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AGARICUS IN NORTH AMERICA: TYPE STUDIES

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Summary

Type specimens of *Agaricus* taxa from North America are described, and nomenclatural problems in the genus are discussed.

Although the genus *Agaricus* is easily distinguished from other agaric genera, infrageneric taxonomy appears difficult and has received little in-depth coverage in North America. Regional keys during the past century have covered New York state (Peck, "1883", 1884), the Pacific coast and tropical U.S., particularly Florida (Murrill, 1912, 1918, 1938), the Great Lakes region (Kauffman, 1918), the Chapel Hill, N.C., area (Coker, 1928) and western Washington state (Hotson & Stuntz, 1938). The former North American works, with the exception of Hotson & Stuntz, were superficial by present standards, relying primarily on macroscopic data for species determinations. The following studies of type specimens serve to more accurately associate names and circumscriptions of North American taxa and to lay the groundwork for detailed floristic studies of the genus.

Explanation of two new descriptive terms, campestroid and placomycetoid, is in order. A campestroid stature, exemplified by *A. campestris* L. *per* Fr., exhibits a pileus diameter-stipe length ratio of one or greater than one. Also frequently associated with this stature are a thick-set fruit body with an equal or subequal stipe and a meadow or pasture habitat. Placomycetoid stature, exemplified by *A. placomyces* Pk., exhibits a pileus diameter-stipe length ratio of less than one. Frequently associated with this stature are a thin-fleshed fruit body with a slender, bulbous stipe and a woodland habitat. These terms were created to describe distinct stature types and were based on the two most common species of the respective statures found in the area where this study was made.

Certain descriptions may be incomplete due to the lack of sufficient type material. In some cases only a portion of the type collection was made available for study, but in other cases, although the greatest care was taken with aged and fragile fruit bodies, poor condition of original material, age, or less than scrupulous care have reduced collections to fragments or to dust. When only one collection by an originating author survives, but is not specifically labelled "type", the term "implicit holotype" has been applied.

Specimens from the following herbaria were examined: the National Fungus Collections (BPI), Cornell University (CUP), the Royal Botanic Gardens (K), the University of Michigan (MICH), the University of North Carolina (NCU), the New York Botanical Garden (NY), New York State Museum (NYS), and the University of Tennessee (TENN). Herbarium abbreviations are from those established by Lanjouw & Stafleu (1964).

Agaricus arvensis var. *abruptus* Peck. 1894. N.Y. State Mus. Bull. 48: 239.

≡ *A. abruptus* Peck. 1900. N.Y. State Mus. Mem. 4, 3: 163-164. *(non A. abruptus* Fries. 1874. Hym. Eur. p. 245).

≡ *A. abruptibulbus* Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, West Albany, N.Y., -.-.92, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus ovate to convex when young, expanded to plane when mature, to 10 cm diam, pale gold-tan when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe to 13 cm long, bulbous, often rimmed and depressed at base, appearing fibrous, concolorous with pileus; ring superior, bearing floccose patches on reverse, more or less appendiculate, pale gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh to 12.0 µm diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae to 4.5 µm diam, uninflated; basidia 6.0-9.2 x 15.3-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring, patches on lower surface of ring) to 25.0 µm diam, irregularly inflated, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-5.5 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus merely a hyaline spot in the spore wall or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: Collection data is insufficient to determine which collection (if only one) labelled by Peck as *A. arvensis* var. *abruptus* actually formed the basis for the type description. I have chosen the above collection as lectotype because it is the better of two collections labelled by Peck and dated prior to the publication of the original description. The lectotype contains several fruit bodies including immature forms.

Agaricus alabamensis Murrill. 1922. Mycologia 14: 202-203.

TYPE SPECIMEN (neotype *des. mihi*): TENN, no. 10182, Gainesville, Fla., 7.vii.48, coll. W. A. Murrill, det. B. F. Isaacs. (!)

Stature of carpophore campestroid; pileus convex, not fully expanded, 6.5 cm diam, dull gold when dried; surface smooth to fibrillose; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin; margin projecting up to 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe tapering upward, to 6 cm long, slightly bulbous, appearing fibrous, concolorous with pileus when dried; ring superior, persistent, thicker near margin, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-13.8 µm diam, occasionally slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, uninflated; basidia 7.5 x 18.5-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, broadly clavate to napiform, to 12.2 µm diam. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) irregularly inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Note: Because the original type collection of this taxon (NY, Auburn, Ala., 19.v.01, coll. F. S. Earle, det. W. A. Murrill, s.n.) is not only badly broken up but also overgrown with a contaminant fungus and therefore unidentifiable, I have selected the above as neotype. The collection contains three mature fruit bodies.

Agaricus alachuanus Murrill. 1938. J. Elisha Mitchell Sci. Soc. 54: 140.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.viii.37, coll. & det. W. A. Murrill, no. 15917. (!)

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 2 cm diam, deep tan with brown, appressed, fibrillose scales when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, in fragments, appearing fibrous, concolorous with pileus when dried; ring gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 4.5-7.5 µm diam, irregularly inflated, unbranched; hyphae of pileus flesh 9.2-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 µm diam, slightly inflated; basidia 6.0-7.5 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cheilocystidia sparce, saccate to napiform, to 9.2 µm diam. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Cells of universal veil (stipe surface below ring) regularly elongated, inflated, to 20.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate or indiscernible, hyaline.

The type collection consists of two broken fruit bodies, both mature. There are also some very brief notes written by Murrill contained with the specimens.

Schaeffer macrochemical reaction: negative.

Agaricus albolutescens Zeller. 1938. Mycologia 30: 468-469.

TYPE SPECIMEN (holotype, explicit): NY, Lincoln Co., Ore., 21.xi.34, coll. G. S. Burlingham, det. S. M. Zeller, no. 9158. (!)

Stature of carpophore campestroid; pileus convex to plane, to 6.5 cm diam, golden yellow when dried; surface smooth, fibrous with age; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 5 cm long, appearing fibrous, concolorous with pileus or slightly darker when dried; ring superior, somewhat appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered, 4.5-5.5 µm diam, unbranched; hyphae of pileus flesh 6.0-21.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-13.8 µm diam, occasionally inflated; basidia 6.0-8.5 x 21.5-24.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 µm, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5) 6.0-7.0 x 3.8-4.5 µm, ovoid to ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type specimen consists of two fruit bodies in separate packets. Both fruit bodies are mature; notes on the fresh condition accompany the specimens.

Schaeffer macrochemical reaction: negative.

Agaricus alligator Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193-194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.x.4, coll. & det. W. A. Murrill, no. 19566. (!) Isotype: TENN, no. 21101. (!)

Stature of carpophore campestroid; mature pileus convex, to 5.5 cm diam, dull gray-gold when dried; surface silky, imbricate-scaly on disc; dried flesh to 7 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, more or less appendiculate, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.8-6.0 µm diam, irregularly inflated, branched; hyphae of pileus flesh 4.5-10.7 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.0 µm diam, occasionally inflated; basidia 7.5 x 9.2-15.3 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, brownish, 10.7-15.3 µm diam. Hyphae of stipe surface above ring 4.5-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 µm, ovoid to broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type specimen contains numerous fragments of mature and young fruit bodies as well as a sketch and notes on the fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus alutaceus sp. nov. (≡ *A. californicus* var. *alutaceus* Peck, *nom. herb.*)

TYPE SPECIMEN (holotype): NYS, Palo Alto, Calif., no date, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Statura campestroidia; pileo 15 cm diam, plano, alutaceo, summo serico; stipito aut aequo aut bulboso, 9 cm long; annulo medio vel superiore; cheilocystidiis absentes; cellulis integumentorum universorum -20.0 µm diam; sporis 4.5-6.0 x 3.8-4.5 µm.

Stature of carpophore campestroid; mature pileus plane, to 15 cm diam (Peck, notes), pale tan (Peck, notes), gray-tan when dried; surface silky-fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe more or less bulbous, to 9 cm long (Peck, notes), dark brown when dried; ring median to superior, thick, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia undifferentiated; hyphae of pileus flesh 4.5-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 µm diam, occasionally slightly inflated; basidia 4.5-7.5 x 10.7-15.3 µm, 4-sterigmate, without

clamp connections; cystidia lacking. Hyphae of stipe surface above ring 1.5-3.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 µm diam. Cells of universal veil (stipe surface below ring) variously inflated, to 20.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to broadly ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: *Agaricus californicus* is a *nomen dubium* (q.v.) and this variety name a *nomen herbariorum*. Peck's name is used in acknowledgement of Peck's recognition of this taxon as distinct. The type collection consists of a single mature fruit body and brief notes on its fresh condition.

This taxon produces large fruit bodies resembling those of *A. blazei*, yet distinct. Fruit bodies of *Agaricus alutaceus* are darker in color, bear smaller spores and produce less highly inflated universal veil hyphae than *A. blazei*. Further collections of *A. alutaceus* from the west might also establish a difference in habitat preference, particularly since *A. blazei* is currently known only from the coastal plain area of Florida and South Carolina.

Agaricus angustifolius Murrill. 1918. Mycologia 10: 74.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 30.x.02, coll. F. S. Earle, det. W. A. Murrill, no. 287. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 3 cm diam, golden brown with dark brown fibrils when dried; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, dark brown when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking, scales formed by undulations of cuticle; hyphae of pileus flesh 6.0-15.3 µm, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.7 µm diam, occasionally inflated; basidia 4.5-6.0 x 13.8-15.3 µm, 4-sterigmate, without clamp connections; cystidia indiscernible (gill edge infected with second fungus). Hyphae of stipe surface near pileus 4.5-13.8 µm diam, parallel, tightly packed. Hyphae of ring absent. Cells of universal veil (stipe surface near base) inflated; to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0 µm, ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The type collection consists of three broken fruit bodies, all mature, and brief notes by Murrill on the fresh condition of the spceimens.

Schaeffer macrochemical reaction: negative.

Agaricus approximans Peck. 1908. N.Y. State Mus. Rep. 131: 33.

TYPE SPECIMEN (holotype, implicit): NYS, Trenton, N.J., 5.ix.08, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus conic or campanulate, umbonate, to 4 cm diam, pale gold when dried; surface radially rimose, excluding the umbo, covered with brownish squamules; dried flesh to 4 mm thick, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median to superior, thick, draping, dingy gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia abundant, scattered or loosely fasciculate, to 10.7 µm diam, unbranched; hyphae of pileus flesh 6.0-16.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, irregularly inflated; basidia 4.5-6.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.5 x 3.0-4.5 µm, ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: The specimen is considered an implicit holotype becasue it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the protologue. The collection consists of thirteen fruit bodies plus fragments; all specimens are mature.

Agaricus argenteus Braendle *in* Peck. 1899. Bull. Torrey Bot. Club 26: 68.

TYPE SPECIMEN (holotype, implicit): NYS, Washington, D.C., -.xi.-, coll. and det. F. J. Braendle, s.n. (!)

Stature of carpophore campestroid; pileus convex to plane, to 4.5 cm diam, dingy tan when dried; surface fibrillose; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh to 15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae to 6.0 µm diam, usually uninflated; basidia 7.5-9.2 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 16.8 µm diam, parallel, tightly

packed. Ring tissue absent on type material. Hyphae of universal veil (stipe surface near base) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 9.2-13.0 x 6.0-7.5 µm, ellipsoid to ovoid; wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site, and collector coincide with the data in the original description. The specimen consists of eleven mature fruit bodies plus fragments.

Agaricus cylindriceps var. *aureus* Murrill. 1945. J. Florida Acad. Sci. 8: 194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 23.x.42, coll. & det. W. A. Murrill, no. 20495. (!)

Stature of carpophore campestroid; pileus cylindric, to 4 cm diam, dull gold with golden brown scales when dried; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3.0 cm long, appearing fibrous, concolorous with pileus; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 6.0 µm diam, unbranched; hyphae of pileus flesh 4.5-15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-3.8 µm diam, uninflated; basidia 7.5 x 13.8-20.0 µm, 4-sterigmate, without clamp connections; cystidia lageniform, ventricose-rostrate or pseudoparaphysoid, to 7.5 µm diam, scattered. Hyphae of stipe surface above ring 3.0-7.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-7.5 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated, to 6.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 µm, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate on immature spores, indiscernible on mature spores.

The type specimen consists of one mature fruit body plus fragments, as well as very brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subplacomyces var. *badius* Murrill. *nom. illeg.* 1941. Mycologia 33: 447.

≡ *A. placomyces* var. *badius* Murrill. *nom. herb.*

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., 7.vi.38, coll. & det. W. A. Murrill, no. 16402. (!) Isotypes: NY, no. 16402. (!); NCU, s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex, to 5 cm diam, dull gold with brown disc and scales when dried; surface heavily squamulose on disc, glabrous near the margin; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 10 cm long, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 4.5-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 (12.2) µm diam, occasionally inflated; basidia 6.0.7.5 x 18.5-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia napiform to broadly capitulate, 5.5-6.0 µm diam, scattered. Hyphae of stipe surface above ring 4.5-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-4.5 µm, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: As evidenced by a note with the type specimen, Murrill clearly meant this to be a variety of *A. placomyces*. The published protologue, however, cites the name as a variety of *A. subplacomyces*, an undescribed taxon. I therefore feel that this taxon, which is not closely related to *A. placomyces*, should bear Murrill's varietal name elevated to species rank. The collection consists of seven fruit bodies, two of which are entire. They are all mature specimens.

Agaricus bivelatoides Murrill. 1912. Mycologia 4: 297.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x-1.xi.11, coll. & det. W. A. Murrill, no. 493. (!)

Pileus gray-tan with innate brownish fibrils when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, to 2 mm deep. Stipe concolorous with pileus when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 2.3-9.2 µm diam, unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, uninflated; basidia 4.5-6.0 x 20.0-24.5 µm, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 6.0-10.7 µm diam. Hyphae of stipe surface near pileus 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring absent on type material. Universal veil tissue absent on type material.

Spores 5.5-6.0(7.0) x 3.8-4.5 µm, ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The specimen consists solely of fragments.

Schaeffer macrochemical reaction: negative.

Agaricus blazei Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911. (!) Isotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus subcylindric to subexpanded, to 7 cm diam, dull gold when dried; surface finely gold scaly; dried flesh to 11 mm thick at disc, thinning to < 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to sub-bulbous, to 5.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 µm diam, branched or unbranched; hyphae of pileus flesh 3.0-10.7 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0(10.7) µm diam, occasionally inflated; basidia 5.5-7.5 x 15.3-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3-7.5 µm diam, parallel, tightly packed. Hyphae of ring 1.5-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.0 x 4.5-5.3 µm, subglobose to ovoid or broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The specimen consists of three immature and three mature fruit bodies as well as notes and a sketch by Murrill. The isotype contains one mature carpophore.

Schaeffer macrochemical reaction: negative.

Agaricus blockii Murrill. 1954. Mycologia 46: 112.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533. (!)

Stature of carpophore placomycetoid; mature pileus conic, to 4.5 cm diam, dull gold when dried; surface covered with delicate, appressed, fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin undulate. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe tapering upward, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, more or less appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, to 7.5 µm diam, unbranched; hyphae of pileus flesh 4.5-10.7 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular, hyphae 3.0-6.0 µm diam, uninflated; basidia 6.0 x 12.2-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid, often matured to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus hyaline, minute,

The specimen consists of a single mature fruit body and notes, including a sketch, by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus cervinifolius Zeller. 1933. Mycologia 25: 388.

TYPE SPECIMEN (holotype, explicit): NY, Linn Co., Ore., 20.ix.32, coll. & det. S. M. Zeller, no. 5589 (!)

Stature of carpophore campestroid; mature pileus convex-expanded, to 10 cm diam, dull tan with gray-brown disc and scales when dried; dried flesh to 6 mm thick at disc, thinning to <1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, gray-brown when dried; ring superior when adhering to stipe, off-white when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 10.7 µm diam, unbranched; hyphae of pileus flesh 3.0-21.5 µm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular, hyphae 3.0-7.5 µm diam, occasionally inflated; basidia 6.0 x 18.5-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking (gill edge sterile, composed of interwoven hyphae). Hyphae of stipe surface above ring 4.5-20.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x 3.8-4.5 µm, ovoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

There are approximately five fruit bodies, all mature, all fragmented, in the type collection.

Schaeffer macrochemical reaction: negative.

Agaricus chlamydopus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. cothurnatus* Peck. 1904. Bull. Torrey Bot. Club 31: 181. (*non. A. cothurnatus* Fries, Epicr. Sys. Myc., 1836-1838, p. 218).

TYPE SPECIMEN (holotype, implicit): NYS. Denver, Colo., 25.vii.02, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 6 cm diam, cream when dried; surface smooth; dried flesh to 10 mm thick at disc, thinning at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 7 mm deep. Stipe equal, to 4.5 cm long, appearing fibrous, concolorous with the pileus when dried; ring existing as tufted upper edge of membranous, adherent volva.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia few to lacking, to 7.5 µm diam, unbranched; hyphae of pileus flesh 6.0-12.2 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-6.0 µm diam, occasionally inflated; basidia 7.5-9.2 x 30.0 µm, 4-sterigmate, without clamp connections; cheilocystidia clavate or irregularly clavate, single or fasciculate, to 4.5 µm diam. Hyphae of stipe surface above volva 3.0-4.5 µm diam, parallel, tightly packed. Hyphae of universal veil (pileus margin, volva) inflated, to 13.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 7.0-9.2 x 7.5 µm, subglobose to pyriform; lacking germ pore (SEM); wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline.

The specimen consists of two mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus cinchonensis Murrill. 1918. Mycologia 10: 76.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 25.xii.08-8.i.09, coll. W. A. & E. L. Murrill, det. W. A. Murrill, no. 444. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, more or less umbonate, to 4 cm diam, chocolate brown when dried; surface fibrillose; dried flesh to 1 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, gray when dried; ring median where adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-16.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-13.8 µm diam, occasionally inflated; basidia 4.5-6.0 x 18.5-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, sparse, napiform, to 9.2 µm diam. Hyphae of stipe surface above ring 3.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 2.3-9.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, broadly ellipsoid to ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

The specimen contains five mature fruit bodies, a spore print, and brief notes written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus ciscoensis Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 136-137.

TYPE SPECIMEN (holotype, explicit): MICH, Cisco, Texas, -.ix.35, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; pileus convex to plane, to 4 cm diam, brown when dried; surface silky-fibrillose, particularly on the disc; dried flesh 1 mm thick, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal to slightly bulbous, to 5 cm long, appearing fibrous, gray-tan when dried; ring superior, flaring, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven; pileocystidia abundant, 3.0-7.5 µm diam, usually unbranched, fasciculate or scattered; hyphae of pileus flesh 2.3-12.2 µm diam, slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, occasionally inflated; basidia 6.0-7.0 x 13.8-16.8 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 12.2 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-9.2 x 3.8-5.3 µm, broadly ellipsoid to more or less truncately ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible or minutely papillate, hyaline.

The type specimen consists apparently of several fruit bodies, although only one was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus citrinidiscus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 193.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 11.viii.44, coll. & det. W. A. Murrill, no. 32719. (!)

Stature of carpophore placomycetoid; mature pileus plane, to 3.5 cm diam, dull tan with darker disc when dried; surface appearing glabrous; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 3.5 cm long, appearing fibrous, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 µm diam, branched or unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 6.0-15.3 µm diam, occasionally inflated; basidia not rehydrating on type material; cystidia lacking or also not rehydrating. Hyphae of stipe surface above ring 4.5-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

The specimen consists of a portion of one mature pileus and two stipes. There are also brief notes on the fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus comptuliformis Murrill. 1922. Mycologia 14: 203.

TYPE SPECIMEN (holotype, explicit): NY, Auburn, Ala. 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 3.5 cm diam, dull tan when dried; surface smooth; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 2.3-4.5 µm diam, scattered, branched or unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama, basidia indiscernible on type material. Hyphae of stipe surface above ring 3.8-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 µm diam. Universal veil tissue absent on type material.

Spores 4.5-6.0 x 3.0-4.5 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

The specimen consists of one immature fruit body plus numerous fragments of mature specimens.

Schaeffer macrochemical reaction: negative.

Agaricus comptuloides Murrill. 1912. Mycologia 4: 297.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x.11-1.xi.11, coll. & det. W. A. Murrill, no. 434. (!)

Stature of carpophore placomycetoid; mature pileus conic to convex, umbonate, to 2 cm diam, golden brown when dried; surface slightly fibrillose-scaly; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 6 cm long, appearing fibrous, tan when dried; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.7 µm diam, occasionally inflated; basidia 6.0-7.5 x 16.8-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 34.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-4.5 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The type specimen consists of two, mature, broken fruit bodies and an aquarelle by Murrill of a fresh specimen.

Schaeffer macrochemical reaction: negative.

Agaricus cothurnatus Peck. 1904. Torrey Bot. Club 31: 181. (*non. A. cothurnatus* Fries, Epicr. Sys. Myc., 1836-1838, p. 218.) see *A. chlamydopus* Peck.

Agaricus cretacellus Atkinson. 1902. J. Myc. 8: 110.

TYPE SPECIMEN (holotype, explicit): CUP, Cascadilla woods, Ithaca, N.Y., 7.ix.00, coll. & det. Geo. F. Atkinson, no. 5359. (!)

Stature of carpophore placomycetoid; mature pileus convex-expanded, to 6.5 cm diam, cream when dried; surface smooth; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous; ring superior, cream when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia lacking; hyphae of pileus flesh 3.8-13.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 µm diam, occasionally inflated; basidia 5.5-6.0 x 16.8-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.0-3.8 µm, broadly ellipsoid to ovoid; wall dark brown, less than 0.6 µm thick; apiculus indiscernible.

The type collection contains approximately ten fruit bodies, three of which are whole. All specimens are mature.

Schaeffer macrochemical reaction: negative.

Agaricus cylindriceps Murrill. 1944. Lloydia 7: 323.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, 13.viii.37, coll. & det. W. A. Murrill, no. 16050. (!) Isotype: NY, no. F16050. (!)

Stature of carpophore campestroid; pileus cylindric to convex-truncate, to 4 cm diam, dull gray-gold when dried; surface minutely squamulose; dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6 cm long, appearing fibrous, tan when dried; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia usually unbranched, fasciculate or scattered, to 6.0 µm diam; hyphae of pileus flesh 4.5-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 µm diam, uninflated or only slightly so; basidia 4.5-7.0 x 12.2-18.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 µm, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection consists of ten immature fruit bodies, a sketch by Murrill and notes by him on the fresh condition of the specimens. The isotype contains fragments of two fruit bodies, one immature.

Schaeffer macrochemical reaction: negative.

Agaricus diminutivus Peck. 1873. Buffalo Soc. Nat. Sci. 1: 53.

TYPE SPECIMEN (holotype, implicit): NYS, Croghan, N.Y., -.ix.72, coll. & det. C. H. Peck, s.n., annot. A. H. Freeman, 1976. (!)

Stature of carpophore placomycetoid; mature pileus plane to slightly umbonate or depressed in center, to 1.5 cm diam, gray-tan when dried; surface spotted with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe to 3.5 cm long, slightly bulbous to equal, concolorous with pileus when dried; ring superior, thin, membranous, pale tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate, 4.5-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-7.5 µm diam, occasionally inflated, without clamp connections, thin-walled.

Lamella trama irregular; hyphae 3.0-4.5 µm diam, inflated; basidia 4.5-6.0 x 13.8-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-4.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 14.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.3 x 3.8 µm, ellipsoid to ovoid or subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate to barely discernible, hyaline.

The type collection of this taxon consists of four fruit bodies, all mature, and mounted on stiff paper. There is also included a color pencil sketch of a fruit body, apparently drawn by Peck.

Schaeffer macrochemical reaction: positive.

Agaricus earlei Murrill. 1918. Mycologia 10: 79.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 17.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 33. (!)

Stature of carpophore placomycetoid; pileus ovoid to convex, then expanded, to 2.5 cm diam, dull gold with brownish disc and brown appressed fibrillose scales when dried; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, brown when dried; ring superior, brownish when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered or loosely fasciculate, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 4.5-16.8 µm diam, inflated, without clamp connections; thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm, uninflated or only slightly so; basidia 4.5-6.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-21.5 µm diam, parallel, tightly packed. Hyphae of ring 1.5-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5 x 3.0-3.8 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of approximately fifteen fruit bodies plus fragments; five of them are in the button stage.

Schaeffer macrochemical reaction: negative.

Agaricus eastlandensis Smith. 1944. Mycologia 36: 244.

TYPE SPECIMEN (holotype, explicit): MICH, Eastland, Texas, 28.viii.38, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 1 cm diam, dull cream when dried; surface appressed silky-fibrillose; dried flesh less than 1 mm thick at disc. Lamellae (mature) deep

chocolate brown, free, 1 mm deep. Stipe bulbous, to 15.0 mm long, appearing fibrous, concolorous with pileus when dried; ring superior, cream when dried.

Hyphae of lamella trama 3.0-7.5 µm diam, occasionally slightly inflated; basidia 7.5-9.2 x 18.5-24.5 µm, 4-sterigmate, without clamp connections.

Spores 7.5-9.2 x 6.0-7.5 µm, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 1.2 µm thick; apiculus minutely papillate, hyaline.

This description is incomplete because only one tiny fruit body was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus eludens Peck. 1910. N.Y. State Mus. Bull. 139: 42-43.

TYPE SPECIMEN (holotype, implicit): NYS, Trenton, N.J., 15.ix.08, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus ovate, broadly conic or subcampanulate, to 5.5 cm diam, dull gold when dried; surface except disc covered with brown appressed fibrillose scales; margin surpassing lamellae by 0.5 mm; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to bulbous, to 8 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, thick, membranous, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate, branched, to 12.0 µm diam; hyphae of pileus flesh 4.5-7.5 µm diam, usually uninflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0(10.7) µm diam, occasionally inflated; basidia 6.0 x 15.3-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled hyaline.

Spores 5.3-6.0 x 3.0-3.8 µm, broadly ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus barely discernible, hyaline.

The type collection consists of approximately fifty fruit bodies, half of which are immature.

Schaeffer macrochemical reaction: negative.

Agaricus placomyces var. *flavescens* Thiers. 1959. Mycologia 51: 538.

TYPE SPECIMEN (holotype, explicit): MICH, Wellborn, Texas, 7.vi.52, coll. & det. H. D. Thiers, no. 1656. (!)

Stature of carpophore placomycetoid; pileus convex, broadly convex or obscurely broadly umbonate with age, to 12 cm diam, gray-gold when dried; surface covered with appressed to slightly recurved fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 1-2 mm. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe slightly bulbous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus flesh 3.0-13.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, uninflated; basidia 6.0-8.0 x 15.0-20.0 µm, sterigmata not found, without clamp connections; cheilocystidia catenulate, consisting of globose to pyriform cells, to 9.2 µm diam, scattered. Hyphae of ring 3.0-7.5 µm diam. Universal veil tissue absent on type material.

Spores 4.5-6.2 x 2.8-3.5 µm, ellipsoid to subovoid, lacking germ pore (SEM).

This description is incomplete because adequate material was not furnished for examination.

Schaeffer macrochemical reaction: negative.

Agaricus floridanus Peck. 1911. N.Y. St. Mus. Bull. 495: 50.

TYPE SPECIMEN (holotype, implicit): NYS, DeFuniak Springs, Fla., 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck, s.n. (!) Isotype: FLAS, no. 45919. (!)

Stature of carpophore campestroid; pileus campanulate, expanded to plane, to 8 cm diam, dull gray-gold when dried; surface rimose-areolate to slightly strigose or glabrous; dried flesh to 1 cm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal to bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, appendiculate on young specimens, dull gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia lacking; hyphae of pileus flesh 9.2-20.0 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.6 µm diam, uninflated; basidia 6.0-7.5 x 15.3-24.5 µm, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 12.2-18.5 µm diam, thin-walled. Hyphae of stipe surface above ring 3.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-5.3 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minute to indiscernible, hyaline.

The type collection contains seventeen fruit bodies, four of these immature. There are also notes by Peck on the fresh condition of the

specimens. The isotype consists of one immature specimen plus pileus fragments.

Schaeffer macrochemical reaction: negative.

Agaricus glabrus Zeller. 1938. Mycologia 30: 469-470.

TYPE SPECIMEN (holotype, explicit): NY, Pacific Grove, Calif., 1.ii.37, coll. G. S. Burlingham, det. S. M. Zeller, no. 11532. (!)

Stature of carpophore placomycetoid; pileus subconical to expanded, subumbonate, to 10 cm diam, gray-brown when dried; surface covered with delicate innate brown fibrils; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe bulbous, to 9 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, lower portion more or less cottony, upper portion smooth, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-6.0 µm diam, branched or unbranched; hyphae of pileus flesh 4.5-16.8 µm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.8-9.2(13.8) µm diam, occasionally inflated; basidia 5.5-6.0 x 20.0-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 7.5(27.5) µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.5-6.0 x 3.8 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

The type collection consists of nine mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus halophilus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36

≡ *A. maritimus* Peck. 1899. Bull. Torrey Bot. Club 26: 66. (*non A. maritimus* Fries. Syst. Myc. I: 198).

TYPE SPECIMEN (holotype, implicit): NYS, Lynn. Mass., -.xi.-, coll. R. F. Dearborn, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus at first subglobose, then convex to plane, to 6 cm diam, dull gold when dried; surface smooth to somewhat fibrillose; dried flesh to 1.5 cm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3-4 mm deep. Stipe tapering downward, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring median to superior, upstanding, dull gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 12.2-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 µm diam, uninflated; basidia 4.5-7.5 x 23.0-46.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-7.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Hyphae of universal veil (stipe surface below ring, ring margin) inflated, to 10.7 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 5.3-6.0 µm, subglobose; wall dark brown, less than 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its collection site and collector coincide with the data in the original description. The collection consists of six fruit bodies, including four immature specimens, plus fragments.

Agaricus hondensis Murrill. 1912. Mycologia 4: 296-297.

TYPE SPECIMEN (holotype, explicit): NY, LaHonda, Calif., 25.xi.11, coll. W. A. Murrill & L. S. Abrams, det. W. A. Murrill, no. 1260. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or depressed, to 4.5 cm diam, tan with brown disc when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 8 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.8-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 µm diam, occasionally inflated; basidia 4.5 x 12.2-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-12.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (pileus margin, stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.5-6.0 x 3.8-4.5 µm, subglobose to ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The type collection contains one mature fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus johnstonii Murrill. 1918. Mycologia 10: 75.

TYPE SPECIMEN (lectotype, *des. mihi*): NY, Rio Piedras, P.R., 12.xii.15, coll. J. R. Johnston, det. W. A. Murrill, no. 3485. (!)

Stature of carpophore placomycetoid; mature pileus expanded, 3.5 cm diam, brown, almost black on disc when dried; surface squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle tightly interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh 3.0-13.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 µm diam, uninflated or only slightly so; basidia indiscernible; cystidia indiscernible. Hyphae of stipe surface near pileus 3.0-10.7 µm diam, parallel, tightly packed. Hyphae of ring absent. Cells of universal veil (stipe surface near base) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores (3.8)4.5-6.0 x 3.0 µm, ellipsoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: As the original type of this taxon is in fragments and beyond any recognition, I have established this collection, mentioned in Murrill's original description of the taxon, as a lectotype. The collection contains a single, mature fruit body.

Agaricus kauffmanii Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 126-127.

TYPE SPECIMEN (holotype, explicit): MICH, Takoma Park, Md., 22.vii.19, coll. C. H. Kauffman, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; pileus dark tan to brown when dried; surface covered with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe more or less bulbous, to 9 cm long, fibrous, dark tan when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia abundant, usually unbranched, 3.0-9.2 µm diam; hyphae of pileus flesh 3.0-13.8 µm diam, slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.8 µm diam, uninflated; basidia 7.5 x 18.5-24.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface near pileus 3.0-10.7 µm diam, parallel, tightly packed. Hyphae of ring absent on type material. Cells of universal veil (stipe surface near base) inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

This description is incomplete because only a portion of the type collection was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus lilaceps Zeller. 1938. Mycologia 30: 470-471.

TYPE SPECIMEN (holotype, explicit): NY, Pacific Grove, Calif., 12.ii.35, coll. G. S. Burlingham, det. S. M. Zeller, no. 9009. (!)

Stature of carpophore campestroid; mature pileus hemispheroid to convex-expanded, to 6.5 cm diam, golden tan when dried; surface smooth to more or less fibrillose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin projecting somewhat. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal to more or less bulbous, to 5.5 cm long, appearing fibrous, gold when dried; ring somewhat appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 4.5-10.7 µm diam, branched or unbranched; hyphae of pileus flesh 4.5-20.0 µm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.8-15.3 µm diam, usually inflated; basidia 6.0 x 21.5-26.0 µm, 4-sterigmate, without clamp connections; cheilocystidia clavate, subnapiform or slightly capitulate, to 7.5 µm diam, extending beyond hymenium to 20.0 µm. Hyphae of stipe surface above ring 3.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-9.2 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0(7.0) x 4.5 µm, subglobose to ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection contains four fruit bodies, including one immature specimen, and notes on the fresh condition.

Schaeffer macrochemical reaction: positive.

Agaricus magniceps Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. magnificus* Peck. 1899. Bull. Torrey Bot. Club 26: 67. (*non A. magnificus* Fries. 1874. Hymen. Eur. p. 25).

TYPE SPECIMEN (holotype, implicit): NYS Mt. Gretna, Pa., -.viii .98, coll. McIlvaine, det. C. H. Peck, s.n. (!)

Stature of carpophore robustly placomycetoid; pileus dull brown-gold when dried; surface glabrous. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, draping, adherent, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-12.2 µm diam, inflated, without clamp connections, thin-walled. Lamella trama, basidia, cystidia impossible to discern. Hyphae of stipe surface above ring 7.5-12.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-7.5 x 3.0-4.5 µm, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with data in the original description. The collection consists of a single mature fruit body, badly broken up.

Agaricus magnificus Peck. 1899. Bull. Torrey Bot. Club 26: 67. *non A. magnificus* Fries. 1874. Hymen. Eur. p. 25. See *A. magniceps* Peck.

Agaricus campestris var. *majusculus* Peck. 1912. N.Y. State Mus. Bull. 157: 57-58, 106.

TYPE SPECIMEN (holotype, implicit): NYS, Schenectady, N.Y., -.x.11, coll. Mrs. G. E. Duryee, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus convex, expanded to plane, to 11 cm diam, dull tan when dried; surface covered with brown, silky fibrillose scales; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin slightly surpassing lamellae. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 6 cm long, brown when dried; ring median, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, 3.0-6.0 µm diam, usually unbranched; hyphae of pileus flesh 4.5-23.0 µm diam, usually highly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-9.2 µm diam, uninflated or only slightly so; basidia 5.5-7.5 x 15.3-18.5 µm, 2-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 9.2-12.2 µm diam, scattered. Hyphae of stipe surface above ring 6.0-30.0 µm diam, parallel, tightly packed. Hyphae of ring 3.8-10.7 µm diam. Cells of universal veil (stipe surface below ring) variously inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 µm, subglobose; wall dark brown, 0.6 µm thick; apiculus indiscernible or minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because its collection site, collector and date coincide with the data given in

Peck's original description of the taxon. I feel this taxon is clearly distinct from *A. campestris* in several respects: *A. majusculus* exhibits cellular universal veil tissue, 2-sterigmate basidia and is brown in the fresh condition, whereas *A. campestris* has hyphal universal veil tissue, 4-sterigmate basidia and white (or brownish from fibrils) coloration. For these reason, *A. campestris* var. *majusculus* should be considered a distinct species. I retain Peck's varietal name raised to species rank in acknowledgement of his recognition of the taxon.

Agaricus maritimus Peck. 1899. Bull. Torrey Bot. Club 26: 66. *non A. maritimus* Fries. Syst. Myc. I: 198. See *A. halophilus* Peck.

Agaricus micromegethus Peck. "1904" (1905) N.Y. State Mus. Bull.

≡ *A. pusillus* Peck. 1900. N.Y. State Mus. Rep. p. 152. (*non A. pusillus* Pers. *per* Fries. 1821. Syst. Myc. 1: 279; bas. *Amanita pusilla* Pers. 1797. Obs. Mycol. 2: 36).

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, Delhi, N.Y., no date, coll. S. Sherwood, det. C. H. Peck. s.n. (!)

Stature of carpophore campestroid; pileus convex to plane, to 3 cm diam, occasionally depressed in center, golden tan with somewhat darker disc when dried; surface silky fibrillose with brown appressed fibrillose scales; dried flesh to 4 mm thick at disc, thinning to 0.5 mm at margin. Lamellae (mature) deep chocolate brown, free, 2-4 mm deep. Stipe equal to slightly bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, median when adhering to stipe, pale gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate or single, rarely branched, to 5.3 µm diam; hyphae of pileus flesh 4.5-13.8 µm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 µm diam, uninflated; basidia 3.8-6.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-4.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 µm, broadly ellipsoid to subglobose; wall dark brown, 0.6 µm thick; apiculus minutely papillate hyaline to indiscernible.

Schaeffer macorchemical reaction: negative.

Note: In Peck's original description he made reference to the fact that the description was based on Delhi specimens plus specimens in Detroit. Because he cites collection data matching that of the Delhi specimens I have established these specimens as a lectotype. The type consists of nine fruit bodies including two immature forms.

Agaricus placomyces var. *microsporus* Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 125-126.

TYPE SPECIMEN (holotype, explicit): MICH, Smith River, Cal., 16.xi.37, coll. & det. A. H. Smith, no. 8800. (!)

Stature of carpophore placomycetoid; mature pileus expanded to plane, white, darker on the disc, with gray fibrils when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 7 cm long, dull tan when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, unbranched, 4.5-7.5 µm diam, grayish; hyphae of pileus flesh 4.5-20.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, uninflated or only slightly so; basidia 5.3-6.0 x 12.2-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate, hyaline.

Only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus ochraceidiscus Murrill. 1918. Mycologia 10: 80.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 28.ix.04, coll. F. S. Earle, det. W. A. Murrill, no. 265. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 6.5 cm diam, dull gold with tan disc and tan fibrillose scales when dried; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, golden tan when dried; ring superior, somewhat appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 1.5-4.5 µm diam, unbranched; hyphae of pileus flesh 3.0-12.2 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-9.2 µm diam, uninflated or only slightly so; basidia 6.0-7.5 x 13.8-15.3 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform or broadly clavate, to 9.2 µm diam. Hyphae of stipe surface above ring 3.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of six fruit bodies, all mature, plus fragments and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus arvensis var. *palustris* Smith. "1939" (1940). Pap. Mich. Acad. Sci. Arts Lett. 25: 117-118.

TYPE SPECIMEN (holotype, explicit): MICH, Kent Lake, Mich., 13.ix.37, coll. & det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus broadly umbonate to plane, uniformly gold when dried; surface appressed silky fibrillose; dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, appearing fibrous, gray-gold when dried; ring superior, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-6.0 µm diam, scattered, branched; hyphae of pileus flesh 4.5-15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-20.0 µm diam, inflated; basidia 7.5 x 20.0-24.5 µm, 4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 7.5-17.5 µm diam, fasciculate or forming a sterile band along entire gill edge. Hyphae of stipe surface above ring 4.5-16.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-3.8 µm diam. Cells of universal veil (lower surface of ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 7.5-9.2 x (4.5)5.3(6.0) µm, ovoid to pyriform; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus pattersonae Peck. 1907. Bull. Torrey Bot. Club 34: 347.

TYPE SPECIMEN (holotype, implicit): NYS, Stanford University, Stanford, Calif., -.i.07, coll. Miss A. M. Patterson, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 4.5 cm diam, dull tan to chocolate brown when dried; surface covered with brown appressed fibrillose scales; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring two-limbed, superior, more or less appendiculate, flaring, dull gray-tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia fasciculate, unbranched, to 7.5 µm diam; hyphae of pileus flesh to 9.2 µm

diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 µm diam, uninflated; basidia 7.5-10.0 x 24.5-39.8 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 10.7 µm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 7.5 x 6.0 µm, subglobose to ovoid; wall dark brown, 0.6 µm thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the original description. The collection contains one mature and one immature fruit body plus fragments, a spore print, and two black and white photos.

Agaricus pilosporus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. sphaerosporus* Peck. 1904. Bull. Torrey Bot. Club 31: 181. (*non A. sphaerosporus* Krombholz. 1836. Naturgetreue Abbildungen u. Beschreibungen der Essbaren, Schadlichen u. Verdachtigen Schwamme. Viertes Heft. Prag. p. 10).

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., 7.vi.02, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, occasionally depressed in the center, to 12 cm diam, pale gold when dried; surface rimose to a depth of 2 mm; dried flesh to 1 cm thick at disc, thinning to 1 mm at margin; margin incurved. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 10 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, flaring, membranous, more or less appendiculate, cream to pale tan when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-13.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, occasionally inflated; basidia 6.0-7.5 x 24.5-29.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Hyphae of universal veil (stipe surface below ring, ring margin) to 15.0 µm diam, inflated, with spathulate tips and intercalary inflations, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 6.0-7.5 µm, subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minute to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site, and collector coincide with the data in the original description. The collection consists of six fruit bodies plus fragments; one of the six is an immature form.

Agaricus placomyces Peck. 1878. N.Y. State Mus. Nat. Hist. 29: 40.

TYPE SPECIMEN (holotype, implicit): NYS. Knowersville and Oneida, N.Y., no date, coll. & det. C. H. Peck, s.n. (!) Isotype: NCU, s.n. (!)

Stature of carpophore placomycetoid; pileus convex expanded to plane, to 8 cm diam, dull gray-brown when dried; surface covered with appressed, fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, appearing fibrous, dull tan to gray when dried; ring superior, gray-tan to brown when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia fasciculate, unbranched, to 7.5 µm diam, golden brown; hyphae of pileus flesh 4.5-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 µm diam, uninflated or only slightly so; basidia 6.0 x 12.2-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its collection site and collector coincide with the data given in the original description. The two collection sites indicate a mixed collection; however, Guzmair attempted to separate the Knowersville and Oneida specimens, but there was nothing to indicate that this was possible. I have therefore considered the mixed collection, consisting of many pieces which seem to be quite homogeneous, as a single collection and an implicit type.

Agaricus pocillator Murrill. 1941. Mycologia 33: 446-447.

TYPE SPECIMEN (holotype, expiicit): FLAS, Gainesville, Fla., 4.vi.38, coll. & det. W. A. Murrill, no. 16476. (!) Isotypes: NY, no. 16476. (!); NCU, s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, depressed in center, to 6 cm diam, dull gray-tan, somewhat darker on the disc when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous to cupulate at base, to 8 cm long, appearing fibrous, dull brown when dried; ring superior, conspicuously double, the lower portion rounding up into a discrete partial veil, the upper portion (marginal veil) stretching across the lamellae in youth, thin, membranous, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 µm diam, uninflated; basidia 4.5-6.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-11.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, ellipsoid to broadly ellipsoid; wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline.

The type collection consists of six fruit bodies, three of which are immature.

Schaeffer macrochemical reaction: negative.

Agaricus praemagniceps Murrill. 1938. J. Elisha Mitchell Sci. Soc. 54: 140.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 15.viii.37, coll. & det. W. A. Murrill, no. 16051. (!)

Stature of carpophore campestroid; mature pileus convex, depressed over disc, to 8 cm diam, gray-gold, brown on disc when dried; surface smooth with the exception of minute fibrils on the disc; dried flesh to 7 mm thick around the depressed disc, thinning to < 1 mm at margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia locally abundant (on disc), loosely fasciculate or scattered, 2.3-6.0 µm diam, usually unbranched; hyphae of pileus flesh 3.0-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, uninflated; basidia 5.5-6.0 x 15.3-18.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, catenulate chains of 2-3-4 cells, to 6.0 µm diam, thin-walled. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection contains three fragmented fruit bodies, one mature, two immature, as well as brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus praemagnus Murrill. 1918. Mycologia 10: 78.

TYPE SPECIMEN (holotype , explicit): NY, Cuba, 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 11 cm diam, dull gold with gray tinges and grayish appressed fibrillose scales when dried; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe more or less bulbous, to 9.5 cm long, appearing fibrous, dull gray-gold when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia loosely fasciculate or scattered, 3.0-9.2 µm diam, unbranched; hyphae of pileus flesh 4.5-15.3 µm diam, inflated, without clamp connections; thin-walled. Lamella trama irregular; hyphae 2.3-6.0 µm diam, uninflated or only slightly so; basidia 5.5-6.0 x 12.2-16.8 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.8-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0(29.0) µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 3.8-4.5 µm, ovoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of five mature fruit bodies, four buttons, fragments and notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus praerimosus Peck. "1904" (1905). N.Y. State Mus. Bull. 94: 36.

≡ *A. tabularis* Peck. 1898. Bull. Torrey Bot. Club 25: 325. (*non A. tabularis* Persoon. 1822. Myc. Eur. 3: 73; *non A. tabularis* Fries. 1821. Syst. Myc. I: 221).

TYPE SPECIMEN (neotype, *des. mihi*): NYS, Leadville, Colo., -.ix.-, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 5 cm diam, dull gray-tan when dried; surface coarsely and deeply rimose-

areolate; scales to 1 cm thick, truncately pyramidal, appearing layered as a stack of succedingly smaller plates, occasionally tomentose; dried flesh to 1 cm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 10 mm deep. Stipe equal to slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, more or less appendiculate, pale to dingy tan when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia locally abundant (on scale surfaces), fasciculate, unbranched, to 4.5 µm diam; hyphae of pileus flesh to 15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, uninflated or only slightly so; basidia 6.0-7.5 x 18.5-26.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.7 µm diam, parallel, tightly packed. Hyphae of ring 2.3-4.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 10.7 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 6.0-7.0 µm, subglobose; wall dark brown, 0.6 µm thick; apiculus minute, rarely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: Because this collection is the only one of this taxon among the Peck specimens, but not the one referred to by him in the original description, I have established this as a neotype. The collection consists of numerous fragments in rather poor condition; an immature form is in fair condition.

Agaricus projectellus Murrill. 1941. Mycologia 33: 447.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill, no. 16219. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, to 5.5 cm diam, uniformly pale tan when dried; surface appearing smooth; dried flesh to 1.5 mm thick at disc, thinning to < 1 mm at margin; margin projecting 5 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to more or less bulbous, to 6 cm long, appearing fibrous, concolorous with pileus when dried; ring median, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh mostly highly inflated, (3.0-6.0)10.7-16.8 µm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 µm diam, uninflated; basidia 6.0-7.5 x 13.8-24.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 6.0-12.2 µm diam. Cells of universal veil (pileus surface) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 3.8-5.3 µm, broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

The type collection contains three entire mature fruit bodies and brief notes by Murrill; the isotype consists of mature and immature fragments.

Schaeffer macrochemical reaction: negative.

Agaricus pseudoplacomyces Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 194.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.v.44, coll. & det. W. A. Murrill, no. 20483. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 5 cm diam, brown when dried; surface brown fibrillose; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia tightly fasciculate, to 9.2 µm diam, unbranched; hyphae of pileus flesh 4.5-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 µm diam, uninflated; basidia 6.0-9.2 x 10.7-13.8 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-20.0 µm diam, parallel, tightly packed. Hyphae of ring 4.5-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5(6.0) µm, subglobose to ovoid; lacking germ pore (SEM), wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection consists of one mature and one immature fruit body as well as fragments. Also included are notes and a sketch by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus pusillus Peck. 1900. N.Y. State Mus. Rep. p. 152. *non A. pusillus* Pers. *per* Fries. 1821. Syst. Myc. 1: 279; bas. *Amanita pusilla* Pers. 1797. Obs. Mycol. 2: 36. See *A. micromegethus* Peck.

Agaricus rhoadsii Murrill. 1939. Bull. Torrey Bot. Club 66: 29.

TYPE SPECIMENS (holotype, explicit): FLAS, Gainesville, Fla., 7.ix.38, coll. Rhoads & Murrill, det. Murrill, no. 18117. (!)

Stature of carpophore placomycetoid; mature pileus truncate-conic, to 4 cm diam, dull tan with brown fibrils when dried; surface finely fibrillose-squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 4.5-7.5 µm diam, unbranched; hyphae of pileus flesh 6.0-13.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 µm diam, uninflated or only slightly so; basidia 4.5-7.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 µm diam. Cells of universal veil (stipe surface near base) inflated, to 27.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 µm, ellipsoid, broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type consists of one mature fruit body in seven pieces. Notes on the fresh condition written by Murrill accompany the specimen.

Schaeffer macrochemical reaction: negative.

Agaricus rodmanii Peck. 1884. N.Y. State Mus. Nat. Hist. Ann. Rep. 36: 45-46.

TYPE SPECIMEN (holotype, explicit): NYS, Astoria, L.I., N.Y., no date, coll. Washington Rodman, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; pileus convex, expanded to plane, to 10 cm diam, dull tan when dried; surface smooth to slightly rimose-squamose on disc; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin decurved. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 7.5 cm long, appearing fibrous, concolorous with pileus; ring median to inferior, flaring upward, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia abundant, loosely fasciculate, 1.5-3.0 µm diam, unbranched; hyphae of pileus flesh to 18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 µm diam, inflated; basidia 6.0-7.5 x 13.8-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring to 7.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-5.5 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0 x 4.5-6.0 µm, ovoid to ellipsoid when young, globose to subglobose in age; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The type collection consists of fragments of approximately four fruit bodies, all mature.

Schaeffer macrochemical reaction: negative.

Agaricus rubribrunnescens Murrill. 1922. Mycologia 14: 216.

TYPE SPECIMEN (holotype, explicit): NY, N.Y., 8.ix.16, coll. & det. W. A. Murrill, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 5 cm diam, brown with darker brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to more or less bulbous, to 4 cm long, appearing fibrous, brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 7.5-13.8 µm diam, unbranched; hyphae of pileus flesh 4.5-38.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-21.5 µm diam, occasionally inflated; basidia 4.5-7.0 x 15.3-18.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 20.0 µm diam. Hyphae of stipe surface above ring 6.0-27.5 µm diam, parallel, tightly packed. Hyphae of ring 4.5-9.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 24.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x 3.0-3.8 µm, ellipsoid or broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type consists of four mature fruit bodies accompanied by notes written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus solidipes Peck. 1904. Bull. Torrey Bot. Club 31: 180.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 7 cm diam, pale cream when dried; surface squamose or rimose-squamose, scales imbricate, to 4 mm thick; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with the pileus when dried; ring superior to appendiculate, cream colored when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh highly inflated, to 27.5 µm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae

3.0-4.5 µm diam, irregularly inflated; basidia 4.5-7.5 x 20.0-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-9.2 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 16.8 µm diam, without clamp connections, thin walled, hyaline.

Spores 7.5-12.2 x 6.0-7.5 µm, subglobose to ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Note: This collection is considered an implicit holotype because it is the only collection whose collection site and collector coincide with the data in the original description. There are sixteen fruit bodies, three of them immature.

Agaricus sphaerosporus Peck. 1904. Bull. Torrey Bot. Club 31: 181. *non A. sphaerosporus* Krombholz. 1836. Naturgetreue Abbildungen u. Beschreibungen der Essbaren, Schadlichen u. Verdachtigen Schwamme. Viertes Heft. Prag. p. 10. See *A. pilosporus* Peck.

Agaricus subalachuanus Murrill. 1942. Lloydia 5: 151.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 29.viii.39, coll. & det. W. A. Murrill, no. 19000. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to subumbonate, to 1.5 cm diam, gold when dried, surface appearing fibrillose; dried flesh 1 mm thick at disc, thinning at margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal to somewhat bulbous, to 2.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior when adhering to stipe, appendiculate, cream colored when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered or fasciculate, to 4.5 µm diam, usually unbranched; hyphae of pileus flesh 3.0-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 µm diam, uninflated; basidia 7.5 x 21.5-29.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-16.8 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5 µm, broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate to indiscernible, hyaline.

The type collection consists of approximately seven fruit bodies, all mature, plus fragments and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subarvensis Murrill. 1942. Lloydia 5: 151.

TYPE SPECIMEN (holotype, explicit): FLAS, Lake Warburg, Alachua Co., Fla., 17.ii.39, coll. J. R. Watson & W. A. Murrill, det W. A. Murrill, no. 19253. (!)

Stature of carpophore placomycetoid; mature pileus convex to broadly umbonate, to 6 cm diam, gray when dried; surface appearing glabrous; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 9 cm long, appearing fibrous, concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gray-gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh 6.0-13.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-6.0 µm diam, uninflated; basidia 4.5-5.5 x 10.7 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-10.0 µm diam, parallel, tightly packed. Hyphae of ring 3.8-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 4.5-5.5 µm, subglobose to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection consists of a single mature fruit body in five pieces plus a sketch and notes on the fresh condition by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subcomptulus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 194-195.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 2.vii.38, coll. & det. W. A. Murrill, no. 17335. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 1.5 cm diam, tan to brown when dried; surface fibrillose; dried flesh 1.5 mm thick at disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 2.5 cm long, appearing fibrous, brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 2.3-4.5 µm diam, unbranched; hyphae of pileus flesh 6.0-10.7 µm diam, somewhat inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-5.5 µm diam, uninflated; basidia 6.0-7.5 x 13.8-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Cells of universal veil (stipe surface below ring)

inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.0 x 3.0-4.5 µm, ellipsoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of three fragmented mature fruit bodies accompanied by brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subfloridanus Murrill. 1942. Lloydia 5: 151-152.

TYPE SPECIMEN (holotype, explicit): FLAS, Alachua Co., Gainesville, Fla., 12.iii.39, coll. & det. W. A. Murrill, no. 18611. (!) Isotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus expanded, to 8 cm diam, dull gold when dried; dried flesh to 6 mm thick around depressed disc, thinning to < 1 mm at margin; margin projecting 2-3 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, cupulate, to 4 cm long, appearing fibrous, gray-gold when dried; ring median, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, unbranched, 3.0-7.5 µm diam; hyphae of pileus flesh inflated, to 21.5 µm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-4.5 µm diam, uninflated; basidia 7.5 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, 7.5-12.2 µm diam. Hyphae of stipe surface above ring 5.3-15.3 µm diam, parallel, tightly packed. Hyphae of ring 7.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 46.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection, one broken, mature fruit body, is accompanied by a sketch and description of the fresh condition by Murrill. The isotype contains one mature pileus.

Schaeffer macrochemical reaction: negative.

Agaricus subhortensis Murrill. 1946. Lloydia 9: 328.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 8.i.45, coll. & det. W. A. Murrill, no. 17971. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 4.5 cm diam, brown, surface covered with brown appressed fibrils when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 3 cm long, appearing fibrous, brown when dried;

ring absent on type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 µm diam, unbranched; hyphae of pileus flesh 4.5-23.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-7.5(15.3) µm diam, occasionally inflated; basidia 7.5-9.2 x 20.0-27.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Cells of universal veil (stipe surface near base) inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-8.5 x 5.3-6.0 µm, subglobose, subovoid or broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

The type collection consists of one mature, broken fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subnitens Peck. 1909. Bull. Torrey Bot. Club 36: 335.

TYPE SPECIMEN (holotype, implicit): NYS, Claremont, Calif., -.i.09, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus broadly convex or depressed in center, to 5.5 cm diam, dull tan when dried; surface fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal to bulbous, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, cream-gray when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia abundant, to 9.2 µm diam, unbranched, fasciculate; hyphae of pileus flesh to 15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.0 µm diam, uninflated; basidia 4.5-6.0 x 13.8-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-7.5 µm diam, parallel, tightly packed. Hyphae of ring 4.5-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-9.2 x 4.5-6.0 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate or indiscernible.

Schaeffer macrochemical reaction: negative.

Note: This is considered an implicit holotype because it is the only collection under this name among the Peck specimens and because its date, collection site and collector coincide with the data in the original description. The collection contains four fruit bodies including two immature forms plus fragments and brief notes.

Agaricus suboreades Murrill. 1942. Lloydia 5: 152.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 14.vii.38, coll. & det. W. A. Murrill, no. 17693. (!) Topotype: 28.vi.38, coll. & det. W. A. Murrill, no. 17257. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or somewhat umbonate, to 2.0 cm diam, golden brown when dried; surface brown squamulose; dried flesh to 2.0 mm thick at disc, thinning to < 1.0 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2.0 mm deep. Stipe bulbous, to 3.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-3.1 µm diam, branched or unbranched; hyphae of pileus flesh 4.6-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.6 µm diam, uninflated; basidia 6.1-7.6 x 16.8-21.4 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.6-10.7 µm diam, parallel, tightly packed. Hyphae of ring 2.3-4.6 µm diam. Hyphae of universal veil (stipe surface below ring) 2.3-6.1 µm diam, uninflated or only slightly so, without clamp connections, thin-walled, hyaline.

Spores 6.1-9.2 x 3.8-5.4 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

The type collection consists of twelve fruit bodies, three of which are entire. All specimens are mature. The topotype contains two mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus subplacomyces Murrill. Unpublished; see *A. badius* above.

Agaricus subponderosus Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.xii.44, coll. & det. W. A. Murrill, no. 21775. (!) Isotype: TENN, no. 21107. (!)

Stature of carpophore robustly campestroid; mature pileus convex to plane, to 8 cm diam, gold when dried; surface lightly squamulose; dried flesh to 12 mm thick around depressed disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 11 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-4.5 µm diam, usually unbranched;

hyphae of pileus flesh 3.0-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-3.8(10.7) µm diam, occasionally inflated; basidia 6.0-7.0 x 12.2-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-12.2 µm diam, parallel, tightly packed. Hyphae of ring 2.3-9.2 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-6.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection, in two boxes, consists of five fragmented, mature fruit bodies plus a description of their fresh condition written by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subpratensis Murrill. 1918. Mycologia 10: 77.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 9-10.i.09, coll. & det. W. A. Murrill, no. 824. (!)

Stature of carpophore campestroid; mature pileus globose to convex, to 7 cm diam, off-white with scattered brown appressed fibrillose scales when dried; dried flesh to 14 mm thick at disc, thinning to 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior to median when adhering to stipe, off-white when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, 3.0-5.5 µm diam, branched or unbranched; hyphae of pileus flesh 4.5-8.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 µm diam, occasionally inflated; basidia 7.5-8.5 x 23.0-27.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-4.5 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 6.0-10.7 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5(8.5) x 6.0 µm, subglobose to ovoid or ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

The type consists of approximately twenty fruit bodies, plus fragments, and includes at least ten buttons.

Schaeffer macrochemical reaction: negative.

Agaricus subrufescens Peck. 1894. N.Y. State Mus. Bull. 43: 236-238.

TYPE SPECIMEN (holotype, implicit): NYS, Glen Cove, L.I., N.Y.,

-.x.-, coll. W. Falconer, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus convex or broadly expanded, to 8 cm diam, dull gold to gray-gold when dried; surface silky fibrillose to obscurely squamulose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 µm diam, usually unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae (2.3)3.0-6.0(9.2) µm diam, uninflated; basidia 4.5-6.0 x 13.8-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-6.0 µm diam, parallel, tightly packed. Hyphae of ring 4.5-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 16.8 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.5 x 4.5-5.5 µm, subglobose to ovoid or ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate to indiscernible.

The type collection consists of four mature fruit bodies.

Schaeffer macrochemical reaction: negative.

Agaricus subrufescentoides Murrill. 1912. Mycologia 4: 299.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x.11-1.xi.11, coll. & det. W. A. Murrill, no. 591. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, more or less umbonate, to 7 cm diam, tan with brown disc and brown fibrillose scales when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 11 cm long, appearing fibrous, dull gray-gold when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia abundant, scattered to loosely fasciculate, 3.8-7.5(10.7) µm diam, usually unbranched; hyphae of pileus flesh (3.0)7.5-18.5 µm diam, usually inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 µm diam, occasionally inflated; basidia 6.0 x 18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Hyphae of universal veil (stipe surface below ring) with irregularly to clavately inflated tips, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-7.0(8.5) x 3.8 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus papillate, hyaline.

The type consists of a single mature fruit body and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus subrutilescens Kauffman. "1925" (1926). Pap. Mich. Acad. Sci. Arts Lett. 5: 141-142.

TYPE SPECIMEN (holotype, explicit): MICH, Mt. Hood, Ore., 11.x.22, coll. & det. C. H. Kauffman, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane, blackish-brown when dried; surface fibrous; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe absent from type material.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate to scattered, 4.5-12.2 µm diam, unbranched; hyphae of pileus flesh 4.5-13.8 µm diam, occasionally slightly inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 4.5-9.2 µm diam, occasionally slightly inflated; basidia 6.0 x 18.5-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface near pileus 4.5-7.5 µm diam, parallel, tightly packed. Hyphae of ring (from edge of pileus) 3.0-10.7 µm diam. Universal veil tissue absent on type material.

Spores 5.5-7.0 x 3.0-3.8 µm, ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

This description is incomplete because only a portion of the type was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus subsilvicola Murrill. 1918. Mycologia 10: 75.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 2.xi.02, coll. F. S. Earle, det. W. A. Murrill, no. 380. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 5 cm diam, golden tan when dried; surface smooth; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe more or less bulbous, to 6 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 µm diam, uninflated or only slightly so; basidia 5.5-6.0 x 15.3-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-18.5 µm diam, parallel, tightly packed. Hyphae of ring 1.5-6.0 µm diam. Universal veil tissue absent on type material.

Spores 5.5-7.0 x 3.0-3.8 µm, ellipsoid; wall dark brown, 0.6 µm thick; apiculus papillate or indiscernible.

The type collection consists of a single mature fruit body with notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus sulphureiceps Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195.

TYPE SPECIMEN (holotype, explicit): Flas, Gainesville, Fla., 18.vi.44, coll. & det. W. A. Murrill, no. 38805. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 2 cm diam, gold when dried; surface appearing glabrous; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free to 1 mm deep. Stipe more or less bulbous, to 3 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-4.5 µm diam, unbranched; hyphae of pileus flesh 3.0-12.2 µm, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0 µm diam, uninflated; basidia 6.0-7.5 x 12.2-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-7.5 µm diam, parallel, tightly packed. Hyphae of ring 1.5-9.2 µm diam. Universal veil tissue absent on type material.

Spores 4.5-5.5 x 3.8 µm, subglobose to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

The type collection consists of a single, mature fruit body in several pieces. It is accompanied by brief notes and a sketch by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus tabularis Peck. 1898. Bull. Torrey Bot. Club 25: 325. *non A. tabularis* Persoon. 1822. Myc. Eur. 3: 73; *non A. tabularis* Fries. 1821. Syst. Myc. I: 221. See *A. praerimosus* Peck.

Agaricus trisulphuratus Berkeley. 1885. Ann. Mag. Nat. Hist., Ser. 5, XV, P. 386.

TYPE SPECIMEN (holotype, explicit): KEW, Zanzibar, 6.xi.84, coll. & det. Berkeley, s.n.

This species, the type of the subgenus *Lanagaricus* Heinem., will be described and discussed in a subsequent work.

Agaricus venus Murrill. 1918. Mycologia 10: 76.

TYPE SPECIMEN (holotype, explicit): NY, Jamaica, 29-30.xii.08-2.i.09, coll. W. A. & E. L. Murrill det. W. A. Murrill, no. 749½. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or slightly depressed, to 7 cm diam, golden brown, darker on the disc, when dried; surface appearing glabrous; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe subequal, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring median, gold when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 6.0-21.5 µm diam, inflated, without clamp connections, thin walled. Lamella trama irregular; hyphae 6.0-26.0 µm diam, usually inflated; basidia 4.5-6.0 x 16.8-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 12.2 µm diam. Hyphae of stipe surface above ring 6.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 4.5-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 3.8-4.5 µm, ellipsoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

The type collections consists of one mature fruit body, a water color drawing and brief notes by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus vinaceo-umbrinus Smith. 1944. Mycologia 36: 242.

TYPE SPECIMEN (holotype, explicit): MICH, Cisco, Texas, 15.ix.35, coll. E. A. Smith, det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus campanulate to plano-umbonate, to 3.5 cm diam, dull gray-tan when dried; surface appressed fibrillose silky; dried flesh to 2 mm thick at umbo, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring absent on type material.

Hyphae of pileus cuticle interwoven, repent; pileocystidia loosely fasciculate to matted, to 7.0 µm diam, usually unbranched; hypahe of pileus flesh 1.5-12.5 µm diam, occasionally inflated; without clamp connections, thin-walled; basidia 6.0-7.5 x 20.0-26.0 µm, 4-sterigmate, without clamp connections; cheilocystidia capitulate, some minutely warted at tip, to 7.5 µm diam, parallel, tightly packed. Hyphae of ring absent on type material. Hyphae of universal veil (stipe surface near base) inflated, to 16.8 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5-5.5 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

This description is incomplete because only a portion of the type material was made available for study.

Schaeffer macrochemical reaction: negative.

Agaricus weberianus Murrill. 1939. Bull. Torrey Bot. Club 66: 29-30.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, FLa., 9.ix.38, coll. & det. W. A. Murrill, no. F18131. (!)

Stature of carpophore placomycetoid; mature pileus expanded, to 5.5 cm diam, surface covered with appressed imbricate scales, yellowish-brown with brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 6.5 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, dull tan when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 4.5-9.2 µm diam, usually unbranched; hyphae of pileus flesh 4.5-13.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 µm diam, occasionally inflated; basidia 6.0-7.5 x 15.3-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Universal veil tissue absent on type material.

Spores 5.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to subovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection includes one mature fruit body, a sketch and a brief description of the fresh condition by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus wilmotii Murrill. 1946. Lloydia 9: 328-329.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 20.vii.45, coll. W. A. Murrill & R. J. Wilmot, det. W. A. Murrill, no. 45895. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, broadly umbonate or slightly depressed, to 8.5 cm diam, dull gold with brown scales when dried; surface, with the exception of the disc, covered with appressed-fibrillose scales; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to slightly bulbous, to 12 cm long, appearing fibrous, tan when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia 3.0-4.5 µm diam, tightly fasciculate, unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-6.0(15.3) µm diam,

occasionally inflated; basidia 6.0-7.5 x 13.8-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 2.3-10.7 µm diam. Cells of universal veil (margin of ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 µm, subglobose to ovoid or broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

The type collection contains approximately six fruit bodies, all fragmented, mature and immature. There are also extensive notes on the fresh condition taken by Murrill.

Schaeffer macrochemical reaction: negative.

Agaricus xanthodermoides Murrill. 1945. Quart. J. Florida Acad. Sci. 8: 195-196.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 25.iii.44, coll. & det. W. A. Murrill, no. 22503. (!) Isotype: TENN, no. 16056. (!)

Stature of carpophore delicately campestroid; pileus convex to expanded, to 4 cm diam, dull gray-tan when dried; surface silky to slightly scaly; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 3 mm. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe slightly bulbous, to 4.5 cm long, appearing fibrous, concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 4.5-7.5 µm diam, unbranched; hyphae of pileus flesh 4.5-20.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-4.5 µm diam, uninflated; basidia 6.0-7.5 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 6.0-20.0 µm diam, parallel, tightly packed. Hyphae of ring 2.3-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 µm, globose to broadly ellipsoid; wall dark brown, slightly greater than 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

The type collection consists of numerous fragments of old and young specimens.

Schaeffer macrochemical reaction: negative.

NOMINA DUBIA

I believe the following species should be considered as *nomina dubia* because the type collections are either entirely or almost entirely destroyed, no other collections exist which could serve as lectotypes and the names have been rarely and sometimes variously applied. If spores were present, their dimensions follow the species citation.

TYPE SPECIMEN (holotype, explicit): NY, Palo Alto, Calif., 25.xi.11, coll. W. A. Murrill & L. S. Abrams, det. W. A. Murrill, no. 1227. (!)

Agaricus bivelatus Peck. 1909. Bull. Torrey Bot. Club 36: 335.

TYPE SPECIMEN (holotype, implicit): NYS, Claremont, Calif., -.i.-, coll. C. F. Baker, det. C. H. Peck, s.n. (!)

Agaricus californicus Peck. 1895. Bull. Torrey Bot. Club 22: 203.

TYPE SPECIMEN (holotype, implicit): NYS, Pasadena, Calif., 10.i.95, coll. A. J. McClatchie, det. C. H. Peck, no. 849. (!)

Agaricus flavitigens Murrill. 1912. Mycologia 4: 298.

TYPE SPECIMEN (holotype, explicit): NY, Seattle, Wash., 20.x. - 1.xi.11, coll. & det. W. A. Murrill, no. 381. (!)

Agaricus herradurensis Murrill. 1918. Mycologia 10: 78.

TYPE SPECIMEN (holotype, explicit): NY, Herradura, Cuba, 3.viii.07, coll. F. S. Earle, det. W. A. Murrill, no. 575. (!)

Spores 4.5-6.0 x 3.8-4.5 µm.

Agaricus hillii Murrill. 1912. Mycologia 4: 298.

TYPE SPECIMEN (holotype, explicit): NY, New Westminister, British Columbia, 12.xii.04, coll. A. I. Hill, det. W. A. Murrill, no. 104. (!)

Spores 5.5-6.0 x 3.8 µm.

Agaricus hornei Murrill. 1918. Mycologia 10: 80.

TYPE SPECIMEN (holotype, explicit): NY, Herradura, Cuba, 25.xii.07, coll. F. S. Earle, & W. J. Horne, det. W. A. Murrill, no. 579. (!)

Spores 5.5-7.0 x 4.5 µm.

Agaricus mcmurphyi Murrill. 1912. Mycologia 4: 299.

TYPE SPECIMEN (holotype, explicit): NY, Searsville Lake, Calif., 6.i.03, coll. J. McMurphy, det. W. A. Murrill, no. 35. (!)

Agaricus rutilescens Peck. 1904. Bull. Torrey Bot. Club 31: 180.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., 7.vi.02, coll. E. B. Sterling, det. C. H. Peck, no. 101, 175. (!)

Spores 7.0-7.5 x 4.5-6.0 µm.

Agaricus shaferi Murrill. 1918. Mycologia 10: 81.

TYPE SPECIMEN (holotype, explicit): NY, Pindar del Rio, Cuba, 12.xii.11, coll. J. A. Shafer, det. W. A. Murrill, no. 11269. (!)

Spores 4.5-6.0 x 3.8-4.5 µm.

Agaricus sterlingii Peck. 1902. Bull. Torrey Bot. Club 29: 73.

TYPE SPECIMEN (holotype, implicit): NYS, N. J., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Spores 6.0-9.2 x 4.5-6.0 µm.

Agaricus xuchilensis Murrill. 1918. Mycologia 10: 79.

TYPE SPECIMEN (holotype, explicit): NY, Xuchiles, Mexico, 17.i.10, coll. W. A. & E. L. Murrill, det. W. A. Murrill, no. 1156. (!)

Spores 6.0-10.0 x 3.0-4.5 µm.

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AGARICUS IN THE SOUTHEASTERN UNITED STATES

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Summary

A key to and descriptions of forty-two species of *Agaricus* from the southeastern United States is presented, including five described as new: *A. andrewii*, *A. auresiccescens*, *A. hannoni*, *A. nobelianus* and *A. tantulus*. Characters utilized in species circumscriptions include basidiocarp stature, nature of the universal veil tissue, presence or absence of cheilocystidia and spore size and shape. Nomenclatural history and problems are discussed.

INTRODUCTION

Agaricus as treated by Linnaeus (1753) was envisioned as including all lamellate fungi and was an arbitrary substitution for and synonymous to *Amanita* of Dillenius (1719). The Linnaean sense was adopted by Fries (1821), the starting point author, who divided the unwieldy assemblage into series based on the color of the spore print. His tribe 'Psalliota' contained the annulate, purple-brown spored, free-gilled agarics. Karsten (1879) recognized this as a discrete genus and reapplied the name *Agaricus* to it, this time in a restricted sense, thus circumscribing the modern genus concept.

The name *Agaricus*, with *A. campestris* as type species, was suggested for conservation by Donk (1962, 1964) and appeared as proposal 120 in Taxon (Anonymous, 1968). Conservation was officially made with its incorporation in the International Code of Botanical Nomenclature, Seattle ("1969", 1972, p. 254).

Agaricus has been given only regional attention in North America during the past century: Peck (1884) presented keys and descriptions for seven species in New York, but also proposed several new species over subsequent years; Murrill (1912) proposed new taxa from the Pacific coast, the tropical U.S., particularly Florida (Murrill, 1918),

and produced a general key to thirty species (Murrill,1922[1]); Kauffman (1918) described thirteen species from the Great Lakes region of Michigan and his key was essentially republished with the addition of one species by Coker (1928) in a Chapel Hill study; the latest and most modern treatment of the genus was by Hotson & Stuntz (1938), who included twenty-four species from western Washington. With the exception of Hotson & Stuntz, the aforementioned must be considered superficial by modern standards. More detailed descriptions of most of the species names by the preceeding authors can be found in Freeman (1979).

European studies, however, are numerous and fairly recent: Barr (1937), Bohus (1961, 1969, 1971), Heinemann (many works between 1952 and 1977, concerning tropical as well as European taxa), Kühner & Romagnesi (1953), Lange (1926), Møller (1950, 1952), Pilát (1951), and Pegler & Raynor (1969).

The intention of this work, based on a study of North American type specimens (Freeman, 1979) and fresh collections has been not only to facilitate identification of chiefly herbarium specimens, but also to disclose consistent characters which can be of taxonomic value throughout the genus. Cataloging and more fully describing species of *Agaricus* from the southeastern United States offered a unique opportunity to study both northern species, which have reached their southern distributional limit, and southern species which terminate their ranges northward.

Specimens were examined from the following herbaria: the National Fungus Collections (BPI), the University of Florida (FLAS), The Royal Botanic Gardens (K), the University of Michigan (MICH), the University of North Carolina (NCU), The New York Botanical Garden (NY) and the University of Tennessee (TENN). Herbarium abbreviations are from those listed by Holmgren & Keuken (1974). In addition, collections of fresh specimens were made in the Smoky Mountains region of east Tennessee and western North Carolina.

TAXONOMIC CHARACTERS AND SUBGENERIC CIRCUMSCRIPTIONS

Current methods of taxonomic analysis of specimens of *Agaricus* include grouping on the basis of spore size (Lange, 1926), color changes upon bruising a fresh fruit body (Møller, 1950, 1952; Heinemann, 1956), the Schaeffer macrochemical reaction (cross reaction of aniline oil and nitric acid), presence or absence of cheilocystidia, and habitat (Isaacs, unpublished data, 1965, 1967). This utilization

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[1]A compilation of his personal keys to Florida fungi, including eighteen species of *Agaricus* has recently been published by Kimbrough (1972).

of fresh characters for species determination has laid the responsibility of identification on whomever identified the specimen while it was fresh, making later verification impossible. Moreover, the keys constructed by the preceding authors all utilize characteristics of fresh specimens -- practically useless when attempting to identify very young, old, or preserved specimens, especially those with scanty or inadequate notes. Confusing the issue is the Schaeffer reaction. According to Heinemann (1961), results could be obtained readily on dried specimens. The present study, however, disclosed only two positive reactions with dried material, in A. lilaceps (type specimen only, species not currently known from the southeastern U.S.) and various collections of A. diminutivus. The reaction, therefore, is questionable on dried material or of only limited value in North America.

Subgeneric concepts vary. Those envisioned by Møller combined the characters of color changes of bruised flesh, odor and Schaeffer reaction. His two "groups" were: Rubescentes, comprising those species whose flesh turned red where bruised, odor "acidulous" and Schaeffer reaction negative; and Flavescentes, containing those species whose flesh yellowed where bruised, odor of almonds, and Schaeffer reaction positive (except for one group which smelled of acid and reacted negatively to the Schaeffer reagents). Møller's keys to species utilized some morphological characters, habitat, and color. These characters are apparently striking when dealing with fresh specimens, but are impossible to verify in the dried condition (with the possible exception of the Schaeffer reaction, which, in this case, is only useful if positive).

Pilát (1951) accepted *Melanophyllum* as part of *Agaricus* and erected two subgenera based on this: subgenus *Melanophyllum*, containing one species whose spore print is smoky-purple and *Euagaricus*, containing all species now generally regarded as *Agaricus*. This did nothing to aid classification or indicate affinities within the currently accepted genus. His keys to sections and species were similar to those of Møller.

Authors have attempted to use constant characters for identification. Lange (1926) based subgenera on spore size. The subgenus *Megasporae* contained species whose spores were generally larger than 6.5 x 4 µm and *Microsporae* whose spores were less than 6 x 4 µm. This held, however, for only a small number of species. Not only are the ranges only half a micron in difference, but overlap and variability in many species render the system useless. Other keys (Kauffman, 1918; Coker, 1928; Murrill, 1912, 1918, 1922, 1938) are based on size of carpophore, presence or absence of scales on the pileus surface, color and habitat, but are far too general for accurate identification and consist only of keys to species with no subgeneric designations.

The first author to attempt to combine macroscopic

(fresh condition) and microscopic characters was Heinemann (1956). His three subgenera were: *Agaricus*, which contains those species with a poorly developed general (universal) veil, pileus consisting of radially arranged hyphae and pileus surface smooth, fibrillose or squamulose; *Lanagaricus*, containing species with a well-developed general veil and thick-fleshed, scaly pileus and *Conioagaricus*, containing species with a thin-fleshed pileus often exhibiting a striate margin, a highly reduced annulus and cuticle hyphae which are often encrusted. His subsequent keys were based primarily on flesh coloration when bruised and the Schaeffer reaction. My study disclosed no members of his subgenus *Conioagaricus* in the southeastern United States.

The most logical classification scheme for the present work was Heinemann's modern treatment. Preliminary studies, which revealed hyphal (Fig. 1A) and cellular (Fig. 1B) universal veil types (see also Atkinson, 1906; Reijnders, 1963) reinforced the importance of this character for taxonomy. Problems arose initially in determining what Heinemann meant by "voile général peu développé" as opposed to "voile général plus ou moins abondant". The degree of development is difficult to precisely ascertain. As I have interpreted the condition, however, the subgenus *Agaricus* contains those species with the "peu développé" or hyphal universal veil, while the "voile plus ou moins abondant" group, *Lanagaricus*, contains those species with cellular universal veil tissue. Further support of this interpretation is the observation that hyphal universal veil tissue is generally found as only one or two hyphal layers at the stipe base, whereas cellular universal veil tissue can be observed on the stipe base and often on the pileus surface. "Abondant", then, is perceived as easily observed in more than one area on the carpophore.

Correlated with these veil types is stature and habitat: campestroid (pileus diameter divided by stipe length ratio equal to or greater than one), meadow or pasture inhabiting species almost always possess hyphal universal veil tissue; conversely, placomycetoid (pileus diameter divided by stipe length retio less than one), forest inhabiting species almost always possess cellular universal veil tissue. Overlap of any of these characters is slight. In view of these findings, Heinemann's subgenera, which accommodate southeastern species, can be emended to acknowledge the above correlated characters.

TAXONOMY

Agaricus L. *ex* Fr., Syst, Mycol. 1: 8. 1821, *emend.* Karsten, Bidrag Kännedom Finlands Natur Folk 32: xxv, 482. 1879. [*Agaricus* Linnaeus, Species Plantarum 2: 1171. 1753.]
≡ *Pratella* (Pers.) *per* S. F. Gray, A Natural Arrangement of British Plants, 626, 1821. (*p.p.*)
≡ *Psalliota* (Fr.) Kummer, Fuhr. Pilzkunde 72: 23. 1871.

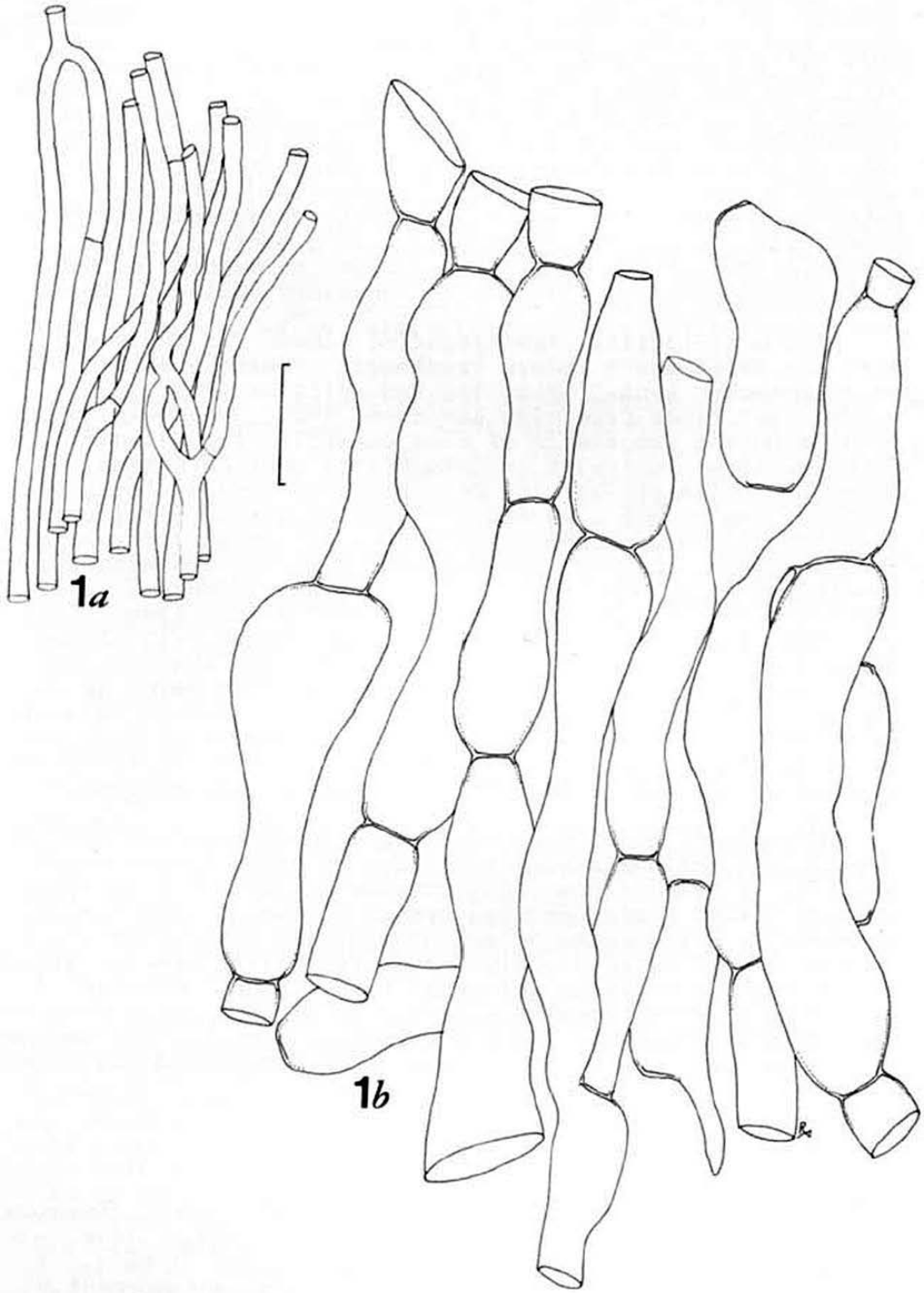

Figure 1. Hyphae of universal veil. a. Hyphae type.
b. Cellular type. Standard line equals 20 µm.

Habit of carpophore campestroid (pileus diameter-stipe length ratio > 1) or placomycetoid (pileus diameter-stipe length ratio < 1); pileus white or colored, glabrous, silky-fibrillose, fibrillose scaly or occasionally rimose-areolate, dry, never viscid; cuticle of interwoven, usually repent hyphae without clamp connections, rarely cellular (several tropical species); pileocystidia, if present, fasciculate or scattered, branched or unbranched; hyphae of context usually inflated, thin-walled, without clamp connections; hymenophore lamellate, lamellae free, grayish, white to pink or roseous in youth, deep chocolate brown when mature, trama regular, then irregular, hyphae inflated or not, without clamp connections; spore print deep chocolate brown, spores subglobose, ellipsoid or ovoid, wall generally less than 0.6 µm thick, apiculus papillate, hyaline or indiscernible; basidia clavate, 2- or 4-sterigmate, without clamp connections; cheilocystidia absent or present, napiform, clavate or broadly clavate, several-celled or (rarely) ventricose-rostrate; pleurocystidia absent; ring superior or median, single or double or with floccose patches on the lower surface, hyphae filamentous, occasionally slightly inflated, without clamp connections; stipe equal or bulbous at the base, with or without rhizomorphs; hyphae parallel, tightly packed, thin-walled, without clamp connections; universal veil tissue appressed to lower surface of stipe, occasionally on the surface of the pileus, particularly the disc, or the lower surface of the ring, composed of thin-walled, filamentous to inflated or even cellular elements, without clamp connections.

Bruised flesh of stipe or pileus staining reddish, yellowish, brownish or not at all. Schaeffer reaction (cross reaction aniline oil with nitric acid) immediately or slowly positive (fire red to orange) or negative.

KEY TO SUBGENERA

1. Universal veil tissue of inflated or uninflated hyphae; fruit bodies thick-set, stature usually campestroid; stipe usually equal or subequal; generally occurring in meadows or pastures . . . . . Subgenus *Agaricus* Heinemann emend. Freeman, p.

1. Universal veil tissue cellular; fruit bodies usually thin-fleshed, stature usually placomycetoid; stipe often bulbous; generally occurring in woods. . . . . Subgenus *Lanagaricus* Heinemann emend. Freeman, p.

Subgenus *Agaricus* Heinem. emend. Freeman

Flore Icon. des Champs. du Congo, Fasc. 5: 99. 1956.
≡ *Agaricus* subgen. *Euagaricus* Pilát, Acta Mus. Nat. Pragae, 7B(1): 27. (*p.p.*)
≡ *Agaricus* subgen. *Psalliota* Konrad & Maublanc, Rev. Hymeno. de France, 58. 1924-1937. (*p.p.*)

Type Species: *Agaricus campestris* L. *per* Fr.

Stature of fruit bodies usually campestroid (pileus diameter divided by stipe length ratio > 1); stipe usually equal or subequal; annulus often not well-developed; universal veil of inflated or uninflated hyphae (Fig. 1A); species generally fruiting in open areas, pastures or meadows.

Observations: The emendation of Heinemann's (1956) subgenera included emphasis on the nature of the universal veil tissue and omission of certain chemical tests which were either of no value in the present study (Schaeffer reaction) or required specimens in the fresh condition.

KEY TO SPECIES

1. Stature placomycetoid; pileus to 3.0 cm diam, squamulose; stipe to 4.0 cm long; cheilocystidia lacking; spores (4.5)6.0-9.2 x 3.8-5.5 µm . . . . . 1. *A. suboreades* Murr.

1. Stature campestroid 2

2. Cheilocystidia present 3

2. Cheilocystidia absent 5

3. Cheilocystidia pseudoparaphysoid, lageniform or ventricose-rostrate, to 7.5 µm diam; pileus to 5.0 cm diam, squamulose to fibrillose; margin inrolled; stipe to 3 cm long; spores (5.3)6.0 x (3.8)4.5 µm . . . . . 2. *A. cylindriceps* var. *aureus* Murr.

3. Cheilocystidia clavate, broadly clavate, subpyriform or napiform 4

4. Universal veil hyphae inflated; cheilocystidia broadly clavate to napiform, 10.7-18.5 µm diam, sparse; pileus glabrous, to 6.0 cm diam; spores (7.0)7.5-9.2 x (4.5)5.5-6.0 µm . . . . . 3. *A. andrewii* Freeman

4. Universal veil hyphae filamentous or only slightly inflated; cheilocystidia clavate, broadly clavate, or sybpyriform, to 10.0 µm diam, numerous; pileus smooth or becoming slightly squamulose with age, to 10 cm diam; spores variable, 5.5-6.0(7.5-10.0) x 3.8-4.5 (7.0) µm . . . . . 4. *A. campestris* L. *per* Fr. *ss.* Pilát

5. Pileus surface smooth (or possibly becoming rimose-squamose on disc only with age) 6

5. Pileus surface fibrillose to squamulose 8

6. Universal veil hyphae highly inflated, (20.0-30.0 µm diam); spores 9.2-13.0 x 6.0-7.5 µm; pileus to 5.0 cm diam; stipe to 3.5 cm long . . . . 5. *A. argenteus* Braendle *in* Peck

6. Universal veil hyphae and spores smaller than above 7

7. Fruit body extremely thick-set, flesh to 5 mm thick when dried; margin deeply decurved; pileus occasionally rimose-squamose on disc, to 10 cm diam; stipe to 7.5 cm long; spores 6.0 x 4.5-6.0 µm . . . . . 6. *A. rodmanii* Peck

7. Fruit body not as squat and full-bodied as above, dried flesh to 3 mm thick, margin even; pileus to 5 cm diam, stipe to 5 cm long; spores 4.5-6.0 x 3.0-4.5 µm . . . . . 7. *A. comptuliformis* Murr.

8. Spores (7.5)12.2 x (6.0)7.5 µm; pileus surface broken up into rimose-squamose imbricate patches; pileus to 7 cm diam, margin inrolled; stipe to 4 cm long . . . . . 8. *A. solidipes* Pk.

8. Spores smaller than above 9

9. Fruit body large, pileus to 12 cm diam; stipe equal, to 12 cm long; margin upturned with age; spores 4.5-6.0 x (3.0)3.8-4.5 µm . . . . . 9. *A. subponderosus* Murr.

9. Fruit body smaller than above 10

10. Pileus cylindric to convex and truncate, then expanded; margin more or less inrolled; surface minutely squamulose; pileus to 8 cm diam; stipe to 7.5 cm long; spores (5.3)6.0 x (3.8)4.5 µm . . . 10. *A. cylindriceps* Murr. var. *cylindriceps*

10. Pileus campanulate, expanded, margin projected slightly; surface finely fibrillose; pileus to 4 cm diam; stipe to 3.5 cm long; spores 4.5-5.5(6.0) x (3.0)3.8(4.5) µm . . . . . 11. *A. sulphureiceps* Murr.

1. AGARICUS SUBOREADES MURRILL, Lloydia 5: 152. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 14.vii.38, coll. & det. W. A. Murrill, no. 17693. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane or somewhat umbonate, to 3 cm diam, roseous (Murrill), golden brown when dried; surface squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, golden brown when dried; ring superior, membranous, gold

when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-4.5 µm diam, branched or unbranched; hyphae of pileus flesh 3.0-16.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-23.0 µm diam, occasionally inflated; basidia 6.0-9.2 x 15.3-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 2.3-6.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)6.0-9.2 x 3.8-5.5 µm, subglobose to broadly ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This is one of several small placomycetoid species with a scaly pileus, but is readily distinguished from all others by its hyphal universal veil tissue and its large spores. Murrill (1942) seemed to feel that this species lay between *A. alachuanus* and *A. comptulus* in its outward appearance. It is, however, distinct from *A. alachuanus* which has cellular universal veil tissue, smaller spores and cheilocystidia. *Agaricus comptulus ss.* Pilát (1951) differs in having a glabrous and yellowish pileus and bearing much smaller spores than *A. suboreades*.

The species is most commonly found on grassy ground, in direct sun or shaded areas (*teste* Murrill) and up to the present time has been collected only in Florida. The edibility of this species in unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 14.vii.38, coll. & det. W. A. Murrill, no. 17963 (FLAS, TYPE); Gainesville, 31.viii.39, det. W. A. Murrill, no. 16055 (TENN); Gainesville, 30.viii.39, det. W. A. Murrill, no. 18447 (TENN); Gainesville, 9/5/38, det. W. A. Murrill, no. F19225 (FLAS); Gainseville, 8.viii.44, det. W. A. Murrill, no. F45885 (FLAS); Gainesville, 23.vii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 30.viii.39, det. W. A. Murrill. s.n. (BPI).

2. AGARICUS CYLINDRICEPS VAR. AUREUS MURRILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 23.x.42, coll. & det. W. A. Murrill, no. 20495. (!)

Stature of carpophore campestroid; pileus cylindric, then expanded, to 5 cm diam (Murrill), pallid with small yellow scales (Murrill), dull gold with golden brown scales when dried; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal; to 3 cm long, base more or less flattened, appearing fibrous, concolorous with pileus; ring superior, gold when dried; odor strong, amygdaline (Murrill), flesh readily turning gold when handled (Murrill).

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-10.7 µm diam, unbranched; hyphae of pileus flesh 2.3-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 µm diam, slightly inflated to uninflated; basidia 6.0-7.5 x 13.8-23.0 µm, 4-sterigmate, without clamp connections; cystidia (crush mounts) lageniform, ventricose-rostrate or pseudoparaphysoid, to 7.5 µm diam. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 2.3-13.8 µm diam. Hyphae of universal veil (stipe surface below ring) mostly uninflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores (5.3)6.0 x (3.8)4.5 µm, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate on immature spores, indiscernible on mature spores.

Schaeffer macrochemical reaction: negative.

Observations: The lageniform, ventricose-rostrate or pseudoparaphysoid cystidia immediately characterize this species. In addition, it is macroscopically distinctive for its small size and flattened stipe base.

Murrill (1945) said the species is readily recognized by its strong amygdaline odor and golden coloration when handled or dried. *Agaricus xanthodermus* is suggested, particularly as regards the yellowish staining of the fruit body, but according to Pilát (1951), *A. xanthodermus* has little or no odor, often cracks rimosely on the surface of the pileus and bears considerably larger spores. Murrill also remarked that the species will turn yellow in KOH, a trait which is apparently observed only on fresh specimens. Murrill synonymized the species with *A. amygdalinus* Curtis *(nomen herbariorum)*, but I have found the two to be distinct.

The species occurs in open wooded areas (*teste* Murrill) and is known from Florida, Tennessee and South Carolina. Its distribution suggests that this is a coastal plain species which has extended its range into mountainous areas. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 23.x.42, coll. & det. W. A. Murrill, no. 20495 (FLAS, TYPE); Gainesville, 27.v.43, det. W. A. Murrill, no. 21103 (TENN); Gainesville, 19.vi.42, det. W. A. Murrill, no. F20485 (FLAS); Gainesville, 14.ix.41, det. W. A. Murrill, no. F21511(FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F17700 (FLAS); Gainesville, 25.iii.44, det. W. A. Murrill (as *Agaricus projectellus*), no. 16053 (TENN).

South Carolina: Winnsboro, 23.v.66, det. A. H. Freeman, no. 29019 (TENN).

Tennessee: Knoxville, 6.vi.57, det. A. H. Freeman, no. 9239 (TENN); Knoxville, 6.vi.57, det. A. H. Freeman, no. 21689 (TENN); Knoxville, 30.v.55, det. B. F. Isaacs (as *A. subponderosus*), no. 21668 (TENN); Knoxville, 24.vi.60, det. A. H. Freeman, no. 23769 (TENN); Knoxville, 30.v.63, det. A. H. Freeman, no. 25526 (TENN); Gatlinburg, 21.vi.76, det. A. H. Freeman, no. 40092 (TENN); Claxton School, Anderson Co., 15.viii.42, coll. L. R. Hesler (as *A. silvicola*), s.n. (MICH).

3. AGARICUS ANDREWII FREEMAN SP. NOV.

TYPE SPECIMEN: TENN, West Waynesville, N.C., -.vii.75, coll. G. W. Freeman, det. A. H. Freeman, no. 40331.

Statura campestroidia; pileo 6 cm diam, convexo mox plano, albo, summo serico; stipito aequo, 4.5 cm longo; annulo superiore vel medio; cheilocystidiis paucis, napiformis vel clavis, 10.7-18.5 µm diam; hyphis integumentorum universorum -23.0 µm diam; sporis (7.0)7.5-9.2 x (4.5)5.5-6.0 µm.

Stature of carpophore campestroid; mature pileus convex to plane, to 6 cm diam, white, cream colored when dried; surface silky-fibrillose; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin appendiculate. Lamellae pink in youth, deep chocolate brown when matured, free, to 3 mm deep. Stipe equal to tapering upward, to 4.5 cm long, appearing fibrous, concolorous with pileus; ring median to superior, cream colored when dried; odor mild.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia 2.3-5.5 µm diam, scattered, unbranched; hyphae of pileus flesh 4.5-24.5(35.0) µm diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 2.3-18.5 µm diam, occasionally inflated; basidia 7.0-9.2 x 18.5-32.0 µm, 2-4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 10.7-18.5 µm diam, scattered, sparse. Hyphae of stipe surface above ring 4.5-18.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (7.0)7.5-9.2 x (4.5)5.5-6.0 µm, broadly ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Macroscopically, this species is identical to glabrous forms of *A. campestris*. Microscopically, however, it is unique. Like *A. campestris*, *A. andrewii* bears cheilocystidia, but they are broadly clavate to napiform and sparse, as opposed to the numerous clavate, broadly clavate or subpyriform cheilocystidia of *A. campestris*. In addition, the universal veil hyphae of *A. andrewii* are highly inflated, whereas in *A. campestris* they are uninflated or only slightly so. *Agaricus andrewii* also produces somewhat narrower spores than *A. campestris*.

This is a meadow and pasture species and due to its close resemblance to *A. campestris* has probably been unwittingly eaten and proved edible. Further collections are needed to establish range of the species.

Specimens examined:

North Carolina: West Waynesville, -.vii.75, coll. G. W. Freeman, det. A. H. Freeman, no. 40331 (TENN, TYPE).

4. AGARICUS CAMPESTRIS LINNAEUS PER FRIES (Syst. Mycol. I: 281. 1821.) SS. PILÁT (Acta Mus. Nat. Pragae, 7B(1): 30. 1951.)

Stature of carpophore campestroid (fig. 2A); mature pileus to 10 cm diam, subglobose when young, expanded to plane upon maturity, white, cream when dried; surface silky-fibrillose, occasionally bearing (with age) brownish appressed squamules on the disc; dried flesh to 6 mm thick at disc, thinning at margin; margin projecting 2 mm. Lamellae pink to roseous in youth, deep chocolate brown when mature, free, to 3 mm deep. Stipe to 5 cm long, equal, concolorous with pileus; ring superior, indistinct to absent on older specimens, cream when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 7.5-23.0 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 µm diam, uninflated; basidia 7.5-9.2 x 20.0-27.5 µm, 4-sterigmate, without clamp connections; cheilocystidia 7.5-10.0 µm diam, scattered, clavate to broadly clavate to subpyriform. Hyphae of stipe surface above ring 2.3-15.3 µm diam, parallel, tightly packed. Hyphae of ring 2.3-10.7 µm. Hyphae of universal veil (stipe surface near base) uninflated or only slightly so, to 12.2 µm diam, without clamp connections, thin-walled, hyaline.

Spores variable, 5.5-10.0 x 3.8-7.0 µm, ovoid to very broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus

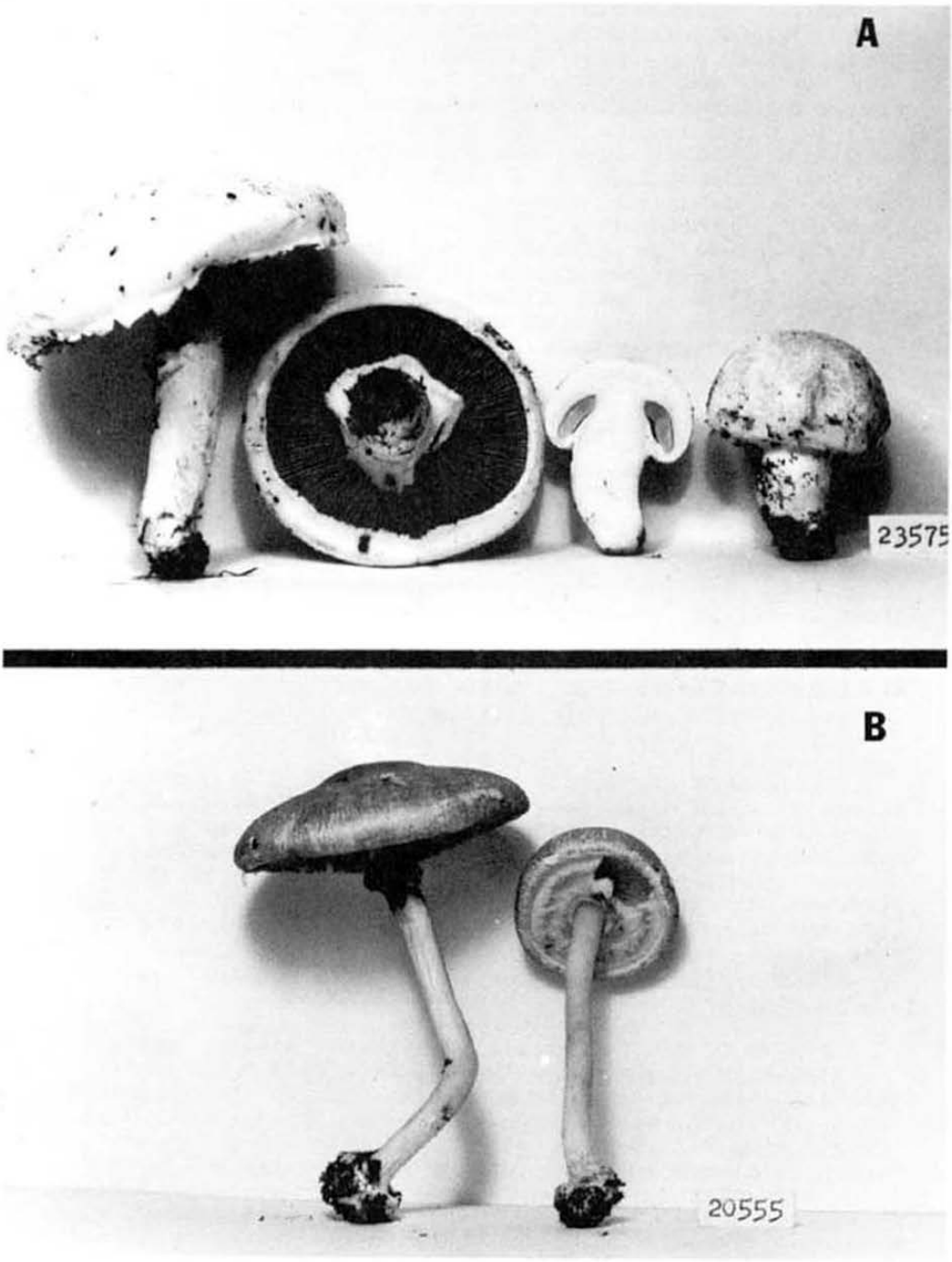

Figure 2. Two common species: (A) *Agaricus campestris;* and (B) *Agaricus pocillator.*

indiscernible to minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: In the absence of type material, Pilát's description and photographs are, I feel, sufficient for identification of this species. The species is ubiquitous and is characterized by uninflated or only slightly inflated universal veil hyphae, numerous cheilocystidia, field habitat and pink lamellae in youth. Spore size seems to be variable; in all other respects, however, small-spored and large-spored forms are identical.

This is a meadow and pasture species, often called "the blusher" or "pink bottom" due to the rosy-pink color of the immature lamellae. It is a prized edible fungus.

Specimens examined:

Florida: Gainesville, 28.iv.43, det. A. H. Smith, s.n. (MICH).

South Carolina: Clemson College campus, 16.viii.26, det. C. H. Kauffman, s.n. (MICH).

Tennessee: Knoxville, 24.vii.37, det. L. R. Hesler, no. 10702 (TENN); Smoky Mt. Nat'l. Park, 29.v.38, det. L. R. Hesler, no. 11441 (TENN); Knoxville, 11.xi.41, det. A. H. Smith, no. 14059 (TENN); Knoxville, 26.x.49, det. L. R. Hesler, no. 19483 (TENN); Knoxville, 26.x.49, det. L. R. Hesler, no. 19484 (TENN); Knoxville, 13.ix.51, det. A. H. Smith, no. 20179 (TENN); Knoxville, 13.ix.51, det. A. H. Smith, no. 20173 (TENN); Knoxville, 27.ix.54, det. A. H. Smith, no. 21342 (TENN); Knoxville, 9.vii.56, det. L. R. Hesler, no. 22314 (TENN); Knoxville, 2.vi.59, det. B. F. Isaacs, no. 22994 (TENN); Knoxville, 7.viii.59, det. L. R. Hesler, no. 23222 (TENN); Knoxville, 25.vi.60, det. L. R. Hesler, no. 23575 (TENN); Knoxville, 20.ix.62, det. L. R. Hesler, no. 24911 (TENN); Knoxville, 9.viii.62, det. L. R. Hesler, no. 24929 (TENN); Knoxville, 23.vii.63, det. L. R. Hesler, no. 27084 (TENN); Knoxville, 5.vi.65, det. B. F. Isaacs, no. 28061 (TENN); Knox Co., 5.vii.71, det. A. H. Freeman, no. 35834 (TENN); Knoxville, 6.x.73, det. L. R. Hesler, no. 39058 (TENN); Knoxville, 20.v.76, det. A. H. Freeman, no. 40091 (TENN).

5. AGARICUS ARGENTEUS BRAENDLE IN PECK, Bull. Torrey Bot. Club 26: 68. 1899.

TYPE SPECIMEN (holotype, implicit): NYS, Washington, D.C., -.xi.-, coll. & det. F. J. Braendle, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 5 cm diam, pale grayish white or grayish brown (Braendle), dingy tan when dried; surface silky; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae brownish

at first, never pink, deep chocolate brown when mature, free, to 4 mm deep. Stipe equal, to 3.5 cm long, appearing fibrous, concolorous with pileus, solid; ring superior, evanescent (Braendle).

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-23.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamellae trama irregular; hyphae 3.0-23.0 µm diam, usually uninflated; basidia 6.0-9.2 x 15.3-29.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-26.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Hyphae of universal veil (stipe surface near base) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (7.5)9.2-13.0 x 6.0-7.5 µm, ellipsoid to ovoid; wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This is a most distinctive species due to the highly inflated universal veil tissue, very large spores and lack of cheilocystidia. Peck (1899) remarked that specimens were frequently associated with *Stropharia bilamellata*.

The species is found on lawns and in meadows and is reportedly edible and delicious. Its range extends as far north as Washington, D.C. and south to South Carolina, preferring, apparently, coastal plain areas.

Specimens examined:

Maryland: Prince Georges Co., 2.vii.73, det. KHM (as *Agaricus campestris*), no. KHM 13626 (BPI).

North Carolina: Highlands, 8.viii.66, det. A. H. Freeman, no. 29252 (TENN); Chapel Hill, 21.ix.14, coll. W.C. Coker, no. 1240 (NCU); Jackson Co., 3.viii.75, det. A. H. Freeman, no. 40070 (TENN); 25.ix.-, coll. W. C. Coker, no. 434 (NCU); Chapel Hill, 9.vii.14, coll. W. C. Coker, no. 1104 (NCU).

South Carolina: Winnsboro, 16.v.66, det. A. H. Freeman, no. 28985 (TENN); Fairfield Co., 18.v.66, det. A. H. Freeman, no. 29012 (TENN).

Tennessee: Knoxville, 17.xii.71, det. A. H. Freeman, no. 5147 (TENN); Knoxville, 4.xii.41, det. B. F. Isaacs (as *A. pampeanus*), no. 14090 (TENN); Great Smoky Mtn. Nat'l. Park, 24.v.42, det. A. H. Smith (as *A. argentatus*), no. 14211 (TENN); Knoxville, 29.x.49, det. B. F. Isaacs, no. 19495 (TENN); Knox Co., 25.xi.54, det. B. F. Isaacs, no. 21572 (TENN); Knoxville, 2.vi.55, det. B. F. Isaacs, no. 21690

(TENN); Oak Ridge, 16.x.66, det. A. H. Freeman, no. 29447 (TENN); Knoxville, 4.xii.41, det. A. H. Smith (as *A. argentatus*), no. F31330 (FLAS).

Washington, D.C.: -.xi.-, coll. & det. F. J. Braendle, s.n. (TYPE, NYS); 13.xi.30, coll. C. S. & A. L. Parker (as *Psalliota arvensis*), no. 2014 (BPI).

6. AGARICUS RODMANII PECK, N.Y. State Mus. Bull. 36: 45. 1844.

TYPE SPECIMEN (holotype, implicit): NYS, Astoria, L.I., no date, coll. W. Rodman, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to plane, to 10 cm diam (Peck), white or whitish to yellowish on disc (Peck), dull tan when dried; surface smooth to slightly rimose-squamose on disc; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin decurved. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe equal, to 7.5 cm long, appearing fibrous, concolorous with pileus, solid; ring median, flaring upward, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia abundant, loosely fasciculate, 1.5-6.0 µm diam, unbranched; hyphae of pileus flesh 3.8-21.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 µm diam, occasionally slightly inflated; basidia 6.0-7.5 x 13.8-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-10.7 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 7.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-7.0 µm, ovoid to ellipsoid when immature, becoming globose to subglobose when mature; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: A very squat, thick-fleshed species, *A. rodmani* is remarkable for its preference for urban habitats. It differs from *A. campestris* in its lack of cheilocystidia and generally smaller spores. The nature of the ring is highly variable as also noted by Kauffman (1918) and Hotson & Stuntz (1938); at times it is distinctly double, appearing as two single rings, one just above the other, but at other times it appears to be single. There is no difference microscopically between the two forms.

The distribution of these specimens suggests that *A. rodmani* is a northern species whose range has extended southward. The species is edible and, according to Peck, equal

to *A. campestris* in flavor.

Specimens examined:

New York: Astoria, L.I., no date, det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Chapel Hill, 17.x.12, coll. W. B. Cobb (as *A. campestris*), no. 587 (NCU).

Tennessee: Smoky Mtn. Nat'l Park, Elkmont, 2.xi.41, det. A. H. Freeman, no. 14051 (TENN).

Washington, D.C.: 14.ix.23, det. Dr. C. Thom., s.n. (BPI); 22.v.29, det. V. K. Charles, s.n. (BPI).

7. AGARICUS COMPTULIFORMIS MURRILL, Mycologia 14: 203. 1922.

TYPE SPECIMEN (holotype, explicit): NY, Auburn, Ala. 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 5 cm diam (Murrill), bright yellow, then white (Murrill), dull tan when dried; surface smooth; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal, to 5 cm long, appearing fibrous, white to tawny with more or less fibrous scales below ring (Murrill), concolorous with pileus when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.0-6.0 µm diam, scattered, branched or unbranched; hyphae of pileus flesh 3.0-20.0 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 µm diam, occasionally inflated; basidia 6.0-7.5 x 18.5-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Universal veil hyphae (stipe surface below ring) slightly inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus comptuliformis*, like *A. campestris*, possesses uninflated or only slightly inflated universal veil tissue and a glabrous white pileus. *Agaricus comptuliformis*, however, lacks cheilocystidia and has much

smaller spores than *A. campestris*. The species is also very closely related to *A. sulphureiceps* from which *A. comptuliformis* differs primarily in possession of an equal stipe and broadly ellipsoid to ovoid spores.

The species is found in open wooded areas (*teste* Murrill). Its edibility is unknown. Current distribution includes mountainous and coastal plain areas (Alabama and Tennessee).

Specimens examined:

Alabama: Auburn, 29.vii.99, coll. F. S. Earle, det. W. A. Murrill, s.n. (NY, TYPE); Fusihatchie, 21.xi.42, det. A. H. Smith, s.n. (MICH).

Tennessee: Carter School, Knox Co., 7/10/34. det. B. F. Isaacs, no. 3947 (TENN); Knoxville, 13.vii.41, det. A. H. Smith, no. 13825 (TENN); Knoxville, 13.vi.51, det. B. F. Isaacs, no. 20051 (TENN); Knoxville, 10.vi.60, det. B. F. Isaacs, no. 23709 (TENN); Knoxville, 27.v.74, det. L. R. Hesler, no. 39214 (TENN).

8. AGARICUS SOLIDIPES PECK, Bull. Torrey Bot. Club 31: 180. 1904.

TYPE SPECIMEN (holotype, implicit): NYS, Denver, Colo., no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (!)

Stature of carpophore campestroid; mature pileus convex, to 7 cm diam (Peck), white or whitish (Peck), pale cream when dried; surface squamose or rimose-squamose, scales imbricate, to 4 mm thick; dried flesh to 5 mm thick at disc, thinning to 1 mm at margin; margin involute. Lamellae (mature) deep chocolate brown, free, to 6 mm deep. Stipe equal, to 4 cm long, appearing fibrous, concolorous with pileus, solid; ring superior to appendiculate, cream colored when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh highly inflated, to 27.5 µm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.5 µm diam, irregularly inflated; basidia 4.5-7.5 x 20.0-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-9.2 µm diam. Hyphae of universal veil (stipe surface below ring) inflated, to 16.8 µm diam, without clamp connections, thin-walled, hyaline.

Spores 7.5-12.2 x 6.0-7.5 µm, subglobose to ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Although somewhat resembling *A. campestris*, *A. solidipes* may be distinguished by its lack of cheilocystidia, imbricate cracking of the pileus and larger spores.

The species is found in meadows and is, according to Peck, edible. *Agaricus solidipes* currently has a rather disjunct distribution having been collected in Florida and Colorado; further collecting might solidify the distribution, but it may be that this is strictly a coastal plain and prairie species.

Specimens examined:

Colorado: Denver, no date, coll. E. B. Sterling, det. C. H. Peck, s.n. (NYS, TYPE).

Florida: Gainesville, 14.v.43, det. A. H. Smith, no. F1935 (MICH).

9. AGARICUS SUBPONDEROSUS MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.xii.44, coll. & det. W. A. Murrill, no. 21775. (!) Isotype: TENN, no. 21107. (!)

Stature of carpophore robustly campestroid; mature pileus convex to plane, to 12 cm diam (Murrill), white (Murrill), gold when dried; surface squamulose; dried flesh to 12 mm thick around depressed disc, thinning to < 1 mm at margin; margin upturned with age. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 12 cm long, appearing fibrous, concolorous with pileus, solid; ring appendiculate, superior when adhering to stipe, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 µm diam, usually unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-10.7 µm diam, occasionally inflated; basidia 5.5-7.0 x 12.2-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, 3.0-6.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This is a large, thick-fleshed species,

suggesting *A. campestris*, but lacking cheilocystidia, bearing floccose squamules and having smaller spores. From *A. praemagniceps*, *A. subponderosus* may be distinguished by its lack of multicellular cheilocystidia.

The species is found in shaded, grassy areas and is currently known only from Florida and Tennessee. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 4.xii.44, coll. & det. W. A. Murrill, no. 21775 (FLAS, TYPE); Gainesville, 7/11/42, det. W. A. Murrill (as *Agaricus cylindriceps*), no. F22137 (FLAS).

Tennessee: Knoxville, 17.v.53, det. B. F. Isaacs, no. 20818 (TENN); Knoxville, 1.v.54, det. B. F. Isaacs, no. 21313 (TENN); Knoxville, 2.vi.57, det. B. F. Isaacs, no. 22581 (TENN); Knoxville, 27.v.61, det. B. F. Isaacs, no. 23748 (TENN); Knoxville, 22.v.72, det. L. R. Hesler, no. 36706 (TENN).

10. AGARICUS CYLINDRICEPS MURRILL VAR. CYLINDRICEPS, Lloydia 7: 323. 1944.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 13.viii.37, coll. & det. W. A. Murrill, no. 16050. (!) Cotype: NY, no. F16050. (!)

Stature of carpophore campestroid; young pileus convex-truncate, with flattened disc, not fully expanded at maturity, to 8 cm diam (Murrill), white or pale yellow-white (Murrill), dull gray-gold when dried; surface minutely squamulose; dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin; margin inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 7.5 cm long, appearing fibrous, white (Murrill), gray when dried, solid; ring median to superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia usually unbranched, fasciculate or scattered, to 7.5 µm diam; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 1.5-9.2 µm diam, uninflated or only slightly so; basidia 4.5-7.0 x 12.2-24.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 µm diam. Hyphae of universal veil (stipe surface below ring) inflated slightly, to 7.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, ovoid to ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: The convex-truncate nature of the immature pileus, which, even with age, never fully expands, serves to make this species easily identifiable. This shape of the pileus, the inrolled margin and campestroid stature are the species' most distinctive characteristics.

The species is found in grassy exposed areas (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 13.viii.37, coll. & det. W. A. Murrill, no. 16050 (FLAS, TYPE); Gainesville, det. R. Singer, no. F2080/I (MICH); Gainesville, 22.v.43, det. W. A. Murrill, s.n. (MICH); Gainesville, 27.v.43, det. W. A. Murrill, s.n. (MICH); Gainesville, det. W. A. Murrill, s.n. (MICH); Gainesville, 13.vi.42, det. W. A. Murrill, no. 16048 (TENN); Gainesville, 1.vi.44, det. W. A. Murrill, no. F8731 (FLAS); Gainesville, 4.vii.38, det. W. A. Murrill, no. F17350 (FLAS); Gainesville, 21.ix.41, det. W. A. Murrill, no. F9263 (FLAS); Gainesville, 6/2/38, det. W. A. Murrill, no. F16426 (FLAS); Gainesville, 19.vi.42, det. W. A. Murrill, s.n. (NYS); Gainesville, 21.vi.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 14.viii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 26.xii.41, det. A. H. Smith (as *Agaricus bivelatus*), s.n. (MICH); Gainesville, -.-.43, det. A. H. Smith (as *A. bivelatus*), s.n. (MICH).

11. AGARICUS SULPHUREICEPS MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 18.vi.44, coll. & det. W. A. Murrill, no. 38805 (!)

Stature of carpophore placomycetoid; mature pileus campanulate to expanded, to 4 cm diam (Murrill), sulphureous, slightly darker on the disc (Murrill), gold when dried; surface finely fibrillose; dried flesh 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe more or less bulbous, to 3.5 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia scattered, 3.0-4.5 µm diam, unbranched; hyphae of pileus flesh 3.0-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-7.5 µm diam, uninflated; basidia 6.0-7.5 x 12.2-26.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3-12.2 µm diam, parallel, tightly packed. Hyphae of ring 1.5-9.2 µm diam. Hyphae of universal veil (stipe surface below ring) uninflated or only slightly so, to 12.0 µm diam,

without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x (3.0)3.8 µm, subglobose to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Although very closely related to *A. comptuliformis*, *A. sulphureiceps* may be distinguished by its bulbous stipe and subglobose spores. Murrill (1945) also compared the two species, but added that *A. sulphureiceps* differs also in color and habitat as well as stipe length and shape. Although the two species are very close, I believe the above differences, taken *in toto*, serve to separate two distinct taxa.

The species is found in open woodlands (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 18.vi.44, coll. & det. W. A. Murrill, no. 38805 (FLAS, TYPE); Gainesville, 25.ix.51, det. W. A. Murrill, no. F45880 (FLAS); Gainesville, 16.vi.49, det. W. A. Murrill, no. F8810 (FLAS); Gainesville, 21.ix.51, det. W. A. Murrill, no. F45882 (FLAS); Gainesville, 12.ix.50, det. W. A. Murrill, no. F 45884 (FLAS); Gainesville, 8.viii.44., det. W. A. Murrill, no. F8929 (FLAS); Gainesville, 18.vi.44, det. W. A. Murrill, no. 21108 (TENN).

Subgenus *Lanagaricus* Heinem. emend. Freeman

Flore Icon. des Champ. du Congo, Fasc. 5: 114. 1956.
≡ *Agaricus* subgen. *Euagaricus* Pilát, Acta Mus. Nat. Pragae 7B(1): 27. 1951. (*p.p.*)
≡ *Agaricus* subgen. *Psalliota* Konrad & Maublanc, Rev. Hymeno. de France, 58. 1924-1937. (*p.p.*)

Type Species: *Agaricus trisulphuratus* Berk.[1]

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[1] *Agaricus trisulphuratus* Berkeley, Ann. Mag. Nat. Hist., Ser. 5: xv, 386. 1885.

Type Specimen (holotype, explicit): K, Zanzibar, 6.xi.84, coll. & det. Berkeley, s.n.

Stature of carpophore placomycetoid; pileus convex to slightly umbonate, 1.0 cm diam, gold when dried; surface inconspicuously tufted-scaly; dried flesh < 1.0 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free. Stipe 1.5 cm long, equal to slightly bulbous,

Stature of fruit bodies usually placomycetoid (pileus diameter divided by stipe length ratio < 1); stipe usually bulbous; annulus usually well-developed; universal veil cellular (Fig. 1B), consisting of regularly inflated, barrel-shaped cells, or irregularly inflated or diverticulate cells; species generally fruiting in wooded areas.

Observations: As in subgenus *Agaricus*, emendation of this subgenus is based on emphasis of the universal veil tissue and omission of the chemical tests conducted by Heinemann. Because *A. triculphuratus* falls within the limits of my subgeneric circumscription, my emendation has not significantly altered Heinemann's concept.

Key to Species

1. Stature campestroid 2
1. Stature placomycetoid 11

2. Cheilocystidia absent 3
2. Cheilocystidia present 8

3. Pileus surface bearing colored scales 4
3. Pileus surface silky or if scaly then the scales concolorous with pileus surface 6

4. Spores 6.0-7.5 x 3.8-4.5 µm; pileus to 18 cm diam; stipe to 10 cm long . . . . . 12. *A. praemagnus* Murr.
4. Spores and fruit body smaller than above . . . 5

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appearing fibrous, concolorous with pileus; ring median, evanescent, gold when dried.

Hyphae of stipe above ring 1.5-12.2 µm diam, parallel, tightly packed. Hyphae of ring 4.6-12.2 µm diam. Cells of universal veil (stipe surface below ring) to 10.7 µm diam, regularly inflated, without clamp connections, thin-walled, hyaline.

Spores (4.6)5.4(6.0) x 3.8(4.6) µm, broadly ellipsoid to ovoid; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Note: This description is incomplete because only a single small carpophore, whose pileal tissues were indiscernible, was made available for study.

5. Universal veil cells highly inflated, to 46.0 µm diam; pileus to 8 cm diam, disc glabrous; spores 4.5-6.0 x 3.8-4.5(6.0) µm . . . . . 13. *A. pseudoplacomyces* Murr.

5. Universal veil cells not highly inflated, to 28.5 µm diam; pileus to 4.5 cm diam, gold with gold appressed fibrillose scales when dried; spores 4.5-6.0 x 3.0-4.5 µm . . . 14. *A. nobelianus* Freeman

6. Spores 6.0-7.5 x 4.5-6.0 µm; pileus to 9 cm diam, margin projecting; stipe bulbous, to 7 cm long . . . . . 15. *A. xanthodermoides* Murr.

6. Spores generally smaller than above 7

7. Ring superior, thick, persistent; spores 5.3-7.0 x 4.5-5.3 µm; pileus to 9 cm diam, margin projecting . . . . . 16. *A. blazei* Murr.

7. Ring median to superior, more or less evanescent; spores 4.5-6.0 x 3.8-4.5 µm; pileus to 7 cm diam, margin slightly inrolled . . . . . 17. *A. auricolor* Krieger ss. Coker

8. Cheilocystidia multicellular, scattered, to 6.0 µm diam; pileus to 15 cm diam, with fibrils on the disc; stipe bulbous, to 10 cm long; spores (4.5)5.3-6.0 x 3.8-4.5 µm . . . . . 18. *A. praemagniceps* Murr.

8. Cheilocystidia not as above 9

9. Pileus imbricate-scaly on disc, to 10 cm diam; margin projecting 1 mm, more or less inrolled; stipe equal, to 7 cm long; spores 6.0-7.5 x 4.5-6.0 µm diam; cheilocystidia scattered, napiform, brown, 10.7-15.3 µm diam 19. *A. alligator* Murr.

9. Pileus not as above, spores smaller than above . . 10

10. Universal veil cells irregularly inflated, to 18.5 µm diam; spores 5.5-6.0 x 3.8-4.5 µm; pileus convex, not fully expanded, to 6.5 cm diam, smooth to fibrillose; stipe to 6 cm long . . . . . 20. *A. alabamensis* Murr.

10. Universal veil cells regularly inflated (barrel-shaped), to 15.3 µm diam; spores 6.0-6.8 x 4.5-5.3 µm; pileus broadly convex to plane, occasionally rimose-areolate, to 15 cm diam; stipe to 10 cm long . . . . . 21. *A. floridanus* Pk.

11. Cheilocystidia present 12

11. Cheilocystidia absent 16

12. Spores 7.5-9.2 x (4.5)5.3(6.0) µm; pileus to 7 cm diam; stipe bulbous, to 8 cm long; surface appressed silky fibrillose to scaly

on disc; lamella edge sterile with broadly clavate to napiform cheilocystidia, 7.5-17.5 µm diam . . . . . 22. *A. arvensis* var. *palustris* Smith

12. Spores smaller than above 13

13. Fruit body small; pileus to 4 cm diam, stipe bulbous, to 4 cm long; surface covered with imbricate purple scales; cheilocystidia napiform, to 9.2 µm diam; spores 4.5-6.0 x 3.0-3.8 µm . . . . . 23. *A. alachuanus* Murr.

13. Fruit body larger than above 14

14. Pileus surface covered with fine gray to smoky appressed fibrillose scales, to 11 cm diam; stipe bulbous, to 11 cm long; cheilocystidia broadly clavate to napiform, 7.2-10.0 µm diam; spores (4.3)5.0-5.7 x 2.8-3.5 µm . . . . . 24. *A. praeclaresquamosus nom. nov.*

14. Pileus surface not as above 15

15. Pileus densely brown fibrillose-scaly, to 8 cm diam; pileocystidia 7.0-13.8 µm diam; stipe equal to slightly bulbous, to 5 cm long; cheilocystidia scattered, napiform, to 20.0 µm diam; spores 4.5-5.5(6.0) x 3.0-3.8 µm . . . . . 25. *A. rubribrunnescens* Murr.

15. Pileus squamulose, to 12 cm diam; stipe bulbous, to 10 cm long; cheilocystidia scattered, broadly capitulate to napiform, to 6.0 µm diam; spores (4.5)5.5-6.0(8.5) x 3.0-4.5 µm . . . . . 26. *A. badius* Freeman

16. Fruit body small, pileus usually less than 4 cm diam 17

16. Fruit body larger than above 21

17. Universal veil cells irregularly inflated, to 14.0 µm diam; spores 4.5-5.3(6.0) x 3.8 µm; pileus to 1.5 cm diam, fibrillose on disc; stipe to 3.5 cm long, equal to slightly bulbous . . . . . 27. *A. diminutivus* Pk.

17. Universal veil cells regularly inflated (barrel-shaped), spores larger than above 18

18. Pileus squamulose, to 3.5 cm diam, margin slightly inrolled; stipe equal to tapering upward, to 3 cm long; spores 6.0-7.0 x 4.5 µm . . . . . 28. *A. subalachuanus* Murr.

18. Pileus minutely scaly or fibrillose, to 2.5 cm diam, margin even 19

19. Pileus minutely scaly, isabelline, becoming tan to dull brown when dried; stipe to 3.0 cm long; spores 4.5-7.0 x 3.0-4.5 µm . . . . . 29. *A. subcomptulus* Murr.

19. Pileus fibrillose, not scaly 20

20. Ring superior, thick, mobile when dried; pileus grayish when fresh; spores 6.0-7.0 x 3.8-4.5 µm . . . . . .30. *A. hannonii* Freeman

20. Ring superior, evanescent, not mobile when dried; pileus cream-yellow when fresh; spores 4.5-6.0(7.0) x 3.8-4.5 µm . . . . . 31. *A. tantulus* Freeman

21. Pileus innately brown-fibrillose, not scaly . . . 22

21. Pileus squamulose or smooth 23

22. Spores 6.0-8.5 x 5.3-6.0 µm; pileus to 5 cm diam; stipe equal, to 4 cm long . . . . 32. *A. subhortensis* Murr.

22. Spores 5.3-6.0 x 3.8-4.5 µm; pileus to 6.5 cm diam; stipe bulbous, to 8 cm long . . 33. *A. rhoadsii* Murr.

23. Pileus appressed fibrillose-squamulose, to 15 cm diam, becoming gold when dried; stipe abruptly bulbous, to 10 cm long, often with one to three rhizomorphic strands; spores 5.5-6.0 x 3.8-4.5 µm . . . . . 34. *A. auresiccescens* Freeman

23. Pileus squamulose, spores larger than above . . . 24

24. Spores 4.5-7.5(9.2) x 3.8-5.3 µm; size of fruit body variable; pileus to 15 cm diam, always very thick-set; stipe bulbous, to 10 cm long . . . . . 35. *A. subrufescens* Pk.

24. Fruit bodies smaller than above 25

25. Ring obviously double, the partial veil forming a discrete roll of tissue on the lower surface of the marginal veil; pileus to 10 cm diam, minutely scaly; stipe bulbous, to 8 cm long; spores 4.5-6.0 x 3.0-3.8 µm . . . . . 36. *A. pocillator* Murr.

25. Ring not as above 26

26. Universal veil cells irregularly inflated . . 27

26. Universal veil cells regularly inflated (barrel-shaped) 28

27. Pileus squamulose, to 7.5 cm diam; stipe bulbous, often with one or two rhizomorphic strands attached to the base, to 12.5 cm long; spores 4.5-6.0 x 3.0-

3.8(4.5) µm . . . . . 37. *A. placomyces* Pk.

27. Pileus smooth, to 6.5 cm diam; stipe abruptly bulbous, the bulb often somewhat flattened on top, to 12.5 cm long; spores 6.0-7.5 x 4.5 µm . . 38. *A. abruptibulbus* Pk.

28. Stipe broad at base, tapering upward, to 5 cm long, pileus conic to truncate-convex, with fibrillose scales, to 7 cm diam; spores 4.5-6.0 x 3.8-4.5 µm . . . . . 39. *A. blockii* Murr.

28. Stipe not as above 29

29. Pileus convex, depressed in center, slightly squamulose, to 5 cm diam; stipe distinctly bulbous, to 3 cm long; spores 4.5-6.0 x 3.8-4.5 µm . . . . . 40. *A. citrinidiscus* Murr.

29. Pileus not depressed in center 30

30. Margin projecting to 5 mm, inrolled; pileus occasionally minutely floccose, to 8 cm diam; spores (4.5)6.0-7.5 x 3.8-5.3 µm . . . . . 41. *A. projectellus* Murr.

30. Margin not projecting; pileus broadly umbonate, to 8 cm diam, squamulose; spores 4.5-6.0 x 4.5-5.5 µm . . . . . 42. *A. subarvensis* Murr.

12. AGARICUS PRAEMAGNUS MURRILL, Mycologia 10: 78. 1918.

TYPE SPECIMEN (holotype, explicit): NY, Cuba, 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 18 cm diam (Murrill), avellaneous to dirty-white or yellowish with minute appressed avellaneous or brownish scales (Murrill), dull gold with gray tinges and grayish scales when dried; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe more or less bulbous, to 10 cm long, appearing fibrous, dirty-white (Murrill), dull gray-gold when dried; ring superior, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-10.7 µm diam, loosely fasciculate or scattered, unbranched; hyphae of pileus flesh 4.5-15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-16.8 µm diam, occasionally inflated; basidia 5.5-6.0 x 12.2-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-16.8 µm diam, parallel, tightly packed. Hyphae of ring 3.8-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to

20.0(29.0) µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 3.8-4.5 µm, ovoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Of studied species with cellular universal veil tissue and campestroid stature but lacking cheilocystidia, *A. praemagnus* is not only larger overall, but can be distinguished most obviously by its dark colored, appressed, fibrillose scales. It is also interesting to note the range of this species; first described from Cuba, it has since been found in Florida and as far north as Tennessee.

The species is found in grassy areas (*teste* Murrill). Edibility is unknown.

Specimens examined:

Cuba: 13.v.04, coll. F. S. Earle, det. W. A. Murrill, no. 18 (NY, TYPE).

Florida: Gainesville, 20.vii.45, det. B. F. Isaacs, no. 21109 (TENN).

Tennessee: Knoxville, 11.x.37, det. B. F. Isaacs, no. 10883 (TENN); Knoxville, 11.viii.49, det. B. F. Isaacs, no. 19221 (TENN); Knoxville, 7.x.56, det. B. F. Isaacs, no. 22443 (TENN).

13. AGARICUS PSEUDOPLACOMYCES MURILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.v.44, coll. & det. W. A. Murrill, no. 20483. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 8 cm diam (Murrill), surface covered except on disc with purple-brown scales (Murrill), brown when dried; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous or equal, to 5 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia tightly fasciculate, to 9.2 µm diam, unbranched; hyphae of pileus flesh 4.5-21.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-12.2 µm diam, uninflated; basidia 6.0-9.2 x 10.7-15.3 µm, 4-sterigmate, without clamp connec-

tions; cystidia lacking. Hyphae of stipe surface above ring 4.5-20.0 µm diam, parallel, tightly packed. Hyphae of ring 4.5-15.3 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.0(46.0) µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5(6.0) µm, subglobose to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Murrill (1945) adequately distinguished *A. pseudoplacomyces* from *A. placomyces* by remarking that *A. pseudoplacomyces* exhibited a shorter stipe, wider spores, and smaller, less persistent scales than *A. placomyces*. *Agaricus pseudoplacomyces* is also almost campestroid in stature, but is very thin-fleshed and generally bears a bulb at the stipe base. The color of the scales and their tendency to be lost, squat stature, highly inflated universal veil tissue and wider spores all serve to distinguish this species.

The species is found in open woodlands (*teste* Murrill) and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 24.v.44, coll. & det. W. A. Murrill, no. 20483 (FLAS, TYPE); Gainesville, 20.iv.44, det. W. A. Murrill, no. F18435 (FLAS); Gainesville, 20.vi.44, det. W. A. Murrill, no. 21106 (TENN); Gainesville, 5.vii.44, det. W. A. Murrill, no. F45896 (FLAS).

14. AGARICUS NOBELIANUS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., -.-.50, coll. & det. W. A. Murrill, no. 19146. (!)
Topotype: FLAS, -.-.51, coll. & det. W. A. Murrill, no. 45904. (!)
[≡ *A. nobelianus* Murrill, *nom. herb.*]

Statura campestroidia; pileo convexo mox plano, 4.5 cm diam, fusco, summo squameo; stipito bulboso, 5.5 cm longo; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum-28.5 µm diam; sporis 4.5-6.0 x 3.0-4.5 µm.

Stature of carpophore campestroid; mature pileus convex to subexpanded, to 4.5 cm diam, dull gold-brown with dark golden brown scales when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 5 cm long, appearing fibrous, concolorous with pileus when dried; ring super-

ior, membranous, gold-brown when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate, 3.5-14.3 µm diam, usually unbranched; hyphae of pileus flesh 6.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, uninflated; basidia 6.0 x 13.8-16.8 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 4.5-9.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 28.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 µm, subglobose to ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: To the best of my knowledge, Murrill never published a description of this taxon. The taxon is distinct and Murrill's original name is retained in acknowledgement of his recognition of the species.

The species is close to *A. praemagnus*, but may be distinguished from the latter by its smaller overall size and smaller spores; from *A. pseudoplacomyces*, *A. nobelianus* is distinguished by its golden scales, less highly inflated universal veil tissue and slightly smaller spores.

Of several collections other than the type and topotype, all were in too poor condition for positive identification. The type collection consists of a single mature fruit body and brief notes by Murrill; the topotype contains two mature specimens.

Range, habitat preference and edibility are unknown.

15. AGARICUS XANTHODERMOIDES MURRILL, Quart. J. Florida Acad. Sci. 8: 195. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 25.iii.44, coll. & det. W. A. Murrill, no. 22503. (!) Cotype: TENN, no. 16056. (!)

Stature of carpophore delicately campestroid; pileus convex, then expanded, to 9 cm diam, white (Murrill), dull gray-tan when dried; surface silky to slightly scaly; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin projecting 3 mm. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe slightly bulbous, to 7 cm long, appearing fibrous, pubescent (Murrill), concolorous with pileus when dried, solid; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh 4.5-23.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 µm diam, occasionally inflated; basidia 6.0-7.5 x 13.8-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-20.0 µm diam, parallel, tightly packed. Hyphae of ring 2.3-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 µm, globose to broadly ellipsoid; wall dark brown, slightly greater than 0.6 µm thick; apiculus indiscernible or merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is one of several exhibiting campestroid stature and cellular universal veil tissue but lacking cheilocystidia. From *A. praemagnus*, *A. xanthodermoides* may be distinguished primarily by its smaller size and from *A. blazei* by its smaller spores. Murrill noted that the cuticle turns yellow in KOH; this is apparently only observed on fresh material.

The species may be found in open grassy areas (*teste* Murrill). Up to the present time, its distribution is limited to coastal plain regions.

Specimens examined:

Alabama: Auburn, 1.viii.55, det. B. F. Isaacs, no. 21947 (TENN).

Florida: Gainesville, 25.viii.44, coll. & det. W. A. Murrill, no. 22503 (FLAS, TYPE); Gainesville, 18.iv.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 28.iv.43, det. W. A. Murrill (as *Agaricus subarvensis*), no. 21104 (TENN).

South Carolina: Winnsboro, 16.v.66, det. A. H. Freeman, no. 28467 (TENN).

16. AGARICUS BLAZEI MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911. (!) Cotype: NY, s.n. (!)

Stature of carpophore campestroid; mature pileus subcylindric to subexpanded, to 9 cm diam (Murrill), cream to ochraceous (Murrill), dull gold when dried; surface finely scaly; dried flesh to 11 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature)

deep chocolate brown, free, to 3 mm deep. Stipe equal to sub-bulbous, to 6 cm long, appearing fibrous, concolorous with pileus; ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-6.0 µm diam, branched or unbranched; hyphae of pileus flesh 3.0-16.8 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 µm diam, occasionally inflated; basidia 5.5-9.2 x 15.3-26.0 µm, 4-sterigmate, without clamp connections, cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 µm diam, parallel, tightly packed. Hyphae of ring 1.5-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.3-7.0 x (3.8)4.5-5.3 µm, subglobose to ovoid or broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus blazei* is one of several species with campestroid stature and cellular universal veil tissue, but lacking cheilocystidia. From *A. praemagnus* it may be distinguished by its smaller size, thicker flesh, projecting margin and delicate scales which are concolorous with the pileus surface. The spores are also somewhat smaller. From *A. xanthodermoides* it differs in its more robust stature and smaller spores.

The species is found in open grassy areas (*teste* Murrill); its current distribution is limited to coastal plain areas of Florida and South Carolina. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 24.iv.44, coll. R. W. Blaze, det. W. A. Murrill, no. 32911 (FLAS, TYPE); Gainesville, 25.vi.42, det. R. Singer (as *Agaricus subfloridanus*), no. F9784 (FLAS); Gainesville, 4/7/39, det. W. A. Murrill (as *A. subfloridanus*), no. F19635 (FLAS); Gainesville, 30.iv.50, det. W. A. Murrill (as *A. blazei minor*), no. F17664 (FLAS); Gainesville, 9.vii.51, det. W. A. Murrill, no. F45918 (FLAS); Gainesville, 20.ix.44, det. W. A. Murrill, no. F45909 (FLAS); Gainesville, 24.iii.51, det. W. A. Murrill, no. F45928 (FLAS); Gainesville, 1.viii.52, det. W. A. Murrill, no. F45929 (FLAS); Gainesville, 29.vi.52, det. W. A. Murrill, no. F45917 (FLAS); Gainesville, 5/12/44, det. W. A. Murrill, no. F9008 (FLAS); Gainesville, 27.v.43, det. W. A. Murrill (as *A. cylindriceps*), no. F19258 (FLAS); Gainesville, 17.viii.51, det. W. A. Murrill, no. F45926 (FLAS); Gainesville, 2.vii.52, det. W. A. Murrill, no.

F45924 (FLAS); Gainesville, 21.vii.51, det. W. A. Murrill, no. F45922 (FLAS); Gainesville, 10.viii.51, det. W. A. Murrill, no. F45925 (FLAS); Gainesville, 13.ix.50, det. W. A. Murrill (as *A. blazei minor*), no. F45923 (FLAS); Gainesville, 14.vii.52, det. W. A. Murrill, no. F45927 (FLAS); Gainesville, 30.vi.51, det. W. A. Murrill, no. F45916 (FLAS); Gainesville, 29.v.48, det. W. A. Murrill (as *A. blazei minor*), no. F45908 (FLAS); Gainesville, 26. viii.51, det. W. A. Murrill, no. 21102 (TENN); Gainesville, 21.vii.50, det. W. A. Murrill, s.n. (BPI); Gainesville, 7/2/50, det. W. A. Murrill, s.n. (BPI); Gainesville, 9.ix.54, det. J. A. Stevenson, s.n. (BPI).

South Carolina: Caesar's Head, 16.vii.38, det. W. C. Coker (as *A. amygdalinus*), no. F45913 (FLAS); Winnsboro, 23.v.66, det. A. H. Freeman, no. 29018 (TENN).

17. AGARICUS AURICOLOR KRIEGER SS. COKER

(≡ *A. amygdalinus* Curtis *fide* Coker, *nom. herb.*)

Stature of carpophore campestroid or placomycetoid; mature pileus convex to plane, to 7 cm diam, dull gold when dried; surface smooth to slightly gold squamulose; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin slightly inrolled. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe slightly bulbous, to 7 cm long, appearing fibrous, flocculose near base, concolorous with pileus; ring median to superior, dull gold when dried; odor when fresh of peach kernels (Coker).

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered, 2.3-5.5 µm diam, unbranched; hyphae of pileus flesh 3.0-16.8 µm diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 3.0-8.5 µm diam, occasionally slightly inflated; basidia 6.0-7.0 x 15.3 x 18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.8-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: All of the collections from NCU had been labeled *A. amygdalinus* by Coker, but in 1928 he synonymized the name under *A. auricolor* Krieger, the type of which I have not seen. This species appears to be most readily distinguishable in the fresh state by its very strong odor of peach kernels. When dried, the species resemble dried

specimens of *A. abruptibulbus*, but it is generally campestroid in stature, bears considerably smaller spores and exhibits distinctly cellular, not highly inflated universal veil tissue. Also, unlike *A. abruptibulbus*, *A. auricolor* tends to be slightly squamulose on the pileus surface.

Edibility is unknown.

Specimens examined:

North Carolina: Chapel Hill, 31.v.19, coll. W. C. Coker, no. 3274 (NCU); Highlands, 16.vii.38, coll. W. C. Coker, no. 10826 (NCU); Chapel Hill, 7.ix.15, coll. H. R. Totten, no. 1692 (NCU); Chapel Hill, 31.v.19, coll. W. C. Coker, no. 3209 (NCU); Chapel Hill, 8.vii.14, coll. W. C. Coker, no. 1099 (NCU); Chapel Hill, 28.ix.14, coll. W. C. Coker, no. 1279 (NCU); Chapel Hill, 27.vii.15, coll. H. R. Totten, no. 1650 (NCU); Chapel Hill, 24.ix.14, coll. W. C. Coker, no. 1259 (NCU); Chapel Hill, 7.vi.15, coll. W. C. Coker, no. 1542 (NCU); Chapel Hill, 6.vii.14, coll. W. C. Coker, no. 1092 (NCU); Chapel Hill, 12.vii.14, coll. W. C. Coker, no. 1125 (NCU).

18. AGARICUS PRAEMAGNICEPS MURRILL, J. Elisha Mitchell Sci. Soc. 54: 140. 1938.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 15.viii.37, coll. & det. W. A. Murrill, no. 16051. (!)

Stature of carpophore campestroid; mature pileus cylindric-truncate to convex, expanded, depressed over the disc, to 15 cm diam (Murrill), avellaneous when young, becoming pallid with age (Murrill), gray-gold, brown on the disc when dried; surface smooth with the exception of minute avellaneous fibrils on the disc; dried flesh 3-5 mm thick around the depressed disc, thinning to < 1 mm at the margin; margin more or less inrolled. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, white (Murrill), concolorous with the pileus when dried; ring more or less appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia locally abundant (on disc), loosely fasciculate or scattered, 2.3-7.0 µm diam, usually unbranched; hyphae of pileus flesh 3.0-20.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 µm diam, occasionally inflated; basidia 5.5-7.5 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, catenulate chains of 2-3-4 cells, to 6.0 µm diam, thin-walled. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of univer-

sal veil (stipe surface below ring) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, less than 0.6 µm thick; apiculus indiscernible or merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Of several species exhibiting campestroid stature, cellular universal veil tissue and bearing cheilocystidia, *A. praemagniceps* alone bears multicellular cheilocystidia and therefore can be easily distinguished.

The species is found in open woodlands (*teste* Murrill) and up to the present time has been found only in Florida. Murrill reported it "disappointing" from the standpoint of the mycophagist.

Specimens examined:

Florida: Gainesville, 15.viii.37, coll. & det. W. A. Murrill, no. 16051 (FLAS, TYPE); Gainesville, det. W. A. Murrill, no. F8980 (FLAS); Gainesville, 12.ii.49, det. W. A. Murrill, no. F45892 (FLAS); Marion Co., 8/10/39, det. W. A. Murrill, no. F19907 (FLAS); Sugarfoot, 4/11/43, det. W. A. Murrill, no. F10249 (FLAS); Gainesville, 26.xii.41, det. A. H. Smith, no. F19565 (FLAS); Gainesville, 31.v.47, det. W. A. Murrill, no. F8766 (FLAS); Gainesville, -.-.43, det. A. H. Smith, s.n. (MICH); Gainesville, 17.v.43, det. A. H. Smith (as *Agaricus sylvicola*), no. F1955A (MICH); Gainesville, 14.vi.39, det. W. A. Murrill, no. 16052 (TENN).

19. AGARICUS ALLIGATOR MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.x.41, coll. & det. W. A. Murrill, no. 19566. (!) Cotype: TENN, no. 21101. (!)

Stature of carpophore campestroid; mature pileus convex to expanded, to 10 cm diam (Murrill), white (Murrill), yellowing when handled (Murrill), dull gray-gold when dried; surface silky, imbricate-scaly on disc; dried flesh to 7 mm thick at disc, thinning to 1 mm at margin; margin projecting 1 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal, to 7 cm long, appearing fibrous, concolorous with pileus, yellowing when handled (Murrill), solid; ring median, more or less appendiculate, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia 3.8-6.0 µm diam, irregularly inflated, branched, loosely fasciculate; hyphae of pileus flesh 3.0-

16.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-10.0 µm diam, occasionally inflated; basidia 7.5 x 9.2-15.3 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, brownish, 10.7-15.3 µm diam. Hyphae of stipe surface above ring 4.5-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.5 x 4.5-6.0 µm, ovoid to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: *A. alligator*, along with *A. floridanus* and *A. alabamensis*, combines the campestroid stature and cellular universal veil tissue with the presence of cheilocystidia. This species is, however, readily distinguishable by the small, imbricate scales which cover the pileus, particularly the disc, and which gave the species its name. Murrill (1945) also compared the species to *A. floridanus*, distinguishing *A. alligator* by its scaly surface, and added that unlike *A. floridanus*, the pileus and stipe became yellowed where bruised or handled.

The species is found in open grassy areas (*teste* Murrill) and appears to be restricted to the coastal plain region. Edibility is unknown.

Specimens examined:

Alabama: Tuscaloosa, 19.viii.52, det. A. H. Freeman, no. 20638 (TENN).

Florida: Gainesville, 17.x.41, coll. & det. W. A. Murrill, no. 19566 (FLAS, TYPE).

20. AGARICUS ALABAMENSIS MURRILL, Mycologia 14: 202. 1922.

TYPE SPECIMEN (neotype, *des. mihi*): TENN, no. 10182, Gainesville, Fla., 7.vii.48, det. B. F. Isaacs.

Stature of carpophore campestroid; mature pileus convex, not fully expanded, to 6.5 cm diam, white (Murrill), dull gold when dried; surface smooth to fibrillose; dried flesh to 7 mm thick at disc, thinning to < 1 mm at margin; margin projecting 2 mm. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe tapering upward, to 6 cm long, slightly bulbous, appearing fibrous, concolorous with pileus; ring superior, persistent, thicker near margin, dull gold when dried.

Hyphae of pileus cuticle loosely interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 3.0-24.5 µm

diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-21.5 µm diam, occasionally inflated; basidia 6.0-7.5 x 13.8-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, broadly clavate to napiform, to 12.2 µm diam. Hyphae of stipe surface above ring 3.0-26.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-18.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 µm, broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Of several species combining the campestroid stature with cellular universal veil tissue and bearing napiform cheilocystidia, *A. alabamensis* is unique in that it lacks the imbricate scales on the pileus which characterize *A. alligator* and, unlike *A. floridanus*, the pileus never becomes rimosely areolate. The spores of *A. alabamensis* are also much smaller than either of the others. Murrill (1922) compared this species to *A. campestris*, but said it differed by having a longer stipe and smaller spores; the species does outwardly resemble *A. campestris*, but microscopically it is distinct.

The species is found in open grass in coastal plains areas. Edibility is unknown.

Specimens examined:

Alabama: Montgomery, -.-.42, det. A. H. Smith, s.n. (MICH).

Florida: Gainesville, Fla., 7.vii.48, det. B. F. Isaacs, no. 10182 (TENN, TYPE).

South Carolina: Winnsboro, 7.v.66, coll. C. Lyles (as *Agaricus* sp.), no. 27562 (TENN).

21. AGARICUS FLORIDANUS PECK, N.Y. State Mus. Bull. 150: 50. "1910" (1911).

TYPE SPECIMEN (holotype, implicit): NYS, DeFuniak Springs, Fla., 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck, s.n. (!) Isotype: FLAS, no. 45919. (!)

Stature of carpophore campestroid; mature pileus broadly convex to plane, to 15 cm diam (Peck), whitish with a yellow or yellowish center (Peck), dull gray-gold when dried; surface rimose-areolate to slightly strigose, becoming glabrous; dried flesh to 1 cm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown,

free, to 4 mm deep. Stipe equal to bulbous, to 10 cm long, appearing fibrous, ochraceous at base (Murrill), solid; ring superior, appendiculate on young specimens, dull gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate to scattered, 3.8-4.5 µm diam, unbranched; hyphae of pileus flesh 4.5-20.0 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.7 µm diam, uninflated; basidia 6.0-7.5 x 13.8-24.5 µm, 4-sterigmate, without clamp connections; cheilocystidia napiform, scattered, 12.2-18.5 µm diam, thin-walled. Hyphae of stipe surface above ring 3.0-15.3(30.5) µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x (3.8)4.5-5.3 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minute to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus floridanus*, one of several species combining the characters of campestroid stature and cellular universal veil tissue with the presence of napiform cheilocystidia, is readily distinguishable by its thick-fleshed pileus, which is often rimose-areolate. Murrill recognized the species in the field by its ochraceous stipe base.

The species is found in open grassy field with sandy soil (*teste* Murrill); it is currently known only from Florida. Edibility is unknown.

Specimens examined:

Florida: DeFuniak Springs, 29.iii.10, coll. G. Clyde Fisher, det. C. H. Peck (NYS, s.n., TYPE; FLAS, no. 45919, ISOTYPE); Gainesville, 2.iv.71, det. J. W. Kimbrough, no. F49096 (FLAS); Newberry Rd., 22.ii.39, det. W. A. Murrill, no. F18535 (FLAS); Gainesville, 22.ii.44, det. W. A. Murrill, no. F32688 (FLAS); Gainesville, 24.ii.45, det. W. A. Murrill, no. 45905 (FLAS); Gainesville, 24.iii.38, det. W. A. Murrill, no. F16064 (FLAS); Gainesville, 4/10/38, det. W. A. Murrill, no. F16200 (FLAS); Gainesville, 19.iii.44, det. W. A. Murrill, no. F18448 (FLAS); Gainesville, 3/1/44, det. W. A. Murrill, no. 20573 (FLAS); Gainesville, 27.iv.43, det. A. H. Smith, s.n. (MICH); Gainesville, 24.iii.38, det. W. A. Murrill, s.n. (MICH); F19339 (MICH); Gainesville, 19.iii.44, det. W. A. Murrill, no. 16049 (TENN); Winter Park, 21.iii.42, det. V. K. Charles, s.n. (BPI).

22. AGARICUS ARVENSIS VAR. PALUSTRIS SMITH, Pap. Mich. Acad. Sci. Arts, Let. 25: 117. "1939" (1940).

TYPE SPECIMEN (holotype, explicit); MICH, Kent Lake, Mich., 13.ix.37, coll. & det. A. H. Smith, s.n. (!)

Stature of carpophore placomycetoid; mature pileus broadly umbonate or convex to plane, to 35 cm diam (Smith), white, creamy or yellowish on the disc (Smith), uniformly gold when dried; surface appressed silky fibrillose to scaly on disc (Smith); dried flesh to 6 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 30 cm long (Smith), appearing fibrous, gray-gold when dried, hollow or stuffed; ring superior, gray-gold when dried.

Hyphae of pileus cuticle loosely interwoven; pileocystidia 3.0-7.5 µm diam, branched, scattered; hyphae of pileus flesh 4.5-15.3 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-20.0 µm diam, inflated; basidia 7.5-9.2 x 20.0-30.5 µm, 4-sterigmate, without clamp connections; cheilocystidia broadly clavate to napiform, 7.5-17.5 µm diam, fasciculate or forming a sterile band along entire gill edge. Hyphae of stipe surface above ring 3.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-10.7 µm diam. Cells of universal veil (stipe surface below ring, lower surface of ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores (7.0)7.5-9.2 x (4.5)5.3-6.0 µm, ovoid to pyriform; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: This species is remarkable for its large cheilocystidia and spores which distinguish it immediately from other near-glabrous, placomycetoid species.

The species is found in swampy areas. Originally described from Michigan, it has since been found in Alabama and Florida. Edibility is unknown.

Speciments examined:

Alabama: Sipsey Swamp, Tuscaloosa Co., 8/9/52, det. A. H. Freeman, no. 20626 (TENN).

Florida: Gainesville, 8.vii.51, det. W. A. Murrill (as *Agaricus sulphureiceps*), no. F45881 (FLAS).

Michigan: Kent Lake, 13.ix.37, coll. & det. A. H. Smith, s.n. (MICH, TYPE).

23. AGARICUS ALACHUANUS MURRILL, J. Elisha Mitchell Sci. Soc. 54: 140. 1938.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 17.viii.37, coll. & det. W. A. Murrill, no. 15917. (!).

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 4 cm diam, isabelline with imbricate purple scales (Murrill), deep tan with brown scales when dried; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4 cm long, appearing fibrous, concolorous with pileus; ring median, flaring, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 2.3-7.5 µm diam, irregularly inflated, unbranched; hyphae of pileus flesh 4.5-26.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-12.2 µm diam, slightly inflated; basidia 6.0-8.5 x 10.7-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia sparse, saccate to napiform, to 9.2 µm diam. Hyphae of stipe surface above ring 3.0-18.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 20 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.8 x 3.0-4.5 µm, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate or indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of several small (pileus less than 4.0 cm diam) species of *Agaricus* exhibiting placomycetoid stature and a squamulose pileus surface, *A. alachuanus* alone bears cheilocystidia and is therefore easily identifiable.

The species may be found in open woods (*teste* Murrill) and is currently known only from Florida. Edibility is unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 17.viii.37, coll. & det. W. A. Murrill, no. 15917 (FLAS, TYPE); Gainesville, 30.viii.39, det. W. A. Murrill (as *Agaricus subalachuanus*), no. 16054 (TENN); Gainesville, 5.ix.43, det. W. A. Murrill, no. 18446 (TENN); Gainesville, 9/6/38, det. W. A. Murrill, no. F18206 (FLAS); Gainesville, 15.vii.44, det. W. A. Murrill, no. F8983 (FLAS); Gainesville, 9/6/43, det. W. A. Murrill, no. F8885 (FLAS); Gainesville, 10/2/38, det. W. A. Murrill, no. F18386 (FLAS); Gainesville, 9/5/43, det. W. A. Murrill, no. F8742 (FLAS); Gainesville, 19.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 8.viii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 5.ix.43, det. W. A. Murrill, s.n. (BPI).

24. AGARICUS PRAECLARESQUAMOSUS FREEMAN, NOM. NOV.

≡ *Agaricus meleagris* J. Schaeffer. Zeitschr. f. Pilzk. 4: 28. 1925. [*non A. meleagris* Sow. ex Berkeley. Outl. Brit. Fung. 101. 1860].

Stature of carpophore placomycetoid; mature pileus convex, then expanded, to 11 cm diam, white, ivory, or gray, surface covered with fine gray to smoky black, appressed, fibrillose scales, disc solid gray, pileus drying yellow-cream with gray scales and brownish disc; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 11 cm long, appearing fibrous, concolorous with pileus; ring superior, occasionally somewhat floccose below, cream to dull brown when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia fasciculate or scattered, 2.3-11.5 µm diam, occasionally inflated, branched or unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae variable, 2.0-20.0 µm diam, occasionally inflated; basidia 5.5-7.0 x 13.0-23.0 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, 7.2-12.2 µm diam, broadly clavate to napiform. Hyphae of stipe surface above ring 2.3-14.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores variable, (4.3)5.0-5.7(7.5)·x 2.8-3.5(4.5) µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Although I have not examined European specimens, Pilát's (1951) and Schaeffer's descriptions and photographs are a sufficient circumscription of the taxon for identification of the species. The species is distinctive for its coloration and delicate nature of the scales on the pileus surface, resembling those of *A. pocillator*.

The species is found in mixed woods; its current North American range extends from Maryland to Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 18.v.43, det. A. H. Smith (as *Agaricus micromegethus*), no. F1963, F1962 (MICH).

Kentucky: Cumberland St. Pk. 22.x.55, det. B. F. Isaacs (as *A. sylvaticus*), no. 22192 (TENN).

Maryland: Riggs Woods, 17.viii.55, det. J. A. Stevenson

(as *A. abruptibulbus*), s.n. (BPI).

North Carolina: Highlands, 17.vii.55, det. B. F. Isaacs (as *A. sylvaticus*), no. 21885 (TENN).

Tennessee: GSMNP, 8/11/36, det. B. F. Isaacs (as *A. sylvaticus*), no. 9287 (TENN); GSMNP, 6/8/37, det. B. F. Isaacs (as *A. sylvaticus*), no. 10398 (TENN); GSMNP, 6/10/44, det. B. F. Isaacs (as *A. sylvaticus*), no. 16388 (TENN); GSMNP, Cades Cove, 12.viii.75, det. A. H. Freeman, no. 40332 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40333 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40334 (TENN); Univ. Tenn. woodlot, det. A. H. Freeman, no. 40335 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40336 (TENN); Univ. Tenn. woodlot, i.x.75, det. A. H. Freeman, no. 40337 (TENN); GSMNP, Roaring Fork, 29. viii.75, det. A. H. Freeman, no. 40338 (TENN); GSMNP, Elkmont, det. C. H. Kauffman (as *Psalliota placomyces*), s.n. (MICH); GSMNP, Elkmont, 3.ix.37, det. Hesler & Smith (as *A. placomyces*), s.n. (MICH).

25. AGARICUS RUBRIBRUNNESCENS MURRILL, Mycologia 14: 216. 1922.

TYPE SPECIMEN (holotype, explicit): NY, N.Y., 8.ix.16, coll. & det. W. A. Murrill, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded, to 8 cm diam (Murrill), white with reddish scales (Murrill), brown with darker brown scales when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe equal to more or less bulbous, to 5 cm long, appearing fibrous; ring superior, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.8-13.8 µm diam, unbranched, brown; hyphae of pileus flesh 3.8-38.3 µm diam, inflated, without clamp connections, thin-walled. Lamellae trama irregular; hyphae 3.0-21.5 µm diam, occasionally inflated; basidia 4.5-7.0 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia scattered, napiform, to 20.0 µm diam. Hyphae of stipe surface above ring 3.0-27.5 µm diam, parallel, tightly packed. Hyphae of ring 3.8-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 24.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(6.0) x 3.0-3.8 µm, ellipsoid or broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is remarkable for its conspicuously scaly surface and large napiform cheilocystidia. In the fresh condition, the scales are tufts of more or less

erect hyphae; upon drying, however, the pileus surface resembles that of *A. placomyces*.

The species is found in mixed woods; it seems to be a northern species with a range extension into the southern mountains. Edibility is unknown.

Specimens examined:

New York: 8.ix.16, coll. & det. W. A. Murrill, s.n. NY, TYPE).

North Carolina: Chapel Hill, 4.vii.49, coll. W. C. Coker (as *Psalliota silvatica*), no. 14531 (NCU); Chapel Hill, 10.ix.15, det. A. H. Freeman, no. 1731 (NCU); Five Points, 13.ix.74, det. R. L. Shaffer (as *Agaricus sanguinarius*), s.n. (MICH); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40088 (TENN); GSMNP, Kephart Trail, 8.viii.75, det. A. H. Freeman, no. 40087 (TENN).

Tennessee: Greenbriar, Sevier Co., 18.x.36, det. A. H. Freeman, no. 9573 (TENN); Cades Cove, 12.vii.41, det. A. H. Freeman, no. 13806 (TENN); Nale's Creek, 21.ix.57, det. A. H. Freeman, no. 19557 (TENN); Knoxville, 23.ix.51, det. A. H. Freeman, no. 20162 (TENN); Cades Cove, 20.viii.64, det. A. H. Freeman, no. 26312 (TENN); Knox Co., 8.x.72, det. A. H. Freeman, no. 37546 (TENN); Cades Cove, 14.viii.75, det. A. H. Freeman, no. 40089 (TENN); Univ. Tenn. woodlot, 1.x.75, det. A. H. Freeman, no. 40090 (TENN).

Virginia: Lynchburg, 11.ix.26, det. W. A. Murrill (as *Agaricus diminutivus*), no. F10156 (FLAS); Blacksburg, 14.x.73, det. A. H. Freeman, no. OKM9589 (VPI).

Washington, D.C.: 7.ix.36, det. C. S. & A. L. Parker, no. 4734 (BPI); 19.vii.12, det. F. J. V. (as *A. placomyces*), s.n. (BPI).

26. AGARICUS BADIUS FREEMAN STAT. NOV.

≡ *A. subplacomyces* var. *badius* Murrill. *nom. illeg.*
≡ *A. placomyces* var. *badius* Murrill. *nom. herb.*

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 7.vi.38, coll. & det. W. A. Murrill, no. 16402. (!) Isotypes: NY, no. 16402 (!); NCU, s.n. (!); BPI, s.n. (!).

Stature of carpophore placomycetoid; mature pileus convex to plane, to 12 cm diam (Murrill), white with bay disc and scales (Murrill), dull gold with brown disc and scales when dried; surface heavily squamulose on disc, becoming glabrous near the margin; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous, to 10 cm long, glabrous above the ring, floccose below, white

(Murrill), concolorous with pileus when dried, stuffed to hollow; ring more or less appendiculate, superior when adhering to stipe, gold when dried; odor fragrant (Murrill).

Hyphae of pileus cuticle loosely interwoven; pileocystidia fasciculate or scattered, 3.0-10.0 µm diam, unbranched; hyphae of pileus flesh 4.5-24.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.0 µm diam, occasionally inflated; basidia 6.0-7.5 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia napiform to broadly capitulate, 5.5-6.0 µm diam, scattered. Hyphae of stipe surface above ring 4.5-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-4.5 µm, ellipsoid to broadly ellipsoid or ovoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: Although this species outwardly resembles *A. placomyces*, it is distinct. *Agaricus badius* is distinguished by the presence of cheilocystidia, which *A. placomyces* lacks, and universal veil cells which are smaller and more regularly barrel-shaped than those of *A. placomyces*. *Agaricus badius* also differs from *A. placomyces* by exhibiting a shorter, thicker stipe, bay color of the pileus and scales and, as Murrill noted, by having a fragrant odor.

The species is found in open, shady areas (*teste* Murrill) and up to the present time is known only from Florida. According to Murrill, it is of excellent flavor.

Specimens examined:

Florida: Gainesville, 7.vi.38, coll. & det. W. A. Murrill, no. 16402 (FLAS, TYPE); Gainesville, 29.iv.43, det. R. Singer (as *Agaricus placomyces* var. *badius*), no. F1887 (MICH); Gainesville, 25.vii.69, det. J. Kimbroush (as *A. alachuanus*), no. F48665 (FLAS); Gainesville, 25.x.38, det. W. A. Murrill (as *A. placomyces badius*), no. F19256 (FLAS); Sugar foot, 6/5/38, det. W. A. Murrill (as *A. placomyces badius*), no. F16279 (FLAS); Gainesville, 13.v.50, det. W. A. Murrill (as *A. placomyces badius*), no. 15600 (FLAS); Gainesville, 8/9/37, det. W. A. Murrill (as *A. subplacomyces* var. *badius*), no. 16050 (TENN).

27. AGARICUS DIMINUTIVUS PECK, Buffalo Soc. Nat. Sci. 1: 53. 1873.

TYPE SPECIMEN (holotype, implicit): NYS, Croghan, N.Y., -.ix.72, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; mature pileus plane to slightly umbonate or depressed in center, to 1.5 cm diam, alutaceous (Peck), gray-tan when dried; surface spotted with appressed fibrillose scales; dried flesh to 1 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 1 mm deep. Stipe to 3.5 cm long, slightly bulbous to equal, concolorous with pileus, hollow or stuffed; ring superior, thin, membranous, pale tan when dried.

Hyphae of pileus cuticle interwoven, repent; pileocystidia loosely fasciculate to scattered, 1.5-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-23.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-23.0 µm diam, inflated; basidia 4.5-6.8 x 12.2-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-20.0 µm diam, parallel, tightly packed. Hyphae of ring 1.5-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 14.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.3 x 3.8 µm, ellipsoid to ovoid or subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus papillate to barely discernible, hyaline.

Schaeffer macrochemical reaction: positive or negative.

Observations: One of several very small, placomycetoid taxa with appressed fibrillose scales on the pileus surface, *A. diminutivus* may be distinguished from *A. subalachuanus* by both its smaller overall size and smaller spores. From *A. suboreades* it may be distinguished by its cellular universal veil tissue. *Agaricus diminutivus* lacks cheilocystidia, which are present in *A. alachuanus*, and from *A. subcomptulus* it differs in its smaller size and larger, more numerous scales.

Coker remarked that this species stains white paper bluish or greenish; I hold to his concept of the taxon, but no other authors have mentioned this phenomenon in the literature and I have not observed it. It is possible that the taxon consists of a series of physiological races, some staining paper, some reacting to the Schaeffer reagent, which may be separated by chemical analysis.

The species may be found in mixed woods; it appears to be a northern species which has extended its range southward.

Edibility is unknown, but its small size renders it impractical in this regard.

Specimens examined:

Florida: Gainesville, 11/9/32, det. W. A. Murrill, no. F10161 (FLAS); Gainesville, 11/8/32, det. W. A. Murrill, no. F10160 (FLAS).

New York: Croghan, -.ix.72, coll. & det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: 2.viii.26, coll. Coker & party, no. 8144 (NCU); Haywood Co. 6.viii.26, coll. Coker & party, no. 8043 (NCU); Blowing Rock, 17.viii.22, coll. J. N. Couch, no. 5518 (NCU); 26.ix.12, coll. Cobb & Totten, no. 438 (NCU); Chapel Hill, 21.ix.44, det. A. H. Freeman, no. 13601 (NCU); Chapel Hill, 26.v.22, coll. W. C. Coker (as *Agaricus placomyces*), no. 5157 (NCU); Chapel Hill, 21.ix.44, det. A. H. Freeman, no. 13599 (NCU); Asheville, -.-.11, det. H. C. Beardslee Jr. (as *Psalliota gracilis*), s.n. (MICH); -.-.11, det. H. C. Beardslee Jr. (as *P. gracilis*), s.n. (MICH); Cashiers, 27.viii.67, det. A. H. Freeman, no. 29908 (TENN).

Tennessee: Cades Cove, 18.x.47, det. A. H. Smith, no. 18168 (TENN); Knoxville, 21.ix.52, det. A. H. Freeman, no. 20612 (TENN); Knoxville, 12.vii.56, det. B. F. Isaacs, no. 22317 (TENN).

28. AGARICUS SUBALACHUANUS MURRILL, Lloydia 5: 151. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 29.viii.39, coll. & det. W. A. Murrill, no. 19900. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to subumbonate, to 3.5 cm diam (Murrill), white with rosy-avellaneous scales (Murrill), gray-gold when dried; dried flesh to 1 mm thick at disc, thinning to 1 mm at margin; margin more or less inrolled. Lamellae white to pink (Murrill), deep chocolate brown when mature, free, to 2 mm deep. Stipe equal to somewhat bulbous, to 3 cm long, appearing fibrous, concolorous with pileus; ring superior when adhering to stipe, appendiculate, cream colored when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia scattered or fasciculate, 3.8-7.5 µm diam, usually unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-15.3 µm diam, occasionally inflated; basidia 6.0-7.5 x 13.8-29.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 2.3-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 4.5 µm, broadly ellipsoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of several small species (pileus less than 4.0 cm diam) exhibiting placomycetoid stature, a scaly pileus, cellular universal veil tissue and lacking cheilocystidia, *A. subalachuanus* is larger overall and bears larger spores. This difference in spore size is the most distinctive feature.

The species may be found in open grassy areas (*teste* Murrill); it appears to be restricted to coastal plain and low elevation mountainous regions. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 29.viii.39, coll. & det. W. A. Murrill, no. 19900 (FLAS, TYPE); Gainesville, 21.ix.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 21.ix.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 30.viii.39, det. W. A. Murrill, no. F19920 (FLAS); Gainesville, 11.viii.44, det. W. A. Murrill, no. 20056 (TENN).

Tennessee: Knoxville, 18.ix.57, det. B. F. Isaacs, no. 14434 (TENN); Knoxville, 16.viii.49, det. B. F. Isaacs, no. 19136 (TENN).

29. AGARICUS SUBCOMPTULUS MURRILL, Quart. J. Florida Acad. Sci. 8: 194. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 2.vii.38, coll. & det. W. A. Murrill, no. 17335. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 2.5 cm diam (Murrill), isabelline, rosy-isabelline on umbo (Murrill), tan to brown when dried; surface minutely scaly; dried flesh 1.5 mm thick at disc, thinning to < 1 mm at margin; margin upturned in age. Lamellae (mature) deep chocolate brown, free, to 1.5 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, white (Murrill), brown when dried; ring superior, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-20.0 µm diam, occasionally inflated, without clamp connection, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 µm diam, occasionally inflated; basidia 6.0-7.5 x 12.2-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 µm diam, parallel, tightly packed. Hyphae of ring 2.3-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 15.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-5.5(7.0) x 3.0-4.5 µm, ellipsoid to broadly

ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible or a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus subcomptulus* is a small species distinguished from *A. diminutivus* by its distinct umbo, delicate scales and slightly larger size, and from *A. subalachuanus* by its smaller spores and bulbous stipe.

The species is found in open woods (*teste* Murrill) and up to the present time has been found only in Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 2.vii.38, coll. & det. W. A. Murrill, no. 17335 (FLAS, TYPE); Gainesville, 8/11/44, det. W. A. Murrill, no. 21105 (TENN); Plauera Hammock, 16.viii.51, det. W. A. Murrill, no. F45883 (FLAS); Gainesville, 8/4/44, det. W. A. Murrill, no. F19293 (FLAS).

30. AGARICUS HANNONII FREEMAN, SP. NOV.

≡ *A. hannonii* Murrill *nom. herb.*

TYPE SPECIMEN (holotype): FLAS, Gainesville, Fla., 26.x.50, coll. C. J. Hannon, det. W. A. Murrill, no. 39000. (!)

Statura placomycetoidia; pileo convexo mox plano, 3 cm diam, fusco ut sicco, summo levi vel serico; stipito abrupte bulboso, 4 cm long; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -14.3 µm diam; sporis 6.0-7.0 x 3.8-4.5 µm.

Stature of carpophore placomycetoid; pileus convex to plane, to 3 cm diam, with gray and dusky disc (Murrill, notes), brown with slightly darker brown disc when dried; surface smooth to fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe abruptly bulbous, to 4 cm long, appearing fibrous, concolorous with pileus when dried; ring superior, thick, mobile when dried, dull tan when dried.

Hyphae of pileus cuticle loosely interwoven, usually more or less repent; pileocystidia fasciculate or scattered, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-12.2 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-4.0 µm diam, uninflated; basidia 6.0-7.5 x 18.5-21.5 µm, 4-sterigmate, without clamp connections; cheilocystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated,

to 14.3 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-7.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: To the best of my knowledge, Murrill never published a description of this taxon. The taxon is distinct and I retain Murrill's original name in acknowledgement of his recognition of the species. The type collection consists of approximately five broken, mature fruit bodies and very brief notes by Murrill.

The species is very close to *A. tantulus* but is distinguished by its slightly larger size and the tendency for the ring to disassociate from both the pileus margin and the stipe; there is also a clear difference in color when the specimens are fresh.

31. AGARICUS TANTULUS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): MICH, Gainesville, Fla., -.-.32, coll. West & Murrill, no. F10163.

Statura placomycetoidia; pileo 2.5 cm diam, convexo mox plano, fusco, summo piloso; stipito bulboso, 4.5 cm longo; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -23.0 µm diam; sporis 4.5-6.0 (7.0) x 3.8-4.5 µm.

Stature of carpophore placomycetoid; mature pileus to 2.5 cm diam, convex to plane, cream-yellow when young, darkening with age (Murrill, notes), tannish-brown when dried; surface dark fibrillose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 4.5 cm long, appearing fibrous, concolorous with pileus when dry; ring superior, evanescent.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.8-7.5 µm diam, usually unbranched; hyphae of pileus flesh 4.5-10.7 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 µm diam, uninflated; basidia 6.0-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 µm diam, parallel, tightly packed. Hyphae of ring 3.0-6.0 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0(7.0) x 3.8-4.5 µm, broadly ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus minutely

papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This small placomycetoid species is distinguished not only by its size, but also by the lack of distinct scales on the pileus surface and the color change to brown upon drying.

The type collection consists of approximately fifteen fruit bodies plus fragments. All specimens are mature.

Habitat preference and edibility are unknown.

Specimens examined:

Florida: 1932, det. as *Agaricus herradurensis*, s.n. (MICH); Gainesville, Alachua Co., 1943, det. A. H. Smith (as *A. herradurensis*), s.n. (MICH).

32. AGARICUS SUBHORTENSIS MURRILL, Lloydia 9: 328. 1946.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 8.i.45, coll. & det. W. A. Murrill, no. 17971 (!)

Stature of carpophore placomycetoid; mature pileus convex to subexpanded, gibbous, to 5 cm diam (Murrill), pallid except for the disc, disc covered with reddish-brown innately fibrillose scales (Murrill), brown when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe equal, to 4 cm long, appearing fibrous, white (Murrill), gold when dried; ring median, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate to scattered, 3.8-6.0 µm diam, unbranched; hyphae of pileus flesh 4.5-23.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-8.5(15.3) µm diam, occasionally inflated; basidia 6.0-9.2 x 20.0-29.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 18.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 6.0-8.5 x 5.3-6.0 µm, subglobose, subovoid, or broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus merely a hyaline spot in the spore wall.

Schaeffer macrochemical reaction: negative.

Observations: This species is distinguished by its innately brown fibrillose pileus and large spores.

The species may be found in open woods (*teste* Murrill); its distribution is currently restricted to coastal plain areas. Edibility is unknown.

Specimens examined:

Alabama: Tuscaloosa, 1.xii.62, det. B. F. Isaacs, no. 25184 (TENN).

Florida: Gainesville, 8.i.45, coll. & det. W. A. Murrill, no. 17971 (FLAS, TYPE); Gainesville, 7.vii.50, det. W. A. Murrill (as *Agaricus cylindriceps*), no. F45907 (FLAS).

North Carolina: Chapel Hill, 6.xii.61, coll. J. N. Couch (as *A. campestris*), no. 15183 (NCU).

33. AGARICUS RHOADSII MURRILL, Bull. Torrey Bot. Club 66: 29. 1939.
= *A. weberianus* Murrill, Bull. Torrey Bot. Club 66: 29. 1939. (!)

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 7.ix.38, coll. Rhoads & Murrill, det. W. A. Murrill, no. 18117. (!)

Stature of carpophore placomycetoid; mature pileus truncate-conic to expanded, to 6.5 cm diam (Murrill), pale dilute-vinaceous, castaneous on the disc, margin white (Murrill), dull gold with brown fibrils when dried; surface finely fibrillose-squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae whitish to dull pink (Murrill), deep chocolate brown when mature, free, to 1.5 mm deep. Stipe bulbous, to 8 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring appendiculate, superior when adhering to stipe, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.4 µm diam, usually unbranched; hyphae of pileus flesh 6.0-13.8 µm diam, inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-13.8 µm diam, uninflated or only slightly so; basidia 4.5-7.0 x 10.7-15.3 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-15.3 µm diam, parallel, tightly packed. Hyphae of ring 3.0-11.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 27.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.3-6.0 x 3.8-4.5 µm, ellipsoid to broadly ellipsoid or ovoid, lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: When fresh, this species is outstanding for its pale-purple color. When dried, the subcampanulate pileus, dense innate fibrillose texture of the cap and the abruptly bulbous stipe base distinguish the species. Outwardly, it could be confused with a delicate form of *A. subrufescens*, but the spores of the latter are much larger than those of *A. rhoadsii*.

The species is found in open woods and up to the present time is known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Gainesville, 7.ix.38, coll. Rhoads & Murrill, no. 18117 (FLAS, TYPE); Gainesville, 28.vii.45, det. W. A. Murrill, no. 19680 (TENN); Gainesville, -.-.40, det. W. A. Murrill, s.n. (MICH); Gainesville, 15.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 15.vii.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 4.viii.44, det. W. A. Murrill, s.n. (BPI).

34. AGARICUS AURESICCESCENS FREEMAN, SP. NOV.

TYPE SPECIMEN (holotype): NCU, Chapel Hill, N.C., 19.ix.44, coll. W. C. Coker, det. A. H. Freeman, no. 13598.

Statura placomycetoidia; pileo 15 cm diam, convexo mox plano, prope albo, aureo ut sicco; summo prope squameo; stipito abrupte bulboso, 10 cm long, portanto rades; annulo superiore; cheilocystidiis absentes; cellulis integumentorum universorum -20.0 µm diam; sporis 5.5-6.0 x 3.8-4.5 µm.

Stature of carpophore placomycetoid; mature pileus convex to plane, disc often depressed when dried, to 15 cm diam, nearly white, pale pinkish buff on center (Coker, notes), gold when dried; surface appressed fibrillose squamulose; dried flesh to 3 mm thick at disc, thinning to 1 mm at margin; margin slightly inrolled. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe abruptly bulbous, to 10 cm long, appearing fibrous, brown when dried, lower portion covered with ground mycelium, base often with one to three rhizomorphic strands; ring superior, bearing floccose patches on lower surface, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-6.0 µm diam, unbranched; hyphae of pileus flesh 4.5-15.3 µm diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 2.3-

18.5 µm diam, occasionally inflated; basidia 6.0-7.5 x 15.3-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 2.3-18.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 20.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores 5.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus auresiccescens* closely resembles *A. abruptibulbus*, but is distinguished by the appressed fibrils on the surface of the pileus, the rhizomorphic strands on the stipe base, the distinctly cellular universal veil tissue and smaller spores. When dried, the specimens turn a deep rich gold.

Habitat preference and edibility are unknown.

Specimens examined:

North Carolina: Chapel Hill, 19.ix.44, coll. W. C. Coker, no. 13598 (NCU, TYPE); Chapel Hill, 21.ix.44, coll. W. C. Coker (as *Psalliota arvensis*), no. 13600 (NCU).

35. AGARICUS SUBRUFESCENS PECK, N.Y. State Mus. Bull. 43: 236. 1894.

TYPE SPECIMEN (holotype, implicit): NYS, Glen Cove, L.I., N.Y., -.x.-, coll. W. Falconer, det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid; pileus deeply convex or broadly expanded, to 15 cm diam (Peck), whitish, grayish or dull reddish-brown (Peck), dull gold to gray-gold when dried; surface brown silky fibrillose to squamulose; dried flesh to 5 mm thick at disc, thinning to < 1 mm at margin. Lamellae white in youth, deep chocolate brown when mature, free, to 5 mm deep. Stipe bulbous, to 10 cm long, appearing fibrous, concolorous with pileus, stuffed, then hollow (Peck); ring superior, membranous, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, to 7.5 µm diam, usually unbranched; hyphae of pileus flesh 3.0-18.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-15.3 µm diam, occasionally inflated; basidia 4.5-9.2 x 13.8-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, paral-

lel, tightly packed. Hyphae of ring 3.0-15.3 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 16.8 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-7.4(9.2) x 3.8-5.3 µm, subglobose to ovoid or ellipsoid; wall dark brown, 0.6 µm thick; apiculus minutely papillate to indiscernible, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: As Kauffman (1918) noted, this is a highly variable species which grows not only in a wild state, but also tends to appear in greenhouses. It is therefore sometimes found exhibiting a squat campestroid stature or a large, thick-set placomycetoid stature. It is comparable to *A. placomyces*, but with much thicker flesh, larger numbers of innately fibrillose squamules and larger spores. Peck compared the species to *A. campestris*, but said it differed in its deeply convex shape when young and the white of the immature lamellae; these differences supported by microscopic data indicate that the two species are distinct.

The species is found in mixed woods or in humus in greenhouses. Its current range extends from New York south to North Carolina.

Specimens examined:

Maryland: Beltsville, 22.ix.38, det. V. K. Charles (as *Agaricus placomyces*), s.n. (BPI); Beltsville, 17.v.38, det. V. K. Charles (as *A. placomyces*), s.n. (BPI).

New York: Glen Cove, L.I., -.x.-, coll. W. Falconer, det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Chapel Hill, 6.ix.15, coll. W. C. Coker (as *Psalliota silvatica*), no. 1686 (NCU); Chapel Hill, 6.ix.15, coll. W. C. Coker (as *P. silvatica*), no. 1685 (NCU); Chapel Hill, 26.x.19, coll. W. C. Coker (as *A. silvaticus*), no. 3510 (NCU); Chapel Hill, 25.ix.14, coll. H. R. Totten (as *P. silvatica*), no. 1265 (NCU).

Virginia: Arlington Farm, -.vi.40, coll. E. B. Lambert, s.n. (BPI); Arlington Farm, -.v.40, coll. E. B. Lambert, s.n. (BPI); Chain Bridge, 6.viii.12, det. Peck, s.n. (BPI).

36. AGARICUS POCILLATOR MURRILL, Mycologia 33: 446. 1941.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 4.vi.38, coll. & det. W. A. Murrill, no. 16476. (!) Isotypes: NY, no. 16476 (!); NCU s.n. (!); BPI, s.n. (!)

Stature of carpophore placomycetoid (Fig. 2B); mature pileus truncate-convex to plane, to 10 cm diam (Murrill), white with dark floccose scales, fuscous on the disc (Murrill), dull gray-tan, somewhat darker on the disc when dried; dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 3 mm deep. Stipe bulbous to cupulate at base, to 8 cm long, appearing fibrous, dull brown when dried; ring superior, conspicuously double, the lower portion rounding up into a discrete partial veil, the upper portion (marginal veil) stretching entirely across the lamellae in youth, thin, membranous, brown when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 2.3-6.0 µm diam, unbranched; hyphae of pileus flesh 3.0-20.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-10.0 µm diam, occasionally inflated; basidia 4.5-7.0 x 10.7-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-13.8 µm diam, parallel, tightly packed. Hyphae of ring 2.3-13.8 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.0-3.8 µm, ellipsoid to broadly ellipsoid; wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: This is a most distinctive species due to the double nature of the ring. Smith ("1939", 1940) considered it merely a variety of *A. placomyces*, but the obviously double ring, cupulate stipe base, and tiny floccose, gray scales distinguish it.

The species is found in open woods; it appears to be restricted to coastal plain and low elevations of mountainous areas. Edibility is unknown.

Specimens examined:

Alabama: Auburn, 1.viii.55, det. B. F. Isaacs, no. 21948 (TENN).

Florida: Gainesville, 4.vi.38, coll. & det. W. A. Murrill (FLAS, no. 16476, TYPE; NY, no. 16476, Isotype; NCU, s.n., Isotype; BPI, s.n., Isotype); Gainesville, 22.vii.44, det. W. A. Murrill, s.n. (BPI); Gainesville, -.-.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 22.vii.44, det. W. A. Murrill, s.n. (NYS); Gainesville, 9.vii.51, det. G.F. Weber, no. F45891 (FLAS); New Smyrna, 1920, det. H. C. Beardslee Jr. (as *Psalliota placomyces*), s.n. (MICH); Gainesville, -.vii.43, det. R. Singer, s.n. (MICH); Gainesville, -.-.38, det. W. A. Murrill, no. 16051 (TENN).

North Carolina: Chapel Hill, 25.ix.45, det. W. C. Coker, no. 13945 (NCU); Chapel Hill, 8.x.48, coll. W. C. Coker (as *Psalliota* sp.), no. 14477 (NCU); Chapel Hill, 27.ix.45, coll. J. N. Couch (as *P.* sp.), no. 13993 (NCU); Chapel Hill, 28.ix.47, coll. W. C. Coker (as *P.* sp.), no. 14227 (NCU); Chapel Hill, 25.vii.45, coll. J. N. Couch, no. 14015 (NCU); Chapel Hill, 10.viii.48, coll. J. N. Couch (as *P.* sp.), no. 14479 (NCU); Chapel Hill, 19.ix.47, coll. W. C. Coker (as *P.* sp.), no. 14198 (NCU); Chapel Hill, 9.vii.46, coll. J. N. Couch (as *P.* sp.), no. 13714 (NCU); U.N.C. arboretum, 25.ix.44, coll. McCann, no. 13602 (NCU); 11.viii.44, coll. J. N. Couch (as *P.* sp.), no. 13593 (NCU); 29.ix.44, coll. Coker, no. 13608 (NCU); 21.vii.44, coll. Coker & Couch, no. 13587 (NCU); Highlands, 23.vii.53, det. B. F. Isaacs, no. 20924 (TENN).

Tennessee: Sevier Co., 18.x.36, det. B. F. Isaacs, no. 9589 (TENN); Cades Cove, 3.ix.52, det. L. R. Hesler, no. 20555 (TENN); Norris, 9.x.54, det. B. F. Isaacs, no. 21564 (TENN); Knoxville, 18.viii.66, det. A. H. Freeman, no. 29223 (TENN).

37. AGARICUS PLACOMYCES PECK, VAR. PLACOMYCES, N. Y. State Mus. Bull. 29: 40. 1878.

TYPE SPECIMEN (holotype, implicit): NYS, Knowersville and Oneida, N.Y., no date, coll. & det. C. H. Peck, s.n. (!) Isotype: NCU, s.n. (!)

Stature of carpophore placomycetoid (Fig. 3A); pileus convex, then expanded to plane, to 8 cm diam (Peck); surface covered with appressed, fibrillose scales, whitish, the disc and scales brown (Peck), dull gray-gold with brown scales when dried; dried flesh to 2 mm thick at disc, thinning at margin. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe bulbous, usually with one or two root-like processes, to 13 cm long, appearing fibrous, white, somewhat stuffed (Peck), dull tan to gray when dried; ring superior, often studded with drops of a dark brown liquid (Peck), gray-tan to brown when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia fasciculate or scatterd, branched or unbranched, 3.0-9.2 µm diam, golden brown; hyphae of pileus flesh 3.0-20.0 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-18.5 µm diam, irregularly inflated; basidia 6.0-7.0 x 12.2-23.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 1.5-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 26.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)5.3-6.0(7.0) x (3.0)3.8-4.5 µm, ellipsoid

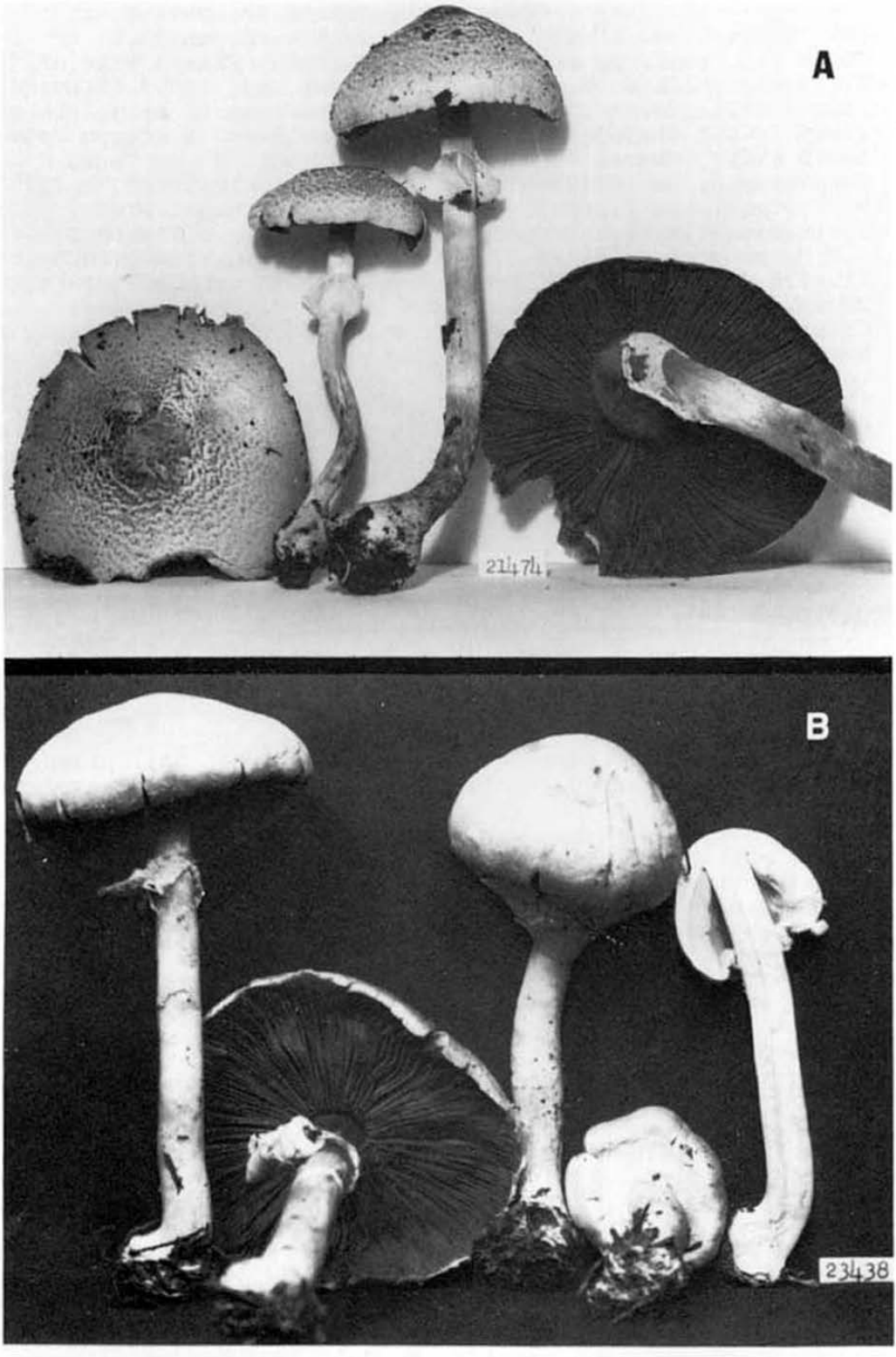

Figure 3. Two common woodland species: (A) *Agaricus placomyces* var. *placomyces*; and (B) *Agaribus abruptibulbus*.

to ovoid; wall dark brown, less than 0.6 µm thick; apiculus papillate, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: *Agaricus placomyces* is one of the most common woodland species of *Agaricus* in the Smoky Mountain area of Tennessee. It is distinguished by the large reddish-brown scales on the pileus and the bulbous stipe base which almost always bears one to several rhizomorphic strands. Although the specimens are occasionally found in deciduous woods, fruit bodies seem to be mainly associated with species of *Abies*.

Edibility is questionable.

Specimens examined:

Alabama: Montgomery, 16.viii.42, det. A. H. Smith (as *Agaricus silvaticus*), s.n. (MICH); Robinson's Springs, 29.vi.42, det. A. H. Smith (as *A. silvaticus*), s.n. (MICH); Robinson's Springs, 29.vi.42, det. A. H. Smith (as *A. silvaticus*), s.n. (MICH).

Kentucky: Jones Creek Rd., Trigg Co., 16.ix.74, det. W. J. Sundberg, no. 2857 (WJS).

Maryland: Herald Harbor, Anne Arundel Co., 27.viii.33, det. V. K. Charles, s.n. (BPI); Great Falls, 7.x.29, coll. C. S. Parker (as *Psalliota silvatica*), no. 1318-56-A (BPI); Chapel Pt., 20.x.36, det. V. K. C. (as *P. silvatica*), s.n. (BPI); Herald Harbor, 9/8/25, det. J. A. Stevenson (as *A. silvicola*), s.n. (BPI); Cabin John Run, Montgomery Co., 28.ix.52, det. J. A. Stevenson (as *A. silvatica*), s.n. (BPI); Sutland, 27.iii.33, det. C. S. & A. L. Parker (as *P.* sp.), s.n. (BPI); Bell Sta., 20.ix.35, det. J. A. Stevenson & E. B. Lambert (as *A. silvicola*), s.n. (BPI); Bay Ridge, Anne Arundel Co., 30.viii.33, det. C. S. & A. L. Parker (as *P.* sp.), s.n. (BPI); Wildlife Refuge, 13.ix.67, det. O. K. Miller, no. OKM6102 (VPI).

New York: Knowersville and Oneida, no date, coll. & det. C. H. Peck (NYS, s.n., TYPE; NCU, s.n., ISOTYPE).

North Carolina: Tuxedo, Henderson Co., 15.ix.74, det. A. H. Smith (as *A. subrutilescens*), KHM 14302 (BPI); Chapel Hill, 18.x.46, coll. W. C. Coker (as *P.* sp.), no. 14057 (NCU); Chapel Hill, 29.ix.46, det. A. H. Freeman, no. 14036 (NCU); Battles Park, 2.x.09, no. 221 (NCU); no. 223 (NCU); 5.x.12, coll. W. C. Coker, no. 507 (NCU); 12.ix.13, coll. W. C. Coker, no. 738 (NCU); Chapel Hill, 23.x.11, coll. W. B. Cobb, no. 1016 (NCU); Chapel Hill, 18.x.46, coll. W. C. Coker (as *P.* sp.), no. 14056 (NCU); Chapel Hill, 24.ix.14, coll. H. R. Totten, no. 1256 (NCU); Chapel Hill, 28.ix.14, coll. H. R. Totten, no. 1266 (NCU); Highlands, 2.viii.31, coll. A. H. S., A. J. S. & Clark Foreman, no. 9033 (NCU); Chapel Hill, 12.x.47, coll. W. C. Coker (as *P.* sp.), no.

14266 (NCU); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40078 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40074 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40073 (TENN); Henderson Co., 12.viii.63, det. B. F. Isaacs (as *A. bambusigenus*), no. 26578 (TENN); Bryson City, 23.viii.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9286 (TENN); Cataloochee, 28.vii.35, det. B. F. Isaacs (as *A. bambusigenus*), no. 8052 (TENN).

Tennessee: Knoxville, 17.vii.34, det. L. R. Hesler, no. 4485 (TENN); Kingston, 5.viii.34, det. L. R. Hesler, no. 5339 (TENN); New Hopewell, 21.x.34, det. B. F. Isaacs (as *A. bambusigenus*), no. 7107 (TENN); Cosby, 30.vii.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9016 (TENN); Sevier Co., Greenbriar, 18.x.36, det. B. F. Isaacs (as *A. bambusigenus*), no. 9621 (TENN); GSMNP, 16.vi.40, det. L. R. Hesler, no. 12538 (TENN); Mt. LeConte, 20.vii.41, det. B. F. Isaacs (as *A. bambusigenus*), no. 13852 (TENN); Sevier Co., 12.viii.42, det. A. H. Smith, no. 14479 (TENN); Cades Cove, 27.ix.47, det. B. F. Isaacs (as *A. bambusigenus*), no. 17898 (TENN); Mt. LeConte, 8.viii.54, det. B. F. Isaacs (as *A. bambusigenus*), no. 21474 (TENN); Sevier Col, 15.x.55, det. B. F. Isaacs (as *A. bambusigenus*), no. 22157 (TENN); Mt. LeConte, 6.viii.63, det. B. F. Isaacs (as *A. bambusigenus*), no. 27526 (TENN); Smokemont, 11.ix.65, det. B. F. Isaacs (as *A. bambusigenus*), no. 28373 (TENN); Cades Cove, 2.viii.66, det. L. R. Hesler, no. 29325 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40071 (TENN); Univ. Tenn. woodlot, 29.ix.74, det. A. H. Freeman, no. 40072 (TENN); Univ. Tenn. woodlot, 5.x.75, det. A. H. Freeman, no. 40074 (TENN); Univ. Tenn. woodlot, 29.ix.74, det. A. H. Freeman, no. 40076 (TENN); Cades Cove, 31.vii.75, det. A. H. Freeman, no. 40077 (TENN); Cades Cove, 31.vii.75, det. A. H. Freeman, no. 40079 (TENN); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH); Elkmont, 7.ix.37, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH); New Hopewell, Knox Co., 13.vii.39, det. L. R. Hesler (as *P.*), s.n. (MICH); Laurel Falls, 22.viii.38, det. A. H. Smith (as *A. subrutilescens*), s.n. (MICH).

Virginia: Buckingham Co., 13.ix.61, coll. Dublin (as *A. silvatica*), s.n. (BPI); Lynchburg, 4.ix.26, det. W. A. Murrill, no. F10151 (FLAS); Occoquam, 10.x.33, det. V. K. Charles (as *A. micromegetha*), s.n. (BPI).

Washington, D.C.: 22.ix.13, det. Mr. & Mrs. J. N. Rose, s.n. (BPI).

38. AGARICUS ABRUPTIBULBUS PECK, N. Y. State Mus. Bull. 94: 36. "1904" (1905).

≡ *A. arvensis* var. *abruptus* Peck, N.Y. State Mus. Bull. 48: 239. 1894.
≡ *A. abruptus* Peck, N.Y. State Mus. Mem. 4, 3: 163. 1900. (*non A. abruptus* Fries, Hym. Eur., 245. 1874.)

= *A. cretacellus* Atkinson, J. Myc. 8: 110. 1902.

TYPE SPECIMEN (lectotype, *des. mihi*): NYS, West Albany, N.Y., -.-.92, coll. & det. C. H. Peck, s.n. (!)

Stature of carpophore placomycetoid (Fig. 3B); pileus ovate, convex or plane, to 10 cm diam, white tinged with yellow (Peck), pale gold-tan when dried; surface smooth; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe to 13 cm long, bulbous, often rimmed and depressed at base, appearing fibrous, concolorous with pileus, stuffed or hollow; ring superior, bearing floccose patches below, more or less appendiculate, pale gold when dried.

Hyphae of pileus cuticle tightly interwoven, repent; pileocystidia lacking; hyphae of pileus flesh 4.5-15.3 µm diam, occasionally inflated, thin-walled, without clamp connections. Lamella trama irregular; hyphae 3.0-10.7(23.0) µm diam, usually uninflated; basidia 4.5-7.0 x 13.8-20.0 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-23.0 µm diam, parallel, tightly packed. Hyphae of ring 3.0-13.8 µm diam. Cells of universal veil (stipe surface below ring, patches on lower surface of ring) inflated, to 32.0 µm diam, occationally almost hypha-like, without clamp connections, thin-walled, hyaline.

Spores (5.5)6.0-7.5 x (3.8)4.5-5.5 µm, ellipsoid to ovoid; wall dark brown, 0.6 µm thick; apiculus a hyaline spot in the spore wall or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This species is easily recognized both macroscopically and microscopically; its woodland habitat, placomycetoid stature and glabrous pileus combined with its white coloration make it a unique species for the southeastern taxa. In youth it could be mistaken for a member of the *Amanita virosa* group, but its lack of a discrete volva and pink tint to the young lamellae distinguish it. Microscopically, the taxon is unique in the nature of the universal veil tissue, which consists of highly inflated, very long, irregularly shaped cells.

The species is known from New York south to Florida; according to Peck, it is edible.

Specimens examined:

Alabama: Robinson's Springs, -.viii.42, det. A. H. Smith (as *Agaricus cretacellus*), s.n. (MICH).

Florida: Devil's Millhopper, 9/11/68, det. J. Kimbrough (as *A. alachuanus*), no. F48028 (FLAS); Tung-oil

Mill, 7/12/38, det. W. A. Murrill (as *A. sylvicola*), no. F17785 (FLAS).

Maryland: Cabin John Woods, 23.ix.37, det. V. K. Charles, s.n. (BPI); Bay Ridge, Anne Arundel Co., 30.viii. 33, coll. C. S. & A. L. Parker (as *Psalliota*), no. 4360 (BPI); Woodards Woods, 28.ix.40, coll. C. S. Parker (as *P.*), no. 10078 (BPI); 20.viii.33, coll. C. S. & A. L. Parker (as *P.*), no. 4303 (BPI); Harper's Ferry, 27.vii.19, det. C. H. Kauffman, s.n. (BPI); Ardmore, 26.viii.33, coll. C. S. & A. L. Parker (as *P. abruptibulba*), no. 4365 (BPI).

New York: West Albany, -.-.92, coll. & det. C. H. Peck, s.n. (NYS, TYPE).

North Carolina: Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40082 (TENN); Indian Creek Rd., 8.viii.75, det. A. H. Freeman, no. 40083 (TENN); Asheville, 1900, det. H. C. Beardslee, s.n. (MICH); Hot Springs, 21.viii. 24, det. C. H. Kauffman (as *P. cretacella*), s.n. (MICH); Highlands, 16.viii.36, det. L. R. Hesler (as *P. abruptibulba*), s.n. (MICH); Highlands, 11.viii.34, coll. W. C. Coker (as *P. sylvatica*), no. 9778 (NCU); Chapel Hill, 8.ix.15, coll. H. R. Totten (as *A. abruptus*), no. 1699 (NCU); Chapel Hill, 23.ix.47, coll. Coker (as *P. abruptibulba*), no. 14206 (NCU); 15.x.10-22.x.10, (as *A. abruptus*), no. 220 (NCU); Indian Springs, 24.ix.10, (as *A. abruptus*), no. 219 (NCU); 8.ix.15, coll. H. R. Totten (as *A. abruptus*), no. 1700 (NCU); Chapel Hill, 24,ix.14, coll. H. R. Totten (as *A. abruptus*), no. 1262 (NCU); Chapel Hill, 10.vii.14, coll. W. C. Coker (as *A. abruptus*), no. 1111 (NCU); 13.ix.13, coll. Totten (as *A. abruptus*), no. 754 (NCU); 20.vi.13, coll. W. C. Coker (as *A. abruptus*), no. 706 (NCU); Chapel Hill, 29.ix.46, coll. W. C. Coker (as *A.*), no. 14031 (NCU); Chapel Hill, 23,ix.14, coll. H. R. Totten, no. 1247 (NCU); 22.vi.16, coll. H. R. Totten (as *P. abruptibulba*), no. 2264 (NCU); Chapel Hill, 25.x.15, coll. H. R. Totten (as *P. abruptibulba*), no. 1923 (NCU); Chapel Hill, 8.viii.46, coll. W. C. Coker (as *P. abruptibulba*), no. 13727 (NCU); Chapel Hill, 10-14.viii.-, coll. W. C. Coker (as *P. abruptibulba*), no. 1120 (NCU); Chapel Hill, 28.ix.47, coll. W. C. Coker (as *P. abruptibulba*), no. 14241 (NCU).

Tennessee: Mt. LeConte, 8/10/34, det. L. R. Hesler (as *A. cretacellus*), no. 5338 (TENN); Blount Co., 8/23/34, det. L. R. Hesler, no. 6305 (TENN); Crossville, 7.vii.35, det. B. F. Isaacs (as *A. cretacellus*), no. 7932 (TENN); Crossville, 7.vii.35, det. B. F. Isaacs (as *A. cretacellus*), no. 7940 (TENN); New Hopewell, 21.viii.35, det. B. F. Isaacs (as *A. fabaceus*), no. 8278 (TENN); Mt. LeConte, 16.viii.63, det. B. F. Isaacs (as *A. cretacellus*), no. 10195 (TENN); Mt. LeConte, 6.viii.39, det. B. F. Isaacs (as *A. cretacellus*), no. 12207 (TENN); Mt. LeConte, 25.viii.40, det. B. F. Isaacs (as *A. cretacellus*), no. 12836 (TENN); Mt. LeConte, 30.viii. 40, det. A. H. Smith (as *A. cretacellus*), no. 12854 (TENN); Cades Cove, 1.ix.40, det. B. F. Isaacs (as *A. cretacellus*), no. 12896 (TENN); Mt. LeConte, 20.vii.41, det. B. F. Isaacs

(as *A. fabaceus*), no. 13846 (TENN); Cades Cove, 3.viii.64, det. A. H. Freeman, no. 23013 (TENN); GSMNP, 11.x.59, det. B. F. Isaacs (as *A. fabaceus*), no. 23438 (TENN); Norris, 22.viii.61, det. B. F. Isaacs (as *A. cretacellus*), no. 24499 (TENN); Norris, 8.vii.63, det. B. F. Isaacs (as *A. fabaceus*), no. 25668 (TENN); Cades Cove, 2.viii.66, det. A. H. Freeman, no. 29328 (TENN); Pickett State Park, -.ix. 74, det. A. H. Freeman, no. 40080 (TENN); GSMNP, 5.viii.75, det. A. H. Freeman, 40081 (TENN); GSMNP, 13.viii.75, det. A. H. Freeman, no. 40084 (TENN); Cades Cove, 23.vii.75, det. A. H. Freeman, no. 40085 (TENN); Oak Ridge, -.x.74, det. A. H. Freeman, no. 40086 (TENN); Cades Cove, 16.viii. 38, det. A. H. Smith (as *A. cretacellus*), s.n. (MICH); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. cretacellus*), s.n. (MICH); Mt. LeConte, 23.viii.41, det. L. R. Hesler (as *P. abruptibulba*), s.n. (MICH); New Hopewell, 21.viii.35, det. A. H. Smith (as *P. abruptibulba*), s.n. (MICH); Cades Cove, 18.viii.38, det. A. H. Smith (as *A. silvicola*), s.n. (MICH); Cades Cove, 25.viii.38, det. A. H. Smith (as *A. silvicola*), s.n. (MICH).

Virginia: Lynchburg, 13.viii.27, det. W. A. Murrill (as *A. silvicola*), no. F10145 (FLAS); Blacksburg, 22.viii. 70, coll. O. K. & Hope Miller, det. A. H. Freeman, no. OKM8648.

Washington, D.C.: 9.ix.36, det. C. S. & A. L. Parker (as *A. rodmani*), s.n. (BPI); 9.ix.33, coll. C. S. & A. L. Parker, no. 4395 (BPI); Rock Creek Park, 9/6/37, det. L. C. C. Krieger, s.n. (BPI); Rock Creek Park, 26.ix.37, det. V. K. Charles, s.n. (BPI); Rock Creek Park, 30.ix.45, det. J. A. Stevenson, s.n. (BPI).

39. AGARICUS BLOCKII MURRILL, Mycologia 46: 112. 1954.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533. (!)

Stature of carpophore placomycetoid; mature pileus conic to truncate-convex, to 7 cm diam (Murrill), white with fibrillose scales, isabelline on disc (Murrill), dull gold when dried; dried flesh to 4 mm thick at disc, thinning to < 1 mm at margin; margin undulate. Lamellae (mature) deep chocolate brown, free, to 4 mm deep. Stipe tapering upward, to 5 cm long, appearing fibrous, white with tawny fibrillose scales pointing upward below the ring (Murrill), concolorous with pileus when dried; ring median, more or less appendiculate, gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate or scattered, to 7.5 µm diam, unbranched; hyphae of pileus flesh 4.5-13.8 µm diam, occasionally inflated; without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-6.0 µm diam, uninflated; basidia 6.0 x 12.2-15.3 µm, 4-sterigmate, without

clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 4.5-10.7 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 21.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, broadly ellipsoid to ovoid, often maturing to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minute, hyaline.

Schaeffer macrochemical reaction: negative.

Observations: Of collections other than the type, only one was in adequate condition for positive identification. The species seems to be most characterized by its placomycetoid stature and sharply upward-tapering stipe.

The species may be found in open grassy areas (*teste* Murrill) and up to the present time is known only from Florida.

Specimens examined:

Florida: Gainesville, 6.vii.50, coll. Dr. S. S. Block, det. W. A. Murrill, no. 21533 (FLAS, TYPE); Gainesville, 25.vii.69, det. N. Black (as *Agaricus alachuanus*), no. 48664 (FLAS).

40. AGARICUS CITRINIDISCUS MURRILL, Quart. J. Florida Acad. Sci. 8: 193. 1945.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 11.viii.44, coll. & det. W. A. Murrill, no. 32719. (!)

Stature of carpophore placomycetoid; mature pileus convex or slightly depressed, to 5 cm diam (Murrill), citrinous over disc, fading toward margin (Murrill), dull tan when dried, slightly darker over the disc; surface slightly squamulose; dried flesh to 2 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous, to 3 cm long, appearing fibrous, white (Murrill), dull gold when dried; ring superior when adhering to stipe, appendiculate, gold when dried.

Hyphae of pileus cuticle loosely interwoven, usually repent; pileocystidia loosely fasciculate, 3.0-10.7 µm diam, branched or unbranched; hyphae of pileus flesh 3.0-15.3 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-15.3 µm diam, some inflated; basidia 4.5-6.0 x 13.8-18.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 4.5-18.5 µm diam,

parallel, tightly packed. Hyphae of ring 3.0-7.5 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 23.9 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0 x 3.8-4.5 µm, subglobose to broadly ellipsoid or ovoid; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: This is a small placomycetoid species, characterized by its citrinous pileus when fresh. When dried, its small size, thin flesh and slightly squamulose surface distinguish it from small forms of *A. placomyces*.

Murrill referred to this species as rare and delicate. It may be found in open woods. Edibility is unknown.

Specimens examined:

Alabama: Fusihatchie, 5.vii.42, det. A. H. Smith, s.n. (MICH).

Florida: Gainesville, 11.viii.44, coll. & det. W. A. Murrill, no. 32719 (FLAS, TYPE); Gainesville, 28.viii.44, det. W. A. Murrill, no. F9015 (FLAS); Gainesville, 8/3/44, det. W. A. Murrill, no. F32914 (FLAS).

North Carolina: Indian Creek, 23.viii.42, det. B. F. Isaacs, no. 14480 (TENN); Oconee Co., 9.viii.61, det. B. F. Isaacs, no. 27278 (TENN).

41. AGARICUS PROJECTELLUS MURRILL, Mycologia 33: 447. 1941.

TYPE SPECIMEN (holotype, explicit): FLAS, Gainesville, Fla., 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill, no. 16219. (!) Isotype: NY, s.n. (!)

Stature of carpophore placomycetoid; mature pileus convex to plane, to 8 cm diam (Murrill), occasionally gibbous, white, more or less cremous on disc (Murrill), pale tan when dried; surface smooth or covered with minute floccose scales; dried flesh to 1.5 mm thick at disc, thinning to < 1 mm at margin; margin projecting to 5 mm. Lamellae (mature) deep chocolate brown, free, to 5 mm deep. Stipe equal to more or less bulbous, to 8 cm long, appearing fibrous, concolorous with pileus; ring median, somewhat appendiculate, dull gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia loosely fasciculate or scattered, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh mostly highly inflated, (3.0-6.0)10.7-18.5 µm diam, without clamp connections, thin-walled. Lamella trama irregular; hyphae 2.3-

12.2 µm diam, occasionally slightly inflated; basidia 6.0-7.5 x 13.8-24.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-12.2 µm diam, parallel, tightly packed. Hyphae of ring 6.0-12.2 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 29.0 µm diam, without clamp connections, thin-walled, hyaline.

Spores (4.5)6.0-7.5 x 3.8-5.3 µm, broadly ellipsoid to subglobose; lacking germ pore (SEM); wall dark brown, 0.6 µm thick; apiculus minutely papillate, hyaline or indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: Although outwardly resembling *A. campestris*, *A. projectellus* can be distinguished by its cellular universal veil tissue, widely projecting margin, lack of cheilocystidia and generally smaller spores. Murrill compared the two species, mentioning also that *A. projectellus* has much whiter immature lamellae than *A. campestris*.

The species may be found in pastures or open grassy areas (*teste* Murrill). It is apparently edible, being easily confused with *A. campestris*. It is currently known only from Florida.

Specimens examined:

Florida: Gainesville, 3.vi.38, coll. E. West, L. Arnold & W. A. Murrill, det. W. A. Murrill (FLAS, no. 16219, TYPE; NY, s.n., Isotype); Gainesville, 2.vi.38, det. W. A. Murrill, no. F16431 (FLAS); Gainesville, 11.vi.44, det. W. A. Murrill, no. F19341 (FLAS); Gainesville, 14.vi.44, det. W. A. Murrill, s.n. (NYS); Gainesville, -.-.44, det. W. A. Murrill, s.n. (NCU); Gainesville, 21.vi.44, det. W. A. Murrill, s.n. (BPI); Gainesville, 25.iii.44, det. W. A. Murrill, s.n. (BPI).

42. AGARICUS SUBARVENSIS MURRILL, Lloydia 5: 151. 1942.

TYPE SPECIMEN (holotype, explicit): FLAS, Lake Warburg, Alachua Co., Fla., 17.ii.39, coll. J. R. Watson & W. A. Murrill, det. W. A. Murrill, no. 19253. (!)

Stature of carpophore placomycetoid; mature pileus convex to expanded or broadly umbonate, to 8 cm diam (Murrill), pallid (Murrill), gray when dried; surface, except disc, covered with rosy-avellaneous scales (Murrill), dried flesh to 3 mm thick at disc, thinning to < 1 mm at margin. Lamellae (mature) deep chocolate brown, free, to 2 mm deep. Stipe bulbous to slightly tapering upward, to 12 cm long, appearing fibrous, white (Murrill), concolorous with pileus when dried; ring more or less appendiculate, superior when adhering to stipe, gray-gold when dried.

Hyphae of pileus cuticle interwoven, usually repent; pileocystidia fasciculate, 3.0-7.5 µm diam, unbranched; hyphae of pileus flesh 5.5-24.5 µm diam, occasionally inflated, without clamp connections, thin-walled. Lamella trama irregular; hyphae 3.0-7.5 µm diam, uninflated; basidia 4.5-7.5 x 10.7-21.5 µm, 4-sterigmate, without clamp connections; cystidia lacking. Hyphae of stipe surface above ring 3.0-18.5 µm diam, parallel, tightly packed. Hyphae of ring 3.0-15.3 µm diam. Cells of universal veil (stipe surface below ring) inflated, to 30.5 µm diam, without clamp connections, thin-walled, hyaline.

Spores 4.5-6.0(7.5) x (3.0)4.5-5.5 µm, subglobose to broadly ellipsoid; wall dark brown, 0.6 µm thick; apiculus indiscernible.

Schaeffer macrochemical reaction: negative.

Observations: A rare species with highly variable spores, *A. subarvensis* is distinctive for its broadly umbonate pileus and lack of scales on the disc. Several collections contain notes by Murrill mentioning a white cap with a straw-colored disc; this apparently is quite distinctive in the fresh condition.

The species is found in rich, open areas (*teste* Murrill) and is currently known only from Florida. Edibility is unknown.

Specimens examined:

Florida: Lake Warburg, 17.ii.39, coll. J. R. Watson & W. A. Murrill, det. W. A. Murrill, no. 19253 (FLAS, TYPE); Gainesville, 28.iv.43, det. W. A. Murrill, no. F25776 (FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F16414 (FLAS); Watson's Grove, 2.ii.45, det. W. A. Murrill, no. F8812 (FLAS); Gainesville, 22.v.43, det. W. A. Murrill, no. F17459 (FLAS).

Acknowledgements

Gratitude is expressed to Dr. Ronald H. Petersen for his many helpful suggestions during the course of this work. Photographs were taken by Dr. L. R. Hesler.

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INDEX TO SPECIES OF *AGARICUS*

(Pagination of figures in *italics*)

MYCOTAXON

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New and interesting Dematiaceous hyphomycetes from Florida

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A new species of Corynespora Güssow, C. obclavata sp. nov., is described from Serenoa sp. and compared with a similar species, C. lanneicola Deight. & M.B. Ellis. A nomenclatural change, Arthrinium arundinis (Cda) comb. nov. (syn. Gymnosporium arundinis Cda) is made. Two species with a limited number of reports, Virgariella oblonga Matsushima and Cordella johnstonii M.B. Ellis, are recorded together with 5 additional cosmopolitan taxa.

During the Second International Mycological Congress in August-September, 1977, an opportunity was taken by many mycologists to collect in the vicinity of the meeting site. A number of interesting fungi were found on the University of South Florida campus. Some of these have already resulted in at least one other paper (Sutton, 1978). This contribution reports an additional new species from this locality and 7 other taxa. Unless otherwise indicated, all specimens cited were collected by B.J. Dyko on 30 Aug. 1977 at the University of South Florida campus, Tampa, Florida, U.S.A. The holotype of C. obclavata is deposited in herb. IMI.

Arthrinium arundinis (Corda) Dyko & Sutton, comb. nov.

Basionym: Gymnosporium arundinis Corda, Icones Fung., 2, p. 1 (1838).

For additional synonyms see Ellis (1965).

Teleomorphosis: Apiospora montagnei Saccardo. Nuovo G. bot. ital. 7: p. 306. (1875). For synonyms and a detailed description see Hudson (1963).

This fungus is common on graminaceous hosts and is truly cosmopolitan. Collections at IMI number well over 100 specimens

from tropical and temperate regions of Europe, Africa, Asia, Australian subcontinents, North and South America.

Corda described the conidial state of this fungus in 1838 as Gymnosporium arundinis from Czechoslovakia. It is this name which provides the earliest specific epithet for the anamorphosis. Hudson (1963), while in Jamaica, obtained single ascospore isolates of Apiospora montagnei from Saccharum officinarum. These isolates produced a Papularia state consistent with the diagnosis of P. arundinis (Cda) Fr. Ellis (1965) listed Papularia Fr. as a synonym of Arthrinium Kunze ex Fr. He assigned the conidial state of A. montagnei to Arthrinium and provided an extensive list of synonyms but did not make a formal transfer of the specific epithet from Gymnosporium to Arthrinium. As this fungus is frequently encountered as the anamorphosis, we propose the formal transfer of the name to Arthrinium.

The conidia of A. arundinis are of the same size range as those produced by A. sacchari (Speg.) M.B. Ellis. The two fungi may, however, be differentiated by the diameter of their conidiophores. Those of A. arundinis are about 0.5μ in diameter whereas in A. sacchari they are 1-1.5μ diameter.

On decaying grass leaves, Prug-Kré, Czechoslovakia, leg. Corda, det. Corda, Herbarium Cryptogamologicum no. 155522 as Gymnosporium arundinis, PR, IMI 113368, type; on dry stipules of Bambusa sp., IMI 227802 a.

Cordella johnstonii M.B. Ellis. C.M.I. Mycol. Pap. 103: 31-33 (1965).

Ellis (1971) reported this fungus from a single collection of culms from Bambusa blumeana from Malaya. The collections at IMI presently include material from Bambusa spp. in Great Britain and Burma. This is the first report of the species from the U.S.A. Cordella is characterised by setae and the variable diameter of the conidiophores, two features which readily distinguish its species from those in Arthrinium.

On dry stipules of Bambusa sp., IMI 227803.

Corynespora cassiicola (Berk. & Curt.) Wei. C.M.I. Mycol. Pap. 34: 5 (1950). For additional synonyms see Hughes (1958).

This taxon is cosmopolitan but especially abundant in tropical climates where it is often responsible for leaf spots on a wide variety of hosts (Ellis & Holliday, 1971). The collections at IMI number well over 100 and come from tropical and subtropical regions of Africa, Asia, North and South America.

On Serenoa serrulata, Univ. S. Fla, B.C. Sutton, 1 Sept. 1977, IMI 215976 b.

Corynespora obclavata Dyko & Sutton, sp. nov.

Coloniae superficiale, effusae, nigrae. Mycelium immersum vel superficiales, sparsum, ex hyphis ramosis, septatis, laevibus, brunneis, compositum. Conidiophora macronemata, mononemata, singula vel 20 in caespitulis aggregata, recta vel flexuosa, non ramosa, brunnea, laeves, cylindrica, septata, 54-210 x 4-6.5μ. Cellulae conidiogenae treticae, in conidiophoris incorporatae, terminales, per porum apicalem prolificantes, subhyalinae vel brunnea, laeves, cylindrica, apicem versus spatulatae. Conidia solitaria, sicca, acrogena, simplicia, laevia, obclavata, apicem versus abrupte attenuata, rostrata, 4-6 euseptata, raro distoseptata, 3 cellulis basibus brunneis, 2 cellulis apicalibus pallide brunneis vel subhyalinis, 32-62.5μ longa (cellulis apicalibus inclusa) x 9.5-11μ.

In petiolis emortuis Serenoae sp., University South Florida campus, Tampa, Fla., U.S.A., B.J. Dyko, 30 Aug. 1977, IMI 227679, holotypus.

Colonies superficial, effuse, black. Mycelium immersed and superficial, sparse, composed of branched, septate, smooth, hyaline to dark brown hyphae. Conidiophores macronematous, mononematous, single or caespitose in groups of up to 20, straight or flexuous, unbranched, brown, smooth, cylindrical, septate, 54-210 x 4-6.5μ. Conidiogenous cells monotretic, integrated, terminal, percurrently proliferating, sub-hyaline to brown, smooth, cylindrical, becoming spathulate towards the apex. Conidia solitary, dry, acrogenous, simple, smooth, obclavate, tapering abruptly to a rostrate apex, 4-6 euseptate, occasionally distoseptate, lower 3-4 cells medium brown, upper two cells sub-hyaline to pale brown, 32-62.5μ long (including the rostrate apex) x 9.5-11μ.

On dead petioles of Serenoa sp., IMI 227679, holotype; on Serenoa serrulata, Univ. S. Fla., B.C. Sutton, 1 Sept. 1977, IMI 215975 g, IMI 215976 b.

This taxon is very similar to C. lanneicola Deighton & M.B. Ellis which was described on dead branches of Lannea afzelii from Sierra Leone (Ellis, 1957). The latter fungus, however, has consistently distoseptate conidia which taper to obtuse apices; the distosepta are not evident from Ellis's (1971) figures. The conidiogenous cells in C. lanneicola are cylindrical, do not swell at the apex and proliferate at closer intervals than those seen in C. obclavata. Corynespora obclavata appears to be sufficiently

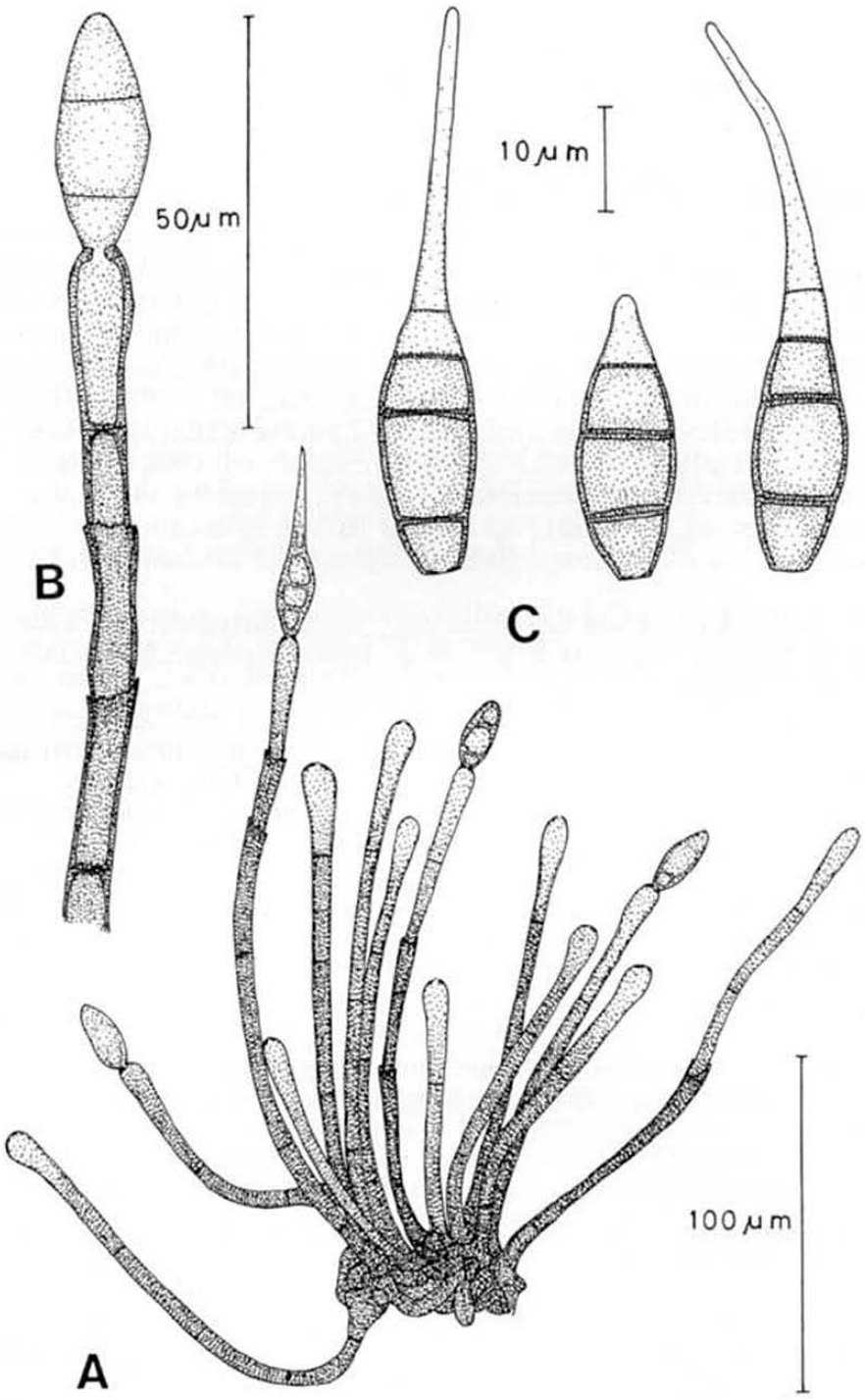

Figure 1. Corynespora obclavata. A. Habit sketch showing arrangement of conidiophores. B. Conidiogenous cell apex showing precurrent proliferations, tretic apex and developing conidium. C. Conidia.

distinct from the remaining species in the genus to cause no difficulty in identification.

Dendryphiella vinosa (Berk. & Curt.) Reisinger. Bull. Trimest. Soc. mycol. Fr. 84: 27-39 (1968).

The ubiquity of this species is reflected by collections at IMI which number well over 100 specimens predominantly on herbaceous hosts from temperate and tropical regions of Europe, Africa, Asia, Australian subcontinent, North and South America.

The genus differs from Dendryphion by showing a slight swelling at the apices of the conidiogenous cells and at the nodes of the conidiophores. The branching of the conidiophore is also generally much more restricted than that seen in Dendryphion.

On decaying leaves of Musa sp., IMI 227801.

Dendryphion comosum Wallr. Fl. Crypt. Germ. 2: 300 (1933).

Ellis (1971) reports this common species on dead stems of herbaceous plants in Europe, but the fungus may also be found on decaying wood. This taxon is represented by more than 120 collections from the U.K., Czechoslovakia, Eire, Belgium, India, Switzerland, Germany and now the U.S.A.

In this species, the conidiophore branches profusely at the apex giving it a tree or brush like appearance. The conidiogenous cells are tortuous and cylindrical, thus distinguishing them from Dendryphiella vinosa.

On decaying leaves of Musa sp., IMI 227799.

Periconia byssoides Pers. ex Mérat. Nouv. Fl. Environs Paris, Ed. 2, 1: 18-19 (1821)

This is common on dead herbaceous material and in leaf spots where it is usually associated with other fungi. The IMI herbarium contains well over 100 specimens from temperate and tropical regions of Europe, Africa, Asia, Australian subcontinents, North and South America.

On dry stipules of Bambusa sp., IMI 227802 b.

Virgariella oblonga Matsushima. Icones Microfungorum a Matsushima lectorum. Kobe, Japan. p. 163 (1975).

This interesting fungus has only been reported from the type locality in Japan (Matsushima, 1975). The dimensions given in the original description are 8-16 x 4.5-7.5μ, whereas those of our material measured 9.5-13 x 6.5-9μ. Additionally, the original illustrations show distinct denticles at the apices of the conidiogenous cells; our material tends not to have prominant denticles. We feel, however, the differences between the original description and our material are small and insufficient to warrant separation into a taxon distinct from V. oblonga.

Acknowledgements

We wish to thank Dr. J.L. Crane for reading this manuscript.

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PHIALEA GRANIGENA, AN OLDER NAME FOR GLOEOTINIA TEMULENTA

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During my studies in the Sclerotiniaceae of Fennoscandia for the forthcoming flora, "Nordic Macromycetes," I had the opportunity to examine an old collection of *Phialea granigena* Quélet in herb. UPS, labelled "*Phialea* (seminis) *granigena* Q, Tillous 15-20 Juin - 81 leg. Quélet," growing on caryopses of *Bromus erectus*. The material is very possibly part of authentic material reported by Quélet (1883) from France. Microanatomical investigations clearly show that the material is conspecific with *Gloeotinia temulenta* as circumscribed by Wilson, Noble and Gray (1954).

The microstructure of *P. granigena* is also in full accordance with that of the type specimens of *Sclerotinia secalincola* Rehm examined by me - (an Samen von *Secale cereale* L. auf schlecht bestandenen Feldern, in der Ober Lausitz bei Gōda, 27. Mai 1900, leg. G. Feurich, ex herb. Rehm (S)) - a species earlier placed in synonymy with *G. temulenta* by Rehm himself (Rehm 1915). The Quélet specimens provide an older name for *G. temulenta* and the necessary new combination is:

GLOEOTINIA GRANIGENA (Quélet) Schumacher, *comb. nov.*

Basionym: *Phialea granigena* Quélet, C. R. Ass. franç. Av. Sci. 11: 407, 1883.

Synonyms: *Sclerotinia granigena* (Quél.) Saccardo, Syll. Fung. 8: 198, 1889.
Phialea temulenta Prill. & Delacr., Bull. Soc. mycol. Fr. 8: 22, 1892.
Ciboria (Stromatinia) temulenta (Prill. & Delacr.) Prill. & Delacr., Bull. Soc. mycol. Fr. 9: 200, 1893.
Stromatinia temulenta (Prill. & Delacr.) Prill. & Delacr. *in* Prilleux, Malad. Plant. Agric., p. 453, 1897.
Sclerotinia temulenta (Prill. & Delacr.) Sacc. & Sacc. *in* Saccardo, Syll. Fung. 18: 42, 1906.

Gloeotinia temulenta (Prill. & Delacr.) Wilson, Noble & Gray, Trans. Brit. Mycol. Soc. 37: 31, 1954.
Sclerotinia secalincola Rehm, Hedwigia 39: 192, 1900.
Stromatinia secalincola (Rehm) Boud., Hist. class. Disc. d'Europe, p. 109, 1907.
Phialea mucosa Gray, Trans. Brit. Mycol. Soc. 25: 329, 1942.

A single record of the species from Norway, on caryopses of *Elytrigia repens* (L.) Nevski (Sör-Tröndelag. Trondheim. UTM grid ref. NR 6224, 25. June 1975 Å. Erlandsen (TRH)) extends the known host-range of this species to the four closely related graminous host genera, *Bromus, Lolium, Secale* and *Elytrigia.*

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MYCOTAXON

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MYXOMYCETES FROM ECUADOR

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The myxomycete flora of Ecuador is poorly known. Apart from the recent monograph by Farr (1976) on neotropical Myxomycetes, the only publication dealing specifically with species from the Ecuadorian mainland during recent decades appears to be that by Harling (1967). From the Galápagos Islands, which politically belong to Ecuador, Myxomycetes have been listed by Bonar (1939), Martin (1948), Eliasson (1971), and Farr (1976).

The rise of the land from sea level to an elevation of nearly 6,300 m has created diverse ecological conditions and resulted in a great variety of vegetation types, ranging from xerophytic scrub to wet, lowland rain forest, to high-Andean páramos, subpáramos, and "snow" areas.

The present paper reports some myxomycete field collections made by K. P. Dumont and colleagues in July and August, 1975 and by U. Eliasson in January and February, 1977. One or more specimens taken by H. Lugo in 1968,

M. Neuendorf in 1972, and B. Sparre in 1967, as well as a couple of G. W. Prescott's collections in BPI, are also included. Altogether forty-seven species are listed, twenty-two of which are reported from Ecuador for the first time. *Didymium leoninum* and *D. ochroideum* represent new records for South America, the former being listed for the second time from the Western Hemisphere. This brings the total number of Myxomycetes reported for mainland Ecuador to sixty-five species in twenty-one genera. However, since the country is still virtually unexplored floristically, many species no doubt remain to be found.

For the sake of brevity, the collecting localities have been numbered and are described below. Each species citation is followed by locality number and collector's number. All specimens marked with a cross (+) are new records for Ecuador. Eliasson's collections are deposited in GB while Dumont's specimens are in NY, with small portions of some in BPI (these are marked with an asterisk). The specimens have been determined by U. Eliasson and M. L. Farr. K. P. Dumont gratefully acknowledges NSF grant GB 28593 which provided financial support for his field work in collecting the cited specimens. U. Eliasson acknowledges the Anna and Gunnar Vidfelt Foundation for financial support of his travels in Ecuador.

Localities

1. Prov. Guayas, Cerro Azul, ca 10 km W of Guayaquil, dry seasonal shrub vegetation, alt. ca 50 m.
2. Prov. Los Ríos, hacienda Clementina on Río Pita, ca 20 km NE of Babahoyo, secondary monsoon forest and cultivated land, alt. ca 20 m.
3. Prov. Los Ríos, Santo Domingo-Quevedo road, Río Palenque Biological Station, 56 km from Quevedo, alt. ca 220 m.
4. Prov. El Oro, Piñas-Santa Rosa road, above El Placer, partly primary rain forest, alt. 400-1000 m.
5. Prov. El Oro, Piñas-Santa Rosa road, ca 7 km from Piñas, alt. ca 1400 m.
6. Prov. El Oro, Piñas-Santa Rosa road, 21 km from Piñas toward Machala, alt. ca 1400 m.
7. Boundary of Pichincha and Imbabura prov., Quito-Otavalo road via Minas, ca 90 km from Quito, alt. ca 3500 m.
8. Prov. Pichincha, Quito-Otavalo road via Minas, ca 66 km from Quito, alt. ca 2200 m.

9. Prov. Pichincha, Quito-Nono-Nanegal road, ca 36 km from Quito, alt. ca 2700 m.

10. Prov. Pichincha, Aloag-Santo Domingo road, ca 55 km from Santo Domingo, alt. ca 2000 m.

11. Prov. Pichincha, Aloag-Santo Domingo road, ca 19 km from Santo Domingo, alt. ca 870 m.

12. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 75 km SW of Chillogallo, alt. ca 1900 m.

13. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 49 km SW of Chillogallo, alt. ca 2400 m.

14. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 39 km SW of Chillogallo, alt. ca 2400 m.

15. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 37 km SW of Chillogallo, alt. ca 2500 m.

16. Prov. Pichincha, Quito-Chiriboga-Santo Domingo road, ca 24 km SW of Chillogallo, alt. ca 3400 m.

17. Prov. Pichincha, Quito-Chiriboga road, between Chiriboga and San Juan, montane rain forest and shrub vegetation, alt. 1900-2000 m.

18. Prov. Pichincha, Aloag-Santo Domingo road, 35 km from Aloag, alt. ca 2000 m.

19. Prov. Pichincha, near "La Plata" copper mine, 3 km above Palo Quemado which is ca 10 km above Toachi, alt. ca 1700 m.

20. Prov. Pichincha, Toachi-Palo Quemado road, 2 km above Toachi, alt. ca 1100 m.

21. Prov. Cotopaxi, Latacunga-Quevedo road, ca 87 km from Latacunga, alt. ca 3300 m.

22. Prov. Cotopaxi, Latacunga-Quevedo road, ca 98 km from Latacunga, alt. ca 2700 m.

23. Prov. Tungurahua, Pueblo Río Negro (near Río Pastaza), alt. ca 1250 m.

24. Prov. Tungurahua, Ambato-Puyo road, ca 50 km from Ambato, alt. ca 1800 m.

25. Prov. Tungurahua, Ambato-Puyo road, ca 59 km from Ambato, alt. ca 1800 m.

26. Prov. Chimborazo, Bucay-Riobamba road, ca 5 km from Bucay (General Elizalde), alt. ca 900 m.

27. Prov. Azuay, Cuenca-Girón road, Portete del Tarqui, montane scrub, alt. 2600-2700 m.

28. Prov. Loja, Catacocha-Macará road, ca 12 km SW of Catacocha, montane scrub, alt. ca 1400 m.

29. Prov. Loja, Catacocha-Macará road, ca 8 km S of Empalme, dry *Ceiba* savannah, alt. ca 1900 m.

30. Prov. Loja, Catacocha-Macará road, ca 16 km N of Macará, seasonal forest, alt. ca 1300 m.

31. Prov. Loja, Catacocha-Macará road, ca 6 km N of Macará, moist ravine, alt. ca 1000 m.

32. Prov. Loja, Loja-Catacocha road, ca 2 km S of Las Chinches, dense shrubby woods, alt. ca 2400 m.

33. Prov. Loja, Loja-Catacocha road, ca 10 km N of Catacocha, grasslands and woods, alt. ca 2100 m.

34. Prov. Loja, Macará-Cariamanga road, 10-15 km E of Macará, seasonal forest, alt. ca 700 m.

35. Prov. Napo, Santa Rosa (near Río Napo), alt. 400 m.

36. Prov. Napo, Coca-Armenia Vieja road, ca 15 km S of Coca (Puerto Francisco de Orellana), secondary vegetation and disturbed rain forest, alt. ca 250 m.

37. Prov. Napo, Coca-Lago Agrio road, Las Sachas, ca 40 km NE of Coca, virgin and disturbed rain forest, alt. ca 250 m.

38. Prov. Napo, Río Payamino, ca 10 km from the mouth, disturbed primary rain forest and riverside vegetation, alt. ca 250 m.

39. Prov. Pastaza, Mera, alt. ca 1100 m.

40. Prov. Pastaza, Mera-Pindo trail, ca 1 km N of Mera, rastrojos and potreros, alt. ca 1100 m.

41. Prov. Pastaza, Mera-Colonia Játiva road, 1-3 km NW of Mera, alt. ca 1100 m.

42. Prov. Pastaza, Ambato-Puyo road, ca 2 km from Puyo, alt. ca 1300 m.

43. Prov. Morona-Santiago, Limón-Méndez road, ca 5 km from Limón (General Plaza Gutierrez), alt. ca 1300 m.

44. Prov. Morona-Santiago, Limón-Méndez road, ca 9 km from Limón, alt. ca 1300 m.

45. Prov. Morona-Santiago, Limón-Méndez road, ca 13 km from Limón, alt. ca 1000 m.

46. Prov. Morona-Santiago, Méndez-Macas road, ca 7 km from Méndez, alt. ca 800 m.

47. Prov. Zamora-Chínchipe, Zamora-Loja road, ca 1 km from Zamora, alt. ca 1200 m.

LIST OF SPECIES

CERATIOMYXALES Martin ex Farr & Alexop.

Ceratiomyxa fruticulosa (Müll) Macbr. -- 1 *(Eliasson 3242)*; 12 (on monocot stem, *Dumont, Carpenter, & Buriticá *EC-338)*; 19 (on twig, *D. C. B. EC-504)*; 20 (on log, *D. C. B. *EC-651)*; 43 (on branch, *D. C. B. EC-2046, EC-2047)*.

+C. sphaerosperma Boedijn -- 41 *(E. 3251)*.

LICEALES Jahn

Liceaceae Rost.
+Licea biforis Morgan -- 39 (*Lugo s n*, GB).
L. ?operculata (Wing.) Martin -- 7 (on leaves, *D. C. B. *EC-2453)*. A scant specimen consisting of 1 1/2 sporangia, and fitting the description fairly well. *L. operculata* has not been reported for Ecuador.
Reticulariaceae Rost.
Tubifera microsperma (B. & C.) Mart. -- 27 *(E. 3274)*.
Lycogala epidendrum (L.) Fr. -- 13 (on wood *D. C. B. *EC-327)*; 26 (on log, *D. C. B. EC-1548)*;37 *(E.* Aethalia immature, not collected.)

Cribrariaceae Rost.
+Cribraria tenella Schrader -- 31 *(E. 3292 B)*.
Dictydium cancellatum (Batsch) Macbr.-- 40 *(E. 3245)*; 41 *(E. 3249)*.

TRICHIALES Macbr.

Arcyria cinerea (Bull.) Pers. -- 3 (on twig, *D. C. B. EC-857)*; 10 (on soil, *D. C. B. EC-427)*; 11 (on wood and soil, *D. C. B. EC-739)*; 35 *(Neuendorf s n*, herb. GB); 37 *(E. 3264)*; 38 *(E. 3272)*; 41 *(E. 3248)*; 44 *(D. C. B. EC-2057)*; 45 (on twig, *D. C. B. EC-2133)*.
A. denudata (L.) Wettst. -- 10 (on log, *D. C. B. *EC-432*; on soil, and twig, *D. C. B. EC-426)*; 20 (on soil and moss, *D. C. B. EC-641)*; 26 (on bark, *D. C. B. EC-1545)*; 31 *(E. 3293)*; 44 (on grass leaf, *D. C. B. EC-2055)*; 43 (on branch, *D. C. B. EC-2041)*.
A. ?insignis Kalchbr. & Cke. -- 20 (on branch, *D. C. B. *EC-629)*. Not known from Ecuador.
Hemitrichia calyculata (Speg.) Farr -- 3 (on log, *D. C. B. EC-819)*; 17 *(E. 3266)*; 20 (on herbaceous stem, *D. C. B. EC-630*; on twig, *EC-654)*; 25 (on twig, *D. C. B. *EC-1359)*; 30 *(E. 3239)*; 36 *(E. 3252, 3255, 3258, 3259)*; 37 *(E. 3262)*; 38 *(E. 3273)*; 40 *(E. 3244)*. The substrate for *EC-630* is unusual and noteworthy, since the species commonly occurs on dead wood.
H. serpula (Scop.) Rost. -- 20 (on wood, *D. C. B. *EC-649* and *EC-570)*.
Perichaena chrysosperma (Currey) A. Lister -- 28 *(E. 3281)*.

PHYSARALES Macbr.

Physaraceae Rost.
+Craterium aureum (Schum.) Rost. -- 33 *(E. 3291)*.

C. leucocephalum (Pers.) Ditmar -- 13 (on leaf, *D. C. B. EC-271*, poor); ?47 *(D. C. B. EC-1847)*.
+*Fuligo septica* (L.) Wigg. -- 36 *(E. 3256)*.
+*Physarella oblonga* (Berk. & Curt.) Morgan -- 37 *(E. 3263)*.
+*Physarum sp.* (Close to *P. bivalve* Pers.) -- 24 (on leaf, *D. C. B. EC-1307)*.
P. sp. (Possibly close to *P. nudum* Macbr.) -- 47 (on monocot stem, *D. C. B. EC-1845*, badly parasitized).
P. bogoriense Racib. -- 30 *(E. 3285)*.
P. cinereum (Batsch) Pers. -- 29 *(E. 3284)*.
+*P. compressum* Alb. & Schw. -- 3 (on monocot stem, *D. C. B. *EC-846;* on bark, **EC-850, EC-851);* 5 (on branch,D. C. B. *EC-1604);* 8 (on vine, *D. C. B. EC-2428);* 11 (on herbaceous stem, *D. C. B. EC-744);* 16 *(E. 3268);* 20 (on leaf, *D. C. B. *EC 647);* 23 *(Neuendorf s n,* herb. GB); 26 (on herbaceous stem, *D. C. B. EC-1544);* 45 (on petiole of *Cecropia sp, D. C. B. EC-2136)*.
+*P. didermoides* (Pers.) Rost. -- 35 *(Neuendorf s n,* herb. GB).
P. melleum (Berk. & Br.) Massee -- 19 (on leaf, *D. C. B. EC-512)*.
P. nutans Pers. -- 19 (on herbaceous stem, *D. C. B. EC-506);* 27 *(E. 3276, 3277);* 28 *(E. 3282);* 34 *(E. 3240);* ?42 (on branch, *D. C. B. *EC-1423)*.
+*P. pusillum* (Berk. & Curt.) G. Lister -- 17 *(E. 3265, 3269, 3295);* 22 (on herbaceous stem, *D. C. B. *EC-1189;* on leaf, *EC-1192);* 41 *(E. 3246, 3250);* 43 (on debris, *D. C. B. EC-2042)*.
+*P. serpula* -- 26 (on leaf, *D. C. B. *EC-1551)*.
P. stellatum (Massee) Martin -- 3 (on herbaceous stem, *D. C. B. EC-854;* on wood, **EC-856);* 12 (on leaf, *D. C. B. *EC-337);* without data (on bark, *Prescott *F. 48)*.
P. viride (Bull.) Pers. -- 9 (on bamboo culm, *D. C. B. *EC-2298)*.

Didymiaceae Rost.
+*Diderma effusum* (Schw.) Morgan -- 22 (on leaf, *D. C. B. EC-1190);* ?25 (on living vine, *D. C. B. EC-1360)*.
+*D. hemisphaericum* (Bull.) Hornem. -- 7 (on leaves, *D. C. B. EC-2454);* 17 *(E. 3267);* 25 (on herbaceous stem, *D. C. B. EC-1254*, poor); 30 *(E. 3238);* 32 *(E. 3279);* 33 *(E. 3290)*.
Didymium sp. (Close to *D. squamulosum)* -- 7 (on debris, *D. C. B. *EC-2456);* 45 (on leaf, *D. C. B. *EC-2134)*.

+*D. clavus* (Alb. & Schw.) Rab. -- 4 *(E. 3237);* 7 (on twig, *D. C. B. EC-37);* 37 *(E. 3286);* 44 (on herbaceous stem, *D. C. B. *EC-2050).*

D. ?difforme (Pers.) S. F. Gray -- 5 (on leaf, *D. C. B. EC-1608;* fits except for spore size, 8-10 µm); ?20 (on leaf, *D. C. B. EC-635,* slightly aberrant; *EC-650,* slightly immature).

+*D. floccosum* Martin, Thind, & Rehill -- 33 *(E. 3288).* This collection agrees with the two deviating specimens discussed by Farr (1976, p. 225) under *D. floccosum.* Although the sporangia have unusually thick stipes, this specimen may be accommodated here for the present.

D. iridis (Ditmar) Fr. -- ?12 (on wood, *D. C. B. EC-335,* one sporangium); 29 *(E. 3294).*

+*D. leoninum* Berk. & Br. -- 20 (on herbaceous stem, *D. C. B. *EC-637).* Second record for Western Hemisphere and first record for South America. The first record of the species from the Western Hemisphere was a collection from Jamaica, discussed earlier (Farr, 1974).

D. minus (A. Lister) Morgan -- 20 (on leaf, *D. C. B. *EC-643).*

D. nigripes (Lk.) Fr. -- 3 (on herbaceous stem, *D. C. B. EC-860);* 11 (on grass leaves, *D. C. B. EC-737);* 20 (on leaf, *D. C. B. EC-626, EC-636, *EC-648);* 33 *(E. 3280, 3289);* 42 (on leaf, *D. C. B. *EC-1427;* on grass, *EC-1420);* 43 (on leaf, *D. C. B. EC-2048);* 46 (on herbaceous stem, *D. C. B. EC-2205;* on leaf, *EC-2223).*

+*D. ochroideum* G. Lister -- 14 (on herbaceous stem, *D. C. B. EC-226).* New for South America.

D. squamulosum (Alb. & Schw.) Fr. -- 5 (on herbaceous stem, *D. C. B. EC-1603);* ?15 (on leaf, *D. C. B. EC-165);* ?24 (on culms of *Equisetum sp., D. C. B. EC-1248,* poor); 28 *(E. 3283);* 31 *(E. 3271);* 45 (on leaf, *D. C. B. EC-2132).*

+*D. verrucosporum* Welden -- 3 (on herbaceous stem, *D. C. B. *EC-820);* 6 (on leaf, *D. C. B. *EC-1734);* 19 (on leaf, *D. C. B. EC-638).*

STEMONITALES Macbr.

Comatricha typhoides (Bull.) Rost. -- 18 (on bamboo culm, *D. C. B. EC-2416);* 40 *(E. 3243).*

+*Lamproderma scintillans* (Berk. & Br.) Morgan -- 21 (on leaf, *D. C. B. EC-1070);* 33 *(E. 3287).*

Stemonitis axifera (Bull.) Macbr. -- 27 *(E. 3275, 3278).*

S. fusca Roth. -- 26 (on wood, *D. C. B. *EC-1543);* 36 *(E. 3257, 3260, 3261);* without data (on bark, *Prescott *F-48).*

+S. herbatica Peck -- 2 (*Sparre s n,* herb. S).

S. splendens Rost. -- 41 *(E. 3247).*

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CONTRIBUTION TO THE STUDY OF LICHENS FROM KIVU (ZAÏRE), RWANDA AND BURUNDI. III. VEZDAEA, A NEW GENUS FOR AFRICA

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SUMMARY

The genus *Vezdaea* Tsch.-Woess & Poelt is recorded as new for Africa where it is represented by a new species : *Vezdaea foliicola* Sérusiaux sp. nov.

RESUME

Le genre *Vezdaea* Tsch.-Woess & Poelt est découvert pour la première fois en Afrique, où il est représenté par une espèce nouvelle : *Vezdaea foliicola* Sérusiaux sp. nov.

The collection of foliicolous lichens recently made in Kivu (Zaïre), Rwanda and Burundi has already proved to be mostly interesting (Sérusiaux 1978). This paper deals with the discovery of the genus *Vezdaea* in this material. Detailed information about the area and its ecogeographical position can be found in Lambinon & Sérusiaux (1977).

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Vezdaea foliicola Sérusiaux sp. nov.

Thallus crustaceus, supracuticulariter crescens, cinereo-viridis. Ascocarpia rotunda vel saepe irregularia, 0.8-1.0 mm diam., leviter convexa, bruneola, interdum leviter tomentosa. Excipulum nullum, hypothecium indistinctum, "hymenium" hyalinum. Asci numerosi, membranis incrassatis, 8-spori. Paraphyses ramosae anastomosantesque, reticula circum ascos formantes. Sporae 1-septatae, ellipsoideae, 16.5-19 x 4-6 µm, leviter sed distincte verrucosae. Algae ad Chlorococcaceae probabiliter pertinentes. Holotypus : Lambinon 71/1115 (LG).

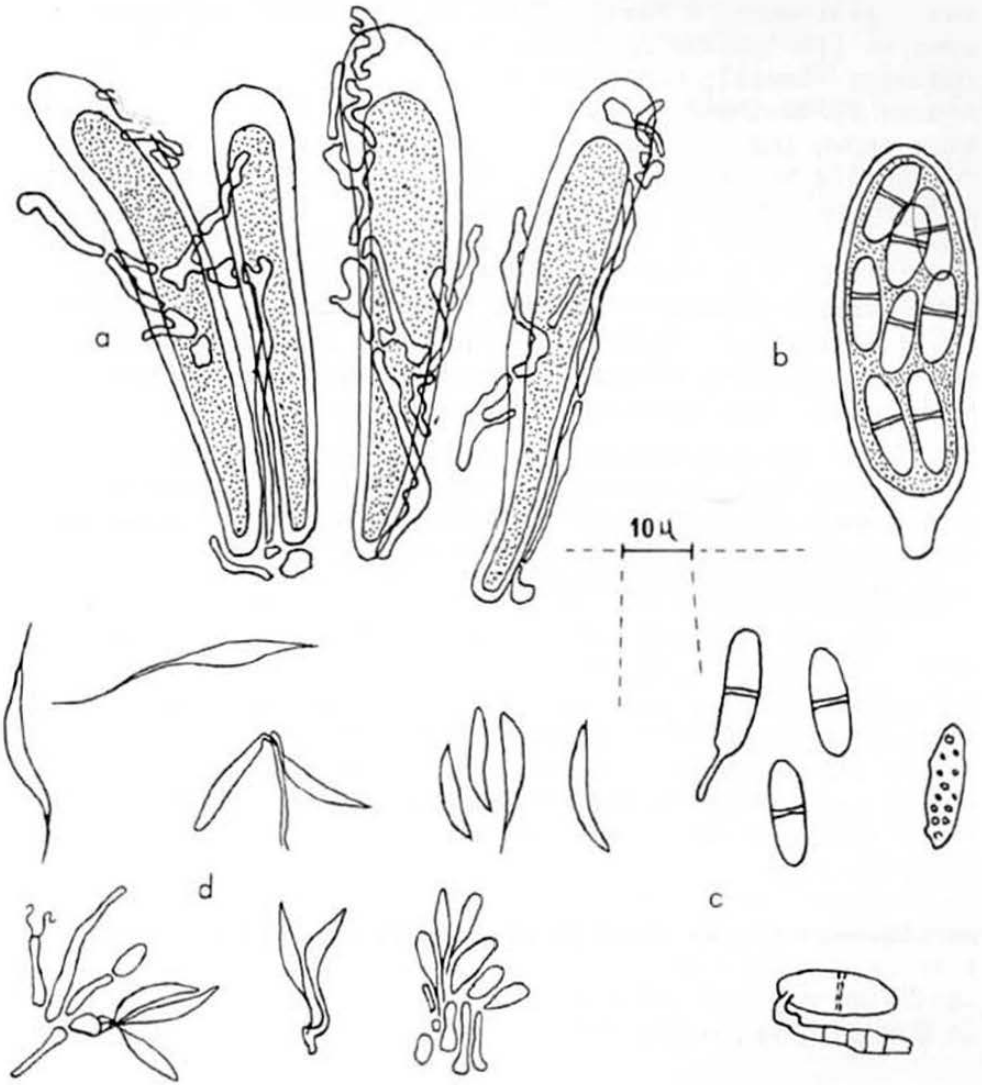
Thallus epiphyllous, growing on the leaf cuticule, at least in adult stage, ± circular but with an often irregular periphery (due to the thallus disappearance), up to 12 mm diam., not exceeding 10 µm thick, ashen green. Ascocarps circular or often irregular in shape and outline, 0.8-1.0 mm diam., slightly convex but giving the impression of being flattened, brownish, when young covered by a minute whitish tomentum (this might in fact be the ascus tips), without margin or in young stages surrounded by intricated whitish hyphae giving the margin a woolly aspect. Excipulum lacking but a few peripheral hyphae suggest an excipulum-like structure,hypothecium ill-defined, the ascus and paraphyses are found in loose tufts, there is no binding hymenial gel and therefore there is no real hymenium.

Asci abundant, clavate, thick-walled, with a double layer and a swollen tholus (especially clear in young asci); paraphyses branched and anastomosed, composed of flattened cells and forming a net work around each ascus. Spores : 8/ascus, 1-septate, not constricted at the septum, (14-) 16.5-19 x 4-6 µm (average of 17.5 x 5 µm),ellipsoid to slightly fusiform, with obtuse ends, minutely verrucose when completely mature (verrucae distinctly refringent).

Pycnidiospores produced only in certain young parts of the thallus (obviously lacking in large areas of the thallus, usually in old ones), fusiform with tapering ends, simple, 14-16 x 25-35 µm, budding on long and ± straight sterigmates.

Algae : micareoid : globose, green, 5-10 µm diam.,cells grouped in a common gelatinous membrane,probably belonging to the Chlorococcaceae.

Zaïre : Central east Afromontane district : Massif du Kahuzi, env. km 37 de la route Bukavu-Walikale, alt. 2300 m, partie inférieure de la forêt de bambous, épiphylle sur *Culcasia* sp., Lambinon 71/1115 (holotypus : LG, isotypus : GZU, herb. Vězda).



Vezdaea foliicola Sérusiaux, holotypus. a : young hymenium; b : ascus with spores; c : spores (a cluster of 3 immature spores, one completely mature with verrucae, a young one parasitized by an unknown fungus); d : pycnidiospores.

The genus *Vezdaea* has been recently recognized (Tschermak-Woess & Poelt, 1976) to accomodate an european species [*Pachyascus byssaceus* (Vězda) Vězda (= *Catillaria byssacea* Vězda)], whose particularities were earlier described by Vězda (1963, 1970). Tschermak-Woess and Poelt also have shown that this taxon formely was described as *Lecidea aestivalis* by Ohlert and should therefore be named *Vezdaea aestivalis* (Ohlert) Tsch.-Woess & Poelt. Four other species have been placed in the genus as well (Poelt & Döbbeler, 1975, 1977) : *V. leprosa* (James) Vězda, *V. retigera* Poelt & Döbbeler, *V. rheocarpa* Poelt & Döbbeler and *V. stipitata* Poelt & Döbbeler. Those papers provide information on morphology, anatomy, ecology and taxonomical position of that genus of Lecideaceae.

The taxon discovered in Lambinon african material clearly belongs to that genus because of its ascocarps structure, ascus anatomy, lack of excipulum, branched and anastomosed paraphyses forming a network around individual asci and bicellular spores.

It can be easily distinguished from the species of the sect. *Stipitatae* Poelt & Döbbeler (*V. stipitata* and *V. leprosa*) by its sessile ascocarps and from the only species of the sect. *Rheocarpae* Poelt & Döbbeler (*V. rheocarpa*) by its paraphyses which reach the ascus tips (in *V. rheocarpa*, paraphyses are scarce and do not exceed half the ascus length). *V. foliicola* seems to belong to the sect. *Vezdaea* and can be distinguished from *V. retigera* by its spores (unicellular in *V. retigera*) and from *V. aestivalis* by its ascocarps color, pycnidiospores, as well as its distribution and ecology. As a matter of fact *V. aestivalis* has flesh-colored ascocarps, bacilliform pycnidiospores 10-12 x 2 µm and is encountered in Europe overgrowing living or dead mosses and liverworts.

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NOTES ON HYPHOMYCETES. XXVI. *UNCISPORA HARROLDII* GEN. ET SP. NOV.

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ABSTRACT

Uncispora harroldii Sinclair and Morgan-Jones, a new genus and species, is described from a collection made on twigs of *Betula nigra* L. in Alabama.

INTRODUCTION

An illustrated account is given of a dematiaceous hyphomycete collected on twigs of *Betula nigra* in Alabama for which we know of no hitherto published name. In some aspects of conidiophore and conidium morphology, the fungus resembles species of *Sporidesmium* Link ex Fr. and related genera. In common with these, it possesses conidiophores bearing holoblastic, monoblastic, integrated, non-cicatrized conidiogenous cells and conidia which are broadly truncate at their base. It differs from them in that its conidiophores are sometimes branched and synnematous and in possessing conidia that are uniquely hooked distally.

TAXONOMIC PART

Uncispora gen. nov.

Deuteromycotina, Hyphomycetes.

(Etym. *Uncus*, hook et Gr. *spora*, spore)

Coloniae late effusae, sparsae, pallide brunneae vel brunneae, pilosae. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis vel pallide brunneis compositum. Conidiophora macronemata, synnemata vel in fasciculata aggregata, erecta, recta vel flexuosa, simplicia vel ramosa, brunnea, laevia, modice crasse tunicata, septata. Cellae conidiogenae in conidiophoris incorporatae, monoblasticae, terminales, determinatae, cylindricae. Conidia solitaria, simplicia, septata, subhyalina

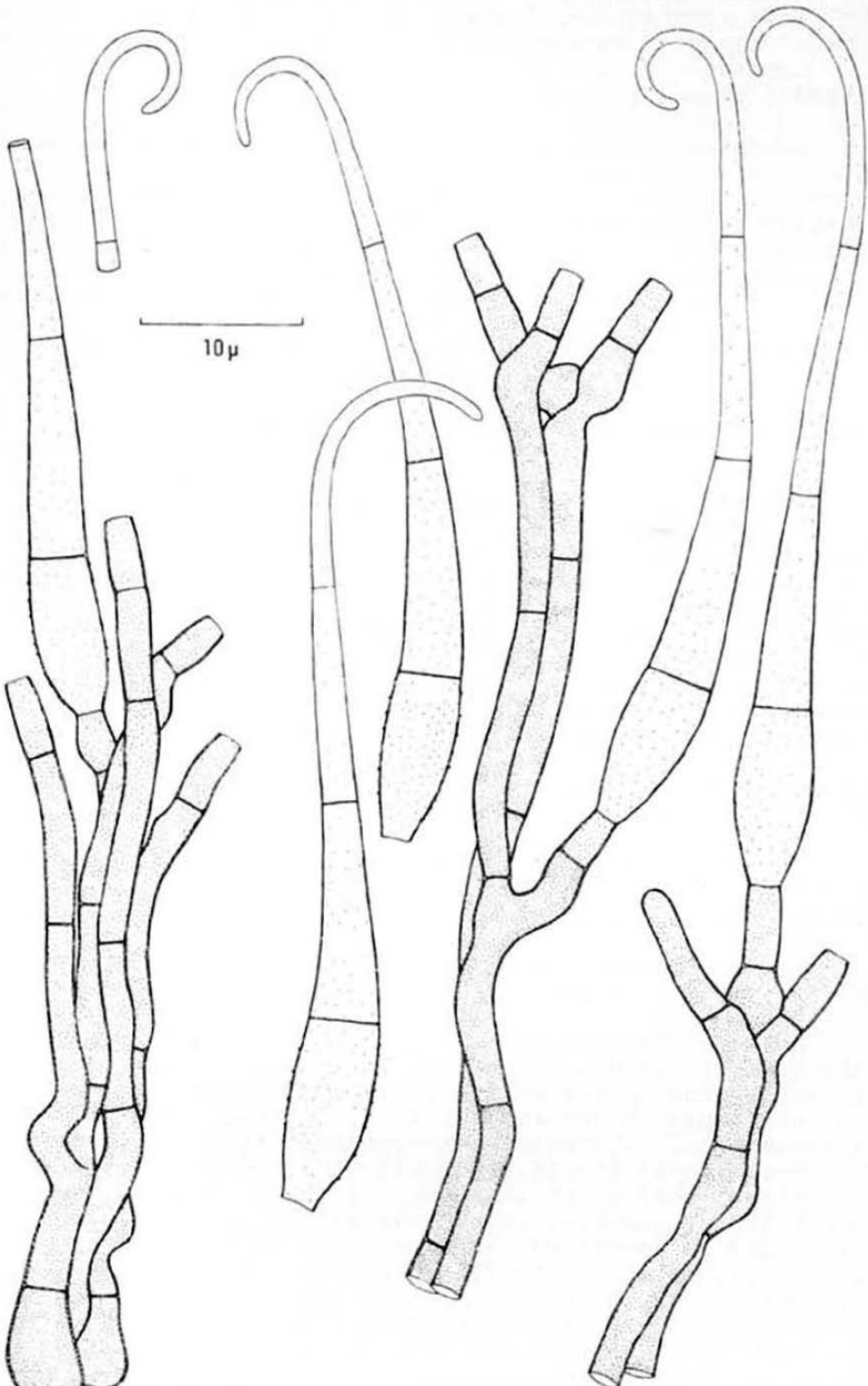

FIGURE 1. *Uncispora harroldii.*
Conidiophora and conidia.

vel pallide brunnea, laevia sed verruculosa ubi matura, obclavata, rostrata et hamata, ad basem truncata.

Species typica: *Uncispora harroldii* Sinclair and Morgan-Jones.

Colonies broadly effuse, thin, pale brown to brown, hairy. Mycelium mostly immersed in the substratum, composed of branched, septate, hyaline to pale brown hyphae. Conidiophores macronematous, synnematous or arranged in fascicles, erect, straight or flexuous, simple or branched, brown, smooth, moderately thick walled, septate. Conidiogenous cells integrated, monoblastic, terminal, determinate, cylindrical. Conidia solitary, simple, septate, subhyaline to pale brown, smooth or verruculose at maturity, obclavate, hooked towards the apex, truncate at the base.

Uncispora harroldii sp. nov. (Fig. 1)

Coloniae late effusae, sparsae, pallide brunneae vel brunneae, pilosae. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis vel pallide brunneis, laevibus, 1.5 - 2.5μ crassis compositum. Conidiophora macronemata, synnemata vel in fasciculata aggregata, erecta, recta vel flexuosa, simplicia vel ramosa, pallide brunnea vel brunnea, sursum pallidiora, laevia, modice crasse tunicata, septata, 35 - 68 X 2.5 - 4μ. Cellae conidiogenae in conidiophoris incorporatae, monoblasticae, terminales, determinatae, cylindricae. Conidia solitaria, simplicia, 3 - 4 septata, subhyalina vel pallide brunnea, laevia sed verruculosa ubi matura, obclavata, rostrata et hamata, ad basem truncata, 62 - 78μ longa, 4 - 5μ crassa, basi 2.5 - 3μ apice 1 - 1.5μ lata,

In ramunculis emortuis Betulae nigrae, Tuskegee National Forest, Macon County, Alabama, May 15, 1978, Susan A. Harrold, AUA, holotypus.

The new species is named in honor of Ms. Susan A. Harrold, its collector.

Colonies broadly effuse, thin, mostly inconspicuous, pale brown to brown, hairy. Mycelium mostly immersed in the substratum, composed of branched, septate, smooth, hyaline to pale brown hyphae, 1.5 - 2μ wide. Conidiophores macronematous, synnematous or sometimes in a fascicle of a few, very rarely single, frequently intertwining, erect, straight or more often flexuous, simple or branched, pale to mid brown, slightly paler towards the apex, smooth, moderately thick-walled, septate, 35 - 68 X 2.5 - 4μ. Conidiogenous cells integrated, monoblastic, terminal, determinate, cylindrical. Conidia solitary, simple, 3 to 4-septate, subhyaline to very pale brown, smooth or with the walls of the lower cell minutely verruculose at maturity, obclavate, rostrate and hamate, truncate at the base, 62 - 78μ long, 4 - 5μ in the broadest part, 2.5 - 3μ wide at the

base, 1 - 1.5μ wide at the apex.

On bark of dead twigs of *Betula nigra* L, North America.

Collection examined: on *B. nigra*, Tuskegee National Forest, Macon County, Alabama, May 15, 1978, Susan A. Harrold, AUA, type.

The conidia of several species of *Sporidesmium* show a tendency to curve towards the tip, particularly those of *S. hamatum* M.B. Ellis, which are hamate. The flexuous, branched, intertwining conidiophores of *Uncispora*, however, serve to distinguish it from *Sporidesmium*.

ACKNOWLEDGEMENT

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NOTES ON HYPHOMYCETES. XXVII. *MYCOGONE PSILOCYBINA*, A NEW MYCOPARASITIC SPECIES

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ABSTRACT

Mycogone psilocybina Morgan-Jones and Gray, a new species, is described from collections on carpophores of *Psilocybe cubensis* (Earle) Singer in Alabama.

INTRODUCTION

In the course of a survey of mycoparasitic fungi occurring on carpophores of members of the Agaricales in Alabama several fungi have been discovered of which there is apparently no documentation in the literature. Among these is an organism isolated from fruit bodies of *Psilocybe cubensis* growing on cow dung in open meadows. It belongs to the genus *Mycogone* Link but is clearly distinct from the other species of this genus described hitherto. A description of the fungus is provided herein and a new name is established for it. Some account of the host-parasite relationship is given.

TAXONOMIC PART

Mycogone psilocybina sp. nov. (Figs. 1 and 2)

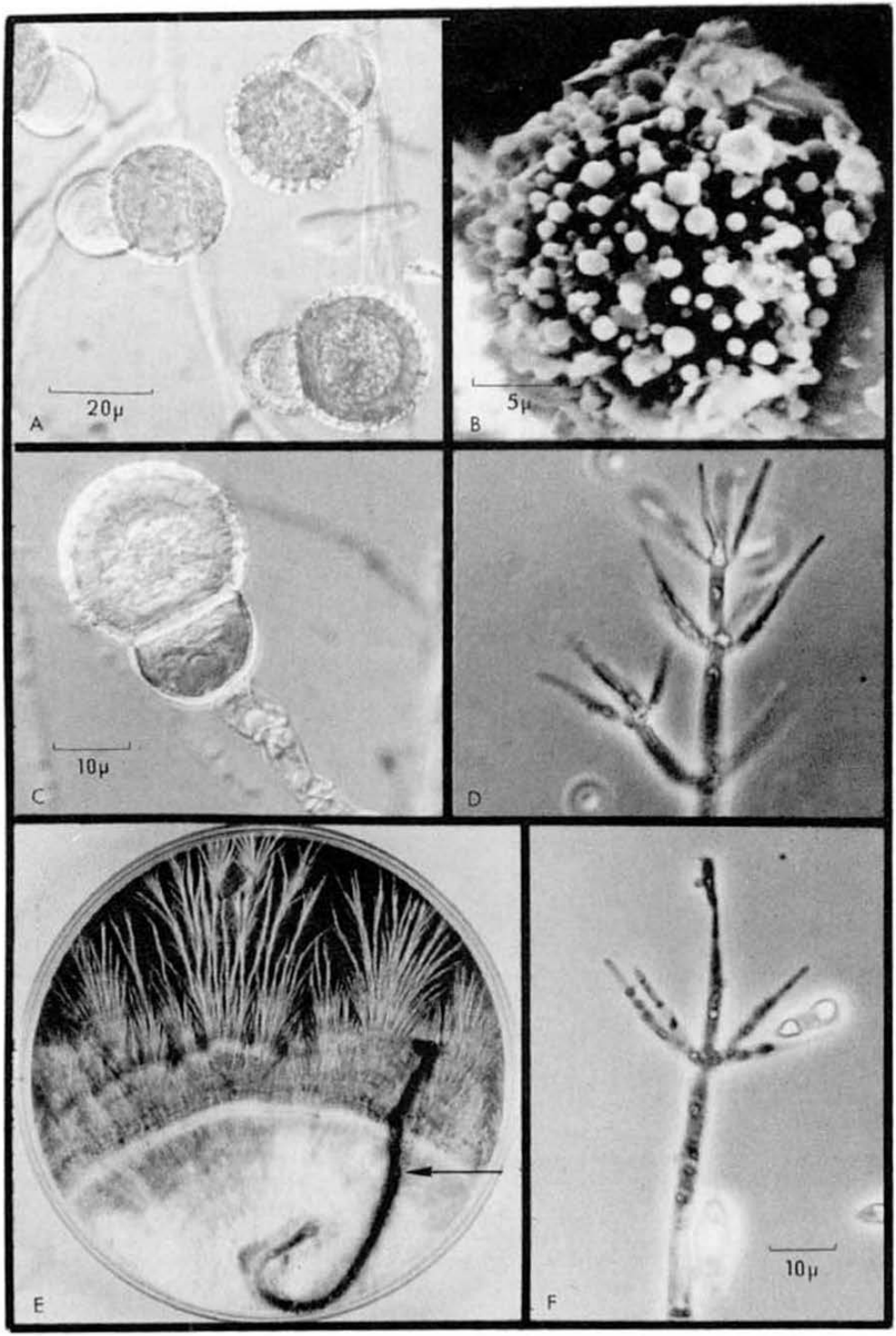
Coloniae effusae, pallide cinnamomeae vel subroseae, sparsae, floccosae. Coloniae in agaro decocto tuberorum post 5 dies 25°C ad 5 cm. diametro, celeriter crescentes, lanosae vel floccosae, cinnamomeae vel pallide badiae; reverso ochraceo-brunneo. Mycelium plerumque superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, hyalinis, levibus, 4 - 7µ crassis compositum. Cellae aleurioconidiogenae monoblasticae, discretae vel in hyphis incorporatae, terminales et intercalares, laeves, cylindricae vel ampulliformes. Aleurioconidia solitaria, sicca, acrogena, 1 septata: cellula superna sphaerica, crassitunicata, verrucosa, ochracea, 26 - 25µ in diam.; cellula inferne semisphaerica, laevia, sybhyalina, 15 - 18µ in

diam., 10 - 14μ alta. In hyphis eisdem ac Mycogone vel sejunctis orta Verticillii fructificatio. Conidiophora semimacronemata, mononemata, recta vel flexuosa, laevia, septata, hyalina, interdum ramosa. Cellulae conidiogenae monophialidicae, discretae et verticillatae, determinatae, hyalinae, subulatae, laeves, 18 - 34 X 2.5 - 3μ, ad apicem 1u crassae. Conidia ellipsoidea vel ovoidea, laevia, hyalina, aseptata vel 1 septata, plerumque guttulata, 7 - 17 X 2 - 5μ.

Ad carpostomata viva Psilocybe, Tuskegee National Forest, Macon County, Alabama, September 20, 1977, Dennis J. Gray, AUA, holotypus.

Colonies effuse, pale cinnamon to pinkish, thin, floccose. Colonies on PDA growing rapidly, lanose, or floccose, cinnamon to pale chocolate brown, becoming somewhat yellowish with the production of aleurioconidia, reverse pale yellowish-brown, 5 cm. in diameter after 5 days at 25° C. Colonies on 2% malt agar growing well, floccose, appreciably thinnner than on PDA, pale chocolate brown, reverse dull grayish, 4 cm. in diameter after 5 days at 25° C. Colonies on Czapek-Dox agar extremely thin, 3.5 cm in diameter after 5 days at 25° C. Mycelium mostly superficial on carpophores, composed of cylindrical, flexuous, branched, septate, hyaline, smooth-walled, 4 - 7μ wide hyphae Aleurioconidium-bearing hyphae micronematous or semi-macronematous, short, branched or unbranched. Aleurioconidium-bearing cells integrated, terminal on lateral branches of vegetative hyphae or intercalary, monoblastic, determinate, cylindrical or somewhat ampulliform. Aleurioconidia solitary, dry acrogenous, divided by a septum, with a large, spherical, thick-walled, verrucose, yellowish-brown, 26 - 27μ wide upper cell and a smaller, smooth-walled, subhyaline, basal cell, 15 - 18μ wide, 10 - 14μ long. A *Verticillium*-like phialidic state is also present. Conidiophores semimacronematous, stipe straight or flexuous, hyaline, smooth, with a terminal verticil of up to six phialides and short lateral branches bearing similar heads but with usually fewer phialides. A few phialides are sometimes formed laterally on the main stipe immediately beneath septa. Conidiogenous cells monophialidic, discrete, arranged verticillately, determinate, narrowly ampulliform, with long narrow necks, without collarettes, 18 - 34 X 2.5 - 3μ. Conidia produced in basipetal succession at the tips of the phialides, variable, ovoid to ellipsoid, hyaline, nonseptate, or more rarely 1-septate, 7 - 17 X 2 - 5μ, the larger conidia frequently

FIGURE 1. *Mycogone psilocybina*. A and C, Aleurioconidia (Nomarski differential interference microscopy); B, surface of upper cell of aleurioconidium (scanning electron microscopy); D and F, phialoconidiophores; E, plate culture of *M. psilocybina* and *P. cubensis* (arrow indicates aborted carpophore of *P. cubensis*).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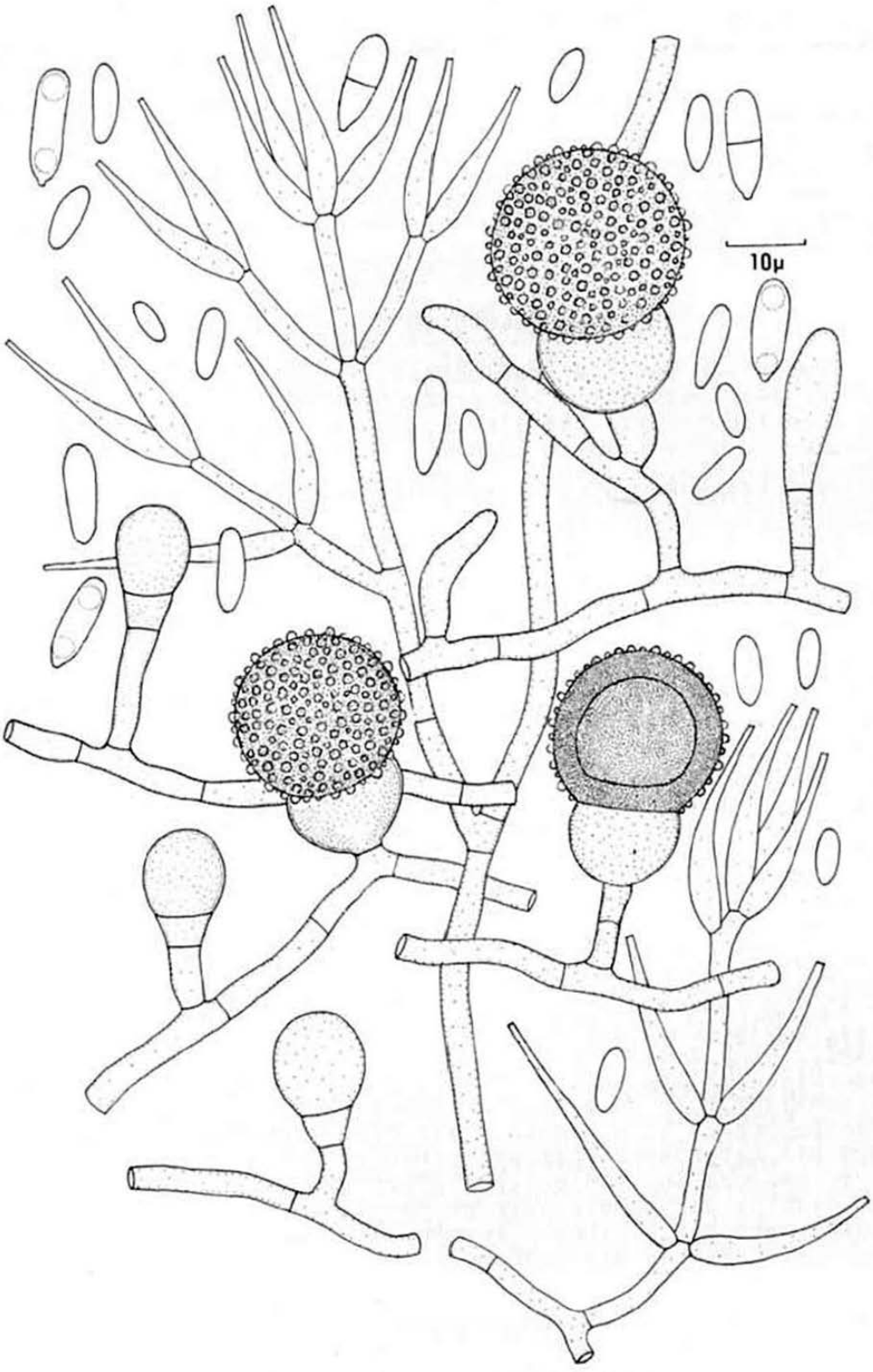

FIGURE 2. *Mycogone psilocybina*

biguttulate and bearing a minute papilla at their extreme base.

On carpophores of *Psilocybe cubensis* (Earle) Singer; North America.

Collection examined: on *P. cubensis*, Tuskegee National Forest, Macon County, Alabama, September 20, 1977, Dennis J. Gray, AUA, type. Culture derived from this collection ATCC 36389.

DISCUSSION

In colony habit *M. psilocybina* resembles *M. cervina* Ditmer particularly in the production of a compact layer of aleurioconidia. The aleurioconidia are however much larger and more reddish in color than those of *M. cervina* and the phialoconidia are shorter. *M. psilocybina* is distinct from *M. rosea* Link ex Link by the discrete very large warts on the upper cell of the aleurioconidia.

Examination of the aleurioconidia of *M. psilocybina* with a scanning electron microscope has shown the warts or protuberances on the wall of the upper cell to be variable in size and to be irregularly spaced (Fig. 1B). There is occasional coalescence of individual protuberances of different size.

In nature the mycelium of *M. psilocybina* covers a large area of the carpophore of the host fungus and some disruption was noticeable in the collection on which our studies are based. Several carpophores were partly aborted. In culture *M. psilocybina* has adverse effects on the growth and sporulation of *P. cubensis*. In plate culture on PDA supplimented with yeast extract a zone of inhibition is apparent where colonies of the two fungi approach each other (the culture of *P. cubensis* [ATCC 36412] used in our growth studies was isolated by us from a healthy carpophore obtained at the same locality as those infected by *M. psilocybina*). After a time inhibition is overcome and the mycelia intermingle. The mycelium of *P. cubensis* however assumes a blue coloration in the zone overlapping the *M. psilocybina* colony. We consider this to indicate some disruption since the carpophores of *P. cubensis* stain blue when bruised. Furthermore all carpophore initials produced become rapidly covered by *M. psilocybina* and quickly abort (Fig. 1E). Healthy sporulating carpophores are produced by *P. cubensis* on this medium when grown alone. Further studies of the host-parasite relationship are underway.

ACKNOWLEDGMENTS

We have had the benefit of consultation with Dr. Walter Gams. Dr. J. Leland Crane reviewed the manuscript.

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NOTES ON HYPHOMYCETES. XXVIII. *VERONAEA BAMBUSAE* SP. NOV.

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ABSTRACT

Veronaea bambusae Morgan-Jones, a new species, is described and illustrated from a collection made on leaves of *Bambusa* sp. in Alabama.

INTRODUCTION

A fungus collected on leaves of *Bambusa* sp. in Alabama has been determined to be an undescribed species of *Veronaea* Ciferri and Montemartini. It resembles *Veronaea apiculata* (Miller, Giddens and Foster) M.B. Ellis and *Veronaea musae* M.B. Ellis. It differs from the former in possessing smooth-walled, ellipsoid conidia and from the latter in having appreciably smaller conidia.

TAXONOMIC PART

Veronaea bambusae sp. nov. (Fig. 1).

Coloniae effusae, griseo-brunneae, pilosae. Mycelium partim superficiale et partim in substrato immersae, ex hyphis ramosis, septatis, subhyalinis vel pallide brunneis, levibus, 1.5 - 2.5µ crassis compositum. Conidiophora macronemata, mononemata ex lateribus hypharum oriunda, simplicia vel laxe ramosa, recta vel flexuosa, septata, subhyalina vel pallide brunnea, apicem versus pallidiora, laevia, cicatricibus conidialibus numerosis praedita, usque ad 140µ longa, 1.5 - 3µ crassa. Cellae conidiogenae polyblaticae, in conidiophoris incorporatae, terminales vel intercalares. Conidia acropleurogena, ellipsoidea, hyalina vel subhyalina, laevia, 4 - 5 X 1.5 - 2µ.

In foliis emortuis Bambusae, Chewacla State Park, Lee County, Alabama, April 18, 1978, R. Munsey, AUA, holotypus.

Colonies effuse, greyish brown, hairy. Mycelium partly superficial, partly immersed in the substratum, composed of

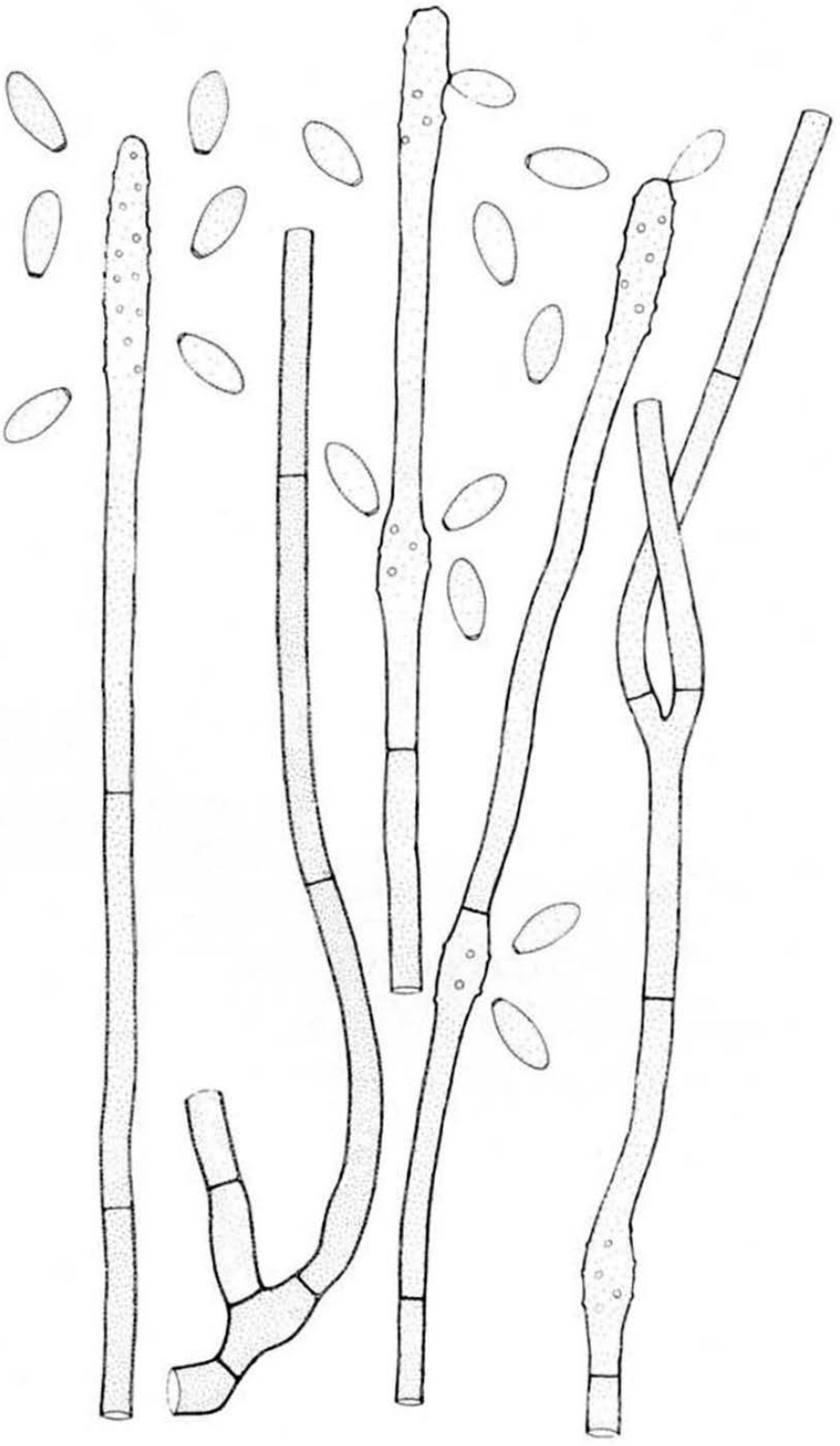

FIGURE 1. *Veronaea bambusae*

branched, septate, subhyaline to pale brown, smooth, 1.5 - 2.5µ wide hyphae. Conidiophores macronematous, mononematous, arising as lateral branches of the hyphae, simple or loosely branched, straight or flexuous, cylindrical, septate, subhyaline or pale brown, paler towards the apex, smooth, bearing numerous conidial scars which are small and flat, up to 140µ long, 1.5 - 3µ thick. Conidiogenous cells polyblastic, integrated, terminal or intercalary, the zone bearing conidia usually noticeably inflated. Conidia acropleurogenous, ellipsoid, hyaline or subhyaline, smooth, with a flat scar at the base, 4 - 5 X 1.5 - 2µ.

On dead leaves of *Bambusa* sp:; North America.

Collection examined: on *Bambusa* sp., Chewacla State Park, Lee County, Alabama, April 18, 1978, R. Munsey, AUA, type.

In establishing the name of *V. bambusae* I am accepting the concept of the genus *Veronaea* as expounded by Ellis (1976). This in spite of the fact that de Hoog (1977) adopted the name *Ramichloridium* Stahel ex de Hoog for the taxa included by Ellis in *Veronaea*. The small, flat conidiophore scars are a hallmark of *Veronaea*. I remain to be convinced that *Ramichloridium* as conceived by de Hoog, containing as it does some species with distinct denticles on the conidiophore, is a fully satisfactory taxonomic entity.

ACKNOWLEDGMENT

Dr. Richard T. Hanlin, University of Georgia, reviewed the manuscript.

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NOTES ON HYPHOMYCETES. XXIX. *OBSTIPISPORA CHEWACLENSIS* GEN. ET SP. NOV.

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ABSTRACT

Obstipispora chewaclensis Sinclair and Morgan-Jones, a new aquatic genus and species, is described from collections made in an Alabama stream.

INTRODUCTION

Although a widespread and extensive aquatic hyphomycete flora, comprising roughly 40 genera and 80 species, is documented in the literature, Ingold (1976) has predicted that twice as many taxa might well eventually be discovered. The abundance of these hyphomycetes in well aerated freshwaters has led to a belief that their biomass exceeds that of other fungi in that aquatic environment.

In the course of a seasonal survey of aquatic hyphomycetes occurring on decomposing leaves of various deciduous trees submerged in a fast flowing stream at Chewacla State Park, Alabama, a number of fungi have been encountered for which there appear to be no established names available. Among these is a fungus which we think to be identical to that illustrated by Matsushima (1975), referred to as *Fungus Imperfectus* non nominatus 1744, collected on decaying leaves of *Sequoia sempervirens* in Japan.

Description and illustration of this fungus are provided herein and a name is proposed for it.

TAXONOMIC PART

Obstipispora gen. nov.

Deuteromycotina, Hyphomycetes.

[Etym. Lat. *Obstipus*, bent forward, et Gr. *spora*, spore]

Fungi aquatici submersi. Mycelium ex hyphis ramosis, septatis, hyalinis, laevibus compositum. Conidiophora micronemata, mononemata, hyalina, filiformia, erecta, recta vel flexuosa, laevia, septata. Cellae conidiogenae monoblasticae, in conidiophoris incorporatae, terminales. Conidia solitaria, hyalina, laevia, septata, cylindrica, flexa.

Species typica: *Ostipispora chewaclensis* Sinclair and Morgan-Jones.

Submerged aquatic fungi. Mycelium composed of branched, septate, hyaline, smooth hyphae. Conidiophores micronematous, mononematous, hyaline, filiform, erect, straight or flexuous, smooth, septate. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, hyaline, smooth, septate, cylindrical, bent.

Obstipispora chewaclensis sp. nov. (Fig. 1).

Fungus aquaticus. Mycelium plerumque in substrato immersum, ex hyphis ramosis, septatis, hyalinis, laevibus 1 - 1.5 µm crassis compositum. Conidiophora micronemata, mononemata, hyalina, filiformia, erecta, recta vel flexuosa, laevia, multiseptata, usque ad 200 µm longa, 1 - 1.5 µm crassa. Cellae conidiogenae monoblasticae, in conidiophoris incorporatae, terminales. Conidia solitaria, hyalina, laevia, septata, cylindrica, characteristice biflexa, interdum torta, 83 -140 X 1 - 3 µm.

In foliis putrescentibus Populi in flumine, Chewacla State Park, Lee County, Alabama, August 12, 1978, R. C. Sinclair, BPI, holotypus.

Aquatic fungus. Mycelium mostly immersed in the substratum, composed of branched, septate, hyaline, smooth, 1 - 1.5 µm wide hyphae. Conidiophores micronematous, mononematous, hyaline, filiform, erect, straight or flexuous, smooth, septate, up to 200 µm long, 1 - 1.5 µm wide. Conidiogenous cells monoblastic, integrated, terminal. Conidia solitary, acrogenous, hyaline, smooth, multiseptate (with up to 22 septa), cylindrical, attenuating gradually towards each end, characteristically abruptly bent towards the middle and with a more gradual bend distally establishing two axes at more or less right angles to one another, sometimes twisted, 83 - 140 X 1 - 3 µm, length from base to first bend 40 - 68 µm, obtuse at the apex, subtruncate at the base.

On decaying leaves of *Populus deltoides* Marsh; North America.

Collection examined: on *P. deltoides* submerged in a stream, Chewacla State Park, Lee County, Alabama, August 12, 1978, R. C. Sinclair, BPI, AUA, type.

The leaves (cut out discs) of popular on which the

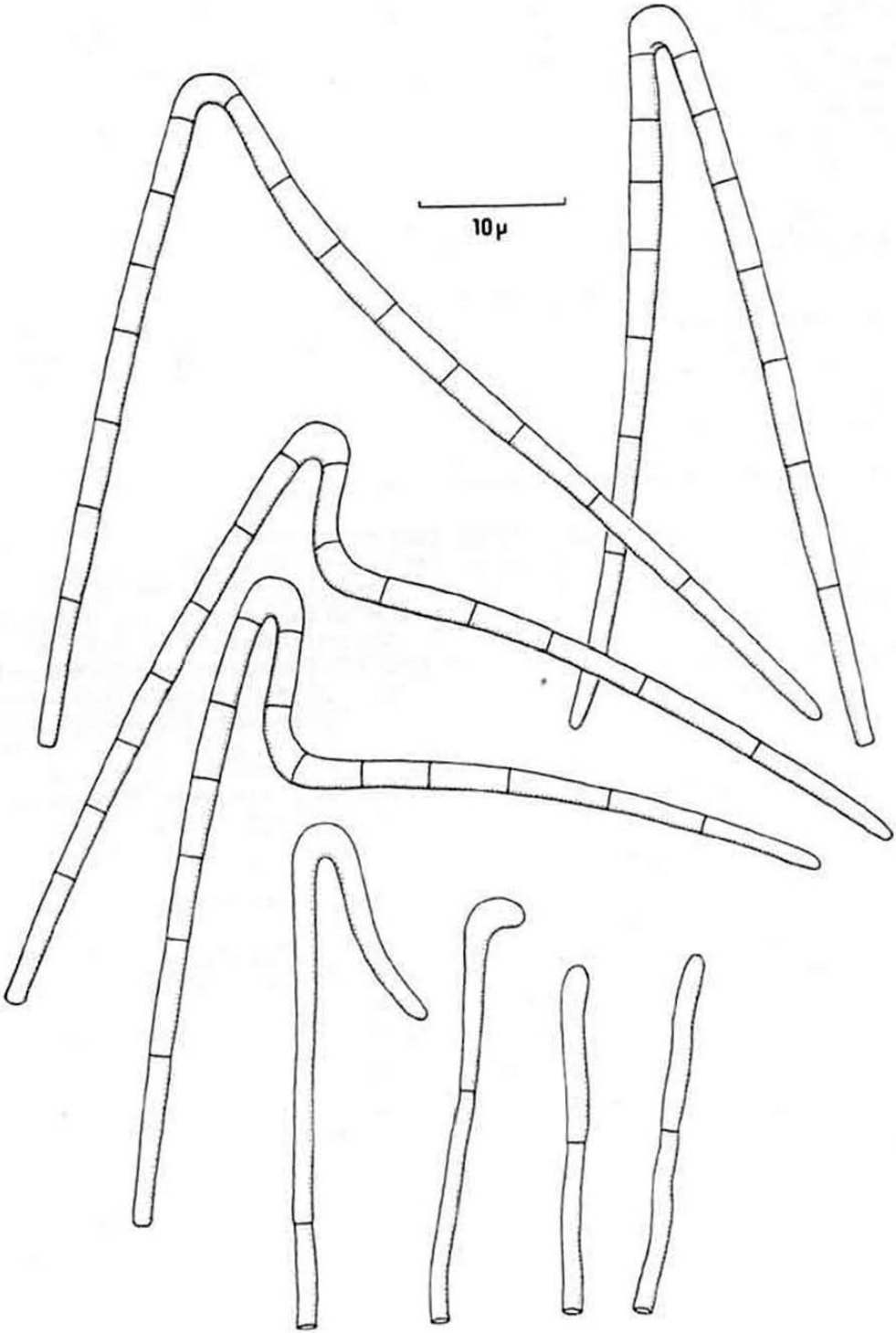

FIGURE 1. *Obstipispora chewaclensis*

fungus was found had been introduced into the stream in fiberglass mesh bags two months prior to collection. Conidia of *O. chewaclensis* were also found on three separate occasions in foam samples taken from two sites during May and July 1978.

There is variation in the degree of bending of the conidia. In some the first bend forms an angle of nearly 180° and the second nearly 90°; in others the first bend may create a lesser angle and the second bend may be negligible. The septa are at first obscure but as the conidium matures they become increasingly evident.

Matsushima (1975) briefly described and illustrated the conidia of what appears to be the same fungus. This is of interest since his collection was a component of leaf litter fungi of *Sequoia*. Bandoni (1972), Park (1974), Singh and Musa (1977), Webster (1977) and Goos (1978) have also reported the occurrence of known aquatic hyphomycetes in terrestrial habitats.

A closely similar spore type had previously been recorded by Ingold (1956) from surface foam of a river in Ibadan, Nigeria and by Tubaki (1966) from scum in Japan. Tubaki's illustration leaves little doubt that he too had conidia of *O. chewaclensis* and it is not unlikely that Ingold had it although one cannot be absolutely certain on the basis of his figure.

In conidium morphology *Obstipispora* most closely resembles *Anguillospora* Ingold and *Angulospora* Nilsson but its much more definite conidium shape serves to separate it from these two genera.

ACKNOWLEDGMENT

We thank Dr. Richard T. Hanlin, University of Georgia, for reviewing the manuscript.

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MYCOTAXON

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AJELLOMYCES AND ITS SYNONYM *EMMONSIELLA*

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SUMMARY

Ajellomyces McDonough et Lewis is emended and *Emmonsiella* Kwon-Chung is considered to be a synonym of *Ajellomyces*. *Emmonsiella capsulata* Kwon-Chung is transferred to *Ajellomyces* as *A. capsulata* (Kwon-Chung) McGinnis et Katz, comb. nov..

The genus *Ajellomyces* was established by McDonough and Lewis (9) in 1968 to accommodate the perfect state of *Blastomyces dermatitidis* Gilchrist and Stokes (8). *Ajellomyces dermatitidis* was distinguished from other members of the Gymnoascaceae by the development of thick-walled spiraling hyphae that radiated from a common center in the ascocarp. From these spirals, there arises a network of secondary swollen thin-walled hyphae. The asci, which contain eight globose hyaline ascospores, were described as being globose to subglobose.

In 1972, Kwon-Chung (3) discovered the perfect state of *Histoplasma capsulatum* Darling and established the new genus *Emmonsiella* (4) with the single species *E. capsulata*. *Emmonsiella* was distinguished from *Ajellomyces* and the other members of the Gymnoascaceae on the basis of its pyriform to clavate asci and network of thin-walled non-swollen secondary hyphae arising from centrally radiating thick-walled spirals. In a later study, Kwon-Chung (5) reported that the ascocarp initials were also distinctive.

Study of the type material, as well as living cultures

of these two fungi, has revealed that *Ajellomyces* and *Emmonsiella* are not different enough to be maintained as separate genera (Table 1). *Ajellomyces* and *Emmonsiella* are considered to be congeneric.

TAXONOMIC PART

Ajellomyces McDonough et Lewis emend. McGinnis et Katz. Type species: *A. dermatitidis* McDonough et Lewis, Mycologia 60:77, 1968.

= *Emmonsiella* Kwon-Chung, Science 177:368, 1972.

Cleistothecia globosa vel in formam stellatam vergenia, lutea; peridii hyphae ex spiris crasse tunicatis, septatis, e centro communi ortis, secundarias hyphas crebras ramosas tenuiter tunicatas e latere producentibus, compositae; asci subglobosi, clavati vel pyriformes, octospori, deliquescentes; ascosporae globosae, hyalinae.

Cleistothecia globose to stellate, tan; peridial hyphae composed of thick-walled, septate spirals arising from a common center, giving forth numerous secondary thin-walled branching hyphae from their sides; asci subglobose, clavate to pyriform, 8-spored, deliquescent; ascospores globose, hyaline.

Accepted species:

1. *Ajellomyces dermatitidis* McDonough et Lewis, Mycologia 60:77, 1968.
2. *Ajellomyces capsulata* (Kwon-Chung) McGinnis et Katz, comb. nov.
   ≡ *Emmonsiella capsulata* Kwon-Chung, Science 177:368, 1972.

Hebarium specimens examined:

Original slide preparations of *Ajellomyces dermatitidis* obtained from E. S. McDonough, Marquette University, Wisconsin; BPI 71811, holotype of *E. capsulata*, obtained from the Herbarium, National Fungus Collection, Maryland.

Living cultures studied:

TABLE 1. Summary of the principle taxonomic characteristics of *Ajellomyces* and *Emmonsiella*.

	Ajellomyces	*Emmonsiella*
Ascocarp initiation	Illustrated to be contact between 2 swollen cells of unequal size, but believed by McDonough to be contact of 2 morphologically undifferentiated hyphae; hyphae originating from these swollen cells giving rise to the ascocarp; heterothallic.	Reported to be contact between 2 morphologically undifferentiated hyphae, then forming 2 swollen cells of unequal size at site of contact; hyphae originating from these swollen cells giving rise to the ascocarp; heterothallic.
Peridial hyphae	Thick-walled spirals originating from center of ascocarp giving rise to secondary swollen thin-walled hyphae.	Thick-walled spirals originating from center of ascocarp giving rise to secondary non-swollen thin-walled hyphae.
Ascocarp	Globose, subglobose, tan.	Globose, subglobose, tan.
Asci	Subglobose, clavate to pyriform, 8 ascospores.	Subglobose, clavate to pyriform, 8 ascospores.
Ascospores	Globose, smooth, hyaline.	Globose, smooth, hyaline.
Conidia	Holoblastic, solitary on conidiophore.	Holoblastic, solitary on conidiophore.
Monotypic genus	Yes	Yes

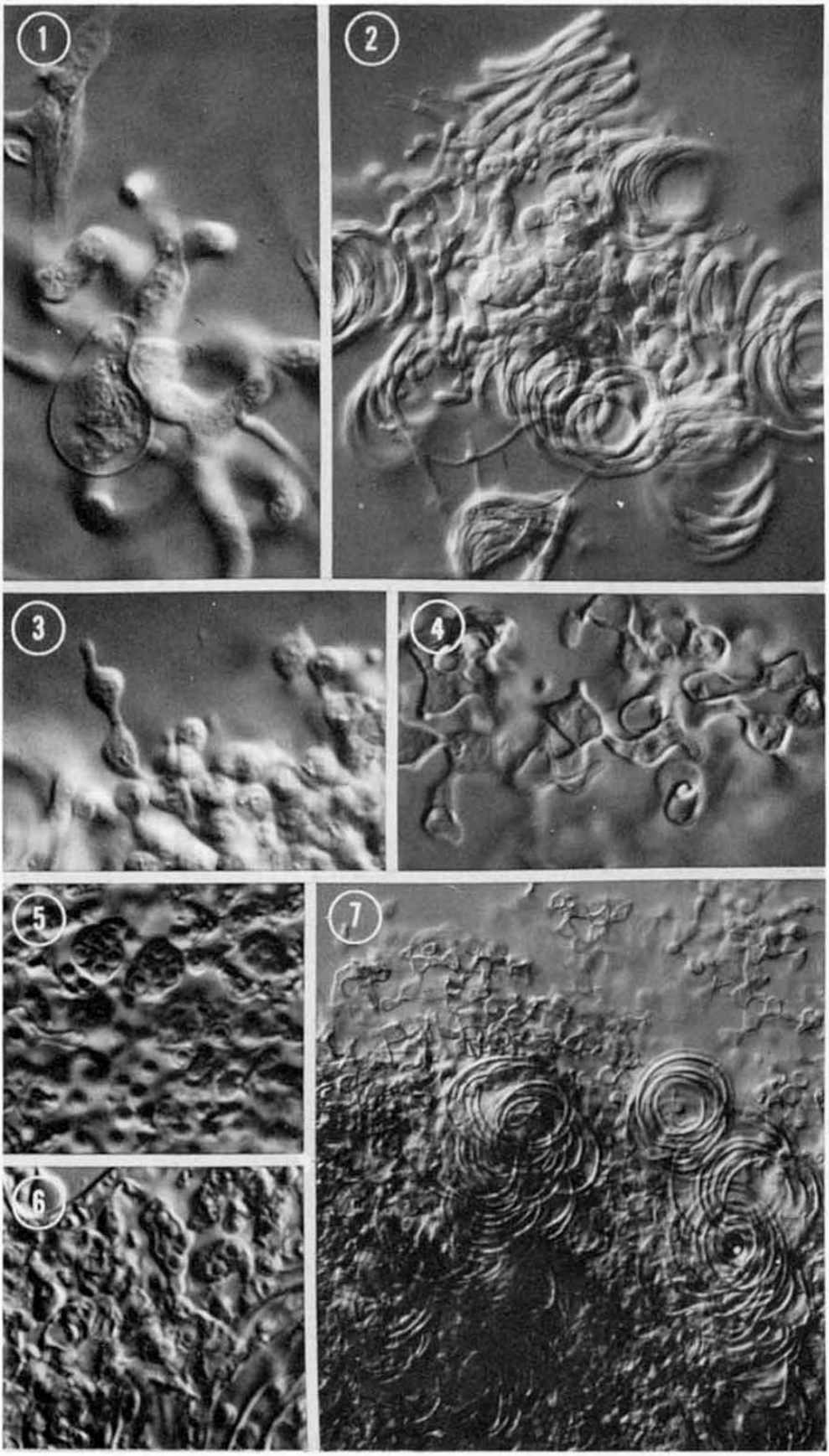
NCMH 811-816, single ascospore isolates derived from the type culture of *A. dermatitidis;* NCMH 805-810, single ascospore isolates derived from the type culture of *E. capsulata.* The living cultures were obtained from A. Padhye, Center for Disease Control, Atlanta.

DISCUSSION

McDonough and Lewis (9) illustrated the initiation of the ascocarp of *A. dermatitidis* occurring by the contact of two swollen hyphal cells of unequal size. McDonough believes (personal communication) that the swollen cells actually develop following the contact of two morphologically undifferentiated hyphae. These swollen cells or knobs (Fig. 1) then form a cluster of hyphae from which the characteristic spirals of the genus *Ajellomyces* originate (Fig. 2). Kwon-Chung (5) reported that *A. capsulata* initiates its ascocarps from morphologically undifferentiated hyphae that wind around hyphae of the opposite mating type. She stated that (5) "The tip of the winding hypha and the site where it contacts the opposite hypha soon became swollen, forming knob-like structures. One of the knob-like structures sends out hyphae which then encircles the two knobs several times thus obscuring them. When encircling hyphae are brushed aside, two knobs of unequal size can be clearly seen." In both species, two swollen cells or knobs of unequal size give rise to the cluster of hyphae which eventually gives rise to the radiating spirals. Since details preceeding ascocarp development are uncertain, a cytological investigation of the process leading to plasmogamy in these two species is planned.

In both species, several robust hyphal spirals radiate from a common center towards the periphery of the ascocarp. The inner walls of the spirals of *A. dermatitidis* and

Figs. 1-7. *Ajellomyces dermatitidis* (NCMH 811 x NCMH 813, except 5-6, herbarium specimen of type). 1. Swollen cell occurring during initiation of the ascocarp, 1,250X; 2. Development of spirals from ascocarp center, 500X; 3. Developing swollen secondary peridial hyphae, 1,250X; 4. Mature secondary peridial hyphae, 1,250X; 5-6. Globose to pyriform asci, 1,250X; 7. Mature ascocarp, 200X. Mixed cereal agar, 24°C, 4-6 weeks (except 5-6), in Nomarski differential interference contrast microscopy.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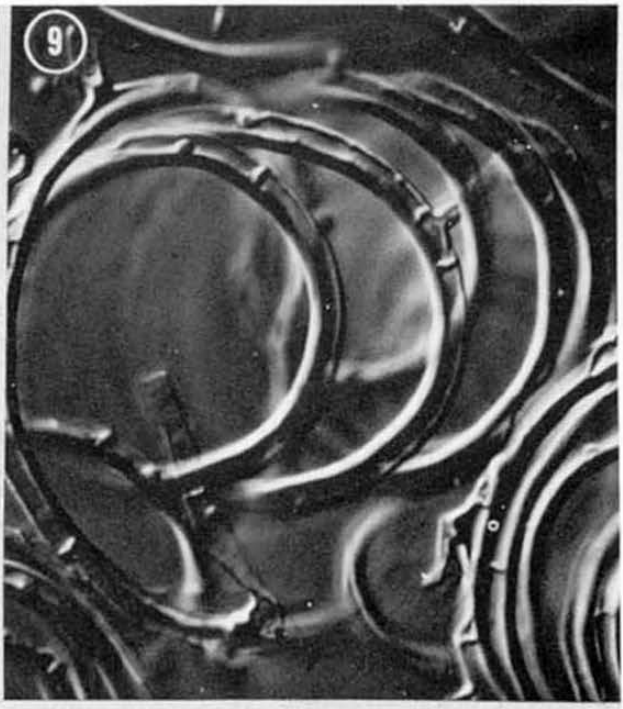
A. capsulata are distinctively thicker than the outer walls (Figs. 8, 9). A network of secondary thin-walled hyphae develops from the spirals in both species. The secondary hyphal network tends to branch dichotomously with some anastomosing hyphal elements. As these hyphae develop in *A. dermatitidis* (Fig. 3), they become repeatedly swollen (Figs. 4, 10). In contrast, the secondary hyphae of *A. capsulata* do not swell but remain parallel-walled (Fig. 11). In both fungi, the mature ascocarp is globose to subglobose in shape and tan in color. The radiating spirals may give the ascocarps a stellate appearance (Fig. 7).

The asci of *A. dermatitidis* were originally reported to be globose to subglobose (9). Examination of McDonough's original slides has shown that the asci are subglobose, clavate to pyriform in shape (Figs. 5-6), as are those of *A. capsulata*. Detailed measurement of the globose ascospores of *A. dermatitidis* and *A. capsulata* by Glick and Kwon-Chung (1) has shown them to be 1.3 - 1.6 μm and 1.2 - 1.5 μm in diameter, respectively. Distinctive projections were also observed by these authors as well as Garrison et al. (2) on the ascospore walls by electron microscopy. The ascospores are hyaline.

The conidial states of *A. dermatitidis* and *A. capsulata* consist of solitary holoblastic conidia that develop upon short distinct conidiophores. The conidial state of *A. dermatitidis* is *B. dermatitidis* (Fig. 12) and the conidial states of *A. capsulata* are *H. capsulatum* var. *capsulatum* (Fig. 13) and *H. capsulatum* var. *duboisii* (6). When these fungi are incubated at 37°C on an appropriate medium, they both grow in a yeast-like morphology that is identical to their parasitic form in animal tissue.

Figs. 8, 10, 12. *Ajellomyces dermatitidis* (NCMH 811 X NCMH 813). Figs. 9, 11, 13. *A. capsulata* (BPI 71811, except 13, NCMH 805). 8. Mature spirals, 1,250X; 9. Mature spirals, 1,250X; 10. Mature secondary peridial hyphae, 1,250X; 11. Mature secondary peridial hyphae, 1,250X; 12. *Blastomyces* conidial state, 1,250X; 13. *Histoplasma* conidial state, 500X. 8, 10, 12-13 mixed ceral agar, 24°C, 4-6 weeks, all in Nomarski differential interference contrast microscopy.


8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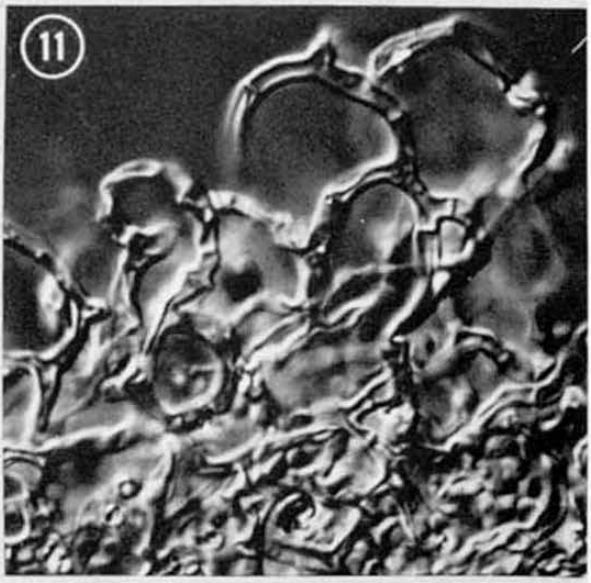
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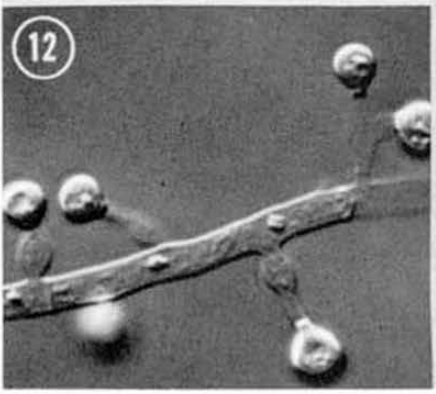
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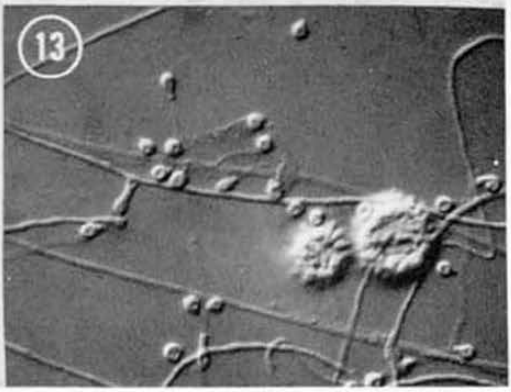
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The genus *Ajellomyces* is similar to *Apinisia* La Touche (7). Both of these genera of the Gymnoascaceae have spirals associated with their ascocarps. Unlike *Apinisia*, the spirals in *Ajellomyces* arise from a common center within the gymnothecium. The ascocarps of *Apinisia* are white and a *Chrysosporium* Corda state is typically present.

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The authors wish to thank Drs. E.S. McDonough and D.P. Rogers for reviewing the manuscript. Special appreciation is extended to Dr. Rogers for translating the emended generic diagnosis into Latin and to Mrs. J. Berky for secretarial assistance.

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MYCOTAXON

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THE GENUS *PSEUDOGYMNOASCUS*

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SUMMARY

The genus *Pseudogymnoascus* Raillo is discussed and reduced to two species; *P. vinaceus* Raillo & *P. roseus* Raillo.

INTRODUCTION

The various genera in the Gymnoascaceae have been clarified and broadened in recent papers, and several new genera and species have also been described. The genus *Pseudogymnoascus* Raillo has been treated (2,4,7,12,13, 24) several times since it was established by Raillo (21) in 1929. The taxonomy of this genus, however, remains in a rather confused state. The purpose of this communication is to clarify this genus and outline its taxonomy more precisely.

TAXONOMY AND DISCUSSION

Pseudogymnoascus Raillo, Zentralbl. Bakteriol. Parasitkde (Abth. 2) 78: 520. 1929.

Gymnothecia more or less globose, discrete or confluent, in yellow to orange or red to brown shades; peridium composed of a loose network of elements or anastomosing more or less at right angles, smooth or roughened, thick-walled, dark colored; appendages absent or simple, short, thin-walled, hyaline, echinulate or tuberculate; asci 8-spored, globose or ovoid, usually stalked, evanescent; ascospores ellipsoid to fusiform, smooth, hyaline, yellow or pink. Asexual state when present represented by aleuriospores and arthroaleuriospores.

Species typica: *Pseudogymnoascus vinaceus* Raillo

Raillo (21), in establishing the genus *Pseudogymnoascus*, did not designate a type species, but described *P. vinaceus*

first and *P. roseus* second. Clements and Shear (8), did not consider *Pseudogymnoascus*. Gilman (12) made no mention of a type, but did list *P. vinaceus* first as did Apinis (2) in his revision of the British Gymnoascaceae. Benjamin (4) did not mention a type in his discussion. Cejp and Milko (7), in their treatment of the genus and description of a new species *(P. caucasicus)*, made no mention of a type but listed *P. vinaceus* first. Arx (3) noted the type as *P. roseus* Raillo. Samson (24) also designated *P. roseus* as the type. Kuehn (13) designated *P. vinaceus* Raillo as the type in 1959 in his survey of the Gymnoascaceae. This designation of a type (lectotype) is the earliest and must be accepted in accordance with Article 8 of the *International Code of Botanical Nomenclature*.

1. *Pseudogymnoascus vinaceus* Raillo, Zentbl. Bakteriol. Parasitkde (Abth. 2) 78:520. 1929.

   = *Gymnoascus vinaceus* (Raillo) Apinis, Mycol. Pap. 96:9. 1964.

   = *Pseudogymnoascus bhattii* Samson, Acta Bot. Neerl. 21:519. 1972.

Gymnothecia discrete or confluent, usually globose, 75-300 µm diam, in yellow to orange shades; peridial hyphae net-like or loosely interwoven, dark-colored, smooth; distinct appendages absent; asci globose or ovoid, 5-6 x 4.5-6.5 µm, hyaline; ascospores ovoid to fusiform 2-3 x 3.5-5.7 µm, hyaline to yellow; asexual state absent. Illustrations: See Figures 1 and 2 and those of Samson (24).

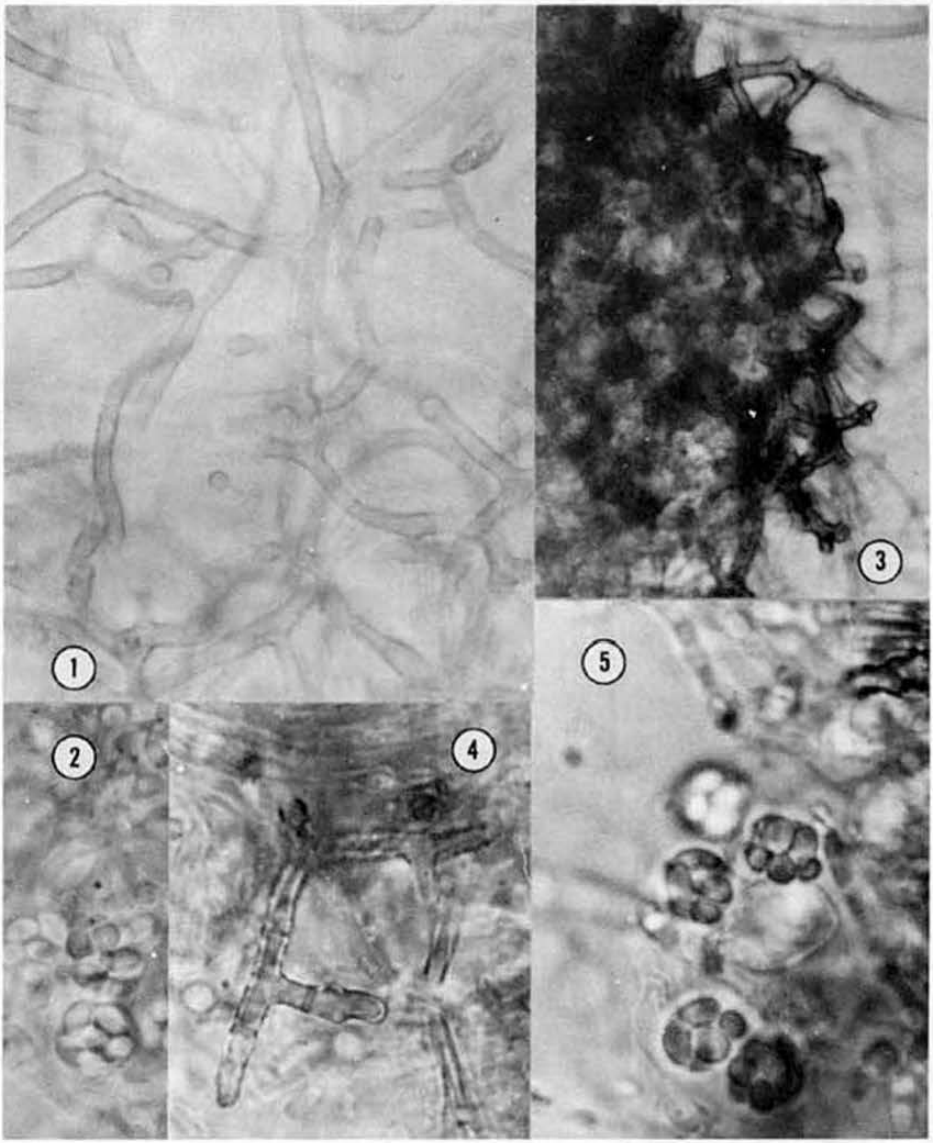
Distribution: Canada, U.S.A. (Alaska) and U.S.S.R.
Material Examined:

O-1115 (Bissett JB 135, CBS 762.71), O-1119 (Bissett JB 95, NRRL 6080, CBS 760.71, ATCC 28808), O-1138 (Bhatt PET 34), O-1143 (Bhatt PET 57), O-1145 (Bhatt 375) from alpine soil, Mt. Allen, Kananaskis, Alberta, Canada. Dried disc cultures of representative strains have been deposited in NY, FH and CUP.

A dried disc culture of strain CBS 760.71 (originally designated as the type for *P. bhattii*) and deposited in NY is suggested as the neotype for *P. vinaceus* since it produces those characters most typical for the species among the strains available for comparison.

Colonies on Oatmeal-Salts agar (14) and Freezing agar (20) at first yellow, becoming orange and attaining a diameter of 20-25 cm in 18 to 20 days at room temperature (22-25°C). Reverse of colonies in red to red-brown shades. No exudate or odor observed.

Gymnothecia composed of a loosely woven net-work of



Figures 1 & 2. *Pseudogymnoascus vinaceus*. Figure 1. Peridial elements, x 1000. Figure 2. Asci and ascospores, x 1000. Figures 3-5. *Pseudogymnoascus roseus*. Figure 3. Gymnothecium, x 600. Figure 4. Peridial elements, x 1200. Figure 5. Asci and ascospores, x 1200.

hyphae in yellow to orange shades, often roughened with crystals. Distinct appendages absent. Hyphal terminations at periphery of the gymnothecia somewhat smaller in diameter with walls slightly thinner. Color and characteristics of the peridial elements as described by Raillo (21) for *P. vinaceus*, and reiterated by Gilman (12) and Kuehn (13).

Asci arising from croziers, usually stalked, subglobose, hyaline and early evanescent.

Ascospores ovoid to fusiform, yellow in mass, hyaline when viewed singly.

The measurements given here are slightly larger than those given by Raillo (21). This discrepancy may be accounted for by strain variation and by later, more sophisticated instrumentation. Ascospores of such shape have also been reported for species of *Myxotrichum* Kunze, *Byssoascus striatisporus* (Barron & Booth) von Arx, *Arachniotus candidus* Schroeter, and *A. terrestris* Raillo. Such a spore shape suggests a possible relationship among those taxa. Gymnothecia of these genera differ widely.

Species of *Gymnoascus* Baranetzky and *Pseudogymnoascus* are occasionally reported from soils and other substrates (1,5,6,22,23,30), but subcultures for confirmation or comparison are seldom available. Farrow (11) and Siddiqi (25) reported *P. vinaceus* from soils, but in view of the apparent confusion between *P. vinaceus* and *P. roseus* Raillo, it is likely that *P. roseus* was the fungus which was isolated. Apinis (2) listed *P. vinaceus* as being isolated from rabbit dung, but also stated that the isolates were near *G. reessii* Baranetzky. Not only do the gymnothecia of the two genera differ, but appendages typical of most species of *Gymnoascus* (17) are lacking in *Pseudogymnoascus*. In addition, ascospores of the former are discoid to oblate and those of the latter are ovoid to fusiform. Isolation data of *P. vinaceus* indicate it is mostly in forested and alpine soils. Isolations from other substrates have not been confirmed.

2. *Pseudogymnoascus roseus* Raillo, Zentbl. Bakteriol. Parasitkde (Abth. 2) 78:250. 1929.

= *Gymnoascus roseus* (Raillo) Apinis, Mycol. Pap. 96:8. 1964.
= *Gymnoascus rhousiogongylinus* Wener & Cain, Canad. J. Bot. 48:325. 1970.

Imperfect state = *Geomyces vinaceus* Dal Vesco, Allionia 3:15. 1957.
Gymnothecia discrete or confluent, more or less spherical,

40-300 µm diam, at first white, finally red or brown; peridial hyphae consisting of a network of elements anastomosing at nearly right angles and often swollen at the junctures (internodes), usually in red to brown shades, thick-walled; appendages simple, short, up to 18 µm long, smooth or tuberculate, thin-walled; asci mostly subglobose, 5-10 µm diam, stalked, hyaline, evanescent; ascospores ovoid to fusiform, 3-4 x 1.5-2.5 µm, smooth, pink to red in mass, hyaline when viewed singly.

Imperfect state represented by arthroaleuriospores and aleuriospores, somewhat globose to ellipsoid, 2-4 x 1.5 - 2.5 µm, with a truncate base, hyaline. Illustrations: see Figures 3,4,5, and those of Samson (24). Distribution: Canada, England, Germany, India, Italy, Japan, Mozambique, Panama, U.S.A. and U.S.S.R.

Material examined:

Herbarium specimen: IMI 46432 (J.E. Brinde BSR 7, Nov. 1949) from soil, Ampthill Forest Nursery Beds, England labeled *Arachniotus candidus* (Eidam) Schroeter.

Cultures: Canada - O-1117 (Bhatt IBP 264), grassland soil, Matador, Saskatchewan; O-1142 (Bhatt PET 36), O-1147 (Bhatt UW 607), O-1144 (Bissett JB 653), O-1116 (Bissett JB 147, CBS 691.71), O-1118 (Bissett JB 97), O-1146 (Bissett JB 339), O-1114 (Widden α-70, CBS 387.69, ATCC 22474, UAMH 2879), alpine soil, Kananaskis, Alberta; O-3595 (Wener TRTC 45536, CBS 722.69, ATCC 18970, UAMH 3337), labeled as type for *Gymnoascus rhousiogongylinus* Wener & Cain, forest soil, Ontario. O-3729 (Malloch TRTC 45538, UAMH 3875), porcupine dung, Ontario; O-3391 (MRI-A-1); O-3390 (MRI B-1, O-3653 (B238 1123) uncertain location, soil. England - O-3151 (Apinis BDUN 266, NRRL 6377, CBS 396.65, IMI 114651) labeled as neotype for *Pseudogymnoascus roseus*, soil. Germany - O-3092 (Domsch, CBS 605.70), O-3205 (Gams C 400), O-3588 (Gams MV 277), from soil. Italy - O-671 (Dal Vesco T-1, CBS 319.62, UAMH 1644), labeled as type for *Geomyces vinaceus*, O-3392 (Dal Vesco T-2, CBS 320.62), O-3392 (Dal Vesco T-3), soil, Torino; O-2513 (Ghillini 3J3, CBS 261.61), soil, Padua. Japan - O-3630 (Udagawa NHL 2284, UAMH 2005), soil. U.S.A.: Arizona - O-1184 (States NM 27), mountain soil. Colorado - O-1338 (Christensen TC-57), O-3697 (Durrell I-4), soil. Iowa - O-516 (Taber T 87, PRL 1453), soil. Wisconsin - O-3210 (Bachus RMF 612), O-3357 (Christensen IKI B-239), O-3358 (Christensen WSF B 2254), O-3463 (Christensen RMF 606), O-3654 (Christensen WSF 3875), O-3389 (Orpurt, QM 6969, UAMH 1990), soil. Wyoming - O-1339 (Christensen TC-60), O-1325 (Rall, TC-218), O-3468 (States 13c),

soil. Dried disc cultures of representative strains have been deposited in NY, FH and CUP.

Colonies on Oatmeal-Salts agar (4) and Freezing agar (20) rosaceous to purple shades (red-brown in strain O-3630) attaining a diameter of 18-20 mm at room temperature (22-25° C) in 25 to 30 days. Reverse red to red-brown. No exudate or odor observed.

Asci arising from croziers, usually stalked, subglobose, hyaline and early evanescent.

Peridial hyphae forming the gymnothecia in red to red-brown shades, thick-walled and often swollen at the internodes. This latter condition is lacking in strains of *P. vinaceus*. Enlargements of this type are not common in species of Gymnoascaceae, but have been reported in *Gymnoascus intermedius* Orr (16) and in *Gymnoascoideus petalosporus* Orr, Ghosh & Roy (19).

The simple appendages forming at the apices of the hyphal elements in *P. roseus* are also lacking in *P. vinaceus*.

Ascospores of *P. roseus* are ovoid to fusiform, pink and similar to though slightly smaller than those of *P. vinaceus*. Ascospores of *P. vinaceus* are yellowish.

The asexual state of *P. roseus* was described by Dal Vesco (10) for *P. vinaceus* and this further attests to the confusion between the two species over the years. Sigler and Carmichael (26) have clearly demonstrated that the asexual state as described by Dal Vesco is actually that of *P. roseus*. Many strains of this species tend to lose their ability to produce the sexual state at room temperature and produce only *Geomyces vinaceus* colonies. Sigler and Carmichael (26) indicate that gymnothecial production is temperature dependent and that the sexual state is readily produced at 18° C.

Sigler and Carmichael (26) have also stated that *Geomyces pannorus* is morphologically similar to *G. vinaceus* and only production of the sexual state by the latter and its colonial coloration can it be distinguished. Possibly appropriate mating of strains of *G. pannorus* combined with reduced temperatures and nutrition might produce a gymnoascaceous state that is related to *Pseudogymnoascus*.

The synonomy as given by Samson (24) for *P. roseus* is in error. *P. vinaceus* is the type of the genus and *P. roseus* is a distinct species. The two species are readily distinguishable from one another.

Isolations of *P. roseus* are noted in the literature from time to time (9,11,22) and usually from alpine or forested soils. *Gymnoascus reessii* has been reported from such soils by Busby et al. (5), who noted that it was

purple-red. Since *G. reessii* strains are not known to exhibit that color, it is more likely that the isolate was *P. roseus*. Udagawa (29) also reported *G. reessii* from soil in Japan. An examination of that strain showed that it was also *P. roseus*. Apinis (2) reported *P. roseus* from snail eggs and other littoral debris. None of the cultures studied here were isolated from substrates other than soil. Possibly the strains examined by Apinis (2) actually represented *G. reessii*. Wener and Cain (30) described a new species of *Gymnoascus (G. rhousiogongylinis)*, but examination of the type demonstrated that it is *P. roseus*. Other investigators (20,26) have expressed similar conclusions.

Neither *P. vinaceus* nor *P. roseus* have been isolated from human sources and therefore are not implicated pathologically as are other members of the Gymnoascaceae (15).

The misidentification of herbarium specimen (IMI 46432) as *Arachniotus candidus* by Apinis (2) further attests to the confusion in *Pseudogymnoascus*. This specimen was discussed in detail earlier (18).

3. *Pseudogymnoascus caucasicus* Cejp & Milko, Česká Mykol. 20:161. 1966.

= species of uncertain position.

No gymnothecia, initials or ascospores were produced by the type culture on the media utilized. The hyphae were quite reminiscent of those for the Phycomycetes. Samson (24) reported some stalked chlamydospore-like structures, but I did not observe them. I did not observe any of the spinal initials or stalked conidiophores and conidia reported by Cejp and Milko (7). It is possible they were examining a mixed culture, one of which was *P. vinaceus*.

Material examined: 0-1295 (CBS 373.67, NRRL 6079, ATCC 28808), labeled as the type for *Pseudogymnoascus caucasicus* Cejp and Milko, from forest soil, Lake Riza, Caucasus, U.S.S.R.

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A NEW SPECIES OF *AMANITA*

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While collecting near Highlands, North Carolina during the summer of 1975, my wife spotted a small *Amanita* growing out of a red clay road cut. Although it was recognized as a member of section *Lepidella*, I could not identify it any further. Subsequently, a comprehensive examination of the macroscopic and microscopic characters has led me to the conclusion that this specimen is representative of a heretofore unnamed species.

Amanita altifissura Jenkins, sp. nov.
Holotype: North Carolina - Highlands, 25. viii. 1975, Jeannie, Tiffan, and David T. Jenkins 991(DTJ).

Pileus 40 mm latus, convexus, penitus rimosus-aureolatus, margo non striatus; volva tenues crustati vel panni in quaque areola, fusci. Lamellae albae ad pallidi cremoris colorem. Stipes 20 x 8-11 mm, floccusus ad apicem, glaber infra, albus; exannulatus; bulbus ad fundum subnapiformatus; nulla reliqua volvarum in stiperis fundo. Sporae (5.0)5.5-6.2 x (9.4)10.2-11.7(12.5) µm.

Fruit body small, solitary. PILEUS: 40 mm diam, plano-convex, white, margin not striate, dry, deeply rimose-areolate, margin incurved and slightly appendiculate, flesh white, 5 mm thick at center; volval remnants as thin, crusts or patches on top of each areola, relatively firmly attached, irregularly shaped, dark brown. LAMELLAE: not crowded, adnexed, narrow, white to pale cream, edges finely pruinose, occasional anastomosing between gills and lamellulae; lamellulae numerous, concavely to convexly truncate to subattenuate. STIPE: 20 x 8-11 mm tapering upward and slightly expanded at apex, solid, slightly floccose at apex, then glabrous below, white; exannulate, annulus possibly evanescent; basal bulb subnapiform, 33 x 18 mm, white, glabrous, spongy; no volval remnants remaining on basal bulb or base of stipe. No distinct smell, but with a slightly unpleasant taste.

PILEIPELLIS: filamentous hyphae 2-8 µm diam, interwoven, only very slightly gelatinized, hyaline to slightly yellowish in alkaline solution. PILEUS TRAMA: filamentous hyphae moderately branched, up to 8 µm diam; inflated cells elongate, terminal or short, terminal chains. LAMELLA TRAMA: bilateral; filamentous hyphae 3-9 µm diam, moderately branched, clamped; inflated cells clavate to cylindrical, terminal or in short, terminal chains, up to 225 µm long. SUBHYMENIUM: ramose, filamentous hyphae clamped, up to 9 µm diam. BASIDIA: up to

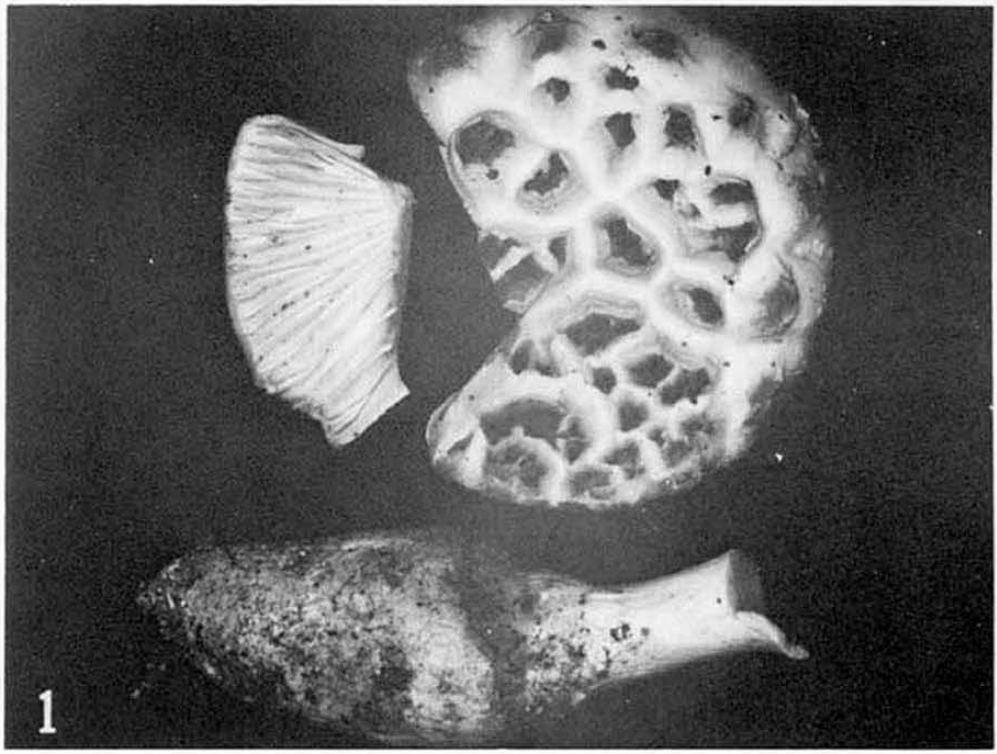

Fig. 1. *Amanita altifissura* Jenkins DTJ 991

42-58.5 x 3.9-11.7 µm, 4-sterigmate, clamped. VOLVA: on pileus a moderately dense tissue of irregularly disposed, terminal chains of inflated cells and single, terminal cells; cells variable in shape, i.e., globose, subglobose, broadly elliptic, ovoid, elliptic, and clavate, rarely over 50 x 50 µm; filamentous hyphae moderately abundant, up to 8 µm diam, no clamps observed, sparsely to moderately branched, gloeoplerous hyphae present, but sparse. STIPE TRAMA: filamentous hyphae 2-9 µm diam, sparsely branched, abundantly clamped; inflated cells up to 21.9 x 312 µm, slenderly clavate, terminal, longitudinally oriented, frequently clamped.

SPORES: (5.0)5.5-6.2 x (9.4)10.2-11.7(12.5) µm ($\underline{E}$ = 1.62-2.13; $\underline{E}^{m}$ = 1.90), elongate to short cylindric, adaxially flattened, thin walled, hyaline, spore print white, amyloid; contents guttulate to subgranular; apiculus sublateral, cylindric to slightly truncate-conic.

Habitat and distribution: terrestrial on red clay road cut near deciduous forest, Highlands, North Carolina.

Discussion: This taxon is very easily associated with section *Lepidella* and subsection *Solitariae* due to the presence of several characters: spores amyloid, pileus margin slightly appendiculate, pileus white, and volva composed of irregularly disposed, variform

elements. Within subsection *Solitariae*, however, establishing a relationship with other organisms was found to be difficult. Due to such characters as rather abundant volval hyphae, irregular disposition of volval elements, volval remnants on pileus as crusts or patches, and clamped basidia, the only stirps into which *Amanita altifissura* (Fig. 1) might fit is *Grossa* (Bas, 1969). Bas, however, states that because of the poor condition of types or lack of material for most of the organisms within this stirps, some of the taxa may be incorrectly included. This may account for the fact that *A. altifissura* does not appear to be closely related to the other taxa within this stirps.

ACKNOWLEDGEMENTS

My thanks are extended to the Highlands Biological Station for funds supporting this study.

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A NEW AMANITA FROM FLORIDA

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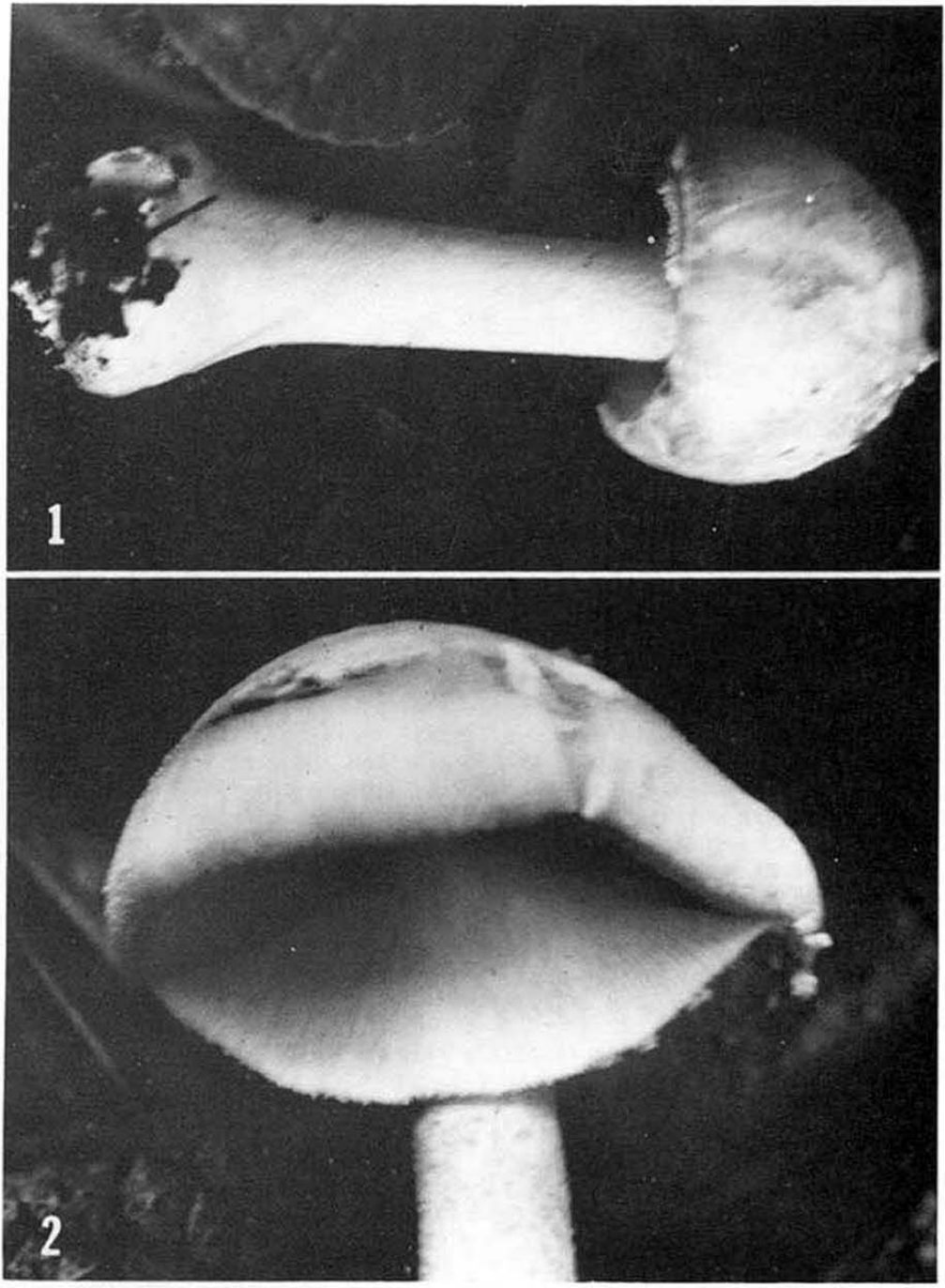
Amanita komarekensis (Figs. 1 & 2) represents an interesting and significant addition to the taxa within section *Amanita* in North America. Although only two collections have been made, fruitbodies are easily recognized as being quite different from others within this section. The most noticeable character of difference is the pinkish, pulverulent volva. Pigmented volvas of specimens of other taxa within section *Amanita* are either tan, gray-brown, or yellowish. The texture and disposition of this volva are quite like those of *Amanita wellsii*, but the nearly cylindric spores and the yellowish volva of A. *wellsii* (Jenkins, 1977) more than adequately separate it from A. *komarekensis*. There are several taxa in this section whose fruitbodies are whitish to creamy-white, e.g., A. *albocreata*, A. *crenulata*, A. *agglutinata*, A. *monticulosa*, A. *muscaria* var. *alba*, and A. *pantherina* var. *multisquamosa*. *Amanita komarekensis* can, however, be easily separated from any of the above based upon the combination of the pinkish-beige, pulverulent volva, the broadly elliptic to elliptic spores, a moderately striate pileus margin, pinkish pulverulence on the apex of the stipe, and a lack of ascending rings or adnate volva material on the stipe base.

Amanita komarekensis is easily recognized as a member of section *Amanita* due to the non-amyloid spores, the striate margin, and the bulbous stipe base. At the moment, however, there are no other known closely related taxa within this section in North America.

Amanita komarekensis Jenkins & Vinopal, sp. nov.
Holotype: Florida - Tall Timbers Research Station, 7. vii. 1977, Joanne Vinopal 40833(TENN).

Pileus 30-65 mm latus, convexus, gilvus dein ravus, margine striatus, subvicidus, glaber; volva roseo-ravus, pulverulentus vel pulverulento-coactatis. Lamellae albidus ad gilvus. Stipes 60-100 x 5-11 mm, creamae, apice roseo-pulverulente, glaber vel basi, volva roseo-ravus, pulverulentus vel coactatis; annulus apicalis, membranaceo roseo-ravus. Sporae 8.2-9.4(10.2) x 5.5-7.0(7.8) µm, non-amyloideae.



Figs. 1 & 2. *Amanita komarekensis* 40833(TENN)

PILEUS: up to 65 mm broad, plano-convex to plane with slight umbo, margin moderately striate and slightly inrolled, creamy-white becoming more beige with age, slightly viscid, glabrous, flesh up to 5 mm thick at center; volval remnants as thin patches or as a thin, pulverulent layer covering most of pileus surface, pinkish-beige, easily removed. LAMELLAE: widely free, crowded, creamy-white, broadest near margin of pileus, edges pulverulent; lamellulae numerous, truncate. STIPE: 60-100 x 5-11 mm, tapering slightly upward, but expanded at apex, slightly stuffed to hollow, creamy-white with pale pinkish pulverulence near apex, becoming more glabrous toward base, basal bulb subglobose to ovoid, up to 25 x 20 mm, creamy-white; volva as pinkish-beige pulverulence, chunks, or patches, distributed irregularly on apex of bulb, never as ascending rings or adnate, free limb; annulus apical, very thin, membranous, pale pinkish-beige, striate above, more floccose below with pinkish-beige chunks of universal veil on margin, moderately persistent, frequently missing in age; no distinct smell or taste.

PILEIPELLIS: filamentous hyphae densely interwoven to subradial, slightly gelatinized, hyaline to slightly yellowish in alkaline solution. PILEUS TRAMA: filamentous hyphae undifferentiated, moderately branched, up to 9 µm diam; inflated cells elongate, terminal or short, terminal chains. LAMELLA TRAMA: bilateral; filamentous hyphae up to 8 µm diam, moderately branched, clampless; inflated cells oblong-elliptic to clavate, terminal or short, terminal chains. SUBHYMENIUM: hyphae ramose, clampless. BASIDIA: up to 51 x 4-10.2 µm, 4-sterigmate, thin walled, clampless. VOLVA: filamentous hyphae at base of stipe abundant, sparsely to moderately branched, up to 9 µm diam, clampless; inflated cells globose, subglobose, to broadly elliptic with fewer oblong-elliptic to elliptic, up to 40 x 40 µm, terminal or short, terminal chains, irregularly disposed: tissue on pileus with fewer and narrower filamentous hyphae; inflated cells more variable in shape than at base of stipe, globose, subglobose, broadly elliptic, elliptic, oblong-elliptic, pyriform, clavate, or astringo-cylindric, irregularly disposed, up to 78.3 x 47 µm. STIPE TRAMA: filamentous hyphae undifferentiated and abundant, sparsely branched, up to 8 µm diam, clampless; inflated cells terminal, clavate, longitudinally oriented, up to 300 x 47 µm, most being less than 200 µm in length. PARTIAL VEIL: filamentous hyphae dominant, moderately branched, 3-6 µm diam, clampless, irregularly interwoven; inflated cells abundant, terminal, globose, up to 35 µm diam.

SPORES: 8.2-9.4(10.2) x 5.5-7.0(7.8) µm ($\bar{E}$ - 1.22-1.56; $\bar{E}^m$ - 1.38), broadly elliptic to elliptic, often adaxially flattened, hyaline, non-amyloid, thin walled; contents guttulate; apiculus sublateral, cylindric.

Habitat and distribution: terrestrial, in annually burned, mixed coniferous and deciduous forest, (*Pinus taeda, Liquidambar styraciflua, Cornus florida, Quercus virginiana* dominant), Tall Timbers Research Station, northern Florida.

Collections examined: Florida - Tall Timbers Research Station, 7. vii. 1977, Joanne Vinopal 40833(TENN); Tall Timbers Research Station, 14. vii. 1977, Joanne Vinopal 1049(JV).

ACKNOWLEDGEMENTS

This taxon is named for Dr. E. V. Komarek, Executive Secretary of Tall Timbers Research Station, in appreciation for his and the station's interest and support in the study of fungal-fire ecology.

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ANAMORPH & TELEOMORPH: TERMS FOR ORGANS OF REPRODUCTION RATHER THAN KARYOLOGICAL PHASES

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The term t e l e o m o r p h was introduced (Hennebert & Weresub 1977) to refer to the "form....that is involved in producing meiotic diaspores...: ...an ascocarp or its equivalent...etc.", and the term a n a m o r p h revived for "the asexual, mitotic diasporic expression of a fungus". Our purpose in presenting these terms was to further the discussions on Art. 59 of the International Code of Botanical Nomenclature (Stafleu et al. 1972) by providing a concise (and, we hoped, unequivocal) way of referring to the elements that are specified as essential for typifying the names, respectively, of the botanical and anatomical systems of nomenclature regulated by that Article. "Teleomorph" was coined primarily to abbreviate the phrase ("the form which it has been agreed to call the perfect form") that had been used in all versions of the rule prior to the Stockholm Code. No change in meaning was intended, it being assumed that mycologists had, by this time, arrived at a consensus on what was meant by "an ascocarp or its equivalent, at maturity producing asci and ascospores;...a basidiocarp or its equivalent, at maturity

producing basidia and basidiospores ..." But apparently our assumption was unwarranted. Petersen (1978: 505) has given primacy to the karyological (meiotic/mitotic) distinctions made in the definitions of the terms teleomorph and anamorph, to the point where he suggests that basidiocarps (lacking clamps and therefore, perhaps) in whose basidia meiosis does not take place "are really anamorphic (i.e. do not exhibit a perfect state)".

Petersen's approach is more or less the reverse of Arthur's (1934) karyological interpretation of the terms "imperfect state" and "perfect state". He sought to define the "perfect state" by the presence of a dikaryon in the hyphae, and thus, along with Bisby (1944), to include uredinial forms with telial forms as "perfect". Rogers (1948) demonstrated the unfeasibility of applying the terms in this way. In his rebuttal of Arthur's argument, Rogers wrote that "the 'states' referred to by the Rules are not cytological phases, but organs of fructification (or assimilation)". Therein lies one of the strong reasons for converting from the "state" terms to "anamorph" and "teleomorph", because these are explicitly morphological.

The teleomorph is a morph, a form, an organ or series of organs known to be, in most fungi, specialized as the site of the fusion of gametic nuclei and the immediate or eventual production of meiospores: in "phycomycetes" -- typically the oospore, zygospore, and resting spore, germinating directly into a haploid thallus or producing either motile or non-motile diaspores; in ascomycetes -- the ascocarp (ascoma) with asci and ascospores; and in basidiomycetes -- the basidiocarp (basidioma) with basidia and basidiospores. Teleomorphs assume many shapes and are constructed in many ways; but few are formed in such a way that they cannot now be distinguished from anamorphs such as conidiomata producing conidia, or other asexual morphs producing somatic diaspores.

Let us take basidiocarps, for instance. The typical basidiocarp demonstrates a clamp connection at each septum of its dikaryotic hyphae, fusion of nuclei within the probasidium, meiosis during the maturation of the basidium, entry of a single haploid nucleus into each developing basidiospore, and finally forcible discharge of the four meiospores. But variations occur (see also Donk 1973). Hyphae may be multinucleate or uninucleate, individual nuclei haploid or diploid (Peabody et al. 1978); clamp

connections may be sparse, or verticillate, or lacking entirely; and yet the "sexual" karyological process may proceed normally, as in, for example, Thanatephorus praticola (Saksena 1961) or the in vitro haploid fruiting of "Peniophora" ludoviciana (Biggs 1938). In some natural parthenogenetic fungi (see e.g. Smith 1934, Lamoure 1969), basidia receive only a single nucleus; it divides in some fungi only once, in others twice (sometimes meiotically?), perhaps thrice, to produce nuclei for two, three or four spores. Secondarily homothallic fungi (Ginns 1974) produce spores that contain two nuclei of compatible mating type. In Gasteromycetes, in some parasitic Hymenomycetes (Ginns & Sunhede 1978) and perhaps other basidiomycetes, the basidiospores are not ballistic. And in the Teliomycetes, a sorus of teliospores in which fusion of nuclei may not yet have occurred, perhaps may never occur, is taken to be satisfactory evidence of sexuality. No matter what their differences, all these forms have been traditionally accepted as "sexual", "perfect" forms.

This means that, although we view sexual reproduction in the fungi as essentially a three-stage process composed of plasmogamy, karyogamy and meiosis (Burnett 1975:8), the organs and cells within which these phenomena occur under normal conditions are accepted as sexual even when impairment of the process (Burnett 1975: 170) takes place. As long as organs that are specialized for sexuality are involved, whether all or none of the cytological sexual events occur, the reproductive phase is understood to be teleomorphic.

A separate problem arises in the case of fungi that produce diaspores following meiosis in cells that do not conform in structure to the familiar so-called sexual cells, or are not borne within recognizable ascocarps or basidiocarps. Many yeasts are protosexual, at some time in their life-cycle changing from a haploid to a diploid condition, their diploid nucleus eventually undergoing meiosis, with a return to cells that are haploid. Where the form of the cells reveals no characteristic difference between these different parts of the life-cycle, karyological evidence is the only means for distinguishing teleomorph from anamorph. Karyology is also decisive in the case of organisms such as Digitatispora marina Doguet (1962), so completely adapted to its marine environment that its basidia and basidiospores are morphologically indistinguishable from aquatic conidiophores and conidia.

In these fungi, where a distinctive form is lacking, we must emphasize the karyological process: the entry of two haploid nuclei into a cell with establishment of either a dikaryon or a diploid condition must be taken as the initiation of the teleomorphic phase (with a possibility of anamorphic replication superimposed), and the return to diasporic haploidy by means of meiosis must be accepted as the teleomorphic finale, the span of these events constituting the teleomorphic phase. The Uredinales present still another deviation in their endocyclic species (Laundon 1967), wherein aecia (otherwise anamorphic) demonstrate fusion of nuclei and meiosis with the production of basidia and basidiospores, and must be recognized as teleomorphic. The term "teleomorph" must be defined in such a way as to include cases of these kinds as well, wherein karyology is decisive.

Thus, meiosis must, in a few cases, be taken as the sole criterion for identifying a form as teleomorphic. In other cases, however, this karyological event may not be primary, not only because meiosis does not necessarily occur in all fungi with clearly recognizable ascomata and basidiomata, but also because the occurrence of parasexuality might introduce a further ambivalence into the interpretation of teleomorphy. In the majority of fungi, therefore, the teleomorph must continue to be recognized more by its form than by the karyological events within it, lest Art. 59 be accused of requiring that the parthenogenetic sibling of a normally sexual fungus be denied a congeneric name in a holomorphic genus, or an obviously anamorphic fungus with occasional bouts of parasexuality be vaulted into a genus unavailable to its fellow (non-parasexual) anamorphs. This kind of additional illogicality would undoubtedly cause abandonment of Art. 59, with its imposition of two nomenclatural systems on non-lichenized pleomorphic ascomycetous and basidiomycetous fungi. For some mycologists, abandoning Art. 59 may perhaps be an attractive outcome, but it is a step that, if taken, should result from deliberate intent rather than terminological confusion. As long as the two nomenclatural systems continue in force and are distinguished by means of the typification and application of their names, terms that distinguish between the nomenclatural types can be helpful. They must not be allowed to contribute to the problems of Art. 59. The term "teleomorph" was coined, not to confuse our understanding of what constitutes a sexual form, but in order to give terminological specification to the form

required by Art. 59 to typify a holomorphic name.

We cannot, of course, prevent misinterpretations. We can only stress that the terms teleomorph and anamorph apply (without exclusion by variations in karyology, though with the use of karyological evidence where necessary) to what has traditionally been accepted as the forms "which it has been agreed to call" the "perfect" and "imperfect" forms respectively. Whether amplifying our original definitions can forestall further misinterpretation we do not know, but we make the attempt here, as follows:

> Teleomorph: a reproductive organ morphologically and /or karyologically specialized for generating meiospores or their homologues, whether by normally sexual or parthenogenetic means. As directly applicable to Art. 59, the teleomorphic phase is characterized, in the Ascomycetes, by the production of an ascoma or its homologue, maturing by development of asci/ascospores or their homologues; and in the Basidiomycetes, by the production of a basidioma or its homologue, maturing by development of basidia/basidiospores or their homologues.
>
> Anamorph: an organ of asexual or somatic reproduction, either specialized or generalized, but neither morphologically nor karyologically teleomorphic.

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TYPE STUDIES IN THE GENUS PEZIZA. V. SPECIES DESCRIBED BY REHM

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Under the generic names *Peziza* [Dill.] L. ex St-Amans, *Plicaria* Fuckel, and *Pustularia* Fuckel, Rehm described a number of species of *Peziza sensu stricto*. The following is an account of the reexamination of these species. Rehm frequently used the name *Plicaria* for ellipsoid-spored species. Korf (1960) discussed this nomenclatural problem and determined that if *Plicaria* is to be used at all it should be restricted to the spherical-spored species.

I am indebted to Dr. Rolf Santesson, Director of the Section for Botany, Swedish Museum of Natural History, Stockholm, for allowing me to study Rehm's collections. Both Drs. Richard P. Korf and Harold H. Larsen, Jr. have again been very helpful.

Plicaria baeomycoides Rehm, Hedwigia *39*: 96. 1900.
≡ *Peziza baeomycoides* (Rehm) Sacc. & Syd., Syll. fung. *16*: 706. 1902.
Ad terram. Brasilia. Ule no. 498. S.

Plicaria baeomycoides and *P. baeomycoides* var. *albo-pruinosa* Rehm, described in the same publication, are both lichens and are referable to the genus *Baeomyces*. Rehm indicated in his description that the material gave the impression of a lichen with a granular thallus; he could not find algal cells. The apothecia are pinkish and sessile.

Plicaria bananincola Rehm, Leafl. Phillipp. Bot. *6*: 2234. 1914.
≡ *Peziza bananincola* (Rehm) Sacc., Syll. Fung. *24*: 1160. 1926-28.
Ad bananam emortuam, Luzón, Prov. Laguna, Los Baños, 7/1913, leg. M. B. Raimundo, comm. C. F. Baker. S.

This is yet another of the smooth-spores species of *Peziza*. Using Svrček's (1970) treatment of this group, one would probably identify this as *P. crassipes* Quél. *Peziza bananicola* differs, however, in that there are pustules on the outer surface of the apothecia and that the apothecia are situated upon an extensive subiculum composed of wide hyphae, up to 16 µm in diam. The apothecia are dark brown when dried, large, up to 5 cm, and have a very short stalk. Rehm reported the ascospores to be 18 - 20 x 9 µm, but my measurements are 20 - 23 x 10 - 11 µm. The walls of the ascospores are up to 2 µm thick.

The species is tentatively accepted and should be known as *Peziza bananincola* (Rehm) Sacc. Rehm compared *P. bananincola* and *P. palmicola* Berk. & Curt. He concluded that they differed in ascospore form.

Plicaria caeruleo-maculata Rehm, Ann. Mycol. *2*: 351. 1904.
≡ *Peziza caeruleo-maculata* (Rehm) Sacc., Syll. fung. *18*: 19. 1906.
Ad terram. East Madison, Wisconsin, comm. Dr. Harper, 1903. S.

The following is a translation of Rehm's Latin description: "Apothecia at first globose, sessile with a short base, disc suborbicular expanded, margin distince, pale, excipulum smooth, parenchymatic, of slightly ash-colored cells, 25 - 30 µ broad, context, dark, blue spotted, ridged when dry, 3 cm diam. Hypothecium especially blue tinted.

Asci cylindrical, apex rounded, 180 - 200 x 10 - 12 µ, 8-spored, apex colored blue in iodine. Spores ellipsoid, rounded at the ends, epispore asperulate, 15 - 18 x 9 - 10 µ, monostichous. Paraphyses filiform, septate. 3 µ broad, hyaline, at the apex up to 5 µ broad."

Harper's note with the holotype reads "Apothecia blue stained. Hymenium pale stained. Flesh blue especially subhymenial layer."

To the description I can add the following comments: The excipulum is two-layered. The outer layer is composed of globose cells which range up to 20 µm in diam. These are interspersed with broad hyphae 10 µm in diam. This outer layer is about 100 µm thick. Loose hyphal tips give this outer surface a furfuraceous appearance. The medullary excipulum is composed of large globose cells, 60 - 80 µm in diam, with interspersed hyphae. The ascospores are biguttulate, 16 - 18 x 7 - 9 µm and are warted. The warts occasionally anastomose. According to my measurements the paraphyses are as wide as 8 µm, making them broader than Rehm reported. The apices are scarcely swollen.

Peziza caeruleo-maculata is strikingly similar in apothecial construction and ascospore morphology to *Peziza badio-confusa* Korf. There is sufficient disagreement between these two Pezizas to advise not merging them. From fresh material the question must be resolved as to whether the apothecia of *P. caeruleo-maculata* are blue or whether they become stained blue when bruised. *Peziza badio-confusa* is sometimes bluish-purplish but the species is variable in hymenial color. Like so many other Pezizas, *P. caeruleo-maculata* is probably a distinct species which requires only recollection to establish its true identity.

Plicaria chlorophaea Rehm, Hedwigia *20*: 34. 1881.
≡ *Peziza chlorophaea* (Rehm) Sacc., Syll. fung. *8*: 93. 1889.
≡ *Galactinia chlorophaea* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 48. 1907.

Auf Lohe eines Treibhauses im Universitäts garten zu Berlin, Prof. Magnus. Ascomyceten 553. FH.

This small, greenish species was described on tanbark in a hothouse. The ascospores are 14 - 16 x 8 - 9 µm, ellipsoid, biguttulate, and marked with a fine, low, complete though somewhat irregular, reticulum. The asci become diffusely blue for their entire length in Melzer's reagent. Details of the apothecial anatomy cannot be seen from the poorly preserved specimens studied.

The green color of the apothecium and reticulate ascospores should make it possible to rediscover this species. Since it was found fruiting in a hothouse it is not known whether this is a temperate or tropical species.

Plicaria fuckelii Rehm, Hedwigia *24*: 9. 1884.
≡ *Peziza fuckelii* (Rehm) Sacc., Syll. fung. *8*: 85. 1889.
≡ *Galactinia fuckelii* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 48. 1907.

Auf Nagelfluh-Lehm bei Oberstaufen im Algäu, Britzelmayr. Im September. Ascomyceten 753a, FH.

Maas Geesteranus (1969) has designated Rehm Ascomyceten no. 753a as lectotype and has provided a description of this species. He recognized the species on the basis of the following three features: 1.) the ascospore ornamentation consisting of "smaller and larger warts, which gradually unite to form low tortuous ridges," 2.) the short, inconspicuous excipular hairs, 3.) the occurrence of the species on loamy sand in mixed *Picea* and deciduous forests.

To date I have seen no material from North America which could be referred to this species.

Plicaria furfuracea Rehm, Hedwigia *20*: 34. 1881.
≡ *Discina furfuracea* (Rehm) Sacc., Syll. fung. *8*: 102. 1889.
≡ *Galactinia furfuracea* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 47. 1907.

In cinere horti. Augusta Vindelicorum. Ascomyceten 554. S.

A specimen from Rehm's Ascomyceten (no. 554) from Stockholm is here designated the lectotype of *Plicaria furfuracea* Rehm. This large collection, unlike that portion of the number in FH, is fully mature. My studies of this specimen show that *P. furfuracea* is a distinct species; but, the epithet *furfuracea* is preoccupied in *Peziza* and thus a new name is necessary:

Peziza cinatica Pfister, nom. nov.
≡ *Plicaria furfuracea* Rehm, Hedwigia *20*: 34. 1881.
[≡ *Peziza furfuracea* (Rehm) Smits'ka, Ukr. bot zh. *29*: 751. 1972, *non Peziza furfuracea* Roth ex Persoon]

Apothecia 5 - 15 mm broad when dried, mature apothecia reflexed without stipe, flesh thin. Hymenium yellowish (according to Rehm's original description). Outer surface of the apothecium white and scurfy. Asci cylindrical 200 - 250 x 9 - 10 µm, tapering somewhat toward the base, with definite croziers, with a J+ apical ring. Ascospores biguttulate, small, 11 - 12.6 x 6 - 7 µm, marked with low isolated warts. Paraphyses colorless, spetate, 3 - 4 µm broad, barely expanded at the apex.

Habitat: on ashes.

Peziza cinatica is similar to *P. tenacella* Phill. in Cooke and *P. praetervisa* Bres. All three occur on burned areas and have similarly sized ascospores. Rifai (1968) distinguished the two on differences in the form of their paraphyses and in the size of the warts on the spores. Both of these species, however, have violet hymenial and excipular pigments and the paraphyses of both are either curved or nearly hooked and are filled with dark granules. *Peziza cinatica* has neither these modified paraphyses nor does it have violet pigments. Given below is a table comparing these three closely related species.

	P. tenacella (Rifai, 1968)	*P. praetervisa* (Dennis, 1968)	*P. cinatica*
Apothecial size	10 - 30 mm	up to 30 mm	5 - 15 mm
Hymenial color	brownish purple to umber	violet with brownish tints	yellow
Outer surface	Purplish white minutely scurfy	pale violaceous, minutely scurfy	scurfy
Asci	185 - 220 x 7 - 8.5 µm	250 x 10 µm	200 - 225 x 9 - 10 µm
Ascospores	10.5 - 12 x 5.4 - 6.5 µm minutely warted	11 - 13 x 6 - 8 µm warted	11 - 12.6 x 6 - 7 µm warted
Paraphyses	1.8 - 2.5 µm below, apex clavate, curved or hooked, 3.6-6 µm above with colored granular contents	slightly clavate and curved at the tip, filled with purplish granules	3 - 4 µm, straight, colorless without granular contents

Pustularia gigantea Rehm, Ann. Mycol. *3*: 517. 1905.
≡ *Peziza gigantea* (Rehm) Sacc. & Trott., Syll. fung. *22*: 611. 1913.
≡ *Sarcosphaera gigantea* (Rehm) Kanouse, Mycologia *33*: 466. 1941.
Ad terram. Mackinac Island, Michigan, Juli 1899. Leg. Harper. S.

The type collection was sent to Rehm by E. T. Harper from Mackinac Island, Michigan. Harper (1918) subsequently reported on additional collections of the species from Michigan and published photographs. He compared it with *Sarcosphaera* and maintained that it differed form *S. coronaria* (Cooke Boud. (now properly called *S. crassa* (Santi ex Steudel) Pouzar) by its smaller ascospores. I have reexamined Harper's material, and a collection I made in upper Michigan and, agreeing with Kanouse, find that they consistently have smaller ascoposes than are generally reported for *S. crassa*. However, in reviewing the Farlow Herbarium collections of *S. crassa*, it was found that the spore size was variable. Buschmann's (1958) suggestion to synonymize *Pustularia gigantea* with *Sarcosphaera dargelasii* Nannf. in Lund. & Nannf. (= *S. crassa*) is confirmed.

A comment on the genus *Sarcosphaera* may be in order at this point. The genus was erected by Auerswald in 1869 for a single species, *Peziza macrocalyx* Reiss. The proper name of this species has been debated over the ensuing years. It has most commonly been called *Sarcosphaera macrocalyx* (Reiss) Auersw., *S. coronaria* (Cooke) Boud., *S. amplissima* (Fr.) Kanouse, and *S. dargelasii*. These changes of name have been discussed by Buschmann (1958) who also gave a description of the species. More recently Pouzar (1972) found yet another older available epithet, *Peziza crassa* Santi ex Steudel, which he combined in *Sarcosphaera*. Trappe (1975) pointed out that *Caulocarpa* Gilk., a monotypic genus for *C. montana* Gilk., should also be added to the synonymy.

Eckblad (1968) did not recognize *Sarcosphaera* as a distinct genus. Instead, he treated the species in *Peziza*. On morphological grounds there is some merit to this merger, however, in my unpublished studies I have found that *S. crassa* differs from most *Peziza* species in that there is an outer excipular layer of parallel hyphae which run perpendicular to the surface of the apothecium. Also *Sarcosphaera* seems morphologically quite close to certain of the Tuberales. On these bases I maintain *Sarcosphaera* as a distinct genus.

Plicaria mirabilis Rehm *in* Strass., Verh. K. K. Zool.-Bot. Ges. Wein *60*: 476. 1910.
≡ *Peziza mirabilis* (Rehm) Sacc., & Trott., Syll. fung. *22*: 612. 1913.
Auf Brandstellen am Sonntagberg. April 1910, no specimen examined.
The name is invalid since it was proposed as a *nomen ad interim*.

Plicaria repandoides Rehm, Ann. Mycol. *5*: 518. 1905.
≡ *Peziza repandoides* (Rehm) Sacc. & Trott., Syll. fung. *22*: 614. 1913.
Ad lignum putridum Populi. Port Byron, Illinois, U. St. Am. 5/1904, leg. Harper. S.

Seaver (1928) thought this was but a small specimen of *Peziza repanda*, a species to which Rehm had referred in his original description. The smooth, eguttulate ascospores are 14 - 16 x 8 - 9 µm. The excipulum is composed of large globose cells with some intermixed hyphae. There is a middle zone of interwoven hyphae which gives the flesh a stratified appearance. The outer surface is pustulate, the pustules being composed of interwoven hyphae, 5 - 8 µm in diam. Harper, on the specimen label, reported the apothecia to be watery-brown in color and Rehm described the species as sub-stipitate.

The species fits the description of *Peziza micropus* Pers. ex Pers.

given by Svřcek (1970) and should be considered a synonym of that species *sensu* Svřcek.

Plicaria rubro-fusca Rehm, Ann. Mycol. *3*: 577. 1905.
≡ *Peziza rubro-fusca* (Rehm) Sacc. & Trott., Syll. fung. *22*: 613. 1913.
Ad terram. Isle Royale, Michgian, U. St. Am. 7/1904, leg. Harper S.

Seaver (1928) placed this species in the synonymy of *Peziza abietina* Pers. ex Fr. (= *Pseudotis abietina* (Pers. ex Fr.) Boud.). The asci are J+.

The fungus reportedly occurred on soil, but, there are pieces of charred wood mixed in the soil suggesting that it was fruiting on a burned area. Harper noted that the fungus was, "Pallid to reddish brown both sides. Watery, cups from 2 - 4 cm in diameter." The material agrees with *Peziza atrospora* Fuckel (≡ *Galactinia tosta* Boud., ≡ *Plicaria ferruginea* Fuckel). This species was discussed by Maas Geesteranus (1969).

Geoscypha subcupularis Rehm ex Rehm, Hedwigia *26*: 82. 1887.
[≡ *Peziza subcupularis* Rehm, Ascomyceten no. 852. 1886. *nom. nud.*]
≡ *Peziza subcupularis* (Rehm ex Rehm) Sacc., Syll. fung. *8*: 77. 1889.
In terra arenacea prope Berolinum, leg. Sydow. Ascomyceten 852. FH.

The specimen issued under the name *Peziza subcupularis* in 1886, is *Octospora leucoloma* Hedw. ex S. F. Gray.

Pustularia violaceonigra Rehm, Hedwigia *21*: 98. 1882
≡ *Humaria violaceonigra* (Rehm) Sacc., Syll. fung. *8*: 150. 1889.
≡ *Plicaria violaceonigra* (Rehm) Rehm *in* Rabeh. Kryptog.-Fl. *1(3)*: 1007. 1894.
≡ *Galactinia violaceonigra* (Rehm) Boud., Hist. Class. Discom. d'Eur. p. 47. 1907.
≡ *Peziza violaceonigra* (Rehm) Smits'ka, Ukrajins'k Bot. Žurn. *29*: 751. 1972.
≡ *Pachyella violaceonigra* (Rehm) Pfist., Canad. J. Bot. *51*: 2021. 1973.
Auf faulen Holz und der daneben befindlichen Erde, Alpen bei Partenkirchen, bei München. IX. 1874. Arnold. S.

Pfister (1973) pointed out that this is a species of *Pachyella* and is synonymous with *P. barleana* Boud., type species of the genus *Pachyella*.

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MYCOTAXON

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A NEW SPECIES OF *STIGMINA* ON *BEAUCARNEA* (LILIACEAE)

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Beaucarnea recurvata Lem. (elephant's foot or pony-tail plant) Fig. 1, a member of the Liliaceae, is collected from the wild in Mexico for the house and garden plants trade in the United States. Early in 1977, Plant Quarantine Inspectors Van Valkenburg, Burgess and Wood began finding evidence of a disease caused by an unnamed fungus on the foliage. This fungus, which has now been collected several times, is here described as *Stigmina beaucarneae* Pollack & D. Farr.

STIGMINA BEAUCARNEAE Pollack & D. Farr sp. nov. Figs. 2-16

Maculae elongato-ellipticae, pallide brunneolae, brunneo usque rufobrunneo marginatae, distinctae, usque ad 8 cm longae; sporodochia amphigena vel saepius hypophylla, pulvinata confluentia, brunnea vel atra; stromata immersa pseudoparenchymatica fusca vel atra; conidiophora e stratis superioribus stromatis orientia erecta parallela, dense

compacta, e cellulis usque ad 11 cylindricis 4-8 X 4 µm in columna dispositis, brunnea; cellulae conidiogenae ad apicum conidiophororum terminales; holoblasticae proliferationibus percurrentibus praeditae, subglobosae dein cylindricae, pallide brunneolae, 6-26 x 4-8 µm; conidia; singulatim ex apicibus cellularum conidiogenarum formantia, recta vel subcurvata, irregulariter cylindrica, subhyalina usque pallide brunneola, 0-7-euseptata, ad basim truncata, 30-74 X 4-7 µm.

Hab. in foliis vivis *Beaucarneae recurvatae* Lem. (Liliaceae), Mexico. Holotypus BPI 71905, Brownsville, Texas, No. 007449, June 2, 1977.

Leaf spots long elliptical, up to 8 cm long and 6 mm wide, pale brown with a brown or reddish brown border, centers becoming straw-colored. *Mycelium* immersed. *Sporodochia* formed in the center of the lesions, more frequently hypophyllous but can be amphigenous or epiphyllous, vein limited, initially circular to elliptical but often coalescing to form elongated striae up to 5 mm long, erumpent, lifting the epidermis and cuticle to form flap-like openings. *Stromata* immersed, consisting of a basal prosenchymatous stratum of interwoven brown hyphae, surmounted by a saucer-shaped base of pseudoparenchyma consisting of thick walled, very dark brown cells. *Conidiophores* closely packed, parallel, simple or branched erect columns of more or less uniform width composed of up to 11 cylindrical cells 4-8 µm long x 4 µm wide, dark brown near base, pale brown at apex, with the conidiogenous cells at their distal end. *Conidiogenous cells* more or less swollen, holoblastic, ampulliform to subglobose to elongate cylindrical, proliferating percurrently with several inconspicuous annellations, aseptate, subhyaline to pale brown, smooth or roughened by wall fragments left after percurrent growth, 6-26 x 4-8 µm. *Conidia* formed singly from the apex of the conidiogenous cells, subcylindrical, at times considerably narrowed at the base and wider in the lower half, apex round, base truncate with a marginal frill sometimes present, straight or slightly curved, 0-7-euseptate, subhyaline to pale brown, smooth or occasionally roughened, guttulate, 30-74 x 4-7.8 µm.

On living leaves of *Beaucarnea recurvata* Lem. (Liliaceae), Mexico. Specimens examined: Brownsville, Texas No. 007449, intercepted by J. Van Valkenburgh,

Mexico, June 22, 1977 (BPI 71905), HOLOTYPE; Brownsville, Texas, Nos. 006926, 007441, 007442, 007557, collected February 7, June 21, June 20, July 5, all in 1977, and Brownsville, Texas 008348 and 008376 coll. May 15 and May 31, 1978.

This organism has been placed in the hyphomycetous genus *Stigmina* Sacc. because it possesses the characteristics used by Ellis (1971, 1975), Hughes (1952), and Sutton (1964, 1975) in their analysis and circumscription of the genus:

Sporodochia--punctiform, brown to black, confluent.
Stromata--always present, variable in size.
Conidiophores--packed closely together to form a pulvinate mass, brown, smooth or verrucose.
Conidiogenous cells--holoblastic, percurrent, cylindrical.
Conidia--solitary, cylindrical, rounded at the apex, truncate at the base, subhyaline to brown, smooth or roughened, with one or more transverse septa.

On the basis of its morphology and the opinion of Ellis (1975) that many *Stigmina* species are host specific, it is described as a new species. It shares with *S. ulei* (Syd.) Sutton (Morgan-Jones, 1971) the very dark saucer-like basal stromatic layer, but that species has superficial stromata and the conidia are smaller. It resembles *S. crotonicola* M. B. Ellis (1975) in that the conidiophores consist of long columns of cells, but that species has much larger and darker conidia. It most closely resembles *S. concentrica* (Cke. & Ellis) Deighton (1973), the only other species in the genus occurring on a member of the Liliaceae. In contrast to *S. beaucarneae*, *S. concentrica* has paler, more slender conidia 21-68 x 3-5 µm and smaller, 2.5-5 µm wide more loosely arranged conidiogenous cells. The leaf spots caused by *S. concentrica* have raised margins and the sporodochia are more erumpent and usually in concentric rings. Leaf spots with *S. beaucarneae* infection have margins that are neither raised nor sunken and the sporodochia are in a linear pattern.

Sporodochia of *Stigmina beaucarneae* have been examined in sectioned host material. The host, *Beaucarnea recurvata* (Fig. 1), has a thick cuticle which provides a barrier that is not readily penetrable and infection appears to take place only through the stomatal openings, giving rise to a small cluster of cells in the mesophyll

beneath the guard cells (Fig. 8). Hyphal growth then continues laterally into neighboring epidermal cells as well as vertically into the host mesophyll forming a submerged stroma between the cuticle and the mesophyll (Fig. 9). Guard cells or epidermal cells are penetrated or surrounded by the developing hyphae and incorporated into the stroma (Fig. 9). Stromata vary in the degree of host penetration as shown in Figs. 11-13. The upper layers of the stromata produce conidiophores which are initially subhyaline to pale brown, thin-walled cells arranged in columns whose growth forces the cuticle to bulge and rupture along one edge (Figs. 10, 11, 12). This one-sided breaking of the cuticle over the developing sporodochium gives the flap-covered sporodochium a distinctive macroscopic appearance (Fig. 2).

Conidiogenesis is not initiated until after the rupture of the cuticle. Conidia tend to adhere to each other in small groups. After the onset of conidiogenesis, the conidiophores continue to mature with the walls becoming thicker and more pigmented. A comparison of Fig. 13 with Fig. 3 shows this change. This increased pigmentation also occurs in the stromata. At maturity sporodochia protrude as pulvinate masses above the leaf surface.

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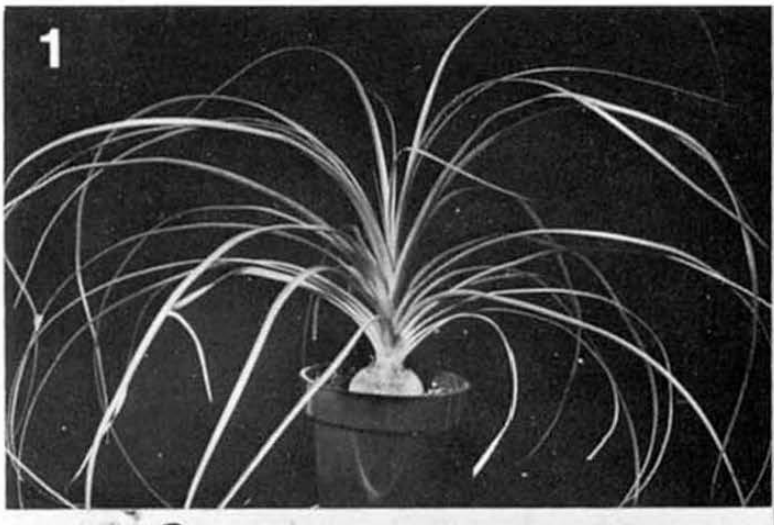
Fig. 1. The host *Beaucarnea recurvata*. Figs. 2-7. *Stigmina beaucarneae*. 2. Sporodochia covered by flaps of host tissue, x25. 3. Cross-section through a mature sporodochium, x250. 4. Columns of conidiophores forced apart. Interference contrast, x600. 5. Young conidium attached to a conidiogenous cell, x900. 6. Conidia stained with phloxine, x800. 7. Conidiogenous cells showing inconspicuous annellations, x1000.

Figs. 8-13. Development of sporodochia in *Stigmina beaucarneae*. 8. Substomatal hyphal cluster with hyphae passing through the stoma and between the guard cells. 9. Stromatal formation in the epidermis and mesophyll beneath a stoma. 10. Early stage in the production of conidiophores above the stromatal layer. 11. Young sporodochium pushing up the epidermis, with a foot-like stroma in the mesophyll. 12. Sporodochium with a loose prosenchymatous sub-base and conidiophores beginning to show the columnar arrangement. 13. Sporodochium with conidiophores in columns and a pseudoparenchymatous base. Fig. 8, x410. Figs. 9-13, x250.

Figs. 14-16. Conidiophores, conidiogenous cells and conidia of *Stigmina beaucarneae*. 14. Conidiophores and conidiogenous cells. 15. An older conidiogenous cell showing several annellations. 16. Conidia.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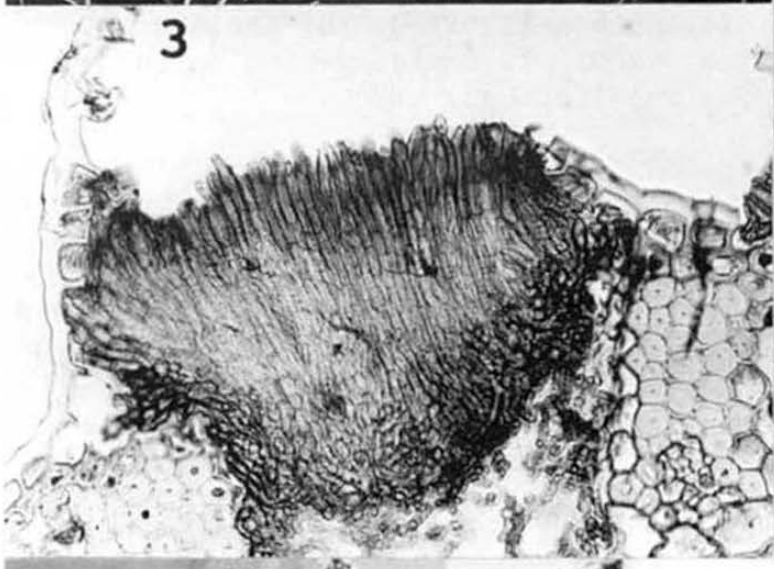
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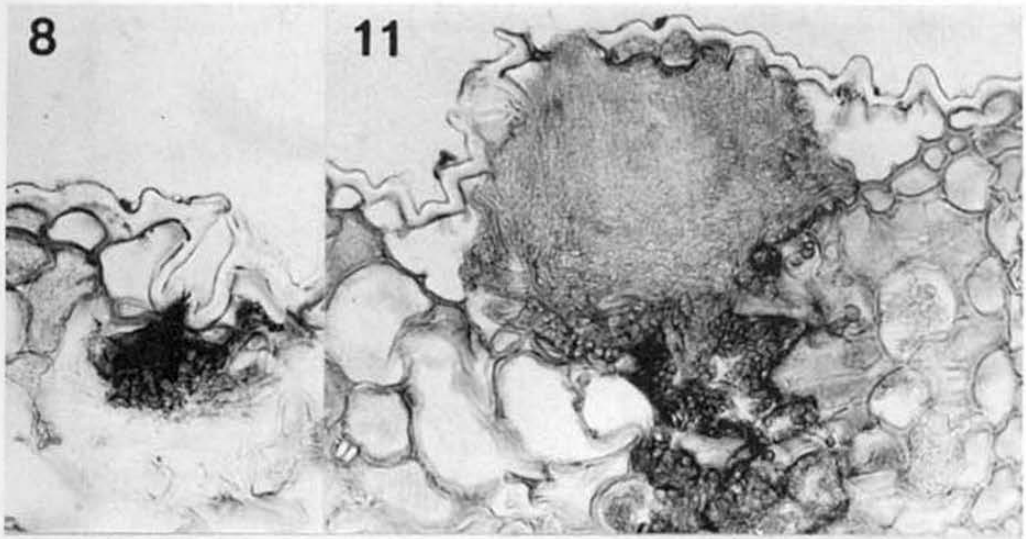
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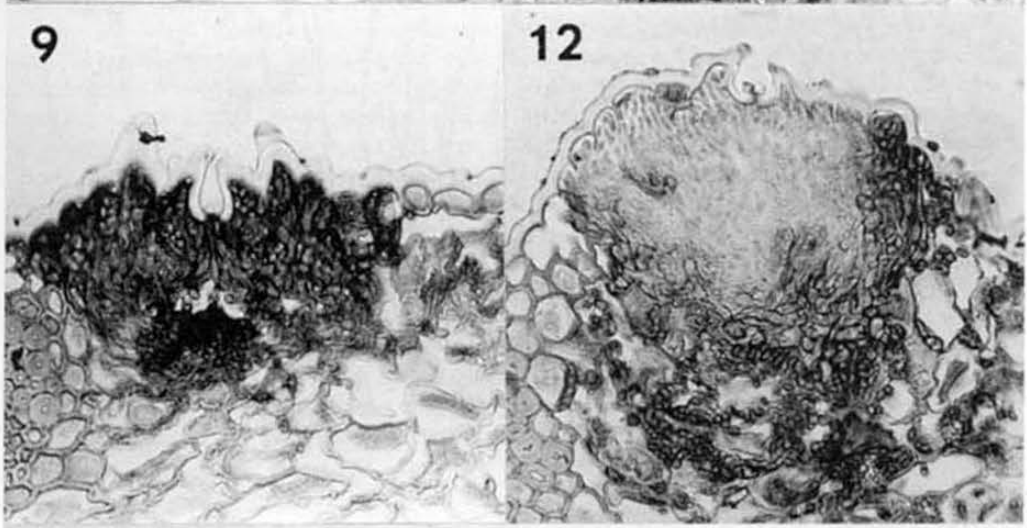
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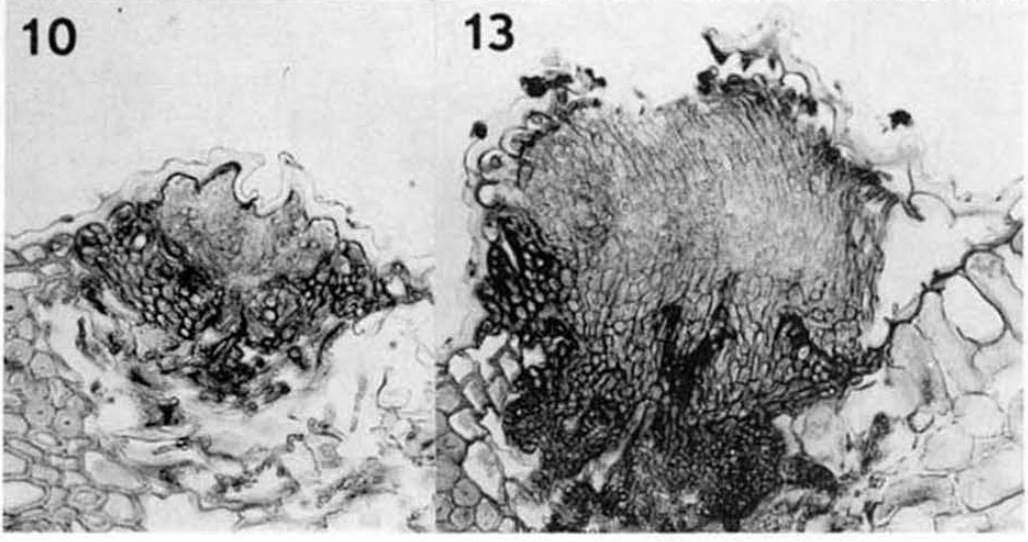
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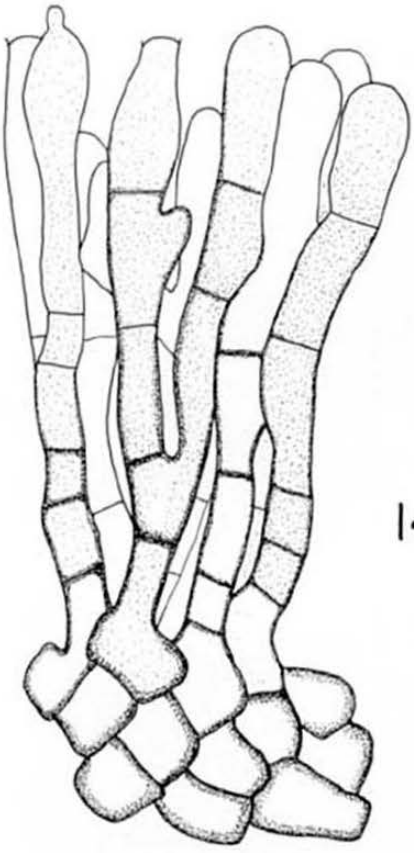

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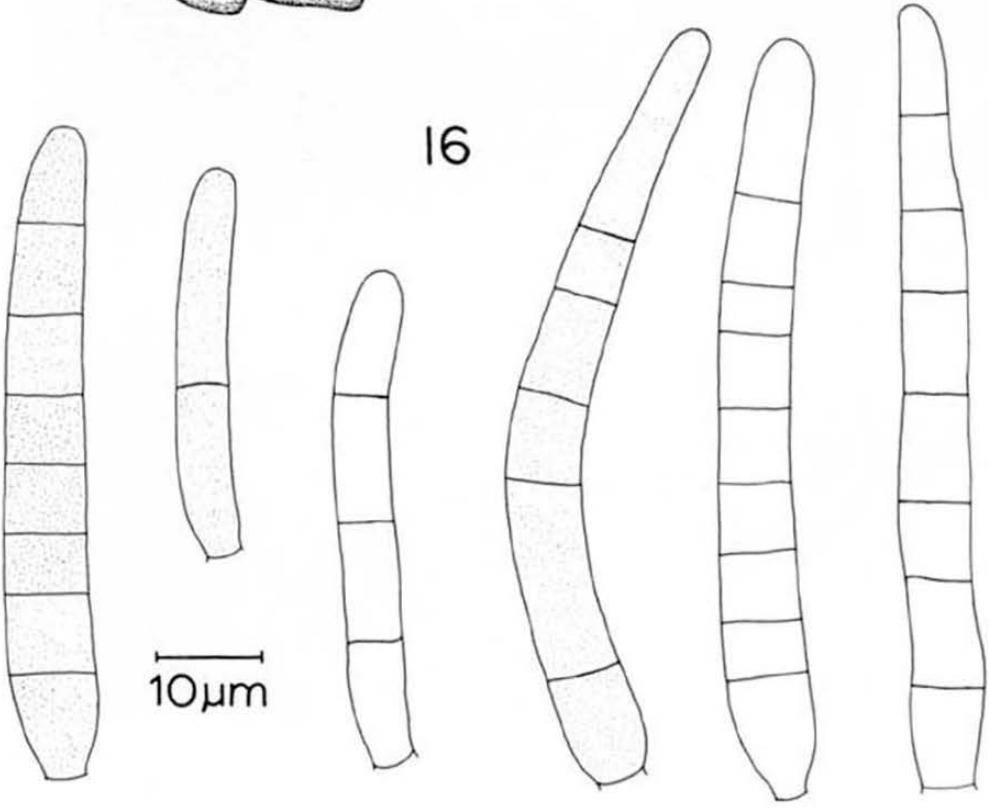

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THE XANTHOCHROIC REACTION IN APHYLLOPHORALES

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SUMMARY

Absorption spectra of aqueous, ethanol and methanol-HCl extracts from the basidiocarps of 65 species of aphyllophoraceous fungi (including 27 Hymenochaetaceae species) were studied spectrophotometrically. Most of the Hymenochaetaceae species revealed similar and unspecific absorption spectra of the basidiocarp pigment extracts, representing steeply declining curves without any maxima, minima or inflections. All the Hymenochaetaceae species studied showed the xanthochroic reaction (darkening) on alkalization, but so were also many other brown or brownish as well as some light-coloured Aphyllophorales fungi besides the Hymenochaetaceae. The xanthochroic reaction is presumed to be due to a set of pigments which obviously represent polymerized phenolic compounds and is not caused by a single specific pigment. However, basidiocarps of several Hymenochaetaceae species contain certain compounds which reveal intensive absorption in the 335-350 nm region on alkalization of the extracts. Certain peculiarities of the basidiocarp absorption spectra could be distinguished, whereas non-hymenochaetaceous Aphyllophorales revealed greater diversity in their absorption spectra. According to the spectrophotometric data on pigment extracts, the genera *Phaeolus* s. str., *Pycnoporellus* and *Pyrofomes* do not belong to the Hymenochaetaceae. Two new combinations, *Phellinus microporus* (Pilát) Parm. and *Ph. jezoënsis* (Yamano) Parm., are proposed.

INTRODUCTION

Patouillard (1900) was probably the first to abandon the view that the shape of the basidiocarp and the configuration of the hymenophore are the most important characters in the taxonomy of fungi that are at present recognized as Aphyllophorales. In this respect Patouillard's *Série des Igniaires* (Basidiomycètes Homobasidiés: Aphyllophoracés: Porohydnés: Porés: Les Fomes) including the genera *Phellinus, Cyclomyces, Hydnochaete, Hymenochaete* and *Xanthochrous* (= *Onnia, Coltricia, Inonotus* as well as *Pyrofomes* and part of the *Phellinus* species) are of special interest. He considered the colour of basidiocarps and the existence of the setae ('cystides') to be characteristic of this group. Members of this group are

fungi with pileate as well as resupinate basidiocarps, with hymenophores either smooth, hydnoid, with concentric gills, or poroid.

The idea of uniting these genera seemed evidently too bold even to Bourdot, one of the best-known mycologists, who has developed and elaborated the system of Patouillard (Bourdot & Galzin, 1928). Only Donk accepted Patouillard's ideas and complemented them (Donk, 1933, 1948, 1964); he also specified the taxonomic position of the group by describing it as a new subfamily in 1933, which he raised to the rank of a new family Hymenochaetaceae in 1948. Imazeki agreed to the views of Patouillard and Donk in his monograph of Hymenochaete already in 1940; nevertheless, he placed the genus Hymenochaete in the family of the "rudimental fungi of higher families", Corticiaceae (Imazeki, 1940: 2, 20).

Corner (1948, 1950) asserted that two clavarioid genera, *Lachnocladium* and *Clavariachaete*, should also be included in this group of fungi. The taxon described by Donk as a family he conventionally named the *Xanthochroic series* of the Basidiomycetes. Later he added: "... eventually it must be raised to the rank of a primary series of the Homobasidiomycetes, and the name Xanthochroales would seem more suitable" (Corner, 1950: 22-23).[1]

Today many mycologists have accepted Patouillard-Donk's conception recognizing the Hymenochaetaceae as a family which unites certain polyporoid, hydnoid and stereoid genera (Kotlaba & Pouzar, 1957; Kreisel, 1961; Jahn, 1967, 1971; Reid, 1969; Parmasto, 1969, 1971; Nobles, 1971; Niemelä, 1972; Vesely, Kotlaba & Pouzar, 1972; Domański, 1974, 1975; Ryvarden, 1976, 1978; Vasser & Soldatova, 1977, and many others).

Some other taxonomists admit that the genera *Inonotus*, *Phellinus* and a few others differ from the rest of the polypores; they regard them as a separate family - the Mucronoporaceae, which they keep apart from the family Hymenochaetaceae s. str., i. e. from the genera having basidiocarps with a smooth hymenium (Imazeki & Toki, 1954 - n. v., cited after Donk, 1964; Imazeki & Hongo, 1957; Imazeki, Hongo & Tubaki, 1970; Domański, Orłoś & Skirgiełło, 1973; Wright & Deschamps, 1975 and some others).

The third group of taxonomists consider that hymenochaetaceous pore fungi belong to the family Polyporaceae s. l. (Overholts, 1953; Bondarzew, 1953; Komarova, 1964; Cunningham, 1965; Zerova, Radzievski & Shevchenko,

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[1] Still, the Hymenochaetales was described as a new order only in 1977 (Oberwinkler, 1977: 89). The clavarioid genera noted by Corner as well as the genera *Scytinostroma*, *Vararia*, *Asterostroma*, which Donk (earlier) and Corner considered to be genera of Hymenochaetaceae, are at present usually regarded as a separate family Lachnocladiaceae (Reid, 1965; Donk, 1971; Parmasto, 1971). However, Pegler (1973) included them (with the exception of *Scytinostroma*) again under the Hymenochaetaceae.

1972; Lyubarski & Vasilyeva, 1975; Mazelaitis, 1976 a. o.).

Although most of them have admitted that this family is somewhat artificial, they do not take into consideration the affinity of "hymenochaetoid pore fungi" to the genera *Hymenochaete*, *Hydnochaete* and *Asterodon* (Hymenochaetaceae s. str.).

One of the most typical features of the family Hymenochaetaceae (s. l.), besides the existence of setae and the absence of clamps on hyphae, is the presence of the so-called xanthochroic basidiocarp. It is "a basidiocarp having the hyphae of the context and trama yellowish brown when observed in a water or acid mount, but dark brown when moistened with the potassium hydroxide solution" (Snell & Dick, 1957: 169). The xanthochroic reaction (or KOH test) is positive when the context of a basidiocarp permanently and noticeably darkens in an alkaline solution (cfr. Pegler, 1973: 414, 408).

In order to clear up the disputable problems of the taxonomy of the group of fungi under discussion, it would be essential to know what the xanthochroic reaction is and what is its value for taxonomy. It would be of special importance to learn if it is connected with the occurrence of a single pigment, or if involves several pigments.

Only suppositions are available about it in the literature. Donk noted (1933: 236): "Die schwarzbraune Verfärbung in KOH ist analog derjenigen, die bei den meisten (braunen) Phylacterioideae auftritt. Wahrscheinlich findet sich hier, wenn nicht Thelephora-säure, so doch ein verwandter Stoff". Later Donk does not repeat this supposition, yet he suggests that "The substance so characteristic of the Hymenochaetaceae deserves to be chemically more extensively analysed" (Donk, 1964: 241). Still later (1971: 22) he has to repeat: "The so-called xanthochroic reaction of the Hymenochaetaceae deserves to be more systematically studied".

So far the pigments of the basidiocarps of the Hymenochaetaceae have been studied only in case of a few species.

Zopf (1889) described the yellow pigments of *Polyporus (= Inonotus) hispidus* that are soluble in water and in ethanol, and stated that their absorption spectra are without any characteristic features and that absorption bands are missing.

Nadson (1891: 24-25) described the reddish-brown pigment of *Polyporus (= Phellinus) igniarius* as a weak acid resembling polyporic acid but soluble in water; the pigment takes on an intensively reddish-brown colour in a 0.5 to 5 per cent KOH solution.

As a conclusion from the study of the composition of the sterile conks of *Inonotus obliquus* (so-called birch cancer or chaga) Shivrina and her co-workers asserted that the pore fungi decomposing lignin have a powerful phenoloxidase system. Due to the oxidase, accumulation of an amorphous dark-coloured (brown) substance takes place in hyphae. These are humin-like compounds ('fungus lignin'). This polyphenolic complex is a breakdown product of the oxidative condensation of the molecule of lignin attacked by the fungus.

The birch cancer as well as the cultured mycelia of *Inonotus obliquus*, *Phellinus igniarius* and *Fomes fomentarius* contain similar complexes. The composition of the complex depends on the character of the lignin used by the fungus. Unlike birch cancer and the cultured mycelium, the basidiocarps of *Inonotus obliquus*, *I. hispidus*, *Phellinus igniarius* and *Fomes fomentarius* have humin-like compounds of different composition: syringic and vanillic acids are absent among the acidic hydrolysis products, but there are p-hydrobenzoic, gallic and protocatehuic acids (Lovyagina, Shivrina & Platonova, 1958; Shivrina, Lovyagina & Platonova, 1959, 1960, 1961; Shivrina, 1961, 1965; Shivrina, Nizkovskaya & Platonova, 1965; Shivrina & Nizkovskaya, 1966; Shivrina, 1969). Shivrina (1961) points out that many pore fungi accumulate a highmolecular amorphous substance with some properties of humic acids. Basidiocarps of fungal species causing white rot contain a much more lignin-like substance than other wood-rotting species.

Malama and her co-authors (1975) characterized the pigment of the cultures of white-rot fungi *Armillariella mellea* (Fr.) Karst. (Agaricales), *Phellinus igniarius* and *Ph. tremulae* (Bond.) Bond. & Boriss. as melanins. They assert that these pigments are similar and may be separated into four fractions, analogous to the fractions of other natural melanins and the main groups of humic substances. The pigments make up 8 to 35 per cent of the dry substance of the mycelium. In one of her later papers Malama (1977) asserts that the two groups, melanin pigments and humic acids, differ from each other primarily in quantitative respects and not to such a degree in qualitative aspects.

Edwards, Lewis & Wilson (1961) found a new pigment - hispidin (a 4-hydroxy-6-styryl-2-pyrone) in *(Polyporus (= Inonotus) hispidus*. Bu'Lock and his co-workers described the pigments of *I. hispidus;* these appeared to consist of a mixture of methoxyl-free phenolic compounds. The principal constituent of the mixture is hispidin, enollactone of 3,4-dihydroxycinnamoylacetoacetic acid (Bu'Lock & Smith, 1961; Bu'Lock, Leeming & Smith, 1962). As the basidiocarp of *I. hispidus* grows old, the oxidation-polymerization of phenolic compounds into dark-coloured pigments takes place. The pigmented structural material of a mature *I. hispidus* basidiocarp can be described as lignin-like. They note that phenolic pigments of the hispidin type are probably of wider distribution in the Polyporaceae (= Hymenochaetaceae! - E.P.).

In one of their later papers Bu'Lock & Walker (1967) show the similarity between the pigments of *Inonotus hispidus* and of sterile conks of *I. obliquus*.

Fiasson, Gluchoff-Fiasson & Steglich (1977) found 3,14'-bihispidinyl in *Phellinus pomaceus* and hypholomin B in *Ph. robustus* var. *robiniae;* these are compounds derived from or related to dehydrohispidin.

Kirk, Lorenz & Larsen (1975) characterized the xanthochroic pigment of the basidiocarp of *Phellinus igniarius* extracted by means of dioxane-water. The pigment is a phenolic compound formed by the oxidative polymerization of a molecule containing 3,4-dihydroxyphenyl moiety. The dark colour of the pigment probably reflects the presence of o-quinones and their condensation products. The pigment is evidently responsible for the positive KOH test in *Inonotus hispidus*, *Phaeolus schweinitzii* and *Phellinus igniarius*. It may be assumed that hispidin (or another related compound) is the

precursor of this pigment. Vanillic acid and syringic acid derivates were not established among the products of the oxidative degradation of ethylated samples. However, Shivrina, Platonova & Nizkovskaya (1973) found derivates of vanillic acid in the hydrolysates of humus-like complexes obtained from the cultures of *Fomes fomentarius*, *Inonotus obliquus* and *Phellinus pini*. They also found syringic acid derivates, when *I. obliquus* and *Ph. pini* were cultivated in a medium containing birch sawdust, but not when pine sawdust was used.

Yefimenko and Ageyenkova (1965) extracted other pigments unsimilar to those above from the basidiocarps of *Phellinus pini* var. *abietis* f. *laricis* (= *Ph. chrysoloma*) and *Ph. igniarius* and characacterized them. The pigments belong to flavonoids, obviously to the group of chalcones or aurones. But as these pigments constitute only about 0.01 to 0.02 per cent of the dry matter of the fungus, we cannot take them for the main pigments of these species. According to Shivrina (1961), the lignin-like matter in pore fungi causing white rot ranges from 20 to 36 per cent of dry weight of the fungus.

Proceeding from these data we can suppose that the brown or brownish colour of the basidiocarps of xanthochroic polypores is imparted not by one pigment of a certain composition, but by a set of pigments, representing the polymerized phenolic compounds. This complex is apparently somewhat different in different species, especially in the fungi which grow on coniferous or deciduous wood, and most probably even on different specimens of the same species and in basidiocarps of different ages, depending on different stages of polymerization.

Colour as a characteristic of great importance is widely used in the taxonomy of Aphyllophorales (and of other fungi) almost equally at species and genus levels. However, it is a macroscopic and subjective feature. Almost the same colour may be caused by chemically very different pigments; this may be the case with the xanthochroic pigments of Hymenochaetaceae. The complicated chemical analysis of a great number of species and specimens is still unrealizable; we do not know the exact composition of all the pigments of even the best studied species.

One of the objective ways to characterize colour (and the xanthochroic reaction) is to investigate the absorption spectra of basidiocarp extracts. Undoubtedly, this is a primitive method, but it allows us to compare the pigments of a great number of basidiocarps. This method was applied in the taxonomy of Aphyllophorales first by Schatz and his co-workers (1956), who demonstrated the identity of the pigments of two *Pycnoporus* species.

MATERIALS AND METHODS

For spectrophotometric studies dried basidiocarps were used (collected usually one to three years ago): 27 species belonging to the family Hymenochaetaceae and 38 species of other aphyllophoraceous fungi, altogether 93 samples. The following genera of Hymenochaetaceae

were represented: *Phellinus* - 14 species, *Inonotus* - 8, *Hymenochaete* - 3, *Polystictus* - 2 species, *Asterodon*, *Coltricia*, *Inonotopsis* - 1 species each. By way of comparision were also used some other aphyllophoraceous fungi with brown or brownish basidiocarps of the genera *Amylostereum*, *Columnocystis*, *Daedalea*, *Datronia*, *Fomes*, *Fomitopsis*, *Ganoderma*, *Gloeophyllum*, *Gloeoporus*, *Hirschioporus*, *Hydnellum*, *Phaeolus*, *Punctularia*, *Pyrofomes*, *Sarcoporia*, and some species with relatively light-coloured basidiocarps of the genera *Amyloporia*, *Antrodia (Coriolellus)*, *Climacocystis*, *Cerrena*, *Coriolus*, *Dichomitus*, *Diplomitoporus*, *Irpex*, *Laetiporus*, *Laricifomes*, *Lenzites* and *Trametes* s.str.

Pieces were cut from dried basidiocarps, avoiding any accidental foreign substance from aside getting into the sample. Of the fungi with perennial basidiocarps, only the parts grown during the two or three last growing seasons were used. The pieces were ground to powder; from each specimen 100 mg was weighed, put into test-tubes and then poured over with 10 ml of the extract solvent. For extraction were used: 1) distilled water, 2) ethanol 96°, and 3) a mixture of methanol and conc. HCl (94 : 6). The liquids were heated at 60 to 65° C: ethanol and methanol extracts were heated for 20 minutes and aqueous extracts - for 1 hour. The extracts were kept for 24 hours at 18 to 20° C and were centrifuged. The obtained extracts were used to determine the absorption spectra in 1-cm cuvettes within a range of 320 to 650 nm wavelengths with the help of spectrophotometer of the type SF-4A or a Specord UV-VIS. After the determination of the spectra in aqueous and ethanol extracts, they were alkalized by adding 0.2 ml of 1 : 1 diluted conc. NH_4OH and the absorption spectra were determined once more.

Part of the samples were studied once again after an interval of 6 years; the powder of the ground basidiocarps were kept in closed glass vials at room temperature. The absorption spectra appeared to be practically the same.

The basidiocarps examined[1]

HYMENOCHAETACEAE

1. Asterodon ferruginosus Pat. - Komi ASSR, Kočmes, on Picea obovata. TAA 17522.
2. A. ferruginosus - Sachalin, Južno-Sachalinsk, on Abies sachalinensis. TAA 55246.
3. Coltricia perennis (Fr.) Murrill - Sachalin, Južhno-Sachalinsk. TAA 55263.
4. Hymenochaete fuliginosa (Pers.) Bres. - Caucasus, Stavropol'skij Terr., Archyz, on Abies nordmanniana. TAA 53243.
5. H. rubiginosa (Fr.) Lév. - Zakarpatskaja Prov., Ugol'skoje, on Carpinus betulus. TAA 3601.
6. H. tabacina (Fr.) Lév. - Sachalin, Južno-Sachalinsk, on Alnus hirsuta. TAA 55300.
7. Inonotopsis subiculosa (Peck) Parm. - Archangel'skaja Prov., Jemca, on Pinus sylvestris. TAA 18415.
8. Inonotus cuticularis (Fr.) Karst. - Hungary. Herb. Z. Igmándy 1260.

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[1] Geographical names are given according to the Political-administrative Map of the Union of Soviet Socialist Republics (Moscow, 1976).

9. Inonotus dryophilus (Berk.) Murrill - Byelorussian SSR, Belovežskaja Pušča, on Quercus robur. TAA 102101.
10. I. obliquus (Fr.) Pilát - Estonian SSR, on Betula pendula. TAA 18323.
11. I. radiatus (Fr.) Karst. - Estonian SSR, on Corylus avellana. TAA 54793.
12. I. radiatus - Kamčatka, Južnyje Kor'aki, on Alnus kamtschatica. TAA 71/228.
13. I. rheades (Karst.) Karst. - Krasnojarskij wildlife area, on Populus tremula. TAA 55347.
14. I. tamaricis (Pat.) Maire - Turkmen SSR, Kara-Kala, on Tamarix sp. TA 55061.
15. I. weirii (Murrill) Kotl. & Pouz. - Canada, British Columbia. DAOM 8734.
16. I. weirii - Krasnojarskij Terr., Badžei, on Abies sibirica. TAA 9737.
17. I. weirii - Krasnojarskij wildlife area, on Abies sibirica. TAA 71491.
18. I. weirii - Gorno-Altajskaja Auton. Prov., near Teleckoje L., on Larix sibirica. TAA 7870.
19. Onnia triqueter (Fr.) Imaz. - Kurile Is., Kunašir, on Picea microsperma. TAA 12979.
20. Phellinus alni (Bond.) Parm. - Estonian SSR, on Alnus incana. TAA 70/212.
21. Ph. chrysoloma (Fr.) Donk - Polar Ural, on Larix sibirica. TAA 70/151.
22. Ph. chrysoloma - Krasnojarskij wildlife area, on Picea obovata. TAA 71/511.
23. Ph. chrysoloma - Estonian SSR, on Picea abies. TAA 71/296.
24. Ph. chrysoloma - Estonian SSR, on Picea abies. TAA 71/297.
25. Ph. ferrugineo-fuscus (Karst.) Bourd. - Estonian SSR, on Picea abies. TAA 4499.
26. Ph. ferruginosus (Fr.) Pat. - Norway, Buskerud, on Corylus avellana. Leg. L. Ryvarden 2. X 1969.
27. Ph. hartigii (All. & Schn.) Pat. - Caucasus, Teberda wildlife area, on Abies nordmanniana. TAA 53074.
28. Ph. hartigii - L'vovskaja Prov., Truskavec, on Abies alba. TAA 1969/1.
29. Ph. jezoënsis (Yamano) Parm.[1] - Sachalin, Južhno-Sachalinsk, on Picea microsperma. TAA 55249.
30. Ph. microporus (Pilát) Parm.[2] - Kamčatka, Južnyje Kor'aki, on Pinus pumila. TAA 55212.
31. Ph. nigricans (Fr.) Karst. - Kamčatka, Južnyje Kor'aki, on Betula ermanii. TAA 71/413.
32. Ph. nigricans - Kamčatka, Južnyje Kor'aki, on Betula ermanii. TAA 71/437.
33. Ph. nigrolimitatus (Romell) Bourd. & Galz. - Caucasus, Caucasian wildlife area, on Abies nordmanniana. TAA 18729.

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[1] *Phellinus jezoënsis* (Yamano) Parm. comb. nova. - Basionymum: *Daedalea jezoënsis* Yamano, Goryorin No. 25, 70. 1930 (n. v.; cited by Donk, Check List Eur. Polyp., p. 327, 382. 1974).

[2] *Phellinus microporus* (Pilát) Parm. stat. novus. - Basionymum: *Phellinus pini* (Fr.) A. Ames var. *abietis* (Karst.) Pilát f. *microporus* Pilát, Atlas Polyp. p. 251, tab. 351 a. 1942.

34. Ph. pilátii Černý - Hungary, near Bugac, on Populus alba. Herb. Z. Igmándy 1447.
35. Ph. pini (Fr.) A. Ames - Estonian SSR, on Pinus sylvestris. TAA 70294.
36. Ph. pini - Estonian SSR, on Pinus sylvestris. TAA 70/295.
37. Ph. pomaceus (S.F. Gray) Maire - Estonian SSR, on Prunus insititia. TAA 70/288.
38. Polystictus tomentosus (Fr.) Fr. - Sachalin, Južno-Sachalinsk. TAA 55299.

OTHER FAMILIES

39. Amyloporia xantha (Fr.) Bond. & Sing. - Yakut ASSR, Spaskaja Pad', on Salix caprea. TAA 56152.
40. Amylostereum chailletii (Fr.) Boid. - Estonian SSR, on Picea abies. TAA 9697.
41. Antrodia sinuosa (Fr.) Karst. - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56133.
42. Cerrena unicolor (Fr.) Murrill - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56190.
43. Climacocystis borealis (Fr.) Kotl. & Pouz. - Caucasus, Teberda wildlife area, on Picea orientalis. TAA 53163.
44. Columnocystis abietina (Fr.) Pouz. - Archangel'skaja Prov., Jemca, on Picea obovata. TAA 13395.
45. Coriolus hirsutus (Fr.) Quél. - Yakut ASSR, Spaskaja Pad', on Alnaster fruticosus. TAA 56878.
46. C. pubescens (Fr.) Quél. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56184.
47. Daedalea quercina Fr. - Krasnodarskij Terr., Pjatigorskoje, on Quercus petraea. TAA 19867.
48. Datronia scutellata (Schw.) Domański - Yakut ASSR, Olen'ok, on Alnaster fruticosus. TAA 56023.
49. Dichomitus squalens (Karst.) D. Reid - Yakut ASSR, Ust'-Nera, on Larix dahurica. TAA 56341.
50. Diplomitoporus flavescens (Bres.) Domański - Estonian SSR, on Pinus sylvestris. TAA 54709a.
51. Fomes fomentarius (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56123.
52. F. fomentarius - Polar Ural, on Betula kusmisseffii. TAA 70/102.
53. Fomitopsis cajanderi (Karst.) Kotl. & Pouz. - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56137.
54. F. rosea (Fr.) Karst. - Caucasus, Caucasian wildlife area, on Abies nordmanniana. TAA 19613.
55. Ganoderma applanatum (S.F. Gray) Pat. - Kamčatka, Kor'aki, on Populus suaveolens. TAA 55223.
56. G. applanatum - Estonian SSR. TAA 54903.
57. Gloeophyllum abietinum (Fr.) Karst. - Estonian SSR, on Picea abies. TAA 6607.
58. G. protractum (Fr.) Imaz. - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 71/56.
59. G. protractum - Caucasus, Teberda wildlife area, on Picea orientalis. TAA 53155.
60. G. sepiarium (Fr.) Karst. - Estonian SSR, on Picea abies. TAA 55374.
61. G. sepiarium - Estonian SSR, on Picea abies. TAA 1528.
62. G. sepiarium - Yakut ASSR, Pokrovsk, on Picea obovata. TAA 56823.

63. Gloeoporus dichrous (Fr.) Bres. - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56172.
64. G. dichrous - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56181.
65. Hirschioporus laricinus (Karst.) Teramoto - Yakut ASSR, Čerski, on Larix dahurica. TAA 56400.
66. H. laricinus - Yakut ASSR, Honuu, on Larix dahurica. TAA 56666.
67. H. pargamenus (Fr.) Bond. & Sing. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56847.
68. Hydnellum sp. - Sachalin, Južno-Sachalinsk. TAA 55265.
69. Irpex lacteus (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56141.
70. Laetiporus sulphureus (Fr.) Murrill - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56135.
71. L. sulphureus - Polar Ural, on Larix sibirica. TAA 70/102.
72. Laricifomes officinalis (Fr.) Kotl. & Pouz. - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56897.
73. Lenzites betulina (Fr.) Fr. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56192.
74. L. warnieri Dur. & Mont. - Krasnodarskij Terr., on Fraxinus excelsior. TAA 18863.
75. Phaeolus schweinitzii (Fr.) Pat. - Sachalin, Južno-Sachalinsk, on Larix kurilensis. TAA 55280.
76. Ph. schweinitzii - Estonian SSR, on Pinus sylvestris. TAA 3149.
77. Ph. schweinitzii - Kurile Is., Kunašir, on Abies sachalinensis. TAA 14186.
78. Polyporus varius Fr. var. nummularius Fr. - Yakut ASSR, Spaskaja Pad', on Alnaster fruticosus. TAA 56157.
79. Punctularia strigoso-zonata (Schw.) Talbot - Krasnojarskij Terr., Kolčim, on Populus tremula. TAA 7681.
80. Pycnoporellus albo-luteus (Ell. & Ev.) Kotl. & Pouz. - Caucasus, Caucasian wildlife area, on Abies nordmanniana. TAA 18738.
81. P. albo-luteus - Komi ASSR, Ust'-Kulom, on Picea obovata. TAA 8333.
82. P. fulgens (Fr.) Donk - Yakut ASSR, Spaskaja Pad', on Larix dahurica. TAA 56858.
83. P. fulgens - Estonian SSR, on Picea abies. TAA 4801.
84. P. fulgens - Chabarovskij Terr., Selichino, on Larix dahurica. TAA 14204.
85. P. fulgens - Krasnojarskij Terr., Kulumysh, on Populus tremula. TAA 7753.
86. P. fulgens - Estonian SSR, on Picea abies. TAA 1671.
87. Pyrofomes demidoffii (Lév.) Kotl. & Pouz. - Turkmen SSR, Kopet-Dagh, on Juniperus turcomanica. TAA 102103.
88. Sarcoporia salmonicolor (Berk. & Curt.) Domański - Komi ASSR, Ust'-Kulom, on Pinus sylvestris. TAA 8292.
89. S. salmonicolor - Gorno-Altaiskaja Auton. Prov., Altai wildlife area, on Pinus sibirica. TAA 8617.
90. Trametes cervina (Schw.) Bres. - Yakut ASSR, Spaskaja Pad', on Betula platyphylla. TAA 56189.
91. T. cervina - Yakut ASSR, Oim'akon, on Larix dahurica. TAA 55992.
92. T. suaveolens (Fr.) Fr. - Estonian SSR, on Salix pentandra. TAA 54675.
93. Tyromyces mollis (Fr.) Karst. - Estonian SSR, on Picea abies. TAA 3541.

RESULTS

Occurrence and Intensity of the Xanthochroic Reaction

In almost all the species studied the absorption curve of the pigment extract is a descending line with a comparatively high degree of extinction in the short-wave region of the visible spectrum (Figs. 1 and 2). Due to such absorption curve, the darkness of the extract is quantitatively characterized by the extinction (optical density) E at two properly selected wavelengths, 400 nm and 450 nm.

The alkalization of fungal extracts by the addition of NH_4OH caused their darkening which may be characterized in different ways. One of the possibilities is to compare visually the absorption curves of unalkalized and alkalized extracts (see next chapters). The second way is to compare quantitatively the intensity of absorption at certain selected wavelengths.

The darkening of the pigment extract by alkalization is proposed to be characterized by the xanthochroic coefficient x indicating how many times the extinction E' of the alkalized extract is higher than that of the non-alkalized extract at certain wavelengths (x = E' : E). The results of the spectrophotometric measurements are presented in Tables 1 and 2. The species of Hymenochaetaceae are indicated with an asterisk. When E is mentioned to have a value of 1.5 or more, it has been calculated on the basis of the extinction of a diluted extract.

TABLE 1.

EXTINCTIONS (E) AND THE XANTHOCHROIC DARKENING COEFFICIENTS (x) OF PIGMENT EXTRACTS IN DARK-COLOURED SPECIES

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	x	E	x	E	x	E	x
Pycnoporellus fulgens 86	0.68	*0.79*	1.14	*0.89*	0.46	*0.74*	1.38	*0.74*
P. fulgens 84	0.31	*0.84*	0.21	*0.76*	0.80	*0.80*	1.14	*0.68*
P. fulgens 83	0.60	*0.92*	0.40	*0.95*	0.99	*0.90*	1.30	*0.69*
P. fulgens 82	0.17	*1.03*	0.13	*0.69*	0.31	*0.87*	0.41	*0.66*
P. fulgens 85					0.82	*0.77*	1.01	*0.68*
P. albo-luteus 80	0.93	*1.03*	0.62	*1.00*	0.54	*0.89*	0.57	*0.79*
Punctularia strigoso-zonata 79	2.82	*1.03*	1.71	*1.11*	1.06	*0.92*	0.68	*0.71*
**Phellinus ferruginosus 26*	0.69	*1.04*	0.43	*0.88*	0.19	*1.26*	0.07	*1.78*
Fomitopsis cajanderi 53	0.33	*1.08*	0.21	*1.07*	0.05	*1.22*	0.03	*1.14*
Hydnellum sp. *68*	0.63	*1.08*	0.35	*1.14*	0.09	*1.00*	0.06	*0.91*
**Phellinus pilatii 34*	0.44	*1.09*	0.25	*1.22*	0.99	*1.10*	0.33	*2.59*

TABLE 1. (continued)

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	*x*	E	*x*	E	*x*	E	*x*
Columnocystis abietina 44	0.59	*1.10*	0.33	*1.18*	0.09	*1.47*	0.04	*1.37*
**Inonotus dryophilus 9*	1.08	*1.10*	0.29	*1.63*	0.23	*1.31*	0.07	*1.86*
**I. obliquus 10*	1.08	*1.11*	0.45	*1.50*	0.33	*1.36*	0.15	*1.72*
**Coltricia perennis 3*	0.16	*1.13*	0.18	*1.33*	0.06	*1.11*	0.04	*1.28*
Pycnoporellus albo-luteus 81	0.56	*1.14*	0.35	*1.09*	0.37	*1.30*	0.40	*1.00*
Ganoderma applanatum 55	0.56	*1.14*	0.31	*1.39*	0.11	*1.24*	0.05	*1.60*
Gloeophyllum abietinum 57	0.61	*1.15*	0.37	*1.25*	0.54	*1.02*	0.24	*1.19*
G. protractum 58	0.32	*1.16*	0.19	*1.24*	4.08	*0.32*	2.93	*0.52*
**Phellinus pini 35*	0.31	*1.18*	0.12	*1.43*		*1.17*		*1.86*
**Inonotus weirii 15*	1.23	*1.20*	0.65	*1.38*	0.29	*1.28*	0.09	*1.85*
Gloeophyllum sepiarium 60	0.31	*1.21*	0.21	*1.28*	3.12	*0.68*	3.30	*0.61*
Pycnoporellus fibrillosus 85	0.42	*1.21*	0.82	*0.83*	0.25	*1.20*	1.14	*0.72*
**Inonotus weirii 16*	0.40	*1.22*	0.23	*1.24*	1.02	*1.44*	0.41	*2.30*
Ganoderma applanatum 56	0.45	*1.22*	0.29	*1.29*				
**Polystictus tomentosus 38*	0.15	*1.23*	0.06	*1.58*	0.13	*2.88*	0.09	*2.17*
Tyromyces mollis 93	0.22	*1.25*	0.10	*1.30*	4.30	*0.86*	1.50	*1.17*
Gloeophyllum protractum 59	0.24	*1.25*	0.15	*1.47*	2.80	*0.80*	2.00	*0.83*
**Inonotus cuticularis 8*	0.82	*1.27*	0.36	*1.78*	0.14	*1.53*	0.06	*1.91*
**Phellinus pomaceus 37*	0.20	*1.31*	0.02	*4.00*	0.53	*1.02*	0.21	*1.57*
**Ph. nigricans 31*	0.60	*1.32*	0.27	*1.74*	0.16	*1.09*	0.08	*1.93*
**Inonotus radiatus 12*	0.45	*1.33*	0.18	*1.55*	0.23	*1.00*	0.07	*1.57*
**Phellinus jezoënsis 29*	0.60	*1.33*	0.15	*3.08*	9.60	*1.01*	3.90	*1.96*
**Inonotus tamaricis 14*	0.35	*1.37*	0.13	*1.92*	0.57	*1.28*	0.24	*1.87*
Fomitopsis rosea 54	0.23	*1.41*	0.14	*1.04*	0.06	*1.08*	0.01	*1.33*
Gloeophyllum sepiarium 61	0.26	*1.41*	0.06	*2.75*	4.05	*0.34*	3.45	*0.44*
Phaeolus schweinitzii 75	0.86	*1.42*	1.26	*2.48*	0.90	*1.75*	0.10	*3.50*
Gloeophyllum sepiarium 62	0.48	*1.43*	0.33	*1.38*	3.25	*0.69*	2.40	*0.54*
Amylostereum chailletii 40	0.59	*1.44*	0.28	*1.64*	0.17	*1.66*	0.06	*1.92*

TABLE 1. (continued)

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	x	E	x	E	x	E	x
*Phellinus microporus 30	0.42	1.45	0.16	2.08	0.67	1.43	0.26	2.23
*Inonotus radiatus 11	0.15	1.45	0.04	3.57				
Fomitopsis scutellata 48	1.00	1.50	0.39	1.54				
*Inonotus rheades 13	0.21	1.52	0.07	2.43	0.46	1.35	0.18	2.50
*Phellinus chrysoloma 21	0.46	1.52	0.16	2.44				
*Ph. alni 20	0.22	1.55	0.10	2.16		1.07		1.32
*Ph. nigrolimitatus 33	0.33	1.58	0.14	2.07	0.35	1.14	0.12	2.50
*Hymenochaete rubiginosa 5		1.59		1.92	0.72	1.72	0.26	2.54
Fomes fomentarius 51	0.56	1.59	0.08	1.88	0.32	1.66	0.02	4.00
*Phellinus nigricans 32	0.30	1.60	0.12	2.44				
*Ph. hartigii 27	0.15	1.62	0.06	2.18	0.20	0.98	0.07	1.31
*Inonotus weirii 17	0.19	1.74	0.33	2.54	0.39	1.20	0.37	3.70
*Onnia triqueter 19	0.07	1.77	0		0.11	1.24	0.05	1.78
*Phellinus chrysoloma 22	0.21	1.83	0.06	3.33				
*Ph. chrysoloma 23	0.38	1.82	0.05	7.20	2.10	1.05	0.62	2.65
*Ph. hartigii 28	0.12	2.17	0.04	3.29	0.80	1.25	0.29	2.80
Phaeolus schweinitzii 76	4.00	2.48	0.64	6.73	8.40	2.27	0.30	14.20
*Phellinus pini 36	0.17	2.53	0					
*Ph. chrysoloma 24	0.15	3.10	0		1.28	1.07	0.51	1.96
Fomes fomentarius 52	0.23	4.33	0		0.09		0.04	
Phaeolus schweinitzii 77	11.00	9.27	0.56	8.44	42.00	3.10	0	
Pyrofomes demidoffii 87	0.03	15.00	0		0.60	1.50	0.35	1.77
*Asterodon ferruginosum 1	0		0		0.13	1.16	0.05	1.70
*A. ferruginosum 2					0.15	1.53	0.06	2.34
*Hymenochaete tabacina 6					0.36	0.92	0.07	2.14
*Inonotopsis subiculosa 7					0.49	1.35	0.20	1.90
*Phellinus ferrugineo-fuscus 25					0.96	1.66	0.35	3.18
*Inonotus weirii 18					0.30	1.28	0.09	1.87
*Hymenochaete fuliginosa 4					0.22	1.15	0.08	1.40

TABLE 2.

EXTINCTIONS (E) AND THE XANTHOCHROIC DARKENING COEFFICIENTS (x) OF PIGMENT EXTRACTS IN LIGHT-COLOURED SPECIES

Species, no. of sample	aqueous extract				ethanol extract			
	400 nm		450 nm		400 nm		450 nm	
	E	x	E	x	E	x	E	x
Laetiporus sulphureus 70	0.24	*0.92*	0.15	*0.88*	0.14	*1.29*	0.05	*1.16*
Climacocystis borealis 43	0.51	*0.98*	0.27	*0.96*	0.09	*1.22*	0.04	*1.13*
Trametes suaveolens 92	0.02	*1.00*	0					
Hirschioporus pargamenus 67	0.21	*1.00*	0.13	*1.00*	0.02	*1.00*	0.01	*1.00*
Lenzites betulina 73	0.50	*1.11*	0.23	*1.09*	0.07	*1.75*	0	
Trametes cervina 90	0.43	*1.06*	0.30	*0.96*	1.27	*0.91*	0.53	*0.91*
Hirschioporus laricinus 65	0.29	*1.17*	0.15	*1.11*	0.03	*1.00*	0.02	*1.00*
H. laricinus 66	0.36	*1.25*	0.20	*1.20*				
Trametes cervina 91	0.37	*1.18*	0.23	*1.09*	0.05	*2.00*	0.03	*2.00*
Cerrena unicolor 42	0.28	*1.21*	0.20	*1.13*	0.03	*8.00*	0	
Gloeoporus dichrous 63.	0.42	*1.21*	0.30	*1.32*	0.31	*1.03*	0.17	*1.36*
Lenzites warnieri 74	0.12	*1.26*	0.06	*1.15*	0.04	*1.12*	0.02	*1.00*
Daedalea quercina 47	0.17	*1.26*	0.09	*1.28*	0.08	*1.07*	0.04	*1.14*
Dichomitus squalens 49	0.23	*1.26*	0.12	*1.21*	0.07	*1.36*	0.03	*1.30*
Laetiporus sulphureus 71	0.20	*1.27*	0.10	*1.42*	0.06	*1.25*	0.04	*1.14*
Coriolus pubescens 46	0.14	*1.30*	0.07	*1.14*	0.04	*1.13*	0.02	*1.00*
Irpex lacteus 69	0.51	*1.31*	0.23	*1.24*	0.16	*2.50*	0.03	*2.50*
Gloeoporus dichrous 64	0.50	*1.33*	0.34	*1.54*	0.44	*1.09*	0.26	*1.26*
Polyporus varius 78	1.27	*1.42*	0.50	*1.40*	0.08	*2.90*	0.02	*3.50*
Coriolus hirsutus 45	0.26	*1.65*	0		0.09	*1.78*	0	
Diplomitoporus flavescens 50	0.18	*2.00*	0					
Amyloporia xantha 39	0.08	*2.50*	0.04	*2.25*				

Absorption spectra of Aqueous Extracts

The absorption spectra of aqueous basidiocarp extracts of the majority of species studied are qualitatively rather similar and un-specific, representing usually more or less gently declining curves without any maxima or minima and ending already in a region of 500 to 600 nm. The curves of alkalized aqueous extracts are similar to those of unalkalized ones, but exhibit enhanced absorption *(Coltricia perennis, Inonotus radiatus, Phellinus ferruginosus, Ph. pilatii, Polystictus tomen-*

tosus, *Inonotus weirii* No. 15, 16 and 18 a. o.; see Fig. 1). The same type of absorption is also revealed by some brownish or brown non-hymenochaetaceous fungi (*Amylostereum chailletii*, *Columnocystis abietina*, *Fomitopsis cajanderi*, *F. rosea*, *F. scutellata*, *Ganoderma applanatum*, *Gloeophyllum abietinum*, *Hydnellum* sp., *Sarcoporia salmonicolor*). Most of the light-coloured non-hymenochaetaceous species have also the same type of absorption, but in most cases the absorption is less intensive (*Amyloporia xantha*, *Antrodia sinuosa*, *Cerrena unicolor*, *Climacocystis borealis*, *Coriolus hirsutus*, *C. pubescens*, *Daedalea quercina*, *Dichomitus squalens*, *Diplomitoporus flavescens*, *Hirschioporus laricinus*, *H. pargamenus*, *Irpex lacteus*, *Laricifomes officinalis*, *Lenzites betulina*, *L. warnieri*, *Polyporus varius* var. *nummularius*, *Trametes cervina*, *T. suaveolens*, *Tyromyces mollis*). Some of them have rather short absorption curves, which end near 410 nm (*Trametes suaveolens*) or near 440 nm (*Diplomitoporus flavescens*).

Laetiporus sulphureus has a similar absorption curve, but the curve of the alkalized extract exhibits less intensive absorption than that of the unalkalized one.

The absorption curves of the second group of species are similar to the curves of the first group, but the curve of the alkalized extract has a weak or distinctive inflexion at about 330 to 350 nm. All the fungi of this group are species of Hymenochaetaceae (*Asterodon ferruginosus*, *Hymenochaete rubiginosa*, *Inonotus cuticularis*, *I. dryophilus*, *I. obliquus*, *I. tamaricis*, *Onnia triqueter*, *Phellinus alni*, *Ph. chrysoloma*, *Ph. microporus*, *Ph. nigricans*, *Ph. pini*, *Ph. pomaceus*, *Inonotus weirii* No. 17, *Phellinus hartigii* No. 27; see Fig. 2). Some other species (*Inonotus rheades*, *Phellinus nigrolimitatus*, *Ph. jezoënsis*, *Ph. hartigii* No. 28) have instead of an inflexion a maximum at 335 to 340 nm (Fig. 3).

Some non-hymenochaetaceous fungi have characteristic absorption curves different from those of all other species:

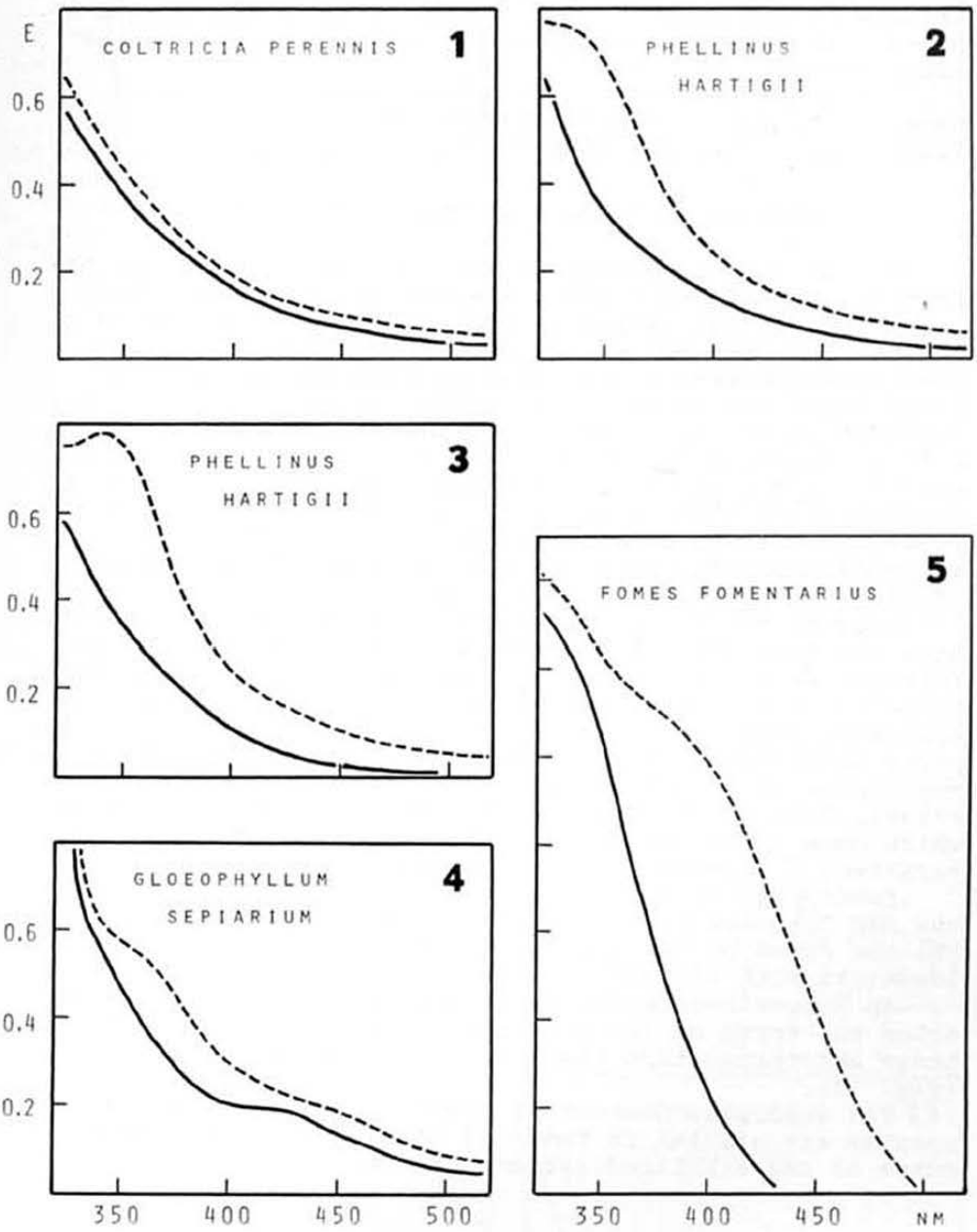
Fomes fomentarius has a steeply descending absorption curve which comes to an end at 430 nm. The curve of the alkalized extract has a weakly resolved inflexion at about 350 to 390 nm and ends at about 500 nm (Fig. 5).

Gloeophyllum sepiarium has a falling curve with an inflexion at 390 to 430 nm; the curve of the alkalized extract has inflexions at 365 and near 450 nm (Fig. 4).

G. protractum has a similar but a very long descending absorption curve with an inflexion at 430 nm; the curve of the alkalized extract has a weak inflexion near 460 nm (Fig. 7).

Gloeoporus dichrous has a long falling curve; the curve of the alkalized extract is characteristically flexuous with an inflexion at 420 to 450 nm (Fig. 6).

Phaeolus schweinitzii has a distinctive absorption maximum at 355 nm; the maximum of the alkalized extract is at 380 nm (Fig. 8).



Figs. 1-5. Absorption spectra of aqueous extracts and alkalized aqueous extracts (broken line): 1 - *Coltricia perennis 3* (diluted 1 : 9); 2 - *Phellinus hartigii 27*; 3 - *Ph. hartigii 28*; 4 - *Gloeophyllum sepiarium 26* (1 : 1); 5 - *Fomes fomentarius 52*.

Punctularia strigoso-zonata has a long steeply falling absorption curve with an inflexion at 365 to 390 nm and a distinctive inflexion at about 415 nm (Fig. 10).

Pycnoporellus albo-luteus and *P. fulgens* have curves similar to each other; the curve of the alkalized extract shows less intensive absorption than that of the unalkalized extract (Fig. 9).

Pyrofomes demidoffii has a descending curve which comes to an end at 410 nm; the curve of the alkalized extract has an inflexion at 415 nm (Fig. 11).

Absorption Spectra of Ethanol Extracts

The absorption curves of the first group of the species of Hymenochaetaceae are non-specific descending lines without any maxima or minima coming to an end in a region of 500 to 550 (or to 600) nm. The curves of the alkalized extracts are similar to those of the unalkalized ones, but exhibit more intensive absorption *(Coltricia perennis, Hymenochaete fuliginosa, Inonotopsis subiculosa, Inonotus radiatus, Onnia triqueter, Phellinus alni, Ph. nigricans* No. 31; see fig. 12). The same type of absorption is also revealed by some brownish or brown non-hymenochaetaceous species *(Amylostereum chailletii, Columnocystis abietina, Ganoderma applanatum, Gloeophyllum abietinum, Hydnellum* sp., *Pyrofomes demidoffii).*

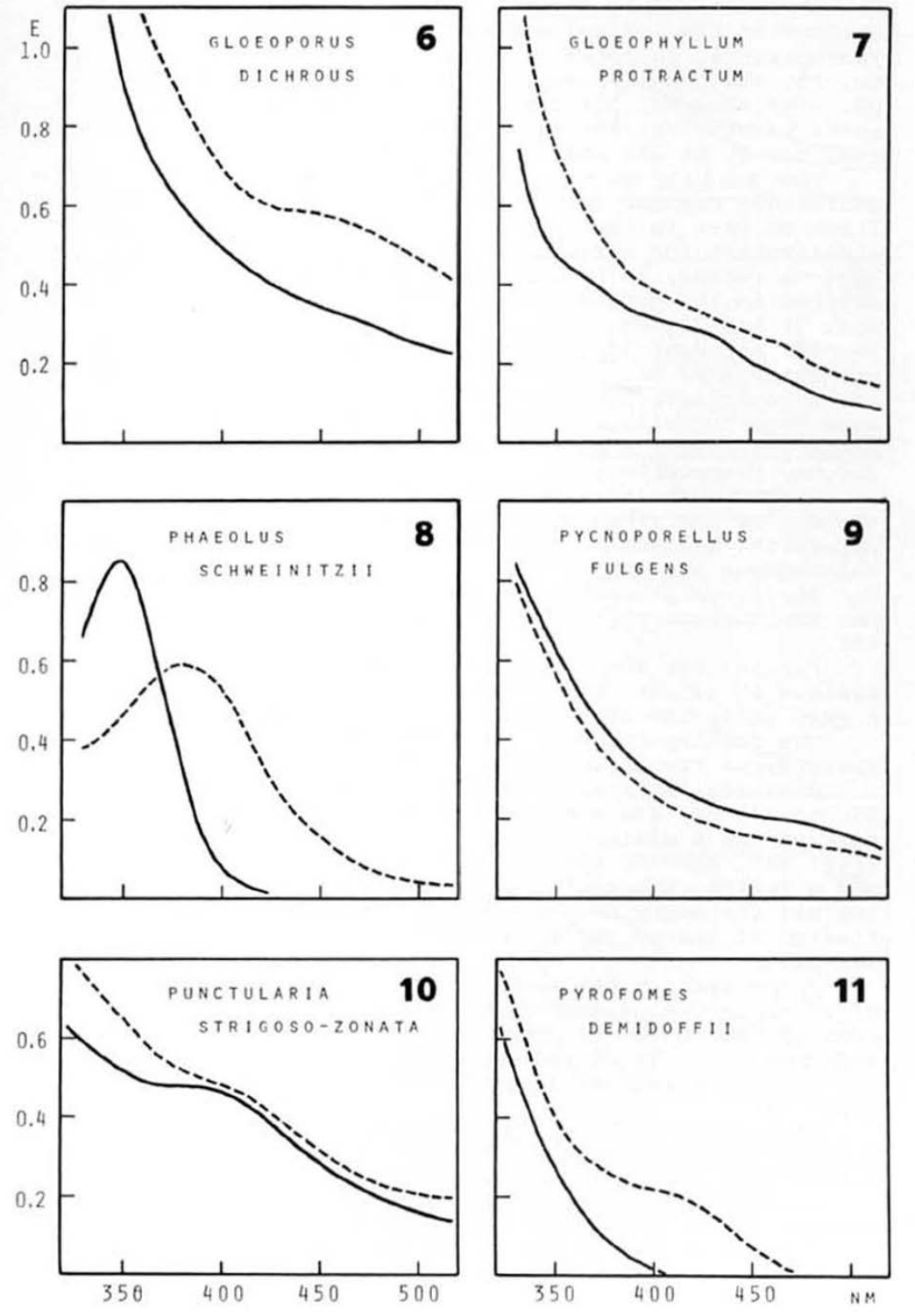
Most of the light-coloured non-hymenochaetaceous fungi have the same type of absorption, but it is usually less intense *(Antrodia sinuosa, Cerrena unicolor, Climacocystis borealis, Coriolus hirsutus, Daedalea quercina, Dichomitus squalens, Diplomitoporus flavescens, Irpex lacteus, Laetiporus sulphureus, Lenzites betulina, L. warnieri, Polyporus varius* var. *nummularius, Trametes cervina, T. suaveolens).* Some of them have rather short absorption curves, which come to an end already at 390 to 400 nm *(Lenzites betulina, L. warnieri, Trametes suaveolens).*

Fomitopsis rosea, Hirschioporus laricinus, H. pargamenus and *Coriolus pubescens* have similar absorption curves, but the curve of the alkalized extract is usually nearly identical with that of the unalkalized extract.

In *Punctularia strigoso-zonata* and *Sarcoporia salmonicolor* the curve of the alkalized extract exhibits less intense absorption than that of the unalkalized extract (Fig. 13).

The absorption curves of the second group of species are similar to those of the first group, but the curve of the alkalized extract has an inflexion at 345 (to

Figs. 6-11. Absorption spectra of aqueous extracts and alkalized aqueous extracts (broken line): 6 - *Gloeoporus dichrous 63;* 7 - *Gloeophyllum protractum 59;* 8 - *Phaeolus schweinitzii 77* (1 : 19); 9 - *Pycnoporellus fulgens 84;* 10 - *Punctularia strigoso-zonata 79* (1 : 5); 11 - *Pyrofomes demidoffii 83* (1 : 1).


E
1.0
0.8
0.6
0.4
0.2
GLOEOPORUS DICHROUS
6
GLOEOPHYLLUM PROTRACTUM
7
PHAEOLUS SCHWEINITZII
8
PYCNOPORELLUS FULGENS
9
PUNCTULARIA STRIGOSO-ZONATA
10
PYROFOMES DEMIDOFFII
11
350
400
450
500
NM

350) nm. All the fungi of this group are species of Hymenochaetaceae (*Hymenochaete rubiginosa, Inonotus dryophilus, I. obliquus, I. tamaricis, I. weirii* No. 16, *Phellinus ferruginosus, Ph. hartigii* No. 27, *Ph. microporus, Ph. nigrolimitatus;* see Fig. 17). Some other species have instead of the inflexion a maximum at 345 nm (*Asterodon ferruginosus, Inonotus cuticularis, I. rheades, I. weirii* No. 15, *Phellinus ferrugineo-fuscus, Ph. hartigii* No. 28, *Ph. nigricans* No. 32; see Fig. 16). One specimen of *Inonotus weirii* (No. 18) has two maxima instead of this maximum, namely at 340 and 355 nm.

The third group of hymenochaetaceous fungi has a distinct maximum (or absorption plateau) of the unalkalized extract in the region of (340 to) 360 to 370 nm; on alkalization the maximum shifts to the 340 to 350 (to 360) nm region, i. e. the curve is similar to the one described in the preceding paragraph (*Phellinus chrysoloma* Nos. 21 and 23, *Ph. pini, Ph. pomaceus, Inonotus weirii* No. 17; see Fig. 14). The unalkalized extract of *Phellinus chrysoloma* No. 22 has in addition a minimum at 330 nm. *Hymenochaete tabacina* has absorption curves of the same type but with different minima and maxima (unalkalized extract: 335 and 380 nm; alkalized extract: 330 and 350 nm, respectively).

Characteristic absorption curves different from the curves described above are obtained from *Phellinus jezoënsis, Polystictus tomentosus,* and several non-hymenochaetaceous species:

Phellinus jezoënsis has an absorption maximum at 372 nm; the maximum shifts to 405 nm in alkalization (Fig. 18).

Polystictus tomentosus has a falling curve with a maximum at 525 nm; the curve of the alkalized extract has a weak inflexion at 340 nm (Fig. 19).

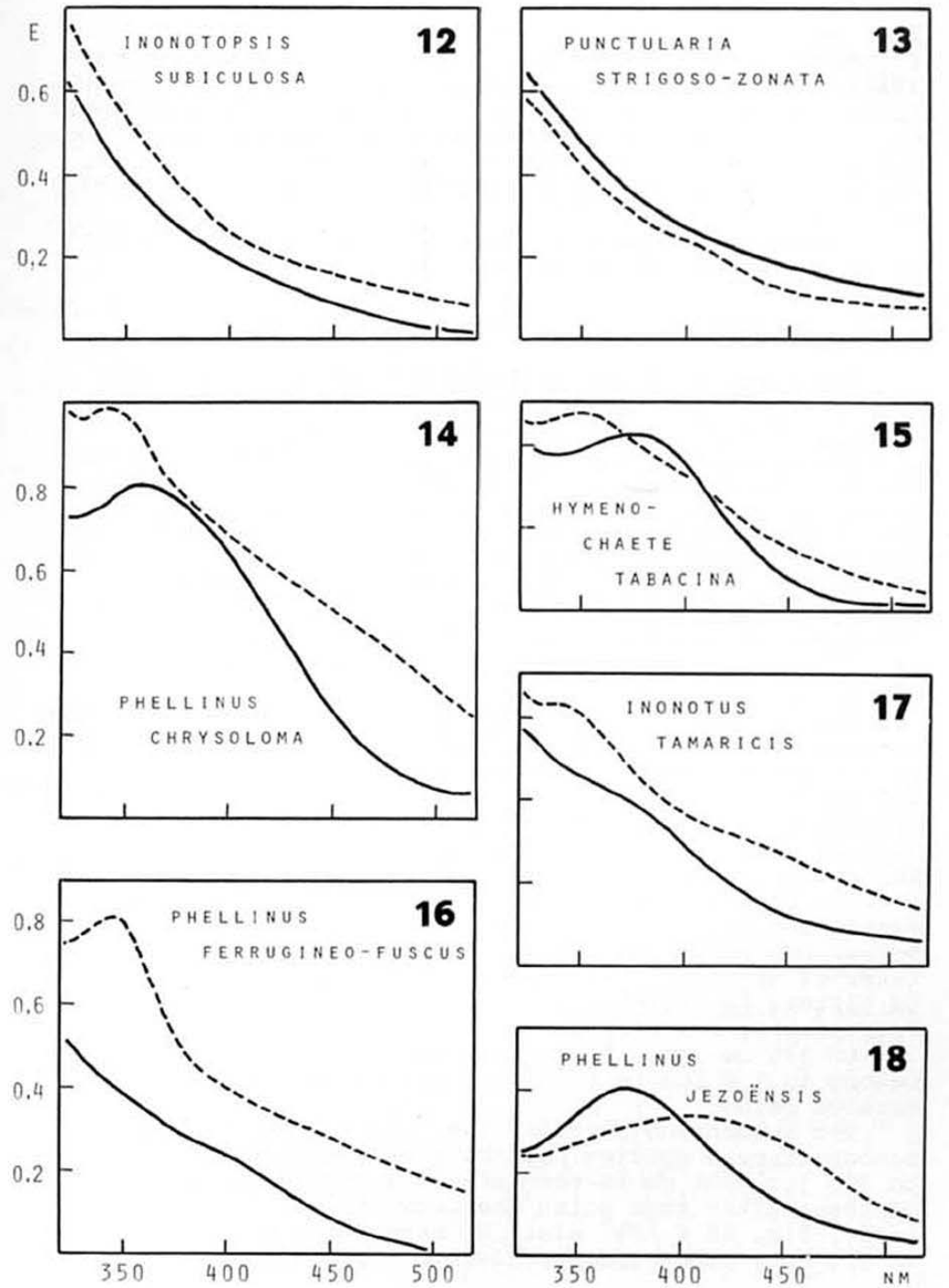
The falling curve of the alkalized extract of *Fomes fomentarius* has an inflexion near 420 nm (Fig. 20).

Gloeophyllum sepiarium has an absorption minimum at 340 to 345 nm, and a maximum at 430 nm; the alkalized extract has a minimum at 400 nm and a maximum at 435 nm (Fig. 21). Another specimen (No. 62) of the same fungus has a falling absorption curve with an inflexion at about 380 nm; the curve of the alkalized extract has an inflexion at 345 nm and an absorption plateau at 410 to 440 nm.

G. protractum has absorption curves similar to those of *G. sepiarium:* specimen No. 58 has a minimum in the region of 390 to 400 nm and a maximum at 435 nm. Another specimen (No. 59) of the same species has a maximum at 405 nm; the alkalized extract has an inflexion at 435 nm (Fig. 22).

Gloeoporus dichrous has a descending absorption curve with an inflexion at 400 nm; the curve of the alkalized extract has a weak inflexion at 460 nm (Fig. 23).

Phaeolus schweinitzii has a curve with an absorption maximum in the region of 360 to 365 nm; on alkalization the maximum shifts to 365 to 370 nm (specimen No. 77,



Figs. 12-18. Absorption spectra of ethanol extracts and alkalized ethanol extracts (broken line): 12 - *Inonotopsis subiculosa 7* (1 : 1); 13 - *Punctularia strigoso-zonata 79* (1 : 3); 14 - *Phellinus chrysoloma 21* (1 : 1); 15 - *Hymenochaete tabacina 6;* 16 - *Phellinus ferrugineo-fuscus 25* (1 : 2); 17 - *Inonotus tamaricis 14* (1 : 1); 18 - *Phellinus jezoënsis 29* (1 : 29).

Fig. 24) or to 380 to 385 nm (specimen No. 76).

Pycnoporellus albo-luteus (Fig. 25) and *P. fulgens* (Fig. 26) have absorption curves with a clear or almost indistinct minimum in 380 to 400 nm region and a maximum at 450 to 455 nm; on alkalization the minimum shifts to the 415 to 425 *(P. fulgens)* or to the 440 to 450 nm *(P. albo-luteus)* region and the maximum shifts to 505 to 512 nm region.

Tyromyces mollis has a falling absorption curve with an inflexion at 365 nm (Fig. 27).

Absorption spectra of Methanol-HCl Extracts

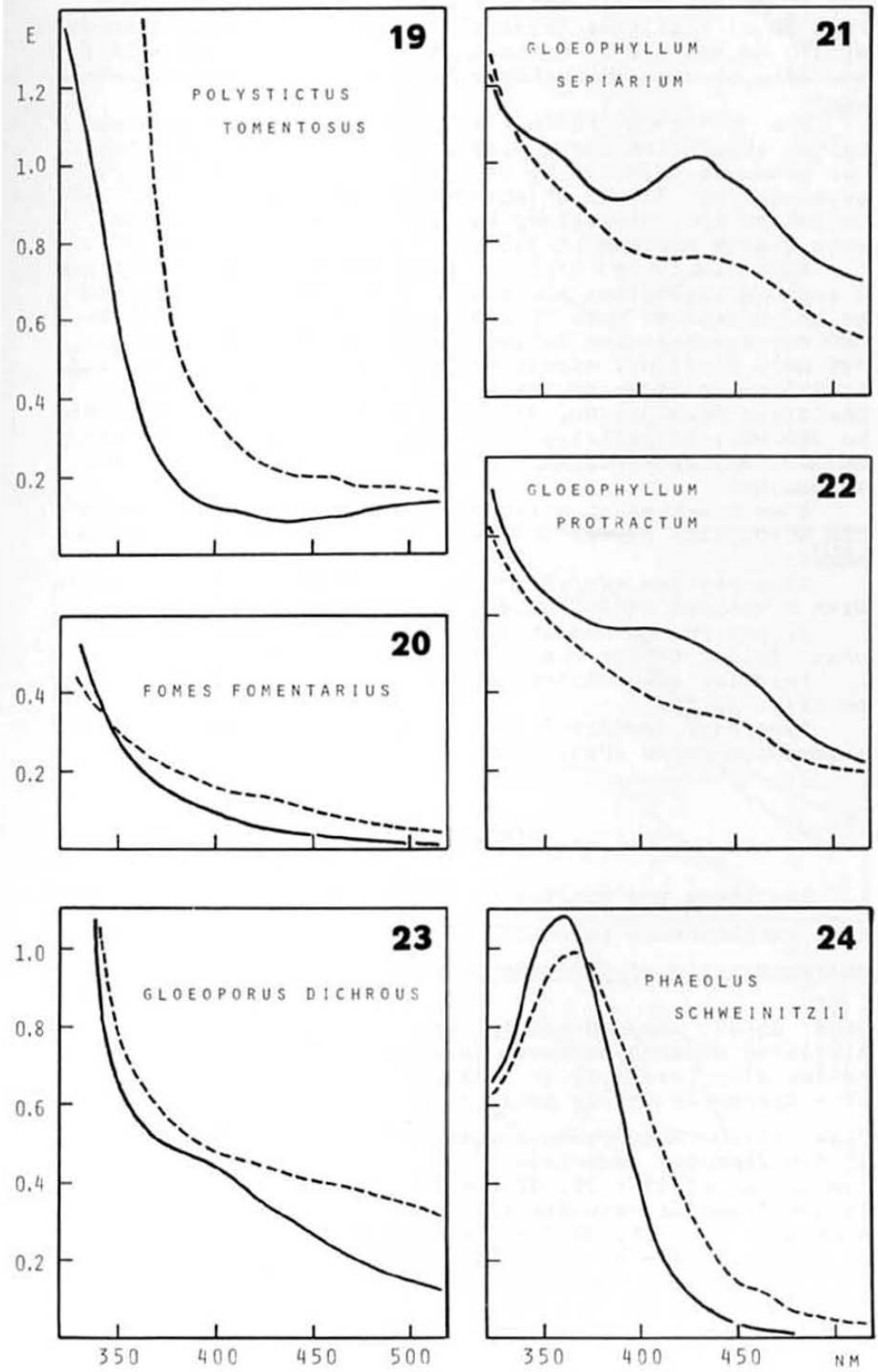
The spectra of the methanol-HCl extracts have much greater specific and individual differences than the spectra of the aqueous and ethanol extracts.

The species of the first group have non-specific falling absorption curves without any clear maxima, minima or inflexions (some Hymenochaetaceae species: *Hymenochaete fuliginosa, Phellinus ferruginosus,* and most of the non-hymenochaetaceous fungi studied: *Amylostereum chailletii, Antrodia sinuosa, Columnocystis abietina, Daedalea quercina, Fomes fomentarius, Fomitopsis rosea, Ganoderma applanatum, Gloeophyllum abietinum, Hydnellum* sp., *Lenzites warnieri, Trametes suaveolens* and *Punctularia strigoso-zonata).*

The second group is made up of Hymenochaetaceae species having a descending absorption curve with a clear or indistinct inflexion in the region of 360 to 380 or to 390 nm, sometimes even an almost horizontal absorption plateau in the region of 350 to 390 nm *(Asterodon ferruginosus, Coltricia perennis, Hymenochaete rubiginosa, Inonotopsis subiculosa, Inonotus cuticularis, I. dryophilus, I. radiatus, I. weirii* Nos. 15 and 16, *Phellinus chrysoloma* No. 23, *Ph. ferrugineo-fuscus, Ph. nigrolimitatus, Ph. pini,* and the non-hymenochaetaceous fungus *Lenzites betulina).* The exact position of the inflexion or plateau is variable in various species and specimens. For example, *Inonotus weirii* No. 16 has a plateau from 340 to 375 nm, No. 15 from 360 to 370 nm, Nos. 17 and 18 belong to the fourth and fifth groups of the species described below.

The absorption curve of the third group of Hymenochaetaceae species has the short wavelength region to 380 (to 390) nm in the form of a nearly horizontal plateau; after this point the curve falls *(Phellinus pilatii,* Fig. 28 C; *Ph. alni; Ph. chrysoloma* No. 21, Fig. 28 B). Some other species have in the middle of the

Figs. 19-24. Absorption spectra of ethanol extracts and alkalized ethanol extracts (broken line): 19 - *Polystictus tomentosus 38;* 20 - *Fomes fomentarius 52;* 21 - *Gloeophyllum sepiarium 60* (1 : 5); 22 - *G. protractum 59* (1 : 5); 23 - *Gloeoporus dichrous 63;* 24 - *Phaeolus schweinitzii 77* (1 : 4).


E
1.2
1.0
0.8
0.6
0.4
0.2
19
POLYSTICTUS
TOMENTOSUS
21
GLOEOPHYLLUM
SEPIARIUM
22
GLOEOPHYLLUM
PROTRACTUM
20
FOMES FOMENTARIUS
23
GLOEOPORUS DICHROUS
24
PHAEOLUS
SCHWEINITZII
350
400
450
500
NM

plateau a weak minimum at 370 nm (*Phellinus nigricans* No. 31) or at 375 nm (*Inonotus obliquus; I. tamaricis*, see Fig. 28 A; *Phellinus hartigii* No. 28), or a weak minimum at 370 nm and a weak maximum at 380 nm (*Inonotus weirii* No. 18), or several weakly resolved bands (*Inonotus rheades*).

The fourth group of Hymenochaetaceae species has an absorption curve with a maximum at 370 nm (*Phellinus pomaceus*, Fig. 29 B; *Ph. jezoënsis*), at 380 nm (*Ph. nigricans* No. 32) or an absorption band (plateau) at 370 to 380 nm (*Ph. chrysoloma* No. 22) or at 355 to 380 nm with a weak minimum at 375 nm (*Inonotus weirii* No. 17).

The fifth group of Hymenochaetaceae species has a sigmoid absorption curve with a minimum at 330 to 340 nm and a peak or band (plateau) in the region of 355 to 380 nm: *Hymenochaete tabacina* (min. at 330 nm, max. at 370 nm), *Phellinus microporus* and *Inonotus radiatus* (min. at 335 nm, plateau at 365 to 380 nm; see Fig. 29 A), *Phellinus hartigii* No. 27 (min. at 340 nm, plateau at 355 to 365 nm), *Polystictus tomentosus* (min. at 340 nm, max. at 370 nm), *Inonotus weirii* No. 18 (min. at 370 nm, max. at 380 nm).

Some non-hymenochaetaceous species have characteristic absorption curves different from those described above:

Gloeophyllum sepiarium has a sigmoid absorption curve with a minimum at 355 nm and a peak at 415 nm (Fig. 30 A).

G. protractum has an absorption curve which is somewhat similar to the one of G.*sepiarium*; see Fig. 30 C.

Phaeolus schweinitzii has a curve with a peak at 367 nm (Fig. 29 C).

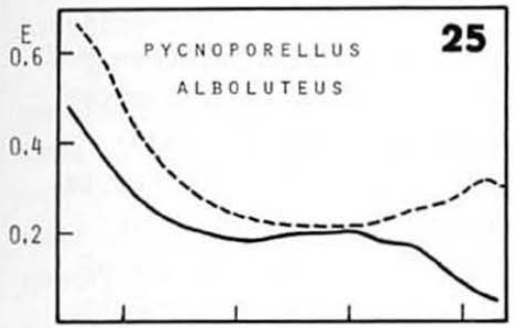
Pyrofomes demidoffii has a falling, somewhat flexuous absorption curve (Fig. 30 B).

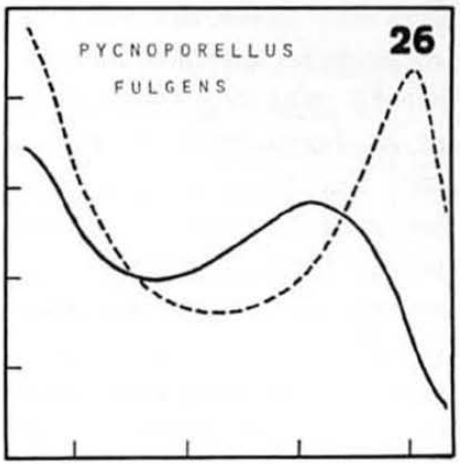
DISCUSSION

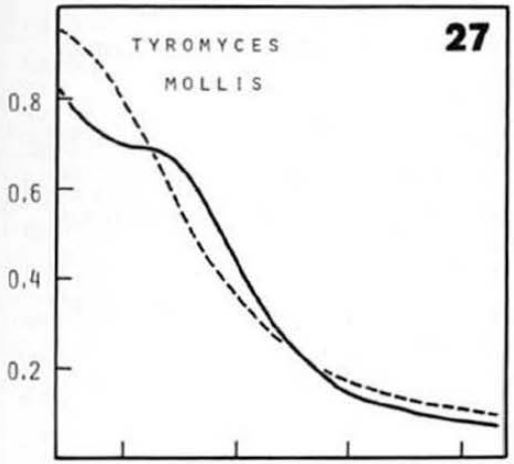
Are there any species of Hymenochaetaceae with a negative xanthochroic reaction? Is the reaction exclusively characteristic of the hymenochaetaceous fungi, or is it

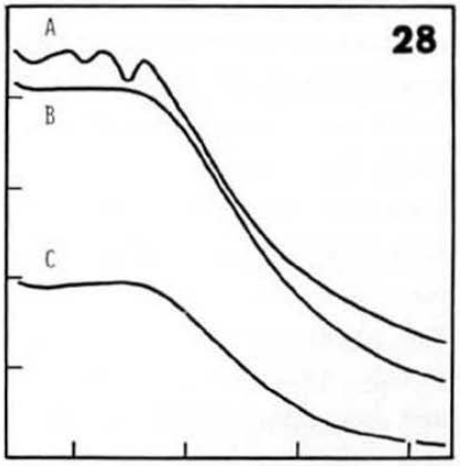
Figs. 25-27. Absorption spectra of ethanol extracts and alkalized ethanol extracts (broken line): 25 - *Pycnoporellus albo-luteus 80* (1 : 1); 26 - *P. fulgens 84* (1 : 1); 27 - *Tyromyces mollis 92* (1 : 10).

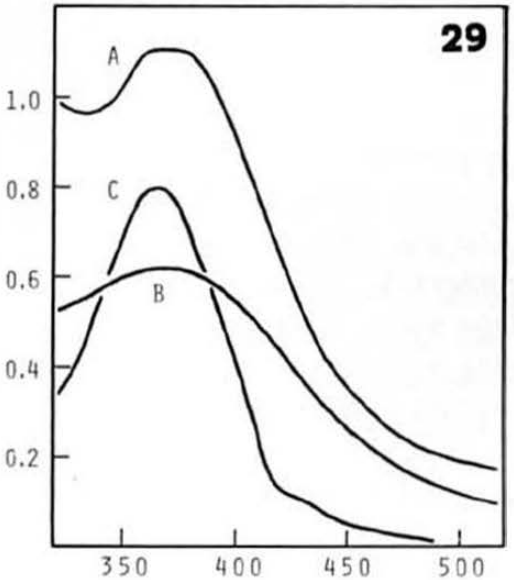
Figs. 28-30. Absorption spectra of methanol-HCl extracts: 28 A - *Inonotus tamaricis 14* (1 : 5), 28 B - *Phellinus chrysoloma 21* (1 : 3), 28 C - *Ph. pilatii 34* (1 : 10); 29 A - *Inonotus radiatus 11* (1 : 3), 29 B - *Phellinus pomaceus 37* (1 : 3), 29 C - *Phaeolus schweinitzii 76* (1 : 35); 30 A - *Gloeophyllum sepiarium 61* (1 : 3), 30 B - *Pyrofomes demidoffii 87* (1 : 3), 30 C - *Gloeophyllum protractum 59* (1 : 10).

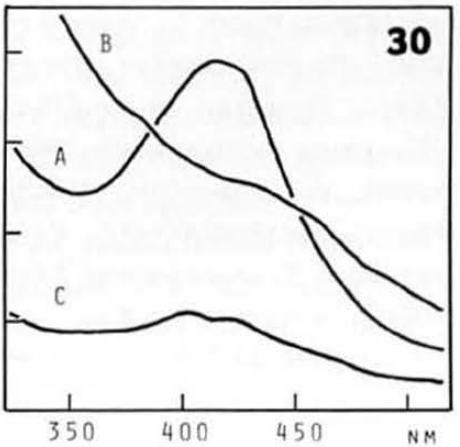

E
0.6
0.4
0.2
PYCNOPORELLUS
ALBOLUTEUS
25


PYCNOPORELLUS
FULGENS
26


TYROMYCES
MOLLIS
27
0.8
0.6
0.4
0.2


A
B
C
28


29
A
C
B
1.0
0.8
0.6
0.4
0.2
350
400
450
500


B
30
A
C
350
400
450
NM

more widespread? In the descriptions of the family Hymenochaetaceae s. l. the xanthochroic reaction (positive KOH test) is indicated as common to the family as a whole. However, there are some genera *(Phaeolus, Pycnoporellus)* which some authors include under the Hymenochaetaceae and others exclude; consequently, the xanthochroic character of at least these genera is disputable. Pegler (1973: 401) asserts that the context of Polyporaceae species is never xanthochroic; on the other hand Jahn (1963: 91) states that the KOH test is positive in the majority of non-hymenochaetaceous pore fungi having a brown context (e. g., in *Ganoderma* species, *Fomes, Osmoporus, Gloeophyllum)*. In 1975 he even wrote that all polypores having a brown context blacken when treated with KOH (though some of them restore their colour afterwards).

Jacquenoud (1974) has written a special paper on some species of non-hymenochaetaceous Polyporaceae with a context darkening when treated with KOH solution. He pointed out that the herbarium specimens of *Lenzites betulina* and *Coriolus versicolor* collected long ago may display a positive KOH test; this is also the case with some parts of the recently collected basidiocarps of *Ganoderma applanatum, Gloeophyllum trabeum* and *Pycnoporus cinnabarinus*. The papers of Bataille (1912), Overholts (1953), Jahn (1963, 1967, 1975), Lowe (1966), Domański & Orlicz (1967) and Ryvarden (1976) carry evidence of the occurrence of the positive KOH test (darkening of the whole basidiocarp or some part of it) also in *Daedalea quercina, D. farinacea* (Fr.) Overh., *Fomes expansus* (Desm.) Domański & Orlicz, *F. fomentarius, Funalia trogii* (Berk.) Bond. & Sing., *Trametes (= Funalia?) hispida* Bagl, *Ganoderma applanatum, G. curtisii* (Berk.) Murrill, *Gloeophyllum abietinum, G. sepiarium, Melanoporia nigra* (Berk.) Murrill, *Phaeolus schweinitzii, Polyporus modestus* Kunze, *P. supinus* Fr., *P. persicinus* Berk. & Curt. and *Poria carbonacea* (Berk. & Curt.) Cooke.

Pegler (1973: 408) asserted that the context of *Pyro-*

fomes and *Nigroporus* changes into blackish with alkali, but the discoloration is not permanent. *Fomes* is placed by him in a group of the genera with a "context not noticeably darkening with alkali" (p. 408-409).

As it is seen from Table 1, all the species of the Hymenochaetaceae studied are really xanthochroic; this is true of both aqueous extracts and ethanol extracts. Moreover, the extinction of an alkalized extract is higher than of an unalkalized one over the whole range of the absorption curve, i. e. at all wavelenghts (see Figs. 1, 2, 3, 12, 14, 16, 17, 19). However, there are some slight deviations *(Hymenochaete tabacina*, Fig. 15; *Phellinus ferruginosus; Ph. jezoënsis*, Fig. 18; *Ph. hartigii* No. 27 in Table 1).

The extinction E, which reflects the darkness and the amount of the soluble pigment in the extract varies greatly in different species and for different basidiocarps of the same species. In some species *(Coltricia perennis, Asterodon ferruginosus, Phellinus pomaceus, Ph. alni, Ph. hartigii, Onnia triqueter*, some specimens of *Inonotus radiatus, Phellinus chrysoloma, Ph. nigricans* and *Ph. pini)* the extracts are quite light-coloured. In the extracts of annual basidiocarps of *Inonotus* species the average extinction is nearly twice as high as in the extracts of the perennial basidiocarps of *Phellinus* species. If the pigments of these genera are closely related, the observed difference in extinction may be explained by the polymerization of the pigment in course of time.

The pigments soluble in water and ethanol seem to be somewhat different in some species. For example, in most cases (but not always) the ethanol extract is much lighter than the aqueous extract in the *Inonotus* species, but vice versa in most of the *Phellinus* species.

The darkening of the extract on alkalization does not vary less than the intensity of extinction. The xanthochroic reaction (see *x* in Table 1) may be quite weak in *Phellinus ferruginosus, Ph. pilatii* as well as in some

specimens of *Inonotus weirii* a. o., while it may be very intensive in some specimens of *Phellinus chrysoloma, Ph. hartigii, Ph. pini* and in other specimens of *Inonotus weirii*. The degree of darkening of the ethanol extract is frequently different from that of the aqueous extract.

All of these observations seem to agree with the supposition that the pigments of the Hymenochaetaceae species are complexes of an uncertain composition.

Among the brown-coloured species of families other than the Hymenochaetaceae there are some with a distinct xanthochroic reaction: *Columnocystis abietina, Amylostereum chailletii* (Stereaceae), *Ganoderma applanatum* (Ganodermataceae), *Gloeophyllum abietinum, Phaeolus schweinitzii, Fomitopsis scutellata, Fomes fomentarius, Pyrofomes demidoffii* (Polyporaceae). The aqueous extract of *Punctularia strigoso-zonata* (Punctulariaceae), *Gloeophyllum protractum* and *G. sepiarium* (Polyporaceae) darkens on alkalization, while the ethanol extract becomes more light-coloured in the same species; these species may not be considered xanthochroic in the strict sense of the term.

The yellowish or brownish aqueous and ethanol extracts may be obtained not only from brown-coloured, but also from light-coloured basidiocarps of various Aphyllophoraceous fungi. As is seen from Table 2, the aqueous extract of many species is not less coloured than that of certain hymenochaetaceous fungi *(Lenzites betulina, Irpex lacteus, Hirschioporus laricinus, Gloeoporus dichrous, Trametes cervina* of Polyporaceae; *Polyporus varius* of Polyporaceae s. str., a.o.). In most of these species the extract darkens on alkalization considerably, i. e. it displays the xanthochroic reaction. The reason why the positive KOH test is not mentioned concerning the majority of these species earlier, lies obviously not in the low darkening index *(x)*, but in the relatively small amount of the dark pigment in basidiocarps.

The xanthochroic reaction is characteristic of many white rot fungi (all the species of Hymenochaetaceae, *Ganoderma applanatum, Fomes fomentarius*, many of the species with light-coloured basidiocarps mentioned in Table 2), but it occurs also in some brown rot fungi *(Phaeolus schweinitzii, Gloeophyllum abietinum, Fomitopsis rosea, Laetiporus sulphureus, Daedalea quercina)*. Consequently,

the darkening of a pigment complex in alkalization does not always demonstrate the origin of these pigments from lignin breakdown products.

Many species have non-specific steeply falling absorption curves without any maxima, minima or inflexions. Other species have some common features, especially in the character of absorption of alkalized extracts.

The absorption curves of alkalized aqueous extracts exhibit the presence of compounds with intensive absorption in the 335 to 350 nm region; alkalized ethanol extracts indicate the presence of such compounds in the 340 to 350 (to 360) nm region. In some species the amount of these compounds is low, in other species rather high. None of the non-hymenochaetaceous species exhibits absorption of the same type.

Several Hymenochaetaceae species have absorption curves of unalkalized ethanol extracts with a maximum or an absorption plateau in the (340 to) 360 to 370 (to 380) nm region; these are the species of the *Phellinus pini* complex, but also some others *(Hymenochaete tabacina, Inonotus weirii)*. Such absorption may be due to the compounds related to hispidin; the analogues of hispidin have $\lambda_{max.}$ 347 to 379 (to 395) nm (Edwards & Mir, 1967).

Most of the Hymenochaetaceae species have absorption curves of the methanol-HCl extract with a maximum absorption in the 340 to 390 nm region. There are usually several weakly resolved bands in this region. Such absorption is characteristic of the Hymenochaetaceae, but also of *Phaeolus schweinitzii* (which has a maximum at 367 nm); it may be due (at least in part) to the compounds related to hispidin and hypholomines (cf. Fiasson, Gluchoff-Fiasson & Steglich, 1977: 1048).

There are no specific features of the absorption curves characteristic of certain genera or a certain group of the Hymenochaetaceae. The only exception is the *Phellinus pini* group *(Ph. pini, Ph. chrysoloma, Ph. microporus)*; the absorption spectra of (unalkalized and alkalized) ethanol extracts show that these species are somewhat different from the majority of the other *Phellinus* species and may be related to *Ph. pomaceus* and *Inonotus weirii*. The same is true of the UV-spectra of these species (authors' unpublished data).

A number of species of fungi having brown or brownish basidiocarps contain pigments of a specific character and exhibit absorption spectra different from the typical Hymenochaetaceae species. These are *Fomes fomentarius, Gloeophyllum protractum, G. sepiarium, Gloeoporus dichrous, Phaeolus schweinitzii, Pycnoporellus albo-luteus,*

Pycnoporellus fulgens, *Pyrofomes demidoffii*, *Sarcoporia salmonicolor*, *Tyromyces mollis* (Polyporaceae) and *Punctularia strigoso-zonata* (Punctulariaceae). Some of them are regarded by several authors as fungi belonging to the family Hymenochaetaceae, but they must be excluded *(Phaeolus, Pycnoporellus, Pyrofomes)*.

Phaeolus Pat. emend. Bond. & Sing. has been referred to the same group as the genera *Phellinus*, *Inonotus*, *Coltricia*, i. e. Hymenochaetaceae (or Mucronoporaceae/Mucronoporeae) by Imazeki (1943), Kühner (1950; cited by David, 1969), Ito (1955), Donk (1964), Kreisel (1961), Veselý, Kotlaba & Pouzar (1972), Pegler (1973, 1973a), Niemelä (questionably, 1976) and Ryvarden (1976 *non* 1978). However, already Patouillard (1900) had separated this genus from his *Série des Igniaires*. In 1963 Kotlaba and Pouzar asserted that "the genera Pycnoporellus and Phaeolus occupy position between the families Hymenochaetaceae and the Poriaceae (Polyporaceae excluding Polyporus)". The sterile element of the hymenium of *Ph. schweinitzii* was called by them *pseudosetae*. Nobles (1971) demonstrated that this species differs from species of the Hymenochaetaceae by its cultural characters. Unlike Hymenochaetaceae, it causes brown rot of wood. The peculiarities of the absorption spectra of the aqueous and ethanol extracts confirm the difference of this species from the Hymenochaetaceae.

Pycnoporellus Murrill emend. Kotl. & Pouz. is said to be intermediate between the Hymenochaetaceae and the Poriaceae (Kotlaba & Pouzar, 1963: 176, 185); Pegler (1973, 1973a) included it in the Hymenochaetaceae. This seems to be unfounded: *P. fulgens* and *P. albo-luteus* are responsible for brown rot of wood; setae are absent; the context turns purple when treated with KOH and not brown or black. As described above, the aqueous extracts of the basidiocarps of these species do not darken when alkalized; the ethanol extract exhibits specific absorption, different from the absorption of the Hymenochaetaceae species.

Phellinus demidoffii (Lév.) Bond. & Sing. was transferred by Kotlaba and Pouzar to the family Polyporaceae in 1964 and was named *Pyrofomes demidoffii;* this was based on the presence of clamps on generative hyphae and an unusual reddish-orange colour of the trama of this species. This standpoint was supported by Domański, Orłoś & Skirgiełło (1967) and Pegler (1973). Nobles (1971) pointed out the peculiarity of the cultural characters of the species. The absorption spectra of *P. demidoffii* are not very characteristic, but at any rate they are not typical of the Hymenochaetaceae.

The absorption curves of the extracts of the *Gloeophyllum* species are worth noting. The similarity of those in *G. protractum* and *G. sepiarium* shows that the species of *Osmoporus* and *G. sepiarium* are really congeneric, as shown by Imazeki (1943), Besl, Bresinsky & Kronawitter (1975) and David & Fiasson (1977); the similarity is obviously due to the presence of trametine. On the other

hand, the pigment of *G. abietinum* is clearly different from the pigments of *G. protractum* and *G. sepiarium*, as was demonstrated already by Besl, Bresinsky & Kronawitter (1975), and David & Fiasson (1977: 313).

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ETUDE SUR LES CHAMPIGNONS PARASITES DU SUD-EST ASIATIQUE. 34. UN NOUVEAU GENRE, CYLINDROCLADIOPSIS (MONILIACÉE), PROVOQUANT UNE MALADIE DE TACHES FOLIAIRES DU LAGERSTRAEMIA EN MALAISIE

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ABSTRACT

This study deals with a new species of plant pathogenic fungi which causes a leaf spot disease of *Lagerstraemia* in Malaysia, *Cylindrocladiopsis lagerstraemiae* Yen, sp. nov. et gen. nov.

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En étudiant des échantillons récoltés par nous-même en Malaisie 1971, nous avons trouvé une maladie de taches foliaires du *Lagerstraemia*, provoquée par un nouveau champignon: *Cylindrocladiopsis lagerstraemiae* Yen, sp. nov. et gen. nov.

Description du champignon

Sur les feuilles du *Lagerstraemia flos-reginae* (Lythracée), à Kuala Lumpur (For. Res. Inst.), Malaisie, leg. Jo-min Yen (No. 71345), 28 sept. 1971.

Macules orbiculaires ou suborbiculaires, brun clair, à bords flous, isolées, dispersées, 2-15 mm de diamètre, parfois confluentes.

Hyphes externes peu développées, hyalines, cloisonnées, ramifiées, 3-4 µm de diamètre. Fructifications hypogènes, invisibles à l'oeil nu, même à la loupe.

Conidiophores hypophylles, généralement sortant par l'ostiole des stomates, solitaires, parfois groupés en fascicules de 2-3 individus, simples à la base, mais 2-4 fois bifurqués en haut, hyalins, cylindriques, érigés, à apex tronqué ou subtronqué après la chute des conidies; parties basales de conidiophores cylindriques, 0-5 cloisonnées, mesurant 40-70 × 5-6.5 µm; rameaux dichotomes cylindriques, non cloisonnés, de longueur très variée, mesurant 5-22 × 3-4 µm (FIG. 1, 4, 5 et 6); cellules conidiogènes terminales, produisant à leur extremité un seul bourgeon évoluant en une conidie cylindrique de diamètre plus grand, séparée bientôt du rameau porteur par une cloison transversale (FIG. 5 et 6); cicatrices d'insertion des conidies indistinctes.

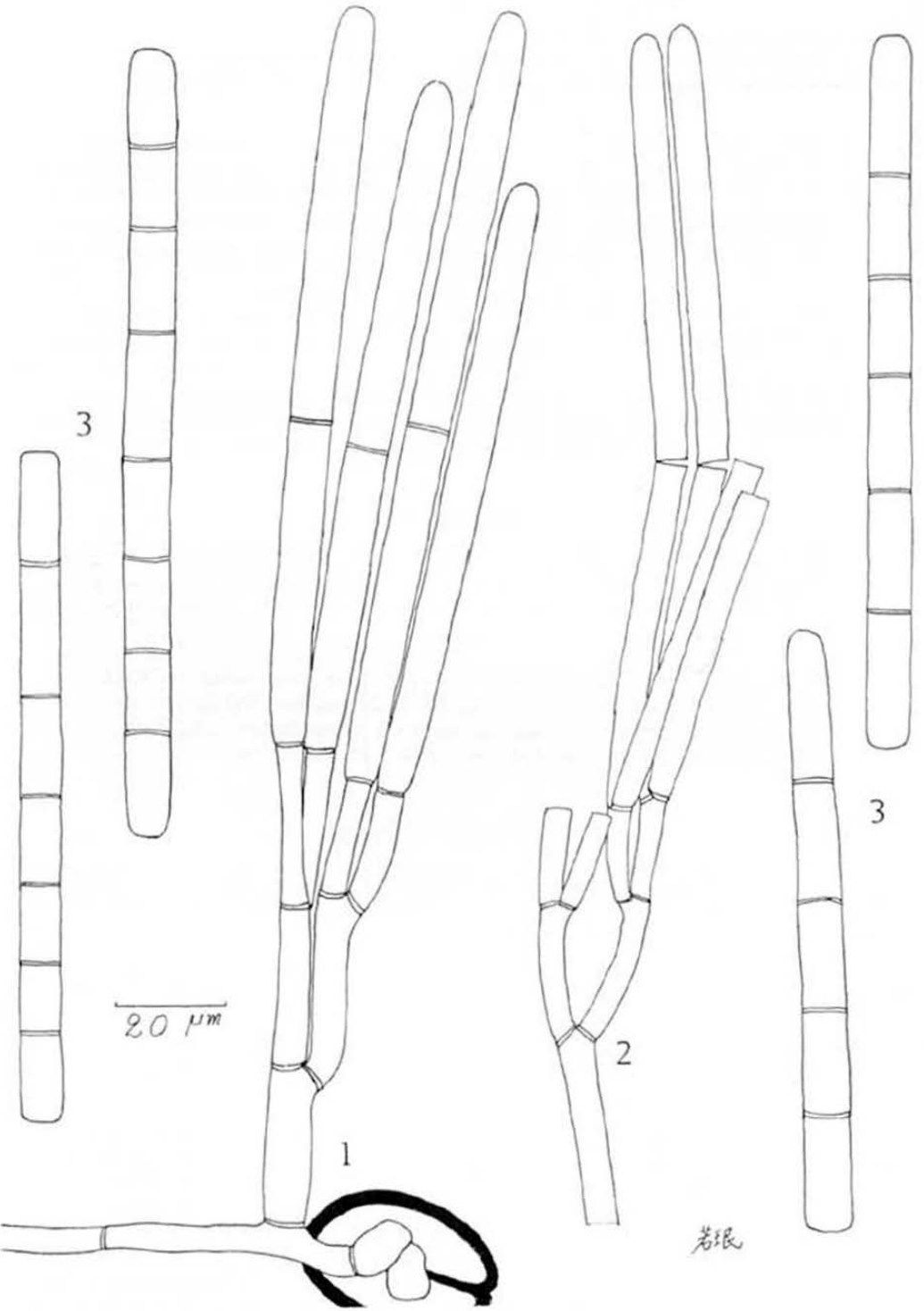

FIG. 1-3, *Cylindrocladiopsis lagerstraemiae* Yen: 1, Conidiophore à deux fois bifurqués; 2, Parties supérieures de jeunes conidies se détachant; 3, Conidies bien divisées.

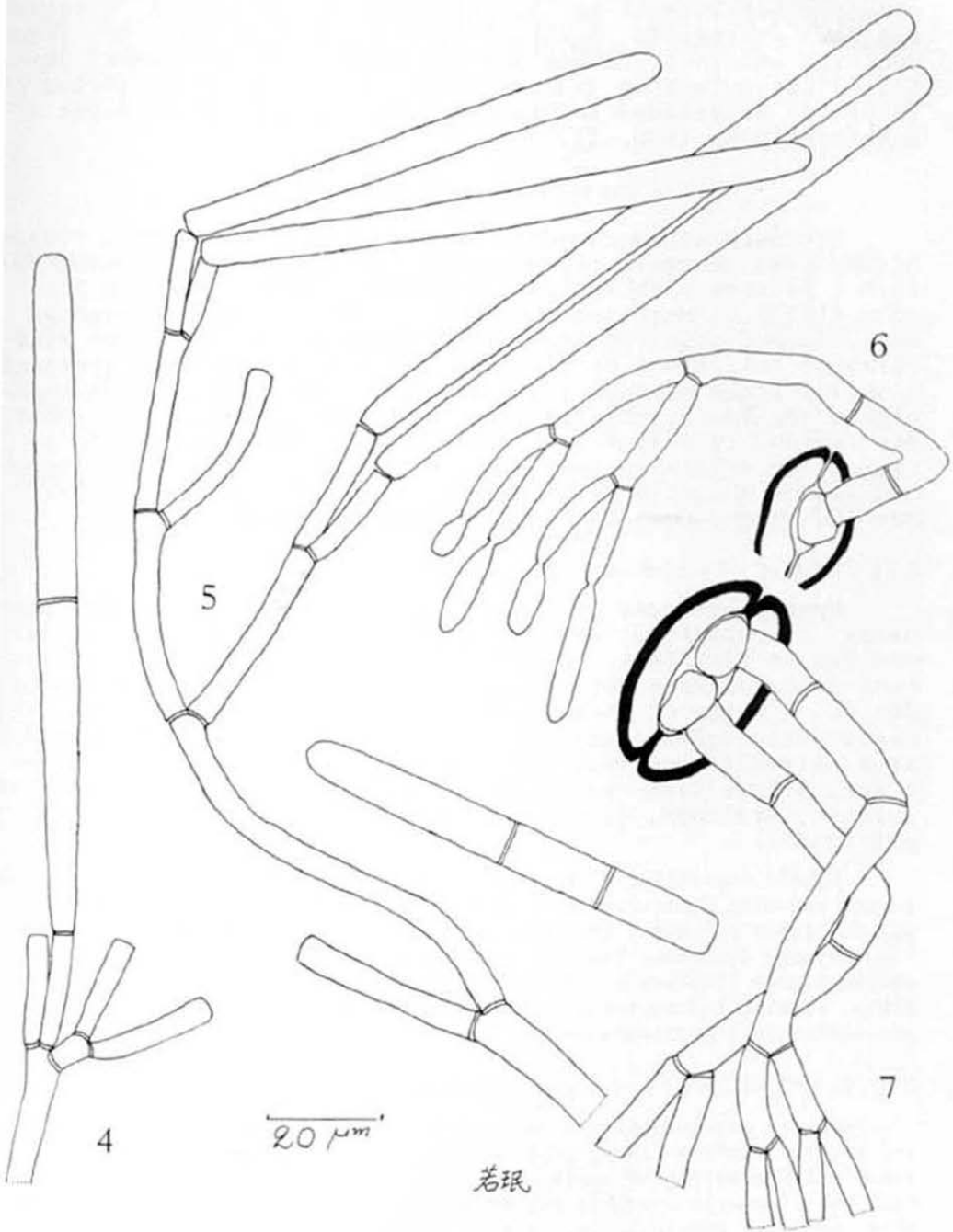

FIG. 4-7, *Cylindrocladiopsis lagerstraemiae* Yen: 4, Rameaux conidiophères à longueurs variées; 5, Conidiophore à 4 fois bifurqués; 6, Formation de conidies; 7, Fascicule de 2 conidiophores.

Conidies cylindriques, hyalines, toujours droites, divisées progressivement par 1-7 cloisons transversales, arrondies aux deux extrémités, mesurant 45-103 × 6-8 µm (FIG. 3); jeunes conidies encore attachées sur les rameaux conidiogènes, parfois s'articulant en deux au niveau de la première cloison et la partie supérieure se désarticulant facilement en forme d' arthroconidies (FIG. 2).

Caractères taxinomiques

Microscopiquement notre récolte montre une grande ressemblance avec le genre *Cylindrocladium*. Cependant, d'après Boedijn & Reitsma (1950), Booth & Murray (1960), Sobers & Seymour (1967) et Morrison & French (1969), toutes les espèces de *Cylindrocladium* presentent constamment des phialides généralement doliformes et de longs stipes cloisonnés et couronnés d'une vésicule globuleuse ou ovoïde. Par contre, notre champignon possède ni phialides, ni longs stipes, mais seulement des rameaux conidiogènes monoblastiques. Par conséquent, ce champignon malaisien peut être considéré non seulement comme une espèce nouvelle, mais aussi le type d'un nouveau genre que nous proposons, avec la diagnose suivante:

CYLINDROCLADIOPSIS Yen, *gen. nov.*

Hyphes externes hyalines, sortant par l'ostiole des stomates, circulant sur la face inférieure de la feuille, cloisonnées et ramifiées. Conidiophores hypogènes, hyalins, sortant d'une ostiole des stomates, solitaires ou en fascicules, droits, simples et cloissonnés en bas, bifurqués en haut, rameaux conidiogènes continus, monoblastiques et produisant à leur extrémité une seul conidie blastique cylindrique, cicatrices d'insertion des conidies indistinctes. Conidies cylindriques, hyalines, droites, cloisonnées, arrondies aux deux extrémités.

Hyphis sterilibus repentibus, ex stomatibus oriundis, hyalinis, septatis, ramosis. Conidiophoris hypophyllis, solitariis vel fasciculatis, ex stomatibus oriundis, hyalinis, erectis, inferne simplicibus et septatis, superne dichotome ramosis, ramis cylindraceis, non septatis, producentibus unum conidium blastice et terminale. Conidiis cylindraceis, hyalinis, rectis, 1-7 septatis, utrinque rotundatis. Species typica: *Cylindrocladiopsis lagerstraemiae* Yen.

CYLINDROCLADIOPSIS LAGERSTRAEMIAE Yen, *sp. nov.*

Maculis orbicularis vel suborbicularis, pallide brunneis, dispersis vel leviter confluentibus, 2-15 mm diam. Hyphis sterilibus leviter repentibus, ex stomatibus oriundis, hyalinis, septatis, ramosis, 3-4 µm crassis. Conidiophoris hypophyllis, ex stomatibus oriundis, erectis, solitariis, raro 2-3 fasciculatis, inferne cylindraceis, simplicibus, 0-5 septatis, 40-70 × 5-6.5 µm, supra 2-4 dichotome furcatis, ramis cylindraceis, non septatis, producentibus unum conidium blastice et terminale, 5-22 × 3-4 µm. Conidiis cylindraceis, hyalinis, rectis, 1-7 septatis, utrinque rotundatis, 45-103 × 6-8 µm, saepe ad septum primum desarticulatis et in partibus descendibus.

Habitat in foliis vivis *Lagerstraemiae flos-reginae*, Kuala Lumpur (For. Res. Inst.), Malaysia, ad Jo-min Yen (No. 71345), 28 Sept. 1971. Typus: in Herb. Jo-min Yen, No. 71345 (isotypus in Herb. G. L. Hennebert, No. 20465).

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NOTICE

THIRD INTERNATIONAL MYCOLOGICAL CONGRESS

The Executive Committee of the International Mycological Association has accepted the invitation of the Mycological Society of Japan to hold the Third International Mycological Congress (IMC_3) in Japan in 1983. The Congress will be based at either Kyoto or Tokyo, most probably in late August.

Further information will be circulated by the Organizing Committee of the Congress when detailed arrangements have been finalized.

D. L. Hawksworth
Secretary, IMA

CMI, Kew
September, 1978

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CONTRIBUTION TO THE LICHEN FLORA OF ARGENTINA

XI. Lichens from Cabo San Antonio, Buenos Aires Province

HECTOR S. OSORIO[1] and FELICIA R. D'ESPOSITO[2]

Summary

Twenty-nine lichens collected in San Antonio Cape, Buenos Aires Province, are enumerated. *Buellia callispora* and *Pseudoparmelia exornata* are added to the known flora of Argentina. The finding of *Parmotrema andinum* and *P. delicatulum* represents a noteworthy extension of their distribution in the country.

Recently the junior author collected some lichens in the San Antonio Cape area, situated in Buenos Aires Province, the most easterly of the Argentine Atlantic coast. Four localities on the oceanic coast were visited (from north to south): San Clemente de Tuyú, Las Toninas, La Lucila, and Punta Médanos, between 36° 20' and 36° 50' south. Some of the species identified are new to the lichen flora of Argentina whereas others enlarge their distribution area considerably. This has encouraged the authors to publish the results.

All of the specimens cited are deposited in the Herbarium of the Museo Nacional de Historia Natural, Montevideo, Uruguay (MVM), and duplicates of those identified with the abbreviation CIBIMA are preserved in the Herbarium of the Centro de Biología Marina, Buenos Aires, Argentina.

Anaptychia obscurata (Nyl.) Vain.

LAS TONINAS: Bark of *Salix* (CIBIMA 20770.a.).

Bacidia megapotamica Malme

SAN CLEMENTE DE TUYU: On bark (MVM 17843).

Buellia callispora (Knight) Stein.

LA LUCILA: On wooden post (MVM 17740); on wooden fence post, *Pinus* forest (MVM 17741); bark of tree (MVM 17826).

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PUNTA MEDANOS: On wooden post on the beach (MVM 17827). New to Argentina.

Buellia subisabellina Zahlbr.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17755, 17756).

Caloplaca erythrantha (Tuck.) Zahlbr.

SAN CLEMENTE DE TUYU: Bark of tree (CIBIMA 20836, MVM 17835, 17837.b.). LAS TONINAS: Bark of *Salix* (CIBIMA 20767, MVM 17840). LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20751, MVM 17743, 17847). PUNTA MEDANOS: On wooden fence post on the beach (CIBIMA 20848, MVM 17849).

Caloplaca xanthraspis (Kremp.) Magn.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17831.b., 17837.b.). LAS TONINAS: Bark of *Salix* (CIBIMA 20766).

Candelaria fibrosa (Fr.) Müll. Arg.

LAS TONINAS: Bark of *Salix* (MVM 17757).

Dirinaria confluens (Fr.) Awasthi

LA LUCILA: On wooden fence post, *Pinus* forest (MVM 17839). Considering as a basis the distribution indicated by Awasthi (1975) this is the first record of the genus *Dirinaria* south of parallel 36 and consequently the southernmost one known at present. The excellent development of the samples we collected leads us to believe that the range ought to extend even farther south in Buenos Aires Province.

Graphis pavoniana Fée

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.d.).

Graphis scripta (L.) Ach.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.c.).

Parmelia borrericides Nyl.

LAS TONINAS: Bark of *Salix* (CIBIMA 20765, 20770.c.). LA LUCILA: On wooden post (CIBIMA 20756).

Parmelia microstricta Müll. Arg.

LAS TONINAS: Bark of *Salix* (CIBIMA 20764). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17842). PUNTA MEDANOS: Wooden fence post on the beach (CIBIMA 20850).

Parmotrema andinum (Müll. Arg.) Hale

LA LUCILA: On wooden fence post, *Pinus* forest (MVM 17742). The present find represents a significant extension of the distribution

because it was formerly known from Salta in northern Argentina (Hale 1965).

Parmotrema austrosinense (Zahlbr.) Hale

SAN CLEMENTE DE TUYU: On wooden fence post (MVM 17838). LA LUCILA: Wooden fence post, *Pinus* forest (CIBIMA 20754, MVM 17744, 17824).

Parmotrema delicatulum (Vain.) Hale

LA LUCILA: On wooden fence post (CIBIMA 20760 pr.p.). This is another unexpected find since it was previously reported from Misiones (Osorio 1970) and from north of Corrientes (Osorio and Ferraro, unpublished record).

Parmotrema reticulatum (Tayl.) Choisy

LAS TONINAS: Bark of *Salix* (CIBIMA 20770.b.). LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20753 pr.p., MVM 17749.b., 17846).

Parmotrema uruguense (Kremp.) Hale

LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20845). PUNTA MEDANOS: Wooden fence post on the beach (MVM 17828).

Pertusaria megapotamica Magn.

SAN CLEMENTE DE TUYU: On bark (MVM 17831.a.).

Phaeographina arechavaletae Müll. Arg.

SAN CLEMENTE DE TUYU: Bark of tree (MVM 17841.a and b.).

Physcia alba (Fée) Müll. Arg. var. *obsessa* (Mont.) Lynge

LAS TONINAS: Bark of *Salix* (CIBIMA 20769).

Physcia syncolla Tuck.

SAN CLEMENTE DE TUYU: Bark of *Cedrus* (MVM 17833, 17834). LAS TONINAS: Bark of *Salix* (CIBIMA 20768).

Pseudoparmelia exornata (Zahlbr.) Hale

LA LUCILA: On wooden fence post (CIBIMA 20760 pr. p.); bark of tree (MVM 17844); on wooden fence post, *Pinus* forest (CIBIMA 20752). New to Argentina.

Pseudoparmelia texana (Tuck.) Zahlbr.

LA LUCILA: On wooden fence post, *Pinus* forest (CIBIMA 20753 pr.p., MVM 17749.c.).

Ramalina celastri (Spreng.) Krog and Swinscow

SAN CLEMENTE DE TUYU: Wooden fence post (CIBIMA 20834). LAS TONINAS: Bark of *Salix* (CIBIMA 20762). LA LUCILA: Wooden fence post, *Pinus* forest (CIBIMA 20749, MVM 17821, 17825).

Ramalina complanata (Sw.) Ach.

LA LUCILA: Wooden fence post (CIBIMA 20758).

Rinodina inseparata (Nyl.) Malme

SAN CLEMENTE DE TUYU: Bark of shrubs (CIBIMA 20835). LA LUCILA: Bark of tree (MVM 17819).

Teloschistes chrysophthalmus (L.) Th. Fr. var. *cinereus* Mull. Arg.

SAN CLEMENTE DE TUYU Wooden fence post (MVM 17836). LAS TONINAS: Bark of *Salix* (CIBIMA 20763). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17845). PUNTA MEDANOS: Wooden fence post (MVM 17848).

Usnea sulcata Motyka

LA LUCILA: Wooden fence post (CIBIMA 20759).

Xanthoria parietina (L.) Th. Fr.

SAN CLEMENTE DE TUYU: On bark (CIBIMA 20838, MVM 17832). LA LUCILA: Wooden fence post, *Pinus* forest (MVM 17820). PUNTA MEDANOS: Wooden fence post on the beach (CIBIMA 20841).

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THE GENUS COPRINUS IN WESTERN NORTH AMERICA, PART II: SECTION LANATULI[1]

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SUMMARY

This second paper of a series on western North American species of Coprinus considers 12 species and 3 varieties comprising the western representatives of the section Lanatuli. Eight new species, Coprinus brunneistragulatus, C. undulatus, C. sylvicola, C. marcidus, C. bubalinus, C. alutaceivelatus, C. pachydermus, and C. tectisporus are described. Two new varieties, C. lagopides var. trisporus and C. cinereus var. depressus are also described. C. macrorhizus f. microsporus is given new status. A key to the species and varieties found in western North America is provided.

INTRODUCTION

In this second paper on western North American Coprini, 12 species and 3 varieties are added to those previously reported (Van De Bogart, 1976). Eight species and two varieties are described as new and one taxon is given new status.

The materials and methods, terminology and color terminology are as used in the first paper of this series (Van De Bogart, 1976).

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1 This paper is based in part on a thesis submitted to the Graduate School of the University of Washington in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

All collections examined are deposited in the Mycological Herbarium of the University of Washington (WTU). The collections used for preparing the camera lucida drawings and in obtaining the microscopical data are indicated by an asterisk (*) after the collection number.

Coprinus Pers. per S. F. Gray, Section Lanatuli Fr., Epicrisis, p. 250, 1838.

Pileal surface except for the apical disk usually composed of radially oriented hyphae or radially elongated cells, at first covered very loosely with scales of universal veil composed mostly of parallelly oriented hyphae. Individual cells of scale hyphae often long and swollen, constricted at the septations, not branched, somewhat catenulate in appearance. Universal veil completely devoid of sphaerocysts. Large characteristic pleurocystidia present. Stipe without annulus, but sometimes with an annular line or small flange near the base where contacted by the margin of the unexpanded pileus. Sporocarps very variable in size, from minute to rather large. Spores less than 15 μm long, smooth walled or with an inflatable perisporium. Growing on dung, soil, decaying wood, or on charcoal.

TYPE SPECIES: Coprinus cinereus Schaeff. per S. F. Gray, Nat. Arr. Brit. Plants, p. 634, 1821.

Observations: The species of section Lanatuli found in western North America seem to fall into two general categories, one with globose to subglobose spores, and one with ellipsoidal spores.

KEY TO TAXA OF SECTION LANATULI

A. Spores globose, subglobose, or broadly limoniform . . . . . B

A. Spores ellipsoidal . . . . . E

B. Spores with an easily dislodged but rather thick, pale brown perisporium, apiculus very small . . . . . 1. Coprinus brunneistragulatus

B. Spores without a perisporium, apiculus medium or large size C

C. Cells of universal veil 5.1-10.0 μm in diameter, not swollen or constricted at the septations; spores 7.9-11.3 μm in diameter 2. Coprinus undulatus

C. Cells of universal veil 2.5-67.5 μm in diameter, mostly swollen and constricted at the septations; spores 5.0-9.1 μm in diameter ..... D

D. Basidia four-spored ..... 3. Coprinus lagopides var. lagopides

D. Basidia mostly three-spored, rarely two- or four-spored ..... 4. Coprinus lagopides var. trisporus

E. Basidia variable, intergrading in sizes and shapes; pileal context and subhymenium pallid yellow microscopically, veil thin, reddish brown ..... 5. Coprinus sylvicola

E. Basidia of several rather distinct sizes and shapes without intergradations; pileal context and subhymenium often not pallid yellow microscopically, veil thick or thin, not reddish brown F

F. Autolysis restricted to the lamellar margin; veil dark gray to almost black ..... 6. Coprinus marcidus

F. Autolysis much more general, often involving the entire pileus; veil white to yellowish tan, ochre, or light brown .. G

G. Germ pore eccentric ..... H

G. Germ pore apical I

H. Lignicolous, universal veil white ..... 7. Coprinus bubalinus

H. Terrestrial, universal veil tan ..... 8. Coprinus alutaceivelatus

I. Most universal veil cells with walls up to 1.5 μm thick ..... 9. Coprinus pachydermus

I. Most universal veil cells with walls less than 1.5 µm thick ..... J

J. Spores with perisporium, spore wall 1.8-1.9 µm thick ... 10. Coprinus tectisporus

J. Spores without perisporium, spore wall usually 0.8 µm or less thick ..... K

K. Coprophilous or on rotting hay, straw, or similar materials L

K. On wood, twigs and leaves, rich humus, or other soils, usually in wooded areas ..... N

L. Stipe base terminating rather abruptly into a mycelial mass either at or just below the substrate surface ..... 11. Coprinus fimetarius

L. Stipe base terminating in a long, tapering, usually solid radicating process that is often inserted deeply into the substratum M

M. Spores 12.5-15.6 µm long .....
12. Coprinus macrorhizus var. macrorhizus

M. Spores 7.5-11.2 µm long .....
13. Coprinus macrorhizus var. microsporus

N. Spores ellipsoidal in lateral view, with no well-defined suprahilar flattening
14. Coprinus cinereus var. cinereus

N. Spores roughly ellipsoidal in lateral view, with well-defined suprahilar flattening
15. Coprinus cinereus var. depressus

1. Coprinus brunneistragulatus VAN DE BOGART sp. nov. (Fig. 1)

Pileus primo ovatus dein conicus, postea campanulatus, postremo revolutus, primo 2.0-2.5 cm longus, post expansionem 4.0-6.0 cm latus, primo atrogriseus et ad apicem atrogriseibrunneus, fragmentis veli universalis pallidis, in maturatione atrogriseilascens et ad apicem

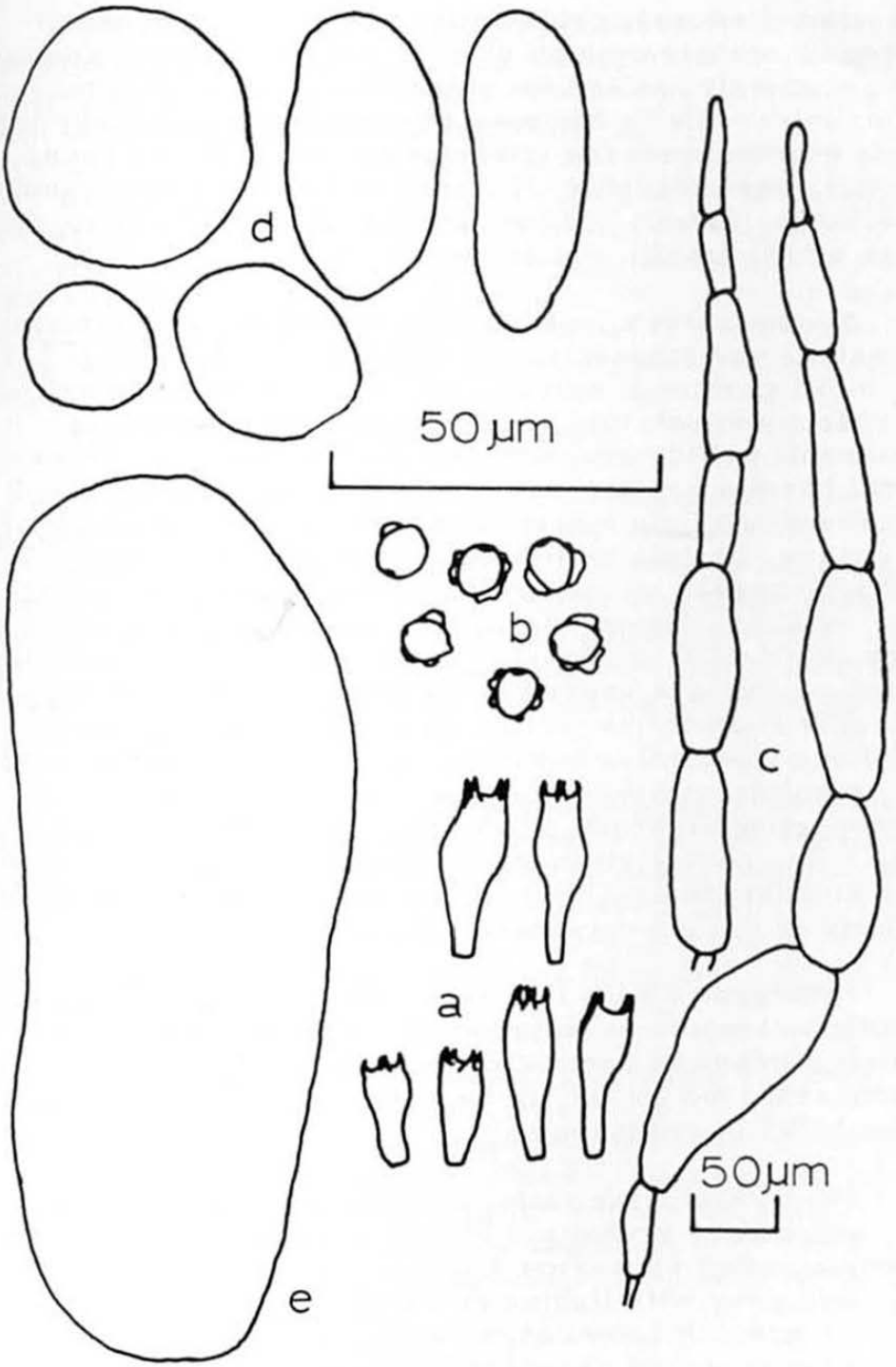

Fig. 1. Coprinus brunneistragulatus FVDB 194, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia.

atrobrunneilascens; pagina pilei primo velo universali crasso et coacteo omnino obtecta, in maturatione aliquantum plicato-striata et velo universali partim obtecta; velum universale in fragmenta irregulares rumpens; caro tenuis et membranacea etiam ad apicem. Stipes cavus, gracilis, basi abruptus, 10-12 cm x 2.0-2.5 mm, candidus vel albidus, opacus, pagina stipitis aliquantum fibrillosa; carne tenui, fragili, facile bracta.

Sporae laeves, e subglobosis in obese limoniformis variantes, per transectionem rotundae, 6.9-8.8 x 6.2-7.5 µm, poro germinali apicali, in cumulo atrobrunneae, per microscopium saturate purpureibrunneae perisporio prominenti pallide brunneo; basidia trimorphica, tetraspora; basidia breviter clavata 14.0-16.0 µm longa, 6.0 µm crassa, basidia longe clavata 22.0-23.0 µm longa, 7.5 µm crassa, basidia ululiformia 24.0-26.5 µm longa, 17.0-22.0 µm crassa, ad apicem rotundata, parietibus rotundatis, hyalina, laevia, parietibus tenuibus, 110.0-142.0 µm longa, 45.0-51.0 µm crassa, numerosissima, in lamella admodum contigua saepe per apicem inclusa. Pagina pilei ex hyphis radiantibus; velum universale ex fragmentis grandibus pileo adhaerentibus, et catenis hypharum rasilium, tenuitunicatarum, hyalinarum, cylindricarum vel magnopere tumidarum, 40.0-150.0 x 11.2-44.0 µm, ad septa vulgo constrictarum. Catenae cellularum ut videtur inter se adhaerentes, sed raro anastomosantes; fibula ad stipitem et in velo universali adsunt.

Holotypus FVDB 194, terrestris, solitarius, in loco graminoso humido et umbroso ad sinum mutiny dictum insulae whidbey in comitato Insula dicto pagi Washingtonis 6 Octoberis 1968 lectus, in herbario Universitatis Washingtonii (WTU) conservatus.

PILEUS at first ovate, then conical, then campanulate, and finally revolute. Prior to expansion 2.0-2.5 cm in length, after expansion 4.0-6.0 cm in breadth. At first dark grey with lighter colored universal veil patches and dark greyish brown at the apex, with maturity becoming darker grey and brownish black at the apex. Some plicate striations developing under the universal veil, the striations often masked at least in part by the veil. Surface completely covered at first, and partly covered at maturity by a feltlike universal veil that breaks up into irregular patches as the pileus expands. Flesh thin and membranous even at the apex.

STIPE hollow, thin, slender, tapered from base to apex, 10-12 cm x 2-5 mm. Base nearly abrupt. White or faintly greyish, opaque. Surface somewhat fibrillose. Flesh thin, fragile and easily broken.

LAMELLAE narrowly lanceolate, some lamellulae present, 0.5-2.8 cm x 3-4 mm, free or slightly adnexed when young, crowded at first, then less so as pileus expands and plicate striation develops. Pale then blackish brown. Autodigestion incomplete, most of the lamellae lysing but usually most of the pileal surface remaining.

ODOR AND TASTE not observed.

SPORES subglobose to broadly limoniform, round in cross-section, 6.9-8.8 x 6.2-7.5 μm, apiculus tiny but often visible, germ pore apical, 1.0-1.4 μm in diameter. Color en masse brownish black, microscopically deep purple-brown in 3% KOH. Contents guttulate or not. Wall with a prominent pale brown perisporium that shows best on spores of young specimens but is also found on those of older specimens.

CYSTIDIA: Cheilocystidia globose, 12.5-38.0 μm in diameter, or ellipsoidal with rounded ends, 44.0-50.0 x 17.0-22.0 μm hyaline, thin walled, smooth. Pleurocystidia long ellipsoidal, ends usually rounded, 110.0-142.0 x 45.0-52.0 μm. hyaline, smooth, thin walled, numerous, often bridging between two opposing lamellae. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL of large patches adhering to the pileus, composed of chains of smooth, thin walled, hyaline, cylindrical to greatly swollen hyphae 40.0-150.0 x 11.2-44.0 μm, constricted at the septae in most cases. The chains of cells seem to be adherent to each other but are seldom anastomosed.

CLAMP CONNECTIONS present on stipe and universal veil.

HABITAT terrestrial, on moist shaded lawns, solitary.

Observations: This species resembles Coprinus lagopides

Karst. in most ways but differs markedly in the presence of a pigmented perisporium.

Material Examined. Washington: HOLOTYPE, FVDB 194*, 6 October, 1968.

2. Coprinus undulatus VAN DE BOGART sp. nov. (Fig. 2)

Pileus primo elongato-glandiformis demum anguste conicus, postea campanulatus, postremo laciniatus et aliquantum revolutus, primo 1.0-3.1 cm longus, post expansionem 1.0-3.4 cm latus, primo velo universali albo vel alutaceo obtectus, pagina pilei subter velo pallide brunnea et ad apicem hygrophane brunnea, in maturatione ex brunnea hygrophane atrogrisea et ad apicem atrogriseibrunnea, primo leviter striata demum leviter plicato-striata, striae ut videtur nullo modo in tramam lamellarum penetrantes. Velum universale tenue, intertextum, ad pileum adhaerens, in maturatione pro parte maxima evanescens. Caro tenuis, membranacea, ad apicem usque ad 1.0 mm crassa. Stipes cavus, gracilis, 2.0-6.0 cm longus, 1.5-6.0 mm crassus, albus, opacus, juventute parte supera luminis telam hypharum laxarum capienti, pagina pro parte maxima laevis et glabra, sericea, juventute ad basem fragmentis veli universali instructus; basis aliquantum carnosa, sed post formationem sporarum fragilescens. Lamellae anguste lanceolate, lamellulis paucissimis, 0.9-3.0 cm longae, 2.0-5.0 mm crassae, liberae sed stipiti approximatae, confertae, primo albae dein pallide aeneae, postea aeneae vel cinereae et postremo atrae, autolysis completa.

Sporae globosae 7.9-11.3 µm diam, poro germinantionis apicali 2.2-2.5 µm lato; in cumulo atrae, per microscopium atropurpureibrunneae, contextis subtiliter granulatis, pariete levi. Basidia dimorphica, tetraspora, basidia breviter clavata 20.2-27.0 µm longa, 9.0-10.7 µm crassa, basidia longe clavata 31.5-37.0 µm longa, 10.3-11.3 µm crassa. Cheilocystidia variabilia, globosa, 11.2-36.0 µm lata, ovata vel ellipsoidea 22.5-92.4 µm longa, 17.0-29.3 µm crassa, hyalina, laevia, tenuitunicata. Pleurocystidia longioblonga vel longiellipsoidea, 112.0-168.0 µm longa, 27.0-58.3 µm crassa, hyalina, laevia, tenuitunicata, apicibus rotundatis, pedicellis usque ad 6.0 µm longis. Pagina pilei ex hyphis tenuitunicatis radiantibus constans. Velum universale filamentis cylindraceis ad septa nec inflatis nec constrictis quamquam diametro

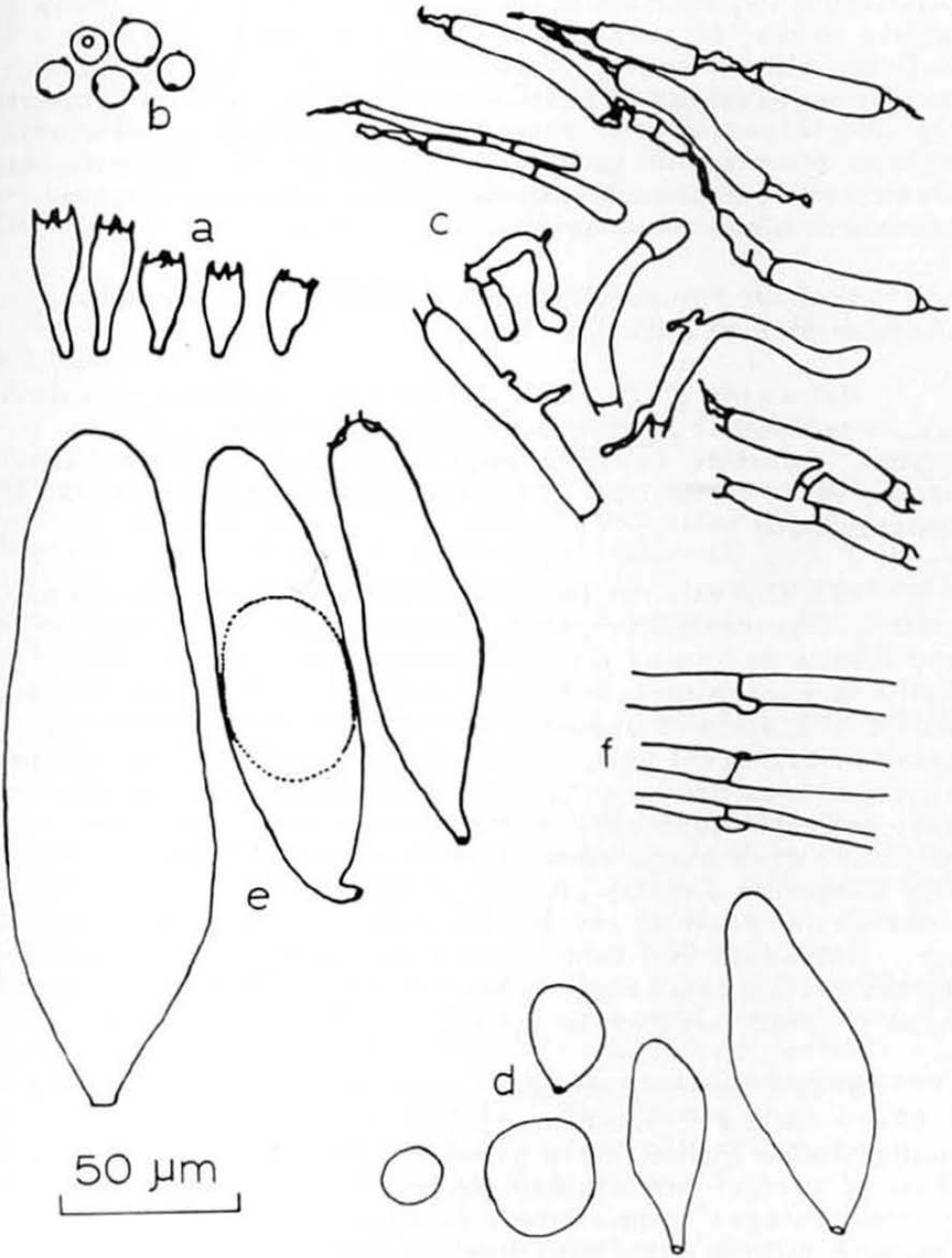

Fig 2. Coprinus undulatus FVDB 2182, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

amplo, 23.6-110.0 μm longis, 5.1-10.0 μm crassis, tenuitunicatis, cytoplasma abundanti ubi vivis, hyalinis, cellulis pro parte maxima curvatis; cellulae veli formationi catenarum hyphoidearum propensae, quamquam cellulis multis libris, et persaepe cellulis evacuatis collapsis. Cellulae aliquot semel ramificantes, nonnullae maculas leviter incrassatas in pariete praebentes. Velum proparte maxima in pagina pilei et in quantitatibus parvis ad basem stipitis speciminum juvenium. Catenum elementorum veli plus minus radiatim dispositae autem sinuosae propter curvaturam parietum cellularum.

Fibulae ad basem stipitis adsunt; sporocarpium odore et sapore nullo.

Holotypus FVDB 2182, in solo vel in materia vegetabili unde crescit Agaricus brunnescens Peck (= A. bisporus), comitato Thurston pagi Washingtonis, 20 Novembreis, 1973, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long-glandiform or truncate-ellipsoidal, then narrowly conic, then narrowly campanulate, and finally becoming laciniate and somewhat revolute. Prior to expansion 1.0-3.1 cm in length and after expansion 1.0-3.4 cm in breadth, covered at first by white to pale tan universal veil, the surface beneath pale brown to hygrophanous brown at the apex, at maturity becoming dark hygrophanous grey with a hint of brown and dark brownish grey at the apex, faintly striate at first, eventually becoming slightly plicate-striate. The plicate striations do not seem to involve the trama of any of the lamellae. Universal veil thin, interwoven, adherent, by maturity mostly disappearing. Flesh thin and membranous but up to 1.0 mm thick at the apex.

STIPE hollow, slender, tapered from base to apex, 2.0-6.0 cm x 1.5-6.0 mm. White and opaque. When young, loose hyphae often present in upper half of lumen. Most of surface smooth and glabrous, silky in appearance. In button stages, some small patches of universal veil at the base. Base somewhat fleshy, fragile by the end of spore production.

LAMELLAE narrowly lanceolate, mostly full length, only a few lamellulae present, 0.9-3.0 cm x 2.0-5.0 mm, free, extremely crowded and remaining so until lysis.

White, then pale bronze, then bronze, then grey, and finally sooty black. Autodigestion complete, with the entire pileus lysed.

ODOR AND TASTE none.

SPORES globose, 7.9-11.3 μm in diameter, round in any section, lacking a perisporium, apiculus large, 1.2 x 1.2 μm, germ pore apical, 2.2-2.5 μm in diameter. Color en masse sooty black, microscopically dark purple-brown in 3% KOH. Contents seem finely granular. Wall smooth.

BASIDIA dimorphic, short clavate and 20.2-27.0 x 9.0-10.7 μm, long clavate and 31.5-37.0 x 10.3-11.3 μm, all four-spored.

CYSTIDIA: Cheilocystidia variable in shape, sphaerocysts 11.2-36.0 μm in diameter, ovate to ellipsoidal, 22.5-92.4 x 17.0-29.3 μm, hyaline, smooth, thin walled, forming a broad band on the lamellar margin. Pleurocystidia long-oblong to long-ellipsoidal, 112.0-168.0 x 27.0-58.3 μm, apices rounded, pedicels usually present, about 6 μm long, hyaline, thin walled, smooth. No other cystidia present.

PILEAL surface of thin-walled, radially oriented hyphae that revive poorly.

UNIVERSAL VEIL of cylindrical filaments, not swollen or constricted at the septa although of large diameter, 23.6-110.0 x 5.1-10.0 μm, thin walled, with abundant cytoplasm in fresh material, hyaline, most cells curved. Cells tending to form hyphalike chains although many loose cells are present, and very often there are collapsed empty cells. A few cells branch once, and some show slightly thickened spots on the cell wall. Veil present mostly on pileal surface and in small amounts at the base of the stipe of young specimens. The chains of veil elements are more or less radially oriented but sinuous due to the curvature in the wall of most cells.

CLAMP CONNECTIONS present only (?) on stipe.

HABITAT terrestrial or subcoprophilous on prepared compost intended for commercial production of Agaricus brunnescens in closed controlled-environment buildings. In large clusters.

Observations: The universal veil elements and spores of this species are distinctive, and the habitat seems to be unique. Personal communications with the staff mycologist of the Ostrom Mushroom Company of Lacey, Washington, indicate that this species is considered a pest, detrimental to obtaining maximum yields of Agaricus brunnescens Peck, Bull. Torrey Bot. Club 27: 16, 1900 (= A. bisporus). The spores or mycelium of Coprinus undulatus appear to be capable of surviving the company's present sterilization techniques for the compost.

Material Examined. Washington: HOLOTYPE, FVDB 2182*, 20 November, 1973: FVDB 3902.

3. Coprinus lagopides Karst., Hattsvampar, p. 535, 1879, var. lagopides (Fig. 3).

PILEUS at first short glandiform, then conic, then campanulate, and finally revolute. Prior to expansion 1.5-3.0 cm in length and after expansion 3.0-5.5 cm in breadth. Pale greyish white to pale brown at first, apex concolorous with remainder of pileus, at maturity becoming grey to dark brownish grey with the apex dark brownish grey to almost black. Plicate striations usually develop quickly. Surface covered with many small loose white or almost hyaline scales that are easily dislodged. Flesh thin and membranous, usually less than 1.0 mm thick even at the apex.

STIPE hollow, slender, tapered slightly from base to apex, 8-15 cm x 2.5-5.0 mm. White, opaque, surface sometimes glabrous but usually with few to numerous bits of loose hyphae scattered along the length of the stipe or more frequently with some small white or pale brown scalelike patches on or near the base. Flesh usually somewhat fibrous although thin and easily broken.

LAMELLAE narrowly lanceolate, 0.8 2.8 cm x 3.0 mm, free and remote, extremely crowded at first then less so as plicate striations develop with pileal expansion, white then black. Autodigestion generally incomplete, only the bottom half of each lamella lysing, and the remainder either withering or becoming putrified.

ODOR AND TASTE none.

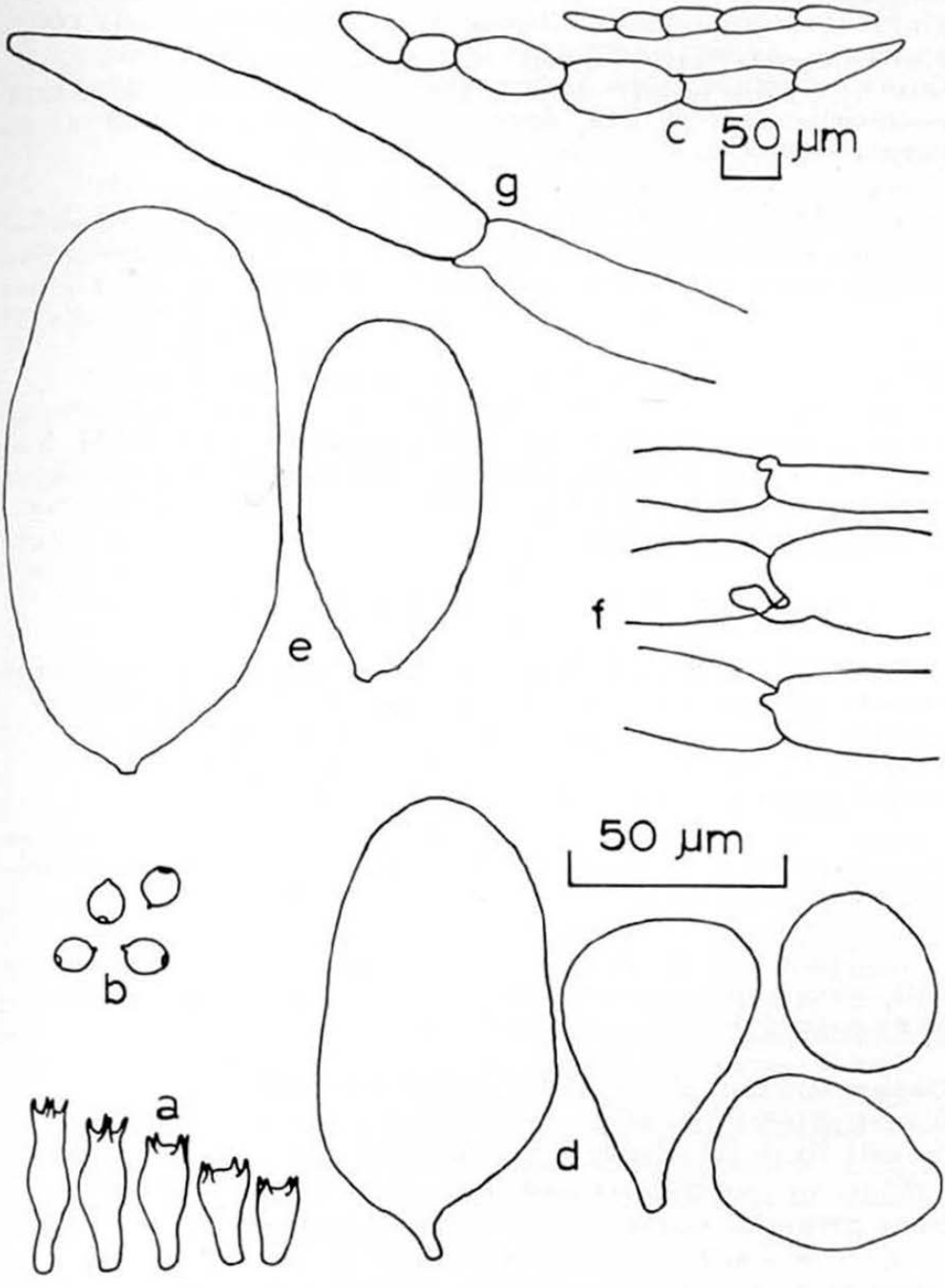

Fig. 3. Coprinus lagopides var. lagopides FVDB 2154, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. universal veil clamp connection.

SPORES subglobose to limoniform, round in cross-section, (5.9-)6.2-9.4(-11.2) x 5.0-6.3(-8.1) µm, lacking a perisporium, apiculus medium to large and mostly conspicuous, germ pore apical 0.8-1.9 µm in diameter. Color en masse from dark brown to soot black, microscopically deep purple, deep purple-brown, or deep purple-black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 16.2-19.5 x 8.1 µm, long clavate and 22.0-28.8 x 10.0 µm, ululiform and 28.8-35.0 x 10.0 µm, all four-spored.

CYSTIDIA: Cheilocystidia of several shapes, sphaerocysts 20.0-50.0 µm in diameter, obclavate to ellipsoidal, 36.0-104.0 x 18.7-53.8 µm, smooth, thin walled, hyaline. Pleurocystidia ellipsoidal, 67.5-137.5 x 37.5-62.5 µm, smooth, hyaline, thin walled, sometimes bridging between lamellae, numerous to widely scattered. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL present on pileus and sometimes at base of stipe as fibrillose scales. Veil elements consisting of long chains of swollen sausage-like cells 25.0-250.0 x 2.5-67.5 µm, constricted at the septae, thin walled, hyaline, smooth, rarely branched.

CLAMP CONNECTIONS present on stipe, universal veil, and occasionally in the pileal trama.

HABITAT terrestrial or seemingly lignicolous; on soil, woody debris, or most often on rotting stumps of Acer macrophyllum. Solitary, or in small groups.

Observations: P. D. Orton (1957) appears to have investigated this species rather fully and synonymizes C. jonesii Peck, C. funariarum Metrod, and C. lagopus var. sphaerosporus Kühner and Josserand with it. My collections of what I consider to be var. lagopides were all on soil, woody debris, or rotten maple wood, but not on burnt soil (which is the habitat stressed by Orton). My two collections of var. trisporus were, however, from burnt soil.

Material Examined. Washington: FVDB 7, 172, 226, 2154*.

4. Coprinus lagopides var. trisporus VAN DE BOGART var. nov. (Fig. 4).

A typo differt basidiis pro parte maxima trisporis, dum e contra basidiis tetrasporis vel bisporis aliquot raris.

Holotypus FVDB 2158 in solo arenario nuper ambusto ergo fragmentis carbonis numerosis in vivario republicae Mons Rainier dicto in comitato Pierce pagi Washingtonis 5 Octoberis 1952 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

As described in var. lagopides except that the basidia are mostly three-spored, with four-spored or two-spored basidia being fairly rare. The habitat is on recently burnt soil and charred debris.

Material Examined. Washington: HOLOTYPE, FVDB 2158*, 5 October 1952; FVDB 61.

5. Coprinus sylvicola VAN DE BOGART sp. nov. (Fig. 5).

Pileus primo longus e margo ad apicem parum contractus sed fere cylindricus, apice obtuse rotundato, demum conicus, postea campanulatus margine explanato, postremo revolutus, primo 1.5-2.0 mm longus, post expansionem 3.0 cm latus, primo cinereus et ad apicem cinereibrunneus, mox plerumque atrocinerascens apice atrocineribrunneo. Pagina pilei subter velo permature plicato-striata, striae in pileis partim expansis saepe prominentes; pagina fere laevia sed diligenter observata squamis et filis minutis rufulibrunneis praebens. Caro tenuis etiam ad apicem. Stipes cavus, gracilis, e basi versus apicem parum contractus, 7.0-9.0 cm longus, 1.5–2.5 mm crassus, sordide albus vel dilute cinereus, opacus, pagina stipitis pro parte maxima laevis et glabra sed squamis parvis appressis aliquot in parte inferna dispositis; caro tenuis, fragilis et friabilis. Lamellae anguste lineares, lanceolatae, lamellulis paucis, 1.8 cm longae, 1.5-2.5 mm latae, liberi et stipite remotae, primo confertissimae dein subdistantes, albae dein pallescentes et rufulibrunneae, postea atrobrunneae et postremo atrae, autolysis fere completa.

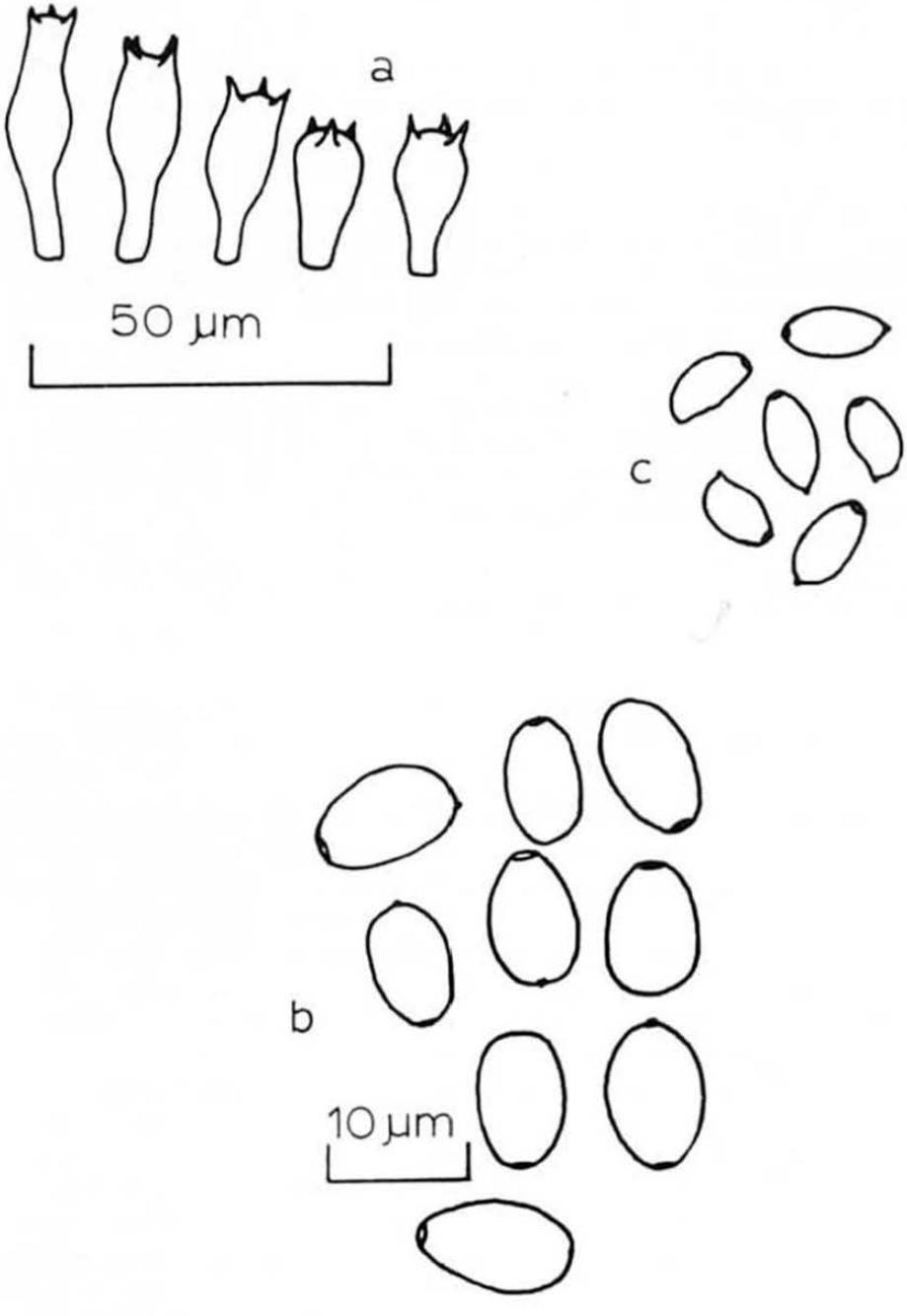

Fig. 4. Coprinus lagopides var. trisporus FVDB 2158, a. basidia, C. macrorhizus var. microsporus FVDB 115, b. spores, C. cinereus var. depressus FVDB 264, c. spores.

Sporae laeves, ellipsoideae apicibus angustatis, per transectionem rotundatae, 13.7-15.0 x 7.2-7.8 µm, apiculo amplo proeminenti, poro germinationis apicali; in cumulo atrae, per microscopium atropurpureae. Basidia formis et amplitudine variabilissima, clavata, longa clavata, subululiformia, et ululiformia, 25.0-51.0 µm longa, 10.0-12.0 µm crassa. Cheilocystidia ovata vel ellipsoidea, 48.0-77.5 µm longa, 22.5-40.0 µm crassa, hyalina, tenuitunicata, laevia, etiam hyphis aliquot cylindraceis, hyalinis, laevibus, tenuitunicatis, ramosis et anastomosantibus 1.5-6.3 µm diam praesentibus. Pleurocystidia pauca, ovata vel ellipsoidea, 63.0-75.0 µm longa, 30.0-40.0 µm crassa, laevia, hyalina, tenuitunicata, et pro parte maxima prope marginem lamellarum disposita, cystidia alia desunt. Pagina pilei ex hyphis radiantibus constans. Velum universale in superficie pilei et ad basem stipitis squamis laxis quibus catenarum longorum cellularum inflatorum constantibus, cellulae catinarum 38.0-102.2 x 3.0-5.0 µm, ad septa constrictae, hyalinae, tenuitunicatae, laeves, raro ramosae.

Contextus pilei in percento tribus kali causticum luteibrunnea. Subhymenia lamellarum etiam in percento tribus kali causticum luteibrunnea, autem stratum tenue tramae medianae lamellarum hyalinum est.

Fibulae in contextu pilei, velo universali, pagina stipitis, et trama lamellarum adsunt.

Holotypus FVDB 297 in foliis emortuis, stramentis et fragmentis lignorum putrefactorum arborum coniferarum, in sylva mixta, Camp Kilowan, prope Falls City, comitato Polk, pago Oregonis 27 April 1972 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long, slightly tapered from base to apex but almost cylindrical, with the apex obtusely rounded, becoming conic, then campanulate with a flaring margin, and finally revolute, prior to expansion 1.5-2.0 cm in length and after expansion 1.8-2.3 cm in breadth, medium grey and apex medium grey-brown at first, but soon becoming generally dark grey and dark grey-brown at the apex. Some plicate striations present early under the universal veil and often prominent in partially expanded pilei. Surface almost smooth but close examination reveals minute reddish brown scales or filaments. Flesh thin.

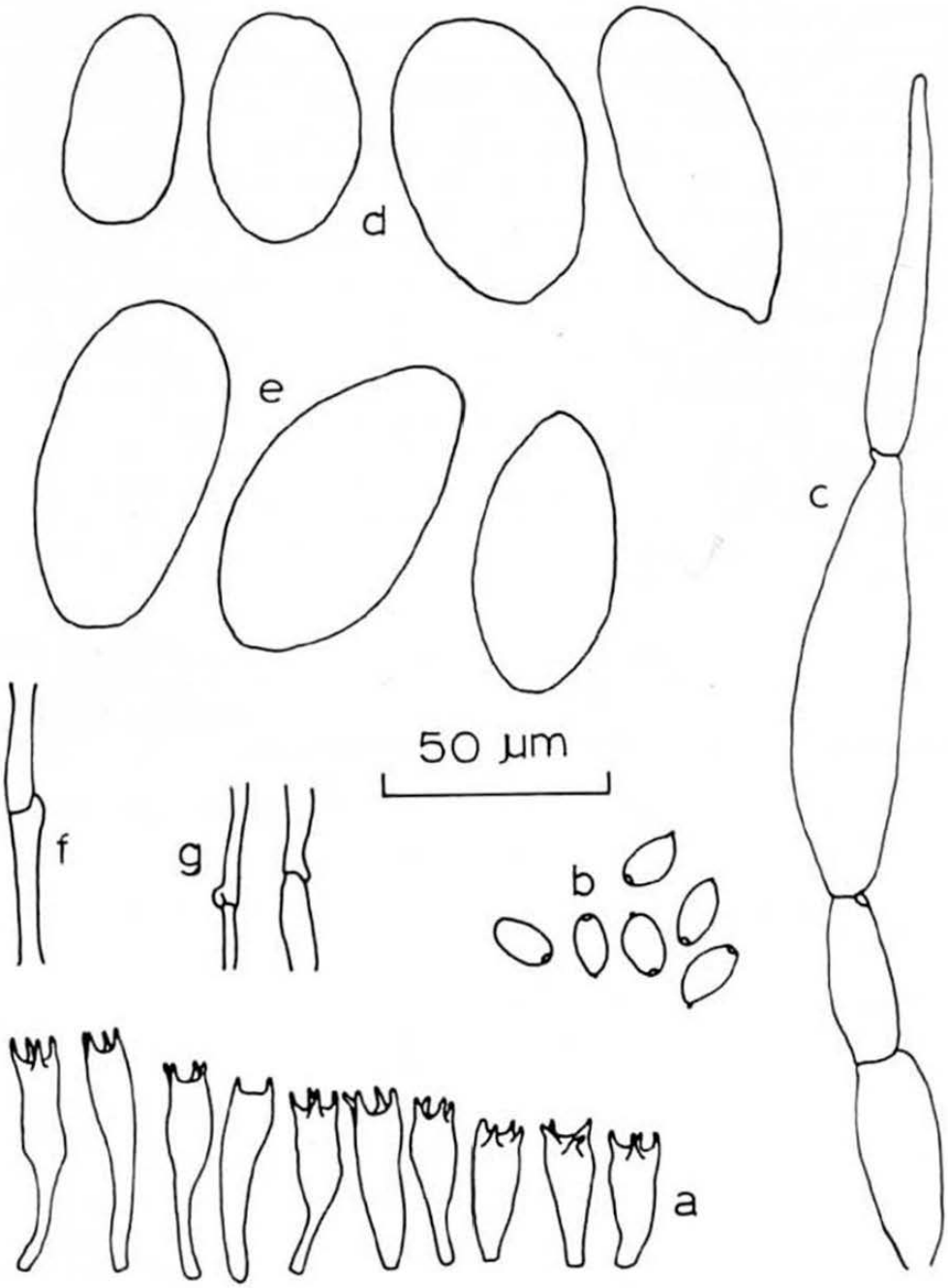

Fig. 5. Coprinus sylvicola FVDB 297, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connection, g. pileal trama clamp connections.

STIPE hollow, slender, slightly tapered from base to apex, 7.0-9.0 cm x 1.5-2.5 mm, greyish to dirty white, opaque. Surface mostly smooth and glabrous but with a few appressed scalelike patches on lower one-third of stipe. Flesh thin, fragile, and brittle.

LAMELLAE narrowly linear-lanceolate, few, if any, lamellulae, 1.8 cm x 1.5-2.0 mm, free and remote, extremely crowded at first then subdistant due to development of plicate striations as pileus expands, white, then pale reddish brown, then dark blackish brown, and finally soot black. Autodigestion destroying most of each lamella and most of the rest of the pileus.

ODOR AND TASTE none.

SPORES ellipsoidal with tapering ends, nearly round in cross-section, 13.7-15.0 x 7.2-7.8 μm, lacking a perisporium, apiculus large and prominent, germ pore apical, 1.0-1.2 μm in diameter. Color soot black en masse, microscopically deep purple-black in 3% KOH. Walls smooth.

BASIDIA variable in shape and size. The shapes intergrade from clavate to long clavate to subululiform to ululiform, and sizes range from 25.0-51.0 x 10.0-12.0 μm. All four-spored.

CYSTIDIA: Cheilocystidia ovate to ellipsoidal, 48.0-77.5 x 22.5-40.0 μm, hyaline, thin walled, smooth. Some hyaline, smooth, thin walled, branched and anastomosed cylindric hyphae 1.5-6.3 μm in diameter present also along lamellar margin. Pleurocystidia ovate to ellipsoidal, 63.0-75.5 x 30.0-40.0 μm, hyaline, smooth, thin walled, few in number and present mostly near the lamellar margin. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL on pileus and at base of stipe of loose scales composed of long chains of swollen cells, 38.0-102.0 x 3.0-25.0 μm, constricted at the septa, hyaline, thin walled, smooth, seldom branched.

PILEAL CONTEXT pallid yellow-brown in 3% KOH. The subhymenium of each side of each lamella is also yellow-brown in 3% KOH while the thin layer of median

lamellar trama is hyaline.

CLAMP CONNECTIONS present on stipe, universal veil, pileal trama, and lamellar trama.

HABITAT terrestrial or sublignicolous, on leaves and debris among chunks of rotten conifer wood lying on the soil in an old second-growth mixed forest. Small loose groups.

Observations: This species is notable for the variation and intergradation in sizes and shapes of the basidia, the very long, almost cylindrical shape of the unexpanded pileus, and the yellow-brown color of the pileal context and the subhymenium.

Material Examined. Oregon: HOLOTYPE, FVDB 297*, 27 May 1972.

6. Coprinus marcidus VAN DE BOGART sp. nov. (Fig. 6).

Pileus primo glandulosus, dein conicus, postea planoconvexus, postremo revolutus, primo 4.0-5.0 mm longus, post expansionem 10.0 mm latus, pagina pilei primo pallide grisea vel alba, subter velo universali atrogrisea vel griseiatra, in maturatione pallidigrisea cum striis albis ubi pagina supra omnem tramam lamellarum, ad apicem atrogrisea, in maturatione profunde plicato-striata. Velo universali primo paginam pilei obscurans strato continuo fibrilloso atrogriseo vel subatro, quo demum in vestigia laciniosa finduntur et late disperguntur, cum paucis frustris amplioribus ad apicem pilei. Caro tenuis etiam ad apicem. Stipes cavus sed lumine columnam acquae capienti, gracilis vel filiformis, 3.5 cm longus, 0.6-1.1 mm crassus, versus apicem leviter angustatus, pallide griseus vel stramineus, ad basem haud translucidus, ad apicem semitranslucidus, pagina stipitis ad basem et ex parte sursum fibrillis grossis, strigosis, cinereis, obtectis, autem apice glabro; caro maxime tenuis, aquosa, fragilis. Lamellae anguste lanceolatae vel ellipsoideae, aliquot lamellulis, 2.0-4.3 mm longae, 1.0 mm latae, ab apice stipitis librae, autem lamellis longis omnibus ad collarium rundimentali affixis, primo confertae dein simul expansione pilei et conformatione plicato-

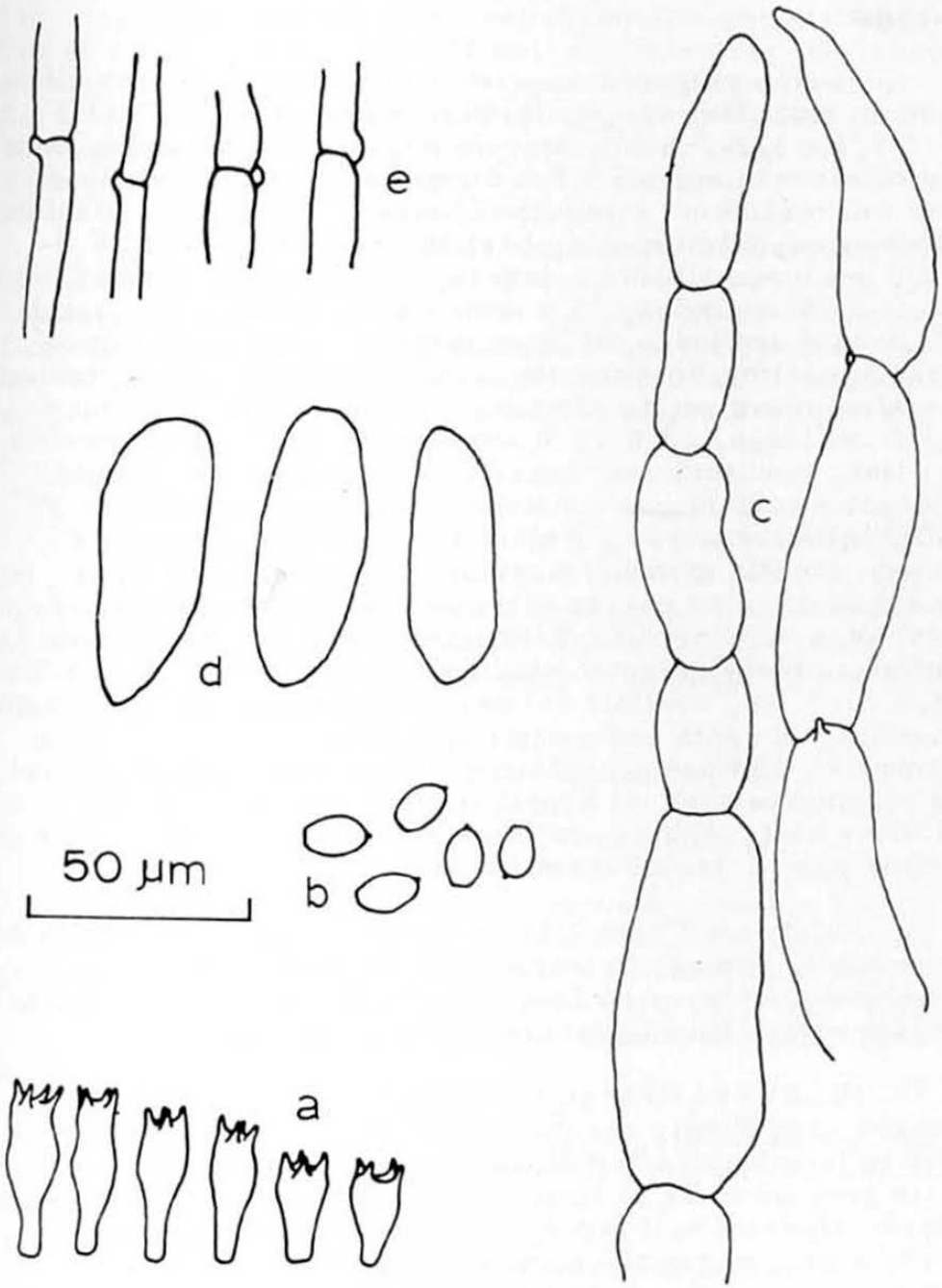

Fig. 6. Coprinus marcidus FVDB 2185, a. basidia, b. spores, c. universal veil, d. pleurocystidia, e. universal veil clamp connections.

striarum subdistantes, pallidae dein atrae, autolysis incompleta, solum marginibus per lysem affectis.

Sporae ellipsoideae, pro parte maxima per transectionem rotundae, aliquot leviter complanatae, 8.7-13.8 x 6.2-8.3 x 6.2-7.5 µm, apiculo grandi et prominenti, poro germinationis apicali 1.2-1.5 µm diam, in cumulo atrae, per microscopium atropurpureiatrae, laevigatae. Basidia tetraspora, trimorphica, basidia breviter clavata 20.0-22.0 µm longa, 10.0 µm crassa, basidia longe clavata 30.0-32.0 µm longa, 10.0 µm crassa, basidia ululiformia 35.0-36.0 µm longa, 10.0 µm crassa. Cheilocystidia praecocissime liquescentia. Pleurocystidia pauca, tantum proxime margine lamellorum inventa, ellipsoidea, 60.0-80.0 µm longa, 23.0-26.0 µm crassa, apicibus rotundatis, hyalina, tenuitunicata, laevia. Pagina pilei ex cellulis elongatis radiantibus constans, cellulae paginarum in 3% KOH pallidibrunneae. Velum universali in pileo et ad basem stipitis stratum fuscatum fibrillosum praebens, quem in maculas parvas irregulares findit, squamellas revolutas nihil prodit. Fibrillae et maculae catenarum cellularum elongatarum compositae, cellulis 50.0-100.0 x 10.0-27.5 µm, hyalinis vel pallide brunneis, tenuitunicatis, tumidis, ad septa constrictis, plerumque fibulatis, haud ramosis. Catinae nonnullae ad basium stipium parum vel haud tumidae sunt, et hyphis normalibus cylindraceis similes sunt. Fibulae in velo universali, in stipite, in trama pilei et lamellarum adsunt.

Holotypus FVDB 2185 in ligno inter muscos, in loco cognitionis naturae Universitatis Montanae, ad lacum Flathead dictum, pago Montana, 8 Sept. 1973, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first glandiform, then conic, then plano-convex, and finally revolute. Prior to expansion 4.0-5.0 mm in length and after expansion 10.0 mm in breadth. Pale grey or white at first under a dark grey to greyish black universal veil layer, then becoming pale grey with white striae where the surface overlies each lamellar trama, and dark grey at the apex. Surface becoming deeply plicate-striate. Universal veil at first obscuring the pileal surface with a continuous fibrillose dark grey to almost black layer that eventually splits into shredlike remnants and becomes widely scattered with a few larger fragments at the pileal apex. Flesh thin at the apex.

STIPE slender or filiform, 3.5 cm x 0.6-1.1 mm, tapering slightly from base to apex, hollow but with the lumen containing a column of water. Pale grey to glassy straw color, opaque at base to semitranslucent at apex. Surface covered with coarse and strigose grey fibrils at base and part way up the stipe, apical half glabrous. Flesh extremely thin, watery, and fragile.

LAMELLAE narrowly lanceolate or ellipsoidal, with some lamellulae, 2.0-4.3 x 1.0 mm, free from stipe apex but with all lamellae attached to a rudimentary collarium. Crowded at first then subdistant as plicate striation develops with pileal expansion, pale then soot black. Autodigestion incomplete, only the margins affected by lysis.

ODOR AND TASTE none.

SPORES ellipsoidal, 8.7-13.8 x 6.2-8.3 x 6.2-7.5 µm, mostly round in cross-section but with some larger spores slightly flattened, apiculus large and prominent, germ pore apical, 1.2-1.5 µm in diameter. Color en masse soot black, microscopically deep purplish black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 20.0-22.0 x 10.0 µm, long clavate and 30.0-32.0 x 10.0 µm, ululiform and 35.0-36.5 x 8.5-10.0 µm, all four-spored.

CYSTIDIA: Cheilocystidia probably present but not observed due to partially lysed condition of lamellar margins. Pleurocystidia few in number, located near the lamellar margins only, ellipsoidal, 60.0-80.0 x 23.0-26.0 µm, apices rounded, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially elongated cells, two to three times as long as broad, cell walls pale brown in 3% KOH.

UNIVERSAL VEIL present on pileus and at stipe base as a dark fibrillose layer that splits into small irregular patches but not into small upturned scales. Fibrils and patches composed of chains of elongate cells 50.0-100.0 x 10.0-27.5 µm, hyaline to pale brownish, thin walled, swollen, constricted at the septa , usually with clamp connections, unbranched. Some of the chains of cells present at stipe bases are little or not swollen and

resemble normal cylindrical hyphae.

CLAMP CONNECTIONS present on universal veil, on stipe, in pileal trama, and in the lamellar trama.

HABITAT lignicolous, on a piece of wood buried in a thick moss carpet on the floor of a conifer forest. Solitary.

Observations: This species possesses several distinctive features, of which the dark color of the veil and the pronounced absence of autodigestion except the lamellar margins are the most outstanding ones. More subtle but still distinctive characters are the pleurocystidia that are rather small and few in number, and the slightly colored cells of the pileal surface which are elongated radially but do bear some resemblance to the appearance of a cellular type of surface.

Material Examined. Montana: HOLOTYPE, FVDB 2185, 8 September, 1973.

7. Coprinus bubalinus VAN DE BOGART sp. nov. (Fig. 7).

Pileus primo oblongo-rotundatus dein ellipsoideus tum conicus, postea campanulatus, postremo aliquantum revolutus, primo 1.0-3.5 cm longus, post expansionem 3.0-6.0 cm latus; pagina pilei primo velo universali albo obtecta, velum universale fragile, mox in squamis irregularibus rumpens et paginam pilei melleam vel luteialutaceam vel pallide ochraceam manifestans, apice pilei concolori; pagina pilei aliquantum lubrica, in maturitate plicato-striata; caro bubalina, tenuis et fragilis, pileus per lysis omnino denigratus. Stipes cavus, aliquantum medullosus, materia medullosa in glaebis gelatinosis siccans; gracilis, leviter versus apicem contractus, primo 1.5-4.0 cm longus, 1.0-1.4 cm crassus, in maturitate 6.0-8.0 cm longus, 0.4-0.8 cm crassus, albidibubalinus, ubi contusus bubalinus, opacus; pagina stipitis obscure pruinosa in sporocarpis juvenibus, residua parva et evanescentia veli universalis circa 4.0 mm supra basim stipitis ferens; caro fragilis. Lamellae lanceolatae, 1.0-2.7 cm longae, 1.0-3.0 mm latae, confertae, librae vel leviter adnexae, primo albidibubalinae dein cinereiatrae et colubrinae, margines lamellarum immaturarum albidicinerei.

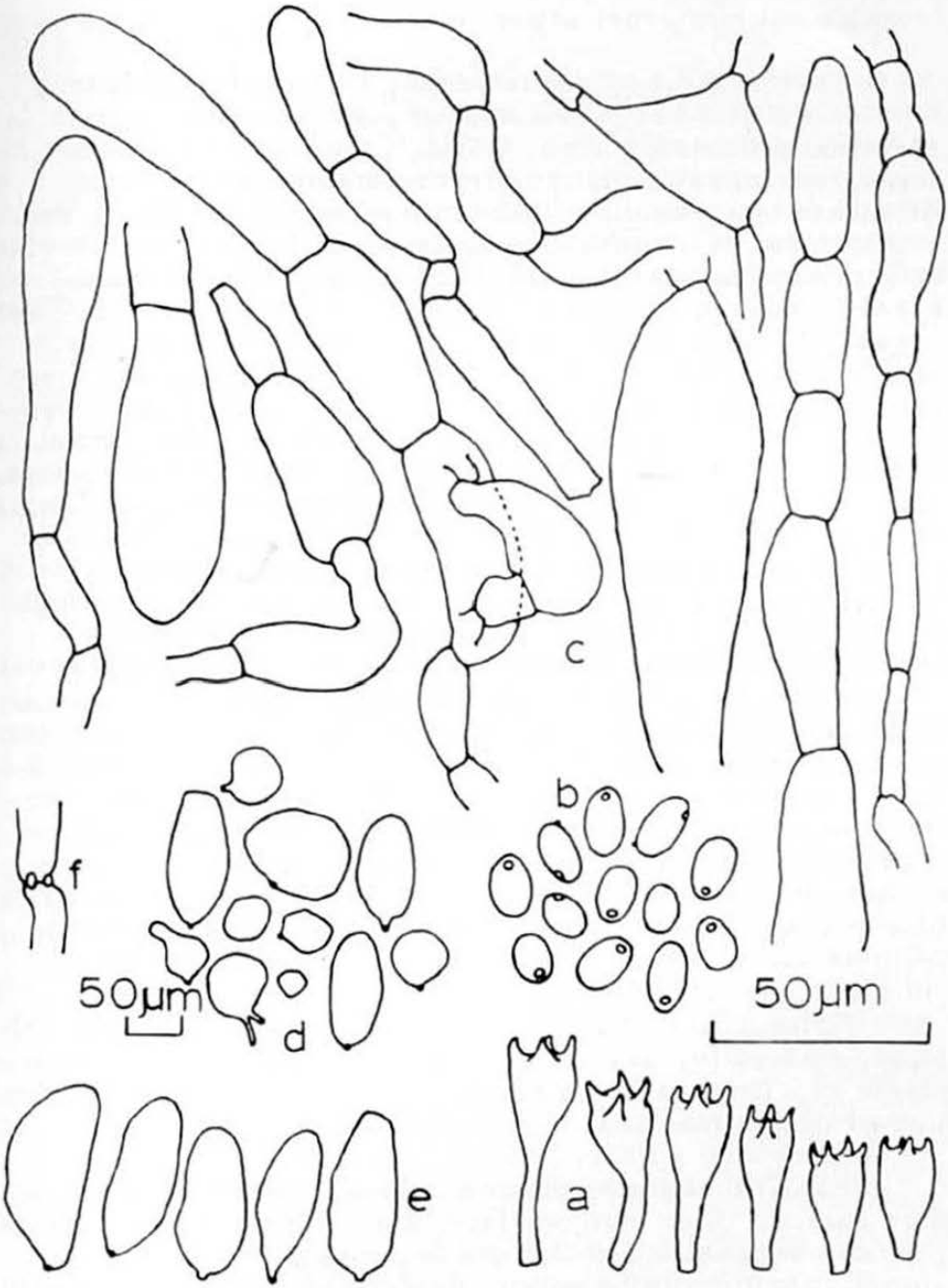

Fig. 7. Coprinus bubalinus FVDB 3821, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

Aliquot lamellulae adsunt. Autolysis completa. Odor fungalis vel humosus; sapor fungalis.

Sporae laeves, ellipsoideae, leviter complanatae, 10.0-14.1 x 6.7-8.5 x 6.2-6.8 µm, apiculo parvo, poro germinationis excentrico, 1.7-2.1 µm diam; in cumulo atrae, per microscopium purpureiatrae, et mox in 3% KOH brunneiatrae. Basidia tetraspora, trimorphica sed per formam et magnitudinem vix perfecte distincta; basidia breviter clavata 22.0-28.0 µm longa, 11.0-12.0 µm crassa, basidia clavata 34.0-39.0 µm longa, 11.0-12.0 µm crassa, basidia longe clavata 40.0-49.0 µm longa, 14.5 µm crassa. Cheilocystidia globosa et 10.0-50.0 µm diam vel ellipsoidea et 50.0-65.0 x 22.0-28.0 µm, aliquot pedicellis 0.1-5.0 µm longis, hyalina, rasilitunicata, tenuitunicata. Pleurocystidia ellipsoidea, 70.0-93.0 µm longa, 28.0-43.0 µm crassa, aliquot pedicellis 0.1-3.0 µm longis, hyalina, rasilitunicata, tenuitunicata, aliquot in lamellis crebe contiguis saepe per apicem inclusa. Pagina pilei in maturitate pro parte maxima e cellulis tumidis et elongatis radiantibus constans, aliquot cellulae isodiametrae adsunt. Velum universale coacteum vel arachnoideum vel pruinosum, primo super paginam pilei continuum, mox in fragmentis parvis et irregularibus ruptum, ex hyphas constans, quarum cellulae cylindriceae vel pertumidae 12.0-116.0 x 12.0-36.0 µm sunt; cellulae tumidae ad septa constrictae, nonnullae cellulae ramosae, omnes cellulae hyalinae, tenuitunicatae, laeves, hae ad apicem catenarum hypharum pro parte maxima clavatae et tumidae. Frustilla veli ad paginam pilei et ad basim stipitis ex eadem cellulae composita. Fibulae ad stipitem raro inventa.

Holotypus FVDB 3821 in ligno emortuo Juglantis vel Mori, Lafayette, in comitato Contra Costa pagi Californiae a cl. Thomas Duffy Aprileis 1976 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first rounded oblong, then ellipsoidal, then conical, then campanulate, finally somewhat revolute. Prior to expansion 1.0-3.5 cm in length and after expansion 3.0-6.0 cm in breadth. Surface at first covered with a white universal veil. Veil fragile, soon breaking up into irregular patches revealing a honey colored, yellow-tan to light ochre pileal surface. Color of pileal apex similar. Entire pileus blackens with lysis. Moderately plicate-striate. Surface under the veil somewhat lubricous. Margin of young pileus curved in to stipe. Flesh buff colored,

thin, fragile.

STIPE hollow and somewhat pithy. The pithy material drying into gelatinous lumps. Slender, slightly tapered, at first 1.5-4.0 x 1.0-1.4 cm, when mature 6.0-8.0 x 0.4-0.8 cm, whitish buff, bruising tan, opaque, surface faintly pruinose, small evanescent remnants of the universal veil present on young specimens about 4.0 mm above the base. Base merges into a fine white mycelium. Flesh fragile.

LAMELLAE lanceolate, some lamellulae also present, 1.0-2.7 cm x 1.0-3.0 mm, crowded, free or slightly adnexed, at first whitish tan, then mottled grey-black, immature lamellar margins whitish cinereous. Autolysis complete unless halted by drying.

ODOR fungoid or earthy. Taste fungal.

SPORES ellipsoidal, slightly flattened, 10.0-14.1 x 6.7-8.5 x 6.2-6.8 μm, lacking a perisporium, apiculus small, germ pore eccentric, 1.7-2.1 μm in diameter. Color en masse black, microscopically purplish black and soon deep brownish black in 3% KOH. Wall smooth.

BASIDIA trimorphic but not completely separate and distinct in sizes and shapes, short clavate and 22.0-28.0 x 11.0-12.0 μm, clavate and 34.0-39.0 x 11.5-12.0 μm, long clavate and 40.0-49.0 x 14.5 μm, all four-spored.

CYSTIDIA: Cheilocystidia globose 10.0-50.0 μm in diameter or ellipsoidal 50.0-65.0 x 22.0-28.0 μm, some with pedicel, 0.1-5.0 μm in length, hyaline, thin walled, smooth. Pleurocystidia ellipsoidal, 70.0-93.0 x 28.0-43.0 μm, some with pedicel, 0.1-3.0 μm in length, hyaline, thin walled, smooth. Some bridging between two opposing lamellae. No other cystidia present.

PILEAL SURFACE of mature sporocarps composed of swollen cells, mostly elongate in a radial direction, some isodiametric cells also present.

UNIVERSAL VEIL felt-like or arachnoid or pruinose, at first continuous over pileal surface, soon breaking up into small irregular patches, composed of hyphae with cylindrical to very swollen cells, 12.0-116.0 x 12.0-36.0 μm, the swollen cells with constricted septa, some cells

branched, all hyaline, thin walled, smooth. Cell at tip of hyphal chains mostly clavate-swollen. Same cell types present in veil remnants on pileus and stipe base.

CLAMP CONNECTIONS rarely present on stipe only.

HABITAT lignicolous, on walnut and mulberry slash, solitary or small clusters.

Observations: This species seems to be closely related to Coprinus sylvicola, C. marcidus and C. alutaceivelatus. The pithy material in the stipe of young sporocarps which upon drying becomes gelatin-like lumps is somewhat distinctive. C. bubalinus resembles C. alutaceivelatus in its overall appearance and the presence of eccentric germ pores on spores of both. It differs in its lack of pigmented pileal context and in having trimorphic basidia as opposed to dimorphic. The color of the pileal surface below the universal veil is much more yellow in C. bubalinus than the more nearly brown surface of C. alutaceivelatus.

Material Examined. California: HOLOTYPE, FVDB 3821*, April 1976.

8. Coprinus alutaceivelatus VAN DE BOGART sp. nov. (Fig. 8)

Pileus primo glandiformis dein conicus, postremo campanulatus, primo 1.0-2.0 cm longus, post expansionem 1.7-2.9 cm latus, pagina pilei infra velum universale primo alutacea apice mediocriter brunneo, in maturitate luteibrunnea infra velum universale alutaceum, et apice infra vestigia veli brunneo. Pagina pilei primo velo obtecta, dein plicato-striata infra vestigia parva, coactea et irregularia veli universalis. Caro tenuis et membranacea. Stipes cavus, contentuum omnino cassus, tenuissimus et versus apicem angustatus, 1.0-2.5 cm longus, 2.0-3.0 mm crassus, albus, impellucidus, pagina glabra et sericea, ad basim zona tenui annuliformi vel volviformi; caro modice crassa et fibrosa. Lamellae lanceolatae lamellulis numerosissimis, 0.8-12.5 mm longae, 1.0-3.0 mm latae, primo confertissimae, dein minus confertae, albae dein spadiceiatrae, postremo atrae, autolysis completa.

Sporae laevae, ellipsoideae, apicibus staturae

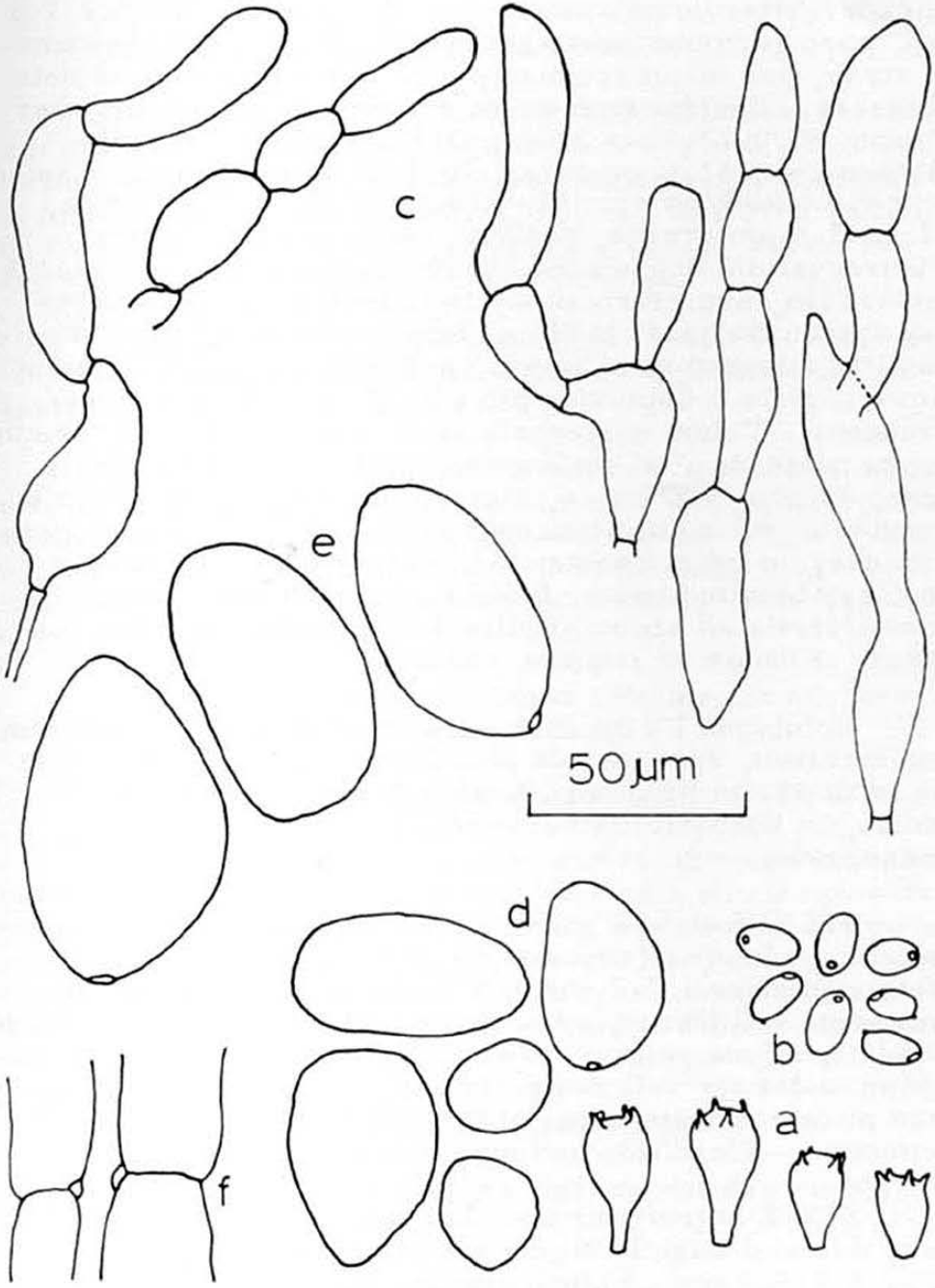

Fig. 8. Coprinus alutaceivelatus FVDB 2516, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections.

mediocris, pro parte maxima per transectionem rotundae, aliquot leviter complanatae, 8.7-11.3 x 6.2-8.8 x 6.2-7.5 µm, poro germinationis excentrico 1.2 µm diam, in cumulo atrae, per microscopium primo purpureibrunneae dein cinereae. Basidia tetraspora dimorpha, basidia breviter clavata 20.0-22.5 µm longa, 12.5 µm crassa, basidia clavata 26.2-32.5 µm longa, 12.5-15.0 µm crassa. Cheilocystidia globosa vel ellipsoidea, 22.5-70.0 µm longa, 22.5-45.0 µm crassa, hyalina, tenuitunicata, glabra. Pleurocystidia ellipsoidea, 56.0-75.0 µm longa 35.0-44.5 µm crassa, numerosissima, in lamellis contiguis saepe per apicem inclusa, hyalina, tenuitunicata, glabra. Pagina pilei aliquantum cellulosa, sed cellulis omnibus radiatim elongatis. Contextus pilei in 3% KOH pallide luteibrunneus. Velum universale alutaceum, coacteum, primo super paginam pilei continuum, mox in frustillis parvis irregularibus ruptum, e catenis plus minusve intertextis constante; cellulae catenarum cylindraceae vel magnopere tumidae, ad septa constrictae, raro ramosae, hyalinae, rasiles, tenuitunicatae, 2.5-23.0 µm crassae. Zona annuliformis ad basim stipitis e cellulis similaribus constans. Fibulae ad stipitem rarae.

Holotypus FVDB 2516, in solo et stramento foliorum coniferarum, sporocarpia laxe fasciculata, proxima Seattle in Comitato King pagi Washingtonis 20 Octoberis 1973 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first glandiform, then conical, then campanulate. Prior to expansion 1.0-2.0 cm in length and after expansion 1.7-2.9 cm in breadth. At first tan from universal veil tissue, apex under veil medium brown, with maturity pileus yellow-brown under the tan veil and apex brown under the veil remnants. Surface covered at first then plicate-striate under small felt-like irregular veil remnants. Flesh thin and membranous.

STIPE hollow, no mycelial web or thread present, very thin and slightly tapered towards the apex, 1.0-2.5 cm x 2.0-3.0 mm, white, opaque, surface glabrous and silky, faint annular or volval ring present at the base, flesh moderately thick and fibrous.

LAMELLAE lanceolate, lamellulae very numerous, 0.8-12.5 x 1.0-3.0 mm. at first very crowded, then less so. White, then brownish black, finally soot black.

Autolysis complete.

ODOR none. Taste not observed.

SPORES ellipsoidal, mostly round in cross-section, a few slightly flattened, 8.7-11.3 x 6.2-8.8 x 6.2-7.5 μm, lacking a perisporium, apiculus of medium size and usually visible, germ pore eccentric, 1.2 μm diameter. Color en masse soot black, microscopically purple-brown becoming greyish in 3% KOH. Wall smooth.

BASIDIA dimorphic, short clavate and 20.0-22.5 x 12.5 μm, clavate and 26.2-32.5 x 12.5-15.0 μm, all four-spored.

CYSTIDIA: Cheilocystidia globose to short ellipsoidal, 22.5 μm in diameter to 70.0 x 45.0 μm, hyaline, thin walled, smooth. Pleurocystidia ellipsoidal, 56.0-75.0 x 35.0-44.5 μm, very numerous, mostly bridging between two opposing lamellae, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE somewhat cellular but all the cells elongated in a radial direction.

PILEAL CONTEXT pale yellow-brown in 3% KOH.

UNIVERSAL VEIL felt-like and at first continuous over pileal surface, soon breaking up into small irregular patches, tan, composed of somewhat interwoven chains of cells. Cells cylindrical to greatly swollen, constricted at the septa, seldom branched, hyaline, smooth, thin walled. Cells 2.5-23.0 μm in diameter. Annular line at stipe base of similar cells.

CLAMP CONNECTIONS rare on stipe.

HABITAT terrestrial, on soil and conifer needle duff. Loosely clustered.

Observations: The tan color of the universal veil and yellow-brown pileal context are distinctive features of this species. The eccentric germ pore of this species and of C. bubalinus distinguish them from others of this section present in the western states.

Material Examined. Washington: HOLOTYPE, FVDB

2516*, 20 October, 1973.

9. Coprinus pachydermus VAN DE BOGART sp. nov. (Fig. 9).

Pileus primo glandiformis, dein conicus, postea campanulatus, postremo revolutus et aliquantum laciniatus, primo 0.8-1.1 cm longus, post expansionem 3.0 cm latus, primo pallidicinereialbus et ad apicem brunneus, in maturitate atrans; pagina pilei leviter striata, glabra, laevis, primo velo universali obtecta; velum universale laxum, facile depulsandum et perdendum, hyalinum vel pallidibrunneum, fibroso-squamatum, squamae ubi novae guttulas parvas lucentibus ferentes. Caro tenuis et membranacea. Stipes cavus, tenuis et gracilis, e basim versus apicem leviter decrescens, 6.0-8.5 cm longus, 2.0-3.0 mm crassus, albus, leviter translucidus, pagina stipitis ad apicem leviter lanata vel sericea, ad basim gradatim lanatior; caro tenuis et fragilis. Lamellae angustae lanceolatae, 4.0-10.0 mm longae, 2.0-3.0 mm crassae, librae et remotae, pallidae dein atrae; lamellulae adsunt; autolysis completa.

Sporae ellipsoideae, per transectionem fere rotundae, 10.0-11.5 x 6.0-6.4 µm, apiculo grandi, poro germinationis apicali, 1.2-1.4 µm diam; in cumulo atrae, per microscopium atrobrunneae, laeves, guttulam unam capientes. Basidia tetraspora, dimorphica, basidia breviter clavata 16.5 x 19.0 µm longa, 7.0-8.0 µm crassa, basidia longe clavata 25.0-27.5 µm longa, 7.5 µm crassa. Cheilocystidia verisimiliter adsunt, sed praecocissime diffluentia. Pleurocystidia sparsa, in pagina omni lamellarum ubique late disseminata, subglobosa et 45.0-50.0 µm diam, vel breviter ellipsoidea et 68.0 µm longa, 40.0-48.0 µm crassa, apicibus rotundus, hyalina, tenuitunicata, laevia. Pagina pilei e cellulis radiantibus constans. Velum universale e squamis parvis, albis, ascendentibus constans, quas e fasciculis catenarum cellularum, ellipsoidearum vel subcylindracearum constantibus, catenae cellularum saepe plus quam 1200 µm longae, singulae cellulae 50.0-210.0 x 10.0-45.0 µm, hyalinae, pro maxima parte aliquantum tumidae et ad septa constrictae, aliquae tenuitunicatae sed maximam partem tunicis usque ad 1.5 µm crassis, laevis, plerumque fibulatis, haud ramosis. Fibulae in velo universali, contexto pilei, insuper aliquot in pagina stipitis.

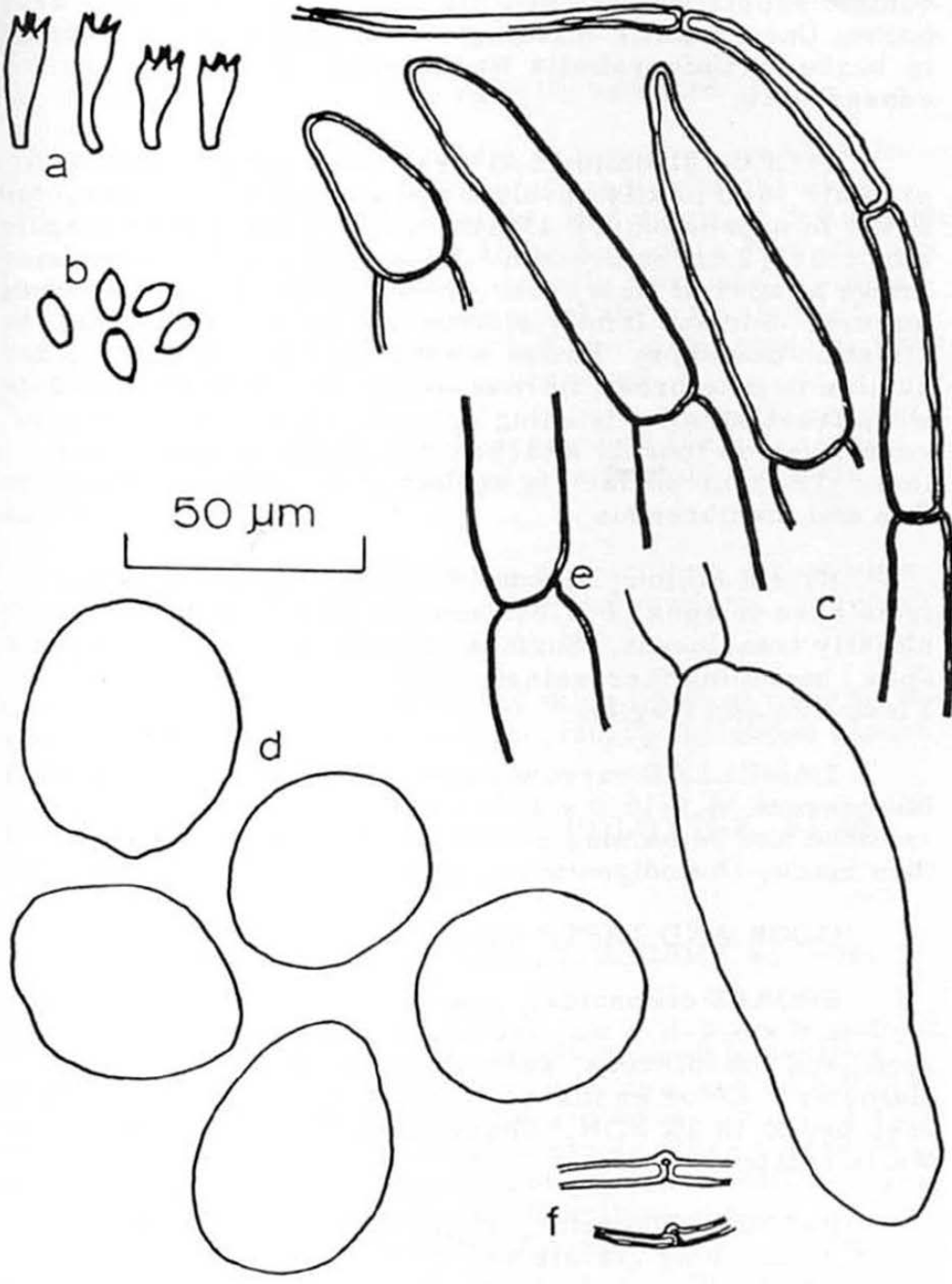

Fig. 9. Coprinus pachydermus FVDB 237, a. basidia, b. spores, c. universal veil, d. pleurocystidia, e. stipe clamp connection, f. universal veil clamp connections.

Holotypus FVDB 237, lignatilis, in turmis parvis in cumulo scobis putrescentis, in insula Foster dicta in arboreto Universitatis Washingtonis 5 Octoberis 1971 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS glandiform at first, then conic, then campanulate, and finally revolute and somewhat laciniate. Prior to expansion 0.8-1.1 cm in length and after expansion 1.8-2.2 cm in breadth. Pale grey-white to medium brown at apex at first, then generally darkening as spores mature. Surface faintly striate, but very little plicate striation develops. Entire surface covered at first by a hyaline to pale brown fibrous-scaly universal veil, and when fresh small glistening drops are present. The universal veil is loosely attached and easily dislodged and lost. The true surface is smooth and glabrous. Flesh thin and membranous.

STIPE hollow, slender and thin, tapered slightly from base to apex, 6.0-8.5 cm x 2.0-3.0 mm. White, slightly translucent. Surface slightly wooly to silky at apex, becoming increasingly wooly towards the base. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, some short lamellae present, 4.0-10.0 x 2.0-3.0 mm, free and remote, crowded and remaining so until destroyed by lysis, pale then black. Autodigestion destroys the entire pileus.

ODOR AND TASTE none.

SPORES ellipsoidal, nearly round in cross-section, 10.0-11.5 x 6.0-6.4 μm, lacking a perisporium, apiculus large and conspicuous, germ pore apical, 1.2-1.4 μm in diameter. Color en masse soot black, microscopically deep brown in 3% KOH. Spores mostly with one guttule. Walls smooth.

BASIDIA dimorphic, short clavate and 16.5-19.0 x 7.0-8.0 μm, long clavate and 25.0-27.5 x 7.5 μm, all four-spored.

CYSTIDIA: Cheilocystidia probably present but destroyed by lysis of lamellar margin. Pleurocystidia scattered widely over entire lamellar face, not plentiful, not bridging the interlamellar spaces, subglobose and 45.0-

50.0 μm in diameter or short ellipsoidal and 68.0 x 40.0-48.0 μm, apices rounded, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL present on pileus as small white upturned loose scales composed of bundles of chains of ellipsoidal to subcylindrical cells, the chains of cells often exceeding 1200 μm in length. Individual cells 50.0-210.0 x 10.0-45.0 μm in size, hyaline, mostly somewhat swollen and constricted at the septa, some of them thin walled but most with walls up to about 1.5 μm thick, smooth, usually with clamp connections, unbranched.

CLAMP CONNECTIONS present on the universal veil, in the pileal trama, and also (a few) on the stipe surface.

HABITAT lignicolous or sublignicolous, on an open compost pile of rotting wood chips and sawdust. In loose groups.

Observations: The exceptionally thick walls of most of the cells of the universal veil and the short subglobose pleurocystidia are distinctive.

Material Examined. Washington: HOLOTYPE, FVDB 237*, 5 October, 1971.

10. Coprinus tectisporus VAN DE BOGART sp. nov. (Fig. 10).

Pileus primo elongato-glandiformis dein conicus, postea campanulatus, postremo revolutus, primo 1.0-1.4 cm longus, post expansionem 1.0 cm latus, primo pallidus et fere albus, dein cinereus et squamas albas ferens, ad apicem atrogriseus, in maturitate plicato-striatus; pagina pilei primo velo universali alba fibrillosa obtecta, velum universale ex fibrillis parallelis constans, per expansionem pilei in squamis parvis, laxis, albis, recurvatis rumpens et pagina laevis et glabra pilei ergo expositur; caro tenuis et fragilis etiam ad apicem. Stipes cavus, gracilis, 4.0-5.0 cm longus, 1.5-3.0 mm latus, aliquantum ad basim tumidus et in substrato usque ad 1.0 cm insertus, e basi ad apicem angustatus, basis annulo fibrillae ornata,

quo locum monstrat, ubi margo pilei inexpansi affixus fuit, pagina alba, impellucida, minute fibrillosa fere usque ad apicem; caro tenuis et fragilis. Lamellae lanceolatae, 0.4-1.3 cm longae, 3.0 mm latae, librae vel annexae, primo creberrimae dein minus confertae, pallidae dein purpureiatrae; lamellae aliquot adsunt; autolysis completa.

Sporae ellipsoideae, per transectionem rotundae, 10.9-15.0 x 7.5-8.8 µm, poro germinationis apicali, 2.4-2.6 µm diam; in cumulo purpureiatrae, per microscopium atropurpureae vel fere atrae et impellucidae, crassitunicatae, tunica 1.8-1.9 µm crassa, primo in 3% KOH rasilitunicata, demum post intervallum brevem et pressione leni, perisporium laxum et pallidibrunneum depulsum est. Basidia tetraspora, dimorphica, basidia clavata 18.0-23.0 µm longa, 10.0 µm crassa, basidia ululiformia 28.0-31.5 µm longa, 10.0 µm crassa. Cheilocystidia proparte maxima globosa et 18.5-39.0 µm diam, aliquot ellipsoidea et 40.0 µm longa, 20.0 µm crassa, rasilitunicata, hyalina. Pleurocystidia late ovata vel ellipsoidea, 77.5-137.7 µm longa, 42.5-55.0 µm crassa, numerosissima, rasilitunicata, hyalina. Pagina pilei ex hyphas cylindraceas radiantes constans. Velum universale ad paginam pilei pro squamis quibus catenarum cellularum laxe aggregatis constatis sunt, et ad basem stipitis pro fimbria catenarum cellularum similaribus; cellulae in quoque catena maximam partem tumidae et ad septis constrictae sed cellulae aliquot cylindricae et haud tumidae; cellulae omnes tenuitunicatae, laeves, hyalinae, 37.5-313.0 x 5.0-52.5 µm. Fibulae in velo universali, in trama lamellarum, et sparse in stipite.

Holotypus FVDB 2171, solitarius vel fasciculatus in solo tepidarii ad Universitate Washingtonis, Seattle, comitato King pagi Washingtonis, Martii 1950 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

PILEUS at first long glandiform, then becoming conic, then campanulate and finally revolute. Prior to expansion 1.0-1.4 cm in length and after expansion 1.0 cm in breadth. Pale whitish at first then becoming grey with whitish scales, apex becoming dark grey. Fine plicate striations develop as pileus expands. Surface at first covered with a white fibrillose universal veil composed of parallel fibrils which soon breaks up into small, loose, white, recurved scales, exposing the smooth, glabrous surface. Flesh thin and fragile even at the apex.

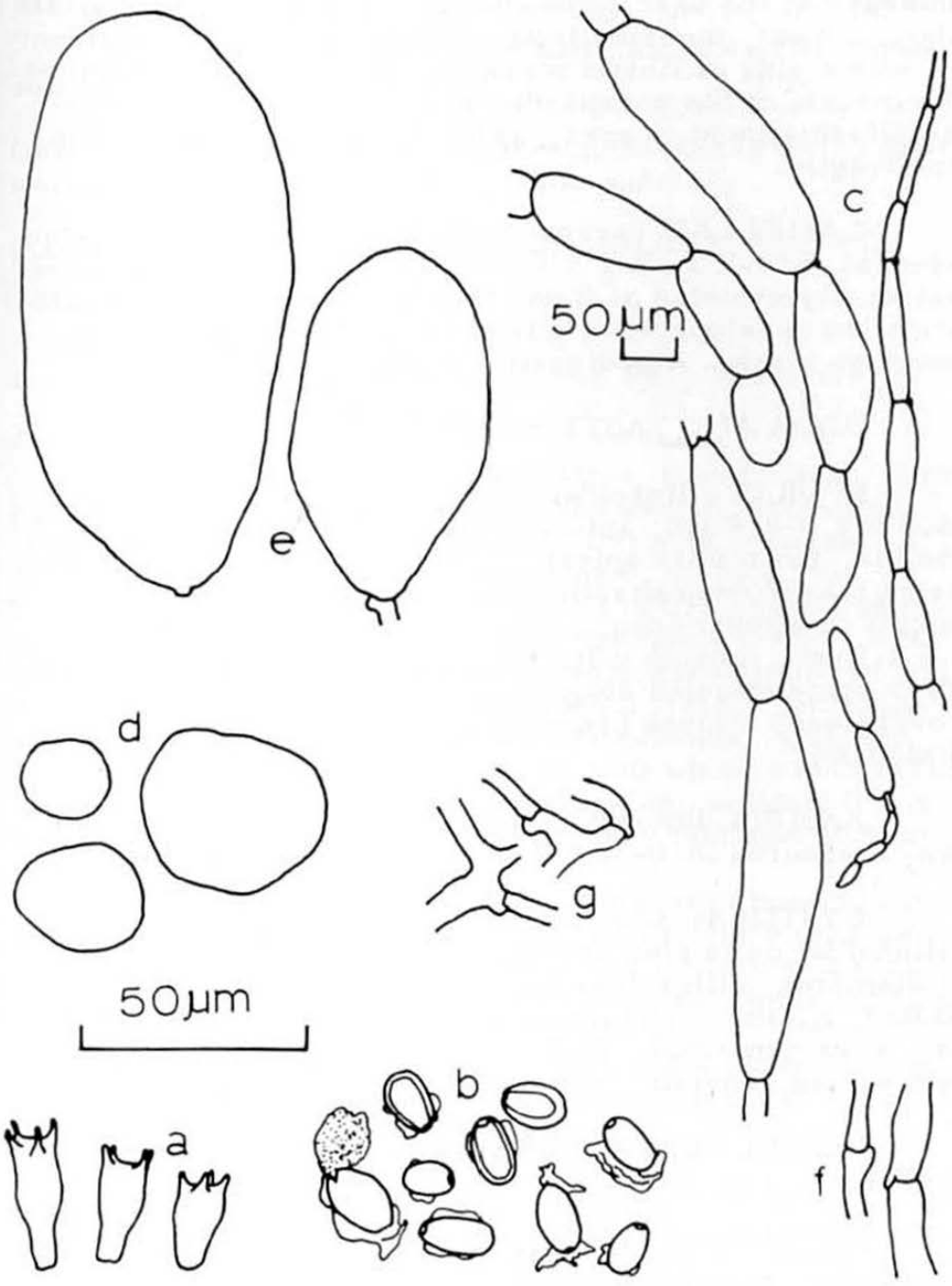

Fig. 10. Coprinus tectisporus FVDB 2171, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. lamellar trama clamp connections.

STIPE hollow, slender, 4.0-5.0 cm x 1.5-3.0 mm, enlarged at the base somewhat and inserted into substrate about 1.0 cm, tapering from base to apex, base ornamented with a ring of fibrils marking the site of attachment of the margin of the unexpanded pileus. Surface minutely fibrillose almost to apex, white and opaque. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, some lamellulae present, 0.4-1.3 cm x 3.0 mm, free and close to adnexed, extremely crowded at first, then less crowded as plicate striation develops when pileus expands, pale then deep purplish black. Autodigestion complete.

ODOR AND TASTE not observed.

SPORES ellipsoidal, round in cross-section, 10.9-15.0 x 7.5-8.8 µm, apiculus medium sized and generally visible, germ pore apical, 2.4-2.6 µm in diameter. Color en masse deep purplish black, microscopically deep purple to almost opaque black in 3% KOH. Walls thick, 1.8-1.9 µm, smooth when first mounted in 3% KOH, then, after some minutes soaking and gentle pressure on the coverglass, a loose brownish perisporium may be dislodged.

BASIDIA dimorphic, clavate and 18.0-23.0 x 10.0 µm, ululiform 28.0-31.5 x 10.0 µm, all four-spored.

CYSTIDIA: Cheilocystidia mostly globose but some ellipsoidal cells also present, globose and 18.5-39.0 µm in diameter, ellipsoidal and 40.0 x 20.0 µm, smooth, thin walled, hyaline. Pleurocystidia broadly ovate to ellipsoidal, very numerous, 77.5-137.5 x 42.5-55.0 µm, hyaline, thin walled, smooth. No other cystidia present.

PILEAL SURFACE of radially oriented cylindric hyphae.

UNIVERSAL VEIL present on pileus as scales composed of loosely aggregated chains of cells, and at the base of the stipe as a fringe of similar chains of cells. Most cells in each chain are swollen and constricted at the septa, some cells cylindrical and not swollen, all thin walled, smooth, hyaline, 37.5-313.0 x 5.0-52.5 µm.

CLAMP CONNECTIONS present on universal veil, in

lamellar trama, and a few in the stipe.

HABITAT terrestrial, on soil mix in a greenhouse, solitary or in loose clusters.

Observations: The perisporium and thickness of the spore wall are distinctive features of this species.

Material Examined. Washington: HOLOTYPE, FVDB 2171, March 1950.

11. Coprinus fimetarius Linn. per Fr., Epicrisis, p. 245, 1838. (Fig. 11).

PILEUS at first long glandiform, then conical, then campanulate and finally revolute and usually somewhat laciniate prior to complete lysis. Prior to expansion 0.2-3.0 cm in length and after expansion 0.3-2.4 cm in breadth, eventually always about 0.1 to 0.4 cm due to pileal lysis. Dingy greyish white or greyish brown at first with a cuticular layer of white or dark greyish brown and often remaining brownish at apex until lysis. Some plicate striation develops as the pileus expands. Surface covered at first by white universal veil which soon breaks up into loose, somewhat upturned scales, the actual surface being smooth and glabrous. Flesh thin and fragile.

STIPE hollow, slender, tapering from base to apex, 1.5-15.0 cm x 0.5-4.0 mm, base often slightly enlarged and usually with an obscurely scaly or tomentose area that sometimes forms a vague annular zone where the margin of the unexpanded pileus rested on the stipe. Surface mostly smooth and glabrous except for the tomentum on the base, white and opaque, or subtranslucent in smaller specimens. Flesh thin and fragile.

LAMELLAE narrowly lanceolate, mostly or entirely elongate, 0.2-2.8 cm x 2.0-5.0 mm, free, crowded and then less so as pileus expands and plicate striation develops, white, then brownish, then finally soot black. Autodigestion complete.

ODOR AND TASTE none.

SPORES oblong-ellipsoidal, occasionally slightly reniform in lateral view, round in cross-section, 10.0-

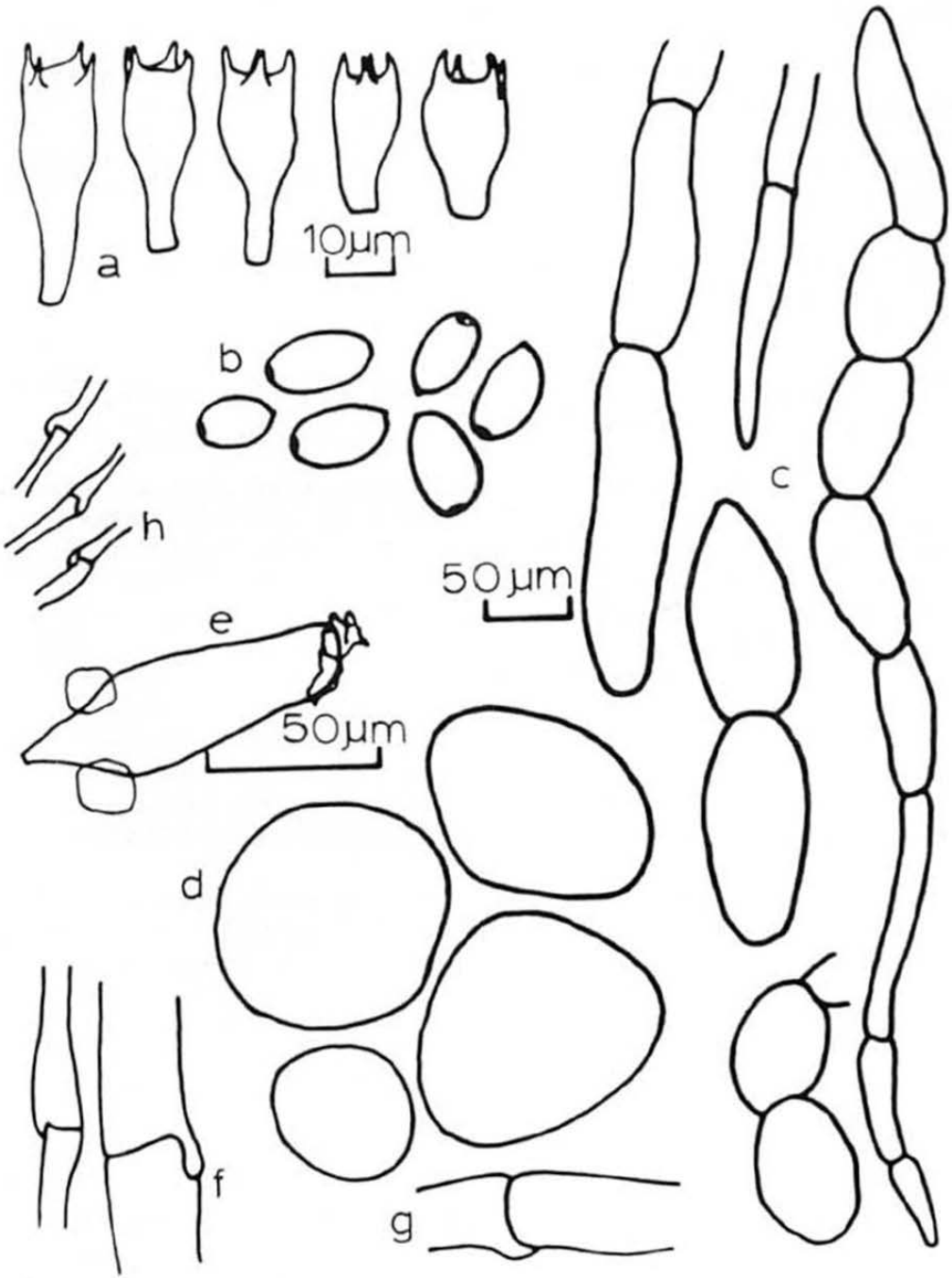

Fig. 11. Coprinus fimetarius FVDB 41, a. basidia, b. spores, c. universal veil, d. cheilocystidia, e. pleurocystidia, f. stipe clamp connections, g. universal veil clamp connection, h. lamellar trama clamp connections.

15.6 x 6.2-9.2 μm, lacking a perisporium, apiculus small to large and usually visible, germ pore apical, (0.4-)1.3-2.3 μm in diameter. Color in masse soot black or deep purplish black or deep brownish black, microscopically deep purple or deep brown or opaque black in 3% KOH. Walls smooth.

BASIDIA trimorphic, short clavate and 15.0-18.5 (-22.5) x 8.8-10.0(-12.5) μm, long clavate and 22.5-25.0 (-27.5) x 8.8-10.0(-12.5) μm, subululiform or ululiform and 27.5-37.5 x 8.8-10.0(-12.5) μm, all four-spored.

CYSTIDIA: Cheilocystidia mostly globose 12.5-44.0 μm in diameter, a few ellipsoidal cells sometimes present 42.5 x 20.0 μm, smooth, thin walled, hyaline, often largely fused together and uniting adjacent lamellae. Pleurocystidia long ellipsoidal, 50.0-90.0 x 12.5-35.0 μm, apices generally rounded but occasionally lageniform, bridging interlamellar spaces, smooth, thin walled, hyaline, very numerous. No other cystidia present.

PILEAL SURFACE of radially oriented hyphae.

UNIVERSAL VEIL of scales on pileus, each scale composed of parallel chains of cells. Similar chains of cells make up the tomentum at the stipe base. The cells of these chains are swollen and constricted at the septa, thin walled, hyaline, smooth, and almost entirely unbranched, 62.0-200.0 x 5.0-63.0 μm.

CLAMP CONNECTIONS present on universal veil, on pileal surface, on stipe surface, and in pileal and lamellar trama.

HABITAT coprophilous or subcophophilous, on herbivore dung and rotting hay and straw. Solitary to loosely clustered.

Observations: Confusion over the identity and name of this species and C. macrorhizus, C. lagopus, and C. cinereus apparently has existed since the earliest attempts at solving the taxonomy of these similar-appearing taxa.

Of these four coprophilous taxa, of which I consider several to be synonymous, C. fimetarius is the first one described by Fries in Epicrisis (1838), and hence is the name accepted here as having priority for the species.

Buller (1924, 1934) accepted the name of C. lagopus for this species and considered C. fimetarius and C. cinereus to be synonyms. Against Buller's usage of these names, however, are the facts that C. cinereus was used for the common woodland (lignicolous?) species by S. F. Gray (1821), and in the Epicrisis C. fimetarius takes precedence over C. lagopus by page priority.

Coprinus macrorhizus has been accepted by some as a valid species, by others as a variety of C. fimetarius, and by still others it is considered synonymous with C. fimetarius or whatever name they happened to use for the common coprophilous taxon. Buller (1924, 1931, 1934) considered C. fimetarius (as C. lagopus) and C. macrorhizus to be two separate species and cites one obscure reference (1931, p. 193) of monospore culture incompatibility but his list of comparative features consists largely of rather minor differences and leaves room for doubt about the specific nature of C. macrorhizus. The problem of the status of the pseudorhiza-forming taxon probably will not be solved until monosporic cultures of it are used again in compatibility tests with monosporic cultures of the more common taxa readily assigned to C. fimetarius.

One collection, FVDB 1721, differed from the others of this taxon in that its pileal surface became gelatinized and even viscid prior to autodigestion, and the basidia were markedly larger than those of the other collections. Also the germ pore of the spores of this collection were markedly smaller (0.4-1.0 μm in diameter) than those of the other collections.

Material Examined. Washington: FVDB 41*, 88, 126, 209, 212, 278, 280, 283, 1719, 1721, 2125, 2130.

12. Coprinus macrorhizus Pers. per Rea, Brit. Basid., p. 503, 1922. var. macrorhizus (Fig. 12).

PILEUS at first glandiform, then conic, then campanulate, and finally revolute, prior to expansion 1.0-3.6 cm in length and after expansion 1.5-4.0 cm in breadth. At first mostly white to grey-white and pale brown or yellow-brown at the apex with a thin loose layer of white fibrillose or somewhat scaly universal veil, then becoming dark grey or dark grey-brown especially at the apex. Some plicate striation develops. Surface under the univer-

sal veil smooth and glabrous, lubricous when fresh. Flesh thin and fragile.

STIPE hollow, slender, tapered from the somewhat enlarged base to the apex, 6.0-23.5 cm x 1.0-6.5 mm, of which up to 8.0 cm or more may consist of a radicating process that arises at the base and usually penetrates the substratum 2.0-8.0 cm or more. The radicating process is more fleshy than the exposed portion of the stipe and may be almost solid with little or no lumen. Surface smooth and glabrous to thinly fibrillose, especially at the enlarged base where the unexpanded pileal margin was attached. Flesh somewhat fibrous but also rather thin and fragile.

LAMELLAE lanceolate, mostly full length, 0.8-3.4 cm x 3.0-6.0 mm, free, crowded at first then less so as some plicate striation develops when pileus expands, white, then pale brown, then brownish black to purplish grey, and finally soot black. Autodigestion complete.

ODOR AND TASTE none.

SPORES broadly ellipsoidal, round in cross-section, 12.5-15.6 x 7.7-8.8 μm, apiculus large and visible unless obscured by opacity of the spore wall, germ pore apical, 1.4-1.9 μm in diameter. Color en masse dark brownish black to soot black, microscopically dark purplish black to almost opaque with a faint purple tint in 3% KOH. Walls smooth.

BASIDIA dimorphic, short clavate and 17.5-22.5 x 8.5-10.0 μm, long clavate to subululiform and 27.1-37.8 x 7.4-12.6 μm, all four-spored.

CYSTIDIA: Cheilocystidia continuous with and resembling the brachybasidioles of the hymenium although larger, 15.0-25.0 μm in diameter, roughly globose or at least subisodiametric. In an immature pileus these brachybasidioles or cystidiumlike cells form a continuous membrane from one lamella to the adjacent one and thus form a temporary closed interlamellar space. Pleurocystidia ellipsoidal, bridging, with the cell apex usually deeply embedded in the opposing lamella and, if forcibly dislodged, carrying away with it cell wall fragments from the opposing lamella, 62.5-88.0 x 26.8-42.8 μm, hyaline, thin walled, smooth, very abundant. No other cystidia

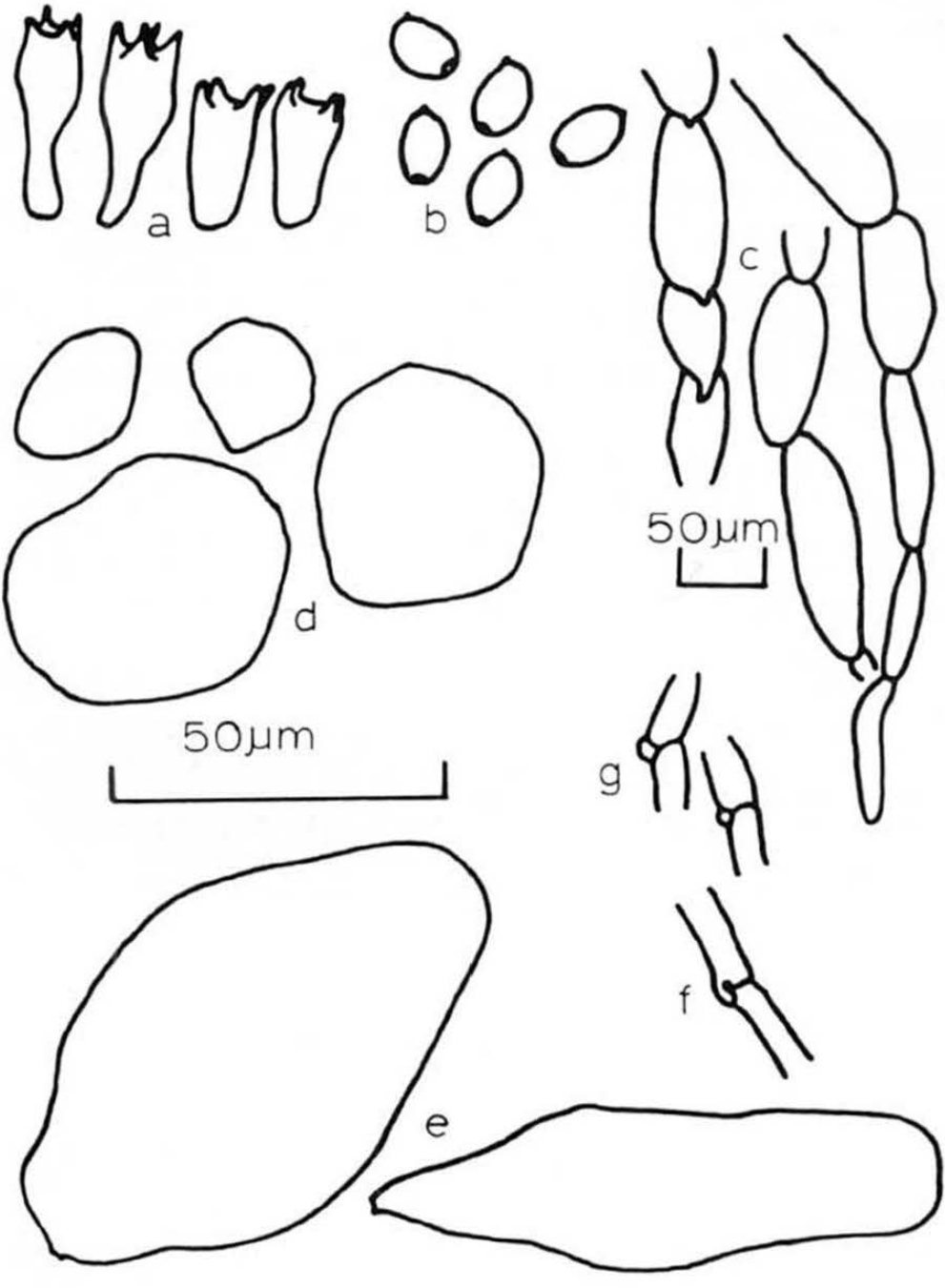

Fig. 12. Coprinus macrorhizus var. macrorhizus FVDB 141, a. basidia, b. spores, c. universal veil, f. pileal trama clamp connection, g. lamellar trama clamp connections, FVDB 1893, d. cheilocystidia, e. pleurocystidia.

present.

PILEAL SURFACE of radially oriented cylindrical hyphae. In one collection (FVDB 1893) there is a layer of pigmented cells in the pileal trama.

UNIVERSAL VEIL mostly on pileus as white scales and fibrils composed of long chains of cylindrical to ellipsoidal cells, 12.5-74.6 x 5.0-54.0 μm, swollen, constricted at the septa, thin walled, hyaline, smooth, unbranched, usually with a clamp connection at each septum, the individual chains of cells about 1400 μm long. Often some universal veil cells or chains of cells also present on stipe base.

CLAMP CONNECTIONS present on universal veil, on stipe, and sometimes in lamellar trama.

HABITAT coprophilous or subcoprophilous, on rotting hay, straw, horse dung, and on a synthetic fly larva medium. Solitary or in loose clusters.

Observations: As mentioned previously, this taxon may be synonymous with C. fimetarius. However, the few morphological differences, such as smaller size of universal veil cells, the presence of a radicating process on the stipe and the dimorphic basidia, seem to be constant.

Material Examined. Washington: FVDB 141*, 1893*.

13. Coprinus macrorhizus var. microsporus (Hongo) Van De Bogart, nov. stat., (Fig. 4)

Basionym: C. macrorhizus Rea f. microsporus Hongo, Journ. of Japanese Bot., 27: 161, 1952.

As described in variety macrorhizus except that the spores are smaller (7.5-11.2 x 5.0-6.9 μm), and the pileal apex is yellowish.

Material Examined. Washington: FVDB 115*.

14. Coprinus cinereus Schaeff. per S. F. Gray, Nat. Arr. Brit. Plants, p. 634, 1821. var. cinereus (Fig. 13).

PILEUS at first long glandiform, then conic, then campanulate, and finally revolute and laciniate, prior to expansion 1.5-3.5 cm in length and after expansion 2.0-6.0 cm in breadth. At first white to pale brown (and darker brown at apex) under a white universal veil layer, then becoming dark grey to grey-brown as the spores mature. Striate from the first, then becoming deeply plicate-striate. Surface under the universal veil smooth and glabrous and lubricous when fresh. Universal veil of fibrils and scales, loose and easily lost. Flesh thin and fragile.

STIPE hollow, slender, often somewhat enlarged at base, tapered from base to apex, 5.0-18.0 cm x 1.7-7.0 mm. White and opaque to slightly translucent in small specimens. Surface sometimes smooth and glabrous but often with strigose woolly fibrils at the base of the stipe. Flesh thin and fragile especially when fully expanded.

LAMELLAE narrowly lanceolate, sometimes with numerous lamellulae also present, 0.5-3.3 cm x 1.0-6.0 mm, free to adnexed, crowded at first then less so as plicate striation develops when pileus expands, pale, then brownish, and eventually soot black. Autodigestion consumes most or all of the pileus.

ODOR AND TASTE none.

SPORES ellipsoidal, round in cross-section, 9.0-15.0 x 5.6-8.1 μm, apiculus small but usually visible, no well-defined suprahilar flattening, germ pore apical, 1.5-2.7 μm in diameter. Color en masse deep brownish black to soot black, microscopically deep chestnut brown to deep purple-black or almost opaque in 3% KOH. Contents sometimes guttulate, sometimes not. Wall smooth.

BASIDIA trimorphic, short clavate and 17.5-22.0 x 8.0-11.2 μm, long clavate to subululiform and 26.0-31.2 x 8.5-11.2 μm, ululiform and 32.0-37.5 x 8.1-11.2 μm, all four-spored.

CYSTIDIA: Cheilocystidia somewhat variable, some globose, some broadly ovate, and some ellipsoidal, globose, 18.7-65.0 μm in diameter, broadly ovate to ellipsoidal, 48.0-112.5 x 16.0-75.0 μm, smooth, thin walled, hyaline. The cheilocystidia tend to be fused into a membrane uniting adjacent lamellae. Pleurocystidia ellipsoidal,

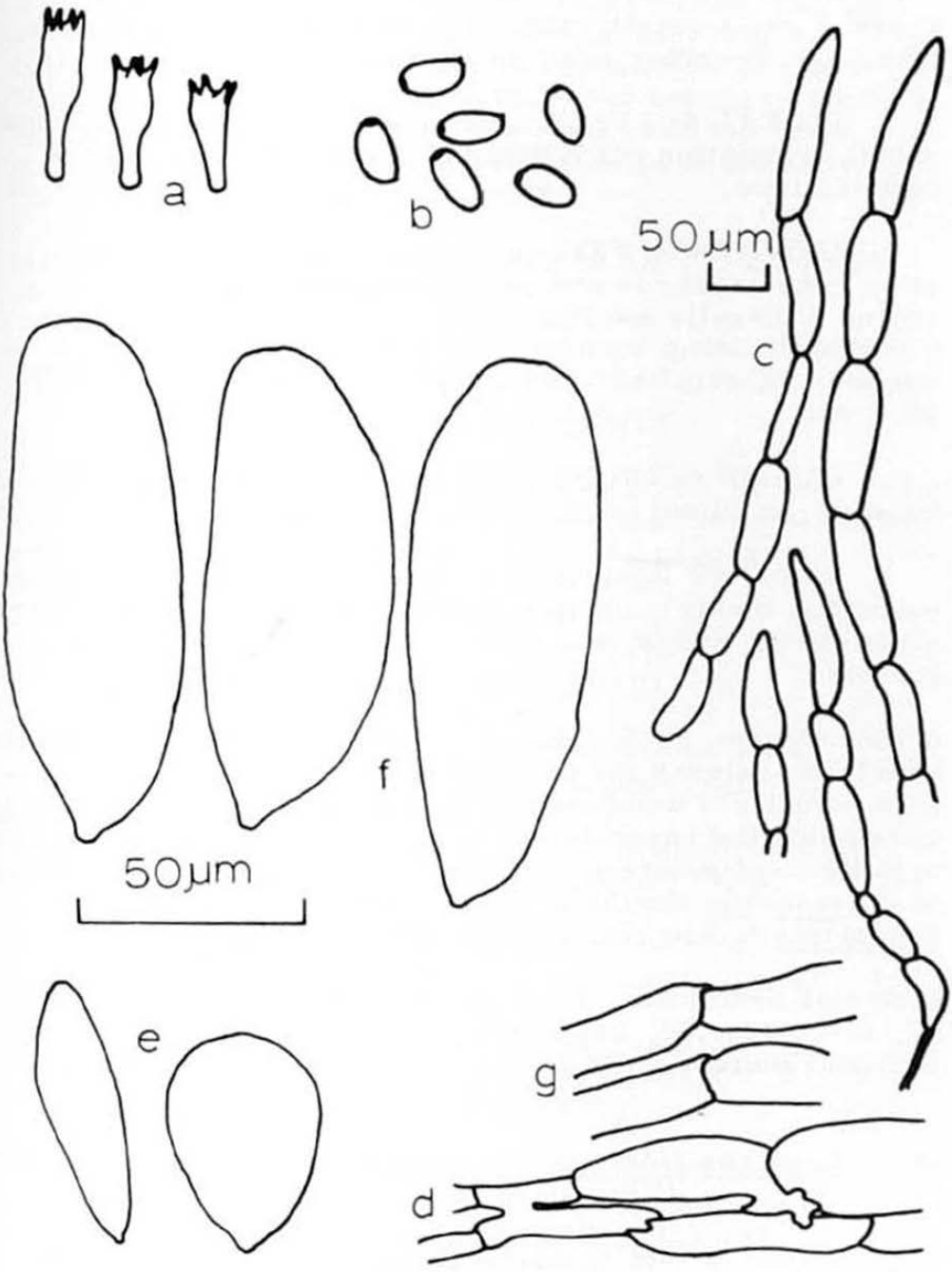

Fig. 13. Coprinus cinereus var. cinereus FVDB 1740, a. basidia, b. spores, e. cheilocystidia, f. pleurocystidia, FVDB 244, c. universal veil, d. universal veil, g. universal veil clamp connections.

108.0-192.5 x 40.0-95.0 μm, often with a short pedicel 2.0-4.0 μm in length, smooth, thin walled, hyaline, bridging. No other cystidia present.

PILEAL SURFACE composed of cells elongated in a radial orientation but bearing some resemblance to the cellular type.

UNIVERSAL VEIL present on pileus and often on stipe base as fibrils and scales that are composed of chains of usually swollen cells, constricted at the septa, (often with clamp connections) hyaline, thin walled, smooth, unbranched. Individual cells 30.0-350.0 x 7.0-56.0 μm.

CLAMP CONNECTIONS present on universal veil, on stipe, in pileal trama, and in lamellar trama.

HABITAT lignicolous or seemingly terrestrial (but on buried wood?), on soil, forest litter, wood chips, hardwood sticks, twigs, and stumps. Solitary or in loose clusters.

Observations: S. F. Gray (1821) indicated that the taxon to which he assigned the name of C. cinereus was this common (usually?) woodland lignicolous species. C. cinereus resembles the coprophilous C. fimetarius in almost every detail except substrate and habitat, so monospore cultures of C. cinereus should be confronted with those of C. fimetarius to determine if they are compatible or not.

Material Examined. Washington: FVDB 33, 34, 43, 51, 57, 187, 202, 203, 227, 244*, 250, 1123, 1729, 1740*. British Columbia: 2193.

15. Coprinus cinereus var. depressus VAN DE BOGART var. nov. (Fig. 4).

A typo differt sporis depressionam suprahilarem conspicuam praebentibus.

Holotypus FVDB 264 ad ligno carioso Pruni emarginati (Dougl.) Walp. in sylva Lee dicta in comitato Snohomish pagi Washingtonis 25 Octoberis 1971 lectus, in herbario Universitatis Washingtonis (WTU) conservatus.

As described in variety cinereus except that the spores have a conspicuous suprahilar depression. Also collection FVDB 264 appears to be attached to slender black compact rhizomorphs which may belong to another fungus, such as Armillariella mellea, and the other collection (FVDB 261) has some of the cells of the universal veil with walls up to 0.5 μm thick.

Material Examined. Washington: HOLOTYPE, FVDB 264*, 25 October 1971; FVDB 261.

ACKNOWLEDGMENTS

The author wishes to thank Dr. D. E. Stuntz for his comments and criticism while preparing the manuscript and especially for his assistance in the preparation of the Latin descriptions.

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MYCOTAXON

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CORYNASCELLA INQUINATA, A NEW CLEISTOTHECIAL ASCOMYCETE FROM SEWAGE SLUDGE

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During microbiological studies on the environmental pollution in the Nagasaki Prefecture, southwestern Japan, an undescribed species of Corynascella was encountered colonizing a plate of sewage sludge.

Corynascella inquinata Udagawa & Ueda, sp.nov. (Figs. 1-3)

Coloniae in agaro farina avenae mixto satis effusae, floccosae, planae, dilute olivaceo-griseae. Mycelium hyalinum vel dilute olivaceo-brunneum, e hyphis ramosis, septatis, laevibus vel asperatis, saepe anastomosantibus compositum.

Ascocarpi plerumque superficiales, dispersi vel aliquantum congregati, profunde olivaceo-brunnei vel nigriores, globosi vel subglobosi, vulgo 185-300 µm diam, pilosi, nonostiolati; pili ascocarparum numerosi, recti vel flexuosiores, rigidi, septati, dilute olivaceo-brunnei, simplices vel superne pauciramosi, usque 250-600 µm longi, ad medium 2.5-3.0 µm diam, aspri, superne gradatim contracti. Peridium tenue, membranaceum, primum semitranslucens, deinde laete olivaceo-brunneum, 4.0-8.0 µm crassum; stratum exterius e cellulis elongatis, incrassatis, 2.0-5.0 µm latis compositum; stratum interius e cellulis hyalinis, angularibus, 3.5-10.0 µm diam compositum. Asci octospori, late clavati, 60-75 × 24-26 µm, brevistipitati, fasciculati, evanescentes; paraphyses nulli. Ascosporae biseriatae vel multiseriatae, primum hyalinae et guttulatae, deinde olivaceo-brunneae vel profunde olivaceo-brunneae, opacae, unicellulares, late ellipticae, (15-)18-21(-23) × (12-)13-15 (-16) µm, laeves, interdum vesiculam magnam continentes, in extremis 1-2 poris germinationis praeditae, circa quos paries inspissatus. Conidia incognita.

Holotypus: 2841, NHL, isolatus e limo (sewage sludge) in Japonia, 22.iii.1978, S. Ueda.

Etymology: inquinatus = polluted, referring to the nature of the habitat.

Colonies on oat-meal agar growing fairly rapidly, attaining a diam of 2.5 to 3.0 cm in 2 weeks at 23 C, floccose, plane, consisting of a thin basal felt of fine hyphae

with surface producing abundant ascocarps, pale olivaceous grey (Rayner, 1970); reverse smoke grey to grey olivaceous (Rayner, 1970).

Mycelium hyaline to pale olive brown, composed of branched, septate, smooth to roughened, often anastomosed hyphae measuring 1.0-5.0 µm in diam; ascocarp initials produced as swollen side branches from the hypha, then many-branched, inflated, and tightly intertwined with each other.

Ascocarps usually superficial, scattered or clustered in small groups, dark olivaceous brown to nearly black, globose to subglobose, mostly 185-300 µm in diam, hairy, nonostiolate; ascocarp hairs numerous, scattered over the ascocarp, straight or somewhat flexed, stiff, septate, pale olivaceous brown, simple or a few branched above, up to 250-600 µm long, 2.5-3.0 µm wide at the middle, usually roughened by conspicuous granules, tapering gradually to a pale-colored, rounded or pointed tip. Peridium thin, membranaceous, semitransparent when young, light olivaceous brown at maturity, 4.0-8.0 µm thick; outer layer 'textura epidermoidea', consisting of elongate, thick-walled cells measuring 2.0-5.0 µm wide; inner layer 'textura angularis', consisting of hyaline, angular cells measuring 3.5-10.0 µm in diam. Asci 8-spored, broadly clavate, 60-75 × 24-26 µm, rounded above, with no apical ring visible, tapering below into a short stipe up to 8.0 µm long, borne from croziers in a fascicle, evanescent; paraphyses lacking. Ascospores biseriate or multiseriate, at first hyaline and conspicuously guttulate, then becoming olive brown to dark olive brown, opaque, one-celled, broadly ellipsoidal, often flattened at one side, 15-23 × 12-16 µm (mostly 18-21 × 13-15 µm), smooth-walled, sometimes with a prominent bubble, provided with a germ pore at one or each end, around which the spore wall is conspicuously thickened; germ pores hyaline, circular, 2.0-3.0 µm in diam. Conidia unknown.

At 37 C, growth is nil.

Holotype - No. 2841, NHL, isolated from sewage sludge, Isahaya-shi, Nagasaki-pref., Japan, March 22, 1978, S.Ueda.

The genus Corynascella was erected in 1975 by von Arx for a single species C. humicola von Arx & Hodges and is characterized by the presence of hairy cleistothecia and ascospores which have two germ pores and a strikingly thickened wall around the germ pores. Almost immediately after the above, von Arx (1975) transferred Thielavia inaequalis Pidoplichko, Kirilenko & Zakharchenko (1973) to this genus as a second species. These two species are separable on the basis of differences in the size of the asci and ascospores, and in the shape of the ascospores. The ascospores of C. humicola are 13-17 × 9-14 µm while those of C. inaequalis are 13.5-15.5 × 6-7.5 µm. The ascospores of the former species are ellipsoidal to nearly spherical or reniform while those of the latter species have been described as fusiform-ellipsoidal and often inequilateral.

Corynascella inquinata differs from them in producing long ascocarp hairs, and larger asci and ascospores in which the germ pore is frequently located only at one end.

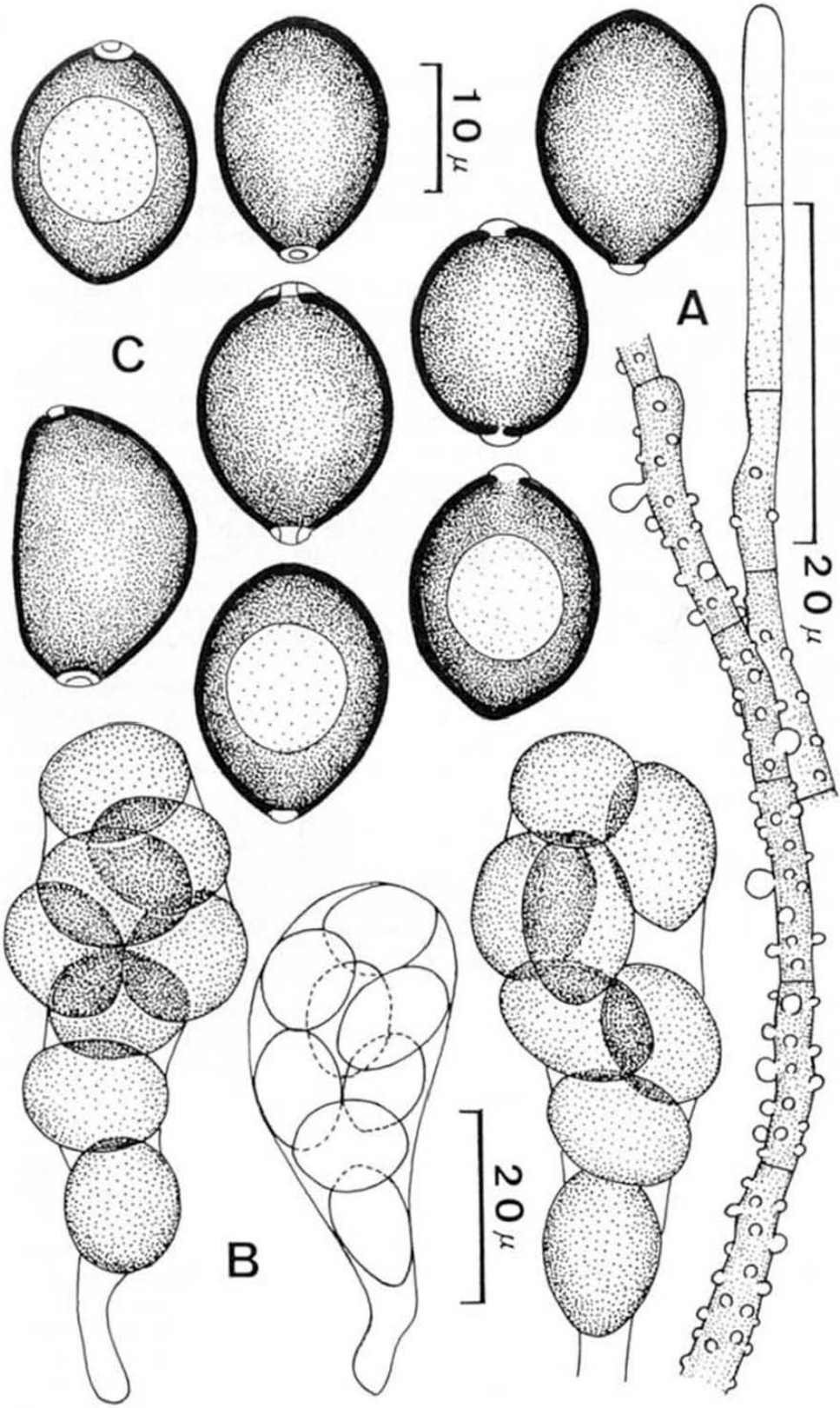
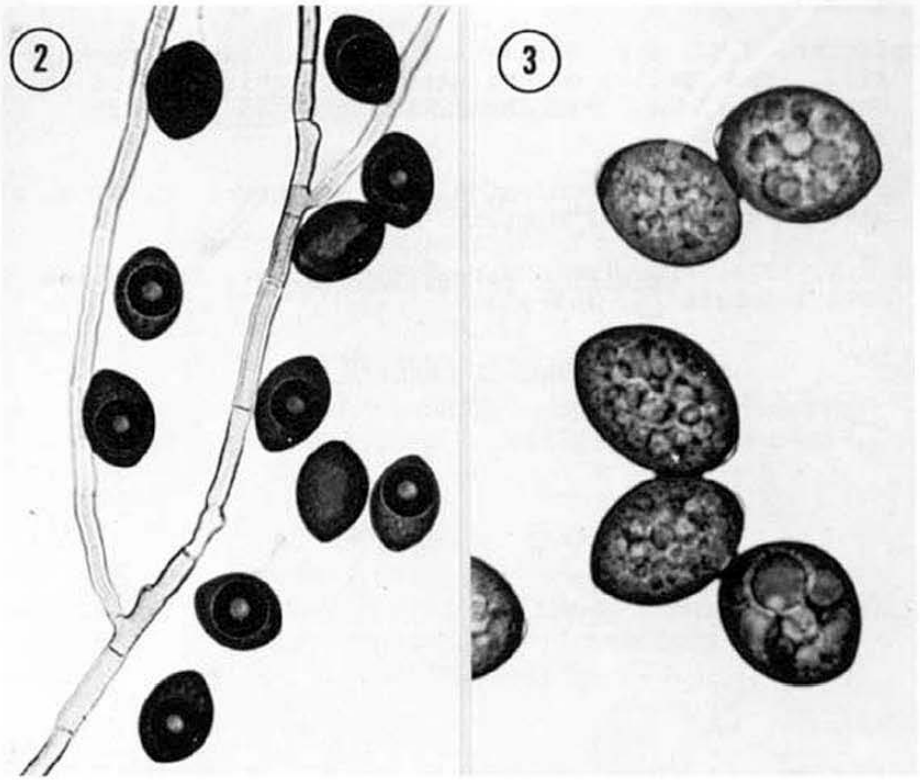


Figure 1. Corynascella inquinata Udagawa & Ueda. A. Ascocarp hairs. B. Asci. C. Ascospores.



Figures 2 and 3. Corynascella inquinata. Ascospores in two different magnifications; 2, × 550 and 3, × 1,000, respectively.

It can be separated from C. humicola, a microthermophile, by its mesophilic growth temperature. Two species of Thielavia, T. wareingii Seth (1974) and T. ovalispora Lodha (1974), which may be conspecific, are most closely related to Corynascella. In both of these species, the ascospores are distinctly smaller.

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The authors thank Professor David Malloch, Department of Botany, University of Toronto, for reading the manuscript and making helpful suggestions.

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MYCOTAXON

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GLOMUS GERDEMANNII SP. NOV.

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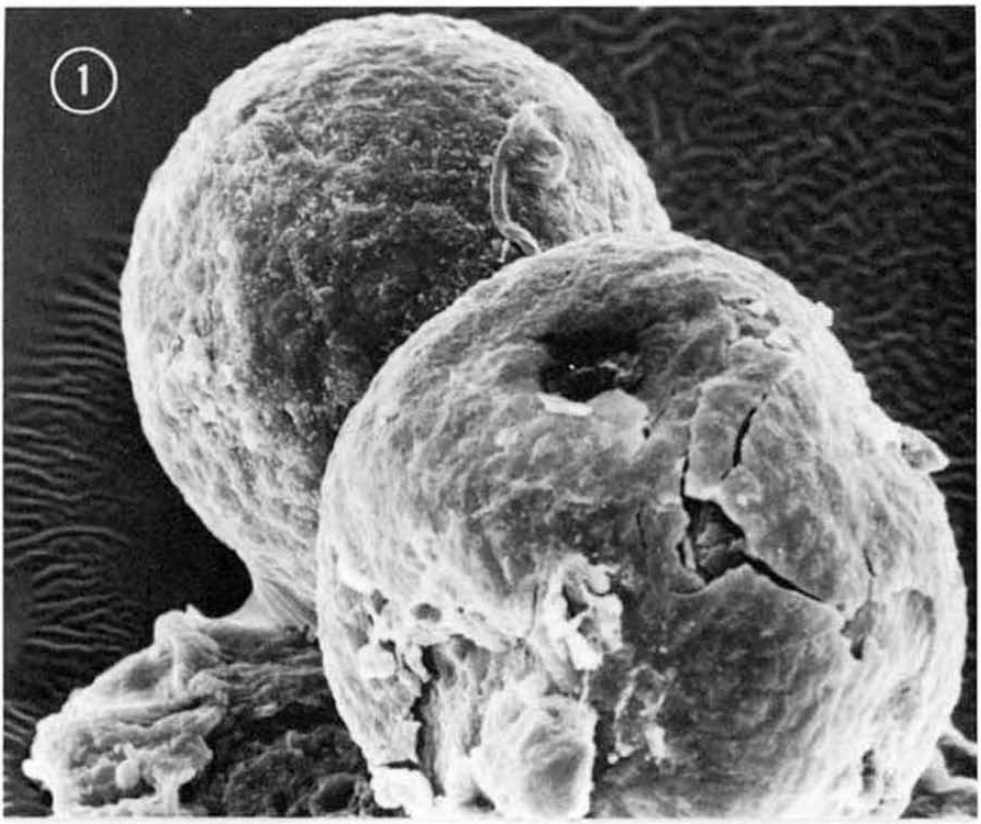
GLOMUS GERDEMANNII Rose, Daniels & Trappe sp. nov.

Figs. 1-3

Sporae globosae, subglobosae, vel ellipsoideae, 140-198 x 149-230 µm, juventute hyalinae, laeves, deinde pallide avellaneae, asperae. Sporae tunica 5-10(-13) µm crassa, stratis quinque: exteriore 0.5-1.0 µm crasso, hyalino; secundo 2-5 µm crasso, hyalino, lamellato; tertio 1-2 µm crasso, hyalino, secedenti; quarto ±0.1 µm crasso, hyalino; interiore 2-3 µm crasso, luteo. Hypha affixa recta, 7-12 µm diam, hyalina.

Spores naked, formed singly or in loose clusters or small sporocarps in soil, globose to subglobose or ellipsoid, 140-198 x 149-230 µm (broader than long when not globose), hyaline and smooth in youth, becoming pale yellow brown and roughened with age. *Spore walls* 5-10(-13) µm thick, of 5 layers: the outermost ±0.5-1.0 µm thick, hyaline, and smooth in youth, with age becoming roughened and cracked and flaking away in pieces; the 2nd layer inward 2-5 µm thick, hyaline and fused-laminated in youth,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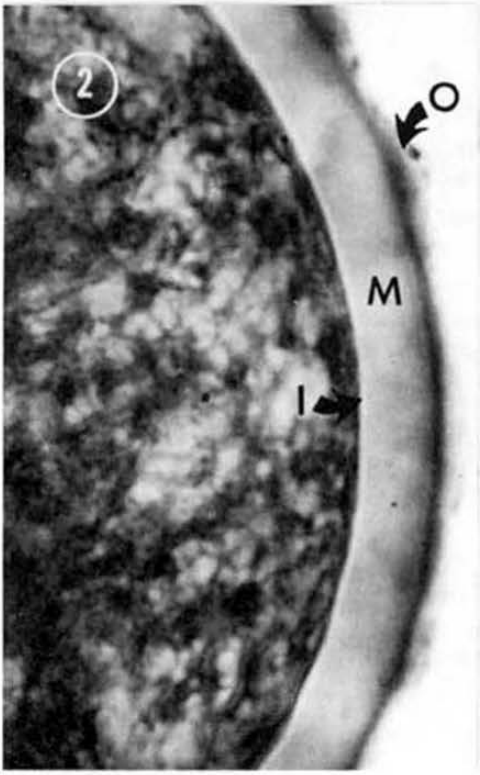
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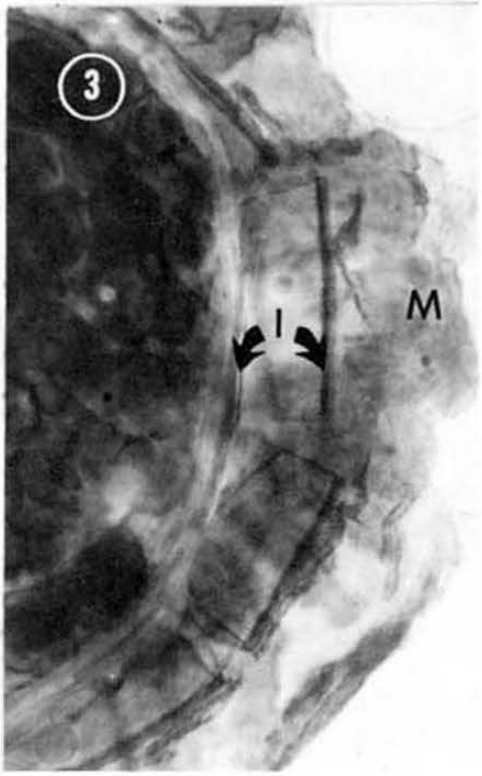
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with age becoming pale yellowish brown and degrading progressively inward to flake away as amorphous pieces of laminations; the 3rd layer inward 1-2 µm thick, hyaline smooth, separable; the 4th layer inward ±0.1 µm thick, hyaline, adherent to the 5th and innermost layer 2-3 µm thick and yellow. *Spore contents* of hyaline oil globules 7-25(-50) µm diam. *Attached hypha* straight, readily detaching, 7-12 µm diam, hyaline, the walls thickened a short distance from the point of attachment, occluded by thickening of the 2nd spore layer. Reaction to Melzer's reagent not distinctive.

DISTRIBUTION AND HABITAT: Cascade Range and Siskiyou Mountains of Oregon on volcanic soils in climatically stressed and pioneer sites.

MYCORRHIZAL ASSOCIATIONS: Associated in the field with vesicular-arbuscular mycorrhizae of *Ceanothus velutinus* Dougl., *C. prostratus* Benth., and *C. integerrimus* Hook. & Arn.; forming mycorrhizae in pot culture with *C. velutinus*. No other host genera have been discovered thus far.

ETYMOLOGY: In honor of Dr. James W. Gerdemann for his contributions to knowledge of the Endogonaceae, particularly those of Oregon.

COLLECTIONS EXAMINED: TYPE: *OREGON*, Deschutes Co., ca. 1 km north of Benham Falls at Fort Benham, elev. 1100 m, July 1976, 15 cm deep in soil under *Ceanothus velutinus* Dougl. Rose S101(OSC).

Figs. 1-3. *Glomus gerdemannii*. 1. Two spores by scan electron microscopy; the foreground spore shows the outer wall layer cracked and separating from the adjacent inner layer. x425. 2. Young spore in cotton blue-lactophenol, with early stage of outer layer (O) formation, thick middle layer (M), and a single, thin inner layer (I). x1,000. 3. Crushed mature spore in cotton blue-lactophenol with outer layer missing, thick middle layer (M) degraded to separable, amorphous flakes, and 2 thin, separable inner layers (I), the innermost composed in turn of 2 nonseparable layers. x400.

OTHER COLLECTIONS: OREGON--Douglas, Jackson, and Lane Counties--used in experiments and thus not available for herbarium deposit.

The complex layering of spore walls of *G. gerdemannii* strikingly separate it from all other known *Glomus* spp. The outermost, thin layer is apparent only in relatively young, smooth spores, because it flakes off soon after spores have reached full size and the 2nd layer inward has begun to thicken. At this stage, the inner 3 layers are not distinctly differentiated. As the outer 2 layers begin to flake away, however, the inner 3 differentiate clearly. The inner 3 layers persist, so that well-matured spores appear to have 3 thin wall layers enclosed in the rough, amorphous remnants of the degenerating outer walls.

The complex wall structure of *G. gerdemannii* resembles azygosporic species in *Acaulospora* and *Gigaspora* more than other species of *Glomus* (Gerdemann and Trappe 1974). Its hyphal attachment, however, places it in *Glomus* as an apparent chlamydospore. Sexual fusion could, of course, take place some distance below the attachment to the spore, but we have not observed it. In any event, *G. gerdemannii* is morphologically suggestive of a relationship between "chlamydosporic" Endogonaceae and azygosporic species.

Spores of *G. gerdemannii* sink rapidly in water. In retrieving them from soil by wet-sieving and decanting, the soil suspension must be decanted within less than a minute after stirring or most of the spores will have settled to the bottom.

Spores colonized by other fungi have been observed fairly often. One relatively frequent colonizer grows as brown, septate hyphae appressed to the degenerated surface of maturing spores (the outer walls of the spores degenerate whether or not microfungi colonize the surface). The brown, septate hyphae produce globose to irregular structures 10-25 µm diam. These structures, of undetermined function, remain attached to the *Glomus* spore walls. Hyaline globose cells 35-45 µm diam are attached to the surface of occasional spores of *G. gerdemannii*. These resemble the sporangia of *Rhizidiomycopsis stomatosa* Sparrow, reported by Schenck and Nicolson (1977) to parasitize Endogonaceae.

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MYCOTAXON

Vol. VIII, No. 1, pp. 302-306 January-March 1979

PERICONIELLA VERRUCOSA SP. NOV. (DEMATIACEOUS HYPHOMYCETES) FROM DOUGLAS FIR WOOD

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The genus *Periconiella* Sacc. is characterized by macronematous conidiophores composed of a stipe and a more or less complex head of conidiogenous cells. The conidiogenous cells are integrated, polyblastic, sympodial, and cicatrized. Conidia are mostly solitary, occasionally in short chains, non-septate, or with transverse septa only. Ellis (1) has assigned twenty-three species to the genus, collected on a variety of plants from Australasia, Africa, Central America, India, and Puerto Rico. In Western Oregon a dematiaceous hyphomycete was frequently isolated from Douglas Fir wood samples from waterfront structures and utility poles. The isolate was morphologically distinct from previously recorded species and is described herein as a new species of *Periconiella*.

Colors were determined by use of Ridgway color standards (5), but names are cited by the Inter-Society Color Council Synonyms (ISCC-NBS) (3). Anatomical features were described from sections mounted in water. Photographs were taken using sections mounted in aqueous solutions of sodium carboxy methyl cellulose (NaCMC) as per Phinney and

Hardison (4). Collections have been deposited in the Plant Pathology Mycological Herbarium, University of Minnesota (MPPD), Commonwealth Mycological Institute (IMI), and the Mycological Herbarium of Oregon State University (OSC). Herbarium designations are those of Holmgren and Keuken (2). The minimum, maximum, mean, and standard deviation based on 50 observations for selected structures are presented in that order throughout the species description. Cultures were grown in the dark and light on 2% malt agar (pH 5.6), in a temperature controlled incubator at 20 C.

Periconiella verrucosa Stewart & Corden, sp. nov. Figs. 1-4

Coloniae radiantes, diam 10 dies natae 15-20 mm in agaro hordeano; coloniae juniores pallide griseo-olivaceae; vetustiores pallide luteo-brunneae; pilis brevibus oculo visibilibus, reversae atroluteo-brunneae. Mycelium superficiale, ex hyphis ramosis, septatis, levibus, brunneis 1.5-7 µm diam, et ex hyphis hyalinis 1-3 µm diam. Conidiophora macronematica ab extremis apicibus hypharum et citra orientia, constituta in stipite mononematica dividente supra apicem aut, rarius cita. Rami 3(1-6) solitarii vel brevibus catenis, 0-septati, cylindrici, hyalini vel pallide brunnei, 9-34 (15 ± 7.7) µm leves vel minute verruculosi, cicatricibus ornati. Stipites erecti, recti vel flexuosi, cylindrici, septati, modica brunnei, apice pallidiore; parietes 0.7-1.5 µm latitudine, juniores leves vel minute verruculosa, prominenter vestustiores, 150-300 µm in longitudinem, 3-5 µm in latitudinem. Conidia acropleurogenosa, solitaria vel brevibus fulsis catenis, 0-septata, hyaline, vel valde luteo-brunneae, bina visa amplitudine; prima subglobosa, rara truncata, vel si modo minute, 3-4 (4 ± 0.4) x 2-3.5 (2.5 ± 0.3) µm; secundo truncata plerumque, ellipsoidea, 5-9 (6.3 ± 0.7) x 3-4.5 (3.7 ± 0.5) µm.

Holotypus ES-2520, in MPPD, OSC, et IMI.

Colonies on malt agar 15-20 mm diam after 10 days; advancing hyphae appressed, hyaline, margins regular. Aerial colony a mass of conidiophores, light grayish olive when first visible, becoming light yellowish brown at maturity. Reverse dark yellowish brown. *Mycelium* superficial, of branched, septate, smooth walled brown hyphae 1.5-7 µm, and hyaline hyphae 1-3 µm diam. *Conidiophores* macronematous, arising terminally and laterally on the hyphae, composed of a mononematous stipe with a single or up to three branches at the apex; occasionally branched below the apex. *Branches* 3 (1-6), mostly a single

conidiogenous cell, occasionally in acropetal chains of two or more, 0-septate, cylindrical, hyaline to pale brown, 9-34 (15 ± 7.7) µm, smooth to minutely verruculose, with conidial scars. *Stipes* erect straight or flexuous, cylindrical, septate, moderate brown, paler towards the apex, walls 0.7-1.5 µm thick, smooth to minutely verrucose when first formed, prominently verrucose at maturity, 150-300 µm long, 3-5 µm wide, some tapering slightly near the apex. *Conidia* acropleurogenous, solitary, or in short acropetal false chains, 0-septate, smooth, hyaline or strong yellowish brown, of two apparent size classes; subglobose conidia, rarely truncate, and if so, only minutely, 3-5 (4 ± 0.4) x 2-3.5 (2.5 ± 0.3) µm, conidia mostly truncate, 5-9 (6.3 ± 0.7) x 3-4.5 (3.7 ± 0.5) µm.

ETYMOLOGY: Latin, "Warty."

COLLECTIONS EXAMINED: Holotype: USA, Oregon 1975. Habitat, marine waterfront pilings and utility poles of Douglas Fir. ES #2520 (MPPD, OSC, IMI). Paratype: USA, Oregon 1975. Habitat, marine waterfront pilings and utility poles of Douglas Fir. ES #2522 (MPPD, OSC, IMI).

Of the species presently assigned to *Periconiella*, *P. verrucosa* appears most like *Periconiella smilacis* M. B. Ellis in the branching pattern of the conidiogenous cells and in having septate, thick walled mononematous stipes. *Periconiella verrucosa* is distinguished from *P. smilacis* by smaller, smooth walled conidia, and by the distinctly ornamented stipe.

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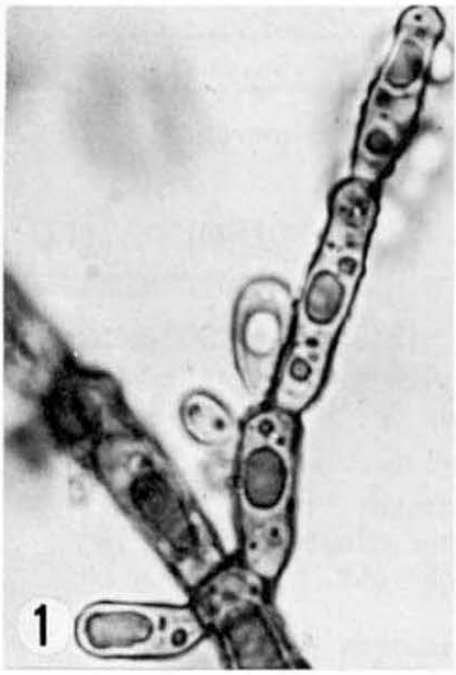

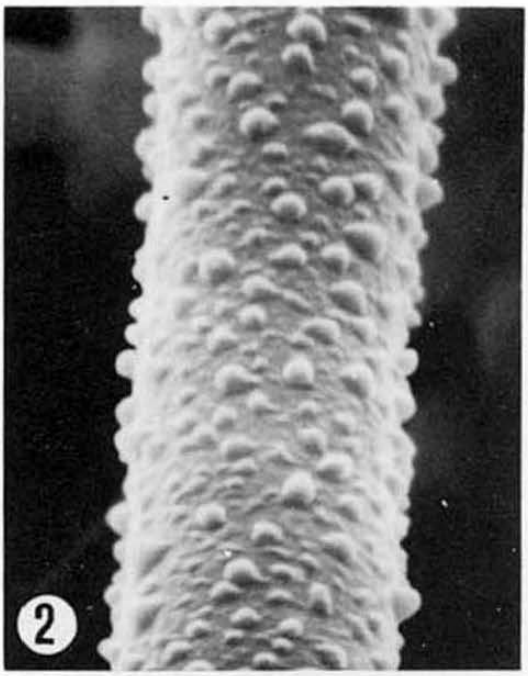

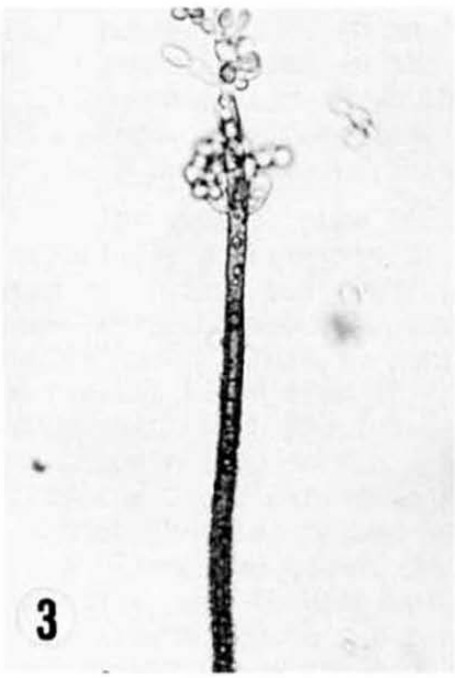

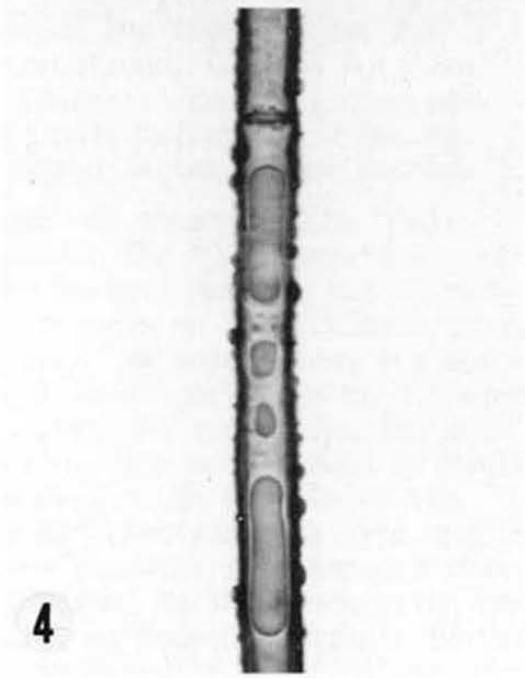

FIGS. 1-4: *Periconiella verrucosa*. 1. Conidiogenous cells illustrating a chain (false chain) of conidiogenous cells. x1420. 2. Scanning electron micrograph of the stipe illustrating the wart like protuberances unique to the species. x 5000. 3 and 4. Conidiophore from culture on malt agar illustrating apical and subapical branching, acropetal chains (false chains) of conidia; and septate, thick walled stipe. x 1420.

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MYCOTAXON

Vol. VIII, No. 1, pp. 307-317 January-March 1979

LECTOTYPIFICATION OF PHYSCONIA, A GENERIC NAME BASED ON A MISNAMED TYPE SPECIES - A NEW SOLUTION TO AN OLD PROBLEM

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SUMMARY

The name *Physconia* was based on a type species cited by a nomenclaturally superfluous name, *Ph. pulverulenta*. An analysis of the type concept for generic names in the International Code of Botanical Nomenclature shows that *Physconia* can be lectotypified. A new species, *Physconia pulverulacea* Moberg is described and is appointed lectotype for *Physconia*.

The generic name *Physconia* was introduced by Poelt (1965) for a segregate of *Physcia*. The type species was cited as *Physcia pulverulenta* (Schreber) Hampe ≡ *Lichen pulverulentus* Schreber. However, this is an illegitimate name, being nomenclaturally superfluous. Moreover, from its automatically fixed type it applies to a species quite different from that which Poelt had in mind; the former species does not even belong to the genus *Physconia* as intended by Poelt. Thus the typification of *Physconia* is an example of the problem that has become known as "citation of a type species by a misapplied name". The case includes some aspects that do not appear to have been discussed in this connection before. Therefore this paper will, we hope, contribute to the understanding of the problems involved in typification of generic names, though its main purpose is to clarify the nomenclature of *Physconia*.

The binomial *Physconia pulverulenta (Physcia pulverulenta)* is in common use for a wide-spread and well-known lichen. There is no taxonomic controversy regarding the identity and circumscription of the species to which this name is being applied, although wrongly. Apparently is was in accordance with this well-established usage that Poelt

cited *Physcia pulverulenta* as type species of his new generic name.

Before we proceed to the question of typifying the generic name *Physconia*, we will discuss the status of the name *Physcia pulverulenta*. *Lichen pulverulentus* was described as a new species by Schreber (1771 pp. 128 - 129). Schreber cited as synonyms three polynomials and one binomial, viz. *Lichen orbicularis* Necker. This is a validly published and legitimate name. Therefore *Lichen pulverulentus* Schreber is an illegitimate, nomenclaturally superfluous name (Art. 63). Since Schreber did not indicate a definite type, *Lichen pulverulentus* is automatically typified by the type of *Lichen orbicularis*, the name that should have been adopted under the rules (Art. 7.11). This fixes *Lichen pulverulentus* Schreber as a nomenclatural (obligate) synonym of *Lichen orbicularis* Necker. Necker (1768) based his *Lichen orbicularis* on a Dillenian polynomial, Lichen n. 71 (Dillenius 1741 p. 176), identical with t. 24, f. 71 (Dillenius, 1763), and the same Dillenian polynomial was included in Schreber's synonymy of his *Lichen pulverulentus* (and also by Hoffmann in describing *Squamaria pulverulenta*, see below). Thus *Physcia pulverulenta* and *Ph. orbicularis* have a common origin in Dillenius's polynomial, and this may be the reason why Schreber cited *Lichen orbicularis* as a synonym of *L. pulverulentus*.

Since *Lichen pulverulentus* Schreber is a nomenclaturally superfluous name, no binomials intended as new combinations based on this name as basionym are legitimate as new combinations. The Code does not admit a new combination to be based on a superfluous name. Generally, with the exceptions mentioned below, such a "combination" will form another superfluous name. In the case under consideration the citation of *Lichen pulverulentus* Schreber as basionym implies the inclusion of its type, identical with the type of *Lichen orbicularis* Necker, which furnishes the epithet that should have been adopted in each instance. The case is identical with that treated in Art. 63.1, example 4 *(Picea excelsa)*. Under certain circumstances, however, such an intended new combination may turn out to be a legitimate name, but, if so, it is not a new combination. As far as we can make out there are three such cases: (1) If the superfluous "basionym" is holotypified by a type different from that of the name it is superfluous for (cf. Art. 7.11; see also Weresub & Hennebert, 1963), we believe, though it is not definitely stated in the Code, that the intended new combination will become a legitimate new name under Art. 72 Note 1.

This is not pertinent to *Lichen pulverulentus* and will not be further considered here. (2) If the author who intended the new combination excluded the type of the "basionym" at the same time, the intended new combiantion will become a new name for a new taxon to be typified on its own merits. It has no nomenclatural bond with the illegitimate name cited as basionym or with the name it is superfluous for. Exclusion of the type can be effected either explicitly or by implication (Art. 63.2). As pointed out by Nicolson (1977) the Code's examples of "exclusion of type by implication" are really examples of "exclusion of type through explicit inclusion elsewhere". (3) A name published as a new combination into a genus where the epithet of the name, for which the intended "basionym" is superfluous, would give rise to a homonym will, under Art. 72 Note 1, be treated as a new name. This is probably a rare case, but an example has been presented recently by Nicolson (1978): *Desmodium incanum* DC. 1825 was intended as a new combination based on *Hedysarum incanum* Swartz 1788, an illegitimate renaming of *H. racemosum* Aublet 1775, for which it is to be treated as nomen novum, because of the existence of the simultaneously published *Desmodium racemosum* DC. 1825 ≡ *Hedysarum racemosum* Thunb. 1784 non Aublet 1775. This case is of no further importance to our subject: In none of the genera to which *Lichen pulverulentus* Schreber has been transferred does there exist an "*orbicularis*" based on another type than *Lichen orbicularis* Necker.

From these considerations it is seen that a new combination based on *Lichen pulverulentus* results in a legitimate name only under the provision that the author of the "combination" clearly indicated that he excluded the type of *Lichen orbicularis*, in practice effected by treating it as a different species.

Hoffmann (1790 p. 39) introduced the binomial *Squamaria pulverulenta*, basing it on *Lichen pulverulentus* Schreber. He did not exclude *Lichen orbicularis*, and *Squamaria pulverulenta* is therefore illegitimate. *Parmelia pulverulenta* (Schreber) Acharius (1803 p. 210) is likewise a superfluous name. Acharius did not exclude the type of *Lichen orbicularis*, on the contrary he cited it as a synonym. The binomial *Physcia pulverulenta* was introduced by Fürnrohr (1839, p. 249) who cited *Parmelia pulverulenta* Acharius as a synonym. He made no mention of *Lichen orbicularis* and therefore *Physcia pulverulenta* Fürnrohr is a superfluous name. This and other binomials introduced by Fürnrohr in this work have erroneusly been ascribed to Hampe. For further details

see Moberg (1977, p. 60) -- Finally, Poelt (1965) made the combination *Physconia pulverulenta* (Schreber) Poelt, still another superfluous name.

Moberg (1977, p. 93) claimed that the epithet in the combination *Squamaria pulverulenta* Hoffmann should be treated as new following Art. 72, Note (Seattle Code), and changed the author citation for Poelt's combination to *Physconia pulverulenta* (Hoffm.) Poelt. This procedure is, however, untenable. As shown above *Squamaria pulverulenta* Hoffm. is nothing but a superfluous name. Article 72 is not concerned, and there is hence no basis for correction of a "bibliographic error of citation" (Art. 33, Note 2 and its example in the Seattle Code; this example was omitted in the Leningrad Code). In fact Moberg has introduced a new name to science, which should be cited as *Physconia pulverulenta* Moberg. This is a validly published name for a new species since Moberg included a reference to a previously effectively published diagnosis (Hoffmann's) and indicated a type (as 'neotype'). It is not nomenclaturally superfluous although Moberg cited *Lichen pulverulentus* Schreb. as a synonym. In the same publication Moberg treated *Lichen orbicularis* Necker as a distinct taxon (p. 44, as basionym of *Phaeophyscia orbicularis*) thus excluding the type of *Lichen pulverulentus* Schreber from his circumscription of *Physconia pulverulenta* Moberg. But it is illegitimate, being a homonym of *Physconia pulverulenta* (Schreber) Poelt.

In summary: The names *Physcia pulverulenta* (Schreber) Fürnrohr and *Physconia pulverulenta* (Schreber) Poelt are illegitimate, superfluous names. By their type they do not apply to the species that is commonly known under these names. *Physconia pulverulenta* Moberg applies to this species but is illegitimate being a later homonym. Since this species obviously lacks a legitimate name we will here furnish one:

PHYSCONIA PULVERULACEA Moberg n. sp.

Thallus foliaceus, orbiculatus, laxe adnatus, cinereo-brunneolus vel atro-brunneus, vulgo pruinosus, sorediis isidiisque destitutus. Laciniae radiatae, vulgo imbricatae, subtus nigrae prope apicem brunneae. Rhizinae abundae, nigrae, squarrosae. Cortex superior scleroplechtenchymatus, cortex inferior prosoplechtenchymatus. Apothecia abunda, usque ad 5 mm diametro, vulgo margine lobata. Sporae (25-) 27-38x13-20 µm.

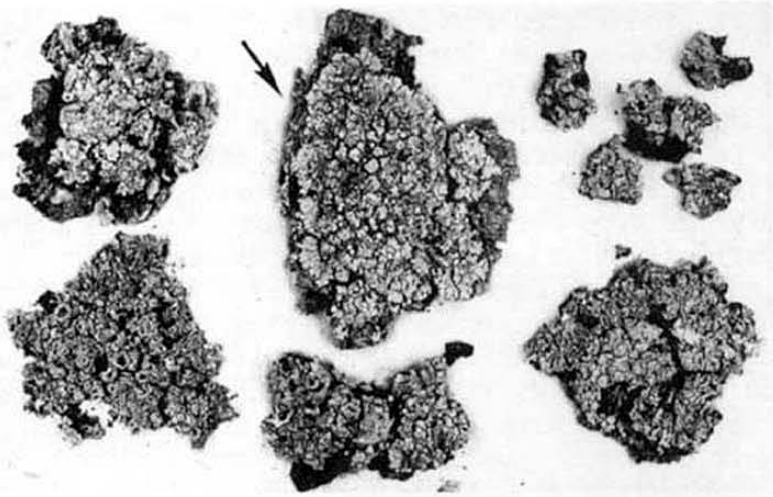

Fig. 1. *Physconia pulverulacea* Moberg, holotype (arrow).

Pycnidia vulgo immersa, pycnoconidia 5-(7)xI-I.5 µm. Holotypus: Germania, Lipsia in Tilia, I767 Schreber (M). (Fig. I).

Evidently, the species that Poelt had in mind was *Physconia pulverulacea* although he cited *Ph. pulverulenta*. What is then the type species of *Physconia*? The question of how to typify a generic name, where the type species has been misidentified has been much disputed. It has become known as "citation of a type species by a misapplied name", but this it not quite adequate. A misapplied name is a name that is applied to a taxon so circumscribed that it excludes the type of that name. There is no controversy regarding this case (cf. Weresub 1967 p. 33 last paragraph). The problems arise when an author of a generic name does *not* exclude the type of the species name he cites, but when it is evident from taxonomic judgements that he has misidentified his specimens. Two divergent opinions have been advanced. Donk (1952) and Nannfeldt & Eriksson (1952) defended the view that the type species of a generic name should be a species that the author of the generic name virtually had in mind when describing the genus, irrespective of the name he attributed to it, or as formulated by Nannfeldt&Eriksson: "The type of a generic name must be a species so circumscribed as to include at least one of the specimens studied

by the author when describing the genus." Weresub (1967), on the contrary, vindicated the idea that the species cited by name (that is the species including the type specimen of that name) by an author of a generic name be accepted as holotype, and made a formal proposal for an addition of a paragraph to this effect to Art. 10. In other words, the type specimen of the name of the type species would indirectly serve as type for the generic name. Each of these interpretations has its advantages and drawbacks.

The advantage of Donk's and Nannfeldt & Eriksson's view ("the idealistic approach") is primarily that it is in accordance with common sense. The example given by Nannfeldt & Eriksson is very illustrative: Karsten validly published the name *Lachnellula* with the following short diagnosis: "Est *Lachnella* sporis sphaeroideis" for one single species cited as *Lachnellula chrysophthalma* (Pers.) Karst. To base *Lachnellula* on a quite different species which does not exhibit the character of having spherical spores would appear rather absurd. Nevertheless, in a number of cases there arise considerable difficulties if one tries to apply this approach. It may be impossible to determine exactly which specimen or specimens the author actually had at hand when describing the genus, or the genus may have been erected on purely bibliographic grounds. The most important objection is, however, the ambiguity in the identity of the type (this will be further detailed below). Weresub's proposal ("the pragmatic approach") aims to warrant an unequivocal type — but at the expense of the common sense aspect: Some generic names will apply to taxa quite different from those intended by the author of the generic name.

The question of how to typify generic names based on misidentified type species has been the object of an IMA Nomenclature subcommittee (now dissolved) and is at present being studied by an IAPT committee. We cannot foresee what will be the eventual result of these considerations. The only thing we can do is to try to find a path to solve our problem guided by the Code as it stands at present (Leningrad Code).

In our opinion some of the crucial typification problems — including the typification of *Physconia* — may be solved by lectotypification. The present Code permits lectotypification to a certain but limited extent in cases like this. Holotypification contra lectotypification has been a central point in the discussion on generic typification (Weresub, 1967; Stafleu & Voss 1972, pp. 98 - 100). It is therefore essential to understand in what instances a holo-

type is extant and when the Code allows for lectotypification. It is often assumed that Art. 37 implies that all names published on or after 1 Jan. 1958 are automatically holotypified. This is, however, a too extensive interpretation of Art. 37. Art. 9.2 stipulates that if a type specimen is found to contain parts belonging to more than one taxon, a lectotype may be selected. And if a name is lectotypifiable there can be no holotype. This applies to post-1958 as well as to pre-1958 names. In fact, a type is not necessarily a holotype even if it was designated as such by the type author. Under the condition of the taxonomic conclusion that a type consists of "discordant elements" the taxonomic process of lectotypification may be undertaken. The signification of Art. 37 is to guarantee that the element is supplied from which the type is to be selected in accordance with Arts. 7 — 10. It sets up a condition that must be fulfilled for a name to be validly published. As far as typification is concerned it adds nothing to Arts. 7 — 10. Now, one may demur, this concerns only those names whose types are specimens, not generic names. Right. But nevertheless it proves that a type indicated along with Art. 37 is not always holotype, which is the essential point.

The Code requires (Art. 37) that an author who publishes a name on or after 1 Jan. 1958 should indicate the nomenclatural type. But, in the case the type is a taxon, what does the Code mean by "indicating a type"? The natural way is of course to cite its name. The first thing we will have to consider is this: what does it mean, from a strictly nomenclatural point of view, when an author who is studying a certain species accredits a certain name to this species. The Code states (Principle II) that the application of names of taxonomic groups is determined by means of nomenclatural types. Therefore we can formulate the following statement: When an author identifies one or more specimens, he is actually saying: "I regard this specimen (these specimens) to belong to a species so circumscribed as to include also the type of the name I am mentioning". A wrong determination is therefore in fact a circumscription that is wrong in someone's opinion, a purely taxonomic matter. Therefore, when an author makes a direct or indirect reference to an earlier published name, the type of that name is included irrespective of the circumscription of the taxon to which this name is being applied. But on the other hand, if an author clearly indicates that he excludes the type of a name he is using, he has in fact created a homonym with a different type (Art. 48). An analysis of these matters has

recently been presented by Nicolson (1977).

The Code stipulates that "the type of a name of a genus ... is a species". (Art. 10). However, it does not demand that this species has a validly published name. Therefore other ways to indicate a type species than by citing its name will have to be accepted. A species in the sense of the Code is a taxon, a constituent quality of which is to have a circumscription. And a type species is a taxon in the rank of species as circumscribed by the author who makes the typification — be it the author of the generic name or one who makes a later lectotypification. Therefore all specimens possibly mentioned should be taken into consideration as an indication of the species in the sense of that author. Thus, as "indication of type species" are accepted: (1) the type specimens of the specific names cited by the author (not only the type of the name he accepts for it but also the type of any taxonomic synonyms he cites) and (2) any specimens he cites as actually studied by him. If the specimens under (1) and (2) are later considered to belong to more than one species, these species are to be regarded as "syntypes", and a lectotype will have to be chosen among them. As lectotype should be chosen the species which corresponds most nearly with the original description. Therefore, generally, a species including a specimen studied by the author has precedence over a species cited only by name, which may have been cited only incidentally (misdetermination). In those cases where no studied specimens were indicated, only the name or names cited can be used to determine the type species.

Obviously, lectotypification along these lines will lead to the same result as that recommended by Nannfeldt & Eriksson (1952) and Donk (1952), though with a different argumentation. However, the applicability of the lectotypification process outlined above is much more restricted than that of these authors, since the only species eligible as lectotypes are those represented by specimens actually cited by the author of the generic name. The basis for our argumentation is the present Code's ruling that a type of a generic name is a taxon (species). But how can such an ambiguous thing as a taxon be a type? A species may be interpreted widely differently by different taxonomists. What is one species to one person may be ten species to another. A holotype (species) may be divided into several "syntypes" because of a taconomic judgement. Can there ever be a stable type for a generic name? This ambiguity is built-in within the present Code.

The only way to get rid of this ambiguity will be to tie the identity of a type species to a specimen. And this is exactly what Weresub's proposal does. Nevertheless, although we agree with Weresub's line of argument to a certain point, we cannot totally support her proposal. In Weresub's opinion her proposal deals with *holotypified* generic names. It should be emphasized that the signification of the term "holotype", as contrasted to lectotype or neotype, is that it is a type recognized on purely nomenclatural grounds without any taxonomical considerations. Now, many generic names, probably most of them, are based on old species, whose names do not always have holotypes. Following Weresub's arguments the type of a generic name is a species which includes the type specimen of the cited type species. But if this type specimen is in its turn a lectotype or a neotype, the type of the generic name will undeniably be (indirectly) dependent on taxonomic considerations. It can hardly be maintained that such a type is a holotype. Moreover, Article 8 provides for alteration of a lecto- or neotype on taxonimic grounds. Therefore a generic type will be liable to changes because of changes in the typification of its name. If a genus is based on a species whose name is lectotypifiable, we see no reason why the generic name should not be lectotypifiable too, and if so, why should it not be possible to typify the generic name independently of the name of its type species? We are, after all, dealing with typifications on two different levels that should not be confused with each other.

Although we do not wholly support Weresub's idea, we feel the need to include in the Code a regulation which ties the type of a generic name to a certain specimen. This goal can be gained in two ways, either by deciding simply that the type of a generic name is a specimen or by deciding that the type of a generic name is a species that includes a certain specimen. The difference between these two approaches is in fact semantic rather than real. The term generic type specimen was introduced by Donk (1959, p. 84). We find it very useful, and besides selecting a lectotype speices we will also designate a generic type specimen, which serves the purpose of leaving the identity of the selected lectotype species beyond any doubt. It may be noticed that in this case the generic type specimen is identical with the holotype of the name of the lectotype species.

After this digression on typification of generic names let us now return to the topic that was the original scope of this paper. In the protologue of *Physconia*, Poelt indi-

cated the type species as follows: "Typus generis: *Lichen pulverulentus* Schreber, *Physcia pulverulenta* (Schreber) Hampe (M)." As we have shown above *Lichen pulverulentus* Schreb. is a superfluous name for *Lichen orbicularis* Neck. This species was not treated in Poelt's paper and therefore Poelt included its type by citing its obligate synonym, the superfluous name. However, the citation "(M)" refers to Schreber's specimen of *Lichen pulverulentus* in herb. M. With our discussion above in mind we see that *Ph. pulverulenta* as circumscribed by Poelt includes two specimens, viz. (1) the type specimen of *Lichen orbicularis* Necker (= the type specimen of *L. pulverulentus* Schreb.) and (2) Schreber's specimen in M. Obviously Poelt cited the type species as he did because he did not realize that Schreber's name is illegitimate and the specimen in M would have been the natural (lecto)type for it if it had not been superfluous. There is no controversy regarding the taxonomic status of *Phaeophyscia orbicularis* (Neck.) Moberg and *Physcia pulverulenta* sensu auctt. non (Schreber) Hampe, now *Physconia pulverulacea* Moberg, as two distinct species and it is generally agreed (certainly also by Poelt) that they should be classified in two different genera. But we cannot get around the link between a name and its type, and therefore, *Physcia orbicularis* (Neck.) Poetsch is a correct name for the type species as circumscribed by Poelt. But since to our taxonomic judgement the two specimens included in this circumscription represent two distinct species (two discordant elements), these species are equivalents of syntypes. As lectotype should be chosen the species which best matches Poelt's description. *Therefore we hereby select* Physconia pulverulacea *Mob. as lectotype for* Physconia *Poelt* (generic type specimen: Germania, Lipsia in Tilia, 1767 Schreber, M).

Footnote: We have been using the word syntype for generic names within quotation marks since, strangely enough, the Code does not sanction the use of this term for the species among which a lectotype for a generic name is to be chosen. (Art. 7: "A syntype is any one of two or more *specimens* cited by the author...", but "A lectotype is a specimen *or other element* selected..."). We see no reason why this very useful term should not be applicable to types that are taxa as well as to types that are specimens.

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REVUE DES LIVRES

par

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MULTILINGUAL COMPENDIUM OF PLANT DISEASES: VIRUSES AND NEMATODES, par Paul R. MILLER et Hazel L. POLLARD, 434 p., 229 ph. col., quarto, 1977, cartonné-toilé. Ed. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA.

297 maladies causées aux plantes cultivées par les virus et les nématodes sont cataloguées par les auteurs. Leur dénomination est donnée en 18 langues: anglais, français, espagnol, portugais, italien, russe, suedois, allemand, néerlandais, hongrois, bulgare, turc, arabe, thai, hindi, indonésien, coréen, chinois et japonais. Une description d'une dizaine de lignes, répétée en 4 langues, anglais, espagnol, français et "interlingua", accompagne la fiche d'identité. Une série de 229 photographies en couleurs de format 5x5 cm, groupées en 26 planches, illustre un bon nombre des maladies cataloguées. Après les index latins des agents et des hôtes, viennent les index généraux dans les 18 langues. Cet ouvrage contribuera sans doute à faciliter la communication entre spécialistes, dans les publications et les réunions scientifiques et coordoner les législations de portée internationale en la matière.

COMPENDIUM OF WHEAT DISEASES, par M. V. WIESE, 106 p., 103 figs., 63 phot. col., quarto, dos papier, 1977. Ed. The American Phytopathological Society, 3340 Pilot Knob Road, St Paul, Minnesota 55121, USA.

L'ouvrage débute par une clé dichotomique symptomatologique permettant l'identification macroscopique des maladies du froment. Les maladies sont ensuite systématiquement décrites et illustrées. Les unes sont infectieuses, bactériennes, mycoplasmiques, fongiques (sur semences, sur feuillage, sur racines et sur tiges), nématiques ou virales. Les autres sont non-infectieuses, dues à l'intervention d'animaux ou de facteurs du milieu. Un glossaire achève l'ouvrage. L'intérêt de ce travail est double: d'abord, il couvre un grand nombre des maladies du blé; des 200 maladies connues, 50 sont communes et d'importance économique, réduisant les récoltes annuelles de 20 %; d'autre part, il excelle par la qualité de sa documentation et le choix d'une illustration démonstrative et "uptodate".

IMPROVING THE DISSEMINATION OF SCIENTIFIC AND TECHNICAL INFORMATION A PRACTIIONER'S GUIDE TO INNOVATION, préparé par le CAPITAL SYSTEMS GROUP INC. for the Office of Science Information Service, N.S.F., Distribué par le National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, USA.

Un complément"Standard Format for calendar dates" et "Computer-managed conferences" a été édité en 1977.

LA SANTE PAR LES CHAMPIGNONS, par Georges A. LAFUENTE. 139 p., illustré au trait, 18x12 cm, 1974. Editions du Jour, 10 rue Mayet, 75006, Paris. Prix 10 FF.

Un titre quelque peu trompeur, puisque ce n'est ni un traité de médecine ni un guide de diététique. C'est simplement l'introduction à la connaissance des champignons toxiques et comestibles, bien nécessaire si l'on veut éviter l'empoisonnement. Il faut pratiquer la mycologie avant la mycogastronomie dit l'auteur.

MYCOLOGIE DU GOUT, par Marcel V. LOCQUIN, 97 p., 1 tabl., broché, dos papier, 25x16 cm, 1977. Ed. J.F. Guyot, 8 rue de Mézières, 75006 Paris.

Comme la gastronomie, la mycogastronomie est un art. Il ne s'improvise pas, il s'apprend. Mais à la base, ce conseil de l'auteur: ne consommer que des champignons d'identité certifiée. L'auteur a goûté 700 espèces, il en retient 300 comme comestibles intéressantes, mais n'en propose qu'une centaine à la consommation courante. Un tableau synoptique en donne la valeur pour chacun des usages types, soit à l'état cru en salade, soit à l'état cuit en légume , condiment, sauce, potage, garniture, avec oeufs, viandes, poissons, crustacés, ou encore en dessert, fromage, boisson. 176 recettes sont décrites, de mêmes que 12 méthodes de conservation.

LES CHAMPIGNONS COMESTIBLES, par Olle PERSSON et H.K. PRINT, traduit par Anne Besançon. Coll. "Nouveaux Guides du Naturaliste", 134 p., illustré en coul. et b.n., 12x18 cm, dos semi-rigide, 1975. Ed. Fernand Nathan, 18 rue Monsieur le Prince, 75006 Paris.

Ce petit guide est fort intéressant par le fait qu'il présente les champignons les plus communs par milieu écologique différent: la forêt d'épicea, la forêt de pin, la forêt de chênes et hêtres, la lisière forestière et la prairie, les parcs et les jardins. 80 espèces constituant les associations écologiques sont décrites et illustrées d'une manière didactique adaptée au non-initié. Des commentaires propres à chaque espèce sont groupés en fin du livre. Une présentation originale.

RECONNAITRE LES CHAMPIGNONS, par Hans Burckhardt, Coll. "Multiguide nature", 128 p., 102 phot. col., 12x19 cm, cartonné toilé, 1977. Ed. Elsevier Sequoia, Leuvensesteenweg 325, 1940 Woluwe, Belgium, Prix 295 FB. (Traduit de PILZE, par H. Burckhardt, Ed. Albrecht Philler Verlag, Minden, D., par Héry Fastré-Kok).

Ce guide pour débutant présente 102 espèces de basidiomycètes, toutes illustrées de bonnes photographies en couleurs, et d'une description brève. Le choix d'espèce correspond plus précisément à l'Europe centrale. De bons conseils destinés aux débutants sont donnés dans la seconde partie de l'ouvrage. L'édition est impeccable.

SCHWEIZER PILZTAFELN, PLANCHES SUISSES DE CHAMPIGNONS, anonyme, tome 1, 48 p., 40 pl. col., 1967 (5e éd.), tome 2, 86 p. 75 pl. col. 1965 (4e éd.), tome 3, 84 p., 80 pl. col., 1969 (3e éd.), tome 4, 68 p., 75 pl. col., 1968 (2e éd.), tome 5, 42 p., 80 pl. col., 1975 (1e éd.), dos papier, 11 x 16 cm. Ed. Union Suisse des Sociétés Mycologiques, Schnarnachtalstrasse 2, CH-3006 Berne.

Les cinq fascicules parus ont été publiés en français, en allemand et en italien. Le nombre total d'espèces actuellement décrites est de 350. Les illustrations sont des reproductions d'aquarelles et sont présentées en vis à vis des descriptions, à raison de deux espèces par double page. Il n'y a pas d'ordre particulier dans la présentation des espèces. L'index de chaque tome est cumulatif, incluant les tomes déjà parus. Les aquarelles de très bonne qualité par le dessin et la couleur sont plus didactiques qu'artistiques et répondent bien au but de l'ouvrage d'être un bon catalogue d'identification des champignons de la Suisse.

PILZE, DIE NICHT JEDER KENNT, par Hans HAAS et Heinz SCHREMPP, 70 pages, 112 phot. col. 13,5x19,5 cm, cartonné laminé, 1974, Coll. Bunte Kosmos Tascher Führer. Ed.Kosmos, Gesellschaft der Naturfreunde Franckh'sche Verlagshandlung, W. Keller & Co, Stuttgart, Deutschland. Prix DM 8.8o.

Dans la collection des Guides Kosmos, ce petit livre, dû à la plume du Dr Haas, mycologue et à la photographie de H. Schrempp, est une perle de qualité. 120 espèces d'ascomycètes et de basidiomycètes sont décrites et illustrées, à raison de 4 par double page.

PILZE MITTELEUROPAS, SPEISE- UND GIFTPILZE, par Hans HAAS, 80 aquarelles de Gabriele GOSSNER, 304 p., 80 pl. col., 19 x 13 cm, cartonné toilé, 1976. Ed. Kosmos, Gesellschaft der Naturfreunde Franckh'sche Verlagshandlung, W. Keller & Co, Stuttgart, Deutschland. Prix DM 19.8o.

Hans HAAS, l'auteur du livre précédent, met ici en valeur quatre-vingt aquarelles de l'artiste Gabriele GOSSNER, dans un livre à la fois luxueux et scientifique. Les Editions Kosmos n'ont d'ailleurs pas trahi la qualité du texte et des illustrations. Celles-ci sont présentées en face des descriptions dans la première partie; la seconde partie est consacrée aux clés de détermination et à la classification de 554 espèces brièvement décrites. L'ouvrage sera apprécié par les mycologues amateurs, spécialistes et bibliophiles.

HONGOS DE NUESTROS CAMPOS Y BOSQUES, par Francisco de Diego CALONGE préfacé par Alvaro ZUGAZA, 1e édition, 316 p., 120 figs. col., 1975, 2e édition, 344 p., 133 figs. col., 1977, cartonné toilé. Ed. Instituto Nacional para la Conservacion de la Naturalera, Servicio de Publicaciones Agrarias, Paseo de Infanta Isabel 1, Madrid 7, España.

Dans cette seconde édition de son ouvrage déjà bien connu, l'auteur présente 13 espèces de plus, soit un total de 125 espèces, appartenant aux ascomycètes, basidiomycètes, gasteromycètes et mixomycètes. Les espèces sont présentées par ordre alphabétique dans leur classe. Description et photographie en couleurs se font face. Les photographies sont de bonne qualité et l'édition luxueuses. Ce guide inclut des espèces propres à l'Europe méridionale et la Peninsule ibérique.

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