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Epifoliar fungi from Queensland, Australia

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Abstract. Collections of epifoliar ascomycete fungi from leaf surfaces in the tropical rain forests of Queensland, Australia, yielded 42 genera and 50 species, including one new genus (*Dubujiana*), three new species (*Dennisiela asetosa*, *Dubujiana glandulifera*, *Microxiphium pleomorphum*), three new combinations (*Polychaeton purpuraefaciens*, *Seuratia australiensis*, *Stomiopeltis gautheriae*), lectotypification of *Micropeltis biseptata*, various emended descriptions, and new species records. Each species is described and compared with similar taxa, and the new species are illustrated.

Introduction

This paper presents a taxonomic treatment of epifoliar fungi, primarily from leaves of rainforest plants at the Tropical Crane Research site on Cape Tribulation, Queensland, Australia. We define epifoliar fungi as those specialised nutritional guilds found only the surface of living plants, particularly the leaves (Gilbert and Reynolds 2002). Several polyphyletic groups, principally Ascomycetes, have evolved to this habitat, and include four main guilds: saprobes, plant parasites, fungal parasites (epimycota), and lichens. With the exception of lichens, all share common adaptive morphological traits including a dark, melinoid pigmentation and reproduction by both ascospores and mitospores. For the non-lichenised taxa, the habits and traits are convergent aposynapies that distinguish groups of fungi at family and ordinal levels (e.g. Capnodiaceae, Micropeltidaceae). In contrast, lichens have acquired the epifoliar habit at comparatively lower taxonomic levels (genera or species; Lücking 2002). This paper provides comparative taxonomic descriptions of 50 species of Queensland epifoliar fungi, describes and illustrates one new genus and three new species, and serves as an essential foundation for a detailed ecological study of Queensland rainforest epifoliar fungi (GS Gilbert and DR Reynolds unpubl. data).

Epifoliar fungi are known from previous mycological studies in Queensland (Simmons 1966). Monographic literature on Queensland fungi extends back over a century, and includes works treating higher taxa (Batista 1959*b*; Müller and von Arx 1962; Batista and Ciferri 1962, 1963*a*, 1963*b*) as well as the more specific revisions cited below. Any assessment of regional biodiversity must place new collections into the body of available published collections; this often presents difficulties in reconciling modern and historical approaches to classification. There are historical difficulties for taxonomic treatments particular to these epifoliar fungi, and we provide related annotations in order to facilitate future work on these important ecological guilds.

The taxonomy of epifoliar fungi has been particularly plagued by (1) inadequate historical appreciation of intraspecific variation, that led to repeated description of the same species based on (2) minor morphological variation or (3) similar collections from different host plant species. Several factors have contributed to a proliferation of species. One problem is that many historical epifoliar fungal species are described based on only a single collection. For instance, the monotypic genus *Plectopeltis* Sydow (Sydow 1927) was erected based on a single collection. Similarly, the monographic revisions of the Micropeltidaceae by Batista and co-workers (Batista 1959*a*; Batista and Peres 1963) include many descriptions of new species based on single collections. Often the specimen, which would also be the type specimen, is unavailable; many specimens were destroyed during wars. Those specimens that still exist are typically scattered world wide in herbaria, with their current location often unknown to the scientific community. In too many cases only the description in the literature, sometimes unaccompanied by illustrations, is available for an interpretation of the species concept and the designations of lectotypes. Second, because of these problems, the same biological species has often been described repeatedly, with only minor morphometric variations. The accounts of the

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ascosporic Capnodiales and the Chaetothyriales by Batista and Ciferri (1962, 1963*a*) and the mitosporic *Asterostomella* Spegazzini by Batista and Costa (1956) demonstrate this practice. The approach of von Arx and Müller (1975) somewhat reflects this problem, but they frequently merged genera with no explanation of the proposed synonymy nor reference to the species literature. Hughes (1976) made some advances to remedy this problem in his overview of the 'sooty molds', with a discussion of obvious nomenclatural issues in several epifoliar families and genera. Finally, there is a pervasive and unfounded tenet that epifoliar fungal species have a one-to-one relationship with an associated host plant species, either as a parasite or a saprobe. A classic example of this approach is the monograph of the Meliolales by Hansford (1961), which differentiated numerous species based solely on the host on which it was found. This same approach was applied to Queenslandic and other Australian leaf fungi by Hyde (1996, 2001), where vascular plant families were surveyed, with the implication that the associated mycota was unique and specific to vascular plant families. Similarly, the revision of Australian Asterinaceae by Rahayu and Parbery (1991) adopted this historical approach to host-based species assignment for 19 species of *Asterina*.

While describing a new genus, several new species, and many new species records, we attempt to provide a more phylogenetically robust and ecologically useful taxonomic treatment of epifoliar fungi from Queensland, with a particular focus on those fungi associated with rainforest plants.

Materials and methods

Examined fungi were primarily from pressed and dried leaves collected from the Tropical Lowland Rain Forest at the Australian Canopy Crane Research Facility, at Cape Tribulation, far North Queensland, Australia (16°06′S, 145°27′E; altitude 31–55 m). The site averages 3600 mm rain annually, with most rain falling between December and April. Specimens were collected from ground level to the top of the forest canopy, vertical access being facilitated by the canopy access crane. The crane is managed by the Rainforest Cooperative Research Centre. Other specimens were collected from regional sites throughout northern Queensland, or were obtained from other herbaria (Holmgren *et al*. 1990; http://sciweb.nybg.org/science2/IndexHerbariorum.asp, validated 2 February 2005). Each of our Australian collections is identified with a unique number suffixed with AUS.

Observations and measurements of fungal structures were made from dried specimens mounted in lactophenol. Zeiss compound and light microscopes (Carl Zeiss International, Göttingen, Germany) and a Cambridge scanning electron microscope (Hitachi S-3000N, Hitachi Scientific Instruments Inc., Hitachinaka, Japan). Photomicrographs were taken with a Nikon Coolpix 4500 digital camera (Nikon, Tokyo, Japan). The 273 specimens collected at the crane site and 34 specimens from other Queensland areas utilised in this study, and cited in the Supplementary material (available online from the website of Australian Systematic Botany), are curated at the University Herbarium (UC) at the University of California, Berkeley, CA.

Key to families

1. Ascospores present, sometimes with mitospores 2
   Mitospores only present 13
2. Ascomas formed on individual, unmodified hyphae developing either flat on the surface or aerially 3
   Ascomas formed otherwise 4
3. Ascoma discrete on surface mycelium, globose 5
   Ascoma flattened, hemispherical scutate or dimidiate 12
4. Ascoma formed severally at periphery of a common gelatinous, hygroscopic thallus ..... Seuratiaceae
   Ascoma attached to leaf hairs or parasitic on other fungi ..... Pseudoperisporiaceae
5. Ascoma apically deliquescing; ascospores 1-septate ..... Engerulaceae
   Ascoma without deliquescence 6
6. Hyphae without haustoria 7
   Hyphae with haustoria 8
7. Ascoma formed on surface mycelium or borne aerially, not appendaged with shield 9
   Ascoma covered by a mycelial shield 10
8. Mycelium or ascoma setose or not; ascoma globose, ascospores 3–4 transseptate, brown, rounded ends ..... Melioliaceae
   Ascoma roundish, elongate or linear 11
9. Associated with rounded to obvoid, small pycnidia and hyphal mitospores ..... Antennulariaceae
   Associated with stalked pycnidia ..... Capnodiaceae
   Ascoma collabent, appendaged with a peripheral ring of individual hyphal strands continuing into the substratum ..... Coccodiniaceae
10. Ascoma separate, dimidiate or flattened spherical, with distinct covering shield ..... Chaetothyriaceae
    Ascoma formed severally under a shield-like thallus, composed of radiating rows of cells in banded or circular pattern .. Brefeldiellaceae
11. Ascoma covering wall of radiately arranged cells ..... Asterinaceae
    Ascoma not radiate, upper layer sometimes formed from elaborated tips of paraphyses-like filaments ..... Schizothyriaceae
12. Ascoma wall composed of hyphae radiating from central point ..... Microthyriaceae
    Ascoma flattened, hemispherical, comprised of non-radiating hyphae ..... Micropeltidaceae
13. Mitospores produced in a fruit body 14
    Mitospores not produced from within a fruit body ..... Mitosporic Ascomycetes
14. Mitospore fruit body hemispherical or dimidiate 15
    Mitospores formed in a globoid pycnidium 16
15. Mitospore fruit body resembling the ascoma of Asterinaceae ..... Asterinaceae
    Mitospore fruit body resembling the ascoma of Microthyriaceae ..... Microthyriaceae
16. Pycnidium stalked ..... Capnodiaceae
    Pycnidium not stalked ..... Antennulariaceae

1. Antennulariaceae

Antennariella Batista & Ciferri *Quaderno* 2: 22 (1963)

Antennariella californica Batista & Ciferri *Quaderno* 2: 25 (1963)

Asbolisia citrina Batista & Ciferri, *Quaderno* 2: 38 (1963)

Description

Mycelium superficial, forming on the substrate mostly on the leaf surface, blackish-brown; pycnidia globose to pyriform, ostiolate, apically and laterally on aerial hyphae, 35–60 µm diameter; mitospores ovoid, continuous, hyaline, 3.5–4.5 µm × 2 µm.

Specimens examined

AUS031, AUS362, DAR12643, DAR19744, DAR207255, URM2743, URM4850, URM5042, URM5292, URM9284, URM9050, URM9319, URM9348, URM10430.

Notes

McAlpine (1896, fig. 19) reported an '*Antennaria* form' of pycnidial sooty mould from Victoria with simple, oval to ovate mitospores. Fisher (1933) reported two similar sooty moulds from Victoria that were placed in the genus *Chaetophoma* Cooke (1878). Fraser (1935*b*) found two pycnidial sooty moulds 'of the *Antennularia* type' in New South Wales. One was said to be associated with *Capnodium moniliforme* Fraser and the other with *Limacinia concinna* Fraser. Later, Batista and Ciferri (1963*a*) suggested that the Fraser collections determined as *C. moniliforme* fall within *Antennariella californica* Batista & Ciferri and that the collections assigned to *L. concinna* are *Asbolisia citrina* Batista & Ciferri.

Asbolisia and *Antennulariella* are distinguished by Batista and Ciferri (1963*b*) in the formation of the pycnidia on erect hyphae. The species in both genera are distinguished by small differences in the size of the pycnidium and the mitospore.

Asbolisia was typified with *Asbolisia ampullula* (Spegazzini) Spegazzini. The basionym was *Chaetophoma ampullula* Spegazzini (Spegazzini 1886). The new taxon was distinguished from *Chaetophoma* by an ostiole. Spegazzini (1918) designated *A. ampullula* (Spegazzini) Spegazzini as the type species in an alphabetised list of 11 names transferred from *Chaetophoma*. Petrak and Sydow (1935) transferred *A. ampullula* to the hypocreoid *Cicinnobella* P. Hennings emend. Petrak and Sydow (1927), a genus that von Höhnel (1911) had earlier found to be based on an immature ascomycete of the genus *Perisporina*, and similar to *Limacinia* Neger (Reynolds 1985).

Batista and Ciferri (1963*b*) utilised *Asbolisia* as a definitive taxon in the sense implied by the common designation of 'sooty mold' for the diversity of sexual and, as in this case, mitosporic species of the Capnodiaceae. The major underlying attribute in this common name is the darkly pigmented mycelium and reproductive structures that characteristically occur on living plant surfaces. They excluded Spegazzini's type, *A. ampullula*, from the genus because of its synonymy with *Cicinnobella ampula* and inadmissibly designated a Brazilian species, *A. citrina* Batista, Nascimento & Ciferri, as a 'Lectotypus.' Sutton (1977) pronounced the name *Asbolisia* as 'dubious'; likewise, Kirk *et al*. (2001) declared the taxon a *nomen dubium*.

Hughes (1976), apparently unaware of the von Höhnel (1911) discovery, concurred with Petrak and Sydow (1927) and noted that Hansford (1946) regarded *Cicinnobella* species as the mitosporic component of hyperparasites of Dimeriaceae genera in the Pleosporales. Hughes (1976) recognised the seven Batista and Ciferri (1963*b*) species of *Antennulariella* and selected *A. unedonis* (Maire & Saccardo) Batista & Ciferri as the generic type, with the assignment of the taxon to the Antennulariellaceae. The pycnidia and mitospores of our collection from Cape Tribulation Beach closely resemble those of *A. citrina*; the pycnidia and mitospores are slightly smaller than the Fraser collections (Fraser 1935*b*) that Batista and Ciferri (1963*b*) assigned to *Antennariella*. Examination of the type and other collections cited in Batista and Ciferri (1963*b*) and the somewhat convolute nomenclature of *Asbolisia* indicate that *A. citrina* should be regarded as a synonym of *A. californica*.

2. Asterinaceae

1. Ascospores present 2
   Mitospores present ..... *Asterostomella*
2. Hyphopodia lateral, septate or not, irregular in outline ..... *Asterina*
   Hyphodia circular, intercalary ..... *Cirsosia*

Asterina Léveillé, *Ann. Sci. nat. Bot., Ser. 3,* 3: 59 (1845)

Asterina eupomatiae Hennings, *Hedwigia* 42: 78 (1903)

Asterina eupomatiae (P. Hennings) Theissen, Abh. K.K. *Zoo.-Bot. Ges. Wien* 7: 64 (1913)

Figs 1–3.

Description

Mycelium: dark brown, straight to flexuous hyphae, branching alternate or unilateral or opposite; hyphopodia unicellular to one septate, smooth to irregular in outline, alternate, unilateral or opposite; ascomas mostly singular, sometimes confluent; flat to convex, orbicular in outline, up to 170 µm diameter; the upper wall of parallel hyphae that radiates from centre towards slightly fimbriate edge, opening by stellate fissures; asci obpyriform, extenditunicate, 8-spored, up to 80 µm in length, paraphysate or not; ascospores slightly unequally 2-celled, 23 µm × 10 µm, becoming dark brown, smooth, echinate to verrucose.

Specimens examined

AUS031, AUS132, AUS153, AUS165; AUS204, AUS215, AUS228, AUS235, AUS241, AUS246, AUS326, AUS329, AUS336, AUS351, AUS357, AUS364, AUS372, AUS381, AUS398, AUS404, AUS411, AUS422, AUS447, AUS460, BRIP2796.

Notes

Asterina (Léveillé 1845) is a large, mostly tropical, genus of Ascomycetes with over 575 species (Hosagoudar and Abraham 2000). [The name *Asterina* Nardo is recognised for a genus of an echinoderm, the starfish (Nardo 1834), as a valid, earlier zoological homonym (Greuter *et al*. 2000)]. *Asterina* is morphologically distinguished from some 19 other genera in the family by the 2-celled ascospores, hyphopodate hyphae, and a lack of setae (Hansford 1946).

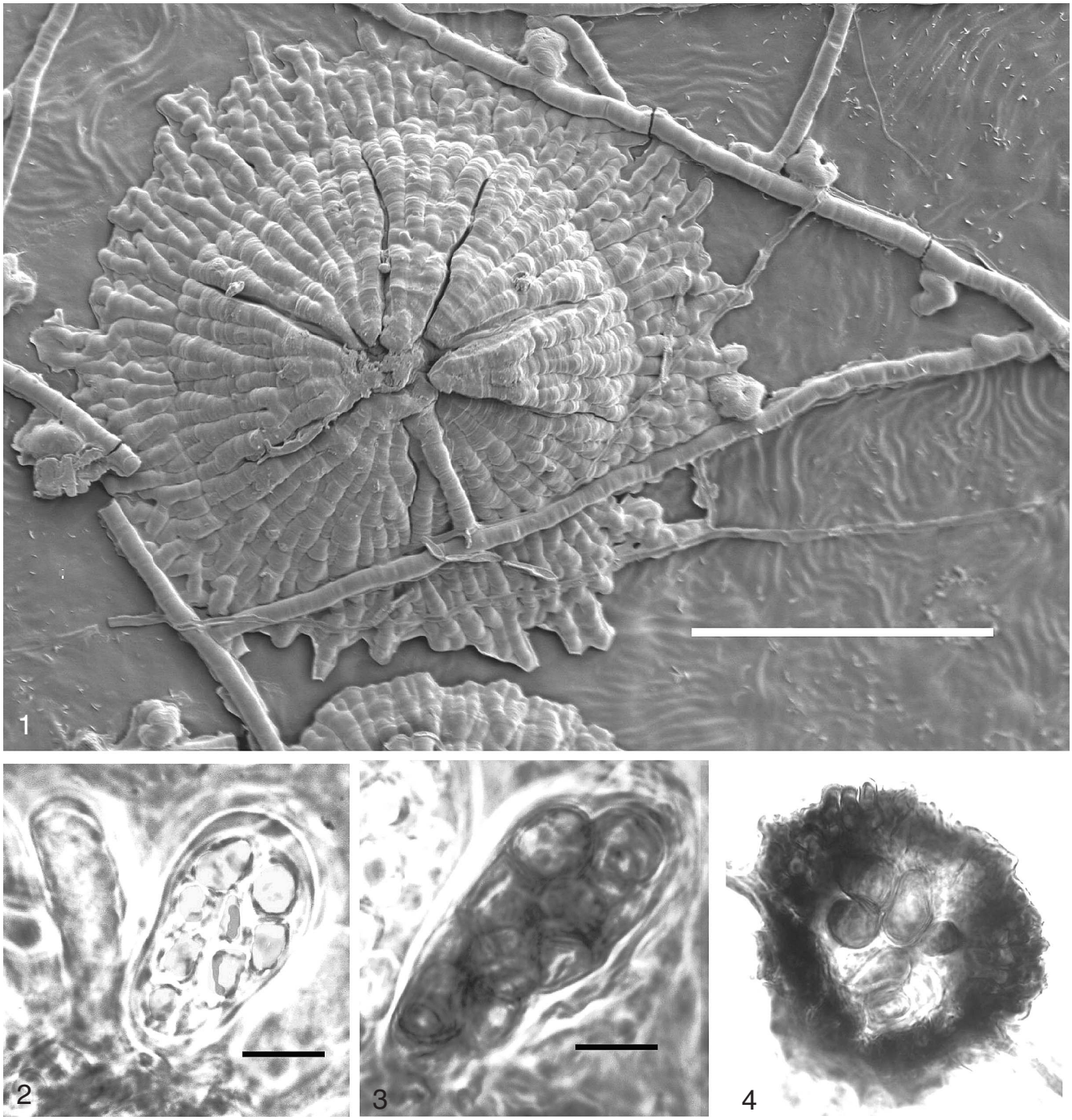

Fig. 1. *Asterina eupomatiae*. AUS204 Dehiscent ascoma; note hyphae with hyphopodia. ×650. **Fig. 2.** *Asterina eupomatiae*. AUS335 Immature asci. ×850. **Fig. 3.** *Asterina eupomatiae*. AUS335 Mature ascus with pigmented ascospores. ×850. **Fig. 4.** *Asterina radulafissilis* asexual fruit body. Note mitospores in dehisced area of fruit body. ×550.

In all, 21 *Asterina* names are reported from Australia (Hosagoudar and Abraham 2000). *Asterina kosciuskensis* Selkirk (1975) was reported from lower Miocene deposits found in New South Wales. Seventeen species have been recorded from Queensland. The characters separating the species are variations on spore size, hyphopodial position, and spore ornamentation. The associated vascular plant is assumed to be a primary attribute in all new taxa as is illustrated by this grouping in the Hosagoudar and Abraham (2000) list of *Asterina* species.

The ascoma and ascospore sizes and hyphopodial morphology variation in a group of our collections fall within seven known Australian species: *A. dictyolomatis* Hennings (Hennings 1904), *A. libertiae* Sydow (Sydow and Sydow 1904), *A. eupomatiae* P. Hennings (Hennings 1903), *A. loranthicola* Sydow, (Sydow and Sydow 1914), *A reclinata* Sydow, (Sydow 1937*a*, 1937*b*), *A. recisa* (Saccardo) Sydow (Sydow 1937*a*, 1937*b*), *A. oritis* Hansford (Hansford 1954) and *A. diospyrina* Hansford (Hansford 1957). The variance in the defining morphological characters found in cited collections suggests that all of these names represent only one species. The Queensland species, *A. eupomatiae* is selected as the name for this group of our collections.

Asterina radulafissilis (Saccardo) Theissen, *Ann. Mycol.* 10: 22 (1912) emend

Fig. 4.

Description

Mycelium absent. A circular shield is formed of two layers of radiating hyphae that originate from a central point, component hyphae form irregular patterns from parallel to prosenchytic tissue. The upper layer comprises darker hyphae than the lower layer that radiate in a loose to regular parallel pattern. Both ascogenous and mitosporic areas are formed beneath the mycelial shield. The surface over the fertile areas is somewhat raised and open with the disintegration of the apical wall covering; asci aparaphysate, extenditunicate, 45 µm in length; ascospores becoming brown, 2-celled, 15–17.5 µm × 7.5 µm; pycnidia scattered, measuring 80–106 µm, develop beneath the shield; conidiophore lanceolate, with apical production of single spores; mitospores hyaline becoming brown, with large vacuole giving the appearance of a band, 12.5–15 µm × 5–6 µm, ovoid, with a basal scar.

Specimens examined

AUS335, BRIP2800.

Additional specimens examined

BRIP2788, BRIP2789, BRIP2790, BRIP2793, BRIP2792, BRIP2795, BRIP2798, BRIP2799, BRIP2801.

Notes

There is no free mycelium associated with the pleomorphic fruit bodies. There is no apparent invasion of the leaf surface by any hyphal formation associated with the fruit body. The ascospores and the mitospores are larger than those of *Asterina delicata* Doidge (Doidge 1920). The mitosporic form of the latter species fits *Asterostomella horrida* Batista & Maia (Batista and Ciferri 1959) from the Philippines.

The mitosporic aspect of this fungus differs from *Asterostomula* (Theissen 1916) in lacking mycelium and the formation of a shield, under which both ascosporic and mitosporic fertile areas develop. A large vacuole in the central area of the mitospore gives the appearance of a light median band similar to that found in *Asterostomella veronicae* (Desmaziéres) Batista and Ciferri (1959), collected by L. Fraser in New South Wales.

On the same leaf, there are colonies composed of hyphae with hyphopodia. The individual fruit bodies have pyriform mitospores that are larger than those in the pleomorphic ascoma, measuring 19 × 10 µm. These are similar to BRIP2800, determined as *Asterina radiofissilis* by CG Hansford. G Rahayu (specimen annotation) found that the collection was mostly mitosporic fruit bodies with some immature ascomata. A comparison was made to the description by Doidge (1942) and was 'considered as an anamorph of *A. radiofissilis*'.

Asterostomella Spegazzini emend. Batista & Ciferri, *An. Soc. Biol., Pernambuco* 11: 44 (1959)

Asterostomella stophani P. Hennings, *Engl. Jahrb.* 38: 125 (1905)

Description

Mycelium superficial, fuscoid, reticulate or radiate, capitate hyphopodia 1–2-celled; pycnidia superficial, dimidiate, 75–130 µm diameter, the upper plate composed of radiate hyphae, dehiscence is irregularly stellate; hymenium is inverted; conidiophores are very short or not apparent; mitospores ovoid, piriform or oblong, continuous, with basal dehiscence scar, fuscous 14–21 × 10–11 µm.

Specimens examined

AUS138, AUS335, AUS339, AUS394, AUS414.

Notes

Asterostomella is a mitosporic taxon for presumed pleomorphic *Asterina* and *Parasterina* species. Batista and Ciferri (1959) place the taxon in the Asterinothyriaceae, a family in the order Peltasterales that they constructed for pycnidial taxa mostly of epifoliar fungi. No ascosporic species were found in direct association with this mitosporic species in our collections. The distribution for the 29 named species and 14 synonyms (Batista and Ciferri 1959) is USA (Florida), the Caribbean, Central and South America, South-east Asia and Uganda. One species, *A. veronicae* (Desmazières) Arnaud, is cited as a specimen collected in New South Wales by L Fraser. The mitospores of *Asterostomella* have a distinctive ovoid, piriform to oblong shape with a reddish brown pigmentation; there is sometimes a non-pigmented band in the mid area of the mitospore. They are produced in a thyriothecium from the underside of an upper plate of radiate hyphae and are dispersed through

a stellate break in the upper wall. Species distinction has been based largely on fruit body diameter and mitospore measurements.

Cirsosia Arnaud, *Ann. École Natl. Agric, Montpellier n.s.* 16: 127 (1918)

Cirsosia globulifera (Patouillard) von Arx in Müller & von Arx, *Beitr. Kryptogamenfl. Schweiz.* 2: 114 (1962)

Description

Mycelium with intercallary, circular hyphopodia; thyriothecium initially roundish becoming longate, 300–500 × 190–240 µm, upper wall of parallel hyphae; ascus fissitunicate; ascospores fuscoid, 2-celled, 30 × 20 µm.

Specimen examined

AUS384.

Notes

This species was described from the Philippines. It has been assigned to *Lembosia* Léveillé (Patouillard and Hariot 1890), *Asterina* (Theissen 1913*a*, 1913*b*), *Cirsosiella* Arnaud (Arnaud 1918), and *Asterolibertia* Arnaud (Hansford 1948). The ascospores in our material are wider than those previously reported, including most recently from India (Hosagoudar and Pillai 1994).

3. Brefeldiellaceae (Theissen) Müller & von Arx, *Ber. schweiz. bot. Ges.* 60: 148 (1962) emend

Figs 5–11.

1. Ascospores present ..... *Brefeldiella*
   Mitospores present 2
2. Mitospore formed within a pycnidium 3
   Mitospore formed on surface of mycelium ..... *Trichothallus*
3. Conidiophores short, mitospores bacillate to cylindrical ..... *Trichopeltulum*
   Conidiophores absent, mitospores linear ..... *Enthallopycnidium*

Description

We recognise the Brefeldiellaceae as having a thallus comprised of flattened cells arranged radially and circularly or in bands or in irregularly diverging rows. The ascomata are dispersed, forming below the thallus, round or elongate in outline, opening by the fissure of covering thallus cells; the asci are clavate, obovate or spherical, fissitunicate, and paraphysate; the ascospores are 1–3-celled, hyaline or brown.

Our *Brefeldiella* species is pleomorphic. The name for the teleomorph is *Brefeldiella subcuticulosa* (Cooke) Theissen and that of its anamorph is *Trichopeltulum pulchellum* Spegazzini. This pleomorphic association occurs consistently in our sample site. The initial description (Spegazzini 1889) is that of a monomorphic and monotypic taxon; no species have been since added to the genus (Kirk *et al*. 2001, Index of fungi). Each pleomorphic state is discussed separately. Our collections exhibit both states in most specimens and either one or the other in some. The thallus is an easily recognisable common character from this locale.

Brefeldiella subcuticulosa (Cooke) Theissen, *Ann. Mycol.* 10: 16 (1912) emend

Asterina subcuticulosa Cooke, *Grevillea* 17: 81 (1889*a*)
Asterella subcuticulosa (Cooke) Saccardo *Syll. Fung.* 9: 937 (1891)

Figs 6, 8–11.

Teleomorph description

Mycelium absent; ascoma pelliculate, applanate, irregular to confluent, without mycelium, becoming darkly pigmented; paraphyses disintegrating at maturity; ascus fissitunicate, pyriform, 25 µm in length; ascopores elliptical-clavate, 3-septate, hyaline, upper cell wider, 10–12 × 4 µm.

Notes

The etymology of the species epithet is not explained by Cooke (1889*a*, 1889*b*) or Theissen (1912). The name implies that some part of the morphological structure is below the cuticle, which is not the case in the material examined.

The saprobic hyphae form a closely adhering, superficial membrane with a basic parallel pattern of generally outwardly radiating hyphae, often circular and with identifiable bands; ascoma dispersed, covered by the thallus, opening with a somewhat elongate surface tear of cover (Fraser 1936); ascus clavate to spherical, fissitunicate with apparent nasse apicale (Reynolds 1989).

The ascomata are identifiable by the distinctive brown coloration that contrasts with the lighter pigmentation of the covering parallel hyphae and a short hyphal radiation pattern from a rounded–elongate fissure that serves as a pore for ascospore dispersal. Other than the abrupt margins of the circular pigmentation areas in the hyphal bands, there is no distinction of the slightly raised fertile areas. The thallus development is apparently influenced by the contour of the subtending living leaf surface in our material. The distinctive hyphal bands conjoin in a generally convergent linear extension, or form circular plate-like growths. The pigmentation of the hyphal strands ranges from a discernable brown to almost translucent.

Brefeldiella subcuticulosa is known from Australia from collections at ‘Gippsland Australiae (Luehmann).’ This is an area east of Melbourne in the state of Victoria. Fraser (1936) distinguished between *Brefeldiella* and *Trichopeltis* in her discussion of specimens from New South Wales, both assigned to the Trichopeltaceae. *Brefeldiella brasiliensis* was recognised as having a circular or lobed thallus. The thalli of *Trichopeltis reptans Spegazzini* (1889) and *Trichothallus hawaiiensis* Stevens (1925; Fig. 20) were described as

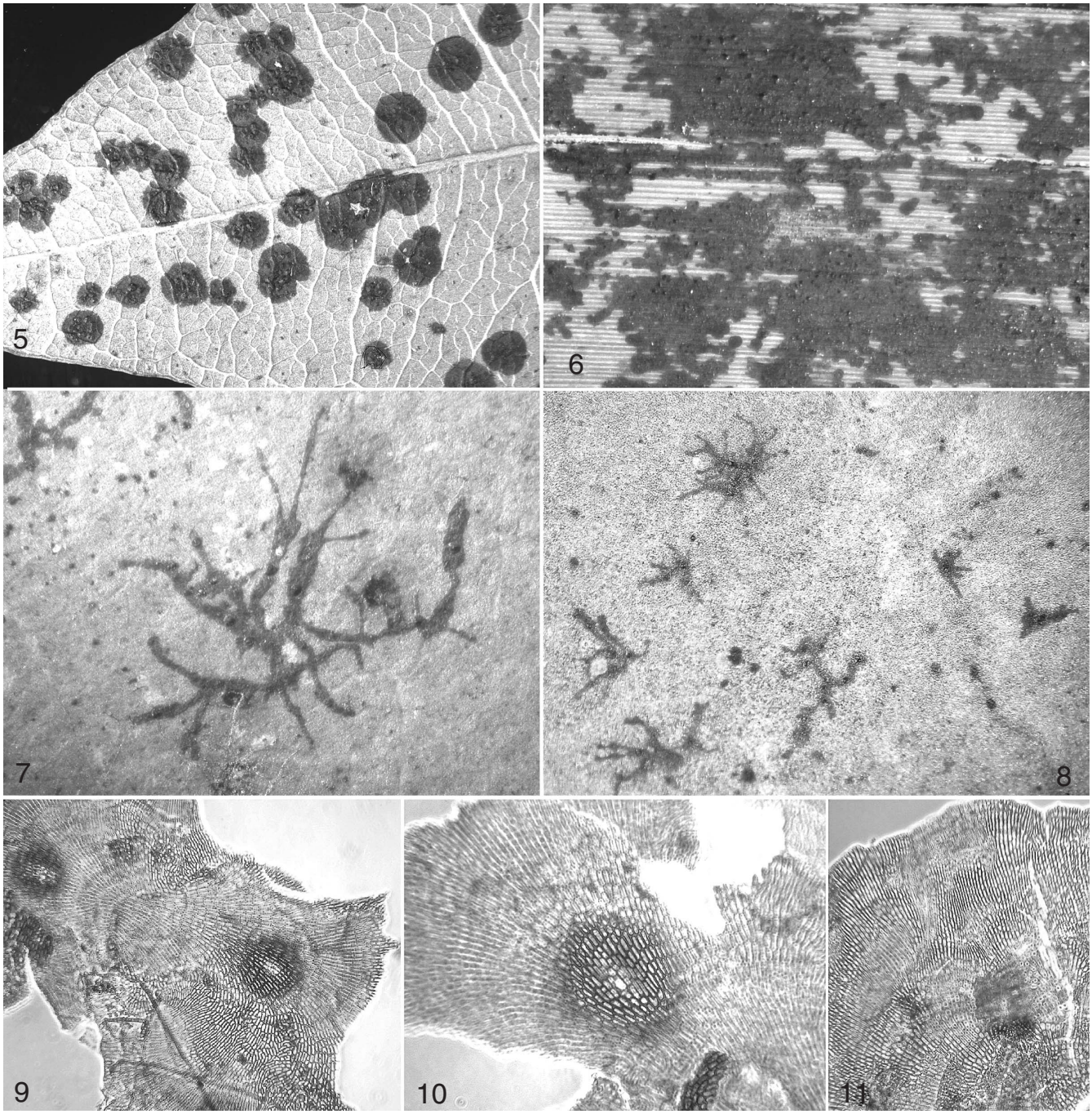

Fig. 5. *Brefeldiella myrceugeniae Stockholm F30018*. This thallus is circular. ×10. **Fig. 6.** *Brefeldiella subcuticulosa*, Kew 117421 from Melbourne. The thallus is effusive and rounded with indistinct margins. ×10. **Fig. 7.** *B. philippinensis*. S F10866. The thallus is band-shaped. ×60. **Figs 8–11.** Australian *B. subcuticulosa* thallus variation in Queensland specimens. Note the patterns of parallel hyphae in the banded thallus. The sporogenous area is darkly pigmented with a pore in the centre. **Fig. 8.** AUS349. ×60. **Fig. 9.** AUS435. ×135. **Fig. 10.** AUS245. ×270. **Fig. 11.** AUS201. ×135.

strap-shaped and branching. Bailey (1909) reported *Asterina reptan* Berkeley and Curtis (1869) from Australia; Stevens (1925) discussed and illustrated this species from Hawaii as *Trichopeltis reptans* Spegazzini. Hughes (1953) renamed the species as *Trichothyrium reptans* (Berkeley & M.A. Curtis) S. Hughes. Hansford (1954) discussed *Trichopeltis* sp. from a New South Wales specimen as having a 'dendritic' mycelium under which thyriothecia formed with circular pores. A similar form, *Brefeldiella philippensis* Sydow (Fig. 7), has discrete bands; this species is represented

in Herbarium S with a 'type' specimen, but a description was apparently never published.

The epifoliar fungi that form rounded to irregularly diverging rows of radially arranged flattened cells are not well understood with regard to their phylogeny and taxonomic disposition. Theissen (1913*b*) recognised them in the family Trichopeltaceae with the subfamilies Trichopeltineae and Brefeldiineae; they were distinguished by the circular or linear thalli. Subsequent systematic treatments of this group (von Höhnel 1910*a*; Stevens 1925; Saccardo 1926; Clements and Shear 1931; Hughes 1953; Müller and von Arx 1962; Luttrell 1973; von Arx and Müller 1975; Eriksson 1981; Sivanesan 1984; Barr 1987; Spooner and Kirk 1990; Kirk *et al*. 2001) have made varying distinctions based on the position of the ascoma above or below the hyphal band, ascospore morphology, and associated mitotic reproductive structures.

A contemporary interpretation of the Trichothyriaceae (Spooner and Kirk 1990) includes the taxa with a catathecium (von Höhnel 1917). The flattened ascoma of *Trichothyrium* with an upper and lower, single-cell thick layer occurring on the surface of parallel hyphal bands is an example. In contrast, the ascoma of *Brefeldiella* in our emended view is dispersed beneath the band-like thallus and open by a fissure of the upper covering cells. Batista and Ciferri (1959) document a similar fruit body structure for mitosporic species that they organise in the Trichopeltulaceae.

The *Brefeldiella brasiliensis* Spegazzini of von Arx and Müller (1975) included *B. subcuticulosa* as a synonym. The material cited, as well as *B. myrceugeniae* Sydow (Kessler 1927) utilised by Eriksson (1981) from Masatierra (= Juan Fernandez Island) Chile (Fig. 5), has a circular ascoma, as does *Brefeldiella chilensis* Spegazzini (Spegazzini 1921; Mujica and Vergara 1945). The epifoliar pellicle of '*Brefeldiella philippensis* Rehm' forms discrete, elongate, branching bands (Fig. 7).

Enthallopycnidium Stevens, *B.P. Bishop Museum Bull.* 19: 85 (1925)

Enthallopycnidium gouldiae Stevens, *B.P. Bishop Museum Bull.* 19: 85 (1925)

Description

Thallus 1–3 mm diameter, consisting of radiating, flat plates formed by the somewhat parallel adherence of hyphal strands similar to that of *Brefeldiella*; individual fertile areas 40–90 µm, the ostiole ranges from a somewhat circular to an elliptical opening, surrounded with setae (= *Trichothallus reptans*); mitospores linear, hyaline, single-celled, 7–7.5 × 1 µm.

Specimens examined

AUS348, AUS377.

Notes

In our collections we found all three genera that Stevens (1925) included as members of the Trichopeltaceae, i.e. the mitosporic *Enthallopycnidium* and *Trichothallus* as well as the ascosporic *Trichopeltis* Spegazzini. Hughes (1976) appropriated *Trichothallus* for his Euantennariaceae. He described *Antennatula* Fries ex Strauss mitosporic taxa as developed from undifferentiated hyphae, while *Trichothallus* mitospores formed on a hyphal plate, as originally described by Spegazzini (1889) from Cuba, and Stevens (1925) from Hawaii. He also found associated *Plokamidomyces* Batista *et al.* (1958) and *Hormisciomyces* Batista and Nascimento (1957) mitosporic taxa developing from undifferentiated hyphae and hyphal plates respectively. He found the subglobose, appendaged ascomas of *Euantennaria* and *Trichopeltheca* associated with free hyphae and the hyphal bands; these taxa were morphologically distinguished on the basis of minor ascospore septation characters. Spooner and Kirk (1990) considered *Trichopeltis* a synonym of *Trichothyrium*.

We found no *Plokamidomyces* nor *Trichopeltheca* 'setae' in our material. Rather, the *Trichopeltis reptan* ascoma is similar to those described by Stevens (1925). In addition, the hyphal bands produced the reproductive structures of *Enthallopycnidium*, which were said to have only pycnidia and no 'setae' on the thallus. The pycnidia of *Polychaeton* were present on some hyphal bands with the normally single, individual hyphal strands of the species being integrated in the flattened, one-layered mycelial layer. Fraser (1936) noted that New South Wales collections identified as *Trichothallus hawaiiensis* have '... hyphae composed of cells growing upwards from the thallus at regular intervals.' She speculated that they functioned as, 'organs of propagation.' *Trichothallus* is either a convergent taxon in the Trichopeltaceae and the Euantennariaceae definitions of Hughes (1976) or it is taxomically misplaced in the latter.

Trichopeltulum pulchellum Spegazzini, *Bol. Acad. Nac. Cienc. Córdoba* 11: 603 (1889)

Description

Thallus diverse and characteristic of *Brefeldiella*; locules dispersed, somewhat rounded, opening via a somewhat elongate pore; mitospores formed on roundish, hyaline cells on the inner surface of the shield, bacillate to cylindrical, unicellular, hyaline, 5 × 1 µm.

Notes

Mitosporic reproduction occurs either with or without the presence of ascosporic hymenia in the same thallus. The mitospores are hyaline and unicellular and range in shape from oval to elongate. Batista and Ciferri (1959) recognised several genera based on the shape of the pellicle of

banded hyphae. Because of the apparent diversity in thallus morphology in our large sample from the collection site, we consider them synonymous as *Trichopeltulum* Spegazzini (Spegazzini 1889).

Several genera are similar to *Trichopeltulum*, differing only in the overall form of the thallus. Otherwise, the taxa are identical. Batista and Ciferri (1959) created the family Trichopeltulaceae for these 'hialoamerosporos' taxa including *Brefeldiopycnis* Petrak & Ciferri (Petrak and Ciferri 1932), *Enthallopycnidium* Stevens (Stevens 1925), *Pycnidiopeltis* Batista & Costa (Batista and Ciferri 1959), *Pycnothyriella* Batista (1952), and *Stellopeltis* Batista & Vital (Batista and Ciferri 1959) and the prototypic *Trichopeltulum*.

Trichopeltulum was assigned to the mitosporic Trichopeltulaceae of the Pelasterales by Batista and Ciferri (1959).

Specimens examined

AUS013, AUS014, AUS015, AUS016, AUS017, AUS018, AUS019, AUS020, AUS021, AUS022, AUS024, AUS025, AUS048, AUS083, AUS089, AUS092, AUS109, AUS120, AUS121, AUS126, AUS137, AUS143, AUS156, AUS157, AUS169, AUS200, AUS201, AUS202, AUS203, AUS206, AUS208, AUS225, AUS227, AUS234, AUS239, AUS240, AUS245, AUS251, AUS254, AUS260, AUS262, AUS264, AUS265, AUS270, AUS271, AUS273, AUS280, AUS282, AUS283, AUS284, AUS285, AUS286, AUS288, AUS291, AUS292, AUS293, AUS294, AUS295, AUS324, AUS330, AUS348, AUS349, AUS350, AUS354, AUS361, AUS372, AUS382, AUS390, AUS393, AUS400, AUS410, AUS416, AUS424, AUS431, AUS434, AUS435, AUS446, AUS452, AUS457, AUS478, AUS480, AUS481, AUS483, AUS485, AUS486, AUS497, DAR19734, DAR19737, K117421, S10866, F30018, F30019, K117419, K117420, K86281, DRRJF01.

Trichothallus Stevens, *B.P. Bishop Mus.* 19: 85 (1925)

Trichothallus hawaiiensis Stevens, *B.P. Bishop Mus.* 19: 85 (1925)

Fig. 20.

Description

Pelliculum of parallel hyphae forming irregular bands; setae (= mitospores?), scattered, arising from thallus, distinct, multicellular, generally 44–50 × 6 µm.

Specimens examined

AUS377, AUS381, AUS386, AUS429, UH146348, UH146349, UH146350, UH146351, UH146353, UH146354, UH487614.

Notes

The ascomata of *Brefeldiella subcuticulosa* are present in AUS429 and the pycnidia of *Trichopeltulum pulchellum* are also found in AUS377.

The *Plokamidomyces* phialidic structures from Hughes (1976) have not been found. Hughes (1976) placed this genus in the Euantennulariaceae and associates it with *Trichopeltheca*, which has 3–5-septate ascospores sometimes becoming muriform. The other taxa in this family are born on hyphal strands, which are sometimes aerial.

4. Capnodiaceae

1. Ascospores present 2
   Mitospores present 4
2. Ascoma with three transsepta ..... *Trichomerium*
   Ascoma with more than three transsepta 3
3. Ascoma somewhat conical, ascospores with 4–6 transsepta ..... *Aithaloderma*
   Ascoma slightly stalked, ascospores with 3(–5) septa ..... *Phragmocapnias*
4. Mitospores formed at open end of synemmial stalk ..... *Caldariomyces*
   Mitospores formed in pycnidial stalk 5
5. Mitosporic centrum midstalk ..... *Conidiocarpus*
   Mitosporic centrum formed in basal centrum of stalk ..... *Polychaeton*

Aithaloderma P. Sydow, *Ann. Mycol.* 11: 256 (1913)

Aithaloderma ferrugineum Fraser, *Proc. Linn. Soc. New South Wales* 60: 98 (1935)

Description

Mycelium light brown; ascoma brown, conical, 100–150 µm in diameter, apical pore surrounded by dark brown, tapering setae 70–140 µm in length; ascus fissitunicate, cylindrical or oblong, 40 µm; ascospores hyaline, 4–6-septate, slightly constricted at the septa, oblong, rounded at both ends, tapering slightly towards the base, 27 × 10 µm.

Specimen examined

AUS502.

Notes

The genus *Aithaloderma* was established (Sydow and Sydow 1913) from the Philippines (Los Baños) with material that had an ascoma with setae, an ascus with a thickened wall, and hyaline ascospores. The interpretation of the ascoma varies from a rounded ascoma like that of *Capnodium*, to one originating beneath a shield similar to that of *Chaetothyrium* (Batista and Ciferri 1957, 1962; Reynolds 1971; Hughes 1976; Pohlad 1989), to a flattened shield-like structure covering the asci similar to that of *Microthyrium* of the Microthyriaceae (Sydow and Sydow 1913). The ascoma was said to be variably setose and producing either an ostiolar opening or radiate cracks for the release of the ascospores (Sydow and Sydow 1913; Hughes 1976).

Accordingly, the genus *Aithaloderma* has been assigned to several taxa. The sooty moulds, as the Capnodiaceae or Capnodiales, is the original designation (Sydow and Sydow 1913; Yamamoto 1954; Luttrell 1973; von Arx and Müller 1975; Hughes 1976; Sivanesan 1984; Barr 1987, 2001). Others considered *Aithaloderma* related to *Chaetothyrium*, a member of the family Chaetothyriaceae (Theissen and Sydow 1917; Fraser 1935*c*; Fisher 1939; Hansford 1946; Batista and Ciferri 1962) The order Chaetothyriales was determined with the use of molecular data to be related to the Plectomycetes

(Berbee 1996) rather than the morphologically defined Loculoascomycetes (Barr 2001). A similar phylogenetic position for *Aithaloderma* has yet to be determined.

Two *Aithaloderma* species were described from New South Wales (Fraser 1935*a*). The developmental life history of *Aithaloderma ferruginea* and *Aithaloderma viridis* was based on morphological states and depicted a mycelium that gave rise to a pycnidium. A similar origin was illustrated for the ascoma of *Pleosphaeria citri* Arnaud (Arnaud 1910).

Caldariomyces Woronichin, *Ann. Mycol.* 24: 261 (1926)

Caldariomyces axillatum (Cooke) Reynolds & Faull, *Taxon* 50: 1183 (2001)

Leptoxyphium axillatum (Cooke) S. Hughes, *Mycologia* 68: 748 (1976)

Capnodium axillatum Cooke, *Hedwigia* 17: 40 (1878)

Polychaeton axillatum (Cooke) O. Kuntze, *Revisio Generum Plantarum* 1: (1891)

Caldariomyces sp. 1 Fraser, *Proc. Linnean Soc. NSW* 60: 177 (1935)

Caldariomyces sp. 2 Fraser, *Proc. Linnean Soc. NSW* 60: 177 (1935)

Description

Pycnidium (synemmium) elongate, darkly pigmented; fertile area at apex of stalk cupulate, open, with individual hyphal strands often continuing as hyaline, acute projections; mitospores formed on enteroblastic phialidic, determinate, integrated cells; mitospores hyaline, aseptate, smooth, ellipsoid, 2–3 µm, becoming cylindric, in the germination process acquiring septation and pigmentation with development of hyphal initial.

Specimens examined

AUS022, AUS025, AUS026, AUS027, AUS028, AUS029, AUS030, AUS032, AUS033, AUS034, AUS035, AUS036, AUS041, AUS044, AUS103, AUS105, AUS108, AUS110, AUS111, AUS112, AUS113, AUS114, AUS117, AUS122, AUS124, AUS125, AUS126, AUS129, AUS133, AUS140, AUS145, AUS148, AUS154, AUS163, AUS164, AUS165, AUS203, AUS208, AUS210, AUS225, AUS239, AUS240, AUS247, AUS338, AUS341, AUS346, AUS353, AUS358, AUS362. AUS367, AUS368, AUS374, AUS378, AUS379, AUS381, AUS383, AUS390, AUS405, AUS412, AUS413, AUS415, AUS417, AUS433, AUS434, AUS435, AUS438, AUS444, AUS445, AUS452, AUS459, AUS477, AUS488, AUS489, AUS505, BRIP2642, DAR19734.

Notes

Sooty mould mitosporic taxa share attributes of ascomycetes in the Capnodiaceae that are related to their evolution as an epifoliar guild. The fruit body is basically a slender, upright pycnidium that develops from a superficial mycelium on living plant surfaces. Dark brown to blackish pigment resides in the mycelial and reproductive structure walls. Even though the sooty moulds are proving to be polyphyletic (D. Reynolds and J. Faull, unpubl. data), the mitosporic taxa have a common spore dispersal strategy. Many genera have small, unicellular, hyaline mitospores. Others produce a multiseptate mitospore that resembles the ascospore. They are adapted to distribution in the canopy flow-through water and have the ability to germinate quickly once dispersed. The mitospores are produced from a specialised area that is predictably positioned in several locations on the stalk (Olejnik *et al*. 1999). The mitospore production area of *Polychaeton* (Persoon) Léveillé (Hughes 1976) is basal and usually somewhat elongate, with an apical continuation of the stalk as a neck through which the mitospores are dispersed. *Fumagospora* Arnaud (1911) and *Phaeoxyphella* Batista and Ciferri (1963*b*) are similar, but have darkly pigmented, septate mitospores. The spore production centre of *Conidiocarpus* Woronichin (Woronichin 1926) is in the middle region of the stalk, sometimes with the neck extension, sometimes not. *Scolecoxyphium* Ciferri & Batista (Ciferri *et al*. 1956) is a name given to a form of *Conidiocarpus* in which there is no apparent swelling of the stalk at the site of mitospore production. The *Caldariomyces* (= *Leptoxyphium sensu* Reynolds and Faull 2001) type of fruit body produces mitospores from an open area at the apex of the stalk, and has been deemed a synnemium (Zopf 1878; Hughes 1976; Roquebert and Bury 1988). The mitospores readily begin the germination process when moistened, and then can become arrested in various stages of morphological development of a hyphal initial.

The Batista and Ciferri (1963*b*) treatment of these mitosporic fungi as members of the Asbolisiaceae recognised numerous taxa for mitosporic sooty moulds with the four types of stalked conidiogenous centers. JL Faull (pers. comm.) found that the ITS sequences from a large number of isolates fall within several phylogenetic clusters. We recognise the name *C. axillatum*, for the collections reported here.

Fraser (1934, 1935*b*, 1937) studied the cultural behaviour of *Caldariomyces* sp. and reported two *Caldariomyces* species from New South Wales. Langdon specimen, BRIU2101 = BRIP2642, is labelled *Leptoxyphium* sp., and was originally determined by R.F. Langdon as *Caldariomyces*. We consistently find *Caldariomyces axillatum* associated with *Trichomerium grandisporum*.

Conidiocarpus Woronichin, *Ann. Mycol.* 24: 250 (1926)

Conidiocarpus philippensis Ciferri & Batista, *comb. nov.*

Microxiphium philippensis Ciferri & Batista in Batista & Ciferri, *Quaderno* 2: 135 (1963)

Microxiphium sp. 1 Fraser, *Proc. Linn. Soc., New South Wales* 60: 175 (1935)

Microxiphium sp. 2. Fraser, *Proc. Linn. Soc., New South Wales* 60: 175 (1935)

Description

Mycelium effuse, of cylindrical cells 7–10 µm in length; pycnidia elongate, narrow, darkly pigmented, 500–1000 µm in length, 50–80 µm wide at the midstalk conidiogenous swelling and otherwise 10–15 µm. The hyaline inner cells of the pycnidial column extend from the apex, giving the

appearance of a thin fringe of hairs; the mitospores are hyaline, ovoid, 6 × 3 µm.

Fraser (1935*b*) characterised the mitospores as 2-celled. Often the germination process begins while the mitospores are clustered at the apex of the fruit body in a droplet of hygrophilous fluid, or after its dilution and mitospore dispersal along the outer pycnidial length or to the substratum. This spore dispersal process is especially prominent in *Caldariomyces* where hyphal formation begins with initial mitospore enlargement, cell division, and the acquisition of dark pigmentation.

Specimens examined

AUS038, AUS228, AUS360, AUS380, AUS396, AUS397, AUS493, AUS495, AUS504.

Notes

This specimen occurs in green tree ant (*Oecophylla smaragdina* Fabricius) nests, on living twig surfaces in the forest canopy. This sooty mould is also consistently associated with *Phragmocapnias betle* as was noted by Hughes (1976).

A second *Conidiocarpus* from New South Wales was described and illustrated by Fraser (1935*a*, 1935*b*, 1935*c*) as *Micoxyphium* sp. 1, in a description of *Scorias philippensis* Mendoza (1932). A similar mitotic fungus was described unnamed in collections of *Capnodium australe* Montagne by Fraser (1935*a*, 1935*b*, 1935*c*), but not by Fisher (1933) in the original description.

Phragmocapnias Theissen & Sydow emend. Reynolds, *Mycotaxon* 8: 421 (1979)

Phragmocapnias betle (Sydow & Butler) Theissen Sydow emend. Reynolds, *Mycotaxon* 8: 425 (1979)

Description

Ascoma mimimally stalked, ostiolate, 75–165 µm × 70–120 µm, with setae measuring 55–115 µm in length; ascus fissitunicate, 35–50 µm; ascospores hyaline, 3(–5)-septate, cyllindrical to elliptical, 16–29×3–5 µm.

Specimens examined

AUS038, AUS360, AUS397A, AUS491, AUS493, AUS495, AUS504.

Notes

This species is similar to *Trichomerium* (Reynolds 1982), but the ascospores have more transsepta.

Polychaeton (Persoon) Léveillé in d'Orbigny, *Dict. Univ. d'Hist. natur. 8: 493 (1847)*

Polychaeton purpuraefaciens (von Beyma) *nov. comb.*

Microxiphium purpuraefaciens van Beyma thoe Kingma, *Verhaldl. Konink. Akad. Wetensch., Amsterdam, Afd. Natuurkunde* 2 Sect. Deel 29: 15 (1931)

Microxiphium sp. 2. Fraser, *Proc. Linn. Soc. New South Wales* 60: 175 (1935)

Description

The pycnidia are elongate and upright, up to 1500 µm, sometimes branched from the exterior development of attached mitospores into fruit bodies; mitospores produced in basal centrum that can be inflated and elongate or almost absent, with elongation above comprised of closely adhering dark-brown cells. Several hyphae protrude from the neck interior as hyaline, hair-like cells; mitospores unicellular, hyaline, ovoid, 4.5–2 µm.

Specimen examined

AUS487.

Trichomerium Spegazzini 1918 emend. Reynolds, *Mycotaxon* 14: 190 (1982)

Trichomerium grandisporum (Ellis & Martin in Ellis & Everhart) Batista & Ciferri, *Saccardoa* 2: 210 (1963)

Description

Ascoma subglobose to ampulliform, ostiolate, 80–230 µm diameter; ascoma setae dark brown, septate or not, 48–200 µm in length; ascus fissitunicate; ascospores hyaline, 2–3 septate, fusiform-elliptical, 18–32 × 5–10 µm.

Specimens examined

AUS022, AUS025, AUS027, AUS028, AUS038, AUS103, AUS105, AUS124, AUS125, AUS126, AUS129, AUS130, AUS133, AUS140, AUS164, AUS208, AUS239, AUS240, AUS362, AUS367, AUS368, AUS374, AUS405, AUS412, AUS415, AUS428, AUS434, AUS435, AUS450, AUS452, AUS459.

Notes

This genus is traditionally assigned to the Capnodiaceae; molecular data (DR Reynolds, unpubl. data) indicate an affiliation with *Caldariomyces* and membership on the black yeast clade (Berbee 1996). The setose *Trichomerium grandisporum* ascoma with 3-septate ascospores were in association with *Caldariomyces* in our collections.

5. Chaetothyriaceae

Chaetothyrium Spegazzini, *Ann. Soc. Cient. Argent.* 26: 46 (1888)

Notes

Eleven species of *Chaetothyrium* have been reported from Australia (Fraser 1935*c*; Fisher 1939, 1940). *Chaetothyrium loganiense* (Saccardo) Theissen and Sydow (1917) was based on an Australian specimen collected by Logan on *Smilax* in Queensland originally described as *Meliola loganiense* Saccardo (Saccardo and Berlese 1885*a*, 1885*b*). von Höhnel (1910*b*) found non-setose, immature ascomata in the type material. The species later became the type of the genus *Zukalia* Saccardo (1891). Theissen and Sydow (1917) placed *Zukalia* as a synonym of *Chaetothyrium* Spegazzini (1888). Hansford (1953), in a discussion of *Meliola* species recorded

by Cooke (1892), suggested that this species 'belongs to the Chaetothyriaceae' and later excluded it from *Meliola* (Hansford 1961).

Chaetothyrium fusisporum Fraser, *Proc. Linn. Soc. New South Wales* 60(3/4): 283 (1935)

Dennisiella fusispora (Fraser) S. Hughes, *Mycologia* 68: 771 (1976)
Vitalia rickiana (Theissen) Batista & Ciferri, *Sydowia Beiheft* 3: 118 (1962)

Description

Mycelium forming a network of hyaline hyphae, superficial, closely adnate to the leaf cuticle, pelliculose, without hyphopodia; mycelial setae formed away from the perithecia in an indefinite ring, straight, smooth, simple, acute, with swollen base to 30 µm; perithecia scattered, single, light brown to faintly greenish, globose to somewhat flattened, to 120 µm diameter; wall thin, translucent, with the asci visible through it; asci basal, aparaphysate, 8-spored; ascospores elongate, hyaline with rounded ends, straight or slightly bent, 3-septate, 12.5–15 × 5 µm.

Specimens examined

AUS106, AUS365, BRIP2833.

Notes

The setae in the original description of *C. fusisporum* are clustered around the ascoma, unlike our collections in which the setae are mycelial and at a short distance from the fruit body. The ascoma has the shield structure typical of *Chaetothyrium* (Theissen 1913*b*; Bitancourt 1936; Pohlad 1989). The ascospores are similar in both species.

Chaetothyrium griseolum Fraser, *Proc. Linn. Soc. New South Wales* 60: 285 (1935)

Ceramothyrium griseolum (Fraser) Batista & Maia, *Atti Ist. Bot. Univ. Pavia, Ser. 5*, 14: 40 (1957)

Description

Mycelium pale to colourless on the leaf surface; ascoma flattened-hemispherical and collabent when dry, asetose; asci aparaphysate; ascospores hyaline, 3–5-septate 20 × 6 µm.

Specimens examined

AUS490, AUS491.

Notes

The number of ascospore septa in this New South Wales species are described as 4–5(6), and the size is 19–25 × 4–5 µm. The ascospores of our collections have fewer septa and are not as long. Batista and Maia (1957) transfer this species to *Ceramothyrium*. The ascospores fit *Ceramothyrium boedijnii* Batista, Nascimento and Ciferri and *C. europeaum* (Von Höhnel) Batista in size, but have more septa.

Chaetothyrium strigosum Fraser, *Proc. Linn. Soc. New South Wales* 60: 288 (1935)

Vitalia setofasciculata Batista, Vital & Ciferri in Batista & Ciferri (1962)

Description

Mycelium forming a thin pellicle; ascoma superficial, scattered, globose and sometimes flattened, 170–200 µm in width; setose, the setae straight or curved, faciculate, 70–225 µm in length; asci clavate to ellipical, fissitunicate, 40–60 µm in length, aparaphysate; ascospores 32–48 × 5–7 µm, 7–9 septate.

Specimens examined

AUS174, AUS313, AUS366, AUS375, AUS429, DAR12643, URM2750.

Notes

This species is characterised by faciculate setae on the depressed ascoma. The ascospores in our material are slightly longer than in Fraser's description. Our species is similar to *Vitalia setofasciculata* Batista, Vital & Ciferri in Batista and Ciferri (1962). *Vitalia* was established with a mix of species from *Chaetothyrium*, *Microxiphium*, and *Trichomerium*. von Arx and Müller (1975) considered *Vitalia* (Batista and Ciferri 1962) a synonym of *Aithaloderma* Sydow (1913). The two species of *Aithaloderma*, *A. ferruginea* Fraser and *A. viridis* Fraser (Fraser 1935*a*, 1935*c*), have ascomaic setae that are not fasciculate, and smaller ascospores with fewer septa. *Chaetothyrium fusisporum* Fraser with setae at the base of the ascoma has been reassigned to *Dennisiella fusispora* (Fraser) S. Hughes.

6. Coccodiniaceae

1. Ascospores present 2
   Mitospores present 3
2. Ascospores with transverse septa ..... *Dennisiella*
   Ascospores muriform ..... *Limacinula*
3. Mitospores formed from a rosette of phialidic cells ..... *Microxiphium*
   Mitospores triradiate, septate mitospores ..... *Bisbyopelti*

Bisbyopeltis Batista & Vital in Batista, Costa & Vital, *Ann. Soc. Biol., Pernambuco* 15: 402 (1957)

Bisbyopeltis phoebesii Batista & Vital in Batista, Costa & Vital, *Ann. Soc. Biol., Pernambuco* 15: 402 (1957) emend

Figs 14–16.

Description

Fertile areas formed in areas beneath the mycelial pellicle; conidiophores forming a cluster of hyaline phialides producing 3–4-radiate, hyaline, septate mitospores.

This species was originally described as having a discrete fruit body.

Specimens examined

AUS064, AUS203, AUS205, L0065884.

Notes

This fungus resembles *Microxiphium fagi* (Persoon) S. Hughes (1953) with non-septate setae and single-celled, hyaline mitospores. An Australian collection (DAOM 152130) of *Microxiphium* sp. was mentioned by Hughes (1976, fig. 20*F*) with curved hyphal tips. Hughes (1976) defined *Microxiphium* as non-septate mycelial setae 'encircled by a cortex of hyphae bearing terminal rosettes of subglobose, phialides which produce an abundance of hyaline conidia in a mucilaginous head.' The various collections he examined were noted to differ mostly in the setal morphology. Hughes (1976) cited species described with cortex enhanced setae, i.e. *Vitalia cecropiae* Batista, Vital & Ciferri (Batista and Ciferri 1962) and *V. jaboatonensis* Batista Nascimento & Ciferri (Batista and Ciferri 1962). Our material in comparison with that observed by Dennis and Ellis (1952) and Hughes (1976) indicates that the occurrence of phialidic rosettes on the setae is variable. The generic description vaguely outlined by Hughes (1976) is emended to focus on the mitosporic element with the setae being regarded as a coincidental substratum for mitospore production.

Microxiphium spp. were cited by Fisher (1933, 1939) from Victoria and Fraser (1935*b*) from New South Wales. Their generic concept is actually that of the elongated pycnidia of *Conidiocarpus*, rather than a seta bearing conidiophores that is associated with *Dennisiella* in the Chaetothyriaceae. Batista and Ciferri (1963*b*) placed a Peltasteraceae species described as *Microxiphium viride* Batista & Ciferri in association with *Aithaloderma viridis* (Fraser 1935*a*) from New South Wales.

Dennisiella Batista & Ciferri, *Sydowia* 338 (1962)

Dennisiella asetosa *sp. nov.*

Subiculum crustaceum, atrobrunneum, late effusum, ex hyphis ramosis, constricto-septatis formatum. Ascoma sparsa vel conferta, sessilia vel infossa, semi-globosa, in sicco collabentia, brunnea, uniloculata, centrum jodo caerulescens. Asci saccati, fissitunicati, octospori. Periphyses sat numerosae. Sporae oblongae, fusiformes, ellipsoideae vel clavatae, transverse pluriseptatae, hyalinae.

Description

The mycelium comprises branching, brown-pigmented hyphae. The ascomata are scattered, sessile, semiglobose, eventually collabent, dark brown, uniloculate; the base of the ascoma is connected to the mycelial pelliculum by hyphal growth that is somewhat similar to those of *Limacinula* (Reynolds 1971). The asci are fissitunicate, 40–50 µm in length and associated with paraphyses. The ascospores are oblong, fusiform, ellipsoide to clavate, hyaline, with up to six traverse septa, 35 × 8 µm.

Holotype

AUS038.

Specimens examined

AUS038, AUS106, AUS109.

Notes

Dennisiella fusispora (Fraser) S. Hughes (1976) is based on *Chaetothyrium fusisporum* Fraser (1935*c*). This New South Wales species was described with setae that could develop around the base of the ascoma. Our collection lacks the mycelial setae that are characteristic of the seven species recognised by Hughes (1976). Also, the ascospores are larger than *C. fusisporum* and other *Dennisiella* species.

Limacinula von Höhnel (1907), Reynolds. *Mycologia* 63: 1173 (1973)

Limacinula tenuis (Earle) Saccardo & Trotter, *Syll. Fung.* 22: 65 (1913)

Antennularia tenuis Earle, Bull. New York Bot. Gard. 3: 302 (1905)
Limacinula samoensis von Höhnel, Sitz. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. Abt. I. 118: 1200 (1909)

Description

Fruit body 150–250 µm; ascospores hyaline, six transsepta, longisepta discontinuous, monostichous, 30 × 10 µm.

Notes

The ascomata of this collection are the typical collabent shape with the whitish to light-brown hyphae that extend individually from the lower portion of the ascoma wall into the subiculum (Reynolds 1971). Most of the ascomas are immature. Species reported from geographically nearby regions include *Limacinula javanica* (Zimmerman) von Höhnel emend. Reynolds (Indonesia) and *L. tenuis* (Indonesia, Philippines, Samoa). These two species differ in the number of transsepta and in ascospore size.

Specimen examined

AUS496.

Microxiphium (Harvey ex Berkeley & Desmazières) Thümen emend. S. Hughes (1976)

Fig. 17.

Notes

This taxon is based on two mitosporic forms. The species is holomorphic rather than 'pleoanamorphic' (Reynolds 1993) and, therefore, should not be considered as a 'pleoanamorph' (Hennebert 1987).

Description

Mycelium forming a setose pellicle; mitosporic reproduction 2-fold, one a rosette of phialidic cells found in the mycelium or often as a cortex of hyphae surrounding the mycelial setae (*Microxiphium pleomorphum*), and the other as subpellicular areas producing triradiate, septate mitospores (*Bisbyopeltis phoebesii*).

Microxiphium pleomorphum *sp. nov.*

Figs 14–18, 19.

Teges mycelialis superficialis, ex hyphis echinulatis profunde pigmentiferis implexis composita; phialides subglobosae pigmentiferae in pellicula praesentes vel ad instar corticis setas myceliales cingentes, rosulam mitosporarum 1–2-cellularium pigmentiferarum 5–10 µm longitudine producentes.

Description

Mycelial mat superficial, composed of interwoven, darkly pigmented, echinulate hyphae; Pigmented subglobose phialides located in the pellicle or encircling mycelial setae as a cortex, producing a rosette of pigmented 1–2-celled mitospores, 5–10 µm.

Holotype

AUS064.

7. Engerulaceae

Englerula Hennings, *Bot. Jahbr.* 34: 49 (1905)

Englerula macarangae P. Hennings, *Bot. Jahbr.* 34: 49 (1905)

Description

Superficial mycelium without hyphopodia; perithecium superficial on external mycelium, globoid, 'gelatinising' from apex downward. >180 µm; asci aparaphysate; ascospores 1-septate, darkly pigmented, 30 × 18 µm.

Specimen examined

AUS170.

8. Meliolaceae

Meliola Fries, *Syst. orb. veg.* p. 111 (1825)

Notes

Meliola is a highly problematic taxon that is need of serious monographic attention for some 1600 species and varieties of *Meliola* and sister taxa (Hansford 1961). An unsubstantiated co-evolution with associated vascular plants at a family level was assumed by Hansford (1961) that has been consistently followed in subsequent literature (Mibey and Hawksworth 1997). The result is a duplication of species because of an unfounded compartmentalisaton into species groups determined by the associated vascular plant family as a major criterion.

Forty species and eight varieties of *Meliola* have been reported from Australia; 21 species and three varieties have been found in Queensland (Hansford 1961; Simmons 1966). Using Hansford's specific vascular plant host concept, we could add two species to the record.

Our collections differ from the SE Asian species descriptions with the wider range of setal length and, appressorial traits. The species characters of our collections fit several described taxa when the unproven associated vascular plant constraint is removed. Eight similar species and three varieties comprise a closely related group of possible synonyms within Hansford's artificial partition under the Apocynaceae. Altogether, 95 similar descriptions in 38 vascular plant families are found in Hansford (1961) that could be applied here.

Meliola alstoniae Koorders, *Verhandl. K. Akad. Wetensch., Amsterdam (1967)*

Description

Mycelium branching opposite; setae simple, straight, rarely apically dentate, 165–235 µm; hyphopodia mixed, alternate, opposite to unilateral, head cell of capitate hyphopodium 30 µm and its stalk cell 2.5 µm; ascoma 120–150 µm diameter; ascospores 4 septate, 30–35 × 12–14 µm.

Specimens examined

AUS025, AUS097, AUS222, AUS223, AUS224, AUS225, AUS226, AUS227, BRIP2874, BRIP3034, BRIP3009, BRIP3010, BRIP3011, BRIP3012, BRIP3014, BRIP3015, BRIP3016, BRIP 3017, BRIP3018, BRIP3020, BRIP3021, BRIP3023, BRIP3024, BRIP3025, BRIP3026, BRIP3027, BRIP3028, BRIP3029, BRIP3030 BRIP3032, BRIP3033, BRIP3034, BRIP3035, BRIP3036, BRIP3037, BRIP 3038, BRIP3039, BRIP 3040, BRIP3042.

Meliola bruguierae Sydow

Description

Mycelium branching opposite; mycelial setae simple, straight, 300–500 µm. Hyphopodia opposite to unilateral, head cell of capitate hyphopodium 10–18 µm and its stalk cell 2.5–6 µm; ascoma 210–235 µm diameter; ascospores 4-septate, 47–49 × 21 µm. The hyphal setae in collection AUS223 are shorter and a few have a slight dentate branching at the tip; the hyphopodia in AUS223 are longer and have more alternate positions.

Specimens examined

AUS233, AUS234.

9. Micropeltidiaceae

1. Ascospores present 2
   Mitospores only present 7
2. Ascoma blue green, ascospores 7–14-septate ..... *Scolecopeltidium*
   Ascoma brown 3

3. Ascoma or hyphae setose ..... *Setopeltis*
   Ascoma or hyphae asetose 4
4. Ascospores 1–2-septate 5
   Ascospores 3- or more septate 6
5. 1–2-septate, paraphysate ..... *Micropeltis*
   1-septate, aparaphysate ..... *Stomiopeltis*
6. Ascospores 3-septate ..... *Stigmatodothis*
   Ascospores more than three septa ..... *Chaetothyrina*
7. Mitospores bacillate 8
   Mitospores not bacillate 9
8. Conidiophore flabellate, branching ..... *Plectopeltis*
   Conidiophore inapparent ..... *Parastigmatellina*
9. Mitospores fuscoid ..... *Plenotrichiella*
   Mitospores filiform ..... *Hymeniodiopeltis*

Chaetothyrina Theissen, *Ann. Mycol.* 11: 495 (1913)

Chaetothyrina costaricensis (Stevens & Weeden) Batista, *Publ. Inst. Micol. Univ. Recife* p. 446 (1959)

Ceratochaetopsis costaricensis Stevens & Weedon, *Ill. Biol. Monogr.* 11: 20 (1927)

Description

Mycelium superficial; mycelial setae simple, straight to curved; ascoma solitary, superficial, circular, brown, of non-parallel hyphae, ostiolate, 135–138 µm. Asci paraphysate, 25 µm length, clavate, 35–45 µm in length. Ascospores clavate-fusoid; 1-septate, constricted, hyaline, 10 × 5 µm.

Specimens examined

AUS042, AUS043, AUS082, AUS094, AUS95, AUS106, AUS109 AUS121, AUS144, AUS231, AUS258, AUS266, AUS311, AUS315, AUS324.

Notes

Batista (1959*b*) mistakenly attributed the genus to 'Speg. (sensu Bitancourt).' He utilised the Micropeltaceae sense of *Chaetothyrina* established by Bitancourt's (1936) developmental study of the ascoma rather than the Chatothryiaceae placement of Petrak and Sydow (1935). The Batista (1959*b*) species concept recognised mycelial setae. *Chaetothyrina costaricensis* (Stevens & Weedon) Batista (1959*b*) was originally described from Costa Rica (Stevens 1927) as the monotypic *Ceratochaetopsis* in the Capnodiaceae; *C. costaricensis* was described as having no mycelial setae and thus distinguish it from *Ceratochatae*. Our specimens have a setose mycelium. The ascospores are closer to *C. costaricensis* in size than other *Chaetothyrina* species.

Hymeniodiopeltis Batista, *Ann. Soc. Biol. Pernambuco* 16: 147 (1959)

Hymeniodiopeltis major Farr, *Mycologia* 78: 275 (1986)

Description

Mycelium initially pale fuscus, later not evident; pycnidium dimidiate-scutiate, textura angularis, darkly pigmented, rounded, 40–60 µm in diameter, ostiolate; conidiophores are not apparent; mitospores hyaline filiform, 10 × 1 µm, with evident orientation towards the ostiole when microscopically viewed through the shield.

Specimens examined

AUS249, AUS297, AUS298, AUS299, AUS300, AUS301, AUS302, AUS303, AUS432.

Notes

The fruit body is smaller than that described by Farr (1986). Also, the mitospores are longer.

Micropeltis Montagne in R. Sagra, *Historia fis., pol. nat. Cuba,* fol. 6: 325 (1842) Micropeltidaceae

Notes

Micropeltis was monographed by Batista (1959*b*) with the recognition of 169 species and two varieties; 41 were new species. Forty additional Brazilian species were later described from Brazil (Batista and Peres 1963). Of the 128 species recognised in mycological literature, only three species have been described by other workers to date (Hino and Katumoto 1960, 1966). The Batista (1959*b*) approach to *Micropeltis* was to utilise the colour of the ascoma as a primary character. Within the 5 colour groups, ascoma diameter and ascospore size and septation were major characters. Most of the species were described from a single collection, mostly from Brazil. We found a range of associated vascular plants in the crane site and adjacent areas on Cape Tribulation. The ascospores were also apparently slow to mature in *M. bambusina* with the formation of first one septum and eventually more. These traits suggest that the species distinctions are not dependent on associated vascular plants and the ascospore morphology from a single collection may not represent the size range or the final measurement for a taxon.

Micropeltis bambusina von Höhnel, *Sitzb. Kaiserl. Akad. Wiss, Wien. Math.-natur.* Klasse 118: 322 (1909)

Description

Mycelium absent; thyriothecium superficial, scutulate, dark brown to black, 190–250 µm, ostiole rounded becoming stellate; ascus fissitunicate, 65–85 µm, paraphysate; ascospores initially 2-celled, becoming multiseptate, hyaline, 24–30 µm length, 6–7.5 µm width.

Micropeltis biseptata von Höhnel emend. Batista, *Batista* 1959, p. 75

Dicthyothriella biseptata (von Höhnel) Theissen von Höhnel. *Frag. Mykol. Sizb. k. Al. Wiss. Wien. Bd. CXVI Abt.* p. 102. 1907
Saccardo, *P.A. Sylloge Fungorum* 22: 527
Stevens, F.L. and H.W. Manter. *Botanical Gazette* 79: 273, 1925

Description

Thyriothecium diameter to 190 µm, ostiole becoming stellate; ascus 90 µm, larger than prototype; paraphysate; ascospore 2-celled, hyaline, 22.5–25 µm length, 5.4 µm width, larger than prototype in width and length.

Specimens examined

AUS080, AUS082, AUS121, AUS125, AUS166, AUS203, AUS233, AUS237, AUS263, AUS343, AUS344, AUS370, AUS390, AUS392, AUS416, AUS457, AUS461.

Notes

The ascospores are apparently 1-septate until almost full sized. The colour of the ascoma is a light brown, sometimes appearing greenish when young, becoming darker with the maturation of the ascospores.

The species was described from Java (von Höhnel 1909). Batista (1959*a*, 1959*b*) noted that Santesson (1952) considered the species a synonym of *Porina corruscans* (Rehm) R. Santesson. *Porina* sp. occurs in many specimens, but is distinguishable by the domed, light brown fruit body and the noticeable algal association. Our collection AUS166 has a *Porina* that is indeed similar to *Micropeltis*; the ascoma, asci and ascospores are very similar in size and shape; there are abundant paraphyses. However, there is a distinguishable algal association in the collections. A more typical and easily recognised *Porina* sp. also occurs in this specimen.

The von Höhnel type specimen was not seen by Santesson nor Batista. We have not been able to locate the type in any herbarium. Thus the collection is presumed lost, likely destroyed during war-time activity as were many other collections.

Collection AUS416 is selected to serve the lectotype from our material because of the apparent absence of von Höhnel's holotype and paratype specimens.

Micropeltis bauhiniae Rehm, *Leaf. Phil. Bot.* 6: 1945 (1913)

Description

Mycelium absent; thyriothecium, superficial, scutulate, dark brown, 190–200 µm diameter, ostiole becoming stellate; ascus fissitunicate; ascospores, hyaline, 1-septate, 12.5 × 5 µm,

The ascospores of *M. bauhiniae* from the Philippine type are 2-celled. Our material might be immature.

Specimens examined

AUS141, AUS167, AUS259, AUS275, AUS277, AUS278, AUS289, AUS312, AUS350, AUS409, AUS410, AUS419, AUS423.

Micropeltis biseptata von Höhnel emend. Batista, *Batista* 1959, p. 75

Dicthyothriella biseptata (von Höhnel) Theisse, von Höhnel. *Frag. Mykol. Sizb. k. Al. Wiss. Wien. Bd. CXVI Abt.* p 102. 1907
Stevens, F.L. and H.W. Manter. *Botanical Gazette* 79: 273. 1925

Description

Dark brown, thyriothecium diameter 190+ µm. The ostiole becomes stellate; ascus larger than prototype, aparaphysate; ascospore 2-celled, hyaline, 22.5–25 µm length, 5.4 µm width, larger than prototype in width and length.

Specimens examined

AUS233, AUS237, AUS390AUS233, AUS237, AUS390.

Parastigmatellina Batista & Costa in Batista & Ciferri, *Mycopath. Mycol. Appl.* 11: 61 (1959)

Parastigmatellina asiatica Batista & Costa in Batista & Ciferri, *Mycopath. Mycol. Appl.* 11: 61 (1959)

Description

Mycelium absent; fruit body a cellular shield comprised of brown, non-parallel, pseudoparenchymatous hyphal strands, glabrous, ostiolate, described as subcuticular; conidiophores inapparent; mitospores bacillate, continuous, hyaline 3–5 × 1 µm.

Specimens examined

AUS141, AUS253, AUS257.

Notes

This fungus differs from *Hansfordiopeltis* Batista and Costa (1956) in the subcuticular habit and the fruit body tissue pattern. *Hansfordiopeltiopsis* (Farr 1986) has a greenish fruit body. Batista and Ciferri (1959) placed this taxon in the Pelastrales family Manginulaceae, which is considered to have a relationship to the Stigmataceae. von Arx and Müller (1975) note a relationship between the Stigmataceae and the Micropeltidaceae because of intermediates with a dimidiate ascoma.

Plectopeltis Sydow, *Ann. Mycol.* 25: 124 (1927)

Plectopeltis egenula Sydow, *Ann. Mycol.* 25: 125 (1927)

Description

Mycelium pelliculos, brown, the hyphae irregularly branched or reticulate; fruit body superficial, scutulate, brown, ostiolate, meanderform-reticulate, 60–80 µm diameter; conidiophores flabellate, composed of septate hyphae branching dichotomously; mitospores acropleurogenous to unilateral, bacillate, continuous, hyaline 4–5 × 1 µm.

Specimens examined

AUS229, AUS316, AUS320, AUS323, AUS359, AUS412, AUS452, AUS458.

Plenotrichiella Batista & Vital in Batista & Ciferri, *Mycopath. Mycol. Appl.* 11: 69 (1959) Plenotrichaceae

Plenotrichiella perseaei Batista & Vital in Batista & Ciferri, *Mycopath. Mycol. Appl.* 11: 70 (1959) emend.

Description

Mycelium in patches; pycnidia superficial, dimidiate, orbicular, glabrose, astomate, brown, plectenchymatous, 30–50 µm diameter; hymeniuim inverted; conidiophores inapparent; mitospores fusoid 6 × 1 µm.

Specimens examined

AUS229.

Notes

This species differs from the description of Brazilian material (Batista and Ciferri 1959) in the smaller pycnidia and in the pigmented mitospores. They place this fungus in the Peltastrales, Plenotrichiaceae with other mitosporic species that have a fruit body construction similar to species in the Micropeltidiaceae.

Scolecopeltidium Stevens & Manter, *Bot. Gaz.* 79: 282 (1925)

Scolecopeltidium bakeri (Sydow) Stevens & Manter, *Bot. Gaz.* 79: 282 (1925)

Scolecopeltis bakeri Sydow, *Ann. Mycol.* 15: 232 (1917)
Micropeltis bakeri (Sydow) Cash & Watson, *Mycologia* 47: 731 (1955)

Description

Ascoma superficial, blue-green to fuscus, reticulate, up to 500 µm diameter, ostiolate; ascus fissitunicate, cylindrical, paraphysate; ascospores hyaline, fuscoid-elongate, 7–14-septate, 90–120 × 12–15 µm.

Specimens examined

AUS217, AUS321, Baker Fungi Malayana 586, 587.

Notes

The species was described in the genus *Scolecopeltis* (Sydow and Sydow 1917) from Philippine material. Stevens and Manter (1925) transferred the species to a new genus, *Scolecopeltidium*; we follow their nomenclature. Cash and Watson (1955) utilised different material, Fungi Malayana #586 and #587, to revise Sydow's description and transfer the name to *Micropeltis*. Batista (1959*b*) examined Fungi Malayana #586 and found in comparison with Stevens and Manter (1925) that the ascoma and ascospores were slightly larger. von Arx and Müller (1975) regarded *Scolecopeltis* Spegazzini (1889) and *Scolecopeltopsis* von Höhnel (1909) as synonyms of *Micropeltis* Montagne along with nine other genera, and without explanation. Batista (1959*b*) distinguished the two scolecosporous genera in his blue–green–black pigmented ascoma group, the Dictyopeltoideae, only by the presence or absence of paraphyses; they differ from *Micropeltis* in a lesser number of ascospore septa.

Setopeltis Batista & Vital in Batista, *Publ. Inst. Micol. Univ. Recife* 56: 411 (1959)

Setopeltis perseae Batista & Vital in Batista, *Publ. Inst. Micol. Univ. Recife* 56: 411 (1959)

Description

Mycelium superficial; ascoma superficial, scutulate, orbicular, tissue meandiform prosenchyma, 130–190 µm diameter, setae on ascoma longer 65–100 µm; asci 30–40 µm length, paraphysate; ascospores 1-septate, hyaline, 12.5–15 × 3–4 µm.

Specimen examined

AUS229.

Notes

The setae are longer than in the original description from Brazilian material (Batista 1959*a*, 1959*b*); the ascospores are longer.

Stigmatodothis H. Sydow, *Philippine J. Sci. C. Bot.* 9: 173 (1914)

Stigmatodothis palawanensis *Philippine J. Sci. C. Bot.* 9: 173 (1914) emend.

Description

Stomata somewhat subcuticular, 1-loculate, black, above multilayered with an irregularly radiate context, non-ostiolate yet developing a rounded pore, basal layer tentative; ascoma somewhat subcuticular, black, multilayered with an irregularly radiate context, developing a rounded pore, 130–170 µm diameter; ascus obate-oblong, 26–30 × 14–16 µm; paraphyses cellular, submuscoid; ascospores, clavate, upper cell rounded, narrowed below, non-constricted, 3-septate, hyaline, 14–17 × 3.5–45 µm.

Specimens examined

AUS147, AUS152, AUS154, AUS155.

Notes

The species described from the Philippines was noted as having ascospores that were many-septate.

Stomiopeltis Theissen emend. Luttrell, *Mycologia* 38: 20 (1946)

Stomiopeltis gautheriae (Batista) *comb. nov.*

Stomiopeltella gautheriae Batista, *Publ. Inst. Micol. Univ. Recife* 56: 426 (1959)

Description

Mycelium without hyphopodia and setae; ascoma dimidiate, circular, ostiolate, 150–175 µm; asci 40 µm in length; ascospores hyaline, cylindrical and clavate to fuscoid, 14×3 µm.

Specimens examined

AUS034, AUS231, AUS250, AUS252, AUS260, AUS304, AUS305, AUS306, AUS307, AUS308, AUS309, AUS310, AUS312, AUS313, AUS314, AUS316, AUS317, AUS318, AUS319, AUS322, AUS373.

Notes

The ascoma size and the ascospore size of our material are close to this species concept. This species was described from Pennsylvania, USA, which has a temperate climate. von Arx and Müller (1975) merged *Stomiopeltis* and *Stomiopeltella*. Batista (1959*b*) distinguished the genera in the family by the presence or absence of paraphyses and in this genus by their absence. We generally found no paraphyses in most of our collections.

The type specimen was originally identified as *Asterina gaultheriae* Curtis (Martin 1885). There was indeed a misidentification in that the hyphae are without hyphopodia and the construction of the ascoma is typically that found in the Micropeltidaceae.

10. Microthyriaceae

1. Mitospores septate ..... *Dubujiana*
Mitospores non-septate, with large vacuole ..... *Elachopeltis*

Dubujiana *gen. nov.*

Mycelium primo cuticulare, e glandibus folii in paginam emergens, thallos dispersos superficiales usque interdum confluentes, formans ambitu circulari, e strato basali hypharum brunnearum ramosarum complanatarum compositos; filia hyphalia non-hyphopodiata singula e basi pycnidii elevati centralis super stratum basale et in substratum radiantia; areae conidiogenae elevatae minores in peripheria areae basalis praesentes; hymenium parietem interiorem arearum elevatarum obducens; mitosporae fusiformes fuscae 1-septatae punctatae non constrictae.

Description

Mycelium initially subcuticular, emerging onto leaf surface from leaf glands forming scattered to occasionally confluent superficial thalli, circular in outline, composed of a basal layer of flattened, parallel, branching, brown hyphae; individual, non-hyphopodiate hyphal strands radiating from base of central, raised pycnidium over the basal layer and onto the substrate; smaller, raised conidiogenous areas in periphery of basal area; hymenium lining inner wall of raised areas; mitospore fusiform, fuscus, 1-septatae, punctate, non constricted.

Type species

Dubujiana glandulifera Reynolds & Gilbert

Etymology

Dubuji is an Australian aboriginal word meaning ‘place of spirits.’ The collection site is the mesophyll vine forest on sand at the Dubuji Boardwalk on Cape Tribulation Road, Queensland. The origin of the ascoma from leaf glands seems unique.

Dubujiana glandulifera *sp. nov.*

Figs 12, 13.
Pelliculum myceliale 375–450 µm diametro, pycnidium centrale elevatum 100–125 µm diametro, pycnidia peripheralia usque ad 50 µm diametro. Mitosporae 10–13×3 µm.

Description

Mycelial pellicle 375–450 µm diameter, central raised pycnidium 100–125 µm diameter, peripherial pycnidia up to 50 µm diameter. Mitospores 10–13×3 µm.

Holotype

AUS399.

Specimens examined

AUS395, AUS399, AUS401.

Notes

This taxon is distinguished by the rounded hyphal layer of parallel hyphae radiating from a central pycnidium and forming smaller pycnidia in the peripheral areas. The two-tiered hyphal layers contrast as a *Microthyrium*-like formation of parallel hyphae and as a sparse network of hyphal strands originating from the larger centrally located pycnidium. The mitospores differ from *Thyriostomella* Batista and Costa (Batista and Ciferri 1959) in the pigmentation; from *Allothyriopsis* Batista, Ciferri & Maia (Batista and Ciferri 1959) in the mitospore septation; and from *Leprieuina* Arnaud (1918) in spore morphology. The species would be assigned to the Peltasteraceae, Peltasterales (Batista and Ciferri 1959) as a mitosporic taxon.

Elachopeltis Sydow, *Ann. Mycol.* 25: 121 (1927)

Elachopeltis andinas Petrak, *Sydowia* 4: 560 (1950)

Description

Fruit body ostiolate, radiating hyphae, 90–100 µm diameter; mitospores continuous, ovoid, appearing to be septa because of large vacuoles, but continuous, hyaline, 12×5 µm.

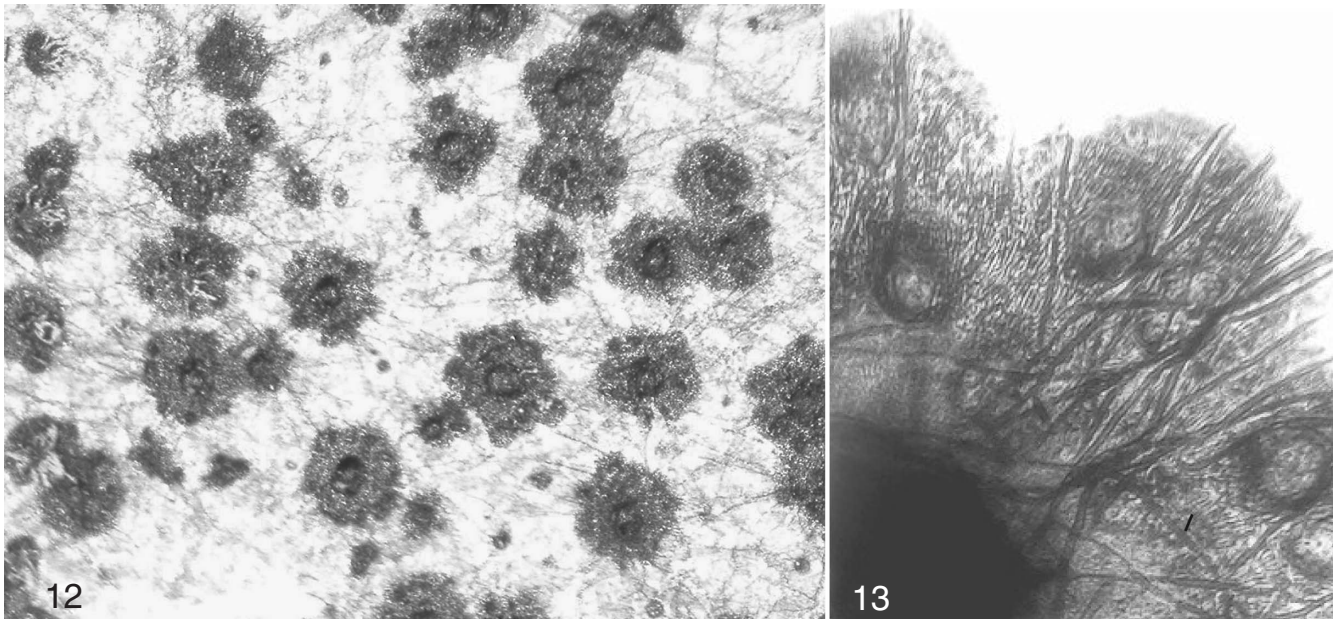

Fig. 12. *Dubujiana glandulifera*. Circular mycelial formations on leaf surface form over a leaf gland with a central fruit body surrounded by smaller ones. ×30. **Fig. 13.** *Dubujiana glandulifera*. The dual hyphal system forms a radiate mycelial mat with small pycnidia in the outer portions with individual hyphal strands extending from a large central pycnidium. ×180.

Our collection has larger mitospores than *E. phoebes* and a stellate dehiscence of the fruit body.

Specimens examined

AUS372, AUS381.

Notes

The taxon was described by Sydow (1927) as having a superficial mycelium comprised of hyphae without hyphopodia. The ostiolate, dimidiate fruit body is formed by a shield of radiate hyphae. The mitospores are oblong-fuscoid, single-celled, hyaline, elongate to slightly curved. The type species, *E. phoebes* Sydow, was described with fruit bodies 80–120 µm in diameter and 25 µm in height. The mitospore dimensions given are 5–9×2–3.2 µm.

This genus was mentioned only in the key to the Pelasteraceae n. fam. by Batista and Ciferri (1959) in their extensive review of mitosporic fungi with 'picnidiostromas with an inverted hymenium' that they recognised in the Pelastrales. The taxon was characterised as having a non-hyphodiate mycelium, an ostiolate fruit body wall comprised of radiate hyphae, and sessile mitospores. Farr (1986) provided a review of 12 *Elachopeltis* species and one variety. Seven of the taxa were described by Batista and his colleagues from Brazil on the basis of sparse material.

11. Pseudoperisporiaceae

1. Ascomas formed on leaf hairs ..... Eudimeriolum
   Ascomas parasitic on leaf fungi ..... Dimerina

Dimerina Theissen, *Beih. Bot. zbl, Abt.* 2,29: 46 (1912)

Dimerina acronychiae Sydow, *Ann Mycol.* 35: 27 (1937)

Description

Mycelium superficial, parasitic on leaf fungi; perithecium 70–100 µm, globose, glabrous, ostiolate; asci 40–46 µm; ascospores 1-septate, hyaline, oblong 21–24×5 µm.

Specimen examined

AUS357.

Eudimeriolum Spegazzini, *Ann. Mus. Nac. Buenos Aires* 23: 36 (1912)

Eudimeriolum acronychiae (Sydow) Hansford, *Mycol. Paper* 15: 52 (1946)

Dimerina acronychiae Sydow, *Ann. Mycol.* 35: 27 (1937)

Description

Mycelium pale olivaceous, irregularly branched, septate, without hyphopodia; ascomas scattered, solitary, superficial among leaf hairs, astomous, glabrous 70–100×65–80 µm; asci paraphysate; ascospores one septate hyaline, 21–24×4–5 µm.

Specimen examined

AUS238.

Notes

This species was reported from Australia by Sydow (1937*a*, 1937*b*) based on an L. Fraser specimen collected in New South Wales.

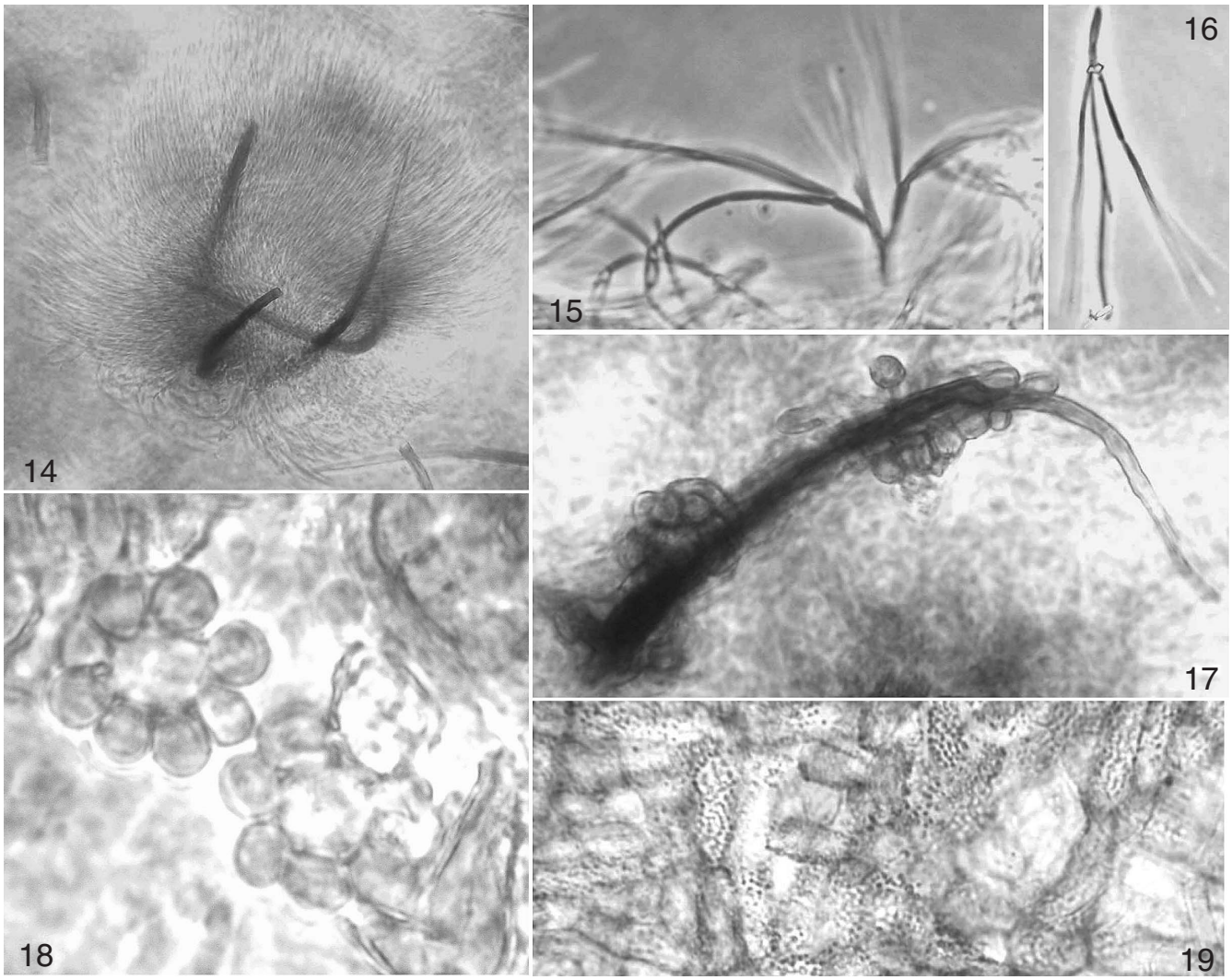

Fig. 14. *Microxiphium*. Setae formed over sporulating area of *Bisbyopeltis phoebesii*. ×150. **Figs. 15, 16.** *Microxiphium*. Mitospores of *B. phoebesii*. ×1000. **Fig. 17.** *Microxiphium*. Seta with *Microxyphium* epihyphal growth. ×460. **Fig. 18.** *Microxiphium*. Rosettes of phialitic cells bearing 2-celled mitospores in the subiculum. ×1000. **Fig. 19.** *Microxiphium*. Echinulate hyphae.

12. Schizothyriaceae

Plochmopeltis Theissen, *Broteria* 12: 87 (1914)

Plochmopeltis ellisii von Arx, *Persoonia* 1: 3 (1959)

Description

Ascoma, flat, shield shaped, rounded, dark brown, 450–800 µm; ascus, fissitunicate, developing from a colourless basal shield, formed on the cuticular surface, ellipsoid to globose, 22–27 µm in length, surrounded by longer upright paraphyses with branched, darkly pigmented tips; ascospores 2-celled, hyaline, 13–16×4–5 µm.

Specimens examined

AUS120, AUS173, AUS236, AUS249, AUS274, AUS388, AUS389, AUS418, AUS503.

Notes

This is the first report of a species in this genus outside the Americas (von Arx 1959; Müller and von Arx 1962; Gomez-Acosta and Calzado 1996).

13. Seuratiaceae

Seuratia Patouillard, *Bull. Mycol. Soc., France* 20: 136 (1904)

Seuratia australiensis (Fisher) *comb. nov.*

Phycopsis Ausstraliensis Fisher, *Ann. Bot.* n.s. 4: 197 (1940)
Atichia Ausstraliensis (Fisher) Müller & von Arx, *Beitr. Kryptogam Schweiz* 2: 232 (1962)

Description

Ascoma a gelatinous spherical, sometimes lobed, stroma 50–250 µm, the composite cells appear as a chain-like

Fig. 20. *Trichothallus hawaiiensis*. AUS335. A setum (= mitospore?). × 1500.

formation of globose cells, often appearing to be separated by a short very thin ismuth; ascospores 11–14 × 3–5 µm. The branched, triradiate, asexual structures found in species of the genus *Atichia* are present.

Specimens examined

AUS064, AUS201, AUS494.

Notes

Atichia Flotow (1850) and the Atichiaceae (Raciborski 1900) were accepted as the ascosporic names by Müller and von Arx (1962) with *Seuratia* Patouillard (1904) listed as a synonym. *Seuratia* and the Seuratiaceae are the accepted ascosporic names with *Atichia* being used for the mitosporic form. Meeker (1975*a*, 1975*b*) accepted the reverse, using *Seuratia* for the ascosporic morph and *Atichia* for the asexual state. Fisher (1933) studied an Australian isolate of *Phycopsis* in culture and obtained the 'propagula.' She described this as a new species from Victoria collections (Fisher 1940).

14. Mitosporic Ascomycete

1. Mitospores single-celled, lenticular ..... *Cordella*
   Mitospores 0–3-septate, cylindrical to elliptical ..... *Periconiella*
   Mitospores 3–5-celled, the two middle cells dark brown ..... *Sporodesmium*

Three noteworthy mitosporic fungi were found that show similar morphological adaptations to the plant surface as found in the epifoliar lineages.

Cordella Spegazzini emend. Subramanian, *Proc. Indian Acad. Sci. B.* 55: 38 (1962)

Cordella coniosporioides Spegazzini, *Anal. Soc. cientif. Arg.* 22: 210 (1886)

Description

Colonies linear, darkly pigmented on leaf surface; mitospores originate from short, brown, non-septate, attenuated cells; conidia single-celled, dark brown, lenticular, circular in outline, smooth, 11–22×6–10 µm; peripheral rim is pale coloured, appearing as a distinctive line in a side view. As Subramanian (1962) noted, no mitospores were seen attached, but should be considered produced singly and acrogenously.

Specimens examined

AUS022, AUS028, AUS035, AUS038, AUS071, AUS120, AUS126, AUS132, AUS140, AUS157, AUS159, AUS219, AUS228, AUS256, AUS268, AUS283, AUS294, AUS295, AUS296, AUS325, AUS333, AUS340, AUS341, AUS347, AUS348, AUS367, AUS368, AUS406, AUS407, AUS417, AUS430, AUS433, AUS435, AUS437, AUS439, AUS445, AUS450, AUS459, AUS462, AUS464, AUS482.

Notes

This is one of the most common species in the crane site collections. Subramanian (1962) examined the types of the four Spegazzini species of *Cordella* located in Herbarium SPEG (1886). He noted that *C. conidiosporioides* should be transferred to *Popularia*, but that the lenticular mitospores in the type material would place the species as a homonym of *C. vinosa* (Berkeley & MA Curtis) Mason (1933).

The mitospores in our material are consistent with those of *C. coniosporioides*, but somewhat smaller than those described for *C. vinosa*. The conidiophores are formed from a discrete mycelial growth and appear to be comprised of only a few cells. As noted by Subramanian (1962) and Mason (1933) the attachment of the mitospore to the conidiogenous cell is difficult to observe. Hyaline, multicellular, lanceolate structures more typical of the illustrated conidiophores (Subramanian 1962) were observed in the outer areas of the mycelial growth.

Periconiella Saccardo apud Saccardo & Berlese, *Atti Ist. Veneto Sci., Ser. 6,* 3: 727 (1885)

Periconiella hakeae Priest, *Mycol. Res.* 95: 926 (1991)

Description

Hyphae partly immersed and partly superficial; superficial hyphae septate, brown; conidiophore single without lateral branches, erect, brown and paler at the apices, septate, up to 240 µm in height and 8 µm wide diameter; primary and secondary branches formed at apex, cylindrical, pale brown; mitospores single, on polyblastic conidiogenous cells, cylindrical, elliptical, 0–3-septate, pale brown, with a basal scar, smooth, elliptical, 14–20×7–8 µm.

Specimens examined

AUS231, AUS258.

Notes

Priest (1991), described this species from Victoria. It was noted that the taxon is characterised by its pallid brown mitospores, which are smooth and wider than other Australian *Periconiella*.

Sporodesmium Link, *Mag. Ges. Nat. Freunde, Berlin* 3: 41 (1809)

Sporidesmium macrurum (Saccardo) M.B. Ellis, *Mycol. Paper* 70: 53 (1958)

Description

Mycelium superficial, non-hyphopodiate, non-setose; conidiophore percurrent, arising singly, terminally and laterally on the hypha, brown, with successive terminal proliferations; mitospores formed singly as blown out ends at apex of conidiophore, obclavate, brown–straw coloured, smooth, transversely septate, 3–5-celled, the two middle cells dark brown and the tapering cells are pale brown, 30–34×8–10 µm.

Specimen examined

AUS165.

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