Revisions of British and Irish Lichens

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Baeomycetales: Xylographaceae

Cover image: *Lithographa tesserata*, Glacier Bay, Alaska. Image copyright Måns Svensson, Museum of Evolution, Uppsala University.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

including the genera *Lambiella*, *Lithographa*, *Ptychographa* and *Xylographa*

by

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XYLOGRAPHACEAE Tuck. (1888)

Thallus crustose, effuse, areolate, granular or of goniocysts, often immersed within the substratum. **Photobiont** chlorococcoid, sometimes lichenicolous but with an independent thallus. **Isidia** or **soralia** present in some species. **Ascomata** roundish or angular to linear, usually ± innate, sometimes strongly melanized, with an exposed or nearly concealed disc, sometimes contorted, gyrose or umbonate. **Thalline margin** absent. **True exciple** of interwoven hyphae, pigmented, sometimes friable and carbonaceous, not amyloid. **Hymenium** usually hemiamyloid, rarely euamyloid, sometimes with brown pigmentation. **Hamathecium** of unbranched or branched paraphyses, sometimes moniliform above, the apices sometimes swollen and pigmented. **Asci** clavate to cylindrical, *Lambiella*-type or *Trapelia*-type. **Ascospores** aseptate, often thin-walled, colourless, broadly to narrowly ellipsoidal. **Conidiomata** pycnidia, globose, part-immersed to superficial. **Conidia** filiform and curved or bacillar.

Four genera are included (Lücking *et al*. 2016), all of which occur in Great Britain and Ireland. The family occupies a clade sister to the *Trapeliaceae* (Resl *et al*. 2015) within the *Baeomycetales* (Kraichak *et al*. 2018, Lücking 2019).

The type species of *Elixia* (*Elixiaceae*) was once placed within *Ptychographa* but has a different ascus structure (Lumbsch 1997) with blueing in Lugol's iodine restricted to a narrow band at the base of the tholus, and is now assigned to the *Umbilicariales*.

Literature

Kraichak *et al*. (2018), Lücking (2019), Lücking *et al*. (2016), Lumbsch (1997), Resl *et al*. (2015), Spribille *et al*. (2014).

1 Apothecia rounded, the disc often gyrose or umbonate, sunken below the level of the exciple ..... ***Lambiella***
Apothecia elliptical to linear in outline 2

2(1) Outer surface of apothecium pale brown; paraphyses unbranched or sparingly branched ..... ***Xylographa***
Outer surface of apothecium black and brittle; paraphyses various 3

3(2) On rock; thallus well-developed, K+ yellow→red (norstictic acid) ..... ***Lithographa***
On wood; thallus of indistinct granules, K– ..... ***Ptychographa***

LAMBIELLA Hertel (1984)

Thallus (where present) effuse, continuous or areolate, sometimes ± papillate or tuberculate, occasionally endosubstratal and then inconspicuous, pale to dark grey, brownish or black, matt, closely adnate to the substratum, sometimes minutely isidiate or granular; areoles convex to strongly bullate; **prothallus** mostly undifferentiated, or black, effuse, marginal and/or visible between the areoles; medulla I– or I+ violet (in non-British species). **Photobiont** chlorococcoid, some species lichenicolous but retaining an independent thallus. Punctiform **soralia** present in one species, with dark brown soredia. **Apothecia** lecideine, roundish to lobate or elongate, sessile to basally constricted or rarely innate; disc black, flat, often gyrose; true exciple prominent, persistent, sometimes flexuose,

usually distinctly elevated above the level of the disc. **Epithecium** greenish to golden or dark brown. **Hymenium** colourless or green-tinged below. **Hamathecium** of branched and anastomosed paraphyses, usually moniliform above. **Hypothecium** usually brownish. **Asci** broadly clavate, mostly *Lambiella*-type, with a KI+ blue tholus with a funnel-shaped central unstained region, and a small obconical apical KI+ blue dome. **Ascospores** broadly ellipsoidal to ovoid, sometimes thin-walled and easily misshapen, colourless but with occasional spores discoloured brownish. **Conidiomata** pycnidia, brown to black, sessile or partly immersed. **Conidia** bacillar, aseptate, colourless. **Ecology**: on bark or siliceous rock, some species lichenicolous or overgrowing crustose lichens or mosses.

Introduced by Hertel (1984) for the southern circum-polar species *Lambiella psephota*, (subsequently reported from the Arctic), but soon after placed into synonymy with *Rimularia* (*Trapeliaceae*). The genus was re-established by Spribille *et al*. (2014) and Resl *et al*. (2015) with molecular support. Important morphological features include the apothecia surrounded by a rim-like exciple and the branched and anastomosing paraphyses that are moniliform above. *Rimularia* differs by asci with a narrow central non-staining tube within the KI+ blue tholus (apical dome) in addition to the features described for *Lambiella* (the difference is subtle and intermediates occur; see Hertel & Rambold 1990, Lumbsch 1997), and thalli that lack depsidones (Resl *et al*. 2015). *Lambiella* species are also included in the key to *Rimularia* (q.v.).

Literature

Giavarini & David (2009), Hertel (1984), Hertel & Rambold (1990), Lumbsch (1997), Resl *et al*. (2015), Spribille *et al*. (2014).

1 Discrete punctiform soredia present; on bark ..... ***fuscosora***
Soredia absent; on rocks, bryophytes or other lichens 2

2(1) Thallus C+ red (gyrophoric acid) or C–; thallus surface finely isidioid; lichenicolous ..... ***furvella***
Thallus C– (gyrophoric acid absent); thallus areolate or granular-areolate 3

3(2) Thallus K+ yellow→red (norstictic acid) 4
Thallus K+ yellow or K– (norstictic acid absent) 6

4(3) Thallus dark grey; apothecia usually contorted, slit-like ..... ***mullensis***
Thallus white to pale grey; apothecia often gyrose or contorted but not slit-like 5

4(3) Overgrowing bryophytes on montane rocks; thallus white, cracked-areolate; apothecia round (except where distorted by compression) with a thick, persistent true exciple; asci *Trapelia*-type ..... ***sphacelata***
Directly on schists, usually montane; thallus grey-brown to reddish brown; apothecia often angular, convolute or gyrose, with a thin true exciple; asci *Lambiella*-type [rare chemotype; see couplet 7 below] ..... ***gyrizans***

6(3) Lichenicolous, on *Lecanora* (*Glaucomaria*) *rupicola*; mainly maritime ..... ***insularis***
Directly on rocks, upland 7

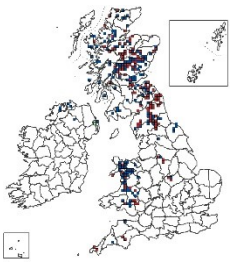
7(6) Apothecia innate; ascospores 9–11 × 4.7–7 µm; thallus pale grey, composed of flat, contiguous areoles ..... ***gyrizans***
Apothecia sessile; ascospores 13–14 × *ca* 8 µm; thallus brown-grey, composed of granular areoles on a thin black prothallus ..... ***globulosa***

Lambiella furvella (Nyl. ex Mudd) M. Westb. & Resl (2015) **LC**

Rimularia furvella (Nyl. ex Mudd) Hertel & Rambold (1987)

Thallus to 0.8 mm thick, effuse, rimose-areolate, dark-brown to blackish; surface minutely isidioid or granular (granules 30–50 µm diam.); photobiont cells 6–12 µm diam. Apothecia 0.3–0.8 (–1.5) mm diam., usually few or

absent, black; disc flat to convex; true exciple thin, exciple and hypothecium dark brown or olive brown; hymenium 60–75 µm tall; paraphyses branched and anastomosed, the apices not strongly capitate. Asci 50–60 × 15–18 µm. Ascospores 12–16 (–20) × 6.5–9 (–10) µm. Thallus usually C+ pink, K–, Pd–, or C–, K+ yellow→red (crystals), Pd+ yellow (with varying proportions of gyrophoric and norstictic acids; other reported substances are probably contaminants from host lichens). **BLS 0722**.



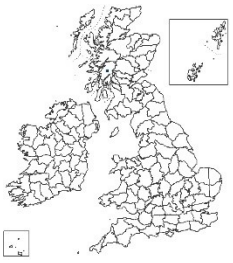
Lichenicolous, overgrowing various crustose lichens on exposed siliceous rocks but easily overlooked for a dark stain; local. N. & W. British Isles.

Sterile morphs of *Placynthiella icmalea* resemble this species, but have smaller photobiont cells (5–9 µm diam.) and occur in shady, humid situations, usually among bryophytes on soil or wood, not on sunny, exposed rocks.

Lambiella fuscosora (Muhr & Tønsberg) M. Westb. & Resl (2015) **DD**

Rimularia fuscosora Muhr & Tønsberg (1989)

Thallus effuse, thin, sorediate, immersed or superficial and then forming an uneven, continuous or areolate crust; soralia dark brown, discrete, punctiform, to 0.6 mm diam., flat to convex. Apothecia to 0.4 (–1.0) mm diam., sparse, sessile, black; true exciple persistent, sometimes flexuose, dark brown, occasionally developing a central column in the disc; disc flat to convex, roughened or cracked; epithecium brown, rarely with a greenish tinge; hymenium 50–70 µm tall, colourless; subhymenium colourless or pale brown. Asci 40–65 × 20–30 µm, clavate. Ascospores (9.5–) 11–16 (–20) × (5–) 7–11 µm, aseptate, ellipsoidal, colourless. Pycnidia 40–80 µm diam., sessile, subglobose, black; conidia 5–7 × *ca* 1 µm, bacilliform. Thallus and soredia C–, K– or K+ yellow→red (crystals), Pd ± faintly yellow (norstictic acid). **BLS 1894**.



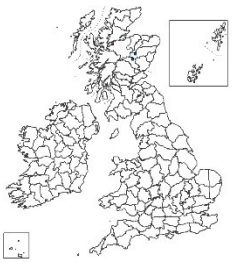
On *Salix* bark (also on *Alnus* and *Betula* in Scandinavia) in moist situations; very rare. W. Scotland (Argyll).

Strongly resembles *Schaereria corticola* in thalline characters, both are epiphytes with punctiform brown soralia, but those of *Schaereria* are always K–. They are readily separated using apothecial characters.

Lambiella globulosa (Coppins) M. Westb. & Resl (2015) **NT**

Rimularia globulosa Coppins (2001)

Thallus crustose, effuse and often wide-spreading on a thin black prothallus, areoles globose, grey-brown to brown, strongly convex, sometimes shortly stipitate; medulla I–. Apothecia at first urceolate with a deeply sunken disc, 0.2–0.3 mm diam., mostly single, sessile, appearing lecideine or gyrose later, to 0.8 mm diam.; exciple dark brown, K–; hypothecium brown below, sometimes paler above and green-tinged, K–; hymenium 70–75 µm thick, colourless but green-tinged in the lower part; paraphyses 1.5–2 µm diam., richly branched in mid-hymenium, becoming bead-like above, with cells to 4.3 µm diam. Asci 60–65 × 18–23 µm, clavate. Ascospores (9.7–) 12.5–14.5 (–15.8) × (6.2–) 6.9–8.4 (–9.6) µm, ellipsoidal. Pycnidia 85–170 µm diam., partly immersed; wall brown; conidia 6.5–8.5 × *ca* 0.8 µm, bacilliform. Medulla C–, K+ yellow-orange, KC–, Pd+ red (stictic acid). **BLS 1992**.



On dry vertical or steeply sloping siliceous rock; very rare. The species appears to be most frequent on iron-rich rock. Scottish Highlands (Cairngorms, Glen Strathfarrar). Endemic.

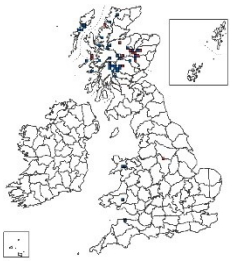
Specimens are most likely to be confused with *L. gyrizans* but can be separated by the larger ascospores, sessile apothecia and a much darker thallus composed of warted granules, which can become almost stipitate.

Lambiella gyrizans (Nyl.) M. Westb. & Resl (2015) **LC**

Rimularia gyrizans (Nyl.) Hertel & Rambold (1990)

Thallus crustose, areolate, grey-brown to somewhat reddish brown; areoles 0.2–1 mm diam., strongly convex; medulla I–. Apothecia 0.2–0.5 mm diam., to 0.8 mm if tuberculate, immersed or a few sessile, black; disc flat to slightly convex, minutely wrinkled; true exciple thin, often greyish, often angular, convolute or gyrose; exciple and hypothecium dark brown, K–; epithecium brown, K–; hymenium 80–120 µm tall; paraphyses 1.5–1.8 µm diam., richly branched and anastomosed, short-celled and often ± moniliform above, with some cells to 4 µm diam. Asci 50–60 × 18–25 µm, clavate. Ascospores (8–) 9–11 × 4.7–7 (–8) µm, subglobose to ellipsoidal.

Pycnidia 60–150 µm diam., immersed; wall brown above, becoming colourless below; conidia 5–8.5 × 0.8–1 µm, bacilliform, aseptate. Medulla C–, K± yellow, KC–, Pd± yellow (stictic and ± norstictic acids). **BLS 0725**.



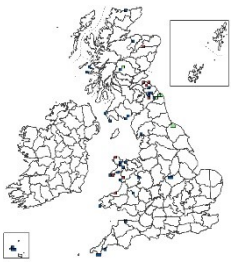
On schists, primarily montane, but known from sea-level in S. Wales (Pembroke); locally common. W & N Britain.

Separated from the similar *Lambiella mullensis* by the different chemistry (K+ yellow→red, Pd+ orange) and from *L. globulosa* by the smaller ascospores, immersed apothecia and paler, non-granular thallus. Small parasitic patches of *Orphniospora moriopsis* are occasionally found on the thallus. Rare forms of *L. gyrizans* that contain norstictic acid can be separated from *L. mullensis* by the paler thallus and more rounded apothecia.

Lambiella insularis (Nyl.) T. Sprib. (2014) **LC**

Rimularia insularis (Nyl.) Rambold & Hertel (1985)

Thallus areolate, grey-brown to brown or somewhat olivaceous; medulla I−; prothallus well-developed, black. Apothecia 0.1–0.6 mm diam., at first sunken between the areoles, later ± sessile, flat to convex; true exciple raised, ± flexuose, black; paraphyses becoming moniliform above with swollen cells to 4 µm diam. Asci 40–55 × 12–16 µm. Ascospores (8–) 8.5–14 × 4.5–7 µm, ellipsoidal. Thallus C± pink (± gyrophoric acid). **BLS 0736**.



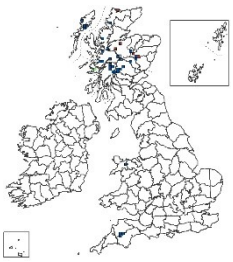
Lichenicolous, forming islets in thalli of *Lecanora* (*Glaucomaria*) *rupicola* but with an independent thallus; locally abundant. Mainly in W. & N. Britain, not reported from Ireland.

The unrelated *Rinodina insularis* (Arnold) Hafellner (1979) occurs on the same host lichen and is externally similar, but has quite different asci and ascospores.

Lambiella mullensis (Stirt.) Fryday & Coppins (2021) **LC IR**

Rimularia mullensis (Stirt.) Coppins (1993)

Thallus grey-brown, of strongly convex to tuberculate or grape-like clusters of areoles, medulla I−; prothallus black, well-developed. Apothecia (0.2–) 0.3–0.5 mm diam., black, immersed; disc concave to flat, sometimes angular by compression, sometimes umbonate; true exciple persistent, slightly raised and forming a distinct rim around the sunken disc, dark brown; epithecium golden brown to dark reddish brown; hymenium 70–100 (–110) µm tall, I+ blue changing to red in parts; hypothecium brownish to deep reddish brown; paraphyses 1.5–2.3 µm diam., branched and anastomosed, ± moniliform above with cells to 4.5 µm diam., the apices brown, not distinctly capitate. Asci 45–60 × 10–15 µm. Ascospores (6–) 8–11 × 4–7 µm, subglobose to ellipsoidal. Thallus and medulla C–, K+ yellow→red (with abundant crystals), KC + red, Pd+ yellow→ red (norstictic acid). **BLS 0752**.



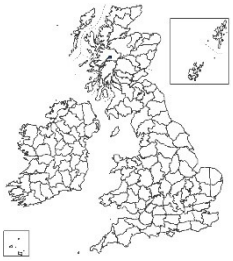
On exposed siliceous rocks. S.W. England (Dartmoor), N. Wales, N. Scotland. Endemic.

Very close to *L. gyrizans*, with which it often grows; that species differs primarily in the presence of stictic acid (K+ yellow, Pd+ yellow). In the field it can usually by separated by its more slit-like apothecia and darker grey thallus, formed of more convex areoles. Small parasitic patches of *Orphniospora moriopsis* are occasionally found on the thallus.

Lambiella sphacelata (Th. Fr.) M. Westb. & Resl (2015) **CR (D)**

Rimularia sphacelata (Th. Fr.) Hertel & Rambold (1990)

Thallus crustose, thin, whitish, overgrowing mosses and plant detritus at >1000 m. Apothecia 0.3–0.8 mm diam., disc black, concave to flat or slightly convex, gyrose, contorted; true exciple 50–80 µm wide; epithecium olivaceous to brown; hymenium 60–75 µm tall; hypothecium hyaline to dilute brownish (K–); paraphyses in mid-hymenium 1.3–1.5 µm diam. Ascospores 10–15 × 5–6 µm, ellipsoidal. Pycnidia unknown. Cortex K+ yellow→red crystals (norstictic acid). **BLS 1895**.



On dead bryophytes over montane acid rocks; very rare. N.W. Scotland (Westerness Aonach Mor, Ben Nevis).

The only member of the genus in Britain with a montane, bryicolous habitat. The species appears to have no close relatives (Resl *et al*. 2015) and the ascus structure is closer to the *Trapelia*-type than the *Lambiella*-type according to Hertel & Rambold (1990).

LITHOGRAPHA Nyl. (1857)

Thallus crustose, areolate, with an epinecral layer; prothallus present. **Photobiont** chlorococcoid. **Ascomata apothecia**, lirellate to ± round or angular, disc slit-like. **Thalline margin** absent. **True exciple** opaque, of dark brown conglutinated anastomosing and radiating hyphae. **Hamathecium** of branched paraphyses, often rather sparse. **Hymenium** colourless, I+ blue. **Hypothecium** colourless to dark brown. **Asci** 8-spored, clavate; tholus with K/I+ dark blue flanks and a broad non-amyloid axial mass (*Trapelia*-type). **Ascospores** aseptate (submuriform in two S. Hemisphere species), colourless, ellipsoidal, without a perispore. **Conidiomata** pycnidia (but unknown in *L. tesserata*). **Conidia** narrowly bacilliform. **Chemistry**: orcinol depsides and β- orcinol depsidones. **Ecology**: on rocks.

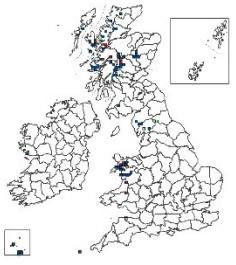
Related to *Lambiella* which has rounded, though sometimes gyrose apothecia. *Lithographa* occupies a clade along with *Ptychographa* (Resl *et al.* 2015), which is corticolous and has a thallus of granular goniocysts. *Wadeana* (of uncertain position; Lücking *et al*. 2016) has periphysoid filaments on the exciple, which is less strongly developed than in *Lithographa*, red-brown pigmentation in the ascomata, multispored asci and *Trentepohlia* as the photobiont; both its species are corticolous.

Only one species occurs in our region. The species with submuriform ascospores may not belong in the genus (Fryday & Coppins 2007).

Literature

Coppins & Fryday (2006), Dobson & Purvis (2009), Fryday & Coppins (2007), Hertel & Rambold (1990), Resl *et al*. (2015).

Lithographa tesserata (DC.) Nyl. (1857) **LC**



Thallus whitish to pale grey-brown, clearly areolate; areoles to 0.4 (–1.5) mm, scattered or contiguous, flat to convex, to 0.5 mm thick, angular to rounded; cortex densely packed with small crystals, K+ dissolving, medulla I± weakly pink-mauve; prothallus black, often wide, frequently visible between areoles and around the thallus; photobiont cells globose, 7–14 µm diam., or ellipsoidal, to 20 (–26) × 14 (–16) µm. Apothecia numerous, 0.2–1.5 × 0.2–0.4 mm, black, lirellate, almost rounded or short and usually unbranched, straight or curved, sometimes divided, solitary or crowded and congested-gnarled forming stellate groups, sessile, shiny, appressed, emergent, constricted at the base; disc slit-like, not opening to expose the hymenium; true exciple well-developed, elevated and curved inwards; hymenium 65–95 µm high; paraphyses to 1 µm diam. Asci 60–65 × 14–17 µm. Ascospores 9–12 (–15) × 5–8 µm. Pycnidia unknown. Medulla C–, K+ yellow→red (crystals), KC+ red, Pd+ orange, UV– (norstictic acid). **BLS 0853**.

On ± moist siliceous or slightly basic rocks, especially basalt, in coastal and upland sites; rare and very local. N. & W. Britain, not reliably reported from Ireland.

Distinguished by the strongly areolate thallus, crowded, shortly lirellate apothecia, aseptate spores, and K+ red medulla. British material referred to as *L. tesserata* var. *petraea* (Ach.) Redinger (1937) is apparently referable to forms of *Acarospora privigna* and *A. subfuscescens*.

PTYCHOGRAPHA Nyl. (1874)

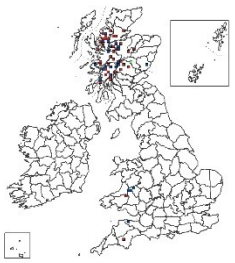
Only a single species is known, so the description below constitutes that of the genus.

Distinguished from *Xylographa* by the black and friable exciple, from *Wadeana* (of uncertain position; Lücking *et al*. 2016) by the 8-spored asci and ascus structure, and *Elixia* (*Elixiaceae*, *Umbilicariales*) by its asci with a narrow, K/I+ blue apical dome.

Literature

Gilbert & Coppins (2009), Lücking *et* al. (2016), Lumbsch (1997), Spribille *et al*. (2014).

Ptychographa xylographoides Nyl. (1874) **NT**



Thallus crustose, indistinct, of minute discrete dark brown granules (goniocysts) scattered on or just below the surface of the substratum; granules mostly 20–50 µm diam. with a cortex of uniformly brown angular cells 4–7 µm diam.; photobiont cells chlorococcoid, 6–14 µm diam. Ascomata lirellate, narrowly elongate or sometimes becoming angular or rounded, usually unbranched, running parallel with the grain of the wood, 0.3–1.4 × 0.1–0.3 mm, black; disc slit-like, at least when young, with (1-)2 (rarely more) longitudinal slits each indicating a parallel hymenium below, which are separated by dark brown tissue; true exciple thick, brown-black, friable, of conglutinated hyphae; hypothecium dark brown, merged with the exciple; hymenium 45–60 µm tall, colourless or tinged greenish along the edge of the exciple and epithecium, I+ yellowish, K/I+ blue; hamathecium of scanty unbranched or sparingly branched paraphyses 1–2 µm diam., apices dark brown, conglutinated (forming an epithecium). Asci 8-spored, clavate, with a K/I+ blue outer fuzzy coat and thick, K/I– apical dome, *Trapelia*-type. Ascospores 8.5–13 × 4.5–6.5 µm, ellipsoidal, aseptate, colourless, without a thickened perispore. Conidiomata pycnidia, 40–50 µm diam., frequent, immersed to superficial, blackish, the wall dark brown; conidia 4–7 × *ca* 0.8 µm, bacilliform, aseptate, colourless. **BLS 1210**.

On wood of ± horizontal surfaces of fallen trees in old-growth stands; local. S.W. England (Devon, Somerset), mid Wales, N. Scotland (Highlands).

Most likely to be confused with *Xylographa parallela*, which has a pale true exciple (section needed), *Elixia flexella*, which has shorter ascomata and ascospores and a different ascus structure (see above), or species of the non-lichenized *Hysterium,* which have septate ascospores.

XYLOGRAPHA (Fr.) Fr. (1836)

Thallus crustose, immersed or thinly superficial, effuse, sometimes with scattered, brown goniocysts. **Photobiont** chlorococcoid. **Ascomata** apothecia, semi-immersed to superficial, narrowly elongate, lirelliform, roundish to linear, usually aligned parallel to the grain of the wood, brown to dark brown; disc ± flat. **Thalline margin** absent. **True exciple** thin, brown at least in the outer part (i.e. not black). **Epithecium** brown, rarely with an olivaceous tinge. **Hymenium** colourless, I+ blue. **Hypothecium** colourless. **Hamathecium** of paraphyses, unbranched or sparingly branched and anastomosed, the apices brown, sometimes branched, gradually widening. **Asci** 8-spored, clavate-cylindrical, ± *Trapelia*-type; in K/I, wall blue, apical dome distinct, with convex base, light blue laterally surrounding a broad, colourless apical cushion; no ocular chamber. **Ascospores** aseptate, colourless or a few old ascospores becoming grey-brown, ellipsoidal to cylindric-ellipsoidal, without a distinct perispore. **Conidiomata** pycnidia, ± globose, ± immersed, brown-black. **Conidia** narrowly falcate,

colourless. **Chemistry**: stictic acid complex, unidentified substances, or none. **Ecology**: on wood, rarely on bark.

Similar genera on wood are the non-lichenized *Agyrium* with convex, dull orange to orange-brown apothecia without a raised exciple and the lichenized *Ptychographa* which has more intensely pigmented, black apothecia with mainly slit-like discs.

Literature

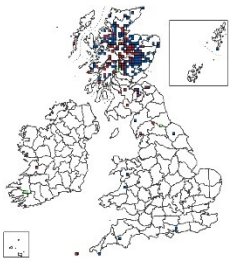
Giavarini & Orange (2009), Resl *et al*. (2015), Spribille *et al*. (2014).

1 Soralia absent 2
Soralia present ..... ***vitiligo***

2(1) Apothecia 0.3–1.7 (–2.7) mm long, elliptic to linear in outline; ascospores 11–16 × 5–7 µm; thallus usually with stictic or norstictic acid (K+ yellow or yellow →red) 3
Apothecia 0.2–1.1 mm long, roundish to narrowly elliptical in outline; ascospores 9–12.5 × 4.5–6 µm; with confriesic acid, or no lichen substances (K–) ..... ***trunciseda***

3(2) Apothecia elongate to linear, not fragmenting into compartments and proliferating to form parallel clusters; true exciple thin; thallus usually K+ yellow (stictic acid) ..... ***parallela***
Apothecia often fragmenting into compartments separated by substratum tissue, sometimes proliferating at a narrow angle to form non-linear clusters; true exciple thick; thallus K+ yellow→red at least in part (norstictic acid) ..... ***rubescens***

Xylographa parallela (Ach.) Fr. (1849) **LC**



Thallus largely immersed, light greyish, usually minutely speckled with brown goniocysts 17–40 µm diam. Apothecia elliptical to linear in outline, semi-immersed to superficial, often following the wood grain, 0.3–1.7 (–2.7) × 0.1–0.28 mm, proliferating when older to form parallel clusters, not fragmenting to form compartments; exposed hymenium pale brown to dark brown; true exciple thin, often prominent when young, later slightly elevated or inconspicuous, concolorous with the disc or usually paler, thin, brown in the outer part, colourless within. Ascospores 11–16 × 5–7 µm, ellipsoidal to cylindric-ellipsoidal. Pycnidia frequent but inconspicuous, resembling large goniocysts; conidia curved, 9–14 × <1 µm. Thallus C–, K± yellow, Pd± yellow (stictic acid often with traces of other members of the complex, including norstictic acid, or no lichen products detected by TLC). The chemistry is generally very difficult to evaluate due to the lack of a visible thallus. **BLS 1532**.

On slowly decaying wood, especially of conifers; locally common in woodland sites. Common in Scotland and N. England, scattered and rare in Wales (Cardiganshire, Merionethshire), W. Ireland and S. England.

Xylographa parallela belongs to a species complex characterized by strongly elongate apothecia (Spribille *et al*. 2014), but only *X. parallela* s. str. and *X. rubescens* appear to occur in our region. Other species may also be present, especially *X. pallens* (Nyl.) Malmgren (1861) (similar to *X. rubescens* but with a paler exciple and chemistry as for *X. parallela*).

X. laricicola Nyl. (1875) is a bark-inhabiting morph of this species; its thallus forms a thin greyish crust, but the algae are still in brown goniocysts. The apothecia are short, perhaps due to the lack of wood grain in the substratum. *Ptychographa xylographoides* is similar but has a black exciple which easily crumbles.

Xylographa rubescens Räsänen (1921) **NE**

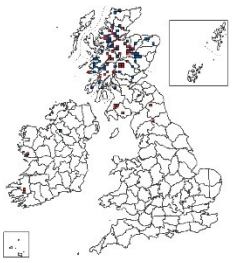
Thallus granuar to rimose or lumpy, light greyish, usually minutely speckled with brown goniocysts. Apothecia elliptical to linear in outline, semi-immersed to superficial, often following the wood grain, 0.4–4.4 × 0.11–0.45 mm, proliferating when older at a narrow angle to form non-linear clusters, often fragmenting to form compartments separated by substratum tissue; exposed hymenium pale brown to dark brown, sometimes appearing pruinose; true exciple thick, sometimes slightly elevated above the disc, concolorous with the disc or usually paler, brown in the outer part, colourless within. Ascospores (9–) 11–12.5 (–14) × (4.5–) 5.5–6.7 (–8.5) µm, ellipsoidal. Pycnidia infrequent; conidia curved, 12–14 × *ca* 0.5 µm. Thallus C–, K+ yellow→red, at least

in part, Pd± yellow (norstictic acid). **BLS 2808**.

On coniferous wood, Scottish Highlands (Abernethy Forest, Grantown-on-Spey).

Part of the *Xylographa parallela* complex, differing macroscopically particularly by ascomata that are initially linear but often degenerate into lines of small compartments separated by substratum tissue, and with a K+ yellow→red rather than K+ yellow spot test. The concentration of norstictic acid may be patchy in some material and then not show in spot tests, but the Scottish collections have almost identical ITS sequences to those studied by Spribille *et al*. (2014).

Xylographa trunciseda (Th. Fr.) Minks ex Redinger (1938) **Nb**



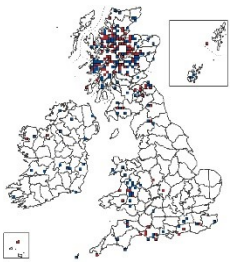
Like *X. parallela*, but the apothecia measure 0.2–1.1 × 0.1–0.3 mm, are roundish to narrowly elliptical rather than elongate in outline, sometimes regenerating in chains from the outer tips of empty excipular shells. Ascospores 9–12.5 × 4.5–6 µm, ellipsoidal. Pycnidia not known. Thallus C–, K–, Pd– (confriesic acid, or no substances detected by TLC). **BLS 1533**.

In similar habitats to *X. parallela*, but often preferring slightly more moist conditions. C. & Highland Scotland, England (N. Pennines), W. Ireland.

The rugby-ball shaped apothecia are diagnostic (Spribille *et al*. 2014). It is considered to be an old-growth forest species, and threatened in much of north and central Europe (Bunnell *et al*. 2008). However, in western Scotland it can be found on cut stumps in cleared conifer plantations. *Xylographa erratica* T. Sprib. (2014) may also occur in our area; it is similar to *X. trunciseda* in ascoma shape but contains stictic acid (K+ yellow) in the thallus and/or exciple (section needed).

Sometimes parasitized by an *Arthonia*-like fungus with aseptate ascospores 14–16.5 × *ca* 2.3 µm.

Xylographa vitiligo (Ach.) J.R. Laundon (1963) **LC**



Thallus immersed, pale greyish, without brown goniocysts; soralia present, erumpent, mostly discrete, roundish to narrowly elliptical in outline, 0.2–1 × 0.18–0.42 mm, ± flat, brown to dark grey or indigo, cream when abraded; soredia 19–30 µm diam., with brown pigment which is unchanged in K. Apothecia occasional, superficial, roundish to narrowly elliptical, 0.24–0.96 × 0.16–0.4 mm; exposed hymenium ± flat, pale brown to dark brown; true exciple narrow, slightly elevated, usually paler than the disc, brown. Ascospores 10–14 (–16.5) × 4–7.5 µm, ellipsoidal. Pycnidia sometimes present, inconspicuous; conidia (12–) 15–20 × <1 µm. Soralia C–, K+ yellow, Pd+ orange (stictic acid, usually with traces of other members of complex, including norstictic acid). **BLS 1534**.

On slowly decaying wood, especially of conifers, also on old garden seats, wooden slats, etc., in sunny exposed situations; widespread. S. England, Wales, Scotland (there common), scattered throughout Ireland.

Distinguished from other British and Irish species of the genus by the presence of soralia. When sterile it may be confused with various other sorediate species, from which it may be distinguished by the colour of the soralia and the presence of stictic acid. TLC is sometimes required to separate sterile specimens from *Buellia arborea* and *B. griseovirens* (*Caliciales*: *Caliciaceae*).

Several other sorediate species of *Xylographa* are recognized by Spribille *et al*. (2014); *X. soralifera* Holien & Tønsberg (2008) could occur in our region, differing from *X. vitiligo* by the strongly convex rather than ± concave soralia and the presence of fumarprotocetraric acid (Pd+ red).

Nomenclature

Lambiella mullensis (Stirt.) Fryday & Coppins, **comb. nov.** **IF 558684**

Basionym: *Lecidea mullensis* Stirt., *Scott. Natural*. **4**: 166 (1878) [1877-78].

Typification: [UK] Scotland: Mull, Ben More, on rocks, Aug. 1876, coll. *J. Stirton* s.n. (**BM**).

Literature

Bunnell, F.L., Spribille, T., Houde, I., Goward, T. & Björk, C. (2008). Lichens on down wood in logged and unlogged forest stands. *Canadian Journal of Forest Research* **38**: 1033–1041.

Coppins, B.J. & Fryday, A.M. (2006). New or previously misunderstood species of *Lithographa* and *Rimularia* (Agyriaceae) from the southern subpolar region and western Canada. *Lichenologist* **38**: 93–107.

Dobson, F.S. & Purvis, O.W. (2009). *Lithographa*. In *Lichens of Great Britain and Ireland* (Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. eds): 558–559. London: British Lichen Society.

Fryday, A.M. & Coppins, B.J. (2007). A second species of *Lithographa* with submuriform ascospores. *Lichenologist* **39**: 245–250.

Gilbert, O.L. & Coppins, B.J. (2009). *Ptychographa*. In *Lichens of Great Britain and Ireland* (Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. eds): 768–769. London: British Lichen Society.

Giavarini, V. & David, J.C. (2009). *Rimularia*. In *Lichens of Great Britain and Ireland* (Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. eds): 808–812. London: British Lichen Society.

Giavarini, V. & Orange, A. (2009). *Xylographa*. In *Lichens of Great Britain and Ireland* (Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. eds): 973–974. London: British Lichen Society.

Hertel, H. (1984). Über saxicole, lecideoide Flechten der Subantarktis. *Beiheft zur Nova Hedwigia* **79**: 399–499.

Hertel, H. & Rambold, G. (1990). Zur Kenntnis der Familie Rimulariaceae (Lecanorales). *Bibliotheca Lichenologica* **38**: 145–189.

Kraichak, E., Huang, J.-P., Nelsen, M., Leavitt, S.D. & Lumbsch, H.T. (2018). A revised classification of orders and families in the two major subclasses of Lecanoromycetes (Ascomycota) based on a temporal approach. *Botanical Journal of the Linnean Society* **188**: 233–249.

Lücking, R. (2019). Stop the abuse of time! Strict temporal banding is not the future of rank-based classifications in fungi (including lichens) and other organisms. *Critical Reviews In Plant Sciences* **38**: 199–253.

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

Lumbsch, H.T. (1997). Systematic studies in the suborder Agyriineae (Lecanorales). *Journal of the Hattori Botanical Laboratory* **83**: 1–73.

Resl, P., Schneider, K., Westberg, M., Printzen, C., Palice, Z., Thor, G., Fryday, A., Mayrhofer, H. & Spribille, T. (2015). Diagnostics for a troubled backbone: testing topological hypotheses of trapelioid lichenized fungi in a large-scale phylogeny of Ostropomycetidae (Lecanoromycetes). *Fungal Diversity* **73**: 239–258.

Spribille, T., Resl, P., Ahti, T., Pérez-Ortega, S., Tønsberg, T., Mayrhofer, H. & Lumbsch, H.T. (2014). Molecular systematics of the wood-inhabiting, lichen-forming genus *Xylographa* (Baeomycetales, Ostropomycetidae) with eight new species. *Symbolae Botanicae Upsalienses* **37**(1): 1–87.

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