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HERPOTRICHIA AND ITS SEGREGATES

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SUMMARY

The North American species described in *Herpotrichia* are more suitably disposed in five genera and four families: *Herpotrichia* (Massarinaceae), *Neopeckia* (Coccoideaceae), *Lojkania* (Fenestellaceae), *Pseudotrichia* and *Byssosphaeria* (Melanommataceae). New combinations are proposed in *Lojkania* for *Sphaeria decorticata* Cooke & Harkness, *Psilosphaeria melasperma* Cooke, *Amphisphaeria nuda* Ellis & Everhart, *A. separans* Ellis & Everhart, *Herpotrichia striatispora* Papendorf & von Arx, *Melanopsammina utahensis* Petrak and in *Byssosphaeria* for *Cucurbitaria alnea* Peck, *Herpotrichia jamaicana* Sivanesan, *Sphaeria salebrosa* Cooke & Peck, *Herpotrichia schiedermayeriana* Fuckel, *Sphaeria semen* Cooke & Peck, and *S. xestothele* Berkeley & Curtis. Two species are included from Venezuela, *Pseudotrichia mamillata* sp. nov. and *P. pachnostoma* (Berkeley & Curtis in Cooke) comb. nov., as well as one from Jamaica, *Byssosphaeria oviformis* sp. nov. *Herpotrichia erythrinae* Huguenin is transferred to *Byssosphaeria*.

North American species that key to *Herpotrichia* in recent treatments (Bose, 1961; Müller and von Arx, 1962; Sivanesan, 1972; Luttrell, 1973; von Arx and Müller, 1975) exhibit a diversity of features. It becomes obvious that *Herpotrichia* s. lat. is heterogeneous and that several genera are recognizable. The variations in shape, position and vestiture of ascomata and in characteristics of asci, pseudoparaphyses and ascospores, are such that it seems essential to re-establish several genera now included in the synonymy of *Herpotrichia*. I present here an account of the North

American species, and remarks on some extralimital taxa, utilizing five genera, arranged in four different families, two each in the Pleosporales and the Melanommatales.

Herpotrichia s. str. bears many resemblances to *Massarina* with numerous "curtainlike" pseudoparaphyses visible above the relatively short asci, ascospores hyaline and one septate, finally becoming light brown and several septate, usually constricted in each hemispore as well as at the primary septum, and usually surrounded by a gel coating. Taxa of *Herpotrichia* seem suitably placed in the family Massarinaceae as an erumpent-superficial, tomentose group of species.

Neopeckia, with the sole species *N. coulteri*, is also pleosporaceous but differs from *Herpotrichia* in several respects. The globose ascomata have a short broad papilla and are borne in and under abundant subiculum of narrow hyphae; the asci are cylindric and occupy much of the centrum space; the ascospores are broadly ellipsoid ovoid, reddish to dark brown, and usually one septate. The fungus presents some problems in disposition and for the present is placed in the Coccoideaceae, a family whose other members are parasitic on leaves of various plants.

The other three genera are melanommataceous, with trabeculate pseudoparaphyses and asci often in a peripheral hymenial layer. *Lojkania* includes species whose ascomata are pyriform with short to elongate beak, or ovoid, and whose ascospores are one septate, brown, ellipsoid. This genus seems best placed in the Fenestellaceae.

The globose and papillate ascomata in species of *Pseudotrichia* are covered by tomentum that is yellowish, green, rusty orange, gray or light brown. Ascospores are fusoid, hyaline becoming light brown, and one to several septate. The species of *Byssosphaeria* have a ± turbinate shape to the ascomata, with rounded or plane apex bearing a minute papilla, and ellipsoid or fusoid ascospores, hyaline soon light clear brown or reddish brown, one or several septate. Both *Pseudotrichia* and *Byssosphaeria* are accommodated in the Melanommataceae.

Herpotrichia Fuckel, Fungi Rhenani exs. no. 2171. 1868, in sched.
Enchnosphaeria Fuckel, Symb. Mycol. p. 146. 1870.

Ascomata immersed erumpent or superficial; separate or gregarious, medium sized, globose or somewhat depressed or pyriform, bases rounded or flattened, apex rounded, short or broadly caplike, opening by broad pore; surface tomentose,

at times tomentum short, especially at apex, at sides mingling with and/or forming scanty or abundant subiculum; peridium of pseudoparenchymatous cells, ± equal in width or thickened toward apex; centrum rounded or depressed. Asci bitunicate, basal, clavate or cylindric. Pseudoparaphyses narrowly cellular, numerous above asci and forming a sheet-like layer in section. Ascospores fusoid, ellipsoid or oblong, straight or inequilateral or slightly curved, ends acute or obtuse; hyaline becoming light yellowish brown, dull brown or reddish brown; one septate, median, constricted, often with constrictions in each hemispore and finally developing one or more septa in each hemispore; wall smooth or finely verruculose in age, usually surrounded by gel coating that may be elongated over tips as appendages; contents globular or guttulate; overlapping biseriate or uniseriate in the ascus.

Anamorph: coelomycetous where known, *Pyrenochaeta* or *Phoma* like.

Saprobic on woody or herbaceous substrates.

Type species: *H. rubi* Fuckel = *H. herpotrichoides* (Fuckel) Cannon.

Cannon (1982) established the earliest name for the type species, as Holm (in Farr et al., 1979) did for the earliest date of publication of *Herpotrichia*. *Enchnosphaeria*, typified by *E. pinetorum* (Fuckel) Fuckel, was originally separated on differences in septation of the ascospores, but is in fact not separable from *H. juniperi*.

Key to temperate North American species of *Herpotrichia*

1. Ascomata ± applanate, superficial in ample and wide-spreading subiculum; typically as "snow mould" on conifer leaves and branches; ascospores 18-27(-34) x 6-9(-12) µm ..... *H. juniperi*
1. Ascomata globose, depressed, or pyriform, immersed at first, becoming erumpent superficial, subiculum more restricted, usually as tomentum around individual ascomata 2
   2. Ascomata globose pyriform with broad caplike apex; ascospores fusoid, (21-)24-43 x (4-)5-7.5 µm ..... *H. macrotricha*
   2. Ascomata globose depressed 3
3. Ascospores ellipsoid oblong, ends obtuse, 24-31(-38) x 6-10 µm ..... *H. symphoricarpi*
3. Ascospores fusoid, ends ± acute, 18-27(-32) x 5-6.5 µm... *H. herpotrichoides*

Other species referred to *Herpotrichia* from extralimital regions include *H. parasitica* (Hartig) E. Rostrup (Tids. Skovbrug 12: 222. 1890). This species is parasitic on leaves of *Abies* in Europe and produces the anamorph *Pyrenochaeta parasitica* Freyer & van der Aa on the same mycelium. A recent redescription is that of Freyer and van der Aa (1975). This fungus appears to be dimeriaceous, with rather thin, soft peridium and septate brown setae. *Herpotrichia villosa* Samuels & Müller (Sydowia 31: 158. 1978) from Brazil produces a *Pyrenochaeta*-like anamorph in culture. *Herpotrichia caesalpiniae* (Doidge) Sivanesan (Mycol. Pap. 127: 15. 1972) is unusual by turbinate shape of ascomata, similar to species of *Byssosphaeria*, but other features are those of *Herpotrichia*; *H. millettiae* Sivanesan (Mycol. Pap. 127: 14. 1972) from Malasia has somewhat the same shape of ascomata and similarly shaped one-septate ascospores. Both *H. yasudae* (Hino) Pirozynski, the type species of *Chaetosphaerulina* Hino, and *H. vermicularispora* (Hino & Katumoto) Pirozynski deviate from *Herpotrichia* in ovoid to barrel-shaped ascomata and elongate-fusoid, multiseptate, hyaline ascospores. *Herpotrichia nigrotuberculata* (Hino & Katumoto) Pirozynski also has vertically elongate ascomata, but with a narrow base, and elongate-fusoid ascospores. These three species appear to belong in *Tubeufia* (Sivanesan, personal comm.). *Herpotrichia pandei* Bose is melanommataceous; the peridium is composed of parallel hyphae at the upper and lower sides, forming platelike areas on the surface. The species is better arranged in *Astrosphaeriella* (cf. Hawksworth, 1981).

Although an exhaustive summary of North American species placed at some time in *Herpotrichia* is not attempted, note is made of the following. *Herpotrichia nicaraguensis* Ellis & Everhart (in C. L. Smith, Bull. Iowa Univ. Lab. Nat. Hist. 2: 400. 1893) with small brown, one-celled ascospores in unitunicate asci belongs in class Ascomycetes. (Central Amer. Fungi, C. L. Smith 8 and Nicaraguan Fungi 77, two parts of holotype, NY). *Herpotrichia purpurea* Ellis & Everhart (Proc. Acad. Nat. Sci. Philadelphia 1895: 415.) is also one of class Ascomycetes. It is a member of the Helotiales, with purplish-brown tomentum and appendages, asci with amyloid apical ring, and hyaline, one-septate, fusoid ascospores. (Washington Flora 344, holotype, NY). *Herpotrichia graminea* Dearness & House (New York State Mus. Circ. 24: 32. 1940) was published without a Latin diagnosis and should be allowed to sink into oblivion. The holotype in NYS (House 820) is very sparse and immature. According

to the description, this is probably *H. macrotricha*. *Herpotrichia quinqueseptata* Weir (J. Agric. Res. 4: 252. 1915) was described as differing from *H. nigra* (= *H. juniperi*) in fusoid ascospores, not constricted at any of the five septa, measuring 28-34 x 7.5-9 µm. From Weir's (1915) illustration, the ascospores are quite different from others in *Herpotrichia*. Seaver (1915) suggested that *H. quinqueseptata* was based upon characteristics of *H. juniperi* but with ascospores of *Mytilidion cf. fusisporum* (Cooke) Saccardo. The ascospores are in agreement with those of *Mytilinidion gemmigenum* Fuckel, of which *M. fusisporum* is a synonym (Zogg, 1962).

Herpotrichia herpotrichoides (Fuckel) Cannon, Trans. Brit. Mycol. Soc. 79: 338. 1982. Figs. 1, 2

Sphaeria herpotrichoides Fuckel, Fungi Rhenani exs. no. 952. 1864, in sched.

Herpotrichia rubi Fuckel, Fungi Rhenani exs. no. 2171. 1868, in sched.

Herpotrichia rhenana Symb. Mycol. p. 146. 1870.

Ascomata 350-650 µm diam, apex rounded, opening by pore; peridium 35-45 µm wide, even in width; tomentum of narrow brown hyphae. Asci 100-160 x 12-15 µm. Ascospores 18-27 (-32) x 5-8 µm, hyaline, dull brown in age, fusoid, 1-septate, with two additional septa in age; usually surrounded by narrow gel coating that is sometimes elongated over tips.

On leaves or twigs or herbaceous stalks, Europe, North America, India.

Material examined: Europe: Fuckel Fungi Rhen. 952 (isotype of *Sphaeria herpotrichoides*, UPS; slide, IMI); Fungi Rhen. 2171 (isotype of *H. rubi*, UPS). North America: Massachusetts: Barr 6060 on rachis of *Carya* sp. Oregon: Barr 6285, twigs of *Ribes* sp.; 6288, stalks of *Epilobium* (MASS).

Herpotrichia herpotrichoides continues to be infrequently collected, as Cannon (1982) noted. He cited two more collections from Germany, four from Britain, and one from India. My collections, although few in numbers of ascomata, conform with European material.

Herpotrichia juniperi (Duby) Petrak, Ann. Mycol. 23: 43. 1925. Figs. 3, 4

Sphaeria juniperi Duby in Klotzsch Herb. Mycol. no. 1833. 1854.

Laestadia juniperi (Duby) Saccardo, Syll. Fung. 9: 585. 1891.

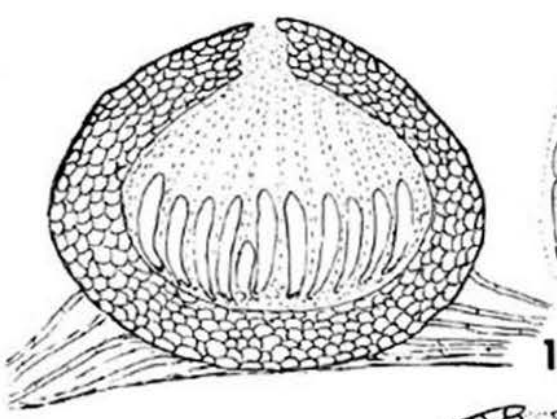
Ozonium plica Kalchbrenner, Math. es Termesz. Közlem. p. 159. 1862.
Sphaeria pinetorum Fuckel, Hedwigia 7: 14. 1868.
Enchnosphaeria pinetorum (Fuckel) Fuckel, Symb. Mycol. p. 147. 1870.
Herpotrichia pinetorum (Fuckel) Winter in Rabenhorst's Krypt. Fl. 2: 208. 1885.
Bertia querceti Rehm, Ascomyceten, no. 43. 1870; in Saccardo, Syll. Fung. 1: 583. 1882.
Enchnosphaeria santonensis Saccardo, Michelia 2: 66.1880.
Lasiosphaeria scabra Auerswald, Fungi Eur. no. 1245; in Saccardo, Syll. Fung. 2: 202. 1883.
Enchnosphaeria passicrinis Saccardo, Syll. Fung. 2: 206. 1883.
Herpotrichia nigra Hartig, Allg. Forst. Jagd. Z. 64: 15. 1888.
Enchnosphaeria nigra (Hartig) Berlese, Icon. Fung. 1: 105. 1892.
Herpotrichia mucilaginosa Starbäck & Greville, Bih. K. Svenska Vetens.-Akad. Handl. 16: 8. 1890.

Ascomata superficial on and immersed in ample subiculum, globose depressed, base ± applanate, 220-400 µm diam, opening by broad pore, tomentum from peridium and subiculum of brown, septate, smooth-walled hyphae, 3-6 µm wide, often iridescent; peridium 30-35 µm wide. Asci (66-)100-145 x (10-)12-18(-20) µm. Ascospores 18-27(-34) x 6-9(-12) µm, hyaline becoming light dull brown, ellipsoid fusoid, 3-(4-) septate.

Anamorph: *Pyrenochaeta*-like; in culture pycnidia appendaged, 80-200 µm diam; conidiogenous cells lining cavity, 4-10 x 1.5-2 µm, branched or unbranched; conidia 1.5-2.5 x 1-2 µm, hyaline, ovoid, one celled (Bose, 1961).

Typically forming "snow mould" of conifers, with leaves and twigs matted together by subiculum; occasionally on other plants. Europe, North America, especially in western mountains.

Figs. 1-10. Species of *Herpotrichia:* 1, 2.*H. herpotrichoides*. 1. Ascoma in section. 2. Ascospores. 3, 4. *H. juniperi*. 3. Habit sketch of ascomata in subiculum. 4. Ascospores. 5-8. *H. macrotricha*. 5. Habit sketches of ascomata. 6. Ascoma in section. 7. Ascus, upper portion, and parts of pseudoparaphyses. 8. Ascospores. 9, 10. *H. symphoricarpi*. 9. Ascoma in surface view. 10. Ascospores. Standard line = 150 µm for figs. 1, 6, 9; 15 µm for figs. 2, 4, 8, 10.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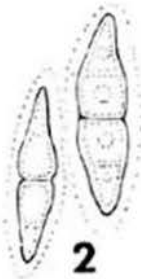
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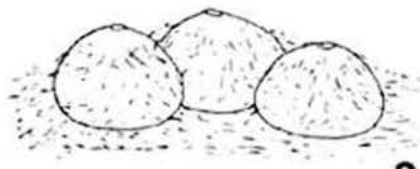
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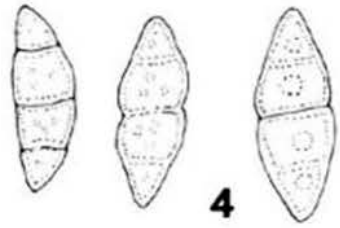
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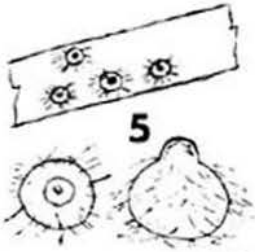
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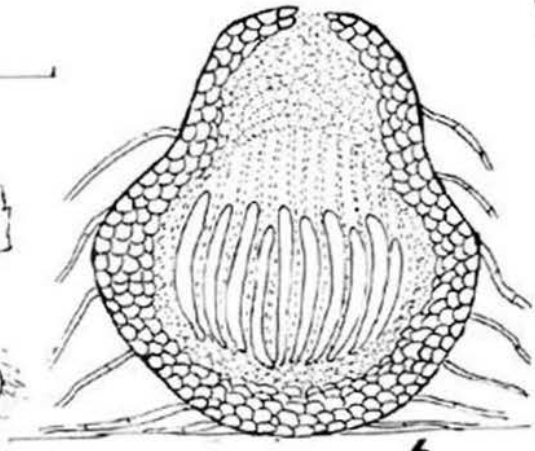
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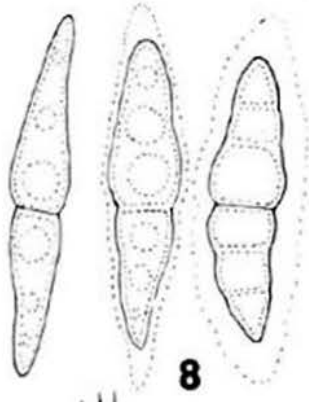
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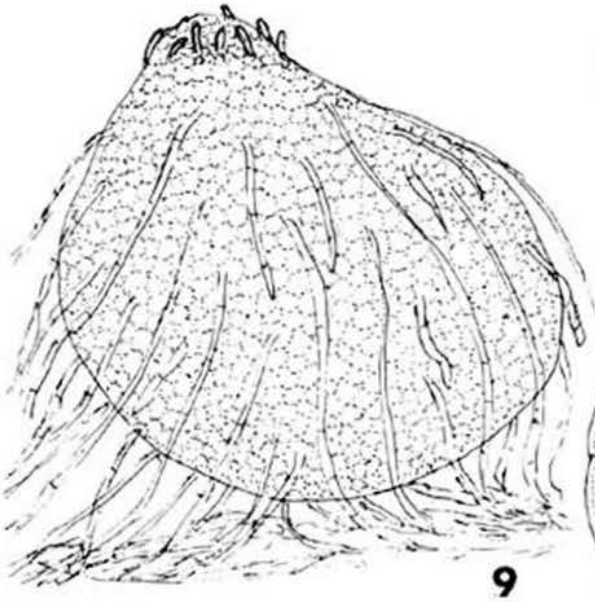
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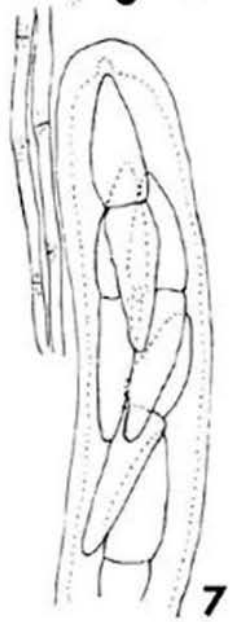
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Material examined: Europe: Rabenhorst-Winter-Patzschke Fungi Eur. no. 3961; Fuckel, Fungi Rhen. 1797 (isotype of *Sphaeria pinetorum*, UPS); Rehm Ascom. no. 996. North America: numerous collections from species of *Abies, Juniperus, Libocedrus, Picea, Pseudotsuga, Tsuga* (*Pinus* rarely) from Alberta, British Columbia, Montana, Idaho, Washington, Wyoming, Oregon, Colorado, Utah, Arizona, California. Exsiccati specimens include: Bartholomew, Fungi Col. 4634; Ellis N.A.F. 1342 (specimen on *Picea*); Ellis & Everhart Fungi Col. 1737; Solheim Myc. Saximont. Exs. 26, 124.

The synonymy is taken from Bose (1961) and Sivanesan (1972). Sivanesan reported collections of this species from Nova Scotia and Quebec in eastern Canada; my collections under this name from the Gaspé region of Quebec are instead *H. macrotricha*.

Simms (1967) investigated the ecology of *H. juniperi* (as *H. nigra*). The mycelial subiculum developed on branches that were covered by snow. Initials of ascomata formed after the second winter of snow cover, and ascomata matured on the groupd following dehiscence of the infected twigs.

Herpotrichia macrotricha (Berkeley & Broome) Saccardo, Syll. Fung. 2: 213. 1883. Figs. 5-8

Sphaeria macrotricha Berkeley & Broome, Ann. & Mag. Nat. Hist. ser. 2, 9: 319. 1852.

Lasiosphaeria (Enchnosphaeria) macrotricha (Berkeley & Broome) Cooke, Grevillea 16: 16. 1887.

Sphaeria scabra Currey, Trans. Linn. Soc. London 22: 315. 1859.

Lasiosphaeria scabra (Currey) Saccardo, Syll. Fung. 2: 202. 1883.

Lasiosphaeria (Leptospora) scabra (Currey) Massee, Grevillea 16: 37. 1887.

Venturia callimorpha Auerswald, Bot. Tausch-Ver. 1867-68, non *V. callimorpha* (Montagne) Auerswald, non *Sphaeria callimorpha* Montagne.

Enchnoa callimorpha (Auerswald) Winter in Rabenhorst, Fungi Eur. no. 1238. 1869.

Herpotrichia callimorpha (Auerswald) Winter, Hedwigia 23: 99. 1885.

Enchnosphaeria callimorpha (Auerswald) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 132: 95. 1923.

Sphaeria albidostoma Peck, New York State Mus. Rep. 32: 51. 1879.

Herpotrichia leucostoma Peck, Bull. New York State Mus. 2: 23. 1887. (name change only)
Herpotrichia albidostoma (Peck) Saccardo, Syll. Fung. 9: 857. 1891.
Herpotrichia boldae Spegazzini, Fungi Chil. p. 65. 1910.
Didymella agrostidis Dearness & House, Bull. New York State Mus. 233/234: 34. 1921.

Ascomata (150-)200-400 µm diam, 250-450 µm high, globose to pyriform, apex broadly caplike, pallid grayish white under dissecting microscope; tomentum of narrow septate hyphae; peridium brown, 20-37 µm wide, in the caplike apex of hyaline or light yellow pseudoparenchymatous cells, only the outer layer brown, finally opening as broad pore. Asci (70-)90-150 x (10-)12-15(-18) µm, usually 8-spored, at times 4- or 6-spored. Ascospores (21-)24-43 x (4-)5-7.5 µm, hyaline, in age dull brown, fusoid, 1-(3-5-)septate; wall finely verruculose in age, narrow gel coating often elongate over tips as appendages.

On varied substrates, culms of sedges, grasses, stalks of herbaceous plants, woody twigs, nut pericarps, leaves of conifers. Widely distributed in temperate regions.

Material examined: Europe: slides of cotype of *Sphaeria macrotricha*, of holotype of *Sphaeria scabra* (IMI); Rabenhorst Fungi Eur. 1238 as *Enchnoa callimorpha* (IMI). South America: slide of holotype of *Herpotrichia boldae* (IMI). North America: Quebec: Barr 2194, 2202, on *Juniperus* leaves (MASS). Maine: Barr 3313B on *Thuja* leaves; Barr 3451 on *Fraxinus* leaves (MASS). Massachusetts: Barr 4794 on *Carya* pericarps (MASS). New York: holotype of *Sphaeria albidostoma* on twigs of *Acer spicatum*, Catskill Mts., Sep (NYS, part in NY); holotype of *Didymella agrostidis*, Albany, 3 Jun 1918 (NYS); on *Solidago* stalks, Mt. Marcy, Aug, Peck (NYS). Georgia: GA 8234 on culms of *Carex* (GA); Barr 6493 on *Arundinaria* (MASS).

The caplike apex to ascomata is a distinctive feature of this species. Bose (1961, as *H. callimorpha*) reported numerous collections on a variety of substrates from India; the fungus grew in culture but produced no anamorph. Sivanesan (1972) examined numerous collections from Europe and one from Chile. Both authors had included *Sphaeria albidostoma* as a synonym of *H. schiedermayeriana*, based upon description only. The holotype of Peck's species shows well the capitate apex, as well as basal asci and hyaline ascospores with constrictions in each hemispore, structures quite different from those of *Byssosphaeria schiedermayeriana*.

Herpotrichia symphoricarpi (Tracy & Earle) Barr in Holm, Svensk Bot. Tidskr. 62: 239. 1968. Figs. 9, 10
Gibberidea (?) symphoricarpi Tracy & Earle, Plantae Bakerianae 1: 28. 1901.

Ascomata separate or gregarious in small groups, erumpent, globose depressed, 450-550 µm diam, 400-500 µm high, short papillate, tomentose, tomentum as short hyphal appendages toward apex, more elongate and recumbent from middle and lower peridium and forming sparse subiculum; peridium 28-33 µm wide. Asci 100-120 x 16.5-20 µm. Ascospores 24-31(-38) x 6-10 µm, reddish brown, ellipsoid, ends obtuse, 3-septate, end cells lighter than mid cells.

On twigs of *Symphoricarpos*, Colorado.

Material examined: Bob Creek west of Mt. Hesperus, 27 Jun 1898, Plants of S. Colorado 173, 2 packets (holotype, NY).

I share L. Holm's (1968) reservations about the disposition of this species, mainly because of ascospore shape and pigmentation. There are, however, several series of species with varied shapes to the ascospores within the closely related genus *Massarina*. In all other features *H. symphoricarpi* is in reasonable agreement with my concept of *Herpotrichia*.

Neopeckia Saccardo in Peck, Bull. Torrey Bot. Club 10: 127. 1883.
Didymotrichia Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Ascomata globose, medium sized, black, papilla short and broad, opening by rounded pore, superficial on substrate, immersed beneath and in abundant subiculum of narrow, long-celled, dark reddish brown hyphae, these penetrating leaf through stomata; peridium firm, composed of several rows of reddish brown, slightly compressed pseudoparenchymatous cells, thin walled and pallid internally; surface smooth except for hyphae appendages similar to hyphae of subiculum. Asci bitunicate, basal, cylindric, nearly sessile with footlike base usually bent, 8-spored. Pseudoparaphyses narrowly cellular, slightly branched, gelatinizing in mature ascomata. Ascospores reddish brown to dark brown; ellipsoid ovoid, ends obtuse, slightly asymmetric, upper hemispore slightly broader than lower, straight; one-septate, rarely 2- or 3-septate, septum ± median, slightly constricted; wall thick, smooth,

at times surrounded by narrow gel coating; contents with one large globule per cell; overlapping uniseriate in the ascus.

Anamorph: coelomycetous, *Pyrenochaeta*-like.

Type species: *N. coulteri* (Peck) Saccardo.

Bose (1961) arranged *N. coulteri* in *Herpotrichia*, and other authors have accepted this decision. *Neopeckia coulteri* differs in several respects from species of *Herpotrichia*, most notably in long cylindric asci that occupy the locule almost completely and in ovoid, brown, one-septate ascospores. *Neopeckia* is reinstated as a genus separate from *Herpotrichia* s. str. In its habit on conifer leaves and twigs, *N. coulteri* resembles *Herpotrichia juniperi*, but the two species differ in centrum structure. Ascospores of *Neopeckia coulteri* are usually one-septate, rarely two- or three-septate (Boyce, 1916), and are always broader and darker brown than those of *Herpotrichia juniperi*.

At present, *Neopeckia coulteri* is the only species of the genus. *Herpotrichia millettiae* Sivanesan (1972) may also belong here, with cylindric asci that fill the centrum at maturity and broadly ovoid, light brown ascospores. The less pigmented ascospores, and the habit on dead branches of *Millettia* sp. (Leguminosae), differ from those characters of *Neopeckia coulteri*.

For comments on *Didymotrichia*, see discussion under *Byssosphaeria*.

Neopeckia coulteri (Peck) Saccardo in Peck, Bull. Torrey Bot. Club 10: 127. 1883. Figs. 11-14

Sphaeria coulteri Peck in Hayden's U.S. Geol. Survey 1872, 6: 792. 1873.

Enchnosphaeria coulteri (Peck) Saccardo, Syll. Fung. 2: 207. 1883.

Lasiosphaeria coulteri (Peck) Ellis & Everhart, North Amer. Pyreno. 147. 1892.

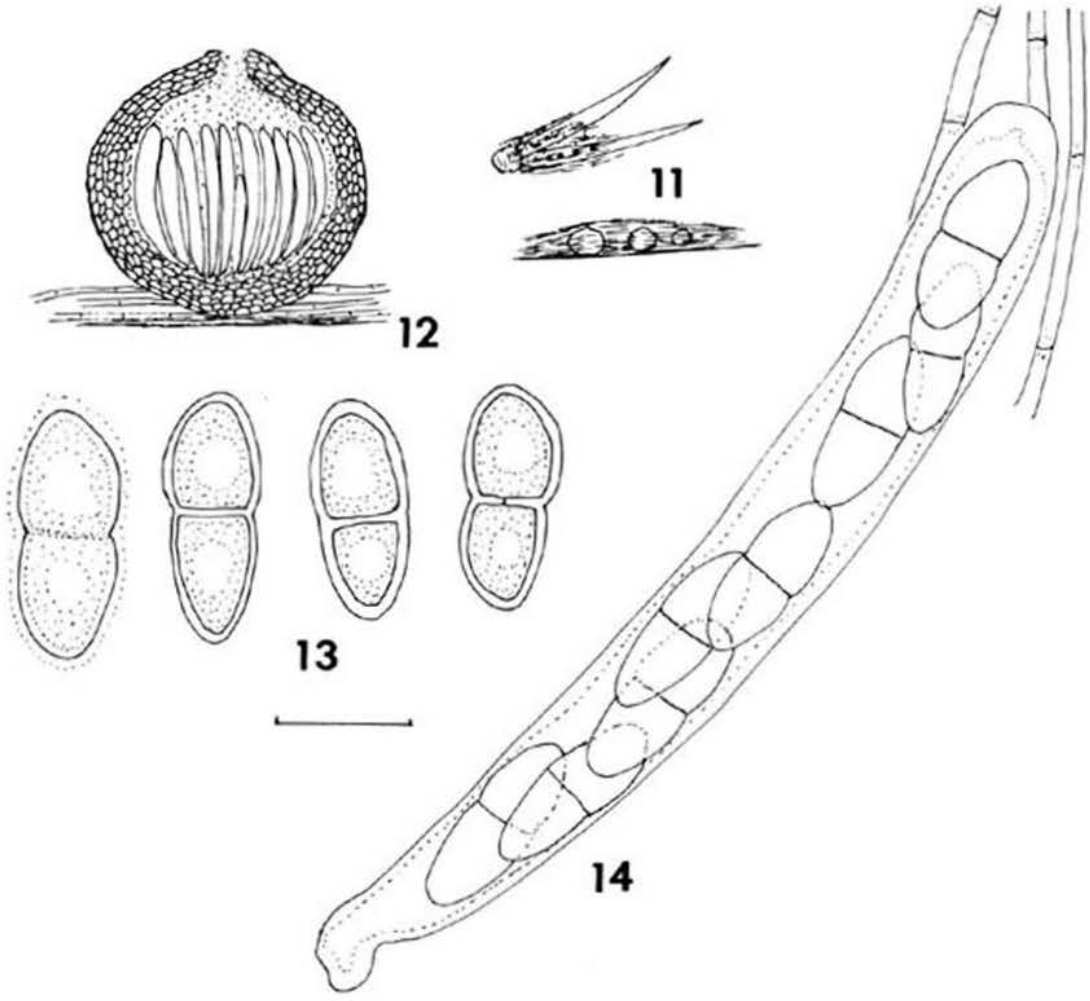
Didymotrichia coulteri (Peck) Berlese, Atti Contr. Bot. Internaz. Genova 1892: 572. 1893.

Herpotrichia coulteri (Peck) Bose, Phytopathol. Z. 41: 195. 1961.

Lasiosphaeria acicola Cooke, Grevillea 8: 87. 1880.

Amphisphaeria acicola (Cooke) Saccardo, Syll. Fung. 1: 727. 1882.

Ascomata 250-380(-500) µm diam, hyphae of appendages and subiculum 2-5 µm wide. Asci 120-160 x 12-22 µm. Ascospores 19.5-27.5 x 9-10.5 µm; gel coating 1.5-2 µm wide.



Figs. 11–14. *Neopeckia coulteri*. 11. Habit sketches of ascomata in subiculum. 12. Ascoma in section. 13. Ascus and parts of pseudoparaphyses. 14. Ascospores. Standard line = 150 µm for fig. 12; 15 µm for figs. 13, 14.

Anamorph: Pycnidia small, conidia borne from short phialides lining centrum, one-celled, hyaline, 2.5–4 x 1.5–2 µm; developed in culture (Bose, 1961).

Smothering and matting together leaves and twigs of species of *Pinus* (*P. albicaulis, P. aristata, P. contorta, P. jeffreyi, P. murrayana, P. monticola, P. ponderosa*). In mountain regions of western North America; also reported from Switzerland (Bose, 1961, on *P. montana*) and Roumania (Sivanesan, 1972, on *P. pumilio*).

Material examined: Numerous collections from western North America, from British Columbia, Washington, Oregon, California, Idaho, Montana, Wyoming, Colorado, Nevada. Exsiccati specimens include: Bartholomew Fungi Col. 4647; Ellis N.A.F. 1342 p.p.; California Fungi 486, 654; Flora of Washington 219; Mycobiota of North America 35; Myc. Saximont. Exs. 125; Plants of Idaho 3644; Plants of Nevada 1350.

The original collection of *Sphaeria coulteri* from Yellowstone Lake was not found among Peck's specimens in NYS, although other authentic material is preserved there. In one of the folders in NY, a note from Peck to Seaver, dated 24 Apr 1911, indicated that the original specimen apparently was lost from the capitol building "when many things destroyed by leaky roofs and many others stolen." In the *Neopeckia coulteri* folder in UPS is a portion of presumptive isotype labelled "Yellowstone (Coulter) P. A. Saccardo" that accords well with other collections of this species.

Lojkania Rehm, Növeny Kozl. 4: 2. 1905.
Sydowina Petrak, Ann. Mycol. 21: 182. 1923.

Ascomata immersed in and under periderm or with bases in outer layers of decorticated wood, gregarious or separate, erumpent, superficial when periderm gone; medium large, pyriform or ovoid, tapering to broad apex, ± beaklike at times, at times flared below tip, pore rounded; surface smooth or roughened, usually surrounded by reddish brown hyphae, sparse or abundant, that forms subiculum toward base; peridium firm, reddish brown, of small ± compressed layers of cells, or double and of small sclerotial cells. Asci basal to lateral or ± peripheral, cylindric or clavate and stipitate. Pseudoparaphyses trabeculate, in matrix. Ascospores clear brown to dark reddish brown; broadly ellipsoid fusoid, often biconic, symmetric; one-septate, slightly or strongly constricted, separating into part cells at times; wall thick, dark, smooth, verrucose, foveolate, or longitudinally striate, occasionally surrounded by narrow gel coating; contents with one large globule per cell; uniseriate or partially biseriate in the ascus.

Anamorph not known for most species.

Saprobic on branches, periderm, or decorticated wood of gymnosperms and angiosperms.

Type species: *L. hungarica* Rehm = *L. melasperma* (Cooke) Barr.

Sydowina vestita, the type species of *Sydowina*, does not differ sufficiently from *Lojkania hungarica*, the type species of *Lojkania*, to permit separation. Both names are predated by *Sphaeria melasperma* as Sivanesan (1972) pointed out.

The worldwide distribution of species of *Lojkania* is little known. The species recognized here are most readily separated by characteristics of the ascospores.

Key to temperate North American species of *Lojkania*

1. Ascospores deeply constricted at the septum, readily separating at maturity into part spores, (19-)23-30(-33) x 9-13 µm ..... *L. separans*
1. Ascospores somewhat or not constricted at the septum, not separating into part spores 2
   2. Ascospore wall ornamented by longitudinal striae, 10-16 x 5-7.5 µm; asci clavate and stipitate ..... *L. striatospora*
   2. Ascospore wall smooth, verrucose, or foveolate, ascospores larger; asci cylindric 3
3. Ascospores (20-)22-30(-35) x 9-12(-14) µm, wall smooth, ends acute ..... *L. melasperma*
3. Ascospores 18-25 µm long, wall smooth or ornamented ...4
   4. Ascospore wall verrucose or verruculose ..... *L. decorticata*
   4. Ascospore wall smooth or foveolate 5
5. Ascospores 7.5-10(-11) µm wide; ascomata short papillate *L. utahensis*
5. Ascospores 9-12 µm wide; ascomata pyriform with conspicuous papilla ..... *L. nuda*

Lojkania decorticata (Cooke & Harkness) Barr, comb. nov. Figs. 24, 25

Sphaeria decorticata Cooke & Harkness, Grevillea 13: 19. 1884.

Amphisphaeria decorticata (Cooke & Harkness) Berlese & Voglino, Addit. Syll. Fung. 124. 1886.

Ascomata 385-550 µm diam, pyriform or ± ovoid, superficial from cracks in decorticated periderm or wood beneath epidermis, separate or few gregarious; peridium ca. 40 µm wide. Asci 120-160 x 15-17 µm. Ascospores 18-25 x (7-)9-10(-11) µm, clear brown becoming dark reddish brown, not or slightly constricted at septum, at times with dark banding in each hemispore but not a true septum; wall verruculose or verrucose, surrounded by gel coating.

On wood of *Quercus agrifolia*, old leaf tips of *Yucca* sp. California.

Material examined: California: San Francisco, Harkness (holotype, NY); San Francisco State Univ. Campus, Dec 1980, H. E. Bigelow (MASS).

The obviously roughened wall of ascospores is a distinctive feature of this species. Cultures from ascospores of the specimen on *Yucca* formed dark mycelium. Pycnidia were

produced within two weeks, globose, short papillate, 220-275 µm diam. Conidiogenous cells lined the inner wall, short, hyaline, annellidic. Conidia were formed and held together in a gel material, dark brown, 10-13 x 4.5-5.5 µm, one celled or one septate, surface finely verruculose. This is the first anamorphic connection reported in members of the genus, and more information is needed.

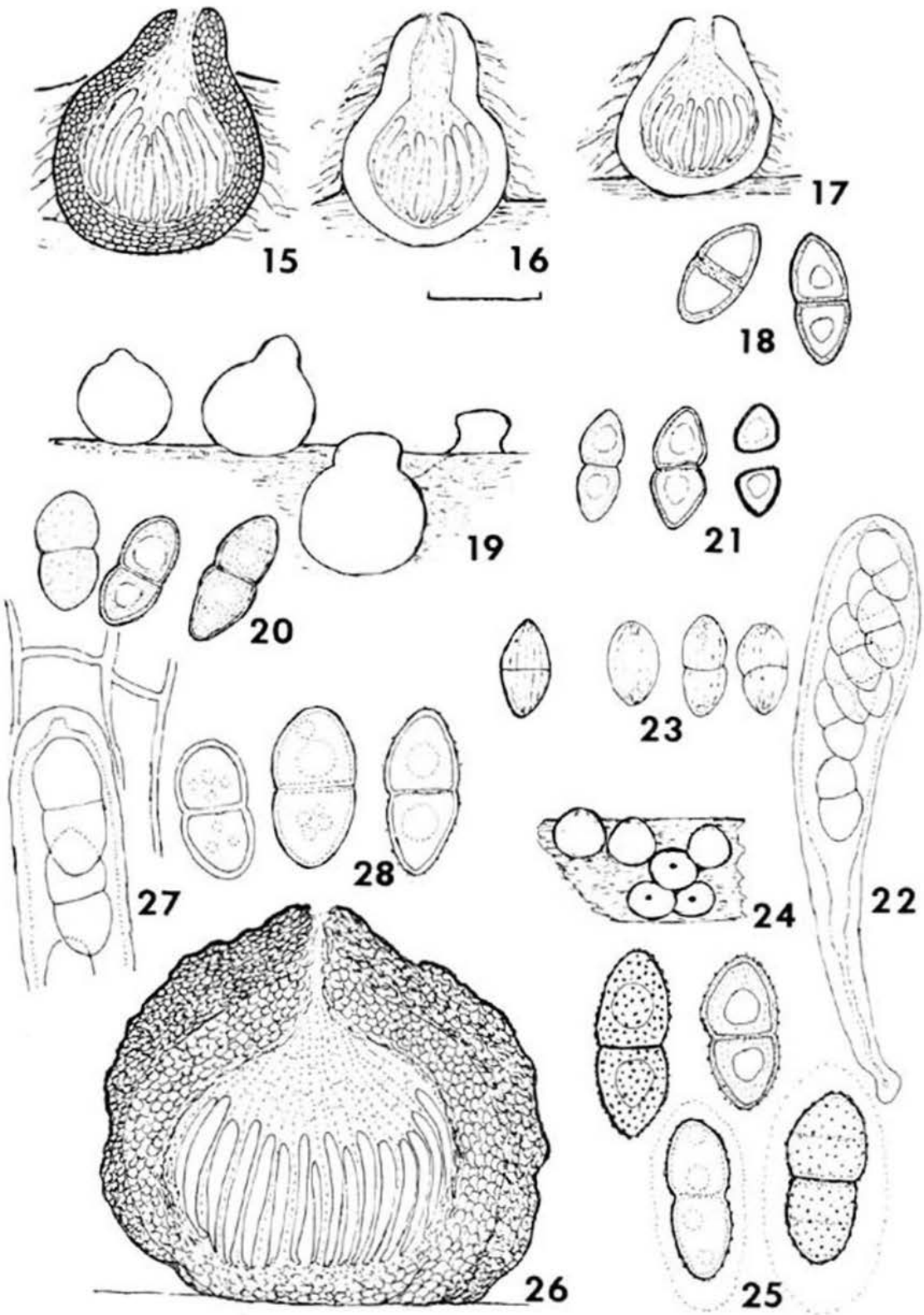
Lojkania melasperma (Cooke) Barr, comb. nov. Figs. 15-17
Psilosphaeria melasperma Cooke, Grevillea 8: 118. 1880.
Amphisphaeria melasperma (Cooke) Saccardo, Syll. Fung. 1: 725. 1882.
Herpotrichia melasperma (Cooke) Sivanesan, Mycol. Pap. 127: 8. 1972.
Delitschia lignicola Mouton, Bull. Soc. Roy. Bot. Belb. 25: 151. 1886.
Sydowina lignicola (Mouton) Petrak, Ann. Mycol. 23: 96. 1925.
Herpotrichia lignicola (Mouton) Bose, Phytopathol. Z. 41: 201. 1961.
Neopeckia quercina Delacroix, Bull. Soc. Mycol. France 6: 182. 1890.
Rhynchostoma julii Fabre var. *vestitum* Rehm, Hedwigia 30: 256. 1891.
Sydowina vestita (Rehm) Petrak, Ann. Mycol. 21: 182.1923.
Lojkania hungarica Rehm, Növeny Kozl. 4: 2. 1905.

Ascomata 400-700 µm diam, pyriform, erumpent superficial. Asci 130-250 x 12-16 µm. Ascospores 20-39 x 9-14 µm, ends ± acute, constricted at median septum.

On coniferous and angiospermous wood. Europe, North America.

Material examined: Europe: Rehm Ascom. 1030 (slide ex holotype of *Rhynchostoma julii* f. *vestitum*, IMI); Petrak, Fl. Boh. et Mor. exs. 1700 (slide ex *Rhynchostoma julii* var. *vestitum*, IMI); Petrak, Myc. Carpatica 271 (slide ex *Sydowina vestita*, IMI); *Lojkania hungarica* (isotype, UPS; slide ex holotype, IMI); *Neopeckia quercina* (slide ex holotype, IMI). North America: New York: W. R. Gerard 237a (slide ex holotype *Psilosphaeria melasperma*, IMI).

Sivanesan (1972) studied and provided synonymy for this species. I was privileged to examine his slides in IMI, which show variations in shape of ascomata and length of beaks among the collections, but great similarity in ascospore shape. This species has the largest ascospores of those included in *Lojkania*.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Lojkania nuda (Ellis & Everhart) Barr, comb. nov. Figs. 19,20

Amphisphaeria nuda Ellis & Everhart, Erythea 2: 18. 1894.

Herpotrichia australis Bose, Phytopathol. Z. 41: 200. 1961.

Ascomata 250-600 µm diam, pyriform, apex at times flared below tip. Asci 115-165 x 12-16 µm, basal. Ascospores 18-24 x 9-12 µm, biconic, not or slightly constricted at septum; wall smooth or foveolate.

On periderm or wood of angiosperms. North America, South Africa.

Material examined: South Africa: Pretoriuskop Rest Camp, Krüger Nat'l Park, Transvaal, 16 Mar 1960, H. Schüepp (slides and specimen ex holotype of *H. australis*, IMI). North America: Kansas: Ellis & Everhart N.A.F. 3001, on *Celtis*, Rockport, Nov 1893 (isotype, MASS; holotype of *A. nuda*, NY).

The North American specimens do not seem to differ in any way from the type of *Herpotrichia australis*, although both host and locality are quite different.

Lojkania separans (Ellis & Everhart) Barr, comb. nov. Fig. 21

Amphisphaeria separans Ellis & Everhart, Bull. Torrey Bot. Club 24: 130. 1897.

Herpotrichia separans (Ellis & Everhart) Sivanesan, Mycol. Pap. 127: 10. 1972.

Sydowina moravica Petrak, Ann. Mycol. 23: 95. 1925.

Herpotrichia petrakiana Bose, Phytopathol. Z. 41: 199. 1961.

Figs. 15-28. Species of *Lojkania*: 15-18. *L. melasperma*. 15-17. Variations in shape and position of ascomata in section; 15 from type of *Psilosphaeria melasperma*, 16 from type of *Neopeckia quercina*, 17 from type of *Lojkania hungarica*. 18. Ascospores. 19, 20. *L. nuda*. 19. Habit sketch of ascomata in and erumpent from substrate. 20. Ascospores. 21. *L. separans*, ascospores. 22, 23. *L. striatispora*. 22. Ascus. 23. Ascospores, that on left from slide of type. 24, 25. *L. decorticata*. 24. Habit sketch of ascomata on substrate. 25. Ascospores. 26-28. *L. utahensis*. 26. Ascoma in section. 27. Upper portion of ascus and fragment of pseudoparaphyses. 28. Ascospores. Standard line = 300 µm for figs. 15-17; 150 µm for fig. 26; 15 µm for figs. 18, 20-23, 25, 27, 28.

Ascomata 500-900 µm diam, pyriform, ovoid or subglobose, erumpent. Asci 130-200 x 12-16 µm. Ascospores (19-)23-30 (-33) x 9-13 µm, ends acute, constricted deeply at the median septum and often separating into part spores at maturity.

On branches of angiosperms, North America, Pakistan, India.

Material examined: North America: Kansas: slide ex holotype of *A. separans*, IMI. Pakistan: slide ex holotype of *H. petrakiana*, IMI. India: Bikaner, G. P. Sharma, IMI.

I am indebted to Sivanesan (1972) and to his slides in IMI for information on this species.

Lojkania striatispora (Papendorf & von Arx) Barr, comb. nov. Figs. 22, 23

Herpotrichia striatispora Papendorf & von Arx, Nova Hedwigia 12: 395. 1966.

Ascomata 330-600 µm diam, pyriform, immersed erumpent. Asci 62-90 x 9-12 µm, clavate, stipitate. Ascospores 10-16 x 5-7.5 µm, ends acute, constricted or not constricted at the median septum, wall roughened by longitudinal raised striae.

On branches of angiosperms: South Africa, North America.

Material examined: South Africa: slide ex holotype of *H. striatispora*, CBS 385.65, IMI. North America: Iowa: Barr 6933 (MASS). Arizona: Barr 6773 (MASS).

The collection from Arizona on *Cercidium* agrees in all respects with the description and illustration of ascospores, as well as with the slide from type culture deposited in IMI, except that the ascospores of the Arizona material are often constricted at the septum, whereas those from South African material are not. The Iowa collection on *Carya* is sparse in numbers of ascomata, but is in accord with the other material seen. Small, longitudinally striate ascospores are definitive.

Lojkania utahensis (Petrak) Barr, comb. nov. Figs. 26-28

Melanopsammina utahensis Petrak, Ann. Mycol. 25: 274. 1927.

Ascomata 440-770 µm diam, globose, short papillate, superficial and bases embedded in decorticated wood; peridium broad, especially above, up to 65 µm wide at base and to 78-104 µm wide above, of small sclerotial cells. Asci 100-160 x 10-15 µm. Ascospores 16-24 x 7.5-10(-11) µm, hyaline

to light brown, finally dark brown, septum thick; wall smooth or at times verruculose.

On woody branches, western North America.

Material examined: North America: Montana: Great Falls, 18 Jul 1889, F. W. Anderson (on type material of *Teichospora mammoides*, NY); Utah: Grantsville, 13 Apr 1918, J. F. Brenckle, Utah Fungi n. 31 (isotype, NY). California: Mt. Shasta, near Horse Camp, Siskiyou Co., 23 Jul 1941, W. B. Cooke 15597 (NY).

Melanopsammina, typified by *M. carinthiaca* v. Höhnel, is evidently hyalodidymous and a pleosporaceous fungus. The type specimen in FH no longer bears any fungus, nor did it when L. Holm examined it in 1966. Holm (1968) thought the species hardly differed from *Lentomita caespitosa* Niessl. This and related species Müller and von Arx (1962) had relegated to *Otthia*.

Lojkania utahensis seems to be closely related to *L. nuda* but has a less developed apical papilla and somewhat narrower ascospores. Both species may appear to be superficial when the covering periderm has been sloughed.

Pseudotrichia Kirschstein, Ann. Mycol. 37: 125. 1939.

Ascomata immersed erumpent to superficial, gregarious or scattered; globose, pyriform, or ovoid, with short to somewhat elongated papillate apex, usually flask-shaped in section; apex and pore rounded or apex compressed and pore slit-like; surface black, covered by greenish, yellowish, rusty orange, grayish or brown verruculose hyphae, often including granular pigmented material, apical region glabrous; peridium firm, composed of compressed cells, reddish brown, pigment patchy; ostiolar canal periphysate. Subiculum present or sparse. Asci bitunicate, peripheral, clavate. Pseudoparaphyses trabeculate, in matrix. Ascospores hyaline becoming light brown in age; fusoid, tapered to obtuse or ± acute ends, symmetric, straight or inequilateral or slightly curved; one or several septate, primary septum median, constricted, each hemispore septate in age; contents with one or a few globules; wall smooth or finely verruculose in age, usually surrounded by gel coating; biseriate, partially uniseriate, or parallel in the ascus.

Anamorph not known.

On or in old stromata of other ascomycetes or on decaying wood, hypersaprobic.

Type species: *P. stromatophila* Kirschstein = *P. mutabilis*

Petrak erected the genus *Khekia* in the Lophiostomataceae, but his exsiccati specimen (Flor. Boh. et Mor. Nr. 132) was determined as *Calospora ambigua* Pass., and he proposed the combination *Khekia ambigua* (Pass.) Petrak (Hedwigia 62: 284. 1921). Although Petrak's fungus was *Pseudotrichia mutabilis*, Passerini's species was not, and *Calospora ambigua* Passerini is a synonym of *Pseudovalsa longipes* (Tul.) Saccardo in the Diaporthales (Wehmeyer, 1941b). Kirschstein erected *Pseudotrichia stromatophila* based upon Petrak's Nr. 132 (as 123) "*Calospora ambigua* Pass. Forsan nova species?" and observed that *Khekia* was an invalid name. Petrak (1940) repudiated Kirschstein's name and retained *Khekia*. At this time he utilized the earlier epithet and called the species *Khekia mutabilis*. Petrak also considered *Lophiotricha viburni* Richon (Bull. Soc. Mycol. France 32: XI. 1885) as possibly providing an earlier generic name, but concluded that the two taxa differed. Wehmeyer (1941a) accepted *Pseudotrichia*, and at that time used the epithet *aurata*. He reported on some aspects of development in culture. Colonies on oat agar were yellowish green on the surface. Primordia developed on sterilized twigs of *Ulmus*, on both healthy twigs and ones bearing stromata of *Eutypella* sp. Young ascomata contained at first interwoven hyphae. Meristematic cells in the upper regions formed a conic papilla, and others produced down-growing pseudoparaphyses. Asci were not produced in his cultures. Munk (1956) also accepted the genus, but evidently in a different sense according to his description and the position in classification. His *Pseudotrichia minor* seems to be a species of *Massarina*.

Pseudotrichia differs from *Herpotrichia* in several respects. Luttrell (1973) noted under *Herpotrichia* that *Pseudotrichia* lacked a subiculum. The major differences are the rather large ascomata, often with compressed apices, and the peripheral arrangement of asci and trabeculate pseudoparaphyses in *Pseudotrichia*. Petrak was quite correct about the compressed, lophiostomataceous aspect of the fungus, although within a single collection the apices may be rounded or compressed or somewhat triangular. An authentic specimen in Herb. E. Fries (UPS; Smolandia: Femsjö) shows such variation in the apices of ascomata.

Pseudotrichia mutabilis (Persoon: Fries) Wehmeyer, The Fungi of New Brunswick, Nova Scotia, and Prince Edward Island, p. 35 (footnote). 1950. Figs. 29-32

Sphaeria (Villosae) mutabilis Persoon: Fries, Syst. Mycol. 2: 447. 1823.

Lasiosphaeria mutabilis (Persoon: Fries) Fuckel, Jahresber. Nassau. Ver. Naturk. 25-26: 302. 1871.
Herpotrichia mutabilis (Persoon: Fries) Winter in Rabenhorst's Kryptogamenfl. 1(2): 209. 1885.
Enchnosphaeria mutabilis (Persoon: Fries) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 126: 346. 1917.
Khekia mutabilis (Persoon: Fries) Petrak, Ann. Mycol. 38: 203. 1940.
Nectria aurigera Berkeley & Ravenel var. *flavitecta* Berkeley & Curtis, Grevillea 4: 46. 1875.
Calonectria flavitecta (Berkeley & Curtis) Saccardo, Michelia 1: 308. 1878.
Sphaeria viridicoma Cooke & Peck, New York State Mus. Rep. 29: 64. 1876 (name only, Rep. 26: 87. 1874).
Lasiosphaeria viridicoma (Cooke & Peck) Saccardo, Syll. Fung. 2: 193. 1883.
Lophiotricha viridicoma (Cooke & Peck) Kauffman, Pap. Michigan Acad. 9: 189. 1929.
Pseudotrichia viridicoma (Cooke & Peck) Wehmeyer, Canad. J. Res. C, 20: 579. 1942.
Lophiotrema parasitica Peck, New York State Mus. Rep. 40: 71. 1887.
Lophiostoma angustilabrum (Berkeley & Broome) Cooke var. *parasiticum* (Peck) Chesters & Bell, Mycol. Pap. 120: 9. 1970.
Lophiotrema vestita Peck, New York State Mus. Rep. 40: 71. 1887.
Calonectria chlorinella (Cooke) Ellis & Everhart, North Amer. Pyreno. p. 113. 1892, non Cooke.
Calonectria atkinsonii Rehm, Ann. Mycol. 2: 178. 1904.
Zignoella (Trematosphaeria) ybbsitziensis Strasser, Ann. Mycol. 9: 82. 1911.
Melogramma ybbsitziensis (Strasser) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 123: 103. 1914.
Thyridaria aurata Rehm, Ann. Mycol. 10: 392. 1912, non Rehm, Ann. Mycol. 12: 172. 1914.
Pseudotrichia aurata (Rehm) Wehmeyer, Mycologia 33: 60. 1941.
Khekia ambigua Petrak, Hedwigia 62: 284. 1921 sub *Khekia ambigua* (Passerini) Petrak.
Pseudotrichia stromatophila Kirschstein, Ann. Mycol. 37: 125. 1939.

Ascomata 385-615 µm diam, 440-770 µm high; peridium broad, 32-60 µm wide. Asci (90-)120-155 x 12-20 µm. Ascospores 26-39 x (6-)7-9 µm, 1-3-septate.

Hypersaprobic in old stromatic ascomycetes or on wood bearing hyphae of other fungi. Temperate Europe and North America.

Material Examined: Numerous collections from eastern North America and from Colorado and Arizona. Type specimens: New York: Sandlake, Oct, C. H. Peck (isotype of *Sphaeria viridicoma*, NYS); Elizabethtown, Sep, C. H. Peck (holotype of *Lophiotrema parasitica*, NYS); Gansevoort, Sep, C. H. Peck (holotype of *Lophiotrema vestita*, NYS).

Pseudotrichia in temperate regions is represented by *P. mutabilis*, a species that shows variation in rounded or compressed papillate apices and in pigmentation of the tomentum clothing ascomata. Two species known from Venezuela add to the genus more conspicuous apices that are broad and short beaklike, and tomentum that forms a basal subiculum on the substrate. Although the ascospores differ, the following two species are obviously closely related. Both present a spectacular appearance under the dissecting microscope, the broad apical papilla contrasting strongly to the tomentose body of the ascoma, and seated in a weft of gray or brown subiculum. The ascospores of *P. mamillata* are much like those of *P. mutabilis*, whereas those of *P. pachnostoma* are considerably longer and have more septa.

Pseudotrichia mamillata Barr, sp. nov. Figs. 33-35

Ascomata globosa 440-495 µm diametro, gregaria prope basin subiculo brunneo extenso tomentoso ochraceo luteo; apices glabri nigri mamillati. Asci bitunicati cylindrici 100-110 x 10-12 µm. Pseudoparaphyses trabeculatae. Ascosporae 33-40 x 5-6 µm, brunneolae fusoideae quinqueseptatae.

Holotypus in monocotyledoni ignoti "La Silla, south-

Figs. 29-37. Species of *Pseudotrichia:* 29-32. *P. mutabilis*. 29. Habit sketch of ascomata. 30. Ascoma in section. 31. Ascus and portions of pseudoparaphyses. 32. Ascospores. 33-35. *P. mamillata*. 33. Habit sketch of ascomata. 34. Portions of rough-walled hyphae. 35. Ascospores. 36-37. *P. pachnostoma*. 36. Habit sketch of ascomata. 37. Ascospores. Standard line = 150 µm for fig. 30; 15 µm for figs. 31, 32, 34, 35, 37.

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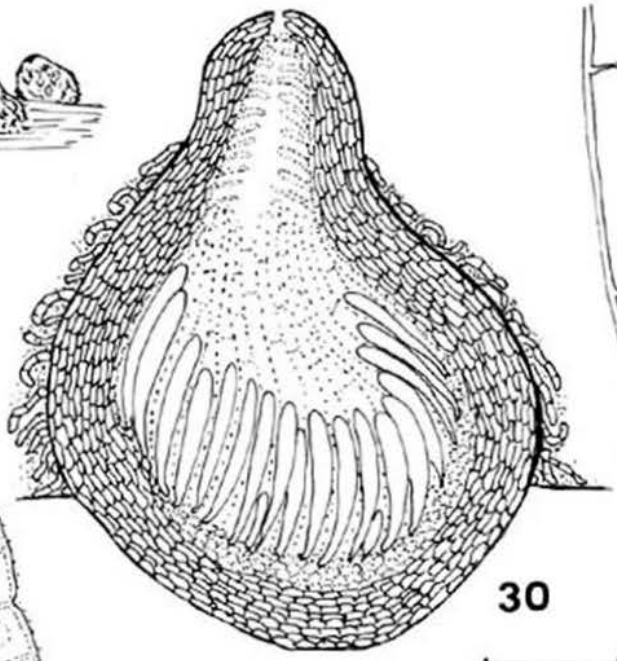

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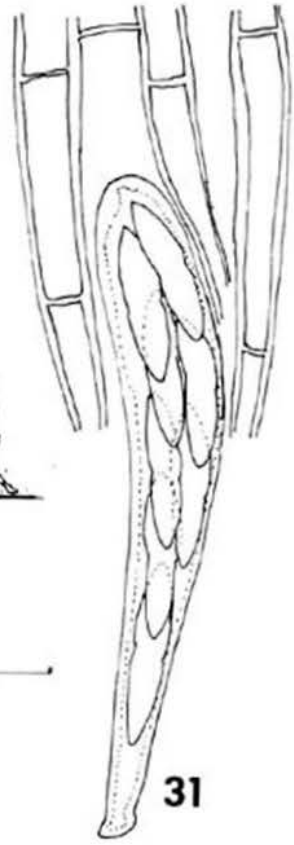

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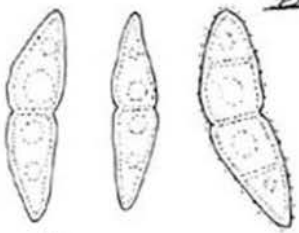

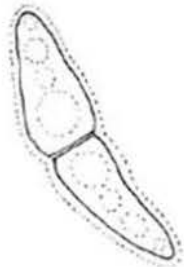

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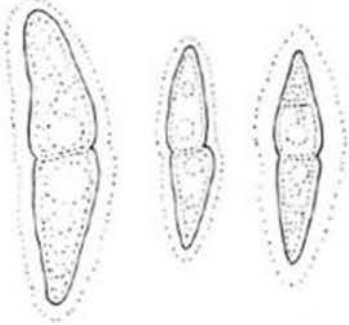

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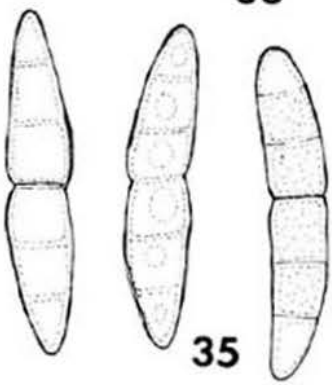

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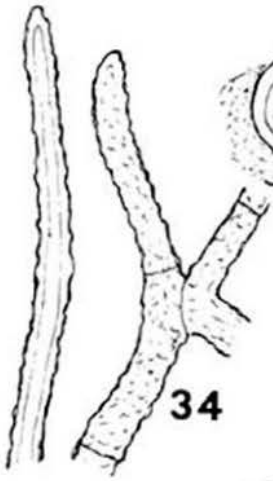

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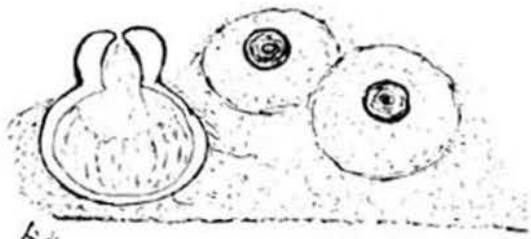

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facing slope, Parq. Nac. En Avila, Edo. Miranda, Venezuela, 30 Jun 1972," leg. K. P. Dumont et al., n. VE-3829 (holotype, NY; isotype, MASS; portion in VEN not examined).

Ascomata 440-495 µm diam, gregarious with bases immersed in brown subiculum, tomentum ochraceous yellow; apex glabrous, black, conspicuous above tomentose body of ascoma. Asci 100-110 x 10-12 µm. Ascospores 33-40 x 5-6 µm, clear light brown, ends paler, fusoid, 5-septate, with slight constriction at median septum.

On unidentified bamboo, known only from type collection.

Pseudotrichia pachnostoma (Berkeley & Curtis in Cooke) Barr, comb. nov. Figs. 36, 37

Byssosphaeria (Trichosphaeria) pachnostoma Berkeley & Curtis in Cooke, Grevillea 15: 80. 1886.

Trichosphaeria pachnostoma (Berkeley & Curtis in Cooke) Saccardo, Syll. Fung. 9: 602. 1891.

Ascomata up to 880 µm diam, gregarious with bases immersed in brown subiculum, tomentum gray or light brown; apex glabrous, black or dark gray, ca. 385 µm diam, 330 µm high; peridium 50-90 µm wide. Asci 130-160 x 18-20 µm. Ascospores 100-120 x 5-7 µm, elongate fusoid, tapered to ± obtuse ends, brown, end cells hyaline or nearly so, 7-11-septate, not constricted at septa.

On wood, base of palm frond, Venezuela.

Material examined: "*Sphaeria pachnostoma* B. & C." (NY, authentic specimen); Uei-Tepui, north-facing slope, road between El Dorado and Sta. Elena, Edo. Bolivar, Venezuela, 5 Aug 1972, K. P. Dumont et al., VE-6953 (NY, MASS). The portion of n. VE-6953 deposited in VEN was not examined.

Apparently the name *Sphaeria pachnostoma* was not published by Berkeley, and the first valid presentation of the epithet was by Cooke (1886) where he cited "*Sphaeria pachnostoma* B. & C." and Herb. Berk. no. 9620. Cooke's brief diagnosis disguised the true nature of the fungus; the ascospores were said to be lanceolate, continuous, hyaline, and to measure 30 x 5 µm. Dennis (1970) in his account of fungi of Venezuela mentioned but had not seen the species.

Byssosphaeria M. C. Cooke, Grevillea 7: 84. 1879.

Macbridella Seaver, Mycologia 1: 195. 1909.

Xenonectria v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 129: 149. 1920.

Ascomata superficial, separate or usually gregarious, occasionally coalescent; turbinate, globose, or ovoid, small to large; apex rounded or plane with minute papilla, soon dehiscent and opening by rounded pore, pore and surrounding cells pallid, whitish, or gray or bright yellow, orange or red pigmented (conspicuous when moistened), pore region appearing sulcate or plicate at times; surface often irregular or slightly roughened with protruding cells or pulverulent, usually bearing dependent hyphal appendages that merge as a subiculum beneath gregarious ascomata, appendages lacking at times; peridium composed of thick-walled small pseudoparenchymatous cells, heavily pigmented externally, bright red or reddish brown, inner layers of cells compressed, hyaline or pallid, cells in pore region hyaline or brightly colored, yellow, orange or reddish, in KOH often leaching bright reddish pigments. Asci bitunicate, peripheral, clavate or broadly cylindric. Pseudoparaphyses trabeculate, in matrix. Ascospores hyaline becoming light reddish brown or clear brown, pigment often more intense at tips of spore; ellipsoid or fusoid, ± symmetric, ends acute or obtuse; one-septate, median, usually constricted at the septum, each hemispore remaining one celled or becoming septate although not constricted; contents globular; walls smooth or delicately longitudinally striate, ends with evanescent hyaline appendages at times but not always visible in aged specimens; overlapping biseriate in the ascus.

Anamorph: coelomycetous where known, *Pyrenochaeta*-like.

Saprobic on decorticated wood, bark of fallen branches, old leathery leaves, petioles, pericarps, etc. of angiosperms. Cosmopolitan.

Type species: *B. keitii* (Berkeley & Broome) Cooke = *B. schiedermayeriana*.

Byssosphaeria was designated by Cooke for species in *Sphaeria, Byssisedae* Fries, and has been regarded as including a diversity of Ascomycetes. The genus was validly typified by *B. keitii* (Holm in Farr et al., 1979). *Byssosphaeria keitii*, described from a greenhouse, is identical with *B. schiedermayeriana* (Sivanesan, 1972), and the genus is accepted for taxa with the features described above.

Berlese created *Didymotrichia* (Atti Congr. Bot. Internaz. Genova 1892: 572. 1893) to encompass species that are included in *Byssosphaeria* in the present study. Unfortunately, he did not designate the type species, and he did include *Neopeckia coulteri* (Peck) Saccardo in his list of four species. *Neopeckia coulteri* is the type species of *Neopeckia* Saccardo (1883); *Didymotrichia* is automatically typified by

D. coulteri (Art. 7. 11) and *Didymotrichia* is a synonym of *Neopeckia* (Holm in Farr et al., 1979; personal comm.). Although this was not the intent of Berlese, according to his comments in Icones Fungorum 1: 106, 107 (1890), it is a fact.

Xenonectria v. Höhnel was erected as a genus in the Nectriaceae for *Herpotrichia schiedermayeriana* var. *caldariorum* P. Hennings. Bose (1961) included the generic name as a synonym of *Herpotrichia*, and the species as a synonym of *H. schiedermayeriana*, without further comment. The taxon seems to be inseparable from *Byssosphaeria schiedermayeriana* and furnishes another example of a predominantly tropical species found in greenhouse conditions in temperate regions.

Samuels (1973) established that *Macbridella chaetostroma* (Ellis & MacBride) Seaver, the type species of *Macbridella*, was identical with *Herpotrichia rhodosticta*. This species is *Byssosphaeria rhodomphala* in my interpretation, and *Macbridella* is a synonym of *Byssosphaeria*.

Key to North American Species of *Byssosphaeria*

1. Ascomata with bright orange or reddish pore area 2
1. Ascomata with pallid, gray, or whitish pore area; asco- tapering to ± acute ends 4
   2. Ascospores (16-)18-23(-25) x (4-)6-7(-9) µm, ends obtuse, 1-septate ..... *B. rhodomphala*
   2. Ascospores longer, ends ± acute 3
3. Ascospores (17-)22-28 x 4-6 µm, 1-3-septate ..... *B. xestothele*
3. Ascospores (25-)30-42 x 5-8 µm, 1-3-(5-7-)septate ..... *B. schiedermayeriana*
   4. Ascospores 12-18(-22) x (3-)4.5-5.5 µm, 1-septate ... *B. diffusa*
   4. Ascospores longer and relatively narrower 5
5. Ascospores 18-30 x 3-5 µm 6
5. Ascospores 25-50 x (5-)6-9 µm 8
   6. Ascospores 18-24(-30) x 4-5 µm, 1-3-septate; lower sides of ascomata bearing appendages and seated on subiculum ..... *B. alnea*
   6. Ascospores 20-30 x (2.5-)3-5.5 µm, 1-3-septate; surface of ascomata roughened with protruding cells but without appendages, seated on blackened substrate . 7
7. Ascomata globose to ellipsoid, 400-600 µm diam; ascospores 20-30 x 3.5-5.5 µm ..... *B. semen*
7. Ascomata ± ovoid, 1-1.5 mm diam; ascospores 25-30 x (2.5-)3-3.5 µm ..... *B. oviformis*

8. Ascospores 25-35 x (5-)6-8 µm, 1-3-septate; surface of ascomata with appendages ..... *B. jamaicana*
8. Ascospores (30-)40-50 x (6-)7-9 µm, 1-(3-5-)septate; surface of ascomata roughened with protruding cells but without appendages ..... *B. salebrosa*

An extralimital taxon is *Herpotrichia erythrinae* Huguenin from New Caledonia. This species is much like *B. xestothele* in length of ascospores but their width and obtuse ends are more those of *B. rhodomphala*. *Byssosphaeria erythrinae* (Huguenin) Barr, comb. nov. (basionym: *Herpotrichia erythrinae* Huguenin, Bull. Soc. Mycol. France 81: 701. 1965) is a recognizable taxon. *Herpotrichia caesalpiniae* (Doidge) Sivanesan from South Africa has ascomata shaped like those of *Byssosphaeria* (cf. Sivanesan, 1972, Pl. 1F) but all other characters are pleosporaceous rather than melanommataceous.

The confusion of taxa in *Byssosphaeria* has been noted several times. It was not resolved by Seaver's (1922) "clarification" of "*Neopeckia diffusa* and *Herpotrichia albidostoma*." I was able to study the collections that Seaver had examined and from his composite descriptions of two species to recognize instead five in *Byssosphaeria* and one in *Herpotrichia*, the isotype of *H. albidostoma* which is *H. macrotricha*. The two smaller-spored species of *Byssosphaeria*, *B. rhodostoma* and *B. diffusa*, were delimited clearly by Bose (1961). The larger-spored species, *B. schiedermayeriana*, *B. jamaicana*, and *B. salebrosa* (with the synonymous name *H. incisa*) differ in surface vestiture and in pigmentation of the apex of ascomata as well as in ascospore sizes.

Byssosphaeria alnea (Peck) Barr, comb. nov. Figs. 46, 47
Cucurbitaria alnea Peck, New York State Mus. Rep. 28: 75. 1876.
Otthia alnea (Peck) Saccardo, Syll. Fung. 1: 740. 1882.
Gibberidea alnea (Peck) Wehmeyer, Canad. J. Res. C, 20: 586. 1942.
Massarina alnea (Peck) L. Holm, Svensk Bot. Tidskr. 62: 226. 1968.

Ascomata 220-460 µm diam, globose, forming compact groups of twenty or more in cracks of periderm; apex with short, shining black papilla; surface bearing brown hyphal appendages that form a subiculum below the group; peridium 40-50 µm wide, pore region pallid. Asci 105-140 x 7.5-12 µm. Ascospores 19.5-24 x 4-5 µm, becoming light brown, fusoid, tapered to acute ends, 1-septate, finally 3-septate;

delicate gelatinous coating or appendages present.

On branches of *Alnus*, northeastern North America.

Material examined: New York: Karner (= Center), May 1874, C. H. Peck (holotype, NYS).

Wehmeyer (1942) reported this species from Nova Scotia. Holm (1968) removed the taxon from *Gibberidea*, and transferred it to *Massarina* as the best accommodation. He tentatively included in synonymy *Massaria alni* Otth ex Jaczewski, *Massarina alni* (Jaczewski) Saccardo, although the type material was immature. *Massarina* in my concept is a genus of the Pleosporales and deviates in several features from *B. alnea*.

Byssosphaeria diffusa (Schweinitz) Cooke, Grevillea 15: 81. 1887. Fig. 45

Sphaeria diffusa Schweinitz, Trans. Amer. Philos. Soc. 4: 210. 1834.

Herpotrichia diffusa (Schweinitz) Ellis & Everhart, North Amer. Pyreno. p. 158. 1892; Starbäck, K. Svenska Vet.-Akad. Handl. 19, III: tab. 2, fig. 17. 1894.

Neopeckia diffusa (Schweinitz) Saccardo, Syll. Fung. 11: 317. 1895.

Didymotrichia diffusa (Schweinitz) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Sphaeria parietalis Berkeley & Curtis, Grevillea 4: 107. 1876.

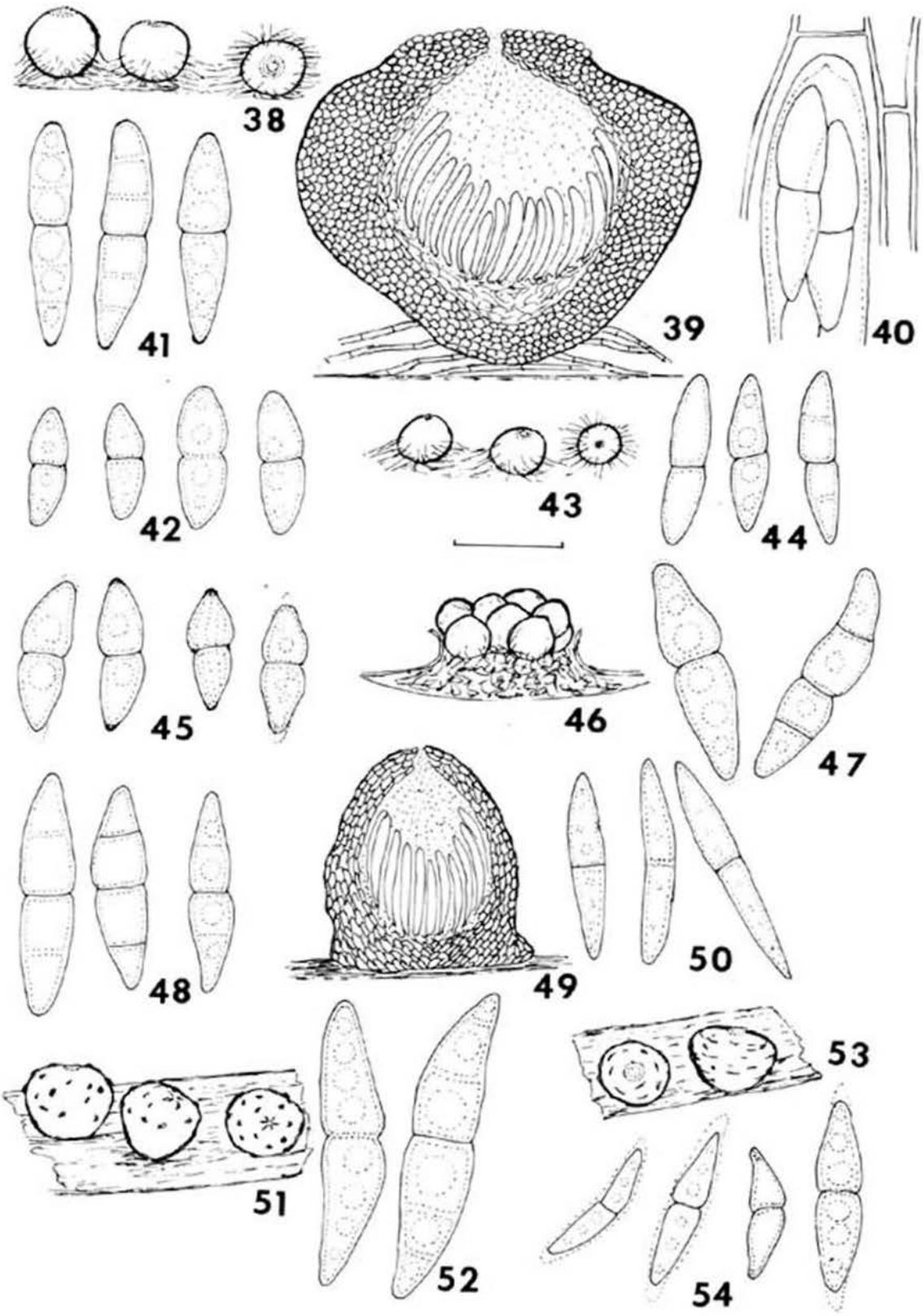
Enchnosphaeria parietalis (Berkeley & Curtis) Saccardo, Syll. Fung. 2: 207. 1883.

Herpotrichia parietalis (Berkeley & Curtis) Ellis & Everhart, North Amer. Pyreno. p. 157. 1892.

Didymotrichia parietalis (Berkeley & Curtis) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 573. 1893.

Neopeckia parietalis (Berkeley & Curtis) Saccardo, Syll. Fung. 11: 317. 1895.

Figs. 38–54. Species of *Byssosphaeria*: 38–41. *B. schiedermayeriana*. 38. Habit sketch of ascomata. 39. Ascoma in section. 40. Upper portion of ascus and portions of pseudoparaphyses. 41. Ascospores. 42. *B. rhodomphala*, ascospores. 43, 44. *B. xestothele*. 43. Habit sketch of ascomata. 44. Ascospores. 45. *B. diffusa*, ascospores. 46, 47. *B. alnea*. 46. Habit sketch of ascomata. 47. Ascospores. 48. *B. jamaicana*, ascospores. 49, 50. *B. oviformis*. 49. Ascoma in section. 50. Ascospores. 51, 52. *B. salebrosa*. 51. Habit sketch of ascomata. 52. Ascospores. 53, 54. *B. semen*. 53. Habit sketch of ascomata. 54. Ascospores. Standard line = 150 µm for fig. 39; 500 µm for fig. 49; 15 µm for figs. 40–42, 44, 45, 47, 48, 50, 52, 54.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Ascomata superficial, scattered or gregarious, often in dense crowds on subiculum; ovoid or ± globose, ± turbinate in section, (170-)400-600 µm diam; apex rounded or nearly truncate, with minute papilla at first, opening by small pore; surface dull black below, grayish white at apex around pore; appendages at lower sides merging with subiculum, of narrow reddish brown hyphae; peridium thick, 20-44 µm wide above, 65-150 µm at base, cells small, reddish brown, thick walled, cells around pore pallid or light yellowish, pigment not leaching out in KOH. Asci (50-)70-100 x (9-)12-13 µm, occasionally only 2-4-spored. Ascospores 12-18(-22) x (3-)4.5-5.5 µm, light clear brown, tips darkened, 1-septate; wall finely longitudinally striate, often with delicate appendages over ends.

Anamorph: *Pyrenochaeta*-like; pycnidia formed in culture, 250-400 µm diam, with hyphal appendages; conidiogenous cells branched or simple, 5-12 x 1.5-2.5 µm; conidia 2-3 x 1-1.5 µm, hyaline, one celled, ovoid (Bose, 1961).

On decorticated wood or twigs. Most common in eastern North America; also reported from India, South Africa (Bose, 1961), Uganda, Ghana (Sivanesan, 1972).

Material examined: North America: Ontario: ex Univ. Toronto Crypt. Herb. 2619 (NY). Pennsylvania: authentic collection of *S. diffusa* ex Herb. Schweinitz (IMI, slide; NY, UPS). Illinois: Ellis & Everhart N.A.F. 2549 (MASS, NY, DAOM). Idaho: Bonner Co., 5 Jun 1940, Slipp 657 (MASS, UIFP 2357). South Carolina: authentic collection of *S. parietalis* ex Herb. Curtis (IMI, slide; UPS). Georgia: GA 7877 (GA). Alabama: R. P. Burke, Fungi of Montgomery Co., no. 325 (NY).

Byssosphaeria jamaicana (Sivanesan) Barr, comb. nov.
Fig. 48

Herpotrichia jamaicana Sivanesan, Mycol. Pap. 127: 35. 1972.

Ascomata 340-550 µm diam, globose, with numerous dependent brown hyphal appendages, as subiculum beneath gregarious ascomata; pore area pallid; peridium 50-60 µm wide, dark reddish brown externally. Asci 80-120 x 12-15 µm. Ascospores 25-35 x (5-)7-8 µm, 1-3-septate, light to clear brown, fusoid, ends ± acute; constricted at primary septum; no appendages seen.

On decorticated rotting wood. West Indies.

Material examined: Jamaica: 1909, A. E. Wight (holotype, FH). Puerto Rico: Espinosa, 2 Mar 1915, J. A. Stevenson 2627 (NY); Explorations of Porto Rico n. 1817, F. J. Seaver

and C. E. Chardon, 1923 (NY). Trinidad: Matchepoori, 11 Mar 1921, F. J. Seaver, Plants of Trinidad n. 3128 (NY).

Byssosphaeria jamaicana is now known from two collections made in Puerto Rico and one in Trinidad, in addition to the type from Jamaica. It probably is much more widespread than these records indicate. I suspect that some collections identified as "*Herpotrichia schiedermayeriana* with pallid pore region" belong instead to *B. jamaicana*.

Byssosphaeria oviformis Barr, sp. nov. Figs. 49, 50

Ascomata ovoidea 1-1.5 mm diametro et lato gregaria, prope basin in ligno denigrato immerso. Asci bitunicati cylindrici 120-130 x 7-9 µm. Pseudoparaphyses trabeculatae. Ascosporae 25-30 x (2.5-)3-3.5 µm hyalinae fusoideae uniseptatae.

Holotypus in ligno decorticato "vicinity of Windsor Cave, 140 m, 18°21' N, 77°39' W, Trelawney Parish, Jamaica, 21 Apr 1981" leg. W. R. Buck n. 5949 (holotypus, NY; isotypus, MASS).

Ascomata superficial, bases in substrate, gregarious; ovoid, 1-1.5 mm diam and high; apex tapered to blunt papilla, opening by rounded pore; surface dull black; peridium firm, carbonaceous, 100-130 µm wide, composed of numerous parallel compressed layers of cells, vertically oriented at the base, vinaceous brown, with hyaline internal layers. Asci bitunicate, peripheral, cylindric, 120-130 x 7-9 µm. Pseudoparaphyses trabeculate. Ascospores 25-30 x (2.5-)3-3.5 µm, hyaline, narrowly fusoid; one septate, not constricted, septum median; three globules or clusters of guttules in each hemispore, i.e., potentially several septate; wall smooth; overlapping biseriate in the ascus.

On blackened decorticated wood, known only from type.

In the ascomata without subiculum, seated on blackened substrate surface, and in narrow ascospores that remain hyaline and one septate for considerable time, *B. oviformis* is related most closely to *B. semen*. The latter species has smaller, more globose ascomata and slightly broader ascospores. *Byssosphaeria jamaicana* differs from both in possession of tomentum of dependent appendages and broader ascospores.

Byssosphaeria rhodomphala (Berkeley) Cooke, Grevillea 15: 81. 1887. Fig. 42

Sphaeria rhodomphala Berkeley, J. Bot. London 4: 313. 1845.

Herpotrichia rhodomphala (Berkeley) Saccardo, Syll. Fung. 2: 212. 1883.

Herpotrichia diffusa var. *rhodomphala* (Berkeley) Ellis & Everhart, Proc. Acad. Nat. Sci. Philadelphia 47: 21. 1895.

Sphaeria rhodosticta Berkeley & Broome, J. Linn. Soc. London 14: 126. 1873.

Herpotrichia rhodosticta (Berkeley & Broome) Saccardo, Syll. Fung. 2: 213. 1883.

Didymotrichia rhodosticta (Berkeley & Broome) Berlese, Atti Congr. Bot. Internaz. Genova 1892: 572. 1893.

Neopeckia rhodosticta (Berkeley & Broome) Saccardo, Syll. Fung. 11: 317. 1895.

Sphaeria lanuginosa Berkeley & Curtis, Grevillea 4: 108. 1876.

Melanopsamma lanuginosa (Berkeley & Curtis) Saccardo, Syll. Fung. 1: 577. 1882.

Amphisphaeria subiculosa Ellis & Everhart, J. Mycol. 2: 103. 1886.

Nectria chaetostroma Ellis & McBride, Bull. Lab. Nat. Hist. Iowa State Univ. 4: 70. 1896.

Macbridella chaetostroma (Ellis & McBride) Seaver, Mycologia 1: 195. 1909.

Letendraea chaetostroma (Ellis & McBride) Weese, Sitzungsber. Akad. Wiss. Wien, Math.-Naturwiss. Cl., Abt. 1, 125: 512. 1916.

Herpotrichia rhodospiloides Peck, Bull. Torrey Bot. Club 36: 155. 1909.

Ascomata superficial, scattered or gregarious on ample subiculum, globose or turbinate, 220-500 µm diam, apex rounded plane, opening by rounded pore, often puckered or sulcate around pore; surface dull black, with red, orange, or yellow pulverulence around pore; peridium 20-60 µm wide above, 40-45 µm wide at base, pigment leaching from apical cells in KOH. Asci (50-)85-120 x 10-13 µm. Ascospores (16-)18-23(-25) x (5-)6-7.5(-9) µm, light brown, ends obtuse, 1-(3-)septate; faintly longitudinally striate, occasionally bearing delicate hyaline appendages over ends.

Anamorph: *Pyrenochaeta*-like; pycnidia formed in culture, 130-170 µm diam, with hyphal appendages; conidiogenous cells phialidic, lining cavity, 5-10 x 4-6 µm; conidia 6.5-10 x 3-4 µm, hyaline, one celled, ellipsoid, oblong or ovoid

(Samuels and Müller, 1978).

On wood and bark of various trees. Cosmopolitan.

Material examined: Numerous collections from tropical and temperate regions of North and South America, Africa, Asia. Selected collections: North America: Ohio: ex Berkeley herb., *Sphaeria rhodomphala* (UPS). Kansas: Bartholomew Fungi Col. 3632 as *Herpotrichia diffusa*. Missouri: Ellis & Everhart N.A.F. 2130 as *Amphisphaeria subiculosa*; Rabenhorst-Winter-Pazschke Fungi eur. 3960; DAOM 90017 (DAOM). Arkansas: holotype of *Herpotrichia rhodospiloides* (NYS), also distributed as Fungi Col. 2835. Georgia: GA 7979 (GA). South Carolina: Curtis,*Sphaeria rhodomphala* (UPS); Ravenel 1595 (MASS). Louisiana: Flora Ludoviciana 382, holotype of *Amphisphaeria subiculosa* (NY). Ceylon: slide ex holotype of *Sphaeria rhodosticta* (IMI); specimen (UPS).

This species was separated from *Herpotrichia diffusa* by Bose (1961), who utilized ascospore shape: ellipsoid with obtuse ends for *H. rhodosticta*, fusoid with acute ends for *H. diffusa*. Normally the ascomata differ in pigmentation around the pore region also, with *Byssosphaeria rhodomphala* having reddish, orange or yellowish granular deposit and *B. diffusa* grayish white. Both Bose and Sivanesan (1972) used the specific epithet *rhodosticta*, and assigned *Sphaeria rhodomphala* to synonymy with *Herpotrichia diffusa*. The ascospores of *Sphaeria rhodomphala* are larger (25 x 7.5 µm) than those of *S. diffusa*. In addition, authentic specimens named as *Sphaeria rhodomphala* by Berkeley in Fries's Herbarium in UPS are reddened about the apical pore. It is concluded that *Sphaeria rhodomphala* is the earliest name for this species that occurs in both temperate and tropical regions.

Byssosphaeria salebrosa (Cooke & Peck) Barr, comb. nov.
Figs. 51, 52

Sphaeria (Denudatae) salebrosa Cooke & Peck, New York State Mus. Rep. 29: 61. 1878.

Amphisphaeria salebrosa (Cooke & Peck) Saccardo, Syll. Fung. 1: 726. 1882.

Trematosphaeria salebrosa (Cooke & Peck) Sivanesan, Trans. Brit. Mycol. Soc. 65: 397. 1975.

Herpotrichia incisa Ellis & Everhart, Proc. Acad. Nat. Sci. Philadelphia 45: 130. 1893.

Ascomata 440-800 µm diam, globose or ovoid, scattered or gregarious on sparse subiculum or on blackened substrate; surface irregularly roughened with projecting masses of cells,

dull black; peridium 30-35 µm wide at sides, up to 55-100 µm at base, of thick-walled, small brown cells, cells around pore yellowish, not leaching pigment in KOH. Asci 120-150 x 13-16.5 µm. Ascospores (30-)40-50 x (6-)7-9 µm, hyaline, soon light brown, fusoid, ends acute, 1-(3-5-)septate, constricted at median primary septum only.

On woody substrates. Eastern North America.

Material examined: Ontario: dead roots of *Acer spicatum*, London, 15 Apr 1892, J. Dearness (holotype of *Herpotrichia incisa*, NY). New York: on branches of *Vaccinium* or *Andromeda*, Center, Oct, C. H. Peck (holotype of *Sphaeria salebrosa*, NYS).

This species has ascospores much like those of *Byssosphaeria schiedermayeriana*, although no appendages were found on the ascospores, and they tend to range longer. The subiculum is sparse and the ascomata are quite rough and irregular, without any reddened area at the apex.

Byssosphaeria schiedermayeriana (Fuckel) Barr, comb. nov. Figs. 38-41

Herpotrichia schiedermayeriana Fuckel, Jahrb. Nass. Ver. Naturk. 27-28: 27. 1873.

Sphaeria cirrhostoma Berkeley & Broome, J. Linn. Soc. London 14: 126. 1873.

Lasiosphaeria cirrhostoma (Berkeley & Broome) Saccardo, Syll. Fung. 2: 201. 1883.

Herpotrichia cirrhostoma (Berkeley & Broome) Petch, Ann. Roy. Bot. Gard. Peradeniya 5: 291. 1912.

Sphaeria (Byssisedae) keitii Berkeley & Broome, Ann. Mag. Nat. Hist. 17: 144. 1876.

Byssosphaeria keitii (Berkeley & Broome) Cooke, Grevillea 7: 84. 1879.

Herpotrichia keitii (Berkeley & Broome) Saccardo, Syll. Fung. 2: 212. 1883.

Psilosphaeria (Zignoella) keitii (Berkeley & Broome) Cooke, Grevillea 16: 51. 1887.

Lasiosphaeria keitii (Berkeley & Broome) Berlese, Icon. Fung. 1: 114. 1892.

Herpotrichia tonkiniana Patouillard, Bull. Soc. Mycol. France 8: 51. 1892.

Herpotrichia schiedermayeriana var. *caldariorum* P. Hennings, Hedwigia 34: 102. 1895.

Xenonectria caldariorum (P. Hennings) v. Höhnel, Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 129: 150. 1920.

Herpotrichia sabalicola P. Hennings, Verh. Bot. Ver. Prov. Brandenb. 40: 154. 1898.
Neopeckia roberti Starbäck, Ark. Bot. 5: 16. 1905.
Neopeckia nobilis Rick, Broteria 5: 44. 1906.
Herpotrichia philippinensis Rehm, Leafl. Philipp. Bot. 6: 2203. 1914.
Neopeckia rhodosticta var. *magnifica* Rehm, Leafl. Philipp. Bot. 8: 2947. 1914.
Herpotrichia bakeri Sydow, Ann. Mycol. 15: 203. 1917.
Neopeckia rhodostoma Sydow, Ann. Mycol. 15: 204. 1917.
Neopeckia brasiliana Viegas, Bolm. Soc. Bras. Agron. 9: 2. 1946.

Ascomata scattered or gregarious, dependent appendages formed from lower sides and spreading on substrate as subiculum; globose or ovoid, 500-825 µm diam; dull black below, red or orange around pore region; peridium 50-100 µm wide. Asci (80-)100-150 x 12-15 µm. Ascospores (25-)32-42 x 5-8(-9) µm, light brown, 1-(3-5-)septate.

Anamorph: formed in culture, pycnidia 70-500 µm diam, with hyphal appendages; conidiogenous cells phialidic, lining cavity, 5-8 x 4-6 µm, or more elongate, 5-10 x 3-6 µm; conidia 2.5-3.5(-4) x 1.5-2(-3) µm, hyaline, ellipsoid or subglobose (Samuels and Müller, 1978).

On varied substrates, rotting logs and branches, endocarps of coconut, culms and petioles, on wood or cord in greenhouses. Cosmopolitan in warmer regions.

Material examined: numerous collections from tropical North and South America, Africa, Asia; also from Germany, Italy, Britain. North America: Florida: Collier Co., 1 Jan 1972, K. P. Dumont et al. (NY). Louisiana: Fungi Col. 1035; Flora Ludoviciana 2463 (NY).

The synonymy is essentially that prepared by Sivanesan (1972) but without those names (*albidostoma, incisa*) that do not accord with this taxon in my interpretation. *Byssosphaeria schiedermayeriana* is typically a tropical species, although it was originally discovered in the European Alps on *Sambucus* branches. The large ascomata with orange, bright or dull reddish plane apices are striking. Ascomata, asci and ascospores are larger than in the similar-appearing *B. rhodomphala*, but their kinship is notable. When Berkeley and Broome described *Sphaeria keitii* they suggested that it might be of exotic origin and thought it could be related to *S. rhodosticta* (= *B. rhodostoma*). Although many collections of North American tropical specimens have been labelled as "*Herpotrichia albidostoma*" the original of this

species is a true *Herpotrichia* and is identical with *H. macrotricha*. Similarly shaped and sized ascospores account for the confusion. In the temperate-zone *H. incisa* (=*Byssosphaeria salebrosa*), ascospores are again quite similar, but the ascomata differ markedly.

Byssosphaeria semen (Cooke & Peck) Barr, comb. nov.
Figs. 53, 54

Sphaeria semen Cooke & Peck, New York State Mus. Rep. 29: 65. 1878. (name only, Rep. 26: 87. 1874).
Metasphaeria semen (Cooke & Peck) Saccardo, Syll. Fung. 2: 170. 1883.

Ascomata 400-600 µm diam, 330-550 µm high, globose or somewhat depressed; without appendages or subiculum, surface crustose and roughened; pore area pallid; peridium thick, 40-84 µm wide, outer region reddish brown, inner region hyaline. Asci 80-110 x 9-12 µm. Ascospores 20-30 x 3.5-4.5(-6) µm, hyaline becoming light brown, fusoid, ends tapered and acute, 1-(3-)septate, constricted at median septum; delicate appendages at each end.

On decaying petioles of *Sorbus* sp., rotting hardwood. Eastern North America.

Material examined: New Hampshire: Barr 3915 (MASS). New York: Sandlake, Sep 1872, C. H. Peck (holotype, NYS); Sandlake, no date, C. H. Peck (NYS).

This species is smaller than *B. salebrosa*, but it is obviously related by the surface of ascomata that is roughened but not appendaged.

Byssosphaeria xestothele (Berkeley & Curtis) Barr, comb.nov.
Figs. 43, 44

Sphaeria xestothele Berkeley & Curtis, Grevillea 4: 107. 1876.
Lasiosphaeria xestothele (Berkeley & Curtis) Saccardo, Syll. Fung. 2: 194. 1883.
Herpotrichia xestothele (Berkeley & Curtis) Berlese, Icon. Fung. 1: 107. 1894.
Eriosphaeria xestothele (Berkeley & Curtis) Dearness & House in Seymour, Host Index of the fungi... 543. 1929.
Herpotrichia schiedermayeriana var. *xestothele* (Berkeley & Curtis) Sivanesan, Mycol. Pap. 127: 20. 1972.

Ascomata 330-440 µm diam, 330-550 µm high, globose or ovoid, reddish around pore area, hyphal appendages dependent and forming subiculum with gregarious ascomata or occasion-

ally forming compound structures of several centra surrounded by common outer peridium; peridium bright red in section in apical region, reddish brown below, of small-celled pseudoparenchyma, thick walled, 30-52 µm wide. Asci 70-100 x 9-12 µm. Ascospores hyaline becoming light brown, 20-26 x 4.5-6 µm, 1-3-septate, constricted at median septum, fusoid, tapered to ± acute ends; usually bearing delicate appendages, faintly longitudinally striate.

On fallen branches of *Cornus florida* or old leathery leaves. Eastern North America, Mexico.

Material examined: South Carolina: Society Hill, Apr 1855, Curtis (isotype of *Sphaeria xestothele*, Curtis Herb. in FH). Mexico: old leaves of *Loranthus crassipes*, Hacienda de Tamasopo, San Luis Potosi, 16 Dec 1891, ex Pringle Plantae Mexicanae 3978 (MASS).

Sivanesan (1972) considered this taxon to be only a small variety of *Herpotrichia schiedermayeriana* but it appears to be separable at the species level in comparison with the other species in the genus.

ACKNOWLEDGMENTS

I acknowledge with thanks the curators of the herbaria cited for the loan of specimens in their keeping. I am much indebted to Dr. C. T. Rogerson for reviewing the manuscript and providing additional information, and to Dr. A. Sivanesan, whose preparations of numerous critical species gave answers to several questions, and who read and made suggestions on an early draft of the manuscript.

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MYCOTAXON

Vol. XX, No. 1, pp. 39-43 April-June 1984

HERICIUM CORALLOIDES N. AMER. AUCT. (= *H. AMERICANUM* SP. NOV.) AND THE EUROPEAN *H. ALPESTRE* AND *H. CORALLOIDES*

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SUMMARY

Cultures of a fungus known as *Hericium coralloides* in North America were not compatible in mating experiments with four other species of *Hericium*, including *H. coralloides* and the morphologically similar *H. alpestre*, a European species also often labelled *H. coralloides*. This genetic isolation, in addition to geographic and substrate differences from *H. alpestre*, prompted recognition of the North American fungus as a distinct species, herein named *H. americanum* sp. nov.

In 1975 I began to describe and compare the cultural features of the North American species of *Hericium*. It soon became evident that the problem was not as straightforward as it appeared initially and the project was expanded to include study of interfertility types, the conspecificity of certain cultures as well as the conspecificity of several *Hericium* species reported to be in North America and Europe. Most of these results will be published later.

This report deals with the application of the name "*Hericium coralloides* (Scop.:Fr.) S. F. Gray". Two

species in Europe have been labelled *H. coralloides* (Hallenberg 1983). The neotypification of the name by Hallenberg (1983) should result in the name being applied to only one fungus. As a result of neotypification, the names *H. clathroides* (Pallas:Fr.) Pers. and *H. ramosum* (Bull.) Let. become synonyms of *H. coralloides* and the name *H. alpestre* Pers. is the earliest name for the "*H. coralloides*" of many European authors, e.g., Maas Geesteranus (1959).

In North America, we, e.g., Harrison (1973), labelled as "*H. coralloides*" a fungus which seemed identical to what is now named *H. alpestre*. To determine whether the North American and European fungi were conspecific a series of intercollection matings have been evaluated. As a result a new name, *H. americanum*, is proposed for the North American fungus.

MATERIALS AND METHODS

Monokaryon cultures used in mating tests were derived from the following:

H. americanum

1) DAOM F2167: USA, Pennsylvania, from basidiome on *Platanus*.
2) DAOM 21467: Canada, central Ontario, from decay in *Acer saccharum*.
3) Basham 467-KO: Canada, Ontario, Swan Lake, from decay in *Betula alleghaniensis*.

H. alpestre

4) Culture 392: Austria, Steiermark, Koralpe, Kalbenwald, from basidiome on *Abies alba*, coll. N. Hallenberg.
5) Culture 407: same data as no. 4.

H. coralloides as neotypified by Hallenberg (1983).

6) FP 59062-S: USA, Virginia, from basidiome on *Acer* or *Fagus*.
7) DAOM 22531: England, Epping Forest, from basidiome on *Carpinus* or *Fagus*, FPRL 60.

The fungi were grown at 25°C on 1.25% malt agar in plastic Petri dishes. Monokaryons representing each of the four mating types were used from no. 3 and three mating types were available from nos. 4 and 7. The mating types of the remaining monospore cultures were not determined. All cultures are preserved at DAOM and several are at the institutions acknowledged.

In each mating a monokaryon was paired with a monokaryon from a different specimen. After the mycelia had grown together the mats were examined for the presence of clamp connections. Hyphae from both the zone of convergence and from the opposite margin of each mat were observed. In Table 1 the negative (-) symbol indicates that no clamps were found and those matings were judged to be incompatible.

RESULTS AND DISCUSSION

All matings between *Hericium alpestre* and *H. coralloides* from Europe and *H. americanum* of North America were negative (Table 1). The data indicate that *H. americanum* is genetically distinct from both *H. alpestre* and *H. coralloides*, the two other species which have been labelled *H. coralloides*. Matings (Ginns unpubl.) involving isolates from an additional 33 specimens confirmed that *H. americanum* was distinct from *H. abietis* (Weir ex Hubert) K. Harrison and *H. erinaceus* (Bull.:Fr.) Pers., the two other North American species of *Hericium*.

The basidiomes of *Hericium americanum*, characterized by branches which bear spines in terminal clusters and spores 5.5-7µm diam, are different from *H. coralloides* sensu neotype which has spines arranged on the underside of branches like teeth on a comb and spores 3-5µm diam. The basidiomes of *H. americanum* and *H. alpestre* are very similar but have not been critically compared, partly due to the scarcity of basidiomes of *H. alpestre* (cf. Hallenberg 1983). *Hericium alpestre* appears to be restricted to the mountains of central and southern Europe, where it occurs almost entirely on recently cut stumps and fallen stems of *Abies alba* (Hallenberg 1983). The North American fungus is found in eastern North

Table 1. Results of matings between monokaryon cultures of *Hericium americanum*, and *H. alpestre* and *H. coralloides*.

		H. americanum															
		F2167[a]			21467							467-KO					
		1[b]	4	5	1	2	4	5	6	10		2	3	4	5	6	10
H. alpestre																	
392[a] -	1[b]	0[c]	-[d]	-	0	-	-	-	-	-		0	0	-	-	-	-
	2	0	-	-	0	-	-	-	-	-		0	0	-	-	-	-
	3	0	-	-	0	-	-	-	-	-		0	0	-	-	-	-
	4	0	0	0	0	-	-	-	-	-		0	0	-	-	-	-
407	4	0	-	-	0	-	-	-	-	-		0	0	-	-	-	-
H. coralloides																	
50962 -	1	-	-	0	-	-	0	-	0	0		-	-	-	0	-	0
	2	-	-	0	-	-	0	-	0	0		-	-	-	0	-	0
	3	-	-	-	-	-	0	-	0	0		-	-	-	0	-	0
	4	-	-	0	-	-	0	-	0	0		-	-	-	0	-	0
	5	0	-	-	0	0	0	0	0	0		0	0	0	0	0	0
	6	0	-	-	0	0	0	0	0	0		0	0	0	0	0	0
22531 -	1	-	-	0	0	-	-	-	0	0		-	-	-	-	0	0
	2	-	-	0	0	-	-	-	0	0		-	-	-	-	0	0
	3	-	-	0	0	-	-	-	0	0		-	-	-	-	0	0
	4	-	-	0	0	-	-	-	0	0		-	-	-	-	0	0

a: culture number; b: arbitrary number assigned to each monokaryon culture; c: zero indicates that no mating was attempted; d: negative symbol indicates incompatible mating (i.e., no clamp connections were formed).

America, extending as far west as Lake Superior. It occurs on a variety of broad-leaved tree species and infrequently on coniferous trees (Harrison 1973, Ginns unpubl.). Thus the geographic isolation of the North American "*H. coralloides*", its distinct substrate preferences, and its genetic isolation from *H. alpestre* as well as the other *Hericium* species convinced me that the North American fungus should be recognized as a distinct species.

Hericium americanum sp. nov.

Hericium alpestre affinis, sed segregatus genetice et geographice. Holotypus: USA: Pennsylvania: Houserville, 5 Nov. 1931, in *Platano*, ut *H. erinaceus*, L.O. Overholts Herb. 14844 (PAC). Culture DAOM F2167.

A detailed description and illustration of the basidiomes appeared in Harrison (1973) labelled as "*H. coralloides*".

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MYCOTAXON

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STELLOSPORA GEN. NOV. (HYPHOMYCETES)

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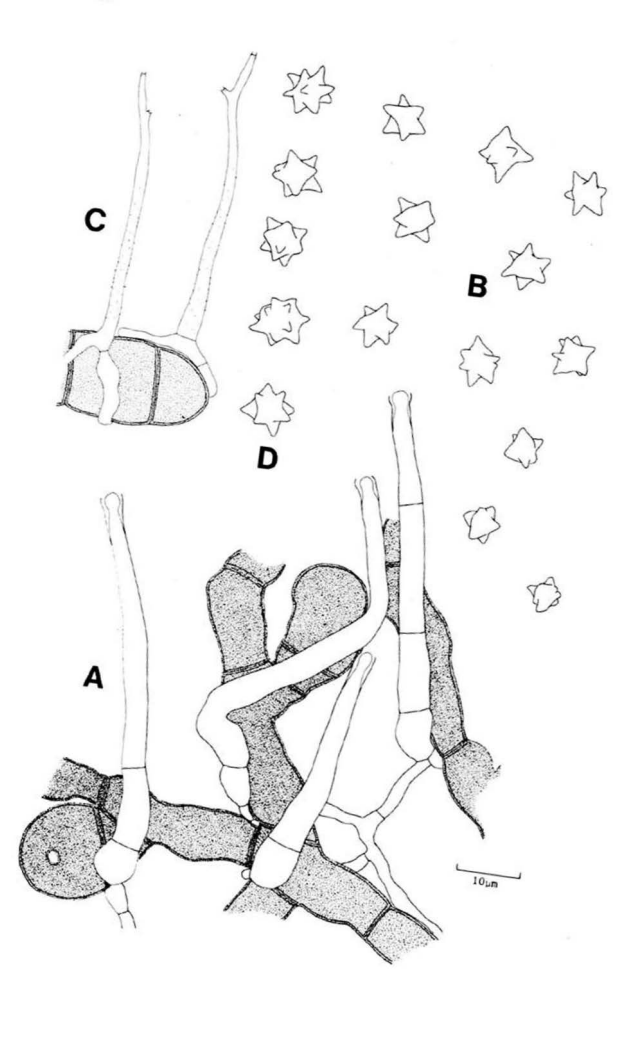
An interesting hyphomycete overgrowing colonies of *Appendiculella calostroma* (Desm.) Höhnel on *Rubus* in eastern Australia and the Philippines has characters which separate it from morphologically similar fungi known to us. The differences appear of sufficient magnitude to warrant the erection of a new genus.

Stellospora appendiculellae gen. et sp. nov. (Fig. 1)
Deuteromycotina, Hyphomycetales.
Hyphae hyalinae vel subhyalinae, ramosae, septatae, laeves, in hyphis hospitis superficiares vel immersae, 2-3 µm diam. Conidiophora macronematosa, mononematosa, simplicia vel ramosa, recta vel flexuosa, laevia, septata, cylindrica, hyalina vel subhyalina, ad basim interdum tumida, 43-90 x 4-6 µm. Cellulae conidiogenae enteroblasticae, monophialidicae, terminales, in conidiophoris incorporatae, determinatae, hyalinae, angustatae, ad apicem collo praedita 3-6 µm latae, 34-50 µm longae, ad basim 4-4.5 µm latae, sub apicem 2-2.5 µm latae. Conidia hyalina, continua, stellata, 5-10 µm lata, in capitula globosa apicalia agglutinata.

In coloniis *Appendiculellae calostromatis* in foliis *Rubi moluccani* L., Palen Ck., Queensland, 15 April 1979, J.H. Simmonds, IMI 239528, holotypus; isotypus BRIP 12866.

The fungus forms white patches on the black colonies of the substrate. This association appears to be deleterious to growth and sporulation by the affected colonies of


C
B
D
A
10µm

Appendiculella calostroma. Hyphae sparse, hyaline to subhyaline, septate, branched, superficial on hyphae of the host or internal, smooth, 2-3 µm diam. Conidiophores macronematous, mononematous, unbranched or once-branched near base, straight or flexuous, hyaline to subhyaline, smooth, tapered cylindrical, sometimes swollen to 6-8 µm at the base, 1-4-septate, wall up to 1 µm thick at the base, 43-90 µm long, 4-6 µm diam. Conidiogenous cells monophialidic, integrated, terminal, determinate, hyaline, tapered, with a flared, sometimes recurved collarette, thickened internally at conidiogenous locus, 32-50 µm long, 3.5-5 µm diam. at the basal septum, 2-2.5 µm diam. subapically, and 3-6 µm diam. at the apex. Conidial initials endogenous, becoming semi-endogenous with maturation. Conidia hyaline, unicellular, at first globose with short blunt projections, eventually stellate with typically 6 papillae blunt to more or less acute, 5-10 µm diam.; some conidia elongated, 6-11 x 5-9 µm. The conidia aggregate in globose heads at the tip of the conidiogenous cell, and disperse poorly in lactophenol or lactofuchsin but freely in water.

This fungus resembles *Tuberculispora jamaicensis* Deighton & Pirozynski (1972) which also grows on superficial ascomycetes (Fig. 1, C & D). Conidiogenesis is clearly different, however, being phialidic in *Stellospora* and holoblastic in *Tuberculispora*. In the latter genus conidia are borne on denticles, and conidium secession is rhexolytic in contrast to the schizolytic type seen in *Stellospora*. The denticles of *Tuberculispora* are occluded, a feature not mentioned by Deighton and Pirozynski (1972). There are typically 6 papillae on conidia of *Stellospora*, whereas in *Tuberculispora* there are 8 or more. The association of *Stellospora* with depauperate colonies of *Appendiculella* suggests that it, like *Tuberculispora*, is hyperparasitic. Hyphae are both superficial and internal, and occasionally were observed growing out of a broken host hypha to form a conidiophore. We were unable to ascertain how host hyphae are penetrated.

The genus *Bahusutrabeeja* is superficially similar to *Stellospora*, producing hyaline appendaged conidia from simple phialides (Subramanian & Bhat 1977). It differs in

---

Fig. 1. A,B. *Stellospora appendiculellae*, conidiophores and conidia (from IMI 239528).
C,D. *Tuberculispora jamaicensis*, conidiophores and conidia (from IMI 39266b).

having dematiaceous conidiophores and conidiogenous cells, which may proliferate percurrently, and filiform conidial appendages quite distinct from the conoid projections on conidia of *S. appendiculellae*. In addition the first-formed conidium in *Bahusutrabeeja* is obpyriform, while all others are globose. No such dimorphism occurs in *Stellospora*.

Specimens examined

Stellospora appendiculellae (all on *Appendiculella calostroma*)

Rubus moluccanus, Palen Ck., Qd., 15 April 1979, J.H. Simmonds, IMI 239528 (holotype), BRIP 12866 (isotype; additional material as BRIP 12865); *R. rosifolius* Smith, National Park, New South Wales, Oct. 1934, L.R. Fraser, DAR 2322 (slides as BRIP 13788); *R. rosifolius*, National Park, N.S.W., Nov. 1934, L.R. Fraser, DAR 2330 (BRIP 13789); *R. hillii* F. Muell., National Park, N.S.W., Nov. 1934, L.R. Fraser, DAR 2332 (BRIP 13790); *R. hillii*, National Park 96 km west of Wauchope, N.S.W., May 1983, D. Brown, DAR 44696d (duplicate as BRIP 14046); *R. fraxinifolius* Poir., Amboina, Philippines, July-Nov. 1913, C.B. Robinson 2115, IMI 25485 b.

Tuberculispora jamaicensis

Irenopsis aciculosa (Wint.) F.L. Stev. on *Bastardia viscosa* H.B. & K., road from Quickstem to Balmore Castle, Jamaica, 29 Dec. 1949, E.B. Martyn, IMI 39266 b.

Irenopsis cryptocarpa (Ell. & Mart.) Hansf. on *Gordonia lasianthus* (L.) Ell., Eustis, Lake Co., Fla, U.S.A., 28 May - 15 June 1895, G.V. Nash, *Plants of Florida* No. 1956 (slide, IMI 149075).

We are grateful to Mr J. Walker for lending specimens in DAR.

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MYCOTAXON

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A PHOTOMEMOIR: IMC$_3$, TOKYO, JAPAN, 1983

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No apologies are offered for technique or omissions among these 30 personal selections of my photographs. My hope is to allow an association of names and faces.

1. A. HENSSEN, West Germany
2. E. G. SIMMONS, U.S.A.
3. K. AOSHIMA, Japan
4. K. KATSUMOTO, Japan
5. R. A. SAMSON, Netherlands
6. T. SCHUMACHER, Norway
7. C. V. SUBRAMANIAN, India
8. P. F. CANNON, Great Britain
9. Y. KOBAYASI, Japan
10. H. DISSING, Denmark
11. W. GAMS, Netherlands
12. J. MORAVEC, Czechoslovakia
13. M. A. RIFAI, Indonesia
14. G. L. HENNEBERT, Belgium
15. I. SAITO, Japan
16. Y. OTANI, Japan
17. R.-y. ZHENG, China
18. T. YOKOYAMA, Japan
19. S. J. HUGHES, Canada
20. L. M. KOHN, Canada
21. H. CLEMENÇON, Switzerland
22. O. HILBER, West Hermany
23. D. W. MINTER, Great Britain
24. V. DEMOULIN, Belgium
25. L. R. BATRA, U.S.A.
26. C. BAS, Netherlands
27. A. REIJNDERS, Netherlands
28. J. WEBSTER, Great Britain
29. G. J. SAMUELS, New Zealand
30. R. IMAZEKI, Japan

KEY

1		5	6	7		14	15		22 23 24
2							16 17		
3		8	9	10			18 19		25 26 27
4		11	12	13		20	21		28 29 30

MYCOTAXON

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EAST AFRICAN RUSTS (UREDINALES), MAINLY FROM UGANDA
2. ON CYPERACEAE

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SUMMARY

Eleven rust species on cyperaceous hosts are described. Seven species are described as new, viz. Puccinia morotoensis on Cyperus procerus and P. nabugaboensis on Rhynchospora gracillima ssp. subquadrata from Uganda, Puccinia petitianae on Carex petitiana and Uredo montis-elgonensis on Carex conferta from Kenya, and Puccinia cyperi-cristati on Cyperus cristatus, Uredo caricis-confertae on Carex conferta and U. fuirenae-strictae on Fuirena stricta from Tanzania. Two rust species are new to the flora of Uganda. Some new host species are recorded.

The material presented below is partly collected by myself in the autumn 1970 (cf. Gjærum 1983) and partly picked out from phanerogams preserved in the herbaria of Makerere University, Kampala (MHU) and of University of Oslo (O). The nomenclature of the hosts follows Haines & Lye (1983). My thanks are due to the curators of the said herbaria. I also want to thank Dr. G.B. Cummins, Dept. of Plant Pathology, University of Arizona, Tucson, AZ., U.S.A., for critically reading the manuscript.

Puccinia conclusa Thuem., J. Sci. Math. Phys. Nat. 24:10, 1878.

Syn. P. romagnoliana Maire & Sacc., Annls mycol. 1: 220, 1903.

On Cyperus latifolius Poir.

Masaka Distr., Kalungu Co., 3 km S of W. Mengo Border, 1140 m, 5.6.1971, leg. K.A. Lye (M107), II.

On Cyperus niveus Retz. var. leucocephalus (Kunth) Fosberg (syn. C. obtusiflorus Vahl)

Karamoja Distr., Pian Co., Escarpment S of Kapendongor, 1550 m, 10.6.1970, leg. K.A. Lye (5581) & A.B. Katende, II.

Urediniospores on C. latifolius 20-30 x 14-23 um, obovoid or ellipsoid to broad ellipsoid, wall 2.0-3.0 um

thick, pale to dark cinnamon-brown, echinulate and with 2 equatorial, conspicuous pores. On C. niveus var. leucocephalus the urediniospores are larger than on the other hosts, measuring 29-38 x (21)24-29 um, otherwise they are similar.

P. conclusa, widespread on Cyperus spp. in Africa, in S. Africa also recorded on Ficinia capitaltum Nees, is a new member of the rust flora of Uganda. It has been found on C. latifolius in Malawi, but C. niveus var. leucocephalus seems to be a new host. Outside Africa it is widespread from the Mediterranean region to China and the Philippines.

Puccinia cyperi-cristati n.sp. (Fig. 1).

Uredinia et telia in pagina abaxiali foliorum. Urediniosporae 18-30 x 15-18 um, irregularissimae, angulatae, interdum rhomboideae, obovoideae, ellipsoideae vel subglobosae, parietibus 1-1.5 um crassis, cinnamomeis, echinulatis, poris duobus equatorialibus instructis. Telia paraphysibus, brunneis, epidermidi obtecta. Teliosporae clavatae vel fusiformes, saepe aliquantum curvatae, 43-54 x 12-17 um, parietibus c 1 um crassis, ad apicem usque 7 um incrassatis, pallide brunneis, laevibus, pedicello brevo, pallide brunneo.

Holotype: A. Bjørnstad 1312(0), 31.1.1972, Tanzania, Iringa Distr., Ruaha National Park, 7 km SW of Msembe, 900 m, on Cyperus cristatus (Kunth) Mattf. & Kük. (syn. Kyllinga alba Nees). Isotype in NPPI.

P. cyperi-cristati differs from other Puccinia species described on "Kyllinga" spp. especially in the very irregularly formed urediniospores.

To my knowledge no rust has previously been recorded for this host.

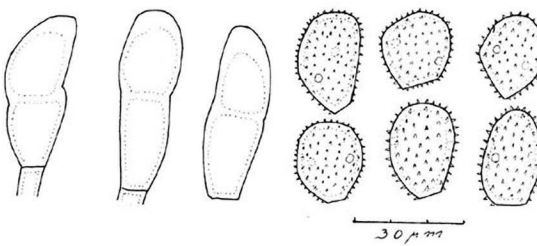

Fig. 1. Puccinia cyperi-cristati. Teliospores and urediniospores from type.

Puccinia cyperi-tagetiformis Kern, Mycologia 11: 138, 1919.
On Cyperus digitatus Roxb. ssp. auricomus (Spreng.) Kük.
Teso Distr., Serere Co., Serere Research Station, 1150 m, leg. Gj. (438), II.
On Cyperus distans L.f.
Bugisu Distr., Central Bugisu Co., near Busano, 1600-1700 m, 21.1.1969, leg. K.A. Lye (1664), II; Ankole Distr., Nyabushozi Co., Ruhengere Research Station, 1300 m, leg. Gj. (126), II, Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (132), II.
On Cyperus esculentus L.
Busoga Distr., Butembe Bunya Co., Jinja, at the Freshwater Fishing Research Station, 1150 m, leg. Gj. (105), II.
On Cyperus fischerianus A. Rich. s.lat. (aff. C. pseudoleptocladus Kük.)
Ethiopia. Shoa Distr., Wondo Gennet, 1800 m, 26.11.1970, leg. Gj., II+III.
On Cyperus longus L.
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 7.1937, leg. Geldart, II.
On Cyperus polystachyos Rottb. ssp. laxiflorus (Benth.) Lye (syn. Pycreus chlorostachos (Boeck.) P. Beauv.)
W. Mengo Distr., Mawokota Co., 3-4 km N of Masaka Border, 1140 m, 1.2.1970, leg. K.A. Lye (5048) & R. Wh. Haines. II.
On Cyperus purpureo-glandulosus Mattf. & Kük. (syn. Kyllinga sphaerocephala Boeck)
W. Mengo Distr., Kyadondo Co., Namulonge, 1180 m, leg. Gj. (93), II, Makerere, 1200 m, leg. Gj. (6), II.
On Cyperus richardii Steud. (syn. Kyllinga macrocephala A. Rich.)
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 7.1937, leg. Geldant, II, 21.11.1969, leg. K.A. Lye (4710), II, leg. Gj. (457), II; Ankole Distr., Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (195), II.
On Cyperus rotundus L.
W. Mengo Distr., Kyadondo Co., Port Bell, 1140 m, Gj. (49) II, Namulonge Research Station, 1180 m, leg. Gj. (91) II, Mpanga Forest, 1150 m, 4.1953, leg. E.M.L., II; Mubende Distr., Singo Co., Kiboga, 1170 m, leg. Gj. (309), II.
On Cyperus spp.
Busoga Distr., Butembe Bunya Co., Jinja, near Freshwater Fishing Research Station, 1150 m, leg. Gj. (106), II; Bunyoro Distr., Bujenje Co., Itutwe Borehole, 1050 m, leg. Gj. (338), II.
Kenya, Kilike, Mwatsuma River E of Mariakani 180 m, leg. 23.6.1971, leg. K.A. Lye & A. B. Katende (6772), II.
On Fuirena leptostachya Oliv.
Masaka Distr., Kalingu Co., 1 km SW of W. Mengo Border, 1140 m, 16.6.1971, leg. K.A. Lye (6620), II.

The specimens discussed here have obovoid or ellipsoid to globoid, cinnamon-brown to dark cinnamon-brown urediniospores, which are slightly thickened, a low hyaline membran, are more distinctly echinulate at apex, and with two equatorial pores. The spore sizes and wall thickness for each host species are given below:

C. digitatus ssp.
auricomus 18-24 x 17-23 um, wall 1.5-2 um
C. distans (14-)16-24 x (12-)14-19 um, wall 1.5-2 um
C. esculentus 17-24 x 16-21 um, wall 1-1.5
C. fischerianus 20-27 x 16-21 um, wall 1-1.5(-2.0) um
C. longus 20-27 x 14-21 um, wall 1-1.5 um
C. polystachos ssp.
laxiflorus 18-22 x 16-21 um, wall (1.5-)2-2.5 um
C. purpureo-
glandulosus 19-27 x 16-21(-25) um, wall 2-2.5 um
C. richardii 16-27(-34) x (12-)14-20 um, wall 1.5-2 um
C. rotundus (14-)16-27 x (12-)14-25 um, wall 1.5-2 um
Fuirena leptostachya
(21-)25-32 x (16-)20-25 um, wall 2-2.5 um

Gjærum (1977) discussed P. cyperi-tagetiformis var. africana Doidge (=P. pegleriana Dodge) and var. madagascariensis Bouriquet & Bassino and found them poorly delimited from the main type.

Kern (loc.cit.) placed Uredo cyperi-tagetiformis Henn. with P. cyperi-tagetiformis while the Sydows (1924) and later Jørstad (1956) placed it with P. cyperi Arth. However, Yen (1973) again placed it with P. cyperi-tagetiformis.

P. cyperi-tagetiformis is a new member of the rust flora of Uganda and Kenya, but it has been reported from other countries both in Eastern Africa (Ethiopia, Mocambique and Madagascar) and West-Africa (Gabon, Guinea, and Ivory Coast). It is widespread in the Americas, and it occurs also in India and China.

C. distans and C. longus are previously reported from Africa as hosts for this rust, while the other hosts mentioned are new. Fuirena leptostachya represents a new host genus.

Puccinia fimbristylidis Arth., Bull. Torrey Bot. Club 33: 28, 1906.
On Fimbristylis miliaceae (L.) Vahl (syn. F. quinquiangularis (Vahl) Kunth)
Kigezi Distr., Queen Elisabeth Park, Katajo, ca 950 m, 6.9.1964, leg. J.W. Lock (636a), II.

Urediniospores (21-)24-27(-31) x (12-)15-22(-25) um, ellipsoid to obovoid, sometimes irregularly angular, wall 1-1.5(-2) um thick, pale cinnamon-brown, echinulate and with 2 superequatorial pores.

P. fimbristylidis was published by Wakefield and Hansford (1949) on F. exilis Roem. & Schult. from Katakwi in Teso. An examination of Hansford's specimen 1632 (IMI) showed that the urediniospores have walls about 3 um thick. This might indicate a misidentification of either host or rust species. Of the rusts occurring on Fimbri-

stylis only the American species P. superior Jacks. has urediniospores with a wall thickness corresponding to those in the Hansford collection (in the diagnosis 3-4 um).

Other rust species with similar urediniospores occurring on Fimbristylis are the Asiatic Puccinia flavipes Syd. and Uromyces kwangsianus Cumm. Ramachar et al. (1978) when describing P. fimbristylidis-ferrugineae with 2 equatorial pores in the urediniospores, considered P. flavipes as a synonym of P. fimbristylidis (cf. also Saccardo 1912).

In Africa F. miliacea is a new host for this rust which inhabits Fibristylis spp. in America (Mexico, West Indies, S. America), Tropical Africa, East Asia and New Guinea.

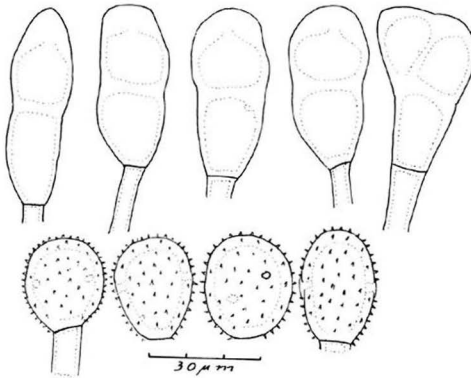

Fig. 2. Puccinia morotoensis. Teliospores and urediniospores from type.

Puccinia morotoensis n.sp. (Fig. 2).
Uredinia et telia in pagina adaxiali foliorum. Urediniosporae 23-34 x 18-26 um, obovoideae, ellipsoideae vel subgloboideae, parietibus 1.5-3 um crassis, cinnamomeis, echinulatis, poris duobus (-tribus) equatorialibus vel superequatorialibus instructis, papillis demissis hyalinis obsitis. Teliosporae 43-54(-63) x 20-25 um, clavatae, ad septum constrictae, parietibus lateralibus 1-1.5 um crassis, ad apicem usque 11 um incrassatis, laevibus, cinnamomeis, ad pedicello flavido dilutis. Teliosporae tricellulares raro.

Holotype: K.A. Lye 5657, A.B. Katende & D. Swinscow (MHU), 11.6.1970, Uganda, Karamoja Distr., Mathenico Co., SE of Sogolomon, Mt. Moroto, 2600 m on Cyperus procerus Rottb. Isotype in NPPI.
Material examined:
On Cyperus dubius Rottb. (syn. Mariscus dubius (Rottb.) Hutch.)
Bugisu Distr., Central Bugisu Co., 2-3 km N of Busoba, 1200 m, 31.5.1969, K.A. Lye (3176) II; Toro Distr., Queen Elisabeth Park, Mweya, main track, 950 m 8.4.1964, U. Lock (510) II.
On Cyperus procerus Rottb. (syn. Mariscus procerus (Rottb.) Hutch.)
Karamoja Distr., Matherrico Co., SE of Sogolomon, Mt. Moroto, 2600 m, 11.6.1970, K.A. Lye (5657), A.B. Katende & D. Swinscow, II + III (type).

In the three specimens listed above, there are a certain variation in thickness of the urediniospore walls. In the uredinospores on C. dubius collected by Lye (3176) the spore walls are on an average thinner and less distinctly echinulate, but the the spine patterns are similar.

On hosts previously ascribed to Mariscus, four species of Puccinia are described. Puccinia hennopsiana Doidge and P. mariscicola Yen have respectively 3-4 and 4-5 pores in the urediniospores. P. subtegulanae Cumm. has telia with paraphyses and smaller urediniospores with two pores, and thinner walls. Uredo marisci Yen also has smaller spores, while in P. marisci-sieberiani Saw. uredinia have paraphyses and spores with 3-4 pores.

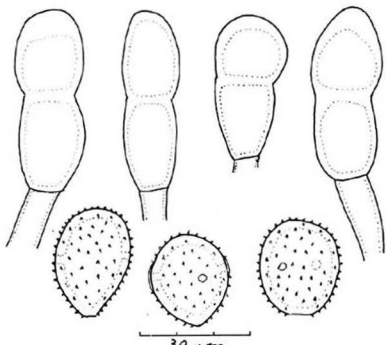

Fig. 3. Puccinia nabugaboensis. Teliospores and urediniospores from type.

Puccinia nabugaboensis n.sp. (Fig. 3).
Uredinea amphigena, ovata, 0.5 mm longa. Urediniosporae 23-28 x 20-28 um, obovoideae, ellipsoideae vel globoideae, parietibus 2.5-3 um crassis, cinnamomeis, echinulatis, poris duobus (-tribus) equatorialibus instructis. Telia uredinia conformes, interdum in uredinis posita. Teliosporae 38-47 x 16-20 um, ellipsoideae vel clavatae, ad apicem rotundatae vel truncatae, ad septum constrictae, facile separatae, parietibus lateralibus 1-1.5 um crassis, ad apicem usque 7 um incrassatis, dilute cinnamomeis, laevibus, pedicello pro longitudine 60 um excedenti, saepe brevi fracto, hyalino, collabenti.
Holotype: K.A. Lye 5011 & R.W.H. Haines (MHU), 1. Febr. 1970, Uganda, Masaka Distr. Buddu Co., 0.5-1 km S of Bake, Lake Nabugabo, 1140 m, on Rhynchospora gracillima Thw. ssp. subquadrata (Cherm.) J. Rayn. Isotype in NPPI.

To my knowledge six Puccinia species are recognized on Rhynchospora, five American and one Asian. Also three Uromyces species, all American, are described on Rhynchospora. The only African rust on this genus is Uredo rhynchospora Henn., described from Kisanthu, Zaire. This species has slightly smaller urediniospores, 18-26 x 15-20 um than has P. nabugaboensis, and with walls only 1.5-2 um thick (Sydow 1924).

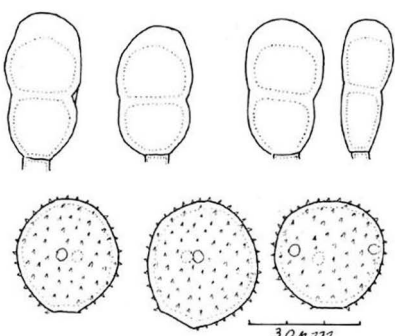

Fig. 4. Puccinia petitianae. Teliospores and urediniospores from type.

Puccinia petitianae n.sp. (Fig. 4).
Uredinia in pagina abaxiali foliorum, ovalia, 0.3 mm longa, brunnea. Urediniosporae subgloboideae vel globoideae, raro late obovoideae, 28-35 x 26-34 um, parietibus 1.5-2 um crassis, fulvis, echinulatis, poris (duobus-) tribus equatorialibus instructis, papillis demissis hyalinis obsitis. Telia in uredinia, pulvinata, fusca. Teliosporae obovoideae, raro clavatae, ad apicem et pedicellum rotundatae, ad septum leniter constrictae, 37-43 x (14-)19-22 um, parietibus cellulae inferioris minus 1 um crassis, in cellulae superioris leniter crassis, ad apicem usque 6.5 um incrassatis, fulvis, laevibus, pedicello hyalino vel fulvo, raro 10 um longiore, persistenti.
Holotype: K.A. Lye 1507 (MHU), 19.1.1969, Kenya, Kitale Distr., Mt. Elgon Region, Northern Mt. Elgon Road, 3000 m, on Carex petitiana A. Rich. (syn. C. fischeri K. Schum. Isotype in NPPI.

Doidge (1939) described Uredo caricis-petitianae on the same host from S. Africa, but the urediniospores are smaller, especially more narrow, and have a thicker wall.

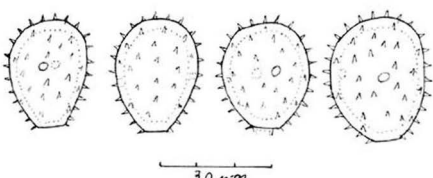

Fig. 5. Uredo caricis-confertae. Urediniospores from type.

Uredo caricis-confertae n.sp. (Fig. 5).
Uredinia amphigena, ovalea, 0.3 mm longa, epidermidi diu tectis, brunnea. Urediniosporae ovoideae vel ellipsoideae, raro angulariae, 25-32 x 19-27 um, parietibus 1.5-2.5 um crassis, fulvis, echinulatis, poris duobus equatorialibus instructis, papillis demissis hyalinis obsitis.
Holotype: K.A. Lye and A.B. Katende 4835 (MHU), 12.1.1970, Tanzania, Moshi Distr., Mt. Kilimajaro, near Lemosho gladea on Carex conferta A. Rich. Isotype in NPPI.

To my knowledge only four rust species are previously reported on Carex spp. from Africa, and none of them correspond to the species described above. Puccinia dioicae Magn. has superequatorial pores in the urediniospores while P. caricina DC. has 3-4, occasionally 2 pores. P. caricis-cernuae Doidge has smaller urediniospores with obscure pores. More narrow urediniospores have Uredo caricis-petitianae Doidge, and they also have 2-3 pores while U. caricis-confertae has

only 2. P. petitianae described in this paper has larger urediniospores with mostly 3 pores.

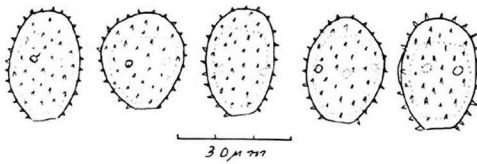

Fig. 6. Uredo fuirenae-strictae. Urediniospores from type.

Uredo fuirenae-strictae n.sp. (Fig. 6).
Uredinia in pagina adaxiali foliorum. Urediniosporae 30-38 x (21-) 24-31 um, obovoideae, parietibus 1.5-2 um crassis, ad apicem usque 9 um incrassatis, aureo-brunneis, echinulatis, poris duobus-tribus equatorialibus instructis.
Holotype: R.W. Haines 4115 (MHU), Kenya, Narasha Lake, near Timboroa, 2100 m, 13.4.1966, on Fuirena stricta Steud. ssp. chlorocarpa (Ridl.) Lye. Isotype in NPPI.
Material examined:
On Fuirena stricta Steud. ssp. chlorocarpa (Ridl.) Lye Kenya. Narasha Lake, near Timboroa, 2100 m, 13.4.1966, R.W. Haines (4115), II (type).
Tanzania. Iringa Distr., Ruaha National Park, 2.5 km SSW of Magangwe Ranger Post, 1370 m, 20.12.1972, A. Bjørnstad (2198), II.

The Tanzanian specimen has slightly smaller spores than has the type specimen (27-34 x 20-25 um), but they are otherwise similar.

U. fuirenae-stricta differs from P. fuirenae Cke. which urediniospores are more narrow, from P. fuirenae-pubescentis Maire which urediniospores have 1-2 pores, on the drawing shown to be more superequatorial, from P. fuirenella Doidge in having thinner urediniospore walls with 2 pores and from P. fuirenicola Arth. which has thicker urediniospore walls. Viennot-Bourgin (1953) indicated that P. fuirenae-pubescentis and P. fuirenicola are conspecific.

Uredo montis-elgonensis n.sp. (Fig. 7).
Uredinia amphigena, ovalia, 0.3-0.5 mm longa, brunnea. Urediniosporae obovoideae, 28-34 x 21-24 um, parietibus 2.5-3.5 um crassis, castaneo-brunneis, echinulatis, poris duobus equatorialibus instructis.
Holotype: A.C. Hamilton (MHU), 19.12.1966, Kenya. Mt. Elgon, ca 3500 m, on Carex conferta A. Rich. Isotype In NPPI.

This species differs from uredo caricis-confertae in having spores with thicker and darker coloured walls.

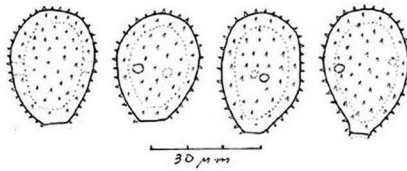

Fig. 7. Uredo montis-elgonensis. Urediniospores from type.

Uromyces notabilis Wakefield in Wakefield & Hansford, Proc. Linn. Soc. Lond., Sess. 161, 1948-49: 173, 1949.
On Cyperus brevifolius (Rottb.) Hassk. ssp. intricatus (Chern.) Lye (syn. Kyllinga brevifolia Rottb.)
W. Mengo Distr., Kyadondo Co., Kazi, 1140 m, Gj. (63), II.
On Cyperus sesquiflorus (Torr.) Mattf. & Kük. ssp. cylindricus (Nees) Koyama (syn. Kyllinga cylindrica Nees)
Bunyoro Distr., Bujenje Co., Budongo Forest 1050-1100 m, 16.5.1969, R.W. Haines (4521), II.
On Cyperus sesquiflorus (Torr.) Mattf. & Kük. ssp. appendiculatus (K. Schum.) Lye (syn. Kyllinga odorata Vahl var. major (C.B. Cl.) Chiov.)
Sebei Distr., Sebei Co., near Kapkwata, 2100 m, 20.1.1969, leg. K.A. Lye (1588), II.
On Cyperus purpureo-glandulosus Mattf. & Kük. (syn. Kyllinga sphaerochepala Boeck.)
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, Gj. (2), II; Mubende Distr., Buwekula Co., Mubende Hill, 1350 m, Gj. (498), II.

Urediniospores 18-29 x 14-21 um, ellipsoid to obovoid or subgloboid, wall 1 um thick, hyaline to pale cinnamon-brown, echinulate and with 2 equatorial pores, often obscure.

On Cyperus aromaticus (Ridl.) Mattf. & Kük. (syn. Kyllinga polyphylla Kunth)
Kigezi Distr., Queen Elizabeth National Park, Ishasha Camp, 980 m, 2.6.1970, K.A. Lye (5513) & A.B. Katende, II, and 0.5 km S of Kaizi River, 950 m, 2.6.1970, K.A. Lye (5518), II.

These two specimens are placed within U. notabilis, but they have larger urediniospores, (20-)23-32(-35) x 15-27(-29) um with a wall 1-1.5 um thick, thus approching U. loculatus Cumm., described on Kyllinga sp. from Zambia. However, these two rust species might be difficult to separate when only uredinia are present.

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EAST AFRICAN RUSTS (UREDINALES), MAINLY FROM UGANDA 3. ON AMARYLLIDACEAE, COMMELINACEAE, IRIDACEAE, JUNCACEAE, LILIACEAE, ORCHIDACEAE AND XYRIDACEAE

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SUMMARY

Twelve rust species on monocotyledonous host families are recorded. Uredo kabanyoloensis on Asparagus officinalis and Uromyces eulophiae on Eulophia paivaeana ssp. borealis from Uganda and Uromyces dipcadi on Dipcadi viride from Kenya are described as new. Uredo xyridis, a new member of the African rust flora, is reported from Uganda. The other species or stages are either new to Uganda or have been found on new hosts. Physopella tecta is new to Tanzania.

The material presented below originate mainly from the same sources as in Part 1 (Gjærum 1983) and Part 2 of this series of papers on East African rust fungi. I thank the curators of the herbaria mentioned in the text for lending me material for identification and for comparison. Dr. G.B. Cummins, Dept. of Plant Pathology, University of Arizona, Tucson, AZ, U.S.A., has read the manuscript critically and for which I am most grateful.

Aecidium hartwegiae Thuem. Flora 60: 411, 1877.
Syn. A. crini Kalchbr. Grevillea 19: 26, 1882.
On Ammocharis tinneana (Klotchy & Peyr.) Milne-Redh. & Schweick (syn. Crinum tinneanum Klotchy & Peyr.) (Amaryllidaceae)
Ankole Distr., Nyabushozi Co., 3 km SW of Kyibega, 1250 m, 21.4.1970, leg. K.A. Lye (M15), 0 + I.
Tanzania. Iringa Distr., Ruaha National Park, 0.5 km W of Ibuguziwa 29.12.1970, leg. I. Bjørnstad (389), 0 + I.
Pycnia in groups on the adaxial side of the leaves. Aecia on abaxial, rarely on the adaxial side of the leaves, densely aggregated. Peridia short, cupshaped. Aeciospores 18-26(-29) x (14-)16-24 um, ellipsoid or subgloboid, often angular. Wall about 1 um thick, hyaline, finely verrucose and with obscure, scattered pores.

This aecial stage has been reported as A. crini on several Crinum spp. from several African countries, but it is new to Uganda. The host represents a new genus. Outside Africa it is reported from India and Nepal. Patil & Thirumalachar (1969) proved that aecia on Crinum latifolium L. belonged to the graminicolous rust Uromyces clignyi Pat. & Har., and they made A. crini synonymous with A. hartwegiae.

Aecidium ornithogaleum Bub. Annls mycol. 3:223, 1905.
On Ornithogalum echlonii Schlecht. (Liliaceae)
Masaka Distr., Buddu Co., Mile 70 on road from Masaka to Mbarara, 1400 m, leg. Gj. (296), 0 + I; Kigezi Distr., Rubanda Co, Muko Research Station, 1300 m, leg. Gj. (117), 0 + I.

Pycnia on the adaxial side of the leaf, 130 µm wide, 180 µm deep. Aecia in clusters, abaxial. Peridium cupshaped, white. Aeciospores 17-23 x 16-19 µm, angularly globoid, ellipsoid, wall less than 1 µm thick, hyaline, finely verrucose with obscure, scattered pores.

The aecial stage on Ornithogalum spp. is widespread in Europe, and it is also reported from Morocco, S. Africa (on O. echlonii) and U.S.A. Tranzschel (1914) proved that this aecial stage belongs to P. hordei Otth. This stage is new to the flora of Uganda.

Physopella tecta (Jacks. & Holw.) Azbukina. Novit. systen. plant. non vasc. 7: 223, 1970.

Syn. Phakopsora tecta Jacks. & Holw. in Jackson, Mycologia 18: 148, 1926.
On Commelina africana L. var. lanciespatha C.B. Cl. (Commelinaceae)
Tanzania. Iringa Distr. Ruaha Nat. Park, at the foot of Magangwe Hill, 1450 m, 10.5.1972, leg. A. Bjørnstad (1748), II + III.
On Commelina zambesica C.B. Cl.
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, leg. Gj. (14), II, Busiro Co., Entebbe, 1150 m, leg. Gj. (36), II.

Uredinia with hyaline or yellowish paraphyses, thickened dorsally and at apex. Urediniospores 19-28 x 14-26 µm, ellipsoid or subgloboid, wall ca 1 µm thick, pale yellowish, echinulate.

P. tecta is widespread in Asia, Central- and South America, occurring on several genera belonging to Commelinaceae, but it seems to be rare in Africa. The only record known to me from the continent is one by Angus (1962) who reported the rust on C. ? buchananii C.B. Cl. from Zambia. Both hosts mentioned above are new to this rust.

Puccinia obscura Schroet. in Pass., N. Giorn. Bot. Ital. 9: 256, 1877.
On Luzula abyssinica Parl. (Juncaceae)
Toro Distr., Mt. Ruwenzori Co., between Bujuki Hut and Irene Lake Hut, 4300 m, 1.1.1969, leg. K.A. Lye (1309), II.

Urediniospores 23-27 x (16-)18-24 µm, mostly obovoid, wall 1.5-2 µm thick, cinnamon-brown, echinulate and with 2 superequatorial pores.

This rust species, widespread in Europe and also in Asia and North America on several Luzula spp., has been reported on L. graeca Kunth in Morocco and Algerie where also its aecial stage has been found on Bellis sylvestris Cyr. and Senecio perralderimus Coss. & Dur. It is a new member of the Ugandan rust flora and L. abyssinica is a new host for the rust.

Puccinia phyllocladiae Cke. Grevillea 10: 125, 1882.
On Asparagus falcatus L. (Liliaceae)
Ankole Distr., Co., Ruizi Valley, 1440 m, 9.2.1951, leg. T. Jarrett (Ug/MB/460), III.

Two-celled teliospores 54-59 x 47-52 µm, broadly ellipsoid, one-celled spores 49-52 x 44-47 µm, subgloboid. Wall pale 3-4(-5) µm thick, sometimes slightly thickened at apex, smooth. Pedicel more than 110 µm long, hyaline, thinwalled, collapsing, often attached obliquely to the lower cell.

P. phyllocladiae is a new rust species in Uganda. On A. falcatus it has previously been reported from South Africa and Sri Lanka. Other African hosts are A. sarmentosus L. in S. Africa and Asparagus sp. in Kenya. This rust is reported on Asparagus spp. in India and Pakistan.

Puccinia smilacis-kraussianae Yen. Rev. Mycol. 36: 109, 1971.
On Smilax kraussiana Meisn. (Liliaceae)
Masaka Distr., Buddu Co., Nabugabo, 1000 m, no date, Lind. III. W. Mengo distr., Busiro Co., W. Kisubi Bay, 1100 m, no date, M.E.S. Morrison. O+I.

Pycnia amphigenous (type 4), surrounded by hemisphaerical aecia, covered by epidermis. The peridia have an opening at the top through which the irregularly and ellipsoid, laminate spores escape. Spores 25-41 x (16-)23-30 µm. Wall unevenly thick, apically up to 11 µm, pale yellow to pale brown, coarsely and sparsely echinulate, but with smooth spots and with 2-4 more or less distinct pores. Uredinia not seen. Telia hypophyllous, scattered, compact, surrounded by epidermis, brown. Teliospores ellipsoid, slightly constricted at septum, 50-64 x 17-23 µm. Wall 2-2.5 µm thick, at apex thickened to 8 µm. Pedicel nearly hyalin, thickwalled, perisitent, length exceeding 100 µm.

Two rust species are described on Smilax kraussiana viz. Puccinia kraussiana Cke. and P. smilacis-kraussianae, the forner an eu- form, the latter an opsis- or demicyclic form, lacking the uredinia. However, what Yen has named uredinia, I have named aecia as pycnia are supposed to preceed either aecia or telia, and not uredinia. The peridia are not protruding the epidermis, but except for the small opening at the top, covered by it. The aecial cavities are filed with spores, developed from the base of the aecia.

Uredo kabanyoloensis n. sp. (Fig. 1).

Uredinia pedicellata perdurante epidermidi obtecta, ovalia, pallide cinnamomea. Urediniosporae 20-31 x 15-18 um obovoideae vel ellipsoideae, parietibus 1-1.5 um crassis, cinnamomeis, dense echinulatis, 3-4 poris equatorialibus instructis, papillis demissis hyalinis obsitus.

Holotype: A. Beisland (MHU) Uganda, W. Mengo Distr., Kabanyolo, 1200 m, 13.11.1970, on Asparagus officinalis L. (cult.) (Liliaceae). Isotype in NPPI.

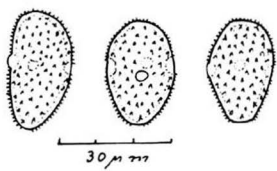

Fig. 1. Uredo kabanyoloensis, urediniospores from type.

The urediniospores of this new species differ from those of Puccinia asparagi DC. being more narrow, having a thinner wall which is not so pigmented, and not so densely echinulate. It has also a thinner urediniospore wall than has Puccinia asparagi-lucidi Diet.

Uredo xyridis E.B. Mains. Contrib. Univ. Michigan Herb. 1: 17, 1939.
On Xyris angularis N.E. Br. (Xyridaceae)
Masaka Distr., Bukoto Co., Makonzi - Kasala in Jubiya Forest, 1140 m, 12.8.1971, K.A. Lye & A.B. Katende, II.

Uredinia hypophyllous, subepidermal, long covered by epidermis. Urediniospores raising from a stroma, subgloboid or abovoid, 27-33 x 20-27 um. Wall 1.5 um thick, hyalin, echinulate and with several scattered pores.

The only record of this rust is from Vaquero in Belize. The urediniospores in the African specimen match well with those from the type specimen (IMI 67641).

Uromyces commelinae Cke. Trans. Roy. Soc. Edinb. p. 342, 1887.
On Aneilema spekei C.B. Cl. (Commelinaceae)
Masaka Distr., Buddu Co, Kasokero, Lake Victoria, 1140 m, 12.5.1969, leg. K.A. Lye (2925), R.N. Lester & M. Morrison, II.

On Commelina benghalensis L. (Commelinaceae)
W. Mengo Distr., Busiro Co., Entebbe, 1150 m, leg. Gj. (31) II.
On Commelina congesta C.B. Cl.
Ankole Distr., Bunyaruguru Co., Kalinzu Forest, 1400 m, leg. Gj. (139), II.
On Commelina erecta L.
Kenya. Eastern Prov., Nyeri Distr., Mt. Kenya S slope, Regati Forest Station, 2200-2300 m, 2-3.2.1973, leg. L. Ryvarden (9116), II.
On Commelina reptans Brenan
Distr. Ankole, Co., Ruizi River, c. 1350 m, leg. T. Jarrett (MB/501), II.
On Commelina zambesica C.B. Cl.
W. Mengo Distr., Busiro Co., Kisibawo, 1200 m, leg. Gj., (188), II; Tororo Distr., W. Bugama Co., on the Jinja-Tororo road, 17 km W of Tororo, 1200 m, leg. Gj. (422), II.
On Cyanotis aff. foecunda Hassk. (Commelinaceae)
W. Mengo Distr., Kyadondo Co., Kazi, 1160 m, 7.9.1970, leg. Gj. (64), II.
On Cyanotis longifolia Benth.
Mubende Distr., Singo Co., Hoima Road, Mile 112 from Kampala, 1400 m, leg. Gj. (322) II; Bunyoro Distr., Bujenje Co., Bukumi Escarpment, 1000 m, leg. Gj. (346) (II+) III.
On Murdannia simplex (Vahl) Brenan (Commelinaceae)
W. Mengo Distr., Kyadondo Co., Kazi, 1160 m, leg. Gj. (52), II, Busiro Co., Zika Forest, 1160 m, leg. Gj. (73), II.

Urediniospores 20-40 x 18-35 µm, obovoid, ellipsoid to globoid, wall 1.5-2.5(-3) µm thick, pale cinnamon-brown to cinnamon-brown, echinulate and with two mostly conspicus, equatorial pores covered by low, hyaline papillae. Telio-spores 20-35 x 21-27 µm, ellipsoid, attenuate at apex, wall at side 2-2.5 µm thick, at apex thickened up to 16 µm, cinnamon-brown, smooth. Pedicel hyaline, collapsing, up to 50 µm long, but often broken shorter.

U. commelinae is widespread in Africa, and also in warmer regions of Asia, Australia and America, and it is recorded on several genera belonging to Commelinaceae. Wakefield & Hansford (1949) who reported it on Commelina spp., said that the rust is common everywhere in Uganda. Aneilema, Cyanotis and Murdannia are new genera for the rust in Uganda, and Commelina congesta, C. reptans and C. zambesica and the two Cyanotis species are new host species for the rust. On Aneilema spekei and Murdannia simplex it is reported from Malawi and India, respectively. Commelina erecta is reported as a host in U.S.A., while C. benghalensis has been reported from several African countries.

In India Patil & Thirumalachar (1968) showed that U. commelinae produces pycnia and aecia on Cissus and Vitis, but there seems to be specialized forms.

Aecidia on Cissus and Vitis are described under several names. From Uganda Wakefield & Hansford (op.cit.) reported Aecidium vitis Smith on Cissus sp. Patil & Thirumalachar (op.cit.) stated that this aecial stage (A. vitis) it "not very distinct from A. mexicanum" Diet. & Holw. Cummins (1963) reported on uredinia on Commelina elegans H.B.K. after inoculation experiments carried out by E.C. Heinrich with aeciospores of A. mexicanum on Cissus. To my knowledge such experiments have not been carried out in Africa.

Uromyces dipcadi n.sp. (Fig. 2).
Pycnia, aecia et uredinea non visa. Telia amphigena, dense aggregata, epidermidi diu obtecta, demum nuda, pulverulenta, cinnamomea. Teliosporae irregulariter angulatae vel ellipsoideae, ovoideae vel obovoideae, 23-34 x 19-30 µm, parietibus in eadem spora irregulariter crassis (1.5-) 2-4 µm, laevis, brunneis, pedicello usque ad 20 µm longo, hyalino, persistenti.

Holotype: M. Thulin 2689 (UPS), 9.-10.5.1978, Kenya, Mandera Distr., 48 km on the Ramu - El Wak road, 650-900 m on Dipcadi viride (L.) Moenck (Liliaceae). Isotype in NPPI.

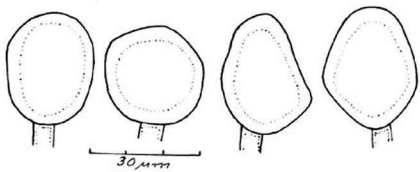

Fig. 2. Uromyces dipcadi, teliospores from type.

U. dipcadi differs from U. maireanus P. & H. Syd. in having wider teliospores with thicker walls which thickness also varies in the same spore. U. maireanus has a full life cycle, while in U. dipcadi only telia are known. U. dipcadi also differs from U. muscari (Duby) Lév. (syn. U. scillarum (Grev.) Lév.) reported on Dipcadi, in having thinner teliospore walls. However, teliospores of U. maireanus and U. muscari are very similar and may have been confused if only telia are present (cf. Jørstad 1958).

Doidge (1948) described Aecidium dipcadi-viridi on Dipcadi from S. Africa.

In some leaves the fungus forms several long patches with telia indicating a systemic habit.

Uromyces eulophiae n.sp. (Fig. 3)

Pycnia non visa. Aecia amphigena, dispersa vel laxe aggregata. Aeciosporae 15-24 x 11-19 µm, irregulariter angulatae, ellipsoideae, parietibus ca 1 µm crassis, ad apicem usque ad 4.5 µm incrassatis, hyalinis, dense verrucosis. Uredinia non visa. Telia irregulariter rotundata, usque ad 2 mm diam., epidermidi obtecta, compacta, atrobrunnea. Teliosporae 31-38 x 23-27 µm late ellipsoideae vel obovoideae, apice rotundatae, parietibus 1.5-2 µm crassis, laevis, ad apicem usque ad 13 µm incrassatis, cinnamoneis, apice extus pallidior, pedicello prope sporam pallide brunneo, aliter hyalino.

Holotype: K.A. Lye 2286 (MHU), 5.3.1969, Uganda, Kigezi Distr., Bufumbira Co., Cyanika, on Ruanda Border, 2000 m on Eulophia paivaeana (Reichb. f.) Summerh. ssp. borealis Summerh. (Orchidaceae). Isotype in NPPI.

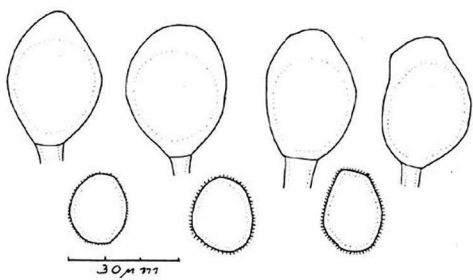

Fig. 3. Uromyces eulophiae, teliospores and aeciospores from type.

The only rust species known on Eulophia is Puccinia humationis Cumm., described on E. squalida Lindl. from the Philippines.

Uromyces transversalis Wint. Flora 42: 263, 1884.
Syn. Uredo transversalis Thuem. Flora: 570, 1876.
On Gladiolus c.v. 'Carmen' (Iridaceae)
W. Mengo Distr., Kyadondo Co., Kabanyolo, 1200 m, 12.5.1972,leg. O.M. Heide, II.
On Gladiolus psittacinus Hook.
W. Mengo Distr., Kyadondo Co., Makerere, 1200 m, 27.7.1971, leg. O.M. Heide, II, Kabanyolo 1200 m, 11.1959, leg. F. Katete, II; Bugizu Distr., N. Bugisu Co., Mt.

Elgon, near Sasa River on the track to Sasa Hut, 2800 m, leg. Gj. (364), II + III.

Urediniospores 16-25 x 14-21 µm, ovoid, ellipsoid to subgloboid, wall 1.5 µm thick, hyaline, echinulate with scattered pores. Telia loculate by brown paraphyses, irregularly angular, obovoid, ellipsoid, wall 1-1.5 µm thick, at apex thickened up to 5 µm, pale brown, smooth. Pedicel hyaline, collapsing.

This rust, reported on Gladiolus sp. from Mt. Elgon by Wakefield & Hansford (1949), is widespread in Africa not only on Gladiolus, but also on several other genera belonging to Iridaceae. On cuttings and cut flowers it has been found in Europe. G. psittacinus has been recorded as a host in Kenya and South Africa.

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NEW SPECIES OF XANTHOPARMELIA (VAIN.) HALE (ASCOMYCOTINA: PARMELIACEAE)

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Abstract.--Eight new species of Xanthoparmelia are described: X. californica, X. isidiascens, X. kalbii, X. montanensis, X. neocongruens, X. neotaractica, X. schmidtii, and X. subpigmentosa. New combinations in the genus are proposed for Parmelia barbellata Kurok., P. exuviata Kurok., P. globulifera Kurok. & Filson, P. luminosa Elix, P. metastrigosa Elix, P. multipartita (R. Br.) Elix, P. refringens Kurok. & Filson, P. subcrustacea Gyel., and P. sulcifera Kurok.

Xanthoparmelia californica Hale, sp. nov. Fig. 1

Thallus affinis X. lineolae (Berry) Hale sed acidum norsticticum continente differens.

Thallus closely adnate on rock, yellowish green, 4-6 cm broad; lobes short and irregularly branched, crowded, 1-2 mm wide; upper surface plane, shiny, emaculate, lacking isidia; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia numerous, 90-110 μm in diameter; microconidia cylindrical, 4-5 μm long. Apothecia adnate, 1.5-2.0 mm in diameter; hymenium 45 μm high; spores simple, colorless, 4-5 X 8-9 μm.

Chemistry: Usnic, norstictic and connorstictic acids.

Type: Entrance to Folsom Prison, Folsom, Sacramento County, California, elev. 100 m, Elmer A. Schmidt 464, 22 March 1980 (US, holotype).

Specimens examined. CALIFORNIA: Figueroa Mountain, Santa Barbara County, Cole 1547 (US). ARIZONA: Douglas Spring, Pima County, McCune 10243 (US). TEXAS: Llano, Llano County, Fisher 42232 (US).

This rare species would be identified as a small X. lineola without a chemical test (X. lineola contains salazinic acid). There is only one other Xanthoparmelia in North America with norstictic acid, X. dierythra (Hale) Hale, distinguised by broader lobes, a very pale lower surface, and isidia. It is probably unrelated.

Xanthoparmelia isidiascens Hale, sp. nov. Fig. 2

Thallus affinis X. conspersae (Ach.) Hale sed lobis linearibus, laxe adnatis differens.

Thallus loosely attached on rock, yellowish green, 6-13 cm broad; lobes sublinear, 2-5 mm wide; upper surface plane, continuous, emaculate, sparsely to moderately isidiate, the isidia short branched with age, 0.08-

0.1 mm in diameter, to 1.0 mm high; lower surface black, except brown in a marginal rim, sparsely to moderately rhizinate, the rhizines black.

Pycnidia numerous, 100-120 µm in diameter; microconidia cylindrical to weakly bifusiform, 5-6 µm long. Apothecia common, adnate, 3-6 mm in diameter; hymenium 55-60 µm high; spores simple, colorless, 5-6 X 7-9 µm.

Chemistry: Usnic, stictic, constictic, and norstictic acids.

Type: West side of Tallapoosa River, near Blake's Ferry, Randolph County, Alabama, R. McVaugh 4588 (US, holotype).

Specimens examined. MARYLAND: Baltimore County, Plitt H.R.1 (US). VIRGINIA: Albemarle County, Luttrell & Goldstein 3162 (US); Chesterfield County, Luttrell 1502, 1548 (US); Henrico County, Luttrell 99 (US). NORTH CAROLINA: Alexander County, Keever 420 (US). TENNESSEE: Roane County, Spector TL-731 (US). GEORGIA: Columbia County, McVaugh 4661 (US); Greene County, McVaugh 4670, Pyron & McVaugh s.n. (US); Hancock County, McVaugh 4690 (US); Heard County, McVaugh 4606 (US); Oglethorpe County, McVaugh 4600, Pyron & McVaugh s.n. (US); Putnam County, McVaugh 4680 (US); Walton County, McVaugh 2038 (US). ARKANSAS: Searcy County, Emig 2066 (US). INDIANA: Crawford County, Deam 51607 (US). MISSOURI: Franklin County, Berry 649 (US); Iron County, Hubricht B2296 (US); Montgomery County, Darker 7471 (US).

This species is widespread and apparently confined on open sandstone and granite outcrops in southeastern U.S.A. It differs from X. conspersa in overall growth form, being larger and more loosely adnate with long linear lobes. On the world level there are no comparable species with stictic acid.

Xanthoparmelia kalbii Hale, sp. nov. Fig. 3

Thallus ut in X. plittii (Gyel.) Hale sed isidiis globosis et acidum hypostictícum atque hyposalazinicum continente differens.

Thallus closely adnate on rock, bright yellow green, 3-4 cm broad; lobes sublinear but crowded and contiguous, 1.5-2.0 mm wide; upper surface plane, transversely cracked with age, emaculate, sparsely to moderately isidiate, the isidia basally constricted, somewhat inflated, eroding and subsorediate apically with age, 0.08-0.2 mm in diameter, up to 0.5 mm high; lower surface pale brown, moderately rhizinate, the rhizines pale brown.

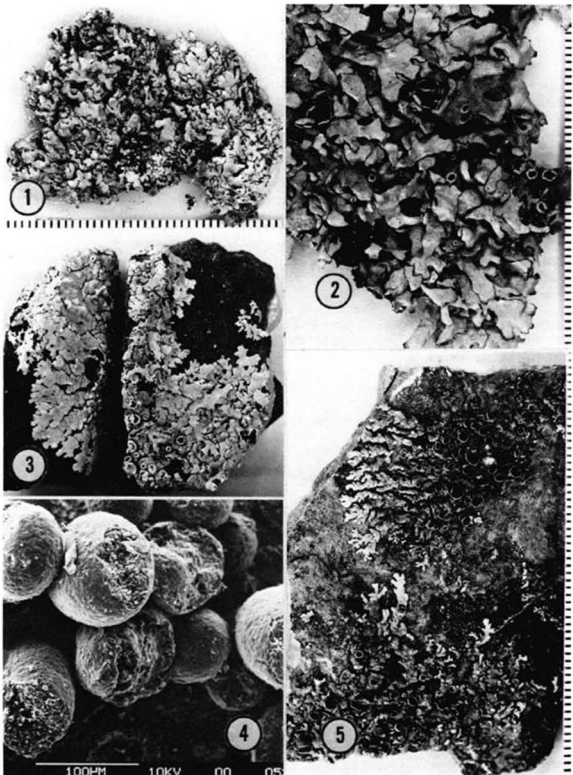
Pycnidia numerous, 100-110 µm in diameter; microconidia cylindrical to weakly bifusiform, 5-6 µm long. Apothecia numerous, adnate, 1-1.3 mm in diameter; hymenium 50-55 µm high; spores simple, colorless, 6 X 10-11 µm.

Chemistry: Usnic, hypostictic and hyposalazinic acids with an additional "quintaria" substance.

Type: Catimbal-Pe, Pernambuco, Brazil, Lauro Xavier 754 (US, holotype).

Specimens examined. BRAZIL: 10 km vor Milagres, Bahia, K. Kalb 296, 21.7.1980 (Herb. Kalb, US).

Globose isidia are rare in Xanthoparmelia. In X. kalbii they are rather delicate and some burst open (Fig. 4). Similar isidia are known in several Australian species, X. exuviata (Kurok.) Hale*, X. globulifera (Kurok. & Fils.) Hale*, and X. refringens (Kurok.) Hale* [formal new combinations for these and other species mentioned below with asterisks will be given at the end of this paper]. An equally unusual character is the "quintaria" chemistry, previously unknown in South America, and as a matter of fact X. kalbii is the only known isidiate Xanthoparmelia with this chemistry. All others (X. metastrigosa (Elix) Hale,* X. multipartita (R. Br.) Hale,* X. quintaria (Hale) Hale, X. subcrustacea (Gyel.) Hale,* and X. sulcifera (Kurok.) Hale*) are nonisidiate. The species is named in



Figs. 1-5. Type specimens of Xanthoparmelia. 1, X. californica; 2, X. isidiascens; 3, X. kalbii; 4, isidia of X. kalbii (SEM); 5, X. montanensis (all holotypes in US) (scale in mm).

honor of Dr. Klaus Kalb, the first professional lichenologist to collect extensively in Brazil since G. A. Malme in the 1890's.

Xanthoparmelia montanensis Hale, sp. nov. Fig. 5

Differt ab X. lineola (Berry) Hale acidum lichesterinicum continente.

Thallus closely adnate on rock, dull yellowish green, 3-6 cm broad; lobes short and irregularly branched, crowded, 1-1.5 mm wide; upper surface dull to shiny, plane to minutely rugulose, emaculate, becoming short laciniate at the center with age; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia rare, microconidia not found. Apothecia numerous, adnate, the disc plane, dark brown, 1-3 mm in diameter; hymenium 45-50 µm high; spores simple, colorless, 5-6 X 9-11 µm.

Chemistry: Usnic and a fatty acid near lichesterinic acid.

Type: Near Kootenai Falls, 6 mi E of Troy, Lincoln County, Montana, B. McCune 8863, 9-5-1977 (US, holotype).

Specimens examined. MONTANA: Lincoln County, McCune 7833 (US). CALIFORNIA: Plumas County, Hale 57615 (US); Tulare County, Hale 57075 (US). UTAH: Beaver County, Hale 51288, 51310 (US). ARIZONA: Coconino County, Hale 33585, 33589 (US).

This western U. S. species is superficially close to X. lineola but with somewhat more linear, closely adnate lobes. The chemistry is unique, for no other species in the genus contain lichesterinic acid. Almost all other fatty acid-containing Xanthoparmelias, including X. subdecipiens (Vainio) Hale in North America, contain constipatic acid or derivatives. I am grateful to Dr. Chicita Culberson for identification of the chemistry.

Xanthoparmelia neocongruens Hale, sp. nov. Fig. 6

Thallus subaffinis X. molliusculae (Ach.) Hale sed isidiis nullis et acidum hypoprotocetraricum continente differt.

Thallus loosely adnate on soil, bright yellowish green, leathery, 4 cm broad; lobes sublinear, irregularly branched and weakly convoluted, 2-5 mm wide; upper surface dull, plane to rather rugulose with age, emaculate, isidia lacking; lower surface light brown, moderately rhizinate, the rhizines pale brown.

Pycnidia numerous, about 100 µm in diameter; microconidia 4-5 µm long, bifusiform. Apothecia imperfectly developed; spores not seen.

Chemistry: Usnic, hypoprotocetraric and 4-O-methylnotatic acids.

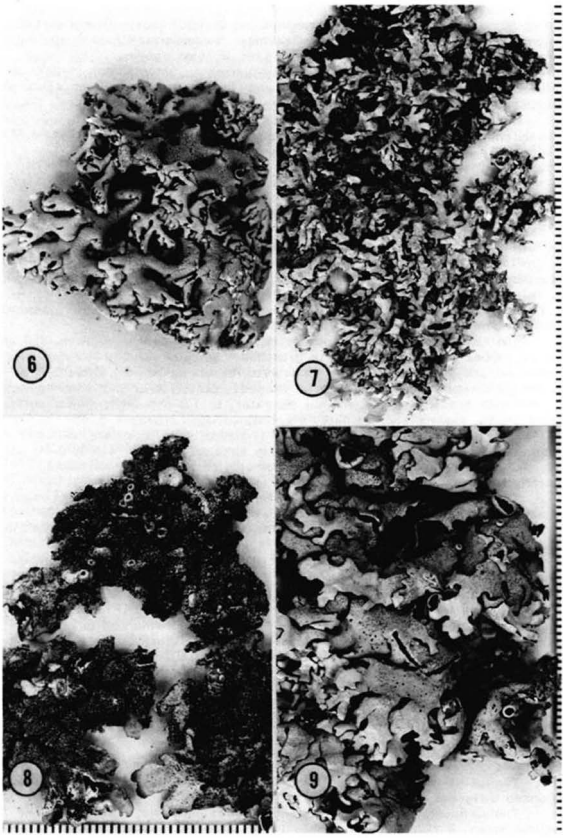
Type: Bowe's Dorp, near Kamieskroon, Namaqualand, Republic of South Africa, T. P. Stokoe 7719, September 1941 (BOL, holotype; US, isotype).

While known only from a single collection, X. neocongruens is well distinguished by the combination of chemistry and morphology. No other species with hypoprotocetraric acid are loosely adnate and grow on soil. An apparent isotype of Parmelia congruens Ach. in UPS, which lacks any specific label data, is this same species. However, the protologue of P. congruens mentions a corticolous lichen from Pennsylvania, the identity of which is still unknown today. Nylander (Syn. Lich. p. 392, 1860) also examined "type material" which he recognized as close to Parmelia conspersa, "laciniis saepius convexiusculis differens."

Xanthoparmelia neotaractica Hale, sp. nov. Fig. 7

Thallus affinis X. taracticae (Krempih.) Hale sed differens acidum sticticum continente.

Thallus loosely attached on rock, yellowish green, 5-8 cm broad;



Figs. 6-9. Type specimens of Xanthoparmelia. 6, X. neocongruens (isotype in US); 7, X. neotaractica (US); 8, X. schmidtii (US); 9, X. subpigmentosa (isotype in US) (scale in mm).

lobes sublinear and divaricate-branched, 1-2 mm wide; upper surface plane, continuous, emaculate, isidia lacking; lower surface pale or darker brown, sparsely to moderately rhizinate, the rhizines brown.

Pycnidia numerous, 120-150 μm in diameter; microconidia cylindrical, 5-6 μm long. Apothecia rare, about 3 mm in diameter; hymenium 45-50 μm high; spores simple, colorless, 5-6 X 8-9 μm.

Chemistry: Usnic, stictic, constictic and norstictic acids.

Type: Albert Pike Recreation Area, Montgomery County, Arkansas, M.E. Hale 3911, July 1954 (US, holotype).

Specimens examined. ARKANSAS: Franklin County, Hale 3643 (US); Yell County, Hale 3198 (US). OKLAHOMA: McCurtain County, Hale 4920 (US); Pottawatomie County, Hale 4834 (US).

This species is externally similar to the well-known X. taractica ("Parmelia stenophylla") but lacks any trace of maculae on the lobe surfaces and contains the stictic acid series rather than salazinic acid.

Xanthoparmelia schmidtii Hale, sp. nov. Fig. 8

Thallus ut in X. mexicana (Gyel.) Hale sed acidum barbaticum, acidum norstictic um atque acidum salazinicum continente differt.

Thallus closely adnate to adnate on rock, dull yellowish green, 4-8 cm broad; lobes short and irregularly branched, apically rotund, 3-5 mm wide; upper surface plane, continuous, emaculate, becoming densely isidiate, the isidia cylindrical to somewhat barrel shaped, densely branched with age and tipped with brown, 0.15-0.3 mm in diameter, to 1.0 mm high; lower surface light brown, moderately rhizinate, the rhizines light brown.

Pycnidia not found. Apothecia rare, adnate to substipitate, 2-3 mm in diameter; hymenium 45 μm high; spores simple, colorless, 4-6 X 9-10 μm.

Chemistry: Usnic, barbatic, 4-O-demethylbarbatic, salazinic and norstictic acids.

Type: On M-296, about 4 mi W of junction M-296 and J-37, on road to Visalia, Tulare County, California, M. E. Hale 57087 (US, holotype).

Specimens examined. CALIFORNIA: Tulare County, Hale 56347, 56355, 56499, 56671, 56675, 56679, 56683, 57078, Schmidt 1120 (US).

This lichen was first identified as X. mexicana, a common Xanthoparmelia in California. The chemistry, however, represents a most remarkable combination of several acids in nearly equal concentration. Barbatic acid is known in North America only in rare X. barbatica (Elix) Egan and X. moctezumensis Nash, but never on the world level with norstictic or salazinic acids. The species is known so far only in Tulare County California, in the foothills of the Sierra Nevada at 400-800 m elevation. In this same area X. mexicana occurs mostly at 1500 m or higher. The species is named for Mr. Elmer Schmidt, an avid lichen collector who first discovered it. The chemistry was verified by Dr. J. A. Elix.

Xanthoparmelia subpigmentosa Hale, sp. nov. Fig. 9

Thallus ut in X. luminosa (Elix) Hale• sed subtus colore pallide brunneo differens.

Thallus loosely adnate on rocks, somewhat pulvinate, leathery, bright yellow green, 8-12 cm broad; lobes linear-elongate, 3-5 mm broad, becoming black-rimmed with age; upper surface plane, dull, emaculate, isidia lacking; lower surface light brown with a dull reddish orange tinge or darkening, sparsely to moderately rhizinate, the rhizines coarse, light brown.

Pycnidia common, 100-110 µm in diameter; microconidia 5-6 µm long, bifusiform. Apothecia common, adnate, 3-5 mm in diameter; hymenium 45-50 µm high; spores simple, colorless, 5-6 X 9-10 µm.

Chemistry: Usnic, salazinic acids; skyrin in the lower cortical area.

Type: Mountain Road near Blue Mountain Pass, above St. Philomena School, Div. Maseru, Basutoland, South Africa, L. Kofler 3669, 6.6.1963 (LD, holotype; US, isotype).

Specimens examined. REPUBLIC OF SOUTH AFRICA: Basutoland, Hewitt s.n., Kofler 82 63 1, s.n. (2 specimens) (LD, US); Cape Province, Höeg s.n. (LD, US); Orange Free State, Maas Geesteranus 6523a, 6523b (LD, US); Natal, Höeg s.n. (TRS, US).

I had earlier identified all of the specimens listed above as X. taractica. A reexamination of this difficult species complex showed that the South African material has a darker brown, often dull orange-tinted lower surface, the pigmentation being caused by skyrin in a thin layer of medulla just above the lower cortex. It is also different in texture, quite leathery and stiff. In these respects it is actually quite close to the Australian X. luminosa, which has a jet black lower surface. Skyrin is also known in X. barbellata (Kurok.) Hale* and X. fucina Knox.

The following new combinations are formally proposed in this paper:

Xanthoparmelia barbellata (Kurok.) Hale, comb. nov.
Basionym: Parmelia barbellata Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:35. 1982.

Xanthoparmelia exuviata (Kurok.) Hale, comb. nov.
Basionym: Parmelia exuviata Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:36. 1982.

Xanthoparmelia globulifera (Kurok. & Filson) Hale, comb. nov.
Basionym: Parmelia globulifera Kurok. & Filson, Bull. Nat. Sci. Mus. (Tokyo), ser. B, 1:38. 1975.

Xanthoparmelia luminosa (Elix) Hale, comb. nov.
Basionym: Parmelia luminosa Elix, Austr. Journ. Bot. 29:357. 1981.

Xanthoparmelia metastrigosa (Elix) Hale, comb. nov.
Basionym: Parmelia metastrigosa Elix, Austr. Journ. Bot. 29:360. 1981.

Xanthoparmelia multipartita (R. Br.) Hale, comb. nov.
Basionym: Parmelia conspersa var. multipartita R. Br. ex Crombie, Journ. Linn. Soc. London Bot. 17:394. 1880.

Xanthoparmelia refringens (Kurok. & Filson) Hale, comb. nov.
Basionym: Parmelia refringens Kurok. & Filson, Bull. Nat. Sci. Mus. (Tokyo), ser. B, 1:43. 1975.

Xanthoparmelia subcrustacea (Gyel.) Hale, comb. nov.
Basionym: Parmelia subcrustacea Gyel., Ann. Mus. Nat. Hung. 29:30.1935.

Xanthoparmelia sulcifera (Kurok.) Hale, comb. nov.
Basionym: Parmelia sulcifera Kurok., Bull. Nat. Sci. Mus. (Tokyo), ser. B, 8:37. 1981.

MYCOTAXON

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A NEW SPECIES OF TRICHIA (MYXOMYCETES) FROM NORWAY

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SUMMARY

Trichia sordida sp. nov. is described from Norway. The species seems related to T. botrytis (J.F. Gmel.) Pers. and T. contorta (Ditmar) Rost. It differs from both in having large, ochraceous, crowded sporangia and larger spores. Furthermore, it differs from T. botrytis in its sessile habit and from T. contorta in having elaters with long, slender tips.

TRICHIA SORDIDA Johannesen sp. nov.

Fructificatio sporangia, aggregata, sessilia, globosa vel leviter elongata, (0.5-)1-1.5(-2.5) mm diam. Peridium simplex, plusminusque translucens, partim densatum cum rudi materia granulas complectenti, densationes videntur ut fuscae lineae vel panni in facie peridii, luce reflecta ochraceo-fulvum, luce transmissa pallide flavum, dehiscentia irregularis. Hypothallus conspicuus, rubro-brunneus vel memnonius. Capillitium abundans, per saturam aurantiacum, luce transmissa luteum, e elateribus 4-5 um diam. cum 4-6 spiris laevibus et apicibus longe protractis constans, interdum cum subapicalibus tumoribus. Sporae per saturam luteae, luce transmissa flavae, globosae, (13.5-)14-15(-16.5) um diam., dense et minute verrucosae. Plasmodium ignotum.

F r u c t i f i c a t i o n sporangiate. S p o r a n g i a closely aggregated in a single plane, rarely somewhat superimposed, sessile, globose or irregular from pressure to slightly elongate, (0.5-)1-1.5(-2.5) mm in diameter. P e r i d i u m single, more or less translucent, dull ochraceous in reflected light (44 Ochreous of Rayner 1970), pale yellowish in transmitted light, partly thickened with amorphous matter including granules 1-1.5 um in diameter, the thickenings seen as dark lines and patches on the outer peridial surface, inner surface deli-

Fig. 1: Trichia sordida Johannesen sp. nov. Group of sporangia.

cately striated, dehiscence irregular. Hypothallus prominent, cartilaginous, common to a colony, reddish-brown to blackish. Capillitium abundant, orange in mass (between 7 Orange and 8 Sienna of Rayner 1970), bright yellow in transmitted light, consisting of long, free elaters, unbranched or very rarely branched near the apices, bearing 4-6 smooth spiral bands, 4-5 um in diameter, with long, gradually tapering tips, sometimes with subapical swellings up to 10 um or more. Spores bright yellow in mass (between 44 Ochreous and 47 Amber of Rayner 1970), pale yellow with a slight greenish tint in transmitted light, globose or somewhat irregular in shape, (13.5-)14-15(-16.5) um in diameter, densely covered with small, pileate warts. Plasmodium unknown.

Etymology: From the Latin 'sordidus' (dirty-looking), referring to the dark lines and spots on the peridium.

Holotypus: Norway: Akershus: Bærum, near Furuholmen, May 8 1975, Leg. K. Høiland, (O). Isotypi at K and in the private collection of Mrs. N.E. Nannenga-Bremekamp, Doorwerth (sub no. 12 560).

Habitat: Dead grass and litter near melting snow.

Distribution: Known only from the type collection.

Discussion: The species is characterized by its large, crowded, dull ochraceous sporangia with dark lines and spots, its smooth elaters with long, gradually tapering tips, and its large, densely-warted spores.

The sporangia are mostly 1-1.5 mm in diameter, which is larger than in any other species of Trichia. The type of

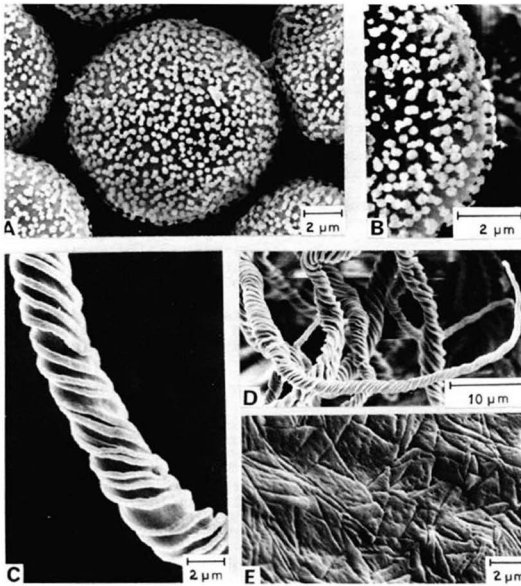

Fig. 2: Trichia sordida Johannesen sp. nov. A, B: Spores. C, D: Elaters. E: Inner peridial surface.

spore ornamentation (Fig. 2 A, B) is what Rammeloo (1974b) termed 'pileate' and is similar to what is found in T. varia (Pers.) Pers. and T. contorta (Ditmar) Rost. Both these species, however, have smaller spores and smaller, more scattered sporangia. Furthermore, T. varia has elaters with only 2-3 spirals and T. contorta more irregular elaters without the long, gradually tapering tips.

The ornamentation on the inner peridial surface (Fig. 2 E) is similar to that seen in T. botrytis (J.F. Gmel.) Pers. (Rammeloo 1974a). The latter, however, has smaller, scattered, and usually stalked sporangia and smaller spores.

The elaters (Fig. 2 C, D) are similar to those of T. botrytis, T. floriformis (Schw.) G. Lister, and T. decipiens (Pers.) Macbr., and also bear resemblance to those of T. contorta in being occasionally swollen, especially near the apices, and in being very rarely branched. T. floriformis, however, has purplish, stalked sporangia with brick-red spores and capillitium, and T. decipiens has stalked sporangia with a shining peridium and subreticulate spores.

The habitat is also somewhat unusual, since the other species of Trichia with extensive fructifications of crowded sporangia are mostly confined to dead wood or bark. According to the collector (pers. comm.), the type specimen was collected on the ground, apparently without any connection to dead wood.

Using the key of Martin & Alexopoulos (1969) the specimen would probably be identified as T. alpina (R.E. Fries) Meylan due to the sessile sporangia and the large, minutely warted spores. However, T. alpina has smaller sporangia (or plasmodiocarps) with a much darker and tougher peridium and elaters 6-8(-10) um wide without the long, gradually tapering tips.

Judging from the spore ornamentation, the ornamentation on the inner peridial surface, and the type of elaters, T. sordida seems most closely related to T. contorta and T. botrytis.

ACKNOWLEDGEMENTS

I am much indebted to Mrs. N.E. Nannenga-Bremekamp, Doorwerth, for helpful advice and comments and to Professor E. Kraggerud, Oslo, for correcting the Latin description. The Electron Microscopical Unit for Biological Sciences, University of Oslo, is thanked for their kind help in preparing the scanning electron micrographs.

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MYCOTAXON

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TWO NEW BASIDIOMYCETES ON LIVING LIVE OAK[1] IN THE SOUTHEAST AND GULF COAST REGION

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SUMMARY

Two new species of Aphyllophorales, *Perenniporia phloiophila* (Polyporaceae) and *Hyphoderma baculorubrense* (Corticiaceae), are described and illustrated. They fruit on bark of living live oak and are apparently restricted to that host.

Observations of live oak (*Quercus virginiana* Mill.) on the campus of Louisiana State University and elsewhere in the southeastern United States and Texas have indicated that certain wood-rotting basidiomycetes are consistently associated with that host species. Two of these fruit abundantly on bark of live trunks and branches of older trees and apparently utilize bark tissue as a nutrient source. One is a species of the genus *Perenniporia* Murr. of the family Polyporaceae, and the other is a species of the genus *Hyphoderma* Wallr. of the Corticiaceae (Figs. 1 and 2). Morphological studies of these two fungi and interfertility tests with similar species indicate that they are distinct and genetically isolated species. They are here described as new.

PERENNIPORIA PHLOIOPHILA Gilbn. et M. Blackwell, sp. nov.

Fructificatio resupinata vel leviter reflexa, perennia, in corticem quercuum vivum, cremea vel pallido-bubalina; pori 3-5 per mm; systema hypharum trimiticum; hyphae generatoriae fibulatae; hyphae skeletales dextrinoideae; cystidiola 16-20 x 6-8 µm, fusoidea; basidia 16-28 x 8.5-11 µm, late clavata; basidiosporae 7.5-11 x 6-8 µm, ellipsoideae, hyalinae, truncatae, crassitunicatae, dextrinoideae. Typus: on *Quercus virginiana* Mill., Louisiana State Univ., Baton Rouge, East Baton Rouge Parish, LA, R. L. Gilbertson 13308, Aug. 27, 1981 (BPI).

Basidiocarps resupinate to slightly reflexed, perennial, developing as small single units 0.7-6 cm wide or becoming confluent and up to 1

[1]University of Arizona Agricultural Experiment Station Journal Article No. 3846.

Fig. 1. Basidiocarps of *Perenniporia phloiophila* on bark of living live oak on LSU campus (x 0.4). Fig. 2. Basidiocarps (arrows) of *Hyphoderma baculorubrubrense* on bark of living live oak on LSU campus. Note darker, smoother exfoliated bark (x 0.5).

meter in largest dimension, conforming to the topography of the bark; pore surface cream-colored to pale buff, the pores circular to angular, 3-5 per mm; dissepiments thick, entire; context white to cream colored, less than 1 mm thick; tube layer indistinctly stratified, up to 2 mm thick, older layers often stuffed with white mycelium.

Hyphal system trimitic; generative hyphae (Fig. 3a) 2-4 µm in diam, inconspicuous and difficult to discern, thin-walled, with clamps; binding hyphae (Fig. 3b) 2-4 µm in diam, thick-walled, nonseptate, with frequent branching, negative in Melzer's reagent; skeletal hyphae (Fig. 3c) mostly 2.5-5.5 µm in diam but some slender skeletals 1-2 µm in diam also present, thick-walled, with occasional branching, nonseptate, dextrinoid in Melzer's reagent; cystidioles (Fig. 3e) 16-20 x 6-8 µm, fusoid, thin-walled, not projecting; basidia (Fig. 3d) 16-28 x 8.5-11 µm, broadly clavate, 4-sterigmate, with a basal clamp; basidiospores (Fig. 3f) 7.5-11 x 6-8 µm, ellipsoid, smooth, thick-walled, with a thin-walled truncate apex, hyaline in KOH, dextrinoid in Melzer's reagent.

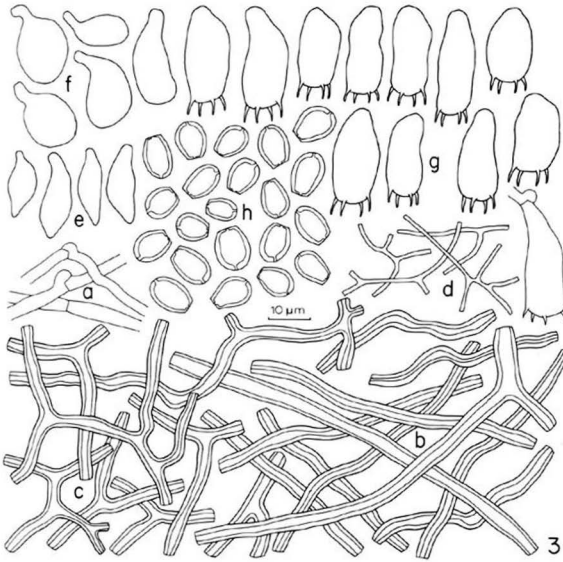

Fig. 3. Microscopic characters of *Perenniporia phloiophila*. a, generative hyphae; b, skeletal hyphae; c, binding hyphae; d, slender binding hyphae; e, fusoid cystidioles; f, immature basidia; g, mature basidia; h, basidiospores.

ADDITIONAL SPECIMENS EXAMINED (all on living live oak): FLORIDA: H.H. Burdsall No. 10013, Tall Timbers, Leon County, Aug. 17, 1977. LOUISIANA: Meredith Blackwell (MB) 928 and 929, LSU, Alexandria, Rapides Parish, Sept. 28, 1982; R.L. Gilbertson (RLG) 13362, LSU, Baton Rouge, East Baton Rouge Parish, Aug. 28, 1981; RLG 14782, Grand Chenier, Cameron Parish, July 9, 1983; MB 620, Evangeline State Park, St. Martinville, St. Martin Parish, March 26, 1982; MB 608, University of Southwestern Louisiana (USL), Lafayette, Lafayette Parish, Dec. 14, 1981; MB 642 and 648, USL, March 16, 1982; MB 641, Thomas Duckett Boyd oak, State Capitol Grounds, Baton Rouge, April 24, 1982; MB 1350, Jan. 13, 1982, MB 651, March 16, 1982, Avery Island, Iberia Parish; MB 957 and 974, Fontainebleau State Park, St. Tammany Parish, Oct 2, 1982;

MB 1052, Natchitoches, Natchitoches Parish, Oct. 16, 1982; MB 2056, Sulphur, Calcasie Parish, Nov. 30, 1983; MB 1530, New Orleans, Orleans Parish, Aug. 5, 1983; MB 642 and 648, March 16, 1982, MB 650, 651, 652, and 653, June 17, 1982, MB 624, April 5, 1982, all from LSU, Baton Rouge; A.L. Welden, TU 9635, New Orleans, June 22, 1983. MISSISSIPPI: MB 984, Gulf Coast Research Lab., Ocean Springs, Jackson County, Oct. 5, 1982; MB 987, Phillips College, Gulfport, Harrison County, Oct. 5, 1982. SOUTH CAROLINA: J.L. Lowe 12632, 12633, and 12634, Santee Exp. Forest, Huger, Berkeley County, Aug. 22, 1962. TEXAS: MB 1602 and 1604, Brackenridge Tract, University of Texas, Austin, Travis County, Dec. 2, 1983, on *Quercus virginiana* var. *fusiformis* (Small) Sarg. MEXICO: P.A. Lemke 5965 (TU 4829), Horsetail Falls, Nuevo Leon, Sept. 8, 1959 (host not given, *Q. virginiana* var. *fusiformis* occurs in the area). Inaccessible specimens of *P. phloiophila* were also observed in Texas by MB at the east bank of the Trinity River, Site of Mission Nuestra Senora de la Luz del Oreoquisac and Presidio San Augustin de Ahumada, Liberty County, on *Q. virginiana* var. *fusiformis*, Dec. 2, 1983. Fig. 4 shows the distribution of *P. phloiophila*.

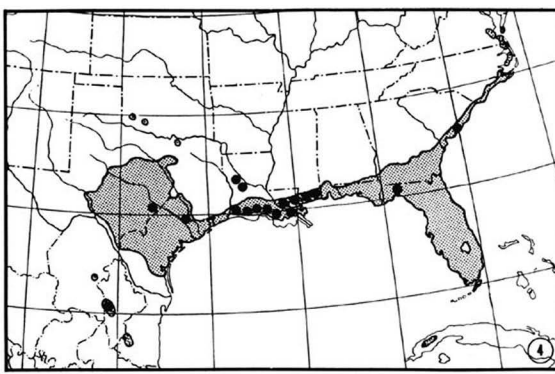

Fig. 4. Distribution of *Perenniporia phloiophila* (black circles). Crosshatched area indicates the natural range of live oak (from Little, 1971).

Perenniporia phloiophila is perhaps most similar to *P. medulla-panis* (Fr.) Donk, a widely distributed species on dead hardwoods throughout the temperate regions of the world. However, *P. phloiophila* is morphologically distinct because of its larger basidiospores (7.5-11 x 6-8 µm as compared to 5-7 x 3-5 µm for *P. medulla-panis*) and specific habit and host relationship. Furthermore, it is genetically isolated from *P. medulla-panis* with homokaryons from the two species completely incompatible. *Perenniporia fraxinophila* (Pk.) Ryv. has basidiospores

more like those of *P. phloiophila* but differs in producing large pileate basidiocarps and occurring mainly on ash. *Perenniporia fraxinophila* is also genetically isolated from *P. phloiophila*.

HYPHODERMA BACULORUBRENSE Gilbn. et M. Blackwell, sp. nov.

Fructificatio resupinata, annua, effusa in pannus usque ad 5 cm, cremea vel ochracea, leves vel tuberculata; systema hypharum monomiticum, hyphae fibulatae; gloeocystidia 5-12 µm in diam, usque ad 85 µm longae, ventricosae vel cylindricae; basidia 35-40 x 8-9 µm, clavatae; basidiosporae 8-10.5 x 5-7 µm, ellipsoidae, hyalinae, non-amyloidae. Typus: on *Quercus virginiana* Mill., Louisiana State Univ., Baton Rouge, East Baton Rouge Parish, LA, M. Blackwell no. 737, Aug. 25, 1982 (BPI).

Basidiocarps resupinate, annual or persisting longer than one year, effused up to 5 cm, developing in bark crevices and conforming to topography of bark; hymenial surface cream colored to pale buff or ochraceous, often with greenish tints from associated algae, smooth to shallowly tuberculate; margin abrupt to thinning out; subiculum white to cream, less than 1 mm thick.

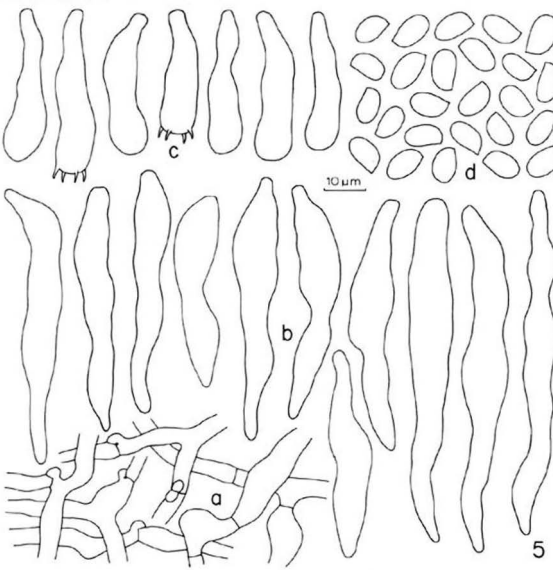

Fig. 5. Microscopic characters of *Hyphoderma baculorubrense*. a, generative hyphae; b, gloeocystidia; c, basidia; d, basidiospores. (MB 737, Type).

Hyphal system monomitic; generative hyphae (Fig. 5a) 2.5-6 µm in diam, thin-walled, with clamps, coarse crystalline material abundant on hyphae and scattered throughout subiculum; gloeocystidia (Fig. 5b) 5-12 µm in diam and up to 85 µm long, abundant and conspicuous, arising at all levels of the subiculum, imbedded or projecting slightly beyond the basidia, highly refractive in Melzer's reagent and staining brightly in phloxine, ventricose to cylindric, bluntly to acutely fusoid; basidia (Fig. 5c) 35-40 x 8-9 µm, clavate, 4-sterigmate, with a basal clamp; basidiospores (Fig. 5d) 8-10.5 x 5-7 µm, ellipsoid, hyaline, smooth, negative in Melzer's reagent.

ADDITIONAL SPECIMENS EXAMINED: LOUISIANA: MB 618, Feb. 15, 1982, 625, 626, and 629, Feb. 23, 1982, 640, April 15, 1982, 646, March 1, 1982, 991, Oct. 9, 1982; 1127, 1128, 1129, 1130, and 1131, Nov. 23, 1982, all from LSU, Baton Rouge; RLG 13291, Sept. 18, 1981, 13307, Aug. 27, 1981, 13361, Aug. 28, 1981, all from LSU, Baton Rouge; MB 940, 958, 972A, 973, all from Fontainebleau State Park, St. Tammany Parish, Oct. 2, 1982; MB 616 and 617, St. Martinville, St. Martin Parish, March 26, 1982; MB 649, New Iberia, Iberia Parish, March 26, 1982; MB 653, Avery Island, Iberia Parish, March 26, 1982; MB 2057, Sulphur, Calcasie Parish, Nov. 30, 1983; RLG 14778, Pecan Island, Vermilion Parish, July 9, 1983; RLG 14781, LA Highway 82, Cameron Parish, July 9, 1983; RLG 14999, Audubon Park, New Orleans, Orleans Parish, Nov. 14, 1983. MISSISSIPPI: MB 982, Univ. of Southern Mississippi, Hattiesburg, Lamar County, Oct. 5, 1982; MB 983, Gulf Coast Research Lab., Ocean Springs, Jackson County, Oct. 5, 1982. TEXAS: MB 1611, East Bank of Trinity River at site of Mission Nuestra Senora de la Luz del Oreoquisac and Presidio San Augustin de Ahumada, Liberty County, Dec. 2, 1983; MB 2061, 2062, and 2066, Burton, Washington County, Dec. 1, 1983; MB 2053, west bank of Trinity River, Chambers County, Nov. 30, 1983; MB 2074 and 2075, Austin, Travis County, Dec. 1, 1983. All Texas collections were on *Q. virginiana* var. *fusiformis*. Fig. 6 shows the distribution of *H. baculorubrense*.

Hyphoderma baculorubrense is similar to *H. praetermissum* (Karst.) John Erikss. et Strid, a widely distributed and highly variable taxon. The spores of *H. baculorubrense* are broadly ellipsoid in contrast to the cylindric-allantoid spores of *H. praetermissum*. The latter species usually has capitate hymenial cystidia. These are never present in *H. baculorubrense*. Homokaryons of the two species are completely incompatible.

Perenniporia phloiophila and *H. baculorubrense* are both known only from living live oak. We have no records of either species on other hosts including other species of oak commonly associated with live oak in the Gulf Coast region.

Perenniporia phloiophila commonly fruits profusely on bark of large living branches and main stems of trees that show no dieback or other symptoms of deterioration. Sections of branches infected with *P. phloiophila* show that mycelium is usually restricted to the dead, non-conducting outer bark. However, in one instance, damage of bark by insects and birds apparently resulted in invasion of underlying wood by the fungus, and subsequent development of a uniform white rot. Isolates of *P. phloiophila* from bark and decayed wood of this collection were identical with isolates obtained from mass basidiospores.

Because *H. baculorubrense* occurs only on the main trunk or large lower branches of mature trees it has not been possible to obtain sections. Increment borer samples from the bark were so badly decayed that

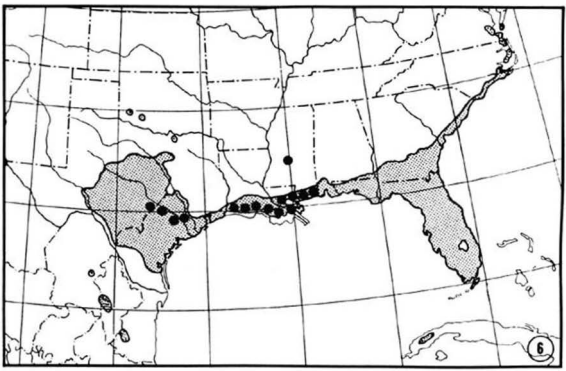

Fig. 6. Distribution of *Hyphoderma baculorubrense* (black circles). Crosshatched area indicates the natural range of live oak (from Little, 1971).

the exact limit of the decay could not be determined. Decay is apparently restricted to the older, deeply ridged outer bark and causes sloughing of the outer bark leaving a bark surface smoother than normal. This results in a condition commonly known as "smooth patch." Smooth patch has been reported on *Quercus alba* L. (white oak) associated with *Aleurodiscus oakesii* (Berk. et Curt.) Cke. (Tehon and Jacks, 1933) and on *Q. alba* and *Q. stellata* Wangenh. (post oak) associated with *Cortictum maculare* Lair (Lair, 1946). *Hyphoderma baculorubrense* is almost certainly the "bark-rotting fungus" mentioned by Penfound and Mackaness (1940) on live oaks in Louisiana. They reported that mycelial growth and decay of bark in flowways on the trees increased bark water-holding capacity and allowed invasion by liverworts and mosses. They also observed bark sloughing associated with the fungus. Mycelium of *H. baculorubrense* occurs in flowways and basidiocarps usually develop at the edges of flowways.

No other species of *Perenniporia* or *Hyphoderma* are known to be restricted to bark of a single species of living tree. *Perenniporia ohiensis* (Berk.) Ryv. has recently been collected on living live oak in Texas (MB 1603, 2064, 2069, and 2070, ARIZ). However, *P. ohiensis* is widely distributed and occurs on many other hardwood species. Considering the high incidence of *P. phloiophila* and *H. baculorubrense*, it is surprising that neither species has been described previously. Several workers have collected *P. phloiophila* in the past as indicated in the specimens listed earlier in this paper. Cultures at the U.S. Forest Service Center for Forest Mycology Research, Forest Products Lab., Madison, WI were tentatively identified as *Poria beaumontii* Berk. et Curt. Our study of an isotype of *P. beaumontii* (BPI) disclosed that it is sterile and unidentifiable with certainty, but a species with macro-

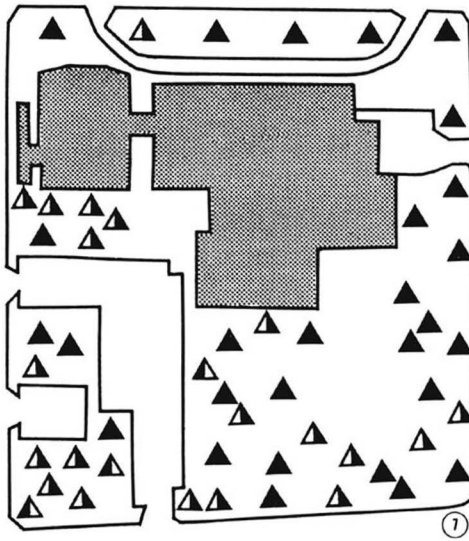

Fig. 7. Diagram of study area in Memorial Oak Grove near LSU Union (crosshatched area) showing incidence of *Perenniporia phloiophila* (▲) and *Hyphoderma baculorubrense* (▲) on 51 living oak trees. A solid triangle indicates presence of both fungi on a single tree.

morphology and hyphal structure different from those of *P. phloiophila*.

A high frequency of infection was found wherever we observed these fungi in Louisiana. In the Memorial Oak Grove at the Union Building on the LSU campus 51 live oaks about 65 years of age were carefully examined for the presence of *P. phloiophila* and *H. baculorubrense*. At least one of the two fungi was observed to be fruiting on all 51 trees. *Perenniporia phloiophila* was found fruiting on 31 trees, and *H. baculorubrense* on 48 trees. Both fungi were present on 28 trees (Fig. 7). Both species are probably distributed throughout the natural range of live oak. Older live oaks planted as ornamentals outside their natural range in Louisiana and Mississippi are also known to be infected (Figs. 4 and 6).

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MYCOTAXON

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A NEW STIPITATE HYDNUM OF NOVA SCOTIA

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KEY WORDS: *Sarcodon dissimulans*, Hydnaceae, basidiomycetes, fungi.

A new stipitate hydnum has been found in Nova Scotia. *Sarcodon dissimulans* resembles *S. lanuginosum* (K. Harrison) Maas G. in extreme age; however, the other stages are different and the new species is easily recognized in the field when growing actively and in the herbarium it is darker and not distinctly scaly. This taxon is known only from the type locality and was first seen in 1980 as very old specimens with extremely obnoxious taste and odors.

All color terms placed within quotations are taken from Ridgway (1912), and others are our own. Scanning electron micrographs were taken on a JEOL JSM 25 scanning electron microscope using spores from a spore print. The holotype and other collections cited are deposited in the E.C. Smith Herbarium (ACAD), Acadia University.

Sarcodon dissimulans K. Harrison sp. nov.

Pileus 3.5-13 cm latus, connatus, convexus; bubalinus vel brunneus; tomentosus vel scabridus, rimosus; ad marginem pallida, inflexa; odor et sapor ingratus, pungentes. Contexus pallidus vel bubalinus, brunnescens. Aculeis avellaneis, tenui, confertis. Stipes 3-6 cm longus, 1-3 cm crassus, tomentosus val glaber, bubalinus; basi mycelio pallido. Sporae 5-6 x 4-5 µm, subglobosae, tuberculatae. Haribatio prope Picea. Habitus gregarious, in sylvis prope Black Hole, commitato Kings lectus. Holotypus ACAD 14897 in Universitatis Michiganiae et pars in DAOM, Ottawa conservatus.

Basidiocarp: 3.5-1.3 cm broad, convex, usually connate and compressed in various shapes with numerous lobes; surface irregular, when young exuding a few drops of pinkish liquids, finely tomentose to finely fibrillose becoming minutely scaly or with innate fibrils and fine cracks, in age scaly on disc with radiating innate fibrils or finely cracked areas toward the margin; margin faintly tomentose (lens), appearing glabrous, strongly incurved, sterile, color when young "Avellaneous" becoming "Buffy Brown" to "Natal Brown" on the disc, darkening on the younger parts when handled or bruised; context firm but brittle, "Avellaneous", darkening when cut to "Wood Brown"; taste extremely disagreeable, pungent and persistent in the throat; odor faintly aromatic, pungent, unpleasant. Stipe 3-6 x 1-2 cm, rarely with a short tapering root, usually rather blunt for the larger compound basidiocarps, expanding quickly and branching into stipes with complexly fused pilei; surface limited, finely tomentose in protected areas, glabrous, whitish to "Tilleul Buff" or "Avellaneous" to an uneven line of tiny spines slightly decurrent on the apex of the stipes; context near "Wood Brown", darkest downward, darkening when cut to "Wood Brown", tips persist as "Avellaneous", overall color changes with angle of light. Spore mass on overlapping surface of pileus "Army Brown".

Microscopic details: Spores 5-6(7) x 4-5 µm, subglobose to slightly oblong, coarsely tuberculate, basidia closely packed and difficult to separate in KOH by crushing, no clamps observed in any tissue. Hyphae of tramal tissues hyaline, equal, thin-walled, a few somewhat inflated 4-10(12) µm, branching and closely interwoven, epidermal hyphae of pileus inflated to 12 µm, more loosely interwoven and cells somewhat larger than in tramal tissues. The end cells of cuticular hyphae not differentiated. Gloeoperous hyphae 4-8 µm wide, light-brown, present occasionally in all tramal tissues. Hyphae in context of spines 4-5 µm wide and in stipe 2-4 µm wide. Cystidia not observed in hymenium, pileus or stipe.

Electron photomicrographs: Photomicrographs of young spores (Fig. 1) show the nodulose nature of the tubercles and the globular appearance of the spores. Fig. 2 illustrates an older spore with the tubercules larger and the outline more irregular. The tubercle adjacent to the jagged edge of the apiculus is of interest and was seen in several SEM fields when searching for suitable material to photograph.

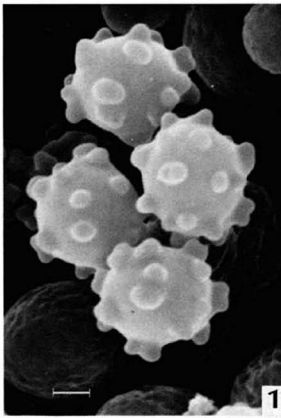
DISCUSSION

S. dissimulans was found in quantity in 1983 and was followed through its stages of growth and found to differ significantly in surface features, color, odor, and taste from *Hydnum lanuginosum* K. Harrison (1961, 1964). In the herbarium it is darker and distinctly scaly. The spores are similar microscopically, but under the S.E.M. the new taxon has small nodulose tubercules compared to the larger and broader ones of *S. lanuginosum*.

The following characters are sufficiently distinct to enable the two species to be easily separated in the field.

	S. dissimulans (Fig. 3)	*S. lanuginosum* (Fig. 4)
Pileus: (young)	Exuding red droplets Tomentose	No red droplets Usually grayish
Pileus: (mature)	Brown, rivulose cracks, a few fine scales on disc	Intensely scaly scales with black tips
Habit:	Connate, in complex clumps	Usually simple
Taste:	Extremely nauseating	Farinaceous, slowly acrid in throat
Margin:	Strongly lobed	Usually regular
Stipe:	Short, branched	Often long, not branched
Dried:	Dark, fuscous, wrinkled	Grayish and scaly

Reddish drops have been seen twice on the stipes of young *S. lanuginosum* which was one of the more common hydnums in this area in 1983. The microscopic details are similar with the spores in the same size range. Young spores of *S. dissimulans* have distinct rounded tabercles that have not been seen in any specimen of *S. lanuginosum*. The tramal hyphae are not as inflated in the new species and the texture is extremely brittle with the margin easily damaged.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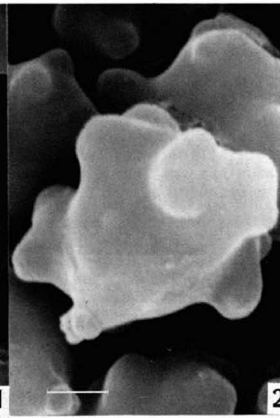
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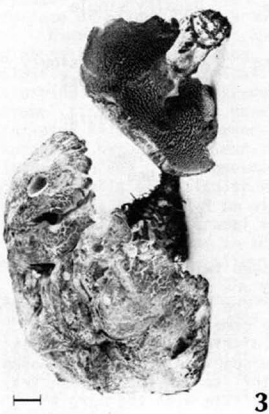
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ACKNOWLEDGEMENT

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FIGURES

Figs. 1-3: *S. dissimulans*: Fig. 1 - young spores showing developing tubercles. Fig. 2 - single spore with tubercule associated hilar appendix. Fig. 3 - photograph of part of holotype collection (ACAD 14897).

Fig. 4 - *S. lanuginosum* showing scaly pileus and eccentric and mesopodial specimens. Scale bars for Figs. 1, 2 equal 1 µm, and for Figs. 3, 4 equal 1 cm.

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NEW NORTH AMERICAN SPECIES OF LACCARIA (AGARICALES)[1]

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ABSTRACT

Five new species in the genus Laccaria are described and discussed. The new species are L. amethysteo-occidentalis, L. nobilis, L. oblongospora, L. trichodermophora, and L. vinaceo-brunnea. Circumscriptions of these taxa are based on macro- and micromorphological characters of the basidiocarp along with cultural characters acquired through somatic culture mat analysis of isolates obtained via tissue culture.

Key words: Laccaria, Agaricales, Tricholomataceae, taxonomy, cultural characters

INTRODUCTION

Extensive collecting was carried out in several regions of the United States and Canada as part of an ongoing study of the floristically (e.g., Singer 1975) and ecologically (e.g., Singer and Moser 1965, Trappe 1977, Watling 1977) important ectomycorrhizal genus Laccaria Berk. & Br. (Agaricales, Tricholomataceae). Numerous herbarium collections and all available type specimens were also examined (Mueller 1982). In order to obtain additional data, attempts were made to examine the somatic culture mat morphology of each putative taxon.

A result of these studies has been the segregation of three new species from L. laccata (Scop. : Fr.) Berk. & Br. sensu lato and two from L. amethystina (Hud.) Ck. described below.

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[1]This paper is based on a portion of a thesis submitted to the Graduate School of the University of Tennessee, Knoxville in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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MATERIALS AND METHODS

Collections were made, assembled, and examined using standard techniques. Color names within parentheses and quotation marks are from Ridgway (1912) while color names outside of parentheses are author-generated. All specimens are deposited in the University of Tennessee Herbarium, Knoxville (= TENN). A list of the 181 collections examined for this paper will be supplied upon request.

Basidospore size data are always given without ornamentation and hilar appendage and were obtained with the hilar appendage in profile. In order to treat all specimens equally, all basidiospore measurements were taken from hymenial tissue and not from spore prints. Width and diameter measurements of other elements were taken at the widest point. At least 10 randomly sampled cheilocystidia and terminal cells of cuticular hyphae and 15 randomly sampled basidia and basidiospores were measured for each collection included in the composite descriptions. These collections were sampled from the pool of material that I had examined for each taxon and include the range of variation encountered within their respective species.

To give some indication of data reliability, the number of elements measured and utilized for compilation of range, length-width ratios, and means are given in parentheses before size data for cuticular hyphae, cheilocystidia, and basidia. For basidiospores, the number of collections used in the description are included in brackets with spore size data (Bas 1974). Within the brackets, the first figure represents the number of spores measured and the second figure the number of collections utilized.

To obtain dikaryotic isolates, small pieces of tramal tissue excised from the pileus-stipe interface were aseptically placed on modified Melin-Norkrans medium (= MNM) plus benomyl (10 mg/l) in disposable test tubes (Molina and Palmer 1982). Initial experimentation with the inclusion of various antibiotics in the medium appeared to have little effect on bacterial contamination and, thus, they were not used subsequently. Six to ten replicates were taken for each isolation attempted. Subculturing of each isolate was undertaken until a pure culture was obtained. Stock isolates were then stored on MNM in the dark at 4°C.

Culture mat analyses were based on the classic work of Nobles (e.g., 1965) and that of Campbell and Petersen (1975). Plastic Petri dishes containing malt extract agar (= MA) (Nobles 1965) were inoculated with mycelium of the isolates being examined and incubated in the dark at 24°C for two weeks. From these, round inoculation plugs 5 mm in diam were transferred to the edge of Petri dishes containing either MNM, MA, or Difco potato dextrose agar (= PDA). Seven replicates of each medium for each isolate were inoculated and placed in a dark incubator at 24°C. Macromorphological descriptions were made during the third and sixth weeks, while micromorphological characters were examined during the sixth week. Terminology used was taken from Nobles (e.g., 1965).

Initially, extracellular oxidase activity of each isolate was tested using both the Bavendamm (Davidson et al. 1938) and gum guaiac (Nobles 1965) tests. However, since no growth or diffusion zone occurred in the Bavendamm test, it was not used subsequently. For the gum guaiac test, observations were made after 2-3 minutes and then again at 1 hour.

RESULTS AND DISCUSSION

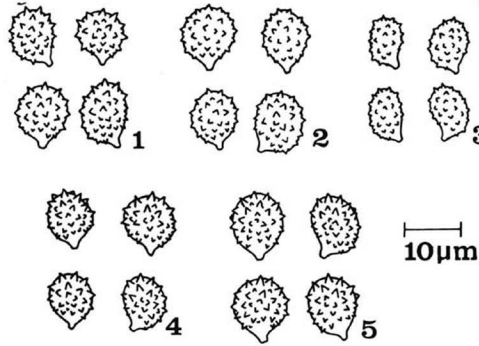
Laccaria amethysteo-occidentalis Mueller. sp. nov. Figs. 1, 6, 11, 17.

Pileo 10-65(-89) mm lato, haud striato, purpureo-violaceo, siccando vinaceo vel pallido, lamellis concoloribus. Stipite 18-115 x 3-12 mm, fortiter striato, concolori. Basidiis tetrasporis. Cheilocystidiis grandibus, abundis. Sporis plerumque 7.4-10.6 x 6.4-9.2 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis curtis vel moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42526; Canada: British Columbia, near Squamish, Alice Lake Provincial Park campground. 3.X.1981. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus 10-65(-89) mm broad, obtuse to convex to plane, often depressed, not striate when fresh, occasionally becoming slightly translucent-striate upon fading, finely fibrillose to fibrillose-scaly, hygrophanous, deep purple when fresh ("Taupe Brown" to "Dull Indian Purple" to "Dusky Dull Violet 1" to "Dark Hyssop Violet" to "Slate-Violet"), fading to vinaceous ("Dark Vinaceous-Drab" to "Dark Vinaceous-Gray" to near "Wood Brown"), finally becoming buff (near "Pale Ochraceous-Salmon"); margin inrolled to decurved, becoming plane, entire to eroded; context thin, concolorous with lighter gray purple ("Pale Bluish Lavender") to white areas intermixed. Lamellae narrow to broad, thick to very thick, occasionally waxy, sinuate to arcuate, subdistant to distant, dark violaceous ("Deep Slate-Violet" to "Slate-Violet"), fading lighter (near "Lavender"). Stipe 18-115 x 3-12 mm, equal to subclavate, occasionally slightly bulbose, dry, strongly longitudinally striate, occasionally with recurved scales, purple ("Dark Slate-Purple" to "Dark Vinaceous Brown" to "Hay's Brown"), often with lighter violet ("Pale Bluish Lavender") to white scattered sectors; context solid, concolorous with pileus context. Basal mycelium violet ("Dark Slate-Purple" to "Deep Slate-Violet" to "Light Dull Bluish Violet"). Spores white in mass.

MICROMORPHOLOGY: PILEUS: Pileipellis tightly interwoven with scattered elongate fascicles of ± perpendicular hyphae, fascicles usually composed of 15-30 hyphae; terminal cells of fascicular hyphae (n=30) 28.5-73.5 x 7-16 µm, undifferentiated to clavate, occasionally broadly clavate; walls up to 0.5 µm thick, vinaceous brown; contents hyaline to light vinaceous brown. Trama tightly interwoven, undifferentiated, hyaline, light vinaceous brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 3-11.5 µm diam, thin-walled, hyaline to light vinaceous brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 45) 34-56.5 x 9.7-14.7 µm, clavate, elongate, hyaline, in young specimens vinaceous brown in mass; sterigmata 4, up to 9.2 µm long. Pleurocystidia lacking. Cheilocystidia (n = 20) 36.5-66.5 x 12-18.4 µm, subclavate to clavate, often very abundant, extending well beyond basidia, thin-walled, hyaline. Basidiospores (excluding ornamentation) [81/6](6.4-)7.4-10.6 x 6.4-9.2 µm (mean dimensions = 8.9±0.8 x 7.8±0.6 µm), L/W = (0.95-)1-1.24(-1.36) (mean L/W = 1.13± 0.08), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, echinulate; spines < 0.5-1.4 (-1.8) µm long (mean length = 1± 0.3 µm), crowded; hilar appendix 1.3-2 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 2.7-7.5 µm diam, hyaline, undifferentiated, long-celled.



Figs. 1-5. Representative basidiospores from the Holotype of each of the proposed species. Fig. 1. L. amethysteo-occidentalis (TENN 42526). Fig. 2. L. nobilis (TENN 42527). Fig. 3. L. oblongospora (TENN 42522). Fig. 4. L. trichodermophora (TENN 42523). Fig. 5. L. vinaceo-brunnea (TENN 42525).

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 1 isolate): PDA: Radius at week III < 3 mm, at week VI = 12-14 mm; mat felty, moderately thick, tightly interwoven, submerged, not translucent, dark violet; margin up to 3 mm broad, subfelty, abruptly thinner than mat, entire, light violet; plug dark violet. MNM: Radius at week III = 14-22 mm, at week VI = 24-32 mm; mat felty, moderately thick, tightly interwoven, thicker near plug, submerged, not translucent, moderate violet color, darker near plug, becoming lighter outward; margin 1-2 mm broad, subfelty to silky, not well differentiated from mat, even to serrate, light violet; plug moderate violet. MA: Radius at week III = 14-17 mm, at week VI = 23-27 mm; mat subfelty, moderately thick and interwoven with a narrow (3 mm) thicker band at midpoint, submerged, slightly translucent, white; margin 1-2 mm broad, subfeltly not well differentiated, entire to somewhat serrate, white; plug white. EXTRACELLULAR OXIDASE: Reaction negative at first, moderate blue color after 1 hr.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 1 isolate): PDA: Hyphae mostly undifferentiated, few scattered subcoralloid hyphae in some plates. MNM: Hyphae same as in PDA. MA: Hyphae undifferentiated.

HABITAT AND DISTRIBUTION: Scattered to gregarious; under conifers often Pseudotsuga menziesii (Mirb.) Franco ; western North America. Number of collections examined per province or state: British Columbia 8; California 26; Oregon 21; Washington 28.

OBSERVATIONS: Although this taxon has been reported as L. amethystina, it differs in several important respects, and thus, is described here as a distinct species. Laccaria amethysteo-occidentalis can be distinguished from L. amethystina by its distribution, larger basidiocarp size, and deeper purple color which becomes vinaceous upon fading. Additionally, it has subglobose to broadly ellipsoidal, short-spined basidiospores instead of the nearly globose, moderate to long-spined basidiospores of L. amethystina. It differs from the other North American "purple" Laccaria, L. vinaceo-brunnea sp. nov., by its robust size, the color of its mature basidiocarps, and its pileipellis of scattered fascicles rather than individual perpendicular hyphae. All three taxa often have large cheilocystidia which form a nearly continuous layer along the lamella margin. This character can be used to distinguish herbarium material lacking macromorphological notes of L. amethysteo-occidentalis from L. bicolor (Maire) Orton and L. ochropurpurea (Berk.) Pk.

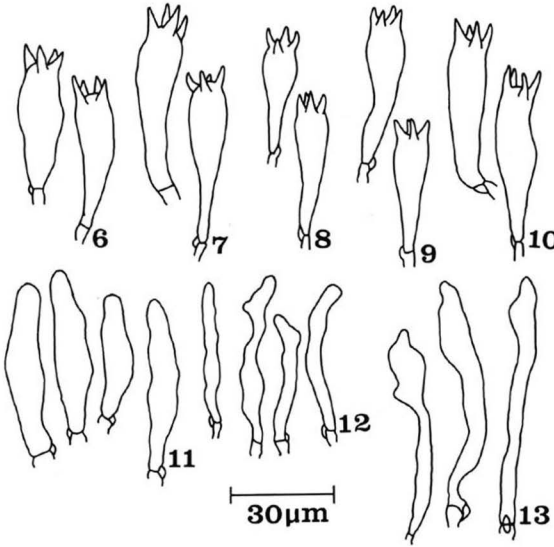
The above description of culture mat morphology was based on a single isolate, TENN 42526. Numerous attempts to obtain additional isolates were unsuccessful. The slow rate of growth of and dark purple color of the culture mat on PDA was similar to the growth of L. ochropurpurea (Figs. 17, 18).

Laccaria amethysteo-occidentalis can be found commonly in the coniferous forests of the northwestern U. S. and western Canada. In contrast, within the range of this study L. amethystina appears to be restricted to the mixed conifer-hardwood forests of eastern North America while L. vinaceo-brunnea has only been found along the Gulf Coast.

Laccaria nobilis Smith apud Mueller. sp. nov. Figs. 2, 7, 19.
[Laccaria nobilis Smith in herb.]

Pileo (16-)24-77 mm lato, haud striato, paulatim squamoso, aurantio-brunneo. Lamelis carneorosellis. Stipite (21-)26-110 x 4-10(-16) mm, fortiter striato, interdum reticulato, frequenter squamoso, concolori; mycelio basali albo. Basidiis tetrasporis. Cheilocystidiis nullis. Sporis 7.4-9.7 x 6.4-8.7 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis brevis.

Type specimen (HOLOTYPE): TENN - TENN 42527; USA: Colorado, Larimer Co., Roosevelt National Forest, Rayah Wilderness, Blue Lake Trail. 13.IX.1981 [!]



Figs. 6-13. Representative basidia and cheilocystidia. Note the similarities between basidia. Fig. 6. Basidia of L. amethysteo-occidentalis (TENN 42526). Fig. 7. Basidia of L. nobilis (TENN 42527). Fig. 8. Basidia of L. oblongospora (TENN 42522). Fig. 9. Basidia of L. trichodermophora (TENN 42523). Fig. 10. Basidia of L. vinaceo-brunnea (TENN 42525). Fig. 11. Cheilocystidia of L. amethysteo-occidentalis (TENN 42582). Fig. 12. Cheilocystidia of L. oblongospora (TENN 42522). Fig. 13. Cheilocystidia of L. vinaceo-brunnea (TENN 42525).

MACROMORPHOLOGY: BASIDIOMA: Pileus (16-)24-77 mm broad, convex to plane, occasionally becoming uplifted, depressed to deeply depressed, not striate, fibrillose-scaly becoming scaly to squarrose, brownish orange ("Sanford's Brown" to "Cinnamon-Rufous"), occasionally darker at disc ("Hazel"); margin decurved to plane, occasionally becoming upturned, entire to eroded; context thin, concolorous. Lamellae moderately broad to very broad, moderately thick to thick, sinuate to adnate, close to distant, pinkish flesh color ("Flesh Color" to "Pale Flesh Color" to "Orange-Pink"). Stipe (21)26-110 x 4-10(-16) mm, equal to slightly bulbous, dry, fibrillose, fibers forming prominant longitudinal striations, occasionally almost forming reticulate ridges, often with recurved scales near apex when mature, concolorous with pileus. Basal mycelium white. Spores white in mass.

MICROMORPHOLOGY: PILEUS: Pileipellis interwoven with scattered fascicles of ± perpendicular hyphae; fascicles usually composed of 15-30 or more hyphae; terminal cells of fascicular hyphae (n = 52) 34.5-59.8(-73.6) x (4-)7-13.8(-19.3) µm, subclavate to clavate, occasionally broadly clavate or capitate; walls up to 0.5 µm thick, light to moderate yellowish brown; contents hyaline to light yellowish brown. Trama tightly interwoven, undifferentiated, hyaline, light yellowish brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 2.8-10 µm diam, thin-walled, hyaline to light yellowish brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 75) 32.2-55 x 7.8-13.8 µm, clavate, elongate, hyaline; sterigmata 4, up to 8.7 µm long. Pleurocystidia lacking. Cheilocystidia lacking. Basidiospores (excluding ornamentation) [75/4] 7.4-9.7(-10.6) x 6.4-8.7 µm (mean dimensions = 8.5±0.7 x 7.5±0.6 µm), L/W = 1-1.26(-1.33) (mean L/W = 1.15±0.09), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, hyaline, echinulate; spines < 0.5-1.4 µm long (mean length = 0.9±0.2 µm), crowded; hilar appendix 1.3-2 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 1.8-12 µm diam, tightly interwoven, hyaline; cell long, undifferentated to barrel-shaped.

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 2 isolates): PDA: Radius at week III = 23-34 mm, at week VI = 35-43 mm; mat felty, moderately thick to thick, tightly interwoven, almost crustose, submerged, with time forming a pruinose aerial layer away from plug, not translucent, at first dark bright violet, soon fading, by week VI the dark purple color restricted to a 7-9 mm band near margin, rest of mat light orange brown; pruinose aerial hyphae light grayish purple becoming light orange brown; margin 3-4 mm broad, subfelty, thin, very uneven, light violet to white; plug concolorous with mat. MNM: Radius at week III = 40-47 mm, at week VI = 67-78 mm; mat subfelty, thin, becoming slightly thicker with age, loosely to tightly interwoven, submerged, translucent to slightly translucent, light violet, color often becoming restricted to 3-4 mm band at midpoint, remainder of mat white; margin 3-6 mm broad, silky to subfelty, thin, parallel to loosely interwoven, entire, very light violet to white; plug concolorous with mat. MA: Radius at week III 33-47 mm, at week VI = 47-77 mm; mat subfelty, thin to slightly thicker near plug, loosely interwoven, submerged, translucent, white; margin 1-2 mm broad, subfelty, thinner than mat, undulate, white; plug white. EXTRACELLULAR OXIDASE: Reaction moderate blue color immediately, unchanging.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 2 isolates): PDA: Hyphae mostly undifferentiated with occasional irregular swollen hyphae, purplish brown in mass. MNM: Hyphae mostly undifferentiated with rare, widely scattered irregular swollen hyphae near margin. MA: Hyphae undifferentiated.

HABITAT AND DISTRIBUTION: Solitary to scattered; usually at high elevations (below tree line); Cascade and Rocky Mts. Number of collections examined per state: Colorado 13; Idaho 1; New Mexico 1; Washington 2.

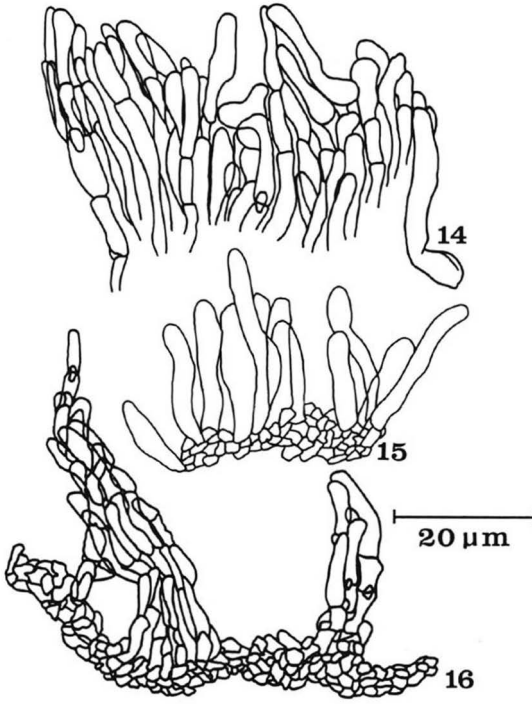
OBSERVATIONS: Laccaria nobilis can be distinguished from other members of the "L. laccata complex" by its large size, scaly to squarrose pileus and scaly to almost reticulate stipe. Its culture mat morphology differs from L. laccata sensu stricto by displaying a relatively fast growth rate and purple to violaceous mat color on PDA and MNM in contrast to the slow growth and white mat color on all three media exhibited by L. laccata (Figs. 19, 20). Alexander H. Smith proposed the name L. nobilis in an unpublished manuscript along with several other proposed taxa including L. pisciodorus (Smith no. 18812) and L. sphagnicola (Smith no. 4573). These latter two taxa were judged not sufficiently distinct (based on available material) to justify validly publishing these epithets.

Laccaria oblongospora Mueller. sp. nov. Figs. 3, 8, 12, 16, 21.

Pileo (5-)12-59 mm lato, haud striato, aurantio-brunneo, interdim vinaceo. Lamellis plerumque carneorosellis, interdum vinaceis. Stipite (11-)20-65 x 2-12 mm, interdum striato, concolori; mycelio basali plerumque albo, interdum violaceo. Basidiis tetrasporis. Cheilocystidiis nullis vel dispersis. Sporis 7.4-10 x 5-7 µm sine ornamentatione, ellipsoideis vel oblongis, echinatis; breve spinosis.

Type specimen (HOLOTYPE): TENN - TENN 42522; USA: Mississippi, Harrison Co., DeSoto National Forest, Harrison Experimental Forest, Road H-8. 7.XII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus (5-)12-59 mm broad, obtuse to convex, becoming plane to uplifted, often depressed, not striate, finely fibrillose, becoming fibrillose-scaly, hygrophanous, brownish orange, ("Vinaceous-Rufous" to "Kaiser Brown" to "Apricot Buff" or "Burnt Sienna" to "Sanford's Brown"), occasionally vinaceous color ("Vinaceous-Brown" or "Vinaceous-Russet" to "Japan Rose"); disc often darker, red brown to dark orange brown or occasionally vinaceous ("Dark Livid Brown" to "Deep Brownish Vinaceous" to "Hay's Russet" or "Chocolate" to "Vinaceous-Russet" or "Mahogany Red"); margin incurved to decurved, becoming plane to uplifted, entire to undulate, occasionally becoming eroded; context 1-2 mm thick, tapering quickly to margin, flesh color ("Pale Vinaceous-Pink"). Lamellae broad to very broad, thick to very thick, sinuate to adnate, occasionally arcuate, subdistant to distant, pinkish flesh color ("Vinaceous-Pink" to "Buff-Pink" or "Light Congo Pink" to "Shell Pink"), occasionally vinaceous or violaceous ("Light Brownish Vinaceous" to "Pale Brownish Vinaceous" or "Light Pinkish Lilac"). Stipe (11-)20-60(-65) x 2-12 mm, equal to subclavate, often slightly bulbous, dry, fibrillose, occasionally finely longitudinal-striate concolorous with pileus; striations occasionally darker ("Pecan Brown").

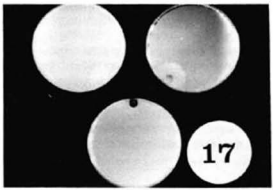


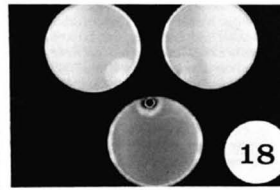
Figs. 14-16. Representative pileipelli. Fig. 14. L. trichodermophora (TENN 42523). Fig. 156. L. vinaceo-brunnea (TENN 42525). Fig. 16. L. oblongospora (TENN 42522). This type of pileipellus is also found in L. amethysteo-occidentalis and L. nobilis.

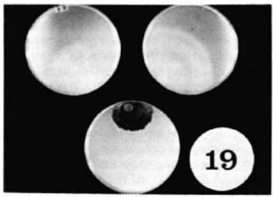
Basal mycelium usually white, occasionally violet. Spores white in mass.

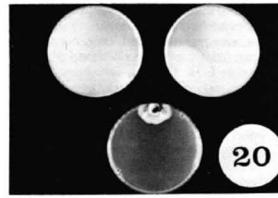
MICROMORPHOLOGY: PILEUS: Pileipellis loosely interwoven with scattered large fascicles of ± perpendicular hyphae; fascicles long, usually composed of (5-)10-30 or more hyphae; terminal cells of fascicular hyphae (n = 50) 32.5-71 x 7-24.5 µm, undifferentiated to subclavate to clavate, occasionally broadly clavate or capitate; walls up to 0.5 µm thick, light yellowish brown to light vinaceous; contents hyaline to light yellowish brown or light vinaceous. Trama tightly interwoven, undifferentiated, hyaline, moderate yellowish brown to light vinaceous toward cuticle. LAMELLA: Trama parallel; hyphae 3-10 µm diam, thin-walled, hyaline to light yellowish brown; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 53) 24-35 x 6.4-10 µm, clavate, elongate, hyaline; sterigmata 4, up to 5.5 µm long. Pleurocystidia lacking. Cheilocystidia (n = 20) 31.5-53 x 2.8-7 µm, undifferentiated to subclavate, found only in some collections, scattered, thin-walled, hyaline. Basidiospores (excluding ornamentation) [90/5] (6.8-)7.4-10 x (4-)5-7 µm (mean dimensions = 8.7 ± 0.7 x 5.8 ± 0.5 µm), L/W = (1.25-)1.3-1.76(-1.8) (mean L/W = 1.51 ± 0.12), ellipsoidal to oblong, occasionally subreniform, hyaline, echinulate; spines < 0.5(-1.4) µm long (mean length = 0.6 ± 0.1 µm), spines over 0.5 µm long restricted to spore apex, crowded; hilar appendix 1.32-2 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acanophyllic. BASAL MYCELIUM: Hyphae mostly 2.8-11 µm diam, tightly interwoven, hyaline; cells long, undifferentiated to barrel-shaped.

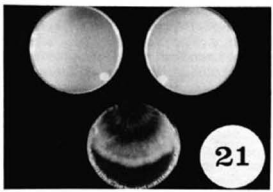
CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 5 isolates): PDA: Radius at week III = 28-39 mm, at week VI = 45-78 mm; mat felty, moderately thick to thick, tightly interwoven, with scattered small sectors of longer, loosely interwoven hyphae, submerged, on aging forming pruinose aerial layer away from plug, not translucent, at first dark violet, soon fading, by week III light to moderate violet restricted either to 2-3 mm band near margin or 4-5 mm zone near plug, most of mat light orange brown, by week VI all light orange brown, no violet coloration present; margin up to 5 mm broad, silky to subfelty, thin, uneven to very uneven, very light violet, becoming white; plug concolorous with mat. MNM: Radius at week III most 48-56 mm, one isolate 30-36 mm, at week VI most covering agar surface, one isolate 58-78 mm; mat subfelty to subwooly, very thin to thin, becoming thicker, loosely interwoven, some with subwooly to wooly or cottony narrow strands radiating out from plug to margin, between strands very thin, submerged, translucent, becoming somewhat translucent, at first light violet, soon fading to very light violet to white; margin not well differentiated, thin, uneven to very uneven, concolorous; plug concolorous. MA: Radius at week III = 26-40 mm, at week VI = 51-78 mm; mat subfelty, very thin to thin, loosely interwoven, some with 1-3 narrow slightly thicker concentric bands, submerged, translucent, white; margin 1-2 mm broad, not well differentiated, even to uneven, white; plug white. EXTRACELLULAR OXIDASE: Reaction in one isolate (TENN 42522) moderate blue color after 1 hr, all other negative.

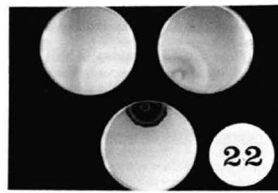


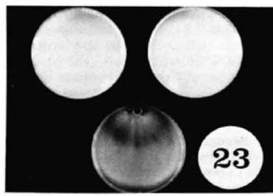












Figs. 17-24. Photographs of four-week-old vegetative culture mats. Fig. 17. L. amethysteo-occidentalis (TENN 42526). Fig. 18. L. ochropurpurea (TENN 42915). Fig. 19. L. nobilis (TENN 42893). Fig. 20. L. laccata (TENN 42961). Fig. 21. L. oblongospora (TENN 42672). Fig. 22. L. proxima (TENN 42920). Fig. 23. L. trichodermophora (TENN 42705).

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 5 isolates): PDA: Hyphae mostly undifferentiated with scattered irregular swollen hyphae and subcoralloid hyphae, occasionally coralloid hyphae present. MNM: Hyphae mostly undifferentiated with any combination of scattered, rare to moderately common irregular swollen hyphae, subcoralloid hyphae or coralloid hyphae. MA: Hyphae mostly undifferentiated with scattered irregular swollen hyphae and subcoralloid hyphae.

HABITAT AND DISTRIBUTION: Gregarious; in very sandy soil under Pinus palustris Miller; Gulf Coast. Number of collections examined per state: Mississippi 30.

OBSERVATIONS: Laccaria oblongospora often appears similar to other members of the "L. laccata complex" in the field, but it can readily be distinguished by its strongly ellipsoidal to oblong, short-spined basidiospores. The size, shape, and ornamentation of its basidiospores are most similar to those of L. proxima (Boud.) Pat. but are more elongate, mean L/W = 1.51 versus 1.27 for L. proxima. This difference was statistically significant based on a t-test between the mean basidiospore L/W of both taxa. Additionally, the two taxa have unique culture mat morphologies (Figs. 20, 21).

Basidiocarp color varies greatly in this taxon. Most specimens exhibited the typical orange brown coloration of L. laccata sensu lato. Scattered amongst these were a few individual fruitbodies which were vinaceous to violaceous (e.g., TENN 42524). Initially, these vinaceous collections were thought to represent a separate taxon. However, due to the occurrence of intermediate color forms (orange brown pilei and stipes with violaceous basal mycelium and/or lamellae) and the fact that both color forms showed identical micromorphology and culture mat morphology, they have been treated as contaxic.

Only two populations of this species have been located. Both populations were very large, occurred under long leaf pine, and were within several kilometers of each other.

Laccaria trichodermophora Mueller. sp. nov. Figs. 4, 9, 14, 23.

Pileo 9-66 mm lato, haud striato, aurantio-brunneo. Lamellis carneorosellis. Stipite 22-125 x 2-11 mm, striato, concolori; mycelio basali plerumque albo, interdum violaceo. Cuticula trichodermide vel abundis perpendicularibus fasciis hypharum. Basidiis tetrasporis. Cheilocystidiis nullis. Sporis plerumque 7.4-9.2 x 6.4-8.3 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42523; USA: Mississippi, Harrison Co., DeSoto National Forest, Harrison Experimental Forest, Road H-6. 5.XIII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus 9-66 mm broad, convex to to plane, occasionally becoming uplifted, often depressed, not striate, finely fibrillose, becoming fibrillose-scaly to scaly due to cuticular difraction, hygrophanous, brownish orange, occasionally reddish brown ("Hazel" to "Vinaceous-Rufous" or "Auburn" to "Orange Rufous" or "Cacao Brown"), fading lighter ("Flesh-Ocher" to "Apricot Buff"), occasionally darker at disc ("Hay's Russet" to "Kaiser Brown"); margin incurved to decurved, often becoming

plane, entire to undulate, sometimes becoming eroded; context 1-2 mm thick, tapering quickly to margin, pinkish flesh color ("Light Congo Pink" to "Pale Vinaceous-Pink"). Lamellae moderately broad to broad, relatively thin to thick, sinuate to adnate, close to subdistant to distant, flesh color ("Vinaceous Pink" to "Shell Pink" or "Flesh Color" to "Pale Salmon Color"), sometimes become vinaceous in age (near "Vinaceous"). Stipe 22-125 x 2-11 mm, equal to subclavate, occasionally slightly bulbous, dry, fibrillose, inconspicuously to moderately longitudinally striate, brownish orange to reddish brown ("Rood's Brown" to "Onion-skin Pink" or "Kaiser Brown" to "Cinnamon-Rufous" to "Salmon Color"); context stuffed, becoming hollow, concolorous with pileus context. Basal mycelium usually white, occasionally violet (near "Lavender").

MICROMORPHOLOGY: PILEUS: Pileipellis composed of very numerous large fascicles of ± perpendicular hyphae, forming a trichodermium in young specimens and at the disc; fascicles long, usually composed of more than 30 hyphae; terminal cells (n = 60) 25.3-73.6 x 6-28 µm, undifferentiated to clavate, occasionally capitate; walls up to 0.5 µm thick, light to moderate yellowish brown; contents hyaline to light yellowish brown. Trama tightly interwoven, undifferentiated, hyaline, light yellowish brown toward cuticle. LAMELLA: Trama parallel; hyphae mostly 3.2-15 µm diam, thin-walled, hyaline to light yellowish brown; cells long, undifferentiated to barrel-shaped. Subhymenium undifferentiated. Basidia (n = 70) 25.8-46 x 7.4-12.4 µm, clavate, elongate, hyaline; sterigmata 4, up to 8.7 µm long. Pleurocystidia lacking. Cheilocystidia lacking. Basidiospores (excluding ornamentation) [90/6] (7-)7.4-9.2(-10.6) x 6.4-8.3(-9.2) µm (mean dimensions = 8.3±0.6 x 7.6 ± 0.5 µm), L/W = 1-1.18 (-1.33) (mean L/W = 1.09 ± 0.07), subglobose to broadly ellipsoidal, occasionally globose or ellipsoidal to amygdaliform, hyaline, echinulate; spines (0.5-)0.9-1.8 µm long (mean length = 1.3± 0.3 µm), irregularly spaced to crowded; hilar appendix 1.3-1.8 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 3.2-12 µm diam, tightly interwoven, hyaline; cells long, undifferentiated to barrel-shaped.

CULTURE MAT ANALYSIS: MACROMORPHOLOGY (n = 5 isolates): PDA: Radius at week III = 16-38 mm or 42-45 mm, at week VI = 29-48(-59) mm or covering agar surface; mat felty, moderately thick to thick, tightly interwoven, uniformly thick or with narrow thicker dendritic strands radiating out from plug, submerged, usually forming pruinose aerial layer away from plug, not translucent, very dark bright violet, fading to moderate violet, finally to light orange brown near plug; aerial hyphae light grayish violet; margin 5-6 mm broad, subfelty to felty or silky, thin to almost moderately thick, entire to very uneven, very light violet to white; plug very dark violet, soon becoming light orange brown. MNM: Radius at week III = 26-44 mm or 52-64 mm, at week VI = 54-78 mm or agar surface covered; mat subfelty becoming felty or silky, moderate to moderately thick or very thin, with 2-3 narrow (2-3 mm) slightly thicker concentric zones or with slightly thicker radially arranged dendritic strands from midpoint to margin or uniformly thin, submerged, translucent to slightly translucent, very light violet, thicker zones somewhat darker; margin not well differentiated from mat, silky to subfelty, sinuate, very light violet to white; plug concolorous with mat. MA: Radius at week III = 20-26 mm or 35-42 mm, at week VI = 38 mm to agar surface covered; mat subfelty, very thin or moderate, occasionally thicker near plug, loosely or moderately interwoven, submerged, translucent or somewhat translucent, white; margin not well differentiated from mat, silky to subfelty, entire to sulcate, white; plug white. EXTRACELLULAR

OXIDASE: Reaction normally a moderate blue color immediately, negative in TENN 42523.

CULTURE MAT ANALYSIS: MICROMORPHOLOGY (n = 5 isolates): PDA: Hyphae mostly undifferentiated with occasional subcoralloid hyphae and irregular swollen hyphae. MNM: Hyphae same as on PDA. MA: Hyphae mostly undifferentiated occasionally with scattered irregular swollen hyphae.

HABITAT AND DISTRIBUTION: Scattered to gregarious; in very sandy soil, under Pinus palustris; Gulf Coast. Number of collections examined per state: Alabama 1; Louisiana 4; Mississippi 23.

OBSERVATIONS: Laccaria trichodermophora can be distinguished from L. laccata by its pileipellis composed of a trichoderm of numerous large hyphal fascicles, relatively small, subglobose to broadly ellipsoidal, moderately spined basidiospores, larger, more robust basidiocarps, and unique culture mat (Figs. 20, 23).

Although similar in overall culture mat morphology, isolate TENN 42705 grew at a much faster rate than the other four isolates used. Since there was no apparent basidiocarp morphology differences between it and other collections of the species, it is considered contaxic. Similarly, even though the basidiocarps of TENN 42706 had violet basal mycelium, no significant differences in its micromorphology or culture mat could be discerned.

Laccaria vinaceo-brunnea Mueller. sp. nov. Figs. 5, 10, 13, 15.

Pileo 7-25(-42) mm lato, violaceo in statu juvenili, paulatim vinaceobrunneo dein rufrobrunneo, siccando pallidiore. Lamellis purpureo-violaceis. Stipite 7-56(-98) x 2-7 mm, haud fortiter striato, concolori. Cuticula abundis grandibus perpendicularibus hyphis intertexta. Basidiis tetrasporis. Cheilocystidiis grandibus, abundis. Sporis plerumque 7.4-10 x 6.4-9.2 µm sine ornamentatione, plerumque subglobosis vel late ellipsoideis, echinatis; spinis curtis vel moderatis.

Type specimen (HOLOTYPE): TENN - TENN 42525; USA: Louisiana, Tammany Parish, Fountainbleau State Park, under Quercus virginiana Miller. 9.XII.1980. [!]

MACROMORPHOLOGY: BASIDIOMA: Pileus 7-25(-42) mm broad, obtuse to convex, becoming plane to uplifted, often depressed, not striate or occasionally finely striate when wet, finely fibrillose, occasionally becoming finely fibrillose-scaly, hygrophanous, when very young violaceous (near "Purplish Lilac"), soon becoming vinaceous brown ("Dark Vinaceous Brown" to "Hay's Brown" to "Vinaceous-Brown"), becoming reddish brown ("Cameo Brown" to "Walnut-Brown"), fading to near orange brown to buff ("Cinnamon-Rufous" to "Light Ochraceous-Buff"); margin decurved to plane, entire to eroded; context thin, tapering to margin, light vinaceous ("Light Brownish Vinaceous" to near "Vinaceous-Fawn"). Lamellae moderately broad to very broad, thick to very thick, waxy, adnate to arcuate, subdistant to distant, purple ("Purplish Lilac" to "Purplish Vinaceous"). Stipe 7-56(-98) x 2-7 mm, equal or occasionally subclavate, often slightly bulbous, dry, fibrillose, occasionally with recurved fibers or finely striate, concolorous with pileus; fibers ("Hazel" to "Vinaceous-Brown"). Basal mycelium violet. Spores white in mass.

MICROMORPHOLOGY: PILEUS: Pileipellis interwoven with very numerous ± perpendicular individual large hyphae, almost forming a palisadoderm but hyphae not dense enough; terminal cells (n = 30) 32-78 x 7-14.5 µm, undifferentiated to clavate, hyaline to light vinaceous; walls up to 0.5 µm thick; contents hyaline. Trama tightly interwoven, undifferenciated, hyaline to light olive brown in mass. LAMELLA: Trama parallel; hyphae thin-walled, hyaline; cells long, barrel-shaped. Subhymenium undifferentiated. Basidia (n = 30) 33-60 x 8.5-9.2 µm, clavate, elongate, hyaline; sterigmata 4, up to 9.2 µm long. Pleurocystidia lacking. Cheilocystidia (n ± 32) 31.5-92 x 5.5-11 µm, undifferentiated to clavate, very abundant, extending well beyond basidia, hyaline. Basidiospores (excluding ornamentation) [60/4] (7)-7.4-10(-10.6) x 6.4-9.2(-9.7) µm (mean dimensions = 8.7±0.8 x 7.8±0.7 µm), L/W = 1-1.26 (mean L/W = 1.11±0.06), subglobose to broadly ellipsoidal, occasionally globose, hyaline, echinulate; spines <0.5-1.4(-1.8) µm long (mean length = 1±0.3 µm), crowded; hilar appendix 1.3-1.8 µm long, prominant, truncate; plage present; contents aguttulate to occasionally uniguttulate; nonamyloid, acyanophyllic. BASAL MYCELIUM: Hyphae mostly 2.8-8.2 µm diam, tightly interwoven, long-celled, hyaline.

HABITAT AND DISTRIBUTION: Scattered to gregarious, often caespitose; in sandy soil under Quercus virginiana; Gulf Coast. Number of collections examined per state: Louisiana 19; Mississippi 4.

OBSERVATIONS: Laccaria vinaceo-brunnea can be distinguished from L. amethystina and L. amethysteo-occidentalis by its habitat (almost exclusively under Live Oak), color (quickly becoming dark vinaceous brown to reddish brown), unique pileipellar arrangement, and short-spined, subglobose to broadly ellipsoidal basidiospores. As in the latter two species, the abundant large cheilocystidia often make a reliable character to use in identifying dry collections which lack notes on macromorphology. Although several attempts to obtain tissue cultures of this species were made, none were successful.

ACKNOWLEDGEMENTS

My thanks go to Dr. Ronald Petersen, Knoxville, TN for his support and guidance during this study and Dr. Walter Sundberg, Carbondale, IL for critically reading this manuscript. For help with the latin diagnoses, I gratefully acknowledge Dr. Lennart Holm, Uppsala, Sweden. I also wish to thank Dr. Bill Cibula and the members of the New Orleans Mycological Society for assistance during field work in Mississippi and Louisiana. Partial financial support of this study came from Sigma Xi, The Research Society of America.

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MYCOTAXON

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Cookeina indica, a new species from India with a key to the species of *Cookeina*

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The purpose of this brief note is to describe a species of *Cookeina* which has heretofore not been recognized. Of the tropical species of the Pezizales, few are so frequently encountered as are species of *Cookeina*. The large apothecia of these species and their often prominent coloration assure that collectors take notice. In certain habitats, where twigs and branches accummulate, members of the genus may be found in great profusion.

To date, five species have been recognized in the genus. These species are morphologically distinct and are easily delimited. Denison (1967), Rifai (1968), and Eckblad (1968) have treated them. Pfister (1978) provided some observations on apothecial development in the pantropical *C. tricholoma*, and Zoberi (1973) discussed the influence of water on spore release in *C. sulcipes*, another pantropical species.

In the course of studying distributional ranges of the species of *Cookeina*, the senior author, some time ago, located a specimen at BPI which seemed to represent an undescribed species. The specimen, from India, was poorly preserved and fragmentary. Recently, the junior author collected material which he recognized as being unlike described species of *Cookeina*. This collection proved to be the same as the BPI material and allowed description.

Cookeina indica Pfister et Kaushal, sp. nov.

Apothecia grandia, usque 3 cm diam, stipitata cupulata, coriacea; stipites usque 2.2 cm x 1.5 mm. Hymenia lutea, laevia; pars exterior concolorans. Asci cylindracei,

octospori 300-370 x 14-16 µm; ascosporae ellipsoideae, asymmetricae, guttulatae, primum laeves, denique minute striatae, 26.5-34.2 x 10-11.5 µm. Paraphyses anastomosantes 4.5 µm diam.

In ramunculi emortui.

Holotypus: on wood in an angiospermous forest, Tipi, West Kameng, Arunachal Pradesh, India (alt. 300 m), Sept. 16, 1981, col. Rishi Kaushal (#18611) (FH), (isotype PAN).

Other specimens examined: on *Dalbergia* sp., Dehra Dun, India, Sept. 2, 1952 (BPI).

Apothecia stipitate, cupulate, up to 3.5 cm high and up to 3 cm in diameter, gregarious, tough in consistency; stalk up to 2.2 cm long and up to 1.5 mm thick; solid, terete; external surface of the disc concolorous with the hymenium, nearly smooth except at the margin where it is minutely furfuraceous. Margin entire. Hymenium yellow, smooth. Asci 300-370 x 14-16 µm, 8-spored, long cylindrical, base narrow-hyphoid, thick-walled, apices obtuse, J-. Ascospores 26.5-34.2 x 10-11.5 µm; ellipsoid, 3-guttulate or multiguttulate, often inequilateral, with thickened walls at the poles of the spores, ornamentation of fine longitudinal ridges which sometimes anastomose, branching more oftenly at the apex, sometimes swollen up to 4.5 µm, slightly projecting beyond the ascus tips.

Outer excipulum up to 44 µm thick, textura angularis, cells up to 25 x 14.5 (-21.5) µm: medullary excipulum up to 160 µm thick, of interwoven hyphae somewhat parallel in arrangement at the junction between layers. Hairs arising from the outer excipulum and reaching a length of 80 µm.

Holotype: on wood in an angiospermous forest, Tipi, West Kameng, Arunachal Pradesh, India (alt. 300 m.). Sept. 16, 1981, Rishi Kaushal (#18611) FH (isotype PAN).

Other specimen examined: on *Dalbergia* sp., Dehra Dun, India, Sept. 2, 1952 (BPI).

Comments--*Cookeina indica* is distinct, having striate spores, a yellow hymenial surface and a non-hairy, nearly smooth outer surface. It seems quite limited in distribution. In the genus *Cookeina* the distributional patterns are of interest. Two species, *C. sulcipes* and *C. tricholoma*, are cosmopolitan. The remainder of the species are more limited in range. *C. venezuelae* has been reported from Jamaica and the northern part of South America. *C. colensoi*, on the other hand, has been reported from northern and central South America and from southern pacific areas. *C. insititia*, treated by some authors in the genus *Boedijnopeziza*, is found in the Pacific basin and *C. indica*

seems limited to the Indian subcontinent. As more becomes known of the genus and the modes of speciation in it, these patterns may become important.

For convenience, a key to species is provided below.

Key to species of *Cookeina*

1. Apothecia with distinct hairs, stipitate 2
1. Apothecia smooth or at least without long prominent hairs, sessile, substipitate or stipitate, with or without gelatinous material in the excipular tissues 4
   2. Hairs broad, pyramidal; ascospores smooth, fusoid to more or less allantoid, with a single spore wall, 38-48 x 8-10 µm. Apothecia with a gelatinous layer within the cortical region . . . . . *C. insititia* (Berk. & Curt.) O. Kuntze
   2. Hairs slender, ascospores ornamented with longitudinal striations. Apothecia non-gelatinous. . . 3
3. Hairs arising from the medullary tissue, more or less evenly spaced on the outside of the apothecium; paraphyses slender, exceeding the asci only slightly, ascospores marked with longitudinal ridges, 25-31 x 12-14 µm . . . . . *C. tricholoma* (Mont.) O. Kuntze
3. Hairs arising from the outer excipulum, formed in rows at the margin of the disc; paraphyses sometimes setose, exceeding the asci; ascospores longitudinally striate, 25-30 x 13-16 µm . . . . *C. sulcipes* (Berk.) O. Kuntze
   4. Ascospores ornamented with longitudinal striations or with a combination of longitudinal and transverse folds 5
   4. Ascospores smooth, 28-36 x 9-12 µm, apothecia sessile or with a short stipe, with a gelatinous layer in the inner cortical region . . . . . *C. colensoi* (Berk.) Seaver
5. Ascospores with longitudinal and transverse markings, 32-37 x 11-14 µm; inner cortical layer gelatinous; apothecia sessile . . . . . .*C. venezuelae* (Berk. & Curt. in Cooke) Le Gal
5. Ascospores with fine longitudinal markings only; 26.5-34.2 x 10-11.5 µm; gelatinous layer lacking or at least not well-formed; stipe well-developed . . . . . *C. indica* Pfister & R. Kaushal

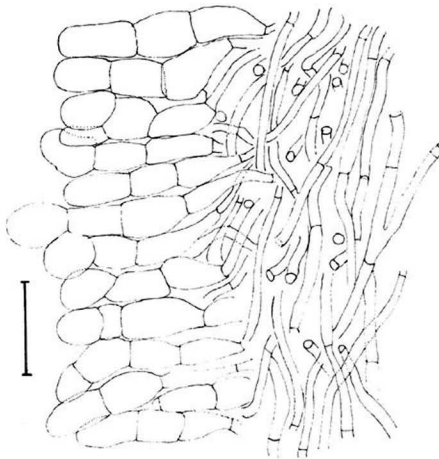

Figure 1. A portion of the outer excipulum of *Cookeina indica*. Scale equals 20 µm.

Acknowledgements

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MYCOTAXON

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GLOMUS DESERTICOLA SP. NOV.

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GLOMUS DESERTICOLA Trappe, Bloss & Menge, sp. nov. Figs. 1-6

Sporae singulatim vel in fasciculis laxis in solo vel in radices efformatae, globosae vel subglobosae, (47-)54-115 x (38-)52-102 µm, nitide-laeves, hepaticae, tunica singula (1.5-)2-2.5(-4) µm incrassata. Hypha affixa 6-12 µm in diam., tunica prope sporam incrassata sed hypham non occludens, hepatica. Tunica sporae interius ad afficionem hyphalem colliformane incrassata.

Spores borne singly or in loose fascicles in soil or within roots, globose to subglobose, (47-)54-115 x (38-)52-102 µm, shiny-smooth, reddish brown, with a single, sometimes laminated wall (1.5-)2-2.5(-4) µm thick. Attached hypha 6-12 µm in diam., cylindric to occasionally somewhat funnel shaped, the walls thickened and reddish brown, especially thick adjacent to the spore but not occluding the hypha. Interior of the spore wall at the hyphal attachment thickened at maturity to form an inner mounded collar, which appears to be closed by a membranous septum.

DISTRIBUTION AND HABITAT: Southern California, Arizona, and Texas, in sandy desert soils.

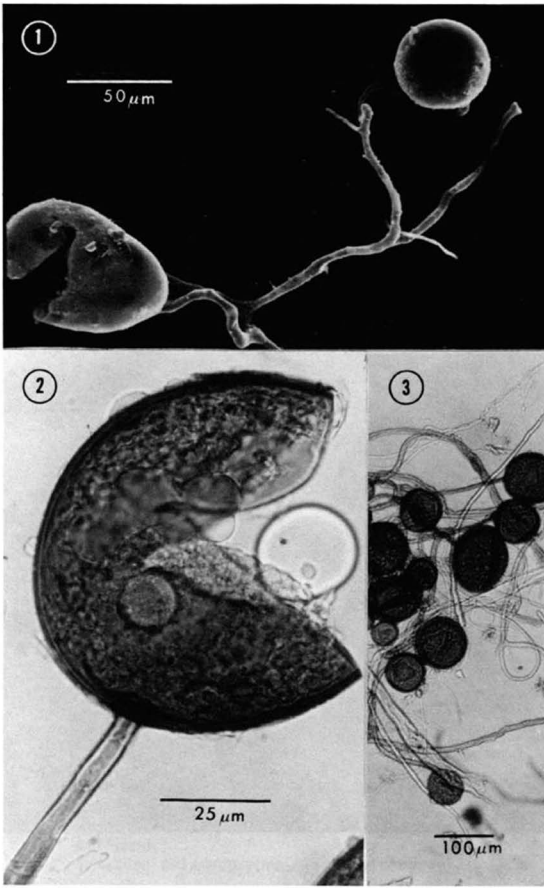
MYCORRHIZAL ASSOCIATIONS: Occuring among mycorrhizae of Parthenium argentatum A. Gray, P. incanum H.B.K., and Simmondsia chinensis (Link) Schneid. in the field; forms mycorrhizae and sporulates in pot culture with Sorghum sudanense (Pip.) Staff.

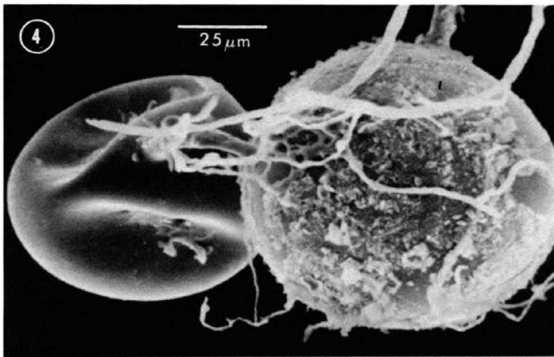
ETYMOLOGY: Latin, deserticola (desert dweller). The gender of the generic name Glomus is neuter, so adjectival species epithets must also be neuter. The suffix "-cola" is a feminine substantive, not an adjective, and thus retains its feminine ending.

COLLECTIONS EXAMINED: TYPE: CALIFORNIA, Riverside Co., Thermal, Willits and Newcomb property, Menge O-1#25(OSC). PARATYPES: ARIZONA: Pima Co., Tucson Mountains, Gates Pass, elev. 1,040 m, col. H. E. Bloss, 5 July 1978, Trappe # 5477, 7201(OSC); Pot cultured with Sorghum sudanese, H. E. Bloss, 1979, Trappe #7200(OSC). TEXAS: Brewster Co., 48 km South of Alpine, pot cultured with S. sudanese for 65 days, col. Judy Blackwell, Trappe #7453(OSC).

The walls of occasional G. deserticola spores appear to have either a very thin outer layer or a similarly thin inner layer. Because these structures are not evident on all or even most spores, we regard them as laminations or artifacts due to light refraction. The collar on the inner spore wall at the hyphal attachment is well developed only on quite mature spores. Only then could the membranous septal closure of the hyphal attachment be seen on some spores. On most spores at that stage, interference from adjacent spore walls prevented a clear view with the light microscope. Transmission-electron microscopy is needed to clarify the details of such structures.

FIGURES 1-3. Glomus deserticola
(1) Scanning electron micrograph of two chlamydospores and connective hyphae.
(2) Mature broken chlamydospore, light micrograph.
(3) Light micrograph showing several chlamydospores and hyphae.


1
50 μm
2
25 μm
3
100 μm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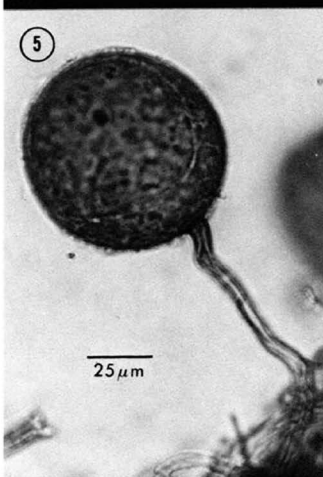
25 μm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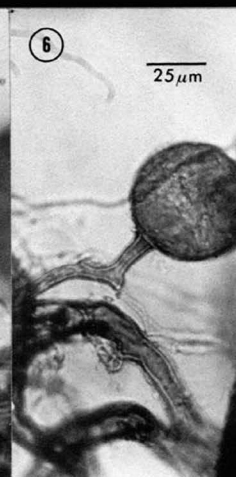
25 μm


6
25 μm

G. deserticola encompasses the general size range of Glomus fasciculatum, from which it differs by having deep reddish brown walls +2 µm at maturity (vs. yellowish brown walls 5-10 or more µm thick), a relatively narrow, reddish brown hyphal attachment not occluded by wall thickening (vs. a broad, hyaline to yellowish brown hyphal attachment occluded by wall thickening at maturity), and apparently a closure of the attached hypha by a septum. Until now, G. deserticola has been grouped with other variants under the name G. fasciculatum sensu lato; the type collection of G. deserticola, Menge #0-1, is from a pot culture that has been widely distributed to mycorrhiza researchers as "G. fasciculatum." References to "G. fasciculatum 0-1" should thus be corrected to "G. deserticola 0-1."

FIGURES 4-6. Glomus deserticola
(4) Scanning electron micrograph showing two chlamydospores and hyphae.
(5) Light micrograph of mature chlamydospore with hypha attached.
(6) Immature chlamydospore, light micrograph.

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SOME HYPHOMYCETES WITH THALLIC CONIDIA

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Trichothecium cinnamomeum Lib. is reclassified in *Malbranchea*. It has differentiated fertile hyphae and yellow ochre pigmentation. *Arthropsis cirrhata* sp. nov. differs from the species known to date mainly by exuding a vivid orange pigment and forming arcuate lateral branches.

In the course of a revision of *Geotrichum* by the second author, several interesting species with thallic conidia were encountered. The type collection of *Trichothecium cinnamomeum* Lib. was well preserved in the Brussels Herbarium. It was found to be a *Malbranchea* species not included in the revision of the genus by Sigler & Carmichael (1976), and is therefore described below.

Malbranchea cinnamomea (Lib.) van Oorschot & de Hoog, *comb. nov.* -- Fig. 1

Trichothecium cinnamomeum Lib. -- Pl. crypt. Arduenna, Coll. I, Nr. 1013. 1830 (basionym) = *Geotrichum cinnamomeum* (Lib.) Sacc. -- Revue mycol. 1881: 55; Michelia 2: 636. 1882; Syll. Fung. 4: 40. 1886.

Colonies on the natural substrate forming patches of irregular shape, up to 4 mm diam, yellow ochre (Methuen 5C7), even, powdery. Hyphae yellowish brown, with firm, thick and smooth walls, 2.5-3.5 µm wide, remotely septate, branched more or less orthotropically from repent hyphae, mostly somewhat curved, occasionally branched, soon converted into chains of arthroconidia which disarticulate easily, leaving a prominent scar on the supporting hypha. Conidia yellowish brown, with firm walls, usually intercalary, adjacent or alternate and connected by hyaline, thin-walled and fragile cells which soon collapse and deteriorate. Conidia cubic to cylindrical sometimes curved, 3-6 x 2.4-3.5 µm, with conspicuous frills at both ends.

Specimens examined: Libert, Pl. crypt. Arduenna, Coll. I No. 1013 (Herb. BR), type specimen, on horse dung with straw, Belgium, M.A. Libert; Sydow, Mycoth. Germ. No. 1744 (Herb. L 922.54-67) on rotten hay, Tamsel, Brandenburg, Germany, leg. P. Vogel, 15 Sept. 1920.

Discussion

The above species is distinguished from other species described in *Malbranchea* Sacc. in that the primary hyphae are pigmented and fertile

branches appear to be little-branched. *M. cinnamomea* is most like *M. aurantiaca* Sigler & Carmichael in colour, the curved fertile hyphae and the conidium size and shape. The arthroconidia of *M. aurantiaca* are more regularly alternate.

The genus *Coremiella* Bubak & Krieger also has catenate arthroconidia and pigmented hyphae, but here hyphae are wider (up to 7 um), often dichotomously branched and aggregated in loose coremia. Arthroconidia of *Coremiella* are directly adjacent and show a protruding scar or papilla at each end (Sigler & Carmichael, 1976).

Arthropsis cirrhata van Oorschot & de Hoog, *sp. nov.* -- Fig. 2

Coloniae in agaro 25°C ad 4-5 mm diam. post 10 dies, pulverulentae, coactae, modice elevatae, aurantiae, in medio dilute aurantiae; reversum aurantiobrunneum, pigmento exsudato brunneo circumdatum. Hyphae fertiles a hyphis vegetativis haud distinctae, dilute luteo-aurantiae, 2-3 um latae, primariae dichotomae, ramos laterales saepe recurvatos rectangulariter formantes; septis densis in successione basipetali divisae conidia enterarthrica producunt; arthroconidia dilute luteo-aurantia, levia, cylindrica vel cuboidea, saepe latiora quam longa, utrinque truncata, 2.5-4.0 x 2-3 um, connectivis trapezoideis separata,post liberationem vestigia parietis exterioris ferentia.
Typus CBS 628.83, vivus et exsiccatus, isolatus e pariete prope Schiphol in Neerlandia.

Colonies on PYE at 25°C restricted, attaining 4-5 mm diam in 10 days, powdery, felty, slightly raised, orange (Methuen 5A7), light orange (5A5) at the centre; reverse brownish orange (7C8), exuding a faint brown pigment into the medium. Hyphae pale yellowish orange, 2-3 um wide, main branches dichotomously branched, with often recurved lateral branches arising at right angles, septating basipetally to form enteroarthric conidi Conidiophores not differentiated. Arthroconidia light yellowish orange, smooth-walled, cylindrical or cubic, often broader than long, truncate at both ends, showing remnants of outer walls at liberation, separated by trapezioid connectives, 2.5-4.0 x 2-3 um. Growth temperatures: optimum 25-30°C, maximum 30°C.

Discussion

Sigler & Carmichael in a series of publications (1976, 1983; Sigler et al., 1982) greatly expanded the knowledge of the Hyphomycetes with cubic arthroconidia. As to the relationship of the genus *Arthrographis* Cochet, they (Sigler & Carmichael, 1983) stated that the taxonomy is still somewhat unsatisfactory. Major generic criteria in this group are the presence of intercalary cells or disjunctors between conidia, the differentiation of fertile branches,and the intensity of pigmentation.

Arthrographis was conceived as hyaline and schizolytic, without disjunctors while *Arthropsis* Sigler et al. was dematiaceous with disjunctors present between conidia. The generic type, *A. truncata*, is dimorphic, a dematiaceou *Humicola* anamorph being produced in addition to hyaline, cubic arthroconidi However, the differences between the various conidial anamorphs are rather difficult to ascertain. In the type specimen of *Arthropsis microsperma* (Berk. & Br.) Sigler, connectives sometimes seemed to be absent. We conside *A. microsperma* as closely related to *Arthrographis cuboidea* (Sacc. & Ell.) Sigler, the differences in conidiogenesis hardly warranting classification

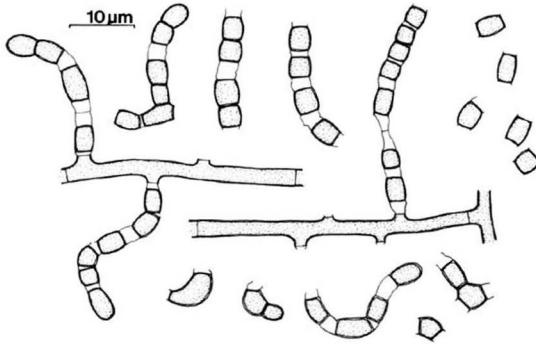

Fig. 1. *Malbranchea cinnamomea*, type specimen (BR).

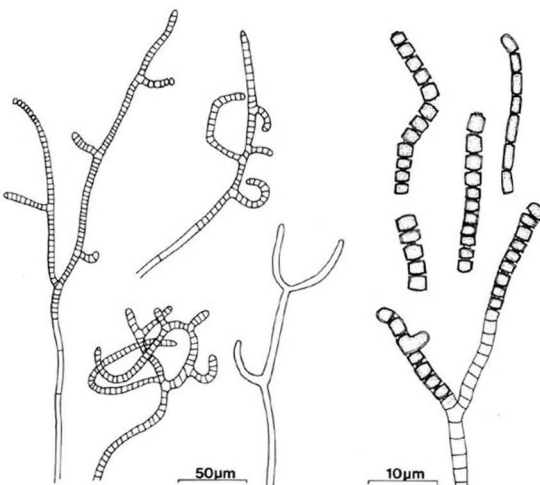

Fig. 2. *Arthropsis cirrhata*, type strain CBS 628.83.

in separate genera. Besides it is uncertain whether the structure of connectives is comparable in all species. For the moment we believe that *Arthropsis* might be a useful genus for all species now known in *Arthrographis*, except the generic type, all being characterized by specialized arthroconidial hyphae and cubic arthroconidia. The anamorph of *Bysseascus striatisporus* (Barron & Booth) v. Arx also fits this genus. The type species of *Arthrographis, A. sulfurea* (Grev.:Fr.) Stalpers & van Oorschot (in Stalpers, 1984), is different from *Arthropsis* in that the conidial structures are unspecialised and additional globose aleurioconidia are present. More material should be collected and TEM studies carried out in anticipation of any nomenclatural changes in this group.

A further synonym of *A. cuboidea* may be *Geotrichum candidum* Link var. *thermoideum* Qureshi & Mirza (1981). However, the type specimen was not sent upon request, and in the diagnosis no attention was paid to the presence or absence of connectives.

The name of the type species of *Arthrographis* was recently changed in Stalpers's (1984) monograph of *Sporotrichum* Link:Fr. Full synonymy now runs as follows:

Arthrographis sulfurea (Grev.:Fr.) Stalpers & v. Oorschot

Sporotrichum sulfureum Grev. -- Mem. Werner. Soc. 4: 69. 1822; Scott. Crypt. Fl. 2: 108. 1823 = *Sporotrichum sulfureum* Grev.:Fr. -- Syst. Mycol 3: 423. 1832 = *Arthrographis sulfurea* (Grev.:Fr.) Stalpers & van Oorschot in Stalpers -- Stud. Mycol. 24: 87. 1984.

Oospora cuboidea Sacc. & Ell. -- Michelia 2: 576. 1882 = *Geotrichum cuboideum* (Sacc. & Ell.) Sumstine -- Mycologia 5: 56. 1913 = *Coremiella cuboidea* (Sacc. & Ell.) Cif. & Caretta -- Mycopath. Mycol. appl. 12: 249. 1960.

Oospora sulfurea Sacc.& Roum. -- Michelia 2: 637. 1882 (non *Oospora sulfurea* (Preuss) Sacc. & Vogl. -- Syll. Fung. 4: 21. 1886) = *Oospora sulphurella* Sacc. & Roum. -- Syll. Fung. 4: 21. 1886 (name change).

Geotrichum microsporum G. Smith -- Trans. Br. mycol. Soc. 45: 388. 1962 = *Briosia microspora* (G. Smith) v. Arx -- Antonie van Leeuwenhoek 38: 293. 1972.

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MYCOTAXON

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SOME NEW AND NOTEWORTHY BASIDIOMYCETES (APHYLLOPHORALES) FROM NEPAL.

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SUMMARY

90 species of Aphyllophorales are reported from Nepal for the first time. Peniohora bicornis, Phlebia albo-fibrillosa, Schizopora roseotingens, Phellinus acontextus, Inonotus hamusetulus and Grammothele bambusicola are described as new. The following new combinations are proposed: Hypochnicium longicystidiosum (Rattan) Hjort. & Ryv., Inonotus flavidus (Berk.) Ryv. and Daedalea incana (Lév.) Ryv.

The mycoflora of Nepal is poorly known. The main contributions include Balfour-Browne (1955 & 1968) and Ryvarden (1977),with additional scattered information in Rattan (1977). In 1979 one of us (L.R.) led a trek to Annapurna in Western Nepal. Although conditions were relatively unsuitable for collecting with walking every day and living in a small tent for 3 weeks, some 490 collections were gathered. The following is a list of species not previously reported from Nepal. The species are arranged by families and within each family alphabetically according to genus. For each species one or several collection numbers are cited behind the name and this, taken in connection with the following list of localities, should give the necessary information. All collections are deposited in the Oslo University Herbarium (O).

List of localities, all in Gandaki prov. Nepal 1979.
Coll. 18500-18527: Pokhara, 1200 m. 27. Oct. 1979.
Coll. 18528-18604: Khare, 1500 m, 28. Oct. 1979.
Coll. 18611-18759: Ghorapani, 2600 m. 30. Oct. 1979.
Coll. 18760-18796: Chomro, Annapurna, 2000 m, 3. Nov.
Coll. 18797-18823: Hinko, Annapurna, 2400 m, 4. Nov.

Coll. 18824-18867: Annapurna base camp. 3800 m, 5. Nov.
Coll. 18868-18990: Kuldi, Annapurna, 2400 m, 11. Nov.

CORTICIACEAE.

Aleurodiscus aff. **bertii** Lloyd. 18848, 18849.
Two, fairly small specimens probably belonging to this group of species (compare Lemke, 1964) but which differ from the above species by the larger acanthophyses and softer fructifications. The spores are smooth, distinctly amyloid but do not swell fully in KOH and Melzer's reagent.
Asterostroma muscicolum (Berk. & Curt.) Massee. 18538/B, 18695. Determined with some doubt as the spores are only found as amyloid fragments in a crush-preparation.
Athelia epiphylla Pers. 18670, 18770, 18805, 18814, 18896, 18964. Variable in the size of the spores and basidia.
Cerinomyces crustulinus (Bourd.& Galz.) Martin. 18922.
C. pallidus Martin. 18670B. The species has apparently not been reported from Asia before.
Conferticium ochraceum (Fr.) Hallenb. 18673, 18705.
This genus is a segregate of Gloeocystidiellum and separated mainly by the stratified fruitbody and that the basidia have linear repetition. The specimens were collected on Abies.
Cylindrobasidium evolvens (Fr.) Jülich. var. **cucullatum** 18616/B. (Bourd. & Galz.) Hjortst. & Ryv. comb. nov.
Basionym: Corticium laeve Pers f. cucullata Bourd. & Galz., Hym. de France, p. 184, 1928.-
This unusual small variety of C. evolvens is worthily of attention. It has microscopical characters similar to the typical resupinate form, but the cupulate fruitbody is very distinctive.
Specimens seen: 18625, and in addition one from USA. Minnesota: Clearwater Co., Itasca State Park, Itasca Lake, 1977-09-16, Ryvarden 14382 (O).
Cystostereum aff. stratosum Hallenb. 18935.
According to the original description and also verbal communication from Hallenberg the textura of C. stratosum has a characteristic honeycomb pattern and the cystidia are filled with yellowish contents, which is not the case in the material from Nepal. In other characteristics e.g. colour and stratification of the fruitbody, size of the spores they are very similar.
Dacryobolus sudans (Fr.) Fr. 18928, 18990.
The aculei are much longer than in specimens from the northern temperate zone, often up to 1.5-2 mm long. This morphological variation has also been observed in collections from East Africa.
Dendrothele aff. **commixta** (Höhn. & Litsch.) Erikss. & Ryv. 18576, 18578. Two collections apparently belong here. Cystidial organs are lacking, but dendrohyphidia are present. Basidia longer than normal, about 50 x 5 um, usually with four sterigmata. Spores indistinctly thick-walled, non-amyloid, 12 x 8 um.

Dentipellis fragilis (Fr.) Donk. 18729.
Dichostereum pallescens (Schw.) Boid. & Lanquet. 18916, 18939. Two specimens have been examined. Number 18939 is typical D. pallescens in having yellowish to pale brown dichohyphidia (KOH), 7-8 um wide spores, and a pale brown fruitbody. The specimen has been compared with material in the Göteborg herbarium (e.g. Burdsall 9538). No 18916 has similar spores but the dichohyphidia are fewer and hyaline. According to the key in Boidin and Lanquetin (1980) this specimen is apparently close to D. rhodosporum (Wakef.) Boid. & Lanq.
The geographical distribution of the two species (see Boid. & Lanquet. 1980) is different. D. pallescens is known from North America (but compare Parmasto 1970), where it is more or less common, at least in the south, where as D. rhodosporum is known only from Australia. Balfour-Browne (1968) reported the latter species from Nepal but her spore-measurements seem to be too small (5-6 um wide). We have also examined another specimen from Nepal (Poelt, 1968, in GB) also determined Vararia pallescens, but no spores were found and the dichohyphidia were very few.
Fibricium rude (Karst.) Jülich. 18796/B.
Fibrodontia gossypina Parm. 18784.
Gloeocystidiellum lactescens (Berk.) Boid. 18519. Recently transferred to Megalocystidium by Jülich together with G. luridum and G. leucoxanthum (type species). Evidently this species has little in common with the other two. It lacks clamps and the spores are weakly amyloid and is morphologically quite different from all other species formerly placed in Gloeocystidiellum. In micro-morphology G. irpicescens Boid. is extremely similar but has odontioid fruitbody.
G. lactescens is cosmopolitan in its distribution. We have seen specimens from Europe, Asia, Africa, South and North America, from both northern conifer regions as well as from subtropical forests.
Haplotrichum conspersum (Pers.) Hol.-Jech. 18644, 18945. The teleomorph is lacking in the specimens.
Hyphodermella corrugata (Fr.) Erikss. & Ryv. 18929.
Hyphodontia lanata Burds. & Nakas. 18918/B.
This recently described species is macroscopically somewhat similar to H. breviseta, although well separated by its smaller aculei (about 5/mm) and a more yellow colour. The spores are smaller than those of H. breviseta and subcylindrical. This is the first report outside the type-locality. The type-specimen has been studied (H.H.B. 8925, WIS).
H. propinqua Hjortst. 18746, 18782, 18766, 18779.
H. sambuci (Pers.) John Erikss. 18507.
Hypochnicium detriticum (Bourd. & Galz.) Erikss. & Ryv. 18815. Strongly grandinioid. Cystidia rare.
Hypochnicium longicystidiosum (Rattan) Hjortst. Fig.1. & Ryv. comb. nov. Basionym: Hyphodontia longicystidiosa Rattan, Biblioth. Mycol. 60:340, 1977. Holotypus: India.

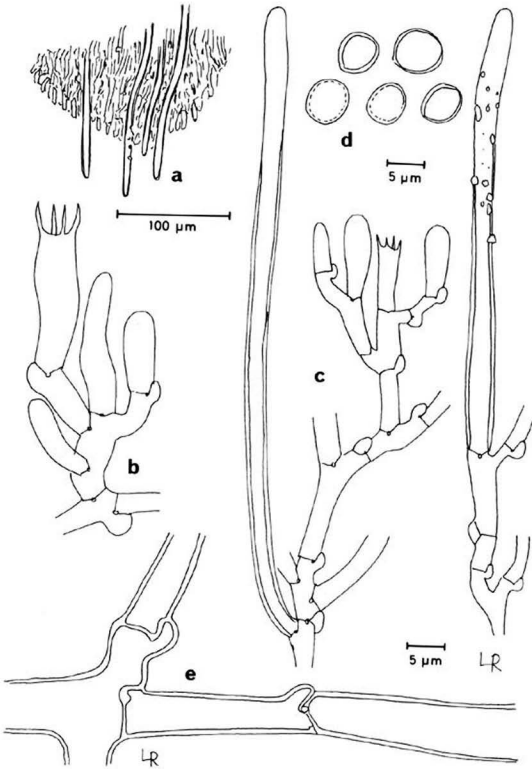

Fig. 1. Hypochnicium longicystidiosum a) section through an aculeus b) basidium c) cystidia d) spores e) basal hypha. Coll. R. 18966.

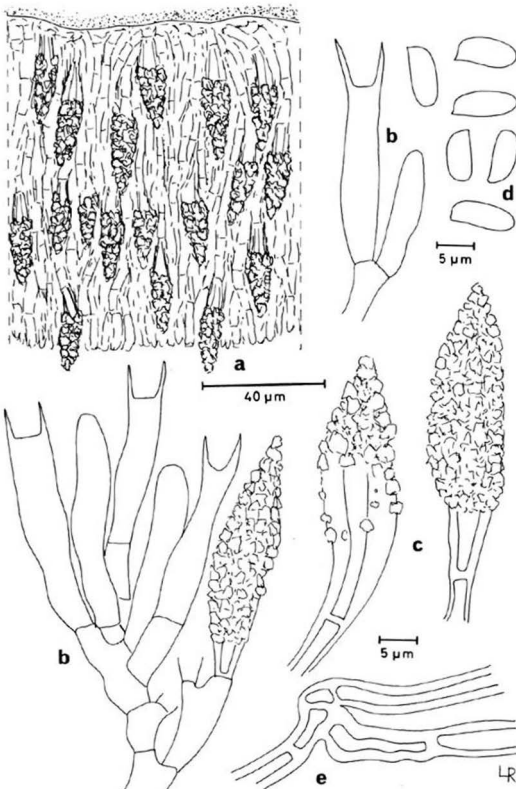

Fig. 2. Peniophora bicornis a) section through hymenium b) basidia c) cystidia d) spores e) basal hypha. From the holotype.

Himachal Pradesh. 1971-10-06. Rattan No. 4377 (K)! 18891, 18966, 18967.
This species clearly belongs in Hypochnicium because of the thick-walled and cyanophilous spores (described as thin-walled by Rattan). The cyanophilous reaction is also prominent in the hyphae and the thick-walled, cylindrical cystidia. In the Corticiaceae of North Europe Eriksson & Ryvarden divided Hypochnicium into six groups, and this species fits best into the H. sphaerosporum-group with H. detriticum as the closest relative.
H. polonense (Bres.) Strid. 18740.
Melzericium udicolum (Bourd.) Hauerslev. 18867.
This species is determinated following the sense of Eriksson and Ryvarden (1976), but has somewhat shorter spores (7-8 um long). Compare also Jülich (1976).
Mycoacia aurea (Fr.) Erikss. & Ryv. 18983.
Peniophora bicornis Hjortst. & Ryv. spec. nov. Fig. 2.
Differt a Peniophora cinerea basidiis 2-(vel 3) sterigmaticis et hyphis non fibulatis. Fructificatio distincte resupinata, colore argillaceo.
Holotypus: Nepal. Gandaki prov., Pokhara, 1200 m, on deciduous wood. 1979-10-27. Leif Ryvarden 18506 (O). Isotypus: in herb (GB). Paratypus: Nepal. Gandaki prov., Khare, 1500 m, on deciduous wood. 1979-10-28. Leif Ryvarden (O, GB). 18599.
Fruitbody resupinate, closely attached to the substratum, 0.1-0.3 mm thick, slightly tuberculate (lens) and moderately cracked, in dried state clay-coloured (argillaceous) with pale rosy tint, margin poorly defined. Hyphal system monomitic. Subiculum composed of densely packed, thick-walled hyphae, 2.5-3.5 um wide, pale brown pigmented. Subhymenial hyphae hyaline, thin-walled, 2-3 um wide. All hyphae without clamps. Cystidia numerous, (metuloids), as immature semihyaline, thin-walled and simulating gloeocystidia, gradually strongly encrusted and brown, normally 30-35 x 7-10 um, gloeocystidia lacking. Basidia subclavate, slightly sinuous and constricted, thin-walled or by degree with thickened walls, without basal clamp, usually with 2 (rarely 3 or 4) sterigmata, 25 x 4.5-5 um. Spores suballantoid, smooth, thin-walled, hyaline, (6-)7-8(-9) x 3-3.5 um, non amyloid.
Remarks. The species is externally somewhat similar to P. cinerea, but under a microscope immediately separated from that species by the bi-sterigmatic basidia and clampless hyphae. Another species, P. confusa, described by Gómez and Loewenbaum (1976) from Argentina is, according to the description, quite similar but has gloeocystidia and the basidia have 4 sterigmata bearing slightly narrower spores.
P. cinerea (Fr.) Cooke. 18949, 18950.
Phanerochaete filamentosa (Berk. & Curt.) Burds. 18646.
P. radulans Hallenb.
A very good collection of this species and compared with the type (in GB). It should be noted that Radulum subquercinum P. Henn. is very closely related, and on basis of collections examined from East Africa these appears to be a

species-complex containing several closely related taxa. (See also Hjortst. & Ryv. 1982).

P. tuberculata (Karst.) Parm. 18780.

P. sordida (Karst.) Erikss. & Ryv. 18804, 18918, 18987.

P. viticola (Schw.) Parm. 18552.

Phlebia albo-fibrillosa Hjortst. & Ryv. spec. nov. Fig. 3. Differt a Phlebia queletii sporis subglobosis (raro distincte globosis). Fructificatione cremeo-albida. Margo fibrosus, albidus.

Holotypus: Nepal. Gandaki Prov. Kuldi, Annapurna trek, 2400 m. 1979-11-07 Leif Ryvarden 18979 (O). Isotypus: in herb (GB). Paratypi: 18613, 18710, 18737, 18905, 18932, 18934, 18986.

Fruitbody resupinate, closely adnate, effused, strongly odontioid, hymenium between the aculei whitish, fairly thin, somewhat pilose owing to the projeting cystidia (lens 50 X), aculei slightly darker than the hymenium, up to 0.5 mm long, conical and approximately 3-5 per mm, margin pubescent or fibrous, whitish. Hyphal system monomitic. Hyphae about 3 um wide, thin-walled or with slightly thickened walls, those of subhymenium and of the aculeal trama more or less parallel, closely packed but not agglutinated as in many species of Phlebia, all hyphae with clamps. Cystidia numerous, usually more than 100 um long, strongly encrusted, thick-walled and often with several adventitious septa and with a basal clamp. Basidia subclavate, about 20-25 x 5(-5.5) um, thin-walled, with 4 sterigmata and a basal clamp. Spores subglobose (seldom globose) 4-4.5(-5) x 3.5-4 um, thin-walled, inamyloid, acyanophilous.

Remarks. Although Phlebia queletii (Bourd. & Galz.) M. P. Christ. is similar it is easily separated by its ellipsoid spores 5-6 x 3-3.5 um and by a darker (yellowish-ochraceous) hymenium. The fibrous margin is more pronounced in Ph. albo-fibrillosa though this also occurs to a some degree in well developed Ph. queletii.

Hjortstam and Ryvarden (1980) referred a specimen determined by Bresadola to Kneiffia brasiliensis Berk. Recently the holotype of this species (Rio de Janeiro, M. Glaziou. Sept. 1876, K) was examined. This species should better be treated near such species as Corticium archerii Berk. and Kneiffia wrightii Berk. & Curt. The other specimen from Brazil (Bresadola's determination), however, belongs near Ph. albo-fibrillosa and Ph. queletii but seems to be separated by smaller spores and shorter cystidia.

P. bresadola Parm. 18652.

This acystidiate species is fairly well known from North Europe, where it occurs on Populus tremula, though rare. The Nepalese collection (substratum unknown) has the subiculum, at least at the perifery, more loose with hyphal and basidial structures easily separated in a squash-preparation. In well developed parts of the fruitbody the hyphae are more densely agglutinated.

P. centrifuga Karst. 18877.

P. deflectens (Karst.) Ryv. 18747.

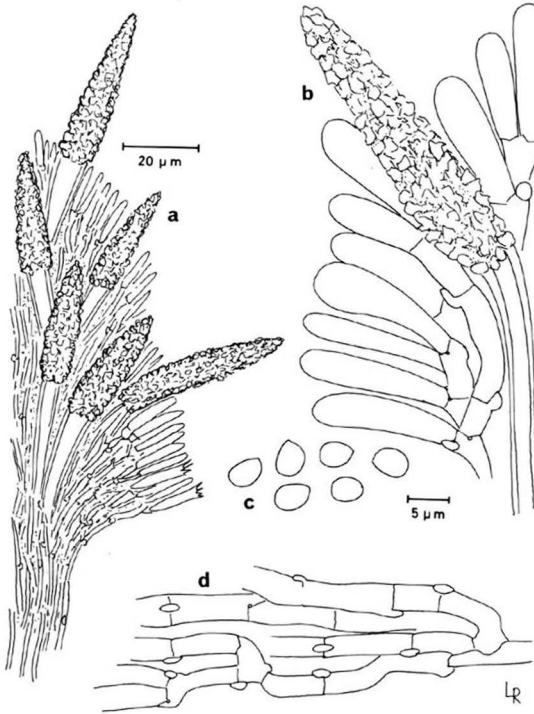

Fig. 3. Phlebia albo-fibrillosa a) section through aculeus b) cystidium and unripe hymenium c) spores d) basal hyphae. From the holotype.

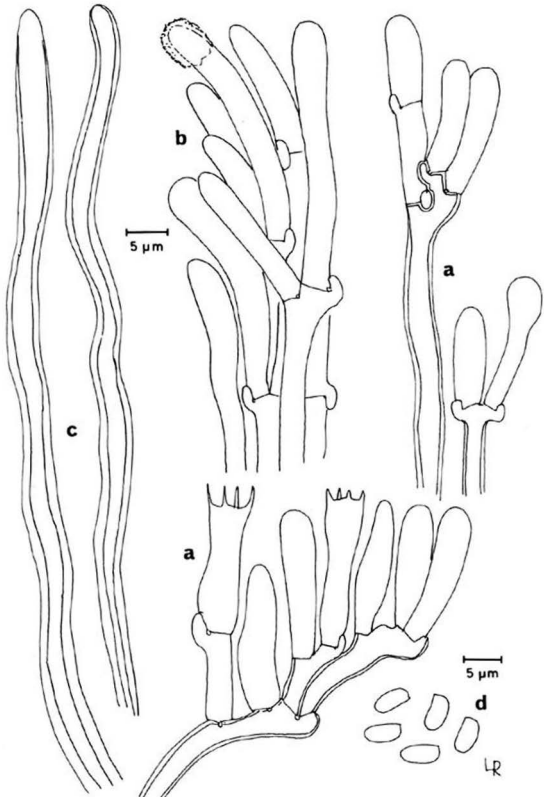

Fig. 4. Schizopora roseo-tingens a) basidia b) hyphae with encrusted apex c) skeletal hyphae d) spores. From the holotype.

P. livida (Fr.) Bres. 18565, 18874, 18895.
P. martiana (Berk. & Curt.) Parm. 18953.
P. radiata Fr. 18543, 18736.
P. verruculosa Hjortst. & Ryv. 18796/E.
This is the first collection outside East Africa (type-locality: Tanzania). It should be mentioned that several additional specimens are now known from Africa, discovered since the description, (Hjortstam and Ryvarden 1980).
Phlebiopsis gigantea (Fr.) Jülich. 18525, 18752.
P. roumeguerii (Bres.) Jülich & Stalpers. 18624, 18643, 18700, 18750. The syntype of this species has been studied: Florentiae 09.1890, leg. U. Martelli (portion in GB). Brief description of microscopical characteristics: Hyphae dense, 2.5-3.5 um, thin-walled, without clamps. Cystida conical, strongly encrusted (metuloids), about 50-80 um long, without basal clamp. Basidia 20-25 x 4 um, with 4 sterigmata, without basal clamp. Spores 5-5.5 x 2.8(-3) um, abaxial side concave.
Radulomyces confluens (Fr.) M. P. Christ. 18787.
Ramaricium flavomarginatum (Burt) Ginns. 18538, 18798. Not previously reported outside North America where according to Ginns (1979) it is found on Quercus garryana in the western coastal areas. Externally it is similar to other species of the genus, but microscopically immediately separated by smooth and slightly sigmoid spores, reminiscent of those of Lepiota.
Resinicium bicolor (Fr.) Parm. 18661, 18665, 18685.
Schizopora roseo-tingens Hjortst. & Ryv. spec. nov. Fig. 4 & 5. Fructificatio resupinata, effusa, adnata, cremicolor vel dilute erubescens, hymenium distincte odontioides, inter aculeos leve, circiter 0.1-0.2 mm crassum, aculei plus minus conici, firmi, versus apicem leviter fimbriati, raro complanati, plerumque 0.5-1 mm longi, subiculum dilute erubescens, aliquantum densum et tenax, margo plus minus reflexus; systema hyphale dimiticum, hyphis generatoris tenuitunicatis, abundanter ramosis, fibulatis, 3.5-4 um latis, hyphis skeleticis crassitunicatis, incoloratis, rectis, raro ramosis, fibulis nullis, 2.5-3(-4) um latis, neque dextrinoidibus neque cyanophilis; cystidia desunt, in aculeis hyphoideis incrustatis disposita; basidia subclavatis, suburniformibus, 20-25 x 4.5-5 um, 4 sterigmatibus; sporis ellipsoidibus, tenuitunicatis, 4-4.5 x 2-2.2 um, neque amyloidibus et cyanophilis neque dextrinoidibus.
Holotypus: Nepal, Gandaki Prov. Kuldi, Annapurna trek. 2400 m. on deciduous wood, 1979-11-07. L. Ryvarden 18989 B (O).

Fruitbody resupinate, adnate, creamish to light brown or with rosy tint, distinctly odontioid to hydnoid with smooth and firm, about 0.1-0.2 mm thick, hymenium between the aculei, individual aculei more or less conical or subcylindrical, rarely flattened, smooth or with a slightly fimbriate apex, mostly 0.5-1 mm long. Subiculum 0.3-0.5 mm thick,

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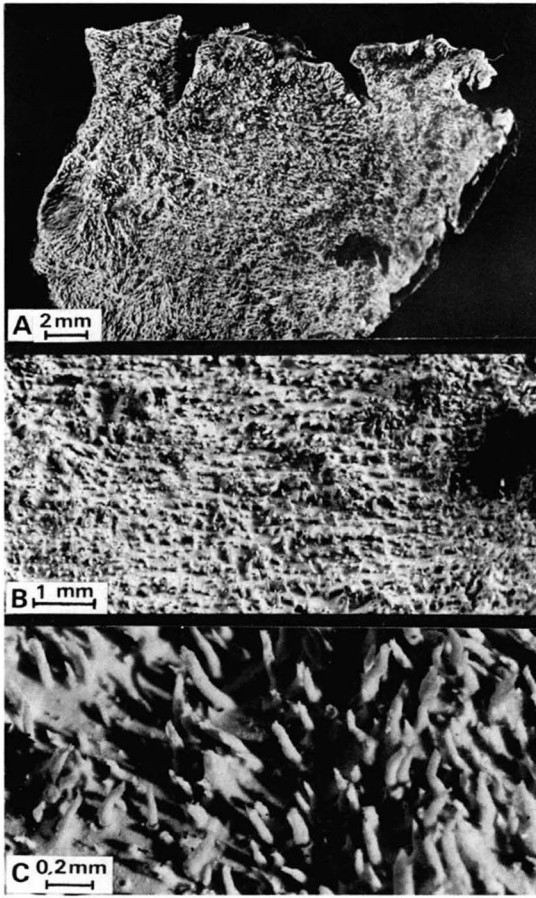
Fig. 5. Schizopora roseo-tingens, different views of the fruitbody. From the holotype. Photo T. Hallingbäck.


A 2mm
B 1 mm
C 0,2mm

light rosy brown, fairly dense and tough. Margin not especially differentiated but loosening and tend to be more or less reflexed. Hyphal system dimitic. Generative hyphae strongly branched, 3.5-4 um wide, thin-walled, with clamps. Skeletal hyphae straight and rarely branched, thick-walled with fairly narrow, 1-1.5 um wide lumen, without clamps or such seen only in transition stage between generative and skeletal hyphae. The skeletals in the central part of the aculei intertwined, rarely parallel, indextrinoid, inamyloid or acyanophilous. Cystidia lacking but in the aculei with scattered capitate hyphal ends, seemingly originating from tramal hyphae, often encrusted apically with resinous substance. Basidia subclavate, more or less suburniform, 20-25 x 4.5-5 um, with 4 sterigmata and basal clamp. Spores ellipsoid, thin-walled, 4-4.5 x 2-2.2 um, inamyloid, acyanophilous, indextrinoid.

Remarks. The new species is placed in Schizopora on the basis of the conspicuous skeletal hyphae and similar basidia and spores. On the other hand, the thin-walled hyphae differ in the shape of the clamps and the irregularity of the walls. An alternative to Schizopora could be Fibrodontia but the hymenial structure deviates from that genus in its narrow sense (see below). Schizopora roseo-tingens is well separated from other species by a strictly odontioid hymenium and pale rosy colour. Nevertheless, in both macro- and microscopic features the species is intermediate between species of Hyphodontia, Fibrodontia and Schizopora. The latter genus comprises species with an obviously tough consistency, both porioid and such with a more irpicoid or labyrinthine hymenium, whereas Fibrodontia sens. str. (limited to the type species) is fairly soft, somewhat fibrous and typically odontioid. Both genera are generally accepted and described as dimitic. Species of Hyphodontia are monomitic, even if some species have large cystidia of subicular origin (pseudocystidia) seemingly like those of Fibrodontia but with fairly wide lumen. At present we prefer to include the new species within Schizopora rather than to extend Fibrodontia until a better knowledge of both the morphology and cultural tests can be acertained for these genera.

Scopuloides hydnoides (Cooke & Massee) Hjortst. & Ryv. 18936, 18941. Jülich (1982) placed this species in synonymy with Peniophora rimosa Cooke. On account of the variability of this taxon and that the type material of P. rimosa was temporarily unavailable at Kew we prefer to use this well known name. Specimens seen from Central Europe, East Africa, and also from Nepal show that several more or less closely related taxa occur.

Scopuloides sp. Ryv. 18981.

In essential characteristics, the nature of cystidia, basidia, and hyphal structure, this specimen agrees with S. hydnoides but differing in the suballantoid spores, 4.5(-5) x 1.2(-1.5) um. Externally the small cylindrical aculei are also of importance to separate this fungus from S. hydnoides. It should be noted that the type of P. hydnoides was not studied on this occasion.

Scytinostroma ochrolecuum (Bres.) Donk. 18613/B.
The material is fairly small, but easily recognized by the following characteristics: dextrinoid skeletal hyphae, stout basidia, and smooth, large inamyloid spores. For its general distribution, see Parmasto (1970).
S. portentosum (Berk. & Curt.) Donk. 18745.
The species is treated here in its wide sense, to include S. hemidichophyticum. Pouz.
Sistotrema brinkmannii (Bres.) John Erikss. 18873, 18933.
S. oblongisporum M. P. Christ. 18971.
A variable species in spore morphology which needs further studies on cultural level. The Nepal specimen consist of a small fragment but microscopically well developed. The smooth adnate fruitbody, slightly curved spores 4 x 1.8(-2) um together with small and urniform basidia characterize this species.
Stereum sanguinolentum (Fr.) Fr. 18904, 18913.
Trechispora aff. **farinacea** (Fr.) Liberta. 18626.
Xenasma praeteritum (Jacks.) Donk. 18539, 18777.
In its general features e.g. spores, basidia, and hyphal structure similar to the concept of the species but differs from other specimens seen by having an odontioid appearance. The small and scattered aculei are spread over the hymenium and make the specimen quite characteristic.
Xenasmatella tulasnelloidea (Höhn. & Litsch.) Oberw. 18817, 18907, 18988.

HYMENOCHAETACEAE

Hymenochaete cruenta (Pers.:Fr.) Donk 18912, on Rhododendron.
Inonotus flavidus (Berk.) Ryv. comb. nov. Basionym: Polyporus flavidus Berk. Hook. J. Bot. 6:161, 1854. Syn. Inonotus sciurinus Imaz. 18636, 18709, 18733, 18954.
Inonotus hamusetulus Ryv. nov. sp. Fig. 6.
Fructificatio sessilis, pileus ferreus vel brunneus, zonatus, velutinus, pori facies ferra, pori 5-7 per mm, contextus ferreus, duplex cum zona nigra sub tomentum in pileo. Systema hypharum monomiticum, hyphae generatoriae afibulatae, ferreae, crassae vel tenuitunicatae, setulae hamatae, sporae subglobosae, 3-5 x 3-3,5 um, hyaline vel pallide flavus.
Typi: Nepal, Gandaki prov. Khare 1500 m, 28 Oct. 1979, on deciduous tree. L. Ryvarden 18591 (O, holotype, K, isotype).
Fruitbody annual, sessile and flabellate up to 8 cm wide and 12 cm long, and 10 mm thick at the base, margin thin and sharp bent down in dry condition, pileal surface dark rusty brown to dark brown at the base, first coverd with a fine adpressed tomentum under which there is a thin black zone with age becoming exposed from the base, faintly zonate in sulcate zones and slightly wrinkled radially when dry, pore surface dark rusty brown, pores round to angular 5-7 per mm, tubes concolorous, up to 6 mm deep, context rusty brown, dense and duplex with a black zone above.

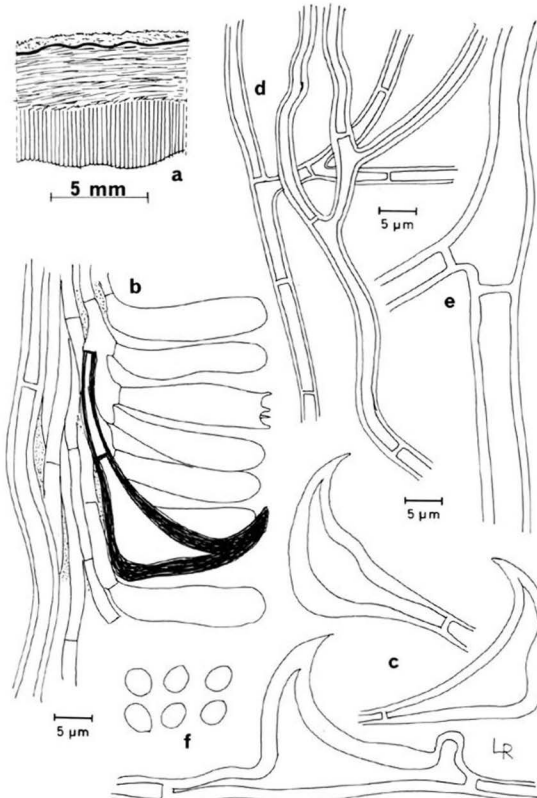


Fig. 6. Inonotus hamusetulus a) section through fruitbody b) from the hymenium c) setae d) hyphae from the trama e) hyphae from the context f) spores. From the holotype.

Hyphal system monomitic, and generative hyphae with simple septae, in the subhymenium thin to slightly thick-walled and abundatnly septate, 2-3 um wide, in the trama and context with a wider lumen, sparsely branched and with scattered to rare septa, 3-8 um wide, setae numerous, hooked, 20-30 um from base to top, often elongated in a long roof-like base, a few also birooted and up to 40 um long at the base, thick-walled and dark brown, spores hyaline to pale yellowish, subglobose 3-4 x 3-3,5 um, acyanophilous and non-amyloid.
I. hamusetulus is related to I. radiatus (Fr.) Karst. and I. crocitinctus (Berk. & Curt.) Ryv. All three species are characterized by hooked setae and small, hyaline to pale yellowish subglobose spores. The spore-range decreases from I. radiatus to I. hamusetulus. The closest relative to I. hamusetulus is the North American I. crocitinctus which has slightly larger spores (4-4,5 x 3-3,5 um), distinctly more ventricose setae and minute pores (7-8 per mm).

Phellinus acontextus Ryv. nova. sp. Fig. 7.
Fructificatio pendens, pileus glaber, brunneus, densus zonatus, pori facies brunneus, pori minuti 6-8 per mm, tubi brunnei, contextus destitutus vel tenuissimus, cinnamomeus, systema hypharum dimiticum, hyphae generatoriae afibulatae, hyphae skeletales ferrugineae, setae destitutae, sporae-ellipsoideae, ferrugineae, 5,5-6,5 x 3,5-4 um.

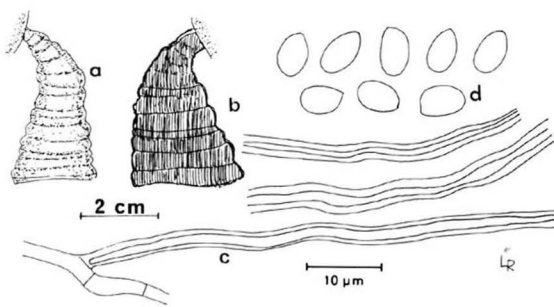


Fig. 7. Phellinus acontextus a) fruitbody b) section through a fruitbody c) skeletal hyphae d) spores. From the holotype.

Typi: Nepal, Gandaki prov. Ghorapani 2800 m, 30. Oct. 1979, on Abies sp. L. Ryvarden 18742. (O, holotype, K isotype).
Fruitbody pendant and small, ungulate, 2,5-3 um high and 1,5-2 cm diam, circular to irregular in section, brittle and light of consistency when dry. Pileus dark brown to almost black, glabrous, densely zonate with narrow and in part sharp ridges, covered with a thin black cuticle, 100-250 um thick, margin sharp, pore surface dark rusty to umber brown, pores minute, almost invisible to the naked eye, 6-8 per mm, tubes dark rusty brown, slightly zonate up to 3 cm deep, context lacking or extremely thin (lens!) close to the base, cinnamon.
Hyphal system dimitic, generative hyphae with simple septae, hyaline 2-3 um wide, skeletal hyphae narrow and thick-walled, golden to pale rusty brown, 2-4 um wide, setae none, spores rusty brown, ellipsoid, 5,5-6,5 x 3,5-4 um non-amyloid.
This is a striking species with small and distinctly pendant fruitbodies and either lacking a context or present only as an extremely thin cinnamon layer next to the black cuticle close to the base of the fruitbody. The spores are more strongly coloured than is usual in the genus. The species seems to take up a rather isolated position in the genus.
Phellinus allardii (Bres.) Ryv. 18619, 18963.
P. gilvus (Schw.) Pat. 18554, 18758.
P. punctatus (Fr.) Pil. 18596.
P. wahlbergii (Fr.) Reid. 18555.

POLYPORACEAE

Antrodia malicola (Berk.) Donk. 18587, 18977.
A. sinuosa 18711.
Antrodiella semisupina (Berk. & Curt.) Ryv. 18607, 18818.
Ceriporia excelsa (Rom.) Parm. 18890.
C. subreticulata Ryv. 18711.
C. xylostromatioides (Berk.) Ryv. 18633.
Daedalea incana (Lév.) Ryv. comb. nov. Basionym Trametes incana Lév. Ann. Sci. Nat. Ser. 3, vol. 2:196, 1844. The species is related to Daedalea quercina, separated by smaller and more regular pores. Both species exhibit a brown rot in the attacked wood. D. incana is widespread in Asia and is often named D. dickensii Berk. in Japanese and Chinese herbaria and papers.
Datronia mollis (Somf.:Fr.) Donk 18899.
Fomes fomentarius (Fr.) Kickx. 18590, 18947.
Grammothele bambusicola Ryv. nov. sp. Fig.8 .
Fructificatio resupinata, pori facies ochracea, pori 2-3 per mm. System hypharum dimiticum, hyphae generatoriae hyalinae, tenuitunicatae et fibulatae, hyphae skeletales crassitunicatae, hyalinae, non dextrinoideae, dendrohyphidia sparse ramosa praesentia in pori margine et hymenio, sporae ellipsoideae, 7-8,5 x 4-5 um, non-amyloideae.

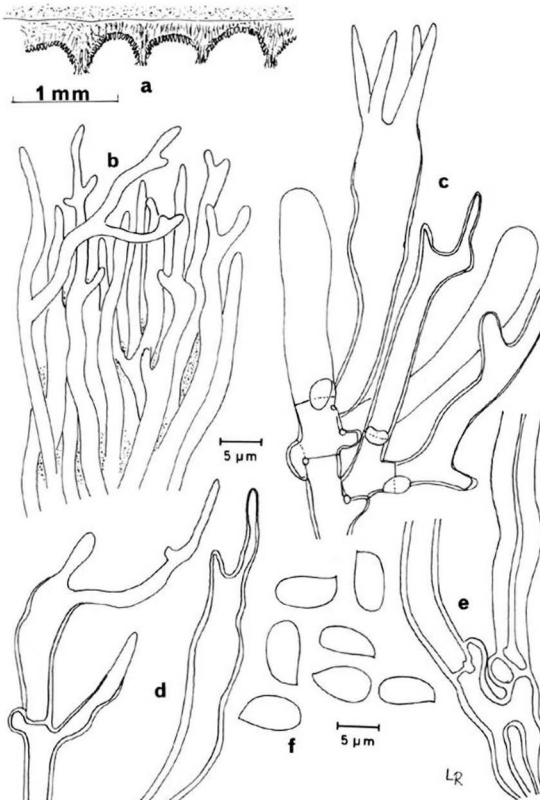


Fig. 8. Grammothele bambusicola a) section through fruit-body b) hyphae from the pore-edges c) basidium and dendroid hyphae e) branched organs from the hymenium e) basal hyphae f) spores. From the holotype.

Typi: Nepal, Gandaki prov. Ghorapani, 2800 m, 30 Oct. 1979. On Bambusa sp. L. Ryvarden 18718 (O, holotypus, K, isotypus).
Fruitbody resupinate, effused, adnate, up to 1 mm thick, pore surface cream to strawcoloured or pale yellowish brown when old, pores round to sinuous on sloping substrata, 2-3 per mm and shallow, context white and very thin.
Hyphal system dimitic, generative hyphae with clamps, thin- to thick-walled, hyaline to pale yellow, 3-8 um wide, skeletal hyphae thick-walled and pale yellowish, without dextrinoid reaction, 3-5 um, sparsely branched dendrohyphidia in the hymenium with 2-3 apical branches, slightly thick-walled in the basal part, up to 35 um long, in the poremouths more narrow and branched, basidia clavate with 4 large sterigmata, 30-40 x 5-8 um, spores oblong ellipsoid, thinwalled and non-amyloid, 7-8,5 x 4-5 um. On Bambusa sp.
This species comes close to G. ochraceus Ryv. from Thailand, but is separated by larger pores, a more yellowish colour, sparsely branched dendrohyphidia and longer and more ellipsoid spores.
Irpex lacteus Fr. 18597.
Ischnoderma resinosum (Fr.) Karst. 18641.
Junghuhnia nitida (Fr.) Ryv. 18630.
Microporus vernicipes (Berk.) Kunt. 18992.
Oxyporus cervino-gilvus (Jungh.) Ryv. 18592.
Perenniporia inflexibilis (Berk.) Ryv. 18601.
P. tenuis (Schw.) Ryv. 18639.
Pachykytospora papyracea (Schw.) Ryv. 18532.
Polyporus ciliatus Fr. 18588, 18880.
Rigidoporus ulmarius (Fr.) Imaz. 18955.
Sceletocutis alutacea (Lowe) Kell. 18514, 18797, 18901.
S. nivea (Jungh.) Kell. 18659.
Spongiporus cerifluus (Berk. & Curt.) David. 18803.
S. luteocaesius David. 18753. on Abies sp. This is the second collection of this species recently described by David (1980:29). The Nepalese collection matches the description very well. Briefly, the species can be described as a T. caesius with brown pileus. The specific epithet is misleading as the yellow colour disapears in dry condition and the pore surface attains the pale mouse-grey colour as in a typical S. caesius.
S. cerifluus (Berk. & Curt.) David. 18803.
Trametes cingulata Berk. 18504.
Tyromyces. dissectus (Lév.) Ryv. 18698.
T. gilvescens (Bres.) Ryv. 18649, 18696, 18756, 18872.
T. gratus (Berk.) Ryv. 18698.
T. leucomallus (Berk. & Curt.) Murr. 18663, 18762, 18989.
Wrightoporia lenta (Overh. & Lowe) Pouz. 18699.

TREMELLACEAE

Aporpium caryae (Schw.) Teix. & Rog. 18947.

Acknowledgements.

Dr. D. Pegler, Kew, has suggested linguistic improvements and otherwise given valuable help, for which we are very grateful.

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NOTICE

INTERNATIONAL MYCOLOGICAL ASSOCIATION

RECORD OF BUSINESS MEETINGS AND GENERAL ASSEMBLY CONVENED DURING THE THIRD INTERNATIONAL MYCOLOGICAL CONGRESS, TOKYO, 28 AUGUST-3 SEPTEMBER 1983

Contents

A. Preamble

1. This Notice provides a record of the Business Meetings and General Assembly of the International Mycological Association (IMA), and also of its Committees, convened during the Third International Mycological Congress (IMC3), Tokyo, 28 August-3 September 1983.

2. A record of the previous Business Meeting, held on 26 August 1981 during the XIII International Botanical Congress in Sydney was published in Mycotaxon **16** (1): 335-339 (1982). Reports of Committees and officers included in the present Notice relate to the period since the Sydney Business Meeting.

B. Honorary Presidents

3. At the Opening Ceremony of the Congress, Professor C.V. Subramanian (President, IMA) paid tribute to the foresight of Dr Geoffrey C. Ainsworth (formerly Director, Commonwealth Mycological Institute) which led to the establishment of International Mycological Congresses and of the IMA itself in 1971. Further, tribute was also paid to Professor Costantin J. Alexopoulos, who presided over IMC2, and the work he has undertaken for international mycology. These two exceptional individuals have devoted so much of their lives to the service of mycology and were accepted with acclamation as the first Honorary Presidents of the IMA.

C. **Apologies for absence**

4. Apologies for absence were received from the following members of the IMA Executive Committee who were unable to attend IMC3: Dr J.A. von Arx (Treasurer), Dr C. Booth, Dr E. Parmasto, Dr M.A. Peerally, Professor K.S. Thind, Dr J. Walker and Dr G.C.A. van der Westhuizen.

D. **Secretary's Report**

5. Reports of action taken since 1981 are noted under the appropriate heads below.

E. **Treasurer's Report**

6. Dr von Arx submitted a statement of the financial situation of the IMA, which showed a balance of Hfl 29,582.90 as at 1 July 1983.

F. **Nomenclature Secretariat**

7. The IMA Nomenclature Secretariat convened its meeting on 1 September 1983. In the absence of its Chairman, Dr K.T. van Warmelo, the meeting was chaired by Dr R.H. Petersen. Also in attendance were Drs Otani (Japan), Hawksworth (UK) and Gams (The Netherlands) of the Secretariat, and Drs Wang (People's Republic of China) and Demoulin (Belgium) as invited guests.

8. A report from Dr van Warmelo was read and accepted. All proposals on which action was taken at IMC2 were summarized and published in Taxon (**28**: 424-431, 1979), effectively fulfilling the mandate to the Secretariat. Many of the proposals made were adopted by the XIII International Botanical Congress and incorporated into the Code. The subcommittees which had produced the proposals were then informally disbanded.

9. On behalf of the IAPT Special Committee for Fungi, Dr Petersen informed the Secretariat that the Special Committee is prepared to take responsibility for remaining IMA Secretariat duties, including authority for one remaining subcommittee on the nomenclature of fossil fungi (Secretary Dr Reynolds).

10. Accordingly, the Secretariat requested that it be disbanded, with its role to pass to the IAPT Special Committee, and this was agreed. Concommitantly, it urged the IMA Executive Committee to reappoint the Secretariat at any appropriate future time, and recorded its thanks to Dr van Warmelo for his service to the Secretariat.

G. **Regional Committees**

11. During the Congress, the Committee for the Development of Mycology in Asian countries was firmly established under the Chairmanship of Dr K. Tubaki. It drew up and adopted the following Statutes.

12. Article 1. The name of the Committee shall be "Committee for the development of mycology in Asian countries".

13. Article 2. The general objective of the Committee shall be to promote the development of mycology, with activities for mycological education, training, research, and service in countries and regions in Asia.

14. Article 3. The membership of the Committee shall be composed of representatives of the Mycological Society or related Societies in each country and regions, or individual persons who are willing to contribute for the development of mycology in the regions concerned.

15. Article 4. The Committee shall be composed of: (a) Chairman, Dr K. Tubaki; (b) Vice-Chairman or Vice-Chairmen, Dr F.R. Uyenco; and (c) Secretary or Secretariat, Dr M.A. Rifai and Dr T. Yokoyama.

16. Article 5. The term of the members shall be within the years between one and the next Congress.

17. Preliminary discussions with UNESCO in 1982 suggest they would contribute to the cost of the IMA running a workshop on the problems confronting mycology in Asia, but that the IMA would have to provide a significant part of the cost.

18. The Committee for the Development of Mycology in Latin-American countries reported that little progress had been made owing to the numerous problems in the region at the present time.

H. **Statutes**

19. As instructed at the Sydney meeting, a revised draft of the IMA Statutes had been prepared and circulated to the Executive Committee. A further revision taking account of the Executive's comments was then circulated to all Affiliated Associations for their views. The draft tabled for approved at IMC3 which was circulated to all Affiliated Organizations on 3 June 1983, incorporated amendments proposed by some of them.

20. The revised Statutes, providing for a greater involvement of individual mycologists, and also designed to place the organization on a firmer financial base were debated by the IMA Business Meeting and, with minor amendments, were then adopted unanimously by the General Assembly. The Statutes are given in full at Appendix I.

I. Fourth International Mycological Congress

21. All Affiliated Organizations were invited to submit offers to host IMC4 by 30 June 1983. Three well-documented proposals were received by the due date, circulated to the IMA Executive, and voted on. The first choice subsequently decided to modify its proposal and the Executive therefore had to re-consider the position.

22. It was agreed to keep IMC's distinct from International Botanical Congresses and that it was desirable to establish a regular cycle with them. The year 1990 was therefore decided for IMC4 with a view to a six-year interval being established thereafter. Shorter intervals were

not favoured as such a gap meant that there was a greater amount of new data to present.

23. The Executive Committee was pleased to annouce the acceptance of the proposal on behalf of the German mycological and botanical societies to host IMC4 in August 1990 in Regensburg, Germany. Professor Dr A. Bresinky, on behalf of the German proposers, invited mycologists throughout the world to attend IMC4.

J. Subscriptions

24. The subscription unit for the purpose of calculating dues of Individual Members and Affiliated Associations was fixed by the General Assembly at US $ 20. This value of the unit is intended to stay in force until IMC4, but remaining subject to revision by the Executive Committee in the interim should that prove unavoidable.

25. The Secretary-General thanked all those who had joined the IMA as Individual Members for the first time at IMC3 on behalf of the Executive Committee.

26. The Executive Committee confirmed that Individual Membership fees should be included in the Registration Fee for all participants in future IMC's and regretted that the Committee's decision to do this had not been adequately implemented at IMC3.

K. Relationships with IUBS and IUMS

27. The IMA constituted the Section of General Mycology within the Division of Botany and Mycology of the International Union of Biological Sciences (IUBS). At the IUBS General Assembly in Ottawa in September 1982, IUBS dissolved its divisional structure, despite strong representations from the Division of Botany and Mycology. Sections and Commissions within IUBS were allowed to group freely. Most organizations formerly within the Division of Botany and Mycology subsequently agreed to the establishment of an International Association of Botanical and Mycological Societies (IABMS) with the same officers and role of the former Division.

28. The IUBS Executive have confirmed that they would have no objection to the IMA being involved in both IUBS and IUMS.

29. The IMA was invited to attend meetings of the Division of Mycology of the International Union of Microbiological Sciences (IUMS) in Boston in August 1982. Following preliminary discussions in Boston, an IUMS/IMA ad hoc group to discuss the representation of mycology in international biology was established. This group worked by correspondence and held its first meeting during IMC3. The IMA was very pleased that Professor K. Arima (IUMS Executive Board), Professor N. Goodman (Chairman, IUMS Division of Mycology) and Dr K. Iwata (past-Chairman, IUMS Division of Mycology) were able to participate in the Tokyo discussions along with representatives of other interested societies.

30. The discussions of the ad hoc group were wide-ranging but a strong desire to work more closely together in the future emerged, and Resolution 3 adopted by the General Assembly (see below) was unanimously agreed by both IMA and IUMS representatives on the group.

L. Affiliated Associations

31. The Mycological Society of the Republic of China (Taipei) applied to join the IMA at IMC3. This was accepted by the Executive Committee and endorsed by the General Assembly. Professor Subramanian welcomed the Society, through its President Professor Zuei-ching Chen, to the IMA. The Society has about 250 members.

32. This brings the number of international and national organizations affiliated to the IMA to 26.

33. Following a proposal from Professor G. Pegg, on behalf of the British Mycological Society, it was agreed by the Executive Committee that at future IMCs special meetings of Affiliated Association representatives should be convened.

34. The Secretary-General agreed to invite all Affiliated Societies to send comments on IMC3 so that they could be passed to the Organizing Committee for IMC4. The same procedure had been adopted after IMC2 and led to some proposals adopted at IMC3.

M. Executive Committee Membership

35. Nominations for Executive Committee members and officers of the IMA were invited from Affiliated Associations and Individual Members on 7 June 1983. Nominations received by 1 September were considered by a Nominations Committee under the retiring President. Their recommendations (Appendix II) were unanimously accepted by the Executive Committee and endorsed by the General Assembly.

36. At the Closing Ceremony of the Congress, Professor Subramanian paid particular tribute to the work Dr J.A. von Arx had undertaken for the Association, having served as Treasurer from its inception in 1971 to IMC3. He regretted that Dr von Arx's health led to his not feeling able to continue for a further term. The incoming President of the IMA, Professor J. Webster, thanked Professor Subramanian and retiring members of the Executive Committee for their service to the Association since IMC2.

N. Resolutions

37. All participants in IMC3 were invited to submit Resolutions to a Resolutions Committee convened under the Chairmanship of Professor E.G. Simmons.

38. Most proposals submitted informally or formally to the Committee reflected concern for strengthening the discipline throughout the world, particularly in those geographical regions where communication, training, and facilities currently are inadequate for sustained

mycological work and service. In general, these proposals re-emphasized concerns reflected in Resolutions adopted at the Second International Mycological Congress, Tampa, 1977. Those resolutions focussed (1) on financial and operational support by international scientific organizations, (2) on a system of workshops and seminars addressed to regional needs, (3) on improved facilities for exchange of scientific materials (e.g. cultures, exsiccatae, and publications), (4) on support of international centres of excellance in fungus identification, and (5) on input and involvement of the mycological community in the UNEP/UNESCO Microbiological Resource Centre Program (MIRCEN), with upgrading of professional mycological expertise to high levels in these facilities.

39. The Committee proposed, **RESOLUTION 1**, that these continuing concerns form the basis of renewed approaches for programmatic and financial support by the International Mycological Association, the International Association for Lichenology and other Affiliated Organizations of the IMA, and further as appropriate by organizations such as the International Union of Biological Sciences, the International Union of Microbiological Societies, the United Nations Educational, Scientific and Cultural Organization, the United Nations Food and Agriculture Organization, the United Nations Environmental Program, and the World Health Organization.

40. The Committee for the Development of Mycology in Asiatic Countries, at its meeting during this Congress (paras 11-17), organized itself formally and determined to initiate activities of regional relevance, including establishment of directories of institutions, herbaria, living collection and research mycologists for all countries of the region, as well as compilation of informational materials on national regulations governing the collection and transport of fungus materials across international boundaries.

41. The activation of this Committee representing countries of Asia draws attention to the existence of other regional committees established at IMC2 and brings us to **RESOLUTION 2**, that the IMA continue its responsibility (1) to foster action by the regional mycological groups of Latin America, Tropical Africa, the Middle East and Asia; (2) that it activate the proposed IMA Liaison Office to improve co-operation and co-ordination in the work of regional committees; and (3) that it establish a mechanism to explore the possibility of transfer of funds between countries to support identification services and other international activities.

42. As **RESOLUTION 3**, recognizing the advantages of closer liaison between the International Mycological Association (IMA) and the International Union of Microbiological Societies Division of Mycology, this Congress agrees to an exchange of observers at Executive Meetings, to their working together whenever appropriate, and in particular invites the IUMS Division of Mycology to participate in the Fourth International Mycological Congress.

43. All three Resolutions were adopted unanimously at the Closing Plenary Session of the Congress.

O. **Third International Mycological Congress**

44. Professor Subramanian paid tribute to Professor N. Hiratsuka (President, IMC3), Dr K. Tubaki (Secretary-General, IMC3) and other members of the IMC3 Organizing Committee for making the Congress such a success.

45. The Congress was attended by about 900 registered delegates of which 400 were from outside Japan.

P. **Future Plans**

46. The Executive Committee also considered in outline plans for the IMA for the period to IMC4. Subject to the availability of resources, it was agreed that the IMA should endeavour to (a) establish a Newsletter, (b) draw up directories of mycologists and mycological resources (perhaps on a regional basis), (c) maintain its involvement with appropriate international organizations, (d) assist in the costs of workshops or attendance of IMA representatives at appropriate meetings, and (e) the establishment of an IMA Liaison Office.

47. The Secretary-General reported that the Executive Director of the Commonwealth Agricultural Bureaux (CAB) had approved the concept of the establishment of an IMA Liaison Office at the Commonwealth Mycological Institute, Kew (CMI) provided that appropriate financial arrangements can be made. The IMA Executive Committee agreed that some funds could be made available for this proposal.

D.L. Hawksworth
Secretary-General, IMA
Commonwealth Mycological Institute
Ferry Lane, Kew,
Surrey TW9 3AF, UK

17 December 1983

APPENDIX I

Statutes

Preamble

1. The Association shall be called the International Mycological Association (IMA).

2. The object of the IMA, a non-profit making organisation, is the encouragement of mycology in all its branches, particularly international aspects such as the promoting of International Mycological Congresses, representing mycological interests at an international level, and encouraging liaison with all national and international bodies which have mycological interests.

Management

3. The affairs of the IMA are managed by:

   3.1 *The General Assembly*, convened by the President on the occasion of an International Mycological Congress. All Congress registrants can participate and vote at the General Assembly, which has no continuing responsibility. Votes taken at a General Assembly are subject to ratification by two-thirds of the Affiliated Associations, each of which should nominate one representative to act in this capacity.

   3.2. *The Executive Committee*, composed of (a) a minimum of twelve but not more than sixteen members elected by the General Assembly from nominations received from Affiliated Associations, Individual Members, or the Executive Committee; and (b) the Officers.

   3.3 *The Officers*, comprising a President, two to four Vice-Presidents, a Secretary-General and a Treasurer.

   The Officers are elected by the General Assembly on the nomination of the Executive Committee. When necessary in the period between two General Assemblies the Executive Committee may itself appoint any of these Officers.

   The term of office of each Officer terminates at the close of an International Mycological Congress, with the exception of the Secretary-General and Treasurer who may be re-elected without restriction.

   3.4 *Committees* for special purposes may be appointed by the General Assembly or the Executive Committee.

4. The Executive Committee ensures that the affairs of the IMA are conducted in accordance with the decisions of General Assemblies.

Membership

5.1 Membership of the IMA is open to (a) national or international societies, associations or other groups having mycological interests, and (b) individuals having mycological interests. Such memberships shall be recognized as Affiliated Associations and Individual Members respectively.

5.2 New Affiliated Associations are recognized by the Executive Committee by a majority vote.

5.3 Honorary Presidents may be elected by the General Assembly on the proposal of the Executive Committee, provided that the number at any given time does not exceed five. Honorary Presidents are elected for life and are not required to pay dues.

Finance

6.1 The income of the IMA consists of (a) subscriptions from Affiliated Associations and Individual Members, (b) contributions from International Mycological Congresses, (c) donations, and (d) interest on funds held.

6.2 The expenses of the IMA consist of (a) administrative expenses of the Officers, and (b) all other expenses approved by the Executive Committee.

6.3 The subscriptions of an Individual Member shall be 1 unit and that of an Affiliated Association shall be 0.02 units multiplied by the total number of members in the Affiliated Association. The value of the unit is fixed by the General Assembly on the recommendation of the Executive Committee, subject to ratification as in 3.1.

6.4 The subscriptions of Affiliated Associations are due annually. Those of Individual Members become due at each International Mycological Congress and cover the period to the next Congress.

6.5 An Affiliated Association two years in arrears, or an Individual Member who has not paid the subscription due within two years of an International Mycological Congress, shall, on notice having been given by the Treasurer, be disaffiliated.

6.6 Administration of the funds of the IMA is the responsibility of the Treasurer who shall present accounts annually to the Executive Committee and also to the General Assembly at each International Mycological Congress. The accounts shall be audited by two auditors nominated by the Executive Committee but who are not members of that Committee or Officers of the Association.

Statutes

7. The Statutes of the IMA can be modified only by a majority of two thirds of those present at a General Assembly. Any proposals to modify the Statutes must be received by the Secretary-General at least six months before the Assembly and shall be circulated to Affiliated Associations and Individual Members at least three months before the Assembly. In cases of extreme urgency, the Executive Committe shall have the right to modify the Statutes until the following General Assembly which shall have the right to approve or reject the changes.

8. A motion to dissolve the IMA must be approved by a two-thirds majority of those present at a General Assembly and at which nominated representatives of at least half of the Affiliated Associations must be present. If the IMA is dissolved the balance of any funds is to be used for scientific purposes in the field of mycology as agreed by the dissolving General Assembly.

September 1983

D.L. HAWKSWORTH
Secretary-General IMA

APPENDIX II

EXECUTIVE COMMITTEE 1983-90

Honorary Presidents:	G.C. Ainsworth (UK) C.J. Alexopoulos (USA)
President:	J. Webster (UK)
Vice-Presidents:	K. Esser (Germany) M.V. Gorlenko (USSR) E.G. Simmons (USA) K. Tubaki (Japan)
Secretary-General:	D.L. Hawksworth (UK)
Treasurer:	H.A. van der Aa (Netherlands)
Executive Committee:	L.R. Batra (USA) A. Bresinsky (Germany) I.A. Dudka (USSR) M. Galun (Israel) G. Guzman (Mexico) L. Holm (Sweden) K. Iwata (Japan) S.-C. Jong (USA) C. Kurtzman (USA) A. Peerally (Mauritius) G.F. Pegg (UK) J.I. Pitt (Australia) C.J. Rabie (South Africa) M.A. Rifai (Indonesia) A.K. Sarbhoy (India) R.A. Shoemaker (Canada)

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A NEW SPECIES OF ENDOGONACEAE: GLOMUS BOTRYOIDES

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AND

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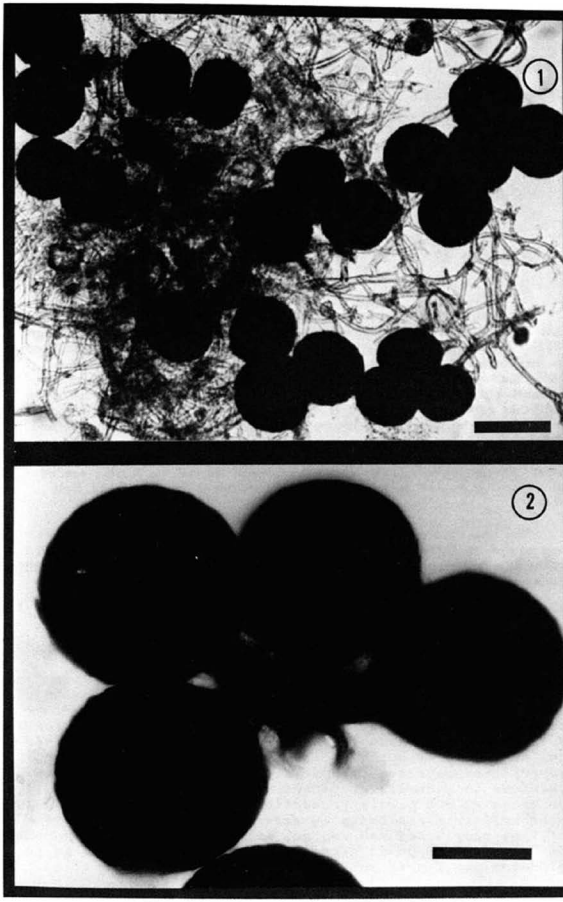
Approximately 85 percent of the land area in the Appalachian Region that is being mined for coal is occupied by mixed hardwood forests (Vogel 1981). A number of the native tree species that are planted or volunteer on surface-mined sites readily form mycorrhizae with members of the Endogonaceae (Rothwell and Vogel 1982). Many of these fungi produce diminutive subterranean sporocarps which serve as a food source for mice and other small mammals, and it is presumed that the majority of spores are dispersed by mammalian mycophagists (Maser et al. 1978, Trappe and Maser 1976). Resident mammals in adjacent unmined areas probably are active vectors in the colonization of endophytes on newly vegetated mine sites. For example, cricetine mice have been trapped on freshly seeded mine sites up to 119 meters from protective cover (Rothwell and Holt 1978).

The new species of *Glomus* described was found in the stomach contents of an eastern chipmunk (*Tamias striatus* L.) and a whitefoot mouse (*Peromyscus leucopus* Raf.) which were trapped in a forested wildlife management area in central Kentucky.

GLOMUS BOTRYOIDES Rothwell and Victor sp. nov. (Figs. 1-5)

Chlamydosporae in laxe intexto peridio, peridiales hyphae frequenter bifurcatae, diametro mutabili, aliquando ad 60-80 µm latae cum muris ad 20 µm crassis; sporae singulae vel frequentius artae uvae sporarum ex auctis finibus hyphae, subglobosae vel globosae, 145-250 µm in diametro, spadiceae vel nigrae in maturitate. Muri sporarum 5-7 µm crassi cum duobus laminis murus exterior fulvus, 3-5 µm crassus, densatus ad hypham affixam (ad 20 µm) et patens in hypha affixa in parvo spatio, exterior superficies asperata, fragilis et facile separabilis cum premitur in maturitate; interior murus laminatus, circa 2 µm crassus, cum parvis projectionibus ad 1.0 µm longis et inaequaliter distributus in exteriore superficie. Hyphae affixae rectae vel recurvatae, locus adligationis frequenter inflatus, 38-45 µm in diametro, decrescens ad 20-35 µm in diametro cum flavis vel fulvis muris 4-6 µm crassis.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Chlamydospores borne within a loosely interwoven peridium, the peridial hyphae frequently bifurcate, of variable diameter, some up to 60-80 µm in width with walls to 20 µm thick; spores occur singly, or more frequently as tight clusters of spores formed from swollen endings of a hypha, subglobose to globose, 145-250 µm in diameter; reddish-brown to black at maturity. *Spore wall structure* consisting of two walls; the outer wall yellowish-brown, 3-5 µm, thickened near the hyphal attachment (up to 20 µm) and extending along the attached hyphae for a short distance, outer surface roughened, becoming fragile and readily separable under pressure on mature spores; the inner wall laminated, ca. 2 µm thick, with fine projections up to 1 µm long and unevenly distributed over the outer surface. *Attached hyphae* straight to recurved, point of attachment frequently inflated, 38-45 µm in diameter, tapering to 20-25 µm in diameter with yellow to yellow-brown walls 4-6 µm thick.

OCCURRENCE AND HABITAT: Observed in wet-sieved stomach contents of small mammals that were trapped in a wildlife managment area in which oak was the predominant plant cover.

MYCORRHIZAL ASSOCIATIONS: Unknown.

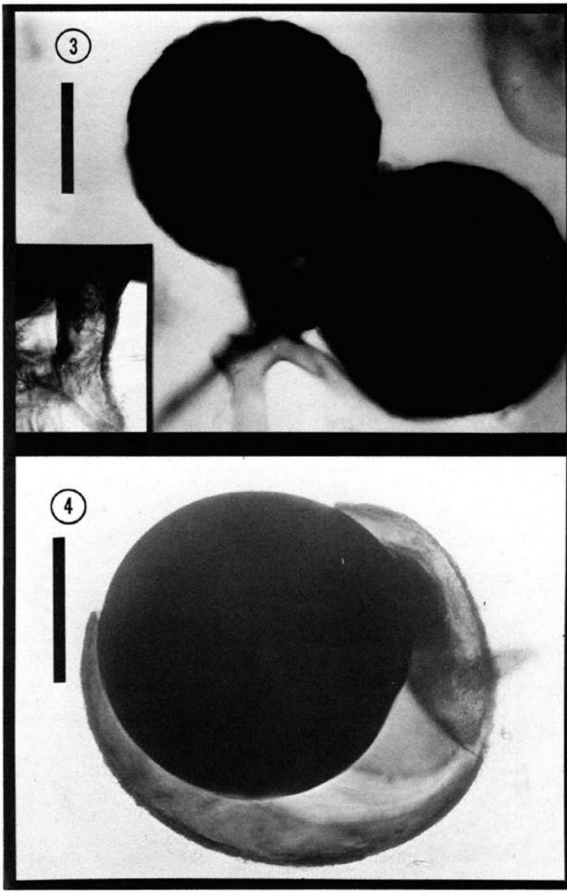
ETYMOLOGY: Greek, *botryoides*, referring to the grape-like clusters of spores.

COLLECTIONS: TYPE: KENTUCKY, Jackson County, Daniel Boone National Forest, August, 1982. Collections have been deposited in the herbaria of Oregon State University (HOLOTYPE: OSC Trappe 7219) and University of Florida (ISOTYPE: FLAS F53644).

Walker (1983) has recently proposed a standardized form of graphic representation of wall structure in the Endogonaceae. The murograph shown in Figure 5 has been suggested by Koske (personal communication) as representing the spore wall structure for *Glomus botryoides*.

This species superficially resembles *Glomus constrictum* Trappe, but spores differ in having a roughened surface, a separable outer wall, and in often forming in tight clusters from bulbous endings of hyphae. Other dark-spored *Glomus* species with which this species might be confused, either because of color or overlapping spore sizes, are: *Glomus geosporum* (Nicolson and Gerdemann) Walker, which is not sporocarpic, and has spores which are formed only singly in soil; *G. halonatum* Rose and Trappe, has spores with a hyaline outer wall and light brown inner wall that collectively measure 18-35 µm; *G. melanosporum* Gerdemann and Trappe, although sporocarpic, spores are enclosed in hyphal envelopes and have a hyaline inner wall; and *G. multicaule* Gerdemann and Bakshi, which occurs singly in soil, has rounded projections over the entire surface of outer wall, and has more than one hyphal attachment per spore.

Figs. 1-2. *Glomus botryoides*. 1. Tight clusters of spores enclosed within peridial hyphae. Bar = 200 µm. 2. Typical botryoid form of spore formation. Bar = 100 µm.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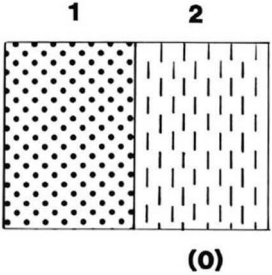

Figure 5: Murograph of *Glomus botryoides*

ACKNOWLEDGMENTS

We gratefully acknowledge the assistance of Dr J E Shelton, Department of Classics, University of Tennessee, for providing the Latin description. We especially want to thank Dr N C Schenck, Dr J M Trappe and Dr R E Koske for their helpful suggestions and critical review of the paper.

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Figs. 3-4. *Glomus botryoides*. 3. Two spores with roughened surface of outer wall evident. Insert shows extension of outer wall on attached hypha. Bar = 100 µm. 4. Fragile outer wall of a mature spore (separating only following application of pressure on mature spores). Bar = 75 µm.

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STUDIES IN THE GENUS STROSSMAYERIA (HELOTIALES). 1. GENERIC DELIMITATION. 2. TWO LOST SPECIES. 3. THREE EXCLUDED SPECIES

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ABSTRACT

1. **Strossmayeria** Schulzer (= **Leptobelonium** Höhn.) is a genus of tiny, pale-colored, sessile, inoperculate discomycetes assignable to the Helotiales, Leotiaceae. It is always accompanied by anamorphs of the genus **Pseudospiropes** Ellis (a segregate of **Helminthosporium** Link : Fr.), and both usually occur on decorticated wood or rarely on culms of large grasses or bamboos. Apothecia are characterized by long-celled, gelatinized ectal excipular tissues that blue in iodine solutions (e.g., Melzer's Reagent), hyalophragmosporous ascospores that also blue in such reagents, and ascal pores that do not react with iodine.

2. The type specimen of the type species of **Strossmayeria**, **S. rackii** Schulzer (a superfluous name for **Peziza heterosperma** Schulzer described from the same collection), has apparently been lost. A neotype should be selected, preferably a topotype from the Vidor Forest, near Zagreb, Yugoslavia. The type specimen of **Lecanidion album** Cr. & Cr., which would provide the oldest known epithet for any species of **Strossmayeria**, is also apparently lost, and a neotype should be selected from topotype material from the province of Finistère, France.

3. Studies of the type specimens of all 8 species names

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assigned to **Strossmayeria** reveal that three cannot be accommodated there: **S. phaeocarpa** Dennis may possibly be a species of **Pezicula**; **S. viridi-atra** (Sacc. & Fautr.) Dennis is a later synonym of **Claussenomyces prasinulus** (Karst.) Korf & Abawi; the type specimen of **S. sphenospora** (Kirschst.) Dennis is probably assignable to the Dermateaceae, but is in such poor condition that no generic position is proposed here.

RESUMEN

1. **Strossmayeria** Schulzer (= **Leptobelonium** Höhn.) es un género de pequeños, pálidos, sésiles e inoperculados discomycetes, asignables a los Helotiales, Leotiaceae. Se encuentra siempre acompañado por anamorfos del género **Pseudospiropes** Ellis (un segregado de **Helminthosporium** Link : Fr.); ambos usualmente habitan en madera decorticada o raramente en hierbas altas o bambú. El apotecio se caracteriza por tener: (a) un excípulo ectal gelatinazado, formado por células largas y tornándose azul en soluciones de yodo (reactivo de Melzer's); (b) ascasporas hialofragmosporas, las cuales también se tornan azules en dichos reactivos; (c) poro del asca no reaccionando con yodo.

2. El especímen tipo de la especie tipo del género **Strossmayeria, S. rackii** Schulzer (nombre supérfluo para **Peziza heterosperma** Schulzer, descrito de la misma colección), aparentemente se encuentra perdido. Un neotipo debe ser seleccionado, o preferiblemente un topotipo del bosque Vidor, cerca de Zagreb, Yugoslavia. El especímen tipo de **Lecanidion album** Cr. & Cr., el cual proporcionaría el epíteto más viejo conocido para las especies de **Strossmayeria**, también aparentemente se encuentra perdido; y así mismo, un neotipo debería de ser seleccionado de material topotipo de la provincia de Finistère, Francia.

3. Estudios de los especímenes tipo de las 8 especies asignadas al género **Strossmayeria**, revelan que tres de ellas no pueden ser acomodadas en dicho género: **S. phaeocarpa** Dennis que posiblemente es una especie del género **Pezicula**; **S. viridi-atra** (Sacc. & Fautr.) Dennis que es un sinónimo (posterior) de **Claussenomyces prasinulus** (Karst.) Korf & Abawi; y por último el especímen tipo de **S. sphenospora** (Kirschst.) Dennis que es asignable probablemente a la familia Dermateaceae, pero se encuentra en tan malas condiciones que no se otorga posición genérica para dicha especie.

1. Generic Delimitation

Strossmayeria Schulzer is a genus of pale-colored, subsessile, inoperculate discomycetes with apothecia approximately 1/2 mm in diameter. The genus is assigned to the Helotiales, Leotiaceae. Its species are saprophytes on decorticated wood, or rarely on large grasses and bamboos. The apothecia occur together with their anamorphs, hyphomycetes belonging to the genus **Pseudospiropes** Ellis.

Eight species have been assigned to the genus **Strossmayeria**: **S. rackii** Schulzer, **S. basitricha** (Sacc.) Dennis, **S. viridi-atra** (Sacc. & Fautr.) Dennis, **S. sphenospora** (Kirschst.) Dennis, **S. phaeocarpa** Dennis, **S. josserandii** (Grelet) Bertault, **S. longispora** Raitviir, and **S. ostoyae** Bertault.

From 1881, when the generic name **Strossmayeria** was proposed (Schulzer, **1881**), until 1932 the genus was essentially forgotten. Nannfeldt (**1932**) picked up the name and indicated that it was a monotypic genus. At that time he also indicated that **Leptobelonium** Höhn., based on **L. helminthicola** (Blox.) Höhn., was surely a later synonym.

Dennis (**1960a**) made the combination **S. basitricha** for **Belonidium basitrichum** Saccardo (**1875**), noting that it occurs in association with **Helminthosporium simplex** Kunze : Fr. His concept of the genus expanded when he published **S. phaeocarpa** Dennis (**1960b**), a new species from Venezuela, which he described as being on "a mixture of Dematiaceous moulds including a species of **Helminthosporium.**" Soon after he expanded the genus again, publishing two new combinations, for neither of which the presence of any anamorph was noted. These were **S. viridi-atra** (Sacc. & Fautr.) Dennis (**1962**), made "judging by the description" of **B. viridi-atrum** Saccardo & Fautrey (**1900**), and **S. sphenospora**, based on **B. sphenosporum** Kirschstein (**1938**) which Dennis (**1962**) thought "then probably ... is also a **Strossmayeria.**"

Raitviir (**1968**) described the new species **S. longispora**, without mentioning the occurrence of any anamorph, though I have found a **Pseudospiropes** present on the type specimen. Bertault (**1970**) published the new combination **S. josserandii** and the new species **S. ostoyae.** Each was associated with a dematiaceous mould which he called, respectively, **Helminthosporium josserandii** Bertault and **H. ostoyae** Bertault, both new anamorph species.

My studies of **Strossmayeria** revealed that the ana-

morphs present with the species I now accept in the genus are better referred to the genus **Pseudospiropes** Ellis (**1971**), one of the many segregate genera now recognized from the heterogeneous **Helminthosporium** Link : Fr. sensu lato. Independently, Prof. E. Müller and P. Raschle (Switzerland) apparently had arrived at the same conclusion (pers. comm.).

The genus **Strossmayeria** is characterized by pale, sessile to subsessile apothecia that extrude a yellow pigment when mounted in 2% aqueous KOH, by an ectal excipulum blueing completely or partially in Melzer's Reagent, by hyalophragmosporous ascospores that also blue in that reagent, by failure of the ascus pore to react to Melzer's Reagent, with or without pre-treatment in KOH, and by constant association with a **Pseudospiropes** anamorph. The genus appears to occupy an isolated position within the Leotiaceae, and is easily recognized by the above combination of characters. Blueing of the ectal excipulum in iodine reagents is rare in the family, and blueing of ascospores even rarer; no other genus of discomycetes is known to possess a **Pseudospiropes** state [the presumed connection of a **Pseudospiropes** to the pyrenomycetous **Melanomma subdispersum** (Karst.) Berl. & Vogl. (Ellis, **1976**) merely reflects the still unsatisfactory taxonomic limits of the anamorphic genus].

I provide here a provisional description of the genus:

Status Teleomorphosis

STROSSMAYERIA Schulzer von Müggenburg, Oesterr. Bot. Z. **31:** 313. 1881, **emend.** Iturriaga

Holotype: **Peziza heterosperma** Schulzer, Oesterr. Bot. Z. **28:** 320. 1878 (= **Strossmayeria rackii** Schulzer, Oesterr. Bot. Z. **31:** 313. 1881, a superfluous name based on the same specimen).

= **Leptobelonium** Höhn., Akad. Wiss. Wien Sitzungber., Math.-Naturwiss. Kl., Abt. 1, **132:** 112. 1923.

Holotype: **Peziza 'helminthicola'** Blox. in Höhn.

Apothecia superficial, sessile or with a very short pseudostipe, up to 1 mm diam, bowl- to cup-shaped. Receptacle white, whitish, light brown, yellowish-white, or cream colored, darker towards the base. Disco concolorous with the receptacle or paler, pruinose to granulose. Hymeni-

um hyaline. Ectal excipulum hyaline but usually brownish in the outermost layers, all or in part J+ (amyloid blue reaction to Melzer's Reagent), of textura oblita with glassy walls, composed of thin, parallel hypahe 1.5- 3 µm wide. Base of the excipulum composed of rounded, dematiaceous cells. Medullary excipulum and subhymenium indistinguishable from ectal excipulum. Paraphyses long and slender, with swollen tips, hyaline, simple or divided. Asci clavate, hyaline, unitunicate, arising from croziers. Ascospores cylindric- clavate, hyaline, more than 2-septate, biseriate or multiseriate, J+, surrounded by a thin layer of gel. Anamorph present: **Pseudospiropes.**

Status Anamorphosis

PSEUDOSPIROPES Ellis, Dematiaceous Hyphomycetes, p. 258. 1971.

Holotype: **Helminthosporium nodosum** Wallr.

Conidiophore macronematous, mononematous, arising from a mass of rounded or elongated brown cells, simple, slightly flexuous or flexuous, thick-walled, septate, brown, lighter towards the apex. Conidiophore base swollen. Conidiogenous cell polyblastic, integrated, terminal or intercalary, sympodial, cylindrical flexuous, bearing protruding, cicatrized scars, lighter than the rest of the conidiophore. Conidia solitary, dry, acropleurogenous, simple, fusiform, truncate at the base, tapering toward the apex, dematiaceous, 5- to 10-septate or pseudoseptate.

2. Two Lost Species

The type specimens of two species names clearly referable to the genus **Strossmayeria** appear to be lost, and neotypes should be designated for both.

Peziza heterosperma (≡ Strossmayeria rackii)

Strossmayeria rackii Schulzer, the type species of the genus, was described as occurring together with **Helminthosporium gongrotrichum** Corda, and was collected in the Vidor Forest, near Zagreb (Yugoslavia). The epithet "rackii" is superfluous, since three years earlier Schulzer had described the fungus in almost exactly the same words as a new species, **Peziza heterosperma** Schulzer, Oesterr. Bot.

Z. **28:** 320, 1878. Schulzer himself acknowledged the intentional name change in his unpublished notes (obtained through the courtesy of Dr. Milica Tortić, University of Zagreb), in which he had crossed out the name **Peziza heterosperma** and overwritten **Strossmayeria rackii.** He noted there that he had "tentatively" published it in 1878 as **P. heterosperma,** with a full diagnosis, and again in 1881 in the same journal as **S. rackii.** Schulzer's herbarium apparently no longer exists as a unit, and his specimens are difficult if not impossible to locate (M. Tortić, pers. comm.). Attempts to locate this type material in any Yugoslavian herbarium met with failure. Though portions of it were sent to Bresadola and to Quélet, no trace can now be found in Bresadola's herbarium at Stockholm, and Quélet's herbarium has apparently not survived. A neotype should undoubtedly be designated, preferably a topotype, but I shall avoid doing so until such suitable material becomes available. In all likelihood Schulzer's **P. heterosperma** is a later synonym of **Belonidium basitrichum** Sacc.; selection of a neotype would not upset the currently accepted name, **Strossmayeria basitricha** (Sacc.) Dennis.

Lecanidion album

Lecanidion album Cr. & Cr., Florule du Finistère, p. 75, 1867, described as occurring with a **Helminthosporium,** would provide the oldest known epithet for any species of **Strossmayeria.** The Crouan brothers' specimens are deposited at Concarneau, France (CON). Since the specimens from this herbarium may not be loaned, a visit was made by R.P. Korf to locate the specimen and to decide upon its taxonomic position. Unfortunately he was unable to find the specimen amongst the uncatalogued and generally unarranged collection. A neotype specimen should be designated, preferably a topotype from the province of Finistère. It is probable that this species also is a synonym of **S. basitricha,** as already suggested by von Höhnel (1909). Should this be the case, a new combination in **Strossmayeria** would become necessary, and **S. basitricha** would fall into synonymy.

3. Three Excluded Species

The originally monotypic genus **Strossmayeria** has grown by accretion to include eight species. Three of the seven more recently assigned species fail to agree with the type

species, **S. rackii**, in major features: all three lack a **Pseudospiropes** anamorph, none have ascospores nor excipular tissues that blue in Melzer's Reagent, two have an ascal pore that blues in that reagent, and only one has an excipular structure similar to that in **Strossmayeria** species.

1. Strossmayeria phaeocarpa Dennis, Kew Bull. **14:** 433. 1960.

Holotype specimen examined: **Strossmayeria phaeocarpa** Dennis, on bamboo. Cloud forest, 2000 m, El Avila, Dto. Federal. Venezuela. R.W.G. Dennis # 1817. 17 August 1958. 1960. (K)

Apothecia brown with a white margin, on dead bamboo culms, gregarious, sphaerical when young, saucer-shaped and of irregular contour when mature, accompanied by an imperfect fungus of the genus **Clasterosporium**, sessile, 0.25-1 mm diam, no extrusion of yellow substance in 2% aqueous KOH. Disc greyish-brown, pruinose, flat. Receptacle dark brown, margin slightly involute. Stipe none. Hymenium yellowish to light brown, approximately 150 µm thick. Ectal excipulum brown, composed of thin, brown, parallel hyphae 2-4 µm wide, with thick walls, forming a textura oblita, J-. Base composed of brown cells forming a textura epidermoidea. Medullary excipulum and subhymenium indistinguishable. Paraphyses the same length or slightly longer than the asci, cylindrical, blunt to slightly rounded at the apex, hyaline, 2.2-3.7 µm wide, simple, not septate, not forming an epithecium. Asci cylindrical, thick-walled, the wall 1.5 µm wide, 58.7-112 x 7.3-13.1 µm, arising from croziers, pore J+ dark blue. Ascospores cylindrical, sometimes constricted at the septa, hyaline at first, later turning light brown to brown (Dennis: "hyaline or nearly so when examined fresh but distinctly brownwalled in dried material"), biseriate, J-, 15.4-22.7(-30.3) x 4.4-7.3 µm, 3-5-septate (mostly 3-septate), very rarely 9-10-septate with the additional septa fainter and lighter colored than the rest. Associated **Clasterosporium**: conidiophores dark brown, septate, very short, 3.5-5.9 µm wide; conidia cylindrical or funnel-shaped, blunt at both ends, brown, (26.4-)33.1-67.0 x 5.9-7.3 µm, 6-10-septate; hyphopodia irregular in shape, lobate.

Notes: This species from Venezuela is not a **Strossmayeria**, differing in the J- ectal excipulum, J- ascospores, shape and color of the ascospores, J+ ascal pore, and an associated **Clasterosporium** imperfect and lack of a **Pseudospiropes** anamorph. Though Dennis reported the

apothecia to be "on a brown mycelium, apparently belonging to a mixture of Dematiaceous moulds, including a species of **Helminthosporium**", neither a **Helminthosporium** nor a **Pseudospiropes** was found on the fragment of the type specimen sent by Kew on loan. It is possible Dennis took the **Clasterosporium** conidia for those of a **Helminthosporium**. Because of the poor state of preservation, several of the microscopic structures could not be adequately studied, and a generic assignment could not be made. The species is probably a member of the Dermateaceae, but the ectal excipulum has longer hyphae than those characteristic of that family. It is possibly a member of the genus **Pezicula**.

2. **Strossmayeria viridi-atra** (Sacc. & Fautr.) Dennis, Persoonia **2**: 188. 1962.

≡ **Belonidium viridi-atrum** Sacc. & Fautr., Bull. Soc. Mycol. France **16**: 22. 1900.

Holotype specimen examined: **Belonidium viridi-atrum** Sacc. & Fautr. # 45, in ligno putri **Quercus**. Côte-d'Or, Galia. 1899. (PAD)

Apothecia black (dry), greenish-black (rehydrated), spherical when young, disc-shaped when mature, sessile, up to 1 mm in diam, but usually 0.5 mm in diam, accompanied by an imperfect fungus, **Brachysporium bloxamii** (Cooke) Sacc. A small amount of yellowish substance extruded in 2% aqueous KOH. Disc greenish-black, pruinose. Receptacle concolorous with disc, margin irregular, involute when young and then opening. Stipe none. Hymenium greenish-yellow, 168-178 µm thick. Ectal excipulum greenish-yellow, J-, embedded in a gelatinous matrix. Paraphyses difficult to distinguish, embedded in copious gel. Asci clavate, unitunicate, (56-)71-86 x 5.6-9.3 µm, probably arising from croziers, J-. Ascospores cylindrical to slightly curved, sometimes clavate, hyaline, often constricted at the septa, biseriate, 8 per ascus, 7.3-10.2 x 1.5-2.2 µm, 3-septate, J-, surrounded by gel, budding in the ascus. Associated **Brachysporium bloxamii**: conidiophores brown, lighter towards the apex, long and straight, smooth, (1.5-)2.9-6.6 µm wide, base wider, 7.3-12.4 µm wide; conidia pyriform, brown, (19-)22.0-24.2 x 7.3-11.0 µm, 3-septate, all four cells dark, or two extreme ones lighter, or just the basal cell lighter.

Notes: The greenish-black apothecia immediately lead one to suspect that this is **Claussenomyces prasinulus** (Karst.) Korf and Abawi, which is confirmed in observing the textura angularis of the ectal excipulum, the abundant gel, and

the budding of the ascospores. The associated hyphomycete, **Brachysporium bloxamii**, presumably has nothing to do with the life cycle of the **Claussenomyces**. Dennis's assignment of this species to **Strossmayeria** was an error. He presumably had not examined the type specimen at the time he made the new combination, and based it solely on the brief, original description. **Belonidium viridi-atrum** and **Strossmayeria viridi-atra** should be added to the already extensive synonymy of **C. prasinulus** given by Korf and Abawi (1971).

3. **Strossmayeria sphenospora** (Kirschst.) Dennis, Persoonia 2: 188. 1962.

= **Belonidium sphenosporum** Kirschst., Ann. Mycol. **36**: 375. 1938.

Holotype specimen examined: **Belonidium sphenosporum** Kirschst., Grossbenitz, Westhavelland. Auf einer alten entrindeten Kieferstange. Oktober 1916. (B); Isotype: (FH).

Apothecia yellowish to light brown, on decorticated wood, gregarious, saucer-shaped, erumpent but sometimes very flat due to preservation, 0.25-0.75 mm diam. Excipulum of textura globulosa to textura angularis, J-, poorly preserved, no details of subhymenium or medullary excipulum seen. Asci poorly preserved, only a few young asci with J+ pores observed. Ascospores clavate, 3-septate, measurements differing between holotype and isotype: holotype, 14.6-22 x 2.2-3.7 µm; isotype, 7.3-12.4 x 2.9-3.7 µm.

Notes: Though the labels on the holotype and isotype are almost identical, the difference in ascospore size noted is unexplained. Both portions are in a state of poor preservation, and little can be said about its generic position other than to be certain that it is not a species of **Strossmayeria**. The ectal excipular characters suggest that it may best be placed in the Dermateaceae, though the cell walls are not dark. The J- ascospores, J- ectal excipulum, and J+ ascal pore all point to the clear exclusion of this species from **Strossmayeria**. It is probable that Dennis had not examined type material at the time he proposed his new combination.

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STUDIES IN THE GENUS STROSSMAYERIA (HELOTIALES). 4. CONNECTION TO ITS ANAMORPH, PSEUDOSPIROPES

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ABSTRACT

The constant association on decorticated wood of tiny, sessile discomycetes (now placed in the genus **Strossmayeria** Schulzer) with anamorphs assignable to **'Helminthosporium'** (i.e., **Pseudospiropes** Ellis) was noted long ago, and whether they represented different morphs of a single species or one fungus parasitic on another were subjects of speculation. Single-ascospore cultures of five collections referable to at least two species of **Strossmayeria** consistently yielded cultures belonging to the genus **Pseudospiropes**, proving these to be teleomorphs and anamorphs, respectively, of the same holomorphs. Production of apothecia of these species in axenic culture has not yet been achieved.

RESUMEN

La asociación constante de pequeños y sésiles discomycetes (hoy referidos al género **Strossmayeria** Schulzer) con anamorfos correspondientes a **'Helminthosporium'** (i.e., **Pseudospiropes** Ellis) ha sido observada desde hace tiempo, aunque era objeto de especulación de si representaban diferentes formas (morfos) de una misma especie o un hongo ere parásito del otro. Cultivoa individuales de ascasporas de cinco recolecciones (representando al menos 2 especies) de **Strossmayeria** produjeron consistentemente cultivos pertenecientes al género **Pseudospiropes**, siendo éstos teleomorfos y anamorfos, respectivamente, de los mismos holomorfos. No se ha logrado aún la producción de apotecios de éstas especies en cultivos axénicos.

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An association of tiny, sessile, pale-colored apothecia with colonies of a phaeophragmosporous hyphomycete belonging to the genus **Helminthosporium** Link : Fr. (sensu lato), occurring on decorticated wood, was noted by both early and more recent describers of micro-discomycetes (Table I). Some authors were of the apparent conviction that the apothecial and conidial states were organically connected, parts of a single life-cycle (Schulzer, **1878, 1881**; Bertault, **1970**), while others speculated on the possibility that one state was instead a parasite on the other (Höhnel, **1909a**; Korf, **1952, 1973**).

In all cases known to us, the apothecia are referable to the genus **Strossmayeria** Schulzer (Figs. 1, 2), and the conidia to the genus **Pseudospiropes** Ellis (Fig. 3) (Iturriaga, **1984**).

The first pure-culture studies of these discomycetes appear to have been performed by the junior author on collections he made in the Ithaca area in the 1960's and 1970's. He had been intrigued by the question of connection vs. parasitism ever since his Ph.D. studies on Arachnopezizeae, in which he stated (Korf, **1952**: 173) that he hoped to present a complete treatment of **Strossmayeria**, but that awaited "life-history studies on living material." In those subsequent studies he repeatedly obtained successful ascospore discharge from apothecia suspended on the covers of petri dishes and successful germination of the ascospores on the agar below (usually water agar, with or without antibiotics). He routinely lost his cultures after transfer to nutrient agars in test tube slants before they produced any recognizable anamorph, or they would die after producing only a few conidiophores and conidia.

Quite by accident the junior author discovered that those cultures maintained on Difco Corn Meal Agar (CMA) survived. A series of recent studies by the senior author has confirmed that several different species of **Strossmayeria** grow readily in CMA cultures, but are quickly lost on a variety of other, generally richer, standard culture media.

The junior author's cultures had always been made from mass-ascospore transfers of discharged ascospores, usually soon after ascospore germination had been confirmed by microscopic examination. Despite his obtaining repeated cultures yielding, always, a **Pseudospiropes** anamorph, the technique employed did not ex-

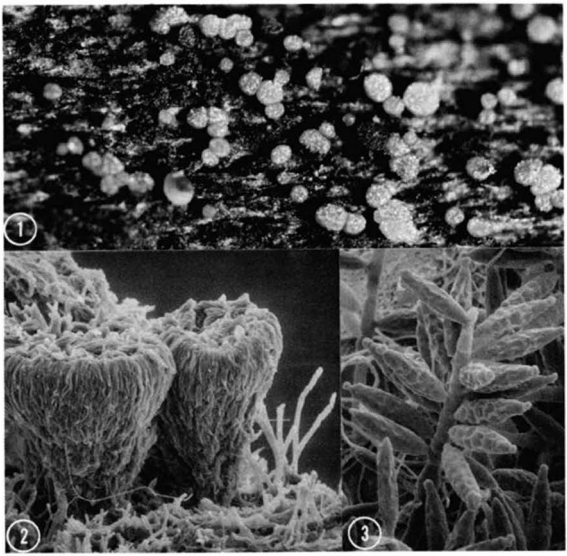
TABLE I

Literature references to reported associations between species with **Strossmayeria** apothecia and **Pseudospiropes** anamorphs

Strossmayeria sp.	**Pseudospiropes** sp.	Association reported:
Peziza helminthosporii Blox. MS	**Helminthosporium** sp.	Berkeley & Broome 1865
= **P. minutissima** Batsch sensu Berk. & Br. (misapplied)	**Helminthosporium** sp.	Berkeley & Broome 1865
= **P. 'helminthicola'** Blox. in Höhn.	**H. ? fusiforme** Cda.	Höhnel 1909b
Lecanidion album Crouan & Crouan	**Helminthosporium** sp.	Crouan & Crouan 1867
Belonidium basitrichum Sacc.	**Helminthosporium** sp.	Saccardo 1875
	H. belonidium Sacc.	Saccardo 1877
	H. fusiforme Cda.	Höhnel 1909a
= **Strossmayeria basitricha** (Sacc.) Dennis	**H. simplex** Kunze : Fr.	Dennis 1960
Peziza heterosperma Schulzer	**H. 'gonyotrichum'** Cda.	Schulzer 1878
= **Strossmayeria rackii** Schulzer	**H. gongrotrichum** Cda.	Schulzer 1881
Belonidium marchalianum Sacc., Bomm. & Rouss.	**H. apiculatum** Cda.	Bommer & Rousseau 1886
Strossmayeria josserandi (Grelet) Bertault	**H. josserandi** Bertault	Bertault 1970
Strossmayeria ostoyae Bertault	**H. ostoyae** Bertault	Bertault 1970
Strossmayeria longispora Raitviir	**Pseudospiropes** sp.	Iturriaga 1984

clude the possibility that one or more of the conidia of **Pseudospiropes** amongst which the apothecia grow might have fallen to the agar surface and have germinated. According to an unpublished manuscript by Emil Müller and Paul Raschle (pers. comm.), they have also performed similar cultural work with **Strossmayeria** and obtained a **Pseudospiropes** state.

The senior author has undertaken not only a monogra-



Figs. 1-3. **Strossmayeria** sp. (CUP 59716). 1. Apothecia on decorticated wood, x 6.5. 2. Apothecia and conidiophores, SEM, x 225. 3. Conidia and conidiophores, SEM, x 705. SEM photographs from unfixed, freeze-dried material.

phic study of the genus **Strossmayeria** and its allies as a Ph.D. thesis topic, but also undertook the life-history studies needed. By single-ascospore isolations she has established that each species of the genus examined so far has produced without fail a corresponding species of **Pseudospiropes** in culture. Five collections from New York State representing at least two distinct species of **Strossmayeria** were studied in some detail. From each of these collections the author has made from a few to over 30 successful single-ascospore isolations, taken from ascospores discharged onto CMA surfaces and transferred shortly after germination onto 6 cm diam plastic petri dishes containing CMA, and then sealed with Parafilm. Each such single-spore germling has yielded a **Pseudospiropes** colony, which we

take as irrefutable evidence of the connection of teleomorph and anamorph. Light microscopic and electron microscopic (TEM and SEM) studies on conidia and conidiogenesis based upon these and other cultures are reported elsewhere (Iturriaga and Israel, 1984).

Many experiments, some started long ago by the junior author using mass-ascospore derived cultures, many done more recently by the senior author using single-ascospore cultures, mass-ascospore cultures, and various combinations of single-ascospore cultures derived from a single apothecium, were performed in an attempt to induce apothecial formation in axenic culture. A variety of artificial media and natural substrata, and a range of temperature and light regimes were tested, some in the laboratory, some in growth chambers. Though we would like to report success (and thus complete Koch's postulates), whatever the physical and cultural factors are that would provide such success have thus far eluded us.

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TWO NEW SPECIES OF THE GENUS PHIALOCEPHALA

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Abstract

In this paper an amendment of the Hyphomycete genus Phialocephala Kendrick (1961) is proposed. Two new species, P. mexicana Onofri et Zucconi sp. nov., found on Coffea arabica L. leaf litter in Mexico, and P. ivoriensis Zucconi et Onofri sp. nov., found on indeterminate leaves in forest litter, Tai, Ivory Coast, are described and illustrated. A key to the members of the genus is given.

Two new species of the Dematiaceous Hyphomycete genus Phialocephala Kendrick (1961) are herewith described. The morphological characteristics were obtained from nature. Every attempt at cultivation on common media proved unsuccessful.

The genus Phialocephala was established by Kendrick (1961) to separate from the genus Leptographium Lagerb. et Mel. (1927) those species which possess conidiophores and general appearance very similar to that of this genus but which produce phialospores instead of anellospores.

During some investigations on the productivity and management of the coffee agro-ecosystems, a new Hyphomycete, belonging to the genus Phialocephala Kendrick, on leaves of Coffea arabica L. in litter, has been discovered.

Phialocephala mexicana Onofri et Zucconi sp. nov.

Coloniae amphigenae, effusae, parum manifestae, non circumscriptae. Mycelium immersum. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel leviter flexuosa, levia, pallide brunnea, comparative brevia, usque ad 54 μm longa, ex stipite et apparatu conidiogeno plus minusve penicilliformi composita. Stipes usque ad 34,5 μm longus, 7-11 μm ad basim crassus et 5,5-8 μm ad apicem, plerumque aseptatus, basi lobata praeditus. Apparatus conidiogenus symmetricus aut asymmetricus, ex apice stipitis ortus; aut 1 ex serie 4-5 metularum (7-11x3,5-5,4 μm), 2-6 phialides quisque ad apicem ferens, aut

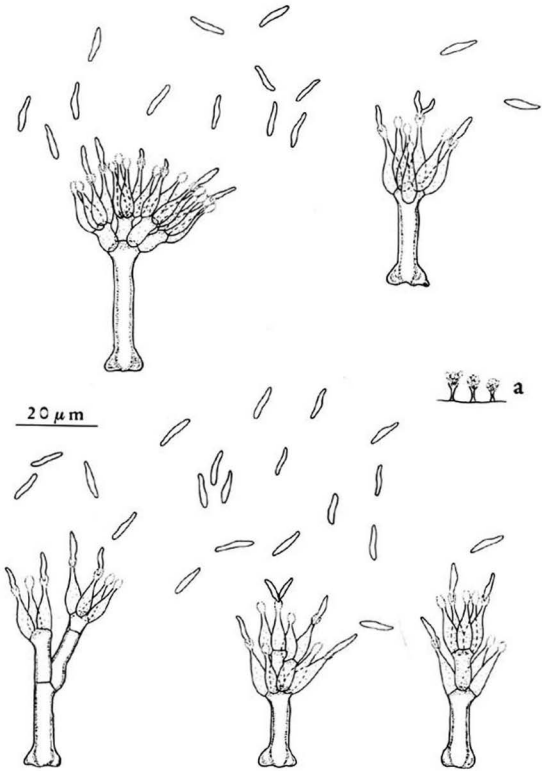

Fig. 1 - Phialocephala mexicana: conidiophores and conidia; a. habit sketch.

3-7 ex phialidibus simpliciter in apice stipitis positis; aut saepius ex metulis et phialidibus in apice stipitis pari altitudinis fastigio, compositus. Stipes a latere ramum, metulis vel phialidibus praeditum, interdum septatum, rarius fert. Cellulae conidiogenae enteroblasticae, monophialidicae, discretae, determinatae, lagoeniformes, parietibus tenuibus, subhyalinae, 12,6-20 μm longae (collarettis additis) et 3,6-5,4 μm crassae, definito collaretto praeditae. Collaretta ellipsoidalia vel ovata, extremitate trunca, vix perspicua; 1,8-2,8x 2-2,5 μm. Conidia aseptata, levia, hyalina, subacerosa, saepe modice incurvata vel modice sigmoidalia, omnia glutinata; 7,2-10x1-1,8 μm.

In foliis emortuis Coffeae arabicae L., situs coffeiculus Xalapensis, Veracruz, Mexico, 16.5.1983, holotypus: H.B.R. 125A

Colonies amphigenous, effuse, scarcely visible, uncircumscribed. Mycelium immersed. Conidiophores macronematous, mononematous, solitary, erect, straight or slightly flexuous, smooth, pale yellowish brown, comparatively short, up to 54 μm long, consisting of a stipe and a conidiogenous apparatus arranged in a more or less penicillate manner. Stipe up to 34.5 μm long, 7-11 μm wide at the base and 5.5-8 μm wide at the apex, generally aseptate, with a lobed base. Conidiogenous apparatus terminal on the stipe, symmetrical or asymmetrical, consisting either of one regular series of 4-5 metulae (7-11x 3,6-5,4μm), the distal ends bearing each 2-6 phialides, or of 3-7 phialides inserted directly on the stipe, or, more frequently, of metulae and phialides inserted at the same level on the stipe. Rarely, the stipe bears a lateral branch, sometimes septate, on which metulae and/or phialides are inserted. Conidiogenous cells enteroblastic, monophialidic, discrete, determinate, lageniform, thin-walled, subhyaline, 12,6-20 μm long (including collarettes) and 3,6-5,4 μm wide, with a well-defined collarette. Collarettes ellipsoidal to oval, open-ended, scarcely visible, 1,8-2,8x2-2,5 μm. Conidia aseptate, smooth, hyaline, subacerose, often slightly curved or sigmoid, produced in slimy masses, 7,2-10x1-1,8 μm.

The Hyphomycete here described presents phialidic conidiogenous cells with defined collarettes, conidia produced in slimy masses, and solitary conidiophores with a conidiogenous apparatus arranged in a more or less penicillate manner. These are the most taxonomically relevant characteristics of the genus Phialocephala Kendrick (1961).

In the original diagnosis of this genus, Kendrick describes a sporogenous head consisting "of from one to several multiplicative series of metulae", and he does not consider phialides inserted directly on the stipe, as sometimes occurs in our fungus. We think that the presence or the absence of the metulae can not be considered in distinguishing between genera, in accordance with what occurs, for example, in Penicillium or in Aspergillus. In fact Sutton (1975) has already included in the genus Phialocephala the species P. fumosa (Ell. et Ev.)

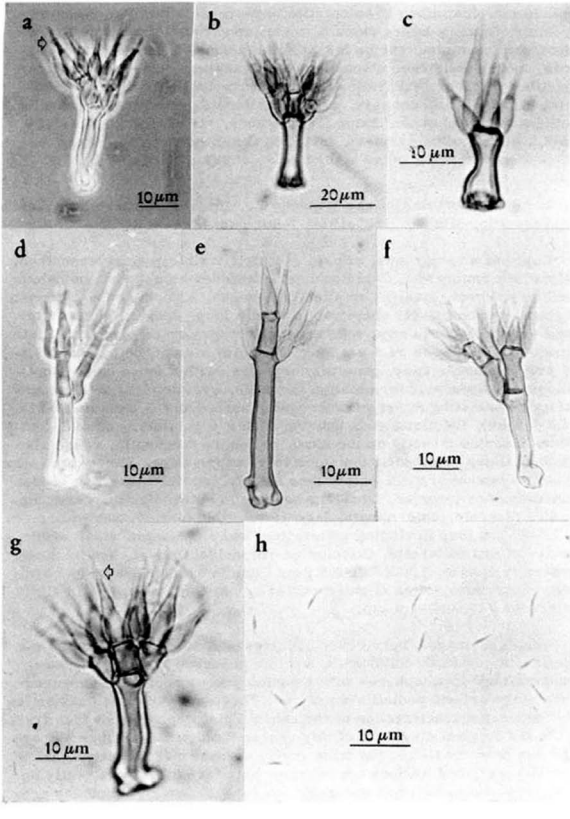

Fig. 2 - Phialocephala mexicana: a. - g. conidiophores (arrows indicate collarettes); h. conidia.

Sutton, which can present phialides inserted directly on the conidiophores or on metulae. Therefore we think it is necessary, in order to include P. fumosa and P. mexicana correctly in the genus Phialocephala Kendrick, to propose the following amended Latin diagnosis of the genus, also adding to it the amendment already proposed by Crane (1971).

Phialocephala Kendrick (1961)

Fungi Imperfecti, Hyphomycetes.
Conidiophora erecta, solitaria vel raro fasciculata. Stipites mononematei, dematiacei. Apparatus sporogenus obconicus, simplex vel complexus, vel ex apice vel a latere stipitis ortus, ex phialidum verticillo vel 1-pluribus ex seriebus metularum compositus, distaliter phialides ferens. Phialides saepius strophium gaudentes. Phialosporae parvae, unicellulares, saepius hyalinae, ex phialidibus in capitulum mucosum successive extrusae.

Species typica: P. dimorphospora Kendrick

In the above-mentioned paper, Sutton (1975) considers P. fumosa (Ell. et Ev.) Sutton (≡Spicaria fumosa Ell. et Ev.) as a synonym of Sporendocladia castaneae Arnaud (1954, nom. nud.). In the same year Nag Raj and Kendrick (1975) validated the genus Sporendocladia Arnaud ex Nag Raj et Kendrick (type species: S. castaneae Arnaud ex Nag Raj et Kendrick). Subsequently Carmichael et al. (1980) consider the validated genus Sporendocladia as a synonym of Phialocephala, and the species S. castaneae = P. fumosa. We are in agreement with this synonymy also because the above-proposed amendment makes possible the inclusion in Phialocephala of species either with or without metulae.

The Hyphomycete here described is surely includible in this enlarged concept of the genus Phialocephala, within which limits it presents affinities with P. fumosa. It differs from this species mainly in the shape of the collarettes and of the conidia, which are moreover produced in slimy masses and not in chains. In addition, this is the only species in the genus Phialocephala with a stipe distinctly lobed at the base.

For the above-mentioned reasons we propose P. mexicana as a new species.

Another species belonging to the genus Phialocephala has been discovered during some mycological researches carried out within the Tai Project: Effects of increasing human activities on South-Western Ivory Coast tropical forests, UNESCO, Program M. A. B., Project n. 1.

Phialocephala ivoriensis Zucconi et Onofri sp. nov.

Coloniae amphigenae, effusae, parum manifestae, non circumscriptae. Mycelium immersum. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel flexuosa, levia, usque ad 360 μm longa, ex stipite et penicilliformi apparatu conidiogeno composita. Stipes

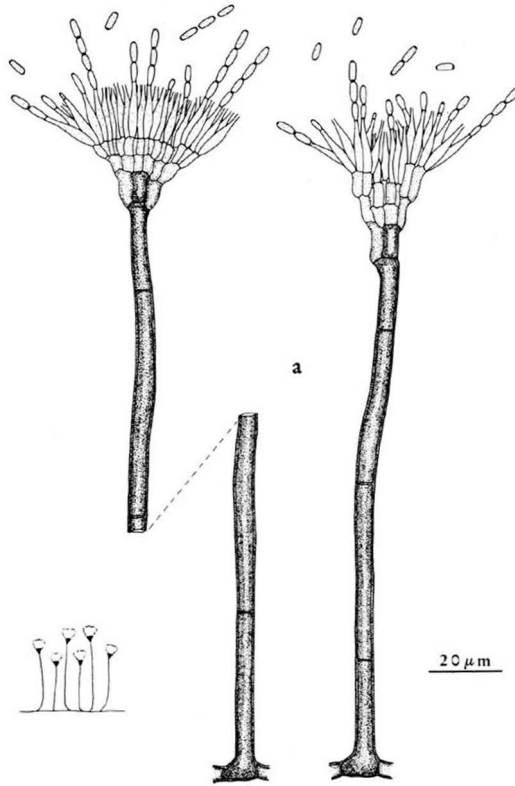

Fig. 3 - Phialocephala ivoriensis: a. conidiophores and conidia; b. habit sketch.

2-3-septatus, parietibus crassis, atro-brunneus, ad apicem versus le viter dilutior et attenuatus, basi inflatus et leviter expansus ad metularum nexum; 135-315x3,6-5,4 μm; 11-18 μm ad basim crassus. Apparatus conidiogenus ex apice stipitis ortus, obconicus, complexus, 35-45 μm longus, 3 ex seriebus metularum compositus, distaliter phialides ferens. Metulae primariae 2-4, parietibus crassis, pallide brunneae, metula media integrata et brunnea; 7,2-18x3,6-4,5 μm. Metulae secundariae 2-4 in singula metula primaria, parietibus tenuiori bus quam primariae, pallide brunneae; 3-8x3-3,5 μm. Metulae tertia riae 2-4 in singula metula secundaria, parietibus tenuibus, pallide brunneae; 4,5-8x2,7-3,6 μm. Cellulae conidiogenae 2-4 in singula me tula tertiaria, fere pari altitudinis fastigio positae, enteroblasticae, monophialidicae, discretae, determinatae, graciles, subulatae vel lagoeniformes, parietibus tenuibus, pallide brunneae, non definito col laretto praeditae; 12,5-15,5x2-3,5 μm. Conidia aseptata, levia, conidiogenis cellulis concoloria, subcylindrica, rotundata et crassa ad apices, in catenis pertinacibus extrusa et in capitulum mucosum ad conidiophori apicem congregata; 4,5-5,4x1,8-2,2 μm.

In foliis emortuis, Tai, Ora Eboris, 23.3.1981, holotypus: H. B. R. 126A; in foliis emortuis, Tai, Ora Eboris, 23.3.1981, paratypus: H. B. R. 126A(1)

Colonies amphigenous, effuse, scarcely visible, uncircumscribed. Mycelium immersed. Conidiophores macronematous, mononematous, solitary, erect, straight or flexuous, smooth, up to 360 μm long, con sisting of a stipe and a conidiogenous apparatus arranged in a penicillate manner. Stipe 2- or 3-septate, thick-walled, dark brown, slightly paler and tapering toward the upper part, inflated at the base and slightly widened at the insertion of the metulae; 135-315x3.6-5.4 μm; 11-18 μm wide at the base. Conidiogenous apparatus terminal on the stipe, obconical, complex, 35-45 μm long, consisting of 3 series of metulae ultimately bearing a cluster of phialides. Primary metulae 2-4, thick-walled, pale brown, with the central one integrated and darker in colour, measuring 7.2-18x3,6-4.5 μm. Secondary metulae 2-4 on each primary metula, somewhat thinner-walled, pale yellowish brown; 3-8x3-3.5 μm. Tertiary metulae 2-4 on each secondary metula, thin-walled, pale yellowish brown; 4.5-8x2.7-3.6 μm. Conidiogenous cells 2-4 on each tertiary metula, all arising at approximately the same level, enteroblastic, monophialidic, discrete, determinate, slim, subulate or lageniform, thin-walled, pale yellowish brown, with undefined collarettes; 12.5-15.5x2-3.5 μm. Conidia aseptate, smooth, with the same colour as the conidiogenous cells, subcylindrical with rounded and thickened apices, produced in long persistent chains aggregated in slimy masses at the apex of the conidiophore; 4.5-5.4x 1.8-2.2 μm.

The Hyphomycete here described presents some affinities with the type species of the genus Phialocephala, P. dimorphospora Kendrick

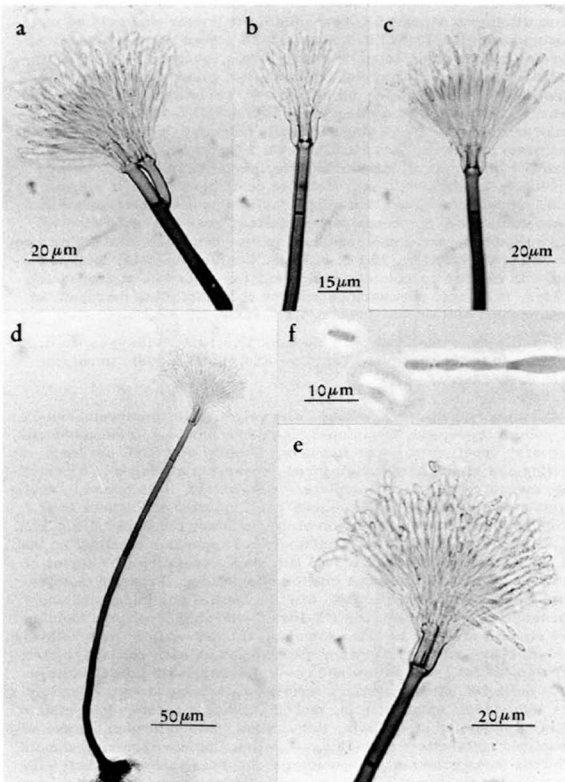

Fig. 4 - Phialocephala ivoriensis: a., b., c. and e. conidiogenous heads; d. conidiophore; f. phialide and conidia.

(1961), mainly in the general morphology of the conidiophore, in its conidiogenesis and in the catenate conidia, but it differs from the above-mentioned species most importantly in the absence of long cylindrical collarettes, as well as in several other characteristics, such as the shape of the conidia. Our fungus presents phialides without well-defined collarettes such as are found in P. phycomyces (Auerswald) Kendrick (1964), P. humicola Jong et Davis (1972) and P. gabalongii Sivasithamparam (1975). It differs from the first-named in the dimensions of the conidiophores, which are smaller, in the conidiogenous apparatus, which is simpler, in the shape and the dimensions of the phialides and in the conidia, which are in chains and thickened at the apices; it differs from P. humicola in the shape and the dimensions of the phialides and of the conidia, which are, as stated above, in chains. Finally, it differs from the third species, in the number of the series of metulae, in the morphology of the conidiogenous cells, which are not thickened at the apex, and in the shape and dimensions of the conidia, which moreover in P. gabalongii are not in chains.

For the above-mentioned reasons we propose P. ivoriensis as a new species.

At this moment there are 14 species belonging to the genus Phialocephala. To facilitate the identification of these species we set out below a dichotomous key.

Phialides with typical well-defined collarettes, either flaring, swollen or cylindrical 1
Phialides without well-defined collarettes, or thickened at the apex. 10

1. Sterile lateral outgrowths present 2
1. Sterile lateral outgrowths absent 3

2. Conidia with lateral hilum ..... P. canadensis Kendrick
2. Conidia with basal scar .... P. fluminis Shearer, Crane et Miller

3. Collarettes cylindrical 4
3. Collarettes not cylindrical 7

4. Conidia bacilliform, cylindrical or subcylindrical 5
4. Conidia of two types ovoid and spherical, not bacilliform .... P. dimorphospora Kendrick

5. Conidiogenous apparatus with one or more series of metulae .. 6
5. Conidiogenous apparatus with one series of metulae or without metulae ..... P. fumosa (Ell. et Ev.) Sutton

6. Metulae well-defined lengthened branches P. bactrospora Kendrick
6. Metulae very short and irregular in shape .... P. truncata Sutton

7. Collarettes regular 8
7. Collarettes irregular ..... P. fusca Kendrick

8. Conidiogenous apparatus terminal on the stipe 9
8. Conidiogenous apparatus lateral on the stipe ..... P. illini Crane

9. Conidia more or less spherical . P. repens (Cooke et Ellis) Kendrick
9. Conidia subacerose, often slightly curved or sigmoid .....
..... P. mexicana Onofri et Zucconi

10. Conidia not in chains, either subglobose, ovoid or ellipsoidal
..... 11
10. Conidia in chains, subcylindrical . P. ivoriensis Zucconi et Onofri

11. Phialides flask-shaped, with thickened apices .....
..... P. gabalongii K. Sivasithamparam
11. Phialides not flask-shaped 12

12. Phialides very long, up to 40 μm, subulate .....
..... P. phycomyces (Auerswald) Kendrick
12. Phialides relatively short, up to 12 μm, cylindrical .....
..... P. humicola Jong et Davis

ACKNOWLEDGEMENTS

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STUDIES IN THE GENUS *PHOMA*. IV. CONCERNING *PHOMA MACROSTOMA*.

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ABSTRACT

Phoma macrostoma Montagne, is described and illustrated. Its cultural characteristics and the structure of its pycnidial wall are documented.

INTRODUCTION

The *raison d'être* behind our undertaking a reexamination of species concepts in the genus *Phoma* Saccardo lies primarily in a wish to resolve problems frequently encountered in applying names to isolates, particularly when known only from *in vitro* axenic culture. Uncertainties concerning specific taxonomy in the genus are caused not only by lack of fully adequate documentation of morphological and biological discontinuities but by absence in the literature of clear identification of the key characters separating individual entities. There is often difficulty in applying a classification based on morphological characteristics exhibited when a fungus occurs on natural substrates to an isolate grown in pure culture on agar media. Several criteria considered to be useful and reliable in a natural substrate-based taxonomy are sometimes found to be unstable and of little use in identifying isolates *in vitro*. A classification, in order to be practical, must, in large part, be based on criteria that are invariable or on characters which do not vary significantly within a species but which differ between species, whatever the growing condition. It is essential to recognize at least one or two characters for each specific taxon that are comparable in all conditions both in culture and on natural substrata. Failing this, two classifications will have to exist. One, based on traditional criteria, particularly host-substrate relationship, the other on predominating cultural characteristics. Our approach in these studies is multidimensional. A reevaluation is made of criteria used traditionally in recognition of species while searching for additional stable characteristics. Among the latter, structural aspects of the pycnidial conidiomata are

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thought to have potential value, even at specific level.

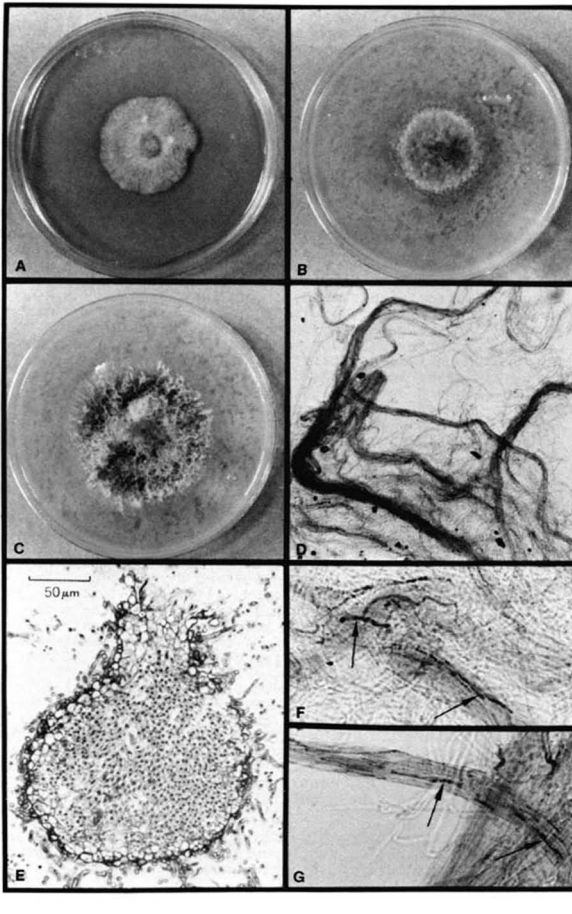
Pycnidial wall composition and structure have been little used in coelomycete taxonomy for characterizing species. Within some genera the structure of conidiomata may vary but little. In others, however, including *Phoma* as presently constituted, it is evident that some diversity occurs in this regard. White and Morgan-Jones (1983) showed that the presence of large, inflated cells in the pycnidial wall of *Phoma sorghina* (Sacc.) Boerema, Dorenbosch and van Kesteren is diagnostic for that species. In a reexamination of *Phoma* and *Ascochyta* species described by Wollenweber and Hochapfel as fruit-rotting fungi, Boerema and Dorenbosch (1973) recognized the usefulness of determining the structure of the pycnidial wall for identification purposes. No attempt was made, however, to document pycnidial wall anatomy. Pycnidial walls were broadly categorized as being either of pseudoparenchymatous cells, or, where hyphal elements are present, having a prosenchymatous structure. Some species, such as *Phoma pomorum* Thümen, were said to have flat, furrowed pycnidial walls; others, such as *Phoma betae* Frank, were described as having "hairy" walls with hyphal outgrowths. The pycnidia of *Phoma cava* Schulzer were noted to have a different wall structure but the precise nature of this variance was not detailed. In an ink-drawing illustration contrasting the pycnidial wall surface of *P. cava* and *P. pomorum* the cellular composition of the former is shown as being less discernible than in the latter. *P. cava* bears filiform, septate conidiophores and may not be properly classified in *Phoma*. A group of species, many of which were previously classified in the genus *Plenodomus* Preuss, were made the basis of a new section of the genus *Phoma* [sect. *Plenodomus* (Preuss) Boerema, van Kesteren and Loerakker] by Boerema et al (1981). These taxa are characterized by possession of more or less thick-walled, hyaline cells lining the venter of the pycnidia and sometimes extending irregularly, as protruding mounds of tissue, into the pycnidial cavity, especially at the base. Such cells were termed scleroplectenchyma.

During the course of our recent study of *Phoma* species we have had opportunity to examine two isolates of *Phoma macrostoma* Montagne. A detailed investigation of the characteristics of this plurivorous species *in vitro* and of its pycnidial wall anatomy has been conducted. The composition of the latter is quite unlike that of the other species described hitherto in this series of papers.

MATERIALS AND METHODS

Isolates were obtained from Plantenziektenkundige Dienst, Wageningen, The Netherlands and the American Type Culture

PLATE 1. *Phoma macrostoma*. A, 7-day old colony on PDA at 25C; B, 7-day old colony on MEA at 25C; C, 7-day old colony on MEA at 20C; D, funiculose mycelium; E, V.S. pycnidium; F,G, mycelium bearing reddish pigment (indicated by arrows).


A
B
C
D
50 µm
E
F
G

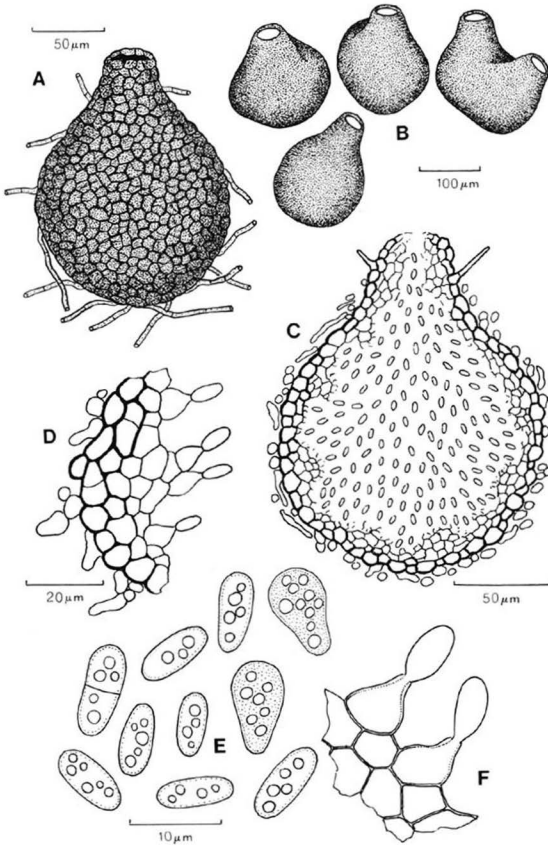
Collection. Axenically grown cultures were prepared from single conidia. Standardized conditions for growth were those used by Morgan-Jones and White (1983), as were the techniques for sectioning.

TAXONOMIC PART

Phoma macrostoma Montagne, Ann. Sci. nat., ser. 3, 11: 52, 1849 (Plates 1 and 2, figure 1).

Colonies on potato dextrose agar (Plate 1, A) felty to lanose, pale gray to light purplish, margin compact, regular, attaining a diameter of 35mm at 20C after 6 days, 33mm at 25C, with no growth at 30C; reverse dark brick-red to brownish centrally, becoming gradually lighter marginally. Colonies become purple-blue in color following the addition of NaOH. Colonies on malt extract agar (Plate 1, B & C) coarsely lanose, becoming strongly funiculose, somewhat variable in color from pale grayish-olivaceous to purplish, margin distinctly arachnoid, attaining a diameter of 55mm at 20C after 6 days, 33mm at 25C, with no growth at 30C; reverse dark brick-red to brownish centrally, becoming gradually lighter marginally. Pycnidia are produced abundantly on both PDA and MEA after ten days, superficial or partly immersed in the agar. No growth or pycnidial production occurred on cellulose agar. Mycelium composed of septate, infrequently branched, hyaline to subhyaline, smooth, 2 - 4µm wide hyphae. Aerial hyphae abundant, frequently ascending in closely appressed funiculose strands (Plate 1, D), especially on MEA. Hyphae often containing concentrated, deep red to violet pigment deposits at intervals (indicated by arrows in Plate 1, F & G), imparting a purplish hue to the colonies especially when present in abundance. Pycnidia solitary, flask-shaped (Figure 1, B), brown to blackish-brown, pseudoparenchymatous, uniostiolate or, occasionally, biostiolate, 150 - 250µm in diameter, usually bearing a short but distinct neck, 50 - 70µm wide; ostioles large, 20 - 40µm in diameter. Pycnidia usually partly or completely covered by mycelium in colonies on PDA and MEA, loosely hairy. Hyphal outgrowths from the outer wall cells in the neck region are sometimes present (Plate 1, E). Pycnidial wall composed of more or less isodiametric cells (Plate 2, B-D), up to five cells deep, 20 - 30µm thick. Outer wall cells thick-walled, pale brown to brown, 5 - 10µm in diameter, occasionally somewhat elongate. Inner wall cells thinner-walled, lining the venter, very pale brown to subhyaline, irregular in number, constituting an uneven layer, in part clustered, forming pulvinate protrusions at irregular intervals extending into the pycnidial cavity. Conidiogenous cells (indicated by arrows in Plate 2, B) phialidic, hyaline, simple, smooth-walled, mostly ampulliform, borne on the innermost cells of the pycnidial wall up to the base of the

FIGURE 1. A, pycnidium; B, variation in pycnidial shape and number of ostioles; C, V.S. pycnidium; D, portion of pycnidial wall; E, conidia; F, conidiogenous cells.


50 μm
A
B
100 μm
C
D
20 μm
50 μm
E
F
10 μm

neck region, 4 - 7µm in diameter. Conidia hyaline, simple, multiguttulate, somewhat variable in shape, cylindrical, oblong to ellipsoidal or, occasionally, pyriform, obtuse at each end, smooth, continuous or rarely one-septate, 5.5 - 9 X 2 - 3.5µm; with age, conidia often become swollen to several times their original size, frequently assuming a broadly pyriform shape (Plate 2, F) and turning pale brown in color.

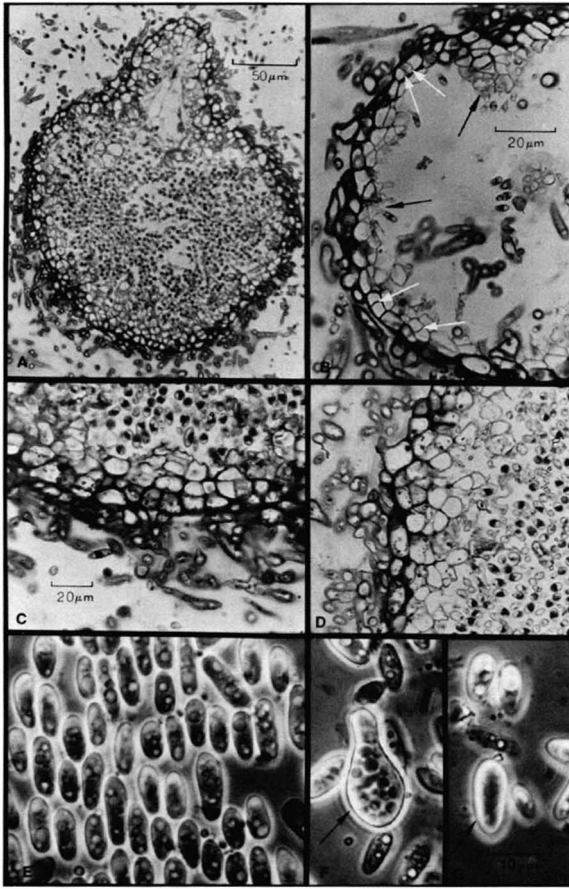
Ubiquitous on woody plants, incidental on herbaceous substrates, often associated with spots on leaves and fruits of apple; cosmopolitan.

Collections examined: isolate from buds of *Malus pumila* Mill., The Netherlands, G.H. Boerema and M. Dorenbosch, PD75/145, ATCC 28981, AUA; isolate from an apple fruit spot, Emmeloord, The Netherlands, G.H. Boerema, PD68/1014, AUA.

Phoma macrostoma is considered to be a plurivorous, weak pathogen, especially on woody members of the Rosaceae (Boerema, 1976). It occurs world-wide on a large number of hosts (Sutton, 1980). An account of its nomenclatural history and synonymy was given by Boerema and Dorenbosch (1970), who also chose a lectotype for the name. Its original spelling, *Phoma macrostomum*, is considered an orthographic error.

A number of characteristics serve to distinguish this species. The wide ostiole, of which the specific epithet is descriptive, is a notable feature, as are the peculiarities of pycnidial wall construction. The pulvinate, convex cellular extensions into the pycnidial venter are particularly distinctive. These occur over the whole inner wall surface, even into the neck region, and bear clusters of conidiogenous cells (Plate 2, B - conidiogenous cells indicated by black arrows). Subdivision of primary wall cells into smaller entities is apparent during maturation of both outer and inner wall layers. One or more thin transverse septa (indicated by white arrows in Plate 2, B) are laid down within the thicker-walled primary cells. This secondary cell division, occurring irregularly, is in part responsible for the uneven thickness of the pycnidial wall. It also leads to a progressive increase in the overall size of the pycnidium. Among the many species of *Phoma* examined by us to date this type of pycnidial wall anatomy has been encountered in but one other taxon, namely *Phoma medicaginis* Malbr. and Roum., var. *pinodella* (L.K. Jones) Boerema [White and Morgan-Jones, unpublished data]. The overall appearance of the pycnidial wall of *Phoma macrostoma* is not unlike that of some species classified by Boerema et al. (1981) in *Phoma* sect. *Plenodomus* in that the cavity of

PLATE 2. *Phoma macrostoma*. A, V.S. pycnidium; B-D, portions of pycnidial wall (conidiogenous cells indicated by black arrows, secondary pycnidial wall cell septation indicated by white arrows; E-G, conidia (swollen, pale brown conidia indicated by arrows).


50μm
A
20μm
B
20μm
C
D
E

mature pycnidia of the latter may also sometimes become irregular due to the occurrence of protrusions of thin-walled cells. These cells are, however, invariably subtended by more or less thick-walled, hyaline cells composing the tissue type referred to as scleroplectenchyma (Boerema and van Kesteren, 1981). For this reason *P. macrostoma* cannot be considered as a prospective member of section *Plenodomus* although its wall anatomy bears more similarity to that of species included there than it does to that of *P. herbarum* Westd., the type species of the genus *Phoma*. Clearly, satisfactory circumscription of taxonomic infra-generic sections within *Phoma* must await accumulation of more knowledge than is at present available.

Additional features useful in identifying *P. macrostoma* include colony morphology on MEA, particularly hyphal roping to give a funiculose appearance, a higher growth rate at 20C than at 25C, and the presence of aggregations of red pigment at intervals in the hyphae. The heavily guttulate conidia, some of which swell and become brownish with age, are also distinctive. Conidial septation is variable *in vitro*. Conidia are predominantly unicellular but sometimes a single septum, or rarely up to three, are formed.

Strains of *P. macrostoma* not possessing red pigment in their hyphae have been made the basis of the varietal name *incolorata* (Horne) Dorenbosch and Boerema.

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PANELLUS LONGINQUUS SUBSP. PACIFICUS A NEW WEST COAST NORTH AMERICAN AGARIC ASSOCIATED WITH RED ALDER

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&

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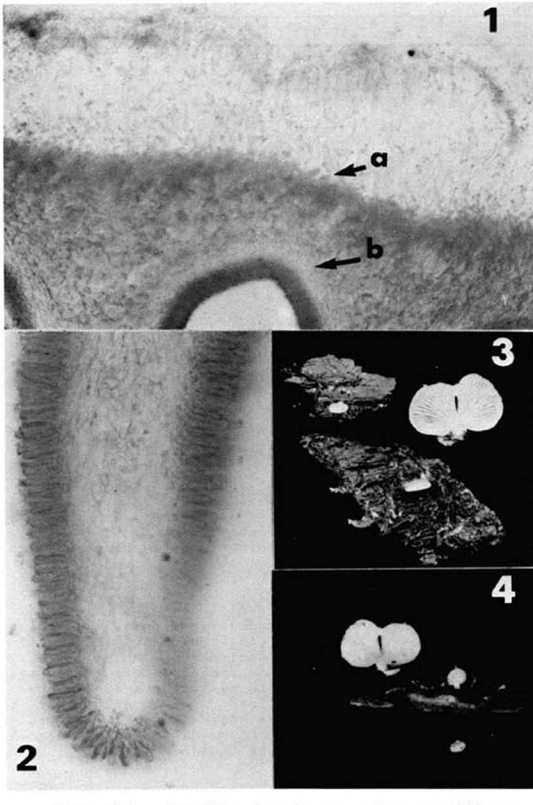
ABSTRACT

Panellus longinquus subsp. *pacificus* subsp. nov. occurs in British Columbia, Washington, and Oregon mainly on rotting logs and branches of *Alnus rubra* Bong. *Panellus longinquus* (Berk.) Singer subsp. *longinquus* occurs in the equivalent temperate zone in South America.

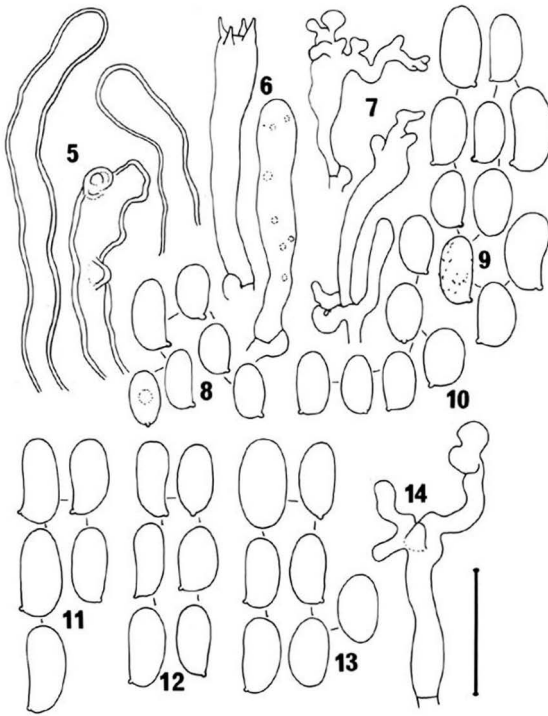
The agaric flora of the Pacific coast of North America still harbours many undescribed taxa. Several new pleurotoid agarics have been discovered and will be described elsewhere by S.D. Libonati-Barnes. *Panellus longinquus* subsp. *pacificus* was independently recognized as an undescribed taxon by both researchers during the course of separate investigations. The fungus appears to be restricted to coastal areas where it usually occurs on rotting wood of red alder (*Alnus rubra* Bong.), a coastal hardwood in both the U.S.A. and Canada.

Panellus longinquus subsp. *pacificus* Libonati-Barnes & Redhead subsp. nov. Figs. 1-10

*Author to which reprint requests should be sent



Figs. 1-4. *Panellus longinquus* subsp. *pacificus*. 1. Cross section of pileus showing the thick gelatinized subpellis, a compact upper trama(a), the less dense lower trama, the gelatinized subhymenium(b), and the hymenium. 2. Fertile lamellar edge in cross section. 3,4. Two views of small basidiomes, life size (DAOM 185837). Figs. 1-2. (DAOM 180405).



Figs. 5-10. *Panellus longinquus* subsp. *pacificus*. 5. Caulocystidia. 6. Basidia. 7. Cheilocystidia. 8,9, 10. Basidiospores. Figs. 5-8 (DAOM 185837). 9. One showing adhering debris common in this collection (DAOM 185838). 10. (DAOM 180405). Figs. 11-14. *Panellus longinquus* subsp. *longinquus*. 11. Basidiospores (BAFC 29151). 12. Basidiospores (BAFC 29144). 13. Basidiospores (BAFC 29145). 14. Caulocystidium (BAFC 29144). Bar = 15µm.

Pileus 2-40 mm *lat.*, 1-20 mm *long.*, *dimidiatus, glabratus, viscidus, hyalinus vel vinaceous, striatus ex parte. Lamellae decurrivae, niveae vel pallide vinaceae. Stipes* 1-9 x 1-5 mm, *lateralis, niveus, pulveratus. Basidiosporae* 6-11.5(-13.5) x 3-5(-6)µm, *ellipsoideae vel cylindraceae, hyalinae, leves, amyloideae. Basidia tetraspora, clavata. Cheilocystidia coralliformia, infrequentia. Hyphae inamyloideae, fibulis. Pileus pellicula gelantinosa absitus. Subhymenia gelatinosa.*

Holotypus de ligno Alno rubro; S.D.L.-B.1529 (WTU).

PILEUS 2-40 mm wide x 1-20 mm long, when very young orbicular, at maturity flabelliform, reniform, or irregularly lobed, in profile convex, often depressed at the rear; margin inrolled; surface glabrous, hygrophanous, translucent when wet and often viscid, opaque and concentrically rugose when dry; colors when young pale ivory, faint peach (5A2 orange white, Kornerup & Wanscher 1966), or tan (5B3 pale orange), with age becoming pinkish (7C4 brownish orange) on a camel brown background (6D4), "pale greyish vinaceous, rosy vinaceous or rosy buff" (Rayner 1970) and finally, in some specimens, brown (6F7 chestnut brown) with purple-brown discoloration (9F3 grayish brown), when dried becoming translucent waxy yellow (4A2 yellowish white), or opaque golden brown, or purple-brown, varying with age and exposure; CONTEXT 0.6-1.0 mm thick, firm, fibrous, white to pale pinkish tan, odor and taste not distinctive.

LAMELLAE short decurrent onto a stipe or pseudostipe, 1-3 mm wide, close when young, subdistant with age (16-36 per cm at the margin, 14-35 per cm at the stipe), entire, firm, ivory, pale yellow-cream, or peach like the young pileus, sometimes drying with a greyish tint; transverse rugae sometimes present.

STIPE absent or present, when present lateral, varying from a mere prolongation of the pileus to a distinct stipe, horizontal to ascending, always fairly broad at the lamellar attachment, 1-9 mm long x 1-5 mm wide; context white, firm, initially solid, with age hollow; surface ivory, yellow-cream, peach, or brown, varying with age, often frosted on the inferior surface, usually with some white coarse tomentum toward the base, and a small mat of hyphae extending on to the substratum.

HYMENIAL FEATURES: SPORES in thick deposits dingy yellow-cream (3A3 pale yellow), 6-11.5 (-13.5) x 3-5.0 (-6)µm, L/D 1.75-3.25, average L/D 2.3, subcylindric, short-boletoid, or ellipsoid, occasionally slightly dumbbell-shaped, subreniform, or suballantoid, usually slightly curved at the apicular end, in face view elliptical to short-cylindric, usually centrally constricted, smooth, hyaline, amyloid; BASIDIA 4-spored, narrowly

clavate, 30-41.5 x 4-6.2µm, often multiguttulate; sterigmata 2µm long; PLEUROCYSTIDIA none; CHEILOCYSTIDIA absent in young lamellae, sparsely scattered and inconspicuous, or sometimes erumpent in small fascicles, clavate, irregular, filiform or capitate, ultimately branched and coralliform, 22-50 x 2-6µm, with necks 1.3µm, the bases sometimes slightly gelatinized; lamellar edge occasionally with irregular deposits of brown amorphus material up to 25µm diam.; LAMELLAR TRAMA subparallel in the center of the lamella, gradually more interwoven toward the prominent subgelatinized subhymenium, of thick and thin-walled hyphae 2.5-6 (-19)µm diam., with the thicker-walled hyphae toward the lamellar base; subhymenium 10-25 (-50)µm thick, of densely interwoven hyphae 1.3-2.5 (-3)µm diam.

PILEAL STRUCTURE: PILEAL SURFACE a thin ephemeral cutis 5-10 (-125)µm thick which is usually worn away at maturity exposing the subtending gelatinized layer; hyphae contorted, radial, 2.5-3.5µm diam.; pileal projections scattered single or fasciculate hyphae 27-40 x 2-2.5µm; the subpellis gelatinized, typically 125-500µm thick, of hyphae 1-4µm wide, interwoven, ascendent or subradial; PILEAL CONTEXT composed of two layers: a compact radial layer 37-125µm deep, of hyphae 2.5-7.5 (-15)µm diam. with faint vinaceous brown tints; an interwoven layer 250-700µm deep, of thick-walled filamentous hyphae 3.5-30(-25)µm diam. with an occasional swelling; hyphal walls up to 1µm diam.

STIPE STRUCTURE: hyphae of the cortex 2-10µm diam., compactly arranged, parallel, with thickened walls, enclosing a medulla composed of hyphae similar to those of the pilear trama and continuous with that tissue. CAULOCYSTIDIA: present on the hymenial side of some well developed stipes, scattered to clustered, 20-50 x 5-8µm, nodose-clavate or more irregular, with thickened hyaline walls. BASAL MYCELIUM: radiating in short strigose bundles, the hyphae thin-walled, smooth 2-3µm diam. CLAMPS: present on all hyphae. CULTURAL CHARACTERISTICS (25°C): Colonies (DAOM 180405) at 1 wk, produce a very strong reaction (brown opaque corona) with little growth on tannic acid agar; a moderately strong reaction (translucent brown corona) and little growth on gallic acid agar; on 2% malt agar moderately fast growing, 15 mm rad. at 1 wk., 40-50 mm at 3 wks., white and loosely woolly at first, later becoming felty centrally; hyphae of the leading edge 1.5-3.5µm diam., slightly sinuose, thin-walled, with long cells (>100µm), with elongated clamps sometimes giving rise to branches, otherwise irregularly branched; aerial hyphae similar but tending to fall into two ranges, 1-1.5µm diam. and 3.5-4µm diam.; hyphae in the center at 3 wks. more contorted, many containing numerous refractive granules, and usually constricted at the septa, some broader hyphae empty and with cytoplasmic rich narrower hyphae more abundant proportionately. No

spores or cystidia noted.

HABITAT, HABIT AND SUBSTRATE: solitary to gregarious or subcespitose-imbricate on decorticated or partially decorticated fallen logs and branches of *Alnus rubra* Bong. or rarely on conifers including stumps of *Tsuga heterophylla* (Raf.) Sarg., in mixed temperate coastal rain forests.

COLLECTIONS EXAMINED: Canada: British Columbia: Queen Charlotte Islands, Graham I., Naikoon Prov. Park, Tow Hill, Sept. 20, 1982, S.A. Redhead 4128 (DAOM 185837); North Vancouver, Seymour R., Jan. 3, 1983, T. Taylor (DAOM 185838); Vancouver I., Cowichan L., at Millar Cr., Sept. 26, 1979, S.A.R. 3166 (DAOM 180405), Jordan R., Dec. 2, 1982, D. Chu VC-83-1 (DAOM 188294). U.S.A. (all at WTU): Oregon: Lincoln Co., Cascade Head, Nov. 3, 1979, S.D. Libonati-Barnes 1584; Tillamook Co., Sandlake, Nov. 13, 1976, S.D.L.-B. 1252, F. Van De Bogart (S.D.L.-B 1253,1256). Washington: Clallam Co., Cape Flattery, Jan. 12, 1976, A.R. Palmer (S.D.L.-B. 593,596); Gray's Harbor Co., 3 mi S of Copalis, Sept. 12, 1979, S.D.L.-B. 1529 (holotype), Ocean Shores, Dec. 11, 1977, J. Roger (S.D.L.-B. 1558,1559), Dec. 16, 1979, F.V.D.B. (S.D.L.-B. 1573, 1574); Jefferson Co., W coast of Olympic Pen., near Ruby Beach, Nov. 17, 1974, J. Hunter (S.D.L.-B. 377).

Panellus longinquus subsp. *longinquus* and subsp. *pacificus* were at first believed to represent distinct species by both authors. Although both taxa were known to have rosy pigments, gelatinized tissues in their pilei, and gross morphological similarities, there appeared to be other distinct morphological differences reported by various authors. Singer (1951 p. 471) studied the type of *Agaricus longinquus* Berk. in Hooker, the basionym of *Panellus longinquus*, and reported the amyloid collapsed spores to be about 8.2 x 2.7µm. *Agaricus minusculus* Speg. was said to be conspecific. Singer (1952 p. 209-210) and Singer & Digilio (1952 p. 121-122) published more detailed descriptions based on both types but no fresh materials. The spores were recorded as 6.8-8 x 2.7um. Cystidioles were said to have replaced most basidia. Later, Singer (1954 p. 117-118) published on his own collections. In this much expanded description the spores were reported to be 6.8-9.7 x 2.7-4.5µm. Reference to the cystidioles was dropped as was the mention of versiform cheilocystidia described in both 1952 publications. Singer (1969 p. 87-88) listed additional collections, noted that Horak (1967) had erroneously reported the spores of the type of *Agaricus minusculus* to be inamyloid, and suggested that *Agaricus tasmanicus* Berk. might be synonymous. Singer (1975) has also suggested that *Panellus roseolus* Stevenson (1964) is a synonym. Raithelhuber (1977) gave 6.8-8 x 2.5-3µm as the spore size but did not indicate what material had been examined. All these reports are based

on materials from the southern hemisphere.

Examination of Singer's collections deposited at BAFC by S. Redhead convinced us that the North American and South American collections represented very closely related taxa. The spore sizes overlap (figs. 11-13), the gross morphological variation is the same, many collections were similarly palely pigmented, the presence of a prominently gelatinized subpellis and less conspicuous subhymenium was confirmed in both, and the hymenial appearance was identical. The nonsporulating elements were considered to be basidioles. Cheilocystidia were not observed on Singer's collections but they had been reported by him on the type materials he had examined earlier (Singer 1951,1952) and the reported general shape resembled that found in our collections. Caulocystidia present on Singer's material (fig. 14) resembled those in our collections but tended to be thin-walled.

The main differences between the two taxa are subtle. Subsp. *longinquus* has never been reported to be darker than rosy colour centrally (Singer 1954), its gelatinized subpellis tends to be thinner (approx. 60-70µm deep), and the caulocystidia have not been observed to be thickened. These differences are mainly quantitative and therefore they are considered to be less important than would be distinct morphological differences. As these differences are correlated with a large geographic separation the North American collections are recognized at the subspecific level. *Panellus longinquus* has not been reported from the northern hemisphere previously (Moser 1983, Miller 1970).

In western North America small pale basidiomes of *Panellus longinquus* subsp. *pacificus* can be confused with *Panellus mitis* (Pers.:Fr.) Singer. Miller (1970) reported *P. mitis* basidiomes up to 8 mm wide but illustrated, life size, basidiomes of an A.H. Smith collection up to 2 cm wide. Smith's collections at Ann Arbor cited by Miller were checked and confirmed to be *P. mitis*. Some basidiomes reached 2 cm in width; thus they overlap *P. longinquus* subsp. *pacificus* in size. *Panellus mitis* differs by its typically coniferous substrates, narrower spores (3.5-6.0 x 0.9-1.2µm, Miller 1970) than *P. longinquus* subsp. *pacificus*, and prominently gelatinized lamellar edges (see Miller 1970, fig. 31).

Specimens of *Panellus longinquus* subsp. *longinquus* examined: ARGENTINA: prov. Neuquén: Lago Nahuel Huapí, April 1964, R. Singer (BAFC 29145); Los Cántaros, Nov. 10, 1966, R. Singer M6050 (BAFC 29146), M6049 (BAFC 29144); Parque Nacional Nahuel Huapí, Santa María, April 19, 1965, R. Singer M5072 (BAFC 29148); Quetrihué, May 18, 1952, R. Singer M734 (BAFC 29151). prov. Rio Negro: Camino a los Cantaros, Puerto Blest, Mar. 23, 1963, R. Singer M3140

(BAFC 29149). CHILE: prov. Valdvia: Cordillera Pelada, May 6, 1965, R. Singer M5531 (BAFC 29147), May 9, 1965, R. Singer M5640, 5646 (BAFC 29150, 29152).

ACKNOWLEDGEMENTS

We thank Prof. Jorge Wright (BAFC) for the loan of *P. longinquus* and Dr. Robert Fogel (MICH) for the loan of *P. mitis*. The help of Drs. J. Ammirati and the late D. Stuntz (WTU) to S.D.L.-B. was greatly appreciated. Collecting support (to S.A.R.) was provided by the B.C. prov. Min. Forests (Lake Cowichan), Min. Parks & Recr. (Naikoon Park), Can. Dept. Environ. (Pacific For. Res. Centre), and Can. Forces Base (Masset). Helpful reviews were provided by Drs. T. Baroni and J. Ginns.

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NOTICE

IX EUROPEAN MYCOLOGICAL CONGRESS 1985

The First Circular describing the IX European Mycological Congress, to be held in Norway, 15-21 August, 1985, was mailed in December, 1983. Lectures will be combined with all-day congress sessions and laboratory work.

A pre-Congress foray on Agaricales will be held 11-15 August at a field station in the alpine area at Finse; four post-Congress forays will be held, one on Ascomycetes at a hotel in Kongsvoll/Grimsdalen in the upper boreal area, one on Agaricales at a field station in the lower boreal area at Hurdal, another on Agaricales at a hotel in Biri in the lower boreal area, and a fourth at a field station at Stange, in the lower boreal area, on Aphyllophorales. All post-Congress forays run from 21-25 August.

The Committee had requested that all who planned to attend contact them before 1 April 1984, before this notice will appear in print. Perhaps some late registrations will be accepted? Contact:

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NOTICE

4th INTERNATIONAL MARINE MYCOLOGY SYMPOSIUM

The First Circular describing the 4th International Marine Mycology Symposium to be held in Portsmouth, England, 11-17 August, 1985, requests contact by 1 March, 1984, as a deadline date for titles of offered papers. A Second Circular will be distributed in November, 1984, with abstracts to be submitted by 1 March, 1985.

There will be two workshops, one each on Higher Marine Fungi and on Lower Marine Fungi, a Poster session, and five sections, as follows (Convenor noted):

1. Taxonomy (E. B. G. Jones)
2. Physiology and Biochemistry (D. H. Jennings)
3. Ecology (G. J. F. Pugh)
4. Lower fungi (S. T. Moss)
5. Applied topics and biotechnology (R. A. Eaton and E. B. G. Jones)

The Erika Kohlmeyer Prize will be awarded for the best paper submitted by a graduate (or postgraduate) student, which must be the sole work of the student.

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REVUE DES LIVRES

par

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ICONES MYCOLOGICAE 1-18, by J. RAMMELOO édit., 17 p., 6 pl.h.w., 12 pl. col., in 4°, in folder, 1982. Jardin Botanique National de Belgique, Domaine de Boechout, B-1860 Meise, Belgium. Price FB 600.- (Benelux), 700.- (Europe), 800.- (outside Europe).

The National Botanic Garden of Belgium recently started the publication of a new series entitled *Icones Mycologicae* composed of coloured loose-leaved plates of fungi and text sheets. The first issue contains the first 18 plates, devoted to *Russula* species of temperate regions of Europe and North America (4 species from Belgium, 3 from the Netherlands, 1 from France, 1 from Germany, 1 from the Grand Duchy of Luxemburg, 3 from Pennsylvania, USA). This set comprehends 12 water colour plates (25 x 32 cm) painted by the Belgian mycologist Louis IMLER, from Antwerp, and 6 plates of scanning electron microscopical photographs of spores. The description of the 13 species and some complementary line drawings are printed on separate sheets. The carpophores are painted at natural size, microscopical features are magnified 1000 x to 4000 x. Like in the other series published by the National Botanic Garden of Belgium, the *Flore Iconographique des Champignons du Congo* (en 18 volumes, 1935-1972) (still available at FB 5500.-), the colours of the original paintings carefully reproduced. The series is not only open to accurate description and illustrations of macrofungi but offers the artistic mycological works to be preserved for ever. It will be issued at irregular intervals depending on the availability of critical studies accompagnied by good illustrations. Publication in English is prefered. From the quality of the first issue, we can predict a successful publication of the series.

SUPPRESSIVE SOILS AND PLANT DISEASE, par R. W. SCHNEIDER, 88 p., 14 x 22 cm., 1981. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA.Prix US $ 9.-(8.-).

Ce livre fait la synthèse des connaissances sur la propriété du sol d'inhiber (ou non) l'action des organismes phytopathogènes, base d'une forme de lutte biologique contre les maladies des plantes. Les sols possédant cette propriété, dits "sols suppresseurs" peuvent l'exercer à l'égard des champignons tels que *Phytophthora* spp., *Pythium* spp., *Fusarium* spp., *Gauemannomyces graminis* et *Rhizoctonia solani* comme à l'égard des bactéries ou des nématodes. L'induction de cette propriété antipathogène à des sols qui ne la possèdent pas a été réalisée par diverses voies, telles que l'addition de sol suppresseur, l'inoculation d'organismes inhibiteur parasites (*Trichoderma hamatum, T. harzianum*) ou l'addition d'amendements modifiant les caractéristiques du sol. Les résultats obtenu sont analysés mais ne sont pas encore entièrement expliqués. La méthode

ne connaîtra un succès assuré que grâce à une connaissance approfondie du système naturel sol-racine et sa lisation. Ce petit livre qui pourrait passer inaperçu est important. Il stimule la curiosité, incite à l'expérimentation et documente le lecteur de ses 240 références bibliographiques.

COMPENDIUM OF TURFGRASS DISEASES, par Richard W. SMILEY, 136 p., 66 fig., 185 ph. col., in 4°, broché, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121. Prix US $ 12.- (membre), 15.- (non membre).

Ce Compendium est le 9e volume de la série publiée par l'A.P.S. et concerne non seulement les spécialistes de la protection des plantes mais aussi tous les horticulteurs et les propriétaires de gazons. Comme à l'habitude, ce compendium traite successivement des maladies non infectieuses et des maladies infectieuses par champignons, bactéries, virus et nématodes, décrivant pour chacune d'elles les symptômes, les causes, l'écologie, l'épidémiologie et la technique de lutte. En plus des 48 maladies décrites, ce compendium montre l'existence de conjonctions et de successions de pathogénies. Il donne encore des clés symptomatologiques pour aider l'identification et les principes généraux d'une stratégie de lutte. Comme dans les autres compendia, le texte est ici remarquable par sa clarté et sa simplicité (les mots techniques étant repris en lexique), et son illustration graphique et photographique excellente. Traiter en un fascicule de toutes les maladies du gazon n'était pas une tâche facile, compte tenu encore de la diversité des graminées concernées, mais l'auteur, avec la collaboration de 25 spécialistes, l'a parfaitement réussie. C'est un ouvrage que beaucoup auront avantage à consulter.

COMPENDIUM OF ROSES DISEASES, par R. Kenneth HORST, A.P.S. Compendium (10), 72 p., 18 fig., 83 ph. col., in 4°, broché, 1983. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA. Prix US $ 12.- (membre), 15.- (non membre).

Ce Compendium est le premier de la série à traiter des maladies d'une plante ornementale, en l'occurence des roses dont les nombreux hybrides dérivent de quelques 7 espèces botaniques de *Rosa.* Des maladies étudiées, les plus importantes sont d'origine fongique, le blanc, l'oïdium la rouille, les tâches noires, l'anthracnose, le Botrytis, et divers chancres. Les maladies bactériennes atteingnent surtout les racines. Les maladies virales sont au nombre de 9. Les maladies physiologiques sont dues à des désordres nutritionnels, à la pollution de l'air, aux pesticides, et sont de beaucoup plus nombreuses et bien illustrées. Les roses étant les plantes ornementales les plus populaires à travers le monde, ce guide sur les maladies des roses et leur traitement sera utile à beaucoup.

METHODS AND PRINCIPLES OF MYCORRHIZAL RESEARCH, par N.C. SCHENCK édit., 244 p., 66 fig., 64 ph. col., in 4°, relié toilé, 1982. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA. Prix US $ 22.- (membre), 24.- (non membre).

Préparé par l' *A.P.S. Committee on Mycorrhizae,* ce livre répond au besoin d'une synthèse des nombreuses techniques en usage dans l'étude et

l'utilisation des champignons mycorhizogènes, sur la base d'une explicitation des grand principes directeurs de ce domaine de recherche. Le livre est donc un véritable manuel de recherche sur les mycorhizes, donnant le pourquoi et le comment de chaque démarche. Il sera donc d'une grande utilité dans l'enseignement (il est le premier manuel didactique dans ce domaine) comme dans les laboratoires et les entreprises forestières. La première partie (90 p.) concerne les endomycorhizes, le plus souvent vesiculo-arbusculaires, et pour la plupart produites par les Endogonales (Zygomycotina). La deuxième partie (98 p.) traite des ecto- et ectendomycorhizes produites par des Basidiomycotina et Ascomycotina. Chacune des deux parties comprend un chapitre taxonomique précisant la manière d'observer les divers caractères diagnostiques, puis d'autres chapitres sur la description qualitative et l'évaluation quantitative de la mycorhization, les techniques nécessaires à la mise en culture in vitro, à la synthèse mycorhizique axénique et à l'étude de la réponse de l'hôte à la mycorhization. Dans une troisième partie, l'utilisation de radiotraceurs dans les approches physiologiques de la symbiose, l'observation au microscope électronique et l'étude de la relation entre la microflore du sol et la mycorhize sont d'application générale. Chacun des 18 chapitres de ce livre conduit en outre à une abondante littérature. 39 spécialistes de réputation mondiale ont contribué à cet ouvrage.

ECOLOGY AND COENOLOGY OF MACROFUNGI IN GRASSLANDS AND MOIST HEATHLANDS IN DRENTHE, THE NETHERLANDS, PART 2. AUTECOLOGY, PART 3. TAXONOMY, par Eef ARNOLDS, in Bibliotheca Mycologica v. 90, 502 p., 250 fig., 8 pl. col., in 8°, relié toilé, 1982. J. Cramer, 9490 Vaduz, Lichtenstein. Prix DM 200.-.

La première partie de ce travail traitant des méthodes mycocénologiques et des résultats sur la synécologie des champignons des prairies de Drente a été analysée dans Mycotaxon vol. 14(2):507.

Le présent volume complète le premier en présentant les documents ayant servi de base aux conclusions synécologiques déjà publiées: la 2e partie sur l'autoécologie des 346 taxa de macrochampignons récoltés (incluant des ascomycètes) et une 3e partie sur l'étude taxonomique des taxa trouvés.

La caractérisation autoécologique de chaque taxon (262 p.) comprend la valeur diagnostique du taxon pour la mycocénose, la fréquence temporelle et spatiale, le microhabitat, les caractéristiques du sol (capacité hydrique, pH, bases échangeables totales, phosphore échangeable, matière organique, rapport carbone/azote) et la périodicité de la fructification. La fréquence et la périodicité sont illustrées en graphes pour 102 taxa et en fonction du sol et de la phytocénose. De plus ces données autoécologiques sont comparées à celles de la littérature mycocénologique et phytosociologique pour chaque taxon. Certaines publications de floristique forestière et de taxonomie mycologique ont été aussi dépouillées bien que les informations sur le substrat ou l'habitat y sont souvent sommaires.

La description taxonomique de chaque taxon, la liste des récoltes, les figures et les commentaires couvrent 196 p. L'auteur déclare à juste titre: "The correct identification of the collected fungi is the most laborious, most difficult and most critical part of mycocoenological studies. For a good interpretation of the results of such studies, an account of the applied names is necessary, including descriptions of the critical taxa. Although this statement has often been made in a way or another, most mycocoenological studies lack such taxonomic notes."

Notons que cette exigence, à laquelle l'auteur répond d'ailleurs bien, vaut aussi pour toute publication sur l'écologie, la physiologie, la biochimie, la pathogénie et la toxicologie des champignons. Les descriptions sont précises. En plus des 145 illustrations au trait, des aquarelles dépeignent 39 espèces. Des commentaires taxonomiques très documentés mettent souvent en évidence les problèmes taxonomiques en attente de solution ou les positions taxonomiques prises par l'auteur. 26 taxa sont décrits comme nouveaux et 8 autres à titre provisoire. 15 nouvelles combinaisons sont aussi établies. Cette contribution à la taxonomie étend encore l'intérêt de ce travail.

Le soin et la précision qu'apporte l'auteur au relevé de ses observations sont évidents et mettent le lecteur en confiance. Il est souhaitable que des études semblables et d'un tel intérêt soient publiées.

DIE EPIPHYLLE PILZFLORA VON ACER PLATANOIDES L., EIN VERGLEICH VERSCHIEDENER STANDORTE IN BERLIN-TEGEL, par Martina KLOIDT et G. LYSEK, in Bibliotheca mycologica v. 86, 144 p., 31 fig., 2 fig. h.t., 14 x 22 cm, broché, 1982. J. Cramer, FL 9490 Vaduz, Lichtenstein.

Il s'agit d'un travail de fin d'études par le premier auteur. Le but est d'évaluer les variations spatiales et temporelles de la mycoflore de la phyllosphère du platane (*Acer platanoides*) dans quatre stations différemment éloignées du site urbain pollué. L'idée est bonne mais sa réalisation est imparfaite. En effet, sans encore mettre en cause le choix des stations, la faiblesse de l'échantillonnage d'une part et la méthode d'analyse utilisée d'autre part ne permettent pas d'obtenir des résultats répondant au but proposé. De chaque station et chaque mois une surface de 6 à 8 cm2 de limbe foliaire est analysée par mise en culture des eaux de lavage. Le nombre de colonies de chaque espèce en culture est considéré comme la fréquence de chaque espèce sur les feuilles et est exprimée en nombre de colonies par cm2 alors qu'il correspond au nombre de germes produits ou déposés sur la feuille par cm2, nombre dans lequel intervient la capacité différentielle de sporulation de chaque espèce. Les 51 espèces observées sont réparties en 3 goupes: 4 espèces de champignons levures (3 ind.) et levuriforme (*Aureobasidium pullulans*), 31 espèces de champignons filamenteux fructifiant en culture groupant 15 hyphomycètes, 14 sphaeropsidales et 2 zygomycètes (dont 16 espèces déterminées) et 16 espèces de champignons filamenteux non déterminés comprenant 1 basidiomycète, 8 sphaeropsidales et 7 mycelia sterilia. En vain, l'auteur consacre 36 pages à décrire sommairement ces champignons dont 34 espèces restent indéterminées et à en construire une clé dichotomique. Seul le groupe des 31 champignons filamenteux sporulants sert à l'analyse écologique. La fréquence du groupe des levures et levuriformes n'est d'ailleurs pas chiffrée. Etant donné ces lacunes, l'interprétation des résultats est des plus aléatoires. Il me semble que ce travail dût être achevé et largement abrégé avant d'être publié. Un comité d'édition devrait être établi par l'éditeur pour sa collection Bibliotheca Mycologica.

DIE ENTWICKUNG DER DOLIPORE VON COPRINUS RADIATUS (BOLT.)FR., par Sabine DESOLE, in Bibliotheca Mycologica v. 88, 85 p., 11 fig., 128 ph. b.n. hors texte, 14 x 22 cm., 1982. J. Cramer, FL 9490 Vaduz, Lichtenstein.

Sabine Desole constate à travers une bonne étude bibliographique une diversité croissante dans la constitution des dolipores décrits chez les Basidiomycètes, y compris certaines levures, et s'est posée la question de savoir si des différences ultrastructurales existent dans les dolipores suivant leur relation aux différentes cellules et en fonction du développement de celles-ci. Elle a donc choisi l'hyménium et a défini six stades de développement de la baside, de sa naissance à la maturité de ses spores, chez le *Coprinus radians*. A chacun des six stades, elle a étudié sous le microscope électronique le dolipore de la baside, des paraphyses, des cellules subhyméniales et de la trame, en y ajoutant le dolipore des filaments du stipe et du mycelium. Comme pressenti, elle met en évidence une évolution propre du dolipore, dans ses éléments constitutifs et en particulier dans son mécanisme de fermeture au cours du développement et de la maturation de chaque cellule et en fonction de la nature de celle-ci. Elle montre aussi la parenté existant entre le septopore des cellules hyphales et le dolipore dans le carpophore. Ces observations, toutes appuyées de bonnes électromicrophotographies, conduisent l'auteur à d'intéressantes considérations phylogénétiques basées sur l'ultrastructure porale. Ce travail retiendra l'attention.

MANUAL AND ATLAS OF THE PENICILLIA, par Carlos RAMIREZ, xvi +874 p., 227 fig., 252 pl. col., 38 pl. b.n., in 8°, relié toilé, 1982. Elsevier biomedical Press, P.O.Box 211, 1000 AZ Amsterdam, Pays-Bas.

Le *Manual of the Penicillia* de Raper et Thom (1949) était devenu un classique pour l'identification des *Penicillium* jusqu'à la parution en 1979 de la nouvelle monographie de J. Pitt *The genus Penicillium*. En effet le *Manual of the Penicillia* de Raper et Thom n'était plus à jour et demandait une revision en vue surtout de rejeter le concept holomorphique du genre *Penicillium* que pronaient ses auteurs et de prendre en considération les 140 espèces décrites depuis 1949. Carlos Ramirez, de Madrid, avait entrepris cette revision. Son *Manual and atlas of the Penicillia* apparaît comme une bonne mise à jour de celui de Raper et Thom, gardant la même méthode taxonomique et le même style, mais s'alignant sur les règles internationales de la nomenclature botanique.

Ramirez, comme Pitt, reconnaît le genre *Penicillium* comme anamorphique, mais se refuse, contrairement à Pitt, d'y inclure les anamorphes des espèces ascosporées d'*Eupenicillium* et de *Talaromyces*, ce qui rend sa monographie incomplète. Des 140 espèces décrites depuis 1949, Ramirez en accepte plus de 130, portant ainsi les 93 espèces anamorphiques de Raper et Thom à 227 espèces sans téléomorphe connu, tout en acceptant certaines synonymies d'espèces proposées par Samson, Stolk et Hadlok. Un certain nombre d'espèces ne restent cependant connues que par leur type et sa culture. Aussi ne faudra-t-il pas s'étonner si des taxonomistes préférant pour une quelconque raison une notion large d'espèce refusent les différences notées par Ramirez entre espèces monotypiques et synonymisent celles-ci à de plus larges espèces. Cependant à l'analyse fine, on s'apperçoit que la ségrégation par Ramirez de ces espèces, monotypiques parce que rares, se fonde non pas sur un seul caractère, mais sur un faisceau de caractères différents qui, au delà de la couleur et de la vitesse de croissance, ont trait à la morphologie de l'appareil conidien et à l'ornementation des conidies.

La méthode taxonomique de Ramirez est celle de Raper et Thom. Cela transparaît dans la valeur donnée aux caractères diagnostiques.

Les clés dichotomiques sont semblables, à quelques différences et additions près. Les subdivisions génériques et subgénériques sont inchangées et sans correction de leur nomenclature, mais augmentées de plusieurs nouvelles séries. Les descriptions suivent le même modèle et le même style. De même encore, la souche de référence, type ou autre, sur laquelle se base la description est la seule mentionnée et sans doute le lecteur regrettera de ne pas connaître les autres souches cultivées, et leur origine, que l'auteur a utilisées pour évaluer l'espèce et en établir ou vérifier la synonymie.

Il est aussi regrettable que les dessins n'aient pas été réalisés avec le même soin que les illustrations photographiques. En effet ces dessins sont sommaires voire schématiques et moins bons que ceux de Raper et Thom. On remarquera par exemple que les sclérotes repésentés aux figures 1 à 7 pour *Penicillium thomii, P. sclerotiorum, P. syriacum, P. turbatum, P. pusillum, P. donkii* et *P. indicum* sont la reproduction d'un même schema.

Par contre, l'illustration photographique polychrome de chaque espèce sur 3 milieux de culture, vue de face et d'envers, est bonne même si, dans l'exemplaire reçu, elle pèche par une teinte olivâtre généralisée. De plus, l'auteur s'est donné la peine de proposer au lecteur, et pour chacune des 227 espèces et variétés, une électromicrophotographie de l'ornementation des conidies. L'auteur y voit en effet un caractère diagnostique supplémentaire des espèces, comme il l'annonce dans l'introduction (p. 21). Cependant il ne l'utilise pas en termes descriptifs dans les descriptions d'espèces.

Le livre contient des imperfections de texte, en plus de coquilles typographiques. Citons, entre autres, p. 97, dernière ligne, 'type species' pour 'type locality', p.246, 'slightly azonate' pour 'slightly zonate', p. 368, fig. 132, '*Penicillium atramentosum* ...CBS 291.48' au lieu de '*Penicillium oxalicum* ...CBS 291.30', p. 498, 22e ligne, 'A. C. Stolk' au lieu de 'J.A. Meyer'.

La monographie de Ramirez, comme celle de Pitt d'ailleurs, mérite une sérieuse étude. Si Pitt précise beaucoup certains caractères culturaux, comme la vitesse de croissance, Ramirez a mis un accent nouveau sur le caractère d'ornementation des conidies. Les divergences entre les deux auteurs s'expliquent par la difficulté de la taxonomie des *Penicillium*. L'une et l'autre monographie y apportent une contribution précieuse qu'il serait regrettable de rejeter hâtivement.

A KEY TO THE LICHEN-FORMING, PARASITIC, PARASYMBIOTIC AND SAPROPHYTIC FUNGI OCCURING ON LICHENS IN THE BRITISH ISLES, par D. L. HAWKSWORTH, extrait de Lichenologist 15(1):1-14, 141 fig., in 8°, 1982. The British Lichen Society, Castle Museum, Norwich NR1 3JU, UK. Prix £ 3.- or 2.- pour les membres.

Les lichens sont une niche à champignons trop peu explorées jusqu'à présent. Depuis plus de 10 ans, l'auteur a porté son attention sur cette flore où se manifestent aussi bien les champignons symbiontes et parasymbiontes que les parasites et saprophytes. Dès 1972, il avait dépouillé toute la littérature existante sur cette mycoflore et avait construit une clé provisoire d'identification. A la suite de ses nombreuses récoltes dont il a publié par ailleurs les résultats, il nous propose ici une version revue et corrigée de cette clé dichotomique. 183 champignons appartenant à 79 genres, pour la plupart Ascomycètes, quelques Coelomycètes et Hyphomycètes et deux Basidiomycètes, y sont

inclus. La nomenclature des taxa antérieurs à 1980 a été revisée par Hawksworth et al. dans *Lichenologist* 12: 1-115, 1980. La clé n'inclut donc que les synonymies établies dans la suite. Pour chaque taxon amené par la clé une référence bibliographique est donnée, et éventuellement un dessin de spores ou de conidies. L'index alphabétique des taxa est aussi l'index numérique des illustrations. Ainsi ce livre est non seulement une clé d'identification, mais aussi réellement une clé à la littérature mycologique sur le sujet et, selon le souhait de chacun, une clé vers de nouvelles découvertes.

CHARACTER ANALYSES OF SELECTED RED YEASTS, by G.S. DE HOOG edit., in Studies in Mycology n° 22, 74 p., 59 fig., in 8°, 1982. Centraalbureau voor Schimmelcultures, Baarn, Nederland. Price HFl 24.-.

CBS strains of the red yeast *Rhodosporidium infirmo-miniatum, Rh. toruloides, Sporidiobolus pararoseus, Sporobolomyces roseus, Sp. alborubescens,* as classically identified are studied in their morphogenesis, ultrastructure, biochemical characteristics (volatiles, carotenoids, sterols, fatty acids, carbohydrates) and pyrolysis mass spectrometry in order to search for a correlation between those characteristics and the classical diagnostic criteria. The author describes the pleomorphic conidiogenesis that may be multilateral, sympodial, basipetal, arthric, ballistosporic (2 types), chlamydosporic (2 types) and endogenous, one single strain showing up to sic distinct morphs. The production of pseudo-teliospres (called "teliospores-mimics") is also considered anamorphic. Only *Rhodosporidium infirmo-miniatum* shows endogenous conidiation. Although the observed features appear to be variable, *Rhodosporidium infirmo-miniatum,* also because of its biochemical and ultrastructural characteristics, shows more affinities to the Filobasidiaceae than to the Sporidiobolaceae. The paper is surely interesting, but to some extent confuse, especially in the morphological part. The observed data are not described for each strain or species neither separately nor before any comparison and interpretation. It is therefore not easy to find out which of the ten distinct types of morph are present in each of the strains or species studied.

HYDROPUS (BASIDIOMYCETES - TRICHOLOMATACEAE - MYCENEAE), par Rolf SINGER, in Flora Neotropica n° 32, 153 p., 26 fig., in 8°, broché, 1982, The New York Botanical Garden, Bronx, New York 10458, USA. Prix US $ 25.00.

Cette monographie est en fait la première du genre *Hydropus*, un genre d'agaricales constitué d'espèces surtout tropicales et néotropicales, situé aux confins de *Mycena*, d'*Omphalia* et de *Collybia*. Ce groupe taxonomique, d'abord reconnu par Küthner, prit plus d'importance avec les explorations de Dennis et de Singer en Amérique du Sud. Aux 40 espèces que contenait donc le genre, dont 30 furent décrites par Singer lui-même, l'auteur ajoute aujourdhui 43 espèces, 6 combinaisons et 11 variétés nouvelles. La distinction du genre d'avec *Mycena, Dennisiomyces, Dermoloma, Delicatula, Clitocybula, Gerronema, Hemimycena* et *Pseudohyatula* est sans doute délicate mais est clairement exposée. Le genre est divisé en 3 sections et 7 sous-sections. Les affinités entre sections et vis-à-vis des sections de genres voisins ont été évaluées par méthode numérique et confirment la cohérence du genre.

BASIDIUM AND BASIDIOCARP, EVOLUTION, CYTOLOGY, FUNCTION AND DEVELOPMENT, par Kenneth WELLS et Ellinor K. WELLS, in Springer Series in Microbiology, M.P. STARR ed., 187 p., 117 fig., relié toilé, 1982. Springer Verlag, 175 Fifth Ave, New York, NY 10010, USA, Berlin-Heidelberg, Deutschland. Prix DM 89.-, US $ 40.-.

Ce livre a pour but de réunir les connaissances acquises sur la baside et le carpophore des Basidiomycètes par les chercheurs de disciplines très diverses, afin de contribuer à une réévaluation des concepts taxonomiques et biologiques existants. K. Wells remarque justement que "there are significant advantages of peeking into de backyards of others: possibly even a visit over the fence would be instructive for many".

Dans le 1er chapitre, F. Oberwinkler montre combien la distinction entre Homobasidiomycètes et Hétérobasidiomycètes proposée par Patouillard en 1900, basée sur la morphologie et la germination de la baside, conduit bien à une phylogénie et à l'origine de ces champignons. Sans dénier le progrès apporté par la microscopie électronique, il remarque que beaucoup reste encore à découvrir sur la baside, même par la microscopie optique. Par une étude fouillée et comparative de la morphologie basidiale dans la plupart des ordres de Basidiomycètes et jusqu'à leurs formes levures, l'auteur démontre de très intéressantes relations.

D.J. Mac Laughlin (Chap. 2) étudie l'ontogénie de la baside et de la basidiospore au niveau ultrastructural et cytochimique de la cellule, laissant à C. Thielke (Chap. 3) le soin de suivre l'évolution structurale du noyau au cours de la division méiotique. Leur matériel expérimental est représenté par *Coprinus cinereus*. On découvre entre autres le développement endogène des stérigmates basidiaux, le mécanisme de fermeture du dolipore basidial, les caractères de la division du noyau communs à tous les champignons supérieurs et ceux propres aux Homobasidiomycètes.

B.C. Lu (Chap. 4) étudie l'inhibition par les facteurs physiques, température, lumière, sur le déroulement des phases de la méiose et sur la fréquence des recombinaisons. Les éléments d'un système déterminant du crossing over sont donc mis en évidence. C'est un pas dans la connaissance des mécanismes de la reproduction et de l'évolution.

I. Uno et T. Ishikawa (Chap. 5) étudient les facteurs chimiques, tel que l'adénosine monophosphate, dans la formation du basidiocarpe, tandis que H.E. Gruen (Chap. 6) et G.W. Goodway (Chap. 7) examinent les divers paramètres de l'élongation du stipe des Agaricales, et spécialement le rôle du pileus et du mycélium d'une part, des substances de croissance, des nutrients et des métabolites cellulaires (chitine, protéine, glycogène, glucose, tréhalose) d'autre part sur *Flammunila velutipes* ou sur *Coprinus cinereus*. Ces derniers chapitres donnent à la synthèse *Basidium and Basidiocarp* de K. Wells et E.K. Wells un intérêt nouveau, celui de faire le point sur la recherche de la régulation de la production de carpophores en culture industrielle de champignons.

A NOMENCLATURAL REVISION OF F.J. SEAVER'S NORTH AMERICAN CUP-FUNGI (OPERCULATES), par Donald H. PFISTER, in Occasional Papers of the Farlow Herbarium of Cryptogamic Botany n° 17, 32 p., 15 x 22 cm., 1982. Farlow Herbarium, Harvard University, Cambridge, Mass. USA.

Ce petit fascicule sera très utile pour tous les mycologues ayant utilisé ou utilisant encore le *North American Cup-Fungi* de Seaver dans l'identification des Discomycètes operculés. Les 359 noms d'espèces apparaissant dans le premier volume de l'ouvrage de Seaver sont mis en correspondance avec les noms corrects en accord avec la taxonomie et la

nomenclature modernes. Un index de ces derniers permet le chemin inverse. Des références aux monographies récentes des Discomycètes operculés sont ajoutées dans la plupart des cas. Au sujet des 35 taxa de Seaver, des commentaires permettent de mieux comprendre encore la position adoptée par l'auteur.

UEBER DIE HETEROGENE ASCOMYCETENGATTUNG PLEOSPORA RABH. VORSCHLAG FUR EINE AUFTEILUNG, par P.G. GRIVELLI, Dissertation E.T.H. n°7318, 215 p., 43 fig., 15 x 22 cm., broché, 1983. ADAG Administration & Druck AG, Zurich Switzerland.

Depuis la monographie de Wehmeyer, *A World Monograph of the Genus Pleopora and its Segregates* (1981), le concept générique de *Pleospora* Rabh. s'est avéré hétérogène. L'auteur propose donc ici la revision de plus de 100 espèces et le reclassement de près de la moitié dans 11 autres genres d'ascomycètes bituniqués: *Pyrenophora, Leptosphaerulina, Massariosphaeria, Montagnula, Modulosphaeria, Cilioplea, Leptosphaeria, Paraphaeosphaeria, Pleomassaria, Pseudopleospora Dacampia*. 106 espèces dont 12 nouvelles sont donc redécrites sur base des matériaux types et, pour la moitié d'entre elles, sur base de cultures monospermes. Des anamorphes sont observés: *Stemphylium* de *Pleospora gigaspora, P. herbarum* et *P. triglochinicola, Alternaria* de *P. scirpi, P. scrophulariae* et *P. discors, Drechslera* de *Pyrenophora trichostoma* et *Dendryphion* de *Pleospora papaveracea*. A part quelques imperfections textuelles, le lecteur regrettera peut-être la sobriété des illustrations de bon nombre d'espèces (consistant en 2 ascospores ou 1 seule). Cependant ce travail digne de l'école de E. Gaümann, de J.A. von Arx et de E. Müller représente un grand nombre d'investigations précises et une contribution utile.

FUNGHI BUONI A CATTIVI DI COLLINA E DI PIANURA. par N. TOGUI, 232 p., 108 pl. col., 16 x 24 cm., cartoné relié, 1982. Mundici e Zanetti Ed. Modena, Italia. Prix Lire 40.000.-.

Cent espèces de champignons asco- et basidiomycètes comestibles sont décrites dans leurs caractères externes seulement et dénommées dans une nomenclature traditionnelle. Elles sont illustrées pour la moitié de photographies en couleurs de pleine page, pour l'autre moitié de dessins. Cet album destiné à l'amateur attirera surtout le chasseur d'images.

LES CHAMPIGNONS : 100 RECETTES DE CHEZ NOUS ET D'AILLEURS. par Clémence LAMBINON-ADAM, 158 p., 16 x 23 cm, broché, 1983. Société Botanique de Liège, Université de Liège, B 4000 Liège, Belgique. Prix FB 450.-.

Un livre de mycogastronomie. 100 recettes: essayez-les et vous en goûterez la saveur. Elles ont le mérite d'être appropriées à chacune des 45 espèces de champignons comestibles considérés. De plus, l'auteur avertit le lecteur des précautions à prendre dans certaines préparations. Chaque recette est de plus qualifiée de facile ou difficile, d'économique ou coûteuse, de bonne à très savoureuse. Ecrit dans un language facile, ce livre contient encore un lexique pour aider le lecteur.

Un nouveau périodique mycologique :

MYCOLOGIA HELVETICA, Vol. 1, N° 1, 65 p., 23 August 1983. Periodical of the Association of Swiss Mycological Societies, Editor H. GÖPFERT, Alpenblickstrasse 53, CH 8330 Rüti, Switzerland. Subscription: SFr 10.- or 14.- (abroad) per year.

This new journal is edited by the Mycological Societies of Switzerland, starting in 1983. Each volume will contain 10 fascicles, two of them issued each year. The scope of the journal covers systematics, ecology, experimental studies, genetics, medical aspects, mycotoxicity of preferably higher fungi (Asco- and Basidiomycetes), industrial mycology being explicitely excluded. The journal accepts manuscripts ready for offset printing in any of the four languages English, French, German or Italian. A charge is billed for colour plates.

The first issue contains 7 papers on *Cortinarius* subg. *Telamonia* (M. Moser), *Tricholoma* sect. *Tricholoma* (H. Clémençon), *Gastrosporium simplex* (O. Monthoux), *Lyophyllum helvella* (Boudier) comb.nov. (H. Clémençon), *Ramaria* (E. Schild) and on the amyloidity of spores (G. Lazzari). The papers are illustrated, two of them with a colour plate.

The journal has a good look and its price is feasible. With our best wishes of succes.

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