Exhibit 4a, #18

Issued 10th February, 1987

Mycological Papers, No. 157

THE TUBEUFIACEAE AND SIMILAR LOCULOASCOMYCETES

by

AMY Y. ROSSMAN

Mycology Laboratory, Plant Protection Institute
United States Department of Agriculture
Agricultural Research Service
Beltsville Agricultural Research Center
Beltsville, Maryland 20705, USA

C·A·B INTERNATIONAL MYCOLOGICAL INSTITUTE

C.A.B. International Mycological Institute (CMI), Ferry Lane, Kew, Surrey TW9 3AF, UK.

A study of the f
presented based c
accepted in the T
in this paper: one
five species of dis
species are prov
Tubeufiaceae an
elsewhere. One
ciliata Rossman,
proposed as follo
Rossman, *Melioli*
(F. Stev.) Rossm
indica (Dharne &
(Rehm) Rossma
imperconspicua (
Hyalosphaera pu

Keywords: Ascon

Published by

C.A.B International,
Farnham Royal,
Slough SL2 3BN,
United Kingdom

Tel: Farnham Common (02814) 2281
Telex: 847964 (COMAGG G)
Telegrams: Comag, Slough
International Dialcom: 84: CAU001

ISSN 0027-5522
ISBN 0 85198 5807

Printed in Great Britain by the Cambrian News (Aberystwyth) Ltd

SUMMARY

A study of the fungi having fleshy, white to bright-coloured, uniloculate ascocarps with bitunicate asci is presented based on an examination of type specimens and all other available specimens. Fifty-three species are accepted in the Tubeufiaceae, Pleosporales. In addition, ten species similar to the Tubeufiaceae are included in this paper: one species in the Dimeriaceae, Pleosporales; four species in the Dothideaceae, Dothideales; and five species of discomycetes with bitunicate asci of uncertain disposition. Keys to sixteen genera and sixty-one species are provided. Thirty-six species are fully described and illustrated. The remaining species of Tubeufiaceae and similar Loculoascomycetes are discussed with reference to full descriptions found elsewhere. One new genus, *Uredinophila* Rossman, and three new species are established: *Hyalosphaera ciliata* Rossman, *Tubeufia albo-ostiolata* Rossman and *T. ovatum* Rossman. Seventeen new combinations are proposed as follows: *Pseudotrichia viburnicola* (Crouan & H. Crouan) Rossman, *Malacaria luxurians* (Rehm) Rossman, *Melioliphila winkleriana* (Henn.) Rossman, *Paranectriella arcuata* (Hansf.) Rossman, *P. miconiae* (F. Stev.) Rossman, *Puttemansia stromatica* (Cooke) Rossman, *P. stromaticola* (Henn.) Rossman, *Tubeufia indica* (Dharne & Müller) Rossman, *T. roraimensis* (Samuels & Müller) Rossman, *Uredinophila erinacea* (Rehm) Rossman, *U. tropicalis* (Speg.) Rossman, *Nematostoma hoehnelii* (Rehm) Rossman, *Hyalocrea imperconspicua* (Höhnel) Rossman, *H. jasmini* (Hansf.) Rossman, *H. meliolicola* (F. Stev.) Rossman, *Hyalosphaera pulchella* (F. Stev.) Rossman, & *Nematothecium horridum* (Pat.) Rossman

Keywords: Ascomycetes, bitunicate asci, fungicolous fungi, Loculoascomycetes, hyperparasites, Tubeufiaceae.

CONTENTS

INTRODUCTION

During a study of the long-spored, nectriaceous fungi, specimens were encountered that appeared superficially similar to members of the Hypocreales but had bitunicate asci. The presence of bitunicate asci is correlated with centrum characteristics such as lack of apical paraphyses and lack of periphyses, excluding them from the Hypocreales. Among the fungi with bitunicate asci, those with fleshy, white to bright-coloured, uniloculate ascocarps are considered here as members of the Tubeufiaceae and Dimericeace, Pleosporales, the Dothideaceae in the Dothideales and discomycetes with bitunicate asci of uncertain disposition. Keys to sixteen genera and sixty-one species are provided. All species of Tubeufiaceae and similar Loculoascomycetes are treated in this paper of which thirty-six species are fully described and illustrated. The remaining species are discussed with reference given to full descriptions found elsewhere.

Within the subdivision Ascomycotina species with bitunicate asci are herein considered to belong to the class Loculoascomycetes and those with unitunicate asci are placed in the Euascomycetes following Luttrell (1955) and Barr (1979, 1983). Eriksson (1984) and Hawksworth, *et al.* (1983) recognized only one class, Ascomycetes, most recently placed in the subdivision Ascomycotina (Eriksson & Hawksworth, 1985). Within the Ascomycotina Barr (1983) recognized six classes including the Tubeufiaceae in the Loculoasomycetes. She divided the Loculoascomycetes into two subclasses placing the Dothideales *sensu stricto* in the Loculoparenchemycetidae and the Pleosporales in the Loculoedaphomycetidae. The system of Barr (1983) is followed here recognizing the Tubeufiaceae and Dimeriaceae in the Pleosporales and the Dothideaceae in the Dothideales. This contrasts with the view of Eriksson (1984) and Hawksworth, *et al.* (1983) who include the Pleosporales *sensu* Barr within the Dothideales. These diverse systems of classification of Ascomycetes are reviewed by Hawksworth (1985).

The recognition of the Pleosporales as distinct from the Dothideales is based primarily on differences in centrum characteristics. Within the species considered here, members of the Tubeufiaceae and Dimeriaceae, Pleosporales, have numerous, clavate to cylindric asci and branched pseudoparaphyses which anastomose and fill the apical region of the locule. Members of the Dothideales generally have ascocarps smaller than those of the Pleosporales, short, obclavate to broadly cylindric asci, few asci per ascocarp and lack interthecial elements.

The first comprehensive account of the Tubeufiaceae, therein call the "hypocreoid Dothideales" as adapted from Petrak (1931), was presented by Pirozynski (1977). He reviewed the history of the group and proposed a tentative arrangement with four genera, largely based on literature. The family Tubeufiaceae was first erected by Barr (1979) who included six genera. She later synonymized one genus, added five more genera to the family, and described, discussed, and illustrated the North American species (Barr, 1980). Eriksson (1981) reviewed the developmental studies and phylogenetic position of the Tubeufiaceae within the Ascomycetes.

Generic limits within the Tubeufiaceae are not distinct. Traditionally, host and ascospore characteristics have been used. As a result species that appear to be related based on characters other than host and ascospores may be separated into different genera. In this paper the traditionally defined genera established by Pirozynski (1977) and Barr (1980) are maintained because so little information is known about these species. Increased knowledge of anamorphs and more complete host ranges may suggest new generic concepts.

All possible species of Tubeufiaceae referred to in major works on the family (Hansford, 1946; Pirozynski, 1977; Barr, 1980) have been accounted for. If a genus contained a species that was found to belong in the Tubeufiaceae, an attempt was made to examine the type specimens of all species in that genus. Taxa that were determined not to belong to the Tubeufiaceae or for which the type specimen could not be located are listed in a section at the end of this paper. Because fungi with bitunicate asci had previously been included in the Hypocreales, species described in the hypocrealean genera *Ophionectria* and *Calonectria* have been considered for possible inclusion in the Tubeufiaceae. Where available, type specimens of these taxa have been examined and the names have been accounted for in currently accepted taxa (Rossman, 1977, 1979, 1983).

Morphology and Terminology

Although resembling the Hypocreales superficially, members of the Tubeufiaceae and similar Loculoascomycetes can be differentiated macroscopically. Ascocarps of this group are hyaline, white, or yellow to pale peach, rarely, brick, brown or brown-vinaceous; they never contain scarlet pigments in the ascocarp wall itself. Species of Tubeufiaceae are not known to have a reaction observed in many of the nectrioid fungi in which the red colour of the ascocarp wall becomes dark purple in potassium hydroxide. In one species included here, *Nematostoma hoehnelii*, the peridial hairs are encrusted with a reddish pigment which dissolves in potassium hydroxide. Colour names are taken from Rayner (1970) using the modifying adjectives "pale" and "dark" to describe shades of a particular hue.

Members of the Tubeufiaceae and similar Loculoascomycetes generally have only a thin, hyphal stroma below and surrounding the ascocarps. A few species have a pseudoparenchymatous stroma described herein as "well-developed".

Eriksson (1981) describes the variation in ascal morphology and dehiscence found within the families of bitunicate ascomycetes and proposes terminology to be used. The asci of the species included here probably function by the "jack-in-the-box" mechanism described by Eriksson (1981), however, such dehiscence has been observed in only a few of the species discussed. In this paper the term "bitunicate" rather than "fissitunicate" is used to describe the asci characteristic of the Loculoascomycetes.

Within the Tubeufiaceae most species have long, hyaline, multiseptate ascospores. The exceptions are *Allonecte lagerheimii* and *Letendraea* species that have ellipsoid, one-septate ascospores and *Boerlagiomyces* species that have muriform ascospores. Species of *Malacaria* have smoke-grey ascospores while *Hyalosphaera miconiae* and *Nematothecium* species have pale umber to pale cinnamon ascospores.

Most species in the Tubeufiaceae do not have a proven anamorph, however, some species have been found growing in close proximity to possible anamorphs. Considering that many species of Tubeufiaceae are fungicolous, this is not conclusive evidence that these are states of the same species. Until proven by laboratory observation or frequent association, these connexions are noted but are considered circumstantial.

Geographic Distribution

Members of the Tubeufiaceae are generally inconspicuous and thus are collected infrequently. Many species are known only from their type specimen or from one or two collections; their known distribution probably reflects the collecting activities of mycologists rather than actual distribution. For example, *Malacaria luxurians* known only from the Philippines and Uganda may be pantropical. In general, species that occur on *Meliola* or fungi on living leaves are pantropical. Most species of Tubeufiaceae are tropical although some species of Tubeufiaceae are known primarily from temperate areas, namely *Letendraea helminthicola*, *Rebentischia massalongii*, *R. unicaudata*, *Tubeufia cerea* and *T. scopula*.

Substrate

Species in the Tubeufiaceae and similar Loculoascomycetes generally occur on or are closely associated with other fungi on decaying wood or on living leaves. The following species exist on meliolaceous fungi on living leaves: all species in the genera *Byssocallis*, *Malacaria* and *Melioliphila*; and *Paranectriella arcuata*, *P. minuta*, *Hyalocrea meliolicola*, *Hyalosphaera ciliata*, *H. pulchella*, *Nematothecium horridum* and *N. vinosum*. Several species occur on Uredinales on living leaves: *Paranectriella hemileae* on coffee rust, *Uredinophila erinacea* on a bamboo rust and *Uredinophila tropicalis* on a fern rust. *Auerswaldia*, *Microthyrium*, *Phaeodomus* and *Phyllachora*, all fungi with carbonous stromata on living leaves, are substrates for *Paranectriella juruana*, *P. miconiae*, *Puttemansia albolanata*, *P. hyperparasitica*, *P. rickiana*, *P. stromatica*, *P. stromaticola*, *Hyalocrea imperconspicua* and *H. epimyces*. *Allonecte lagerheimii*, *Nematostoma hoehnelii*, *Hyalocrea jasmini*, *Hyalosphaera miconiae* and *Puttemansia brachytricha* occur on leaf hairs or directly on the undersurface of living leaves. All *Boerlagiomyces*, *Letendraea*, *Rebentischia* and *Tubeufia* species are found on decaying

woody or herbaceous substrata often closely associated with carbonous pyrenomycetes. Members of the genus *Podonectria* occur on scale insects on living leaves. Several unrelated fungi which occur on hyphae on living leaves appear superficially similar to members of the Tubeufiaceae and Dothideaceae namely, species of the *Nectria leucorrhodina* group (Hypocreales) and *Calloriopsis gelatinosa* (Ellis & Everh.) Dennis, a discomycete with unitunicate asci. Species of the *Nectria leucorrhodina* group are differentiated from the Tubeufiaceae by small, thin-walled, pale luteous ascocarps and unitunicate asci.

Methodology

Specimens for this study were obtained from herbaria as noted using abbreviations according to Holmgren, *et al.* (1981). All specimens listed here have been examined. Dried herbarium specimens were rehydrated in water and mounted for microscopic examination in water or cotton blue in lactic acid. Measurements of ascospores and asci were made from water mounts. Sections 10-15 µm thick were made using a freezing microtome. Specimen data are translated into English wherever possible. Under the habitat citation host names and authors are listed according to their most recently accepted name, whereas under the list of specimens examined host names without authors are listed as they were on the herbarium packet.

SPECIES INCLUDED IN THE TUBEUFIACEAE AND SIMILAR LOCULOASCOMYCETES

PLEOSPORALES, TUBEUFIACEAE

**Allonecte lagerheimii* (Pat.) H. Sydow
**Boerlagiomyces laxus* (Penz. & Sacc.) Butzin
**B. velutinus* (Penz. & Sacc.) Butzin
Byssocallis capensis (Doidge) Rossman
B. phoebes H. Sydow
**Letendraea helminthicola* (Berk. & Broome) Weese ex Petch
**L. padouk* Nicot & Parquey-Leduc ex Parquey-Leduc
Malacaria luxurians (Rehm) Rossman, **comb. nov.**
M. meliolicola H. Sydow
Melioliphila appendiculata (Rehm) Rossman
M. balanseana (Berl. & Roum.) Piroz.
M. coralloides (Maubl.) Rossman
M. erysiphoides (Berl. & Roum.) Piroz.
M. melioloides (Speg.) Piroz.
M. volutella (Berk. & Broome) Rossman
M. winkleriana (Henn.) Rossman, **comb. nov.**
Paranectriella arcuata (Hansf.) Rossman, **comb. nov.**
P. hemileiae (Hansf.) Piroz.
P. juruana (Henn.) Henn. ex Piroz.
P. miconiae (F. Stev.) Rossman, **comb. nov.**
P. minuta (Hansf.) Piroz.
**Podonectria aurantii* (Höhnel) Petch
**P. coccicola* (Ellis & Everh.) Petch
**P. coccorum* (Petch) Rossman
**P. echinata* Petch
**P. gahnia* Dingley
**P. larvispora* (Cooke & Massee) Rossman
**P. novaezealandica* Dingley
**P. tenuispora* Dennis
Puttemansia albolanata (Speg.) Höhnel
P. brachytricha H. Sydow & Sydow
P. hyperparasitica (Sivan. & Kranz) Piroz.
P. rickiana (Sacc. & H. Sydow) Petrak
P. stromatica (Cooke) Rossman, **comb. nov.**
P. stromaticola (Henn.) Rossman, **comb. nov.**
**Rebentischia massalongii* (Mont.) Sacc.
**R. unicaudata* (Berk. & Broome) Sacc.
Tubeufia albo-ostiolata Rossman, **sp. nov.**
**T. amazonensis* Samuels, Rossman & Müller
**T. aurantiella* (Penz. & Sacc.) Rossman
**T. cerea* (Berk. & M. A. Curtis) Höhnel
**T. clintonii* (Peck) Barr
**T. cylindrothecia* (Seaver) Höhnel
**T. helicoma* (Phil. & Plowr.) Piroz.
T. indica* (Dharne & Müller) Rossman, **comb. nov.
T. ovatum Rossman, **sp. nov.**

*T. *palmarum* (Torrend) Samuels, Rossman & Müller
*T. *paludosa* (Crouan & H. Crouan) Rossman
*T. *pezizula* (Berk. & M. A. Curtis) Barr
*T. *roraimensis* (Samuels & Müller) Boise
*T. *scopula* (Cooke & Peck) Barr
Uredinophila erinacea (Rehm) Rossman, **comb. nov.**
U. tropicalis (Speg.) Rossman, **comb. nov.**

PLEOSPORALES, DIMERIACEAE

Nematostoma hoehnelii (Rehm) Rossman, **comb. nov.**

DOTHIDEALES, DOTHIDEACEAE

Hyalocrea epimyces H. Sydow & Sydow
H. imperconspicua (Höhnel) Rossman, **comb. nov.**
H. jasmini (Hansf.) Rossman, **comb. nov.**
H. meliolicola (F. Stev.) Rossman, **comb. nov.**

BRIGHT-COLOURED DISCOMYCETES WITH BITUNICATE ASCI

Hyalosphaera ciliata Rossman, **sp. nov.**
H. miconiae F. Stev.
H. pulchella (F. Stev.) Rossman, **comb. nov.**
Nematothecium horridum (Pat.) Rossman, **comb. nov.**
N. vinosum H. Sydow & Sydow

---

*These species are included in the keys but are not described and illustrated here; recent references to descriptions are cited under the discussion of each genus.

PLEOSPORALES, TUBEUFIACEAE

ALLONECTE H. Sydow

Annls mycol. **37**: 378 (1939).

Type: *Allonecte lagerheimii* (Pat.) H. Sydow.

This monotypic genus was well described and illustrated by Müller & von Arx (1962) and was mentioned by Rossman (1979) and Barr (1980). Known only from Ecuador, the dark red ascocarps of *A. lagerheimii* are covered with long, white, hyphal hairs. The ascocarps occur on living leaves attached by a basal foot which penetrates the leaf epidermis. The hyaline, ellipsoid ascospores are one-septate.

BOERLAGIOMYCES Butzin

Willdenowia **8:** 39 (1977).
Boerlagella Penz. & Sacc., *Malpighia* **11:** 404 (1897), *non* Pierre *ex* Boerlage (1981) (Sapotaceae).

Type: *Boerlagiomyces velutinus* (Penz. & Sacc.) Butzin.

Barr (1980) review *Boerlagiomyces* tentatively accepting two species, *B. velutinus* and *B. laxus* (Penz. & Sacc.) Butzin, both from Java on decaying wood or culms. According to Barr (1980), the dark, fleshy ascocarps on a well-developed, dark subiculum and elongate, muriform ascospores suggest that *Boerlagiomyces* species are related to *Tubeufia* sect. *Thaxteriella* (Petrak) Barr (≡*Thaxteriella* Petrak) having only transversely-septate ascospores. The presence of longitudinal septa in cells of the ascospores is considered a character important enough to distinguish this genus from *Tubeufia* sect. *Thaxteriella*. Another loculoascomycetous genus, *Thaxteriellopsis* Sivan., Panwar & Kaur may also be closely related to *Thaxteriella* but, like *Boerlagiomyces*, has muriform ascospores. I have not examined specimens of these genera.

BYSSOCALLIS H. Sydow

Annls mycol. **25:** 14 (1927).

Type: *Byssocallis phoebes* H. Sydow.

Ascocarps solitary to gregarious, superficial on substrate, with a thin hyphal stroma covering the host hyphae, luteous to sienna, not changing colour in KOH, globose to subglobose, walls smooth. *Ascocarp wall* in longitudinal section usually more than 20 µm wide of thin to slightly thick-walled, angular cells, outer cells encrusted with luteous granules. *Pseudoparaphyses* irregularly branching, anastomosing, up to 2 µm diam. *Asci* bitunicate, cylindric. *Ascospores* narrowly fusiform to narrowly clavate, ends often constricted, hyaline, multiseptate.

Byssocallis includes two species, *B. phoebes* and *B. capensis* (Doidge) Rossman, which are morphologically similar to species of *Melioliphila* except for the presence of luteous granules in the outer cell walls of the ascocarps and hyphae forming the stroma covering the host. *Byssocallis* was synonymized with *Puttemansia* by Petrak (1931) and Pirozynski (1977) based on the presence of "apiculate ascospores." In species of *Byssocallis*, *Melioliphila* and *Puttemansia*, ascospores may vary from broadly rounded to strongly constricted toward the ends. Thus the nature of the ascospore ends is not useful in distinguishing these three genera. The rounded ends of the ascospores of *Byssocallis*, *Melioliphila* and *Puttemansia* species differ from the cellular apiculi or appendages on ascospores of *Paranectriella* species. Species of *Byssocallis* occur on

FIGS 1-4.
hair, lect
ascospor

Meliola as do those of *Melioliphila* while *Puttemansia* species are found directly on living leaves or on the carbonous stroma of leaf inhabitants.

Key to species of Byssocallis

1 Ascocarps orange to sienna, with numerous, flexuous hyphae, encrusted with luteous granules, hyphae 45–120 × 6–10 μm; ascospores 32–42 × 5–8 μm, 4-septate ..... **B. capensis**
Ascocarps luteous, with long, hyaline setae 125–200 × 6–9 μm; ascospores 32–40 × 6–7 μm, 3-septate ..... **B. phoebes**

Byssocallis capensis (Doidge) Rossman, *Mycotaxon* **8:** 496 (1979).

Calonectria capensis Doidge, *Bothalia* **1:** 218 (1921).
Anamorph: None known, although conidia of an *Eriomycopsis* species are occasionally associated with these colonies.

Illustration: Fig. 1.

Ascocarps: Scattered, solitary, superficial on a thin, ochraceous, hyphal stroma; hyphae 3.5–4.5 μm diam, encrusted with luteous granules on outer surface, closely appressed to dark host hyphae and forming a network between host hyphae.

Ascocarps: Orange to sienna, not changing color when dry, globose to subglobose with a flattened or depressed apex, collabent when dry, 250–350 μm tall × 270–400 μm wide; ostiole present; ascocarps with numerous, flexuous hyphae, 45–120 × 6–10 μm, apices bluntly rounded, walls thin, encrusted with luteous granules, with thin septa, often constricted at each septum.

Ascocarp wall: In longitudinal section 25–35 μm wide, of two regions: outer region 15–25 μm wide, cells angular, 8–12 μm wide, thin-walled, with luteous granules on outer surface of walls and between cells; inner region 5–10 μm wide, cells elongate, 8–12 × 3–4 μm, thin-walled, without luteous granules; in surface view cells angular 8–12 μm wide, thin-walled, with luteous granules on walls.

Pseudoparaphyses: 1–2 μm diam, septate, irregularly branching, anastomosing.

Asci: Bitunicate, broadly clavate, 80–95 × 14–16 μm, eight spored, obliquely biseriate or multiseriate.

Ascospores: 32–42 × 5–8 μm, fusiform to clavate, usually widest slightly above the midpoint, straight or slightly curved, especially toward base, (2) 4-septate, tapering to rounded apex and narrowly rounded base, smooth, hyaline.

Type: Republic of South Africa: Cape Province, Humansdorf District, Storms, parasitic on *Irene podocarpi* on leaves of *Podocarpus elongata*, 15 May 1923, *Doidge* 17167, HOLOTYPE (**PREM**), ISOTYPE (**W**-no fungus found).

Host: Parasitic on colonies of *Irene podocarpi* (Doidge) Doidge on living leaves of *Podocarpus elongata* L'Herit. ex Pers.

Distribution: Republic of South Africa, known only from type collection.

Byssocallis capensis is related to *B. phoebes* and *Melioliphila* species but differs in having usually 4-septate ascospores and long, thin-walled, bluntly rounded, flexuous hairs on the ascocarps.

Byssocallis phoebes H. Sydow, *Annls mycol.* **25:** 14 (1927).

Puttemansia phoebes (H. Sydow) Petrak, *Annls mycol.* **29:** 343 (1931).
Anamorph: None known. Conidia of an *Eriomycopsis* are occasionally associated with these colonies.

Illustrations: Fig. 2, 38; Pirozynski (1977: figs. 2N, 2P).

Ascocarps: Scattered, solitary, superficial on a thin, ochraceous, hyphal stroma; hyphae 2.4–3.5 μm diam with walls up to 1 μm thick, often encrusted with luteous granules; erect setae similar to those on ascocarps

arising from stroma.

Ascocarps: Luteous, not changing colour when dry, luteous pigments becoming orange to scarlet in 3% KOH; ascocarps globose to subglobose with a flattened or depressed apex, partially collabent when dry, 250–350 µm tall × 250–350 µm wide; ostiole present; ascocarps with sparse to numerous, long, hyaline setae; setae curved to flexuous, with bluntly rounded apices, 125–200 µm long × 6–9 µm wide, developing from a basal cell, 14–20 µm diam, of outer ascocarp wall; setae with walls 2.5 µm thick except at thin-walled apex and lower side of basal cell, sometimes encrusted with luteous granules.

Ascocarp wall: In longitudinal section 25–35 µm wide, of angular to circular cells, 8–15 µm wide, cell walls hyaline, up to 1.5 µm thick, with luteous granules on outer surface of walls and between cells; in surface view cells angular, 7–10 µm wide, thin-walled, with luteous granular encrustations on walls.

Pseudoparaphyses: 1–2 µm diam, irregularly branching, anastomosing.

Asci: Bitunicate, broadly cylindric, 80–110 × 17–21 µm, constricted near base, eight ascospores per ascus, multiseriate.

Ascospores: 32–40 × 6–7 µm, fusiform to clavate, usually widest slightly above the midpoint, straight, sigmoid or curved, 3-septate, tapering to a rounded apex and narrowly rounded base, smooth with granular contents, hyaline.

Type: Costa Rica: Grecia, parasitic on mycelium of *Meliola* on living leaves of *Phoebe tonduzii*, 19 January 1925, [H. Sydow, *Fungi in itinere costaricensi collecti* 160a], LECTOTYPE (**FH**-general), ISOLECTOTYPES (**BPI**-two specimens, **S**).

Host: On colonies of *Meliola* sp. on living leaves of *Phoebe tonduzii* Mez.

Distribution: Costa Rica, known only from type collection.

Byssocallis phoebes is the type species of *Byssocallis*, a genus separated from *Melioliphila* by the presence of luteous granules on the ascocarps, setae and basal hyphae.

LETENDRAEA Sacc.

Michelia **2:** 73 (1880).

Type: *Letendraea helminthicola* (Berk. & Broome) Weese ex Petch.

The two species of *Letendraea* accepted by Barr (1980) have one-septate ascospores and thin-walled, white to pale luteous ascocarps. *Letendraea helminthicola* was described and illustrated by Müller & von Arx (1962) and Samuels (1973). Ascocarp development of a second species, *L. padouk* Nicot & Parquey-Leduc ex Parquey-Leduc, was described and illustrated by Parquey-Leduc (1959, 1967). Barr (1980) discussed the disposition of species excluded from *Letendraea*.

Key to species of Letendraea

1 Asci 60–85 × 10–13 µm; ascospores 12–15 × 4–5 µm ..... **L. helminthicola**
Asci 70–120 × 10–12 µm; ascospores 15–20 × 5–6 µm..... **L. padouk**

MALACARIA H. Sydow

Annls mycol. **28:** 69 (1930).

Type: *Malacaria flagellata* (Hansf.) Hansf. (=*M. meliolicola* H. Sydow).

Ascocarps scattered, solitary, superficial on substrate, with a thin stroma, dark luteous to brick, not changing colour in KOH, ovoid, walls smooth or with hairs. *Pseudoparaphyses* unbranched, septate. *Ascocarp wall* in longitudinal section usually less than 20 μm wide, of thin to thick-walled, angular to elongate cells. *Asci* bitunicate. *Ascospores* narrowly clavate, fusifom or cylindric, multiseptate, pale smoke-grey.

The genus *Malacaria* was described for *M. meliolicola* occurring on *Meliola* in Venezuela. The type specimen has not been located and may have been destroyed along with many other Sydow specimens. Sydow (1930) presented a detailed description of *Malacaria meliolicola* which agrees in several unique features with the description and type specimen of *M. flagellata*. Thus *M. flagellata* is considered a taxonomic synonym of *M. meliolicola*. In addition, the lectotype of *M. flagellata* is herein designated the neotype of *M. meliolicola*. *Malacaria* is unusual among the genera of Tubeufiaceae in the presence of pale smoke-grey ascospores and unbranched, septate pseudoparaphyses.

Key to species of Malacaria

1 Ascospores narrowly fusifom to cylindric, 30–175 × 2–2.5 μm, 11–15 septate ..... **M. luxurians**
Ascospores narrowly clavate with narrowly tapering basal end, 40–48 × 3–4.5 μm, 3-septate .....**M. meliolicola**

Malacaria luxurians (Rehm) Rossman, **comb. nov.**

Paranectria luxurians Rehm, *Leafl. Philipp. Bot.* **8**: 2924 (1916).
Malacaria entebbeensis Hansf., *Proc. Linn. Soc. Lond.* **157:** 26 (1945).
Anamorph: None known.

Illustration: Fig. 3.

Ascocarps: Scattered, solitary, superficial on a thin, hyphal stroma which forms a dense network obscuring the dark host hyphae.

Ascocarps: Sienna to rust, chestnut when dry, not changing color in KOH, globose to ovoid or short pyriform, not collapsing, cupulate or laterally pinched when dry, 125–170 μm tall × 100–150 μm wide, with conspicuous, broadly rounded papillae; ostiole present; ascocarp surface smooth.

Ascocarp wall: In longitudinal section 7–10 μm wide, of two regions: outer region 6–8 μm wide, two layers of elongate, angular cells, 6–8 μm long × 3–4 μm wide, cell walls pale luteous, up to 2 μm thick; inner region 3–4 μm wide, of thin-walled, hyaline, elongate, angular cells; in surface view cells, angular, elongate horizontally, 6–10 μm long × 4–6 μm wide.

Pseudoparaphyses: 1.5–2 μm wide, straight, unbranched, septate, extending beyond asci, filling centrum.

Asci: Bitunicate, narrowly cylindric, 100–130 μm, apex bluntly rounded to slightly flattened, eight ascospores per ascus, multiseriate.

Ascospores: 30–75 × 2–3 μm, narrowly fusiform to cylindric, often curved, sigmoid, with rounded apex, tapering to a narrowly rounded base, 11–15-septate, pale smoke-grey, smooth.

Type: Philippines: Province Laguna, Mt. Maquiling, near Los Baños, on *Meliola maesae* on leaves of *Maesa laxa*, April 1913, *C. F. Baker*. Several collections are listed in the protologue. The collection mentioned above was issued as *Paranectria luxurians* [C. F. Baker, *Fungi Malayana* 171]. The upper packet of *Fungi Malayana* 171 on the sheet at **BPI** is herein designated the LECTOTYPE specimen. Other specimens of this collection are ISOLECTOTYPES and were examined from **BPI, NY** and **S.**

Hosts: On *Meliola groteana* H. Sydow & Sydow (= *M. maesae* Rehm) and *M. artabotrydis* Hansf. on *Maesa laxa* Mez. and *Artabotrys nitidus* Engl.

Distribution: Philippines and Uganda.

Specimens: Philippines: Province Laguna, Los Baños, on *Meliola maesae* on leaves of *Maesa laxa,* January 1913, det. Baker, PARATYPE of *Paranectria luxurians,* [Rehm, *Ascomycetes 2116*] (**BPI, FH, NY, S**); as above, det. Eladio Sablan, comm. C. F. Baker 2882b, PARATYPE of *Paranectria luxurians* (**S**).—**Uganda**: Entebbe Road, on *Meliola artabotrydis* on *Artabotrys nitidus,* November 1943, *C. G. Hansford 3243, HOLOTYPE of Malacaria entebbeensis* (**BPI**).

Malacaria luxurians is a distinctive species that will probably be found more frequently as mycologists collect in tropical areas.

Malacaria meliolicola H. Sydow, *Annls mycol.* **28**: 69 (1930).

Paranectria flagellata Hansf., *Proc. Linn. Soc. London* **153**: 28 (1941).
Malacaria flagellata (Hansf.) Hansf., *Mycol. Pap.* **15**: 128 (1946).
Anamorph: None known.

Illustration: Fig. 4.

Ascocarps: Scattered, solitary, superficial on a thin, white stroma closely appressed to dark hyphae of host, hyphae of stroma thin-walled, 1–2 µm diam.

Ascocarps: Dark luteous to cinnamon or brick, dark brick when dry, not changing colour in KOH, ovate to elongate ovate with rounded apex, not collapsing when dry, 150–200 µm tall × 100–140 µm diam; conspicuous ostiole present; ascocarp surface smooth.

Ascocarp wall: In longitudinal section 12–17 µm wide, of two regions: outer region 8–12 µm wide, of 3–4 layers of angular, slightly elongate cells, 3–4 µm wide × 4–7 µm long, walls ochraceous, up to 1.5 µm thick; inner region 4–7 µm wide, of hyaline, elongate cells lining centrum; in surface view cells angular 6–15 µm diam, with orange walls up to 1.5 µm thick.

Pseudoparaphyses: Unbranched, up to 120 µm long, tapering from 1.5–2 µm at base to 1 µm at apex, septate, ends free, bluntly rounded.

Asci: Bitunicate, narrowly clavate to broadly cylindric, 44–56 × 10–12 µm, apex bluntly rounded to slightly flattened, eight ascospores per ascus, multiseriate.

Ascospores: 40–48 × 3–4.5, narrowly clavate with elongate basal end, ends bluntly rounded, 3-septate, smooth, pale smoke-grey, parallel in asci.

Type: Uganda: Kampala, on *Irenina glabra* on leaves of *Coffea robusta*, elev. 4000', June 1936, *C. G. Hansford* 1871, LECTOTYPE of *Paranectria flagellata*, also NEOTYPE of *Malacaria meliolicola* (K). Hansford (1941) listed two specimens in the protologue of *P. flagellata*, one of which is herein designated the LECTOTYPE. In addition, the type specimen of *Malacaria meliolicola* apparently no longer exists. The lectotype specimen of *P. flagellata* is herein designated the NEOTYPE of *M. meliolicola*.

Host: On *Irenina glabra* (Berk. & M. A. Curtis) F. Stev. on *Coffea robusta* L. Linden.

Distribution: Uganda and Venezuela.

Malacaria meliolicola appears similar to *Nematothecium vinosum* H. Sydow & Sydow and *Hyalosphaera miconiae* F. Stev., both discomycetes with coloured, narrowly clavate ascospores and bitunicate asci. *Malacaria meliolicola* is distinguished from these species by the presence of cellular, thick-walled ascocarps and long, unbranched pseudoparaphyses.

MELIOLIPHILA Speg.

Boln Acad. nac. Cienc. Cordoba **25 (26)**: 344 (1924) ["1923"].
Subiculicola Speg., *Boln Acad. nac. Cienc. Cordoba* **25 (26)**: 347 (1924) ["1923"].

Type: *Melioliphila volutella* (Berk. & Broome) Rossman (=*M. graminicola* (F. Stev.) Speg., ≡ *Calonectria graminicola* F. Stev.).

Ascocarps solitary to gregarious, superficial on substrate, with a thin hyphal stroma covering the host hyphae. *Ascocarps* white to pale luteous, not changing colour in KOH, globose to subglobose, walls smooth or with hairs. *Ascocarp wall* in longitudinal section usually more than 20 μm wide, of thin to thick-walled, angular cells. *Pseudoparaphyses* irregularly branching, anastomosing, thin, up to 2 μm diam, often extending beyond asci, filling ascocarp centrum. *Asci* bitunicate, narrowly cylindric. *Ascospores* fusiform to clavate, ends broadly rounded or slightly constricted, multiseptate, hyaline.

The genus *Melioliphila* was included by Pirozynski (1977) in the "hypocreoid Dothideales" and later by Barr (1980) in the Tubeufiaceae. Pirozynski included *Subiculicola* as a synonym of *Melioliphila* based on Höhnel (1910) who discussed the relationship of *Calonectria ambigua* Speg., the type of *Subiculicola*, with *Paranectria lanosa*, now considered *Puttemansia albolanata*. This synonymy is confirmed based on an examination of the type specimen of *C. ambigua* which is determined to be a synonym of *M. volutella*. Pirozynski also listed *Amphinectria* Speg. as a synonym of *Melioliphila* citing Petrak (1951). Based on an examination of the type specimen, Petrak concluded that *A. portoricensis*, the type species of *Amphinectria*, is a lichen. My examination of the type specimen of *A. portoricensis* revealed a lack of any ascocarps which resembled the described fungus, thus the accurate identity of the species and its possible synonymy remain obscure.

Pirozynski (1977) cites *Melioliphila melioloides* (Speg.) Piroz. as the type of *Melioliphila* based on its synonymy with the type species, *Calonectria graminicola*. After an examination of type specimens, *M. volutella* was found to be the oldest epithet for the species of which *C. graminicola* is a synonym. *M. melioloides* is described as a species distinct from *M. volutella*.

Key to species of Melioliphila

1 Ascocarps ochraceous to fulvous with long, flexuous hairs ..... **M. erysiphoides**
Ascocarps white or pale luteous, with or without hairs 2

2(1) Ascocarps smooth, without hairs ..... **M. balanseana**
Ascocarps with hairs 3

3(2) Ascocarps with long, straight, thick-walled, pointed hairs, walls greater than 3μm thick 4
Ascocarps with various kinds of hairs, either coralloid, or long, straight, thin-walled hairs 6

4(3) Spores 5–9-septate, 40–85 × 4–5 μm ..... **M. winkleriana**
Spores 3-septate 5

5(4) Ascocarps translucent, with thick-walled hairs forming a ring around ascocarp opening and long hairs near base of ascocarp ..... **M. appendiculata**
Ascocarps opaque, with long, straight hairs scattered over ascocarp wall ..... **M. volutella**

6(3) Ascocarps with coralloid hairs that are dichotomously branched toward the apices ..... **M. coralloides**
Ascocarps with unbranched hairs, walls up to 1.5 μm thick, hairs cylindric with bluntly rounded apices ..... **M. melioloides**

Melioliphila appendiculata (Rehm) Rossman, *Mycotaxon* **8**: 488 (1979).

Calonectria appendiculata Rehm, *Hedwigia* **37**: 197 (1898).

Anamorph: Both *Chionomyces meliolicola* (Cif.) Deighton & Piroz. and an *Eriomycopsis* species were associated with specimens of *Melioliphila appendiculata*.

Ilustrations: Fig 5; Wollenwebr (1916: fig. 805 as *Calonectria appendiculata*).

FIGS 5-8. 5. ascospores **FH**-Patouil

Speg., ≡ *Calonectria*

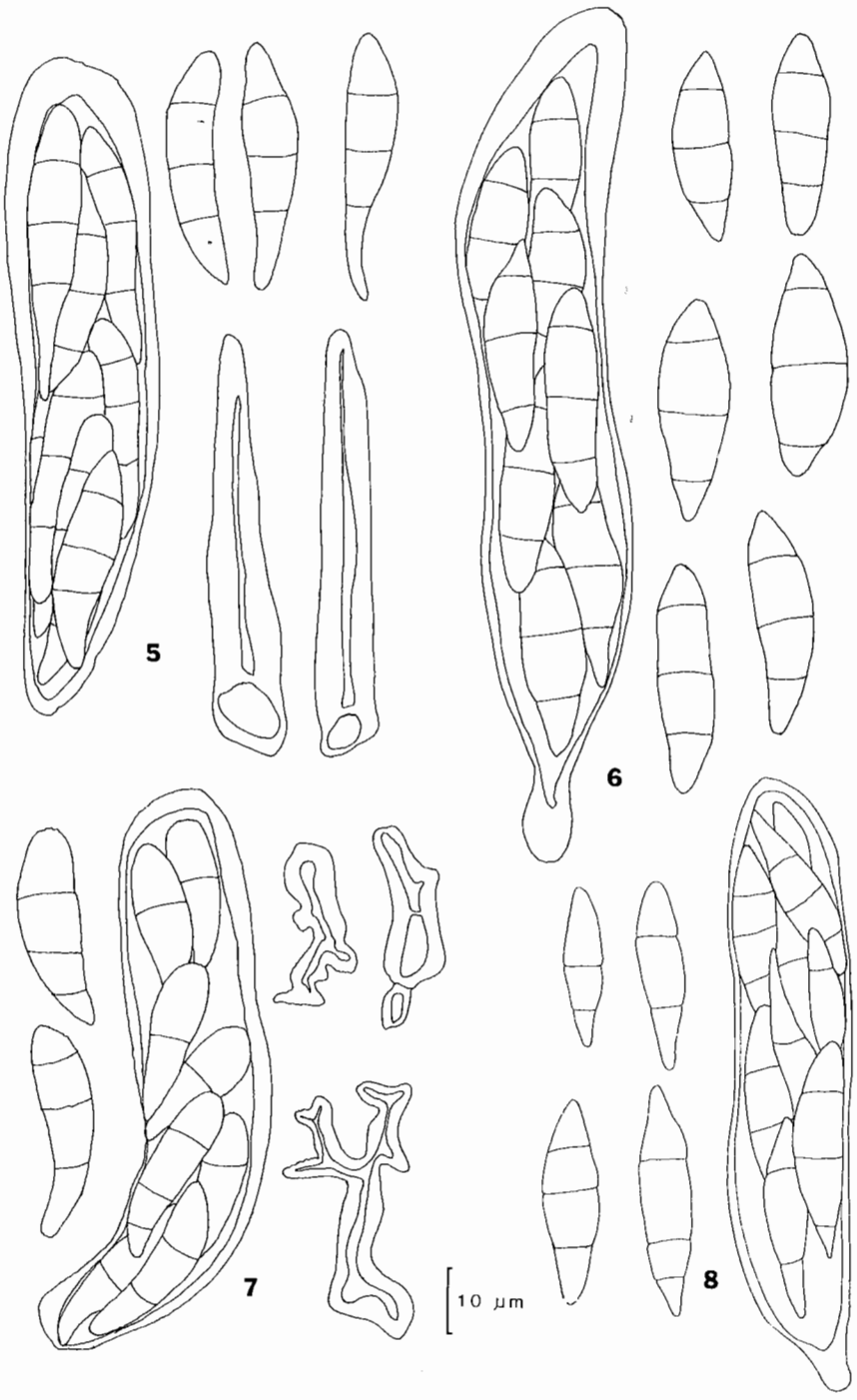
ıa covering the host
globose, walls smooth
thin to thick-walled,
liam, often extending
; fusiform to clavate,

les" and later by Barr
iila based on Höhnel
cola, with *Paranectria*
ın examination of the
Pirozynski also listed
amination of the type
ia, is a lichen. My
which resembled the
ny remain obscure.

ioliphila based on its
ɔecimens, *M. volutella*
/m. *M. melioloides* is

.....**M. erysiphoides**
..... 2
..... **M. balanseana**
..... 3
ım thick 4
alled hairs 6
....**M. winkleriana**
..... 5
opening and long hairs
..... **M. appendiculata**
.....**M. volutella**
ɔes .....**M. coralloides**
ic with bluntly
.....**M. melioloides**

ımycopsis species were



FIGS 5-8. 5, *Melioliphila appendiculata*, ascus, ascospores and ascocarp hair, **IMI** 39731*b*. 6, *Melioliphila balanseana*, ascus and ascospores, isolectotype **FH**-Patouillard. 7, *Melioliphila coralloides*, ascospores, ascus and ascocarp hairs, holotype **FH**-Patouillard. 8, *Melioliphila erysiphoides*, ascus and ascospores, **PREM** 42538.

Ascocarps: Scattered, solitary or in small groups, superficial on a thin, white stroma, hyphae thin-walled, closely appressed to dark host hyphae, stromal hyphae radiating from base of ascocarp.

Ascocarps: White to pale luteous, often slightly pinkish, pale luteous to luteous when dry, translucent, globose to subglobose with a flattened or slightly depressed apex, partially collabent when dry, 270–300 µm diam, without distinct ostiole, with hairs; short hairs scattered on surface of ascocarp wall forming a ring around the ostiole; long hairs arising from ascocarp base; short hairs 24–47 (–70) µm long, tapering from 7–10 (–15) µm at base to 3–5 µm at apex, ends rounded, walls 4–5 µm thick, lumen narrow; basal hairs 6–7 µm wide with walls up to 2 µm thick.

Ascocarp wall: In longitudinal section 10–25 µm wide, of angular to elongate cells 5–10 µm wide, cell walls thin, 1–1.5 µm thick; in surface view cells angular, 5–8 µm wide, thin-walled.

Pseudoparaphyses: Thin, up to 2 µm thick, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, broadly cylindric to slightly clavate, 100–120 × 15–18 µm, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 36–44 × 6.5–8 µm, fusiform to clavate, widest above midpoint, sometimes sigmoid or curved, 3–(5-) septate, ends pointed to slightly apiculate or truncate, minutely roughened to granular.

Type: Brazil: On *Meliola* on leaves of Euphorbiaceae, *Ule* 927, LECTOTYPE (**FH**-Höhnel). The type specimen at **FH** was designated LECTOTYPE by Rossman (1979).

Hosts: On *Meliola* spp. including *M. coffeae* Hansf., *M. mitragynicola* Deighton var. *leonensis* (Hansf. & Deighton) Deighton (= *M. canthii* Hansf. var. *leonensis* Hansf.) and *M. simillima* Ellis & Everh. on *Coffea arabica* Linn., *Mitragyna macrophylla* Hiern. (=*M. stipulosa* Kuntze), *Oncinotis* sp., *Psychotria vogeliana* Berth., *Rauwolfia vomitaria* Afzel. and unknown Euphorbiaceae.

Distribution: Brazil, Ghana, Sierra Leone and Togo.

Specimens: Ghana (Gold Coast): Agona near Tarkwa, on *Meliola* on *Oncinotis* cf. *campanulata* (Apocynaceae), 12 May 1949, *S. J. Hughes* 661 (**IMI 44394e**).—**Sierra Leone:** Gegburema, Tunkin, on *Meliola coffea* on *Coffea arabica*, 27 October 1947, coll. *C. T. Pyne* M6373, as *Calonectria* sp. (**IMI** 61721d); Gbiuti, Dahia, on *Meliola simillima* on *Rauwolfia vomitaria*, 31 January 1954, *F.C. Deighton* M5790 (E), associated with *Eriomycopsis* sp. (**IMI** 56523e); Kangehmn, Gasdnia, on *Meliola* on *Mitragyna stipulosa*, associated with *Eriomycopsis*, 7 February 1954, *F.C. Deighton* M5791 (f), (**IMI** 56524f); Makali, Kunike Barina, on *Meliola canthii* var. *leonensis* on *Mitragyna stipulosa*, 8 February 1945, *F.C. Deighton* M2398 pp (**IMI** 25516b).—**Togo:** Jasikan, on *Meliola* on *Psychotria vogeliana* (Rubiaceae), 27 May 1949, *S.J. Hughes* 890, [Gold Coast Mycological Herbarium 525b] (**IMI** 39731b).

Melioliphila appendiculata is similar to *M. volutella* in the presence of straight, thick-walled hairs on the ascocarp. The hairs of *M. appendiculata* generally are shorter with rounded apices, the ascocarps are smaller, translucent collapsing when dry, and no setae arise from the byssoid stroma as in *M. volutella*.

Exsiccati specimens issued as *Calonectria appendiculata* [Rehm, *Ascomyceten* 1689 (**BPI, CUP** and Theissen, *Decades Fungorum Brasiliensium* 149 (**BPI**)] are *Melioliphila balanseana* (Berl. & Roum.) Piroz.

Melioliphila balanseana (Berl. & Roum.) Piroz., *Kew Bull.* **31:** 596 (1977).

Calonectria balanseana Berl. & Roum., *Revue Mycol.* **10:** 77 (1888).
Calonectria melioloides Speg. f. *microspora* Rehm, *Hedwigia* **37:** 196 (1898).
Calonectria gyalectoidea Rhem, *Hedwigia* **37:** 197 (1898).
Calonectria warburgiana Henn. in O. Warburg, *Monsunia* **1:** 25 (1899).
Calonectria ambigua Speg. var. *exappendiculata* Speg., *An. Soc. cient. argent.* **33:** 475 (1919).
Calonectria meliolae Hansf., *Proc. Linn Soc. Lond.* **153:** 33 (1941).
Associated anamorph: *Chionomyces meliolicola* (Cif.) Deighton & Piroz., *Mycol. Pap.* **128:** 75 (1972). (=*Eriomycopsis meliolae* Hansf., *Bothalia* **4:** 468 (1942)).

Illustrations: Figs 6, 39; Pirozynski (1977: figs. 1L as *M. ?adianti*, 1M, pl. 27D).

Ascocarps: Scattered, solitary or in small groups, superficial on a white stroma of thin hyphae; hyphae closely

appressed to dark hyphae of host, sometimes filling area between host hyphae, stromal hyphae often radiating from base of ascocarp.

Ascocarps: White to pale luteous, often slightly pinkish, pale luteous to luteous when dry, globose to subglobose with a flattened or depressed apex, slightly collabent when dry, 400–500 µm tall × 350–500 µm diam, without distinct ostiole, centrum contents exposed by wearing away of ascocarp apex, ascocarp surface smooth, slightly roughened when dry.

Ascocarp wall: In longitudinal section 50–75 µm wide, of angular to circular cells, 12–18 µm wide, walls 1–2.5 µm thick; in surface view cells angular, 12–18 µm, thin-walled.

Pseudoparaphyses: 1–2 µm diam, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, narrowly clavate to broadly cylindric, 120–140 × 14–15 µm, constricted at base, eight ascospores per ascus, obliquely biseriate.

Ascospores: 26–40 × 6.5–9 µm, clavate to fusiform, widest above midpoint, sometimes sigmoid or curved, 3–(5-) septate, ends often slightly apiculate, minutely roughened, hyaline.

Type: Philippines: Tonkino, Mt. Vavi near Tu-Pha, on the upper surface of living leaves of *Bambusa*, December 1887, *B. Balansa*, [C. Roumeguère, *Fungi selecti exsiccatae* 4452], type of *Calonectria balanseana*, LECTOTYPE (**NY**), ISOLECTOTYPE (**BPI, BR, FH-**Patouillard, **FH-**exsiccatae, **M**).

Hosts: On *Meliola* spp. including *M. rhois* Henn. and *M. tecleae* Hansf. on living leaves of *Bambusa* sp., *Geonoma gastoniana* Glas. ex Drude, *Rhus glaucescens* A. Reich., *Serjania* sp., *Toddalia nobilis* Hook. (=*Teclea nobilis* Delile) and unidentified members of the Lauraceae, Myrtaceae and Sapindaceae.

Distribution: Brazil, Paraguay and Uganda.

Specimens: Brazil: Apiahy, on living leaves of Lauraceae, July 1881, *J. Puiggari* 1507 (1661) (**FH-**Patouillard), although this specimen is the ISOTYPE of *Calonectria ambigua*, the fungus at **FH** is different from the HOLOTYPE at LPS which is *Melioliphila volutella*; Apiahy, on living leaves of Sapindaceae, January 1888, *J. Puiggari* 1507, HOLOTYPE of *C. ambigua* var. *exappendiculata* (**LPS-**1660); Estado de Sta. Catherine, on *Geonoma gastoniana*, February 1901, *E. Ule*, Herbarium Brasiliense 1754, labelled *Calonectria ferruginea* (**BPI**); Sao Leopoldo, on leaves of Myrtaceae, *Theissen* 1907, as *Calonectria melioloides* (**PACA-**12787); Sao Leopoldo, Rio Grande do Sul, on the upperside of leaves of Sapindaceae, July 1907, *Rick* [Rehm, *Ascomycetes* 1745], type of *Calonectria gyalectoides*, HOLOTYPE (**S**), ISOTYPE (**BPI, C, FH-**general, **FH-**Höhnel, **PACA, W**); Sao Leopoldo, Rio Grande do Sul, on living leaves, September 1906, *Rick* [Rehm, *Ascomycetes* 1689 as *Calonectria appendiculata*] (**B**), at **BPI** this number contains *M. volutella*; Sao Leopoldo, on *Serjania* sp., 1908, *F. Theissen* [Theissen, *Decades fungorum brasiliensium* 149 as *Calonectria appendiculata*] (**BPI**); as above, as *C. tubaroensis* (**GZU**).—**Paraguay:** Guarapi, on Sapindaceae, July 1883, *Balansa* 3796, type of *Calonectria melioloides* f. *microspora*, LECTOTYPE (**LPS**), ISOLECTOTYPE (FH-Höhnel); Guarapi, on Myrtaceae, November 1883, *Balansa* 4017, mistakenly labelled "type" of *Calonectria melioloides* (**LPS-**1674); Guarapi, on living leaves of Sapindaceae, January 1883, *Balansa*, [Roumeguère, *Fungi gallici exsiccati* 4047 issued as *Calonectria guarapiensis*] (**NY**).—**Uganda:** Kazi, Kampala, on *Meliola tecleae* on leaves of *Teclea nobilis, Hansford* 1909, HOLOTYPE of *Calonectria meliolae* and *Eriomycopsis meliolae* (**K**); Entebbe Road, on *Meliola tecleae* on *Teclea nobilis*, November 1943, *C. G. Hansford* 3304, authentic specimens of *Calonectria meliolae* and *Eriomycopsis meliolae* (**BPI, DAOM, GZU, PREM**); Kazi, Kampala, on *Meliola rhois* on *Rhus glaucescens*, July 1942, *C. G. Hansford* 3081, with conidia of *Eriomycopsis meliolae* (**BPI**).

Melioliphila balanseana and *M. volutella* are the most frequently encountered species of *Melioliphila*. Both species are pantropical occurring on black hyphae of *Meliola* on living leaves. *Melioliphila balanseana* is distinguished from other *Melioliphila* species by ascocarps that lack any kind of hairs. The associated anamorph was found among ascocarps of *M. balanseana* on the type specimen of *C. meliolae* and other specimens. Deighton & Pirozynski (1972) also found ascocarps of *Melioliphila balanseana* cited as *Calonectria meliolae* associated with this anamorph.

Melioliphila coralloides (Maubl.) Rossman, *Mycotaxon* **9:** 500 (1979).

Calonectria coralloides Maubl., *Bolm Agric., S Paulo* **16:** 315 (1915).
Paranectria coralloides (Maubl.) Hansf., *Mycol. Pap.* **15:** 130 (1946).
Anamorph: None known.

Illustrations: Fig. 7; Maublanc (1920: pl. 3, figs. 5–8 as *Calonectria coralloides*).

Ascocarps: Scattered, solitary or in small groups, superficial on dark host hyphae; hyphae radiating from base of ascocarps.

Exhibit 4a, #18

Issued 10th February, 1987

Mycological Papers, No. 157

THE TUBEUFIACEAE AND SIMILAR LOCULOASCOMYCETES

by

AMY Y. ROSSMAN

Mycology Laboratory, Plant Protection Institute
United States Department of Agriculture
Agricultural Research Service
Beltsville Agricultural Research Center
Beltsville, Maryland 20705, USA

C·A·B INTERNATIONAL MYCOLOGICAL INSTITUTE

C.A.B. International Mycological Institute (CMI), Ferry Lane, Kew, Surrey TW9 3AF, UK.

A study of the fi
presented based o
accepted in the Tı
in this paper: one
five species of disc
species are provi
Tubeufiaceae an
elsewhere. One
ciliata Rossman, T
proposed as follo
Rossman, *Melioli*
(F. Stev.) Rossm
indica (Dharne &
(Rehm) Rossmar
imperconspicua (
Hyalosphaera pul

Keywords: Ascom

Published by

C.A.B International,
Farnham Royal,
Slough SL2 3BN,
United Kingdom

Tel: Farnham Common (02814) 2281
Telex: 847964 (COMAGG G)
Telegrams: Comag, Slough
International Dialcom: 84: CAU001

ISSN 0027-5522
ISBN 0 85198 5807

Printed in Great Britain by the Cambrian News (Aberystwyth) Ltd

SUMMARY

A study of the fungi having fleshy, white to bright-coloured, uniloculate ascocarps with bitunicate asci is presented based on an examination of type specimens and all other available specimens. Fifty-three species are accepted in the Tubeufiaceae, Pleosporales. In addition, ten species similar to the Tubeufiaceae are included in this paper: one species in the Dimeriaceae, Pleosporales; four species in the Dothideaceae, Dothideales; and five species of discomycetes with bitunicate asci of uncertain disposition. Keys to sixteen genera and sixty-one species are provided. Thirty-six species are fully described and illustrated. The remaining species of Tubeufiaceae and similar Loculoascomycetes are discussed with reference to full descriptions found elsewhere. One new genus, *Uredinophila* Rossman, and three new species are established: *Hyalosphaera ciliata* Rossman, *Tubeufia albo-ostiolata* Rossman and *T. ovatum* Rossman. Seventeen new combinations are proposed as follows: *Pseudotrichia viburnicola* (Crouan & H. Crouan) Rossman, *Malacaria luxurians* (Rehm) Rossman, *Melioliphila winkleriana* (Henn.) Rossman, *Paranectriella arcuata* (Hansf.) Rossman, *P. miconiae* (F. Stev.) Rossman, *Puttemansia stromatica* (Cooke) Rossman, *P. stromaticola* (Henn.) Rossman, *Tubeufia indica* (Dharne & Müller) Rossman, *T. roraimensis* (Samuels & Müller) Rossman, *Uredinophila erinacea* (Rehm) Rossman, *U. tropicalis* (Speg.) Rossman, *Nematostoma hoehnelii* (Rehm) Rossman, *Hyalocrea imperconspicua* (Höhnel) Rossman, *H. jasmini* (Hansf.) Rossman, *H. meliolicola* (F. Stev.) Rossman, *Hyalosphaera pulchella* (F. Stev.) Rossman, & *Nematothecium horridum* (Pat.) Rossman

Keywords: Ascomycetes, bitunicate asci, fungicolous fungi, Loculoascomycetes, hyperparasites, Tubeufiaceae.

CONTENTS

INTRODUCTION

During a study of the long-spored, nectriaceous fungi, specimens were encountered that appeared superficially similar to members of the Hypocreales but had bitunicate asci. The presence of bitunicate asci is correlated with centrum characteristics such as lack of apical paraphyses and lack of periphyses, excluding them from the Hypocreales. Among the fungi with bitunicate asci, those with fleshy, white to bright-coloured, uniloculate ascocarps are considered here as members of the Tubeufiaceae and Dimericeace, Pleosporales, the Dothideaceae in the Dothideales and discomycetes with bitunicate asci of uncertain disposition. Keys to sixteen genera and sixty-one species are provided. All species of Tubeufiaceae and similar Loculoascomycetes are treated in this paper of which thirty-six species are fully described and illustrated. The remaining species are discussed with reference given to full descriptions found elsewhere.

Within the subdivision Ascomycotina species with bitunicate asci are herein considered to belong to the class Loculoascomycetes and those with unitunicate asci are placed in the Euascomycetes following Luttrell (1955) and Barr (1979, 1983). Eriksson (1984) and Hawksworth, *et al.* (1983) recognized only one class, Ascomycetes, most recently placed in the subdivision Ascomycotina (Eriksson & Hawksworth, 1985). Within the Ascomycotina Barr (1983) recognized six classes including the Tubeufiaceae in the Loculoasomycetes. She divided the Loculoascomycetes into two subclasses placing the Dothideales *sensu stricto* in the Loculoparenchemycetidae and the Pleosporales in the Loculoedaphomycetidae. The system of Barr (1983) is followed here recognizing the Tubeufiaceae and Dimeriaceae in the Pleosporales and the Dothideaceae in the Dothideales. This contrasts with the view of Eriksson (1984) and Hawksworth, *et al.* (1983) who include the Pleosporales *sensu* Barr within the Dothideales. These diverse systems of classification of Ascomycetes are reviewed by Hawksworth (1985).

The recognition of the Pleosporales as distinct from the Dothideales is based primarily on differences in centrum characteristics. Within the species considered here, members of the Tubeufiaceae and Dimeriaceae, Pleosporales, have numerous, clavate to cylindric asci and branched pseudoparaphyses which anastomose and fill the apical region of the locule. Members of the Dothideales generally have ascocarps smaller than those of the Pleosporales, short, obclavate to broadly cylindric asci, few asci per ascocarp and lack interthecial elements.

The first comprehensive account of the Tubeufiaceae, therein call the "hypocreoid Dothideales" as adapted from Petrak (1931), was presented by Pirozynski (1977). He reviewed the history of the group and proposed a tentative arrangement with four genera, largely based on literature. The family Tubeufiaceae was first erected by Barr (1979) who included six genera. She later synonymized one genus, added five more genera to the family, and described, discussed, and illustrated the North American species (Barr, 1980). Eriksson (1981) reviewed the developmental studies and phylogenetic position of the Tubeufiaceae within the Ascomycetes.

Generic limits within the Tubeufiaceae are not distinct. Traditionally, host and ascospore characteristics have been used. As a result species that appear to be related based on characters other than host and ascospores may be separated into different genera. In this paper the traditionally defined genera established by Pirozynski (1977) and Barr (1980) are maintained because so little information is known about these species. Increased knowledge of anamorphs and more complete host ranges may suggest new generic concepts.

All possible species of Tubeufiaceae referred to in major works on the family (Hansford, 1946; Pirozynski, 1977; Barr, 1980) have been accounted for. If a genus contained a species that was found to belong in the Tubeufiaceae, an attempt was made to examine the type specimens of all species in that genus. Taxa that were determined not to belong to the Tubeufiaceae or for which the type specimen could not be located are listed in a section at the end of this paper. Because fungi with bitunicate asci had previously been included in the Hypocreales, species described in the hypocrealean genera *Ophionectria* and *Calonectria* have been considered for possible inclusion in the Tubeufiaceae. Where available, type specimens of these taxa have been examined and the names have been accounted for in currently accepted taxa (Rossman, 1977, 1979, 1983).

Morphology and Terminology

Although resembling the Hypocreales superficially, members of the Tubeufiaceae and similar Loculoascomycetes can be differentiated macroscopically. Ascocarps of this group are hyaline, white, or yellow to pale peach, rarely, brick, brown or brown-vinaceous; they never contain scarlet pigments in the ascocarp wall itself. Species of Tubeufiaceae are not known to have a reaction observed in many of the nectrioid fungi in which the red colour of the ascocarp wall becomes dark purple in potassium hydroxide. In one species included here, *Nematostoma hoehnelii*, the peridial hairs are encrusted with a reddish pigment which dissolves in potassium hydroxide. Colour names are taken from Rayner (1970) using the modifying adjectives "pale" and "dark" to describe shades of a particular hue.

Members of the Tubeufiaceae and similar Loculoascomycetes generally have only a thin, hyphal stroma below and surrounding the ascocarps. A few species have a pseudoparenchymatous stroma described herein as "well-developed".

Eriksson (1981) describes the variation in ascal morphology and dehiscence found within the families of bitunicate ascomycetes and proposes terminology to be used. The asci of the species included here probably function by the "jack-in-the-box" mechanism described by Eriksson (1981), however, such dehiscence has been observed in only a few of the species discussed. In this paper the term "bitunicate" rather than "fissitunicate" is used to describe the asci characteristic of the Loculoascomycetes.

Within the Tubeufiaceae most species have long, hyaline, multiseptate ascospores. The exceptions are *Allonecte lagerheimii* and *Letendraea* species that have ellipsoid, one-septate ascospores and *Boerlagiomyces* species that have muriform ascospores. Species of *Malacaria* have smoke-grey ascospores while *Hyalosphaera miconiae* and *Nematothecium* species have pale umber to pale cinnamon ascospores.

Most species in the Tubeufiaceae do not have a proven anamorph, however, some species have been found growing in close proximity to possible anamorphs. Considering that many species of Tubeufiaceae are fungicolous, this is not conclusive evidence that these are states of the same species. Until proven by laboratory observation or frequent association, these connexions are noted but are considered circumstantial.

Geographic Distribution

Members of the Tubeufiaceae are generally inconspicuous and thus are collected infrequently. Many species are known only from their type specimen or from one or two collections; their known distribution probably reflects the collecting activities of mycologists rather than actual distribution. For example, *Malacaria luxurians* known only from the Philippines and Uganda may be pantropical. In general, species that occur on *Meliola* or fungi on living leaves are pantropical. Most species of Tubeufiaceae are tropical although some species of Tubeufiaceae are known primarily from temperate areas, namely *Letendraea helminthicola*, *Rebentischia massalongii*, *R. unicaudata*, *Tubeufia cerea* and *T. scopula*.

Substrate

Species in the Tubeufiaceae and similar Loculoascomycetes generally occur on or are closely associated with other fungi on decaying wood or on living leaves. The following species exist on meliolaceous fungi on living leaves: all species in the genera *Byssocallis*, *Malacaria* and *Melioliphila*; and *Paranectriella arcuata*, *P. minuta*, *Hyalocrea meliolicola*, *Hyalosphaera ciliata*, *H. pulchella*, *Nematothecium horridum* and *N. vinosum*. Several species occur on Uredinales on living leaves: *Paranectriella hemileae* on coffee rust, *Uredinophila erinacea* on a bamboo rust and *Uredinophila tropicalis* on a fern rust. *Auerswaldia*, *Microthyrium*, *Phaeodomus* and *Phyllachora*, all fungi with carbonous stromata on living leaves, are substrates for *Paranectriella juruana*, *P. miconiae*, *Puttemansia albolanata*, *P. hyperparasitica*, *P. rickiana*, *P. stromatica*, *P. stromaticola*, *Hyalocrea imperconspicua* and *H. epimyces*. *Allonecte lagerheimii*, *Nematostoma hoehnelii*, *Hyalocrea jasmini*, *Hyalosphaera miconiae* and *Puttemansia brachytricha* occur on leaf hairs or directly on the undersurface of living leaves. All *Boerlagiomyces*, *Letendraea*, *Rebentischia* and *Tubeufia* species are found on decaying

woody or herbaceous substrata often closely associated with carbonous pyrenomycetes. Members of the genus *Podonectria* occur on scale insects on living leaves. Several unrelated fungi which occur on hyphae on living leaves appear superficially similar to members of the Tubeufiaceae and Dothideaceae namely, species of the *Nectria leucorrhodina* group (Hypocreales) and *Calloriopsis gelatinosa* (Ellis & Everh.) Dennis, a discomycete with unitunicate asci. Species of the *Nectria leucorrhodina* group are differentiated from the Tubeufiaceae by small, thin-walled, pale luteous ascocarps and unitunicate asci.

Methodology

Specimens for this study were obtained from herbaria as noted using abbreviations according to Holmgren, *et al.* (1981). All specimens listed here have been examined. Dried herbarium specimens were rehydrated in water and mounted for microscopic examination in water or cotton blue in lactic acid. Measurements of ascospores and asci were made from water mounts. Sections 10-15 µm thick were made using a freezing microtome. Specimen data are translated into English wherever possible. Under the habitat citation host names and authors are listed according to their most recently accepted name, whereas under the list of specimens examined host names without authors are listed as they were on the herbarium packet.

SPECIES INCLUDED IN THE TUBEUFIACEAE AND SIMILAR LOCULOASCOMYCETES

PLEOSPORALES, TUBEUFIACEAE

**Allonecte lagerheimii* (Pat.) H. Sydow
**Boerlagiomyces laxus* (Penz. & Sacc.) Butzin
**B. velutinus* (Penz. & Sacc.) Butzin
Byssocallis capensis (Doidge) Rossman
B. phoebes H. Sydow
**Letendraea helminthicola* (Berk. & Broome) Weese ex Petch
**L. padouk* Nicot & Parquey-Leduc ex Parquey-Leduc
Malacaria luxurians (Rehm) Rossman, **comb. nov.**
M. meliolicola H. Sydow
Melioliphila appendiculata (Rehm) Rossman
M. balanseana (Berl. & Roum.) Piroz.
M. coralloides (Maubl.) Rossman
M. erysiphoides (Berl. & Roum.) Piroz.
M. melioloides (Speg.) Piroz.
M. volutella (Berk. & Broome) Rossman
M. winkleriana (Henn.) Rossman, **comb. nov.**
Paranectriella arcuata (Hansf.) Rossman, **comb. nov.**
P. hemileiae (Hansf.) Piroz.
P. juruana (Henn.) Henn. ex Piroz.
P. miconiae (F. Stev.) Rossman, **comb. nov.**
P. minuta (Hansf.) Piroz.
**Podonectria aurantii* (Höhnel) Petch
**P. coccicola* (Ellis & Everh.) Petch
**P. coccorum* (Petch) Rossman
**P. echinata* Petch
**P. gahnia* Dingley
**P. larvispora* (Cooke & Massee) Rossman
**P. novaezealandica* Dingley
**P. tenuispora* Dennis
Puttemansia albolanata (Speg.) Höhnel
P. brachytricha H. Sydow & Sydow
P. hyperparasitica (Sivan. & Kranz) Piroz.
P. rickiana (Sacc. & H. Sydow) Petrak
P. stromatica (Cooke) Rossman, **comb. nov.**
P. stromaticola (Henn.) Rossman, **comb. nov.**
**Rebentischia massalongii* (Mont.) Sacc.
**R. unicaudata* (Berk. & Broome) Sacc.
Tubeufia albo-ostiolata Rossman, **sp. nov.**
**T. amazonensis* Samuels, Rossman & Müller
**T. aurantiella* (Penz. & Sacc.) Rossman
**T. cerea* (Berk. & M. A. Curtis) Höhnel
**T. clintonii* (Peck) Barr
**T. cylindrothecia* (Seaver) Höhnel
**T. helicoma* (Phil. & Plowr.) Piroz.
T. indica* (Dharne & Müller) Rossman, **comb. nov.
T. ovatum Rossman, **sp. nov.**

*T. *palmarum* (Torrend) Samuels, Rossman & Müller
*T. *paludosa* (Crouan & H. Crouan) Rossman
*T. *pezizula* (Berk. & M. A. Curtis) Barr
*T. *roraimensis* (Samuels & Müller) Boise
*T. *scopula* (Cooke & Peck) Barr
Uredinophila erinacea (Rehm) Rossman, **comb. nov.**
U. tropicalis (Speg.) Rossman, **comb. nov.**

PLEOSPORALES, DIMERIACEAE

Nematostoma hoehnelii (Rehm) Rossman, **comb. nov.**

DOTHIDEALES, DOTHIDEACEAE

Hyalocrea epimyces H. Sydow & Sydow
H. imperconspicua (Höhnel) Rossman, **comb. nov.**
H. jasmini (Hansf.) Rossman, **comb. nov.**
H. meliolicola (F. Stev.) Rossman, **comb. nov.**

BRIGHT-COLOURED DISCOMYCETES WITH BITUNICATE ASCI

Hyalosphaera ciliata Rossman, **sp. nov.**
H. miconiae F. Stev.
H. pulchella (F. Stev.) Rossman, **comb. nov.**
Nematothecium horridum (Pat.) Rossman, **comb. nov.**
N. vinosum H. Sydow & Sydow

---

*These species are included in the keys but are not described and illustrated here; recent references to descriptions are cited under the discussion of each genus.

PLEOSPORALES, TUBEUFIACEAE

ALLONECTE H. Sydow

Annls mycol. **37**: 378 (1939).

Type: *Allonecte lagerheimii* (Pat.) H. Sydow.

This monotypic genus was well described and illustrated by Müller & von Arx (1962) and was mentioned by Rossman (1979) and Barr (1980). Known only from Ecuador, the dark red ascocarps of *A. lagerheimii* are covered with long, white, hyphal hairs. The ascocarps occur on living leaves attached by a basal foot which penetrates the leaf epidermis. The hyaline, ellipsoid ascospores are one-septate.

BOERLAGIOMYCES Butzin

Willdenowia **8:** 39 (1977).
Boerlagella Penz. & Sacc., *Malpighia* **11:** 404 (1897), *non* Pierre *ex* Boerlage (1981) (Sapotaceae).

Type: *Boerlagiomyces velutinus* (Penz. & Sacc.) Butzin.

Barr (1980) review *Boerlagiomyces* tentatively accepting two species, *B. velutinus* and *B. laxus* (Penz. & Sacc.) Butzin, both from Java on decaying wood or culms. According to Barr (1980), the dark, fleshy ascocarps on a well-developed, dark subiculum and elongate, muriform ascospores suggest that *Boerlagiomyces* species are related to *Tubeufia* sect. *Thaxteriella* (Petrak) Barr (≡*Thaxteriella* Petrak) having only transversely-septate ascospores. The presence of longitudinal septa in cells of the ascospores is considered a character important enough to distinguish this genus from *Tubeufia* sect. *Thaxteriella*. Another loculoascomycetous genus, *Thaxteriellopsis* Sivan., Panwar & Kaur may also be closely related to *Thaxteriella* but, like *Boerlagiomyces*, has muriform ascospores. I have not examined specimens of these genera.

BYSSOCALLIS H. Sydow

Annls mycol. **25:** 14 (1927).

Type: *Byssocallis phoebes* H. Sydow.

Ascocarps solitary to gregarious, superficial on substrate, with a thin hyphal stroma covering the host hyphae, luteous to sienna, not changing colour in KOH, globose to subglobose, walls smooth. *Ascocarp wall* in longitudinal section usually more than 20 µm wide of thin to slightly thick-walled, angular cells, outer cells encrusted with luteous granules. *Pseudoparaphyses* irregularly branching, anastomosing, up to 2 µm diam. *Asci* bitunicate, cylindric. *Ascospores* narrowly fusiform to narrowly clavate, ends often constricted, hyaline, multiseptate.

Byssocallis includes two species, *B. phoebes* and *B. capensis* (Doidge) Rossman, which are morphologically similar to species of *Melioliphila* except for the presence of luteous granules in the outer cell walls of the ascocarps and hyphae forming the stroma covering the host. *Byssocallis* was synonymized with *Puttemansia* by Petrak (1931) and Pirozynski (1977) based on the presence of "apiculate ascospores." In species of *Byssocallis*, *Melioliphila* and *Puttemansia*, ascospores may vary from broadly rounded to strongly constricted toward the ends. Thus the nature of the ascospore ends is not useful in distinguishing these three genera. The rounded ends of the ascospores of *Byssocallis*, *Melioliphila* and *Puttemansia* species differ from the cellular apiculi or appendages on ascospores of *Paranectriella* species. Species of *Byssocallis* occur on

FIGS 1-4.
hair, lect
ascospor

Meliola as do those of *Melioliphila* while *Puttemansia* species are found directly on living leaves or on the carbonous stroma of leaf inhabitants.

Key to species of Byssocallis

1 Ascocarps orange to sienna, with numerous, flexuous hyphae, encrusted with luteous granules, hyphae 45–120 × 6–10 μm; ascospores 32–42 × 5–8 μm, 4-septate ..... **B. capensis**
Ascocarps luteous, with long, hyaline setae 125–200 × 6–9 μm; ascospores 32–40 × 6–7 μm, 3-septate ..... **B. phoebes**

Byssocallis capensis (Doidge) Rossman, *Mycotaxon* **8:** 496 (1979).

Calonectria capensis Doidge, *Bothalia* **1:** 218 (1921).
Anamorph: None known, although conidia of an *Eriomycopsis* species are occasionally associated with these colonies.

Illustration: Fig. 1.

Ascocarps: Scattered, solitary, superficial on a thin, ochraceous, hyphal stroma; hyphae 3.5–4.5 μm diam, encrusted with luteous granules on outer surface, closely appressed to dark host hyphae and forming a network between host hyphae.

Ascocarps: Orange to sienna, not changing color when dry, globose to subglobose with a flattened or depressed apex, collabent when dry, 250–350 μm tall × 270–400 μm wide; ostiole present; ascocarps with numerous, flexuous hyphae, 45–120 × 6–10 μm, apices bluntly rounded, walls thin, encrusted with luteous granules, with thin septa, often constricted at each septum.

Ascocarp wall: In longitudinal section 25–35 μm wide, of two regions: outer region 15–25 μm wide, cells angular, 8–12 μm wide, thin-walled, with luteous granules on outer surface of walls and between cells; inner region 5–10 μm wide, cells elongate, 8–12 × 3–4 μm, thin-walled, without luteous granules; in surface view cells angular 8–12 μm wide, thin-walled, with luteous granules on walls.

Pseudoparaphyses: 1–2 μm diam, septate, irregularly branching, anastomosing.

Asci: Bitunicate, broadly clavate, 80–95 × 14–16 μm, eight spored, obliquely biseriate or multiseriate.

Ascospores: 32–42 × 5–8 μm, fusiform to clavate, usually widest slightly above the midpoint, straight or slightly curved, especially toward base, (2) 4-septate, tapering to rounded apex and narrowly rounded base, smooth, hyaline.

Type: Republic of South Africa: Cape Province, Humansdorf District, Storms, parasitic on *Irene podocarpi* on leaves of *Podocarpus elongata*, 15 May 1923, *Doidge* 17167, HOLOTYPE (**PREM**), ISOTYPE (**W**-no fungus found).

Host: Parasitic on colonies of *Irene podocarpi* (Doidge) Doidge on living leaves of *Podocarpus elongata* L'Herit. ex Pers.

Distribution: Republic of South Africa, known only from type collection.

Byssocallis capensis is related to *B. phoebes* and *Melioliphila* species but differs in having usually 4-septate ascospores and long, thin-walled, bluntly rounded, flexuous hairs on the ascocarps.

Byssocallis phoebes H. Sydow, *Annls mycol.* **25:** 14 (1927).

Puttemansia phoebes (H. Sydow) Petrak, *Annls mycol.* **29:** 343 (1931).
Anamorph: None known. Conidia of an *Eriomycopsis* are occasionally associated with these colonies.

Illustrations: Fig. 2, 38; Pirozynski (1977: figs. 2N, 2P).

Ascocarps: Scattered, solitary, superficial on a thin, ochraceous, hyphal stroma; hyphae 2.4–3.5 μm diam with walls up to 1 μm thick, often encrusted with luteous granules; erect setae similar to those on ascocarps

arising from stroma.

Ascocarps: Luteous, not changing colour when dry, luteous pigments becoming orange to scarlet in 3% KOH; ascocarps globose to subglobose with a flattened or depressed apex, partially collabent when dry, 250–350 µm tall × 250–350 µm wide; ostiole present; ascocarps with sparse to numerous, long, hyaline setae; setae curved to flexuous, with bluntly rounded apices, 125–200 µm long × 6–9 µm wide, developing from a basal cell, 14–20 µm diam, of outer ascocarp wall; setae with walls 2.5 µm thick except at thin-walled apex and lower side of basal cell, sometimes encrusted with luteous granules.

Ascocarp wall: In longitudinal section 25–35 µm wide, of angular to circular cells, 8–15 µm wide, cell walls hyaline, up to 1.5 µm thick, with luteous granules on outer surface of walls and between cells; in surface view cells angular, 7–10 µm wide, thin-walled, with luteous granular encrustations on walls.

Pseudoparaphyses: 1–2 µm diam, irregularly branching, anastomosing.

Asci: Bitunicate, broadly cylindric, 80–110 × 17–21 µm, constricted near base, eight ascospores per ascus, multiseriate.

Ascospores: 32–40 × 6–7 µm, fusiform to clavate, usually widest slightly above the midpoint, straight, sigmoid or curved, 3-septate, tapering to a rounded apex and narrowly rounded base, smooth with granular contents, hyaline.

Type: Costa Rica: Grecia, parasitic on mycelium of *Meliola* on living leaves of *Phoebe tonduzii*, 19 January 1925, [H. Sydow, *Fungi in itinere costaricensi collecti* 160a], LECTOTYPE (**FH**-general), ISOLECTOTYPES (**BPI**-two specimens, **S**).

Host: On colonies of *Meliola* sp. on living leaves of *Phoebe tonduzii* Mez.

Distribution: Costa Rica, known only from type collection.

Byssocallis phoebes is the type species of *Byssocallis*, a genus separated from *Melioliphila* by the presence of luteous granules on the ascocarps, setae and basal hyphae.

LETENDRAEA Sacc.

Michelia **2:** 73 (1880).

Type: *Letendraea helminthicola* (Berk. & Broome) Weese ex Petch.

The two species of *Letendraea* accepted by Barr (1980) have one-septate ascospores and thin-walled, white to pale luteous ascocarps. *Letendraea helminthicola* was described and illustrated by Müller & von Arx (1962) and Samuels (1973). Ascocarp development of a second species, *L. padouk* Nicot & Parquey-Leduc ex Parquey-Leduc, was described and illustrated by Parquey-Leduc (1959, 1967). Barr (1980) discussed the disposition of species excluded from *Letendraea*.

Key to species of Letendraea

1 Asci 60–85 × 10–13 µm; ascospores 12–15 × 4–5 µm ..... **L. helminthicola**
Asci 70–120 × 10–12 µm; ascospores 15–20 × 5–6 µm..... **L. padouk**

MALACARIA H. Sydow

Annls mycol. **28:** 69 (1930).

Type: *Malacaria flagellata* (Hansf.) Hansf. (=*M. meliolicola* H. Sydow).

Ascocarps scattered, solitary, superficial on substrate, with a thin stroma, dark luteous to brick, not changing colour in KOH, ovoid, walls smooth or with hairs. *Pseudoparaphyses* unbranched, septate. *Ascocarp wall* in longitudinal section usually less than 20 μm wide, of thin to thick-walled, angular to elongate cells. *Asci* bitunicate. *Ascospores* narrowly clavate, fusifom or cylindric, multiseptate, pale smoke-grey.

The genus *Malacaria* was described for *M. meliolicola* occurring on *Meliola* in Venezuela. The type specimen has not been located and may have been destroyed along with many other Sydow specimens. Sydow (1930) presented a detailed description of *Malacaria meliolicola* which agrees in several unique features with the description and type specimen of *M. flagellata*. Thus *M. flagellata* is considered a taxonomic synonym of *M. meliolicola*. In addition, the lectotype of *M. flagellata* is herein designated the neotype of *M. meliolicola*. *Malacaria* is unusual among the genera of Tubeufiaceae in the presence of pale smoke-grey ascospores and unbranched, septate pseudoparaphyses.

Key to species of Malacaria

1 Ascospores narrowly fusifom to cylindric, 30–175 × 2–2.5 μm, 11–15 septate ..... **M. luxurians**
Ascospores narrowly clavate with narrowly tapering basal end, 40–48 × 3–4.5 μm, 3-septate ..... **M. meliolicola**

Malacaria luxurians (Rehm) Rossman, **comb. nov.**

Paranectria luxurians Rehm, *Leafl. Philipp. Bot.* **8**: 2924 (1916).
Malacaria entebbeensis Hansf., *Proc. Linn. Soc. Lond.* **157:** 26 (1945).
Anamorph: None known.

Illustration: Fig. 3.

Ascocarps: Scattered, solitary, superficial on a thin, hyphal stroma which forms a dense network obscuring the dark host hyphae.

Ascocarps: Sienna to rust, chestnut when dry, not changing color in KOH, globose to ovoid or short pyriform, not collapsing, cupulate or laterally pinched when dry, 125–170 μm tall × 100–150 μm wide, with conspicuous, broadly rounded papillae; ostiole present; ascocarp surface smooth.

Ascocarp wall: In longitudinal section 7–10 μm wide, of two regions: outer region 6–8 μm wide, two layers of elongate, angular cells, 6–8 μm long × 3–4 μm wide, cell walls pale luteous, up to 2 μm thick; inner region 3–4 μm wide, of thin-walled, hyaline, elongate, angular cells; in surface view cells, angular, elongate horizontally, 6–10 μm long × 4–6 μm wide.

Pseudoparaphyses: 1.5–2 μm wide, straight, unbranched, septate, extending beyond asci, filling centrum.

Asci: Bitunicate, narrowly cylindric, 100–130 μm, apex bluntly rounded to slightly flattened, eight ascospores per ascus, multiseriate.

Ascospores: 30–75 × 2–3 μm, narrowly fusiform to cylindric, often curved, sigmoid, with rounded apex, tapering to a narrowly rounded base, 11–15-septate, pale smoke-grey, smooth.

Type: Philippines: Province Laguna, Mt. Maquiling, near Los Baños, on *Meliola maesae* on leaves of *Maesa laxa*, April 1913, *C. F. Baker*. Several collections are listed in the protologue. The collection mentioned above was issued as *Paranectria luxurians* [C. F. Baker, *Fungi Malayana* 171]. The upper packet of *Fungi Malayana* 171 on the sheet at **BPI** is herein designated the LECTOTYPE specimen. Other specimens of this collection are ISOLECTOTYPES and were examined from **BPI, NY** and **S.**

Hosts: On *Meliola groteana* H. Sydow & Sydow (= *M. maesae* Rehm) and *M. artabotrydis* Hansf. on *Maesa laxa* Mez. and *Artabotrys nitidus* Engl.

Distribution: Philippines and Uganda.

Specimens: Philippines: Province Laguna, Los Baños, on *Meliola maesae* on leaves of *Maesa laxa,* January 1913, det. Baker, PARATYPE of *Paranectria luxurians,* [Rehm, *Ascomycetes 2116*] (**BPI, FH, NY, S**); as above, det. Eladio Sablan, comm. C. F. Baker 2882b, PARATYPE of *Paranectria luxurians* (**S**).—**Uganda**: Entebbe Road, on *Meliola artabotrydis* on *Artabotrys nitidus,* November 1943, *C. G. Hansford 3243, HOLOTYPE of Malacaria entebbeensis* (**BPI**).

Malacaria luxurians is a distinctive species that will probably be found more frequently as mycologists collect in tropical areas.

Malacaria meliolicola H. Sydow, *Annls mycol.* **28**: 69 (1930).

Paranectria flagellata Hansf., *Proc. Linn. Soc. London* **153**: 28 (1941).
Malacaria flagellata (Hansf.) Hansf., *Mycol. Pap.* **15**: 128 (1946).
Anamorph: None known.

Illustration: Fig. 4.

Ascocarps: Scattered, solitary, superficial on a thin, white stroma closely appressed to dark hyphae of host, hyphae of stroma thin-walled, 1–2 µm diam.

Ascocarps: Dark luteous to cinnamon or brick, dark brick when dry, not changing colour in KOH, ovate to elongate ovate with rounded apex, not collapsing when dry, 150–200 µm tall × 100–140 µm diam; conspicuous ostiole present; ascocarp surface smooth.

Ascocarp wall: In longitudinal section 12–17 µm wide, of two regions: outer region 8–12 µm wide, of 3–4 layers of angular, slightly elongate cells, 3–4 µm wide × 4–7 µm long, walls ochraceous, up to 1.5 µm thick; inner region 4–7 µm wide, of hyaline, elongate cells lining centrum; in surface view cells angular 6–15 µm diam, with orange walls up to 1.5 µm thick.

Pseudoparaphyses: Unbranched, up to 120 µm long, tapering from 1.5–2 µm at base to 1 µm at apex, septate, ends free, bluntly rounded.

Asci: Bitunicate, narrowly clavate to broadly cylindric, 44–56 × 10–12 µm, apex bluntly rounded to slightly flattened, eight ascospores per ascus, multiseriate.

Ascospores: 40–48 × 3–4.5, narrowly clavate with elongate basal end, ends bluntly rounded, 3-septate, smooth, pale smoke-grey, parallel in asci.

Type: Uganda: Kampala, on *Irenina glabra* on leaves of *Coffea robusta*, elev. 4000', June 1936, *C. G. Hansford* 1871, LECTOTYPE of *Paranectria flagellata*, also NEOTYPE of *Malacaria meliolicola* (K). Hansford (1941) listed two specimens in the protologue of *P. flagellata*, one of which is herein designated the LECTOTYPE. In addition, the type specimen of *Malacaria meliolicola* apparently no longer exists. The lectotype specimen of *P. flagellata* is herein designated the NEOTYPE of *M. meliolicola*.

Host: On *Irenina glabra* (Berk. & M. A. Curtis) F. Stev. on *Coffea robusta* L. Linden.

Distribution: Uganda and Venezuela.

Malacaria meliolicola appears similar to *Nematothecium vinosum* H. Sydow & Sydow and *Hyalosphaera miconiae* F. Stev., both discomycetes with coloured, narrowly clavate ascospores and bitunicate asci. *Malacaria meliolicola* is distinguished from these species by the presence of cellular, thick-walled ascocarps and long, unbranched pseudoparaphyses.

MELIOLIPHILA Speg.

Boln Acad. nac. Cienc. Cordoba **25 (26)**: 344 (1924) ["1923"].
Subiculicola Speg., *Boln Acad. nac. Cienc. Cordoba* **25 (26)**: 347 (1924) ["1923"].

Type: *Melioliphila volutella* (Berk. & Broome) Rossman (=*M. graminicola* (F. Stev.) Speg., ≡ *Calonectria graminicola* F. Stev.).

Ascocarps solitary to gregarious, superficial on substrate, with a thin hyphal stroma covering the host hyphae. *Ascocarps* white to pale luteous, not changing colour in KOH, globose to subglobose, walls smooth or with hairs. *Ascocarp wall* in longitudinal section usually more than 20 μm wide, of thin to thick-walled, angular cells. *Pseudoparaphyses* irregularly branching, anastomosing, thin, up to 2 μm diam, often extending beyond asci, filling ascocarp centrum. *Asci* bitunicate, narrowly cylindric. *Ascospores* fusiform to clavate, ends broadly rounded or slightly constricted, multiseptate, hyaline.

The genus *Melioliphila* was included by Pirozynski (1977) in the "hypocreoid Dothideales" and later by Barr (1980) in the Tubeufiaceae. Pirozynski included *Subiculicola* as a synonym of *Melioliphila* based on Höhnel (1910) who discussed the relationship of *Calonectria ambigua* Speg., the type of *Subiculicola*, with *Paranectria lanosa*, now considered *Puttemansia albolanata*. This synonymy is confirmed based on an examination of the type specimen of *C. ambigua* which is determined to be a synonym of *M. volutella*. Pirozynski also listed *Amphinectria* Speg. as a synonym of *Melioliphila* citing Petrak (1951). Based on an examination of the type specimen, Petrak concluded that *A. portoricensis*, the type species of *Amphinectria*, is a lichen. My examination of the type specimen of *A. portoricensis* revealed a lack of any ascocarps which resembled the described fungus, thus the accurate identity of the species and its possible synonymy remain obscure.

Pirozynski (1977) cites *Melioliphila melioloides* (Speg.) Piroz. as the type of *Melioliphila* based on its synonymy with the type species, *Calonectria graminicola*. After an examination of type specimens, *M. volutella* was found to be the oldest epithet for the species of which *C. graminicola* is a synonym. *M. melioloides* is described as a species distinct from *M. volutella*.

Key to species of Melioliphila

1 Ascocarps ochraceous to fulvous with long, flexuous hairs ..... **M. erysiphoides**
Ascocarps white or pale luteous, with or without hairs 2

2(1) Ascocarps smooth, without hairs ..... **M. balanseana**
Ascocarps with hairs 3

3(2) Ascocarps with long, straight, thick-walled, pointed hairs, walls greater than 3μm thick 4
Ascocarps with various kinds of hairs, either coralloid, or long, straight, thin-walled hairs 6

4(3) Spores 5–9-septate, 40–85 × 4–5 μm ..... **M. winkleriana**
Spores 3-septate 5

5(4) Ascocarps translucent, with thick-walled hairs forming a ring around ascocarp opening and long hairs near base of ascocarp ..... **M. appendiculata**
Ascocarps opaque, with long, straight hairs scattered over ascocarp wall ..... **M. volutella**

6(3) Ascocarps with coralloid hairs that are dichotomously branched toward the apices ..... **M. coralloides**
Ascocarps with unbranched hairs, walls up to 1.5 μm thick, hairs cylindric with bluntly rounded apices ..... **M. melioloides**

Melioliphila appendiculata (Rehm) Rossman, *Mycotaxon* **8**: 488 (1979).

Calonectria appendiculata Rehm, *Hedwigia* **37**: 197 (1898).
Anamorph: Both *Chionomyces meliolicola* (Cif.) Deighton & Piroz. and an *Eriomycopsis* species were associated with specimens of *Melioliphila appendiculata*.

Ilustrations: Fig 5; Wollenwebr (1916: fig. 805 as *Calonectria appendiculata*).

FIGS 5-8. 5, ascospores **FH**-Patouil

Speg., ≡ *Calonectria*

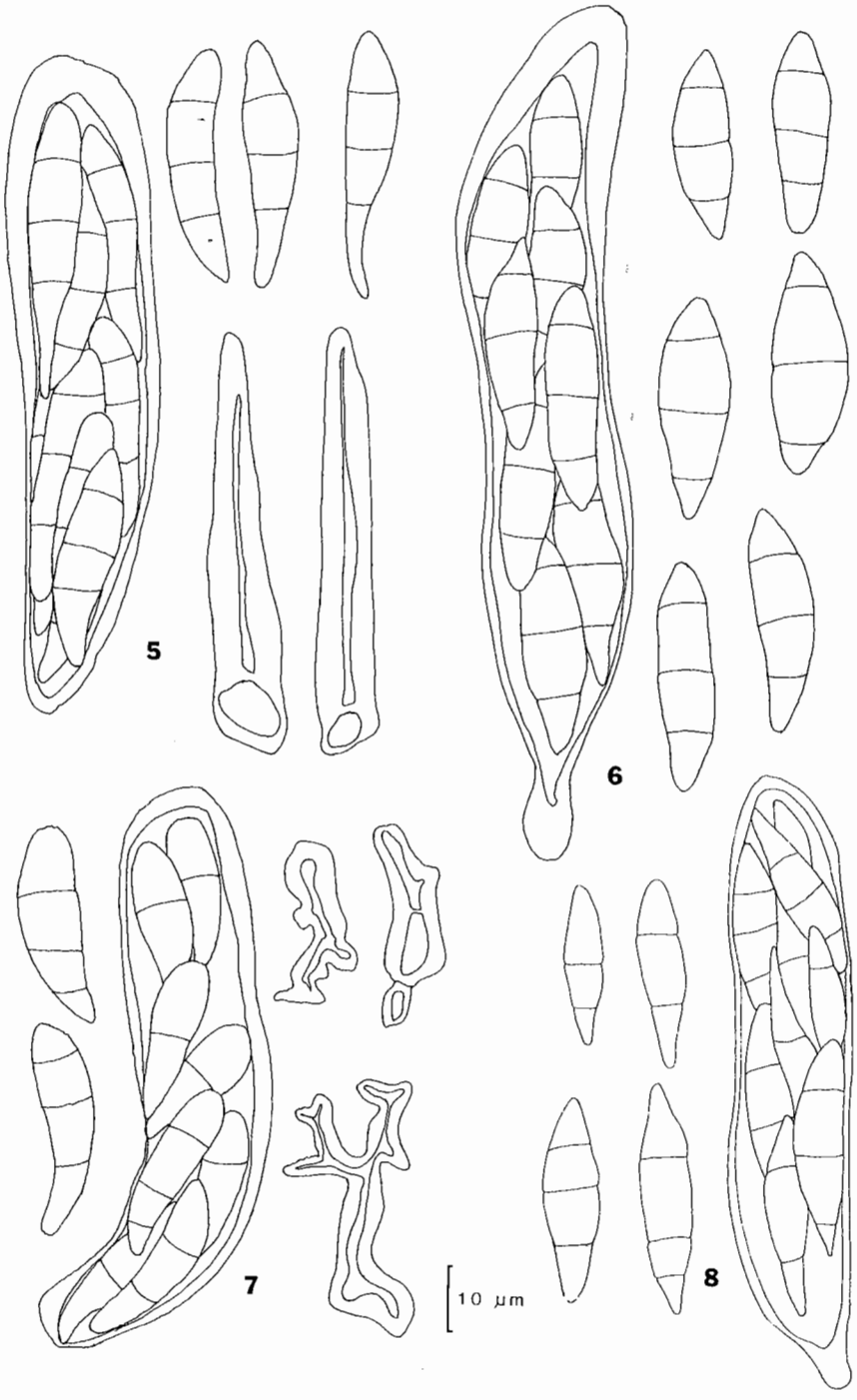
ıa covering the host
globose, walls smooth
thin to thick-walled,
liam, often extending
; fusiform to clavate,

les" and later by Barr
iila based on Höhnel
cola, with *Paranectria*
ın examination of the
Pirozynski also listed
amination of the type
ia, is a lichen. My
which resembled the
ny remain obscure.

ioliphila based on its
ɔecimens, *M. volutella*
/m. *M. melioloides* is

.....**M. erysiphoides**
..... 2
..... **M. balanseana**
..... 3
ım thick..... 4
alled hairs..... 6
....**M. winkleriana**
..... 5
opening and long hairs
..... **M. appendiculata**
.....**M. volutella**
ɔes.....**M. coralloides**
ic with bluntly
.....**M. melioloides**

ımycopsis species were



FIGS 5-8. 5, *Melioliphila appendiculata*, ascus, ascospores and ascocarp hair, **IMI** 39731*b*. 6, *Melioliphila balanseana*, ascus and ascospores, isolectotype **FH**-Patouillard. 7, *Melioliphila coralloides*, ascospores, ascus and ascocarp hairs, holotype **FH**-Patouillard. 8, *Melioliphila erysiphoides*, ascus and ascospores, **PREM** 42538.

Ascocarps: Scattered, solitary or in small groups, superficial on a thin, white stroma, hyphae thin-walled, closely appressed to dark host hyphae, stromal hyphae radiating from base of ascocarp.

Ascocarps: White to pale luteous, often slightly pinkish, pale luteous to luteous when dry, translucent, globose to subglobose with a flattened or slightly depressed apex, partially collabent when dry, 270–300 µm diam, without distinct ostiole, with hairs; short hairs scattered on surface of ascocarp wall forming a ring around the ostiole; long hairs arising from ascocarp base; short hairs 24–47 (–70) µm long, tapering from 7–10 (–15) µm at base to 3–5 µm at apex, ends rounded, walls 4–5 µm thick, lumen narrow; basal hairs 6–7 µm wide with walls up to 2 µm thick.

Ascocarp wall: In longitudinal section 10–25 µm wide, of angular to elongate cells 5–10 µm wide, cell walls thin, 1–1.5 µm thick; in surface view cells angular, 5–8 µm wide, thin-walled.

Pseudoparaphyses: Thin, up to 2 µm thick, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, broadly cylindric to slightly clavate, 100–120 × 15–18 µm, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 36–44 × 6.5–8 µm, fusiform to clavate, widest above midpoint, sometimes sigmoid or curved, 3–(5-) septate, ends pointed to slightly apiculate or truncate, minutely roughened to granular.

Type: Brazil: On *Meliola* on leaves of Euphorbiaceae, *Ule* 927, LECTOTYPE (**FH**-Höhnel). The type specimen at **FH** was designated LECTOTYPE by Rossman (1979).

Hosts: On *Meliola* spp. including *M. coffeae* Hansf., *M. mitragynicola* Deighton var. *leonensis* (Hansf. & Deighton) Deighton (= *M. canthii* Hansf. var. *leonensis* Hansf.) and *M. simillima* Ellis & Everh. on *Coffea arabica* Linn., *Mitragyna macrophylla* Hiern. (=*M. stipulosa* Kuntze), *Oncinotis* sp., *Psychotria vogeliana* Berth., *Rauwolfia vomitaria* Afzel. and unknown Euphorbiaceae.

Distribution: Brazil, Ghana, Sierra Leone and Togo.

Specimens: Ghana (Gold Coast): Agona near Tarkwa, on *Meliola* on *Oncinotis* cf. *campanulata* (Apocynaceae), 12 May 1949, *S. J. Hughes* 661 (**IMI 44394e**).—**Sierra Leone:** Gegburema, Tunkin, on *Meliola coffea* on *Coffea arabica*, 27 October 1947, coll. *C. T. Pyne* M6373, as *Calonectria* sp. (**IMI** 61721d); Gbiuti, Dahia, on *Meliola simillima* on *Rauwolfia vomitaria*, 31 January 1954, *F.C. Deighton* M5790 (E), associated with *Eriomycopsis* sp. (**IMI** 56523e); Kangehmn, Gasdnia, on *Meliola* on *Mitragyna stipulosa*, associated with *Eriomycopsis*, 7 February 1954, *F.C. Deighton* M5791 (f), (**IMI** 56524f); Makali, Kunike Barina, on *Meliola canthii* var. *leonensis* on *Mitragyna stipulosa*, 8 February 1945, *F.C. Deighton* M2398 pp (**IMI** 25516b).—**Togo:** Jasikan, on *Meliola* on *Psychotria vogeliana* (Rubiaceae), 27 May 1949, *S.J. Hughes* 890, [Gold Coast Mycological Herbarium 525b] (**IMI** 39731b).

Melioliphila appendiculata is similar to *M. volutella* in the presence of straight, thick-walled hairs on the ascocarp. The hairs of *M. appendiculata* generally are shorter with rounded apices, the ascocarps are smaller, translucent collapsing when dry, and no setae arise from the byssoid stroma as in *M. volutella*.

Exsiccati specimens issued as *Calonectria appendiculata* [Rehm, *Ascomyceten* 1689 (**BPI, CUP** and Theissen, *Decades Fungorum Brasiliensium* 149 (**BPI**)] are *Melioliphila balanseana* (Berl. & Roum.) Piroz.

Melioliphila balanseana (Berl. & Roum.) Piroz., *Kew Bull.* **31:** 596 (1977).

Calonectria balanseana Berl. & Roum., *Revue Mycol.* **10:** 77 (1888).
Calonectria melioloides Speg. f. *microspora* Rehm, *Hedwigia* **37:** 196 (1898).
Calonectria gyalectoidea Rhem, *Hedwigia* **37:** 197 (1898).
Calonectria warburgiana Henn. in O. Warburg, *Monsunia* **1:** 25 (1899).
Calonectria ambigua Speg. var. *exappendiculata* Speg., *An. Soc. cient. argent.* **33:** 475 (1919).
Calonectria meliolae Hansf., *Proc. Linn Soc. Lond.* **153:** 33 (1941).
Associated anamorph: *Chionomyces meliolicola* (Cif.) Deighton & Piroz., *Mycol. Pap.* **128:** 75 (1972). (=*Eriomycopsis meliolae* Hansf., *Bothalia* **4:** 468 (1942)).

Illustrations: Figs 6, 39; Pirozynski (1977: figs. 1L as *M. ?adianti*, 1M, pl. 27D).

Ascocarps: Scattered, solitary or in small groups, superficial on a white stroma of thin hyphae; hyphae closely

appressed to dark hyphae of host, sometimes filling area between host hyphae, stromal hyphae often radiating from base of ascocarp.

Ascocarps: White to pale luteous, often slightly pinkish, pale luteous to luteous when dry, globose to subglobose with a flattened or depressed apex, slightly collabent when dry, 400–500 µm tall × 350–500 µm diam, without distinct ostiole, centrum contents exposed by wearing away of ascocarp apex, ascocarp surface smooth, slightly roughened when dry.

Ascocarp wall: In longitudinal section 50–75 µm wide, of angular to circular cells, 12–18 µm wide, walls 1–2.5 µm thick; in surface view cells angular, 12–18 µm, thin-walled.

Pseudoparaphyses: 1–2 µm diam, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, narrowly clavate to broadly cylindric, 120–140 × 14–15 µm, constricted at base, eight ascospores per ascus, obliquely biseriate.

Ascospores: 26–40 × 6.5–9 µm, clavate to fusiform, widest above midpoint, sometimes sigmoid or curved, 3–(5-) septate, ends often slightly apiculate, minutely roughened, hyaline.

Type: Philippines: Tonkino, Mt. Vavi near Tu-Pha, on the upper surface of living leaves of *Bambusa*, December 1887, *B. Balansa*, [C. Roumeguère, *Fungi selecti exsiccatae* 4452], type of *Calonectria balanseana*, LECTOTYPE (**NY**), ISOLECTOTYPE (**BPI, BR, FH**-Patouillard, **FH**-exsiccatae, **M**).

Hosts: On *Meliola* spp. including *M. rhois* Henn. and *M. tecleae* Hansf. on living leaves of *Bambusa* sp., *Geonoma gastoniana* Glas. ex Drude, *Rhus glaucescens* A. Reich., *Serjania* sp., *Toddalia nobilis* Hook. (=*Teclea nobilis* Delile) and unidentified members of the Lauraceae, Myrtaceae and Sapindaceae.

Distribution: Brazil, Paraguay and Uganda.

Specimens: Brazil: Apiahy, on living leaves of Lauraceae, July 1881, *J. Puiggari* 1507 (1661) (**FH**-Patouillard), although this specimen is the ISOTYPE of *Calonectria ambigua*, the fungus at **FH** is different from the HOLOTYPE at LPS which is *Melioliphila volutella*; Apiahy, on living leaves of Sapindaceae, January 1888, *J. Puiggari* 1507, HOLOTYPE of *C. ambigua* var. *exappendiculata* (**LPS**-1660); Estado de Sta. Catherine, on *Geonoma gastoniana*, February 1901, *E. Ule*, Herbarium Brasiliense 1754, labelled *Calonectria ferruginea* (**BPI**); Sao Leopoldo, on leaves of Myrtaceae, *Theissen* 1907, as *Calonectria melioloides* (**PACA**-12787); Sao Leopoldo, Rio Grande do Sul, on the upperside of leaves of Sapindaceae, July 1907, *Rick* [Rehm, *Ascomycetes* 1745], type of *Calonectria gyalectoides*, HOLOTYPE (**S**), ISOTYPE (**BPI, C, FH**-general, **FH**-Höhnel, **PACA, W**); Sao Leopoldo, Rio Grande do Sul, on living leaves, September 1906, *Rick* [Rehm, *Ascomycetes* 1689 as *Calonectria appendiculata*] (**B**), at **BPI** this number contains *M. volutella*; Sao Leopoldo, on *Serjania* sp., 1908, *F. Theissen* [Theissen, *Decades fungorum brasiliensium* 149 as *Calonectria appendiculata*] (**BPI**); as above, as *C. tubaroensis* (**GZU**).—**Paraguay:** Guarapi, on Sapindaceae, July 1883, *Balansa* 3796, type of *Calonectria melioloides* f. *microspora*, LECTOTYPE (**LPS**), ISOLECTOTYPE (FH-Höhnel); Guarapi, on Myrtaceae, November 1883, *Balansa* 4017, mistakenly labelled "type" of *Calonectria melioloides* (**LPS**-1674); Guarapi, on living leaves of Sapindaceae, January 1883, *Balansa*, [Roumeguère, *Fungi gallici exsiccati* 4047 issued as *Calonectria guarapiensis*] (**NY**).—**Uganda:** Kazi, Kampala, on *Meliola tecleae* on leaves of *Teclea nobilis*, *Hansford* 1909, HOLOTYPE of *Calonectria meliolae* and *Eriomycopsis meliolae* (**K**); Entebbe Road, on *Meliola tecleae* on *Teclea nobilis*, November 1943, *C. G. Hansford* 3304, authentic specimens of *Calonectria meliolae* and *Eriomycopsis meliolae* (**BPI, DAOM, GZU, PREM**); Kazi, Kampala, on *Meliola rhois* on *Rhus glaucescens*, July 1942, *C. G. Hansford* 3081, with conidia of *Eriomycopsis meliolae* (**BPI**).

Melioliphila balanseana and *M. volutella* are the most frequently encountered species of *Melioliphila*. Both species are pantropical occurring on black hyphae of *Meliola* on living leaves. *Melioliphila balanseana* is distinguished from other *Melioliphila* species by ascocarps that lack any kind of hairs. The associated anamorph was found among ascocarps of *M. balanseana* on the type specimen of *C. meliolae* and other specimens. Deighton & Pirozynski (1972) also found ascocarps of *Melioliphila balanseana* cited as *Calonectria meliolae* associated with this anamorph.

Melioliphila coralloides (Maubl.) Rossman, *Mycotaxon* **9:** 500 (1979).

Calonectria coralloides Maubl., *Bolm Agric., S Paulo* **16:** 315 (1915).
Paranectria coralloides (Maubl.) Hansf., *Mycol. Pap.* **15:** 130 (1946).
Anamorph: None known.

Illustrations: Fig. 7; Maublanc (1920: pl. 3, figs. 5–8 as *Calonectria coralloides*).

Ascocarps: Scattered, solitary or in small groups, superficial on dark host hyphae; hyphae radiating from base of ascocarps.

Ascocarps: Hyaline to pale luteous, pale luteous when dry, globose, partially collabent when dry, 90–200 μm diam, without ostiole, centrum contents exposed by wearing away of ascocarp apex; ascocarp surface with coralloid hairs extending from upper regions, hyaline, dichotomously branched, 30–50 μm long × 4–6 μm wide, septate, with walls up to 2 μm thick.

Ascocarp wall: In longitudinal section 20–50 μm wide, of two regions: outer region 5–10 μm wide, of loose hyphae; inner region 10–40 μm wide, of circular to angular, thin-walled cells, 5–7 μm wide; in surface view cells angular, 8–12 μm with walls up to 1 μm.

Pseudoparaphyses: 1–2 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, clavate to broadly cylindric, 62–65 × 10–16 μm, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 19–22 × 4.5–5.5 μm, clavate to fusiform, often with apiculate ends, apiculus prominent at apex, basal end rounded, 3-septate, smooth, hyaline.

Type: Brazil: Rio de Janeiro, Route de Vista Chinese, on living leaves of *Clidemia hirta* associated with *Meliola melastomacearum* and *Trichothyrium fimbriatum* Speg., 8 December 1912, [A. Maublanc, *Fungi Brasilienses* 353], HOLOTYPE (**FH**-Patouillard).

Hosts: On *Meliola melastomacearum* Speg. and *M. reflexa* Hansf. on living leaves of *Clidemia hirta* D. Don and *Funtumia* sp.

Distribution: Brazil and Kenya.

Specimen: Kenya: Western Prov., Kakemega Distr., Kakemega Forest, near Yala River 5–7 km S of Forest Station, 1500–1700 m, 0 11' N, 34 52' E, on *Meliola reflexa* on *Funtumia* sp., 26 January 1970, *K. & L. Holm* (**UPS**).

Melioliphila coralloides is distinguished from other *Melioliphila* species by the dichotomously branching hairs on the ascocarps.

Melioliphila erysiphoides (Berl. & Roum.) Piroz., *Kew Bull.* **31**: 596 (1976), non Rossman, *Mycotaxon* **8:** 508 (1979).

Calonectria erysiphoides Berl. & Roum., *Revue Mycol.* **10:** 76 (1888).
Associated anamorph: Conidiophores of an *Eriomycopsis* present on type collection.

Ascocarps: Scattered, solitary or in small groups, superficial on orange to brown stroma of thin hyphae; hyphae closely appressed to dark host hyphae, sometimes filling area between host hyphae; hyphae often radiating from base and sides of ascocarp; stromal hyphae 3 μm diam.

Ascocarps: Ochraceous to fulvous, darker when dry, globose to subglobose with a flattened or depressed apex, collabent when dry, 150–300 μm diam, without ostiole, centrum contents exposed by wearing away of ascocarp apex; ascocarp surface with hairs, especially toward apex; hairs ochraceous, long, straight with rounded apices, 40–60 × 6–7 μm, septate, thick-walled.

Ascocarp wall: In longitudinal section 15–25 μm wide, of one region, cells angular, 6–10 μm wide, thin-walled; in surface view cells angular, 8–12 μm wide, with walls up to 1 μm thick.

Pseudoparaphyses: Irregularly branching, anastomosing, thin, extending beyond asci, filling centrum.

Asci: Bitunicate, clavate to broadly cylindric, 70 × 20 μm, constricted at base, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 24–37 × 4–8 μm, fusiform to clavate, widest slightly above midpoint, sometimes sigmoid or curved, 3-septate, apices rounded or with apiculus 1–3 μm long, smooth, hyaline.

Type: Philippines: Tonkin, Tu Phap, parasitic on *Meliola amphitricha* developing on living leaves of *Citrus bigaradia*, December 1887, *B. Balansa*, [C. Roumeguère, *Fungi selecti exsiccati* 4451], LECTOTYPE designated herein (**NY**), ISOLECTOTYPES (**BPI, BR, FH**-Patouillard). The specimen at BPI no longer has any ascocarps and there are very few on the other specimens of this number.

Hosts: On *Meliola* spp. including *M. amphitricha* Fr. on living leaves of *Citrus aurantium* Linn.(= *C. bigaradia* Loisel) and *Maytenus acuminata* (L. F.) Loes.

FIGS 9-12. 9,
ascospores a
Calonectria p
PREM 35253

nt when dry, 90–200 µm
; ascocarp surface with
ım long × 4–6 µm wide,

5–10 µm wide, of loose
ide; in surface view cells

ng beyond asci, filling

·es per ascus, obliquely

:ulus prominent at apex,

ıia hirta associated with
., [A. Maublanc, *Fungi*

ıf *Clidemia hirta* D. Don

tation, 1500–1700 m, 0 11' N, 34

:omously branching hairs

sman, *Mycotaxon* **8:** 508

tion.

ı stroma of thin hyphae;
st hyphae; hyphae often

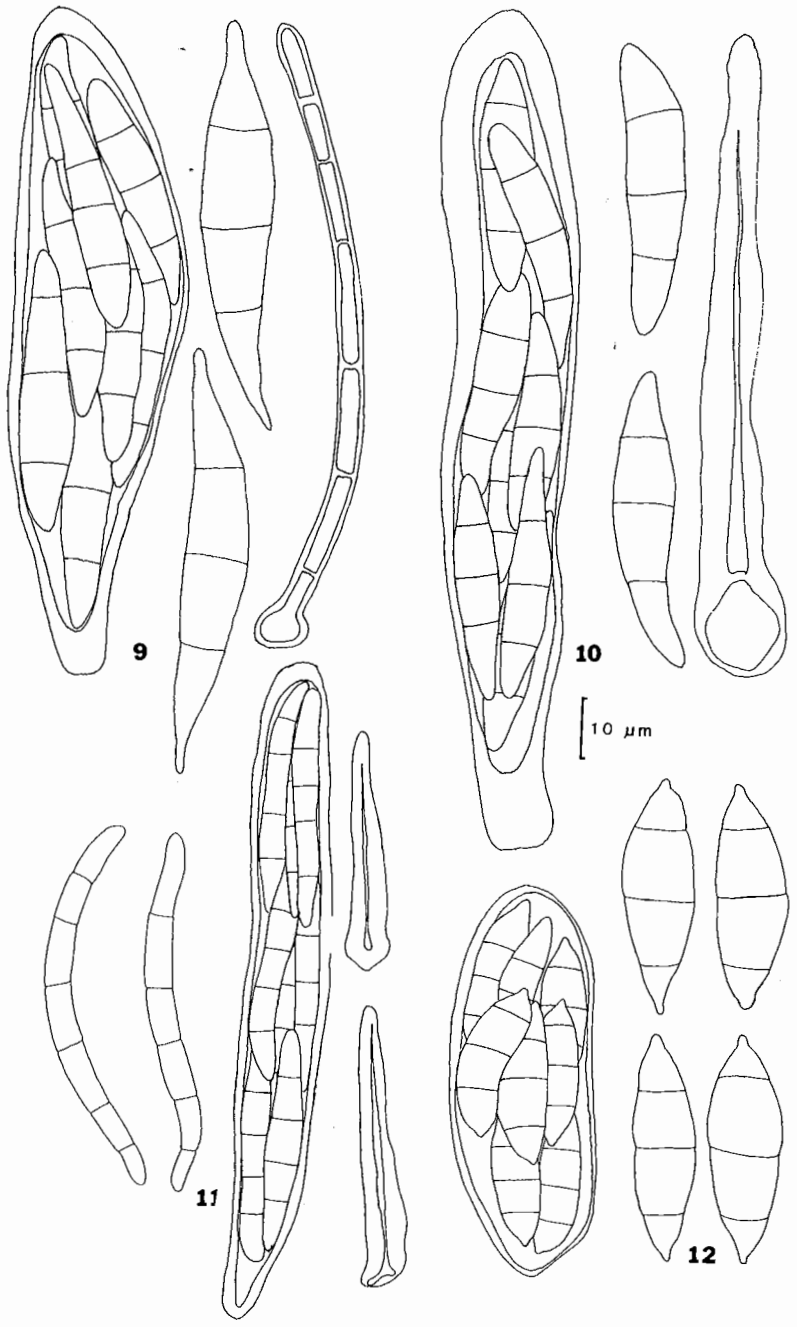
a flattened or depressed
osed by wearing away of
:ous, long, straight with

angular, 6–10 µm wide,
n thick.
d asci, filling centrum.
ight ascospores per ascus,

nt, sometimes sigmoid or
ıe.

; on living leaves of *Citrus*
ati 4451], LECTOTYPE
imen at BPI no longer has

us aurantium Linn.(= *C.*



FIGS 9-12. 9, *Melioliphila melioloides*, ascus, ascospores and ascocarp hair, isolectotype **BPI.** 10, *Melioliphila volutella*, ascus, ascospores and ascocarp hair, isolectotype **UPS.** 11, *Melioliphila winkleriana*, ascospores and ascocarp hairs, lectotype of *Calonectria pachythrix* **S**, ascus, holotype of *Hyaloderma winkleriana* **S.** 12, *Paranectriella arcuata*, ascus and ascospores, **PREM** 35253.

Distribution: Philippines and Republic of South Africa.

Specimens: Republic of South Africa: Transvaal, Louis Trichardt, Entabani, on *Meliola* sp. on living leaves of *Maytenus acuminata*, October 1963, *W. F. Marassa*, [Doidge 42638] (**PREM**).

Among *Melioliphila* species *M. erysiphoides* is unique in having ochraceous to fulvous ascocarps with flexuous hairs. In longitudinal section the ascocarps are relatively thin, composed of thin-walled cells.

Pirozynski (1977) lists *Calonectria soroccae* Rehm and *C. appendiculata* as synonyms of *M. erysiphoides*. Examination of the type specimens of these species revealed that *C. soroccae* is a synonym of *M. volutella* and *C. appendiculata* belongs in *Melioliphila* as *M. appendiculata* (Rossman, 1979).

Meliollphila melioloides (Speg.) Piroz., *Kew Bull.* **31:** 596 (1977).

Calonectria melioloides Speg., *An. Soc. cient. argent.* **19:** 41 (1885).
Calonectria melioloides f. *macrospora* Rehm, Hedwigia **37**: 196 (1898).
Anamorph: *Eriomycopsis bonplandii* Speg. was associated with ascocarps according to Pirozynski (1977). This conidial species has also been associated with *M. volutella*.

Illustrations: Fig. 9; Pirozynski (1977: figs. 1A-H).

Ascocarps: Scattered, solitary or in small groups, superficial on a white stroma of thin hyphae; hyphae closely appressed to host, forming a thin layer between host hyphae, producing numerous erect setae among which ascocarps are seated.

Ascocarps: White to pale luteous, pale luteous when dry, globose to subglobose, often laterally pinched when dry, 240–350 μm tall × 220–280 μm diam; ostiole irregular in size and shape; ascocarp surface with scattered, hyaline hairs some of which extend from ascocarp to surface of stroma; hairs solitary, 40–190 × 5–7 μm wide, straight or flexuous, with walls up to 1.5 μm thick, septate, apex rounded.

Ascocarp wall: In longitudinal section 20–30 μm wide, of one region of angular to circular cells, 7–13 μm wide; cell walls hyaline, slightly thickened, 1.5–2 μm thick; in surface view cells angular, 6–10 μm wide, with walls up to 2 μm thick.

Pseudoparaphyses: 1–1.5 μm diam, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, broadly cylindric, slightly constricted toward base, 60–100 × 12–20 μm, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 35–55 × 6.0–7.5 μm, broadly clavate to fusiform, usually widest slightly above midpoint, ends rounded, often constricted toward apex, 3-septate, smooth, hyaline.

Type: Paraguay: Guarapi, on leaves of Myrtaceae, January 1881, *Balansa*, [Roumeguere, *Fungi selecti exsiccati* 4141], type of *Calonectria melioloides*, LECTOTYPE (**FH**-Höhnel), ISOLECTOTYPE (**BPI, CUP**); additional ISOLECTOTYPES, same collection as above, [Balansa, *Plantes du Paraguay* 2744], labelled as both *Calonectria melioloides* and type of *C. melioloides* f. *macrospora* Rehm (**FH**-Höhnel, **FH**-Patouillard, **NY**).

Hosts: On *Appendiculella sororcula* (Speg.) Hansf. (= *Irene sororcula* (Speg.) F. Stev., = *Meliola compositarum* (Earle), *A. sororcula* var. *portoricensis* Hansf. (= *M. compositarum* Earle var. *portoricensis* F. Stev.) and on *Meliola* spp. including *M. bidentata* Cooke on living leaves of *Bignonia caproleata* L., *Eupatorium odoratum* L., *E. oerstedianum* Benth. ex Oerst, *E. portoricense* Urb. and other Aurantiaceae and Myrtaceae.

Distribution: Guatemala, Honduras, Paraguay, Puerto Rico, and United States (Florida).

Specimens: Chile: Corral, on *Drimys winteri*, 1905, *R. Thaxter* (**FH**).—**Guatemala:** Los Amates, on *Eupatorium oerstedianum*, 15 March 1905, *W.A. Kellerman*, det E. K. Cash as *Paranectria meliolicola* (**BPI**).—**Honduras:** Atlantida, Triunfo, near Tela, on *Irene sororcula* on *Eupatorium*, 28 December 1927, *Paul C. Stanley* 53781 (**BPI, NY**).—**Paraguay:** Bois de Guarapi, on living leaves of Aurantiaceae, July 1883, *Balansa* [Roumeguère, *Fungi selecti exsiccati* 4142] issued as *Calonectria leucorrhodina* (Mont.) Speg. var. *minor* Speg. (**BPI**); the holotype specimen of *C. leucorrhodina* var. *minor* from **LPS** is *Nectria pipericola* Henn. (Rossman, 1979).—**Puerto Rico:** Dos Bocas, *F. L. Stevens 6574* (**BPI**); Utuado, on *Meliola compositarum* var. *portoricensis* on *Eupatorium odoratum*, 17 December 1913, *F. L. Stevens* 6056 as *Calonectria melioloides* (**BPI**–71004, **UPS**).—**United States:** Florida, Duval Co., on north side of Trout River west of Jacksonville Zoo, north of northern city limits of Jacksonville, parasitizing *Meliola bidentata* on crossvine (*Bigononia capreolata*), 26 December 1947, *A. S. & C. L. Rhoads*, det. *E. K. Cash* as *Calonectria guarapiensis* Speg.; *Nectria leucorrhodina* (Mont.) Samuels also present (**BPI**).

Melioliphila melioloides is similar to other species of *Melioliphila* in microscopic details. It differs in the presence of cylindric, thin-walled hairs radiating from ascocarps, ascocarps that collapse laterally when dry and the presence of erect setae developing from the stroma surrounding the ascocarps.

Pirozynski (1977) lists several synonyms of *Melioliphila melioloides* which were originally described in the genus *Calonectria*. An examination of the type specimens of these species revealed that: *C. leucorrhodina* (Mont.) Speg. var. *minor* Speg. f. *microspora* Rehm is a synonym of *Nectria pipericola* Henn.; *C. melioloides* Speg. f. *microspora* Rhem is a synonym of *Melioliphila balanseana* (Berl. & Roum.) piroz.; *C. trichiliae* Rhem, *C. graminicola* F. Stev., *C. ambigua* Speg. and *C. ugandae* Hansf. are synonyms of *M. volutella* (Berk. & Broome) Rossman; and *C pachythrix* is a synonym of *Melioliphila* as *M. winkleriana* (Henn.) Rossman. The type specimen of *Hyaloderma tricholomum* Pat. was not located.

Melioliphila volutella (Berk. & Broome) Rossman, *Mycotaxon* **8:** 551 (1979).

Nectria volutella Berk. & Broome, *J. Linn. Soc.* **14:** 115 (1873).
Calonectria volutella (Berk. & Broome) Sacc., *Michelia* **1:** 309 (1878).
Lasionectria volutella (Berk. & Broome) Cooke, *Grevillea* **12:** 112 (1884).
Calonectria ambigua Speg., *An. Soc. cienc. argent.* **12:** 212 (1881).
Subiculicola ambigua (Speg.) Speg. [ut "Speg."], *Boln Acad. nac. Cienc. Cordoba* **26:** 347 (1924).
Calonectria adianti Rehm, *Hedwigia* **37:** 197 (1898).
Melioliphila adianti (Rehm) Piroz., *Kew Bull.* **31:** 596 (1977).
Calonectria trichilae Rehm, *Hedwigia* **37:** 198 (1898).
Calonectria soroccae Rehm, *Hedwigia* **39:** 224 (1900).
Calonectria graminicola F. Stev., *Bot. Gaz.* **45:** 232 (1918), non *C. graminicola* (Berk. & Broome) Wollenw., 1913.
Melioliphila graminicola Speg. [ut "(F. Stev.) Speg."], *Boln Acad. nac. Cienc. Cordoba* **26:** 345 (1924).
Calonectria ugandae Hansf., *Proc. Linn. Soc. Lond.* **153:** 35 (1941).
Calonectria chorleyi Hansf., *Mycol. Pap.* **15:** 132 (1946).
Paranectria sclerochitonis Hansf., *Mycol. Pap.* **15:** 132 (1946).
Puttemansia sclerochitonis (Hansf.) Piroz., *Kew Bull.* **31:** 601 (1977).
Anamorph: Both *Eriomycopsis bonplandii* Speg. and *E. sclerochitonis* Hansf. were found associated with this teleomorph.

Illustrations: Fig. 10; Pirozynski (1977: figs. 1 J, K, as *Melioliphila melioloides*, drawn from Stevens 6056 at **ILL**); Rehm (1900: fig. 9 as *Calonectria soroccae*).

Asocarps: Scattered, solitary or in small groups, superficial on white stroma of thin hyphae; hyphae closely appressed to dark host hyphae; erect setae similar to those on ascocarps developing from stroma.

Ascocarps: White to pale luteous, pale luteous to luteous when dry, opaque, globose to subglobose with a flattened or slightly depressed apex, collabent when dry, 300–350 µm high × 250–320 µm diam, centrum contents exposed by wearing away of ascocarp apex; long, straight, hyaline hairs scattered over ascocarp wall, hairs (40) 125-225 (270) µm long, 7.5–13.0 µm wide at base, with walls up to 3 µm thick, hairs septate forming cells 14–25 µm long; hairs arising from enlarged outer ascocarp wall cells 10–18 µm diam.

Ascocarp wall: In longitudinal section 20–25 (50) µm wide, of angular to circular cells 8–15 µm wide, with walls up to 1.5 µm thick; in surface view cells angular, 9–15 µm wide, thick-walled or with walls up to 1.5 µm thick especially where cells intersect.

Pseudoparaphyses: 1–2 µm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, clavate to broadly cylindric, constricted at base, 70–125 × 13–20 µm, eight ascospores per ascus, obliquely multiseriate.

Ascospores: 25–57 × 6–10 µm, fusiform to clavate, widest at or above middle, rarely sigmoid or curved, 3–(5-) septate, apex often apiculate, 2.5–3.0 µm long × 1 µm wide, ascospores minutely roughened, hyaline.

Type: Sri Lanka [Ceylon]: On leaves of *Atalanta monophylla* on a lichenoid, hispid, white crust, 445, LECTOTYPE (**K**), ISOLECTOTYPE (**UPS**). In a packet at **K** labelled *Nectria volutella*, there are two separate envelopes with one leaf in each envelope. One contains a lichen of unknown identity, the other an abundant collection with mature ascocarps of *M. volutella*. The envelope with *M. volutella* at **K** was designated the lectotype by Rossman (1979) and fits the fungus described by Berkeley and Broome. At **UPS** there are also two packets labelled *N. volutella*, comparable to the two packets at **K.** The one with *M. volutella* was designated the isolectotype by Rossman (1979).

Hosts: On *Appendiculella natalensis* (Doidge) Hansf. (= *Irene natalensis* Doidge) and *Meliola* species including *M. landolphiae* Hansf., *M. panici* Earle, *M. panici* Earle var. *lasiacidis* (Toro) Hansf. (= *M. lasiacidis* Toro), *M. salaciae* Hansf., *M. tabernaemontanae* Speg. var. *escharoides* (H. Sydow) Cif. (= *M. escharoides* (H. Sydow) Cif.) and *M. ventilaginicola* Hansf. on living leaves of *Adiantum trapeziforme* L., *Atalanta monophylla DC., Lasiacis sorghoidea* Hitchc. & Chase, *L. compacta* Hitchc., *Oncoba spinosa* Forsk., *Oncinotis erlangerii, Paspalum quadrifarium* Lam. (= *P. paniculatum* Poir.), *Salacia elegans* Welw., *Sorocea ilicifolia* Miq., *Tabernaemontana longipes* Donn. Sm. and *Ventilago africana* Exell and unidentified members of the Bignoniaceae, Lauraceae and Sapindaceae.

Distribution: Brazil, Chile, Costa Rica, Jamaica, Paraguay, Puerto Rico, Sri Lanka, Uganda, United States (Alabama), Venezuela and Zaïre.

Specimens: Brazil: near Apiahy, on living leaves of Lauraceae, July 1881, *J. Puiggari* 1507, HOLOTYPE of *Calonectria ambigua* (**LPS**-1661); Sao Leopoldo, Rio Grande do Sul, on living leaves, September 1906, *Rick* [Rehm, *Ascomycetes* 1689 issued as *C. appendiculata*] (**BPI**); at **B,** this number is *M, balanseana;* Tubarao, on leaves of *Sorocea ilicifolia,* Ule 2274, type of *Calonectria soroccae,* HOLOTYPE (**S**), ISOTYPE (**FH**-general, filed under *Mellitosporiopsis violacea* Rehm, **FH**-Höhnel). The specimen in **FH**-general herbarium also contains *Melioliphila balanseana*; Tubaro, Estado de Sta. Catharine, on *Adiantum trapeziforme*, October 1890, *E. Ule* 1326 (**W**); this is a type collection of *C. adianti* which was examined and found to be *M. volutella* and is herein designated the LECTOTYPE.—**Chile:** Corral, December 1905, *Roland Thaxter*, with *Nectria leucorrhodina* (**FH**).—**Costa Rica:** San Pedro de San Ramon, on *Meliola escharoides* on *Tabernaemontana longipes*, 5 February 1925, *H. Sydow* as *C. adianti* (**B**).—**Jamaica:** Portland Parish, 1 mi S Tranquility, along Hwy B1, on *Meliola* sp. on calabash leaf, 19 January 1971, *R. P. Korf, et al.* (**NY**).—**Paraguay:** Feuilles de Trichilia, [Balansa, *Plantes du Paraguay* 4015], type of *Calonectria trichilae*, LECTOTYPE (**FH**-Höhnel), ISOLECTOTYPE (**FH**-Höhnel); an additional collection of *Balansa* 4015 at **LPS** is labelled *Calonectria ambigua* Tipo but this number does not have data which agrees with type collection data for *C. ambigua*; Guarapi, on Sapindaceae, 1883, *Balansa* 3794 (**LPS**-1662); Guarapi, on Bignoniaceae, 1883, *Balansa* 4012, det. C. Spegazzini as *C. ambigua* (**LPS** 1664).—**Puerto Rico**: along road 1 mi S of Barros, on *Meliola panici* (?) on *Paspalum paniculatum*, 1 August 20, *C. E. Chardon*, [*Fungi of Porto Rico 786,* also *867,* both as *Calonectria graminicola*] (**CUP**-2 packets); Utuado, on *Meliola panici* on *Lasiacis compacta*, 8 November 1913, *F. L. Stevens*; lectotype specimen of *C. graminicola* was designated by Rossman (1979) (**CUP, NY**).—**Uganda:** Entebbe Road, parasitic on *Irene natalensis* on leaves of *Oncoba spinosa, Hansford* 2490, HOLOTYPE of *Calonectria ugandae* (**IMI** 5855); Entebbe Road, on *Meliola salaciae* on *Salacia elegans,* March 1944, *C. G. Hansford* 3374, with *Eriomycopsis bonplandii* (**BPI**); as above, 3362 (**BPI**); Entebbe Road, on *Meliola ventilaginicola* on *Ventilago africana*, August 1944, *C. G. Hansford* 3572, with *E. bonplandii*, *Calonectria inconspicua*, and *Dimerium venturioides* (**BPI**); Kiterera Busoga, on *Meliola* on *Albizzia* sp., September 1940, *C. G. Hansford* 2835, with *Eriomycopsis bonplandii* and other parasites (**BPI**); Mukon, Kiagwe, on a *Meliola* on leaves of *Trichilia*, February 1941, *C. G. Hansford*, HOLOTYPE of *Paranectria sclerochitonis* (**IMI** 18433a); Semuto Road, on *Meliola* on *Ventilago africana*, December 1943, *C. G. Hansford* 3327, with *Eriomycopsis bonplandii* (**BPI, PREM**-34884); Semuto Road, on *Meliola landolphiae* on *Oncinotis erlangeri*, December 1943, *C.G. Hansford* 3332, with *E. bonplandii* (**BPI**).—**United States:** Alabama, Lee Co., Auburn, on *Meliola* on *Arundinaria*, Fall, 1897, *D. P. Dixon* (**NY**).—**Venezuela:** E1 Limon, Valle de Puerto La Cruz, on mycelium of *Meliola panici* on *Lasiacis sorghoidea, 16 January 1928* H. Sydow, *Fungi Venezuelani* 260a as *Calonectria graminicola* (**BPI, FH**-general, **PREM**); Tachira, road from San Cristobal to Rubio, 730 m, on *Meliola panici* on *Lasiacis*, 20 September 1932, *Chardon* 1271 (**CUP**); as above, on *Meliola lasiacidis* on *Lasiacis sorghoidea*, *Chardon* 1286 (**CUP**).—**Zaïre**: Leopoldville, Kangu, 10 October 1930, *H. Vanderyst* 26226, det. C. G. Hansford as *C. meliolae* and other parasites (**BR**).

Melioliphila volutella and *M. balanseana* are the most frequently encountered species of *Melioliphila*. *Melioliphila volutella* is easily differentiated from other *Melioliphila* species by the long, hyaline setae radiating from the ascocarp wall.

Hansford (1942) noted a "*Calonectria* with setose perithecia", probably *M. volutella*, associated with specimens of *Eriomycopsis bonplandii*. Deighton & Pirozynski (1972) list several specimens of *Chionomyces sclerochitonis* (Hansf.) Deighton & Piroz. (= *Eriomycopsis sclerochitonis* Hansf.) on which ascocarps of *Melioliphila volutella* (as *Paranectria sclerochitonis*) are closely associated with the anamorph.

Melioliphila winkleriana (Henn.) Rossman, **comb. nov.**

Hyaloderma winkleriana Henn., *Bot. Jb.* **38:** 125 (1905).
Calonectria pachythrix Rehm, *Annls mycol.* **5:** 531 (1907).

Tubeufia pachythrix (Rehm) Rossman, *Mycotaxon* **8:** 534 (1979).
Anamorph: None known.

Illustration: Fig. 11.

Ascocarps: Scattered, solitary or in small groups, superficial on white stroma, stroma densely covering dark host hyphae.

Ascocarps: White to pale luteous, darker when dry, globose to subglobose with a flattened or depressed apex, partially collabent or laterally pinched when dry, 290–320 µm tall × 240–375 µm diam, centrum contents exposed by wearing away of ascocarp apex, without distinct ostiole; ascocarp hairs solitary, straight, 60–105 µm long × 10–15 µm at base, tapering from basal cell to rounded apex, walls 2–3 µm thick, basal cell slightly enlarged, up to 10 µm diam.

Ascocarp wall: In longitudinal section 20–50 µm wide, of one layer of angular to circular cells 8–20 µm wide, with walls up to 1.5 µm thick, cells toward centrum elongate, cells toward apex shorter, thin-walled; in surface view cells angular, 9–15 µm wide, thin-walled or with walls up to 1 µm thick, especially where cells intersect.

Pseudoparaphyses: 2–3 µm wide, septate, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, clavate to broadly cylindric, 95–115 × 12–16 µm, eight ascospores per ascus, multiseriate.

Ascospores: 40–83 × 4–5 µm, narrowly fusiform to cylindric, often sigmoid or curved, tapering to rounded, 5–9-septate, smooth, hyaline.

Type: Cameroon: Victoria, on mycelium of *Meliola* on leaves of "Marantaceen", *Winkler* 650, HOLOTYPE (S).

Hosts: On *Meliola* sp. on living leaves of *Rubus* sp. and "Marantaceen".

Distribution: Brazil and Cameroon.

Specimens: Brazil: Sao Paulo, Sao Francisco dos Campos, on *Meliola* sp. on branch of *Rubus* sp., December 1896, *F. Noack* [Sydow 199], LECTOTYPE of *Calonectria pachythrix* (**S**), ISOLECTOTYPES (**FH**-general, **W**-Petrak 39617). Types designated by Rossman (1979).

Melioliphila winkleriana is macroscopically similar to *M. volutella*. The opaque ascocarp wall is composed of relatively large cells with thickened cell walls. The ascospores of *M. winkleriana* are cylindric, 5–9-septate, longer than those of *M. volutella*. The ascospores of *M. winkleriana* resemble those of *Tubeufia* species which are fungicolous, occurring commonly on the old stromata of carbonous pyrenomycetes. Based on the ascocarp wall structure and its occurrence on *Meliola*, this species is transferred to *Melioliphila*.

PARANECTRIELLA (Henn. ex Sacc.) Höhnel

Sber. Akad. Wiss. Wien., Abt. 1, **119:** 899 (1910).
Paranectria subgen. *Paranectriella* Henn. ex Sacc., *Sylloge Fung.* **17:** 812 (1905).
[*Paranectria* subgen. *Paranectriella* Henn., Hedwigia **43:** 245 (1904), *nom. inval.*]

Type: *Paranectriella juruana* (Henn.) Henn. ex Piroz. (= *Paranectria juruana* Henn.).

Ascocarps solitary to gregarious, scattered, superficial on substrate, with a thin hyphal stroma. *Ascocarps* white to pale luteous or pale peach, often translucent, not changing colour in KOH, ovoid to globose or subglobose, walls smooth or with hairs, with or without a distinct ostiole. *Asococarp wall* in longitudinal section usually less than 20 µm wide, of thin-walled, angular to elongate cells, surface cells thin-walled, angular. *Pseudoparaphyses* sparse, branching, thin. *Asci* bitunicate, short to long cylindric. *Ascospores* ellipsoid to fusiform, multiseptate, hyaline, with cellular appendages at both ends.

The genus *Paranectriella* was described as a subgenus of *Paranectria* by Hennings (1904) who neglected to provide a diagnosis or designate a type species. Saccardo (1905) validated the subgenus by providing a diagnosis but did not select a type. Höhnel (1910) designated *Paranectria juruana* as the lectotype of the subgenus and raised the subgenus to generic rank. Hawksworth & Pirozynski (1977) clarified the nomenclatural problems in *Paranectria* and *Paranectriella*. In addition they discussed the genera *Poeltia* Petrak and *Poeltiella* Petrak which Petrak (1972, 1974) invalidly published for *Paranectriella* species. Hawksworth & Pirozynski designated *Paranectria meliolicola* F. Stev. the lectotype of *Poeltia* Petrak and thus also *Poeltiella* Petrak which resulted in their synonymizing both genera with *Paranectriella*. Based on an examination of the type specimen, *Paranectria meliolicola* is herein placed in *Hyalocrea*, Dothideales, thus *Poeltia* and *Poltiella* are synonyms of *Hyalocrea*, rather than *Paranectriella*.

Paranectriella is included in the Tubeufiaceae based on the hyaline to pale luteous or pale peach, relatively thin-walled ascocarps with bitunicate asci, abundant pseudoparaphyses and a fungicolous habit. *Paranectriella* species are distinguished from other members of Tubeufiaceae by distinct apiculi or cellular appendages at each end of the ascospores.

Key to species of Paranectriella

1	Ascospores greater than 20 µm, exclusive of apiculi or cellular appendages	2
	Ascospores less than 20 µm, exclusive of apiculi or cellular appendages	3
2(1)	Ascocarps with long, solitary or fasciculate hairs; hairs longer than 200 µm	**P. arcuata**
	Ascocarps with short, abundant hairs around apex; hairs less than 50 µm long	**P. miconiae**
3(1)	Ascocarps aggregated, on carbonous stroma of *Auerswaldia* on living leaves of *Miconia*	**P. juruana**
	Ascocarps solitary, on *Meliola* species or on *Hemileia vastatrix* on living leaves	4
4(3)	Ascocarps with a ring of hyaline hairs around an apical disc; on *Meliola* species	**P. minuta**
	Ascocarps with sparse hairs scattered over ascocarps; on *Hemileia vastatrix*	**P. hemileiae**

Paranectriella arcuata (Hansf.) Rossman, **comb. nov.**

Calonectria arcuata Hansf., *Mycol. Pap.* **15:** 119 (1946).
Anamorph: None known.

Illustration: Fig. 12.

Ascocarps: Scattered, solitary, superficial on host hyphae or on a thin, hyphal stroma radiating from base of ascocarp, covering dark host hyphae; hyphae of stroma 2–3 µm diam.

Ascocarps: White, globose to subglobose, about 180 µm diam, not collapsing when dry, with long, white, solitary or fasciculate hairs; hairs 230–300 µm × 3–4 µm, septate, thin-walled, radiating from sides and base of ascocarp.

Ascocarp wall: In longitudinal section 5–10 µm wide, of 2–3 cell layers, cells angular, thin-walled; in surface view cells angular, 8–16 µm wide, thin-walled.

Pseudoparaphyses: Sparse, 1–2 µm wide, branching, not extending beyond asci.

Asci: Bitunicate, broadly cylindric when immature, subglobose to obclavate at maturity, 55–75 × 23–30 µm, less than 20 asci in each ascocarp, eight ascospores per ascus, multiseriate.

Ascospores: 27–35 × 8–10 µm, exclusive of apiculi, broadly fusiform with short apiculus at each end 2–3 µm long, ascospores 3-septate, not constricted, smooth, hyaline.

Type: Uganda: Entebbe Road, on leaf spot of *Asterina* on leaves of *Tetracera potatoria*, *Hansford* 2797, HOLOTYPE (**K**-slide).

FIGS 13-16. *Paranectriel* neotype **ILI**

)04) who neglected to
genus by providing a
s the lectotype of the
ied the nomenclatural
a Petrak and *Poeltiella*
ksworth & Pirozynski
Poeltiella Petrak which
mination of the type
eltia and *Poltiella* are

pale peach, relatively
is habit. *Paranectriella*
lar appendages at each

..... 2
..... 3
.....**P. arcuata**
..... **P. miconiae**
Miconia .... **P. juruana**
..... 4
..... **P. minuta**
..... **P. hemileiae**

radiating from base of

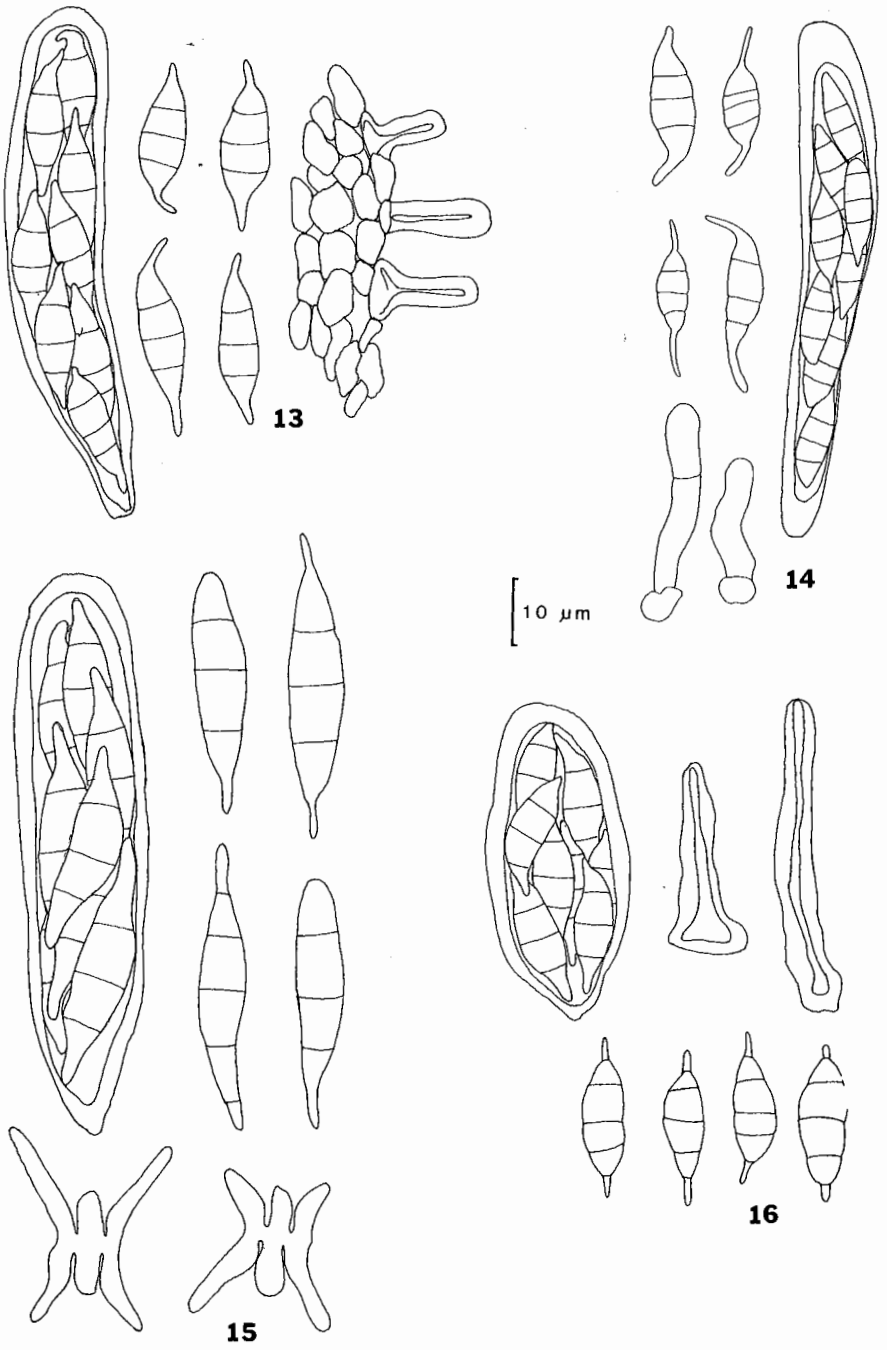
dry, with long, white,
from sides and base of

thin-walled; in surface

ity, 55–75 × 23–30 µm,

llus at each end 2–3 µm

atoria, *Hansford* 2797,



FIGS 13-16. 13, *Paranectriella hemileiae*, ascus, ascospores, partial section of ascocarp and ascocarp hairs, holotype **K**. 14, *Paranectriella juruana*, ascospores, lectotype **FH**. 15, *Paranectriella miconiae*, ascus, ascospores and conidia of *Titaea miconiae*, neotype **ILL**. 16, *Paranectriella minuta*, ascus, ascospores and ascocarp hairs, holotype **IMI**.

Hosts: Associated with or parasitic on *Asterina* sp., *Ctenoderma toddaliae* (Petch) Sydow, and *Irene intermis* (Kalchb. & Cooke) Theiss. on living leaves of *Buddleia auriculata* Benth. in Hook., *Toddalia aculeata* Pers. (as *T. asiatica* Lam.), and *Tetracera potatoria* Afzel. ex G. Don.

Distribution: Republic of South Africa and Uganda.

Specimens: Republic of South Africa: Natal, Bulwer, Marwaga Forest, on *Irene inermis* on *Buddleia auriculata*, June 1939, *E. M. Doidge* (**PREM** 30901c)—**Uganda:** Entebbe Road, on or associated with uredinia of *Ctenoderma toddaliae* on underside of leaf of *Toddalia asiatica*, May 1944, *C. G. Hansford* 3490 as *Calonectria arcuata*, authentic (**PREM** 35253).

Paranectriella arcuata has large, saccate asci with few asci per ascocarp characteristic of the Dothideales but also has distinct pseudoparaphyses among the asci characteristic of the Pleosporales. Based on the variability in ascus shape and presence of pseudoparaphyses, the species is placed in *Paranectriella,* Tubeufiaceae, Pleosporales.

Paranectriella hemileiae (Hansf.) Piroz., *Kew Bull.* **31:** 598 (1977).

Paranectria hemileiae Hansf., *Proc. Linn. Soc. Lond.* **153:** 28 (1941).
Anamorph: *Titaea hemileiae* Hansf., *Mycol. Pap.* **15:** 207 (1946).

Illustrations: Fig. 13; Carmichael, *et al.* (1980: fig. 112C as *Titaea hemileiae*); Hansford (1946: fig. 66 as *T. hemileiae*); Pirozynski (1977: fig. 2D); Sutton (1984: fig. 4 as *T. hemileiae*).

Ascocarps: Scattered, solitary, superficial on rust pustules, thin, hyaline hyphae spreading over pustules.

Ascocarps: Pale luteous, transparent, luteous when dry, not changing colour in KOH, globose, not collapsing or slightly pinched when dry, 80–95 µm diam; ostiole present; ascocarp with sparse, straight, hyaline hairs; hairs straight to slightly sigmoid, 14–22 µm long × 4–5 µm at base, 3 µm in diam at apex, apex bluntly rounded, walls up to 2 µm thick with a narrow lumen.

Ascocarp wall: In longitudinal section 6–10 µm wide, of two regions: outer region 4–8 µm wide, one to two cell layers thick, cells elongate, angular, 5–9 µm long × 4–5 µm wide, thin-walled; inner region 3–5 µm wide, thin-walled, cells lining centrum; in surface view cells angular, 5–9 µm wide, thin-walled.

Pseudoparaphyses: Sparse, 1.0–1.5 µm wide, hyaline, septate, anatomosing, not extending beyond asci.

Asci: Bitunicate, clavate to broadly cylindric, 50–68 × 9–14 µm, eight ascospores per ascus, irregularly biseriate.

Ascospores: 14–18 × 5–7 µm exclusive of apiculi, fusiform with an apiculus at each end; apiculi 3–6 × 1 µm, often curved, apex blunt, ascospores 3-septate, hyaline, smooth.

Conidiophores: Not seen.

Conidia: Staurospores, with six appendages, three short basal processes, 7–8 × 4–5 µm, including the one to which the conidium is attached, two long lateral appendages, 10–12 × 2–3 µm, and one short apical appendage, 5–7 × 2–3 µm.

Type: Uganda: Kampala, elev. 4000 ft., on *Hemileia vastatrix*, June 1936, *Hansford* 1870, HOLOTYPE (**K**), slide (**IMI** 44076).

Hosts: Parasitic on pustules of *Hemileia vastatrix* Berk. & Broome on living leaves of *Coffea robusta* L. Linden.

Distribution: Uganda, known only from the type collection.

Paranectriella hemileiae appears macroscopically similar to species of *Uredinophila* in having small, pale luteous, translucent ascocarps occurring superficially on rust pustules. Ascospores of *Uredinophila* species are narrowly cylindric and lack any kind of appendages. Like other species of *Paranectriella*, the ascospores of *P. hemileiae* have an apiculus at each end, thus the species is retained in that genus despite its occurence on a rust. The associated anamorph, *Titaea hemileiae*, has staurosporous conidia as do some anamorphs of other members of the Tubeufiaceae including *P. miconiae*.

Paranectriella juruana (Henn.) Henn. ex Piroz., *Kew Bull.* **31:** 598 (1977).
Paranectria juruana Henn., Hedwigia **43:** 245 (1904).
Anamorph: *Araneomyces acariferus* Höhnel, *Sber. Akad. Wiss. Wien* **118:** 894 (1909), fide Sutton (1984) (= *Titaea acarifera* (Höhnel) Damon, *J. Wash. Acad. Sci.* **42:** 367 (1952)).

Illustrations: Fig. 14; Hennings (1904: taf. 4, fig. 8).

Ascocarps: Aggregated, partially immersed in white, hyphal stroma completely covering carbonous stroma of host; stroma of thin-walled cells, irregularly circular to hyphoid, 2.5–3 µm wide.

Ascocarps: White, pale luteous when dry, globose to subglobose, collabent when dry, 180–300 µm tall × 160–300 µm wide, ascocarp surface with abundant, hyphoid hairs, hairs cylindric, curved or irregularly sinuate, with rounded ends, 12–25 × 4–6 µm, walls thin or up to 1 µm thick.

Ascocarp wall: In longitudinal section 16–20 µm wide, of elongate, thin-walled cells, 8–16 µm long × 4–6 µm wide; in surface view cells angular, 8–12 µm wide, thin-walled.

Pseudoparaphyses: 1–2 µm diam, filiform, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, cylindric, 75–84 × 9–10 µm, eight ascospores per ascus, irregularly biseriate.

Ascospores: 12–16 × 4.5–5.5 µm exclusive of apiculi, ellipsoid to fusiform with a narrow apiculus at each end, apiculus 3.5–8 × 1 µm, ascospores 3-septate, sometimes constricted at middle septum, smooth, hyaline.

Type: Brazil: Rio Jurua-Miry, on stroma of *Auerswaldia miconiae*, on leaves of *Miconia*, August 1901, *E. Ule* 312a [E. Ule, *Appendix Mycothecae Brasiliensis* 22], LECTOTYPE (**FH**-Höhnel), ISOLECTOTYPES (**B**-immature, **NY**-2 specimens).

Hosts: On *Auerswaldia miconiae* Henn. and *Bagnisiopsis puyana* H. Sydow on *Miconia* spp. including *M. pujana* Markgraf.

Distribution: Brazil, Ecuador, and Haiti.

Specimens: Ecuador: Prov. Nap-Pastaza, Puyo, parasitic on stroma of *Bagnisiopsis puyana* on *Miconia pujana*, 21 February 1938, *H. Sydow, [Fungi Aequatorienses* 882] (**S**).—**Haiti:** Dept. de la Grand'anse, Massif de la Hotte, "Geffrard," 44 km S of Roseaux on road to Camp Perrin, 780 m, 18° 25' N, 73° 53' W, mostly cut-over broadleaf cloud forest, on *Miconia* leaves, 14 November 1982, *W. R. Buck* 9169 (**BPI, NY**).

Paranectriella juruana, type species of *Paranectriella,* is distinct from other species of *Paranectriella* in having opaque, thick-walled ascocarps on a well-developed stroma which forms within the host tissue.

Paranectriella miconiae (F. Stev.) Rossman, **comb. nov.**

Paranectria miconiae F. Stev., *Bot. Gaz.* **65:** 233 (1918).
Associated anamorph: *Titaea miconiae* (F. Stev.) Damon, *J. Wash. Acad. Sci.* **42:** 367 (1952) (= *Monogrammia miconiae* F. Stev., *Trans. Ill. Acad. Sci.* **10:** 202 (1917)).

Illustrations: Fig. 15; Damon (1952: fig. 1A-1C as *Monogrammia miconiae*); Pirozynski (1977: fig. 2G, 2H); Stevens (1917: fig. 9 as *M. miconiae*).

Ascocarps: Scattered, solitary, superficial on thin, byssoid stroma; stroma of thin-walled cells, cells irregularly globose to hyphoid, difficult to distinguish.

Ascocarps: White to translucent, pale luteous when dry, globose to subglobose, not collapsing when dry, 150–180 µm tall × 150–180 µm wide, ascocarp surface with abundant hairs around apex; hairs 21–30 × × 4.5–6 µm, cylindric to slightly clavate, apex obtuse, rounded walls up to 2 µm thick, thin-walled at apex, non-septate; long, flexuous, thin-walled hairs radiating from base of ascocarp.

Ascocarp wall: In longitudinal section not seen; in surface view cells angular, 3–5 µm diam, thin-walled.

Pseudoparaphyses: Short, broad, wavy, septate, thin-walled, extending only about one-third the length of the asci.

Asci: Bitunicate, broadly cylindric, 60–70 × 12–14 µm, eight ascospores per ascus, multiseriate.

Ascospores: 24–28 × 5–7 µm exclusive of apiculi, fusiform, with narrow apiculus at each end, apiculi 4–5 × 1 µm; ascospores 3-setate, smooth, hyaline.

Conidiophores: Not seen.

Conidia: Staurospores, with six appendages, shaped like an "X" with a central process extending above and below the center, outer appendages 12–25 μm long, central appendages 11–12 μm long, always equal or shorter than outer processes, entire conidium 20–25 μm wide.

Type: Puerto Rico: "Yabucoa, on microthyriaceous fungus on *Miconia* sp., 6705." (Stevens 1917: 233). At **ILL** there is a specimen labelled "No. 6705a, *Hyalosphaera miconiae* sp. nov., on *Miconia laevigata*, locality Maricao, 1-10-1913" that contains a fungus fitting the description of *Paranectriella miconiae*. Although not fitting the precise data for the type, this specimen is herein designated the NEOTYPE of *Paranectria miconiae*.

Other possible type specimens without good fungal material are described below. At **NY** there is a specimen labelled "No. 6705. Porto Rican Fungi. *Microthyrium hysterioidides*, *Napicladium fumago* Speg., *Trichosporium stetigerum*, determined by F. L. S., Host *Miconia laevigata*, determined by Britton & Wilson, collected by *F. L. Stevens*. Locality Preston's Ranch (Yabucoa), 12-31-1913. *Hyalosphaera miconiae*". This specimen comes the closest to matching the data for the type collection cited in the protologue *Paranectria miconiae*. Unfortuately, no fungus fitting the description is present on this specimen. Other specimens found at **NY** labelled 6705a also lacked the appropriate fungus. At **ILL** a specimen labelled 8395 but containing an inner packet labelled 6705a had no fungal material left resembling *P. miconiae*. Another specimen, the upper packet on the sheet numbered 6705a, had no material of *P. miconiae*.

Type of *Monogrammia miconiae*: **Puerto Rico**: "On *Miconia*, associated with *Hyalosphaera miconiae*, *Yabucoa*, 6705" (Stevens 1917: 203). A specimen fitting this description with slightly different data but labelled 6705a was located at **ILL.** As for *Paranectriella miconiae*, this specimen is herein designated the NEOTYPE of *Monogrammia miconiae* (**ILL**). It may also be the type of "*Trichopeltatum miconiae* sp. nov.", a name pencilled on the packet.

Hosts: On microthyriaceous fungus, possibly *Microthyrium hysterioides*, on living leaves of *Miconia* sp.

Distribution: Puerto Rico, known only from type collection.

Paranectriella miconiae is poorly known and the neotype specimen contains only a few ascocarps. The presumed anamorph of *Paranectriella miconiae*, *Titaea miconiae*, was originally described by Stevens (1917) in the monotypic genus *Monogrammia*. Damon (1952) was unable to locate the type specimen or any specimen of this species when he transferred it to *Titaea*. Sutton (1984) questioned its placement in *Titaea*. Another species of *Titaea*, *T. hemileiae*, is the anamorph associated with *P. hemileiae*. A specimen at **ILL** issued as *Paranectria miconiae* F. Stev., [H. Sydow, *Itinere Costaricensi Collecti* No. 147], did not contain any ascocarps of the fungus.

Paranectriella minuta (Hansf.) Piroz., *Kew Bull.* **31:** 600 (1977).

Paranectria minuta Hansf., *Proc. Linn. Soc. Lond.* **153:** 30 (1941).
Anamorph: None known.

Illustrations: Fig 16; Hansford (1941: fig. 5 as *Paranectria minuta*); Pirozynski (1977: figs. 2A-C).

Ascocarps: Scattered, solitary, solitary, superficial on thin, hyphal stroma covering dark, host hyphae; hyphae of stroma 2–3 μm diam, hyaline, thin-walled, septate.

Ascocarps: White, translucent, white to pale luteous when dry, not changing colour in KOH, globose, pinched or not collapsing when dry, 80–95 μm tall × 80–95 μm diam; ostiole present; ascocarp with numerous hairs; hairs forming a ring around ascocarp apex; hairs 25–40 × 4.5–6 μm, straight to crooked toward apex, walls 2.0–2.5 μm thick, thin at apex; apex obtuse; hairs arising from flattened wall cells.

Ascocarp wall: In longitudinal section 6–10 μm wide, of two regions: outer region of one to two cell layers, cells angular to elongate, 5–9 long × 4–5 μm wide, thin-walled; inner region 3–5 μm wide, of thin-walled cells lining centrum; in surface view cells angular, 7–15 μm wide, thin-walled.

Pseudoparaphyses: 1.5–2 μm wide, septate, branching, anastomosing.

Asci: Bitunicate, broadly cylindric to obovate, 37–50 × 12–17 μm, eight ascospores per ascus, multiseriate.
Ascospores: 14–18 μm × 5–6 μm exclusive of appendages, broadly ellipsoid, 3-septate, smooth, hyaline, each end with a cellular appendage, appendages straight or curved, apically blunt, 2–6 μm long × 1.5 μm wide.

Type: Uganda: Entebbe Road, on *Meliola paulliniae* on *Paullinia pinnata*, July 1939, *C. G. Hansford* 2528, HOLOTYPE (**IMI** 4665).

Hosts: On *Meliola paulliniae* F. Stev. and *M. landolphiae* Hansf. on living leaves of *Serjana curassavica* Radlk. (= *Paullinia pinnata* L.) and *Oncinotis* sp.

Distribution: Puerto Rico, Trinidad and Uganda.

Specimens: Puerto Rico: near Santurce, parasitic on myeelium of *Meliola* on grass, 18 May 1899, *Mr & Mrs A. A. Heller* 1368, det. Patouillard as *Hyaloderma piliferum* (**ILL, NY**).—**Uganda:** Semuto Road, on *Meliola landolphiae* on *Oncinotus*, December 1943, *C. G. Hansford* 3341, authentic specimen of *Paranectria minuta* (**BPI**).—**Trinidad:** Port of Spain, Maraval Valley, on *Meliola* on *Adiantum*, 1912-1913, *R. Thaxter* (**FH**); Port of Spain, Emperial Valley, 1912-1913, *R. Thaxter* (**FH**).

Paranectriella minuta is similar to *P. hemileiae* in microscopic characters but *P. minuta* occurs on *Meliola* species and has numerous hairs on the ascocarp. *Paranectriella minuta* also appears macroscopically similar to *Hyalocrea meliolicola* but the latter has longer ascospores and lacks pseudoparaphyses. Although the presence of cellular appendages on the ascospores and small, translucent ascocarps occur in some species of *Hyalocrea*, the distinct pseudoparaphyses are characteristic of the Pleosporales. Thus *P. minuta* is retained in Paranectriella.

PODONECTRIA Petch

Trans. Br. mycol. Soc. **7**: 146 (1921).

Type: *Podonectria coccicola* (Ellis & Everh.) Petch.

Species of *Podonectria* are parasitic on scale insects, have pale to bright-colored ascocarps that sometimes appear dark due to a granular coating, bitunicate asci and elongate, multiseptate ascospores. The genus was monographed by Rossman (1978) who included a key plus descriptions and illustrations of the eight accepted species. Pirozynski (1977) placed one additonal species in *Podonectria*, *P. bambusicola* (Rehm) Piroz., based on *Trichonectria bambusicola* Rehm. An examination of the type specimen of *T. bambusicola* revealed that this is a synonym of *Uredinophila erinacea* (Rehm) Rossman included in this paper. Additional information about some *Podonectria* species is reported here.

Podonectria larvispora (Cooke & Massee) Rossman (as "*larvaespora*") was described from Australia and, up to now, has been known only from there. Recently Dr. W. R. Buck (New York Botanical Garden, Bronx, **NY**) collected a specimen of *P. larvispora* from Fiji thus extending the range.

Specimen: Fiji: Viti Levu, N'ambukavesi, in hardwood forest, 24 September 1981, *W. R. Buck* 7432 (**BPI, NY**).

Podonectria echinata Petch has been known only from the type specimen, collected in Sri Lanka (Ceylon). Recently specimens were discovered at **FH** and **NY** which extend the range to Grenada and Puerto Rico.

Specimens: British West Indies: Grenada, Grand Etang, on scale insects of *Citrus*, 1912–1913, *R. Thaxter* (**FH**); Puerto Rieo: twelve km N of Ponce, on scale insects, 13 March 1915, *N. Wille* 1743II (**NY**)

Podonectria gahnia Dingley was described from New Zealand (Dingley, 1954) and up to now, was known only from that country. Recently a portion of the type specimen of *Ophionectria globosa* Sawada was located at **BPI.** Although the description of *O. globosa* lacks a Latin diagnosis and is thus not validly published (Sawada, 1943), the name is found to be a synonym of *P. gahnia*. The portion of the type collection at **TAI** was examined but lacked adequate fungal material, thus the specimen at **BPI** is designated the LECTOTYPE. *Podonectria gahnia* now is known to occur in New Zealand and Taiwan.

PUTTEMANSIA Henn.

Hedwigia **41:** 113 (1902).
Annajenkinsia Thirum. & Naras., *Mycologia* **47:** 760 (1955).

Type: *Puttemansia albolanata* (Speg.) Höhnel (= *P. lanosa* Henn.).

Ascocarps solitary to gregarious, superficial on a pseudoparenchymatous stroma developing from within the host tissue. *Ascocarps* white to pale luteous, darker when dry, not changing colour in KOH, globose to subglobose, walls smooth or with various kinds of hairs. *Ascocarp wall* in longitudinal section more than 20 µm wide, of thin to thick-walled, angular cells. *Pseudoparaphyses* irregularly branching, anastomosing, up to 2 µm diam, often extending beyond asci, filling centrum. *Asci* bitunicate, cylindric. *Ascospores* narrowly to broadly fusiform, often tapering to narrowly rounded apices, multiseptate, smooth, hyaline.

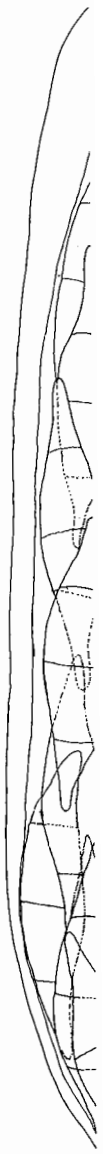
Ascocarps of *Puttemansia* species form within a well-developed stroma inside the substrate, eventually becoming erumpent and superficial. They occur on non-meliolaceous fungi on living leaves and are often associated with anamorphs having tetraradiate conidia, namely *Tetranacrium* and *Titaea*.

The type species of *Annajenkinsia*, *A. fungicola*, is a synonym of *Puttemansia stromatica*. Based on centrum and other characters, the only other species in *Annajenkinsia*, *A. hyperparasitica* is transferred to *Puttemansia*.

Pirozynski (1977) listed *Byssocallis* as a synonym of *Puttemansia*. An examination of the type specimen of *B. phoebes*, the type of *Byssocallis*, suggests that *Byssocallis* should be recognized as a separate genus which develops only a hyphal stroma and occurs on *Meliola*. Of the names and synonyms listed by Pirozynski (1977) in *Puttemansia*, the following are retained in *Puttemansia* based on an examination of type specimens: *P. albolanata* (= *P. lanosa*), *P. brachytricha*, *P. hyperparasitica* (= *Annajenkinsia hyperparasitica*), *P. rickiana*, *P. stromatica* (= *Annajenkinsia fungicola*, = *P. ekmanii*) and *P. stromaticola*. In the same manner, *Puttemansia sclerochitonis* (= *Paranectria sclerochitonis*) was found to be a synonym of *Melioliphila volutella*. *Calonectria coralloides*, considered by Pirozynski to be a probable synonym of *Puttemansia wildemanniana*, is placed in *Meliloliphila* as *M. coralloides*. Type specimens could not be located for the following names: *P. caespitosa* (= *Paranectria caespitosa*), *Puttemansia lanosa* var. *unicaudata*, *P. aphanes* (= *Byssocallis aphanes*), *Puttemansia toddaliae* (= *Paranectria toddaliae*), *Puttemansia ugandae* (= *Paranectria ugandae*), and *Puttemansia wildemanniana* (= *Paranectria wildemanniana*).

Key to species of Puttemansia

1	Ascocarps smooth to rugose, hairs lacking	2
	Ascocarps with hairs	3
2(1)	Ascospores narrowly fusiform, 42–85 × 4.5–7 µm, 5–9-septate	**P. rickiana**
	Ascospores fusiform, 25–34 × 7–10 µm, 3–5-septate	**P. stromatica**
3(1)	Ascospores fusiform, 3–7-septate, generally less than 50 µm long; hairs on ascocarps less than 50 µm long	4
	Ascospores narrowly clavate to cylindric, 5–7-septate, generally more than 50 µm long.	**P. stromaticola**
4(3)	Ascocarps with straight, solitary hairs; ascospores 3-septate	**P. brachytricha**
	Ascocarps with long, fasciculate hairs; ascospores 3–7-septate	5
5(4)	Ascospores 3-septate, 41–51 × 8–10 µm	**P. albolanata**
	Ascospores 5–7-septate, 35–45 × 8–12 µm	**P. hyperparasitica**



FIGS 17-19. 17, *I*
18, *Puttemansia*
ascus, holotype

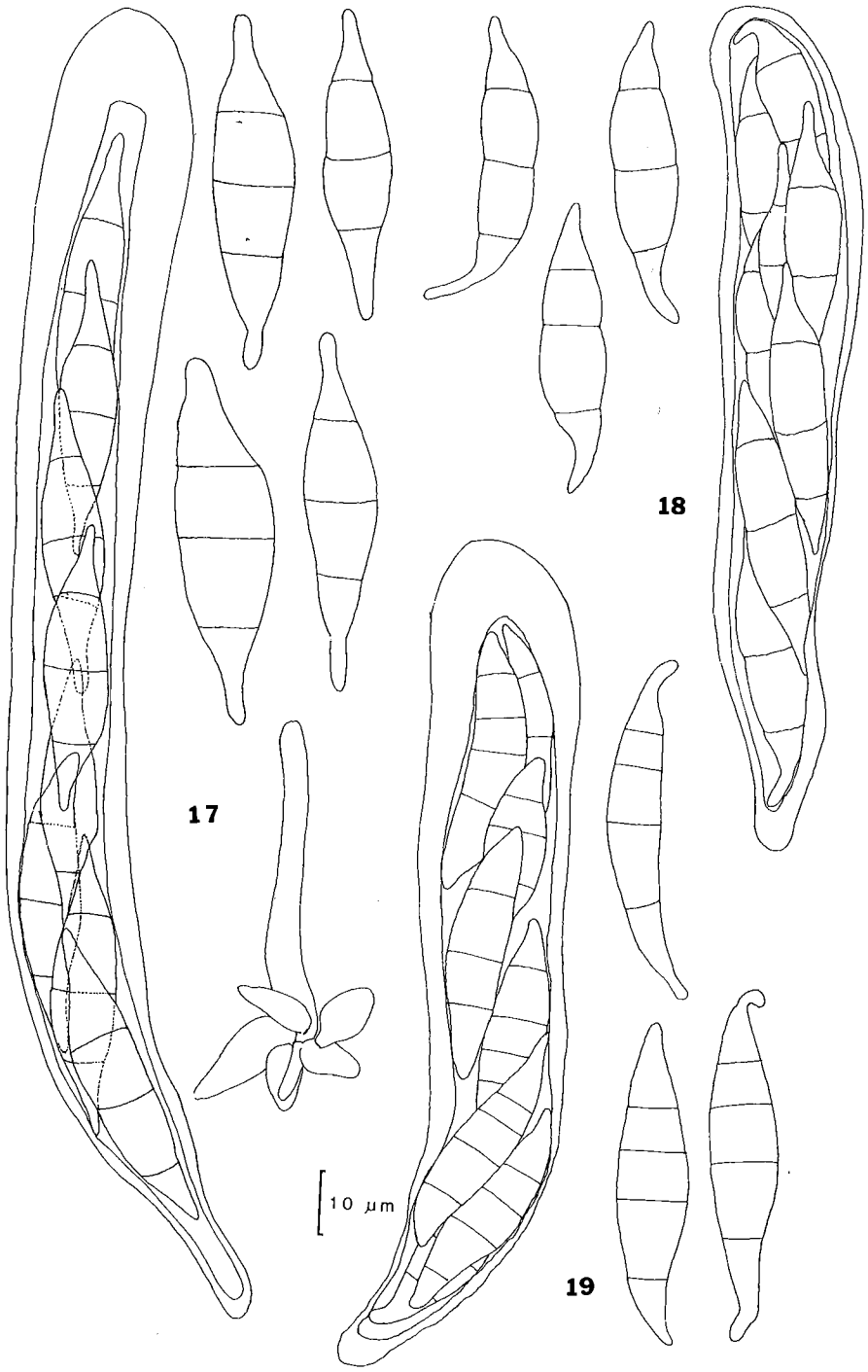
from within the
)H, globose to
n more than 20
mosing, up to 2
res narrowly to
ne.

ate, eventually
s and are often

ica. Based on
s transferred to

ype specimen of
ate genus which
irozynski (1977)
e specimens: *P.*
, *P. rickiana*, *P.*
er, *Puttemansia*
ella. *Calonectria*
ina, is placed in
es: *P. caespitosa*
callis aphanes),
ugandae), and

..... 2
..... 3
.....**P. rickiana**
.... **P. stromatica**
less than 50 µm
..... 4
g. **P. stromaticola**
. **P. brachytricha**
..... 5
....**P. albolanata**
. hyperparasitica



FIGS 17-19. 17, *Puttemansia albolanata*, ascus, paratype **BPI**; ascospores, lectotype **NY**; conidium of associated *Titaea* **BPI** 178. 18, *Puttemansia brachytricha*, ascospores and ascus, isolectotype **CUP** 653. 19, *Puttemansia hyperparasitica*, ascospores and ascus, holotype **IMI**.

Puttemansia albolanata (Speg.) Höhnel, *Sber. Akad. Wiss. Wien*, Abt. 1, **119:** 901 (1910).
Paranectria albolanata Speg., *An. Soc. cienc. argent.* **19:** 42 (1885).
Calonectria lanosa (Henn.) Weese, *Mycol. Centralbl.* **4:** 197 (1914).
Puttemansia lanosa Henn. *Hedwigia* **41:** 112 (1902).
Anamorph: Possibly *Tetranacrium* Hudson & Sutton or *Titaea* Saccardo. Conidia of both genera were associated with the teleomorph.

Illustration: Fig. 17.

Ascocarps: Aggregated in groups of up to five, on a white stroma which develops inside living leaves; stroma white to pale luteous, up to 1 mm diam, continuous with outer region of ascocarp wall, in longitudinal section cells of stroma angular to circular, 12–20 µm wide, with walls up to 2 µm thick.

Ascocarps: White to pale luteous, pale luteous to luteous when dry, subglobose, with a flattened or slightly depressed apex, partially collabent when dry, 350–450 µm tall × 550–750 µm wide, centrum contents exposed by wearing away of ascocarp apex, ascocarp surface densely covered with long, fasciculate, interwoven hairs; hairs up to 350 µm long, hyaline, 4–7 µm wide, with walls 1.5–2 µm thick, septate.

Ascocarp wall: In longitudinal section 60–95 µm wide, of two indistinct regions: outer region continuous with subtending stroma, 50–80 µm wide, cells circular to angular, 12–20 µm wide, with walls up to 2 µm thick; inner region about 15 µm wide, of indistinct, elongate, thin-walled cells; in surface view cells not visible due to hairs.

Pseudoparaphyses: 1.5–2 µm diam, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, cylindric, often curved, 130–170 × 14–17 µm, constricted at base, eight ascospores per ascus, obliquely uniseriate or biseriate.

Ascospores: 40–50 × 8–10 µm, fusiform, with elongate apex and narrowly rounded base, 3-septate, smooth, hyaline.

Type: Paraguay: Guaranitica near Piribebuy, on leaves of living bamboo, 24 March 1883, number 3832, [Balansa, *Plantes du Paraguay* 298], LECTOTYPE (**NY**), ISOLECTOTYPE (**FH**-general, **FH**-Höhnel).

Hosts: On living leaves of bamboo, *Nectandra* sp. and other members of the Lauraceae, possibly on *Phyllachora phoebes* H. Sydow.

Distribution: Brazil, Costa Rica and Paraguay.

Specimens: Brazil: Sao Paulo, Mattos da Serra da Cantareira, on leaves of Lauraceae, 26 March 1901, *A. Hannar* 178, det. P. Hennings, LECTOTYPE of *P. lanosa* designated by Rossman (1979) (**BPI**), ISOLECTOTYPES (**BPI, CUP, FH**-Höhnel, S-2 packets); Sao Paulo, Serra da Cantareira, on *Nectandra* sp., 19 August 1905, *A. Puttemans* 3837, PARATYPE (**BPI**).—**Costa Rica:** San Pedro de San Ramon, on stroma of *Phyllachora phoebes* on leaves of *Nectandra* sp., 8 October 1926, *Alberto M. Brenes, Fungi costaricensis* 157 as *Puttemansia lanosa* (**BPI**).

Puttemansia brachytricha H. Sydow & Sydow, *Annls mycol.* **23:** 361 (1925).

Anamorph: None known.

Illustration: Fig. 18.

Ascocarps: Aggregated in groups of up to five, on a white stroma developing from inside an unidentifiable fungus, possibly a rust; stroma white to pale luteous, up to 400 µm diam, continuous with inner wall of ascocarps; in longitudinal section, cells of stroma angular, 8–14 µm wide, thin-walled.

Ascocarps: White to pale luteous, pale luteous to luteous when dry, subglobose to globose with a flattened or depressed apex, partially collabent when dry, 240–320 µm tall × 200–320 µm wide; ascocarp surface rugose, cracked, with solitary hairs; hairs sparse to numerous, cylindric, tapering to broadly rounded apex, 115–150 µm long × 9–5 m wide, with walls 3–4 µm thick, with a narrow lumen; one or two septa per hair, each septum up to 8 µm thick.

Ascocarp wall: In longitudinal section 40–45 µm wide, of two indistinct regions; outer region 25–35 µm wide, cells angular, 8–16 µm wide, with walls up to 2 µm thick, outer cells with greatly thickened outer walls; inner region about 12 µm wide, of angular to elongate, thin-walled cells, 8–16 × 4–10 µm; in surface view cells angular, 10–15 µm wide, with walls 1–2 µm thick.

Pseudoparaphyses: 1.5–2 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, cylindric, often slightly curved, 120–135 × 15–20 μm, constricted at base, eight ascospores per ascus, obliquely uniseriate or biseriate.

Ascospores: 35–55 × 8–12 μm, fusiform, with elongate apex and elongate, narrowly rounded base, 3-septate, smooth, hyaline.

Type: Costa Rica: San Pedro de San Ramon, on leaves of *Nectandra "reticulata,"* 25 January 1925, *H. Sydow*, [Sydow, *Fungi exotici exsiccati* 653], LECTOTYPE designated herein (**BPI**), ISOLECTOTYPES (**CUP, FH, NY, S**).

Hosts: On living leaves of *Nectandra reticularis* Britton & P. Wilson, possibly on a rust.

Distribution: Costa Rica, known only from the type collection.

Puttemansia hyperparasitica (Sivan. & Kranz) Piroz., *Kew Bull.* **31:** 601 (1977).

Annajenkinsia hyperparasitica Sivan. & Kranz, *Trans. Br. mycol. Soc.* **64:** 12 (1975).
Anamorph: None known.

Illustrations: Fig. 19; Sivanesan & Kranz (1975: figs. 2A-B, 3A-B, pl. 1).

Ascocarps: Aggregated in groups of two to three, superficial on a white stroma which develops from inside the black host stroma; stroma white to pale luteous, well-developed, continuous with ascocarp wall, cells angular to slightly elongate, 12–20 μm wide, hyaline, thin-walled.

Ascocarps: White to pale luteous, concolorous when dry, subglobose with a flattened or depressed apex, collabent when dry, 300–400 μm diam, centrum contents exposed through opening at ascocarp apex, centrum contents pale luteous to pale peach, ascocarp surface with long hyphae except where centrum contents exposed; hyphae flexuous, interwoven, up to 150 μm long × 4–7 μm diam, with walls up to 2 μm thick, nonseptate, ends rounded.

Ascocarp wall: In longitudinal section 20–30 μm wide, of two indistinct regions: outer region 15–25 μm wide continuous with subtending stroma, cells angular to elongate, 5–9 μm wide, thin-walled; inner region about 5 μm wide, of indistinct, elongate, thin-walled cells (based on Sivanesan & Kranz, 1975; specimen not sectioned).

Pseudoparaphyses: 1–1.5 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, cylindric, often curved, 120–185 × 14–18 μm, constricted at base, eight ascospores per ascus, multiseriate.

Ascospores: 35–46 × 8–12 μm, fusiform with bluntly rounded ends, 5–7-septate, smooth, hyaline.

Type: Indonesia: Sumatra, Baukkilttingi, on *Phyllachora cinnamomi* on living leaves of *Cinnamomum* sp., 20 January 1974, *Kranz* 1b, HOLOTYPE (**IMI** 182520 b).

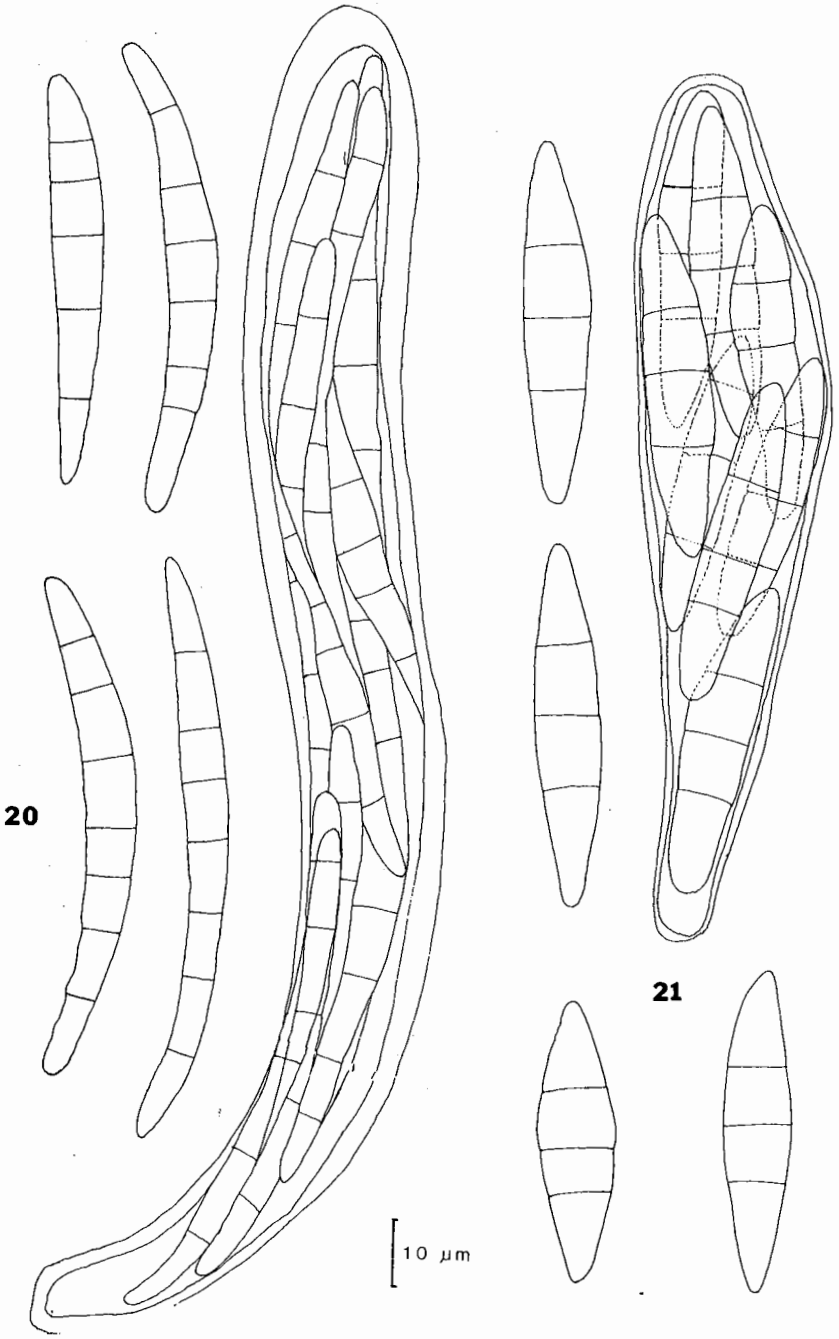
Hosts: On black stroma of *Phyllachora cinnamomi* Hansf. on living leaves of *Cinnamomum* sp.

Distribution: Indonesia, known only from type collection.

Puttemansia hyperparasitica is similar in macroscopic appearance to *P. albolanata,* type of *Puttemansia. Puttemansia albolanata* has 3-septate ascospores while those of *P. hyperparasitica* are 5–7-septate. In addition *P. albolanata* occurs directly on the surface of living leaves developing from a basal stroma inside the leaf. *Puttemansia hyperparasitica* develops from a basal stroma inside the stroma of another fungus that is parasitic on living leaves.

Puttemansia rickiana (Sacc. & H. Sydow) Petrak, *Annls mycol.* **29:** 339 (1941).

Calonectria rickiana Sacc. & H. Sydow, *Annls mycol.* **5:** 177 (1907).
Anamorph: None known.



FIGS 20-21. 20, *Puttemansia rickiana*, ascospores and ascus, **BPI**-Petrak 1951. 21, *Puttemansia stromatica*, ascus and ascospores, **LPS** 40138.

Illustration: Fi

Ascocarps: Ag
stroma, eventuall
µm tall × 1000 µn
up to 2 µm thic
Ascocarps: Wh
depressed apex, c
surface smooth t
Ascocarp wall:
width, thin towar
µm wide, with wa
up to 2 µm thic
Pseudoparaphy
filling centrum.
Asci: Bitunicat
per ascus, multi
Ascospores: 4
5–9-septate, smc

Type: Brazil:
LECTOTYPE (I
not have enoug
Hosts: On strc
Nectandra sp. a
Distribution:

Specimens: Brazil:
present, authentic sp
Decades Fungorum
stroma of *Phaeodor*
IMI-24041b with *P.*

Puttemansia
however *P. rick*
Meliola. *Putten*
ascospores whi

Puttemansia st

Helotiella stron
Puttemansia ek
Annajenkinsia
Anamorph: Nc

Illustrations:

Ascocarps: S
from inside bla
µm wide, hyal
Ascocarps: V
depressed apex
wide; ascocarp
Ascocarp wa
becoming elon

Illustration: Fig. 22.

Ascocarps: Aggregated in groups of up to ten, superficial on a stroma; stroma initially covering the host stroma, eventually entering the host; stroma of *Puttemansia* white to pale luteous, well-developed, up to 350 µm tall × 1000 µm wide, continuous with outer region of ascocarp wall, cells angular, 6–15 µm wide, with walls up to 2 µm thick, intermixed with dark host cells.

Ascocarps: White to luteous, luteous to pale umber when dry, globose to subglobsoe with a flattened or depressed apex, collabent when dry, 340–450 µm tall × 350–400 µm wide, ostiole about 25 µm diam, ascocarp surface smooth to slightly rugose when dry.

Ascocarp wall: In longitudinal section 40–70 µm wide, of two indistinct regions: outer region variable in width, thin toward apex, becoming thick toward base, continuous with subtending stroma, cells angular, 6–15 µm wide, with walls up to 2 µm thick; inner region 10–15 µm wide, of elongate cells 5–10 × 2–3 µm with walls up to 2 µm thick; in surface view cells angular, 8–12 µm wide, with walls up to 2 µm thick.

Pseudoparaphyses: 1.5–2 µm wide, irregularly branching, anastomosing, septate, extending beyond asci, filling centrum.

Asci: Bitunicate, cylindric, often slightly curved, 125–200 × 14–15 µm, constricted at base, eight ascospores per ascus, multiseriate.

Ascospores: 42–85 × 4.5–7 µm, narrowly clavate to narrowly fusiform, tapering to rounded ends, 5–9-septate, smooth, hyaline.

Type: Brazil: Sao Leopoldo, parasitic on carbonous fungal stroma, July 1906, *Rick*, comm. H. Sydow, LECTOTYPE **(PAD)**, probable ISOLECTOTYPE **(SP).** The specimen at **SP** is immature and the label does not have enough information to determine if it is part of the type collection.

Hosts: On stroma of *Phaeodomus erumpens* (Berk. & M.A. Curtis) Petrak & H. Sydow on living leaves of *Nectandra* sp. and *Ocotea floribunda* Benth. & Hook.

Distribution: Brazil and Dominican Republic.

Specimens: Brazil: Sao Leopoldo, Rio Grande do Sul, on leaves of *Nectandra*, 1907, *Rick*, det. Sacc. & Sydow, *Puttemansia stromatica* also present, authentic specimen of *P. rickiana* **(FH-**Höhnel); Sao Leopoldo, Rio Grande do Sul, on *Nectandra*, February 1907, *Rick*, [Theissen, *Decades Fungorum Brasiliensium* 88], possibly an authentic collection **(BPI, M).—Dominican Republic:** Santa Domingo, La Cumbre, on stroma of *Phaeodomus erumpens* on *Ocotea floribunda*, 3 March 1930, *E. L. Ekman*, det. F. Petrak 1951, [herb. Ciferri 3463] **(BPI, IMI**-24041b with *P. stromatica,* **S**).

Puttemansia rickiana is similar to *Melioliphila* species in ascocarp structure and centrum characteristics; however *P. rickiana* has a well-developed stroma and occurs on carbonous fungal stroma rather than hyphae of *Meliola. Puttemansia rickiana* often occurs with *P. stromatica,* a closely related species having fusiform ascospores which are shorter than those of *P. rickiana.*

Puttemansia stromatica (Cooke) Rossman, **comb. nov.**

Helotiella stromatica Cooke, *Grevillea* **20:** 91 (1892).
Puttemansia ekmanii Petrak & Cif. in Petrak, *Annls mycol.* **29:** 341 (1931).
Annajenkinsia fungicola Thirum. & Naras., *Mycologia* **47:** 760 (1955).
Anamorph: None known.

Illustrations: Fig. 21; Pironzynski (1977: fig. 2L, pl. 27A); Thirumalachar & Narasimhan (1955: figs 1–5).

Ascocarps: Scattered, solitary or aggregated in groups of five to ten, superficial on a white stroma developing from inside black, host stroma; stroma white to pale luteous, well-developed, cells angular to elongate, 5–15 µm wide, hyaline, walls thin or up to 2 µm thick, often intermingled with black cells of host stroma.

Ascocarps: White to pale luteous or ochraceous not changing colour when dry, subglobose with a flattened to depressed apex, collabent when dry, 450–600 µm tall × 400–800 µm wide; ostiole present, occasionally very wide; ascocarp surface smooth to rugose, deeply cracked.

scospores,

Ascocarp wall: In longitudinal section 70–120 µm wide, of one region of angular cells, 12–20 µm wide, cells becoming elongate toward centrum, inner cells with walls up to 1.5 µm thick, outermost cells with walls up to 7

μm thick, cells at base thin-walled, forming a dense layer 7–15 μm thick on host surface, hyaline or pale ochraceous; in surface view cells angular, 6–8 μm wide, with walls 1–3 μm thick.

Pseudoparaphyses: 2–4 μm diam, septate, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, 90–130 × 13–18 μm, cylindric, often curved, constricted at base, eight ascospores per ascus, obliquely biseriate or multiseriate.

Ascospores: 25–34 × 7–10 μm, fusiform, tapering to bluntly rounded ends, 3–5-septate, hyaline, smooth.

Type: Brazil: on dead leaves, 1891, *A. Glaziou* 18799, HOLOTYPE (**K**).

Hosts: On stroma of superficial, leaf-inhabiting fungi including *Phyllachora amphidyma* Penz. & Sacc. on *Salacia* sp. (Hippocrateaceae) and *Phaeodomus erumpens* (Berk. & M. A. Curtis) Petrak & Sydow on *Nectandra* sp., *Ocotea floribunda* Benth. & Hook. and *O. leucoxylaris* Benth. & Hook.

Distribution: Brazil, Dominican Republic and India.

Specimens: ?Brazil: On *Nectandra* sp., 1922, *Spegazzini* (**LPS** 40138).—**Dominican Republic:** Republic Santo Domingo, Bonao, Prov. de La Vega, Cordillera Central, on stroma of *Phaeodomus erumpens* on living leaves of *Ocotea floribunda*, December 1926, *R. Ciferri* 2422, LECTOTYPE of *Puttemansia ekmanii* (**BPI**), ISOLECTOTYPE (**S**); as above, occurring on *Ocotea leucoxylaris*, PARATYPE (**S**); Santa Domingo, La Cumbre, on stroma of *Phaeodomus erumpens* on *Ocotea floribunda*, 3 March 1930, *E. L. Ekman*, det. F. Petrak 1951 [herb. Ciferri 3463] (**IMI**-24041a labelled *Puttemansia rickiana*).—**India:** Coorg, Sul da India, on *Phyllachora amphidyma* on *Salacia* sp. (Hippocrateaceae), 10 March 1948, *K. S. Gopalkrichnan* 6410, comm. A. E. Jenkins, N. F. C. 91255, HOLOTYPE of *Annajenkinsia fungicola* (**BPI**).

Puttemansia stromatica was initially described by Cooke as a discomycete. When young, the apex of the ascocarp is closed but a broad, ostiolar region is differentiated with age, thus the mature ascocarps resemble those of a discomycete. The type specimen of *P. stromatica* initially examined by Cooke is mature with the centrum exposed. The type of *P. stromatica* occurs on an unidentified, black, stromatic, superficial, leaf-inhabiting ascomycete.

Puttemansia stromatica is placed in *Puttemansia* based on its thick-walled ascocarps, the narrowly clavate to cylindric ascospores lacking appendages and the occurrence on stromatic leaf-inhabiting fungi, rather than on a carbonous fungal stroma on rotten wood. The presence of short, blunt hairs covering the ascocarps differentiates *P. stromaticola* from other species of *Puttemansia* and *Tubeufia*. *Puttemansia stromatica* appears macroscopically similar to *P. rickiana* but is differentiated by ascospore size, shape and septation. A specimen from the Dominican Republic at **K** labelled *Puttemansia rickiana* contained both species. The orthographic relationship of *P. stromatica* to *P. stromaticola* is unfortunate; these two species are otherwise quite distinct.

Annajenkinsia fungicola is the type species of *Annajenkinsia* which is here considered a synonym of *Puttemansia* as suggested by Pirozynski (1977). He listed *A. fungicola* as a questionable synonym of *Puttemansia ekmanii*. Based on a study of type specimens, *A. fungicola* is herein recognized as a synonym of *P. ekmanii* which is a synonym of *P. stromatica*. The only other species in *Annajenkinsia, A. hyperparasitica,* was transferred to *Puttemansia* by Pirozynski (1977) and is redescribed herein as *P. hyperparasitica.*

Puttemansia stromaticola (Henn.) Rossman, **comb. nov.**

Tubeufia stromaticola (Henn.) Rossman, *Mycotaxon* **8:** 544 (1979).
Calonectria stromaticola Henn., *Bot. Jb.* **40:** 226 (1908).
Berkelella stromaticola (Henn.) Höhnel, *Sber. Akad. Wiss. Wien.* Abt. 1, **119:** 824 (1909).
Anamorph: None known.

Illustration: Fig. 25.

Ascocarps: Solitary or in small groups, superficial on a thin, white hyphal stroma; stroma closely appressed to dark stroma of host; ascocarps occur at edge of host colony.

Ascocarps: White to pale luteous, pale sienna when dry, globose to subglobose with a flattened or depressed apex, collabent when dry, 300–450 μm tall × 200–450 μm wide, centrum contents exposed by wearing away of ascocarp apex, ascocarp surface with short, hyaline hairs; hairs 18–50 × 5–7.5 μm with walls up to 2 μm thick, lumen narrow, apices rounded.

Ascocarp wall: In longitudinal section 40–60 μm wide, of two indistinct regions: outer region 20–40 μm wide, cells circular to angular, 4–8 μm wide, with walls up to 2 μm thick; inner region 10–20 μm wide, cells elongate, 4–8 × 3–5 μm, difficult to distinguish, with walls up to 1 μm thick; in surface view cells not visible due to hairs on ascocarp.

Pseudoparaphyses: 1.5–2 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, broadly cylindric, 110–160 × 10–18 μm, eight ascospores per ascus, multiseriate.

Ascospores: Narrowly clavate to cylindric, 50–75 × 5.5–7.5 μm, widest slightly above the midpoint, often sigmoid or curved, 5–7-septate, apex broadly rounded, basal end attenuated, smooth, hyaline.

Type: Peru: In mountains southwest of Monzon, 2000–2500 m, on microthyriaceous fungus on the upper surface of leathery leaves of Lauraceae, August 1904, *Weberbruer* 3530, LECTOTYPE (**FH**-general), ISOLECTOTYPE (**FH**-Höhnel filed as "*leptostromaticola*" under *Calonectria,* an unpublished name.)

Hosts: On black stroma of microthyriaceous fungus, possibly *Polystomella nervisequia* Höhnel, on living leaves of Lauraceae.

Distribution: Peru, known only from type collection.

Puttemansia stromaticola bears a resemblence to *Tubeufia* species in having pallid, translucent ascocarps and narrowly clavate to cylindric ascospores. However, based on its occurence on a non-meliolaceous host, the species is transferred to *Puttemansia*. The presence of short, blunt hairs and long ascospores differentiates *P. stromaticola* from other *Puttemansia* species.

REBENTISCHIA P. Karst.

Fungi Fennicae Exsiccati, no. 881 (in sched.) (1869).

Type: *Rebentischia massalongii* (Mont.) Sacc. (= *R. pomiformis* P. Karst.).

The two species of *Rebentischia* accepted by Barr (1980) have pale to dark brown-vinaceous ascocarps and ascospores hyaline at first, becoming pale fawn to pale brown-vinaceous at maturity. A key, descriptions, and illustrations of both accepted species, *R. massalongii* and *R. unicaudata* (Berk. & Broome) Sacc., are provided by Barr (1980) along with an account of excluded species.

TUBEUFIA Penz. & Sacc.

Malpighia **11**: 517 (1897).

Acanthostigmina Höhnel, *Sber. Akad. Wiss. Wien*, Abt. 1, **118:** 149 (1909), fide Arx & Müller (1975) and Barr (1980).

Thaxteriella Petrak, *Annls mycol.* **22:** 63 (1924).

Type: *Tubeufia paludosa* (Crouan & H. Crouan) Rossman, an earlier name for *T. javanica* Penz. & Sacc.

Tubeufia is well-described and characterized by Barr (1980), Booth (1964) and Sivanesan (1984). These authors have broadened the concept of the genus to include species with dark ascocarps previously separated

into *Thaxteriella*. If species previously placed in *Thaxteriella* are included in *Tubeufia*, the distinction between *Tubeufia* and *Herpotrichia* is difficult to determine as discussed below. The identity of the type species, *T. paludosa*, has been considered by Samuels, Rossman & Müller (1979). Species of *Tubeufia* differ from other members of the Tubeufiaceae in their occurrence on nonfoliicolous fungi or on old, rotten wood or herbaceous debris. *Tubeufia* species are often hypersaprobic occurring on overmature stromata of ascomycetes.

Sivanesan (1984) transferred two species from *Chaetosphaerulina* to *Tubeufia*, *T. yasudae* (Hino) Sivan., the type of *Chaetosphaerulina,* and *T. vermicularispora* (Hino & Katum.) Sivan. Pirozynski (1972) had previously transferred both species and *Tubeufia nigrotuberculata* Hino & Katum. to *Herpotrichia.* Pirozynski based this decision on developmental characteristics of the ascospores and the presence of a dark, hyphal stroma subtending or surrounding the ascocarps. Although *Tubeufia* is related to *Herpotrichia,* I agree with Pirozynski's distinction between the genera and retain these three species in *Herpotrichia* as *H. yasudae* (Hino) Piroz., *H. vermicularispora* (Hino & Katum.) Piroz. and *H. nigrotuberculata* (Hino & Katum.) Piroz.

A key to *Tubeufia* species is presented here derived from Barr (1980) who included a key, descriptions and illustrations of North American species in her paper. Two new species of *Tubeufia* and one species not found in recent literature are described and illustrated here.

Key to species of Tubeufia and Thaxteriella, modified from Barr (1980).

1 Ascocarps white to pale luteous, darkening upon drying; ascocarp ornamentation, when present, of hyphae or protruding cells, rarely of short setae. Sect. *Tubeufia* 2
Ascocarps brightly pigmented due to external granules or with vinaceous, greyish, greyish-green or blackish-brown pigmentation 3

2(1) Ascospores 40–55 (65) × 3–5 µm, (6) 7–9 (13)-septate ..... **T. cylindrothecia**
Ascospores (70) 100–200 (230) × (2) 3.5–7 (8) µm, up to 35-septate ..... **T. paludosa**

3(1) Ascocarps brightly pigmented due to external granules; ascocarp ornamentation, when present, of hyphae or protruding cells. Sect. *Nectrioidea* 4
Ascocarps with vinaceous, greyish, greyish-green or blackish-brown pigmentation 6

4(3) Ascocarps dark luteous to ochraceous, rarely with hairs; ascospores generally (5) 7–10 (13)-septate; common in temperate North America and Europe ..... **T. cerea**
Ascocarps luteous with luteous hairs or scales; occurring in tropical areas 5

5(4) Ascocarps with luteous hairs of globose cells, hairs 17–40 µm long; ascospores 26–40 (50) × 3–4 µm, 5–7 (9)-septate ..... **T. palmarum**
Ascocarps without hairs; ascospores 45–66 × 3–4.5 µm, 7–9-septate ..... **T. aurantiella**

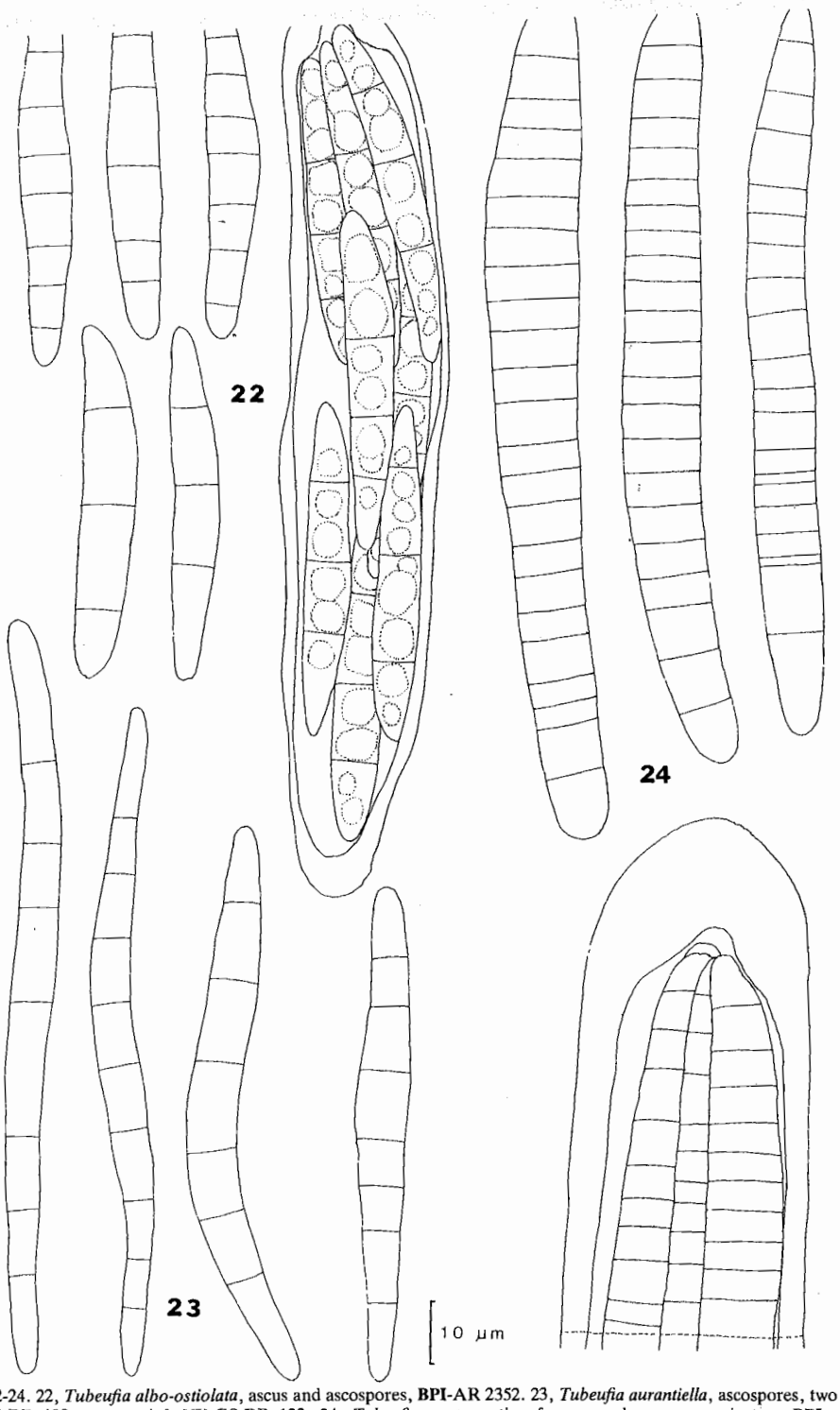
6(3) Ascocarp ornamentation, when present, of hyphae or protruding cells. Sect. *Thaxteriella* 7
Ascocarp ornamentation of dark, thick-walled, tapering setae, rarely reduced to dark protruding cells. Sect. *Acanthostigmina* 13

7(6) Ascocarps immersed in a subiculum which forms a thick mat on the surface of the substratum .....
Tubeufia indica (Dharne & Müller) Rossman, **comb. nov.** Basionym: *Thaxteriella indica* Dharne & Müller, *Sydowia* **23:** 77 (1969).
Ascocarps superficial, occasionally on a black subiculum 8

8(7) Ascospores generally longer than 60 µm, more than 12-septate 9
Ascospores generally less than 60 µm long, less than 12-septate 10

9(8) Ascocarps generally taller than 375 µm, with walls 45–55 µm wide; ascospores 68–90 × 8–9.5 µm .....
..... **T. ovatum**
Ascocarps generally less than 375 µm tall, with walls 26–32 µm wide; ascospores 60–100 × 4–6.5 µm ...
..... **T. helicoma**

FIGS 22-24. 22, NY-GS-BR 19



FIGS 22-24. 22, *Tubeufia albo-ostiolata*, ascus and ascospores, **BPI**-AR 2352. 23, *Tubeufia aurantiella*, ascospores, two on right **NY**-GS-BR 192, two on left **NY**-GS-BR 122. 24, *Tubeufia ovatum*, tip of ascus and ascospores, isotype **BPI**.

10(8) Ascospores (25) 35–60 (65) × (6.5) 8–12 (13) µm, (5) 7–9 (11)-septate ..... **T. pezizula**
Ascospores generally less than 35 µm long, generally less than 7-septate..... 11

11(10) Ascocarps with a white rim around the ostiole; ascospores 32–38 × 4.5–6 µm, 3–5 (7)-septate ..... **T. albo-ostiolata**
Ascocarps concolorous, without a white rim around the ostiole 12

12(11) Ascocarps seated on a dense, velvety mycelial layer; ascocarp wall with distinct inner region loosely attached to outer region; anamorph *Helicoma*; ascospores 26–36 × 3.5–4.5 µm, 4–7-septate..... **T. roraimensis**
Ascocarps with basal mycelium; ascocarp wall with inner hyaline region and outer region of dark cells firmly attached to each other; anamorph *Monodictys*- and *Asteromella*-like; ascospores 25–35 × 3–4 µm, 3–5-septate..... **T. amazonensis** Samuels, Rossman & Müller, *Sydowia* **31:** 186 (1979).

13(6) Ascospores (19) 32–45 (54) × (2.5) 3.5–5.5 (6) µm, 7-septate..... **T. clintonii** (Peck) Barr, *Mycotaxon* **12:** 163 (1980).
Ascospores (40) 56–80 (125) × (2) 2.5–3.5 (4.5) µm, 11-septate..... **T. scopula** (Cooke & Peck) Barr, *Mycotaxon* **12:** 164 (1980).

Tubeufia albo-ostiolata Rossman, **sp. nov.**

Associated anamorph: Unnamed.

Illustration: Fig. 22.

Ascocarpi superficiales in stromate hyphali nigro insidentes, isabellini vel sepiacei, breviter cylindrici vel pyriformes 220–250 × 200–230 µm, papillis cellulis albis circumdatis obsiti, superficie laeves vel subrugosi. Ascocarpi murus longitudinaliter sectus 18–25 µm latus, regionem unam e cellulis 6–9 × 4–6 µm secus muros subfuscis constantem efformans. Pseudoparaphyses 1–2 µm latae anastomosantes. Asci bitunicati late cylindrici 90–115 × 12–16 µm. Ascosporae fusiformes vel cylindricae utrinque late rotundatae 32–38 × 4.5–6 µm, 3–7 septatae laeves hyalinae.

Ascocarps: Crowded in small groups, superficial on a black, basal stroma, stroma of hyphae 3 µm diam, among solitary, black setae of anamorph.

Ascocarps: Isabelline to sepia, darker when dry, short-cylindric to pyriform, collapsed irregularly collabent or not collapsed when dry, 210–240 µm tall × 190–240 µm wide, with raised papillae surrounded by distinct, white cells; ascocarp surface smooth to slightly rugose.

Ascocarp wall: In longitudinal section 18–25 µm wide, forming one region, cells angular, isodiametric to slightly elongate, 6–9 × 4–6 µm with slightly darkened walls, outer surface thickened and darkened.

Pseudoparaphyses: 1–2 µm wide, thin, irregularly branching, anastomosing, extending beyond asci.

Asci: Bitunicate, broadly cylindric, 90–115 × 12–16 µm, eight ascospores per ascus, multiseriate.

Ascospores: 32–38 × 4.5–6 µm, fusiform to cylindric with broadly rounded ends, 3–7-septate, smooth, hyaline.

Anamorph: Dark brown setae 150–210 µm tall × 7–8 µm wide, apex broadly rounded, hyaline, 14 µm wide, bearing solitary, hyaline conidia; conidia globose, hyaline, 21–25 µm diam, walls appearing fibrillose or covered with bacteria; conidia borne endogenously; outer wall of conidiophore forming collarette.

Host: On dead woody twigs between cracks in bark.

Distribution: Venezuela.

Type: Venezuela: T. F. Amazonas, Dep. Rio Negro, San Carlos de Rio Negro, near airport, on dead branch, 24 January 1985, *A. Rossman* 2346, HOLOTYPE (**VEN**), ISOTYPE (**BPI**).

Specimens: Venezuela: T. F. Amazonas, Dep. Rio Negro, San Carlos de Rio Negro, near airport, on dead twig, 24 January 1985, *A. Rossman* 2341 (**BPI, VEN**); as above, *A. Rossman* 2352 (**BPI, VEN**).

Tubeufia albo-c
the astiole of *T.*

Tubeufia auranti

Anamorph: None

Illustration: Fi

Ascocarps: Soli
associated with b
Ascocarps: Pur
collapsed when dr
ascocarp, ascocar
slightly darkened.
Ascocarp wall:
except for yellow
15–25 µm wide,
Pseudoparaphys
Asci: Bitunicat
Ascospores: 45-

Hosts: On dead
Distribution: Br
Type: Java: Tjil
FH no longer co

Specimens: Brazil: A
Samuels with J. Pipoly,
xylariaceous pyrenomy
(**NY**).—**Honduras:** Lan
24 September 1963, *S.*
the intersection of the
Dumont PE 1695 (**NY**
decorticated wood amo
VEN); T. F. Amazonas,
W, on dead stem of *I*

Two tropical *Tu*
and *T. palmarum.*
long and presence

Tubeufia cylindro
= Ophioe
Rossman (1977
encompassing spe
well-defined (Samu
the shorter-spored
illustrated therein

Brazil: Amazonas, S
base of west facing talu
palms, elev 60 m 00°49'
de la Neblina, Base Ca
Negro, Neblina Base C

Tubeufia albo-ostiolata resembles *T. amazonensis* differing primarily in the presence of the white rim around the astiole of *T. albo-ostiolata* and the structure of the ascocarp.

Tubeufia aurantiella (Penz. & Sacc.) Rossman, *Mycotaxon* **8:** 489 (1979).

Anamorph: None known.

Illustration: Fig. 23.

Ascocarps: Solitary, scattered or in small groups, superficial on substrate, without evidence of stroma, often associated with black stroma of other fungi.

Ascocarps: Pure yellow to luteous, luteous when dry, globose to subglobose, partially collabent or not collapsed when dry, 240–330 µm tall × 180–300 µm wide, sunken papillae small, concolorous or darker than ascocarp, ascocarp surface rugose without hairs, with granules which dissolve in lactic acid, base of ascocarp slightly darkened.

Ascocarp wall: In longitudinal section 45–60 µm wide, of two regions: outer region 20–45 µm wide, hyaline except for yellow granules on surface, of thin-walled, angular to globose cells, 8–15 µm diam; inner region 15–25 µm wide, slightly darkened, of thin-walled, elongate cells, 8–15 × 4–7 µm.

Pseudoparaphyses: 1–2 µm wide, thin, irregularly branching, anastomosing, extending beyond asci.

Asci: Bitunicate, broadly cylindric, 92–150 × 15–20 µm, eight ascospores per ascus, multiseriate.

Ascospores: 45–66 × 3.5–5 µm, narrowly fusiform to cylindric, 7–9-septate, smooth, hyaline.

Hosts: On dead woody substrates with other fungi, occasionally on ascocarps of *Rhytidhysteron rufulum*.

Distribution: Brazil, Honduras, Java, New Zealand, Peru, and Venezuela.

Type: Java: Tjibodas, superficial on dead wood, 1 March 1897, no. 126 (**PAD**). A fragmentary isotype at **FH** no longer contains any ascocarps.

Specimens: Brazil: Amazonas, Pico Rondon, lower vine forest, on stroma of xylariaceous pyrenomycete on wood, 4 February 1984, *G. J. Samuels with J. Pipoly, T. Nicholas, & J. Gedes*, GS-BR 192 (**NY**); Amazonas, Pico Rondon, Bald Spur vicinity, along stream, on stroma of xylariaceous pyrenomycete on wood, 3 February 1984, *G. J. Samuels with G. T. Prance, A. Cress, & T. Nicholas*, GS-BR 122 (**NY**).—**Honduras:** Lancetilla, on rotting log of *Hevea* sp., *T. J. Grant* 2024 (**BPI**).—**New Zealand:** Auckland, Orere, on *Cyathodes fasciculata*, 24 September 1963, *S. J. Hughes* (**PDD** 21755).—**Peru:** Dpto. Cuzco, along the Cuzco-Pilcopata-Paucartambo Rd., at a point ca 135 km from the intersection of the Cuzco-Punoi Rd., on indet. branch, 19 July 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood, & P. Buritica*, Dumont PE 1695 (**NY**).—**Venezuela:** T. F. Amazonas, Dep. Rio Negro, Neblina Base Camp on Rio Baria, left bank, elev 140 m, on decorticated wood among other fungi, 18 February 1985, *A. Rossman* 2142 (**BPI, VEN**); as above, 21 February 1985, *A. Rossman* 2197 (**BPI, VEN**); T. F. Amazonas, Dep. Rio Negro, Cerro de la Neblina, cloud forest elev 1250 m, Camp 5, valley north base of Pico Phelps, 0 49'N, 66 0' W, on dead stem of *Philodendron* associated with other fungi, 12 April 1984, *G. J. Samuels* 1340 (**NY**).

Two tropical *Tubeufia* species with luteous ascocarps in the section *Nectrioidea* are recognized: *T. aurantiella* and *T. palmarum*. They are distinguished by the shorter ascospores of *T. palmarum* generally up to 40 µm long and presence of short hairs composed of globose cells on the ascocarps of *T. palmarum*.

Tubeufia cylindrothecia (Seaver) Höhnel, *Sber. Akad. Wiss. Wien*, Abt. 1, **118:** 1479 (1909).
= Ophionectria africana Saccas 1981.

Rossman (1977) synonymized *Tubeufia cylindrothecia* with the type species of *Tubeufia, T. paludosa,* encompassing specimens with a wide range of ascospore sizes. Species in this section of *Tubeufia* are not well-defined (Samuels, Rossman, & Müller, 1979). Following Barr (1980), *T. cylindrothecia* is recognized as the shorter-spored species of the section with ascospores 40–55 µm, rarely up to 65 µm, as described and illustrated therein. Several additional specimens have been examined:

Brazil: Amazonas, Serra Araca, vic. of lower airstrip, caatinga, ca. 60 m, 00°49'N, 63°19'W, *G. J. Samuels* GS-BR 220 (**NY**); Amazonas, base of west facing talus slipe of Serra Araca, near central portion of serra about 45 min walk from lower airstrip, tall moist igapo forest with palms, elev 60 m 00°49'N, 63°19'W, 28 February 1984, *G. J. Samuels* GS-BR 573 (**NY**); GS-BR 899 (**NY.—Venezuela:** T. F. Amazonas, Cerro de la Neblina, Base Camp, elev 140 m, on decaying palm sheathing base, 27 April 1984, *G. J. Samuels* 1654 (**NY**); T. F. Amazonas, Dep. Rio Negro, Neblina Base Camp on Rio Baria, left bank, elev. 140 m, on rotting legume pod, 16 February, 1985 *A. Rossman* 2127 (**BPI, VEN**).

French Guiana AR 3030

Tubeufia helicoma (Phill. & Plowr.) Piroz., *Mycol. Pap.* **129:** 30 (1972).

Barr (1980) provided an excellent account of this species with a list of synonyms, a description and illustrations. *T. helicoma* is now known to occur throughout the warm temperate and tropical regions of the world. Additional specimens have been examined as follows:

Brazil: Amazonas, Plateau of Serra Araca, N side of North Mountain, elev. 1250 m, 00°57'N, 63°21'W, cloud forest, on decaying bamboo, 17–22 February 1984, *G. J. Samuels* with *G. T. Prance & J. Pipoly*, GS-BR 479 (**BPI, NY**).—**Costa Rica:** near Zapote, road to Buenavista, on monocot wood with associated *Helicosporium*, 10 September 1964, *G. Carroll* (**OSC**-21,230).—**Venezuela:** T. F. Amazonas, Dep. Rio Negro, Cerro de la Neblina, 5.1 km NE Pico Phelps, elev ca 1800 m, on decorticated wood, 3 February 1985, *A. Rossman* 2484 (**BPI, VEN**); as above, on dead fibrous branch, AR 2527 (**BPI, VEN**).

Tubeufia ovatum Rossman, **sp. nov**.

Anamorph: None known.

Illustrations: Fig. 24.

Ascocarpi superficiales in stromate hyphali tenui insidentes, fusco-isabellini vel fuliginosi, ovoidei 372–450 × 270–372 µm, epapillosi, superficie subrugosi. Ascocarpi murus longitudinaliter sectus 45–55 µm latus regiones duas efformans: regio externa 30–35 µm lata e cellulis angularibus tenuibus 8–12 µm latis constans; regio interna e cellulis 6–10 × 4–8 µm leviter fuscatis constans. Pseudoparaphyses 1–2 µm latae anastomosantes. Asci bitunicati, late cylindrici 190-270 × 18–29 µm. Ascosporae fusiformes utrinque late rotundatae 68-87 × 8–9.5 µm 16–22 septatae leaves hyalinae.

Ascocarps: Scattered, solitary or in small groups, superficial, easily dislodged, on a sparse, hyphal stroma, hyphae up to 7 µm diam.

Ascocarps: Dark isabelline to smoke-grey, black when dry, not collapsed when dry, ovoid, 372–450 µm tall × 270–372 µm wide, without papillae; ascocarp surface slightly rugose.

Ascocarp wall: In longitudinal section 45–55 µm wide, of two regions: outer region 30–34 µm wide, of angular, thin-walled cells, isodiametric, 8–12 µm wide; inner region 15–20 µm wide, of angular cells, isodiametric to elongate toward centrum, 6–10 × 4–8 µm, walls slightly darkened.

Pseudoparaphyses: 1–2 µm wide, thin, branching, anastomosing, extending beyond asci.

Asci: Bitunicate, broadly cylindric, 190–270 × 18–29 µm, eight ascospores per ascus, multiseriate.

Ascospores: 68–87 × 8–9.5 µm, fusiform with broadly rounded ends, 16–22-septate, smooth, hyaline.

Host: On dead woody twigs.

Distribution: New Zealand and Venezuela.

Type: Venezuela: T. F. Amazonas, Dep. Rio Negro, Cerro de la Neblina, 5.1 km NE Pico Phelps, elev. ca 1800 m, on dead branch, 5 February 1985, *A. Rossman* 1972, HOLOTYPE (**VEN**), ISOTYPE (**BPI**).

Specimens: New Zealand: Auckland Province, Manukau City, along track ca. 3 mi S. of Kawakawa Bay, vic. Papkauri Hill, 23 May 1973, G. J. Samuels & J. M. Dingley, GJS 73–83 & 73–85 (**AUPD**).—**Venezuela:** T. F. Amazonas, Dep. Rio Negro, Cerro de la Neblina, 5.1 km NE Pico Phelps, elev ca 1800 m, on fibrous stem, 8 February 1985, *A. Rossman* 2036 (**BPI, VEN**).

Tubeufia palmarum (Torrend) Samuels, Rossman & E. Müller, *Sydowia* **31:** 189 (1979).

Ophionectria palmarum Torrend, *Bull. Jard. Bot. Etat Brussels* **4:** 8 (1914).

This species was recently described and illustrated by Samuels, *et al.* (1979). Additional specimens were examined as follows:

Brazil: Amazonas, Serra Araca, vic of lower airstrip, caatinga, elev ca. 60 m, 00°49'N; 63°19'W, on dead bark, 10 February 1984, *G. J. Samuels* GS-BR 221 (**BPI, NY**); Amazonas, 0–3 KM S of central portion of Serra Araca and 8 km E of Rio Jauari, elev 60 m, 00°49'N, 63°19'W, on dead bark, 12–13 March 1984, *G. J. Samuels*, GS-BR 743 (**NY**).—**Venezuela:** T. F. Amazonas, Cerra de la Neblina, vicinity of base camp, around and on *Rytidhysteron rufulum* (GJS 1921) on decaying wood, 7 May 1984, *G. J. Samuels*, GS-VE 1917 (**NY**) [anamorph cultured by *A. Rossman 1931*] (**BPI**).

Tubeufia paludosa (Crouan & H. Crouan) Rossman, *Mycologia* **69:** 383 (1977).

Rossman (1977) circumscribed *Tubeufia paludosa,* type species of the genus *Tubeufia,* to include specimens with a wide range of ascospore lengths. Both Samuels, *et al.* (1979) and Barr (1980) present a list of synonyms, descriptions and illustrations, recognizing a narrower species concept with ascospores of *T. paludosa* generally longer than 100 µm. Specimens with shorter spores are placed in *T. cylindrothecia.* Additional specimens have been examined as follows:

Venezuela: T. F. Amazonas, Dep. Rio Negro, Neblina Base Camp on Rio Baria, left bank, elev 140 m, on decaying, woody fruit, 24 February 1985, *A. Rossman* 2226 (**BPI, VEN**); as above, on palm fruit peduncle, *A. Rossman* 2301 (**BPI, VEN**).

Tubeufia pezizula (Berk. & M. A. Curtis) Barr, *Mycotaxon* **12:** 157 (1980).

Thaxteriella lignicola Teng, *Sinensis* **7:** 506 (1936).

Barr (1980) presented a list of synonyms, a description and illustrations of this ubiquitous species. One additional synonym is listed here. The type specimen of *Thaxteriella lignicola* from **CUP** was examined. Although no ascospores were present, the specimen and type description suggest that *Thaxteriella lignicola* is a synonym of *Tubeufia pezizula.*

UREDINOPHILA Rossman, gen. nov.

Type: *Uredinophila tropicalis* (Speg.) Rossman (= *Ophionectria tropicalis* Speg.).

Ascocarpi superficiales globosi vel subglobosi albi vel luteoli, colore in KOH immutato, muris laevibus vel pilis 1-compluribus obsitis, saepissime minus quan 20 µm latis, e cellulis tenuiparietalibus angularibus constantibus. Pseudoparaphyses 1–2 µm latae. Asci bitunicati, anguste clavati vel cylindrici. Ascosporae anguste fusiformes multiseptatae hyalinae laeves.

Ascocarps solitary to aggregated in small groups, scattered, superficial, with a thin hyphal stroma covering the substrate. *Ascocarps* white to pale luteous, not changing colour in KOH, globose to subglobose, walls smooth or with solitary to numerous hairs. *Ascocarp wall* usually less than 20 µm wide, of thin-walled, angular cells. *Pseudoparaphyses* present, thin, irregularly branching, anastomosing, often extending beyond asci, filling centrum. *Asci* bitunicate, narrowly clavate to cylindric, eight ascospores per ascus, multiseriate. *Ascospores* narrowly fusiform to cylindric, hyaline, smooth, multiseptate.

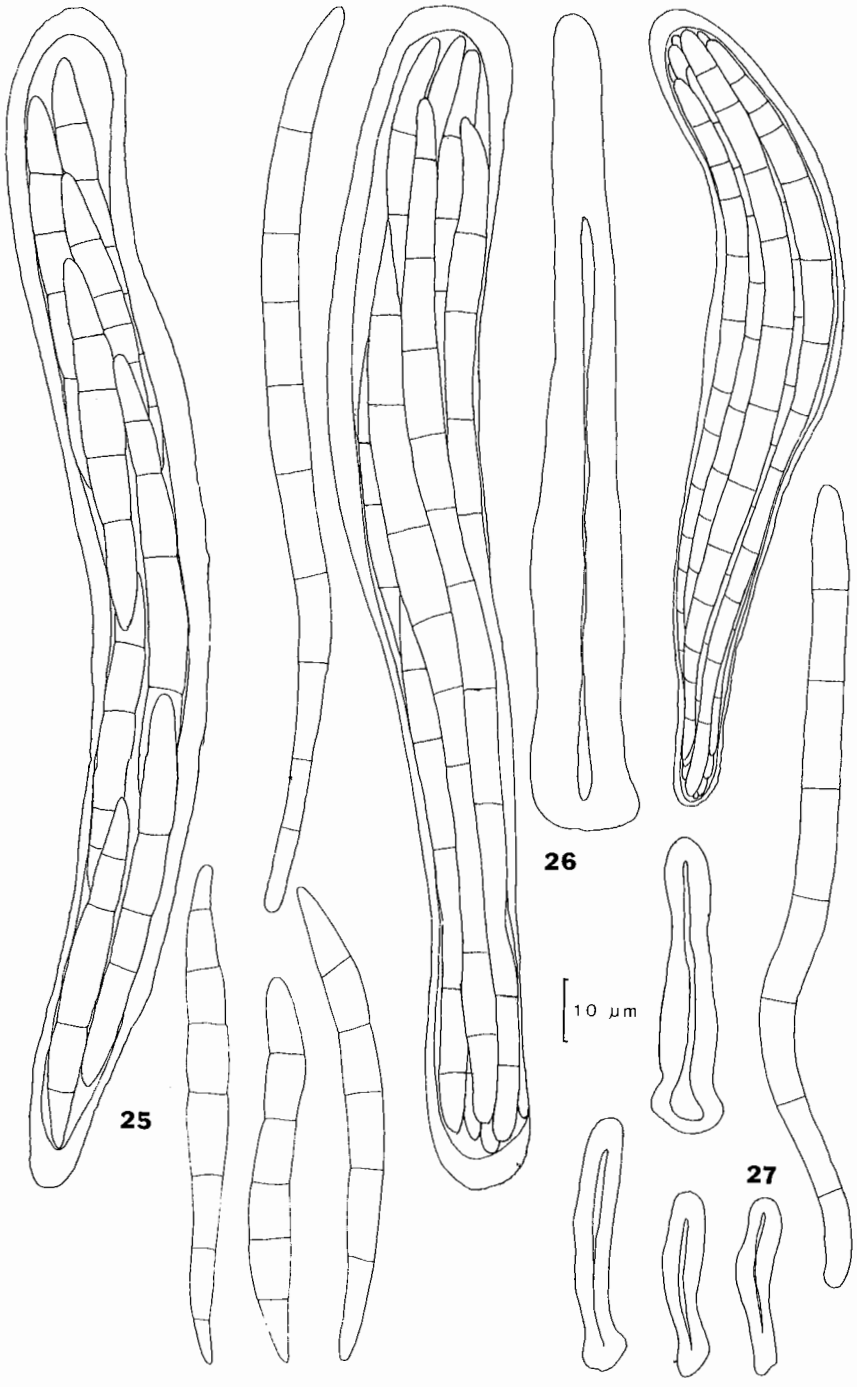
Uredinophila is established for those members of the Tubeufiaceae that occur on rusts on living leaves, have translucent ascocarps with walls less than 20 µm wide, and have narrowly fusiform to cylindric ascospores. At present no anamorphs are known for *Uredinophila* species.

Key to species of Uredinophila

1 On rusts of bamboo; ascocarps with long, straight, hyaline setae; ascospores 100–125 × 2.5–4 µm, 15- or more septate..... **U. erinacea**
On rusts of ferns; ascocarps smooth or with scant hyphal strands; ascospores 75–95 × 2.5–4 µm, 7–15 septate..... **U. tropicalis**

Uredinophila erinacea (Rehm) Rossman, **comb. nov.**

Ophionectria erinacea Rehm, *Philipp. J. Sci.* **8:** 182 (1913).
Trichonectria bambusicola Rehm, *Leafl. Philipp. Bot.* **6:** 2226 (1914).
Podonectria bambusicola (Rehm) Piroz., *Kew Bull.* **31:** 603 (1976).
Erinella setulosa Sacc., *Atti Accad. scient. veneto-trent.-istriana* **10:** 70 (1917).
[*Ophionectria erinacea* Teng, *Contr. Biol. Lab. Sci. Soc. China* **8:** 271 (1933), a later homonym of *Ophionectria erinacea* Rehm, 1913.]



FIGS 25-27. 25, *Puttemansia stromaticola*, ascus and ascospores, lectotype **FH**-general. 26, *Uredinophila erinacea*, ascus and ascocarp hair, lectotype **BPI**. 27, *Uredinophila tropicalis*, ascus, *Sydow* 840 **FH**-exsiccati; ascocarp hairs **PREM** 22735.

Ophionectria
[*Ophionectria*
uredinicola
Anamorph:

Illustration

Ascocarps:
leaf; stroma
thin-walled.
Ascocarps:
collabent whe
wearing away
setae 35–110
thick, only a n
wall cell, cell
Ascocarp
thin-walled, a
Pseudopara
filling centrur
Asci: Bitu
multiseriate.
Ascospores:
septate, septa

Hosts: On
Arundinaria
Distribution
Type: Philip
12 September
(**S**), ISOLEC

Specimens: Ja
sp. (**YAM**).—**Phil**
Reyes, comm. Ba
(**FH**-Höhnel, **M,**
(**BPI, FH, NY**); a
herein (**BPI**-lower
Roxb., March 192
G. Collado, det.
August 1928, HC

Although th
description, il

The type s
specimen was
lectotype by R
may also be t
possibly a da

Uredinophila

Ophionectria

Ophionectria uredinicola Teng, *Sinensia* **4:** 277 (1934).
[*Ophionectria uredinicola* Petch, *Trans. Br. mycol. Soc.* **24:** 143 (1944), a later homonym of *Ophionectria uredinicola* Teng, 1934.]
Anamorph: None known.

Illustrations: Fig. 26; Pirozynski (1977: pl. 28B, figs. 3E-G as *Podonectria bambusicola*).

Ascocarps: Gregarious, in groups of up to 10, superficial on a well-developed stroma arising from inside leaf; stroma white, up to 400 μm diam, erumpent from leaf tissue; cells of stroma angular, 5–10 μm wide, thin-walled.

Ascocarps: White to pale luteous when dry, globose to subglobose, with a flattened or depressed apex, collabent when dry, 150–300 μm tall × 150–325 μm wide, without distinct ostiole, centrum contents exposed by wearing away of ascocarp apex, appearing luteous where exposed; ascocarp with long, straight, hyaline setae, setae 35–110 μm long × 8–15 μm wide at base, tapering to a rounded apex, aseptate, with walls up to 3 μm thick, only a narrow lumen remaining, each seta developing as an extension of a single, globose, outer ascocarp wall cell, cells 7–15 μm diam, larger in width than other ascocarp wall cells.

Ascocarp wall: In longitudinal section 13–18 μm wide, not differentiated into regions; cells small, thin-walled, angular to elongate, 4–7 × 5–10 μm; in surface view cells angular, 6–16 μm, thin-walled.

Pseudoparaphyses: Filiform, 1–2.5 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, broadly cylindric to clavate, 100–165 × 12–15 μm, eight ascospores per ascus, multiseriate.

Ascospores: 100–125 × 2.5–4 μm, cylindric, apex rounded, tapering to narrowly rounded base, 15- or more septate, septate every 8–12 μm, hyaline, smooth.

Hosts: On uredosori of *Puccinia kusanoi* Dietel and unidentified rusts on undersurface of living leaves of *Arundinaria debilis* Thw., *Bambusa blumeana* Schult., *B. spinosa* Roxb. and *Pleioblastus simoni* Nakai.
Distribution: Japan, Philippines and Sri Lanka.
Type: Philippines: Luzon, Prov. Laguna, Los Baños, on undersurface of living leaves of *Bambusa blumeana*, 12 September 1912, *C.F. Baker* 36, LECTOTYPE designated by Rossman (1977) (**BPI**), ISOLECTOTYPE (**S**), ISOLECTOTYPE SLIDE (**NY**).

Specimens: Japan: Saga City, Kyusyu, on uredia of *Puccinia kusanoi* on *Pleioblastis simoni* Nakai, 3 June 1958, *I. Hino*, as *Ophionectria* sp. (**YAM**).—**Philippines:** Luzon, Prov. Laguna, Mt. Maquiling, near Los Baños, on living leaves of *Bambusa blumeana*, September 1913, *Reyes*, comm. Baker, [Rehm, *Ascomycetes* 2115, LECTOTYPE of *Trichonectria bambusicola* designated herein **(BPI)**, ISOLECTOTYPES (**FH**-Höhnel, **M, NY**); as above, [C. F. Baker, *Fungi Malayana* 92], PARATYPE or possibly the same collection as type of *T. bambusicola* (**BPI, FH, NY**); as above, December 1915, det. Saccardo, [C. F. Baker, *Fungi Malayana* 332], LECTOTYPE of *Erinella setulosa* designated herein (**BPI**-lower packet), ISOLECTOTYPE (**BPI**-upper packet, **FH, NY**); Luzon, Prov. Laguana, Los Baños, on leaves of *Bambusa spinosa* Roxb., March 1920, *S. Palafox*, det. O. A. Reinking as *Trichonectria bambusicola* (**BPI**); as above, on *Bambusa spinosa*, December 1919, *T. G. Collado*, det. O. A. Reinking as *Ophionectria erinacea* (**BPI**).—**Sri Lanka** (Ceylon): Nuwari Eliya, on uredosori on *Arundinaria debilis*, 9 August 1928, HOLOTYPE of *Ophionectria uredinicola* Petch (**K**).

Although the type specimen of *Ophionectria uredinicola* Teng, based on *O. erinacea* Teng, was not located, the description, illustrations and habit are sufficient to determine its synonymy with *Uredinophila erinacea*.

The type specimen of *Ophionectria erinacea* is cited in the original publication as C. F. Baker 1655. No specimen was found with that number. In all other details the data of the specimen designated as the lectotype by Rossman (1977) match the citation of the type specimen. The type of *Trichonectria bambusicola* may also be the same collection as that of *Ophionectria erinacea*. *Uredinophila erinacea* occurs on a fungus, possibly a dark-spored rust, immersed in living leaves of bamboo.

Uredinophila tropicalis (Speg.) Rossman, **comb. nov.**

Ophionectria tropicalis Speg., *An. Soc. cient. argent* **19:** 45 (1885).

ascus and
M 22735.

see Ophionectria sp. on bamboo, Kobayashi & Gugman, Bull. For. & For. Prod. Res. Inst. No. 351, 1988. p 161.

Hyaloderma filicolum Pat. in Duss, *Enum. Meth. Champ. Guadeloupe and Martinique* p. 69 (1904). Anamorph: None known.

Illustrations: Figs. 27, 40, 41.

Ascocarps: Solitary or in small groups, superficial, usually on a thin, hyphal stroma covering and surrounding rust sori, hyphae of stroma often radiating from base of ascocarp; hyphae hyaline, 2.5 μm diam, thin-walled.

Ascocarps: Translucent, white to pale luteous, pale luteous to luteous when dry, globose to obovoid or subglobose, not collapsing when dry, 150–250 μm tall × 120–250 μm wide, centrum contents exposed by wearing away of ascocarp wall, without distinct ostiole; ascocarp surface smooth or with scant, short, blunt, hyphal hairs around apex, hairs 25–40 μm long × 4–5 μm wide, flexuous with broadly rounded apices, walls up to 2 μm thick, only a narrow lumen remaining.

Ascocarp wall: In longitudinal section 10–12 μm wide, not differentiated into regions, cells angular to elongate, thin-walled; in surface view cells angular, 6–15 μm wide, thin-walled.

Pseudoparaphyses: 1–5 μm wide, irregularly branching, anastomosing, extending beyond asci, filling centrum.

Asci: Bitunicate, narrowly clavate to cylindric, 80–120 × 11–16 μm wide, eight ascospores per ascus, multiseriate.

Ascospores: 75–95 × (2) 2.5–4 (5) μm, narrowly fusiform, sigmoid or curved, 7–15-septate, apex rounded, tapering to narrowly rounded base, smooth, hyaline.

Hosts: On uredosori of fern rusts, known from *Desmella anemiae* (Henn.) H. Sydow, *D. gymnogrammes* (Henn.) H. Sydow & Sydow (= *Uredo gymnogrammes* Henn.), and *D. superficialis* H. Sydow & Sydow on *Adiantum latifolium* Lam., *Anemia phyllitidis* (L.) Sw., *Blechnum* sp., *Sapichloena volubilis* (Kaulf.) J. Smith (= *Blechnum volubile* Kaulf.), *Thelypteris glandulosus* (Desvaux) Proctor var. *brachyodus* (Kunze) A. R. Smith (= *Dryopteris brachyodus* (Kunze) Urban), *T. clypeolata* (Desvaux) Proctor (= *D. l'herminieri* (Kunze ex Mettenius) C. Chr.), *T. poiteana* (Bory) Proctor (= *D. poiteana* (Bory) Urban), *T. tetragona* (Sw.) Small (= *D. tetragona* (Sw.) Urban), and *T. tetragona* var. *guadalupensis* (Fee) Kramer (= *D. tetragona* var. *guadalupensis* (Fee) C. Chr.).

Distribution: Brazil, Costa Rica, Ecuador, Grenada, Puerto Rico, Trinidad and Venezuela.

Type: Brazil: In a grove of Mbatobi, on living leaves of *Blechnum* sp. on an unidentified rust, July 1883, *Balansa* 3882, HOLOTYPE (**LPS** 1686), ISOTYPE [Roumeguère, *Fungi selecti exsiccati* 4145] (**NY**).

Specimens: Costa Rica: Los Angeles de San Ramon, parasitic on uredosori of *Desmella superficialis* on undersurface of leaves of *Blechnum volubilis*, 30 January 1925, [H. Sydow, *Fungi exotici exsiccati* 655 issued as *Ophionectria tropicalis*] (**B, BPI, CUP, HBG, M, NY, PREM**-22735, **S**).—**Ecuador:** Pichincha near Mindo, on leaves of *Dryopteris brachyodi*, parasitic on *Desmella superficialis*, 12 November 1937, *H. Sydow* (**NY**).—**Grenada:** Grand Etang, on *Desmella gymnogrammes* on *Dryopteris l'herminieri*, November 1912, *R. Thaxter* 47, det. J. C. Arthur *[Reliquiae Farlowianae* 674] (**NY**).—**Puerto Rico:** Rio Prieto, Yauco Lares Rd., on *Desmella superficialis* on *Dryopteris poiteana*, 20 June 1924, *H. H. Whetzel, et al.* 2298 (**NY**); Mayaguez, LaJagua, on *Uredo gymnogrammes* on *Dryopteris poiteana*, 13 March 1916, *H. H. Whetzel & E. W. Olive* (**NY**).—**Trinidad:** On uredosori on undersurface of living frond of a fern, before 1932, *R. Thaxter*, det. L. W. Riddle [herb. Roland Thaxter 2335], as *Ophionectria tropica* (**FH**-general); Maravel Valley, Port of Spain, on *Desmella gymnogrammes* on *Adiantum latifolium*, March 1913, *R. Thaxter* 9727, rust det. by J. C. Arthur, with *Meliola* sp. (**BPI**).—**Venezuela:** Caguita pr. Puerto La Cruz, parasitic on *Desmella superficialis* on leaves of *Dryopteris poiteana* f. *proliferae*, 27 December 1927, *H. Sydow*, [Sydow, *Fungi exotici exsiccati* 778] (**NY**); as above, on *Dryopteris tetragona* var. *guadelupensis*, [Sydow, *Fungi exotici exsiccati* 779] (**NY**); Caguita near Puerta La Cruz, parasitic on uredosori of *Desmella superficialis* on leaves of *Dryopteris tetragona*, 27 December 1927, [Sydow, *Fungi exotici exsiccati* 840 issued as *Ophionectria tropicalis*] (**B, BPI, CUP, FH**-exsiccati, **HBG, M, NY, PC, S**); Miranda, ravines from Turmerito to La Cortada, elev. 1100–1300 m, on *Desmella anemiae* on *Anemia phyllitidis*, 9 July 1932, *Chardon & Toro* 472, det. Kern, Whet. & Thurston (**BPI**)

FIGS 28-
epimyce
FH-Höh
ascocarp

69 (1904).

overing and
.5 µm diam,

obovoid or
exposed by
short, blunt,
es, walls up

angular to

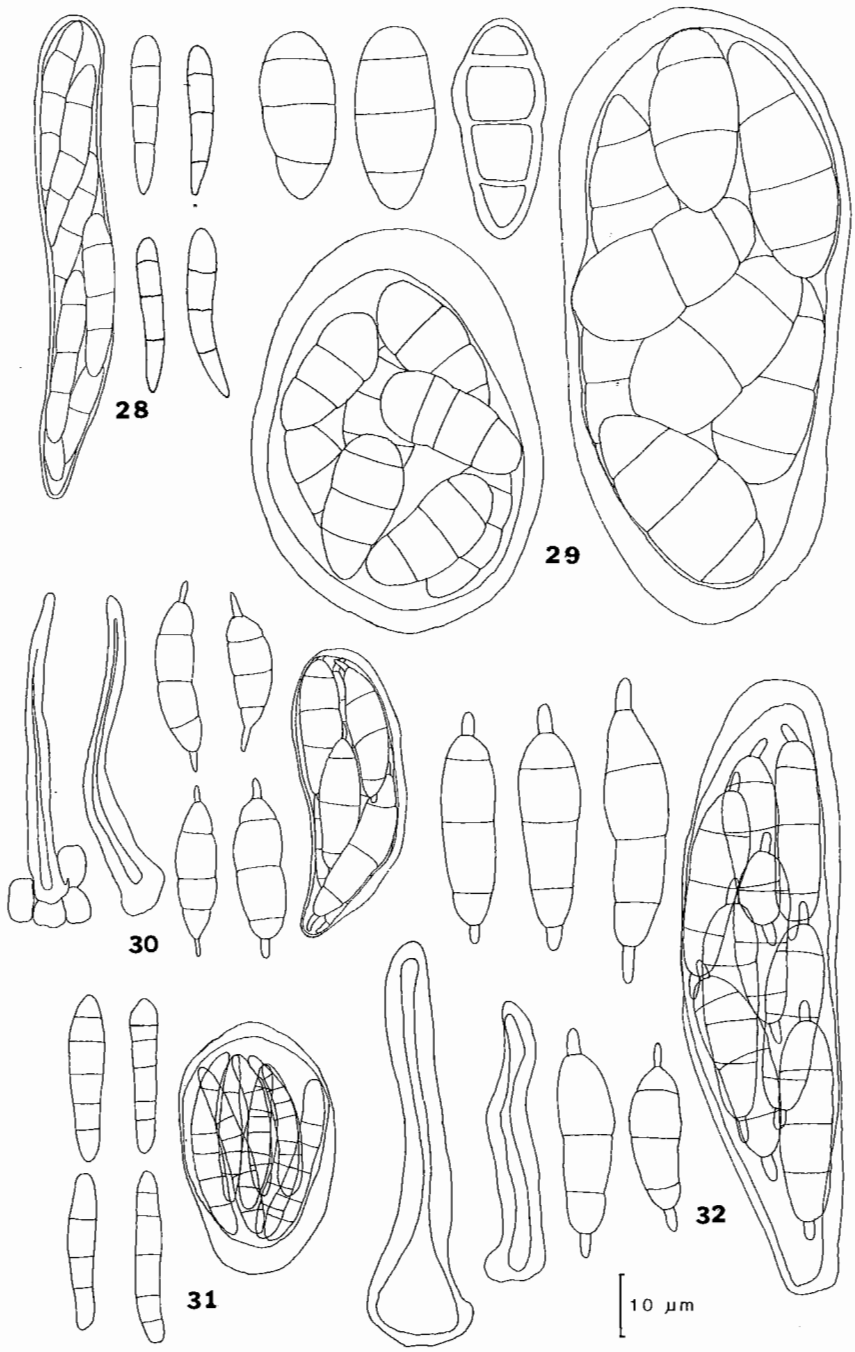
asci, filling

per ascus,

ex rounded,

nogrammes
& Sydow on
lf.) J. Smith
nze) A. R.
ieri (Kunze
(Sw.) Small
ragona var.

a.
, July 1883,
5] (**NY**).
e of leaves of
HBG, M, NY,
, 12 November
R. Thaxter 47,
on *Dryopteris*
ana, 13 March
Thaxter, det. L.
ymnogrammes
a pr. Puerto La
, Fungi exotici
near Puerta La
ici exsiccati 840
Cortada, elev.
urston (**BPI**)



FIGS 28-32. 28, *Nematostoma hoehnelii*, ascus and ascospores, **BPI**-*Rick* 322, lower ascospores, holotype **S**. 29, *Hyalocrea epimyces*, asci and ascospores, isolectotype **FH**. 30, *Hyalocrea imperconspicua*, ascocarp hairs, ascospores and ascus, holotype **FH**-Höhnel. 31, *Hyalocrea jasmini*, ascospores and ascus, isolectotype **GZU**. 32, *Hyalocrea meliolicola*, ascospores, ascus and ascocarp hair, **GZU**-*Hansford* 3081, **NY**-*Buck* 9183.

PLEOSPORALES, DIMERIACEAE

NEMATOSTOMA H. Sydow

Annls mycol. **12:** 161 (1914).
Aphanostigme H. Sydow, *Annls mycol.* **24:** 368 (1926).
Additional generic synonyms listed by von Arx & Müller, 1975.

Type: *Nematostoma artemisiae* H. Sydow.

The genus *Nematostoma* includes species in the Dimeriaceae that are associated with leaf hairs and have hyaline, multiseptate ascospores. Only one species initially described as a member of the Hypocreales is included here. The genus includes additional species, most of which have not been described in the recent literature.

Nematostoma hoehnelii (Rehm) Rossman, **comb. nov.**

Calonectria hoehnelii Rehm in Höhnel, *Annls mycol.* **2:** 43 (1904).
Calonectria rubropunctata Rehm, *Annls mycol.* **7:** 539 (1909).
Anamorph: None known.

Illustrations: Fig. 28.

Asocarps: Scattered, solitary, superficial among leaf hairs on undersurface of leaves; red granules on ascocarp surface forming a ring of red pigments around each ascocarp.

Ascocarps: Dark red to dark brick, blood to black when dry, subglobose to flattened, collabent when dry, about 210 µm tall × 305–370 µm wide, ostiole lacking; ascocarp surface with loose hyphae becoming compact toward ascocarp wall; hyphae 3–4 µm wide, coated with red, lactic acid-soluble granules.

Ascocarp wall: In longitudinal section 20–35 µm wide, of two regions: outer region 10–22 µm wide, of loose, hyphal cells; inner region 8–15 µm wide, cells small, angular, 4–7 µm diam with dark brick walls up to 1 µm thick.

Pseudoparaphyses: Filiform, irregularly branching, anastomosing.

Asci: Bitunicate, narrowly clavate to cylindric, 73–82 × 9–10 µm, arising from basal pad about 15 µm thick, eight ascospores per ascus, obliquely biseriate.

Ascospores: 19–22 × 3.5–4 µm, narrowly clavate, often curved, apex broadly-rounded, base narrowly-rounded, 3-septate, smooth, hyaline.

Hosts: Among hairs on undersurface of living leaves of Myrtaceae-*Eugenia bagensis* Berg. and *Psidium* sp.
Distribution: Known only from Brazil.
Type: Brazil: Rio de Janeiro, near Petropolis, on undersurface of leaves of *Psidium* sp., August 1899, *Höhnel*, HOLOTYPE (**S**), ISOTYPE (**FH**-Höhnel, **GZU**).

Specimens: Brazil: Rio Grande do Sul, Sao Leopoldo, on undersurface of leaves of *Eugenia bagensis*, 1908, *Theissen*, HOLOTYPE of *Calonectria rubropunctata* (**S**), possible ISOTYPE (**SP**). Authentic specimens which may be part of the type collection were issued as Rick, *Fungi austro-americani* 322 (**BPI, FH**-general, **FH**-Patouillard, **M, NY, S**) and Theissen, *Decades fungorum brasiliensium* 151 (**BPI, M**).

Due to the granules on the hairs, the ascocarps of *Nematostoma hoehnelii* appear red, however, the true ascocarp wall is dark red to dark brick. Based on the superficial, dark-coloured ascocarps occurring on living leaves, bitunicate asci and pleosporaceous centrum, this species belongs in the Dimeriaceae, Pleosporales. The ascocarps of *N. hoehnelii* are over 200 µm diam, larger than those of most members of Dimeriaceae (von Arx & Müller, 1975). The ascocarp color and lack of ascocarpal setae differentiate *N. hoehnelii* from other species of *Nematostoma*.

DOTHIDEALES, DOTHIDEACEAE

Members of the Dothideales with pale ascocarps are included here in the genus *Hyalocrea* as suggested by Pirozynski (1977). Unlike species of the Tubeufiaceae, *Hyalocrea* species generally have small ascocarps, less than 200 μm diam, lack pseudoparaphyses, have broadly obclavate, broadly clavate or broadly cylindric asci, and have few asci per ascocarp.

HYALOCREA H. Sydow & Sydow

Annls mycol. **15**: 214 (1917).
[*Poeltia* Petrak, *Sydowia* **25:** 179 (1972), *nom. illegit.*, non *Poeltia* Grolle, see Hawksworth & Pirozynski (1977)].
[*Poeltiella* Petrak, *Sydowia* **26:** 127 (1974), *nom. inval.*, established for *Poeltia* Petrak non Grolle, see Hawksworth & Pirozynski (1977)].

Type: *Hyalocrea epimyces* H. Sydow & Sydow.
Type of *Poeltia* and *Poeltiella*: *Hyalocrea meliolicola* (F. Stev.) Rossman (= *Paranectria meliolicola* F. Stev., LECTOTYPE designated by Hawksworth & Pirozynski (1977).

Ascocarps solitary or aggregated in small groups; superficial on a thin, hyphal stroma. *Ascocarps* white to pale luteous, not changing colour in KOH, globose to subglobose, walls smooth or with hairs. *Ascocarp wall* in longitudinal section usually less than 15 μm wide, cells angular, thin-walled. *Pseudoparaphyses* absent. *Asci* bitunicate, broadly obclavate, broadly clavate or broadly cylindric; few asci per ascocarp. *Ascospores* broadly to narrowly fusiform, multiseptate, with or without cellular appendages at each end, hyaline.

Key to species of Hyalocrea

1 Ascospores 5–7-septate, 18–30 × 4–6 μm, without a cellular appendage at each end; ascocarps occurring directly on living leaves ..... **H. jasmini**
Ascospores 3-septate, wider than 6 μm, with or without a cellular appendage at each end; ascocarps occurring on other fungi on living leaves 2

2(1) Ascocarps with fasciculate hairs, on stroma of *Phyllachora* on living leaves; ascospores 32–38 × 15–18 μm, without cellular appendages ..... **H. epimyces**
Ascocarps with solitary hairs, on meliolaceous hyphae or stroma of *Discodothis* on living leaves; ascospores less than 15 μm wide, with a cellular appendage at each end 3

3(2) Ascospores 26–35 × 7–9 μm; ascocarps on meliolaceous hyphae on living leaves ..... **H. meliolicola**
Ascospores 16–21 × 5–8 μm; ascocarps on stroma of *Discodothis* on living leaves.... **H. imperconspicua**

Hyalocrea epimyces H. Sydow & Sydow, *Annls mycol.* **15:** 214 (1917).

Calonectria epimyces (H. Sydow) Sacc., *Sylloge Fung.* **24:** 680 (1926).
Anamorph: None known.

Illustrations: Fig. 29; Pirozynski (1977: figs 3H-M, pl. 28C).

Ascocarps: Scattered, solitary, superficial, on surface of dark carbonous stroma of host; thin-walled, hyaline hyphae, 2 μm diam, radiating from base of ascocarp, partially covering host.
Ascocarps: White, globose to subglobose, 110–200 μm tall × 130–215 μm wide, with long, white, fasciculate hairs; hairs 110–140 × 25–55 μm; sparse, hyphal hairs also present on ascocarp.

Ascocarp wall: In longitudinal section 12–20 µm wide, of 2–3 cell layers, cells elongate, 3–7 µm wide, with walls up to 1.5 µm thick; in surface view cells angular to circular, 4–6 µm wide, with walls 1–2 µm thick.

Pseudoparaphyses: Lacking.

Asci: Bitunicate, broadly obclavate to broadly cylindric, (35) 75–92 × 25–58 µm, up to 20 asci per ascocarp, ascal apex thick, eight ascospores per ascus, multiseriate.

Ascospores: 32–38 × 15–18 µm, broadly ellipsoid, lacking appendages, 3-septate, often slightly constricted at one or all septae, smooth, hyaline.

Host: On *Phyllachora elmeri* H. Sydow & Sydow (= *Catacauma elmeri* H. Sydow & Sydow on *Ficus minahassae* Miq.

Distribution: Philippines, known only from the type collection.

Type: Philippines: Prov. Laguna, Mt. Makiling, near Los Baños, on superficial stroma of *Catacauma elmeri* on leaves of *Ficus minahassae*, July 1916, *C. F. Baker* 4358, [C. F. Baker, *Fungi Malayana* 541], LECTOTYPE (**BPI-**lower packet), ISOLECTOTYPES (**BPI-**upper packet, **FH**).

Hyalocrea imperconspicua (Höhnel) Rossman, **comb. nov**.

Paranectria imperconspicua Höhnel, *Sber. Akad. Wiss. Wien*, Abt. 1, **118:** 822 (1909).
Anamorph: None known.

Illustration: Fig. 30.

Ascocarps: Scattered, solitary or in small groups, superficial on host stroma, hyphae and hairs radiating from base of ascocarp to substrate.

Ascocarps: Pale luteous, luteous when dry, globose, not collapsing when dry, 40–85 µm diam, with solitary, hyaline hairs, 20–40 µm long, straight or slightly curved, occasionally crooked at apex, pointed, non-septate, with walls up to 2 µm thick.

Ascocarp wall: In longitudinal section 5–10 µm wide, of 2–3 cell layers, cells angular, 5–8 µm wide, thin-walled; in surface view cells angular, 5–8 µm wide, thin-walled.

Pseudoparaphyses: Sparse, 2–3 µm wide, septate, thin-walled.

Asci: Bitunicate, broadly cylindric, 25–40 × 10–16 µm, few asci per ascocarp, (2–6) 8 ascospores per ascus, multiseriate.

Ascospores: 16–21 × 5–8 µm, excluding appendages, broadly fusiform to ellipsoid, 3-septate, not constricted, smooth, hyaline, with a cellular appendage at each end, appendages 3–4 × 1 µm, apices rounded.

Host: On stromata of *Discodothis filicum* Höhnel on undersurface of tree fern fronds.

Distribution: Known only from Java.

Type: Java: Buitenzorg, in the Botanical Garden, on stromata of *Discodothis filicum* on the undersurface of tree fern fronds, 1907–8, *F. von Höhnel,* HOLOTYPE (**FH-**Höhnel).

Despite the presence of sparse pseudoparaphyses, this species is placed in *Hyalocrea* based on centrum characteristics such as broad asci, few asci per ascocarp and ascospores with a cellular appendage at each end. Because of its small ascocarps, *H. imperconspicua* may be easily overlooked.

Hyalocrea jasmini (Hansf.) Rossman, **comb. nov**.

Calonectria jasmini Hansf., *Proc. Linn. Soc. Lond.* **157:** 190 (1946).
Anamorph: None known.

Illustration: Fig. 31.

Ascocarps: Scattered, solitary, superficial on undersurface of living leaves, with a thin byssoid stroma

around base of ascocarp or without a stroma, attached by thin hyphae to substrate; hyphae septate, smooth, 2.5–4 µm wide.

Ascocarps: Hyaline, white to pale luteous, darker when dry, globose to subglobose, collabent when dry, 130–200 µm diam, apex raised, pointed, ostiolate, ascocarp surface with loose hyphae toward base, solitary to fasciculate hairs near apex; apical fasciculate hairs 20–50 µm long × 10–22 µm wide at base, individual hairs 3–4 µm wide.

Ascocarp wall: In longitudinal section 8–10 µm wide, of one region 2–3 cell layers thick, cells elongate, 7–10 × 3–7 µm, thin-walled; in surface view cells angular, 3–7 µm wide, thin-walled.

Pseudoparaphyses: Lacking.

Asci: Bitunicate, broadly clavate to broadly cylindric, 40–55 × 14–20 µm, few asci per ascocarp, eight ascospores per asci, multiseriate.

Ascospores: 18–30 × 4.5–6 µm, narrowly clavate with broadly rounded ends, often slightly sigmoid, 5–7-septate, smooth, hyaline.

Host: On living leaves of *Jasminum dichotomum* Vahl.

Distribution: Uganda, known only from type collection.

Type: Uganda: Entebbe Road, on living leaves of *Jasminum dichotomum,* November 1943, *Hansford* 3114, LECTOTYPE designated herein (**IMI-**4533), ISOLECTOTYPES (**BPI, GZU, PREM**).

Hyalocrea meliolicola (F. Stev.) Rossman, **comb. nov.**

Paranectria meliolicola F. Stev., *Bot. Gaz.* **65:** 232 (1918).

Paranectriella meliolicola (F. Stev.) Piroz., *Kew Bull.* **31:** 598 (1977).

[*Poeltia meliolicola* (F. Stev.) Petrak, *Sydowia* **25:** 177 (1972), *nom. illegit.*, see Hawksworth & Pirozynski (1977)].

[*Poeltiella meliolicola* (F. Stev.) Petrak, *Sydowia* **26:** 127 (1974), *nom. illegit.*, see Hawksworth & Pirozynski (1977)].

Paranectria meliolicola var. *major* (Hansf.) Piroz., *Kew Bull.* **31:** 598 (1977).

Paranectria meliolicola F. Stev. var. *major* Hansf. *Proc. Linn. Soc. Lond.* **153:** 29 (1941).

Associated anamorph: None known. *Chionomyces meliolicola* (Cif.) Deighton & Piroz. occurred on the Same leaves but these colonies are different in appearance and were never mixed with those of *H. meliolicola.*

Illustrations: Fig. 32; Pirozynski (1977: figs. 2E-F).

Ascocarps: Scattered or in small groups, superficial on host hyphae or on a thin, hyphal stroma covering the *Meliola* hyphae and radiating from base of ascocarp.

Ascocarps: White to pale peach, pale luteous when dry, translucent, globose to short pyriform, laterally pinched when dry, 95–180 µm tall × 115–180 µm diam, ostiole lacking, apex discoidal, 60–70 µm diam; ascocarp surface smooth or with sparse hairs; hairs solitary, 16–42 × 6–8 µm, straight or crooked toward apex, walls 1–2 µm thick, hairs with 0–2 thin septa.

Ascocarp wall: In longitudinal section 8–15 µm wide, of one region, 2–3 cell layers thick, cells elongate, 8–12 × 5–7 µm with walls up to 1 µm thick, outermost cell walls up to 1.5 µm thick; in surface view cells angular, 6–12 µm wide, thin-walled.

Pseudoparaphyses: Lacking.

Asci: Bitunicate, broadly clavate to broadly cylindric, 60–66 × 25–29 µm, few asci per ascocarp, eight ascospores per asci, multiseriate.

Ascospores: 26–35 × 8–9 µm, exclusive of appendages, ellipsoid, 3-septate, slightly constricted at middle septum, smooth, hyaline, with a cellular appendage at each end, appendages 2–5 µm long × 2 µm wide.

Hosts: On *Meliola deinbolliae* Hansf., *M. martiniana* Gaill., *M. paulliniae* F. Stev., *M. psychotriae* Earle, *M. rhois* Henn., and *M. tortuosa* Winter on *Deinbollia* sp., *Morinda citrifolia* Linn. (= *M. geminata* DC.),

BRIGHT-COLOURED DISCOMYCETES WITH BITUNICATE ASCI

Among the bright-coloured Loculoascomycetes, two genera have discomycetous ascocarps of uncertain disposition: *Hyalosphaera* and *Nematothecium*. The presence of bitunicate asci excludes these genera from most orders of discomycetous fungi including the Helotiales. Dennis (1970) placed *Hyalosphaera* in the Perisporopsidaceae of the Dothiorales; von Arx & Müller (1975) included *Nematothecium* in the Dimeriaceae, Dothideales *sensu lato*. Other discomycetes with bitunicate asci have dark coloured ascocarps and are lichenized or are similar to lichens in having long-lasting apothecia; in addition, many known discomycetes with bitunicate asci have an amyloid ascal reaction. Both *Hyalosphaera* and *Nematothecium* have fleshy to gelatinous ascocarps and lack asci with an amyloid reaction. In *Hyalosphaera* ascospores are released by deliquescence of the entire ascocarp. *Nematothecium* species have subglobose, flattened ascocarps that erode apically to expose the centrum with asci and ascospores.

HYALOSPHAERA F. Stev.

Trans. Ill. St. Acad. Sci. **10:** 172 (1917).
Dexteria F. Stev., *Trans. Ill. St. Acad. Sci.* **10:** 174 (1917).

Type: *Hyalosphaera miconiae* F. Stev.

Ascocarps solitary to aggregated in small groups, scattered, superficial, on a thin, hyphal stroma covering the substrate. *Ascocarps* white, pale luteous, luteous or brick, darker when dry, not changing colour in KOH, subglobose to discoid, walls smooth to slightly scurfy, without hairs or setae, occasionally with sparse hyphae arising from base and sides of ascocarp. *Ascocarp wall* in longitudinal section generally less than 10 μm wide, non-cellular, with gelatinous material surrounding asci which presumably deliquesces at maturity. *Pseudoparaphyses* lacking or present, 1–2 μm wide, anastomosing, extending beyond asci to form an epithecium. *Asci* bitunicate, broadly clavate to broadly cylindric. *Ascospores* narrowly fusiform, clavate or cylindric, hyaline to pale umber or pale cinnamon, multiseptate.

Key to species of Hyalosphaera

1	Ascospores 15–18 × 6–7 μm, 3-septate, with a long, thin appendage at each end	**H. ciliata**
	Ascospores longer than 20 μm, without appendages	2
2(1)	Ascospores pale umber to pale cinnamon, 36–57 × 4–4.5 μm, 3-septate	**H. miconiae**
	Ascospores hyaline, 33–35 × 4–5 μm, 5-septate	**H. pulchella**

Hyalosphaera ciliata Rossman, **sp. nov.**

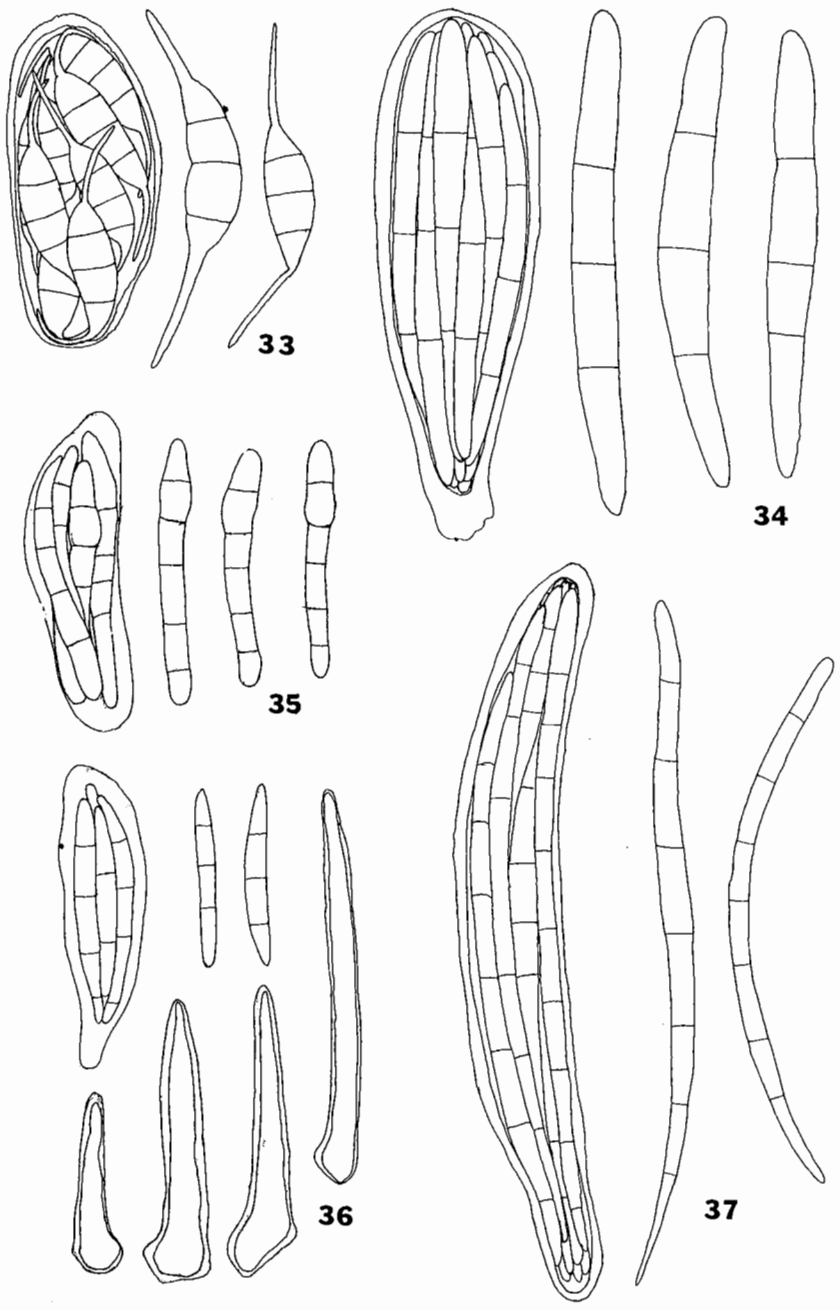
Anamorph: None known.

Illustration: Fig. 33.

Ascocarpi superficiales subglobosi vel discoidei 200–210 × 225–270 μm albi vel luteoli glaberrimi, ostiolo destituti, e basi lateribusque hyphas radiantes sparsas tenuiparietales emittentes. Pseudoparaphyses 1–2 m latae septatae ramosae anastomosantes. Asci bitunicati late cylindrici 35–40 × 16–17 μm. Ascosporae uniuscujusque asci octo fusiformes, absque appendiculuis 15–18 × 6–7 μm, 3-septatae hyalinae laeves, basi apiceque appendiculo elongato provisae.

Ascocarps: Scattered, solitary, superficial on a thin stroma forming on and between host hyphae; hyphae of stroma 2–3 μm diam, hyaline, thin-walled.

Ascocarps: White to pale luteous, pale luteous to luteous when dry, subglobose to discoid, globose when dry, 200–210 μm tall × 225–270 μm wide, without ostiole; ascocarp surface smooth to slightly scurfy, without hairs



FIGS 33-37. 33, *Hyalosphaera ciliata*, ascus, holotype **BPI**; ascospores, isotype **IMI**. 34, *Hyalosphaera miconiae*, ascus and ascospores, isolectotype **BPI**. 35, *Hyalosphaera pulchella*, ascus and ascospores, **IMI** 51806*d*. 36, *Nematothecium horridum*, ascus, ascospores and ascocarp hairs, holotype **FH**-Patouillard. 37, *Nematothecium vinosum*, ascus and ascospores, lectotype **BPI**.

or setae; sparse, thin-walled hyphae, 2.5 μm wide, radiating from base and sides of ascocarps.

Ascocarp wall: In longitudinal section of two regions: outer region one cell layer thick, cells elongate, 5–7 × 4–5 μm, with walls up to 1 μm thick, outermost cells with wall up to 3 μm thick; inner region of thin-walled, irregularly angular to elongate cells, 6–8 × 4–6 μm, forming a layer 10–20 μm thick subtending the asci; in surface view cells angular, 5–8 μm wide, with walls up to 1 μm thick.

Pseudoparaphyses: 1–2 μm wide, septate, anastomosing, extending beyond asci to form an epithecium 15–20 μm thick.

Asci: Bitunicate, broadly cylindric, 35–40 × 16–17 μm, eight ascospores per ascus, multiseriate.

Ascospores: 15–18 × 6–7 μm, exclusive of appendages, fusiform, 3-septate, smooth, hyaline, with one long, thin, hyaline appendage at each end, 10–15 μm long.

Hosts: On *Irene hyptidicola* (F. Stev.) Toro (= *Meliola hyptidicola* F. Stev.) on *Hyptis capitata* Jacq.
Distribution: Venezuela, known only from type collection.
Type: Venezuela: El Limon, on *Meliola hyptidicola* on *Hyptis capitata*, January 1928, *H. Sydow*, [F. Petrak, *Mycotheca generalis* 1209 as *Calloriopsis gelatinosa*], HOLOTYPE (**BPI**), ISOTYPE (**IMI** 32762).

Hyalosphaera ciliata is a white to pale luteous apothecial fungus with bitunicate asci which occurs on *Meliola*. This species was discovered among specimens identified as *Calloriopsis gelatinosa* (Sacc.) H. Sydow & Sydow, a common meliolicolous discomycete with unitunicate asci (Pfister, 1976). *Hyalosphaera ciliata* resembles the type of *Hyalosphaera*, *H. miconiae*, in ascocarp structure but, like *H. pulchella*, *H. ciliata* has hyaline ascospores. *Hyalosphaera ciliata* is unique in having ascospores each with a long, thin, hyaline appendage at each end.

Hyalosphaera miconiae F. Stev., *Trans. Ill. St. Acad. Sci.* **10:** 172 (1917).

Anamorph: None known.

Illustrations: Fig. 34; Pirozynski (1977: figs. 4A-C).

Ascocarps: Scattered, solitary, superficial on hyphal stroma; hyphae of stroma 4–5 μm diam, hyaline, thin-walled, septate.

Ascocarps: Hyaline, ochraceous when dry, translucent, ascospores visible through ascocarp wall, subglobose to discoid, slightly elongate when dry, 90–100 μm high × 110–125 μm wide, without ostiole; ascocarp surface smooth, without hairs or hyphae; ascocarp closed at first, open at maturity, apex eroding to expose asci and ascospores.

Ascocarp wall: In longitudinal section 3–5 μm wide, of one region, one cell layer thick; cells elongate, hyaline, thin-walled; exposed wall of cells very thick, forming continous layer around ascocarp; in surface view cells irregularly angular, 4–8 μm wide, thin-walled.

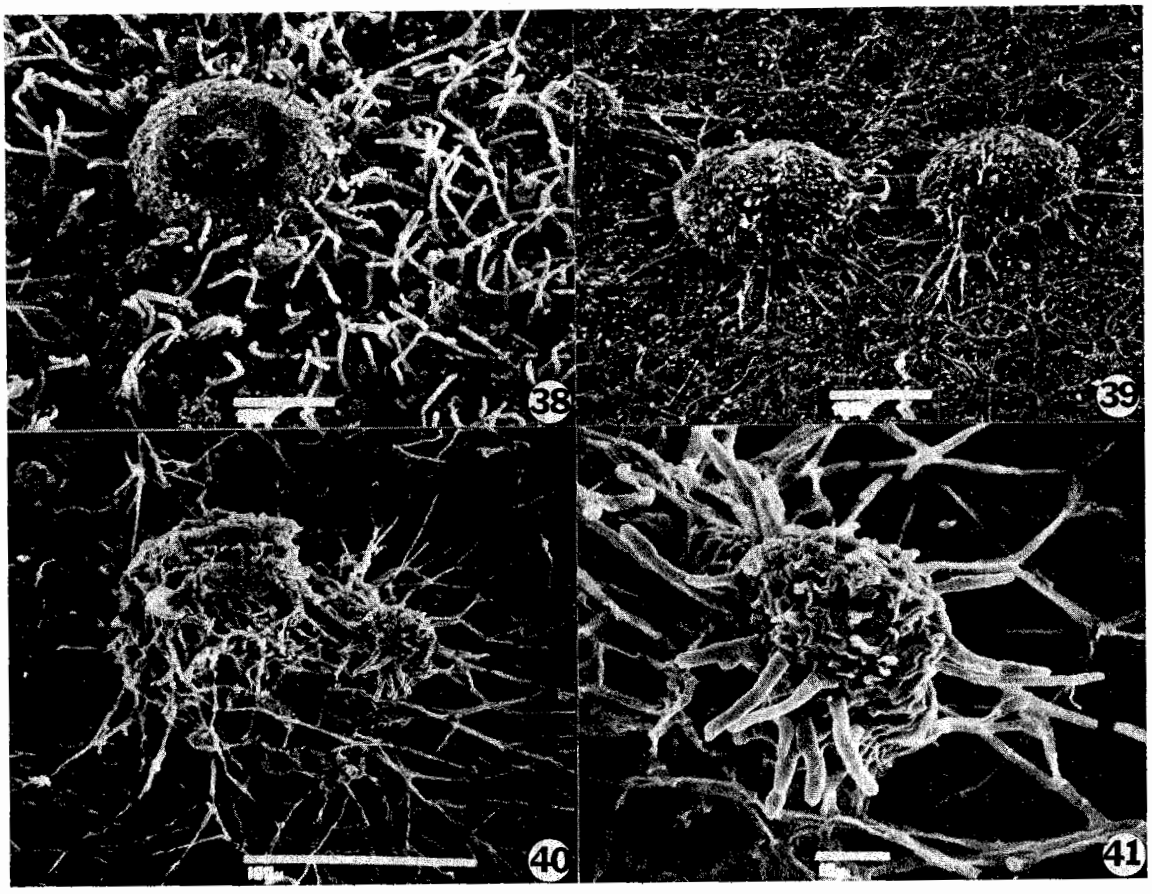
Pseudoparaphyses: Lacking.

Asci: Bitunicate, short cylindric, 52–62 × 14–18 μm, 15–20 asci per ascocarp, eight ascospores per ascus, multiseriate.

Ascospores: 36–57 × 4–5 μm, narrowly clavate to cylindric, ends rounded, 3-septate, smooth, pale umber to pale cinnamon.

Host: On living leaves of *Miconia laevigata* DC. and *Clidemia* sp.
Distribution: Puerto Rico and Venezuela.
Type: Puerto Rico: Maricao, on the undersurface of living leaves of *Miconia laevigata*, 1 October 1913, *F. L. Stevens* 207 (**ILL**-lower packet herein designated LECTOTYPE, ISOLECTOTYPES-**BPI, ILL**-upper packet, **NY**-packet empty, **NY**-slides ex **BPI**).

Specimens: Puerto Rico: Maricao, on *Miconia laevigata*, 18 November 1913, *F. L. Stevens* 4822, PARATYPE (**BPI**); Ponce, on *Miconia laevigata*, 8 November 1913, *F. L. Stevens* 4338, PARATYPE (**BPI, ILL**-2 packets, **NY, NY**-slides ex **BPI, NY**-slides ex **ILL**).—**Venezuela:** El Limon, Valle de Puerto La Cruz, D. F., on leaves of Melastomataceae, *Clidemia* sp., 17 January 1928, *H. Sydow*, also present *Blastotrichum miconiae* F. Stev., *Calothyrium fabnii* Sydow, [H. Sydow, *Fungi Venezuelani* 286a](**BPI**).



FIGS 38-41. 38, *Byssocallis phoebes*, ascocarp, **BPI** 160. 39, *Melioliphila balanseana*, ascocarp, **BPI**-*Rehm* 1745. 40, *Uredinophila tropicalis*,ascocarp on rust pustules, **BPI** 840. 41, *Uredinophila tropicalis*, ascocarp with setae, **BPI** 840.

Hyalosphaera pulchella (F. Stev.) Rossman, **comb. nov.**

Dexteria pulchella F. Stev., *Trans. Ill. St. Acad. Sci* **10:** 174 (1917).
Anamorph: None known.

Illustration: Fig. 35.

Ascocarps: Scattered, numerous, superficial on a thin sheet forming on and between *Meliola* hyphae.

Ascocarps: Luteous to brick, darker when dry, subglobose to discoid, irregularly flattened when dry, 200–210 μm tall × 175–270 μm diam, without ostiole, ascocarp surface smooth to slightly irregular, without hairs; sparse, thin-walled, hyphae, 2.5 μm wide, radiating from base and sides of ascocarps.

Ascocarp wall: Cells indistinct, disc held together by gelatinous material surrounding and covering the ascocarp.

Pseudoparaphyses: Lacking.

Asci: Bitunicate, broadly clavate to broadly cylindric, 42–50 × 12–14 μm, asci scattered throughout ascocarp, 15–20 asci per ascocarp, eight ascospores per ascus, multiseriate.

Ascospores: Clavate to cylindric, 33–35 × 4–5 μm, 5-septate, slightly inflated above second septum, apex broadly rounded, smooth, hyaline.

Hosts: On
Radlk. (= *F*
Distributio
Type: Puer
HOLOTYPE
Specimens: Sie
above, M 5114a

Sydow (19
specimens of

Leafl. Philipp

Type: *Nem*

Ascocarps
blood-red to b
dry; surface w
thin or thick
narrowly fusif

The type s
Sphaeriales a
Borinquenia I
herein recogr
unknown. N
BISH or **ILL**

Key to specie

1 Asco
wi
Asco
as

Nematotheciur

Hyaloderma h
Anamorph: N

Illustration:

Ascocarps:
hyphae 2–4 μ
Ascocarps:
surface with d
nonseptate, ta
Ascocarp w
cytoplasm; ou

Hosts: On *Meliola crucifera* Starb. (= *M. hessii* F. Stev.) and *M. paulliniae F. Stev. on Serjana curassavica* Radlk. (= *Paullinia pinnata* L.).

Distribution: Puerto Rico and Sierra Leone.

Type: Puerto Rico: Mayaguez, on *Meliola hessii* on *Paullinia pinnata*, 4 May 1913, *F. L. Stevens* 1207, HOLOTYPE (**ILL**).

Specimens: Sierra Leone: Njala, Kori, on *Meliola paulliniae* on *Paullinia pinnata*, 2 August, 1953, *F. C. Deighton* M 5114d (IMI 51806d); as above, M 5114a (**IMI** 51806g).

Sydow (1935) suggested that this species belongs in *Hyalosphaera.* After an examination of the type specimens of *Hyalosphaera* and *Dexteria,* I agree.

NEMATOTHECIUM H. Sydow & Sydow

Leafl. Philipp. Bot. **5:** 1534 (1912).

Type: *Nematothecium vinosum* H. Sydow & Sydow.

Ascocarps solitary to gregarious, superficial on thin hyphal stroma covering host hyphae. *Ascocarps* blood-red to brown, black when dry, not changing colour in KOH, subglobose to discoid, not collapsing when dry; surface with dark setae or abundant, hyphoid hairs, surface cells indistinct or of small, dark brick cells with thin or thickened walls. *Pseudoparaphyses* sparse, filamentous. *Asci* bitunicate, cylindric. *Ascospores* narrowly fusiform, acicular or cylindric, smooth, multiseptate, pale umber.

The type species of *Nematothecium*, *N. vinosum*, has bitunicate asci and thus does not belong in the Sphaeriales as suggested by Pirozynski (1977). He questionably synonymized *Malacaria* H. Sydow and *Borinquenia* F. Stev. with *Nematothecium*. Based on an examination of the type specimen, *Malacaria* is herein recognized as a distinct genus within the Tubeufiaceae. The disposition of *Borinquenia* remains unknown. No fungal material resembling the type species of *Borinquenia* was found on the type specimen at **BISH** or **ILL.** See the section on excluded and doubtful species at the end of this paper.

Key to species of Nematothecium

1 Ascospores 22–25 × 3 μm, narrowly fusiform to cylindric; ascocarps with dark-umber setae ..... **N. horridum**
Ascospores 75–90 × 2.5–3.5 μm, narrowly fusiform to acicular; ascocarps with hyaline, hyphal hairs ..... **N. vinosum**

Nematothecium horridum (Pat.) Rossman, **comb. nov.**

Hyaloderma horridum Pat., *Bull. Soc. mycol. Fr.* **12:** 136 (1896).
Anamorph: None known.

Illustration: Fig. 36.

Ascocarps: Scattered, solitary, superficial on dark host hyphae; ascocarps with hyphae radiating from base, hyphae 2–4 μm wide, pale umber, septate.

Ascocarps: Pale umber, black when dry, subglobose, not collapsing when dry, 50–90 μm diam; ascocarp surface with dark umber setae extending from outer wall cells; setae 18–50 μm long × 5–8 μm at base, straight, nonseptate, tapering to an acute apex, walls up to 2 μm thick.

Ascocarp wall: In longitudinal section not seen; in surface view cells indistinct, brown, pigmentation in cytoplasm; outer wall cells which produce setae angular, 5–9 μm wide, with thick, brown walls.

Pseudoparaphyses: Sparse, 2–3 μm wide, septate, unbranched.
Asci: Bitunicate, short-cylindric, 33–42 × 11–13 μm, with short, stipitate base, four ascospores per ascus, multiseriate.
Ascospores: 22–25 × 3 μm, fusiform to cylindric, 3-septate, smooth, pale umber.

Hosts: On *Meliola* sp. on living leaves of *Gymnosporia* sp.
Distribution: Philippines, known only from type collection.
Type: Philippines: Tonkin, near Dinh Hoa, on *Meliola* sp. on leaves of *Gymnosporia* sp., *Bon* 5882, HOLOTYPE (**FH**-Patouillard).

Nematothecium horridum is placed in this genus based on the dark, gelatinous ascocarp wall, bitunicate asci, pale umber, cylindric to acicular ascospores and occurrence on *Meliola*.

Nematothecium vinosum H. Sydow & Sydow, *Leafl. Philipp. Bot.* **5:** 1534 (1912).

Anamorph: None known.

Illustration: Fig. 37.

Ascocarps: Solitary to gregarious, superficial on thin stroma forming on and between host hyphae.
Ascocarps: Blood to dark brown, not changing colour when dry, subglobose to discoid, not collapsing when dry, about 100 μm diam; ascocarp surface with hyphoid hairs; hairs 3–4 μm wide, flexuous, thin-walled, septate, with scarlet granules on outside surface.
Ascocarp wall: Longitudinal section not seen; in surface view cells indistinct, small, thin-walled.
Pseudoparaphyses: Sparse, about 1 μm wide, nonseptate, branching.
Asci: Bitunicate, cylindric, 75–90 × 12–14 μm, eight ascospores per ascus, multiseriate.
Ascospores: 75–89 × 2.5–3.5 μm, narrowly fusiform to acicular, apex narrowly rounded, basal end narrowly attenuated, acutely rounded, 7–9-septate, smooth, pale umber, hyaline at ends.

Host: On *Meliola* sp. on leaves of *Eugenia incarnata* Elmer.
Distribution: Philippines, known only from type collection.
Type: Philippines: Palawan, Puerto Princesa (Mt Pulgar), on *Meliola* on undersurface of leaves of *Eugenia incarnata*, May 1911, *Mr. Elmer* 13232, LECTOTYPE designated herein (**BPI**), ISOLECTOTYPE (**BPI**).

EXCLUDED AND DOUBTFUL SPECIES

Excluded and doubtful species which may belong to the Tubeufiaceae are summarized below.

Amphinectria erubescens (Desm.) Speg., *Boln Acad. nac. Cienc. Cordoba* **26:** 346 (1924).
Sphaeria erubescens Desm., *Annls Sci. nat.* **6:** 72 (1846).
Nectria erubescens (Desm.) Phill. & Plowr., *Grevillea* **10:** 70 (1881).

This species belongs in the Hypocreales as *Nectria erubescens,* a member of the *Nectria arenula* group as delimited by Booth (1959) and Samuels (1978). *Nectria erubescens* has been redescribed, illustrated and discussed by Samuels (1978) who cultured and described its *Cylindrocarpon* anamorph.

Amphinectria portoricensis Speg., *Boln Acad. nac. Cienc. Cordoba* **26:** 346 (1924).

Type: Puerto Rico: near Rosario, on living leaves of *Comocladia glabra* (**LPS**).

The type specimen of *A. portoricensis* was examined; no ascocarps resembling the described fungus were found. *Amphinectria portoricensis* is the type species of the genus *Amphinectria* Speg., thus the identity of *A. portoricensis* and the genus *Amphinectria* remains obscure.

Pirozynski (1977) included *Amphinectria* in the Tubeufiaceae as a synonym of *Melioliphila.* Previously Clements & Shear (1931) had concluded that *Amphinectria* was a synonym of *Berkelella,* now considered a synonym of *Herpotrichiella.* Petrak (1951) examined the small type specimen and found only an unidentifiable lichen.

Borinquenia miconiae F. Stev., *Trans. Ill. St. Acad. Sci.* **10:** 173 (1917).

Type: Puerto Rico: on *Miconia laevigata,* Arecibo, 6804, Utado, 6862, 6871 (type).

Borinquenia miconiae is the type and only species of the genus *Borinquenia.* The type specimen was not located at **BISH** or **ILL.** Although Pirozynski (1977) suggested that *Borinquenia* is a synonym of *Nematothecium*, until a type specimen is located, the identity of this genus remains obscure.

Byssocallis aphanes H. Sydow, *Annls mycol.* **25:** 16 (1927).
Puttemansia aphanes (H. Sydow) Petrak, *Annls mycol.* **29:** 343 (1931).

Type: Costa Rica: San Pedro de San Ramon, on living leaves of *Rondelitia*, 6 February 1925, no. 191 p.p.

The type specimen is apparently lost or destroyed.

Chaetocrea parasitica H. Sydow, *Annls mycol.* **25:** 19 (1927).

Type: Costa Rica: La Caja near Sant Jose, parasitic on stroma of *Cyclostomella disciformis* Pat. on leaves of *Nectandra sanguinae* Rottb., 4 January 1925, no. 166. Host

The type specimen is apparently lost or destroyed. This is the type and only species in *Chaetocrea.*
Spec at BPI w/ ascocarps → M. winkleriana.

Globulina erysiphoides Speg., *Boln Acad. nac. Cienc. Cordoba* **11:** 533 (1889).

Type: Brazil: near Apiahy, on living leaves of composite, March 1888, n. 2785.

The type specimen from **LPS** was examined. No ascocarps were found. Notes and slides made from the type at **LPS** were located at **NY.** The fungus has bitunicate asci and appears to be similar to *Puttemansia albolanata* but this synonymy could not be confirmed. Viegas (1961) mistakenly suggested that *G. erysiphoides* is a synonym of *Barya parasitica* Fuckel which has unitunicate asci and is a member of the Clavicipitales. *Globulina erysiphoides* is the type of *Globulina*, thus the dispostion of the genus remains obscure.

Globulina ingae Pat., *Bull. Soc. mycol. Fr.* **9:** 154 (1893).

Type: Ecuador: Cotocollao, on leaves of *Inga pachycarpa*, February 1892, *Lagerheim.*

Specimens of the type collection were examined from **BPI, FH**-Patouillard and **NY.** The specimen from **FH** is herein designated the LECTOTYPE. This fungus has unitunicate asci and thus does not belong to the Tubeufiaceae.

Hyaloderma afzeliae Keissler, *Annls mycol.* **7:** 290 (1909).

Type: Solomon Islands: on living leaves of *Afzelia* sp., September, *C. Rechinger*, no. 1950, Herb. Mus. Palat. Vindob.

The type specimen is apparently lost or destroyed.

Hyaloderma bakeriana Henn., *Hedwigia* **48:** 103 (1908).

Type: Brazil: Para, "Hort. botan. Mus. Goeldi in vaginis siccis *Bactridis majoris* in societate *Cyphellae paraensis* in hyphis *Helminthospori*." January 1908, *C. F. Baker* no. 102a.

A type specimen from **S** proved to be similar to or the same as *Strossmayeria longispora* Raitviir. This was confirmed by T. Iturriaga, Instituto Botánico, Caracas, Venezuela, who is currently studying this group of inoperculate discomycetes. Another part of the type collection from **FH** contained no ascocarps resembling a *Hyaloderma*.

[Hyaloderma byssiseda]

No description of this species was located but a specimen with this name from **S** contained a fungus with black ascocarps not belonging to the Tubeufiaceae.

[Hyaloderma coronata]

No description of this species was located but a specimen with this name from **S** contained a fungus with immature black ascocarps not belonging to the Tubeufiacae.

Hyaloderma depressulum Speg., *Boln Acad. nac. Cienc. Cordoba* **23:** 93 (1919).

Type: Brazil: Apiaphy, parasitic on the subiculum of various *Meliola* and *Asterina* spp. on living leaves, July 1889, *J. Puiggari*, no. 31.

No specimen of this species was located.

Hyaloderma gardeniae Keissler, *Annls mycol.* **7:** 290 (1909).

Type: Samoa: Upolu Island, near Lake Lanuana, ca. 700, parasitic on living leaves of *Gardenia lanutoo* Rein., August 1905, *C. Rechinger* 5272, Herb. Mus. Palat. Vindob.

The type specimen is apparently lost or destroyed.

Hyaloderma glaziovii Pat., *Bull. Soc. mycol. Fr.* **14:** 154 (1898).
Rizalia glaziovii (Pat.) Piroz., *Kew Bull.* **31:** 607 (1977).

Type: Brazil: on leaves with *Anacardium* with *Dicoccum glaziovii* Allesch., *Glaziou* no. 22715.

The type specimen from **FH** reveals that this fungus has unitunicate asci and thus does not belong in the Tubueufiaceae. Pirozynski (1977) reviewed the nomenclature of this species which he placed in the Sphaeriales.

Hyaloderma imperspicuum Speg., *An. Soc. cient. argent.* **17:** 131 (1884).

Type: Paraguay: Guaranitica, near Gurapi, on living leaves of a tree (Sapindaceae, Solanaceae, etc.) July 1883, *Spegazzini* 3795.

Specimens matching the data for the type specimen given in the protologue were issued as two numbers: [C. Roumeguère, *Fungi selecti exsiccati* 5247] (**NY, S**) and Balansa, *Plantes du Paraguay*, 1878–1884, no. 3795 (**NY**). The fungus found which resembles the description of *H. imperspicuum* is *Nectria leucorrhodina* (Mont.) Samuels. However, ascospores of *N. leucorrhodina* are considerably smaller than those described by Spegazzini for *H. imperspicuum*; this may not be the fungus Spegazzini was describing. The identity of *Hyaloderma imperspicuum* remains obscure. *H. imperspicuum* is the type species of *Hyaloderma*, thus the identity of this genus also remains obscure.

Hyaloderma lateritium Pat. & Lagerh., *Bull. Soc. mycol. Fr.* **9:** 150 (1893).

Type: Ecuador: Rio Machangara, parasitic on *Meliola lagerheimii*, March 1892, *Lagerheim* (**FH**-Patouillard).

The holotype specimen revealed a hyaline, gelatinous discomycete with unitunicate asci and hyaline, acicular ascospores belonging to the genus *Rizalia*.

Hyaloderma piliferum Pat. & Gaill., *Bull. Soc. mycol. Fr.* **4:** 102 (1888).
Melioliphila piliferum (Pat. & Gaill.) Piroz., *Kew Bull.* **31:** 598 (1977).

Type: Venezuela: Maipures, head of the Orinoco, on living leaves, probably parasitic on the mycelium of *Meliola* or *Asterina*, August 1887, *M. A. Gaillard.*

Specimen examined: Puerto Rico: near Santurce, parasitic on mycelium of *Meliola* on grass, 18 May 1899, *Mr. & Mrs. A. A. Heller* 1368, det. Patouillard (**ILL, NY**).

The type specimen was not located. Two non-type specimens of a later collection apparently determined by Patouillard were examined. Three parasites of *Meliola* were present on these specimens: *Nectria pipericola* Henn., *Paranectriella minuta* (Hansf.) Piroz. and *Melioliphila volutella* (Berk. & Broome) Rossman. Only the latter agrees with the description of *H. piliferum*, thus this species may be a synonym of *M. volutella*. Until the type specimen is located, the exact identity of *H. piliferum* cannot be determined.

Pirozynski (1977) listed *Hyaloderma winklerianum* and *Calonectria chorleyi* as synonyms of *M. piliferum*. Examination of the type specimens of these species revealed that *H. winklerianum* belongs in *Melioliphila* as *M. winkleriana*, described herein and *C. chorleyi* is a synonym of *M. volutella* included here.

Hyaloderma puiggariae Speg., *Boln Acad. nac. Cienc. Cordoba* **23:** 94 (1919).

Type: Brazil: Apiahy, parasitic on the stroma of *Polystomella repanda* Speg. on leaves of ?*Eugenia* (Myrtaceae), April 1890, *J. Puiggari* no. 172.

No specimen of this species was located.

[Hyaloderma rollinae]

No description of this species was located but a specimen with this name from **S** contained with black ascocarps not belonging to the Tubeufiaceae.

Hyaloderma rubiacearum Rehm, *Hedwigia* **40:** 158 (1901).

Type: Brazil: on leaves of Rubiaceae, *Ule* 1011, 1299, H. Bresl.; Serr. Org., *Psychotria*, *Ule* 1809; Maua, Rio de Janeiro, *Ule* 2405. H. P.

Isotype specimens: Brazil: Rio de Janeiro, Maua, on *Psychotria* sp., October 1897, *E. Ule* 2405 (**BPI, FH**-Höhnel, **S**); as above, November 1888, *Ule* (**S**).

The isotype specimens mentioned above were examined. None of these specimens had ascocarps resembling the described species. The identity of *H. rubiacearum* remains obscure.

Hyaloderma substomum Pat., *J. Bot., Paris* **2:** 147 (1888).

Type: Chile: parasitic on mycelium of *Meliola* spp.

The type specimen was not at **FH** and could not be located. From the description this species appears to be a synonym of *Nectria leucorrhodina* (Mont.) Samuels.

Hyaloderma tricholomum Pat., *J. Bot., Paris* **2:** 147 (1888).

Type: Chile: sparse or united in groups of 4–5 on mycelium of *Meliola corallina* Mont.

The type specimen was not at **FH** and could not be located. From the description the species appears to belong to *Melioliphila. Hyaloderma tricholomum* was reported from Guadeloupe by Duss (1904) as "parasite sur le *Meliola asterinoides* Wint., Basse-Terre (boise de la Ravine-Souflée), 340a." The specimen from **FH** on which this report was based did not contain any bright-coloured, fleshy ascocarps on *Meliola.*

Hyaloderma uleanum Rehm, *Hedwigia* **40:** 158 (1901).

Type: Brazil: on leaves of Rubiaceae, *Ule* no. 1115b, H. Bresl.

The type specimen could not be located.

Hyaloderma uredinis Racib., *Bull. int. Acad. Sci. Lett. Cracovie* 376 (1909).

Type: Java: Buitenzorg, on the sori of *Sphaerophragmium mucunae* on the undersurface of leaves of *Mucuna* sp.

The type specimen could not be located.

Koordersiella javanica Höhnel, *Sber. Akad. Wiss. Wien* Abt. 1, **118:** 22 (1909).

Type: Java: Buitenzorg, in Kulturtuin von Tjeukumeh, on the upperside of a leaf of *Urostigma vogelii*, 1907–1908 (**K**).

The type specimen was examined. No fungus resembling the described species was found.

Malacaria meliolinae Hansf., *Proc. Linn. Soc. Lond.* **156:** 109 (1944).

Type: Uganda: Entebbe Road, on *Meliolina octospora* on leaves of *Syzygium cordatum*, *Hansford* 3179 p.p.

The type specimen could not be located.

Malacaria ugandensis Hansf., *Mycol. Pap.* **15:** 127 (1946).

Type: Uganda: Kiagwe, Mukono, on *Meliola* on leaves of *Morelia senegalensis, Hansford* 3049 (type); on *Meliola, Hansford* 3291, 3286.

The type specimen was not located.

Malacaria violacea (Racib.) Hansf., *Mycol. Pap.* **15:** 127 (1946).

Acanthostigma violacea Racib., *Bull. int. Acad. Sci. Lett. Cracovie* 385 (1909).

Acerbiella violacea (Racib.) Sacc. & Trotter, *Sylloge Fung.* **22:** 291 (1913).

Type: Java: Djasinga, west of Buitenzorg, parasitic on hyphae of *Meliola* on the underside of leaves of *Jambosa* sp.

Hansford (1946) transferred this species to *Malacaria* based on the description.

Nematothecium asterinae Hansf., *Proc. Linn. Soc. Lond.* **157:** 26 (1945).

Type: Uganda: Entebbe Road, on thyriothecia of *Asterina geniospora* on leaves of *Geniospora paludosa*, *Hansford* 1795 (type); Kabale, on spot of *Balladyna* sp., *Hansford* 2158; on spot of *Asterolibertia* sp., *Hansford* 3296.

Paranectria affinis (Grev.) Sacc., *Michelia* **1:** 317 (1878).

Sphaeria affinis Grev., *Scott. Crypt. Flor.* **4:** 186 (1826).

Type: Great Britain: Scotland, Appin, Carmichael.

The genus *Paranectia* of which this is the type species belongs to the Hypocreales (Hawksworth & Pirozynski, 1977). Rossman, 1983

Paranectria caespitosa Speg., *Boln Acad. nac. Cienc. Cordoba* **11:** 531 (1889).

Puttemansia caespitosa (Speg.) Piroz., *Kew Bull.* **31:** 600 (1977).

Type: Brazil: near Apiahy, in forest, on living, leathery leaves of unknown plant, May 1888, no. 2707.

A specimen at **FH** from the Höhnel collection "ex herb. Puiggari, Apiahy, Juni 1883" did not contain any ascocarps. Two specimens at **NY** were not type material and did not contain any ascocarps.

Paranectria carissiana Sousa da Camara, Gomes & da Luz, *Broteria* **13:** 97 (1938).

Type: Africa: Angola, on the island of Sao Tome off the west coast, on leaves of *Coffea arabica* L. on *Hemileia coffeicola* Maubl. & Rog., October 1936.

The type specimen could not be located. From the description this species is most likely a synonym and earlier epithet of *Paranectriella hemileiae.*

Paranectria missouriensis (Ellis & Everh.) Rabenh. (ut "Rabenh."), *Fungi europaei* 3748 (1891).

Thyronectria missouriensis (Ellis & Everh.) Seaver, *Mycologia* **1:** 205 (1909).

Seeler (1940) correctly discussed the disposition of this species as *Thyronectria missouriensis*, a member of the Hypocreales.

Paranectria oropensis (Ces.) D. Hawksw. & Piroz., *Can. J Bot.* **55:** 2555 (1977).

Sphaeria oropensis Ces., *Bot. Zeit. Berlin* **15:** 406 (1857).

Ciliomyces oropensis (Ces.) Höhnel, *Sber. Akad. Wiss. Wien,* Abt. 1, **115:** 673 (1906).

Type: Italy: Prov. Bugellensis, Pedemont, Sanctuario Sta. Maria Deipara, Monte Oropa, September 1856.
This species was recently described and illustrated by Samuels (1976, as *Ciliomyces oropensis* (Ces.) Höhnel) and Hawksworth (1982) and is correctly placed in *Paranectria*.

Paranectria superba D. Hawksw., *Notes R. bot. Gn Edinb.* **40:** 390 (1982).
Type: Great Britain: England, Derbyshire, Hassop, Marry Becca Mine, on thallus of *Peltigera rufescens* (Weis) Humb., December 1979, *O. L. Gilbert* (**IMI** 244539).
This species is correctly placed in *Paranectria*.

Paranectria toddaliae Hansf., *Mycol. Pap.* **15:** 132 (1946).
Type: Uganda: Entebbe Road, on leaves of *Toddalia aculeata*, *Hansford* 3120, 3491 p.p.
The type specimen could not be located.

Paranectria ugandae Hansf., *Proc. Linn. Soc. Lond.* **153:** 32 (1941).
Type: Uganda: Entebbe Raoad, on *Irenopsis boscia* on leaves of *Capparis afzelii, Hansford* 1540 p.p.
This type specimen could not be located.

Paranectria wildemanniana Henn., *Mission E. Laurent,* III: 316 (1906).
Neither the description nor the type specimen could be located. Hansford (1941) cited a specimen as follows:
Uganda: Nkokonjeru, Bugishu, parasitic on *Meliola* on unknown host, *Hansford* 900.

Puttemansia lanosa var. **unicaudata** Rick, *Broteria* **5:** 32 (1906).
Type: Brazil: Rio Grande do Sul, on leaves of Lauraceae.
The type specimen could not be located.

Puttemansia tucumanensis Petrak, *Sydowia* **16:** 242 (1963).
Type: Argentina: Prov. Tucuman, Sierra de San Javier, Parque Aconguija in a subtropical mountain forest, about 800 m, on *Meliola singeri* Petrak on living leaves of *Piper tucumani*, 3 February 1959, *R. Singer.*
The type specimen could not be located.

Tubeufia acaciae Tilak & Kale, *Sydowia* **23:** 11 (1969).
Type: India: Ramling, on dead bark of *Acacia catechu* Wight & Arn., January 1968, *S. B. Kale,* MUH 223.
Although the type specimen is said to have been deposited in the herbarium of the Botany Department, Marathawada University, it could not be located.

Tubeufia adeana Rehm, *nomen nud.*
Acrospermum adeana Höhnel (ut "(Rehm) Höhnel"), *Sber. Akad. Wiss. Wien,* Abt. 1, **128:** 560 (1919).
Type: Germany, Unterfranken, between Mitgenfeld and Bruckenau in Rhongebirge on fallen leaves of *Amblystegium varium,* December 1915, *A. Ade* (**FH**).
The type specimen was located at **FH.** My examination of this specimen revealed that the species belonged in *Ascrospermum* as indicated by Höhnel (1919).

Tubeufia asclepiadis Bat. & Garnier, *Mems Soc. broteriana* **14:** 68 (1961).
Saccardomyces socius Henn., *Hedwigia* **43:** 353 (1904).
Type: Brazil: Pernambuco, Tamatamirim, Vitoria, on leaves of *Asclepias curassavica*, 28 August 1959, *Osvaldo Soares* (**URM**-19060).
The type specimen was examined from **URM.** This species is found to be a synonym of *Saccardomyces socius* having dark ascocarps and unitunicate asci.

Tubeufia corynespora Munk, *Bot. Notiser* **119:** 180 (1956).
Type: Denmark: Sjaelland, Ermelunden, on thick, rotting bark, seated on the surface of the periderm, 15 December 1963, *A. Munk* (**S**).
An examination of the type specimen revealed that this species may be a member of the Tubeufiaceae. The

ascocarps are fleshy, entirely black, rugose, and lack a basal wall. The elongate, multiseptate, hyaline ascospores resemble those of *T. scopula,* however, the ascocarps of *T. corynespora* lack any ornamentation. Without additional specimens, this species remains obscure.

Tubeufia genuflexa (Höhnel) Arx & Müller, *Stud. Mycol.* **9:** 83 (1975).
Acanthostigmella genuflexa Höhnel, *Annls mycol.* **3:** 327 (1905).

Type: Austria: lower Austria, in the Danube plains of Langenschobichl, near Tulln, on dead stalks of *Phragmites communis*, associated with *Helicosporium phragmites* Höhnel n. sp., 3 June 1905, *F. von Höhnel.*

A slide from Höhnel's type collection was examined (**FH**). No asci were present but the ascocarp was unlike any known *Tubeufia* species. The ostiole is surrounded by long, flexuous, thick-walled appendages. Höhnel described the centrum characteristics as follows: asci broadest at the middle narrowing toward the apex, interascal elements lacking, short, greenish-hyaline ascospores. The description of the centrum and small ascocarps suggests that this species is a member of the Herpotrichiellaceae. This is confirmed by Barr (1977) who provided a description and illustration of *Acanthostigmella genuflexa.*

Tubeufia minuta Munk, *Bot. Notiser* **119:** 179 (1965).

Type: Denmark: Sjaerlland, Boserup, on and around old *Diatrypella favacea* on bark of *Betula,* 1 December 1964 (**C**).

The type specimen was examined and found to be a member of the Herpotrichiellaceae.

Tubeufia nigrotuberculata Hino & Katum., *Bull. Fac. Agric. Yamaguti Univ.* **7:** 270 (1956).
Herpotrichia nigrotuberculata (Hino & Katum.) Piroz., *Mycol. Pap.* **129:** 19 (1972).

Type: Japan: Hukuga, Abu-tyo, Yamaguti, on dead culms of *Phyllostachys bambusoides* Sieb. & Zucc., 2 January 1956, *N. Miake* (**YAM**).

My examination of a type slide suggests that Pirozynski is correct in placing this species in *Herpotrichia.*

ACKNOWLEDGEMENTS

The author wishes to acknowledge the herbaria whose generous loan of specimens made this study possible: **B, BPI, BR, C, CUP, DAOM, FH, G, GZU, HBG, ILL, IMI, K, KRA, LPS, M, NY, PACA, PAD, PC, PREM, S, SP, TAI, TRTC, UPS, URM, YAM, W,** and **Z.** The technical support of the following individuals is gratefully appreciated: assistance with the line drawings was provided by Mr M. Greenleaf, the SEM micrographs were taken by Mr J. Plaskowitz, and Mrs P. Pope and Mrs H. Gladish typed and retyped the drafts of this manuscript. The manuscript was reviewed by Drs G. J. Samuels and M. Palm.

REFERENCES

ARX, J. A. VON & MÜLLER, E. (1975). A reevaluation of the bitunicate Ascomycetes with keys to families and genera. *Stud. Mycol. (Baarn)* **9:** 1-159.

BARR, M. E. (1977). *Acanthostigmella* (Herpotrichiellaceae). *Mycotaxon* **6:** 17-23.

——(1979). A classification of Loculoascomycetes. *Mycologia* **71:** 935-957.

——(1980). On the family Tubeufiaceae (Pleosporales). *Mycotaxon* **12:** 137-167.

——(1983). The ascomycete connection. *Mycologia* **75:** 1-13.

BOOTH, C. (1959). Studies of pyrenomycetes: IV. *Nectria* (Part I). *Mycol. Pap.* **73:** 1-115.

——(1964). Studies of Pyrenomycetes: VII. *Mycol. Pap.* **94:** 1-16.

CARMICHAEL, J. W., KENDRICK W. B., CONNORS, I. L. & SIGLER, I. L. (1980). *Genera of Hyphomycetes.* University of Alberta: Edmonton, Alberta.

CLEMENTS, F. E. & SHEAR, C. L. (1931). *The Genera of Fungi*. Hafner: New York.
DAMON, S. C. (1952). On the fungus genera *Titaea, Monogrammia,* and *Araneomyces*. *J. Wash. Acad. Sci.* **42:** 365-367.
DEIGHTON, F. C. & PIROZYNSKI, K. A. (1972). Microfungi V. More hyperparasitic hyphomycetes. *Mycol. Pap.* **128:** 1-110.
DENNIS, R. W. G. (1970). Fungus flora of Venezuela and adjacent countries. *Kew Bull., Add. Ser.* **3**: 1-531.
DINGLEY, J. M. (1954). The Hypocreales of New Zealand. VI. The genera *Hypocrella, Barya, Claviceps* and *Podonectria*. *Trans. R. Soc. N.Z.* **81:** 489-499.
DUSS, A. (1903) ["1904"]. *Enumeration methodique des champignons recueillis a la Guadeloupe et a la Martinique*. Lons-le-Saunier (Lucien Declume).
ERIKSSON, O. (1981). The families of bitunicate ascomycetes. *Opera Bot.* **60**: 1-220.
——(1984). Outline of the Ascomycetes-1984. *Systema Ascomycetum* **3:** 1-72.
——& HAWKSWORTH, D. L. (1985). Outline of the Ascomycetes–1985. *Systema Ascomycetum* **4:** 1-79.
HANSFORD, C. G. (1941). Contributions toward the fungus flora of Uganda III. Some Ugandan ascomycetes. *Proc. Linn. Soc. Lond.* **153:** 4-52.
HANSFORD, C. G. (1942). The genus *Eriomycopsis* Speg. *Bothalia* **4:** 464-472.
HANSFORD, C. G. (1946). The foliicolous Ascomycetes, their parasites and associated fungi. *Mycol. Pap.* **15:** 1-240.
HAWKSWORTH, D. L. (1982). Notes on British lichenicolous fungi: IV. *Notes R. bot. Gdn Edinb.* **40:** 375-397.
——(1985). Problems and prospects in the systematics of the Ascomycotina. *Proc. Ind. Acad. Sci. (Plant Science)* **94:** 319-339.
——& PIROZYNSKI, K. A. (1977). The generic names *Paranectria* and *Paranectriella* and their synonyms. *Can. J. Bot.* **55:** 2555-2557.
——, SUTTON, B. C. & AINSWORTH, G. C. (1983). *Ainsworth & Bisby's Dictionary of the Fungi* (7th ed.). Kew: Commonwealth Mycological Institute.
HENNINGS, P. (1904). Fungi amazonici II. a cl. Ernesto Ule collecti. *Hedwigia* **43:** 242-273.
HÖHNEL, F. VON (1910). Fragmente zur Mykologie (XII. Mitteilung, Nr. 574 bis 641). *Sber. Akad. Wiss. Wien* 1, **119:** 877-959.
——(1919). Fragmente zur Mykologie (XXIII. Mitteilung, Nr. 1154 bis 1188). *Sber. Akad. Wiss. Wien* 1, **128:** 535-625.
HOLMGREN, P. K., KEUKEN, W. & SCHOFIELD, E.K. (1981). Index Herbariorum Part I. The herbaria of the world. *Regnum Vegetabile* **106:** 1-452.
LUTTRELL, E. S. (1955). The ascostromatic ascomycetes. *Mycologia* **47:** 511-532.
MAUBLANC, M. A. (1920). Contribution a l'étude de la Flore. Mycologique bresilienne. *Bull. Soc. mycol. Fr.* **36:** 33-43.
MÜLLER, E. & VON ARX, J. A. (1962). Die Gattungen der didymosporen Pyrenomyceten. *Beitr. KryptgFlora Schweiz* **11:** 1-922.
PARQUEY-LEDUC, A. (1959). Le développement de la Pléosporale nectrioïde (?) *Letendraea padouk* n.sp. *C. r. hebd. Seanc. Acad. Sci., Paris* **248:** 1556-1562.
——(1967). Recherches sur l'ontogénie et l'anatomie comparée des ascocarpes des Pyrénomycètes ascoloculaires. Second Partie. Les ascocarpes des Pyrénomycètes ascoloculaires unituniqués. *Annls Sci. nat., Bot.,* XII. **8:** 1-103, pl. 7, 8.
PETRAK, F. (1931). Mykologische Notizen XI. *Annls mycol.* **29:** 339-397.
——(1951). Ergebnisse einer Revision der Grundtypen verschiedener Gattungen der Askomyzeten und Fungi imperfecti. *Sydowia* **5:** 169-198.
——(1972). *Poeltia* Petr. *n. gen.*, ein Beitrag zur Revision der Gattung *Paranectria* Sacc. *Sydowia* **25:** 176-179.
——(1974). Ergebnisse einer Revision der Grundtypen verschiedener Gattungen der Askomyzeten und Fungi imperfecti. *Sydowia* **26:** 127-129.
PFISTER, D. H. (1976). *Calloriopsis* and *Micropyxis*: two discomycete genera in the Calloriopsideae. *Mycotaxon* **4:** 340-346.
PIROZYNSKI, K. A. (1972). Microfungi of Tanzania. I. Miscellaneous fungi on oil palm. II. New

hyphomycetes. *Mycol. Pap.* **129:** 1-64.
——(1977) ["1976"]. Notes on hyperparasitic Sphaeriales, Hypocreales and hypocreoid Dothideales. *Kew Bull.* **31:** 595-610.
RAYNER, R. W. (1970). *A Mycological Colour Chart.* Commonwealth Mycological Institute and British Mycological Society.
REHM, H. (1900). Beiträge zur Pilzflora von Südamerika. IX. Hypocreaceae. *Hedwigia* **39:** 221-234.
ROSSMAN, A. Y. (1977). The genus *Ophionectria* (Euascomycetes, Hypocreales). *Mycologia* **69:** 355-391.
——(1978). *Podonectria,* a genus in the Pleosporales on scale insects. *Mycotaxon* **7:** 163-182.
——(1979). A preliminary account of the taxa described in *Calonectria. Mycotaxon* **8:** 485-558.
——(1983). The phragmosporous species of *Nectria* and related genera. *Mycol. Pap.* **150:** 1-164.
SACCARDO, P. A. (1905). *Sylloge Fung.* **17:** 1-991.
SAMUELS, G. J. (1973). The genus *Macbridella* with notes on *Calostilbe*, *Herpotrichia*, *Phaeonectria*, and *Letendraea. Can. J. Bot.* **51:** 1275-1283.
——(1976). A revision of the fungi formerly classified as *Nectria* subgenus *Hyphonectria. Mem. N.Y. bot. Gdn.* **26**(3): 1–126.
——(1978). Some species of *Nectria* having *Cylindrocarpon* imperfect states. *New Zealand J. Bot.* **16:** 73-82.
——& MÜLLER, E. (1979) ["1978"]. Life history studies of Brazilian Ascomycetes. 2. A new species of *Thaxteriella* and its helicosporous anamorph. *Sydowia* **31:** 137-141.
——ROSSMAN, A. Y. & MULLER, E. (1979) ["1978"]. Life history studies of Brazilian Ascomycetes. 6. Three species of *Tubeufia* with, respectively, dictyosporous/pycnidial and helicosporous anamorphs. *Sydowia* **31:** 180-192.
SAWADA, K. (1943). Descriptive Catalogue of the Formosan Fungi Part VIII. *Rep. Gov. Res. Inst. Formosa* **85:** 1-130.
SEELER, E. V. (1940). A monographic study of the genus *Thyronectria. J. Arnold Arbor.* **21:** 429-460.
SIVANESAN, A. (1984). *The Bitunicate Ascomycetes and their Anamorphs.* Vaduz: J. Cramer.
——& KRANZ, J. (1975). A new *Phyllachora* hyperparasitized by a new *Annajenkinsia. Trans. Brit. mycol. Soc.* **64:** 9-14.
STEVENS, F. L. (1917). Porto Rican fungi, old and new. *Trans. Ill. Acad. Sci.* **10:** 162-218.
SUTTON, B. C. (1984). Notes on *Titaea* (Hyphomycetes). *Trans. Brit. mycol. Soc.* **83:** 399-413.
SYDOW, H. (1935). Fungi venezuelani—Additamentum. *Annls. mycol.* **33:** 85-100.
THIRUMALACHAR, M. J. & NARASIMHAN, M. J. (1955). Notes on myriangeaceous fungi. I. A new dothioraceous parasite on *Phyllachora. Mycologia* **47:** 758-762.
WOLLENWEBER, H. W. (1916). *Fusaria autographica delineati.* Berlin.
VIEGAS, A. P. (1961). *Indice de fungos da America do Sul.* Secao de Fitopatologia, Inst. Agron.-Campinas.

INDEX

Note: This index includes both fungus and host names