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Life-History Studies of Brazilian Ascomycetes 4 [1])

Three species of *Herpotrichia* and their *Pyrenochaeta*-like anamorphs

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Abstract. *Herpotrichia villosa* sp. nov. is described; *H. schiedermayeriana* Freyer and *H. rhodosticta* (Berkeley & Broome) Saccardo are redescribed from Brazilian collections. All three species are proven to have *Pyrenochaeta*-like anamorphs.

Introduction

Herpotrichia Fuckel was monographed by Bose (1961) and Sivanesan (1971). With the present study, seven species are proven to have *Pyrenochaeta*-like anamorphs [see also *H. coulteri* (Peck) Bose, *H. diffusa* (Schweinitz) Ellis & Everhart, *H. juniperi* (Duby) Petrak, *H. parasitica* (Hartig) E. Rostrup] (Freyer & van der Aa 1975).

Schneider (1976) redescribed the type species of *Pyrenochaeta*, *P. nobilis* De Notaris, and restricted the genus to those pycnidial fungi having branching conidiophores and pycnidial hairs. She cited *Herpotrichia* as teleomorph of the genus. Such pycnidia have been found for *H. parasitica* (Freyer & van der Aa 1975), *H. diffusa*, *H. juniperi* (Bose 1961) and *H. schiedermayeriana* Fuckel (published herewith). For the remaining species of *Herpotrichia* whose anamorphs are known, only simple, *Phoma*-like, phialides have been found. Although these anamorphs are biologically *Pyrenochaeta* (i. e. *Herpotrichia*) they lack one of the most characteristic features of the genus.

Several species of *Herpotrichia* have been recorded from Brazil by Rick (1933) and Viégas (1944) including *H. brasiliensis* Rick, *H. occulta* Rick, *Neopeckia nobilis* Rick var. *colora* Rick (= *H. schiedermayeriana*, fide Sivanesan 1971), *N. parietalis* (Berkeley & Curtis) Saccardo [= *H. diffusa* (Schweinitz) Ellis & Everhart, fide Sivanesan 1971] and *N. brasiliana* Viégas (= *H. schiedermayeriana*, fide Sivanesan 1971).

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Descriptions of the Species

1. *Herpotrichia villosa* SAMUELS & E. MÜLLER sp. nov. — Figs. 1—2.

Ascomata solitaria vel confertim gregaria, superficialia, nigro subiculo insidentia, globosa vel subglobosa, papilla non instructa, 340—470 µm alta, 430—500 µm lata, pariete longis pilis usque ad 750 µm longitudine instructa. Asci bitunicati, anguste clavati, 140—200 × 17—25 µm, quadri- vel octospori. Ascosporae fusiformes, rectae, 30—40 × 8—12 µm, uniseptatae vel rare bi- ad triseptatae, brunneo humore continentes. Paraphyses ramificantes, anastomosantes, strato mucoso praeditae. Ad lignum et corticem. Status conidialis: *Pyrenochaetae* similis.

Holotypus: DUMONT-BR 425, NY; Isotypus: INPA, PDD, ZT.

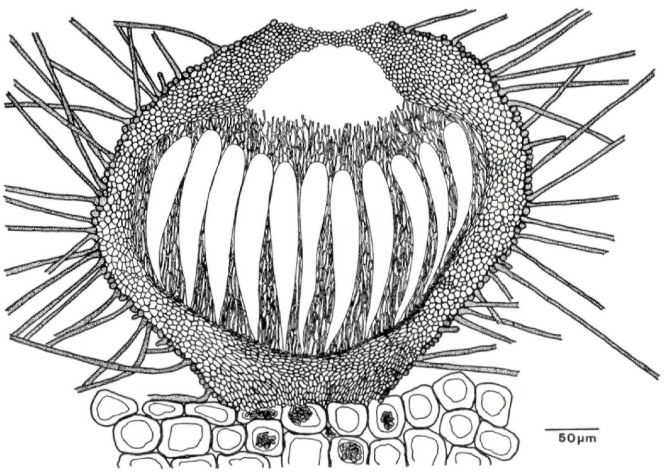

Fig. 1. *Herpotrichia villosa* (DUMONT-BR 256): longitudinal section of ascoma

ANAMORPH: *Pyrenochaeta*-like.

TELEOMORPH: Mycelium present as a thin to thick and wooly, black subiculum around ascomata or not apparent. Ascomata perithecioid, solitary and scattered or densely gregarious and covering large areas of the substrate and giving the substrate a dark, wooly appearance; superficial, non-stromatic, leathery; black, with a lighter ostiolar opening at maturity; globose to subglobose, non-papillate, 350—500 µm diam or 340—490 µm high × 430—500 µm wide; wall covered by hyphal-like, unbranched, septate, black hairs up to 750 µm long × ca. 5 µm wide, walls 1.5—2 µm thick, ends rounded; becoming slightly collabent when dry, not changing color and no soluble pigment in 3% KOH, becoming lighter, red-brown, in 100% lactic acid; color

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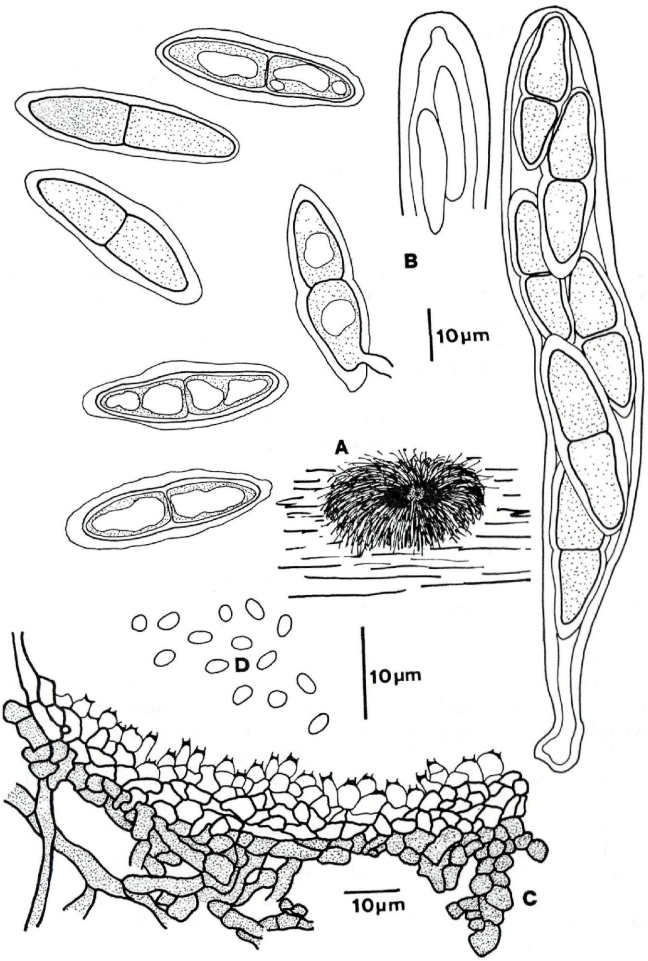

Fig. 2. *Herpotrichia villosa*. A. Habit sketch of ascoma. B. Asci and ascospores, ascal apex at left is immature (DUMONT-BR 283 A). C. Portion of lower pycnidial wall and conidia (DUMONT-BR 886)

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reaction reversible. Ascomatal wall (35—) 40—55 µm wide. Longitudinal section: Cells textura angularis, 7—10 (—17)×5—7 µm, cells at the surface slightly thick-walled and darkly pigmented, cells otherwise thin-walled and hyaline; hairs arising from cells at surface of ascomatal wall. Ostiolar region comprised of nearly circular cells, 7—10 µm diam, thin-walled, hyaline; filamentous cells occasionally seen in the region of the ostiolar opening.

Asci bitunicate, narrowly clavate, (115—) 140—200 (—235)× 17—25 (—30) µm, 4—8-spored; apices broadly rounded, with a pronounced "nasse apicale", bases pedicellate; ascospores biseriate above, uniseriate below; the lower 40—80 µm of some asci abruptly narrowed and lacking spores; forming in a hymenium over the lower ½ of the ascomatal wall. Ascospores fusiform with subacute ends, straight, (28—) 30—40 (—43)×(7—) 8—12 (—13) µm; equally 2-celled, 1—2 additional septa sometimes forming later; slightly constricted at the median septum; spore contents brown while still in asci; enclosed in a hyaline, gelatinous sheath; germinating while still in asci; within 12 hrs producing a single, 60—120 µm long, unbranched or once branched germ-tube. Interascal filaments ca. 2 µm diam, hyaline, branching and anastomosing, each filament with a gelatinous sheath.

Characteristics in culture: Colonies on Weak ME, PDA and OA, in 2 weeks, 3—7 cm diam; aerial mycelium cottony, restricted on OA, white to yellow; at least some areas of the surface mycelium yellow, otherwise black to olivaceous and with a white margin; colony reverse pale to bright yellow; pycnidia forming on Weak ME and OA. Pycnidia forming in dense stromatic crust on the surface of agar, usually with yellow to black hairs or, rarely, hairs lacking; globose to hemispherical, 150—300 µm diam, arising from a stromatic base, cells of base *textura angularis*, yellow; pycnidial locule labyrinthuliform, opening by a single pore, each locule lined by phialides, pycnidial wall textura angularis. Phialides globose, 3—6 µm diam or elongated, 6—13×1.5—2 µm; with a pronounced, broad opening and an unflared collarette. Conidia elliptic to allantoid, 2.5—3.5× 1.5—2 µm, unicellular, hyaline to yellow.

Habitat: On bark and decorticated wood of angiospermous trees.

Holotype: Brazil: Territorio de Roraima, along the Manaus-Caracaraí Rd at a point ca. 333 km from the intersection of the Manaus-Itacoatiara Rd; on bark; Dumont, Hosford, Samuels, Buck, Araujo, Souza, Bernardi; 17 Nov 1977 (Dumont-BR 425, NY; Isotypes: INPA, PDD, ZT).

Additional specimens examined: Brazil: Territorio de Roraima, Acampamento do 6°-BEC-Jundiá, on the Manaus-Caracaraí Rd at a point ca. 328 km from the intersection of the Manaus-Itacoatiara Rd; on decorticated wood; Dumont, Hosford, Samuels, Buck,

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ARAUJO, SOUZA, BERNARDI; 16 Nov 1977 (DUMONT-BR 256, INPA, NY, PDD, ZT); Territorio de Roraima, Boca da Mata, ca. 219 km N of Boa Vista, on the Boa Vista-Sta. Elena, Venezuela Rd; on decorticated wood; DUMONT, HOSFORD, SAMUELS, BUCK, ARAUJO, SOUZA, BERNARDI; 1 Dec 1977 (DUMONT-BR 814, INPA, NY, PDD, ZT); Territorio de Roraima, ca. 226 km N of Boa Vista on the Boa Vista-Sta. Elena, Venezuela Rd; on bark; DUMONT, HOSFORD, SAMUELS, BUCK, ARAUJO, SOUZA, BERNARDI; 1 Dec 1977 (DUMONT-BR 886, INPA, NY, PDD, ZT).

Note. In its general appearance, *H. villosa* is similar to *Lasiosphaeria phyllophila* MOUTON (DENNIS 1974), a species known from Europe and New Zealand.

2. *Herpotrichia schiedermayeriana* FUCKEL, Jahrb. Nassau. Ver. Naturk., Nachtrag II, 27—28: 27. 1873. — Figs. 3—5.

ANAMORPH: *Pyrenochaeta*-like.

TELEOMORPH: Mycelium present as a subiculum of dark brown hyphae. Ascomata perithecioid, densely gregarious in groups of unlimited number, superficial, non-stromatic, leathery, black with a cinereous ostiolar region, globose to doliform, non-papillate, 330—400 µm diam or 280—380 µm high × 320—360 µm wide; wall shining; below ostiolar disc covered with hyphal-like, unbranched, septate, black hairs with rounded ends, greater than 200 µm long × 5—7 µm wide, walls 1.5—2 µm thick; collabent or not collapsing when dry, not changing color and no soluble pigment in 3% KOH, red-brown in 100% lactic acid. Ascomatal wall 25—40 µm wide. Longitudinal section: Cells at the surface nearly circular in outline, 7—13 µm diam or elliptic, 7—13 × ca. 5 µm, somewhat thick-walled and darkly pigmented; cells within elliptic in outline, 7—15 × 3—4 µm, thin-walled, hyaline. Cells of the lower ca. ¼ of the ascomatal wall vertically arranged, growing into the substrate from the base. Ostiolar region comprised of nearly circular, thin-walled cells, 3.5—5 µm diam, forming an ostiolar disc; ostiolar canal lined with filamentous cells which, at the bottom, are continous with the interascal filaments.

Asci bitunicate, clavate, 100—135 × 12—15 µm, 8-spored; apices broadly rounded, thickened, young asci with a pronounced "nasse apicale"; bases pedicellate; ascospores biseriate above, uniseriate below, forming throughout the length, rarely the lower ca. 30 µm of some asci abruptly narrowed and lacking spores; forming in a hymenium over the lower ²/₃ of the ascomatal wall. Ascospores fusiform, with acute to subacute ends, straight, (20—) 27—30 (—38) × 6—7.5 (—9) µm; equally 2-celled, one additional septum sometimes forming after discharge; appendages not seen, not constricted or slightly constricted at the median septum; light brown while still in asci, smooth; producing from 1—4, 50 µm or more long, unbranched or

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infrequently branched germ-tubes within 12 hrs. Interascal filaments 1—2 μm wide, hyaline, septate, branching and anastomosing.

Characteristics in culture: Colonies on Weak ME, PDA and OA, in 2 weeks, 3—6 cm diam; aerial mycelium scant except at colony center where aerial hyphae may be cottony and white to pale

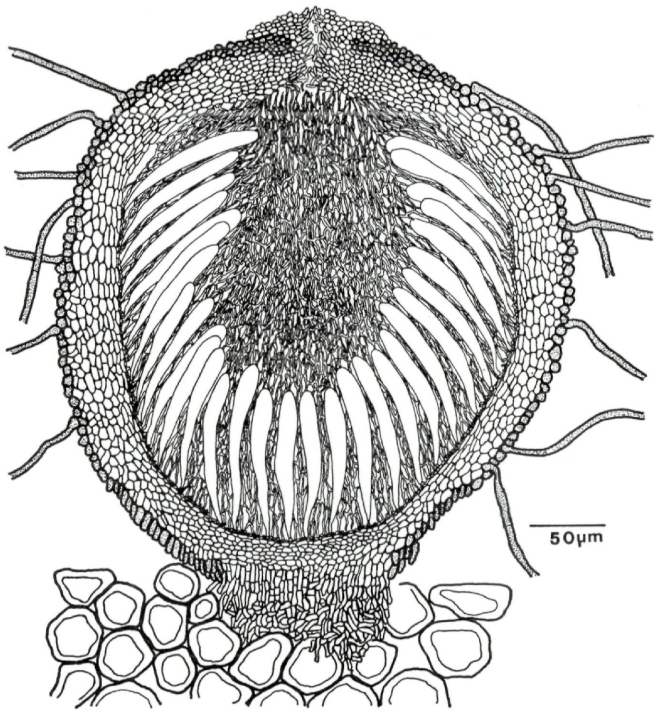

Fig. 3. *Herpotrichia schiedermayeriana* (DUMONT-BR 36): Longitudinal section of ascoma

yellow (PDA), colony otherwise red-brown; colony reverse concolorous. Pycnidia forming on the surface of agar in sharply delimited areas, in concentric rings or in the aerial mycelium; globose, 70—500 μm diam, light brown to black with long, unbranched, stiff to hyphal-like hairs arising from the surface; locule slightly involuted and completely lined with phialides, pycnidial wall textura angularis, pycnidia

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opening by a pore. Phialides nearly globose, 5—8×4—6 µm or elongated, 5—10×3—6 µm; with a pronounced, broad, unflared collarette; solitary or held in chains of 3—4 phialides. Conidia globose, elliptic to allantoid, 2.5—3.5 (—4)×1.5—2 (—3) µm, hyaline.

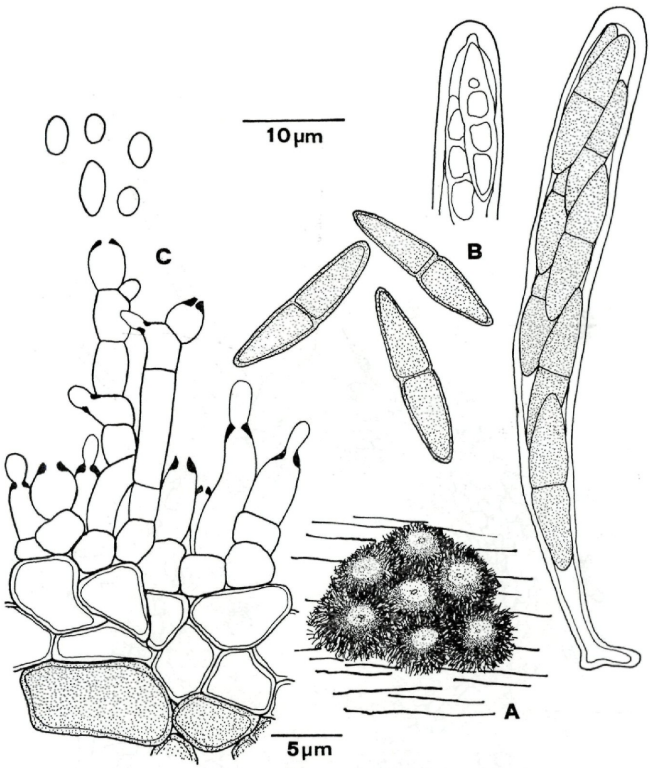

Fig. 4. *Herpotrichia schiedermayeriana*. A. Habit sketch of ascomata (DUMONT-BR 36). B. Asci and ascospores, the ascal apex at left is immature (DUMONT-BR 887). C. Phialides and conidia (DUMONT-BR 815)

Habitat: On bark and decorticated, angiospermous wood.

Specimens examined: Brazil: Amazonas, Embrapa experimental station at km 30 on the Manaus-Itacoatiara Rd; on bark and decorticated wood; FREIRE, HOSFORD, SAMUELS, BUCK;

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3 Nov 1977 (DUMONT-BR 36, INPA, NY); Territorio de Roraima, 204 km N of Boa Vista, on the Boa Vista-Sta. Elena, Venezuela Rd; on decorticated wood; DUMONT, HOSFORD, SAMUELS, BUCK, ARAUJO, SOUZA, BERNARDI; 1 Dec 1977 (DUMONT-BR 815, NY); Territorio de Roraima, ca. 226 km N of Boa Vista on the Boa Vista-Sta. Elena,

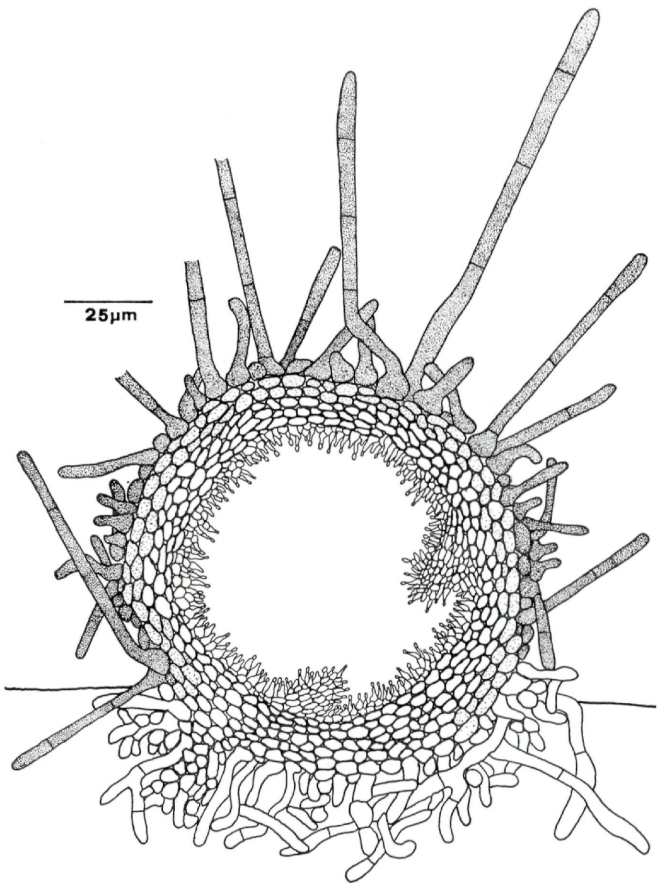

Fig. 5. *Herpotrichia schiedermayeriana* (DUMONT-BR 815): Longitudinal section of pycnidium

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Venezuela Rd; on decorticated wood; DUMONT, HOSFORD, SAMUELS, BUCK, ARAUJO, SOUZA, BERNARDI; 2 Dec 1977 (DUMONT-BR 887, INPA, NY, PDD).

Notes: The above description is based on the three Brazilian collections. *Herpotrichia schiedermayeriana*, one of the most common species of *Herpotrichia*, is found at both temperate and tropical latitudes and is world-wide in distribution. Both SIVANESAN (1971) and BOSE (1961) described terminal, hyaline appendages on the ascospores but none were found on ascospores of the present collections. This is the first report of an anamorph for the species.

Herpotrichia schiedermayeriana is closely related to *H. diffusa*. Ascospores of *H. diffusa* are only bicellular and measure 16—18× 4—5 μm.

3. *Herpotrichia rhodosticta* (BERKELEY & BROOME) SACCARDO, Syll. Fung. 2: 213. 1883. — Figs. 6—7.

= *Sphaeria rhodosticta* BERKELEY & BROOME, Jour. Linn. Soc., London 14: 263. 1873.

ANAMORPH: *Pyrenochaeta*-like.

TELEMORPH: Mycelium present as a black, wooly, effused subiculum. Ascomata perithecioid, gregarious, superficial, nonstromatic or with a small basal stroma, leathery; black, with small, red tubercles on the upper half; broadly obovoid with a flat apex, nonpapillate, 330—440 μm high×350—425 μm wide; wall roughened with small tubercles; brown hairs arising from base and confluent with subiculum; becoming slightly collabent when dry; a red pigment soluble in 3% KOH, no soluble pigment and no color reaction in 100% lactic acid. Ascomatal wall 25—35 μm wide. Longitudinal section: cells elliptic to fusiform, 10—13×ca. 5 μm, walls ca. 1 μm thick; cells at the surface darkly pigmented, cells within with pale yellow walls (in 100% lactic acid). Ostiolar region red, comprised of nearly circular cells, 3.5—4 μm diam, thin-walled; containing an amorphous, red substance (as seen in 100% lactic acid); slightly elongated cells present in the region of the ostiolar opening.

Asci bitunicate, clavate, 100—135×12—14 μm, 8-spored; apices broadly rounded and thickened, bases pedicellate; ascospores biseriate above, uniseriate below; the lower 25—30 μm of each ascus abruptly narrowed and lacking spores; forming in a hymenium over the lower $^2/_3$ of the ascomatal wall. Ascospores elliptic to subfusiform, with rounded ends, straight to slightly curved, 19—22×5—6 μm; 1-septate, apical cell shorter and broader than basal cell; slightly constricted at the septum; pale yellow-brown while still in asci, smooth; producing 1—2, 20—80 μm long, unbranched or infrequently branched germtubes within 12 hrs. Interascal filaments ca. 1.5—2 μm wide, hyaline, branching and anastomosing.

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Characteristics in culture. Colonies on Weak ME and PDA, within 2 weeks, 3—4 cm diam, on OA 7—8 cm diam. Aerial mycelium scant, white, barraged at the margin; surface mycelium in the center dark grey to dark green; long, erect, dark brown to black

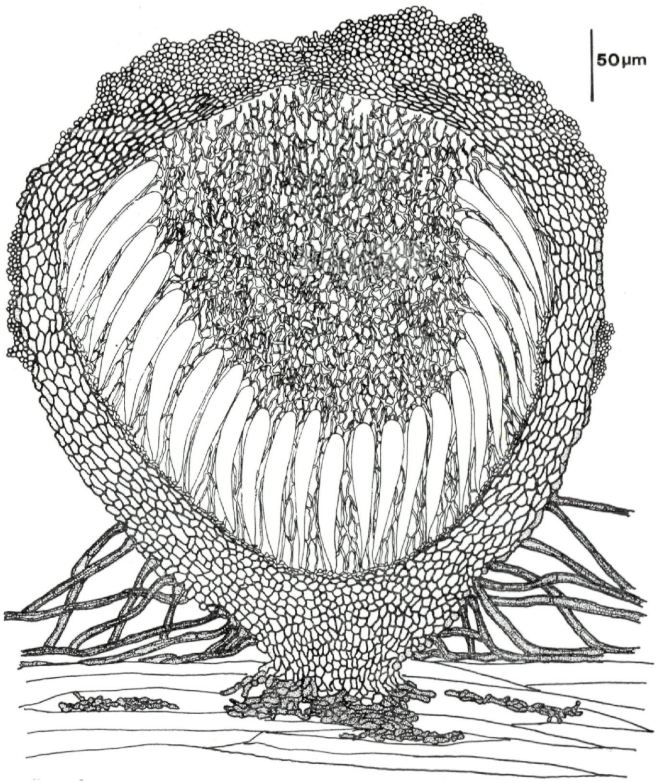

Fig. 6. *Herpotrichia rhodosticta* (DUMONT-BR 283): Longitudinal section of ascoma

hyphae arising from surface of agar in Weak ME and PDA; reverse concolorous; some yellow coloration seen in reverse of Weak ME. Pycnidia abundant on OA, forming within 1 month on PDA and Weak ME. Pycnidia forming on surface of agar or in aerial mycelium,

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globose, 130—170 μm diam; with hyphal-like, unbranched, septate, straight, brown hairs, 420—750 μm long arising from surface of pycnidial wall; pycnidia 1—2-loculate; wall textura angularis, 15—20 μm wide, cells at surface pigmented, otherwise hyaline; entire

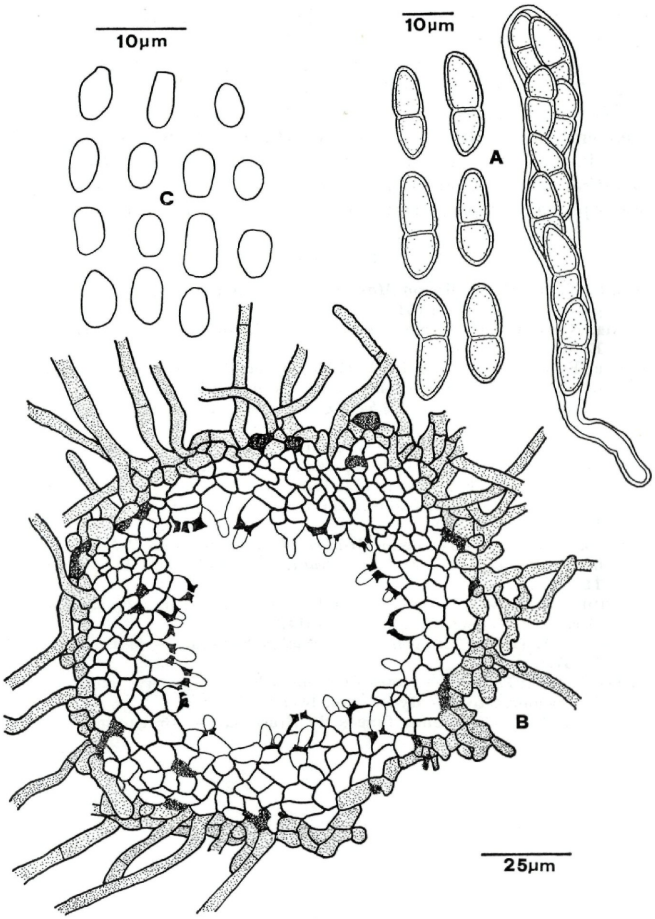

Fig. 7. *Herpotrichia rhodosticta* (DUMONT-BR 283): A. Asci and ascospores. B. Longitudinal section of pycnidium. C. Conidia

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inner wall lined with phialides; opening by a pore. Phialides 5—10× 4—6 µm, with broad, unflared collarettes; arising singly. Conidia elliptic, 6.5—10×3—4 µm, 1-celled, hyaline.

Habitat: On decorticated, angiospermous wood.

Specimen examined: Brazil: Territorio de Roraima, Acampamento do 6°-BEC-Jundiá, on the Manaus-Caracaraí Rd at a point ca. 328 km from the intersection of the Manaus-Itacoatiara Rd; on decorticated wood; DUMONT, HOSFORD, SAMUELS, BUCK, ARAUJO, SOUZA, Bernardi; 16 Nov 1977 (DUMONT-BR 283, INPA, NY).

Notes: This description is taken from the above cited Brazilian specimen. BOSE (1961), SAMUELS (1973) and SIVANESAN (1971) redescribed and gave synonymy for this common species. *Herpotrichia rhodosticta* is found at both tropical and temperate latitudes. An anamorph has not previously been reported for the species.

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