

NOTES ON BRITISH LICHENICOLOUS FUNGI: III*

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ABSTRACT. Two species are described as new: *Clypeococcum hypocenomyceae* D. Hawksw. (on *Hypocenomyce scalaris*) and *Ramularia peltigericola* D. Hawksw. (on *Peltigera polydactyla*). The new genus *Thamnogalla* D. Hawksw. is introduced for *Endocarpon crombiei* Mudd and three new combinations are made: *Spilomela ascaridiella* (Nyl.) D. Hawksw., *Thamnogalla crombiei* (Mudd) D. Hawksw., and *Trichothyria cetrariicola* (Nyl.) D. Hawksw. *Nectriella tincta* (Fuckel) R. Sant and *Pyrenopeziza thallophila* (P. Karsten) Sacc. are reported from the British Isles for the first time and the presence of *Rhagadostoma lichenicola* (de Not.) Keissler confirmed. *Arthonia punctella* Nyl. is considered to be distinct from *A. clemens* (Tul.) Th. Fr. and *Microthelia dissepta* (Nyl.) A. L. Sm. as probably a synonym of *Pleospora peripherica* (Taylor) D. Hawksw.

As the earlier numbers in this series (Hawksworth, 1975, 1978), this paper comprises notes on new or otherwise interesting lichenicolous fungi occurring in the British Isles. Increasing interest in this hitherto very much neglected ecological niche is reflected in recent publications including information on British lichenicolous fungi. These include revisions of *Karschia* Körber s.lat. (Hafellner, 1979), the lichenicolous Hyphomycetes (Hawksworth, 1979a), *Microcalicium* Vainio (Tibell, 1978), *Sphinctrina* Fr. (Löfgren & Tibell, 1979), taxa formerly referred to *Tichothecium* Flotow (Hawksworth, 1979b), lichenicolous *Verrucaria* species (Zehetleitner, 1978), and the introduction of two new genera for some widespread lichenicolous Coelomycetes (Hawksworth & Dyko, 1979). Notes on some species occurring on *Peltigera*, with a key to 42 fungi, have also been prepared (Hawksworth, 1980). Other British records are included in the papers of Coppins & James (1979), Hawksworth (1979c), Hawksworth & Pirozynski (1977), and Hawksworth & Minter (1980).

Lichenicolous fungi recorded from the British Isles are listed in the checklist of Hawksworth, James & Coppins (1980); 183 lichenicolous species are included by these authors.

Arthonia punctella Nyl. apud Carroll in Nat. Hist. Rev. 6:533 (1859). Fig. 1. Syn.: *Conida punctella* (Nyl.) Arnold in Flora 57:105 (1874).

Ascomata arthonioid, forming in bleached patches on the host thallus, \pm circular, scattered, black, lacking a distinct margin, 70-150(-200) μ m diam; epithecium dark brown, composed of the irregularly branched and anastomosing tips of the paraphyses, 5-10 μ m tall; thecium with an olivaceous tinge, 30-60 μ m tall, turning blue in iodine; hypothecium brown, becoming intermixed with the host tissues, irregular in height, colour unchanged with potassium hydroxide. *Paraphyses* simple or, especially towards apex, branched, septate, somewhat constricted at the septa, subvulvate below but becoming pale to dark brown towards the apex, verruculose above, mainly 2-3.5 μ m thick but to 5 μ m thick at the apex.

* II in *Notes R.B.G. Edinb.* 36:181-197 (1978).

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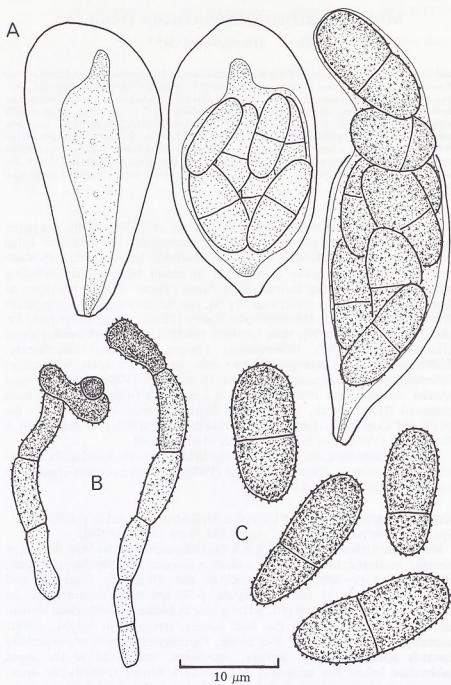


FIG. 1. *Arthonia punctella*. A, asci in different stages of maturation; B, paraphyses; C, ascospores. From the holotype (H-NYL 5806).

Asci subglobose to broadly clavate, thick-walled, markedly thickened at the apex with an internal apical beak visible during maturation, bitunicate, not reacting with iodine, $25-35 \times 14-18 \mu\text{m}$, 8-spored. *Ascospores* irregularly arranged in the asci at first, becoming overlapping distichous with age, broadly ellipsoid, apices rounded, 1-septate, slightly or scarcely constricted at the septum, the upper cell often largest, pale brown (prior to discharge from the asci), minutely verruculose, $12-17 \times 5.5-6.5(-7.5) \mu\text{m}$.

On thalli of *Diplotomma alboatrum* (Hoffm.) Flotow (syn. *Buellia alboatra* (Hoffm.) Branth & Rostrup, *Rhizocarpon alboatrum* (Hoffm.) Anzi) and *D. chlorophaeum* (Hepp ex Müll. Arg.) Anzi (syn. *B. chlorophaea* (Hepp ex Müll. Arg.) Lettau).

ENGLAND. W Kent, Plaxtol, Ducks Farm House, on *Diplotomma alboatrum* on wall, 23 ix 1969, *B. J. Coppins* (E).

IRELAND. Co. Cork, near Cork [Queenstown], on *Diplotomma chlorophaeum* on maritime rocks, ix 1858, *I. Carroll* (H-NYL 5806, holotype of *Arthonia punctella* Nyl.; E, isotype).

SCOTLAND. Caithness, Scrabster, on *Diplotomma alboatrum*, 25 v 1866, *W. L. Lindsay* (E).

Arthonia punctella was treated as a synonym of the common *A. clemens* (Tul.) Th. Fr. by Keissler (1930:73) but that species has consistently hyaline and smooth-walled spores mainly $11-14 \times 3.5-5 \mu\text{m}$; its asci are also more elongate and *Lecanora* species the principal hosts. *A. punctella* is consequently clearly distinct from *A. clemens* and must be reinstated.

The host of the type material of *A. punctella* has previously been misidentified as *Diplotoma alboatrum*, but the species can occur on that species as well as on *D. chlorophaeum*.

Clypeococcum hypocenomycetace D. Hawksw., sp. nov. Fig. 2.

Fungus lichenicola. *Mycelium* immersum, ex hyphis brunneis usque $2-3.5 \mu\text{m}$ latis. *Ascomata* pseudothecia, immersa, globosa, ostiolata, nigra, $50-100 \mu\text{m}$ diam., in clypeo aggregata; muris $8-15 \mu\text{m}$ latis, textura intricata, ex hyphis $2-3.5 \mu\text{m}$ latis. *Paraphyses* (pseudoparaphyses) distinctae, filiformes, ramosae et anastomosantes, $1-2 \mu\text{m}$ latae. *Asci* elongato-clavati, bitunicati, $45-55 \times 12-15 \mu\text{m}$, 8-sporei. *Ascosporeae* ellipsoideae vel soleiformes, 1-septatae, olivaceo-brunneae, plerumque guttulateae, levitissimo-verruculosae, $(9-10-12(-13) \times (4-5-6(-6.5) \mu\text{m}$.

HOLOTYPE: Scotia, Argyll, Crannach Pinewood, in thallo *Hypocenomycetace scalaris* in ligno *Pini* ustulato, 29 vi 1976, *B. J. Coppins* 2929 (E).

Fungus lichenicolous. *Mycelium* immersed, spreading through the upper part of the algal layer and the lower part of the cortex, hyphae flexuose, frequently branching, brown, thin-walled, mainly $2-3.5 \mu\text{m}$ wide, regularly encapsulating algal cells. *Ascomata* pseudothecia, perithecioid, immersed, globose, ostiolate but without an ostiolar beak, lacking any clearly differentiated periphyses, $50-100 \mu\text{m}$ diam., arising singly but soon becoming aggregated into a common clypeus which remains largely immersed, the clypeus comprising hyphae of the host and invading fungus, finally dark brown to black, mainly $20-30 \mu\text{m}$ thick; pseudothecial wall $8-15 \mu\text{m}$ thick, thickest near the ostiole where it is scarcely delimited from

the tissues of the clypeus, *textura intricata*, formed of intertwined thick-walled olivaceous brown hyphae mainly 2-3.5 μm thick. *Paraphyses* (pseudoparaphyses) distinct, persistent, filiform, branched and anastomosing, septate, 1-2 μm thick. *Asci* elongate-clavate, short-stalked, bitunicate, with a distinct internal apical beak when young, 45-55 \times 12-15 μm , 8-spored. *Ascospores* irregularly distichous, ellipsoid to soleiform, rounded at the apices, 1-septate, slightly constricted at the septum, the lower cell often somewhat narrower, olivaceous brown, often guttulate, weakly verruculose, (9-)-10-12(-13) \times (4-)-5-6(-6.5) μm .

The following additional specimens have also been seen (all on *Hypocenyce scalaris* (Ach.) Choisy, syn. *Lecidea scalaris* (Ach.) Ach.): AUSTRIA. Vorarlberg, Mittelbergenland, Kienberg north of Bernstein, c. 1 km north of Strassenabzweigun to Redlschlag, on *Pinus*, 10 vi 1977, J. Hafellner 2150 (GZU).

ENGLAND. East Norfolk, Saxlingham, Hull Wood, on *Quercus*, 16 v 1973, B. J. Coppins & P. W. Lambley (IMI 232957). Cumberland, 13 km N of Penrith, Baron Wood, on *Betula*, 28 vii 1979, B. J. Coppins 4343 (E, IMI 241053). West Somerset, Nettlecombe Court, on decorticate *Quercus*, 7 x 1979, D. L. Hawksworth 4995 (IMI 24331).

This previously unrecognised species is a destructive pathogen of *Hypocenyce scalaris*. Infected squamules first develop small brownish patches but these extend and the thallus is decolourized (bleached) and eventually killed.

The type species of *Clypeococcum* D. Hawksw., *C. cladonema* (Wedd.) D. Hawksw., has a much better developed clypeus than that seen in *C. hypocenyceae*. However in *Polycoccum* [Sauter ex] Körber no clypeus-like structure is developed at all and the wall of the ascumata consists of angular compressed pseudoparenchymatous cells (*textura angularis*) and not interwoven hyphae (*textura intricata*). *C. cladonema*, the only other species of its genus, differs from *C. hypocenyceae* in the larger ascospores (13.5-18 \times 5.5-7.5 μm), more developed clypeus, and different hosts (see Hawksworth, 1977).

Microthelia dissepta (Nyl.) A. L. Sm., Monogr. Br. Lich. 2:344 (1911).

Syn.: *Verrucaria dissepta* Nyl. in Flora 59:576 (1876).

IRELAND. Co. Galway, Connemara, on indet. crustose lichen, 1875, C. Larbalestier (H-NYL 394, holotype of *Verrucaria dissipata* Nyl.).

This fungus, growing on a sterile greyish-white crustose lichen on rock, has erumpent perithecia 150-250 μm diam., persistent branched and anastomosing paraphyses, 8-spored bitunicate asci to 120 \times 18 μm , and 3-septate to muriform dark brown spores which have minutely verruculose walls and measure mainly 20-22 \times 9.5-11.5 μm . It is extremely close to *Pleospora peripherica* (Taylor) D. Hawksw., a species which occurs on *Pertusaria pseudocorallina* (Liljebl.) Arnold, but in that species the ascospores tend to be slightly narrower, measuring 18-23 \times 7-9 μm (Hawksworth, 1979c). As little is known about the variability of *P. peripherica*, it seems most appropriate as an interim measure to regard *M. dissipata* as a probable synonym of it.

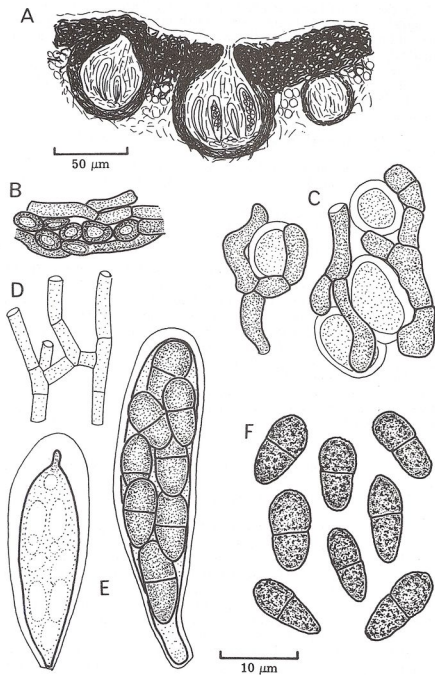


FIG. 2. *Clypeosaccus hypocenomyceae*. A, vertical section of ascomata; B, vertical section of pseudothecial wall; C, hyphae encapsulating algal cells within the host lichen; D, paraphyses; E, asci; F, ascospores. From the holotype (E).

Watson (1948:323) placed *Verrucaria dissepta* as a synonym of *Phaeospora hetairizans* (Leighton) Arnold. I have examined the holotype of the latter (Sussex, on *Verrucaria hydrela* Ach., *W. Borrer*, K) and find it to have largely immersed perithecia 75–100 μm diam., persistent branched and anastomosing knobby paraphyses, 6–8-spored asci (? bitunicate), and particularly characteristic smooth-walled 3-septate ascospores which have their apices markedly thin-walled (paler than the major part of the end cells) and measure 24–26 \times 6.5–9 μm . The generic position of this species is currently uncertain but clearly has little to do with *Phaeospora* Hepp or *Pleospora peripherica*.

Nectriella tincta (Fuckel) R. Sant. apud Eriksson in Svensk Bot. Tidskr. 58:235 (1964).

Syn.: *Cryptodiscus tinctus* Fuckel, Fungi rhen, no. 1836 (1866).

Nectriella coccinea Fuckel in Jb. Nassau. Ver. Naturk. 23/24:177 (1870).

For further possible synonyms see Keissler (1930:284–285).

IRELAND. Co. Kerry, near Sybil Point, on *Anaptychia fusca* (Huds.) Vainio, viii 1978, *J. Poelt* (GZU 554–78 p.p.).

This species, which has not previously been recorded from the British Isles, differs from the other two lichenicolous species of its genus known from here (see Hawksworth, 1978) in the deep red colour of the perithecia (150–200 μm diam.), the size of the ascospores ((10–)11–14(–15) \times 4.5–6(–7) μm), and further in occurring on different hosts. *Nectriella tincta* may be confined to *Anaptychia* species but there are literature reports from some other genera (Keissler, 1930). In the Irish collection infected parts of the thallus are decolorized (bleached) and killed.

An *Illosporium* conidial state has been reported for *N. tincta* but this is dubious and in need of further study (Hawksworth, 1979a).

Illustrations of the ascospores of *N. tincta* are included in Eriksson (1964).

Pyrenopeziza thallophila (P. Karsten) Sacc., Syll. Fung. 8:370 (1889). Fig. 3.

Syn.: *Trochila thallophila* P. Karsten, *Fungi fenn. exs.*, cent. 9, no. 823 (1869).

Mollisia thallophila (P. Karsten) P. Karsten in Bidr. Känned. Finl. Natur. Folk 19:205 (1871).

Apothecia erumpent from the thallus of the host lichen, appearing \pm sessile when mature, lacking a distinct stalk, arising singly, scattered, dark reddish brown at first, becoming almost black with age, cupulate, the excipulum swollen and incurved, often almost entirely obscuring the disc, 200–400 μm diam. when mature; excipulum mainly 20–30 μm thick, composed of reddish brown pseudoparenchymatous cells (textura angularis), cells polyhedral, thick-walled, mainly 7–10 μm diam., those at the apex, and to a lesser extent those on the outer surface, become extended into hyaline, flexuose setae, setae 15–30 \times 2–3.5 μm , swollen in the lower third but tapering to 1.5 μm wide at the tip; no differentiated epithecium present, the excipulum covering the hymenium until mature; thecium hyaline, not reacting with iodine, 40–50 μm tall; hypothecium hyaline,

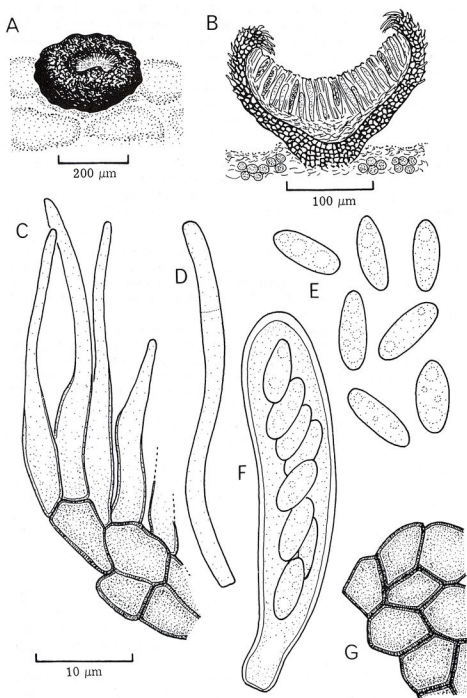


FIG. 3. *Pyrenopeziza thallophila*. A, apothecium on the thallus of *Lecanora chlorotera*; B, vertical section of apothecium; C, setae on the upper margin of the excipulum; D, paraphysis; E, ascospores; F, ascus; G, vertical section of cells from the lower part of the excipulum. From an isotype (K).

mainly 7–20 μm tall. *Paraphyses* straight to flexuose, filiform, unbranched, mainly simple but occasionally septate, hyaline, 2–3 μm thick, smooth-walled, not markedly thickened nor pigmented at the tips. *Asci* elongate-clavate, moderately thick-walled, without any pronounced thickening at the apex, no apical apparatus seen, not reacting with iodine, unitunicate (verrucarioid ?), 35–40 \times 6–10 μm , 8-spored. *Ascospores* overlapping uniseriate to irregularly distichous in the asci, ellipsoid, rounded at the apices, simple, hyaline, smooth-walled, often with numerous guttules, 7–8.5(–9) \times (2–)2.5–3.5 μm .

On *Lecanora chlarotera* Nyl. s. lat., thalli and, very rarely, also apothecia.

FINLAND. Mustiala, on *Lecanora chlarotera*, xii 1868, P. A. Karsten, Fungi fenn. exs. no. 823 (K, isotype of *Trochila thallophila* P. Karsten).

SCOTLAND. Mid-Perthshire, Balliemore, by B847 road to Struan, on *Lecanora chlarotera* on *Populus tremula* twigs, 23 iii 1973, B. J. Coppins 156 (E, IMI 237272).

Infected specimens of the host do not appear to be markedly damaged by this fungus and even when its apothecia are numerous the normal grey colour of the thallus is retained and microscopic examination shows the algal cells also to be healthy. The species consequently appears to be parasymbiotic rather than parasitic.

The lichenicolous discomycetes with hyaline simple spores are badly in need of a critical revision. *Pyrenopeziza* Fuckel is clearly not an appropriate genus for *P. thallophila* as the asci lack a distinct pore turning blue in iodine and may be verrucarioid in their method of discharge: the generic position of this species will be discussed in a future paper. *P. thallophila* does not appear to have previously been recorded from the British Isles.

Karsten's exsiccatum label included a description of the species so the name was first validly published there and not in 1870 as generally cited.

***Ramularia peltigericola* D. Hawksw., sp. nov.** Fig. 4.

Fungus lichenicola. *Mycelium* immersum, ex hyphis vel cellulis hyalinis usque 5–7 μm latis. *Cellulae conidiogenae* monoblasticae vel 2–3 polyblasticae, ampulliformes vel subcylindricae, non septatae, hyalinae, (15–)20–25(–30) \times 6–8 μm , cicatricibus papilliformibus et crassis, 1.5–2 μm latis. *Conidia* singularia, sicca, acrogena, elongato-clavata ad subcylindrica, basi attenuata et truncata e cicatrice, 0–1-septata, hyalina, 15–25 \times 5–6.5(–7) μm .

HOLOTYPE. Scotia, Mid-Ebudes, Isle of Mull, Killiemore, in thallo *Peltigerae polydactylae*, 16 vi 1979, Mrs M. E. Clark (IMI 239715a). Iso. E.

Fungus lichenicolous. *Mycelium* immersed in convex gall-like deformations of the host, galls \pm concolorous with the thallus and mainly 0.5–1 mm diam., their surface becoming areolate-cracked with age, hyphal or cellular, hyaline, hyphae and cells mainly 5–7 μm wide. *Conidiophores* micronematous, mononematous, difficult to distinguish, located just below the surface of the galls. *Conidiogenous cells* arising from the surface of the gall, singly or in small groups, giving the gall surface a frosted appearance, monoblastic to 2–3 polyblastic, ampulliform or subcylindrical, swollen at the base and tapering towards the apices, non-septate, unbranched, hyaline,

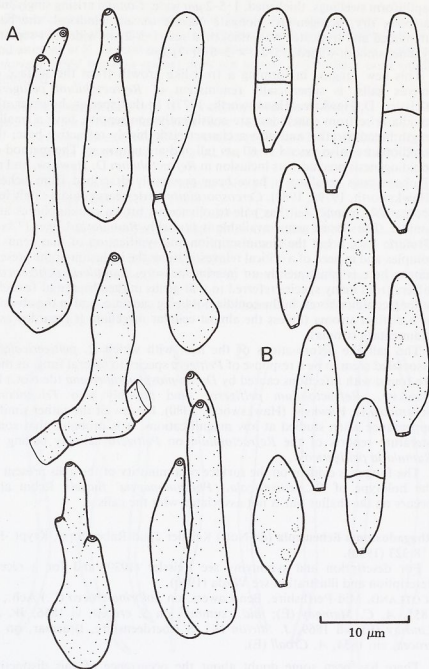


FIG. 4. *Ramularia peltigericola*. A, conidiogenous cells; B, conidia. From the holotype (IMI 239715a).

(15-)20-25(-30) \times 6-8 μm , scars conspicuous, somewhat raised on papilliform swellings, thickened, 1.5-2 μm wide. *Conidia* arising singly, not catenate, dry, acrogenous, elongate clavate to subcylindrical, the base attenuated and truncated by a thickened scar 1.5-2 μm wide, 0-1-septate, hyaline, smooth-walled, 15-25 \times 5-6.5(-7) μm .

This new fungus, in forming a frost-like growth from the surface of convex galls, is superficially reminiscent of *Refractohilum peltigerae* (Keissler) D. Hawksw. (Hawksworth, 1977). In that species, however, the conidia arise from annellides, are consistently non-septate, have a smaller length:breadth ratio, and also a characteristic highly refractive base; the conidiophores also extend to 60 μm tall and are narrower. The method of conidiogenesis precludes its inclusion in *Refractohilum* D. Hawksw. and no Hyphomycetes recalling it have been previously described from lichens (Hawksworth, 1979a, 1980). *Cercosporidium* Earle bears conidia singly in a comparable manner but has pale to olivaceous brown conidiophores and conidia. The closest genus available is probably *Ramularia* Unger (? syn. *Ovularia* Sacc.), but the circumscription and typification of that genus is complex and in need of a critical reinvestigation; the inclusion of the present fungus here is consequently an interim measure. *Ramularia peltigericola* differs from many species referred to that genus in the absence of fascicles of long conidiophores, in the conidia not being catenate, and in the absence of a distinct stroma (unless the almost cellular mycelium is regarded as a rudimentary stroma).

The gall-like deformations of the host with which *R. peltigericola* is associated seem to be a response of *Peltigera* species to several fungi as they are found with infections caused by *Dacampiosphaeria rivana* (de Not.) D. Hawksw., *Refractohilum peltigerae*, and possibly also *Trichoconis lichenicola* D. Hawksw. (Hawksworth, 1980). In view of the rather similar appearance when studied at low magnifications, it is probable that some literature reports of the *Refractohilum* on *Peltigera* actually belong to *Ramularia peltigericola*.

The fungus is evident on the surface of a minority of the galls present in the holotype of *R. peltigericola*. '*Phragmonaevia*' *fuckelii* Rehm also occurs on the thallus but is not associated with the galls.

Rhagadostoma lichenicola (de Not.) Keissler apud Rabenhorst, Krypt.-Fl. 8:323 (1930).

For description and synonymy see Keissler (1930) and for a recent description and illustration see Vězda (1970).

SCOTLAND. Mid-Perthshire, Ben Lawers, on *Solorina crocea* (L.) Ach., iv 1855, *A. C. Maingay* (E); *ibid.*, summit, on *S. crocea*, vi 1856, *W. L. Lindsay* (E), vii 1869, *J. Stirton* (K). S Aberdeenshire, Braemar, on *S. crocea*, viii 1854, *A. Croall* (E).

There has been some doubt about the occurrence of this distinctive pyrenomycete, a monotypic genus of the Coronophorales almost certainly confined to the thalli of *Solorina crocea* (Hawksworth, 1980), in the British Isles. Watson (1948:318) notes that there is a reference to it by Crombie (1870:280) but did not see any material. *Microthelia solorinaria* Lindsay (Lindsay, 1869:350), described from Ireland, may be a synonym but the

material on which this name was based has not been traced in BM, CRK, E or K.

The presence of this species in the British Isles can, however, now be confirmed through the discovery of three nineteenth century collections in E and another in K. Stirton gave his specimen the herbarium name '*Sphaeria solorinae* MSS' but that epithet does not appear ever to have been validly published.

***Spilomela ascaridiella* (Nyl.) D. Hawksw., comb. nov. Fig. 5.**

Syn.: *Lecidea ascaridiella* Nyl. in Flora 51:162 (1868).

Secoliga ascaridiella (Nyl.) Arnold in Flora 53:471 (1870).

Bacidia ascaridiella (Nyl.) A. L. Sm., Monogr. Br. Lich. 2:163 (1911).

Arthrospora [sic] *ascaridiella* (Nyl.) H. Olivier in Bull. internat. géogr. Bot. 21:176 (1911).

Gyalecta ascaridiella (Nyl.) Zahlbr., Cat. Lich. Univ. 2:705 (1924).

Melaspilea vermiformis Leighton in Grevillea 3:114 (1875).

M. vermifera Leighton in Trans. Linn. Soc. Lond., ser. 2, 1:146 (1876); nom. illegit. (Art. 63).

Mycobacidia vermifera (Leighton) Vouaux in Bull. Soc. mycol. Fr. 30:141 (1914).

Spilomela vermifera (Leighton) Keissler in Beih. Bot. Zbl., Abt. II, 37:272 (1919).

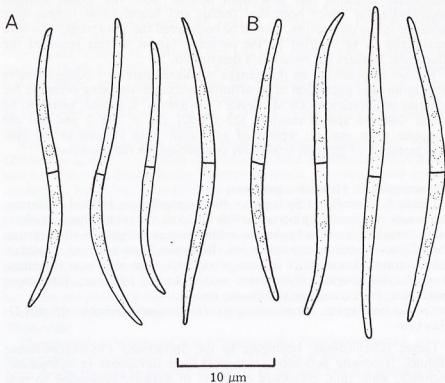


FIG. 5. *Spilomela ascaridiella*, ascospores. A, from the holotype (H-NYL 21874); B, from IMI 233298.

DENMARK. Jutland, Dollerup south of Viborg, on *Pertusaria hymenea* (Ach.) Schaerer on *Fagus* in the wood 'Hald Inderø Skov', 24 v 1976, M. Skytte Christiansen 76.234 (hb. Christiansen, IMI 233298).

ENGLAND. Cumberland, Bolton Gate, on *Pertusaria albescens* var. *corallina* (Zahlbr.) Laundon on *Fraxinus*, 27 ii 1978, M. R. D. Seaward (IMI 227169).

IRELAND. Co. Kerry, Killarney, Mangerton, on ? *Huilia* sp. on rock, ix 1867, I. Carroll 7 (H-NYL 21874, holotype of *Lecidea ascaridiella* Nyl.).

WALES. Caernarvonshire, Trefriw, on *Pertusaria albescens* (Huds.) Choisy & Werner on *Quercus*, 1874, W. A. Leighton (BM, holotype of both *Melaspilea vermiformis* Leighton and *M. vermifera* Leighton).

The identity of *Lecidea ascaridiella* has for long been uncertain but examination of the holotype left no doubt that it represents a lichenicolous fungus, the species also described as *Melaspilea vermiformis* by Leighton (*loc. cit.*) and for which the monotypic genus *Spilomela* (Sacc.) Keissler was introduced. This fungus was previously only known to me from corticolous *Pertusaria* species so its discovery on a saxicolous crustose lichen was somewhat surprising. The host material is fragmentary and sterile but the greyish thallus is K- and C- and on thin-layer chromatography was found to contain confluent acid and a UV+ blue accessory (after charring); this suggests that it was probably a *Huilia* species and not *Pertusaria*.

Since Art. 70 which formerly permitted rejection of names based on discordant elements has now been deleted from the Code, *Lecidea ascaridiella*, for which both host thallus and lichenicolous fungus were included in the description, should be considered the valid name; it is here considered to be typified by the invading fungus as this provided the diagnostic features for Nylander's description.

Further information on this fungus is omitted here as a comprehensive description and discussion of its affinities are currently being prepared for separate publication by Dr M. Skytte Christiansen. It should, however, be noted that the spores measure $(22-25-32(-35) \times 1.5-2 \mu\text{m})$ and are 1-septate when mature; reports of additional septa are due to the misinterpretation of guttules commonly conspicuous in the ascospores.

Thamnogalla D. Hawksw., *gen. nov.*

Genus lichenicola ad Sphaeriales Physosporrellaceae Höhnel pertinens. *Ascomata* perithecia, immersa, pallide olivacea vel subhyalina, ostiolata; muris tenuibus, e stratis hypharum subhyalinarum ad pallide olivacearum. *Paraphyses* numerosae, persistentes, filiformes, non-ramosae, septatae. *Asci* unitunicati, cylindrici ad elongato-clavati, cum iodo non reagentes, 8-spori. *Ascospores* ellipsoideae, non-septatae, hyalinae, plerumque guttulate, laeves, vaginae gelatinosae desunt.

Species holotypica, adhuc unica, est *Thamnogalla crombiei* (Mudd) D. Hawksw.

Genus lichenicolous, belonging to the Sphaeriales Physosporrellaceae Höhnel. *Ascomata* perithecia, immersed, pale olivaceous or subhyaline, ostiolate; walls thin, composed of layers of hyphae, subhyaline to pale olivaceous. *Paraphyses* numerous, persistent, filiform, unbranched, septate. *Asci* unitunicate, cylindrical to elongate-clavate, not reacting with

iodine, 8-spored. *Ascospores* ellipsoid, non-septate, hyaline, often guttulate, smooth, without a gelatinous sheath.

The holotype species of this new genus was first considered to be the fruits of *Thamnolia vermicularis* (Sw.) Ach. ex Schaerer (Massalongo, 1856; Minks, 1874) but Arnold (1874) realised that it was in reality a lichenicolous fungus and introduced the name *Nesolechia vermicularis* Arnold for it. Arnold was evidently unaware that Mudd (1865) had previously described a fungus on *Thamnolia* that, from the original description of Massalongo, was conspecific with his taxon. This species has generally been regarded as an immersed discomycete by students of lichenicolous fungi and was referred to *Stegia* Fr. by Keissler (1925). *Stegia* Fr. is, however, a later homonym of *Stegia* DC. (Malvaceae); *Eustegia* Fr. introduced to replace it is also a later homonym of *Eustegia* R. Brown (Asclepiadaceae), but *Stegilla* Reichenb. (based on the holotype of *Stegia* Fr.) is nomenclaturally acceptable; unfortunately *Stegilla* is of uncertain application (Sherwood, 1977) and so cannot be taken up for the fungus on *Thamnolia*.

The illustrations published by Minks (1874) clearly show a fungus forming perithecia and not one with apothecia. Examination of the lectotype material of Mudd's taxon conclusively established that the fungus is no discomycete. The perithecia have a relatively small ostiole and the paraphyses extend to different heights into the ostiolar canal and do not form a neat hymenium. The view that the fungus was a discomycete may in part be based on confusions with *Lecidea associata* Th. Fr. (*Nesolechia associata* (Th. Fr.) Sacc. & D. Sacc.); this species commonly occurs on *Ochrolechia tartarea* (L.) Massal. but has been recorded on *Thamnolia* in Scotland (Walker, 1970). The ascospores of *L. associata* are subglobose and 6-9 μm diam., quite different from the pyrenomycete, but the asci and paraphyses are sufficiently alike to cause confusion to the unwary. It may be significant that Minks (1874: pl. 5, figs 6-7) illustrated some globose ascospores very similar to those of *L. associata*.

Within the Sphaerales (incl. Phyllachorales) *Thamnogalla* recalls *Glomerella* Spauld. & Schrenck, *Hyponectria* Sacc. (*Anisostomula* Höhnelt) and *Physalospora* Niessl in the filiform persistent paraphyses and simple ascospores, but differs from all these genera in the hyphal (textura intricata) and not pseudoparenchymatous (textura angularis) wall of the perithecia. Further, paraphyses are lacking, as are setae, the perithecia are immersed and do not have even a scarcely protruding ostiole, the tissues around the ostiole are not clearly differentiated in pigmentation or structure, and these genera exclusively comprise saprophytes and mild parasites of vascular plants. Keissler (1930) included a few lichenicolous fungi in *Physalospora* but these are probably not correctly placed in that genus. In view of these considerations a new genus must be introduced for this pyrenomycete on *Thamnolia*.

Thamnogalla is here tentatively referred to the Physosporellaceae, which has recently been considered by Barr (1976), but it must be stressed that some doubt remains in view of the shape of the asci and the absence of a gelatinous sheath to the spores. In the treatment of Müller & von Arx (1973), it keys out to the Polystigmataceae [Höhnelt ex] Nannf.

Thamnogalla crombiei (Mudd) D. Hawksw., **comb. nov.** Fig. 6.

Syn.: *Endocarpon crombiei* Mudd, Monogr. Br. Clad.: 36 (1865); as '*Crombii*'.

Phracidia crombiei (Mudd) Sacc. & D. Sacc., Syll. Fung. 17:648 (1905).

Nesolechia vermicularis Arnold in Flora 57:100 (1874); as '(Mass.)'.

Stegia vermicularis (Arnold) Keissler in Annln naturh. Mus. Wien 38:163 (1925).

Ascomata perithecia, immersed in irregular bullate deformations of the host lichen, not erumpent and the ostiole remaining below the surface of the gall, numerous, arising singly but often crowded together, not stromatic, subglobose to obpyriform, subhyaline to pale reddish or olivaceous, 100–150 μm diam., ostiole not lined with periphyses, 25–50 μm wide in surface view, sometimes becoming more expanded with age; walls composed of 3–6 layers of interwoven hyphae (textura intricata), subhyaline to pale reddish or olivaceous near the ostiole, mainly 7–10 μm thick but sometimes to 15 μm thick near the ostiole, hyphae of the wall mainly 2–3 μm thick with narrow lumina and thick hyaline walls. *Paraphyses* arising from the base of the perithecial cavity, numerous, persistent, filiform, sparsely septate, unbranched, 1–2.5 μm wide, variable in length, some extending into the ostiolar region, tips not markedly differentiated and with no tendency to form a distinct epithecium. *Asci* arising in a fascicle together with the paraphyses from the base of the perithecial cavity, unitunicate, wall \pm equal in thickness when mature but apex slightly thickened in young asci and including an indistinct 'chitinous' area, not reacting with iodine, cylindrical to elongate-clavate, 50–65 \times 5–7 μm , 8-spored. *Ascospores* irregularly arranged in the asci, overlapping distichous to almost uniseriate, ellipsoid with rounded ends, non-septate, hyaline, 0–2 guttulate, smooth-walled, without a gelatinous sheath, 8–10(–11) \times 3–5 μm .

On *Thamnolia vermicularis*, thalli, forming galls.

FRANCE. Dijon, on *T. vermicularis* [no further data], hb. A. Menzies (E).

SCOTLAND. Mid-Perthshire, Ben Lawers, alt. 3000 ft, on *T. vermicularis*, viii 1864, J. M. Crombie (BM, lectotype selected here for *Endocarpon crombiei* Mudd).

U.S.A. Alaska, Bering Sea, St Paul Island, on *T. vermicularis*, 23 vi 1897, J. M. Macoun (E).

In the original description of *Endocarpon crombiei*, Mudd (1865) cited specimens from 'Morrone! Ben-naboord! Cairngorm! and other localities in Scotland' and indicated that Crombie first discovered it in 1862. Despite extensive searches, only a single collection made prior to 1865 has been located, that from Ben Lawers cited above; in selecting this as lectotype here, it is assumed that it is from one of the 'other localities in Scotland' mentioned in the original description. This specimen agrees in all details with Mudd's description which could not have been of *Lecidea associata* from the information on the verrucae, perithecial structure, and spore shape provided.

The galls produced vary considerably in shape and size and cause the branches of the host to become deformed (often geniculate rather than erect) and slightly pinkish instead of the characteristic white. It appears to be either a weak parasite or a parasymbiont.

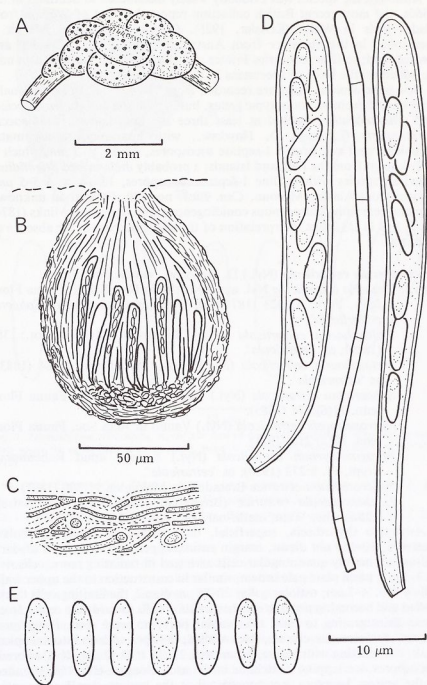


FIG. 6. *Thamnogalla crombiei*. A, galls on *Thamnolia vermicularis*; B, vertical section of ascomata; C, vertical section of ascomatal wall; D, asci and paraphysis; E, ascospores. From the lectotype (BM).

Although the species was evidently widely distributed in Scotland in the 1860s, the most recent British collection reported is that of Watson from Cader Idris in Wales (Keissler, 1925). Outside the British Isles it is mentioned in the literature from Austria, Germany, Italy, Sweden and Switzerland; to these countries France and the USA (Alaska) can also now be added on the basis of specimens in E (see above).

Few lichenicolous fungi are recorded from *Thamnolia*, an exceptionally widespread probably monotypic genus, but in addition to *Lecidea associata* and *Thamnogalla crombiei* at least three are now known: *Endococcus vermicularis* (Lindsay) D. Hawksw., with paraphysate ascomata, bitunicate asci and brown 1-septate ascospores, $14-18 \times 7 \mu\text{m}$, which is only known from the Falkland Islands; a probably undescribed *Stigidium* Trevisan species with hyaline 1-septate ascospores, $13-14 \times 4.5-5 \mu\text{m}$, known from Alaska (Macoun, *Can. Lich.* no. 180, E); and an unknown coelomycete with pleurogenous conidiogenous cells figured by Minks (1874: pl. 5, figs 11-13). The interpretation of the last is obscure in the absence of material.

Trichothyria cetrariicola (Nyl.) D. Hawksw., *comb. nov.* Fig. 7.

Syn.: *Sphaeria cetrariicola* Nyl. apud Norrlin in Not. Sällsk. Fauna Flora fenn. Förh. 13:323 (1874); as '*Verrucaria* eller hellre *Sphaeria cetrariicola*'.

Psilosphaeria cetrariicola (Nyl.) Stevenson, Mycol. Scot.: 389 (1879); as '*cetrariicola*'.

Metasphaeria cetrariicola (Nyl.) Sacc., Syll. Fung. 2:184 (1883); as '*cetrariicola*'.

Sphaerulina cetrariicola (Nyl.) Karsten in Acta Soc. Fauna Flora fenn. 11(6):171 (1885).

Micropeltopsis cetrariicola (Nyl.) Vainio in Acta Soc. Fauna Flora fenn. 49(2):218 (1921).

Phragmothyrium cetrariicola (Nyl.) Keissler apud Rabenhorst, Krypt.-Fl. 8:273 (1930); as '*cetrariicola*'.

?*Microthyrium cetrariae* Bresadola in Malpighia 11:300 (1897).

?*Lichenopeltella cetrariae* (Bresadola) Höhnelt in Sber. Kaiser. Akad. wiss. Wien, math.-nat. Kl., Abt. I, 128:555 (1919).

Ascomata thyrothecia, superficial, dark brown to black, orbicular, scattered, $80-160 \mu\text{m}$ diam., margin entire; upper wall composed of dark red-brown mainly quadrangular cells arranged in radiating rows, cells $4-7 \times 3-5 \mu\text{m}$; basal plate pale brown, similar in construction to the upper wall, cells $4-9 \times 4-7 \mu\text{m}$; ostiolar collar $20-25 \mu\text{m}$ diam., the limiting cells thick-walled and becoming perforated when mature, cells towards the centre from these disintegrating to form the ostiolar pore, no setae seen. Paraphyses absent. Asci elongate-clavate, thick-walled, the apex with an internal apical beak, not reacting with iodine, bitunicate, $25-35 \times 8-12 \mu\text{m}$, 4(-6)-spored. Ascospores overlapping distichous in the asci, elongate-ellipsoid, rounded at the apices, 1-septate, not constricted at the septum, hyaline, smooth-walled, no cilia arising from the septa seen, 0-4 guttulate, $14-16 \times 2.5-4 \mu\text{m}$.

On *Cetraria islandica* (L.) Ach., thallus. Infected thalli retain their normal colour and do not appear to be adversely affected in any way.

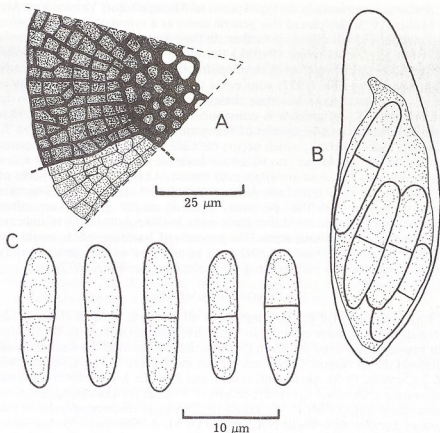


FIG. 7. *Trichothyria cetrariicola*. A, surface view of part of thyrothecium, showing the basal plate where the upper plate is cut away; B, ascus; C, ascospores. From the holotype (H-NYL 3713).

FINLAND. Enontekio, Ounastunturi, on *Cetraria islandica*, 1870, J. P. Norrlin (H-NYL 3713, holotype of *Sphaeria cetrariicola* Nyl.).

SCOTLAND. S Aberdeenshire, Braemar, Ben-nabuir, on *C. islandica*, J. M. Crombie (K).

There has been some uncertainty as to where the name *Sphaeria cetrariicola* was first validly published; this also has some bearing on the typification as one report was based on a collection from Finland and the other from Scotland. Keissler (1930:272) gives the date of Norrlin's publication (see above) as '1873'. The title page for the part including Norrlin's paper is dated '1871-1874' but as p. 349 has an erratum note by Norrlin dated 1 January 1874 the part was almost certainly issued sometime after that date within 1874. The name has often been cited as first published in Cooke (1874:68) where it was cited as 'Nyl. MSS. *in litt.*' and no reference to Norrlin's work was included, only a British specimen collected by Crombie being cited. As the part of *Grevillea* including this paper of Cooke's was dated December 1874, it is most improbable that it appeared before that of Norrlin. The holotype of *S. cetrariicola* is therefore Norrlin's collection and not that of Crombie.

Sphaeria cetrariicola is the type species of *Micropeltopsis* Vainio. Von Arx & Müller (1975:126) placed this generic name as a synonym of *Actinopeltis* Höhnelt but did not discuss it further. In their key, however, *S. cetrariicola* keys out to *Trichothyria* (Petraek) Petraek as the ascomata lack ostiolar bristles. The British species of *Actinopeltis* and *Trichothyria* have recently been revised by Ellis (1977) who notes that the type species of the latter genus may have setae but that these do not spread horizontally as in *Actinopeltis*. *S. cetrariicola* is consequently transferred to *Trichothyria* here as a further aseptose species of that genus. *T. cetrariicola* is close to *T. alpestris* (Sacc.) Petraek, which occurs on *Carex* species, but the ascospores tend to be slightly longer, no cilia have been found arising from the spore septa, and ostiolar setae are apparently absent. Although the ascospores of *T. cetrariicola* have repeatedly been stated to be 3-septate, only 1-septate ones were found in the specimens studied; as the guttules are often conspicuous, it is probable that these were mistakenly thought to indicate the presence of additional septa. The presence of 3-septate spores would not exclude the species from *Trichothyria* in any case as that genus already includes species with more than 1-septate spores (see Ellis, 1977).

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