Revisions of British and Irish Lichens

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Baeomycetales: Baeomycetaceae

Cover image: *Baeomyces rufus*, on riverine sandstone rock, Mallyan Spout, Goathland, N.E. Yorkshire.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

including *Ainoa* and *Baeomyces*

by

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BAEOMYCETACEAE Dumort. (1829)

Thallus crustose, granular, squamulose or almost foliose. **Photobiont** chlorococcoid. **Cortex** pseudoparenchymatous or of interwoven hyphae running ± parallel to the upper surface, sometimes with an epinecral layer. **Soralia** sometimes present. **Isidia** absent. **Schizidia**, where present, discoid, detachable. **Ascomata** apothecia, sessile or on short stipes, thalline margin not present. **Exciple** colourless or pigmented, annulate or cupulate. **Epithecium** brownish. **Hymenium** colourless to light brown, gel K/I–. **Hypothecium** colourless to straw. **Hamathecium** of paraphyses, slender, moderately to richly branched above, contorted, often slightly swollen at the tips. **Asci** 8-spored, cylindrical, thin-walled, with a single functional wall layer, with a relatively undifferentiated, usually non-amyloid, K/I– tholus. **Ascospores** colourless, fusiform or ellipsoidal, aseptate or septate, sometimes with a gelatinous sheath. **Conidiomata** immersed in small warts on the thallus. **Conidia** short, bacilliform.

The family is one of two in the Baeomycetales (the other is the exclusively austral Cameroniaceae), in the arrangement of Lücking *et al.* (2017). For some time it was assumed that the Trapeliaceae was close to this group (e.g. Lumbsch *et al*. 2001), but it was assigned to its own order Trapeliales by Hodkinson & Lendemer (2011). However, Resl *et al*. (2015) included the Trapeliaceae and Xylographaceae in the Baeomycetales, and this arrangement was followed by Orange *et al.* (2021). There are five genera in the current arrangement for Baeomycetaceae, of which *Ainoa* and *Baeomyces* belong in our area.

Literature:
Hodkinson & Lendemer (2011), Lücking *et al.* (2017), Lumbsch *et al.* (2001), Orange *et al*. (2021), Resl *et al.* (2015).

1 Apothecia sessile, constricted at the base, the discs concave ..... ***Ainoa***
Apothecia on short solid and sometimes branched podetium-like stalks; discs often convex .. ***Baeomyces***

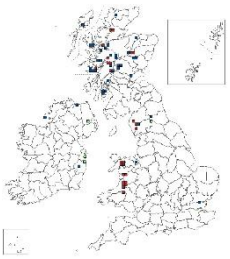
AINOA Lumbsch & I. Schmitt (2001)

Thallus crustose, sometimes schizidiate, covered by an epinecral layer. **Prothallus** not visible. **Photobiont** chlorococcoid. **Ascomata** apothecia, numerous, roundish, sessile, constricted at the base, discs dark brown to blackish, flat to concave, the margins prominent and persistent. **Exciple** cupulate, dark brown, composed of long-celled thick-walled hyphae. **Hymenium** 90–150 µm tall, colourless. **Hamathecium** of septate, slightly branched, easily separated paraphyses. **Asci** cylindrical to subclavate, thin-walled, 8-spored; apical dome K/I± weakly blue, *Trapelia*-type. **Ascospores** narrowly ellipsoidal, colourless, aseptate, without a gelatinous sheath. **Conidiomata** pycnidia, immersed in thalline warts. **Conidia** narrowly bacilliform. **Chemistry**: gyrophoric acid, restricted to apothecia and pycnidia. **Ecology**: saxicolous.

Differs from *Trapelia* (Trapeliaceae) in having larger apothecia with a thicker exciple, easily separable paraphyses, narrowly ellipsoidal ascospores, and a restricted distribution of gyrophoric acid. There is only one species in Great Britain and Ireland.

Literature:
Brodo & Lendemer (2015), Gilbert (2009).

Ainoa mooreana (Carroll) Lumbsch & I. Schmitt (2001) **Nb**



Thallus granular-verrucose, sometimes secondarily cracked, pale fawn, yellow-grey to ochraceous (when iron-stained). Apothecia 0.4–1.5 mm diam., robust, sessile, with a thick, elevated exciple and flat to concave disc, dull brown-black. Ascospores 15–21 × 6–10 µm. Pycnidia mostly 50–80 µm diam., often numerous; conidia 5–6 × *ca* 0.7 µm. Apothecia in section and pycnidia C+ red. **BLS 1433**.

On sheltered moist siliceous, sometimes metal-rich rocks, in walls of damp gullies, on pebbles in moorland and also late-snow patches; local. Upland Britain, a few scattered records from Ireland.

The large dusky sessile cup-shaped apothecia with a thick brown exciple are characteristic. When sterile, the species can be identified by the C+ red thallus only around apothecial initials and pycnidia.

BAEOMYCES Pers. (1794)

Thallus crustose, granular, squamulose or almost foliose. **Photobiont** *Coccomyxa* or *Elliptochloris*, algal layer continuous. **Cortex** pseudoparenchymatous or of interwoven hyphae running ± parallel to the upper surface, but absent where sorediate. **Soralia** sometimes present. **Isidia** absent. **Schizidia** discoid, detachable. **Ascomata** apothecia, brown, single or several, on short stipes which may or may not contain algae (podetia), solid and corticate below or throughout, sometimes almost sessile. **Epithecium** brownish. **Hymenium** colourless to light brown, gel K/I–. **Hypothecium** colourless to straw. **Hamathecium** of paraphyses, slender, unbranched or sparingly branched above, contorted, slightly swollen at the tips. **Asci** 8-spored, cylindrical, thin-walled, the apex truncate, with a single functional wall layer, with a relatively undifferentiated K/I– tholus. **Ascospores** colourless, fusiform or ellipsoidal, aseptate or spuriously septate, guttulate. **Conidiomata** immersed in small warts on the thallus. **Conidia** short, bacilliform. **Chemistry**: stictic acid complex with one additional unidentified substance. Gyrophoric and lecanoric acids are restricted to the epithecium and hymenium and are only present when paraphyses and asci have developed. **Ecology**: characteristic of temporary and recently disturbed sites on acid gravel soils, roadsides, earth banks, mine-spoil heaps, to arctic heathland, occasionally on rock or bark.

The ascus structure together with the solid nature of the podetia clearly separates it from the Cladoniaceae. *Dibaeis* (Icmadophilaceae) has distinctly pinkish apothecia, K/I+ blue hymenium and ascus tip, and different chemistry (depsides).

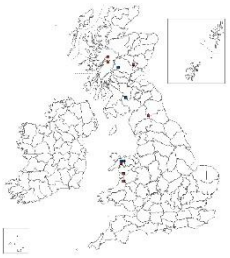
Lichenicolous fungi on *Baeomyces* and similar fungi are treated by Ihlen (1998) and Zhurbenko & Ohmura (2020).

Literature:
Hitch *et al.* (2009), Ihlen (1997, 1998).

1 Thallus conspicuously and coarsely squamulose, with ± radiating marginal lobes; apothecial stipe corticate below ..... ***placophyllus***
Thallus entirely crustose or of minutely compacted squamules, not lobate; apothecial stipe at least mostly ecorticate 2

2(1) Norstictic acid present; thallus K+ yellow→red ..... ***carneus***
Norstictic acid absent; thallus K+ yellow ..... ***rufus***

Baeomyces carneus Flörke (1821) **Nb**



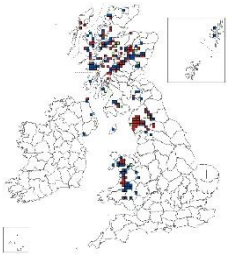
Thallus crustose, to 10 cm diam., coarsely granular to compactly squamulose, ± placodioid at the margin, pale green to pale brown; soralia scattered or absent; schizidia to 0.3 mm diam, circular and frequent; photobiont cells 6–13 (–14) µm diam., globose or a few ellipsoidal. Apothecia (not seen in British material) to 2 mm diam., sessile or stalked with a sometimes branched, ± squamulose solid stipe 0.5–4.0 mm tall; hymenium 65–110 µm, paraphyses hardly swollen at the apices, to *ca* 2.5 µm diam.; asci 60–90 × 8–10 µm. Ascospores (8–) 8.5–12.0 (–15) × 2.5–4.5 (–8) µm. Thallus C–, K+ yellow→red, KC+ red, Pd+ orange, UV– (norstictic [abundant] & connorstictic acids; gyrophoric and lecanoric acids [C+ red] in mature ascomata). **BLS 0141**.

Terricolous on unstable soils and moist mountain heaths, snowbeds, amongst mosses, occasionally saxicolous; rare or overlooked. N. and W. Wales, Cumbria, S.W. Scotland (Wanlockhead) and Scottish Highlands (Ben Nevis, Glen Coe, Blairgowrie).

The chemistry (K+ yellow→red) separates this species from *B. rufus*, with which it could easily be confused. *B. carneus* is also paler, of smaller size and with a ± squamulose stipe to the apothecium.

There is a report of *Arthrorhaphis grisea* Th. Fr. (1860) on this host from Argyll (Glen Coe). Also on this host occurs *Pyrenidium actinellum* Nyl. (1865).

Baeomyces placophyllus Ach. (1803) **LC**



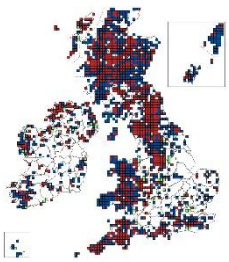
Thallus forming compact partial or complete rosettes to 10 cm diam., rather thick, ridged-rugose or squamulose in the centre, with distinct flattened smooth contiguous lobes, with slightly upturned paler margins, glaucous green-grey or occasionally brownish, becoming bright green when wet, to 5 mm broad; schizidia peltate, often light-coloured, fragile, flat to ± convex, to 0.6 mm across, situated especially towards the centre, leaving shallow scars; soralia absent; photobiont cells 6–13 (–14) µm diam., globose or a few ellipsoidal. Apothecia to 4 mm diam., rare, flattened, red-brown, on a short furrowed solid stipe, ± corticate below, often minutely squamulose; hymenium 70–100 (–120) µm; paraphyses 2–2.5 µm diam. with the apical cell slightly swollen to *ca* 3 µm diam.; asci 80–90 × 8–12 µm. Ascospores (9–) 10–13 (–16) × (3–) 3.5–5 (–5.5) µm, aseptate, guttulate. Thallus C–, K+ yellow, KC+ orange, Pd+ orange, UV+ creamy-yellow (stictic acid complex with trace of norstictic and one unidentified substance; gyrophoric and lecanoric acids [C+ red] in mature apothecia.) **BLS 0174**.

On peaty and humus-rich gravels in upland areas, sometimes in association with heavy metals on mine-spoil heaps; rather local. N.W. England, Wales, Scotland, N. Ireland (very rare).

Separated from *B. carneus* and *B. rufus* by the lichenized podetia, larger apothecial measurements, foliose nature and absence of soralia.

The lichenicolous lichen *Epilichen scabrosus* is occasionally found on this host although it is more common on *Baeomyces rufus*. Other lichenicolous species are *Arthrorhaphis grisea*, *Cercidospora parva* Hafellner & Ihlen (1998) and *Thelocarpon epibolum*.

Baeomyces rufus (Huds.) Rebent. (1804) **LC**



Thallus green to dull grey-green, sometimes brownish, discrete or spreading to *ca* 20 cm diam., continuously crustose, nodulose, or of minute overlapping compacted squamules to 1 mm broad, delimited, non-sorediate or with diffuse coalescing irregular greenish soralia; schizidia occasionally present, to 0.3 mm diam., disc-like; photobiont cells 6–13 (–14) µm diam., globose or a few ellipsoidal. Apothecia almost sessile or stalked to *ca* 10 mm tall, dark red-brown to pale dull pink-brown, translucent when wet, flattened, often incurved at the base, to 2 mm diam., single or occasionally several together on a short whitish furrowed solid stipe, mostly ecorticate, sometimes greenish and corticate towards the base; hymenium 75–120 µm, with asci 60–90 × 7–9 µm, paraphyses 1.5–2.0 µm diam. with apical cells to 2.5 µm diam. Ascospores aseptate, (7.5–) 8–11 (–14) × (2.5–) 3–4 (–5) µm. Pycnidia rare. Conidia 4–5 × *ca* 1 µm. Thallus C–, K+ yellow, KC+

yellow, Pd+ orange, UV± light creamy yellow (stictic acid with trace of norstictic and one unidentified substance; gyrophoric and lecanoric acids [C+ red] in mature apothecia). **BLS 0176**.

On gravelly or peaty acid soils, particularly in recently disturbed or burnt heathland, often spreading over stones, mosses and peat overhangs in damp locations, including streamsides and shaded earth banks, more rarely on sheltered walls and tree trunks; locally abundant. Throughout areas of acid soil in Britain and Ireland.

Arthrorhaphis grisea, A. vacillans (q.v.) and *Sclerococcum athallinum* (Müll. Arg.) Ertz & Diederich are occasionally found growing on the thallus of *B. rufus*. Around old mine-workings and on spoil heaps the thallus is often infested with bright green patches of *Epilichen scabrosus*. Also reported are *Cercidospora parva*, *Pyrenidium actinellum*, *Roselliniopsis tartaricola* (Linds.) Matzer (1993) and *Thelocarpon epibolum*.

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