

NEW OR LITTLE KNOWN LIGNICOLOUS APHYLLOPHORALES (BASIDIOMYCOTINA) FROM SOUTHEASTERN UNITED STATES

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SUMMARY

Eleven species of Corticiaceae and Steccherinaceae (Aphylophorales) are described and illustrated. The new species proposed are *Amphinema arachispora*, *Hyphodontia comptopsis*, *Hyphodontia lanata*, *Lazulinospora cinnamomea*, *Mycoacia meridionalis*, *Phanerochaete insolita*, *Scytinostromella fallax*, *Steccherinum tenue*, and *Steccherinum vagum*. *Botryohypochnus chordulatus* is presented as a new combination, and *Hyphoderma echinocystis* is reported for the first time from North America. Cultural characters are provided for four species. *Mycoacia meridionalis* is shown to be heterothallic and bipolar.

Since they were treated by Burt (1914-1923), little attention has been accorded the effused Aphylophorales of the southeastern United States. Schweinitz (1822) reported on many of these fungi and described numerous new species. Berkeley, using specimens supplied by Curtis and Ravenel, published descriptions of known as well as new species of the effused Aphylophorales in the mid to late 19th Century. Overholts (1938) described a number of new species, but with the exception of Burt's treatments the Basidiomycetes of the Southeast have received little recent attention. As a result the flora of these fungi is today poorly known and descriptions of the species are often inadequate for identification purposes. It is the purpose of this paper to further elucidate the flora of the Southeast.

During the past decade, the first author has made many collections of such fungi throughout the Southeast. Among them were a number of new species, new records, or rarely encountered species. Some of these are treated in this paper.

MATERIALS AND METHODS

Color notations were made in accordance with Kornerup and Wanscher (1967). Specimens were examined microscopically with the

¹ Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

aid of Zeiss WL microscope as hand sections or as squash mounts in a drop of 2% KOH mixed with a drop of 1% aqueous phloxine. Melzer's reagent (Ainsworth, 1971) was used to determine amyloidity or dextrinoidity (if no reaction, indicated as Melzer's -) and lactophenol aniline blue (Ainsworth, 1971) to detect cyanophily. Boidin's formulation (1951) for sulfuric benzaldehyde was used. Line drawings were made with a Zeiss drawing tube. Cultures were grown in 90 mm Petri dishes on 1.5% Difco malt extract agar (MEA) at 25 C. To determine presence or absence of polyphenol oxidases cultures were inoculated on 0.5% gallic acid agar (GAA) and 0.5% tannic acid agar (TAA) (Davidson et al., 1938). Gum guaiac (GG) was used as specified by Nobles (1959). The "key pattern" (Davidson et al., 1942) is based on 2-wk-old cultures centrally inoculated. The "species code" (Nobles, 1965) is based on 6-wk-old cultures inoculated at the side of the dish. Unless otherwise indicated specimens and cultures are on deposit at the Center for Forest Mycology Research, Forest Products Laboratory, USDA, Forest Service, Madison, Wisconsin. The abbreviations of herbaria are from Holmgren and Keuken (1974). Asterisks (*) denote specimens from which polysporous cultures were obtained and studied. Scientific and common names for tree species are in accordance with Little (1979).

SPECIES DESCRIPTIONS

Amphinema arachispora Burds. et Nakas., sp. nov. FIG. 1

Differt a *Amphinema byssoides* cystidiis subuliformibus distinctis, 40-75 X 4-6 μ m; basidiosporis arachiformibus, 3.5-4.5 X 2-2.5 μ m.

Holotypus: HHB 9794. on charred *Cornus florida* L. (flowering dogwood), Greenwood Plantation Snail Plot, Thomasville, Thomasville County, Georgia, U.S.A. 5-VIII-1977. In herb. CFMR conservatum.

Etymology: from arachis (L. n. = peanut) + *spora* (L. n. = spore), referring to the shape of basidiospores.

Basidiocarp annual, broadly effused, hypochnoid, separable, up to 0.2 mm thick; fertile area continuous, smooth, yellowish white (3A2), no color change in KOH; margin up to 3 mm broad, farinaceous to fimbriate, very thin, irregular in outline, white to yellowish white (near 3A2), with infrequent cordons; cordons up to 0.5 mm diam, white; subiculum byssoid, white, up to 100 μ m thick.

Hyphal system monomitic; subiculum a loose *textura intricata*, hy-

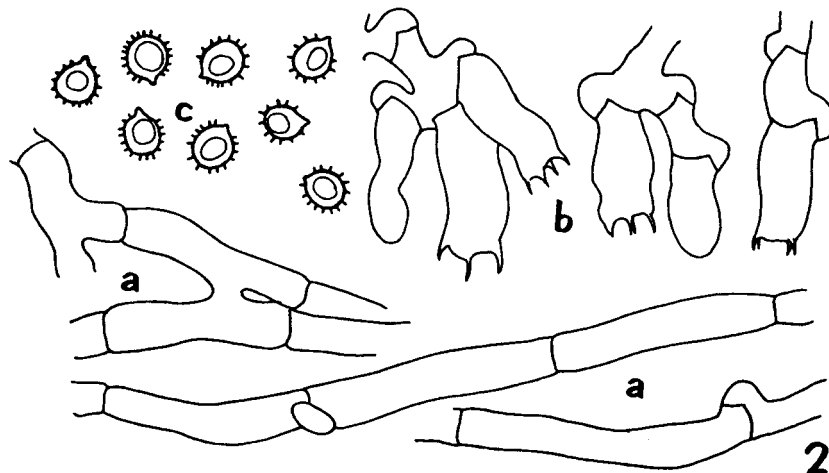
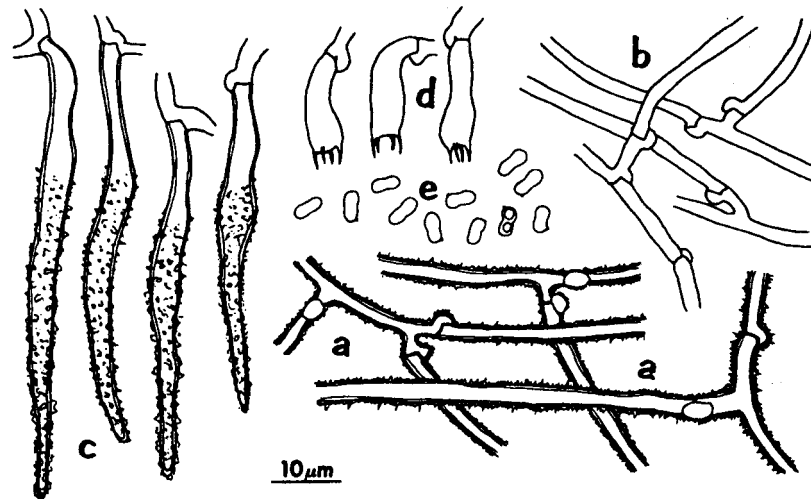


FIG. 1. *Amphinema arachispora* (HHB 9794, holotype): (a) subicular hyphae; (b) subhymenial hyphae; (c) cystidia; (d) basidia; (e) basidiospores. FIG. 2. *Botryohypochnus chordulatus* (HHB 9593): (a) subicular hyphae; (b) basidia; (c) basidiospores.

phae 1.5–2.5 μm diam, thin-walled or with slight wall thickening, hyaline or pale yellow, branched regularly at nearly right angles, long-celled, septate with clamp connections, mostly encrusted with tiny yellow granules, sometimes smooth; cordon surface a loose *textura intricata*, hyphae 2–3 μm diam, with slight wall thickening, branched, septate with clamp connections, encrusted with yellow granules, inner core up to 200 μm diam, a *textura porrecta*, parallel to

axis, hyphae like those of subiculum; *subhymenium* a compact *textura intricata*, hyphae 2–3 μm diam, with slight wall thickening, smooth or lightly encrusted with yellow granules, short-celled, septate with clamp connections; *cystidia* narrowly subulate, 40–75 \times 4–6 μm , with slight wall thickening, pale yellow, lightly encrusted with yellow granules, occasionally smooth, nonseptate, protruding up to 40 μm , with clamp connection at base; *basidia* broadly clavate, 13–17 \times 4.5–5.5 μm , hyaline, thin-walled, with clamp connection at base, 4 sterigmate, sterigmata up to 3 μm long; *basidiospores* arachiform to ellipsoid, 3.5–4.5 \times 2–2.5 μm , hyaline to pale yellow, thin-walled, smooth, often biguttulate, Melzer's - , acyanophilous.

Specimen examined: Holotype, cited above.

Remarks: *Amphinema arachispora* differs from *A. byssoides* (Fr.) J. Erikss., in possessing well-differentiated cystidia and arachiform basidiospores.

Botryohypochnus chordulatus (Rogers) Burds. et Nakas., comb. nov.

FIG. 2

\equiv *Pellicularia chordulata* Rogers, Farlowia 1: 98. 1943
(Basionym)

Basidiocarps annual, broadly effused, thick, appressed, woolly, separable; fertile areas continuous, pruinose, greyish yellow (near 4B3); margin abrupt, byssoid, up to 0.3 mm thick, irregular in outline, concolorous with hymenium with dark brown cordons running through and below subiculum.

Hyphal system monomitic; *subiculum* a loose *textura intricata*, hyphae 5–7.5 μm diam, thin-walled or with slight wall thickening, smooth, pale yellow, with frequent branching, usually at right angles, septate with occasional clamp connections; *cordons* 50–150 (–250) μm diam, a *textura porrecta*, hyphae 2.5–6.5 μm diam, pale yellow, thin-walled, smooth, septate lacking clamp connections; *subhymenium* a *textura intricata* more compact than subiculum, hyphae 6–9 (–10) μm diam, with slight wall thickening, pale yellow, with frequent branching, septate with clamp connections; *basidia* cylindrical to barrel-shaped, 20–24 \times 8–10 μm , with refractive globules, pale yellow, thin-walled, with clamp connection at basal septum, 4 sterigmate, sterigmata up to 4 μm long; *basidiospores* globose, 5–6.5 μm diam (excluding spines), pale yellow, with single refractive globule, thick-walled, with thick spines up to 1 μm long, with large apiculus, Melzer's - , strongly cyanophilous.

Specimen examined: U.S.A.: Florida—HHB 9593, on *Quercus virginiana* Mill. (live oak), Beadel Course, Tall Timbers Research Station, Leon County.

Remarks: The four sterigmate basidia and cyanophilous, spinose basidiospores indicate this species belongs in *Botryohypochnus*. The cordons, smaller basidiospores, and clamp connections distinguish *B. chordulatus* from *B. isabellinus* (Fr.) J. Erikss. Jülich (1979) placed *B. chordulatus* in his new genus *Cyanobasidium*. The authors feel that *B. chordulatus* and *B. isabellinus* are so similar that they must be considered congeneric.

Hyphoderma echinocystis Erikss. et Strid in Erikss. et Ryv. FIG. 3
Cort. N. Eur. 3: 471. 1975.

Basidiocarps annual, broadly effused or effused in small patches, up to 0.5 mm thick, membranous to crustaceous, adherent, fertile area continuous, smooth to odontoid, teeth thin, up to 1 mm long, yellowish white (4A2) to greyish yellow (4C3); margin abrupt or up to 1 mm wide, farinaceous, thin, white, irregular in outline; subiculum compact, not easily observed.

Hyphal system monomitic; *subiculum* a compact *textura intricata*, hyphae 2.5–8 μm diam, thin-walled or walls up to 1 μm thick in wide hyphae, hyaline to pale yellow, regularly branched, long-celled, septate with clamp connections, surface smooth or heavily encrusted with hyaline crystals, also bearing ovoid to globose echinocysts, up to 7–10 \times 7–10 μm , irregularly scattered on hyphae, often rare, hyaline, thin-walled, aculeate, spines up to 1 μm long; *tooth trama* a compact *textura porrecta*, sometimes hyphae collapsed obliterating detail, hyphae like those of subiculum or in some cases, short-celled, swollen up to 10 μm diam, thin-walled, hyaline, constricted conspicuously at septa, with clamp connections; *subhymenium* a compact *textura intricata*, hyphae 2.5–3.5 μm diam, hyaline, thin-walled, with frequent branches, short-celled, septate with clamp connections; *cystidia* broadly clavate, 25–35 \times 8–10 (–15) μm , rare to infrequent, thin-walled or walls up to 1 μm thick, smooth or lightly encrusted with orange granules, protruding up to 10 μm , with clamp connection on basal septum; *cystidioles* poorly differentiated, nearly cylindrical to ventricose, 25–30 \times 3.5–5.5 μm , thin-walled, smooth, hardly protruding, with clamp connection at base; *basidia* clavate or with slight median constriction, 20–27 \times 5.5–7 μm , thin-walled, hyaline, with clamp connections at basal septa, 4 sterigmate, sterigmata up to 4 μm long; *basidiospores* cylindrical to allantoid, 8–10 \times 2.5–3 μm , hyaline, thin-walled, smooth, Melzer's -, acyanophilous.

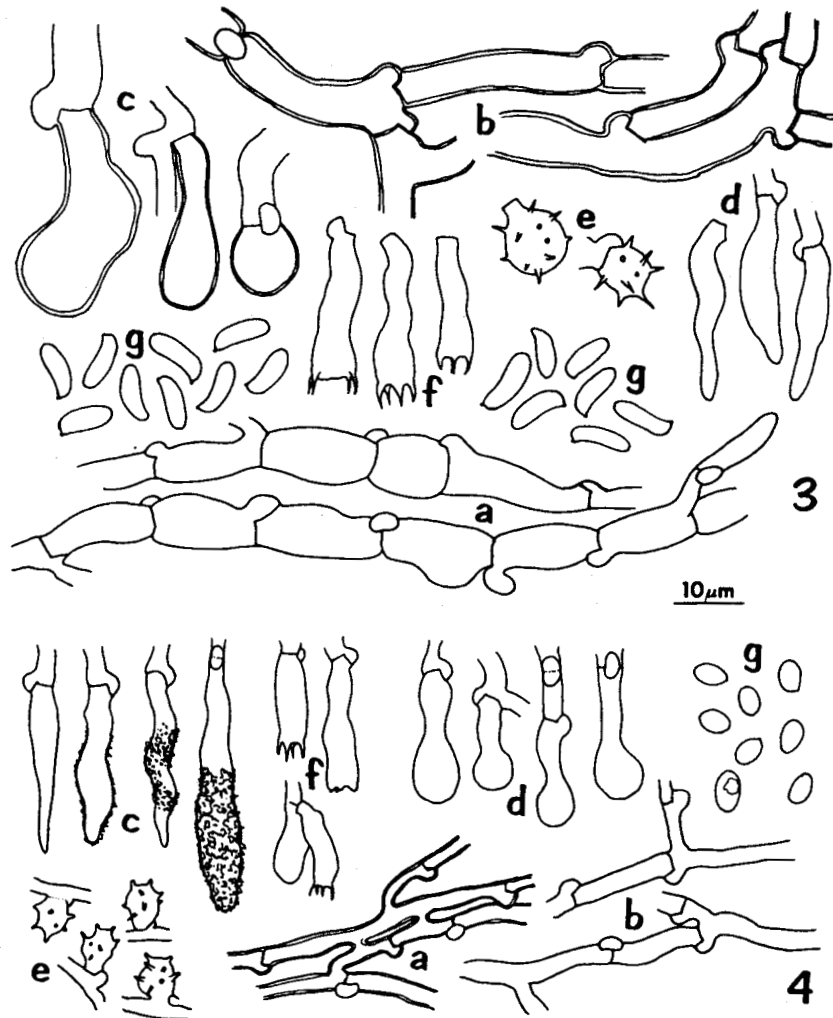


FIG. 3. *Hyphoderma echinocystis* (HHB 4588): (a) hyphae from tooth trama; (b) subicular hyphae; (c) broadly clavate cystidia; (d) cystidioles; (e) echinocysts; (f) basidia; (g) basidiospores. FIG. 4. *Hyphodontia comptopsis* (HHB 9599, holotype): (a and b) subicular hyphae; (c) subulate cystidia; (d) capitatae cystidia; (e) echinocysts; (f) basidia; (g) basidiospores.

Specimens examined: U.S.A.: Florida—HHB4588, on *Sabal palmetto* (Walt.) Lodd. ex J. A. et J. H. Schult. (sabal palm), Devil's Mill-hopper, Alachua County; J. L. Lowe 11279, on hardwood, Silver Springs, Marion County. Sweden: Uppland—Eriksson 4540, on decayed wood; Fasterna par., Norra Varleda (paratype).

Remarks: These specimens represent the first North American records of *H. echinocystis*. A comparison of the Florida specimens with the paratype specimen indicates they are conspecific. As indicated by Eriksson and Strid (Eriksson and Ryvarde, 1975), the echinocysts are sometimes difficult to find in the type; this is also true of the specimens from Florida. *Hyphoderma echinocystis* differs from *H. compta* (Jacks.) Jülich and *Hyphodontia comptopsis* (also treated in this paper) in having large cylindrical to allantoid spores.

Another specimen, HHB 9256, on *Ulmus americana* L. (American elm), from the Huron Mountains, Marquette County, Mich., may be the same species. However, it differs somewhat in that the cystidia are larger, more capitate, and heavily encrusted with an orange substance.

Hyphodontia comptopsis Burds. et Nakas., sp. nov.

FIG. 4

Basidiocarpis effusus, odontoides, pallidolutea vel fulvis; echinocystis in subculis, $6-9 \times 4.5-6 \mu\text{m}$, aculeolatis; cystidiis subulatis vel capitatis; basidiosporis late ellipsoideis, $4.5-5.5 \times 3-4 \mu\text{m}$.

Holotypus: HHB 9599, on well-decayed hardwood, Anders Branch, Tall Timbers Research Station, Leon County, Florida, U.S.A. 28-VII-1979. In herb. CFMR conservatum.

Etymology: from *compta* (in *Corticium compta*) + *opsis* (L. suffix = like) = *compta*-like, because it also possesses echinocysts.

Basidiocarp annual, membranous, broadly effused, adherent, fertile area continuous, odontoid; teeth up to 0.5 mm long, sometimes fused or with slightly fimbriate apex, yellowish white (3A2) to greyish yellow (4B4); margin up to 1 mm broad, powdery to byssoid, irregular in outline, white, fibrillose; subiculum compact, byssoid, thin, white.

Hyphal system monomitic; *subiculum* a compact *textura intricata*, hyphae 2-3 μm diam, thin-walled or with slight wall thickening, hyaline, with regular frequent branching, septate with clamp connections, smooth, bearing scattered echinocysts; *echinocysts* globose to ellipsoid, $6-9 \times 4.5-6 \mu\text{m}$, lateral or terminal, with basal clamp connection, aculeate, spines up to 1 μm long, also bearing scattered capitate end cells $18-25 \times 6-9 \mu\text{m}$, hyaline, thin-walled, smooth; *tooth trama*-like subiculum but more nearly a *textura porrecta*, apex of teeth with cylindrical to nearly subulate end cells, $25-40 \times 5-6 \mu\text{m}$, with interrupted or continuous covering of orange granules; *cystidia* of two types (1) capitate cystidia $12-20 \times 5-6 \mu\text{m}$, thin-walled, smooth, embedded except for apex, with clamp connection at base, (2) subulate cystidia $24-27 \times 3-4 \mu\text{m}$, thin-walled, smooth, protruding up to 15 μm , with clamp connection at base; *basidia* clavate to nearly cylindrical with slight median constriction, $12-20 \times 4.5-5.5 \mu\text{m}$, thin-

walled, hyaline, 4 sterigmate, sterigmata up to $3.5 \mu\text{m}$ long; *basidiospores* broadly ellipsoid, $4.5\text{--}5.5 \times 3\text{--}4 \mu\text{m}$, hyaline, thin-walled, smooth, Melzer's - , acyanophilous.

Specimen examined: Holotype, cited above.

Remarks: *Hyphodontia comptopsis* is similar to *Hyphoderma compta* (Jacks.) Jülich and to *Hyphoderma echinocystis*. From *H. compta* (basidiospores $6\text{--}8 \times 3.5\text{--}5 \mu\text{m}$) it differs in having smaller spores and the capitate structures in the subiculum and hymenium. *Hyphodontia comptopsis* also possesses differentiated end cells in the apex of the teeth which are absent in *H. compta*. *Hyphodontia comptopsis* is easily distinguished from *H. echinocystis* because the basidiospores of the latter are allantoid, $10\text{--}12 \times 3\text{--}4 \mu\text{m}$, while those in *H. comptopsis* are broadly ellipsoid, $4.5\text{--}5.5 \times 3\text{--}4 \mu\text{m}$.

Hyphodontia lanata Burds. et Nakas., sp. nov.

FIG. 5

Basidiocarpis usque 1 mm crassis, late effusis, lanatis, dentibus cremeis vel albis; vesiculosus in subiculis. usque $10 \mu\text{m}$ diam; cystidiis capitatis, $25\text{--}30 \times 7\text{--}9 \mu\text{m}$; basidiis $15\text{--}20$ ($\text{--}24$) $\times 3\text{--}4 \mu\text{m}$, fere cylindraceis; basidiosporis $5\text{--}6.5 \times 3\text{--}4 \mu\text{m}$.

Holotypus: HHB 8925, on *Liriodendron tulipiferae* L. (tulip popular), the Hammock, Rd H4, Harrison Expt. Forest, Desoto National Forest, Harrison County, Mississippi, U.S.A. 1-1V-1976. In herb CFMR conservatum.

Etymology: from *lanatus* (L. adj. = woolly), referring to the woolly texture of the subiculum.

= *Odontia vesiculosa* G. H. Cunn. (*nom. illegit.*). Trans. Roy. Soc. New Zealand 86: 75. 1959. Non *Odontia vesiculosa* Burt in Povah, Pap. Mich. Acad. Sci. 9: 262. 1929. = *Hyphoderma subtestaceum* (Litsch.) Donk.

Basidiocarp annual, broadly effused, up to 1 mm thick, soft, adherent, compact woolly texture, fertile areas continuous, minutely odontoid; teeth irregular in shape, cream to white; margin abrupt, woolly, irregular in outline, concolorous with fertile area, up to 0.75 mm thick.

Hyphal system monomitic; *subiculum* a loose *textura intricata*, hyphae $3\text{--}4 \mu\text{m}$ diam, walls up to $1 \mu\text{m}$ thick, yellow, regularly branched, septate with clamp connections, often bearing small vesicles of capitate end cells, lateral or terminal, swollen up to 8 ($\text{--}10$) μm diam, with slight wall thickening; *tooth trama* like subiculum but

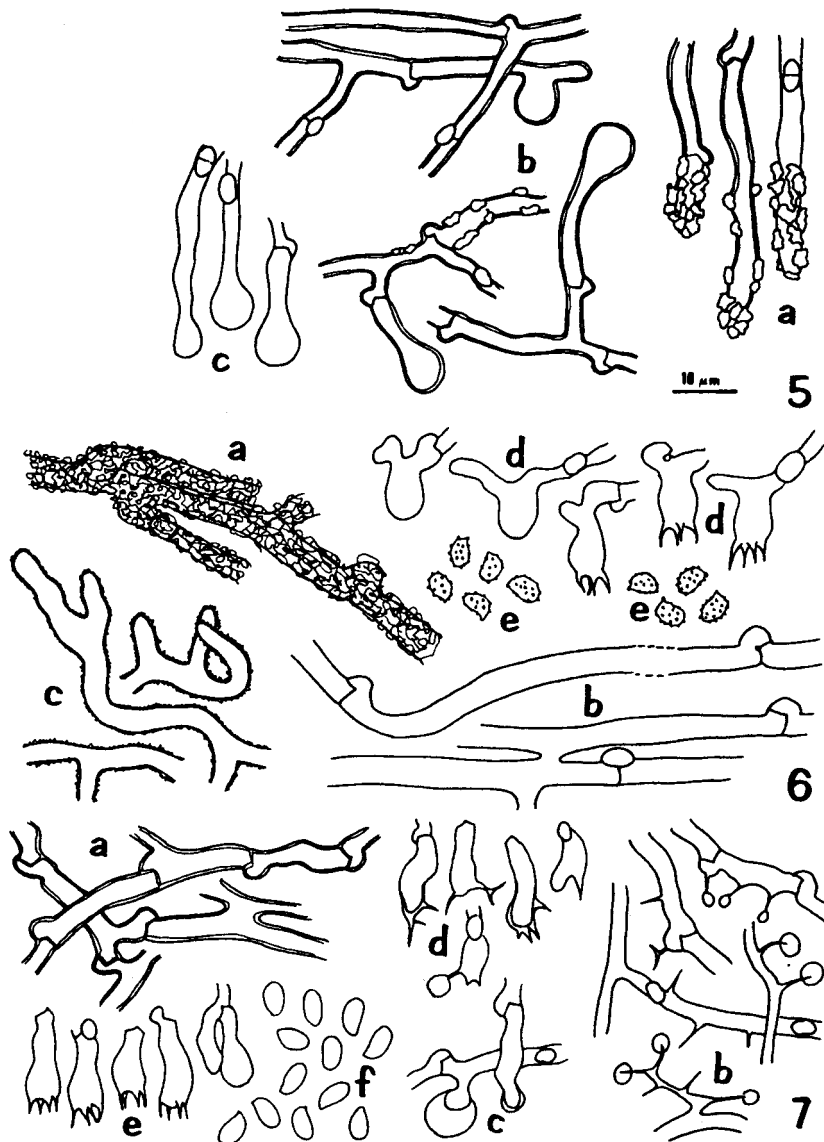


FIG. 5. *Hyphodontia lanata* (HHB 6925): (a) hyphae of tooth apex; (b) subicular hyphae and swollen end cells; (c) cystidia; (d) basidia; (e) basidiospores. FIG. 6. *Lazulinospora cinnamomea* (HHB 9511, holotype): (a and b) subicular hyphae; (c) hyphal ends; (d) basidia; (e) basidiospores. FIG. 7. *Mycoacia meridionalis* (HHB 9846): (a) subicular hyphae; (b) subicular hyphae with capitate spines; (c) "haloed" cystidia; (d) spinose cystidia; (e) basidia; (f) basidiospores.

more nearly a *textura porrecta* oriented perpendicular to the substrate; *subhymenium* poorly differentiated, a *textura intricata*, more compact than subiculum, hyphae 3–4 μm diam, irregularly swollen up to 6 μm diam, yellow, lightly or heavily encrusted with hyaline crystals, frequently branched, septate with clamp connections; hyphae of tooth apices like those of subiculum but often lightly to heavily encrusted with hyaline crystals; *cystidia* capitulate, 25–30 \times 7–9 μm , thin-walled or with slight wall thickening, yellow, with clamp connection on basal septum, protruding up to 10 μm ; *basidia* cylindrical or with slight median constriction, 15–20 (–24) \times 3–4 μm , hyaline, thin-walled, with clamp connection at basal septum, 4 sterigmate, sterigmata up to 3 μm long; *basidiospores* ellipsoid, slightly flattened adaxially, 5–6.5 \times 3–4 μm , hyaline, thin-walled, smooth, Melzer's - , acyanophilous.

Specimens examined: U.S.A.: Florida—HHB6925, on sabal palm inflorescence, Okalawaha River, Marion County, Mississippi—HHB 8364, on *Ligustrum* sp. (privet) and HHB 8925* (holotype, cited above), both at Harrison Experimental Forest, DeSoto National Forest, Harrison County. New Zealand: PDD 18112, on *Nothofagus menziesii* (Hook. f.) Oerst. (silver beech), Alton Valley, Tuatapere, Otago, II-1954 (PDD).

Remarks: This species is characterized by a thick, spongy-woolly basidiocarp and microscopically by the subicular vesicles, capitulate end cells, and ovoid spores.

Cultural Characters

Macroscopic characters: Growth on MEA slow, about 5 mm diam at 2 wk. Mats slightly raised, white, moderately thick, downy, homogeneous, zonate; margin even, distinct, slightly raised; odor none; reverse unchanged. Oxidase reactions at 1 wk on GAA moderately strong, growth none; on TAA reaction stain or moderately strong, growth 0-trace. Test with GG negative.

Microscopic characters: Hyphae from advancing zone, aerial, and submerged mycelium 1.5–4 μm diam, distinct, thin-walled or with slight wall thickening, septate with abundant clamp connections, branched; cystidioles abundant by 2 wk on aerial hyphae, cylindrical to clavate, up to 8 μm diam, with a basal clamp connection, thin-walled.

Key pattern: A-P-S-I-10-16. Species code: 2.3.13.32.36.38.47.54.

Lazulinospora cinnamomea Burds. et Nakas. sp. nov.

FIG. 6

Basidiocarpis effusus, luteobrunneis vel cinnamomeis, byssoideoreticulatis vel colliculosis, superficie reticulatis; hyphis subiculis 2.5–4 μm diam, hyalinis, tunicatis cyaneis vel anthracinis in KOH: hyphis extremis luteis crystallinis vaginis; hymeniis portatis in proximis hyphis filis; pleurobasidiis adsunt; basidiosporis ellipsoideis, adaxialibus complanatis, 4.5–5 \times 2.5–3.5 μm , verrucosis, plerumque cyaneis vel anthracinis in KOH. acyanophilis.

Holotypus: HHB 9511, on *Magnolia* sp. (magnolia), Woodyard Hammock, Tall Timbers Research Station, Leon County, Florida, U.S.A. 24-VII-1977. In herb. CFMR conservatum.

Etymology: from *cinnamoneus* (L. adj. = cinnamon), because of the color of the basidiocarp.

Basidiocarp effused in patches up to several cm in extent, byssoid to colliculose, loosely attached, fertile area of yellowish brown to cinnamon-brown threads loosely and reticulately entwined over a purplish gray, byssoid subiculum; margin fibrillose, irregular in outline, turning yellow-brown in 95% ethanol.

Hyphal system monomitic; *subiculum* a *textura intricata*, hyphae 2.5–4 μm diam, thin-walled or with slightly thickened walls, mostly hyaline in KOH, some areas becoming blue to black, densely encrusted with hyaline crystals, with clamp connection at each septum, sometimes several hyphae formed into cordons; hyphal ends coated by a rather uniform sheath of yellow crystalline material; hymenium borne on narrow cordons; *basidia* mostly pleurobasidial, rarely pedunculate, 9–12 \times 5–6 μm , hyaline, some with contents staining black in KOH, thin-walled, 4 sterigmate, sterigmata up to 3 μm long; *basidiospores* ellipsoid, adaxially flattened, 4–5 \times 2.5–3.5 μm , slightly thick-walled, verrucose, pale yellow, many turning blue-black to black in KOH, verrucae most densely stained, Melzer's - , acyanophilous.

Specimens examined: U.S.A.: Florida—Holotype, cited above; HHB 9787, on *Serenoa repens* (Bartr.) Small (saw palmetto), McBride Slough, State Route 267 near State Route 363, Wakulla County.

Remarks: *Lazulinospora cinnamomea* differs from *L. wakefieldii* Burds. et M. J. Larsen (1974) and *L. cyanea* (Wakef.) Burds. et M. J. Larsen in possessing a cinnamon-colored basidiocarp. The hymenium is born on a reticulum of tiny cinnamon cordons spread over a purplish gray subiculum. *Lazulinospora cinnamomea* appears more closely related to *Trechispora* Karst. than the other two species because of the profusion of pleurobasidia. However, it does not have ampullate hyphae characteristic of the genus *Trechispora*.

Mycoacia meridionalis Burds. et Nakas., sp. nov.

FIG. 7

Basidiocarpis effusis, usque 1 mm crassis, adhaerens, denribus, pallidulureis vel fulvus; hyphis subiculis spinosis; spinis apicis incrustatis globosis, 3 μ m diam; basidiis (10-) 12-15 (-18) \times 4-5 μ m; basidiosporis 4.5-5.5 \times 2.5-3 (-3.5) μ m diam, hyalinis.

Holotypus: HHB 8830, on *Pinus taeda* L. (loblolly pine), Harrison Experimental Forest, DeSoto National Forest, Harrison County, Mississippi, U.S.A. 26-111-1976. In herb. CFMR conservatum; isotype at ARIZ, BPI.

Etymology: from *meridionalis* (L. adj. = southern), referring to its distribution in the southern United States.

Basidiocarp broadly effused, up to a meter or more in extent on prostrate logs, tightly adherent, odontoid, teeth up to 1 mm long and 0.15 mm wide, terete, crowded, more dispersed near margin, light yellow (4A4), in age becoming greyish orange (5B5) to brownish orange (near 5C6), yellowish white to pale yellow between teeth (3A2-3A3); margin up to 3 mm broad, velvety, thinning out, yellowish white to pale yellow (3A2-3A3), irregular in outline.

Hyphal system monomitic; *subiculum* a tightly agglutinated *textura intricata* near the substrate surface, somewhat more loosely organized in some areas towards the subhymenium, hyphae 2.5-4 μ m diam, hyaline, septate with clamp connections, thin-walled, some hyphae with walls up to 0.5 μ m thick, smooth, with simple or branched spines protruding from walls, up to 7 \times 0.5 (-1) μ m, lacking lumen, often capped with globules up to 3 μ m diam; *tooth trama* 70-100 (-120) μ m diam, arising from subiculum by organization of hyphae into an agglutinated *textura porrecta* perpendicular to substrate, hyphae like those of subiculum but capitate spines not observed because of agglutination; *subhymenium* poorly differentiated, a compact *textura intricata* 10-20 μ m thick; *cystidia* infrequent, similar to basidia but with antler-like processes, thick-walled at apex; also rare clavate structures with a capitate membrane or halo up to 10 μ m diam; *basidia* clavate to broadly clavate, (10-) 12-14 (-18) \times 4-5 μ m, hyaline, thin-walled, with clamp connection at basal septum, 4 sterigmate. sterigmata up to 3.5 μ m long; *basidiospores* ellipsoid, 4.5-5.5 \times 2.5-3 (-3.5) μ m, hyaline, thin-walled, smooth, Melzer's - , acyanophilous.

Specimens examined: U.S.A.: Florida—HHB9846 and HHB 9994* on loblolly pine, HHB 9890* on *Pinus* sp. (pine), HHB 9982* on *Carya* sp. (hickory), all Leon County. Georgia—RLG11826 and RLG 11886, on pine, University of Georgia Botanical Garden, Clark County (CFMR, ARIZ) Mississippi—HOB 8820, HHB 8830* (holotype, cited above), on pine, HHB 8327, HHB 8344* on *Pinus palustris*

L. (longleaf pine), Harrison County; FP 105056* on hardwood, Shardey County; HHB 8964* on *Persea borbonia* (L.) Spreng. (redbay), HHB 8849, HHB 8858*, HHB 8862, HHB 8863, HHB 8866* on loblolly pine, Stone County, South Carolina—J.L. Lowe 12560* on *Quercus* sp. (oak), Berkeley County. Texas—HHB 124* on *Carpinus* sp. (hornbeam), San Jacinto County.

Cultural Characters

Macroscopic characters: Growth on MEA slow to moderate. 22-52 mm diam at 2 wk. Mats raised, white, thin to dense, cottony-woolly to downy or felty at 2 wk; however, typically appressed, dense, felty by 4 wk; some isolates in age producing coarse mycelial strands radiating from inoculum; margin even, fimbriate. appressed or raised; odor none; reverse unchanged; some isolates may fruit by 6 wk. Oxidase reactions at 1 wk strong on GAA, growth trace to 15 mm diam; on TAA reaction strong, growth trace to 19 mm diam. Test with GG negative.

Microscopic characters: Hyphae from advancing zone, aerial, and submerged mycelium 1.5-5 (-9) μm diam, septate with clamp connections, thin-walled, branched; some isolates with occasional ampullate hyphae; aerial hyphae slender, 1.5-2.5 μm diam, rarely branched, occasionally encrusted, with abundant capitulate spines, spines 1-8 μm long, cap 2-4 μm diam; some isolates produce swellings in submerged hyphae; crystals abundant, large and thin in aerial mat.

Mating system: Twelve single-spore isolates of HHB 8830 were checked for clamp connections and were paired in all combinations. Two mating types were identified: $A_1 = 1,2,6,7,10,14$; $A_2 = 3,5,8,12,13,15$. The results indicate that *M. meridionalis* is heterothallic and bipolar.

Key patterns: A-P-S-1-10-14-16; A-P-V-1-10-14-16.

Species code: 2.3.(26).28²,32.36.38.(44).(45).(46).(47).(48).54.55.59.

Remarks: *Mycoacia meridionalis* is one of the most commonly found species occurring on pines in the deep South. The bright yellow color of the fertile area makes it easily identifiable in the field. Because it is so common and distinctive, it is surprising that it has not been previously recognized and described. *Mycoacia meridionalis* possesses some characteristics of both *Hyphodontia* and *Resinicium*. The subiculum organization in some areas looks much like that found in species of *Hyphodontia*. The "haloed" structures that resemble those

² Nobles (1965) left numbers 27-33 of her "species code" system available for future characters. Number 27 was adopted by Burdsall et al. (1978). We are using 28 to designate capitulate spines on the vegetative hyphae.

found in *Resinicium* have been found but are rare. However, the more or less phlebioid aspect of the tissues, the small basidia, and the poorly differentiated sterile hymenial structures suggest that the best disposition for this species is in *Mycoacia*.

While *M. meridionalis* resembles *Mycoacia uda* (Fr.) Donk in color, it does not stain red to burgundy in 2% KOH and has broader basidiospores. The unique capitulate spines found on the hyphae of *M. meridionalis* are also present in *Odontia furfurella* Bres. (Gilbertson, 1963). The basidiospores of *O. furfurella* are allantoid, $4-5 \times 1 \mu\text{m}$, while those of *M. meridionalis* are ellipsoid.

Cultures of *M. meridionalis* and *O. furfurella* are nearly identical. Both species produce white mats and capitulate spines in culture. Their growth rates are also similar. *Odontia furfurella* does not grow on GAA, while *M. meridionalis* produces at least a trace of growth by 2 wk.

Phanerochaete insolita Burds. et Nakas., sp. nov.

FIG. 8

Differt a *Phanerochaete septocystidia* (Burt) Erikss. et Ryv. macrocystidiis septatis, $75-200 \times 9-15$ (-21) μm ; basidiis $15-18 \times 6.5-8 \mu\text{m}$; basidiosporis reniformis, $6.5-8.5$ (-10) $\times 3-4 \mu\text{m}$.

Holotypus: HHB 9561, on *Liquidambar styraciflua* L. (sweetgum), Woodyard Hammock, Tall Timbers Research Station, Leon County, Florida, U.S.A. 26-VII-1977. In herb. CFMR conservatum.

Etymology: From *insolitus* (L. adj. = unusual), because of being one of only two *Phanerochaete* species with septate cystidia.

Basidiocarp annual, effused in small patches, up to 0.25 mm thick, hypochnoid, separable; fertile area discontinuous, farinaceous to pubescent, greyish orange (near 5B4 or 6B4), staining red with 2% KOH; margin not differentiated, abrupt, irregular in outline; subiculum very thin, byssoid, concolorous with hymenium.

Hyphal system monomitic; subiculum a loose *textura intricata*, hyphae $4-9$ (-12) μm diam. walls up to $3.5 \mu\text{m}$ thick, hyaline to pale yellow, encrusted with hyaline and yellow granules that dissolve in 2% KOH producing a red solution, regularly branched, long-celled, septate, lacking clamp connections; *subhymenium* a *textura intricata*, hyphae with slightly thickened walls, pale yellow, short-celled, frequently branched in candelabrum pattern, encrusted with orange granules dissolving in 2% KOH turning solution pink; cystidia cylindrical, $75-200 \times 9-15$ (-21) μm , protruding up to $150 \mu\text{m}$, with numerous septa, clamp connections lacking, often constricted at septa, thin-walled or with slight wall thickening, encrusted at first with a

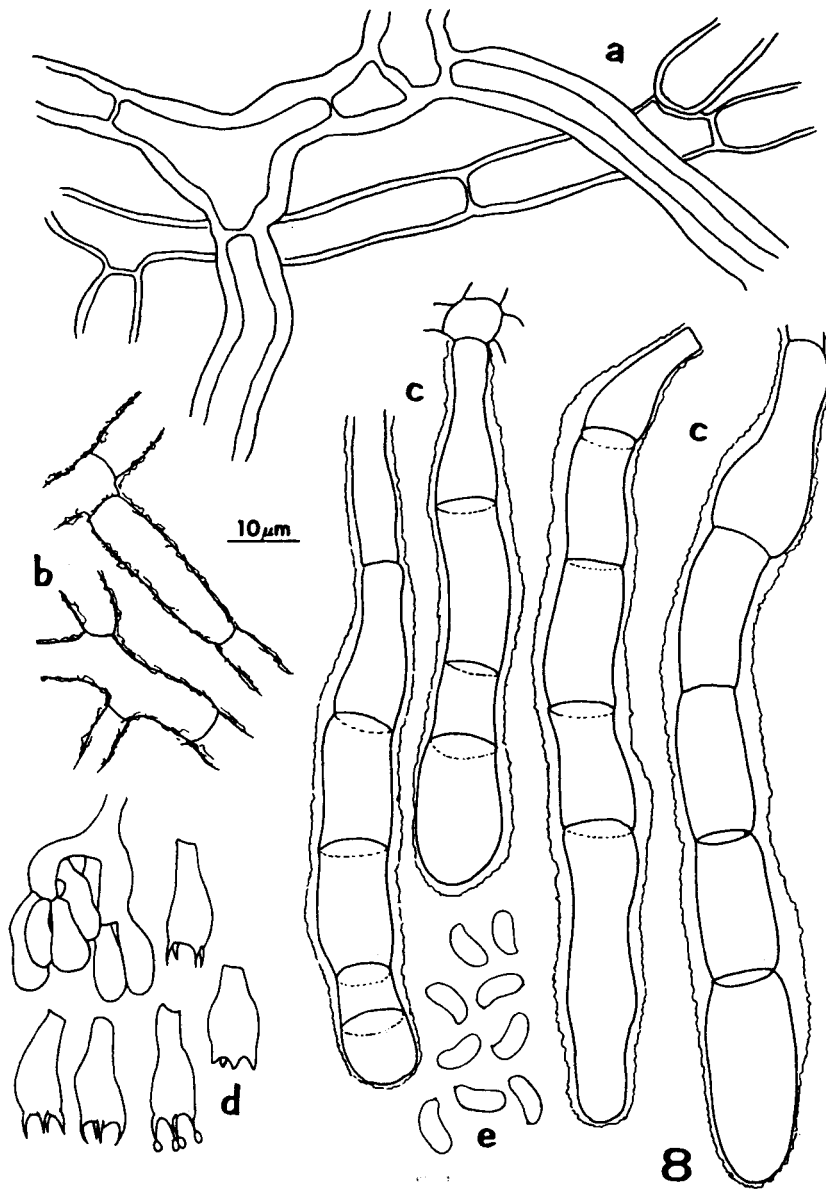


FIG. 8. *Phanerochaete insolita* (HHB 9561, holotype): (a) subicular hyphae; (b) encrusted subhymenial hyphae; (c) cystidia; (d) basidia; (e) basidiospores.

nearly translucent sheath up to 4 μm thick, later developing into a thin, orange granular coating; *basidia* broadly clavate to ovate, 15-18 \times 6.5-8 μm , hyaline, thin-walled, without clamp connection at basal septum, 4 sterigmate, sterigmata up to 3 μm long; *basidiospores* reniform, 6.5-8.5 (-10) \times 3-4 μm , hyaline, thin-walled, smooth, Melzer's - , acyanophilous.

Remarks: *Phanerochaete insolita* differs from *P. septocystida* (Burt) Erikss. et Ryv., the only other *Phanerochaete* species with septate cystidia, in possessing larger basidia and basidiospores, broader cystidia, and a color change to red in KOH.

Scytinostromella fallax Burds. et Nakas., sp. nov.

FIG. 9

Basidiocarpis effusus, pelliculosis; hyphis systematis dimiticis, none dextrinoidibus in Melzer's solutionibus; cystidiis in crustatis absque; cystidiis 18-24 μm longis, mammaliformibus; basidiosporis 4.5-5 \times 2-2.5 μm , laevis, amyloideis in Melzer's solutionibus.

Holotypus: HHB 8860, on *Pinus taeda* L., 5 mi. west of Wiggins, south of Red Creek, Stone County, Mississippi, U.S.A. 30-111-1976. In herb. CFMR conservatum.

Etymology: From *fallax* (L. adj. = deceptive, fallacious), because of its superficial resemblance to *Confertobasidium olivaceoalbum* (Bourd. et Galz.) Jülich (1972).

Basidiocarp annual, effused, up to 0.3 mm thick, fragile, fertile areas continuous, pellicular, pale yellow (3A3), easily broken up and separable from subiculum; margin up to several mm broad, concolorous with the subiculum, byssoid, irregular in outline, fimbriate or with cordons; cordons up to 0.25 mm diam, greyish yellow (near 4B5); subiculum byssoid, greyish yellow (near 4B5). up to 250 μm thick, transversed by cordons.

Hyphal system dimitic; *subiculum* a loose *textura intricata*; generative hyphae (1.5-) 3-4.5 μm diam, thin-walled or walls up to 0.5 μm thick, yellow to brownish yellow, encrusted with yellow granules, regularly branched, long-celled, with clamp connections at all septa; *skeletal hyphae* forming cordons, otherwise rare and widely dispersed, 1-2 μm diam, walls up to 0.5 μm thick, yellow to brownish yellow, Melzer's - , rarely branched, rarely septate, lacking clamp connections, smooth; *cordons* 100-250 μm diam, a *textura porrecta*, composed of two types of hyphae: (a) skeletal hyphae as in subiculum, (b) generative hyphae 2-3 μm diam, thin-walled, hyaline or yellow tinted, smooth, long-celled, rarely branched, regularly septate, with clamp connections; *subhymenium* a loose *textura intricata*, hyphae 2-3 μm

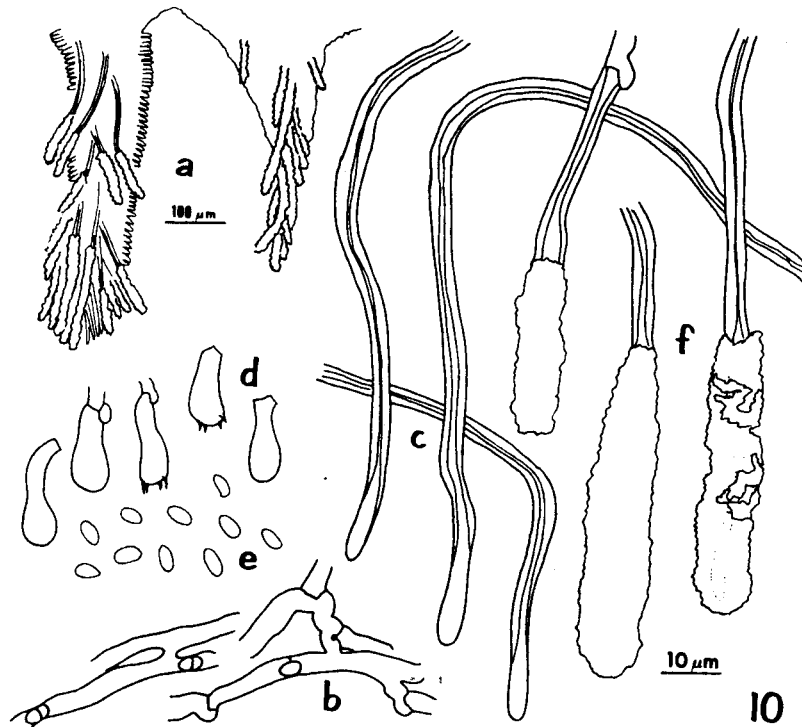
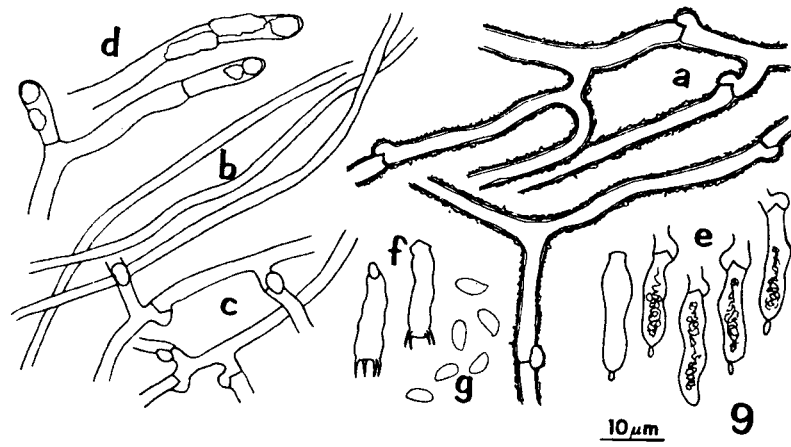


FIG. 9. *Scytinostromella fallax* (HHB 10004): (a) subicular generative hyphae; (b) skeletal hyphae from cordons; (c) subhymenial hyphae; (d) encrusted subhymenial hyphal end cells; (e) cystidia; (f) basidia; (g) basidiospores. FIG. 10. *Steccherinum tenue* (HHB 4050, holotype): (a) schematic drawing of a section of the fruit body; (b) generative subicular hyphae; (c) skeletal hyphae; (d) basidia; (e) basidiospores; (f) pseudocystidia.

diam. with slight wall thickening, hyaline or yellow tinted, smooth or with a yellow film irregularly distributed on surface; *cystidia* cylindrical or with slight constriction, often apically papillate, 18-21 (-24) \times 3-5 μm , mostly embedded, thin-walled, hyaline, aseptate, with granular to globular contents; *basidia* nearly cylindrical but with a slight submedian swelling, (12-) 14-16 \times 35-5 μm , hyaline, thin-walled, with basal clamp connection, 4 sterigmate, sterigmata up to 3.5 μm long; *basidiospores* ellipsoid to narrowly ellipsoid, 4-5 \times 2-2.5 μm , hyaline, thin-walled, smooth, amyloid, acyanophilous.

Specimens examined: U.S.A.: Florida—HHB10004* and HHB 10015,* on loblolly pine, Leon County. Georgia—FØ0196,* on pine, Decatur County. Mississippi—HHB 8842, on pine, Harrison County; HHB 8860* (holotype, cited above).

Cultural Characters

Macroscopic characters: Growth on MEA moderate, 61-90 mm diam at 2 wk. Mats appressed to intermediate, thin, downy to subfelty, zonate, yellowish white (3A2) to light yellow (2A5) at 2 wk, greyish yellow (4B5, 4B4) by 6 wk, color most intense near inoculum, then fading toward margin; many fine, short mycelial strands radiating from inoculum plug; margin even, fimbriate, appressed; odor none; reverse unchanged; not fruiting by 6 wk. Oxidase reactions at 1 wk moderately strong on GAA, growth 0-trace; on TAA reaction moderately strong, growth 0-16 mm diam, the mat is similar to MEA mat. Test with GG positive and strong, immediately turning deep green (25D8) to dark green (25F8).

Microscopic characters: Hyphae of advancing zone, aerial and submerged mycelium 2-6 μm diam, with clamp connections, thin-walled, often branched at right angles; aerial hyphae sometimes heavily encrusted or covered with yellow amorphous substance, by 4 wk developing abundant narrow hyphae, 1.5-2 μm diam, with or without clamp connections, distinct, occasionally branched, difficult to separate; *cystidia* abundant in aerial mycelium, 6 μm diam, papillate, with refractive globular contents, nonstaining in phloxine or sulfo-benzaldehyde; short segments of moniliform hyphae scattered, up to 6 μm diam, nonstaining in phloxine.

Key patterns: C-P-M-1-10-16; B-P-M-1-10-14-16.

Species code: 2.3.(8).15.21.26.32.37.38.44.54.55.

Remarks: Basidiocarps of *S. fallax* are identical macroscopically to those of *Confertobasidium olivaceoalbum*; however, microscopically they are easily distinguished. *Scytinostromella fallax* possesses a dim-

itic hyphal system, cystidia, and amyloid spores, which are all lacking in *C. olivaceoalbum*. It differs from the other species of *Scytinostromella* Parmasto (1968) in possessing smooth spores. It lacks the encrusted cystidia present in *S. heterogenea* (Bourd. et Galz.) Parm., possesses "gloeocystidia" that are absent in *S. humifaciens* (Burt) Freeman et Petersen (1979), and has smaller "gloeocystidia" than those in *S. nannfeldtii* (J. Erikss.) Freeman et Petersen (1979). Cultures of *S. fallax* are bright yellow and develop papillate cystidia, while those of *C. olivaceoalbum* are buff and lack cystidia.

Steccherinum tenue Burds. et Nakas., sp. nov.

FIG. 10

Basidiocarpis late effusus, tenuibus; dentibus dispersis inordinatis; absque hyphis fasciculis; hyphis systematicis dimiticis; pseudocystidiis 6-9 μm diam, fasciculatis ad extremum dentibus, incrustatis crystallinis hyalinis; basidiis 12-15 \times 4-5.5 μm ; basidiosporis 4.5-5 \times 2.5 μm , none amyloideis in Melzer's solutionibus.

Holotypus: HHB 4050, on *Vitis* sp. (grape), Rainbow Falls Trail, Great Smoky Mountains National Park, Sevier County, Tennessee, U.S.A. 20-VI-1970. In herb. CFMR conservatum.

Etymology: from *tenuis* (L. adj. = thin) referring to the thin basidiocarps.

Basidiocarp broadly effused, thin, adnate, yellowish grey (near 4B2), with regularly dispersed teeth, 100-450 μm long; margin irregular, pubescent, very thin, bluish gray.

Hyphal system dimitic; *subiculum* 50-75 (-150) μm thick, a *textura intricata* between teeth; *skeletal hyphae* composing most of tissue, 3.5-4.5 μm diam, hyaline, thick-walled, rarely branched, rarely septate, mostly smooth but occasionally covered with a dense coating of hyaline crystals when in or near substrate; *generative hyphae* 3-4 μm diam, hyaline, thin-walled, occasionally with slightly thickened walls, regularly branched, septate with clamp connections; *tooth trama* of hyphae similar to those in subiculum but arranged in a *textura porrecta*; *pseudocystidia* originating in tooth trama, protruding through hymenium or the tooth apex, often clustered at tooth apex, 40-150 \times 6-9 μm , nearly cylindrical with obtuse apex, hyaline, thick-walled except at basal clamp connection, encrusted over 1/2 to 3/4 of length by dense hyaline crystals; *basidia* clavate, 12-15 \times 4-5.5 μm , hyaline, smooth, thin-walled, with clamp connection at basal septum, 4 sterigmate, sterigmata up to 3 μm long; *basidiospores* ellipsoid, 4.5-5 \times 2.5 μm , thin-walled, hyaline, smooth, Melzer's - , acyanophilous.

Specimens examined: U.S.A.: Tennessee—HHB4092 on *Acer* sp. (maple), Blount County; HHB 4050 (holotype, cited above). North Carolina—HHB2453*, on hardwood, Macon County.

Cultural Characters

Macroscopic characters: Growth on MEA rapid, over 90 mm diam by 2 wk. Mats thin, appressed, farinaceous, white, homogenous; margin even, appressed, hyaline; odor strong and unpleasant; reverse unchanged. Oxidase reactions at 1 wk on GAA moderately strong, growth none; on TAA reaction stain or moderately strong, growth 0-trace. Test with GG positive, faint blue after 1 min, by 3 min greenish blue (24A5 to 24A6).

Microscopic characters: Hyphae of advancing zone and submerged mycelium of two types: (a) predominately 2-3.5 μm diam, thin-walled, with abundant clamp connections, with frequent branching; (b) 5-6 μm diam, thin-walled, with abundant clamp connections, rarely branched; aerial mycelium lacking; surface hyphae with heavily encrusted segments.

Key pattern: A-P-I-1-10-14. Species code: 2.3.7.32.36.38.42.53.54.

Remarks: *Steccherium tenue* is similar to *S. ciliolatum* (Berk. et Curt.) Gilbertson and Budington (1970), but differs in its thin grayish yellow basidiocarps with a gray to nearly bluish gray margin and lack of rhizomorphs. The almost nonexistent subiculum is also characteristic of this species.

Steccherinum vagum Burds. et Nakas., sp. nov.

FIG. 11

Basidiocarpis effusus, dentatis, dentibus usque 2 mm longis, griseoaurantiis vel brunneo-aurantiis, hyphis fasciculis candidis vel pallidoluteis; cystidiis exorientibus dentibus tramis, 9-12 μm diam, protrusis usque 30 μm , dextrinoidiis; basidiis 15-27 \times 4.5-6 μm , fere cylindraceis; basidiosporis 5-6 \times 2-2.5 μm , none amyloideis in Melzer's solutionibus.

Holotypus: HHB 4319, on deciduous log, Roaring Fork, Great Smoky Mountains National Park, Sevier County, Tennessee, U.S.A. 10-VIII-1970. In herb. CFMR conservatum.

Etymology: from *vagus* (L. adj. = uncertain, in several directions) referring to its possessing characters of both *Phanerochaete* and *Steccherinum*.

Basidiocarp annual, effused up to 8 \times 4 cm, up to 0.25 mm thick, membranous, adherent; fertile area continuous, hydaceous, teeth up to 2 mm long, yellowish white (3A2) between teeth, teeth greyish orange (6B5) to brownish orange (6C5), not changing color in 2% KOH; margin about 0.5 mm broad, farinaceous, with small wart-like teeth, yellowish white (3A2), with inconspicuous cordons; cordons 0.25-0.5(-1) mm diam, white or with slight yellow tint, not extensively developed; subiculum up to 1.5 mm thick, concolorous with margin.

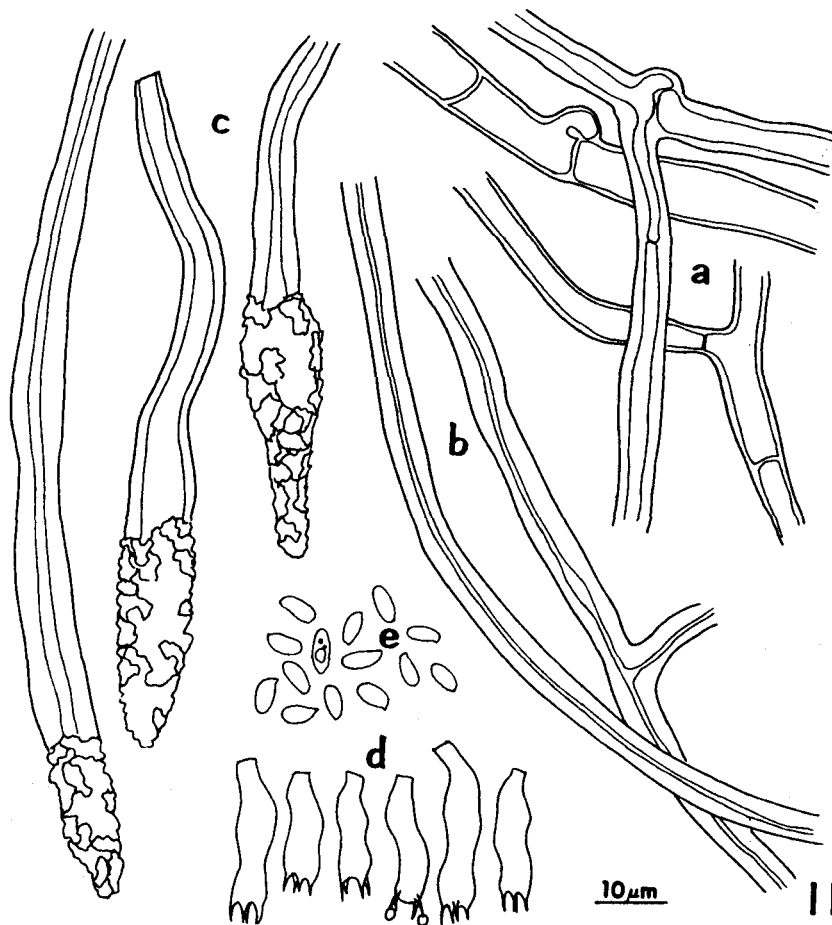


FIG. 11. *Steccherinum vagum* (HHB 4319, holotype): (a) hyphae from rhizomorphs; (b) subicular hyphae; (c) cystidia; (d) basidia; (e) basidiospores.

Hyphal system dimitic; *subiculum* a compact *textura intricata*, hyphae of two types; (1) *skeletal hyphae* predominate, 3-5 (-7) μm diam, walls up to 1 μm thick, hyaline, infrequently branched, long-celled, rarely septate, lacking clamp connections; (2) *generative hyphae* similar but with slight wall thickening, regularly branched, regularly septate, with rare clamp connections; *tooth trama* a compact *textura porrecta*, mostly skeletal hyphae. 3-5 (-7) μm diam, thick-walled, hyaline, smooth, with infrequent branching. refractive, infrequently septate, lacking clamp connections; generative hyphae similar to those in subiculum; cordons 100-1,000 μm diam, rind not differentiated, a compact *textura porrecta*, hyphae 3.5-8 μm diam,

walls slightly thickened or up to 2.5 μm thick, smooth, long-celled, infrequently branched, most septa without clamp connections, with rare single clamps; *subhymenium* of compactly arranged generative hyphae, 3-4 μm diam, with slightly thickened walls, smooth, septate, lacking clamp connections, frequently branched; *pseudocystidia* arising from the tooth trama and protruding through hymenium or tooth apex, cylindrical with obtuse to pointed apex, 9-12 μm diam, protruding up to 30 μm , dextrinoid, encrusted with dense hyaline crystals; *basidia* nearly cylindrical but with a noticeable median constriction, 15-27 \times 4.5-6 μm , hyaline, thin-walled, lacking clamp connection at basal septum, 4 sterigmate, sterigmata up to 3.5 μm long; *basidiospores* narrowly ellipsoid, 5-6 \times 2-2.5 μm , hyaline, thin-walled, smooth, Melzer's - , acyanophilous.

Specimens examined: U.S.A.: Tennessee—HHB 4319, (holotype cited above); HHB 4316 on tulip poplar, Great Smoky Mountains National Park, Sevier County.

Remarks: *Steccherinum vagum*, though dimitic, possesses rare clamp connections on hyphae of the subiculum and tooth trama. In that respect it resembles species of *Phanerochaete*. Other characters such as the texture of the basidiocarp, the heavily encrusted pseudocystidia, and the two types of hyphae require its placement in the genus *Steccherinum*.

Steccherinum vagum is similar to *S. subcrinale* (Peck) Ryvarden (1978) in possessing generative hyphae that lack clamp connections, but the spores of *S. subcrinale* are smaller (2.5-4.0 \times 2.0-3.0 μm) and the margin is fimbriate to rhizomorphic.

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