

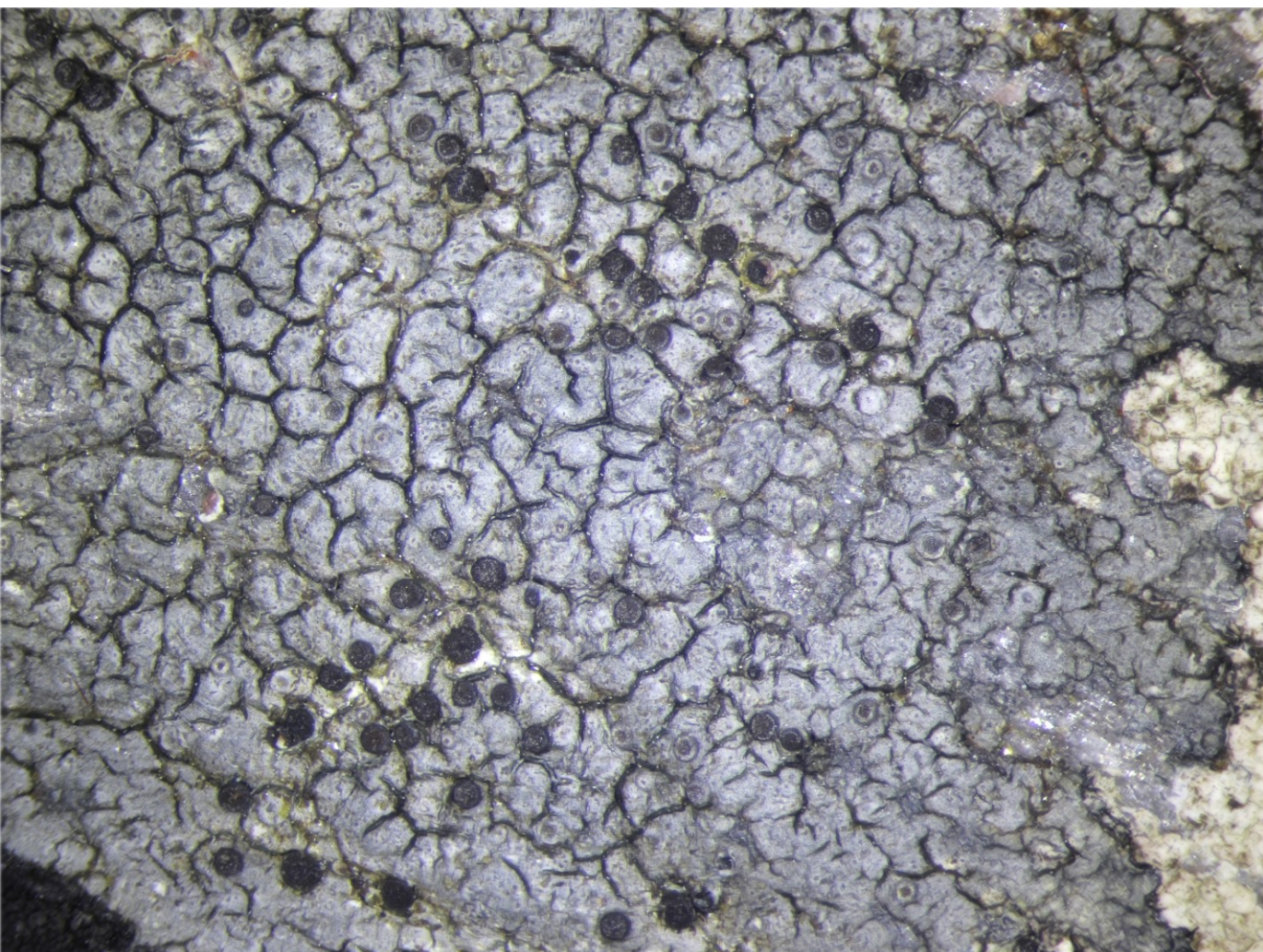
Revisions of British and Irish Lichens



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Caliciales: Leprocaulaceae

Cover image: *Halecania ralfsii*, on siliceous maritime rock, Durness, Sutherland.

Revisions of British and Irish Lichens is a free-to-access serial publication under the auspices of the British Lichen Society, that charts changes in our understanding of the lichens and lichenicolous fungi of Great Britain and Ireland. Each volume will be devoted to a particular family (or group of families), and will include descriptions, keys, habitat and distribution data for all the species included. The maps are based on information from the BLS Lichen Database, that also includes data from the historical Mapping Scheme and the *Lichen Ireland* database. The choice of subject for each volume will depend on the extent of changes in classification for the families concerned, and the number of newly recognized species since previous treatments.

To date, accounts of lichens from our region have been published in book form. However, the time taken to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published. Issuing updates as a serial electronic publication means that important changes in understanding of our lichens can be made available with a shorter delay. The accounts may also be compiled at intervals into complete printed accounts, as new editions of the *Lichens of Great Britain and Ireland*.

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Caliciales: Leprocaulaceae

including the genera *Halecania* and *Leprocaulon*

by

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LEPROCAULACEAE Lendemer & B.P. Hodk. (2013)

Thallus crustose, effuse and rimose-cracked, granular to warted, or with a diffuse and powdery-leprose primary thallus from which small and delicate branched pseudopodetia may develop. **Photobiont** chlorococcoid. **Ascomata** (where present) apothecia, sessile. **Thalline margin** with a broad algal zone and a broad to indistinct cortex. **True exciple** thin laterally, usually expanding above with a surface layer of apically brown-capped cells. **Hymenium** I+ blue. **Hypothecium** colourless. **Hamathecium** of unbranched or occasionally forked septate paraphyses, with swollen, mostly dark brown, capitate apices. **Asci** 8-spored, clavate to subcylindrical, *Catillaria*-type. **Ascospores** colourless, 1-septate, the perispore swelling markedly in K (not apparent in over-mature spores). **Conidiomata** pycnidia, immersed; wall colourless except around the ostiole. **Conidiogenous cells** arranged in branched chains. **Conidia** aseptate, bacilliform, colourless.

The Leprocaulaceae is here circumscribed to follow Lücking *et al.* (2016), containing three genera of which *Halecania* and *Leprocaulon* occur in Britain and Ireland. Many of their morphological features are divergent, but they share unusual tadpole-shaped haustoria, which also occur in *Catillaria* (Mark Powell, in litt. Jan 2022). That genus was also placed in the Leprocaulaceae by Fačková *et al.* (2020), but only one species (not the type) was included in their analysis and were that action to be justified, Catillariaceae Hafellner 1984 would have priority over Leprocaulaceae Lendemer & B.P. Hodk. 2013. The two families are kept separate pending more complete taxon sampling.

Literature:

Fáčková *et al.* (2020), Lendemer & Hodkinson (2013), Lücking *et al.* (2016), Miądlikowska *et al.* (2014).

- 1 Thallus crustose, cracked or granular-warted; lecanorine apothecia usually present *Halecania*
Thallus composed of a leprose basal layer; apothecia unknown in British and Irish species *Leprocaulon*

HALECANIA M. Mayrhofer (1987)

Thallus crustose, effuse, rimose-cracked or granular to warted, mostly white to blue- or brownish grey; cortex usually thin or indistinct, the terminal cells often with a brown cap; medulla I-. **Photobiont** chlorococcoid. **Ascomata** apothecia, sessile. **Thalline margin** soon receding with a broad algal zone and a broad to indistinct cortex; outer edge often with a brown layer of apically capped cells. **True exciple** thin laterally, usually expanding above with a surface layer of apically capped cells. **Hymenium** I+ blue. **Hypothecium** colourless. **Hamathecium** of unbranched or occasionally forked septate paraphyses, with swollen, mostly dark brown capitate apices. **Asci** 8-spored, clavate to subcylindrical, *Catillaria*-type. **Ascospores** colourless, 1-septate, ellipsoidal or ovoid to cylindrical-ellipsoidal, sometimes \pm slipper-shaped, the perispore swelling markedly in K (not obvious in over-mature spores). **Conidiomata** pycnidia, usually present, immersed; wall colourless except around the ostiole. **Conidiogenous cells** arranged in branched chains, pleurogenous. **Conidia** aseptate, bacilliform, colourless. **Chemistry:** argopsin, \pm zeorin; surfaces often with brown (K-, N-) or green (K-, N+ red) pigments. **Ecology:** corticolous and saxicolous; a few species lichenicolous but developing independent thalli.

Similarities in the structure of asci, paraphyses and conidiomata suggest affinities with *Catillaria* (Catillariaceae), but *Halecania* differs in having apothecia with a thalline margin and ascospores with

a distinct perispore. *Lecania* (Ramalinaceae) differs from *Halecania* in the *Bacidia*-type asci, sickle-shaped or curved-filiform conidia, and lack of dark apical caps on its surface cells (including paraphyses); also, the epithelial pigment (when present) is reddish brown and K+.

Literature:

Coppins (1989), Fletcher & Coppins (2009), Van den Boom (2009), Van den Boom & Etayo (2001).

- 1 Thallus rimose-cracked, smooth, waxy-textured, blue to slate-grey or grey-brown; on seashore rocks (mesic supralittoral) 2
Thallus granular or warted, matt, white, grey-brown or black, not on the seashore 3
- 2(1) Apothecia to 0.3 (–0.35) mm diam.; ascospores <11 µm long and 3.5 µm broad (excluding perispore); thallus K–, Pd–..... *laevis*
Apothecia 0.2–0.5 mm diam.; ascospores >11 µm long and 4.5 µm broad (excluding perispore); thallus K± yellow, Pd+ red..... *ralfsii*
- 3(1) Thallus sorediate, Pd+ red 4
Thallus lacking soredia but sometimes granular, Pd+ red or Pd–..... 5
- 4(3) On nutrient-enriched bark, frequent *viridescens*
Overgrowing crustose lichens on siliceous rocks, submontane..... *giraltii*
- 5(3) Epithecium green, N+ red; lowland, below 300 m *spodomela*
Epithecium brown, N–; montane, above 600 m 6
- 6(5) Thallus Pd+ red; ascospores 9.5–12 µm long *micacea*
Thallus Pd–; ascospores mostly >12 µm long 7
- 7(6) Thallus black, minutely granular; ascospores 12–15 µm long *rhypodiza*
Thallus pale to dark brown-grey, warted; ascospores 14–17 µm long 8
- 8(7) True exciple long-persistent; thallus on rock, ? initially growing on crustose lichens *alpivaga*
True exciple soon excluded; thallus on bryophytes *bryophila*

Halecania alpivaga (Th. Fr.) M. Mayrhofer (1987)

Thallus of discrete to clustered granular warts, to ca 1 mm thick, matt, pale to dark brown-grey. Apothecia 0.3–0.8 mm diam., at first globose with a pore-like disc, expanding to reveal a flat to slightly convex, brown-black disc; thalline margin mostly entire and persistent, occasionally receding in old apothecia, the cortex distinct, without crystalline inclusions; epithecium and outer edge of true exciple brown, K–, N–. Ascospores 14–17 × 5–7 µm (in water, including perispore), 4.5–5 µm broad (in K, excluding perispore). Pycnidia usually present; upper wall brown, N–. **BLS 1756.**

On calcareous rocks above 900 m; rare. C. Scotland (Ben Alder, Ben Lawers).

Halecania alpivaga resembles *H. bryophila* but is on rock, the latter has a thinner thallus and apothecia with evanescent thalline margins. *H. rhypodiza* is lowland, with a thin, black thallus and apothecia with evanescent thalline margins. There are reports (e.g. Poelt & Mayrhofer 1988, Zhurbenko 2021) of *H. alpivaga* as lichenicolous, growing on various crustose and foliose lichens (possibly also on free-living cyanobacteria) but subsequently developing an independent thallus. The nutritional status of British populations needs further examination.

VU D2



Halecania bryophila Fryday & Coppins (1996)

Thallus weakly delimited, brown-grey, matt, irregularly warted, 50–100 µm thick, lacking cortex but with brown surface hyphae with N⁻ dark brown caps 3.5–5 µm diam. Apothecia 0.2–0.5 mm diam., sessile, concave with a thin thalline margin, later flat and excluded; brown-black, true exciple persistent, 60–80 µm thick, raised and paler than the disc, flexuose when old; hymenium colourless, 40–55 µm tall; I⁺ blue; epithecium brown, K⁻, N⁻; paraphyses with dark brown apical caps 2.7–4 µm diam.; hypothecium colourless. Ascospores 14–17 × 4.5–5.5 µm (in K, excluding the perispore), the septum swollen in K. Conidiomata not seen. Chemistry K⁻, KC⁻, Pd⁻, UV⁻, brown hyphal pigment K⁻, N⁻. **BLS 0983.**

Overgrowing bryophytes, on damp, calcareous mica-schist; rare. Scotland (Perthshire). Endemic.

Resembles *H. alpivaga* (on rock, possibly lichenicolous) which has a thicker thallus and apothecia with a persistent thalline margin. *H. rhypodiza* has a brown-black granular thallus with a granular evanescent thalline margin.



Halecania giraltii van den Boom & Etayo (2001)

NE

Thallus crustose, effuse, forming scattered irregular patches of closely scattered to contiguous discrete areoles, thin, the areoles angular, 0.2–1 mm diam., upper surface granular-warted, granules 0.1–0.3 mm diam., brownish grey to blackish, matt, many areoles covered with roundish soralia. Soralia numerous, convex, discrete to crowded, sometimes confluent, dark greyish to dark brown or blackish, 0.1–0.25 mm diam., sometimes completely covering the areoles; soredia farinose. Soredia 15–25 µm diam., consisting of one or a few algal cells bound by short-celled hyphae with dark brown caps. Photobiont chlorococcoid. Apothecia rare (unknown in British material), sessile to adnate, 0.2–0.6 mm diam., with a smooth to granular thalline margin that is sometimes receding, the outer cells with dark brown caps; disc flat to slightly convex, dark brown to black, not pruinose, true exciple inconspicuous. Hymenium 50–75 µm tall. Epithecium medium to dark brown, K⁻, C⁻, N⁺ faint reddish brown. Paraphyses conglutinate, sometimes sparingly branched, the apical cells 3.5–5 µm diam., mostly with an internal dark reddish brown pigment. Asci narrowly clavate, 8-spored, *Catillaria*-type. Ascospores ellipsoidal, thin-walled, 1-septate with the upper cell sometimes broader and longer than the lower, colourless, 9–12 × 5.5–6.5 µm (excluding perispore), the perispore markedly swollen in K and then *ca* 2 µm thick. Conidiomata pycnidia, immersed in the thallus, 40–80 µm diam.; the wall colourless but olive brownish around the ostiole. Conidia ellipsoidal to bacilliform, 3–4.5 × *ca* 1 µm. Chemistry K⁻, C⁻, KC⁻, Pd⁺ red, UV⁻. **BLS 2774.**

Overgrowing other crustose lichens on an overhanging siliceous rock face, Scotland (Mid Perthshire).

The only sorediate saxicolous British species of *Halecania*. *H. micacea* has similar chemistry and ascospores, but is not sorediate and occurs on calcareous mica-schist. The description has been adapted from the original description and apothecia are not present in the only GBI collection.

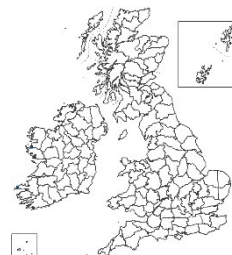
Halecania laevis M. Brand & van den Boom (2009)

NE

Thallus crustose, to 6 cm diam. and 0.13–0.25 mm thick, sometimes rimose to areolate; areoles occasionally ascendant at the edge and subsquamulose, upper surface smooth, matt, greyish brown; epinecral layer mostly present, to 20 µm thick; cortex inconspicuous, cells at the outer rim globose, to 5 µm diam., brown-pigmented, N⁻. Prothallus inconspicuous or absent, brownish grey. Apothecia abundant, small, to 0.3 (–0.35) mm diam., broadly appressed to sessile, flat, disc brownish black; margin thin to evanescent, concolorous with the disc, algae in under part only, outer rim of margin with dark brown-pigmented cells; hymenium 40–50 µm tall; epithecium brown, N⁻; paraphyses not or slightly conglutinated, the apices swollen and dark brown-pigmented, to 5 (–6) µm diam. Asci 8-spored, *Catillaria*-type. Ascospores 8.5–10.5 × 3–3.5 µm, 1-septate, ellipsoidal to broadly fusiform, the perispore to 1.5 µm thick, sometimes indistinct. Pycnidia always abundant, immersed, *ca* 60 µm diam., the wall colourless, dark brown around the ostiole. Conidia shortly ellipsoidal, 2.5–3 × *ca* 1 µm. Chemistry: no compounds found by TLC. **BLS 2552.**

On maritime schistose and conglomerate rocks, Ireland (Connemara, Kerry).

Similar to *Halecania ralfsii* which occurs in similar habitats, but with smaller apothecia and ascospores, and with a brown (N⁻) rather than greenish epithecium and a K⁻, Pd⁻ thallus. In the field it may easily be mistaken



for *Catillaria chalybeia*, but that species has ascospores that lack a perispore (that is sometimes inconspicuous in *H. laevis*) and a brown hypothecium. The description has been adapted from the original protologue.

Halecania micacea Fryday & Coppins (1996)

Thallus effuse, of convex dispersed matt pink-brown rimose-polygonal areoles, each 0.2–0.4 mm diam. Apothecia scattered, 0.2–0.5 mm diam., disc pale brown with a paler, waxy true exciple, thalline margin concolorous with the thallus, becoming excluded; hymenium colourless, I+ blue, 45–60 µm high, epithecium brown, N–, paler in K; paraphyses with brown apices 2.7–3.5 µm diam.; hypothecium colourless. Ascospores 9.5–12 × 4.5–5.5 µm (in K, excluding the perispore). Conidiomata not seen. Chemistry I–, K–, KC–, Pd+ red, UV– (argopsin by TLC). **BLS 1821.**

On calcareous mica-schist, montane, at over 700 m; nationally rare. Scotland (Perthshire). Endemic. A record from Wales (Merioneth) needs confirmation.

Close to *H. ralfsii*, but that species has a very smooth rimose blue-grey thallus (N+ red), darker apothecia, larger ascospores and occurs on mesic-supralittoral rocks.

LC IR



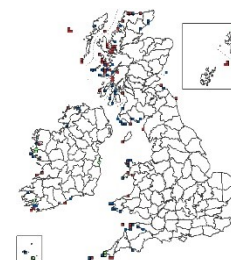
Halecania ralfsii (Salwey) M. Mayrhofer (1987)

Thallus ± effuse, rimose-cracked, surface smooth, waxy textured, blue- to leaden or slate-grey; cortex with brown (pigment caps) and green (N+ red) pigments. Apothecia 0.2–0.5 mm diam.; disc mostly flat, dark brown to black, paler when wet; thalline margin concolorous with the thallus, soon receding; true exciple black, slightly raised when wet; epithecium brown, K–, N–, adjacent upper edge of true exciple usually green-brown (N+ red). Ascospores (13–) 15–17 (–20) × 6–9 µm (in water, including perispore), 4.5–6 µm broad (in K, excluding perispore). Pycnidia numerous; upper wall green-brown, N+ red. Thallus K± yellow, Pd+ red (argopsin and zeorin). **BLS 0620.**

On hard siliceous sea-shore rocks, usually associated with *Lecanora helicopsis* or *Myriolecis (Lecanora) actophila* in the mesic-supralittoral zone; scarce, probably overlooked. W. Britain & Ireland, E. Scotland (rare).

Frequently confused in the field with *Lecanora helicopsis* which also has a rimose-cracked thallus but is Pd–, with *Lecanora*-type asci, predominantly aseptate, shorter ascospores (mostly 9–12 µm long), and thin, curved conidia (12–17 × ca 0.7 µm). *H. micacea* is similar but occurs above 700 m inland on calcareous rocks. The dark, leaden grey, oily thallus of *Sanguineodiscus aractinus (Caloplaca aractina)*, with a black prothallus, resembles that of *Halecania ralfsii*, but bears scattered ± sessile apothecia with orange-brown discs surrounded by a persistent even narrow dark grey thalline margin.

LC



Halecania rhypodiza (Nyl.) Coppins (1989)

Thallus effuse, to ca 200 µm thick, rimose, the surface minutely granular, black, often invaded by cyanobacteria. Apothecia 0.3–0.6 (–0.8) mm diam.; disc black-brown when wet, flat; thalline margin soon receding and obscured by granules; true exciple thin; epithecium and outer edge of true exciple brown, K–, N–; hypothecium colourless. Asci 8-spored. Ascospores 12–15 × 4.5–6 µm (in water). Pycnidia with brown (N–) upper wall. **BLS 0319.**

On calcareous rocks; rare. C. Scotland (Perth, Ben Lawers and Angus, Caenlochan). Endemic.

The black, granular-rimose but not warted thallus recalls that of *Placynthium*. Distinguished from *H. alpivaga* by the thallus form and apothecia with inconspicuous thalline margins; the lowland *H. spodomela* differs from both these species in the green (N+ red) epithecium. The 8-spored asci are distinct from the 12- to 16-spored asci in *Catillaria gilbertii*. Specimens of *C. chalybeia* in similar habitats have a browner thallus and slightly larger apothecia. *H. rhypodiza* has a thalline margin around young apothecia; microscopically, *C. chalybeia* has a green hymenial pigment and dark brown hypothecium, while *H. rhypodiza* has larger ascospores.

VU D2 IR



Halecania spodomela (Nyl.) M. Mayrhofer (1987)

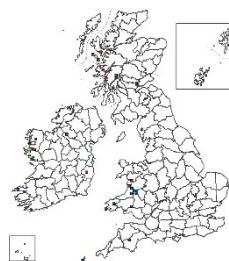
Thallus effuse, warted-areolate, white to pale grey, appearing black owing to a scurfy-granular covering of a

LC

Gloeocapsa-like cyanobacterium (with cells 20–26 µm diam.) and sometimes goniocysts (15–40 µm diam.), dark brown hyphae surrounding chlorococcoid algal cells 7–10 (–12) µm diam. Apothecia 0.3–0.6 mm diam., flat to slightly convex; disc dark brown to black; thalline margin grey (but often coated with black granules), persistent or receding, without a distinct cortex; epithecium dull olive-green, K–, N+ red, but adjacent edge of true exciple brown, N–. Ascospores 10–13 (–15) × 5–7.5 µm (in water, including perispore), 4–5 µm broad (in K, excluding perispore). Pycnidia with green (N+ red) upper wall. **BLS 0622**.

On slightly base-enriched siliceous rocks (e.g. granite), usually near the coast but always away from the supralittoral zone; rare (possibly overlooked). S.W. England (Cornwall, Devon), S. & C. Wales, W. Scotland, Ireland.

Distinguished by the green (N+ red) epithecium. The apparent obligate relationships of this species with the black cyanobacterium and the goniocysts (? an unidentified parasitic lichen) deserve closer study. Non-coastal forms at higher elevations with an N– epithecium are *H. rhypodiza*.



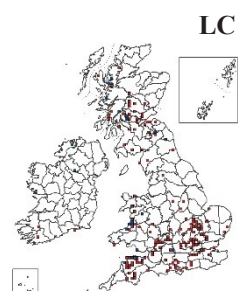
Haleciana viridescens Coppins & P. James (1989)

Thallus effuse, minutely warted-areolate, the areoles 0.05–0.1 mm diam., fragile (disintegrating when touched with a needle), pale green to green-brown, matt, dissolving to form pale, bright green soralia; soralia (0.1–) 0.2 (–0.3) mm diam., punctiform to confluent, farinose; soredia 12–20 µm diam., the surface hyphae with grey- to dark brown walls (K–, N–). Apothecia 0.2–0.4 mm diam., few or absent; disc flat to convex, watery grey to dark brown, not pruinose; thalline margin sorediate, decorticate, often receded; true exciple brown (K–, N–) at the upper edge, often thinly white-pruinose; epithecium pale to brown, K–, N–. Ascospores 12–17 (–20) × 4–6 µm (in water, including perispore), 3.5–4.5 µm broad (in K, excluding perispore), fusiform to clavate-fusiform, upper cell slightly wider. Pycnidia not found. Thallus and soralia C–, K–, KC–, Pd+ red, UV– (argopsin). **BLS 1704**.

On slightly nutrient-enriched bark of twigs and branches of broad-leaved trees and shrubs in woodlands or humid situations; frequent. S. England, Wales, Scotland; common and either increasing in range or previously overlooked. Apparently rare in Ireland but this is likely to be a factor of recording effort.

The only sorediate member of the genus on bark. When sterile, easily mistaken for *Rinodina efflorescens* which has larger (0.1–0.5 mm diam.), less fragile areoles (not disintegrating when touched with a needle), larger soralia (0.1–0.4 mm diam.), and contains pannarin (Pd+ red).

Biatora britannica also has argopsin (Pd+ red), but has larger soralia (0.15–0.30 mm diam) and a more yellowish-green thallus. It grows on trunks in humid old woodlands.



LEPROCAULON Nyl. ex Lamy (1878)

Primary thallus persistent, densely powdery-leprose, diffuse, soft, unstructured, sometimes giving rise to a secondary thallus of pseudopodetia. **Pseudopodetia** small, delicate, slender, white, cartilaginous, terete, branched and interwoven, covered with leprose-sorediate, floccose-tomentose granules. **Photobiont** trebouxiioid. **Ascomata** unknown in British species; fertile taxa have lecanorine apothecia, *Catillaria*-type asci and colourless septate ascospores. **Conidiomata** unknown. **Chemistry**: complex, including a range of depsides, depsidones, phloroglucinol derivatives, triterpenoids and fatty acids. **Ecology**: in sheltered, rather dry crevices on calcareous or siliceous rocks.

Formerly included in *Stereocaulon* and much confused with *Lepraria* (Lendemer & Hodkinson 2013), but distinguished by the absence of corticate phyllocladia, cephalodia, pycnidia, and the different chemistry. The primary thallus resembles that of a *Lepraria*.

Literature:

Lendemer & Hodkinson (2013), Orange *et al.* (2017), Purvis & Fletcher (2009).

- 1 Pseudopodetia not developed, the thallus diffuse, leprose; on mortar and overgrowing bryophytes *calcicola*
Pseudopodetia present, ± erect, sparingly branched; on dry soil and more rarely trunks of
broadleaved trees *quisquiliare*

Leprocaulon calcicola Earl.-Benn., Orange, Hitch & Mark Powell (2017)

Prothallus not observed. Thallus crustose, leprose, diffuse, 100–500 µm thick, pale to mid blue-grey in dried collections, brighter and greener in the field; pseudopodetia not differentiated; granules fine, 60–120 µm diam., not corticate, without projecting hyphae; lower part of thallus of decolorized granules, true medulla absent. Photobiont a green alga, cells spherical, 8–15 µm diam., sometimes divided into autospores. Ascomata and conidiomata unknown. Chemistry: zeorin, usnic acid; acetone extract on filter paper K–, C–, KC+ yellow, PD–. **BLS 2691**.

On vertical or near-vertical surfaces of old mortared walls, on shaded or sunny surfaces; often growing directly on mortar, but also overgrowing mosses and flints; S.E. England (Kent, Surrey) and East Anglia.

Easily distinguished from *L. quisquiliare* by the lack of pseudopodetia and the habit characteristics. Rather similar to *Lithocalla ecorticata* (Orange 2021) which has leprose thalli with a distinct yellowish tinge and grows on acidic rocks. Dry material may resemble *Lepraria incana*, which occurs primarily on acidic substrata and thalli often with patches containing parietin (K+ purple, UV+ pale orange).

NE



Leprocaulon quisquiliare (Leers) M. Choisy (1950)

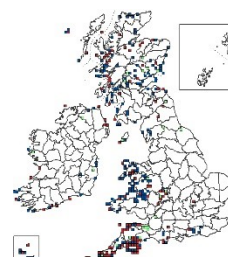
Leprocaulon microscopicum (Vill.) Gams ex D. Hawksw. (1974)

Primary thallus a soft, leprose-granular crust, indeterminate, persistent, white inside with a covering of green-white-grey, sometimes with blue or yellow tints; secondary thallus of delicate white unbranched or sparingly branched curved but ± erect pseudopodetia 2–4 mm in height, which, like the primary thallus, are covered in numerous small leprose-arachnoid granules. Apothecia unknown. Thallus C–, K–, KC–, Pd–, UV– (variable, a combination of atranorin, usnic, rangiformic acids, zeorin, and unidentified substances and fatty acids). **BLS 0824**.

On thin soil, especially in crevices associated with dry sides of cliff faces and walls, rarely on the trunks of old broadleaved trees and peaty soils; most frequently near the coast, less common inland. S., W. and N. Britain and Ireland.

Close examination within the overall sorediate thallus will reveal the minute, ± erect, white, shrubby pseudopodetia which distinguish it from *Lepraria* species in the field. Lendemer & Hodkinson (2013) introduced *Leprocaulon americanum* for New World populations formerly referred to this species, and referred European material to *L. quisquiliare*, which they considered to be an earlier name for *L. microscopicum*. A proposal to reject the name *L. quisquiliare* (Hawksworth *et al.* 2013) was not supported by the Nomenclature Committee for Fungi, so that name must stand.

LC



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