

New taxa, reports, and names of lichenized and lichenicolous fungi, mainly from the Scottish Highlands

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Abstract: The new taxa *Cliostomum subtenerum*, *Dactylospora suburceolata*, *Fuscidea oceanica*, *Lecania granulata*, *Lecidea herteliana*, and *Ropalospora lugubris* f. *sorediata* are described from collections made from Scotland and Wales. Outside the British Isles, *D. suburceolata* is also known from Switzerland, *L. herteliana* from NE North America and *R. lugubris* f. *sorediata* from Sweden and NE North America. In addition, *Lecidea luteoatra* Nyl. belongs to the *Lecanora marginata* group and the name *Lecanora viridiatra* (Stenh.) Nyl. is taken up for this species, *Peterjamesia sorediata* is transferred to *Roccellographa*, and *Ropalospora atroumbrina* is included in the synonymy of *R. lugubris* f. *sorediata*.

Key words: biodiversity, NW Europe, taxonomy

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Introduction

The Highlands of Scotland are widely recognized as supporting many important habitats and the Western Highlands, with their hyper-oceanic climate of high rainfall and low annual temperature fluctuation, are particularly important. The oceanic woodlands of the Western Highlands are internationally renowned for their important assemblages of bryophytes and lichens (Gilbert 1984; Averis 1991; Coppins & Coppins 2012), and more recently the montane lichen biota has been shown to be equally important (Fryday 1997*a, b*, 2001, 2002*a*). Previously, contributions by the authors (Fryday 2000, 2002*b*, 2005; Fryday & Coppins 1996*a, b*, 2008) have added several new taxa to the lichen biota of the British Isles from this habitat, and here we add a further five new taxa and make other taxonomic innovations.

Materials and Methods

The study is based chiefly upon collections made by the first author during fieldwork leading to his PhD and now

held in E or MSC. Type material and other collections were obtained on loan from GZU, STU and UPS.

Apothecial characteristics were examined by light microscopy on hand-cut sections mounted in water, 10% KOH (K), 15% HCl (H), 50% HNO₃ (N) or 0.15% aqueous IKI. Thallus sections were investigated in water and 10% KOH (K). Ascus structure was studied in 0.15% aqueous IKI, both without prior treatment and after pretreatment with 10% KOH. Anatomical measurements were made in 10% KOH. For all fertile taxa at least 20 ascospores were measured. For *C. subtenerum*, where ascospore dimensions were critical for separation from *C. tenerum*, c. 50 ascospores were measured for each species.

Thin-layer chromatography followed the methods of Orange *et al.* (2001). Nomenclature for apothecial pigments follows Meyer & Printzen (2000).

Selected additional comparative material examined. *Cliostomum tenerum* (Nyl.) Coppins & S. Ekman. **Great Britain:** England: **V. C. 3**, South Devon: 1.5 km SW of Noss Mayo, Yealm Estate, coastline between Hilsea Point and Blackstone Point, 20/5.4, 1992, *Coppins* (15174) & *A. M. O'Dare* (E). **Scotland:** **V. C. 103**, Mid-Ebudes: Coll, A Chròic, 17/22(-)3.62, 0–40 m, sheltered rock underhangs, 1983, *Coppins* 9678 (E). **VC 91**, Kincardine: Nr Nigg, *Crombie* (E–Lich. Brit. Exs. no. 68—isotype).

Fuscidea 'alpina' ad int.. **Austria:** Salzburg, *Glockener-Gruppe*: Madelz südlich über Rudolfschütte am Weißsee im Stubachtal, 2300–2500 m, 8 ix 1973, *J. Poelt* (GZU).—**Italy:** *Südtiroler Dolomiten*: Passo di Rolle Quarzporphyr, c. 2000 m, 23 x 1976, *J. Wetz* (GZU). **Trentino:** Catena dei Lagora, Nordgrat des Berges Cavallazza S vom Pso di Rolle, an Porhyrblöcken, 2050–2250 m, 26 x 1984, *J. Poelt* (GZU).

Fuscidea 'badensis' ad int.. **Germany:** Baden, *Nordschwarzwald*: Lautenbach, Bad Sulzbach, Weg zum Pilatusfels, [41°31'N 8°9'E], 1989, *V. Wirth* 18561 (STU).

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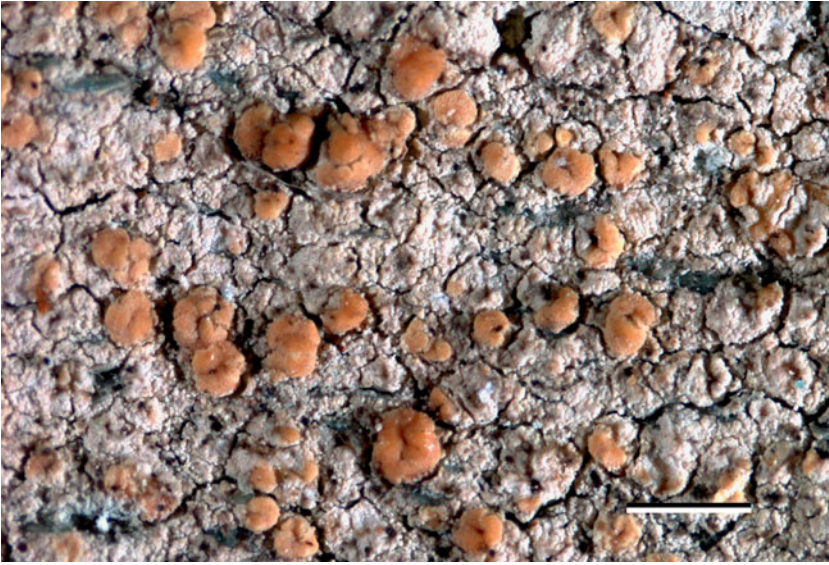


FIG. 1. *Cliostomum subtenerum* (S. Chambers s. n.—holotype). Scale = 0.5 mm. In colour online.

Fuscidea gothoburgensis (H. Magn.) V. Wirth & Vězda. **Great Britain:** Scotland: V. C. 92, South Aberdeen: Braemar, Glen Clunie, Creag nan Gabhar, 37/14.84, 450 m, rocks on scree slope, 1992, *Fryday* 3466 (E).

Fuscidea intercincta (Nyl.) Poelt. **Great Britain:** Wales: V. C. 49, Caernarvon: Bethesda, Carnedd Dafydd, Ysgolion Duon, below Grib Lem, 23/66.63, 525 m, side of giant boulder, 1994, *Fryday* 5332 (MSC). Scotland: V. C. 96, East Inverness: Cairngorm, Coire an Lochain, 28/98.04, 810 m, boulders, 1 x 1980, *P. Topham* s. n. (E). V. C. 97, West Inverness: Fort William, Glen Nevis, Meall Cumhann, 27/17.69, 500 m, vertical acid rock, 1990, *Fryday* (1239) & *O. L. Gilbert* (MSC). V. C. 106, East Ross: c. 17 km ESE of Ullapool, Seana Bhragh, Loch Luchd Coire, 28/289.878, 1800 ft, N-facing vertical rocks, 1984, *Coppins* (10457) *et al.* (E).

Fuscidea kochiana (Hepp) V. Wirth & Vězda (sorediate). **Great Britain:** Scotland: V. C. 92, South Aberdeen: Braemar, between Meall Odhar and Glas Maol, top of siliceous rock, 37/15.77, 900 m, 1995, *Fryday* 6073 (E).

Fuscidea oculata Oberholl. & V. Wirth. **Germany:** Baden, Nordschwarzwald: Ottenhöfen, Melkereikopf, [48°33'N 8°2'W,] 880 m, Buntsandstein-Blockhalde am Nordwesthang, 1981, *V. Wirth* 9385, 9387 (STU-isotypes); *ibid.*, 900 m, "Heidbeermauer", Blockmeer, 1986, *V. Wirth* 15318, 9387 (STU).

Fuscidea lygaea (W. Mann) V. Wirth & Vězda (sorediate). **Great Britain:** Wales: V. C. 49, Caernarvon: Bethesda, Cwm Idwal, Clogwyn y Tarw, 23/64.59, 400 m, vertical face of rhyolite crag, 1994, *Fryday* 5316 (MSC).

Lecidea fuscoatra (L.) Ach. **Great Britain:** Scotland: V. C. 74, Wigtown: c. 0.6 km WSW of Glenluce, Torrs Warren, stable acid dune system, 25/13–4.55, on pebbles and stones, 1989, *Coppins* 13047 (E).

Lecidea paupercula Th. Fr. **Iceland:** Austur-Barðas-trandarsýsla: Kollabúðaheiði, an der Straße, c. 6 km nördlich Kollabúðir, 65°38'45"N, 22°02'W, 440 m, 22 vii 1979, *H. Hertel* (E–*Lecid.* Exs. 7).—**Great Britain:** Scotland: V. C. 90, Angus: Caenlochan Glen, Glasallt Burn, at base of W-facing cliffs, 37/18.7, c.750 m, on granitic rocks, 1989, *Coppins* (13348) & *O. L. Gilbert* (E). V. C. 106, East Ross: c. 17 km ESE of Ullapool, Seana Bhragh, Loch Luchd Choire, 28/28.87, c. 550 m, on large boulder, 1984, *Coppins* 10451 (E).

Ropalospora lugubris f. *lugubris* (Sommerf.) Poelt. **Great Britain:** Scotland: V. C. 97, West Inverness: Sunart, Ben Resipole, Allt Mhic Chiarain, 56°43.5'N 5°40.0'W, 380 m, siliceous rock outcrop in acid moorland, 1992, *Fryday* 3196 (MSC). V. C. 98, Argyll Main: Glen Coe, Coire nam Beitheach, 27/142.545, 875 m, 1992, *Fryday* 3345, 3346 (MSC). V. C. 104, North Ebudes: Isle of Skye, Bla Bheinn, above Loch Fionna-choire, 18/53.21, c. 500 m, on NE-facing rocks, 1987, *Coppins* 12698 (E).

The Taxa

Cliostomum subtenerum Coppins & Fryday sp. nov.

Mycobank No: MB800464

Cliostomo tenero similis sed sorediis praesentibus, thallo zeorinum continentes, apotheciis et ascosporis maioribus.

Typus: Great Britain, Wales, V. C. 52, Anglesey, NE of Amlwch, cove E of Llam Carw, 23/460.936, on vertical siliceous ('green' schist) coastal rocks above HWM, 11 June 1995, *S. P. Chambers* s. n. (E—holotypus).

(Fig. 1)

Thallus effuse, thin and discontinuous, occasionally thicker (to 0.4 mm), white, non-corticate. *Soralia* pale green, covering most of the thallus, 0.1–0.3 mm diam., soon confluent and appearing effuse; soredia farinose c. 0.02 mm diam. *Photobiont* chlorococcoid, cells 8–12 µm diam.

Apothecia scattered, sessile, 0.4–0.8 mm diam., becoming tuberculate and then to 1.2 mm diam.; *disc* pinkish brown to pale brown with paler margin, slightly convex soon becoming tuberculate with excluded margin. *Excipulum* composed of conglutinate radiating hyphae 5 µm wide; internally colourless to yellow-brown with grey-brown granular intrusions not dissolving in K, outer cells with brown pigment, becoming colourless in K. *Hymenium* hyaline, I+ blue, 40–45 µm tall, *epihymenium* brown, granular, becoming colourless in K; *paraphyses* 1.5–2.0 µm wide, moderately branched and anastomosing, apices to 3 µm wide, pigmented cap absent. *Hypothecium* hyaline, composed of randomly orientated hyphae. *Asci* c. 30 × 12 µm, clavate, *Bacidia*-type. *Ascospores* hyaline, 0–1 septate, narrowly ellipsoid to fusiform, often slightly curved, (10–)12–15(–20) × 3–4 µm.

Conidiomata pycnidia, rare; flesh-coloured to pale brown, immersed in thicker areas of the thallus. *Conidia* ellipsoid-bacilliform, 7–8 × 1.5–2.0 µm.

Chemistry. Thallus and soredia C–, K+ yellow, Pd+ orange, UV+ dull yellow; atranorin, stictic acid and zeorin by TLC.

Cliostomum subtenerum resembles *C. tenerum* (Nyl.) Coppins & S. Ekman in the apothecia having a thalline margin but the two species differ in a number of significant characters. The most obvious differences are that the thallus of the new species is sorediate and that the apothecia and ascospores are both larger [0.1–0.2(–0.5) mm diam. and 7–10(–15) × (1.5–)2.0–3.0 µm in *C. tenerum*]. *Cliostomum subtenerum* also has a wider ecological amplitude, occurring in underhangs in montane situations and in coastal habitats, as well as a different chemistry (zeorin absent in *C. tenerum*). An additional difference is

that all collections of *C. subtenerum* are abundantly fertile and pycnidia are rare, whereas *C. tenerum* is rarely fertile and commonly pycnidiate. Reese Naesborg *et al.* (2007) showed that *C. tenerum* was related to *Lecania* s. str., which suggests that the same probably also applies to *C. subtenerum*. However, as *C. tenerum* differed from that genus in a number of characters (e.g., anastomosing excipular hyphae, complex thalline chemistry), they did not make any taxonomic changes.

Cliostomum subtenerum is known only from Coire a' Bhathaich near the summit of Ben Lomond and Llam Carw on Anglesey; at both localities it is relatively frequent in shaded underhangs on schistose rock. Associated species are few but include *Lecanora polytropa* (Wales) and *Acarospora smaragdula* (Scotland).

Additional specimens examined. **Great Britain:** Scotland: V. C. 86, Stirlingshire: Ben Lomond, Coire a' Bhathaich, 27/368027, 925 m, in sheltered underhang on schistose rock, 1994, *Fryday* 5590 (E); *ibid.*, 27/369027, 925 m, in sheltered underhang on schistose rock, 1994, *Fryday* 5663 (MSC).

***Dactylospora suburceolata* Coppins & Fryday sp. nov.**

MycoBank No: MB800465

Dactylospora urceolatae similis sed apotheciis maioribus, ascosporis 3-septatis (sine septatis longitudinalibus), pigmento interno brunneo (haud purpureo) differt.

Typus: Great Britain, Scotland, V. C. 88, Mid-Perthshire, Ben Lawers, An Stuc, north crags, 27/638.433, 1000 m, 18 July 1989, *Fryday* s. n. (E—holotypus).

(Figs 2 & 3)

Thallus inapparent, lichenicolous on a whitish–yellowish muscicolous crustose lichen(s).

Apothecia 0.2–0.8 mm diam., black or with a dark brown margin; *disc* concave; margin prominent, persistent, smooth. *Exciple* 60–75 µm wide (lateral to hymenium); upper part, and especially outer part, dark brown, K–; lower part dilute brownish or ± hyaline, but often with a thin, dark brown outer edge; cells to 12 µm diam. *Hymenium* 70–95 µm tall, hyaline to dilute red-brown; *epihymenium* red-brown, K+ dulling [never



FIG. 2. *Dactylospora suburceolata* (Fryday s. n.—holotype). Scale = 0.5 mm. In colour online.

purplish]; *paraphyses* mostly slender, 1.0–1.5 μm wide in mid-hymenium, apices only slightly widening to 3 μm at the apex, each with a distinct, dark brown apical cap. Occasional thicker filaments present, 2–3 μm wide, gradually widening to 4 μm towards apex. *Hypothecium* red-brown, K+ dulling or K+ dull olivaceous. *Asci* c. 70 \times 12–14 μm , 8-spored. *Ascospores* (14–)17–21(–24) \times (4.8–)6.0–7.0(–9.5) μm , narrowly ellipsoid, brown, smooth-walled but wall of old spores \pm finely warted, (1–)3-septate.

Conidiomata not seen.

Dactylospora suburceolata occurs in similar habitats to *D. urceolata* (Th. Fr.) Arnold [incl. *D. deminuta* (Th. Fr.) Triebel], but has generally larger apothecia, a broader exciple, a taller hymenium, and persistently 3-septate ascospores (Fig. 3) that are slightly broader (Table 1). Furthermore, the purplish tinge (in water or K) of the internal brownish tissues of *D. urceolata* is not evident in *D. suburceolata*, and neither are the blue-violet, K+ green pigmented granules found in the exciple and hypothecium of that species. *Dactylospora urceolata* has 3–7-septate

ascospores, with some becoming submuriform with 1–2 cells having a longitudinal or diagonal septum (Triebel 1989, fig. 32a as *D. deminuta*). However, it is variable with regard to ascospore septation, with some collections having a high proportion of 3-septate spores. *Dactylospora frigida* Hafellner also has 7-septate or submuriform ascospores, but differs from both *D. urceolata* and *D. suburceolata* in having a greenish brown epithecium, and is apparently confined to the thallus of *Brigantiaea fuscolutea* (Hafellner 1985). To date, no *Dactylospora* species has been found on *B. fuscolutea* in the British Isles, and the listing of *D. frigida* in Hawksworth (2003) refers to *D. urceolata*. Other species of *Dactylospora* with brown, 3-septate spores include *D. borealis* Holien & Ihlen, which occurs on *Mycoblastus* spp. and has a K+ purple epihymenium, and *D. parasitica* (Flörke) Zopf and *D. attendenda* (Nyl.) Arnold, both of which have shorter spores and occur on *Ochrolechia* and *Pertusaria*, and *Porpidia* and *Amygdalaria* spp. respectively. A key to the Scandinavian species of *Dactylospora* is provided by Ihlen *et al.* (2004).



FIG. 3. *Dactylospora suburceolata*, ascospores in ascus (Fryday s. n.—holotype). Scale = 10 μ m. In colour online.

Dactylospora pseudourceolata Sarrión & Hafellner (2002), from SW Spain, is superficially similar to *D. suburceolata*, but has somewhat smaller apothecia and ascospores (Table 1) and is a saprobic species on the bark of *Arbutus unedo* L. *Dactylospora rostrupii* Alstrup (Alstrup *et al.* 1994) is lichenicolous on the terricolous *Pertusaria dactylina* (Ach.) Nyl., but differs especially in its broader ascospores (Table 1).

In Scotland, *D. suburceolata* is so far known from only four collections from the Breadalbane mountains in Perthshire, with an altitude range of 750–1000 m. Here, it is lichenicolous on sterile, whitish to pale grey muscicolous crusts, which may belong to '*Lecidea*' *hypnorum* Lib. One host thallus (from Coire Riadhailt) has pale yellow soralia

and may be a species of *Biatora*. However, the single collection from Switzerland, at an altitude of 1518 m, is seemingly on the thallus of *Mycobilimbia tetramera* (De Not.) Vitik. *et al.*, which was also parasitized by *Zwackhiomyces* cf. *berengerianus* (Arnold) Grube & Triebel. All British records of *D. urceolata* are also from the Breadalbane Mountains, with hosts being *Megaspora verrucosa*, *Protopannaria pezizoides*, *Protothelleanella sphinctrinoidella*, and unidentified sterile crustose lichens.

Additional specimens examined. **Great Britain:** Scotland: V. C. 88, Mid-Perthshire: Meall na Samhna, 27/47.33, 750 m, damp N-facing, mica-schist crags, 1991, Fryday 2388 (E); Meall nan Tarmachan, crags on W side of Coire Riadhailt, 27/57.38, 800 m, 24 vii 1989, Fryday s. n. (E); Ben Ghlas, northern crags, 27/62.40, 1000 m, 4 viii 1989, Fryday s. n. (E).—**Switzerland:** Schwyz: Muotathal, Bödmerenwald forest reserve, *Piceetum subalpinum* (on limestone), with few, scattered beech and sycamore, c. 8°50'50"E, 46°58'58"N, 1518 m, over *Mycobilimbia tetramera*, with *Zwackhiomyces* aff. *berengerianus* on saxicolous mosses, 1992, U. Groner 1376 (hb. Groner).

Fuscidea oceanica Fryday & Coppins sp. nov.

Mycobank No: MB800466

Fuscidea gothoburgense similis sed soraliis minoribus, punctiformibus, 0.1–0.2 mm diam., sorediis caesiis, apotheciis frequentibus sessilibus differt.

Typus: Great Britain, Scotland, V. C. 88, Mid-Perthshire, Creag Mhòr, Coire-cheathaich, 27/40.34, 550 m, on quartzite intrusion on side of large schistose boulder, 1993, Fryday 2358 (E—holotypus).

(Fig. 4)

Thallus usually wide-spreading, cracked-areolate, pale grey to (rarely) brown, areoles flat, 0.15–0.40 mm diam. *Soralia* mostly punctiform arising from the centre of each areole, 0.1–0.2 mm diam., less often following cracks in the thallus and becoming stellate; *soredia* blue-grey (K–, N–), 20–25 μ m diam. *Photobiont* chlorococcoid, cells thick-walled, 7–16(–19) \times 8–12(–13) μ m, often dividing to give 2–4 daughter cells (*Chlorella*-type).

Apothecia black, lecideine, initially innate with a white ring around the inner edge of the exciple but soon becoming sessile, 0.5–1.0 mm diam., proper exciple persistent,

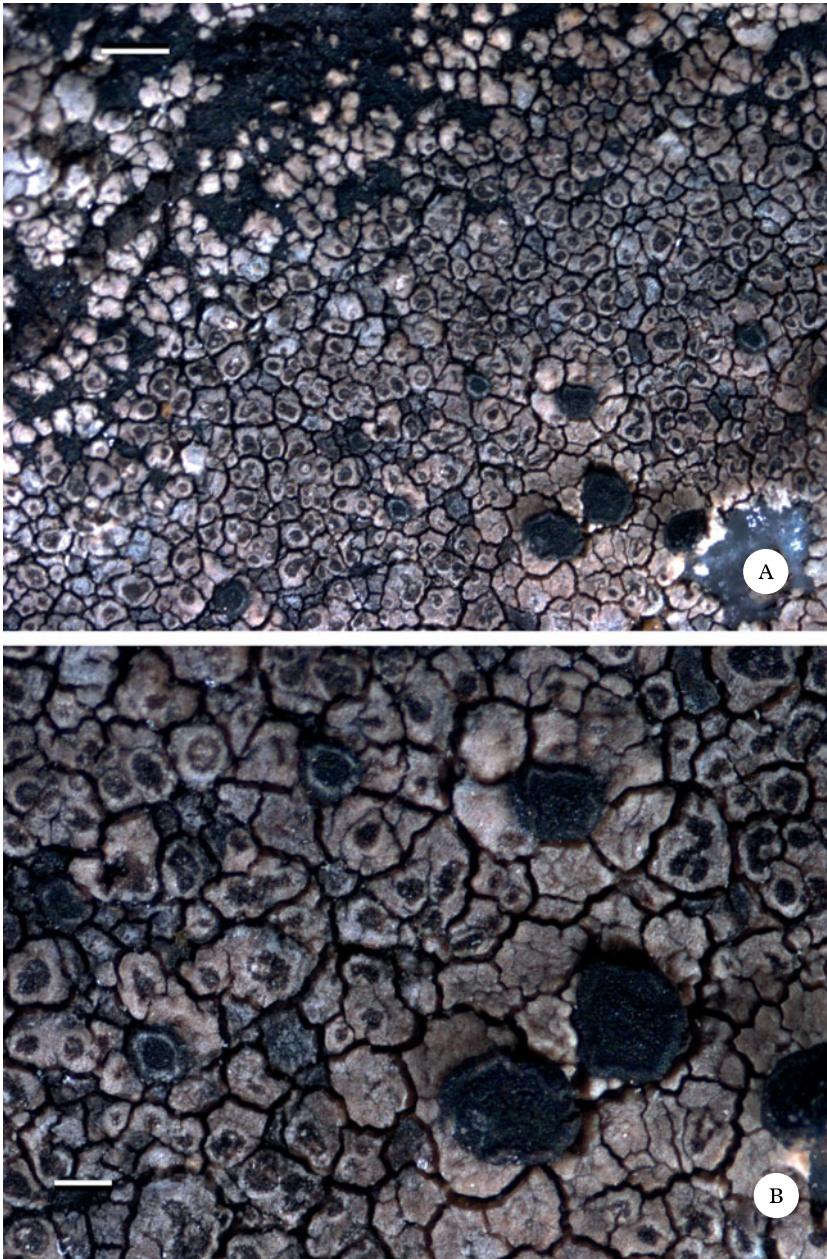


FIG. 4. *Fuscidea oceanica* (Fryday 2358—holotype). Scales: A = 0.5 mm; B = 0.2 mm. In colour online.

becoming flexuose; *disc* occasionally umbonate. *Excipulum* of branched, anastomosing hyphae, colourless with dark brown outer cells, reflexed below apothecium. *Hymenium*

70–90 μm tall, upper third with brown pigment; *paraphyses* simple, 2.5 μm wide, swelling to 5 μm at apex, with dark brown hood. *Hypothecium* hyaline. *Asci* c. 45 \times 20 μm ,

Teloschistes-type; *ascospores* hyaline, simple, broadly ellipsoid, $7\text{--}9 \times 5\text{--}6 \mu\text{m}$.

Conidiomata not seen.

Chemistry. Thallus C–, K–, Pd–, UV–; soredia and medulla C–, K–, Pd–, UV+ white; divaricatic acid detected by TLC.

Fuscidea oceanica is unusual amongst lichenized fungi in regularly producing both sexual and asexual propagules. It is the only sorediate member of the genus occurring in the British Isles that is also usually fertile. However, as the soredia of *F. oceanica* are very small and inconspicuous they are easily overlooked in the field and this species may then be mistaken for other, non-sorediate, members of the genus (e.g., *F. lygaea*). Other sorediate saxicolous species of *Fuscidea* containing divaricatic acid are *F. gothoburgensis* (H. Magn.) V. Wirth & Vězda and *F. recens* (Stirt.) Hertel *et al.*, both of which are very rarely fertile. *Fuscidea recens* is a very different species with a thicker thallus, more wide-spreading, often convex soredia, and curved ascospores, whereas *F. gothoburgensis* differs mainly in thallus morphology and ecology, having a much more dispersed thallus and usually occurring in shaded underhangs. The sorediate counterpart of *F. intercincta*, which has been recognized as *F. oculata* Oberhol. & V. Wirth, differs in having \pm innate apothecia with a white margin and erumpent, cream-coloured soralia.

Two further sorediate species were recognized by Clauzade & Roux (1985) but have not been formally described. *Fuscidea 'alpina'*, known from four collections from the Austrian and Italian Alps, is similar to *F. oceanica* but has brownish soralia. In three of the collections these tend to be scattered over the thallus as individual soredia, often appearing as minute coralloid isidia, whereas the other collection, which is from the same locality and date as one of the previous collections, has more discrete soralia and is very similar in appearance to *F. oceanica*. Unfortunately, all four collections lack apothecia and, given the geographic and environmental separation of the two populations, we have decided not to include these collections in our new species. *Fuscidea 'badensis'*, the other species

mentioned by Clauzade & Roux (1985), is referable to *F. recens* (Stirt.) Hertel *et al.*

Fuscidea oceanica is locally common on exposed, hard acidic rocks in the NW Scottish Highlands and also occurs at scattered localities elsewhere in the Highlands. It is particularly common on Cambrian quartzite, and on the Beinn Eighe NNR in West Ross it covers large areas and is the most frequent species. Associated species are few but include *Allantoparmelia alpicola*, *F. gothoburgensis*, *F. intercincta*, *Ionaspis odora* and *Rhizocarpon geographicum* aggr.

Specimens examined. **Great Britain: Scotland: V. C. 92**, South Aberdeen: Braemar. Creag Choinnich, west side, on top of 'tor-like' outcrop by path, 37/1596.9173, 500 m, on granite, 2004, *Coppins* 21467 (E). **V. C. 97**, West Inverness: c. 7 km NE of Strontian, NE of Ariundle Wood, disused mine, 17/86.66, 240–260 m, top of large boulder, 1992, *Coppins* (15346) *et al.* (E). **V. C. 98**, Argyll Main: Ben Starav, 27/13.42, 850 m, shaded side of granite boulder, 1991, *Fryday* (2341) & *P. Goddard* (MSC); Glen Coe, Coire Gabhail (below 'Lost Valley') 27/16.55, 450 m, vertical acid rocks in damp *Betula* wood, 1992, *Fryday* 3281 (E); Aonach Eagach, S side of E ridge of Sgurr nam Fiannaidh, 27/14.58, 900 m, top of exposed granite rock, 1992, *Fryday* 3327 (MSC); Creag nan Gabhar, 27/13.57, 600 m, top of acid boulder, 1992, *Fryday* 3329 (MSC). **V.C. 105**, West Ross: Beinn Eighe NNR, ridge between Spidean Coire nan Clach and Coinneach Mhòr, 18/96.59, c. 950 m, Cambrian quartzite crags, 1991, *Fryday* 2734 (E); *ibid.*, *Fryday* 2725 (MSC).

***Lecania granulata* Coppins & Fryday sp. nov.**

Mycobank No: MB800467

Lecaniae subfusculae similis sed thallo blastidiato granulato, crassiore, apotheciis initio cum excipulo thallino crenulato vel granulato, disco semper pallido.

Typus: Great Britain, Scotland, V. C. 111, Orkney, Hoy, coast by Wastlee Moor, Kilns of Hawick, ND/251.886, on coastal turf ledges, 21 August 2008, *S. G. Price* [*Coppins* 22942] (E—holotypus).

(Figs 5 & 6)

Thallus whitish to pale buff, densely granular-blastidiolate, to 1.5 mm thick; granules 30–80(–100) μm diam. *Photobiont* chlorococcoid, cells 5–12 μm diam. or ellipsoid to $14 \times 12 \mu\text{m}$.

Apothecia (0.2–)0.3–0.7 mm diam., plane or becoming convex and up to 0.9 mm, each

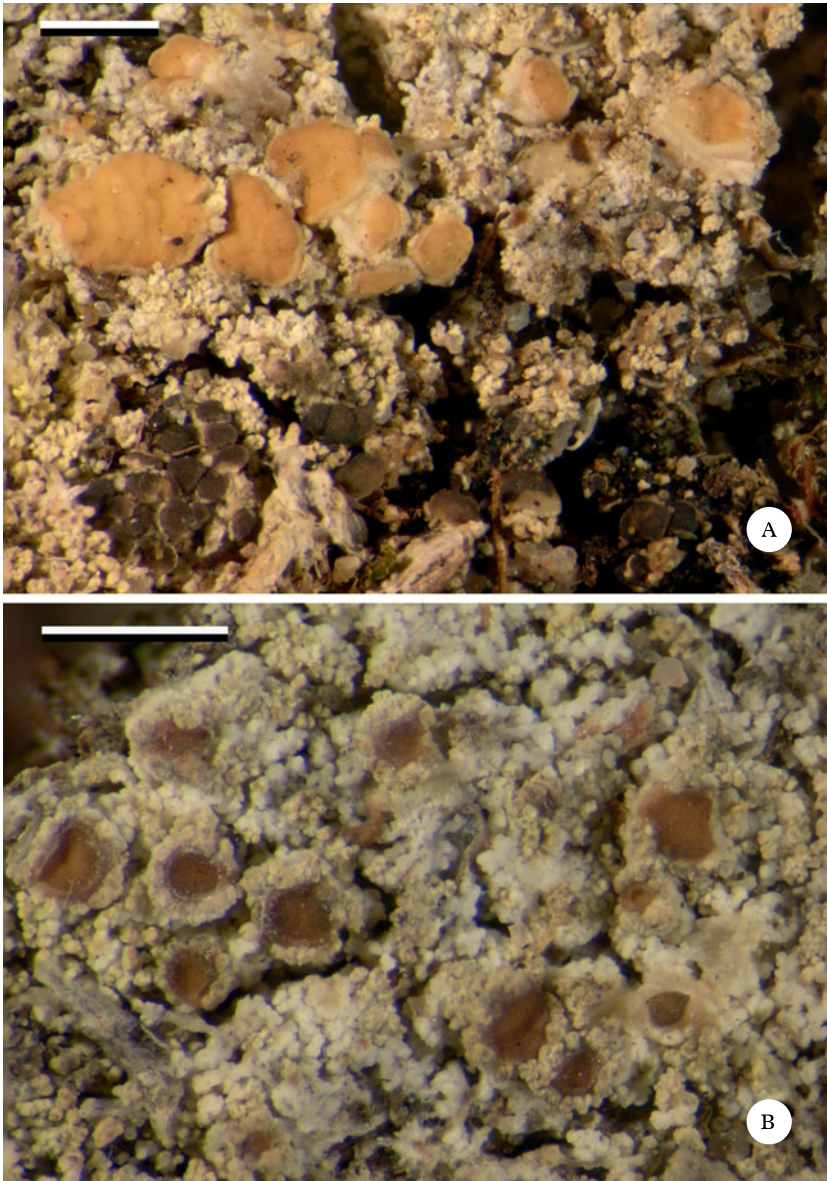


FIG. 5. *Lecania granulata* [S. G. Price (Coppins 22942—holotype)]. A, mature apothecia (with *Lecania subfuscata* bottom left); B, immature apothecia. Scales = 1.0 mm. In colour online.

developing within a thalline wart then becoming urceolate with a crenulate thalline margin and concave disc (Fig. 5), later expanding further with the thalline margin becoming granulate or receding to reveal a proper margin, and with the disc becoming

plane to convex. *Disc* pale, pinkish or pallid, often with patchy brown pigment towards the margin in older apothecia, with paler proper margin. *Thalline exciple* c. 40–60 μ m wide. *Proper exciple* lateral to hymenium 35–60 μ m wide, but not clearly delimited from

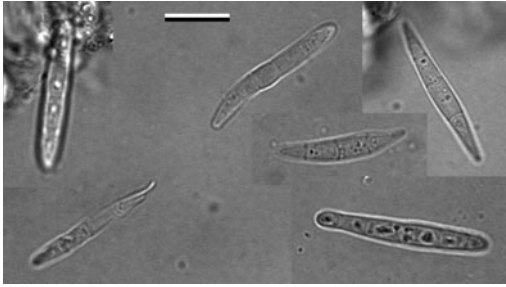


FIG. 6. *Lecania granulata*, ascospores [S. G. Price (Coppins 22942—holotype)]. Scale = 10 μ m.

hypothecium below, hyaline or dilute reddish brown, in outer half composed of \pm radiating hyphae with lumina to $5.0 \times 2.5 \mu\text{m}$, cortical cells *c.* 5–6 μm diam. *Hymenium* 50–65 μm tall, hyaline or tinged dilute reddish brown in part in older apothecia; *epihymenium* hyaline or with patchy dilute reddish brown pigment, especially towards the margin; *subhymenium* 20–35 μm tall, K+ dilute yellow, with cells of ascogenous hyphae to 5 μm wide; *paraphyses* simple, *c.* 1.5 μm wide in mid-hymenium, but upper 2–4 cells gradually widening to 4(–6) μm wide, \pm lax in K. *Hypothecium* massive, of irregularly orientated, slender hyphae *c.* 1.0–1.7 μm wide. *Asci* narrowly clavate, 53–60 \times 9–11 μm , *Bacidia*-type; *ascospores* narrowly clavate-fusiform to shortly acicular, 20–33 \times (2.0–)2.5–2.7(–3.0) μm , 3–5(–7)-septate.

Conidiomata not seen.

Chemistry. Thallus C–, KC–, K–, Pd–, UV–; no substances detected by TLC.

Because of its shortly acicular ascospores and *Bacidia*-type asci, this species was originally filed under *Bacidia*. However, the presence of a thalline margin indicates a more appropriate placement in the genus *Lecania*, as circumscribed by Ekman (1996: 41). Reese Naesborg *et al.* (2007) introduced a revised circumscription for *Lecania* s. str. that included a crustose thallus, with or without blastidia, that usually lacks lichen substances, and lecanorine to biatorine apothecia; branched, but not anastomosing excipular hyphae; an unevenly distributed epihymenial pigment that is usually yellowish or brown; gradually widening paraphyses that are lax in K; and 0–3(–5)-septate, and often

curved, ellipsoid, fusiform, or bacilliform ascospores. *Lecania granulata* is consistent with all these characters and so clearly belongs in *Lecania* s. str..

Lecania granulata has somewhat similar ascospores to *L. subfuscata* (Nyl.) S. Ekman, which can also inhabit nutrient-enriched, coastal turf. *Lecania granulata* differs in having a thickly granular (blastidiate) thallus and a crenate to granular thalline margin. *Lecania subfuscata* (Fig. 5A) has a generally thinner and warty granular thallus, with coherent ‘granules’ 40–200 μm diam., and usually darker pink to grey-brown or even blackish apothecia, with little hint of a thalline margin (Fletcher *et al.* 2009). *Lecania cuprea* van den Boom & Coppins is another species with narrow, multiseptate ascospores, but it has a thinner thallus, no thalline margin, smaller paraphysis-apices, and inhabits shaded limestone rocks.

This distinctive species was first discovered by Oliver Gilbert during expeditions to the remote Hebridean islands of North Rona and the Flannan Isles and reported as “*Bacidia* sp.” (Gilbert *et al.* 1973; Gilbert 1976; Gilbert & Wathern 1976). It grows on coastal, peaty turf near cliff tops or on cliff ledges. At the Orkney locality it was associated with *Anaptychia runcinata*, *Lecania subfuscata* and *Lecanora zosterae*. In the cliff-top maritime grassland on Foula, its associated species included *Anisomeridium polypori*, *Catapyrenium cinereum*, *Lecania subfuscata*, *Lecidea berengeriana*, *Leptogium imbricatum* and *Psoroma hypnorum*.

Additional specimens examined. **Great Britain:** *Scotland:* V. C. 110, Outer Hebrides: North Rona, on peat near the top of the north slope, HW/83, 1972, O. L. Gilbert (E); *ibid.*, above Leac na Sgrob, HW/83, bare peat, rare, vi 1976, O. L. Gilbert (E); Flannan Isles, Eilean Mòr, NA/7246, collected once on peat near cliff top, vi 1975, O. L. Gilbert (E). V. C. 112, Shetland: Foula, Stremness, HT/9693 4116, in cliff-top maritime grassland, 27 vii 2011, A. Acton (hb. Acton).

Lecanora viridiatra (Stenh.) Nyl.

Mycobank No: MB389573

Flora 55: 251 (1872).

Biatora viridiatra Stenh. in E. Fries, *Lichenogr. Europ. Reform.*: 277 (1831).—*Lecidea viridiatra* (Stenh.) Schaer. non (Wulfen) Ach. (1803), in *Enumer. Critic. Lich. Europ.*: 108 (1850).

Lecidea luteoatra Nyl., *Flora* 61: 299 (1873).

This species is locally frequent on the Cambrian quartzite of the NW Highlands and in the British Isles is also known from several localities in the Cairngorm Mountains, as well as Ben Lawers in the Central Highlands. The *Lecanora*-type asci and filiform conidia strongly suggest that this species belongs in *Lecanora*, and the lecideine apothecia, blue epihymenium, and thalline chemistry (usnic acid) refer it to the *L. marginata* group.

Stenhammar's name is the earliest available for this species but was not available in *Lecidea* because of *Lecidea viridiatra* (Wulfen) Ach. (1803), which is *Rhizocarpon viridiatrum* (Wulfen) Körb. However, it becomes available in *Lecanora* and so is taken up here.

Selected specimens examined. **Austria:** Salzburg: Radstädter Tauern, Hänge östlich oberhalb der Hundsfeldalpe, NE oberhalb Obertauern, am Radstädter Tauern paß, 47° 15' N, 13° 35' E, 1900–2000 m, S-W exponierte, steile, mitunter kurzzeitig wasserüberrieselte Gneiswand, 6 ix 1981, *J. Poelt* (E); Hertel: *Lecid. Exsic.* nr. 72).—**Great Britain:** Scotland: **V. C. 89**, East Perthshire: The Cairnwell, 37/1.7, c. 900 m, on mountain top on quartzite boulders, 23 viii 1990, *C. J. B. Hitch* (E). **V. C. 94**, Banff: Ben Avon, Lochan nan Gabhar, 38/14.03, 2500 ft, rock above corrie, 1975, *Coppins* (4618) & *P. Harrold* (E).

Lecidea herteliana Fryday & Coppins sp. nov.

MycoBank No: MB800468

Lecideae pauperculae similis sed thallo minore pallidore et substantiis lichenicis absentibus.

Typus: Great Britain, Scotland, V. C. 97, West Inverness, c. 7 km NE of Strontian, NE of Ariundle Wood, disused mine, 17/86.66, 240–260 m, on stones, 1992, *Coppins* (15340) *et al.* (E—holotypus).

(Fig. 7A)

Thallus effuse, rarely more than 1–2 mm across; areolate, areoles flat to slightly convex, irregular, 0.2–0.4 mm across, grey to pale brown often with a paler margin, contiguous or somewhat dispersed on a black hypothallus; *cortex* 10–20 µm thick with pale brown (rarely red-brown or ± hyaline) pigmented upper layer 7–10 µm thick; *epinecral layer* thick, 45–95 µm, 20–25 µm at edge of areoles; *medulla and upper cortex* I+ blue. *Photobiont* chlorococcoid 9–15 µm.

Apothecia black, lecideine, 0.4–0.6 mm diam., sessile, slightly convex with a thin (0.05 mm), barely raised margin. *Excipulum* dark blue-black with swollen (to 5 µm) cortical cells. *Hymenium* 90–105 µm tall; *epihymenium* c. 10 µm tall, sharply delimited, blue-black (H+ blue, N+ red; cinereorufa-green); *paraphyses* sparingly branched and anastomosing, c. 1.5–2.0 µm thick swelling at apex to 5 µm with a dark blue-black cap. *Hypothecium* dark brown. *Asci* cylindrical to slightly clavate, 45–50 × 12–15 µm, *Lecidea*-type; *ascospores* simple, hyaline, 12–14 × 5–6 µm.

Conidiomata not observed.

Chemistry. All spot tests negative; no substances by TLC.

Etymology. The specific epithet honours our friend and colleague Professor Dr Hannes Hertel (München) for his outstanding contributions to the understanding of the genus *Lecidea* over the past 45 years.

Lecidea herteliana is known from several sites in the Scottish Highlands (Isle of Mull, Rannoch, Strontian, East Perthshire, Angus) and is also present in north-eastern North America (Maine). It has a small (usually < 2 cm diam.), pale grey-brown, *atrobrunnea*-type thallus with an I+ blue medulla but all other spot tests are negative. It most closely resembles *L. paupercula* Th. Fr. (Fig. 7B) but that species has a more wide-spreading, red-brown to dark grey-brown thallus that contains stictic acid (K+ yellow, Pd+ orange). *Lecidea paupercula* also differs in having flat to slightly concave areoles with a dark margin, red-brown pigmented cortical cells and a much thinner epinecral layer (20–35 µm), as well as flat ± innate apothecia. Associated species include *Porpidia flavocruenta* and *Perusaria corallina*.

The two collections from NE North America agree well with British material, but have a somewhat thinner epinecral layer (25–50 µm).

Additional specimens examined. **Great Britain:** Wales: **V. C. 49**, Caernarvon: Carnedd Llewellyn, Clogwynryer, 23/71.66, c. 450 m, boulder by track, ix 1997, *Fryday* s. n. (MSC). Scotland: **V. C. 90**, Angus: Caenlochan Glen, Glasallt Burn, 37/183.767(–772), 600–700 m, 1989, *Coppins* (13334) *O. L. Gilbert* & *R. K. Brinklow* (E). **V. C. 98**, Argyll Main: Bridge of Orchy, Forest

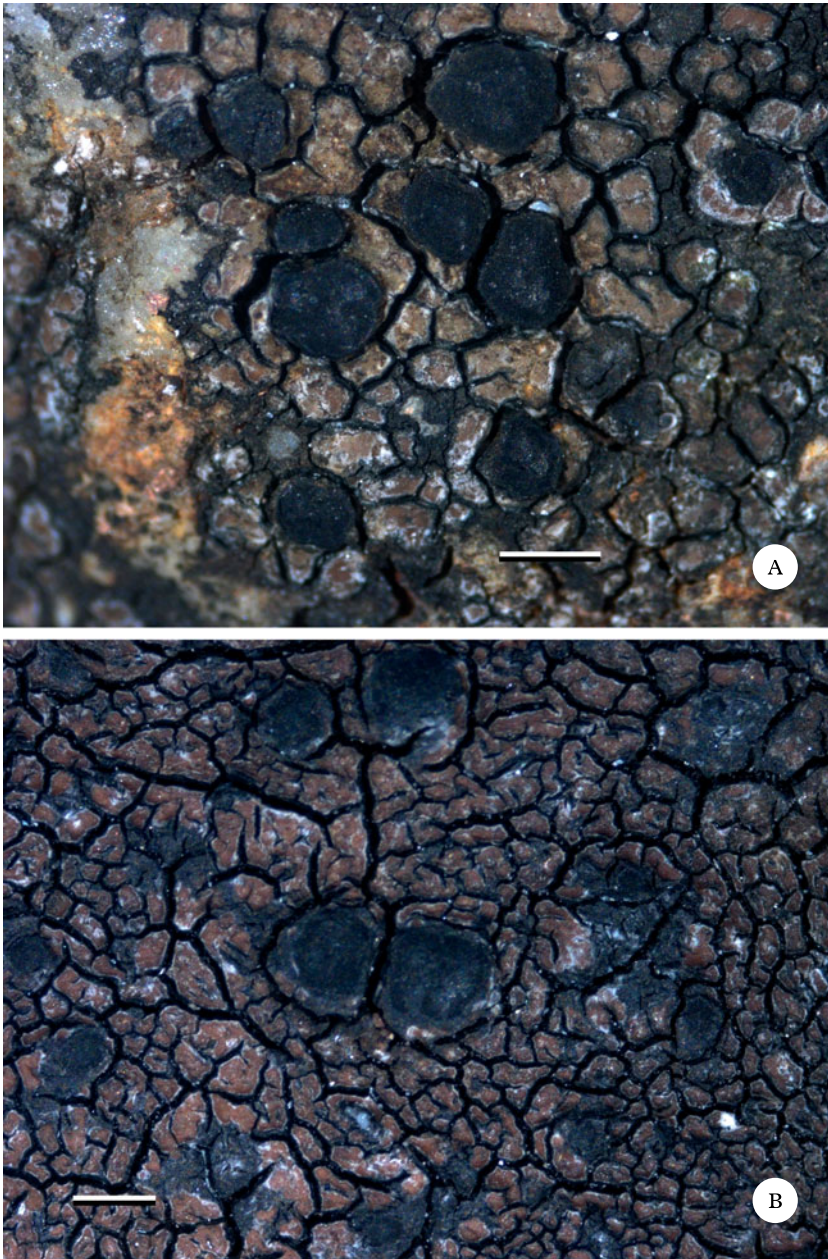


FIG. 7. *Lecidea herteliana* (Coppins 15340 *et al.*—holotypus). B, *Lecidea paupercula* (Coppins 10451). Scales: A & B = 0.5 mm. In colour online.

Lodge, Coire Toaig, 27/44.25, 400 m, top of schistose boulder, 1992, *Fryday* 3040 (M). V. C. 103, Mid Ebudes: Isle of Mull, Ardmeanach, Bearraich, 17/41.27, 250 m, basalt outcrops and boulders, 1993, *Fryday* 4440 (E).—USA: Maine: Piscataquis Co., Baxter State Park, Katahdin, North Basin, between ponds and ‘calcareous

seep’, 45°55.75’N, 68°55.10’W, 1020 m, on upper surface of granitic boulder, 2003, *Fryday* 8580 (MSC); *ibid.*, South Basin, bottom of Chimney Gully, 45°54.4’N, 68°54.7’W, 1120 m, on granitic pebbles, 2004, *Fryday* 8830 (MSC).

Roccellographa sorediata (Sparrius, P. James & M. A. Allen) Coppins & Fryday comb. nov.

MycoBank No: MB800470

Sclerophyomyces circumscriptus var. *sorediatus* Sparrius *et al.*, *Lichenologist* 37: 285 (2005) [Basionym].—*Peterjamesia sorediata* (Sparrius *et al.*) D. Hawksw., *Lichenologist* 38: 189 (2006).

In their landmark paper on the phylogeny of the *Arthoniales*, Ertz & Tehler (2011) found that the genus *Peterjamesia* D. Hawksw. should be included under the earlier generic name *Roccellographa* J. Steiner. They transferred the type species of the former genus, *P. circumscripta* [syn. *Sclerophyton circumscriptum* (Leight.) Zahlbr.] into *Roccellographa* but did not do so for the related, sterile taxon, *P. sorediata*. This is rectified here.

Ropalospora lugubris f. sorediata Fryday & Coppins forma nov.

MycoBank No: MB800469

Ropalosporae lugubri f. *lugubri* similis sed sorediis praesentibus.

Typus: Great Britain, Scotland, V. C. 98, Argyll Main, Glen Coe, Coire nam Beitheach 27/142.545, 875 m alt., on east-facing rhyolite crag in dry underhang, 15 July 1992, *A. M. Fryday* 3347 (E—holotypus).

Lecidea atroumbrina H. Magn., *Bot. Notiser* 1930: 468 (1930).—*Ropalospora atroumbrina* (H. Magn.) S. Ekman, *Bryologist* 96: 590 (1993); type: Sweden, Bohuslän, Forshälla, Stora Hasselön, on a gently sloping rock facing the north, 26 July 1930, *A. H. Magnusson* (UPS!—lectotype; Magnusson, *Lich. sel. Scand. exs. Exsic.*-Nr 88).

(Fig. 8)

Thallus crustose, dark grey (often purple tinged) or pale to dark brown, cracked areolate, areoles plane to verrucose. *Soralia* c. 0.1–0.5 mm diam., initially discrete but becoming confluent, soredia initially concolorous with, or darker than the thallus, coralloid-granular, becoming pale yellow-brown, farinose. *Photobiont* chlorococcoid, cells thick-walled, 7–16(–19) × 8–12(–13) µm, often dividing to give 2–4 daughter cells (*Chlorella*-type).

Apothecia very rare, mature apothecia known only from the type collection. Identical to *R. lugubris* f. *lugubris*.

Conidiomata pycnidia, frequent, dark brown to black, 0.2–0.3 mm diam., immersed in the thallus; *conidia* bacilliform, 6–8 × 0.8 µm.

Chemistry. C–, K–, KC–, Pd–; TLC revealed an unidentified substance (?terpenoid) at Rf 4 in A, 5 in C, and 4 in G that is colourless, UV+ white, brownish pink, UV+ cream-pink after developing, accompanied by two accessories; one with the same characteristics at about Rf 3 in A, 3–4 in C and G, and the other UV+ blue-white after developing at Rf 4–5 in C. Traces of atranorin or another unidentified substance at Rf 3–4 in solvent C that is yellow, UV+ dark after developing were also rarely present.

Species that usually reproduce by apothecia also occasionally produce soredia, but these are usually rare, occur only within normal fertile populations, and the sorediate specimens are always fertile. Some of these are recognized taxonomically [e.g., *Fuscidea cyathoides* var. *sorediata* (H. Magn.) Poelt.] whereas others are not [e.g., the sorediate form of *Ochrolechia parella* (L.) A. Massal.]. *Ropalospora lugubris* f. *sorediata*, however, is very rarely fertile and is also more frequent and widespread than the non-sorediate form. Because of this we consider it appropriate to afford it some taxonomic recognition, and that of forma seems most suitable.

Ekman (1993) separated *R. atroumbrina*, which is not known fertile, from sorediate *R. lugubris* by the different ontogeny of the soralia and also by the presence of atranorin in *R. atroumbrina*. However, the much larger number of collections of *R. lugubris* f. *sorediata* available to us indicates that, although there appear to be two different types of soredia, those of ‘*atroumbrina*’ usually being composed of dark, granular isidia whereas those of *R. lugubris* f. *sorediata* are often cream-coloured and farinose, the two forms intergrade. Initially the soredia of both ‘taxa’ are granular-coralloid and concolorous with, or darker than, the thallus and often coalesce to cover areas up to 5 mm in diameter. However, these later ‘burst’ (or abrade) giving rise to smaller cream-coloured farinose soredia. In older soralia there is sometimes very little evidence of the original form, but careful examination usually reveals some darker, granular soredia around the edges of at least some soralia. This ‘bursting’ of the granular soredia is most evident in *R. lugubris* f.

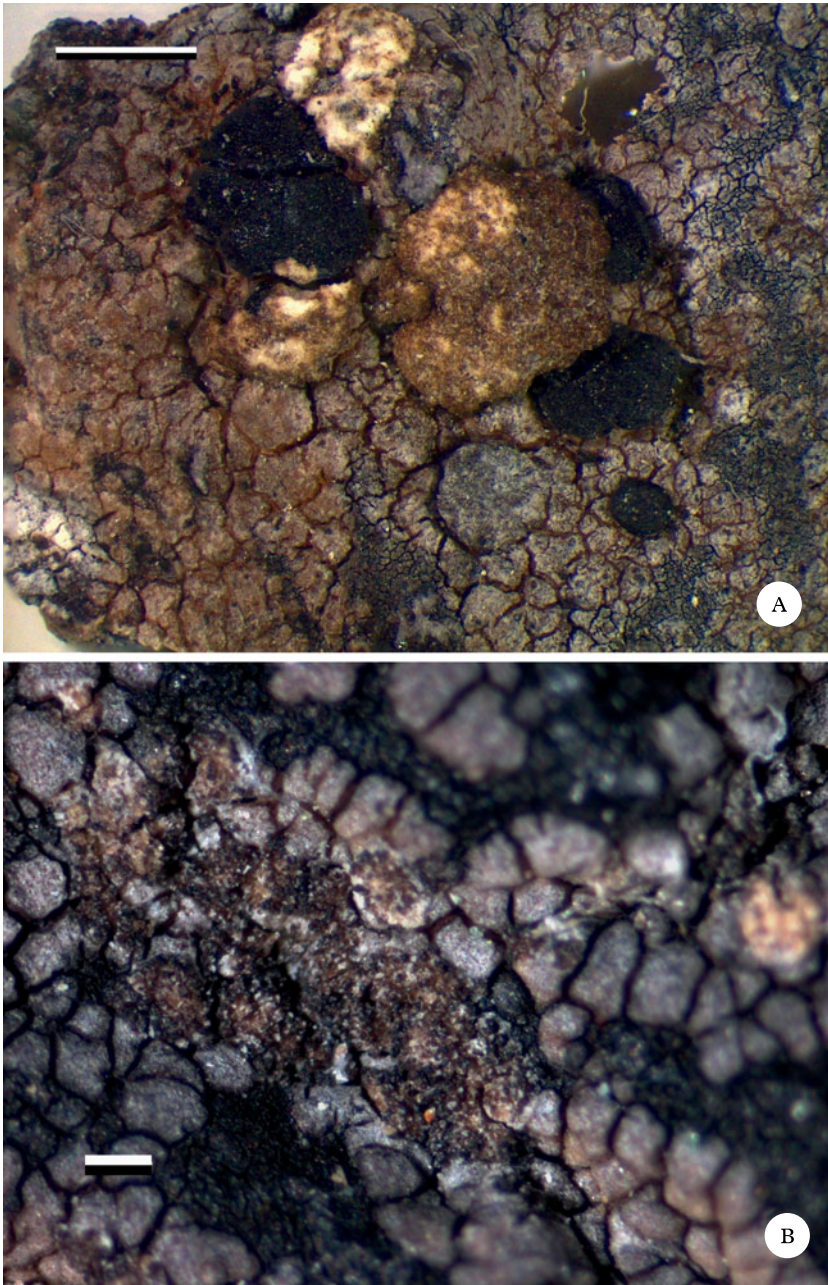


FIG. 8. *Ropalospora lugubris* f. *sorediata*. A, farinose soralia (with apothecia; *Fryday* 3347—holotype); B, granular soralia (*Fryday* 2237). Scales: A = 0.5 mm; B = 0.1 mm. In colour online.

sorediata but can also be observed in some collections of ‘*atroumbrina*’, including the type specimen. The chemical difference reported by Ekman (1993) is also not consis-

tent. We performed TLC on four collections each of *R. atroumbrina*, *R. lugubris* f. *lugubris* and *R. lugubris* f. *sorediata* and found no significant differences. One collection of

R. lugubris f. *sorediata* contained atranorin, whereas all the other collections of the three taxa lacked this substance. Atranorin has also been reported from *R. lugubris* f. *lugubris* (A. Orange, pers. comm.), indicating that this substance is occasionally present in all three 'taxa'. The main chemical constituent (see above) was present in all samples analyzed and the only other difference was that the accessory at Rf 4-5 was sometimes feint or apparently absent in some collections of all three taxa, and the accessory at Rf 3-5 was yellow-orange in *R. atroumbrina* and mauve in both forms of *R. lugubris*, although one collection of f. *sorediata* had both yellow and mauve spots.

Consequently, as we can find no significant morphological or chemical differences between the two taxa, *R. atroumbrina* is included here in the synonym of *R. lugubris* f. *sorediata*. We have decided to introduce the new epithet '*sorediata*' rather than take up '*atroumbrina*' because that epithet describes the colour of both forms.

This taxon was first reported from Scotland (as *Fuscidea* sp. A) by Gilbert *et al.* (1988: 238) and has subsequently been found to be widespread on acidic rocks throughout the western Highlands. Similarities of thallus morphology and chemistry, and ecology, suggested that it may be the sorediate counterpart of *R. lugubris*, and the discovery of a population with mature apothecia confirmed this opinion. It is generally more frequent than *R. lugubris* f. *lugubris* and has also been reported from North Wales, Scandinavia [as *Ropalospora atroumbrina* (H. Magn.) S. Ekman], and NE North America. A report of *R. lugubris* from the English Lake District supported neither apothecia nor soralia (A. Orange, pers. comm.) and so it is not possible to ascertain to which forma it should be referred.

Species associated with Scottish collections include *Coccotrema citrinescens*, *Fuscidea gothoburgensis*, *F. intercincta*, *Lepraria lobificans*, *Pertusaria corallina*, *Porpidia* spp., and *Rhizocarpon geographicum* aggr.

Additional specimens examined. **Sweden:** Halland: Onsala par., Gottskär, on oxidated rock, 1921, *A. H. Magnusson* 5271 (UPS). Bohuslän: Långelanda par.,

Gömme, on steep rock, N side, 1926, *A. H. Magnusson* 10046 (UPS). *Gotland:* Hörsne, NÖ hörnet vid gränsen till Vallstena, exponerat urbergsblock nära landsvägen, riklig, 13 vi 1943, *G. Degelius* (UPS). *Södermanland:* Nämndö, Nämndö Böke, öppen leptitklippa på nordsidan, 1 ix 1943, *G. Degelius* (UPS). *Uppland:* Danmark, Karlsro, Nordsiden av klippvägen, samhällsbildande, 14 x 1945, *G. Degelius* (UPS). *Gästrikland:* Hille, 350 m SSE of the parish church, 10 m 60°43'52.1"N 17°11'10.2"E (RT90), on N side of roadside boulder, 2007, *A. Nordin* 6456 (UPS).—**Great Britain:** *Wales:* **V. C. 49,** Caernarvon: Carnedd Llewellyn, Foel Grach, 23/68.65, c. 950 m, shaded vertical side of boulder, ix 1997, *Fryday* s. n. (MSC); Glyder Fawr, near Llyn y Cwn, 23/639.586, 700 m, on shaded rock, 1998, *A. Orange* 12068 (NMW). *Scotland:* **V. C. 88,** Mid-Perthshire: Glen Lyon, Cairn Gorm, 27/63.48, c. 2700 ft., ± underhang, dry, mica-schist, 1977, *Coppins* 3055 (E); Blair Atholl, Tulach Hill, 27/8.6, N-facing side of old wall, 1988, *Coppins* (12905) & *O. W. Purvis* (E); Ben Ghlas, on coll, 27,620.408, 20 vii 1986, *B. W. Fox*, s. n. (E); *ibid.*, crags at head of Coire Odhair, 27/62.40, 900 m, on west-facing mica-schist crags, 3 vii 1989, *Fryday* s. n. (E); Beinn Heasgarnich, Creag na h-Acharich, 27/42.38, 750 m, exposed acidic crag, 1991, *Fryday* 2237 (E), 2238-9 (MSC) [with immature apothecia]; *ibid.*, north ridge, 27/42.38 950 m, mica-schist boulder, 1991, *Fryday* 2834 (MSC); *ibid.*, 27/4204.3884, 950 m, on vertical siliceous rocks, 2006, *A. Orange* 16514 (NMW); *ibid.*, S of Meall a' Chall, 27/4357.4004, 710 m, 2006, *A. Orange* s. n. (NMW); Creag Mhòr, N-E Crags, 27/39.36, 800 m, mica-schist underhang, 1991, *Fryday* 2332 (MSC); Ben Vorlich, 27/62.19, c. 600 m, on underside of schistose boulder, 1992, *Fryday* 3052 (MSC). **V. C. 90,** Angus: Caenlochan Glen, N-facing cliffs below Little Glas Maol, 37/17.76, c. 800 m, sheltered, vertical, siliceous cliff face, in gully, 1989, *Coppins* (13405) & *O. L. Gilbert* (E); Coire na Berrach, 37/442.772, slightly underhanging rock-face, 2000, *R. C. Munro* s. n. (E). **V. C. 97,** West Inverness: Fort William, Glen Nevis, Meall Cumhann, 27/17.69, 500 m, exposed vertical acid rock, 1990, *Fryday* 1240 (E); Sunart, Strontian River, 17/86.66, 250 m, acid rock in ravine below disused metal mine, 1992, *Fryday* 3174 (E); *ibid.*, Beinn Resipol, 17/75.65, 450 m, vertical, shaded acidic rock, 1992, *Fryday* 3193 (E). **V. C. 98,** Argyll Main: Glen Coe, Achnambeithach, 27/13.56, 200 m, underside of ?ryholite boulder, 1992, *Fryday* 3348 (E). **V. C. 104,** North Ebudes: Isle of Skye, Bla Bheinn, An Carnach, 18/55.20, 200 m, east-facing basalt crag, 1991, *Fryday* 2390 (MSC), 2391 (E); *ibid.*, Quiraing (Cuithearaing), 18/45.69, 250 m, exposed basalt crags, 1991, *Fryday* 2452 (E). **V. C. 105,** West Ross: Kinlochewe, Beinn Eighe NNR, Coille na Glas-leitir, valley of Allt Doire Daraich, 28/00.62, c. 250 m, upper end of rock outcrop by stream, 2000, *Coppins* (19766) & *A. M. Coppins* (E); Lochcarron, c. 1 km W of village, NE-facing crags of hill "212", 18/885.399, c. 200 m, on vertical rocks, 2001, *Coppins* (20997) & *A. M. Coppins* (E). **V. C. 108,** West Sutherland: Creagan Meall Hourn, NE-facing crags above An Dubh Loch, 29/34.45, c. 475 m, shaded underhang, 1991, *Fryday*

2952 (E). V. C. 110, Outer Hebrides: West Lewis, Glen Raonasgill, Teinnasval, 19/03.26, shaded acidic (?granite) boulder, 1991, Fryday 2507 (E); North Harris, Glen Ulladale, Creagan Leathan, 19/07.12, exposed east-facing crag, 1991, Fryday 2612 (E).—USA: Maine: Piscataquis Co., Baxter State Park, Katahdin, north basin, east of the 'calcareous seep', 45°55.8'N, 68°55.5'W, 1120 m, on exposed vertical, granitic rock-face, 2004, Fryday 8866, 8868 (MSC).

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