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SUMMARY

Five new species of Amazonian fungi are described based on recently collected material: *Hypomyces pseudopolyporinus* Samuels & Rogerson (anamorph = *Arnoldiomyces macrosporus* Samuels & Rogerson), *H. villosus* Samuels & Rogerson, *Hypoecrea dipterobia* Samuels & Rogerson and *Obtectodiscus nectriodes* Samuels & Rogerson.

INTRODUCTION

The ascomycetes described herein were collected by the senior author in the early months of 1984 in Brazil, state of Amazonas on Pico Rondon and Serra do Aracá.

1. *Hypomyces pseudopolyporinus* Samuels & Rogerson sp. nov.

Fig. 1.

Hypomyceti polyporino similis sed status anamorphosus diversus; conidia elliptica vel oblonga, 1-2-septata, (21.0-)24.4-32.9(-40.0) x (6.0-)8.3-11.0(-12.0) μ m. Holotypus: Samuels 1133 (INPA, isotypus: NY).

Anamorph. *Arnoldiomyces macrosporus* Samuels & Rogerson sp. nov.

Fig. 2.

Arnoldiomyceti clavato similis sed conidia longiora (21.0-)24.4-32.9(-40.0) x (6.0-)8.3-11.0(-12.0) μ m.

Holotypus: Samuels 84-145 (ex ascosporis *Hypomyceti pseudopolyporini* coll. Samuels 1133, INPA; Isotypus: NY).

Subiculum buff colored, thin, spreading over pore surface of host and easily removed; comprising densely interwoven, 15 μ m wide, septate, branched and anastomosing hyphae with walls < 0.5 μ m thick. Perithecia gregarious, bases immersed in the subiculum, pyriform, 210-270 x 150-180 μ m including a distinct, 60 x 60 μ m papilla, reddish-orange, becoming yellow in 3% KOH; collapsing by lateral pinching when dry.

Cells at surface of perithecial wall angular, 15-20 μ m in greatest dimension, walls ca. 0.5 μ m thick. Perithecial wall 15-25 μ m wide, laterally comprising a single

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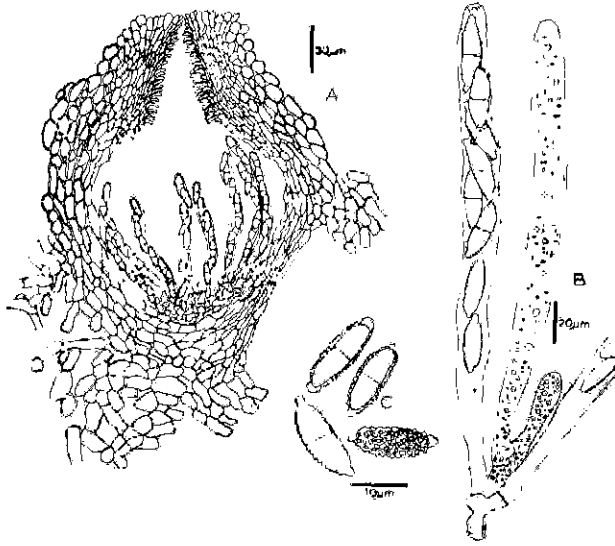


Fig. 1. *Hypomyces pseudopolyporinus* (Samuels 1133): A. median longitudinal section of a mature perithecium; B. asci; C. ascospores.

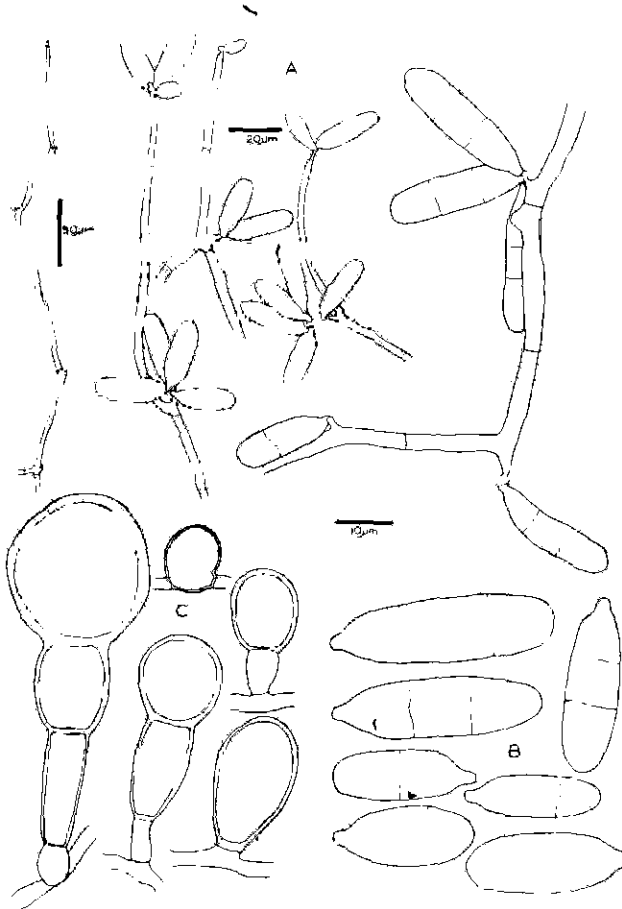


Fig. 2. *Arnoldiomyces macrosporus* (Samuels 84-145): A. conidiophores (from CMD); B. conidia (from CMD); C. *Blastotrichum*-like aleuriospores (from OA).

region of elliptic, fusoid or rectangular cells 10-15 x 5-7 μm with walls \leq 0.5 μm thick; cells toward interior with thinner walls; cells lining the locule disintegrating; cells at base merging with subiculum; cells of papilla \pm circular in outline, ca. 10 μm in diam at the exterior and smaller within; cells around ostiolar opening \pm clavate, ca. 10 x 7 μm at the exterior, becoming progressively more narrow and hyphal toward the ostiolar canal, eventually merging with the periphyses. Periphyses \leq 10 μm long x 2 μm wide.

Pseudoparaphyses not seen.

Asci narrowly clavate, (90-)100-123(-150) x (7.0-)7.7-10.0 μm , apex with a refractive ring, base pedicellate or hooked with crozier septa 3-4 μm broad and refractive, 8-spored, ascospores 2-seriate above, 1-seriate below or middle ascospores 2-seriate with spores at apex and base 1-seriate, completely filling the ascus or 15-60 μm of the ascus base empty; pores not seen in the ascus base nor in ascogenous hyphae.

Ascospores fusiform, (15.0-)15.7-18.5(-21.0) x 5.0-6.2(-7.0) μm , hyaline, apiculate (the apiculus appearing as a cap to 2 μm high), bicellular, septum median, coarsely warty, warts 0.2-1.0 μm high.

CHARACTERISTICS IN CULTURE. Ascospores germinating on Difco cornmeal dextrose agar (CMD) at 20°C. Colonies arising from single ascospores grown 3 weeks at 20°C in diffuse daylight on Difco oatmeal agar (OA) > 9 cm diam, aerial mycelium cottony, white with some orange coloration at the margin. Conidiophores arising in aerial mycelium at the edge of the colony, indefinite in length and barely differentiated from vegetative hyphae, 3 μm wide, colorless. Conidiogenous cells at first terminal but becoming intercalary through sympodial proliferation; little differentiated from nonconidiogenous cells of the conidiophore. Conidiogenous loci peg-like, 5 μm long, narrowly elliptic to oblong with a protruding, flat, noncicatrized, 1.5 μm wide basal abscission scar. Conidia with 1-2 very fine septa, smooth, hyaline, (21.0-)24.4-32.9(-40.0) x (6.0-)8.3-11.0 (-12.0) μm , produced in basipetal succession and held in ziz-zag chains with bases joined; with age adjacent conidia from a chain fusing laterally and at base. Blastotrichum-like chlamydospores forming abundantly in the aerial mycelium, terminal or intercalary, arising as a blown-out cell of a hypha, ultimately becoming 2-3-celled with a globose, 10-30 μm diam tip cell and a more elongated basal and often a globose intercalary cell; wall of tip cell ca. 1 μm thick and smooth.

HABITAT. On pore surface of *Ganoderma* cf. *applanatum*.

DISTRIBUTION. Brazil (Amazonas), known only from the type specimen.

HOLOTYPE. Brazil: State of Amazonas, Pico Rondon, Perimetral Norte Road, km 211, vine forest ca. 3 hr walk from FUNAI post, 01°31'N, 62°48'W, on *Ganoderma* cf. *applanatum*, G. J. Samuels 1133, J. Pipoly & W. Rodrigues, Mar 1984 (INPA, isotype: NY).

NOTES. In characters of the ascospores *H. pseudopolyporinus* is similar to *H. semitranslucens* G. Arnold and *H. polyporinus* Peck but differs in its *Arnoldiomyces* anamorph. The anamorph of *H. semitranslucens* is *Sibirina fungicola* G. Arnold, that of *H. polyporinus* is *Arnoldiomyces clavisporus* (Gray & Morgan-Jones) Morgan-Jones (Gray & Morgan-Jones 1980,

as *Arnoldia clavispora* Gray & Morgan-Jones; Morgan-Jones 1980; Carey & Rogerson 1981 as *Sympodiophora polyporicola* Rogerson & Carey). Conidia of *Arnoldiomyces macrosporus* are much larger, particularly in width, than those of *A. clavisporus* (15-33 x 6-8 μm) and cylindrical rather than clavate.

Rhinocladiella globulifera Arnaud ex de Hoog and *Gliocladium roseum* Bainier accompany *H. pseudopolyporinus* on the holotype and isotype specimens.

2. *Hypomyces villosus* Samuels & Rogerson sp. nov.

Fig. 3.

Perithecia pyriformia, 250-300 x 165-210 μm , pallide salmonnea, villosa. Pili flexuosi, septati, 50-70 x 3-4 μm . Asci cylindrici, (115-)120-145(-155) x 6-9 μm , octospori, apice annulo minuto cincti. Ascospori fusiformes, (15.0-)16.0-18.6(-21.0) x 5-6(-7) μm , 2-cellulares, apiculati, medio septati, verruculosi.

Holotypus: Samuels 76 (INPA, Isotypus: NY).

Anamorph. None known.

Mycelium white, thin, covering pores of host, comprising interwoven, 2-3 μm wide, branched, septate hyphae with warted walls; warts 0.2-0.5 μm high. Perithecia aggregated, with bases immersed in the mycelium, pyriform, 250-300 x 165-210 μm papillate, collapsing by lateral pinching when dry, pale salmon colored, not changing color in 3% KOH; perithecial wall below apex covered with hairs; hairs erect, 50-70 x 3-4 μm , flexuous, unbranched or infrequently branched and then near the base, roughened, septate, cells ca. 8 μm long, walls < 0.5 μm thick.

Cells at surface of perithecial wall \pm angular, 7-12 x 7 μm , to textura epidermoidea and with cells ca. 7 μm wide, walls \leq 0.5 μm thick. Perithecial wall ca. 15 μm wide laterally, comprising a single region of \pm elliptical ca. 7 x 2 μm cells with walls \leq 0.5 μm thick; cells lining the centrum thin-walled and disintegrating, cells at base of perithecial wall merging with subiculum below; cells at exterior of papilla growing outwardly as hairs; perithecial apex formed by hyphal elements with \pm clavate, 5-7 x 4 μm , tip cells; hyphal elements becoming progressively more narrow toward the ostiolar canal and there merging with the periphyses; periphyses 15-20 x 2-3 μm .

Pseudoparaphyses not seen.

Asci cylindrical, (115-)120-145(-155) x 6-9 μm , apex with a minute ring, base indistinctly pedicellate and lacking pores, 8-spored, ascospores 1-seriate with overlapping ends.

Ascospores fusiform, (15.0-)16.0-18.6(-21.0) x 5-6(-7) μm , bicellular, septum median, hyaline; apiculate (apiculi to 0.5 μm high), warted, warts 0.5-1.0 μm high.

HABITAT. On decaying fructification of *Coriolus* sp.

KNOWN DISTRIBUTION. Brazil (Amazonas), known only from type collection.

HOLOTYPE. Brazil: state of Amazonas, 0.3 km N of km 211 of Perimetral Norte highway, ca. 1 km NE of FUNAI post, toward summit of Pico Rondon, 01^o32'N, 62^o48'W, on *Coriolus* sp., Samuels 76, 3 Feb 1984 (INPA, isotype: NY).

NOTE. *Hypomyces villosus* differs from all known species of *Hypomyces* in its perithecial hairs. We cannot see any close relatives within *Hypomyces*.

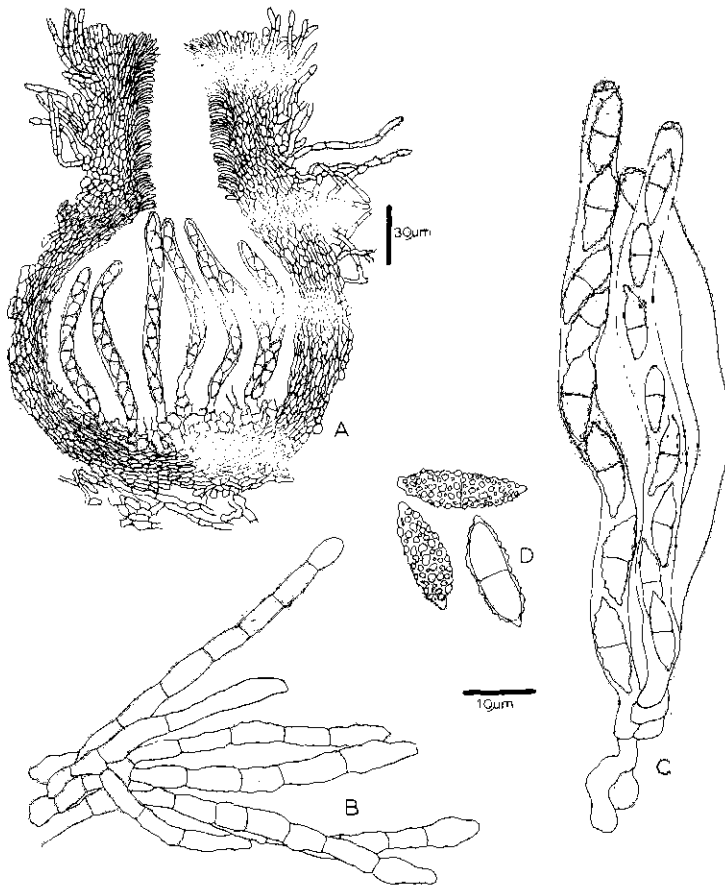


Fig. 3. *Hypomyces villosus* (Samuels 76): A. median longitudinal section of a mature perithecium; B. perithecial hairs; C. asci; D. ascospores.

Ascospores of this species did not germinate on Difco cornmeal dextrose agar at 20° or 25° C.

3. *Hypocrea dipterobia* Samuels & Rogerson sp. nov. Figs. 4, 5, 6A-B.

Stromata discoidea vel pulvinata, 2-5 x 2 mm, albida, superficialia, ab insecto diptero e subcortice orta. Textura strati superficialis stromatorum epidermoidea; hyphae stratorum interiorum laxè dispositae. Perithecia immersa, 185-225 x 125-185 µm. Asci cylindrici, 75-100 x 4-5 µm, apice annulo cincti, 16-hemispori. Hemispori hyalini, glabri, conici, 4.8-6.0(-7.0) x 2.5-3.0 µm.

Holotypus: Samuels 285 (INPA, Isotypus: NY).

Anamorph. None known.

Stroma arising from immersed larva (Diptera), appearing superficial on wood, pulvinate to discoidal, circular to irregular in outline, 2-5 x 2 mm diam, white, not changing color in 3% KOH, smooth, flat; perithecia completely immersed with openings appearing as viscid dots; stromata attached to larvae by a 7 x 0.5-1.0 mm, white stipe, one or more stromata arising from each larva.

Stroma with two zones of tissues. Stromal surface comprising a 25 µm thick layer of compact, intertwined hyphae with swollen, 5-7 µm diam cells and walls ≤ 0.5 µm thick. Internal tissue of stroma hyphal, the hyphae loosely arranged, widely spaced and ± vertically oriented; hyphae 4-6 µm wide with walls ca. 0.5 µm thick. Tissue of stipe densely compacted, hyphal.

Perithecia completely immersed, subglobose, 185-225 x 125-185 µm, papilla 60 µm high x 90 µm wide. Perithecial wall ca. 15 µm wide laterally, comprising a single region of intertwined hyphae that, in section, appear elliptic to elongate, 5-15 x 2-3 µm with wall 1.0-1.5 µm thick; cells at exterior of wall continuous with hyphae of stroma; perithecial apex formed of hyphal elements in a palisade, tip cells 5-7 x 2-3 µm, rounded apically; hyphal elements merging with periphyses within. Periphyses stout, ca. 10 x 2 µm.

Pseudoparaphyses scattered among mature asci, septate, 4 µm wide.

Asci cylindrical, 75-100 x 4-5 µm; apex with a minute ring, 8-spored, ascospores 1-seriate with overlapping ends, completely filling the ascus; pores not seen in ascus base nor in ascogenous hyphae.

Ascospores fusiform, bicellular, septum median, disarticulating at the septum into two conical part spores, 4.8-6.0(-7.0) x 2.5-3.0 µm, smooth, hyaline.

HABITAT. On larvae of Diptera (? Stratiomyiidae).

KNOWN DISTRIBUTION. Brazil (Amazonas), known only from type collection.

HOLOTYPE. Brazil: state of Amazonas, Serra do Aracã, plateau, ca. 1100 m alt., 0°51'N, 63°21'W, south side of northern mountain, near waterfall, on larva of Diptera immersed in wood, G. J. Samuels 285, I. Amaral, L.A. Cisneros, T. Nicholas, 14-16 Feb 1984 (INPA, isotype: NY).

NOTES. *Hypocrea dipterobia* is unusual among the Hypocreales in its relationship to the immersed Dipteran larvae. Other insecticolous members of the Hypocreales are species of

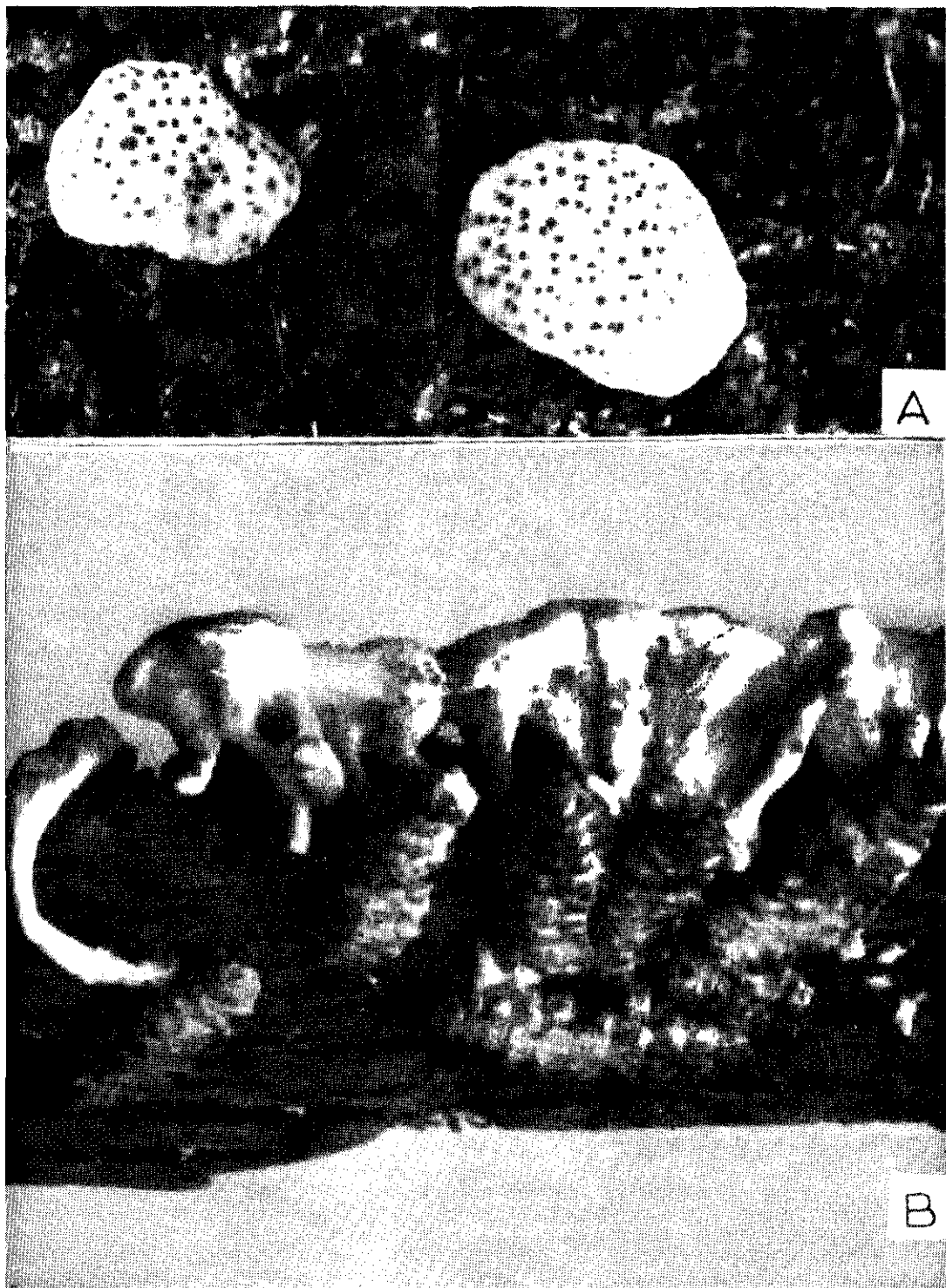


Fig. 4. *Hypocrea dipterobia* (Samuels 285): A. surface view of stromata; B. side view of stromata with host larvae.



Fig. 5. *Hypocrea dipterobia* (Samuels 285): median longitudinal section of a mature perithecium.

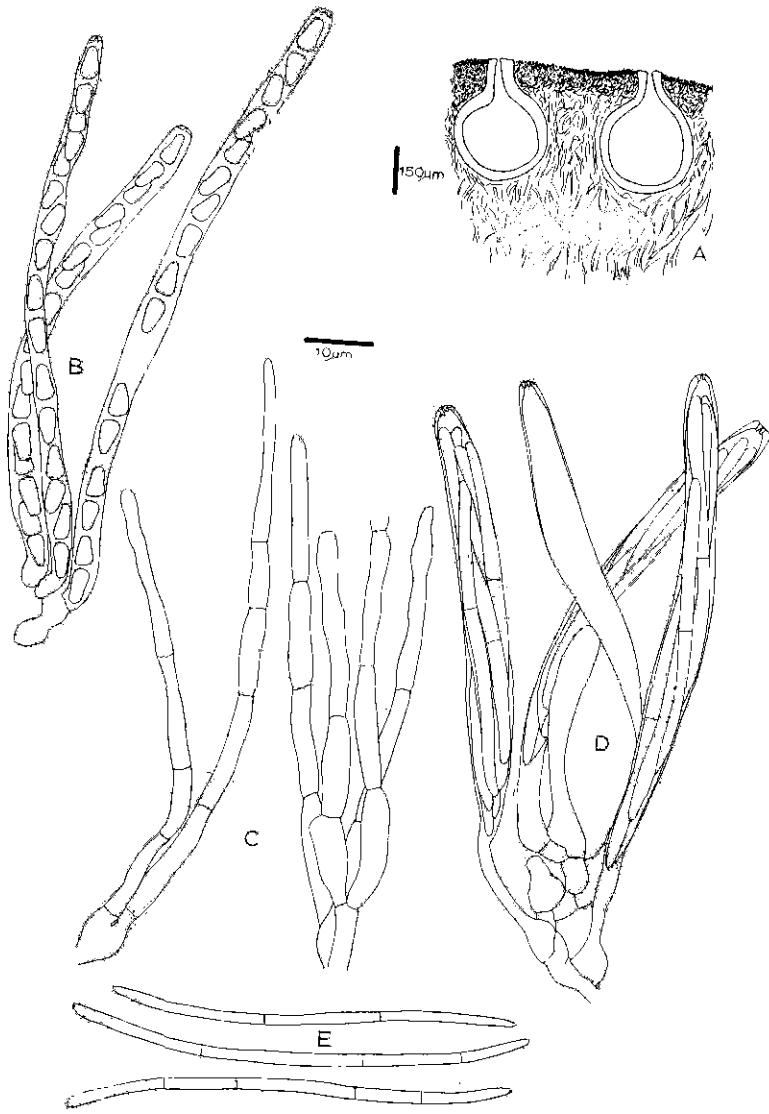


Fig. 6. A-B, *Hypocrea dipterobia* (Samuels 285): A. sketch of two perithecia in a stroma; B. asci with ascospores. C-E, *Obtectodiscus nectriodes* (Samuels 189): C. paraphyses; D. asci; E. ascospores.

Nectria and occur on scale insects. The general form of *H. dipterobia* is strongly reminiscent of a *Cordyceps* but the species cannot be numbered among the Clavicipitales because of its thin ascal apex and because paraphyses are not found in the perithecial centrum.

The host of *H. dipterobia* is a lower Dipteran. It is not *Nematocera* but may be a species of the *Stratiomyidae*.

4. *Obtectodiscus nectrioides* Samuels & Rogerson sp. nov. Figs. 6 C-E, 7.

Obtectodisco aquatico similis sed apothecia rubra, 300-500 x 200-350 μ m gregaria. Asci (72-)80-105(-115) x 6-8 μ m, annulo refractili, non coerulescenti cincti. Ascospori (37-)50-63(-69) x 1.5 μ m, exappendiculati.

Holotypus: Samuels 189 (INPA, Isotypus: NY).

Anamorph. None known.

Apothecia perithecioid, 300-500 x 200-250 μ m, with a minute ostiolum and the hymenium remaining enclosed, densely gregarious, superficial, seated on a thin effused stroma, egg-shaped with an acute apex, fleshy, smooth, red when fresh and dry, becoming yellow brown in 3% KOH, not changing color in 100% lactic acid, collapsing deeply by lateral pinching when dry.

Surface of apothecium covered by a ca. 5 μ m thick membrane continuous with the effused stroma; membrane transparent, cracking unevenly on the apothecial surface; cellular detail not apparent in the surface of the apothecial wall. Ectal excipulum 50-60 μ m wide, formed of chains of cells appearing to arise from a centrally located, pseudoparenchymatous base; cells of ectal excipulum embedded in gel, lumina 10-15 x 5 μ m; cells lining the centrum 20 x 3-4 μ m; ostiolar region comprising thin-walled, ca. 3 μ m wide, hyphal elements not obviously embedded in gel, hyphal elements merging with periphyses within. Periphyses stout, 3 μ m wide, lining the ostiolar canal. Apothecial base with a pedestal of light brown, thin-walled, pseudoparenchymatous, nongelatinized cells from the top of which arise paraphyses and branched ascogenous hyphae in a fascicle.

Paraphyses few, scattered among mature asci, equivalent in length to asci, 2-3 μ m wide, septate, unbranched except at base.

Asci cylindrical to narrowly clavate, (72-)80-105(-115) x 6-8 μ m; apex with a barely refractive, wedge-shaped, porate, J- ring; asci 8-spored, ascospores multiseriate, ascal base empty; asci produced successively along ascogenous hyphae; ascal base and ascogenous hyphae lacking pores.

Ascospores filiform, (37-)50-63(-69) x 1.5 μ m, with 1-5 transverse septa, sides parallel or slightly tapering from tip to base, smooth, hyaline, without appendages.

HABITAT: On decaying wood and basidiomycetous fructification.

KNOWN DISTRIBUTION. Brazil (Amazonas), known only from type.

HOLOTYPE. Brazil: state of Amazonas, Pico Rondon, 0.3 km N of km 211 of Perimetral Norte Highway, below summit, lower vine forest, 01°32'N, 62°48'W on bark and basidiomycetous fructification, G. J. Samuels 189, J. Pipoly, J. Guedes, T. Nicholas, 4 Feb 1984 (INPA, isotype: NY).

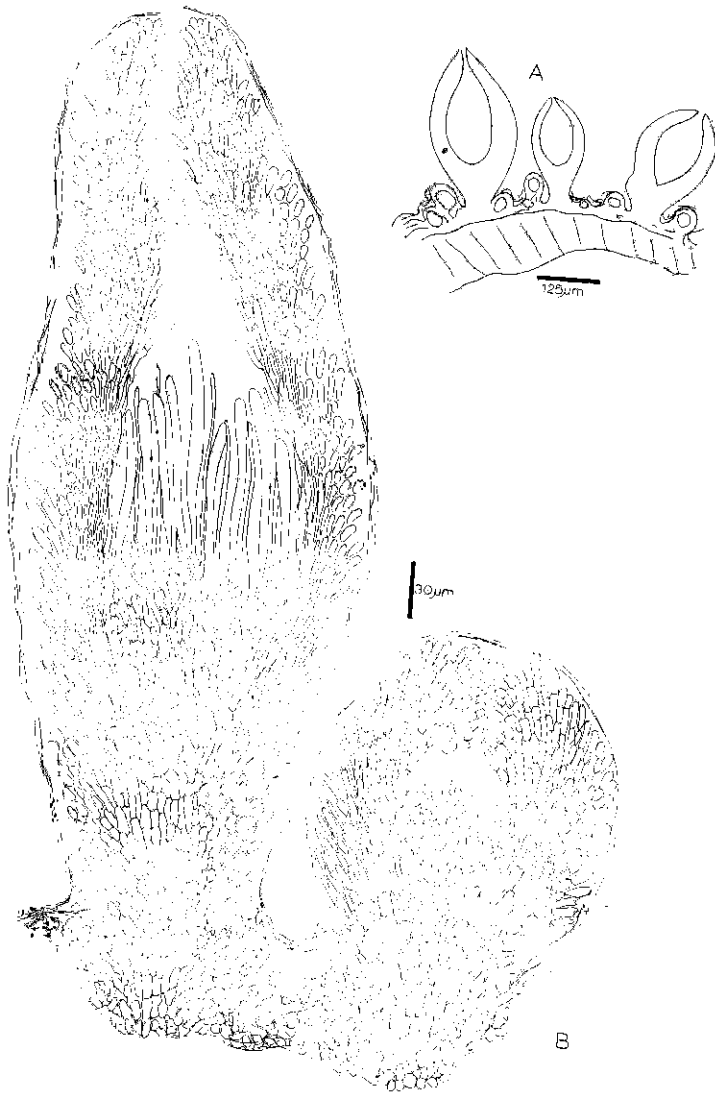


Fig. 7. *Obtectodiscus nectriodes* (Samuels 189): A. sketch of apothecia on substrate; B. median longitudinal section through mature (left) and immature (right) apothecia.

Because of its perithecial aspect and red coloration, *O. nectriodes* was at first mistaken for a species of the pyrenomycetous genus *Nectria*. However, anatomical details of the "perithecial wall," or ectal excipulum, indicate that this species is a discomycete of the order Helotiales.

Obtectodiscus Müller, Petrini & Samuels was previously monotypic for *O. aquaticus* Müller, Petrini & Samuels, a species found on floating leaves and culms of *Carex rostrata* Stokes in lakes of the Swiss Alps. Apothecia of *O. aquaticus* are at first closed, having only a narrow ostiolar opening, but later open somewhat to expose the hymenium. Apothecia of this species are light brown, becoming dark on drying. Asci lack an apical ring and the ascospores have a noncellular appendage at each end. The wall of *O. aquaticus* is formed by chains of cells much as in *O. nectriodes* but the chains of the former species are much more closely spaced than in the latter. The gel layer of *O. aquaticus* is apparently superficial on the apothecium whereas in *O. nectriodes* the cells of the walls are clearly embedded in the gel. The membranous covering of the apothecia of *O. nectriodes* is no doubt hardened gel. Apothecia of *O. aquaticus* are sessile upon a thin, effused stroma but in *O. nectriodes* the apothecial base is attenuated somewhat into a cellular pedestal which is probably analogous to the stipe in a more conventional cup fungus.

Müller et al. (1979) considered *Obtectodiscus* to be a genus of the Helotiales family Dermateaceae because the apothecia arise from a superficial mycelium or stromal pad. The anatomy of the ectal excipulum, with its long-celled tissue embedded in gel, as well as the bright pigmentation argue against placement in the Dermateaceae. The ectal excipulum of the Dermateaceae is of globose to angular, usually pigmented cells (Korf 1973). The ectal excipulum of *O. nectriodes* and, to a lesser extent that of *O. aquaticus*, resembles the ectal excipulum of species of *Crocicreas* Fries (Carpenter, 1981), a genus of the Helotiales family Leotiaceae subfamily Ombrophiloideae. We consider that the resemblance between the ectal excipula of *Obtectodiscus* and *Crocicreas* and the light coloration in both genera is strong enough to take taxonomic precedence over the presence of a stroma in *Obtectodiscus*. In more classical taxonomy, the presence of a stroma would per se relegate *Obtectodiscus* to the Helotiales family Sclerotiniaceae or Dermateaceae.

Müller et al. (1979) obtained cultures of *O. aquaticus* from ascospores and apothecia formed in those cultures but no anamorph was observed. Ascospores of *O. nectriodes* did not germinate on Difco cornmeal dextrose agar at 20° C.

RESUMO

Cinco novas espécies de fungos amazônicos foram descritas após estudo de material recém coletado: *Hypomyces pseudopolyporus* Samuels & Rogerson (anamorph = *Arnoldiomyces macrosporus* Samuels & Rogerson), *H. villosus* Samuels & Rogerson, *Hypochea dipterobia* Samuels & Rogerson e *Obtectodiscus nectriodes* Samuels & Rogerson.

ACKNOWLEDGMENTS

This research was supported in part by Projeto Flora Amazônica, the National Science Foundation and the National Geographic Society. Dr. Beverley Holloway, Entomology Division, DSIR, identified the insect host of *Hypocrea dipterobia*. Dr. G. Kuschel, Entomology Division, DSIR, corrected the Latin diagnoses.

References

- Carey, S.T. and Rogerson, C.T. - 1981. Morphology and cytology of *Hypomyces polyporinus* and its *Symptodiophora* anamorph. *Bull. Torrey Bot. Club.* 108:13-24.
- Carpenter, S.E. - 1981. Monograph of *Crocicreas* (Ascomycetes, Helotiales, Leotiaceae). *Mem. New York Bot. Gard.* 33:1-290.
- Gray, D.J. and Morgan-Jones, G. - 1980. Notes on Hyphomycetes. XXXIV. Some mycoparasitic species. *Mycotaxon* 10:375-404.
- Korf, R.P. - 1973. Discomycetes and Tuberales In: G.C. Ainsworth, F.K. Sparrow, A.S. Sussaman (eds.) *The Fungi. An Advanced Treatise* Vol. IV. A. A taxonomic review with Keys. Academic Press, New York.
- Morgan-Jones, G. - 1980. Notes on Hyphomycetes. XXXVII. *Arnoldiomyces* nom. nov. *Mycotaxon* 11:446. 1980.
- Müller, E.; Petrini, O. and Samuels, G.J. - 1979. *Obtectodiscus aquaticus* gen. nov. et sp. nov., ein neuer, wasserbewohnender Ascomycet aus den Alpen. *Sydowia* 32:190-197.