric acid). **BLS 0871.**

Usually on acid bark (often over bryophytes), occasionally on wood and rarely on rocks; in oceanic woodlands; frequent. W. Britain, Ireland.

Extreme shade morphs of *M. peliocarpa* (with whitish apothecia) are usually sparingly fertile, whereas the apothecia of *M. alabastrites* are almost invariably numerous and crowded. Distinguished from extreme shade morphs of *M. cinerea* by the mostly 3-septate ascospores and shorter, curved or sigmoid macroconidia. *Micarea pycnidiophora*, *M. stipitata* and *Scoliciosporum pruinosum* also have whitish apothecia and grow on acid bark, but all have narrower, acicular ascospores, whereas *M. adnata* has shorter, 1-septate ascospores.

Nb IR



Micarea angulosa Coppins, Chambers & Orange (2022)

NE

Thallus forming small patches <13 mm across amongst other crustose lichens, of pale grey, matt to slightly glossy, contiguous but discrete convex areoles 0.08–0.2 mm diam.; areoles becoming subglobose when containing a pycnidium. Areoles in section ecorticate, but with an amorphous colourless covering layer *ca* 5 µm thick. Photobiont ‘micareoid’, cells *ca* 4–7 µm diam. Apothecia rare, so far found only as immature, dark grey to black, convex, immarginate, 0.2–0.5 mm diam. or tuberculate and to 0.8 mm diam. Epithecium green, K–, N+ red. Hymenium colourless, 50–60 µm tall, C+ red. Paraphyses numerous, richly branched and anastomosing, (1–) 1.3–1.8 (–2) µm diam. Hypothecium colourless. Mature asci and ascospores not seen. Exciple visible in sections, colourless, of radiating, richly branched hyphae 1–1.5 µm diam. Pycnidia numerous, with many areoles each containing a single immersed pycnidium, 60–140 µm diam., the ostiole sometimes widely gaping; wall colourless, or green (K–) around the ostiole. Conidiogenous cells 4–6 × *ca* 2 µm. Conidia colourless, tetrahedral or bluntly ‘T’-shaped, 3–6.5 × 3.5–4 µm. Chemistry: thallus and apothecia C+ red, P– in sections (?gyrophoric acid, but not tested by TLC). **BLS 2780**.

On stones in small inconspicuous patches, in metal mine spoil or on disturbed ground and scree from near sea-level to 840 m altitude, Wales, N. England, Scotland. It seems to be a facultative metallophyte.

Although known only with immature apothecia, ITS and mtSSU sequences obtained from the type specimen place it close to *Micarea lignaria* (Ach.) Hedl. and *M. peliocarpa* (Anzi) Coppins & R. Sant., and the pigmentation and C+ red reaction of the apothecia are the same as for *M. peliocarpa*. The shape of the conidia is so far unique within the genus *Micarea*, and the pigmentation and C+ red reaction of the pycnidial wall and surrounding thallus rule out the possibility of the conidia belonging to a lichenicolous fungus (e.g. *Cornutispora* [anamorphs of *Spirographa*]). The species is formally introduced on p. 43 of this volume.

Micarea assimilata (Nyl.) Coppins (1983)

VU D2

Like *M. incrassata*, but areoles usually whitish; apothecia usually more prominent; hypothecium purple-brown, K± purple intensifying or (especially above) K± dark green, N± purple-red; ascospores (10–) 12–16 (–19) × 3–5 µm, 0(–1)-septate. Lichen products not detected by TLC. **BLS 0698**.

In similar habitats to *M. incrassata*. Scottish Highlands (Ben Lawers, Cairngorms, Skye and W. Highlands); rare. Sometimes confused with *Bryobilimbia hypnorum*, *Frutidella caesiastrata*, “*Lecidea*” *berengeriana* or *Protomicarea limosa*.

**Micarea atroviridis** Coppins, Orange & Sanderson (2022)

NE

Micarea nigra van den Boom, Guzow-Krzemińska, M. Brand & Sérus. (2019), *non* (Huds.) Fr. (1825)
Thallus giving rise to abundant green to dark green, branched to coralloid isidia, with POL+ granules (soluble in K), frequently with patches of an olive-brown K– pigment. Apothecia dark grey to black, 0.15–0.5 mm diam., flat to moderately convex. Hypothecium colourless or patchily dark green, K+ brightening (Cinereorufa-green), hymenium greenish, epithecium colourless or with Cinereorufa-green; all parts POL–. Paraphyses sparse, branched, 1–1.5 µm diam. Ascospores narrowly cylindrical to clavate, (0–)1-septate, 7.5–12 × (2.5–) 3–4.5 µm. Micropycnidia rare, 30–60 µm diam., with a dark brown apex, K–, C–; microconidia bacilliform, 7–10 × 0.5–0.9 µm. Chemistry: K–, C–, Pd–. TLC: methoxymicareic acid. **BLS 2823**.

On acid bark of *Quercus*, *Betula* and *Alnus*, and on *Quercus* lignum; recent records from Somerset and New Forest, but probably more common.

Frequently fertile and distinguished from other members of the *M. prasina* group by the dark green pigment (Cinereorufa-green) in the apothecium (with a corresponding absence of Sedifolia-grey and lack of POL+ crystals). Sterile material of distinctly isidiate species may be difficult to distinguish, but *M. aeruginoprasina* and *M. isidioprasina* contain micareic acid, and the isidia of *M. aeruginoprasina*, at least, are less densely branched and lack the patches of K– olive-brown pigment.

Micarea nigra van den Boom *et al.* (2019) is a later homonym of *M. nigra* (Huds.) Fr. (1825) – a synonym of *Placynthium nigrum* (Huds.) Gray, so a new name is introduced for this species on page 45 of this publication.

Micarea botryoides (Nyl.) Coppins (1980)

LC

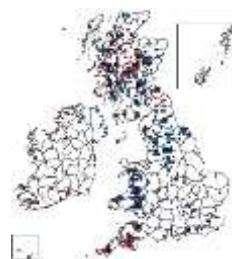
Thallus usually thin, ± inconspicuous when on bryophytes, pale to dark dull green or blackish, rarely pale buff in deep shade, scurfy-granular, granules 15–50 µm diam., photobiont cells 4–7 µm diam. Apothecia 0.1–0.25 mm diam., or tuberculate and to 0.5 mm diam., black, matt, convex to globose; true exciple indistinct, reflexed, reddish brown; hymenium 25–35 µm tall, colourless or partly tinged brown or olivaceous but always with dark

brown (K± olivaceous) vertical streaks; hypothecium dark reddish brown, K- or dulling, N- or red tinge intensifying; paraphyses rather scanty, of two types: 0.5–1 mm diam., to 1.5 µm at apices, colourless, often branched; 2–2.5 µm diam., to 3.5 µm at the apices, fasciculate, coated by brownish pigment. Asci 20–35 × 7–9 µm. Ascospores 8–13 (–16) × 2.3–4 µm, ovoid to cylindrical-ellipsoidal, sometimes ± curved, 0- to 1(-3)-septate. Pycnidia to 0.4 mm tall and 40–90 µm diam., numerous, stalked, black; stalk often branched; wall dark greenish brown, K± green intensifying, N+ red, but stalk tissue ± reddish brown, K-, N- or red tinge intensifying; conidia 3.5–5 × 1–1.5 µm, ± cylindrical, often biguttulate. Lichen products not detected by TLC.

BLS 0874.

Usually under shaded overhangs on rock, roots, soil and bryophytes, rarely on soft wood of stumps and, in polluted areas, on tree bases in sheltered woodland; common. Primarily W. & upland Britain.

Commonly sterile and most often seen as tiny black projections (pycnidia) from moribund mats of bryophytes under overhangs. Sterile morphs on wood differ from *M. misella* and *M. nigella* in pigmentation. On rock, *Brianaria lutulata* has similar apothecia but immersed pycnidia, smaller, aseptate ascospores and a larger-celled photobiont.



Micarea byssacea (Th. Fr.) Czarnota, Guzew-Krzemińska & Coppins (2010)

LC

Thallus minutely granular, green to olive-green, composed of small goniocysts surrounded by a K± violet gel-matrix. Photobiont 'micareoid', algal cells ± globose, 4–7 µm diam. Apothecia usually numerous, olive-grey, whitish-grey, grey to blackish-grey, occasionally some of them whitish to cream, (0.1–) 0.2–0.6 mm diam., immarginate from the beginning but often with a paler, whitish outer part, mostly adnate, convex to hemispherical. Hymenium colourless, but in darker apothecia slightly greyish to olivaceous grey, K± violet, C± violet due to 'sedifolia-grey' pigment, confined to the gel matrix. Hypothecium colourless to slightly yellowish, without a greyish or olive tinge. Paraphyses numerous, branched and anastomosed, colourless throughout, 0.8–1.2 µm diam. Exciple usually well-developed in young apothecia, 10–20 µm broad and disappearing when mature, composed of paraphysis-like hyphae, colourless. Ascospores cylindrical, cylindrical-ovoid or ellipsoidal, 0 (–1)-septate, (6–) 8–12 (–13) × 2.7–3.5 (–4.2) µm. Pycnidia sometimes present, especially those bearing microconidia, sessile or immersed between goniocysts, to 40 (–50) µm diam., white to greyish-white with gaping ostioles; pycnidial walls around the ostiole usually colourless to slightly olivaceous, and then K± violet, C± violet; mesoconidia (3.8–) 4.5–5.5 × 1.2–1.5 µm and microconidia 5–7.5 (–8) × 0.8–1 µm, identical to those produced by *M. micrococca*. Chemistry: thallus and apothecia K-, C-, Pd-. TLC: methoxymicareic acid.

Mainly on the bark of trees, especially of deciduous species; recent records from Scotland (Wester Ross) and England (Cumbria) but probably much more common; many old records of *M. prasina* may refer to this species.

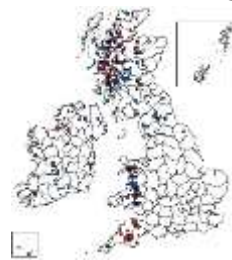
Similar to *M. micrococca* but forming darker pigmented apothecia containing 'sedifolia-grey', K+ violet pigment within the epithecium and goniocysts. Sometimes developing pale apothecia, but they are usually adnate and larger, and the granular thallus is always more olive and not so mealy as that observed in *M. micrococca*.



Micarea cinerea (Schaer.) Hedl. (1892)

LC

Thallus immersed (especially on lignum) but usually of scattered to contiguous, shallow-convex to subglobose areoles; areoles 40–160 (–300) µm diam., greenish white to blue-grey, rarely dark grey; photobiont cells 4–7 µm diam. Apothecia (0.2–) 0.3–0.7 mm diam., adnate, flat and weakly marginate at first but soon convex, sometimes tuberculate and to 1.3 mm diam., pale grey to grey-black, ivory-white in shade forms; exciple well-developed, but obscured in tuberculate apothecia, colourless; hymenium 55–70 µm tall, colourless but usually green (K-, N+ red) in upper part; hypothecium colourless; paraphyses 1–1.4 µm diam., widening to ca 2 µm at the apices, numerous, branched. Asci 50–65 × 15–20 µm. Ascospores (19–) 23–34 (–38) × 4.5–6 µm, fusiform, ± curved, (3–) 5- to 7-septate. Pycnidia: (a) 160–300 µm diam., immersed in areoles, white or greenish around the ostiole, which is often widely gaping, with macroconidia 50–110 × ca 1 µm, filiform, straight or flexuose, 9- to 17-septate; (b) 40–70 µm diam., immersed to emergent, white, with microconidia (3.8–) 4–5 × 0.5–0.7 µm, narrowly fusiform-cylindrical. Thallus and whitish apothecia C+ red,



K-, Pd-; apothecial and pycnidial sections C+ red (gyrophoric acid). **BLS 0875**.

On trunks (often over bryophytes), especially *Betula* and *Quercus*, sometimes on lignum of fallen trunks or boughs, rarely on rocks, usually in woodlands, occasional on humus in moorland. Mainly W. Britain and Ireland.

Most easily confused with *M. alabastrites* and *M. peliocarpa*, which have 3-septate ascospores and with *M. lignaria* var. *lignaria* (thallus Pd+ red, apothecial sections C-) and *M. lignaria* var. *endoleuca* (thallus C+ persistent orange, apothecial sections C-).

Micarea cinerea f. *tenuispora* (D. Hawksw. & Poelt) Fryday (2001) **BLS 2341** occurs on exposed turf in the mountains and is mostly sterile with only macroconidia-containing pycnidia.

Micarea contexta Hedl. (1892)

Thallus immersed, ± inconspicuous; photobiont cells 4–7 µm diam. Apothecia 0.1–0.2 (–0.3) mm diam., ± globose or tuberculate, black; true exciple indistinct; hymenium 33–45 µm tall, dark green (N± red) above, paler below, ± with purple-violet (K± blue-green) granules; hypothecium dark green or purple, the pigments often intermixed, K± green, N± red. Paraphyses rather scanty, of two types: less than 1 µm diam., with apices ± thickened to ca 2 µm diam., branched, colourless; some unbranched, ± in small fascicles, pigmented throughout, 1.5–2 µm diam. and to ca 3 µm at the apices. Asci 35–40 × 10–14 µm. Ascospores 7–13 (–14) × 3–4.6 µm, ovoid to cylindric-ovoid, 1-septate. Pycnidia immersed to sessile, black; walls greenish, K± intensifying: (a) ca 40 µm diam.; mesoconidia 3.5–4.5 × 1.5–2 µm, cylindrical; (b) 20–40 µm diam., microconidia 4–5 × 0.5–1 µm, bacilliform. Thallus and apothecial sections C-; lichen products not detected by TLC. **BLS 1733**.

On rotting wood of fallen *Pinus* branches; rare. N.E. Scotland (Abernethy, Rothiemurchus and Glentnar pine-forests, & Migdale in E. Sutherland), also Central Highlands (Perthshire).

Specimens of *M. melaena* with immature ascospores differ in the usually better developed thallus, more numerous paraphyses and longer microconidia. *M. olivacea* has different paraphyses, narrower, ± cylindrical ascospores and lacks purple pigmentation.

Micarea coppinsii Tønsberg (1992)

Thallus forming small rounded patches to 2 cm diam., sometimes wide-spreading, of discrete rounded grey-green to grey areoles 40–220 (–300) µm diam., many bursting apically to produce soralia; soralia green to blue-grey, 0.1–0.2 mm diam., with farinose soredia 12–25 (–30) µm diam., some with blue-green (K-, N+ red) pigmented hyphae; prothallus not evident; photobiont cells 4–7 µm diam. Apothecia very rare, similar to those of *M. peliocarpa*, to 0.2 mm diam., pallid to blue-grey, at first adnate and weakly marginate but becoming convex and constricted below and sometimes shortly stalked; hymenium 45–70 µm tall, colourless or partly greenish, K-, N+ red; asci 30–44 × 12–20 µm; ascospores 20–28 (–31) × 4 (–5) µm, fusiform to clavate-fusiform, ± curved, 3-septate. Pycnidia occasional, 60–70 µm diam., emergent, pallid, with microconidia 4.5–6 × 0.6–0.8 µm, narrowly fusiform-cylindrical. Thallus, soralia and apothecia C+ reddish (often faint), KC+ red, K-, Pd-, UV- (5-O-methylhiasic acid [major], gyrophoric acid [trace], ± lecanoric acid [trace]). **BLS 1720**.

On a variety of acidic substrata, including twigs of trees and shrubs (including *Calluna* and *Myrica*), less often on tree boles, siliceous rocks and gravestones, sometimes on stones and wood fragments on the ground in heathland or mine sites, or on fence rails; widespread but previously much overlooked. Mainly upland areas of Britain and Ireland, with scattered records from lowland areas.

When soralia are blue-grey, the species is easily confused with diminutive forms of *Trapeliopsis flexuosa* or (when the soralia are pale) with *Trapelia corticola*; both these species have different, ± larger-celled photobiont cells and the major lichen product (TLC) is gyrophoric acid; also, the blue-green pigment in *T. flexuosa* is K+ brown, N-. On twigs, *Halecania viridescens* can look similar, but is C-, Pd+ red (argopsin). Sterile *M. viridileprosa* is distinguished by its light green ± leprose thallus without areoles.

Micarea crassipes (Th. Fr.) Coppins (1983)

Helocarpon crassipes Th. Fr. (1860)

Thallus whitish, pale grey-brown or ash-grey in part; areoles 0.07–0.2 mm diam., often producing secondary granules; photobiont cells 4–7 µm diam. Apothecia 0.2–0.6 mm diam., sessile, turbinate or short-stalked, at first

Nb



LC



flat but later convex, rarely tuberculate and then to 1.4 mm diam; true exciple well-developed especially in young apothecia, becoming excluded, the inner part concolorous with the hypothecium, the outer part greenish (K± intensifying); hymenium 45–50 µm tall, greenish (K± intensifying) or purple-brown (K± purple intensifying) above, pale purplish (K± purple intensifying or K± greenish) below; hypothecium dark purple-brown (K± intensifying, N+ purple-red); paraphyses numerous, unbranched or sparingly branched above, 1–1.5 µm diam., to ca 2.5 µm at the apices. Asci 40–48 × 11–14 µm. Ascospores (9–) 10–17 (–21) × (2.5–) 3–4.5 µm, 0 (–1)-septate, fusiform-ellipsoidal. Pycnidia 65–150 µm diam., black, sessile, rare; conidia 4.5–5.5 × 1.2–1.5 µm, bacillar. Lichen products not detected by TLC. **BLS 1661.**



Over mosses on summit rocks. Scottish Highlands (Ben Lawers); rare.

Distinguished from *Micarea assimilata* by the finely granular thallus, absence of cephalodia, turbinate or ± stalked apothecia and well-developed true exciple.

Molecular studies published by Andersen & Ekman (2005) showed that the species was better placed outside of *Micarea* in its own genus *Helocarpon* Th. Fr. (1860), but Fryday *et al.* (2014) considered that the material sequenced was incorrectly identified and suggested a placement within *Bryobilimbia* (Lecideales: Lecideaceae). More molecular data are needed to confirm those results.

Micarea curvata Coppins (1983)

Thallus thinly scurfy or granular-verrucose, whitish grey to brownish grey; photobiont cells 4–7 µm diam. Apothecia 0.2–0.5 mm diam., convex, or tuberculate and then to 0.65 mm diam., dark brown; true exciple soon reflexed; epithecium pale fuscous brown (K–, N–); hymenium ca 60 µm tall, colourless but with fuscous brown vertical streaks; hypothecium pale, tinged straw-brown (K–). Paraphyses 0.8–1 µm diam., not swollen at the apices, branched. Asci 45–50 × 10–13 µm. Ascospores (7–) 9–11.7 × (2.3–) 2.5–3.8 µm, bean-shaped, distinctly curved, (0–) 1-septate. Pycnidia not known. Sections of thallus and apothecia C+ red (probably gyrophoric acid, but not tested by TLC). **BLS 0615.**

LC NR



On the lower edge of pebbles in coastal and riverside shingle, also on siliceous headstones; probably overlooked. Scotland (East Lothian, Stirling, Wigtown), also recorded quite frequently in S. England in recent years.

Characterized by the strongly curved ascospores, brown (K–, N–) apothecial pigments and C+ red reactions. Easily mistaken in the field for pale-fruited forms of *Scoliciosporum umbrinum*. Forms in S. England with K+ purple apothecial pigments may represent a different taxon.

Micarea deminuta Coppins (1995)

Thallus immersed and inconspicuous, or thinly scurfy, whitish grey to medium grey or grey-green. Photobiont cells 4–7 µm diam. Apothecia 80–200 (–240) µm, convex to subglobose, black; true exciple absent; epithecium patchy, dark brown (K+ olivaceous); hymenium 30–50 µm tall, colourless or with dark brown vertical streaks (K+ olivaceous, N+ red); hypothecium dark reddish brown (K± dulling, N± reddish, or upper part K+ olivaceous, N+ red); paraphyses scanty, of two types: 0.8–1 µm diam., with apices ± thickened to ca 1.8 µm diam., branched, colourless; some unbranched and ± in small fascicles, brown-pigmented throughout, 1.5–2 (–3) µm diam. Asci ca 40 × 15 µm, in K/I with a dark axial tube. Ascospores (5.8–) 7.7–10 (–11.5) × (3.2–) 3.7–4.5 (–4.8) µm, ellipsoidal, ovoid-ellipsoidal to cylindrical-ellipsoidal, aseptate. Pycnidia (few seen) immersed to ± sessile, black; walls brown, olivaceous around the ostiole, ca 60 µm diam., microconidia (4–) 4.3–5 × 0.8–1 µm. Lichen products not detected by TLC. **BLS 1920.**

LC



Mostly on decorticate logs or wood fragments lying on the ground; once on old stem of *Salix herbacea*; occasional, somewhat ephemeral. England (Cornwall, Devon, Hampshire, Kent), Wales (Cardigan), Scotland (Argyll, Kirkcudbright, Perthshire, Stirlingshire).

Similar in appearance to several other black-fruited species of *Micarea* (e.g. *M. contexta*, *M. eximia*, *M. misella* and *M. nigella*) and *Arthonia* (e.g. *A. ligniariella*). A similar apothecial pigmentation is shared by *M. botryoides*, which has larger apothecia and larger, often septate ascospores. Larger conidia (?mesoconidia) are reported from Polish material of *M. deminuta* (Czarnota 2007).

Micarea denigrata (Fr.) Hedl. (1892)

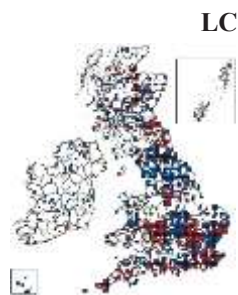
Thallus usually of greenish white to pale grey convex areoles 60–200 µm diam., sometimes scurfy and blackish (when pulverulent), or immersed; areoles not corticate, the outer part ± with greenish, K± violet pigment; photobiont cells 4–7 µm diam. Apothecia 0.15–0.5 mm diam. or tuberculate and to 0.6 mm diam., dark grey to black, pale to brown in shade morphs, convex to subglobose; true exciple usually not evident at maturity; hymenium 25–40 µm tall, the upper part dull greenish, K ± violet; hypothecium colourless; paraphyses 1–1.5 (–1.7) µm diam., numerous. Asci 28–36 × 9–12 µm. Ascospores (7–) 9–16 (–18) × 2–3.3 (–3.5) µm, cylindric-ellipsoidal, cylindric-ovoid, fusiform or bacilliform, often ± curved, (0–) 1-septate. Pycnidia immersed to ± emergent, whitish to black, usually with greenish, K± violet pigment:

(a) 60–150 µm diam., the ostiole often gaping, the macroconidia 12–24 × ca 1 µm, curved, (1–) 3-septate; (b) 80–160 µm diam., the ostiole often gaping, mesoconidia 2.5–4.5 (–5) × 1–2 µm, short-cylindrical or obovoid; (c) 30–50 µm diam., ostiole not gaping; microconidia (4.5–) 5–7.5 × 0.5–1 µm, cylindrical. Except for the greenish, C± violet pigment, K± violet, Pd–, all parts usually C± orange-red, K– (gyrophoric acid). **BLS 0877**.

Usually on wood, on fallen trunks and stumps; an early colonizer on a wide variety of worked timber; more rarely on other substrata, e.g. shaded sandstone rocks and brickwork, dead bark and moribund mosses in acid dunes; common and widespread even in polluted areas. Throughout Britain and Ireland.

Polymorphic, usually identified by the C+ orange-red reaction of apothecial sections and narrow, 1-septate ascospores. Often sterile on worked timber, with numerous pycnidia extruding mesoconidia as white blobs. Often confused with *M. nitschkeana* (ascospores 3-septate), *M. micrococca* and *M. prasina* (thallus of gonocysts, gyrophoric acid absent) and *M. misella* (ascospores mostly aseptate, paraphyses less than 1 µm diam., stalked pycnidia usually present). Compare also with *M. elachista* and *M. herbarum*.

Type host to the lichenicolous *Skyttea viridis* D. Hawksw. & Coppins (1982); also reported parasitized by *Intralichen* cf. *christiansenii*.



LC

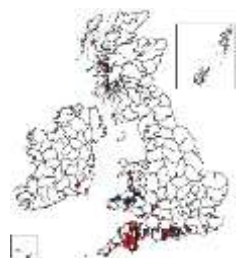
Micarea doliiformis (Coppins & P. James) Coppins & Sérus. (2010)

Lecidea doliiformis Coppins & P. James (1992)

Thallus effuse, often wide-spreading, finely granular but granules often proliferating to form a thickish crust, dull green-grey or whitish grey; granules 30–60 (–80) µm diam. Photobiont cells 7–14 µm diam. Apothecia 0.2–0.5 mm diam., rare, convex to subglobose, pale pinkish brown with whitish pruina. Exciple absent. Epithecium pale brownish due to dense minute crystals that dissolve in K. Hymenium 45–50 µm tall, colourless or with pale brown vertical streaks. Hypothecium reddish brown, K+ yellowish brown. Paraphyses 0.7–1.5 µm diam., widening to 2.5 (–3) µm in the epithecium, branched and anastomosed, apices colourless. Asci 40–45 × ca 9 µm. Ascospores (7–) 8–11 × 2.7–3.7 µm, ovoid- to cylindric-ellipsoidal. Pycnidia 80–160 µm diam., 140–300 µm tall, numerous, sessile or ± stalked, somewhat barrel-shaped, grey-brown to dark grey, usually thinly white-tomentose, the ostiole often gaping; wall dull brown, K–, N+ reddish brown, but green (K+ intensifying, N+ red) around the ostiole. Conidia 3.5–4.7 × 1.5–2 µm, shortly cylindrical or wider at the proximal end, mostly biguttulate. Thallus C–, K–, KC–, Pd–, UV– (no lichen substances by TLC). **BLS 1698**.

On dry to moist, often sheltered, rough acid bark or long-exposed wood (especially *Quercus*) in woodland or sheltered parkland; localized. S. and W. Britain, through Wales to W. Scotland, scattered in upland Ireland. Known only from western Europe.

Easily recognized by its conspicuous pycnidia and its distinctive ecology. Other *Micarea* species with sessile to stalked pycnidia all have a smaller-celled photobiont (cells 4–8 µm diam).



Nb

Micarea elachista (Körb.) Coppins & R. Sant. (1983)

Thallus of scattered to contiguous convex to subglobose areoles; areoles 80–160 (–250) µm diam., greenish white or whitish grey, sometimes tinged grey-brown or olivaceous, occasionally (when on charred lignum) dark brown, sometimes thinly white-pruinose; in section with a distinct algal-free cortex visible; photobiont cells 4–7 µm diam. Apothecia (80–) 120–300 µm diam., dark brown to brown-black, matt, immarginate, convex to subglobose, often tuberculate and to 0.8 mm diam.; true exciple poorly developed and much reflexed; hymenium 30–40 µm, colourless or with yellowish brown vertical streaks; epithecium distinct, dark brown, K+ pigment dissolving into solution, sometimes also K+ faintly violet; hypothecium pale, tinged pale yellowish brown, K–, N–; paraphyses

EN D

0.8–1 μm diam. and widening to *ca* 2 μm at the apices, numerous, sparingly branched but more richly branched in the epithecium. Asci 23–35 \times 10–12 μm . Ascospores (9–) 11–15 (–24) \times 2–3.5 μm , fusiform, cylindrical-fusiform or ovoid-cylindrical, \pm slightly curved, 0 or 1(–3)-septate. Pycnidia usually frequent, immersed but often emergent, grey-brown, sometimes whitish around the ostiole; wall pale olivaceous or brownish, K+ violet: (a) 100–200 μm diam., often widely gaping, with mesoconidia 3.5–4.5 \times 1.3–1.7 (–2) μm , \pm cylindrical or slightly wider at the proximal end; (b) 23–40 μm diam., with microconidia (4–) 4.5–6 (–6.5) μm in length, narrowly cylindrical. Lichen products not detected by TLC; apothecial sections C–. **BLS 1924.**

On lignum of large, decorticate *Pinus*; very rare. Scottish Highlands (Easternness, Guisachan Forest).

Can be confused with shade-forms of *M. denigrata*, but that species has C+ red apothecial sections (gyrophoric acid) and lacks the K+ dissolving yellow-brown pigment in the epithecium.



Micarea eximia Hedl. (1892)

Thallus immersed, \pm inconspicuous; photobiont cells 4–7 μm diam. Apothecia 0.1–0.2 (–0.3) mm diam., \pm globose or tuberculate, to 0.4 mm diam., black; true exciple indistinct; hymenium 30–45 μm tall, dark blue-green (N+ red) above, paler below, with blue-green vertical streaks; hypothecium dilute reddish or purple-brown, K+ dull green, N+ red; paraphyses rather scanty, of two types: less than 1 μm diam., with apices \pm thickened with pigment to 2–3 μm diam., branched, colourless; some unbranched, \pm in small fascicles, pigmented throughout, *ca* 2 μm diam. Asci 30–40 \times 11–12 μm . Ascospores 9–14 (–16) \times 1.8–2.5 μm , cylindrical-fusiform, \pm curved, (0–) 1-septate. Pycnidia immersed to emergent, black, 35–80 μm diam.; walls greenish, K \pm intensifying, N+ red; conidia (mesoconidia) 3.5–4.5 \times 1.5–2 μm , bacilliform. Lichen products not detected by TLC. **BLS 0773.**

On wood of fallen decorticate *Pinus* branch; rare. N.E. Scotland (Inverness, Rothiemurchus Forest).

Similar in appearance to several other black-fruited species of *Micarea* (e.g. *M. contexta*, *M. diminuta*, *M. misella* and *M. nigella*) and *Arthonia* (e.g. *A. lignariella*).



Micarea fallax Launis & Myllys (2019)

NE

Thallus effuse, vivid green or pale olive to dark olive green, granular, composed of goniocysts 20–40 μm diam, often coalescing to form larger granules or a thick \pm continuous cracked thallus; POL+ crystals often present in the thallus and hymenium but not in the epithecium, dissolving in K. Photobiont micareoid, algal cells 4.5–7 μm diam. Apothecia numerous, 0.2–0.4 (–0.5) mm diam, cream-white, pale brownish, honey to medium brown, sometimes with a pale greyish tinge, and then K+ violet and C+ violet due to Sedifolia-gray pigment; usually hemispherical or subglobose, sometimes adnate or convex and semi-immersed in the thallus, sometimes tuberculate; hypothecium colourless or yellowish; epithecium colourless, pale grey or pale brown; paraphyses numerous, 0.5–1 (–1.5) μm diam., branched, not or only scarcely broader at the apices. Ascospores cylindrical-ellipsoidal or obovoid, 0- or 1-septate, 8–11 \times 3–4 μm . Mesopycnidia small and usually inconspicuous, 50–100 μm diam., sessile or mostly semi-immersed in surrounding goniocysts, globose or barrel-like, sometimes with extruding white conidial mass; mesoconidia cylindrical or cylindrical-fusiform, (4–) 4.5–5.5 (–6) \times 1–1.5 μm . Micropycnidia small and inconspicuous, immersed in surrounding goniocysts, globose, 40–80 μm diam.; microconidia straight or sometimes curved, bacillar or narrowly fusiform, 5.5–7.5 \times *ca* 1 μm . Chemistry: micareic acid. **BLS 2776.**

On lignum of old *Quercus*, Scotland (East Lothian).

A semi-cryptic species within the *Micarea prasina* aggregate, differing from *M. prasina* sensu stricto by the POL+ crystals visible in the hymenium but not the epithecium, an often less well-developed thallus, and marginally smaller ascospores. The description has been adapted from Launis & Myllys (2019).

Micarea farinosa Coppins (2008)

Nb

Thallus light green, farinose, of \pm globose goniocysts; goniocysts 12–18 μm diam., sometimes coalescing to form granules to 35 μm diam.; outer hyphae colourless, K–; photobiont cells 4–7 μm diam. Apothecia 0.15–0.25 (–0.3) mm diam., convex to subglobose, immarginate, pale orange to orange-brown; true exciple poorly developed, reflexed, colourless; epithecium colourless, hymenium 24–30 μm tall; hypothecium colourless; paraphyses 1–

1.5 μm diam., to 2 μm towards the apices, scanty, branched; a few additional, stouter (to 3 μm diam.) paraphyses sometimes evident. Asci 27–30 \times 7–10 μm . Ascospores 5–7.5 \times 2–3.4 μm , ovoid, ovoid-ellipsoidal to cylindrical-ellipsoidal, aseptate. Pycnidia not seen. Lichen products not detected by TLC. **BLS 2507**.

On acid rock or consolidated soil, sometimes on moribund mosses, under sheltered dry overhangs, recesses at tree bases and upended root-plates; rare or overlooked. S.W. England (Cornwall), Wales (Cardigan, Radnor), W. Scotland (Wigtown, Argyll).

Similar to *M. lithinella*, differing in its farinose thallus, smaller apothecia and ascospores, and occurrence in underhang niches. *M. myriocarpa* with pale apothecia can be distinguished by its more scurfy granular thallus, narrower, often 1-septate ascospores and reddish to orange-brown hypothecium. Similar farinose or leprose species in similar habitats include *Psilolechia clavulifera* (photobiont *Stichococcus*, ascospores smaller), *P. leprosa* (thallus C+ red), *P. lucida* (thallus and apothecia bright yellow-green) and *Lithocalla ecorticata* (photobiont cells larger, thallus containing usnic acid).



Micarea globulosella (Nyl.) Coppins (1983)

Like *M. denigrata* and *M. nitschkeana*, but distinguished by the \pm curved cylindrical or \pm fusiform-acicular, 0- or 3 (-6)-septate ascospores 13–26 \times (1.5–) 2–2.5 (-3) μm in size, shorter microconidia (3.5–5 \times 0.5–1 μm) and the apparent absence of macroconidia. **BLS 0872**.

On dead *Quercus* wood in parklands in Herefordshire (Croft Park) and S.E. England, and on top of a gate in a wooded valley; also Wales (Merionethshire). Rare.

M. longispora differs in the dark green granular areoles (\pm gelatinous when wet), often longer ascospores and lack of gyrophoric acid. *Biatora beckhausii* has a larger-celled photobiont, \pm pruinose apothecia, excipular hyphae coherent (in K) and occurs on less acid bark or wood.



Nb

Micarea hedlundii Coppins (1983)

Thallus similar to *M. prasina*: dull, darkish green, with goniocysts 25–35 μm diam. that usually contain a yellowish K \pm and C \pm purple-violet pigment (as oily droplets). Apothecia often absent, 0.2–0.4 mm diam., grey-brown to dark dull brown, convex to subglobose, sometimes tuberculate and then to 1.0 mm diam.; true exciple poorly developed; hymenium 35–45 μm tall, colourless or with pale straw-brown epithecium and vertical streaks, K \pm violet, C \pm violet; hypothecium 80–130 μm tall, colourless to pale straw; paraphyses scanty, 0.8–1.5 μm diam., branched, scarcely swollen above. Asci 35–40 \times 9–12 μm . Ascospores 6.5–10 (-12) \times 2.5–4 μm , ellipsoidal, cylindrical-ellipsoidal or cylindrical-ovoid, 0- or rarely 1-septate. Pycnidia numerous, stalked, brown, thinly white-tomentose, 0.1–1 mm tall, 70–140 μm diam., the stalk often branched, with up to 5 pycnidia; mesoconidia (4–) 4.5–5.5 (-6) \times 1.2–1.7 μm , cylindrical-ellipsoidal or cylindrical-ovoid. Lichen products not detected by TLC. **BLS 1721**.

On tree stumps in shaded or humid situations in ancient *Quercus* or *Pinus* woods, also on soft damp sandstone (sandrock) in the Weald (E. Sussex, Kent); rare. S. and S.W. England, N. & S. Wales, Scotland (Highlands), W. & N. Ireland.

Distinguished from other members of the *M. prasina* group by its generally darker thallus, its stalked brown whitish-tomentose pycnidia and the usual presence of yellowish (K \pm purple-violet) oily droplets in the gelatinous matrix of the goniocysts.



NT

Micarea herbarum M. Brand, Coppins, Sérus. & van den Boom (2017)

NE

Thallus very thin, consisting of small greenish flattened or slightly convex areoles less than 0.1 mm diam., with crystals, often partly coated by a thin gelatinous film of green algal cells. Photobiont micareoid, 6–8 μm diam., thin-walled, clustered in compact masses. Apothecia abundant, subglobose, immarginate, 0.15–0.25 mm diam., dark brown to black. Hymenium 30–40 μm high; epithecium with dark green-brown (K+ violet) spots; paraphyses sparse, branched, 1.2–1.4 mm diam. Hypothecium colourless. Asci 20–28 \times 7–12 μm . Ascospores ellipsoidal, 6.5–9.7 \times 2–2.6 μm , (0-) 1-septate. Mesopycnidia often abundant, 40–80 μm diam., the upper part dark greenish grey (K+ violet), formed inside a thallus granule or outside of the lichenized thallus in the

gelatinous matrix of free algal cells. Mesoconidia shortly bacilliform, rarely obovoid, $3.8\text{--}6.1 \times 1\text{--}1.2$ (-1.3) μm , aseptate. Chemistry: no lichen products detected by TLC; pigment sedifolia-grey, K+ violet. **BLS 2694**.

On lignum of fallen trunks of ancient *Fagus*, and *Quercus* lignum on trunks dumped in a quarry in parkland, New Forest and Windsor Park. Reported from a wide range of dead plant material in the Netherlands, including herbaceous stems, sometimes on soil.

Similar to a depauperate version of *M. denigrata*, but differs by slightly longer mesoconidia and the lack of gyrophoric acid. The biology of this is remarkable, as it often grows over or within a gelatinous film of green algal cells. Hyphae connected with the apothecia and pycnidia penetrate into this layer, and these unknown algae can penetrate into the subhymenium of the *Micarea* apothecia.



Micarea hypoviolascens Czarnota & Coppins (2005)

Thallus grey-green to greenish white, immersed or with shallow-convex areoles 40–200 μm diam.; photobiont cells 4–7 μm diam. Apothecia 0.1–0.25 mm diam., grey (when young) to black, immarginate, convex to \pm globose, sometimes tuberculate and then to 0.4 mm diam.; true exciple indistinct and reflexed, gold-brownish; hymenium 30–35 μm tall, pale olive-brown to pale yellowish brown, K \pm violet, C \pm violet, N–; hypothecium 70–85 (-100) μm tall, olive to olive-brown, K+ intense violet, C+ violet, N– or N+ fleetingly violaceous grey; paraphyses 1.3–2 μm diam., numerous, sparingly branched, but more richly branched above and with apices to 2.5 μm diam. Asci (20–) 25–32 \times 8–11 μm . Ascospores (8–) 10–12 (-13.5) \times 3–4 (-4.3) μm , cylindrical-ellipsoidal, 0- or 1-septate. Pycnidia 70–150 μm , immersed in areoles, blackish, ostiole eventually gaping; wall olive, K+ violet, C+ violet; conidia (8.4–) 9–11.5 \times 1.3–1.8 (-2.1) μm , \pm bacilliform. Thallus K–, C–, Pd–, UV– (unidentified substance detected by TLC). **BLS 2446**.

Nb IR



On hard lignum of tree stumps in an oak wood and on a *Quercus* bough in an Atlantic ravine; two known localities. W. Scotland (Argyll), N. Wales (Merionethshire). Endemic.

In the field it resembles *M. denigrata* and several other lignicolous species with small blackish apothecia and a thin, pale thallus. Microscopically, easily identified by its dark, olivaceous, K+ violet hypothecium ('sedifolia-grey').

Micarea incrassata Hedl. (1892)

Thallus dull grey-white, grey-brown to dark grey, matt, of confluent convex-verrucose areoles 80–300 μm diam.; photobiont cells 4–7 μm diam.; cephalodia usually present, areole-like, brown, scattered, with *Nostoc* (cells 3–5 μm diam.); clusters of *Stigonema* often amongst the areoles. Apothecia 0.3–0.8 (-1) mm diam., black, immarginate, convex, usually partly obscured by surrounding areoles; true exciple indistinct; hymenium 45–50 μm tall, the uppermost part dark greenish, K–, N \pm red; hypothecium 150–400 μm tall, dark red-brown (no purple tinge) K–, N \pm bright orange-brown; paraphyses (1–) 1.5–2 μm diam., numerous, sparingly branched, the apices sometimes to 3 μm diam. Asci 45–48 \times 11–14 μm . Ascospores (10–) 12–17 \times 4–4.8 μm , ellipsoidal to cylindrical-ovoid or cylindrical-fusiform, 0 or 1(–2)-septate. Pycnidia 30–60 μm , rare, immersed, blackish; conidia 6–9 \times 1–1.3 μm , \pm bacilliform. Lichen products not detected by TLC. **BLS 1631**.

Nb



On soil of heaths on mountain summits, or on acid coastal heaths; occasional. N.W. Scotland (Highland region).

M. assimolata differs in the purple-brown hypothecium, as does *M. paratropa*, which also has a green, K \pm violet upper hymenium; *M. subconfusa* has a similar hypothecium, but smaller ascospores and conidia. *Protomicarea limosa*, which occurs in similar habitats, has a Pd+ red thallus and pale hypothecium, while *Frutidella caesiastrata* has dark blue-grey apothecia with a pale bluish grey bloom when wet and photobiont cells 8–12 μm diam.

Micarea inopinula (Nyl.) Coppins & T. Sprib. (2021)

Nb

Micarea prasinella (Jatta) I.M. Lamb (1953)

Thallus pale green to olive-green, often brown-tinged, of granular areoles 40–60 μm diam.; soredia and

cephalodia (with *Nostoc*) in some non-British specimens; photobiont cells 4–7 μm . Apothecia 0.15–0.6 mm diam., dark blue-grey to black, sometimes partly greyish tomentose, turbinate to short-stalked, immarginate; true exciple evident in sections, colourless with dark red-brown outer layer; epithecium patchily purple-brown, K+ purple intensifying or K+ green; hymenium 50–70 μm tall, dilute purplish brown, K+ purple intensifying or K+ green, but sometimes partly dull olivaceous in upper part; hypothecium dark purple-brown, K+ purple intensifying or K+ green; paraphyses numerous, slender, sparingly branched and anastomosing, 0.7–1.2 μm diam., to 2 μm diam. at the apices. Asci 65–70 μm tall, narrowly clavate. Ascospores 12–18 \times (4–) 4.7–7 μm , ellipsoidal to ovoid-ellipsoidal, (0–)1(-3)-septate. Pycnidia (not seen in British material) 40–50 μm diam., sessile; conidia 6.7–7.7 \times ca 0.8 μm , bacilliform. Thallus (in squash preparations) C+ red, K–, Pd– (gyrophoric acid). **BLS 2508**.



On moss (*Hypnum cupressiforme*) on rock and tree roots, in birch woods; very rare. Scotland (W. Ross, E. Inverness).

Characterized by the distinctive short-stalked, ‘*Calicium*-like’ apothecia. The internal pigmentation is similar to *M. melaena*, but that species has sessile apothecia, more richly branched paraphyses and mainly 3-septate ascospores. The montane *M. crassipes* differs in having apothecia that are distinctly marginate when young, narrower ascospores and a C– thallus (lacking lichen products in TLC).

Micarea inquinans (Tul.) Coppins (1992)

Thallus absent, lichenicolous. Apothecia 0.24–0.4 mm diam., black, strongly convex, often aggregated; true exciple soon excluded; epithecium and hypothecium red-brown to dark brown, K– (no purple tinge), or epithecium green, K–, N+ red; hymenium 45–60 μm tall, colourless or in part pale greenish or pale red-brown; paraphyses 1.5–2 μm diam., the apices sometimes to 3 μm diam., frequently branched. Asci 40–50 \times 12–18 μm , clavate, with a K/I+ blue apical dome penetrated by a darker tube-like structure. Ascospores 8–13 \times 4–7 μm , broadly ellipsoidal to subglobose, aseptate. Pycnidia immersed, black; wall red-brown but greenish around the ostiole; conidia bacilliform, 3.8–4.8 \times 1.3–1.5 μm . Lichen products not detected by TLC (except those from the host). **BLS 1877**.



On thalli of *Dibaeis baeomyces*; rare. S.W. England (Cornwall, Devon), Scotland (Central Highlands, Skye).

Apothecial anatomy and pigmentation are similar to *Leimonis erratica* and *M. lapillicola*, but the exciple is poorly developed and the habit lichenicolous.

Micarea intrusa (Th. Fr.) Coppins & Kilius (1983)

Scoliciosporum intrusum (Th. Fr.) Hafellner (2004)

Thallus effuse, or forming small patches to 1 cm diam., areoles convex, scurfy or granular-verrucose, dark dull olivaceous-brown to grey-black; photobiont cells 7–21 μm diam. Apothecia 0.14–0.4 mm diam., convex, black, glossy or dull; true exciple reflexed and excluded, colourless to pale brown or dark brown on the outside edge; hymenium 40–50 μm tall; epithecium aeruginose-green, K– lighter green; hymenium colourless or greenish above; hypothecium colourless or faintly olivaceous, sometimes dull orange (K+ purplish-red) in the upper part, ascus and ascospore contents also sometimes with orange, K+ purplish-red pigment; paraphyses 1–1.5 (–1.7) μm diam., branched, apices not swollen. Ascospores (7–) 9–14 (–17) \times 4–6 μm , 0- or 1(-3)-septate (the septum often eccentric), ellipsoidal or ovoid-ellipsoidal, rarely cylindrical-fusiform and \pm curved. Pycnidia not seen. **BLS 0878**.



On exposed, hard acid rocks, apparently establishing on the edges of crustose lichens, e.g. *Rhizocarpon* spp; rare. Scotland (Highlands), W. Wales, N.W. & S.W. England (Westmorland, E. Cornwall).

Transferred to *Scoliciosporum* by Hafellner (2004), but that genus is polyphyletic as recognized in LGBI2 (Edwards *et al.* 2009), and *S. intrusum* was shown to cluster within *Micarea* by Miądlikowska *et al.* (2014).

In the field, *M. intrusa* closely resembles *Scoliciosporum umbrinum*, which has elongate, helically twisted ascospores. Can be mistaken for *M. subnigrata*, which has a brown epithecium and a smaller-celled photobiont.

Micarea isidioprasina M. Brand, van den Boom, Guzow-Krzemińska, Sérus. & Kukwa (2019) NE
Thallus crustose, granular-isidiate, indeterminate, ± immersed in non-isidiate parts and then as a thin greenish film over the substrate or minutely areolate, isidiate; prothallus not seen; areoles to 50 µm diam., green, soon developing isidia; isidia abundantly branched and coralloid, crowded and forming an almost continuous layer locally in older parts of the substrate, green to olive green (*Sedifolia*-grey, K+ violet), to 250 µm tall and 25 µm diam., with a distinct and complete hyphal layer. Photobiont cells 4–7 µm diam. Apothecia rarely developed, white to beige, some patchily grey, to 0.45 mm diam., convex; exciple poorly developed, as a narrow colourless zone of radiating hyphae; hymenium to 50 µm tall, colourless; epithecium and hypothecium colourless; paraphyses of one type, 1–1.5 µm diam., sparse, mostly apically branched and anastomosed, colourless throughout. Asci cylindric-clavate, 30–45 × 12–15 µm. Ascospores 0- to 1-septate, ovoid, ellipsoidal or cylindrical, 11–14 × 3.5–4.5 µm. Pycnidia not seen. Crystalline granules (studied in polarised light) present rather sparsely in the hymenium as strands between asci and paraphyses, and abundantly in isidia, soluble in K. Chemistry: micareic acid (TLC). **BLS 2748.**

On bark of *Betula pubescens*, Merioneth and on old oak stump, Staffordshire. Known from various European countries on rotting wood and acidic bark in old-growth forests.

Distinctive for the production of isidia, and is usually sterile (but see also *M. aeruginoprasina*). *M. prasina* (s. str.) also contains micareic acid, but is not isidiate, often richly fertile and its thallus consists of goniocysts rather than isidia.

Micarea lapillicola (Vain.) Coppins & Muhr (1997)

Thallus pale to medium grey, of dispersed to confluent areoles, prothallus not evident; areoles convex, 0.1–0.2 mm diam. Photobiont cells 3–7 µm diam. Apothecial appearance and anatomy similar to *Leimonis erratica*; ascospores aseptate, ellipsoidal to ovoid-ellipsoidal, 6–9.5 (–11) × 3–4 (–5.5) µm. Pycnidia immersed in areoles, walls colourless or olivaceous in the upper part: (a) 20–40 µm diam., with microconidia, bacilliform, eguttulate, 3–4 × 0.5–0.8 µm; (b) 50–60 µm diam., with mesoconidia, cylindric-ellipsoidal to ovoid-cylindrical, often biguttulate and with a median constriction, 3–4 (–4.5) × 1.3–1.7 µm. Lichen products not detected by TLC. **BLS 1482.**

On small stones and pebbles in open situations, e.g. by forest tracks; occasional. N.E. Scotland & Argyll, Wales, S.W. Ireland.

Apothecial anatomy and pigmentation are similar to *Leimonis erratica*, differing especially in having an areolate thallus with a smaller-celled photobiont.



Micarea leprosula (Th. Fr.) Coppins & A. Fletcher (1975)

Thallus blue-grey, more rarely grey-brown, of scattered or usually coalescing convex to globose areoles 0.1–0.4 mm diam., often proliferating to form a thick crust; areoles matt, fragile, eroding to form sorediate patches, the soredia 20–50 µm diam.; outer hyphae greenish, K–, N± red; photobiont cells 4–7 µm. Apothecia similar to *M. peliocarpa*, rare. Ascospores 14–26 (–29) × 4–5.5 µm, cylindric-ellipsoidal to fusiform, ± curved, (1-) 3-septate. Pycnidia unknown. Thallus C+ red, K–, Pd+ red; apothecial sections C+ red; argopsin and gyrophoric acid. **BLS 0879.**

On bryophytes and plant debris on acid rocks and peaty ground, less often on bark or wood; common, mainly in N. & W. Britain, rare in lowland England, scattered in Ireland.

Of almost identical appearance is *M. submilliaria*, distinguished by its Pd+ yellow (not red) reaction of the thallus. *Trapeliopsis granulosa* usually has more well-defined soralia and reacts Pd–.



Micarea lignaria (Ach.) Hedl. (1892)

Thallus of scattered to confluent ± globose whitish, grey-green or bluish grey glossy or matt areoles 80–300 µm diam., sometimes ± immersed; photobiont cells 4–7 µm diam. Apothecia 0.15–0.6 (–0.9) mm diam., black or blue-black, immarginate, convex to ± globose, rarely with a stalk to 1 mm tall; true exciple ± distinct in young apothecia but soon reflexed, brownish in outer parts; hymenium 50–75 µm tall, colourless, or upper part and sometimes lower part olivaceous to blue-green, K–, rarely with a few scattered, minute violaceous (K+ green) granules; hypothecium pale blue-green or olivaceous, K–, but central part often ± colourless or pale brownish;

LC

paraphyses 1.3–1.8 μm diam., numerous, aseptate or sparingly branched above; apices often \pm swollen and coated in green or greenish brown pigment. Asci 45–50 \times 11–19 μm . Ascospores 16–36 (–38) \times 4–6 (–7) μm , (0-) 3- to 7-septate, fusiform, straight or slightly curved. Pycnidia \pm immersed; walls green (K–) in upper parts: (a) *ca* 100 μm diam., with macroconidia 16–22 \times *ca* 1 μm , curved or hamate, 0- to 3-septate; (b) 100–140 μm diam., with mesoconidia 4–7 \times 1.5–2 μm , \pm cylindrical to obovoid; (c) 40–50 μm diam., with microconidia 5–7 \times *ca* 0.8 μm , narrowly cylindrical; only (c) is common. Thallus C–, K–, KC–, Pd+ red (argopsin); apothecial sections C–. **BLS 0880**.

On various acidic substrata, often over mosses and plant debris, widespread and common, especially in upland districts, more restricted in the lowlands. Throughout Britain and Ireland.

M. cinerea and *M. peliocarpa* differ in having Pd– thalli and C+ red apothecial sections (gyrophoric acid). “*Catillaria*” *contristans* has a Pd–, C– thallus and 1-septate ascospores. *Protomicarea limosa* has a similar Pd+ red thallus, but aseptate ascospores. Rare morphs of *M. lignaria* with stalked apothecia resemble *Pilophorus strumaticus*, which differs in having cephalodia, aseptate ascospores and a Pd \pm faintly yellowish thallus. Often confused with *Bilimbia lobulata* and *B. sabuletorum*, which grow in calcareous or base-rich habitats.

Micarea lignaria var. **endoleuca** (Leight.) Coppins (1983) **BLS 0881** has areoles with a dull yellowish tinge and pycnidia with meso- or microconidia are not known. Thallus C+ and KC+ persistent orange, K–, P– (unidentified xanthones).

On mossy acid rocks and trees; occasional. Mainly in W. Britain and Ireland (map right).

Micarea lithinella (Nyl.) Hedl. (1892)

Thallus thin, often indistinct, sometimes with whitish convex areoles 40–100 μm diam.; photobiont cells 4–7 μm diam. Apothecia (0.1–) 0.15–0.4 mm diam., convex, pale, dull yellow-orange to reddish brown; true exciple poorly developed and reflexed, or absent; hymenium 35–50 μm tall, colourless; hypothecium straw yellow to pale orange-brown; paraphyses 0.5–1 μm diam.; apices to 1.5 μm diam., sparse, unbranched or irregularly forked above; a few additional, stouter paraphyses (to 3 μm diam.) sometimes evident. Asci 35–50 \times 8–13 μm . Ascospores 6.5–9.5 \times 2.5–4 μm , aseptate, ovoid to fusiform-ellipsoidal. Pycnidia *ca* 40 μm diam., immersed; conidia 4–5.5 \times 0.5–1 μm , bacilliform. Lichen products not detected by TLC. **BLS 1613**.

A pioneer colonizer of shaded stones, often with *Trapelia* spp., on ground by woodland tracks, old quarries, etc.; widespread. Probably widely distributed throughout the British Isles, but overlooked.

Similar to *M. bauschiana* but apothecia and pycnidia never with a green pigment, the hypothecium yellowish and the photobiont small-celled. *M. farinosa* differs in having a farinose thallus and smaller apothecia and ascospores. Unlike these two species, *M. lithinella* does not grow under overhang niches.

Micarea longispora Coppins (2021)

Micarea synotheoides auct. br., non (Nyl.) Coppins (1982)

Thallus grey-green to dark olivaceous, \pm gelatinous when wet, of scattered to aggregated granular areoles 20–70 μm diam.; areoles not corticate, the outer hyphae often greenish or brownish, K \pm violet; photobiont cells 4–7 μm diam. Apothecia 0.1–0.3 mm diam., grey- or brown-black, convex to \pm globose, or tuberculate to 0.5 mm diam.; true exciple indistinct; hymenium 35–45 μm tall, the upper part dull greenish, K \pm violet; hypothecium colourless, or pale greenish and K \pm weakly violet; paraphyses 0.5–1 μm diam., sometimes to 1.5 μm diam. towards the apices. Asci 30–40 \times 9.5–12 μm . Ascospores 14–35 (–43) \times 1.8–2.5 (–3) μm , bacilliform to curved-acicular, 1- to 7(–11)-septate. Pycnidia immersed, emergent to sessile, whitish to grey-black; walls dull greenish, K \pm violet: (a) 60–120 μm diam., the ostioles often gaping, mesoconidia 4.5–6 \times 1–1.5 μm , cylindrical to fusiform; (b) 20–40 μm diam.; microconidia 3.5–4 \times 0.5–1 μm , short-cylindrical. Lichen products not detected by TLC. **BLS 0894**.



Nb



Nb IR



On trunks of *Betula*, *Quercus* and *Pinus* etc. in communities allied to the *Parmelion laevigatae*, more rarely on wood; frequent. N. Wales, W. Scotland, N.W. England (Lake District), S.W. England (Dartmoor), W. Ireland.

Easily confused with *M. prasina* or *M. melaena*, but microscopically more like *M. globulosella* or *Biatora beckhausii*. Doubts were raised by Coppins (1983) regarding the conspecificity of Western European populations of *M. synotheoides* with those from Japan (the type locality) and recent collections have confirmed that they are two separate species (Coppins *et al.* 2021).

Micarea marginata Coppins & Muhr (1988)

Nb

Thallus of confluent convex areoles 0.2–0.3 mm diam., pale greenish buff to grey or brownish grey; the areoles sometimes coalesced and the thallus then becomes secondarily cracked; photobiont cells 4–8 µm diam. Apothecia 0.1–0.6 mm diam. or forming blackberry-like clusters to 0.9 mm diam., black, at first flat and thinly marginate, later convex, black; true exciple well-developed but becoming reflexed, purple-black; epithecium ± evident but thin, dark brown (K+ olivaceous); hymenium 35–45 µm tall, colourless or dilute greenish in the lower half and sometimes with some brownish (K+ olivaceous) vertical streaks; hypothecium dark purple- or red-brown (K± intensifying purple), but upper part often greenish (K+ green intensifying, N+ red); paraphyses 1–1.6 µm diam., some to 2 µm diam. at the apices, numerous, sparingly branched, colourless; sometimes a few 2–3 µm diam., unbranched, coated with pigment. Asci 30–40 × 11–13 µm, in K/I without a dark axial tube. Ascospores 9.5–14 (–16) × (2.5–) 3.5–4 (–4.8) µm., mostly ellipsoidal to cylindrical-ellipsoidal, 0- or 1(-3)-septate. Pycnidia immersed to ± emergent, black; walls dull brown or greenish brown (K+ green intensifying, N+ red): (a) 0.1–0.2 mm diam., with macroconidia 19–36 (–50) × 1–1.3 µm, curved to sigmoid, ± thinly 1- to 3-septate; (b) 60–80 µm diam., with mesoconidia 3.5–5 (–5.7) × 1–1.5 µm, cylindrical-ellipsoidal. Lichen products not detected by TLC. **BLS 0716.**



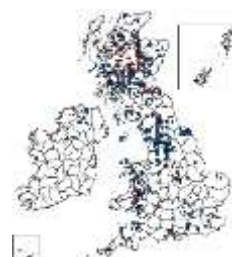
On low rocks and stones in shingle, scree, montane turf and areas of late snow-lie; occasional. N. Wales (Cadair Idris), W. & Highland Scotland.

Frequently found sterile but with numerous pycnidia that produce curved or sigmoid macroconidia. The internal pigmentation of the apothecia easily separates this species from others with a similar appearance, e.g. *Miriquidica pycnocarpa*.

Micarea melaena (Nyl.) Hedl. (1892)

LC

Thallus of pale buff, dull green or dark grey-green granular areoles 20–100 µm diam., often blackish and scurfy due to disruption by dark brown fungal mycelia and foreign algae; photobiont cells 4–7 µm diam. Apothecia 0.1–0.4 mm diam. or tuberculate and to 0.5 mm, black, convex to ± globose; true exciple indistinct; hymenium 30–45 µm tall, usually blue-green (K± intensifying), sometimes purplish (K± intensifying or K± green) below or rarely throughout; hypothecium dark, variously pigmented, usually purple-brown (K± intensifying purple), the outer part or ± whole often K± green; paraphyses 0.5–1 µm diam., numerous, mostly branched, sometimes a few 1.5–2 µm diam., unbranched, coated with dense pigment. Asci 30–40 × 12–15 µm. Ascospores 12–21 × 4–5.5 µm, ovoid-cylindrical or cylindrical, straight, (1-)3(-5)-septate, the apices obtuse. Pycnidia rare, partly immersed to sessile, the walls purple-brown or greenish: (a) 100–140 µm diam. with macroconidia 18–33 × 1–1.5 µm, curved, 0- to 7-septate; (b) 40–60 µm diam. with microconidia 4.5–7 × 0.5–1 µm, fusiform-cylindrical. Thallus C± red, K–, Pd–; apothecial sections C– (± gyrophoric acid). **BLS 0883.**



Usually on wood of stumps, fallen trees and decaying timberwork, but also acid bark and peaty turf, rarely on rock in woodlands; common. Upland areas of N. & W. Britain and Ireland, extending locally to S. England.

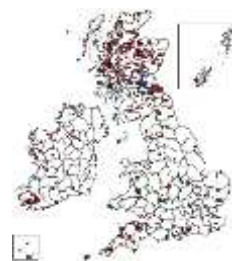
Variable in appearance and internal pigmentation, usually easily identified microscopically; *M. turfosa* and *M. viridiatra* are superficially similar, but restricted to turf in areas over ca 1000 m, where *M. melaena* is rare. Easily overlooked as a black or charred stain when on the tops of stumps or on peat (cf. also *Placynthiella*); on bark it can be confused in the field with *M. longispora* or dark morphs of *M. prasina*.

Micarea micrococca (Körb.) Gams ex Coppins (2002)

LC

Thallus minutely granular, bright green to olive-green, composed of small goniocysts. Photobiont 'micareoid',

algal cells \pm globose, 4–7 μm diam. Apothecia usually numerous, whitish-cream or cream, 0.1–0.3 mm diam., immarginate from the beginning, convex to hemispherical, simple to adnate or sometimes tuberculate. Hymenium and hypothecium colourless to slightly yellowish, without any greyish or olive tinge, K⁻, C⁻. Paraphyses numerous, branched and anastomosed, colourless throughout or sometimes surrounded by a pale straw coloured gel matrix, 0.8–1.2 μm diam., slightly increasing above. Exciple absent or sometimes developed in young apothecia, composed of paraphysis-like hyphae, colourless. Ascospores cylindrical-ovoid to ellipsoidal, (0–) 1-septate, 10–12 (–16) \times 3–4.5 μm . Pycnidia usually abundant, sessile or immersed between goniocysts, white to whitish cream with widely gaping ostioles or bearing white blobs of cylindrical mesoconidia (3.8–) 4.5–5.5 \times 1.2–1.5 μm , or narrowly cylindrical to fusiform microconidia 5–7.5 (–8) \times 0.8–1 μm in size. Crystalline granules present in the thallus and hymenium, visible in polarized light. Chemistry: thallus and apothecia K⁻, C⁻, Pd⁻. TLC: methoxymicareic acid. **BLS 2359**.



On acid bark of trees and shrubs, stumps, fallen debris (especially in conifer plantations), soil or debris in rock crevices in coastal districts, rarely on shaded sandstone rocks; usually in shaded situations or niches; common, even close to centres of large conurbations. The commonest member of the *M. prasina* group and widely distributed in the British Isles and much of Europe.

Frequently sterile. TLC or DNA is recommended for certain separation from other members of the *M. prasina* group (*q.v.*) but the rarer *M. subviridescens* can easily be separated by its very bright blue-white UV fluorescence. However, forms with small (≤ 0.2 mm diam.), whitish apothecia in plantations and other ‘secondary’ habitats are almost certain to be *M. micrococca*. On moist, shaded substrata, the thallus is often infected by non-lichenized algae, giving it a gelatinous appearance and resembling *M. adnata* (*q.v.*). Specimens not critically determined should be recorded as *M. prasina* s.lat. **BLS 0887**.

M. byssacea is similar to *M. micrococca* but has darker pigmented apothecia containing ‘sedifolia-grey’, K⁺ violet pigment within the epihymenium and goniocysts. It can sometimes develop pale apothecia, but they are usually adnate and larger, and the granular thallus is always more olive and not so mealy as that observed in *M. micrococca*.

As circumscribed by Czarnota & Guzow-Krzemińska (2010) and van den Boom et al. (2017), *M. micrococca* contains two phylogenetically distinct entities, *M. micrococca* A and B. The latter was described as *M. czarnotae* by Launis et al. (2019b), and can reportedly be distinguished from *M. micrococca* s. str. and *M. pseudomicrococca* (*q.v.*) by the absence of crystals in the thallus (visible in polarized light). It has not been recorded to date from Great Britain and Ireland.

Micareia micrococca is recorded as host for *Crittendenia lichenicola* (Alstrup et al.) Diederich et al. (2021) and *Nectriopsis micareae* Diederich et al. (1999).

Micareia microsorediata M. Brand, van den Boom, Guzow-Krzem., Sérus. & Kukwa (2019) **NE**
Thallus diffuse, to 10 cm diam., covered in finely granular goniocysts, often with a powdery appearance, vivid green or green, sometimes with a bluish tinge; prothallus not seen; soralia produced from small convex areoles, soon fused and confluent, sometimes forming a continuous sorediate layer; soredia to 20 μm diam., sometimes slightly elongated or in \pm rounded consoredia to 35 μm diam., the thallus and hymenium containing POL+ crystalline granules that are soluble in K. Photobiont micareoid, cells 4–8 (–9) μm diam. Apothecia rarely present, adnate, soon immarginate, 0.2–0.3 mm diam., white or slightly brownish; true exciple present in young apothecia, 15–25 μm thick, of thin irregular hyphae; epithecium and hypothecium colourless; paraphyses thick (in K), branched and anastomosing, 1.2–1.5 μm diam.; asci 29–35 \times 7–10 μm , 8-spored; ascospores cylindrical to ellipsoidal, 9.5–13 \times 2.8–3.5 μm , (0–)1-septate. Pycnidia sometimes present, ca 60 μm diam., with dark brown apices (K⁻); microconidia narrowly fusiform to bacillar, ca 7 \times 0.8 μm , mesoconidia ca 3.8 \times 1.4 μm . Chemistry: methoxymicareic acid detected by TLC, soredia in exposed habitats with Sedifolia-grey pigment, K⁺ violet. **BLS 2806**.

On bark of *Alnus glutinosa*, Staffordshire; only one collection confirmed by sequencing to date, but the species may be much more common than current records indicate.

Morphologically similar to *Micareia viridileprosa* according to Guzow-Krzemińska et al. (2019), from where the above description has been adapted. *M. viridileprosa* has slightly larger mesoconidia and a C⁺ red thallus.

Micarea misella (Nyl.) Hedl. (1892)

Thallus immersed (in British specimens), inconspicuous; photobiont cells 4–7 µm diam. Apothecia 0.1–0.3 mm diam., black, convex to ± globose; true exciple poorly developed; hymenium 25–36 µm tall, the upper part greenish, K± violet; hypothecium colourless, or pale greenish and K± violet; paraphyses scanty, 0.5–1 µm diam., the apices sometimes to 1.5 µm diam. Asci 25–35 × 7–10 µm. Ascospores (6.5–) 7–9.5 × 2–3 (–3.5) µm, ellipsoidal, ovoid or cylindrical-ovoid, never curved, 0(–1)-septate. Pycnidia black; walls green-brown, K± violet: (a) sessile or on unbranched, non-tomentose stalks, 70–320 µm tall and 50–100 µm diam., the mesoconidia 3.5–5 × 1–1.5 (–1.7) µm, short-cylindrical; (b) ± immersed, ca 40 µm diam., microconidia 3.5–6 × 0.5–1 µm, narrowly cylindrical. Apothecial sections C– (except for C± violet, greenish pigment). Lichen products not detected by TLC. **BLS 0884.**

On wood of fallen trees or stumps in *Betula* or *Pinus* woodlands and conifer plantations; widely distributed but easily overlooked.

Often sterile, but easily identified by the immersed thallus and numerous, usually stalked black pycnidia with greenish C+ and K+ violet pigment. Dark coloured stalked pycnidia occur also in *M. botryoides*, *M. hedlundii* and *M. nigella*.

**Micarea myriocarpa** V. Wirth & Vězda ex Coppins (1983)

Thallus scurfy farinose-granular, pale greenish or buff; photobiont cells 4–7 µm diam. Apothecia 0.1–0.15 mm diam., when tuberculate to 0.25 mm diam., immarginate, convex to globose, pale to dark reddish brown; true exciple absent; hymenium 25–35 µm tall, colourless or brownish streaked; hypothecium reddish- or orange-brown, K–, N–; paraphyses rather sparse, of two types: mostly 0.5–1 µm diam., often branched, some 2–3 µm diam., unbranched, usually in brown fascicles. Asci 21–25 × 5–7 µm, in K/I with a dark axial tube. Ascospores 5.5–8.5 × 1.5–2.5 µm, 0- or 1-septate, cylindrical or cylindrical-ovoid. Pycnidia 25–30 µm diam., ± sessile, doliiiform; conidia 2.5–3 × 1–1.5 µm, shortly bacilliform. Lichen products not detected by TLC. **BLS 1596.**

Under dry overhangs on rock, stones, roots, bryophytes etc.; frequent. N. & W. Britain and Ireland.

Distinguished from most other species under dry overhangs by the small apothecia and pigmentation; *M. farinosa* has a more neatly farinose thallus, broader ascospores and a colourless hypothecium. Both species can be confused with *Psilolechia clavulifera* and *P. leprosa*.

**Micarea nigella** Coppins (1983)

Thallus immersed and inconspicuous, or thin and pale greenish grey; photobiont cells 4–7 µm diam. Apothecia 0.1–0.3 mm diam., black, subglobose or tuberculate; hymenium 25–30 µm tall, colourless or with purple-brown streaks; upper part purple-brown, K± dull green; hypothecium mottled, dark purplish brown, K± dull green, N+ purple-red; paraphyses scanty, dimorphic: 0.5–1 µm diam., the apices sometimes to 2 µm diam., colourless, or 2–3 µm diam. and coated throughout by dark pigment. Asci 22–27 × 10–11 µm. Ascospores 6.5–12 × 2.5–4 µm, ellipsoidal to cylindrical-ovoid, aseptate. Pycnidia 60–300 µm tall, 40–80 µm diam., numerous, black, sessile or stalked; wall dark purplish brown, K+ green; mesoconidia 3.4–4.3 × 1.2–1.6 µm, ellipsoidal or short cylindrical. Lichen products not detected. **BLS 1734.**

On ± soft wood of conifer and *Betula* stumps in shaded woodlands; rare. N.E. England, Scotland, N. Ireland.

Distinguished from other species with stalked pycnidia by the purplish brown, K+ green pigmentation.

**Micarea nitschkeana** (J. Lahm ex Rabenh.) Harm. (1899)

Thallus usually forming small patches of slightly warted, clustered or sometimes effuse, convex pale green to grey-green areoles, C± red, K± slightly violet. Apothecia usually numerous, but rarer or absent when pycnidia are well-developed, pale grey to greyish-black, sometimes with a paler margin in young apothecia, shallowly convex to subglobose, often confluent, 0.1–0.35 (–0.5) mm diam., C+ red; hymenium olive-grey, K+ violet, C+ red-violet in the upper part; paraphyses of one type, numerous, branched and anastomosed, (1.2–) 1.4–1.7 µm

LC

diam. Ascospores fusiform to narrowly ellipsoidal, usually slightly curved, (1- to 2-) 3-septate, $10\text{--}17$ (–19) \times $2.5\text{--}3$ (–3.5) μm , apices rounded. Pycnidia of three types usually present, immersed within thallus areoles and then scarcely visible, or distinct with widely gaping ostioles; macroconidia curved or hamate, 1- to 3- (to 4-) septate, (12–) $20\text{--}30$ (–40) \times $1\text{--}1.2$ μm ; mesoconidia short-cylindrical, (3.5) $4\text{--}5.5$ (–6) \times $1\text{--}1.6$ μm ; microconidia narrowly fusiform, $6\text{--}7$ (–9) \times $0.7\text{--}0.8$ μm . **BLS 0885**.

On twigs or small branches of trees and shrubs (especially *Calluna*), often in the *Bacidietum chlorococcae*; also on wood and, rarely, stones in heathland; common. Throughout Britain and Ireland. Common in E. Britain, though corticolous populations have declined in recent years.

Like *M. denigrata*, but the ascospores in that species are usually (0-) 1-septate, the apothecia tend to be a little larger, and the pycnidia may be emergent and shortly stalked; it is typically lignicolous on fallen trunks and branches or on worked timber. The description above has been adapted in part from Czarnota (2007).



Micarea olivacea Coppins (1983)

Thallus immersed, weakly areolate or scurfy, inconspicuous or pale grey to green-grey; photobiont cells $4\text{--}7$ μm diam. Apothecia $0.1\text{--}0.25$ mm diam., black, convex to subglobose, when tuberculate to 0.4 mm diam.; true exciple indistinct; hymenium $30\text{--}35$ μm tall, pale olivaceous with darker streaks, K \pm green intensifying; hypothecium dark olivaceous or olive-brown, K \pm green intensifying, N+ red; paraphyses numerous, of two types: $1\text{--}1.5$ μm diam., sometimes to 2 μm diam. at the apices, colourless, branched; $2\text{--}3$ μm diam., \pm unbranched and often surrounded by dark pigment. Asci $33\text{--}35$ \times $9\text{--}11$ μm . Ascospores (7-) $9\text{--}12.5$ \times $2.5\text{--}3.5$ μm , cylindrical to ovoid-cylindrical, (0-)1-septate. Pycnidia $25\text{--}50$ μm diam., \pm immersed, the walls sordid greenish, K \pm green intensifying; conidiogenous cells $4\text{--}5.5$ μm long; mesoconidia $3\text{--}4.5$ \times $1\text{--}1.5$ μm , cylindrical. No lichen products detected by TLC. **BLS 1777**.

On hard wood of conifer stumps and shaded rocks in woodland; rare. Scotland (Mull & Westernness). Endemic.

Could be confused with non-pruinose morphs of "*Lecidea*" *turgidula*, which has a true exciple of conglutinate hyphae (in K), a paler hypothecium and photobiont cells $12\text{--}16$ μm diam. *M. tuberculata* is distinguished by its smaller ascospores, longer conidiogenous cells ($5\text{--}10$ μm) and larger-celled photobiont.

Nb IR



Micarea paratropa (Nyl.) Alstrup (1994)

Thallus white to pale brown, of \pm confluent, convex-verrucose areoles $0.1\text{--}0.5$ mm diam.; with age the crust may thicken and become cracked into 'islands' $1\text{--}2$ mm across; cortex K \pm pale violet; photobiont cells $4\text{--}7$ μm ; discrete cephalodia absent, but with partly lichenized clusters of *Stigonema* amongst the areoles. Apothecia $0.3\text{--}0.6$ (–0.8) mm diam., black, immarginate, adnate, convex, often confluent or forming tuberculate clusters to 1.2 mm diam.; true exciple soon reflexed, dark purple-brown (K+ dark green) within, changing to green (K+ intensifying) towards the outer edge; hymenium $40\text{--}55$ μm tall, dark greenish in epithecium and below in vertical streaks, K+ violet, N+ red, otherwise pale green or colourless; hypothecium $150\text{--}300$ μm tall, dark purple-brown, K+ purple intensifying, N+ red, or upper part K+ dark green, N+ red; paraphyses $1\text{--}1.8$ (–2) μm diam., numerous, sparingly branched, the apices sometimes to 3 μm diam. Asci $38\text{--}48$ \times $10\text{--}15$ μm . Ascospores $9\text{--}16$ (–17) \times $4\text{--}5$ μm , ellipsoidal, ovoid-ellipsoidal or cylindric-ellipsoidal, aseptate. Pycnidia unknown. Lichen products not detected by TLC. **BLS 1662**.

On small stones in turf in areas of late snow-lie, above 800 m; rare. Scotland (W. Highlands, Angus), Cumbria, N. Wales.

Closely related to the terricolous *M. assimilata*, but differing especially in the K+ violet pigment in the hymenium. In the field, it has a similar appearance to *Lecanora formosa* and *Miriquidica leucophaea*.

Nb IR



Micarea parva Coppins (1995)

Thallus \pm inconspicuous, pale grey-brown, thinly scurfy or irregularly warted; photobiont cells $4\text{--}7$ μm diam. Apothecia $70\text{--}320$ μm diam., convex to subglobose, or tuberculate to 0.6 mm diam., dull red-brown to black (but brownish when wet); true exciple absent; epithecium red-brown (K–, N–); hymenium $30\text{--}60$ μm tall, colourless

Nb

or with dark reddish brown vertical streaks; hypothecium red-brown (K-, N-); paraphyses scanty, of two types: 0.5–0.8 μm diam., sparingly branched, colourless; some unbranched, \pm in small fascicles, brown pigmented throughout, 1.5–2 μm diam. Asci 30–60 \times 13–17 μm , in K/I with a dark axial tube. Ascospores (9–) 10.8–14 (–16.5) \times (4–) 4.5–5.2 (–5.8) μm , ellipsoidal, ovoid or slipper-shaped, (0–)1-septate. Pycnidia immersed to \pm emergent, dark reddish brown; walls brown, K-, N-, 40–70 μm diam., conidia bacilliform, either microconidia 3.8–4.7 \times 0.8–1 μm or mesoconidia 5.8–7.7 \times 1–1.5 μm . Lichen products not detected by TLC. **BLS 1921**.

On shaded sandstone outcrops or crumbling walls; rare. England (Devon, Durham), Wales (Cardigan), Scotland (Midlothian).

Anatomically, very like the lignicolous *M. deminuta*, but differing in internal pigmentation and larger, 1-septate ascospores. *M. myriocarpa* has much smaller ascospores, whereas *M. pseudomarginata* has a better developed thallus and larger apothecia which have a true exciple, aseptate spores and numerous paraphyses.



Micarea peliocarpa (Anzi) Coppins & R. Sant. (1979)

Thallus greenish white or grey-white to blue-grey, of shallowly convex to subglobose areoles 40–200 μm diam; thallus occasionally poorly developed and \pm immersed; photobiont cells 4–7 μm diam. Apothecia 0.14–0.4 (–0.6) mm diam., to 1 mm diam. if tuberculate, appressed, flat to convex, whitish (in shade) or blue-grey to black; true exciple well-developed, colourless; hymenium 40–55 μm tall, usually greenish to blue-green (K-, N \pm red) in the upper part; hypothecium \pm colourless; paraphyses 1–1.5 μm diam., numerous, branched especially above; apices often thickened to ca 2.5 μm diam. by green pigment. Asci 40–55 \times 12–17 μm , clavate, without ring-structure. Ascospores (11–) 15–23 (–24) \times 3–5 (–6) μm , fusiform or cylindrical, \pm curved, (1–)3(–5)-septate. Pycnidia frequent (especially on bark or wood): (a) 0.14–0.2 mm diam., immersed, white or greenish around often gaping ostioles, the macroconidia 21–40 (–50) \times 1–1.5 μm , curved or sigmoid, often faintly 1- to 5-septate; (b) 50–80 μm diam., \pm sessile, whitish, the microconidia 6–7 \times 0.5–1 μm , fusiform–cylindrical. Thallus, apothecia and pycnidia C \pm red, K-, Pd- (gyrophoric acid). **BLS 0886**.

On a wide range of acid substrata; widespread and frequent, especially in uplands (but rare above 500 m). Throughout Britain and Ireland, commoner in the north and west.

Very variable and often confused with *M. lignaria*, which has C- apothecial sections. *M. nitschkeana* has smaller ascospores and a K+ violet epithecium. *M. leprosula* has similar apothecia but a Pd+ red, sorediate thallus. See also *M. alabastrites* and *M. cinerea*. *Lecania naegelii* has unbranched paraphyses with swollen apices, is C- and occurs on basic or nutrient-enriched bark.

LC



Micarea polycarpella (Erichsen) Coppins & Palice (1995)

Thallus effuse, thin, continuous or of slightly convex areoles c. 0.1 mm diam., pale greyish but often darkened by extraneous material; photobiont cells (6–) 9–21 (–28) μm diam. Apothecia 80–150 (–200) μm diam., immersed and flat to \pm sessile and convex, black and immarginate when dry; true exciple appearing as a dark rim encircling a translucent greenish disc when wet, 7–12 μm broad, dark greenish, the hyphae coherent in K; hymenium 35–50 μm tall, pale greenish above, I+ blue; hypothecium colourless or pale greenish; paraphyses 0.8–2 μm diam., few, unbranched or sparingly branched, \pm moniliform above; apices colourless. Asci 30–45 \times 11–14 μm , clavate, in K/I the apical dome is pale blue with a dark blue tubular structure. Ascospores 8–12 \times 4–5 μm , ellipsoidal, aseptate. Pycnidia 40–50 μm diam., immersed, black, the wall greenish; conidiogenous cells subglobose to short ampulliform, lining the pycnidial cavity; conidia 4.5–5.5 \times 1.5–2 μm , bacilliform. Lichen products not detected by TLC. **BLS 1770**.

On loose siliceous stones in urban waste-land, also on brick and an old softwood fence post; rare but probably overlooked. S.W. England (N. Devon), Wales (Cardigan), N. England (S. Yorkshire, Northumberland).

An inconspicuous species with some similarities to the *M. sylvicola* group and *Psilolechia* spp., but differing in having a true exciple of hyphae that are coherent in K.

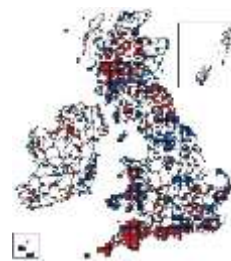
Nb



Micarea prasina Fr. (1825)

LC

Thallus light green or pale to dark grey-green, of often densely aggregated, \pm globose goniocysts; goniocysts 12–18 μm diam., sometimes coalescing to form granules to 60 μm diam.; the outer hyphae often coated by greenish, K \pm violet pigment; photobiont cells 4–7 μm diam. Apothecia with POL+ crystals restricted to the epithecium, 0.2–0.4 mm diam., to 0.8 mm if tuberculate, convex to subglobose or tuberculate, immarginate, whitish, pale to dark grey, brownish grey, or blackish; true exciple poorly developed; epithecium colourless, or dull greenish and K \pm violet; hymenium 30–60 μm tall; hypothecium colourless to dull yellowish; paraphyses 0.5–1.2 μm diam., to ca 2 μm towards the apices, numerous. Asci 25–55 \times 8–12 μm . Ascospores (7–) 8–12 (–14) \times (2.3–) 3–4 (–5.5) μm , ovoid, ovoid–ellipsoidal to cylindric–ovoid, 0– to 1(–3)–septate. Pycnidia white, or greyish around the ostiole (due to greenish, K \pm violet pigment), sometimes olive–black: (a) 50–150 μm diam., emergent to sessile, the ostiole often gaping, with \pm cylindrical to narrowly obpyriform mesoconidia, (3.5–) 4–6 \times 1–1.2 (–1.5) μm ; (b) 30–60 (–100) μm diam., mostly whitish, usually immersed, but occasionally sessile, with cylindrical or narrowly fusiform microconidia, (5–) 5.5–8 \times 0.5–1 μm . Thallus and apothecia Pd–, K–, C–, UV– (except for the greenish C \pm violet, K \pm violet, N \pm red pigment) (micareic acid by TLC). **BLS 2360.**



Mostly on stumps or large trunks in old-growth woodlands; frequent. Throughout Britain and Ireland. Distribution uncertain owing to confusion, especially with *M. micrococca*.

Extremely variable and frequently sterile; and TLC or DNA is required for certain separation from the much more common *M. micrococca* and the rarer *M. byssacea* and *M. pseudomicrococca*. *M. subviridescens subviridescens* can easily be separated by its very bright blue-white UV fluorescence. *M. micrococca* and *M. prasina* have often been confused with *M. adnata*, *M. denigrata*, *M. hedlundii* and *M. misella* and also *Lecania cyrtella*, which has unbranched paraphyses with swollen apices. Sterile collections without stalked pycnidia could be *M. fennica*, not yet recorded from our region (Launis & Myllys 2019).

Specimens not critically determined should be recorded as *M. prasina* s.lat. **BLS 0887.**

Micarea prasina s.lat. is a recorded host for *Nectriopsis micareae*, *Paranectria affinis* (Grev.) Sacc. (1878) and an unnamed *Paranectria* with (3- to) 7-septate ascospores.

Micarea pseudomarginata Coppins (1989)

Nb IR

Thallus scurfy–granular to granular–areolate, pale to dark grey or grey–green, matt, sometimes partly ferruginous; areoles (if discrete) 80–240 μm diam.; photobiont cells 4–7 μm diam. Apothecia 0.2–0.4 mm diam., convex or tuberculate and then to 0.8 mm diam., black; true exciple distinct, soon reflexed, dark brown, colour as hypothecium but outer part K \pm greenish; hymenium 40–60 μm tall, colourless, with dark brown vertical streaks; hypothecium dark brown, K– or K \pm purplish, N \pm red; paraphyses numerous, of two types: mostly 1–1.5 μm diam., sparingly branched; some 2–3 μm diam., unbranched and in small fascicles surrounded by dark pigment. Asci 35–55 \times 9.5–12 (–14) μm . Ascospores 9–12 (–13) \times 3.5–5 (–5.5) μm , aseptate, ellipsoidal, ovoid or cylindric–ellipsoidal. Pycnidia 80–140 μm diam., immersed to emergent, black; conidia 6–9 \times 1.5–2 μm , \pm bacilliform. Lichen products not detected by TLC. **BLS 1632.**



On vertical rock surfaces in open but sheltered situations; local. Upland Britain, with a single record from S.W. Ireland. ? Endemic.

Distinguished from *Brianaria lutulata* and *B. sylvicola* (Psoraceae) by the distinct true exciple, absence of greenish pigment in the hymenium, the thallus type, small–celled photobiont and longer conidia. *Miriquidica pycnocarpa* (Lecanoraceae) has a \pm glossy, white, K+ yellow thallus, paraphyses with dark apical caps and larger photobiont cells.

Micarea pseudomicrococca Launis & Myllys (2019)

NE

Thallus effuse, olive green, sometimes partly bright green, minutely granular, composed of goniocysts 25–40 (–55) μm diam., usually coalescing to form larger granules. Photobiont micareoid, algal cells 4.5–7.5 μm diam. Apothecia 0.2–0.4 mm diam., flat, convex or \pm hemispherical, sometimes becoming tuberculate, creamy white or pale brownish, always K– and C–. Hypothecium colourless. Hymenium colourless, sometimes with vertical brownish streaks, 35–50 μm high. Epithecium colourless or brownish. Paraphyses numerous, of two types: 1)

scanty, scarcely branched, 0.8–1 (–1.2) μm diam., apices usually not wider; 2) thicker, 1.2–2 μm diam. with apices usually increasing up to 3 μm diam., sometimes branched 1–3 times from the apices resulting in a fork- or brush-like appearance. Asci clavate, *Micarea*-type, 30–35 \times 8–10 μm . Ascospores cylindrical–ellipsoidal or obovoid, 0–1 (–2)-septate, 8–14 (–15) \times 2–3.2 μm . Pycnidia of two types, cream–white or brownish, always K– and C–. Mesopycnidia usually present and immersed in surrounding goniocysts, globose, to 100 μm diam., with mesoconidia cylindrical or cylindrical–fusiform, 4–5 \times 1.2–1.5 μm . Micropycnidia usually present, sometimes few or absent, sessile or immersed, if sessile usually with gaping ostiole, 80–100 μm diam., the microconidia filiform to narrowly fusiform, 5.5–9 (–9.5) \times 0.8–1 (–1.2) μm . Crystals visible in polarized light in the hymenium and thallus, soluble in K. Chemistry: Methoxymicareic acid. **BLS 2735.**

On bark of *Prunus padus*, East Lothian. Also known from Finland.

A recently recognized segregate of *M. micrococca* with an olive green rather than bright green thallus, narrower ascospores and crystals present in the hymenium and thallus.

Micarea pycnidiophora Coppins & P. James (1979)

Like *M. stipitata*, but all parts C+ red (gyrophoric acid), pycnidia less than 0.3 mm tall, never forked and ivory coloured and conidia 3.8–6 \times 1–1.5 μm in size. **BLS 0888.**

On acid bark, especially *Fagus* and *Ilex*, but also *Quercus*, *Betula* and *Alnus*, rare on *Quercus* and *Taxus* lignum. Very locally frequent in S.E. England (especially New Forest, Hampshire), very rare beyond, N. England, Wales, W. Scotland (Argyll), Ireland (Kerry (Killarney), Wicklow (Powerscourt Park), Fermanagh (Correl Glen)).

Potentially overlooked as *Micarea stipitata* in the west; specimens with unforked and ivory coloured (i.e. more yellowish) pycnidia should be checked for C+ red reactions. Fertile material often lacks pycnidia and has abundant small apothecia.



Micarea sambuci van den Boom, M. Brand, Coppins & Sérus. (2018)

NE

Thallus small, sometimes diffuse over larger areas, consisting of small greyish to greenish granules 20–200 μm diam, often growing with free living algae or fungi, then aggregated to an indistinct scurfy farinose–granular crust to 0.3 mm thick, the upper part with or without crystals, without pigments. Photobiont cells 5–7 (–10) μm diam. Apothecia to 0.15–0.25 mm diam., at first immersed in thalline warts, seemingly lecanorine, with a narrow clearly developed thalline margin, becoming sessile and with the margin finally evanescent; disc convex, pale to dark grey, pale pinkish to pale brownish, never black. Exciple without algae, composed of thin interwoven hyphae, with an alga-containing layer below the apothecium. Hymenium 25–45 μm thick. Paraphyses narrow, 1.1–1.4 μm diam., densely branched and distinctly sinuous towards the apices. Epithecium greenish grey (K+ violet), sometimes too weak to detect. Hypothecium colourless. Asci clavate, 25–36 \times 9–11 μm . Ascospores ellipsoidal to slightly clavate, straight to slightly curved, 9.5–12 \times 3–3.2 μm , (1–) 3-septate. Mesopycnidia always present, usually abundant, immersed, 30–150 (–250) μm diam., colourless or brownish pigmented at the top; if old, the ostiole often gaping; wall partly with crystals; mesoconidia 2.7–4.1 \times 1.1–1.5 μm . Chemistry: gyrophoric acid always present as crystals in apothecia and often in the pycnidial wall (visible in polarized light), but mostly absent in the thallus. Sedifolia grey K+ violet pigment often present in epithecium and pycnidia. **BLS 2732.**

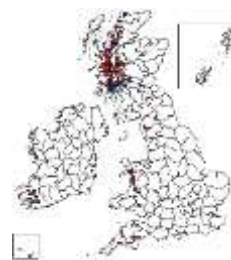
On bark of *Sambucus* and dead stems of *Ulex*, Yorkshire, East Lothian and Westernness; not collected since 1978. Throughout northern Europe on neutral bark, especially on *Sambucus*, often in dune areas or scrub vegetation.

Similar to *M. nitschkeana*, but with somewhat shorter ascospores and with mesoconidia rather than macro- and microconidia.

Micarea stipitata Coppins & P. James (1979)

Nb IR

Thallus dull or grey–green, thin and uneven or with flattened convex areoles 40–100 μm diam.; photobiont cells 4–7 μm diam. Apothecia 0.1–0.3 mm diam., convex to globose or tuberculate, whitish, often absent; true exciple indistinct; hymenium 35–50 μm tall, colourless; hypothecium colourless; paraphyses 1–1.5 μm diam., numerous, branched. Asci 30–35 \times 10–12 μm . Ascospores (14–) 21–34 \times 2–2.5 (–3) μm , short–acicular, 3– to 7-septate. Pycnidia numerous, whitish, on simple or branched stalks, 0.4–0.8 mm tall and 60–100 μm diam.; conidia 6–8 \times 1–1.8 μm , bacilliform to ellipsoidal. All parts C–, K–, Pd– (no lichen products detected by TLC).



BLS 0889.

On leached bark, especially *Betula* and *Quercus*, often over bryophytes, rarely on mossy rocks in oceanic woodlands in high rainfall areas; frequent. W. Britain and Ireland.

Similar to *M. pycnidiophora*, but without C+ red reactions, paler and forked pycnidia and with longer conidia. *Biatora veteranorum* also has white, stalked pycnidia, but its conidia are smaller ($2.5\text{--}4 \times ca\ 1\ \mu\text{m}$) and it grows on the dry bark or wood of ancient trees. *Scoliciosporum pruinosum* has a granular (K+ dissolving) epithecium and narrower, strongly curved ascospores.

Micarea subconfusa (Nyl.) Alstrup (1994)

Thallus dark grey, of confluent convex areoles 0.1–0.3 mm diam., later cracked into ‘islands’ 0.4–1 mm across; discrete cephalodia absent, but with partly lichenized clusters of *Stigonema* appearing as a black prothallus-like structure amongst the areoles; photobiont cells 4–7 diam. Apothecia (0.3–) 0.4–0.7 mm diam., convex, sessile, black; true exciple soon reflexed, blackish green in the outer part, ± colourless within; epithecium dark green, K+ intensifying, N+ red; hymenium 28–40 μm tall, colourless; hypothecium dark reddish brown, K–, N–; paraphyses 1.5–2 μm diam., to 2.5 μm diam. near the apices, numerous, sparingly branched. Asci 25–35 \times 10–12 μm . Ascospores (6–) 7–9.5 \times 2.5–3.5 μm , 0 or (1)-septate, ellipsoidal to cylindrical-ellipsoidal. Pycnidia 80–200 μm diam., immersed; wall green; conidia 4–6 \times 1–1.6 μm , bacilliform. Lichen products not detected by TLC. **BLS 0780.**

On siliceous rocks in open situations; rare. W. Scotland (Argyll, Mull, Ardnamurchan and Skye), N. England (Lake District), W. Ireland (Galway).

Nb**Micarea submilliaria** (Nyl.) Coppins (1994)

Thallus morphology identical to *M. leprosula*. Apothecia often absent, 0.2–0.8 mm diam., grey-brown to black or bluish-black, ± globose or tuberculate. Ascospores (35–) 40–50 (–60) \times 5–6.5 μm , 3-7 (–9)-septate. Pycnidia unknown. Thallus K–, C+ red, KC+ red, Pd+ yellow (alectorialic acid and 2 accessory substances); apothecia sections C–. **BLS 0890.**

Over mosses on rocks, usually above 750 m; rare. Wales (Caernarvon, Cardigan, Carmarthen), Scottish Highlands (Mull, Argyll, Perthshire, Westernness, Sutherland).

Micarea leprosula has a Pd+ red rather than Pd+ yellow thallus; it is much commoner than *M. submilliaria*.

Nb**Micarea subnigrata** (Nyl.) Coppins & H. Kilius (1981)

Thallus dark brown, of scattered to confluent convex areoles 80–450 μm diam.; photobiont cells 4–7 μm diam. Apothecia 0.2–0.6 mm diam., or tuberculate to 1 mm, convex, dark brown to black; true exciple reflexed, pale brown; epithecium brown, K–, N–; hymenium 35–38 μm tall, colourless; hypothecium colourless; paraphyses (1–) 1.5–2 μm diam., to 2.5 μm diam. near the apices, numerous, branched. Asci 33–35 \times 10–14 μm . Ascospores 8–12 \times 4–5 μm , (0-) or 1-septate, ellipsoidal. Pycnidia frequent, immersed: (a) 80–200 μm diam., with macroconidia helicoid with 2–3 coils, often appearing 3- to 5-septate, overall size 7–10 \times 5–6 μm , coils 1.8–2 μm diam.; (b) 40–100 μm diam., with microconidia 4.5–6 \times 0.5–1 μm , bacilliform. Lichen products not detected by TLC. **BLS 0891.**

On ± exposed hard siliceous rocks, often forming small patches with other crustose lichens; local. Upland Britain and Ireland.

Easily overlooked for the common *Scoliciosporum umbrinum*. Microscopically, the helicoid macroconidia are diagnostic.

Nb**Micarea subviridescens** (Nyl.) Hedl. (1892)

Thallus pale grey-green to bluish grey-green, leprose, of thinly scattered to usually densely aggregated, ± globose goniocysts; goniocysts 12–18 μm diam., sometimes coalescing to form granules 25–45 μm diam., densely packed with coarse crystals that are not soluble in K; some outer hyphae coated by greenish, K± violet pigment;

Nb

photobiont cells 4–7 μm diam. Apothecia 0.1–0.4 mm diam., to 0.6 mm if tuberculate, convex to subglobose or tuberculate, immarginate, whitish, pale to dark grey, brownish grey, or blackish; true exciple poorly developed; epithecium colourless, dull straw and K– or dull greenish and K \pm violet; hymenium 45–70 μm tall; hypothecium colourless to dull yellowish; paraphyses 0.5–1 μm diam., to 1.5 μm diam. towards the apices, rather scanty, branched. Asci 45–60 \times 10–14 μm . Ascospores 10–18 \times 4–6 μm , ovoid-ellipsoidal to cylindrical, (0-)1- to 3-septate. Pycnidia not seen. Thallus and apothecia Pd–, K–, C–, UV+ bright blue-white (the greenish pigment is C \pm violet, K \pm violet, N \pm red) (prasinic acid by TLC). **BLS 2361**.

On mildly acid soil of woodland banks, stream banks and root plates and amongst coastal rocks, more rarely on trunks of old *Quercus*; occasional. Jersey, S.W. England, Wales, W. Scotland (Argyll). Likely to be extremely under-recorded, recent studies have found it to be widespread but local in acid soil areas in Hampshire, The Weald and the Thames Basin.

Differs from *M. micrococca* s.l. and *M. prasina* in the thallus having a slightly bluish tinge and the somewhat taller hymenium, and larger asci and ascospores; easily separated from these species by the very bright blue-white fluorescence, combined with the bluish grey-green leprose thallus and the terricolous habitat. The fluorescence is so bright that this lichen can be located by scanning likely habitat with a UV torch. When sterile, it can also be mistaken for a *Lepraria* species (especially *L. elobata*).



Micarea ternaria (Nyl.) Vězda (1970)

Like *M. lignaria*, but ascospores 13–22 \times 3.5–5 μm , never more than 3-septate and no lichen products detected by TLC. Also, the apothecia have a more flattened appearance, with a more well-defined true exciple in section. **BLS 0895**.

On hard siliceous coastal rocks and on stones in heathland and conifer plantations; occasional. S.W. England, Wales (Cardiganshire, Glamorgan, Merionethshire), N. England, Scotland, W. Ireland.

British collections have a hardly developed thallus and the identification is tentative; the usual morph on mosses and debris in arctic Europe and Alaska has a well-developed thallus of convex to subglobose areoles.



Nb

Micarea turfosa (A. Massal.) Du Rietz (1923)

Thallus blackish, thin, without distinct granules or areoles; photobiont cells 4–7 μm diam. Apothecia 0.15–0.3 (–0.4) mm diam., convex or \pm globose; true exciple reflexed, reddish brown; hymenium 35–50 μm tall, greenish (K–, N \pm red) or brownish in part (especially near the base); hypothecium mottled reddish brown, K– or K+ orange-brown; paraphyses numerous, branched, 1–1.5 μm diam. Asci 35–50 \times 11–12 μm . Ascospores (10–) 12–21 (–25) \times (3.5–) 4–5 μm , 0 to 3-septate, cylindrical-ellipsoidal to fusiform. Pycnidia 35–40 μm diam., immersed; conidia 3.5–4.5 \times ca 1 μm , \pm bacilliform. Lichen products not detected by TLC. **BLS 0897**.

On exposed turf, usually on bryophytes on mountain summits, above 1000 m; rare. Wales (Brecknockshire), Scottish Highlands.

Forming a black stain on exposed turf. Distinguished microscopically from *M. melaena* and *Placynthiella uliginosa*, but see also *M. viridiatra*.



Nb

Micarea viridiatra Coppins (1985)

Like *M. turfosa*, but thallus and apothecia greenish tinged (especially when wet), often with granular areoles 60–120 μm diam.; true exciple absent; hymenium vivid blue-green; hypothecium pale blue-green, N+ red; ascospores (10–) 12–17 (–19) \times (3.5–) 4–5 μm , 0 or 1(-3)-septate; conidia 4.5–6 (–6.5) \times 0.5–1 μm . **BLS 1663**.

On exposed turf, usually on bryophytes, in areas of late snow-lie, above 800 m; rare. Scotland (Central Highlands; Cairngorms, Westernness; Ben Nevis range).



Nb IR

Micarea viridileprosa Coppins & van den Boom (2001)

Thallus light, bright green, leprose, of \pm globose goniocysts 12–18 μm diam., which sometimes coalesce to form granules 25–35 (–40) μm diam.; hyphae colourless, K–; photobiont cells 4–7 μm diam. Apothecia rare, 0.1–0.5 mm diam., convex, immarginate, whitish to pale straw; true exciple poorly developed; epithecium colourless; hymenium 35–50 μm tall, colourless; hypothecium colourless; paraphyses (1.2–) 1.5–2 μm diam., to 2.5 μm diam. towards the apices, numerous, richly branched. Asci 25–35 (–40) \times 8–12 μm . Ascospores 8–12 (–14) \times 2.5–4 μm , cylindric-ellipsoidal to obovoid, 0 or 1(–2)-septate. Pycnidia very rare, grey-brown, sessile to short-stalked, 20–50 μm diam., 50–100 μm tall; wall grey-brown, K+ violet, mesoconidia 4.5–6 \times 1.3–2 μm , cylindric-ellipsoidal to bluntly fusiform. Thallus C+ pink, K–, KC+ red, Pd–, UV–; apothecium sections C \pm red (gyrophoric acid). **BLS 0838.**

On acid bark and lignum, mainly in woodlands, often growing with *M. micrococca*, and frequently on acid humus in heathland, more rarely on vertical shaded rock faces. Widespread in the uplands and in acid habitats in the lowlands, probably much overlooked.

Usually sterile and distinguished from other members of the *M. prasina* group by its C+ pink (often faint), KC+ red (quickly fading) thallus; otherwise very similar to light green forms of *M. micrococca*. It also resembles and often grows with *Placynthiella dasaea*, which has a duller, fawn to pale brown colour. *M. xanthonica* is similar, but has a slightly yellowish tinge with larger goniocysts and is KC+ persistent orange and UV+ dark orange; see under that species for further diagnostic tips. *M. coppinsii* differs in having inconspicuous areoles and \pm delimited soralia, which often have a bluish tinge.

The C+ reaction can be faint, and is best checked as a KC+ red test on filter paper.

Nb

**Micarea vulpinaris** (Nyl.) Muhr (1987)

Thallus white to pale grey, \pm with green tinge, immersed or forming convex, often coalescing areoles 60–200 μm diam.; photobiont cells 4–7 μm diam. Apothecia 0.15–0.46 mm diam., adnate, convex, grey-black, but pallid, reddish brown or brown-grey in shade morphs, immarginate but with an adnate rim often forming a narrow pallid zone; true exciple poorly developed, soon reflexed; hymenium 40–45 μm tall, colourless with the upper part olivaceous, K–, N+ red; hypothecium dark reddish brown, K–, N–; paraphyses rather scanty, branched especially in the upper part, 1–1.5 μm diam. or to 2 μm diam. at the apices. Asci 38–40 \times 10–12 μm . Ascospores 9–12 \times 4–5 μm , ellipsoidal, ovoid- or cylindric-ellipsoidal, aseptate. Pycnidia rare, 40–50 μm diam.; conidia cylindrical, 4–6 \times 0.8–1 μm . Lichen products not detected by TLC.

BLS 2489.

On hard lignum of pine stump splashed by water, in native pinewood area; rare. Scotland (S. Aberdeenshire).

Brianaria lutulata and *Micarea parvula* differ in their convex, often tuberculate apothecia; the former also has smaller ascospores and a larger-celled photobiont, whereas the latter has dimorphic paraphyses and a red-brown, N– upper hymenium. Both are mainly saxicolous, but *M. vulpinaris* has been found on boulders by streams in Sweden.

Nb

**Micarea xanthonica** Coppins & Tønsberg (2001)

Thallus light yellowish green, leprose, of \pm globose goniocysts 16–28 μm diam. which sometimes coalesce to form granules to 40 μm diam.; hyphae colourless, K–; photobiont cells 4–7 μm diam. Apothecia very rare, (0.2–) 0.3–0.6 mm diam., or forming tuberculate clusters to 1.2 mm across, at first flattish and weakly marginate, but soon convex, immarginate or becoming tuberculate, whitish to pale straw; true exciple soon reflexed; epithecium colourless; hymenium 40–50 μm tall, colourless; hypothecium colourless; paraphyses 0.7–1 μm diam., to 1.5 μm diam. towards the apices, numerous, richly branched. Asci 36–38 \times 8–12 μm . Ascospores 9.3–14 (–14.3) \times (3.5–) 3.8–4.2 (–4.7) μm , cylindric-ovoid to cylindric-ellipsoidal, (0–)1(–3)-septate. Pycnidia not seen. Thallus C+ and KC+ persistent orange, K–, Pd–, UV+ dark orange, K/UV (wet)+ bright lime green (thiophanic acid, plus some additional xanthenes in trace amounts); apothecium sections C \pm red (gyrophoric acid). **BLS 2293.**

Nb IR



An oceanic species, mostly overgrowing moribund bryophytes on acid bark, lignum and occasionally peaty soil, also on soft sandstone (Wealden sandrock), mainly in ancient woodlands; widespread. Mainly W. Britain and Ireland (also in New Forest and Sussex).

Distinguished from other members of the *M. prasina* group by its KC+ persistent orange thallus, which usually has a slightly yellowish tinge; otherwise similar to *M. viridileprosa* and light green forms of *M. micrococca*. The C+ pink reaction of *M. viridileprosa* often looks orange because of its bright green thallus, so filter paper should be used, and promptly because of the fleeting reaction. The K/UV (wet)+ bright lime green test for xanthonenes definitively separates *M. xanthonica* from all other *M. prasina* group species.

Taxonomy

Micarea angulosa Coppins, Chambers & Orange, **sp. nov.**

IF557852

Type: England, Cumbria, VC69 Westmorland, Helvellyn, Red Tarn, below Striding Edge, NY34861499 [54.52599N, 03.00797W], alt. 800 m, on stones in scree on north-facing slope, 14 September 2018, A. Orange 24185 (E).

Thallus forming small patches <13 mm across amongst other crustose lichens, of pale grey, matt to slightly glossy, contiguous but discrete convex areoles 0.08–0.2 mm diam.; areoles becoming subglobose when containing a pycnidium. Areoles in section ecorticate, but with an amorphous colourless covering layer *ca* 5 µm thick. Photobiont ‘micareoid’, cells *ca* 4–7 µm diam. Apothecia rare, so far found only as immature, dark grey to black, convex, immarginate, 0.2–0.5 mm diam. or tuberculate and to 0.8 mm diam. Epithecium green, K–, N+ red. Hymenium colourless, 50–60 µm tall, C+ red. Paraphyses numerous, richly branched and anastomosing, (1–) 1.3–1.8 (–2) µm diam. Hypothecium colourless. Mature asci and ascospores not seen. Exciple visible in sections, colourless, of radiating, richly branched hyphae 1–1.5 µm diam. Pycnidia numerous, with many areoles each containing a single immersed pycnidium, 60–140 µm diam., the ostiole sometimes widely gaping; wall colourless, or green (K–) around the ostiole. Conidiogenous cells 4–6 × *ca* 2 µm. Conidia colourless, tetrahedral or bluntly ‘T’-shaped, 3–6.5 × 3.5–4 µm. Chemistry: thallus and apothecia C+ red, P– in sections (?gyrophoric acid, but not tested by TLC).

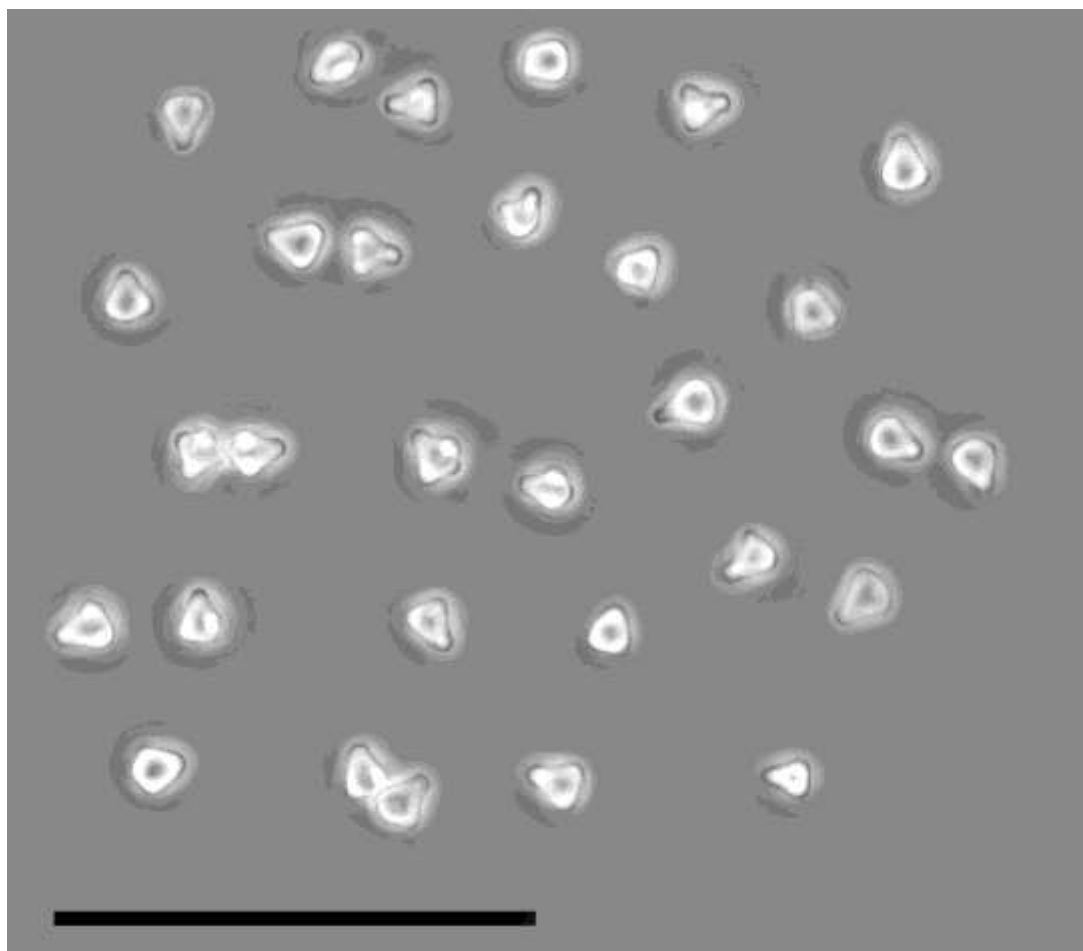


Holotype of *Micarea angulosa*, areoles containing pycnidia. Scale = 500 µm.

On stones, in small inconspicuous patches, in metal mine spoil or on disturbed ground and scree from near sea-level to 840 m altitude, Wales, N. England, Scotland.

Micarea angulosa seems to be a facultative metallophyte, and at the Welsh mine sites is associated with, e.g. *Acarospora sinopica*, *Placopsis lambii*, *Porpidia flavocruenta*, *Rhizocarpon oederi*, *R. reductum*, *Stereocaulon leucophaeopsis*, *S. pileatum* and *Trapelia collaris*. At the lowland site by a conifer plantation on the island of Mull, it was associated with *Ionaspis lacustris*, *Myriospora smaragdula*, *Porpidia crustulata* (parasitized by *Zwackhiomyces martinianus*), *P. tuberculosa*, *Rhizocarpon infernum* f. *sylvaticum*, *R. reductum* and *Trapelia glebulosa* s. lat. On scree, frequent associates include *Lecanora soralifera*, *Micarea lignaria* var. *lignaria*, *Placopsis lambii*, *Porpidia macrocarpa*, *P. striata*, *P. tuberculosa*, *Rhizocarpon anaperum*, *R. reductum*, *Stereocaulon leucophaeopsis* and *S. plicatile/tornoense*, and the bryophytes *Andreaea rupestris* and *Racomitrium sudeticum*.

Although known only with immature apothecia, ITS and mtSSU sequences obtained from the type specimen (ITS: OP494322; mtSSU: OP494336) place it close to *Micarea lignaria* (Ach.) Hedl. and *M. peliocarpa* (Anzi) Coppins & R. Sant., and the pigmentation and C+ red reaction of the apothecia are the same as for *M. peliocarpa*. The shape of the conidia is so far unique within the genus *Micarea*, and the pigmentation and C+ red reaction of the pycnidial wall and surrounding thallus rule out the possibility of the conidia belonging to a lichenicolous fungus (e.g. *Spirographa* spp.; Flakus *et al.* 2019).



Holotype of *Micarea angulosa*, conidia. Scale = 50 μ m.

Micarea atroviridis Coppins, Orange & Sanderson, **nom. nov.** IF557853
Micarea nigra van den Boom, Guzow-Krzemińska, Brand & Sérus., in Guzow-Krzemińska, Sérusiaux, van den Boom, Brand, Launis, Łubek & Kukwa, *MycKeys* **57**: 22 (2019), *non Micarea nigra* (Huds.) Fr., *Syst. orb. veg.* (Lundae) **1**: 257 (1825).

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