November 2013

Camarophyllus Notebook 1

L. R. Hesler

Genus: HYGROPHORUS

Section: Camarophyllus

3 albipes Pk.

3 angustifolius (Murr.) comb. nov.

~~atropunctus (Bres.) Sm. & Hes.~~

australis (recurvatus)

1 bakeri Dennis

6 basidiosus Pk.

82 borealis Pk.

1 borealis f. salmoneus Coker

buccinulus (Speg.) Dennis

1 burgdorfiensis sp. nov.

6 canescens Sm. & Hes.

1 cinereus (Fr.) Karst.

18 colemannianus Blox.

1 cremeus (Murr.) Dennis

12 cremicolor (Murr.) Murr.

1 fallax Sm. & Hes.

fimbriatophyllus Kauff. (excluded)

3 foetens Phillips

1 fulvosiformis Murr.

fulvosus (Bolt.) Murr. (pratensis)

1 fumosellus Sm. & Hes.

2 graveolens Sm. & Hes.

hudsonianus Jennings (a Clitocybe)

11 hymenocephalus Sm. & Hes.

1 lawrencei sp. nov.
microsporus Sm. & Hes.

1 niveicolor (Murr.) Sm. & Hes.

~~nordmanienesis sp. nov.~~

23 niveus Fr..

1 nordmanienesis sp. nov.

3 obconicus Pk.

2 pallidus var. luteifolius var. nov.

11 pallidus Pk. var. pallidus

5 paupertinus Sm. & Hes.

8 peckianus Howe

95 pratensis (Fr.) Fr.

praticola (recurvatus)

3 rainierensis sp. nov. (pseudopallidus sp nov)

~~rainierensis var. macrosporus var. nov.~~

16 recurvatus Pk.

~~rugulosus Sm. & Hes.~~

1 subfescescens var. odora Sm. & Hes.

10 subfuscescens Sm. & Hes. var. subfuscescens

8 subradiatus Fr.

28 subviolaceus Pk.

tepeitensis Murr. (borealis)

1 uliginosus (formerly called subradiatus)
umbrinus Dennis

ventricosus B. & Br. (virgineus)

16 virgineus (Fr.) Fr.

~~Sm-48072=cinereus~~

~~Sm-50254~~

~~Sm-54328~~

~~Sm-60164 (burgdorfiensis)~~.

Sm-62136 (near angustifolius)

HYGROPHORUS ALBIPES Pk.

Bull. Torrey Bot. Club 25:323. 1898

Camarophyllus albipes (Pk.) Murr., North Amer. Clora 9:388. 1916.

Pileus about 1.2 cm. broad, convex, grayish-brown, glabrous, margin strongly decurved.

Lamellae arcuate and commonly very decurrent, whitish, becoming darker with age, narrow, subdistant.

Stipe 2.5-3.5 cm. long, 3-5 mm. thick, white without and within, glabrous, attenuated at the base, solid.

Spores 5.5-7 (8) x 4.5-5.5 (6) μ, subglobose or broadly ellipsoid to ovoid, smooth, pale yellowish in Melzer's reagent. Basidie 37-58 x 5-7 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae narrow, 1.7-2.3 μ broad. Cuticle fibrillose, hyphae repent to more or less erect, appearing slightly subgelatinous. Clamp connections present on the cuticular hyphae.

Habit, habitat, and distribution. - On soil, in Maine, Massachusetts, and Alabama, September-October.

Material studied. - ALABAMA: Burke 85; MASSACHUSETTS: Peck (type, collected by Dr. G. E. Francis, September) ~~9331~~ Bigelow.

Observations. - In the above description the macroscopic characters are taken from Peck's account. The microscopic

characters are based on our study of the type.

This species is related to H. sphaerosporus which has broader hyphae in its gill-trama, more spherical spores, and broader lamellae.

Biglow collected this species in 1960, (No. 933), and, except for the subclavate to clavate stipe, agrees well with the type.

HYGROPHORUS ANGUSTIFOLIUS (Murr.) comb. nov.

Camarophyllus angustifolius Murr., North American Flora 9:386. 1916.

Pileus 2-5 cm. broad, obtuse to plane, at times umbonate, the disk becoming more or less depressed and margin uplifted (very similar in shape to H. pratensis), pure white, surface dry and unpolished, appearing innately fibrillose under a lens. Context thick and firm, white; odor none, taste mild.

Lamellae decurrent, pure white, close, narrow, thickish, very brittle, some forked, edges even.

Stipe 2-4 cm. long, 10-20 mm. thick, pure white, subequal, solid, glabrous or with scattered fibrils.

Spores (3.5) 4.5-6 x 3-4.5 μ, drop-shaped to subglobose, smooth, hyaline, not anyloid. Pleurocystidia and cheilocystidia none. Basidia 28-46 x 5-6 μ, 4-spored. Gill-trama of narrow (2.5-4 μ), intricately interwoven hyphae, yellowish in iodine. Pileus-trama homogeneous, yellowish in iodine. Cuticle a cutis, the surface hyphae not greatly differentiated from the pileus tramal hyphae, 2-3 μ broad, colorless, repent to more or less erect, tangled. No hypodermium. Pileus trama of radial, more or less parallel hyphae. Clamp connections present, scarce.

Habit, habitat, and distribution. - On soil, in woods, including redwood, New Jersey, Massachusetts, and California, September and December.

Material studied. - CALIFORNIA: Smith 3879; MASSACHUSETTS: Bigelow 8986; NEW JERSEY: Earle and Murrill 1387 (type, from Fort Lee, September 13, 1902).

Observations. - The type has been studied, and notes have been recorded as follows: spores 4.5-5.8 x 3.5-4.5 μ, ellipsoid to subglobose, apiculate, smooth, very pale yellow in Melzer's reagent. Basidia 30-46 x 4-6 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven. Cuticle a cutis, the surface hyphae repent, or more or less erect, not greatly differentiated from the subjacent tramal hyphae. Pileus trama of slightly interwoven, radial hyphae. Clamp connections rare on the cuticular hyphae.

This species is a member of the H. pratensis series, and is distinguished from pale forms of the latter by its very small spores and close lamellae.

HYGROPHORUS BAKERI Dennis

Kew Bull. 2:258. 1953

Illustration:

Dennis, Kew Bull. 2, fig. 3.

Pileus 2.5 cm. broad, convex, umbilicate, avellaneous, glabrous, slightly striate. Context white, very thin.

Lamellae decurrent, white, narrow.

Stipe about 3-5 cm. long, slender, white, base attenuated, glabrous, solid.

Spores 6-8 x 5-5.5 μ, subglobose, apiculate, non-amyloid. Basidia 35-40 x 5-6 μ, 4-spored, cylindric-clavate. Pleurocystidia and cheilocystidia none. Gill trama subparallel in the center of the gill, irregularly woven toward its sides. Cuticle of undifferentiated, radiating hyphae, 5.5-7 μ broad, non-gelatinous, with clamp connections.

Habit, habitat, and distribution. - On soil under bamboo, Trinidad.

Material studied. - TRINIDAD: Dennis IIA (type, from St. Joseph).

Observations. - Dennis (1953) suggests that this agaric might be sought in Omphalina, but the long basidia indicate an Hygrophorus. He adds that H. albipes Pk. and H. sphaerosporus Pk. differ in their obtuse, viscid pilei. Dennis properly places it under Camarophyllus.

HYGROPHORUS BASIDIOSUS (Pk.) Pk.

New York State Mus. Bull. 116:57. 1907

Clitocybe basidiosa Pk., New York State Mus. Bull. 1:2:5. 1887.

Camarophyllus basidiosus (Pk.) Murr., North American Flora 9:389. 1916.

Pileus 1-4 cm. broad, convex to plane, subumbonate at times, grayish-brown when moist, fading to pale gray, near "pale gull gray" (no comparable colors in Ridgway), glabrous or appearing glaucous, hygrophanous, pale ashy buff when dry, radiate-streaked in fading. Context whitish; odor and taste not distinctive.

Lamellae adnate to short decurrent, pale gray to "drab gray", broad, subdistant, arched, thick, edges even.

Stipe 2.5-5 cm. long, 3-10 mm. thick at the apex, white, tapering downward to a slender base, solid becoming hollow, surface glabrous or appearing innately fibrillose under lens.

Spores 4-5.5 (-6) x 3-4.5 μ, subglobose, smooth, pale yellowish in Melzer's reagent. Basidia 38-50 x 5-6.5 μ, 2- and 4-spored, sterigmata 5-9 μ long, curved. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae cylindrical, 2-4.5 μ broad. Cuticle not gelatinous, cuticular hyphae cylindrical, 1-3 μ in diameter, repent or free ends more or less erect; pileus tramal hyphae ~~of the pileus mostly cylindrical~~, 1-4 μ in diameter, radially disposed and interwoven.

No hypodermium. Clamp connections present.

Habit, habitat, and distribution. - Gregarious in woods, swamps, and Sphagnum bogs, New York, Massachusetts, and Maine, July-September.

Material studied. - MAINE: Bigelow 4494, 4669; MASSACHUSETTS: Bigelow 7503, 8301, 8347; NEW YORK: Peck (type, from Sandlake, August).

Observations. - Notes on the type follow: spores 4-5.7 (6) x 3-4.5 μ, sub-globose, ovoid, or short-ellipsoid, smooth, pale yellow in Melzer's reagent. Basidia 37-44 x 4.5-6 μ, 4-spored, sterigmata up to 8 μ long. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae 2-4.5 μ broad. Cuticle repent-fibrillose, some hyphae more or less erect. Clamp connections present on the cuticular hyphae. The pileus cuticle is non-gelatinous in KOH. The lamellae apparently vary in color from whitish to pale gray, or they may be whitish with a violaceous tint.

This species is distinguished from H. albipes in its paler color when dried, its larger status, its broader, grayish to violaceous lamellae, and its lack of a gelatinous or even a subgelatinous cuticle. The types of these two species do not resemble each other.

HYGROPHORUS BOREALIS Peck

N. Y. State Mus. Ann. Rept. 26:64. 1874

Camarophyllus borealis (PK.) Murr., North Amer. Flora 9:385. 1916.
Omphalina tepeitensis Murr., North Amer. Flora 9:348. 1916.

Illustrations:

Plate

Coker, Elisha Mitchell Sci. Soc. Jour. 64, pl. 17 (top).

Smith, Michigan Acad. Sci., Arts, and Letters, 17, pl. 31.

Pileus 1-4.5 cm. broad, obtuse to convex, becoming subumbonate, plane or with the disk slightly depressed, the margin remaining decurved or spreading and somewhat undulate in age, watery white when moist, dead white to nearly chalk-white when faded, glabrous, moist, somewhat lubricous at times, the margin striatulate when expanded and moist, even or wrinkled slightly after losing moisture. Context thick on the disk, thin on margin, whitish, soft and fragile; odor and taste not distinctive.

Lamellae arcuate, becoming decurrent, white, subdistant to distant, intervenose, generally narrow, broadest behind, edges even.

Stipe 2-9 cm. long, 2-8 mm. thick, dull white, equal or tapering downward, firm, dry, glabrous or rarely innately silky, straight or flexuous, stuffed.

Spores 7-9 (12) x 4.5-6.5 μ, ellipsoid, smooth, white in mass, pale yellowish in Melzer's reagent. Basidia 40-56 x 6-8 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, cells 6-10 (14) μ broad, yellowish in iodine. Pileus trama homogeneous, ~~with a few slender subgelatinous radially arranged~~ hyphae, ~~as the only pellicle. No hypodermium.~~ Clamp connections present on the cuticular hyphae.

Cuticle of radially disposed repent hyphae, rarely subgelatinous, not sharply differentiated from the pileus trama. No hypodermium. of radially arranged, nearly parallel Massachusetts,

Habit, habitat, and distribution. - On soil, in deciduous and conifer woods, Nova Scotia to Washington, California, Oregon, Wyoming, Idaho, Michigan, Tennessee, North Carolina, ~~Maine~~, New York, August-December; also Mexico and Jamaica.

Pennsylvania, Maine,

Material studied. - CALIFORNIA: Smith 3878, 8180, 8204, 9147, 9248, 56189, 56286, 56423; IDAHO: Kauffman, Copeland, Sept. 8, 1922; Smith 16049, 53207, 53524, 53541, 53596, 53763, 54974, 55343, 60562; MAINE: H. E. and M. E. Bigelow 4452, 4500, 4501, 4502, 4616, 4617, 4694, 4752; Parlin 15216, 15512; MICHIGAN: Imshang 4527, 4631; Kauffman, Marquette, Sept. 4, 1906, and Rock River, Sept. 14, 1929; Mains 32-685; Pennington 1358; Smith 1241, 7697, 18548, 20945, 23493, 32006, 32913, 34206, 38110, 42614, 42816; NEW YORK: Kauffman, Adirondack Mts., Sept. 14, 1921, and Ithaca, Sept. 19, 1913; R. Lowe, Adirondacks, Aug. 30, 1934; Peck (type, from Croghan and Copake, Sept.-Oct.); Singer 239; NORTH CAROLINA: Coker 13209; OREGON: Smith 8007, 19222; PENNSYLVANIA: Kauffman, Mt. Gretna, Sept. 7, 1924; Overholts 15998; TENNESSEE: Boarts 10095, 16574; Drew & Billings 9717; Hesler 1093, 12951, 22415, 22667, 22940, 23508; Mason 9667;

Massachusetts: Bigelow 6227, 6228, 6229, 6230, 6242, 7814, 8690, 9357; Sharp 10947;

~~Sharp 10947; J. Smith 14753; Wallace 4449, 4451, 4454, 4455, 4456, 4460, 4461;~~ WASHINGTON: Smith 30311, 30883, 49128; WYOMING: Kauffman, Medicine Bow Mts., Sept. 5, 1923; CANADA: Kelly 914; Smith 882, 4577.

Observations. - Kauffman (1918) described a variety which he named subborealis in which the spores measured 10-12 (13) x 4-5.5 µ. Kauffman's specimens have been examined and the basidia were found to be consistently 2-spored. Hence we regard his variety as merely a 2-spored form of the species. In Tennessee collection No. 14469, all basidia observed were 2-spored, none 4-spored. In No. 16574, the numbers of 2- and 4-spored basidia are about equal, and the spores measure 8-11 x 5-7 µ. In No. 10938, ~~10938~~, the 4-spored basidia predominate, and the spores measure 7.5-12 x 4.5-5.5 (7) µ; but smaller and larger spores are about equal. In No. 10095, 2-spored basidia predominate and the spores are 7-9 x 4-5.5 µ. It appears then that not all the large spores are borne on 2-spored basidia. In No. 14469, however, only 2-spored basidia were observed and the spores were 9-12 x 5-6 µ.

From Peck's collection we have studied the material marked "types." The specimen-box contains both the Croghan and Copake collections; when studied these were found to be identical. Notes on the Croghan collection: Spores 8-11 (12) x 4.5-6 µ, the majority 8-9 x 4.5-5 µ, ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 37-49 x 6-7 (8) µ, 2- and 4-spored, the majority 2-spored. Pleurocystidia and cheilocystidia none.

Gill-trama interwoven. Cuticle of appressed hyphae which are only slightly gelatinous. Clamp connections present on the cuticular hyphae.

Smith has collected a color-form (Sm-53541) from Idaho, in which the pileus is cinnamon buff, fading to pinkish buff, and the lamellae are pale pinkish buff.

Singer (~~1949~~ 1951 and others have) raised the question as to whether H. borealis is different from H. niveus. The latter species, however, is viscid from the gelatinous cuticle.

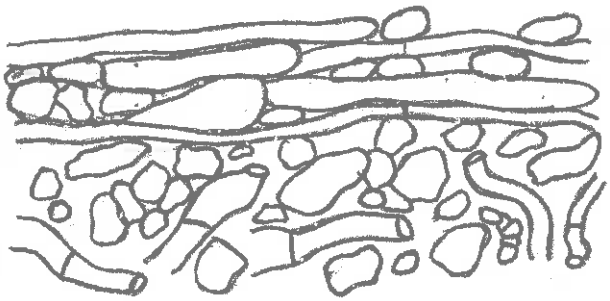
Dennis (1953) has studied the type of Omphalina tepeitensis Murr., and concludes that it is the same as H. borealis.

~~Since both~~

Hygrophorus borealis PK.

Cuticle : Sm - 56189

(Tangential view)



× 1000

Cuticle a thin poorly differentiated cutis, or more rarely a few surface hyphae appearing subgelatinous. No hypoderm. Pileus trama ~~essentially~~ of radially disposed hyphae.

Hygrophorus borealis Pk.

(Smith)

~~Dr. Lutz, Giant~~

Hygrophorus borealis Pk.
Smith 32-685

22940 – Hygrophorus borealis Pk.

10938 - Hygrophorus borealis PK. - x 3/4

HYGROPHORUS BOREALIS f. SALMONEUS Coker

Elisha Mitchell Sci. Soc. Jour. 64:137. 1948

Pileus 2.5 cm. broad, convex, not umbilicate, watery white, flushed with pinkish orange on one side, hygrophanous, opaque-white when not soaked, glabrous, obscurely striate when wet, margin even when dry. Context white, less than 2 mm. thick near disk; odor faintly of wood, taste slight.

Lamellae arcuate-decurrent, white but turning pinkish orange when cut, 3 mm. broad at center, slightly venose, margins even.

Stipe 4 cm. long, 3 mm. thick below, 4 mm. above, tapering slightly downward, white above, dull pink below, the pink extending when handled, nearly glabrous (with a few scattered fibrils).

Spores 7.5-10 x 4-5.5 μ, ellipsoid, smooth, pale yellow in Melzer's reagent. Basidia 34-42 x 5.5-8 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama of interwoven hyphae. Cuticle of repent hyphae. Clamp connections not observed.

Habit, habitat, and distribution. - On soil, in mixed woods, North Carolina, November.

Material studied. - NORTH CAROLINA: Coker 3745 (type, from mixed woods, Chapel Hill, collected by H. R. Totten, Nov. 13, 1919).

Observations. - The description of microscopic characters given above is ~~are~~ based on our study of the type. The macroscopic characters are taken from the account by Coker (1948).

HYGROPHORUS BUCCINULUS (Speg.) Dennis

Kew Bull. 2:256. 1953.

Clitocybe buccinula Speg., Bol. Acad. Nac. Cienc. Cordoba. 11:388. 1889.

Marasmiellus buccinulus (Speg.) Singer, Lilloa 22:299. 1951.

Illustration:

Dennis, Kew Bull. 2, fig. 1 (drawings).

Pileus 1-1.5 cm. broad, convex with a small umbilicus, white, dry, silky. Context white, thick; odor none.

Lamellae decurrent, white, narrow, subdistant, thick.

Stipe white, tapering downwards, undulating, dry, fibrous, solid or, in age, becoming hollow above.

Spores 7-8 (10) x 6-7 μ, subglobose to broadly ellipsoid, non-amyloid. Basidia 67-75 x 10 μ, 4-spored. Gill trama interwoven. Cuticle of radiating hyphae, 4-5 μ broad.

Habit, habitat, and distribution. - On bare soil, Trinidad and Brazil, April and September.

Observations. - The above description is adapted from Dennis' report (1953) of his collection in Trinidad. After his study of Spegazzini's type, Dennis, with some hesitancy, ~~since identified his collections~~ concluded that his collections were identical with Clitocybe buccinula Speg.

HYGROPHORUS BURGDORFIENSIS SP. NOV.

Pileus 1-3.5 cm. latus, viscidus, hygrophanus, pallido-luteus vel "warm buff" deinde "pinkish buff"; lamellae decurrentes, "cartridge buff" demum "pale pinkish buff," latae, distantes; stipes 5-7 cm. longus, 2.5-4 mm. crassus, albidus, aequalis vel deorsum constrictus; sporae 7-9 (10) x 4-5 μ, ellipsoideae. Specimen typicum in Herb. Univ. Mich.; lectum prope Burgdorf, Idaho, Aug. 12, 1958, A. H. Smith n. 60169.

Pileus 1-3.5 cm. broad, convex with an inrolled margin, becoming plane or nearly so, viscid, hygrophanous, when young and fresh pale yellow ("warm buff"), fading to pinkish buff (never white), translucent-striate when moist and mature. Context thin but firm, unchanging when bruised or in $FeSO_4$; odor faintly medicinal (but scarcely diagnostic), taste mild.

Lamellae decurrent, "cartridge buff" to "pale pinkish buff" (not white), broad, distant, unchanging when bruised but gradually becoming more yellow in age.

Stipe 5-7 cm. long, 2.5-4 mm. thick at the apex, surface dull white, twisted striate in some specimens, equal to slightly narrowed dowmward.

Spores 7-9 (10) x 4-5 μ, ellipsoid, smooth, yellow in Melzer's reagent. Basidia 38-50 x 6-8 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill trama intricately inter-

woven, hyphae 5-10 μ broad. Pileus cuticle a medium to narrow gelatinous zone, 30-60 (100) μ thick. Clamp connections on the cuticular hyphae.

Habit, habitat, and distribution. - Gregarious at edge of bog under lodgepole pine, Idaho, August.

Material studied. - IDAHO: Smith 60169 (type, from Burgdorf, Aug. 12, 1958).

Observations. - This species obviously belongs in Stirps Pratensis, and is related to H. pratensis but it has larger spores, a faint medicinal odor, and different colors. It is likewise related to H. berkeleyi Orton (1960) which has smaller spores, is only slightly viscid, and odor none or faint and pleasant.

HYGROPHORUS BURGDORFIENSIS VAR. DISCOLOR VAR. NOV.

Pileus 3-6 cm. broad, plane to slightly depressed with a decurved margin, in age shallowly infundibuliform, surface dull white to cream-color, pale dingy honey color on the disc finally the margin dull white, drying out to whitish on disc and yellowish at margin, glabrous, lubricous to slightly viscid, and margin conspicuously striate. Context whitish, thin, pliant; odor and taste not distinctive.

Lamellae decurrent, milk white to pale cream-color, distant, narrow to moderately broad, edges even, drying whitish with dingy ochraceous edges.

Stipe 3-6 cm. long, 4-6 mm. thick, equal or enlarged either way, naked overall, dingy watery pallid to dull white, discoloring only slightly in drying, base with appressed white mycelium.

Spores 8-10 x 5.5 μ, subovate with a prominent oblique sterigmal appendage as seen in profile, thin-walled, non-amyloid (yellowish hyaline in Melzer's reagent). Basidia 4-spored. Pleurocystidia and cheilocystidia none. Gill trama of interwoven, hyaline hyphae, merely yellowish in Melzer's reagent. Epicutis of pileus a thin (6-15 μ) layer of narrow (1.5-3 μ) hyaline appressed gelatinous hyphae. Clamp connections present.

Habit, habitat, and distribution. - Michigan, September.

Material studied. - MICHIGAN: Smith 63285 (type, from Reese's Bog, Univ. Mich. Biological Station, Douglas Lake, Sept. 14, 1960).

Observations. - This variety has been a puzzle for some years but in the light of the Idaho collection of H. burgdorfiensis it seems to have a natural position between H. niveus and H. borealis, but differs from both in the tendency to become yellow. From H. borealis it differs in its thinner pileus which expands to shallowly funnel-shaped, and in the thin gelatinous epicutis of very narrow hyphae. H. borealis is intermediate in color between H. niveus and the var. discolor of H. burgdorfiensis. The latter differs distinctly in color from H. niveus but in other respects is exceedingly close to it. Var. discolor differs from var. burgdorfiensis in being dull white at first. Here again, we have a series of taxa distinguished on progressive differences in pigmentation, a situation occurring throughout the genus as a whole and one which, it is hoped, can some day be studied from the standpoint of the chemistry involved.

HYGROPHORUS CANESCENS Sm. & Hes.

Lloydia 5:10. 1942

Camarophyllus canescens (Sm. & Hes.) Sing., Silloa 22:148. 1951.

Pileus 2-4.5 cm. broad, obtuse, becoming convex, the margin incurved and lobed or somewhat irregular, "benzo brown" to "drab gray," fading to pallid sordid gray in age, surface at first canescent from a thin coating of appressed fibrils, glabrescent, dry or moist, not viscid, opaque at all stages. Context grayish, unchanging, thin, fragile; odor and taste mild.

Lamellae broadly arcuate-adnate to subdecurrent, "Quaker drab," becoming "light mouse gray" (deep bluish gray), fading when dried and then concolorous with the pileus, subdistant to distant, narrow, broadest near point of attachment, narrowed outward, edges even.

Stipe 4-6 cm. long x 6-8 mm. thick, white at the base, elsewhere near "pallid purplish gray," enlarged above, glabrous and somewhat longitudinally streaked, hollow.

Spores 4-5.5 (6) x 4-4.5 μ, at times globose, more often subovoid, smooth, pale yellowish in Melzer's reagent. Basidia 34-51 x 4.5-6 μ, 2- and 4-spored, mostly 4-spored; sterigmata 5-8 μ long. Pleurocystidia and cheilocystidia none. Gill-trama compactly and intricately interwoven, hyphae 2.5-5 μ broad.

Cuticle of interwoven hyphae with numerous more or less erect, slender (1-3 μ) hyphae, non-gelatinous, a trichodermium. Pileus trama more or less radial, interwoven. Clamp connections present on the cuticular and gill-trama hyphae.

Habit, habitat, and distribution. - Singly on soil, under hemlock, Massachusetts, North Carolina, and Michigan, August-September.

Material studied. - Massachusetts: Bigelow 9125; NORTH CAROLINA: Smith 10031 (type, from Newfound Gap, Great Smoky Mountains National Park, August 11, 1938); MICHIGAN: Smith 38537, 39515, 41824, 61288;

Observations. - This is a very beautiful species and apparently very similar to H. pallidus and H. subviolaceus. It differs in its canescent pileus when young, dark colored stipe (the specimens were growing in deep shade), and smaller spores. In the dried condition it resembles H. basidiosus in appearance, but since most members of the H. pratensis series look much alike when dried, a great deal of emphasis cannot justifiably be placed on that resemblance. When fresh H. basidiosus and H. canescens should be readily distinguishable by the difference in the colors of the pileus and stipe and the lack of striations on the pileus of H. canescens.

HYGROPHORUS CINEREUS Fr.
Sv. Aetl. Svamp., t. 30. 1863

Camarophyllus cinereus (Fr.) Karst., Bidr. Finl. Nat. Folk, p. 226. 1879.

Illustration:

Lange, Flora Agar. Dan., pl. 163B.

Pileus 8-25 mm. broad, glabrous, benzo brown, fading to pale vinaceous drab. Context thin, whitish; taste mild.

Lamellae decurrent, "quaker drab," distant.

Stipe pallid, naked, dry, no veil.

Spores 7-8 (10) x 4-5.5 μ, ellipsoid, smooth, pale yellow in Melzer's reagent. Basidia 41-55 x (5) 6-8 μ, 2-and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 6-9 μ broad. Cuticle of repent hyphae, with a few more or less repent hyphae which appear slightly gelatinous. Clamp connections present on the cuticular hyphae.

Habit, habitat, and distribution. - On soil, on a stream bank, Washington, Mt. Rainier National Park, September; also Europe.

Material studied. - WASHINGTON: Smith 48072.

Observations. - It differs from H. subviolaceus and H. pallidus in its larger spores and mild taste; from H. lacmus in its lack of yellow stipe-base; from H. subradiatus in its pileus color and lack of a striate pileus.

HYGROPHORUS COLEMANNIANUS Blox. apud Berk.

Bloxhausen in Berkeley, Outlines of Brit. Fung., p. 200. 1860.

Camarophyllus colemannianus (Blox.) Ricken, Vademecum fur Pilzfreunde, p. 197. 1920.

Illustrations:

Plate

Bresadola, Icon. Myc., tab. 338.

Juillard-Hartmann, Icon. Champ., pl. 49, fig. 1.

Kauffman, Agar. Mich., pl. 29.

Konrad & Maublanc, Icon. Sel. Fung., pl. 378.

Ricken, Die Blätterp. Deutschl., pl. 7, fig. 5.

Smith and Hesler, Lloydia 5, pl. 1a.

Pileus 1-4.5 cm. broad, obtuse to turbinate, sometimes broadly convex to nearly plane in age or with the margin recurved slightly, sometimes with a low obtuse umbo, the margin decurved, color evenly "walnut-brown" to "cinnamon brown," hygrophanous, fading to "fawn color" or "avellaneous" and finally "cinnamon buff" to "vinaceous buff" (dull deep rusty brown fading to avellaneous or buff), glabrous, viscid and shining, with a thin separable pellicle, the margin translucent striate when moist. Context concolorous with the surface, no color change when bruised, thick under the disk, thin toward the margin, fragile; odor and taste mild.

Lamellae arcuate and soon distinctly decurrent, "avellaneous" to "vinaceous buff" fading to "tilleul buff" (whitish) at times, close to subdistant (20-26 reach the stipe), narrow to moderately

broad, many forking near their outer extremities, usually one tier of short gills, edges entire.

Stipe 3-6 (8) cm. long, 4-7 mm. thick, white, equal or narrowed toward the base, solid or with a narrow tubule, glabrous, not viscid, apex merely silky and not pruinose.

Spores 6-8 x 4.5-6 μ, ellipsoid, a few subovoid, smooth, yellowish in Melzer's reagent. Basidia 37-51 x 6-8 μ, 4-spored, sterigmata 4-8 μ long. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae 5-8 μ broad. Cuticle a gelatinous zone 40-70 μ thick, hyphae repent, colorless, 3-4 μ broad, —an ixocutis. Hypodermium a conspicuous zone of brownish, radially parallel hyphae. Pileus trama of interwoven hyphae. Clamp connections present on the hyphae of the cuticle and gill-trama.

Habit, habitat, and distribution. - Gregarious on humus in oak and beech woods, Michigan, Washington, and Ontario, Canada, September-October; also Europe.

Material studied. - MICHIGAN: Kauffman 817; Porter & Smith 20660; Smith 6056, 7577, 11058, 21056, 21310, 31989, 43519, 43816, 43831, 51024, 62062, 62257; WASHINGTON: Brown, Lake Quiniaret, Oct. 31, 1925; Kauffman, same, Oct. 30, 1925; Smith 18078; Canada (Ontario): Smith 4570.

Observations. - The reddish brown pileus with its thin gelatinous pellicle, the white stipe and broadly ovoid spores

distinguish the species. It is closely related to H. subviolaceus, but very easily distinguished by the color of the gills. The greatest difficulty is encountered in distinguishing H. subradiatus. Both have the pileus conspicuously striate when moist and fresh. The latter, as we recognize it, lacks a viscid pellicle and has a more highly colored stipe. Our data on these species do not agree exactly with the European descriptions of either fungus, but at the same time the differences do not appear really significant. Hence we have referred the viscid species to H. colemanianus and the typically moist one to H. subradiatus.

Hygrophorus colemannianus Blox.

Sm-6056

Sm-43816. Hygrophorus colemanianus Blox.

Hygrophorus colemannianus
(Kauffman)

Hygrophorus colemannianus

(Kauffman)

HYGROPHORUS CREMEUS (Murr.) Dennis

Kew Bull. 2:257. 1953

Omphalina cremea Murr., North American Flora 9:350. 1916.

Pileus up to 4cm. broad, convex, then expanded, flat or slightly umbilicate, warm buff to light buff, smooth, dry. Context white, thin.

Lamellae decurrent, light ochraceous buff, broad, subdistant, thick, lamellulae present, veined at base.

Stipe white, dry, equal or slightly enlarged upwards, smooth, solid.

Spores 8-9 x 4.5-6 μ, broadly ellipsoid, with a large oil drop. Basidia 35-40 x 7 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill trama of interwoven hyphae, 5-7 μ broad.

Habit, habitat, and distribution. - On soil and decayed stump, Trinidad and Jamaica, September to December.

Observations. - Dennis (1953) has studied the type of Omphalina cremea Murr., and, because of its thick gills and long basidia, concludes that it is an Hygrophorus. He suggests that it might be treated as a variety of H. pratensis with yellower gills and paler stipe than the type. ~~Dennis has~~

Material studied:- Trinidad: Dennis 73.

~~collected this species in Trinidad, under bamboos, September 27, 1949 (No. 73), and on November 30, 1949~~. We have studied Dennis' No. 73, and notes on ~~this~~ collection, ~~and~~ our observations are as follows: spores 7.5-9 x 4.5-6 μ, ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 37-46 x 5-6.5 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill trama interwoven, hyphae 3-5 μ broad. Cuticle not differentiated, surface hyphae repent, 3-5 μ brpad, with clamp connections. Pileus trama of radial hyphae.

HYGROPHORUS CREMICOLOR (Murr.) Murr.

Mycologia 4:217. 1912

Hydrocybe cremicolor Murr., Mycologia 4:209. 1912.
Camarophyllus cremicolor Murr., North Amer. Flora 9:389. 1916.

Pileus 1-3 cm. broad, obtuse with an incurved cottony margin, expanding to broadly umbonate with a spreading margin, white to creamy ochraceous or with a salmon tint, unpolished and whitish faded, surface canescent, pallid but moist and hygrophanous. Context cream color to near pale pinkish buff; odor none (or faintly fragrant in Smith No. 54279), taste not distinctive.

Lamellae "maize yellow" or paler yellow, distant, narrow, decurrent, edges even.

Stipe 5-7 cm. long, 8-12 mm. thick at apex, narrowed downward or nearly equal, more or less concolorous with pileus or basal portion paler (pale yellow below in one immature carpophore), surface glabrous and naked, no pruinosity above and no veil seen.

Spores 5-7 x 3.5-4.5 μ, broadly ellipsoid to subglobose, smooth, hyaline in Melzer's solution. Basidia 40-50 x 5-6 μ, 4-spored. Pleurocystidia none seen. Gill trama of interwoven narrow hyphae, 1.5-3 μ broad. Cuticle a trichodermium, hyphae 2-5 μ broad, more or less erect to loosely tangled, some with

cystidioid terminal elements, non-gelatinous. No hypodermium. Pileus trama chiefly of radial, subparallel hyphae, a few periclinally disposed. Clamp connections present.

Habit, habitat, and distribution. - On the ground in woods and in a dried up pool, Massachusetts, Michigan, Idaho, and Washington, July-November.

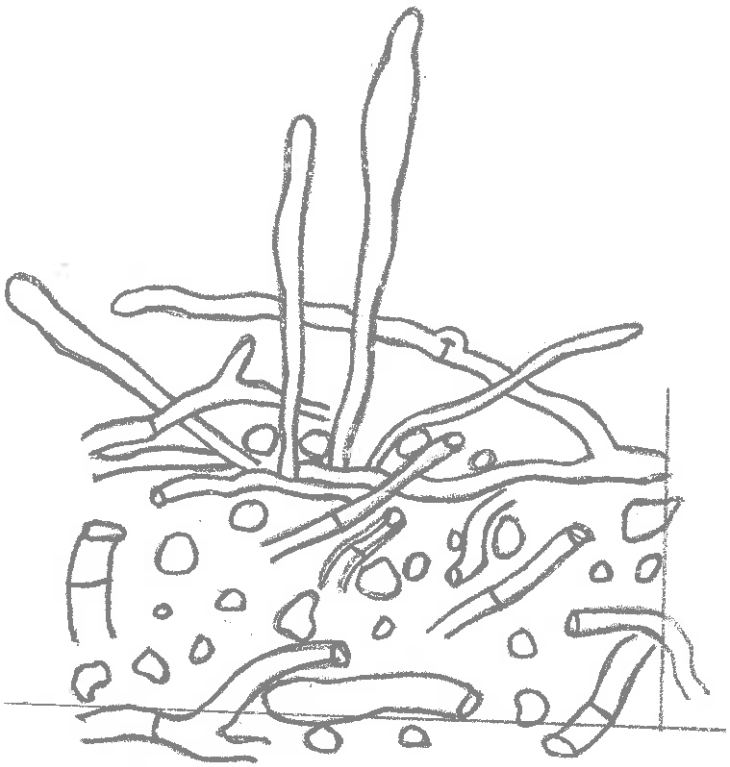
Material studied. - IDAHO: Smith 54279, 58239; MASSACHUSETTS: Bigelow 9130; MICHIGAN: Imshaug 4812; Smith 33115, 33151, 33159, 33163, 41726, 50254; WASHINGTON: Kauffman, Lake Quiniaret, Oct. 16, 1925; Murrill 568 (type, from Seattle, October 20-November 1, 1911).

Observations. - Notes on the type: spores 5.5-7 (8) x 3.5-4.5 μ, ellipsoid, smooth, pale yellow in Melzer's reagent. Basidia 34-46 x 4-6 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven. Cuticle of loosely tangled non-gelatinous hyphae. Clamp connections present on the cuticular hyphae.

Hygrophorus cremicolor
Sm - 58239

(Tangential section : cuticle)

l.



X 1000

Cuticle a loose trichodermium, some hyphae cystidioid, the terminal elements ± clavate. No hypodermium. Pileus trama generally disposed radially.

HYGROPHORUS FALLAX Sm. & Hes.

Sydowia 8:315. 1954

Pileus 10-18 mm. broad, convex, dark smoky gray to fuscous-black when moist, opaque at all stages, fading to a dull dingy gray, moist, somewhat hygrophanous, glabrous, not becoming squamulose when faded. Context fragile; no distinctive odor or taste.

Lamellae adnexed, dingy drab gray, edges usually paler, subdistant, broad, ventricose, fragile and the edges very readily fracturing.

Stipe 2-3.5 cm. long, 2-2.5 mm. thick, concolorous with pileus or darker, equal or enlarged at both ends or at either end, glabrous, apex faintly pruinose, moist to dry.

Spores 5-6 x 4-5 μ, broadly ellipsoid to globose, smooth, hyaline in KOH and yellowish in Melzer's solution. Basidia 20-25 x 5-6 μ, four-spored. Pleurocystidia and cheilocystidia none seen. Gill-trama interwoven, hyphae 4-8 μ broad, dingy in KOH, in Melzer's reagent with yellowish, granular content variously distributed. Cuticle of repent hyphae 8-12 μ broad, at times more or less erect, the terminal elements inflated and usually repent. Pileus trama of radially disposed, compactly interwoven. Clamp connections none.

Habit, habitat, and distribution. - On moss, Tennessee, August.

Material studied. - TENNESSEE: Hesler (type, Smith n. 10661, Indian Camp Creek, Sevier County, Great Smoky Mountains National Park, August 30, 1938).

Observations. - This species differs from *H. microsporus* in its larger spores and in its non-squamulose pileus. The dark granules in the hyphae as seen in Melzer's reagent are common to both.

HYGROPHORUS FOETENS Phillips apud Berk. & Br.

Grevillea 7:74. 1878-1879

Camarophyllus foetens (Phillips) J. Lange, Dansk Botanisk Arkiv. 4:18. 1923.

Hodophilus foetens (Phill.) Heim, Les Champ. d'Eur., p. 219. 1957.

Illustrations:

Lange, Fl. Ag. Dan., pl. 166H.

Phillips, Grevillea 7, t. 121, f. 13.

Bresadola, Icon. Myc., tab. 321 (1).

Favre & Poluzzi, Vita Helvetica, Taf. VII B.

Pileus 1-4 cm. broad, plane to broadly convex, becoming turbinate or the margin uplifted, moist, hygrophanous, "cinnamon brown" to "bister" on disk and over striae, paler between the striae, fading to near avellaneous and then atomate, surface glabrous, in age at times somewhat diffracted scaly. Context concolorous with surface, brittle-waxy; taste mild, odor pungent (reminding one of chloride of lime).

Lamellae decurrent, "wood brown" or darker, thick, distant, medium broad, waxy, brittle, edges even.

Stipe 2-4 cm. long, 2-3 mm. thick at apex, concolorous with pileus or over the lower portion darker, narrowed downward, glabrous, surface scabrous-dotted at first but naked in age.

Spores 4.5-6 x 4.5-5 μ, subglobose to broadly elliptic, smooth, yellowish in Melzer's reagent. Basidia 34-42 x 5-7 μ, four-spored, elongate-clavate, lower part often flexuous.

Pleurocystidia and cheilocystidia none. Gill-trama interwoven, brownish in water when fresh, dull cinnamon revived in KOH. Pileus trama colored like the gill-trama (pigment thinly incrusted on the hyphae), interwoven. Cuticle a dense palisade layer of more or less upright enlarged pseudoparenchymatous elements varying from 20 x 12 μ and subglobose (the cross wall just beneath the enlargement) to elongated pyriform to ventricose capitate elements 10-60 x 5-20 μ. Pileus trama of compactly and slightly interwoven hyphae, disposed more or less radially. Clamp connections absent.

Habit, habitat, and distribution. - Cespitose in an open young stand of hardwoods, on naked soil, Michigan and Idaho, August; also Europe.

Material studied. - IDAHO: Smith 60437; MICHIGAN: Smith 39673; NETHERLANDS: Bas, Oct. 8, 1957.

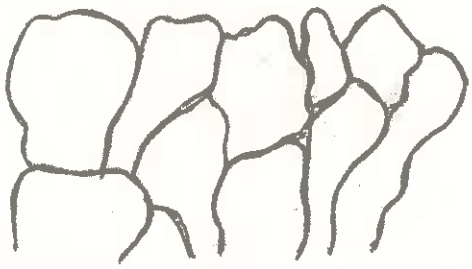
Observations. - This is a most distinctive species by reason of the hymeniform cuticle, pungent disagreeable odor, cinnamon brown color, small spores, wood brown gills, and incrusted pigment on the hyphae. Our collections appear to be identical with H. foetens Phill., and we place them there in spite of a slight difference in the odor foetid as against pungent. Moreover, our material agrees well, in macroscopic and microscopic characters, with specimens kindly communicated to us by Bas, at Leiden, Netherlands.

(more, next page)

In our estimation Nüesch's (1922) account of H. foetens, in which the stipe is described as olive yellow, applies to some other species. Information on the type of H. foetens, if it exists, is needed to establish the presence (or absence) of clamp connections and whether or not the cuticle is hymeniform.

Hygrophorus foetens

Sm - 39673



X 1000

Cuticle a palisade of subglobose, pyriform, ventricose, or capitate pseudoparenchyma, the cells 10 - 30 x 5 - 15 μ.

Pileus trama of compacted, slightly interwoven hyphae tending to be disposed ~~radially~~ ~~tangentially~~ parallelly.

HYGROPHORUS FULVOSIFORMIS (Murr.) Murr.

Lloydia 5:156. 1942

Camarophyllus fulvosiformis Murr., Lloydia 5:136. 1942.

Pileus 3-4 cm. broad, convex to expanded, turbinate, pallid to avellaneous-isabelline, glabrous, dry, margin even. Context thin, white; odor fragrant, taste mild.

Lamellae long-decurrent, white, rather narrow, distant to subdistant, inserted, intervenose, edges even.

Stipe 4-6 cm. long, 4-7 mm. thick, white, shining, glabrous, equal or slightly enlarged upward, becoming somewhat hollow.

Spores (5) 6-7 (9) x 4.5-5.5 μ, ellipsoid to ovoid, smooth, non-amyloid. Basidia 36-54 x 6-8.5 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama of interwoven hyphae. Cuticle of non-gelatinous, repent hyphae which are radially arranged, 2-3 μ broad, brownish, with more or less erect free ends forming a type of trichodermium. No hypodermium. Pileus trama of radial hyphae, with scattered lactifers. Clamp connections present on the cuticular hyphae.

Habit, habitat, and distribution. - In leaf-mold in a climax hammock, Florida, January.

Material studied. - FLORIDA: Murrill & Watson F20129 (type, southwest of Gainesville, January 21, 1940).

Observations. - In the dried condition the carpophores somewhat resemble ~~a species such as~~ H. virgineus. Murrill says that when fresh it suggests H. fulvosus (H. pratensis) but has a more slender stipe and ~~it also has~~ a fragrant odor.

The microscopic characters given above are based on our study of Murrill's type.

HYGROPHORUS FUMOSELLUS Sm. & Hes.

Sydowia 8:316. 1954

Pileus 2.5-5 cm. broad, convex, expanding to concave as margin becomes elevated, hygrophanous but not viscid, "sayal brown" when moist, "pinkish cinnamon" faded, margin faintly striatulate when moist, innately silky faded (under a lens). Context dingy white, thick on disk, thin on margin; odor and taste mild.

Lamellae arcuate-decurrent, near "pale pinkish buff" but with a smoky tint, moderately broad and close, intervenose, somewhat forked, edges even.

Stipe 3-5 cm. long, 5-10 mm. thick, dingy white, tapered downward, glabrous, dry, rigid, solid.

Spores 9-11 x 5-6 μ, ellipsoid, smooth, yellowish in Melzer's reagent, hyaline in KOH. Basidia 50-62 x 6-7 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama compactly and intricately interwoven, hyphae 4-10 μ broad. Cuticle a cutis, hyphae chiefly repent, radially disposed, 3-4 μ broad. No hypodermium. Pileus trama of radially disposed, more or less parallel hyphae. Clamp connections present on the cuticular hyphae and at the base of the basidia.

Habit, habitat, and distribution. - Gregarious on soil in deciduous woods, Tennessee, December.

Material studied. - TENNESSEE: Hesler 14105 (type, from New Hopewell, Knox County, December 17, 1941).

Observations. - The sayal-brown, striatulate pileus, peculiar smoky tint of the gills, and the interwoven gill-trama, along with the appearance of the dried specimens, relate this species to H. pratensis, and, at the same time, distinguish it from the latter. The long, narrow basidia distinguish it from species of Clitocybe if one is inclined to disregard the character of waxiness.

HYGROPHORUS GRAVEOLENS Sm. & Hes.

Sydowia 8:316. 1954

Pileus 3-6.5 cm. broad, obtuse when young, expending to plane with a low obtuse umbo or in some the margin strongly uplifted and split radially, surface moist and "pinkish cinnamon" beneath a "pale pinkish cinnamon" canescent coating, in age remaining "pinkish cinnamon" on disk but becoming "pinkish buff" toward the "pale pinkish buff" margin, some with watery spots around the disk. Context about concolorous with the pileus-surface, not staining when bruised; odor sickening aromatic (sweetish), taste slight and hardly distinctive.

Lamellae short-decurrent to broadly adnate, light "pinkish cinnamon" young, "pinkish buff" in age, distant, strongly intervenose, edges even.

Stipe 4-7 cm. long, 5-14 mm. thick, about "pinkish buff" within, about concolorous with the gills, narrowed downward, silky-striate somewhat canescent at first from a silky coating but no veil seen, solid.

Spores 7-9 x 4.5-5.5 μ, ellipsoid or nearly so, smooth, yellowish in Melzer's reagent. Basidia 48-60 x 8-10 μ, 4-spored. Pleurocystidia and cheilocystidia not seen. Gill-trama intricately interwoven, hyphae 2.5-5 μ broad, hyaline in KOH.

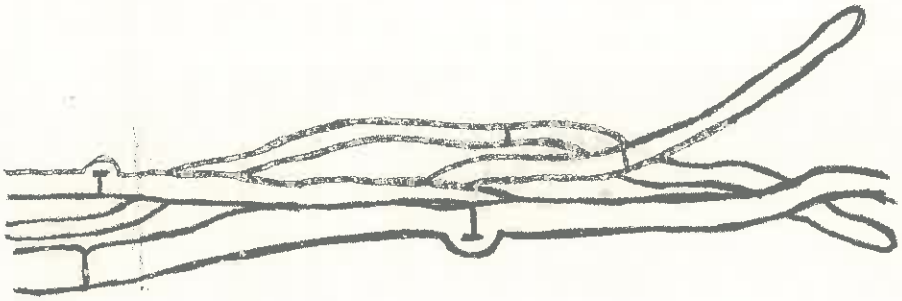
Surface hyphae repent, non-gelatinous, forming an undifferentiated cutis. No hypodermium. Pileus trama loosely but intricately interwoven, the hyphae chiefly disposed radially. Clamp connections abundant.

Habit, habitat, and distribution. - Caespitose-gregarious in a swampy area under cedar and alder, Oregon, October.

Material studied. - OREGON: Smith 27411 (type, from East Fork, Salmon River, Mt. Hood, October 8, 1947), 27448.

Observations. - The interwoven gill-trama clearly places this species in Camarophyllus where it is distinguished by the pinkish cinnamon color and sweetish sickening odor. It has much the stature of H. pratensis but differs in color and in having a peculiar odor. Because of the odor one might regard this species as close to H. russocoriaceus, ~~— if that species is a Camarophyllus —~~ but it cannot be considered identical without making major alternations in the concept of the latter.

Hygrophorus graveolens
*23654 Type (Sm - 27411)



Surface moist, not viscid.
Cuticle not differentiated, a cutis. Hyphae repent, with an occasional free-end, not gelatinous, 3-5μ broad.
No hypodermium.

Pileus trama loosely but intricately interwoven, mostly the hyphae are radially disposed.

HYGROPHORUS HYMENOCEPHALUS Sm. & Hes.

Elisha Mitchell Sci. Soc. Jour. 56:311. 1940

Armillariella hymenocephala (Sm. & Hes.) Singer, Lilloa 22:217. ~~1959 (1951).~~ 1951.

Camarophyllus hymenocephalus (Sm. & Hes.) M. Lange, Friesia 4:1-2. 1950.

Hygrotrama hymenocephalum (Sm. & Hes.) Singer, Sydowia 12:222. 1959.

Illustrations:

Plate

Smith and Hesler, Elisha Mitchell Sci. Soc. Jour. 56, pl. 9 (above).

Smith and Hesler, Lloydia 5, pl. 2b.

Pileus 5-20 (30) mm. broad, convex to hemispheric, margin incurved, often becoming nearly plane, glabrous, hygrophanous, when wet "snuff brown," "light pinkish cinnamon," or "tawny olive," fading to "clay color" or "pinkish buff," slowly darker and grayer, sometimes faded specimens "drab" or "olive brown" and atomate, finally becoming "mummy brown," often the margin crenate or lobed. Context thick on the disk, thin elsewhere, waxy, pallid or concolorous with the surface; odor and taste none.

Lamellae broadly adnate, becoming decurrent, concolorous with the pileus when young, nearly so in age or "hair brown," subdistant to distant, broad, edges pallid and even.

Stipe 2-8 cm. long, 2-7 mm. thick, concolorous with the pileus, darkening in age, finally becoming "mummy brown,"

equal or tapering downward, fragile, terete or compressed, the apex canescent at first, elsewhere glabrous, solid becoming hollow.

Spores 4-6 x 4-5 μ, globose to subglobose, at times short-ellipsoid, often more or less flat-sided, smooth, pale yellowish in Melzer's reagent. Basidia 34-50 (64) x 5-8 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia not differentiated. Gill-trama of interwoven hyphae 4-10 (16) μ broad, the hymenium appearing as a blackish line in sections of old material. Pileus surface corticated by an irregular palisade layer of inflated cells (30) 40-85 x (10) 14-22 (30) μ,— an epithelium. Pileus-trama of subparallel hyphae, radially disposed. Clamp connections none.

Habit, habitat, and distribution. - Gregarious to scattered on soil and decaying logs (chestnut and possible others), in mixed and coniferous woods, and under rhododendron, North Carolina, Tennessee, and Michigan; also England and Denmark, August-October.

Material studied. - MICHIGAN: Smith 22064; NORTH CAROLINA: Smith 7397, 10383 (type, Highlands, August 14, 1938), 10146; Hesler 9237, 12744, 13949, 14422, 15885, 23350; TENNESSEE: Smith 10090.

Observations. - By virtue of the ~~cellular~~ structure of its cuticle H. hymenocephalus is related to H. foetens, H. micaceus, and H. atropunctus. These four species ~~all~~ have a cellular cuticle, and when ~~the pileus~~ is dry ~~it~~ the pileus tends to be glistening. They are distinguishable, however, on their macroscopic characters.

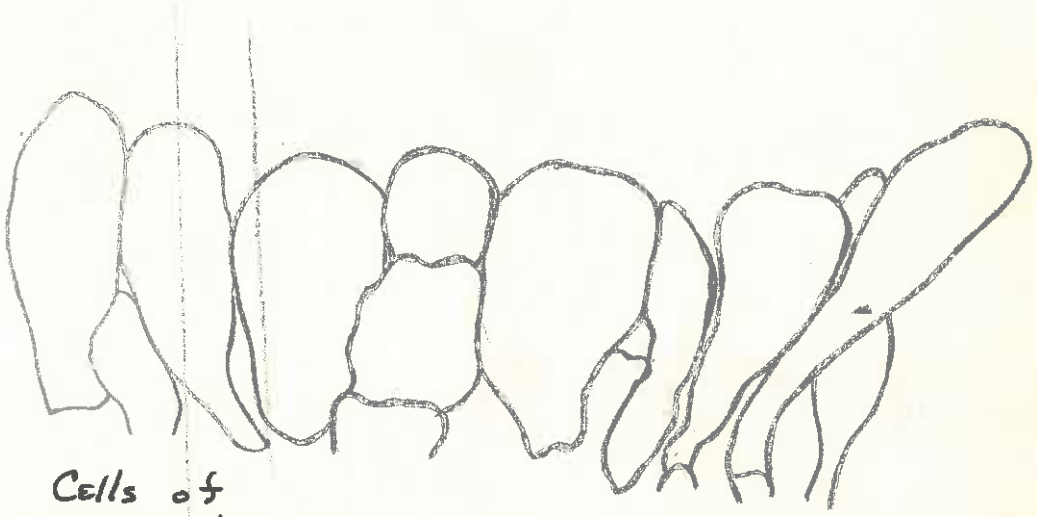
In H. foetens the carpophore emits a strong, disagreeable odor; in H. atropunctus, the stipe apex is provided with blackish fibrillose-floccose scales; and H. micaceus is distinguished by the pileus and stipe being yellowish-brown or tinged olivaceous.

The type of H. hymenocephalus was found in North Carolina. The species has since been collected by us in Tennessee and Michigan. More recently, Hora and Orton (1955) report it from England. Finally, Dennis (1953), it appears, has found it in Trinidad. Singer (1955) has studied Dennis' Trinidad collection and concludes that it differs from the type only in the presence of clamp connections. Fungi Denmark?

On this Agaricales, Singer (1951:148) would place this species in the Tricholomataceae, under the genus Armillariella (1951:217).

Hygrophorus hymenocephalus Sm. & Hes.

No. 12744



Cells of corticated cuticle — x 1000

Hygrophorus hymenocephalus

Sm - 10383

Camarophyllus

HYGROPHORUS LAWRENCEI SP. NOV.

Pileus 1-3 cm. broad, broadly convex to plane, when mature the margin uplifted, at first with a small conic umbo but this disappearing in age, surface smooth and white. Context white, fragile; odor very strong of cedar, taste medicinal or almost like cedar.

Lamellae decurrent, broad, distant, intervenose, thick, white, drying dingy ochraceous, edges even.

Stipe 3-6 cm. long, 5-8 mm. thick, widest at apex and tapered to narrow base or subequal, white, smooth, dry.

Spores 6.5-8 x 5-6 μ, broadly ellipsoid to subglobose, smooth, thin-walled, hyaline in KOH, pale yellowish in Melzer's reagent. Basidia 36-50 x 7-8.5 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill trama of intricately interwoven, hyaline hyphae. Pileus epicutis of narrow hyaline hyphae not showing any appreciable gelatinosity in KOH. Clamp connections present.

Habit, habitat, and distribution. - Under conifers, Oregon, January.

Material studied. - OREGON: Fred Lawrence 1162 (type, from Applegate Area, January 24, 1959.)

Observations. - The fruiting bodies darkened to blackish

in some parts in drying but this may have been due to over-heating. The aspect dried is that of *H. recurvatus*, to which it is closely related but is at once distinct by the white color overall and pronounced odor and taste.

HYGROPHORUS MICROSPORUS Sm. & Hes.

Lloydia 5:11. 1942

Hygrotrama microsporum (Sm. & Hes.) Singer, Sydowia 12:223. 1958 (1959).

Armillariella microspora (Sm. & Hes.) Singer, Lilloa 22:216, ~~217~~. 1951 ~~1949~~.

Pileus 1-2 cm. broad, broadly convex becoming plane, the margin regularly recurved in age, "fuscous" (very dark gray with a tinge of brown) over all, opaque when moist, fading to "drab" or paler (medium to pale gray), surface moist, glabrous, somewhat hygrophanous, somewhat atomate after losing moisture. Context thin, fragile, waxy, dark grayish becoming pallid; taste perfectly mild, odor none.

Lamellae long-decurrent, whitish to pallid, becoming sordid gray in age but drying much lighter than the pileus (yellowish in spots on one old individual), close, narrow, intervenose, edges even.

Stipe 2.5-3.5 cm. long, 2-3 mm. thick at the apex, surface evenly colored and concolorous with the pileus, narrowed toward the base, flexuous, stuffed, becoming hollow, perfectly glabrous.

Spores (3) 4-4.5 x 2.5-3 μ, ellipsoid to subglobose, smooth, pale yellowish in Melzer's reagent. Basidia 23-32 x 4-6 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama

of slightly interwoven hyphae to subparallel in dried material (definitely interwoven in fresh material - see ~~Lloydia 5:11~~ Smith and Hesler, 1942:11), hyphae 2.5-5 (8) μ broad. Cuticle of more or less erect (but finally repent), septate, fuscous, constricted, non-gelatinous hyphae, the terminal elements cystidioid, - a trichodermium (not a palisade), accompanied by a few slender hyphae with clamp connections. No hypodermium. Pileus trama hyphae largely radial, ~~but a few periclinal.~~ Pileus- and gill-trama, and especially the hymenium, a very dull sordid yellowish brown in Melzer's reagent.

Habit, habitat, and distribution. - Gregarious on sandy soil, under aspen, Michigan, September.

Material studied. - MICHIGAN: Smith 15455 (type, from Oakland County, September 24, 1940).

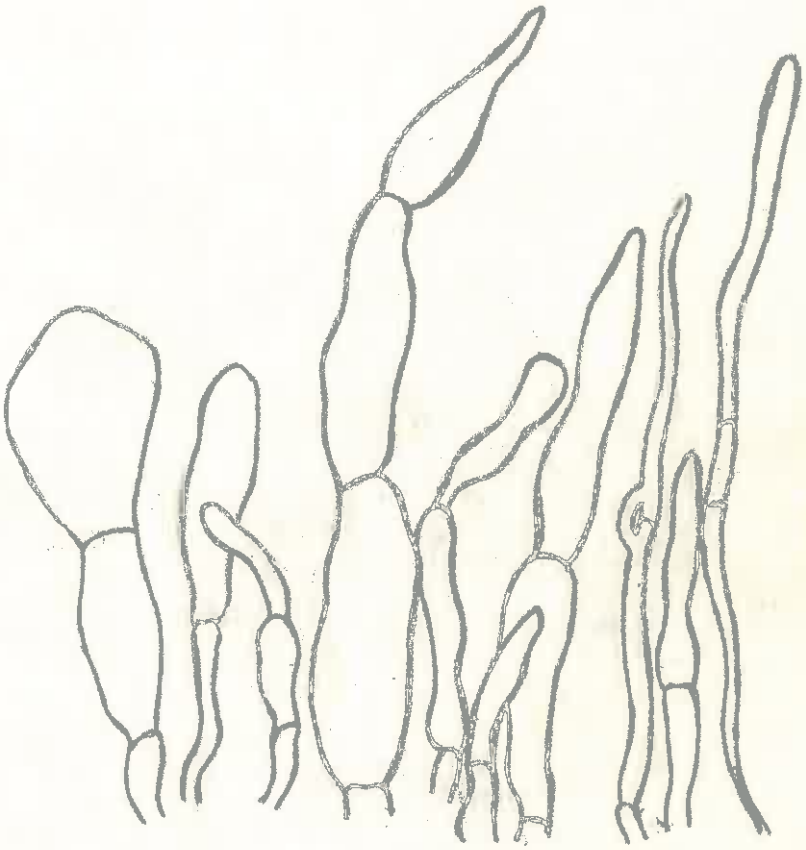
Observations. - The usual iodine reaction for Hygrophori is a bright yellow for the gill-trama, hymenium, and flesh of the pileus. The reaction for this species is strikingly different and very characteristic. The species has the stature of H. recurvatus, but is at once distinguished by its minute spores. It differs from H. peckianus in lacking a distinctive odor and in having ellipsoid spores. The short basidia are very narrow and flexuose so that the impression one gets is that they are typical Hygrophorus basidia even though small. The rather tangled turf-like covering of the pileus is quite similar to that found in the H. cantharellus series, but the pileus was

not observed to become scaly and the iodine reactions of the flesh and hymenium indicate a closer relationship to H. peckianus.

If one were to judge H. schulzeri by Bresadola's (1928) illustration, the above species might be considered a 4-spored form of it. However, if one refers to Bresadola's description, certain significant differences are apparent. He described his species as "luride cinnamomeus vel brunneo cinnamomeus." These colors at once exclude our specimens and indicate that the colors as reproduced on the plate of H. schulzeri are not accurate. In addition, the gills of H. microsporus are close instead of distant, and the stipe is glabrous.

Hygrophorus microsporus Sm. & Nes.
Type (Sm. 15455, UT 13920)

3n

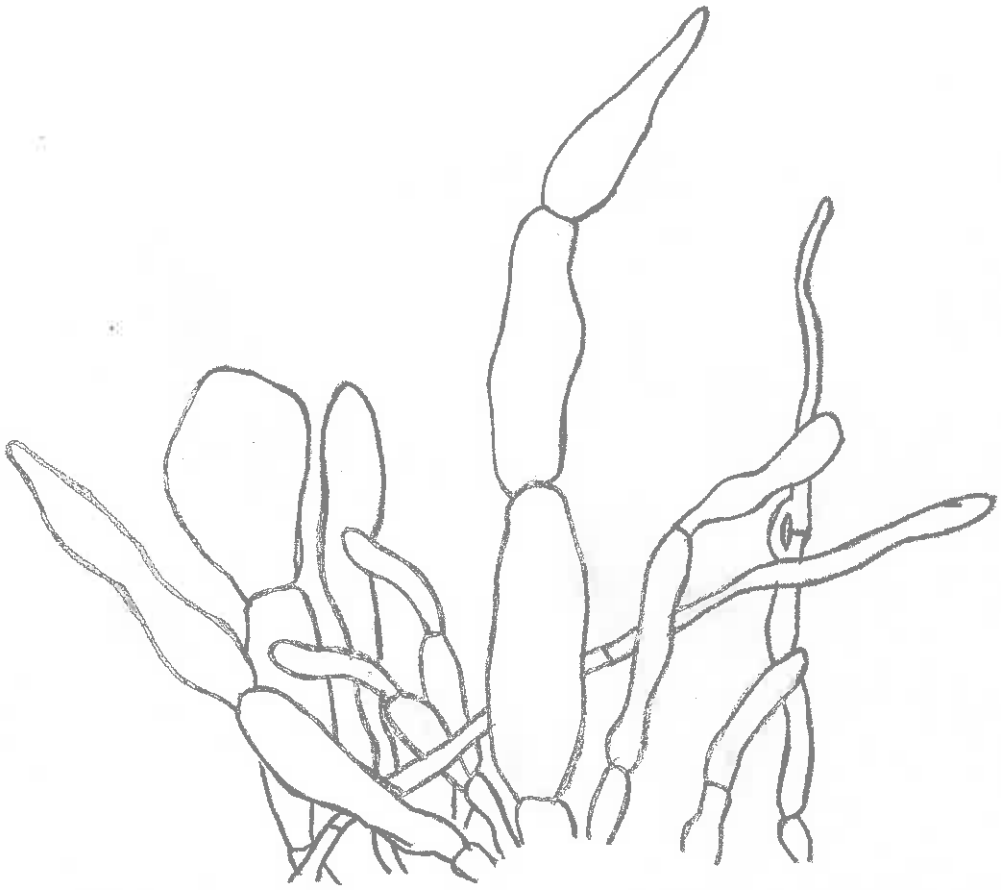


Pilocystidia – x 1000

H. microsporus

U-T 13720 (Sm-15455) - Type

Epicutis - X 1000



HYGROPHORUS NIVEICOLOR (Murr.) Sm. & Hes.

Lloydia 5:23. 1942

Clitocybe niveicolor Murr., Mycologia 3:190. 1911.
Camarophyllus niveicolor (Murr.) Singer, Lloydia 5:99. 1942.

Pileus 3-7 mm. broad, compressed-convex, snow-white, smooth, glabrous, appearing subtomentose when dry because of loosely-woven context, margin slightly irregular, decurved.

Lamellae decurrent, slightly arcuate, white, rather narrow, distant.

Stipe 1-15 cm. long, 1 mm. thick above, 1.5 mm. thick below, white, cylindric, slightly tapering upward, glabrous, fleshy, fistulose.

Spores 10-14 x 7-9 μ, ellipsoid, smooth, pale yellow in Melzer's reagent. Basidia 62-76 x 9-12 μ, mostly 4-spored, a few 2-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae broad, 8-17 μ. Cuticle of appressed, undifferentiated hyphae, - a cutis. No hypodermium. Pileus trama of radially disposed, interwoven hyphae. Clamp connections present on the gill-trama hyphae.

Habit, habitat, and distribution. - On ground in a moist virgin forest, Mexico, January.

Material studied. - MEXICO: Murrill 1058 (type, from a mountain side near Motzorongo, January 15, 1910).

Observations. - The record of microscopic characters above is based on our study of the type. Singer (1942) properly concluded that this species, at first described by Murrill as Clitocybe niveicolor, is a Camarophyllus. It differs from H. niveus in its dry pileus and larger spores.

HYGROPHORUS NIVEUS Fr.

Epicr. Myc., p. 327. 1838

Omit? Agaricus niveus Scop. Fl. Carn. ed. 2. 2:430. 1772.

Camarophyllus niveus (Fr.) Wünsche, ~~1877.~~ Die Pilze, p. 115. 1877.

Omit? Hydrocybe nivea (Scop.) Murrill. North Amer. Flora 9:377. 1916.

Illustrations:

Bresadola, Icon. Myc. 7, pl. 329. 1928.

Dufour, Atl. Champ., pl. 19, fig. 42.

Lange, Flora Agar. Dan. 5, pl. 164 F.

Ricken, Die Blätterp. Deutschl., pl. 7, fig. 3.

Wakefield and Dennis, Common British Fungi, pl. 34, fig. 2.

Pileus 1-3 (6) cm. broad, submembranous, obtuse to convex then plane, often becoming depressed or umbilicate, pure white to whitish, glabrous, viscid when fresh and translucent-striate to the disk. Context thin and pliant, white, unchanging; odor and taste not distinctive.

Lamellae decurrent, white, gradually yellowish in age, distant, rather narrow, thin, somewhat venose, edges even.

Stipe 2-7 cm. long, 2-6 (8) mm., thick, white, equal or tapering downward, at times somewhat striate, dry, glabrous, stuffed, becoming hollow.

Spores 7-10 (11) x 4-5.5 (6.5) μ, ellipsoid, smooth, pale yellowish in Melzer's reagent. Basidia 38-50 x 5-7 μ, 4-spored

(Lange finds 2- and 4-spored). Pleurocystidia and cheilocystidia none. Gill-trama of interwoven hyphae, 4-8 μ broad, yellowish in Melzer's reagent. Cuticle an ixocutis, a thin gelatinous zone, 20-40 μ broad, hyphae colorless, repent, 1.5-3 μ broad. No hypodermium. Pileus trama homogeneous, hyphae more or less radial but rather intricately interwoven. Clamp connections on the cuticular and gill-trama hyphae.

Habit, habitat, and distribution. - Gregarious to scattered on humus and soil, in deciduous and coniferous woods, Massachusetts, Maryland, Michigan, Tennessee, Alabama, California, Oregon, Washington, August-January; also Europe.

Material studied. - ALABAMA: Burke 2057; CALIFORNIA: Smith 3693, 8724, 8738, 9427; MARYLAND: Kelly 1822; MASSACHUSETTS: Bigelow 8767; MICHIGAN: Kauffman, New Richmond, Sept. 25, 1911; Smith 20947, 21352, 33935, 62134; OREGON: Smith 7821, 7856, 7897, 8223, 19989, 28327; TENNESSEE: Hesler 23511, Hesler & Smith 11329; WASHINGTON: Smith 4677, 17931; BELGIUM: Heinemann, near Brussels, Nov. 1, 1960.

Observations. - This species is very close to H. borealis and there is some question whether the two are distinct. H. borealis as we know it has a moist fairly fleshy pileus whereas in H. niveus the pileus is thin, pliant, and viscid. The translucent striations of H. niveus are very pronounced, but H. borealis may also have them and so no emphasis is placed on them here. In color, stature, habit, spore size, and in the interwoven gill-trama they are practically identical. Sections of the

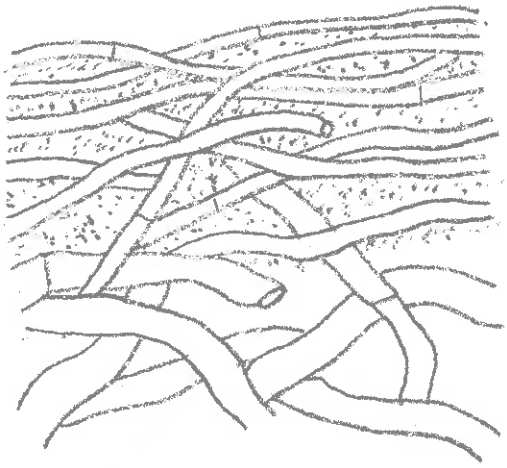
pileus of H. borealis show a few narrow subgelatinous hyphae over the surface, whereas those of H. niveus show a pellicle of appreciable thickness made up of distinctly gelatinous hyphae. In our estimation the recognition of these two species hinges on the differences noted in the pellicle of the pileus. If this proves to be a variable character, then H. borealis would be a synonym of H. niveus. We have recognized both here because our evidence points to the existence of two rather than a single species.

H. niveus is also related to H. virgineus. In niveus the flesh of the pileus is very thin, and the surface viscid; in virgineus the flesh is thick on the disk and not viscid.

A form of H. niveus with a pinkish stipe base has been found in Massachusetts by Bigelow (B-7858), and in England by Orton (1960:247, foot-note). Orton says that niveus, virgineus, and berkeleyi are all prone to a pathological condition (not investigated—perhaps bacterial) in which the stipe and pileus surface turns pink in places; this is var. roseipes of older authors, and, he states, is a worthless name.

Hygrophorus niveus

UT - 23511



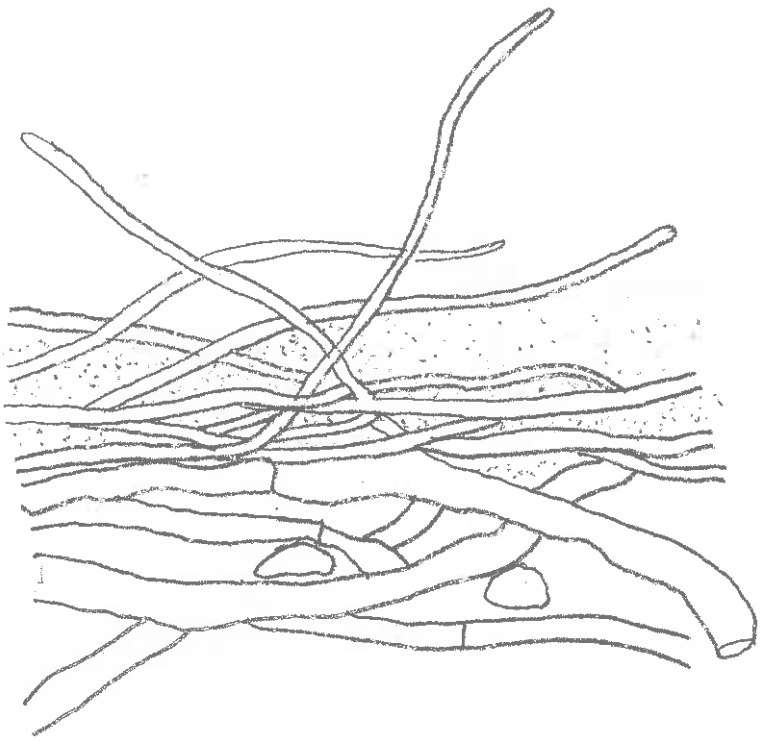
Gelatinous cuticle, ± 50μ thick

Surface hyphae repent (none erect)

× 1000

Hygrophorus nivens

SM-6213+



Gelatinous cuticle,
with several ± erect hyphal ends

x 1000

HYGROPHORUS NORDMANIENSIS SP. NOV.

Pileus 2 cm. broad, convex-expanded, "benzo brown", glabrous, viscid, margin striate; flesh medium thin, odor distinctive; stipe 2 cm. long, dry, pallid; spores 7-11 x 4.5-5.5 μ, ellipsoid. Specimen typicum in Herb. Univ. Mich.; lectum Granit Creek, Nordman, Idaho, Oct. 9, 1956, A. H. Smith n. 54328.

Pileus 2 cm. latus, convexo-extensus, "benzo brown," glaber, viscidus, margine striato; caro modice tenuis, odore proprio; stipes 2 cm. longus, siccus, pallidus; sporae 7-11 x 4.5-5.5 μ, ellipsoideae. Specimen typicum in Herb. Univ. Mich.; lectum Granit Creek, Nordman, Idaho, Oct. 9, 1956, A. H. Smith n. 54328.

HYGROPHORUS NORDMANIENSIS SP. NOV.

Pileus 2 cm. latus, convexo-extensus, "benzo brown", glaber, viscidus, margine striato; caro modice tenuis, odore proprio; stipes 2 cm. longus, siccus, pallidus; sporae 7-11 x 5-5.5 μ, ellipsoideae. Specimen typicum in Herb. Univ. Mich.; lectum Granit Creek, Nordman, Idaho, Oct. 9, 1956, A. H. Smith n. 54328.

Pileus 2 cm. broad, convex-expanding, "benzo brown", glabrous, viscid, margin striate. Context medium thin; odor of green corn.

Lamellae decurrent, pale drab, becoming dingy buff in age, distant, medium broad.

Stipe 2 cm. long, dry, pallid.

Spores 7-11 x 4.5-5.5 μ, ellipsoid, smooth, yellow in Melzer's reagent. Basidia 38-50 x 5-8 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill trama interwoven, hyphae 5-12 μ broad. Cuticle a narrow (20-40 μ) gelatinous zone, hyphae 1.5-3 μ broad, repent, radial, not differentiated from the hyphae of the pileus trama. No hypodermium. Pileus trama of radially disposed, subparallel hyphae. Clamp connections not found.

Habit, habitat, and distribution. - On soil, under hemlock, Idaho, October.

Material studied. - IDAHO: Smith 54328 (type, from Granit Creek, Nordman, Oct. 9, 1956).

Observations. - This species is related to H. rainierensis and H. subviolaceus both of which have smaller spores.

HYGROPHORUS OBCONICUS Pk.

New York State Mus. Bull. 131:36. 1909

Camarophyllus obconicus (Pk.) Murr., North Amer. Flora 9:386. 1916.

Pileus 1-2.5 cm. broad, convex, moist or hygrophanous, soon dry, "light buff" to "avellaneous," fading to whitish, pruinose to innately fibrillose or cancescent, margin even, often lobed. Context thick on the disk, thin on the margin, white, waxy, fragile; odor none, taste slightly sour or none.

Lamellae adnate or subdecurrent, white, slightly arcuate, broad, subdistant to close, venose, edges even.

Stipe 2-5 cm. long, 2-7 mm. thick, concolorous with the pileus, equal, compressed, glabrous, dry, hollow.

Spores 4-5.5 x 3-5 μ, subglobose to short-ellipsoid, smooth, non-amyloid. Basidia 32-47 x 5-6 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 3.5-5 μ broad, yellowish in iodine. Cuticle at times a cutis, again a trichodermium and then with scattered, more or less erect, septate hyphae, the terminal elements cystidioid (similar to H. microsporus). No hypodermium. Pileus-trama homogeneous, hyphae ~~chiefly~~ radial, ~~a few parielinal~~, yellowish in iodine. Clamp connections rare on the cuticular hyphae.

Habit, habitat, and distribution. - On soil, in mixed woods, Massachusetts, Pennsylvania, and Tennessee, July-September.

Material studied. - MASSACHUSETTS: Davis (type, from Stow, September 16, 1907); PENNSYLVANIA: Sumstine, Pittsburgh, Oct. 1942; TENNESSEE: Sharp 12172; Smith, Great Smoky Mts. Nat. Park, Aug. 30, 1938.

Observations. - The description above was drawn from ~~No.~~ 12172 which agrees well with the type. Notes on the type: Spores 4-6 x 3.5-4.5 μ, subglobose to short-ellipsoid, smooth, non-amyloid (Davis, in his notes accompanying the type, says spores are white). Basidia 38-51 x 5-6 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 2.5-4 μ broad. Cuticle of non-gelatinous hyphae. Clamp connections rare on the cuticular hyphae.

This species is related to H. albipes, in which the pileus is not hygrophanous, ~~but which has~~ narrow, white ~~lamellae~~, and larger ~~spores~~; H. cremicolor is distinguished by its yellow lamellae.

pseudopallidus sp nov

HYGROPHORUS ~~PALLIDUS VAR. LUTEIFOLIUS VAR. NOV.~~

Pileus 2-4 cm. latus, "pale ecru-drab", demum cineraceus, subviscidus; lamellae decurrentes, luteae, latae; stipes 3-4.5 cm. longus, 4-6 mm. crassus, albus, basi subflavus; sporae 5-7 x 4-5 μ, subglobosae vel subovoidae. Specimen typicum in Herb. Univ. Tenn.; lectum in Cades Cove, Great Smoky Mts. National Park, Tenn., June 8, 1957, L. R. Hesler n. 14439.

Pileus 2-4 cm. broad, convex, expanding-convex, subviscid, "pale ecru-drab" when young, paler (grayish, not matched) at maturity, innately appressed-silky, faintly ridged radiately. Context thin, rather brittle-fragile, whitish or pallid; odor mild, taste slightly astringent.

Lamellae arcuate-decurrent, "ivory yellow," venose at cap, broad, tapering both ends, subdistant or nearly distant, thin, edges even.

Stipe 3-4.5 cm. x 4-6 mm., glabrous, striate, white-shining, basal third tinged yellow, spongy, fragile.

Spores 5-7 x 4-5 μ, subglobose to subovoid, rarely ellipsoid, smooth, apiculate, white in mass, yellowish in Melzer's reagent. Basidia 40-60 x 6-9 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 3-7 μ broad. Cuticle a thin gelatinous zone, 25-50 (100) μ, hyphae more or less erect to repent, 2-4 μ broad. No hypodermium. Pileus trama of radial,

subparallel to slightly interwoven hyphae. Clamp connections on hyphae of cuticle, subhymenium and gill-trama.

Habit, habitat, and distribution. - On soil, in pine woods, Tennessee, June.

Material studied. - TENNESSEE: Hesler 14439 (type, in pine woods, Cades Cove, Great Smoky Mts. Nat. Park, June 8, 1957), 23760 (same station, June 28, 1960).

Observations. - This variety belongs in the pratensis-cinereus-lacmus complex. Except for its ivory-yellow gills, it closely resembles H. lacmus as illustrated by Lange (1935-40) (pl. 165, fig. B). Similarly it appears to be related to H. pratensis var. cinereus Fr., and to H. pallidus, but these two entities, like H. lacmus, have grayish gills.

HYGROPHORUS PALLIDUS Peck VAR. PALLIDUS

Torrey Bot. Club Bull. 29:69. 1902

Camarophyllus pallidus (Pk.) Murr., North Amer. Flora 9:386. 1916.

Illustration:

Kauffman, Agar. Mich., pl. 29 (above).

Pileus 2-6 cm. broad, convex, becoming convex-campanulate or subumbonate, sometimes plane or slightly depressed, margin recurved at times, smoky violaceous or smoky lilac when fresh and moist, fading to near "violet-gray," nearly whitish at times in age, viscid or subviscid, soon dry and shining, and then minutely fibrillose-floccose under a lens, hygrophanous, pellicle thin, separable, margin often striate. Context white to grayish or smoky violaceous near the margin, thick and firm on the disk; odor mild, taste mild at first but becoming bitterish.

Lamellae arcuate-adnate to decurrent, then decurrent, concolorous with the pileus when moist, becoming whitish or grayish white, narrow to moderately broad, distant to subdistant, intervenose, edges even.

Stipe 3-6 cm. long, 3-8 (11) mm. thick, white or silvery gray, equal or narrowed downwards slightly, fibrillose or glabrous, naked at the apex, stuffed but becoming hollow.

Spores 5-6 x 4-5 μ, globose to subglobose, smooth, pale

yellow in Melzer's reagent. Basidia (31) 38-44 x 5-6 μ, 4-spored. Pleurocystidia and cheilocystidia not differentiated. Gill-trama yellowish brown in iodine, of intricately interwoven, narrow hyphae (3.5-6 μ broad). Cuticle of slightly gelatinous hyphae which are colorless, more or less erect, 1-2 μ broad, and forming an ixotrichodermium. No hypodermium. Pileus trama of radial hyphae which are subparallel to slightly interwoven. Clamp connections on the cuticular hyphae.

Habit, habitat, and distribution. - On moist soil or in swampy areas, Massachusetts, Michigan, California, and Canada, late summer and fall.

Material studied. - CALIFORNIA: Smith 3880; MASSACHUSETTS: Davis (type, Sept. 11, 1901); MICHIGAN: Kauffman 537 (1356), Rock River, Sept. 11, 1927; Smith 1110, 1166, 21333, 38801, 50810, 50496, 62130; CANADA:(Ontario): Smith 4828.

Observations. - The smoky lilac colors of the pileus and gills, small globose to subglobose spores, gelatinous pellicle of the pileus, and whitish stipe are distinctive. The small spores are its best distinction when comparing it with H. subviolaceus. Both have somewhat the same shades of color and fade in a similar manner. H. lacmus of Europe apparently has about the same colors but is tinted bright yellow at the base of the stipe. A critical comparative study of H. lacmus and H. pallidus should be made.

(more)

We have studied a collection from the Peck Herbarium which is labelled *H. pallidus*, - type. But, the specimens are confusing. They are buff colored and give the appearance of never having been smoky-violaceous. Moreover, the pilei do not appear to have been hygrophanous nor striatulate. One gets the feeling that the specimens in the box are not those originally sent to Peck by Simon Davis.

Hygrophorus pallidus

(Smith)

HYGROPHORUS PAUPERTINUS Sm. & Hes.

Lloydia 5:13. 1942

Armillariella paupertina (Sm. & Hes.) Singer, Lilloa 22:216. 1951. ~~1949.~~

Pileus (5) 10-20 mm. broad, convex to nearly flat, the thin margin usually becoming wavy or somewhat elevated, color sordid Isabella-color when young but soon changing to sordid drab or dark brownish gray, sometimes fading to whitish or pallid sordid gray, surface appearing dry and under a lens minutely appressed fibrillose, sometimes fibrillose-furfuraceous near the margin. Context thin, very fragile, grayish; odor exceedingly strong, penetrating, disagreeable, taste mild; no color change noted on bruised portions.

Lamellae distant to subdistant, pallid or pale drab, very narrow (almost fold-like in some), decurrent.

Stipe 1-2 (3) cm. long, 3-6 mm. thick at the apex, concolorous with the pileus or paler, usually enlarged upward, solid, becoming hollow near the apex at least, fragile, moist, glabrous, faintly longitudinally striate from fine cracks in the cuticle.

Spores 5-6 x 4-5.5 μ, subglobose to short-ellipsoid, rarely globose, smooth, yellowish in Melzer's reagent. Basidia 30-46 x 4-7 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-

trama interwoven, hyphae 2-3 μ broad. Cuticle a limited trichodermium, hyphae at times more or less scattered, 2-5 μ broad, the terminal elements at times cystidioid. No hypodermium. Pileus trama of radial hyphae. Clamp connections none.

Habit, habitat, and distribution. - Gregarious on humus and soil under redwoods, California, December.

Material studied. - CALIFORNIA: Smith 3680, 3793 (type, Orick, December 5, 1935), 3941, 9367, 9463.

Observations. - This species resembles H. hymenocephalus in its color change from Isabella-color to dark brownish gray or drab, but differs in having a strong odor, and in the nature of the cuticle of the pileus. It is very close to the little known H. peckianus, but differs from that species as we know it in having very narrow instead of broad gills and different colors when fresh. H. foetens is a somewhat similar species, but the pileus is dark brown, becoming squamulose, and the stipe is ~~in having a~~ squamulose. ~~stipe.~~ Bresadola (1928) illustrates H. foetens as having a glabrous stipe but a somewhat scaly pileus. Aside from the presence or absence of scales, H. foetens differs from H. paupertinus in having much broader gills, and in the structure of the cuticle.

HYGROPHORUS PECKIANUS Howe

Torrey Bot. Club Bull. 5:43. 1874

Camarophyllus peckianus (Howe) Murr., North Amer. Flora 9:389. 1916.

Illustration:

Coker, Elisha Mitchell Sci. Soc. Jour. 64, pl. 16 (inset).

Pileus 1-3 cm. broad, convex, mouse-gray when dry, smoky brown to blackish when wet, appearing smooth but minutely fibrillose under a lens, margin even or wavy. Context whitish to grayish, fragile; odor strong, offensive, taste slight.

Lamellae adnate to arcuate-decurrent, pallid to white at first, soon pale gray, subdistant, broad, thick.

Stipe 1-3 cm. long, 1.5-2 mm. thick, white-pruinose above, elsewhere glabrous, dark below, tapering downward, hollow.

Spores 4-5 x 3.5-4.5 μ, subglobose to globose, more rarely short-ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 28-38 x 4-6 μ, 4-spored. Gill-trama interwoven, hyphae 3-8 μ broad. Pileus-trama homogeneous, composed of subparallel hyphae, ~~periclinally disposed~~, the surface hyphae fuscous, the end-cells inflated (globose, ovoid, pyriform, clavate), more or less erect (forming a trichodermium) or appressed against the surface. Clamp connections none.

Habit, habitat, and distribution. - On soil, in deciduous

and mixed woods, swamps, on lawns, and under bracken fern, Michigan, Massachusetts, Tennessee, and North Carolina, July-October.

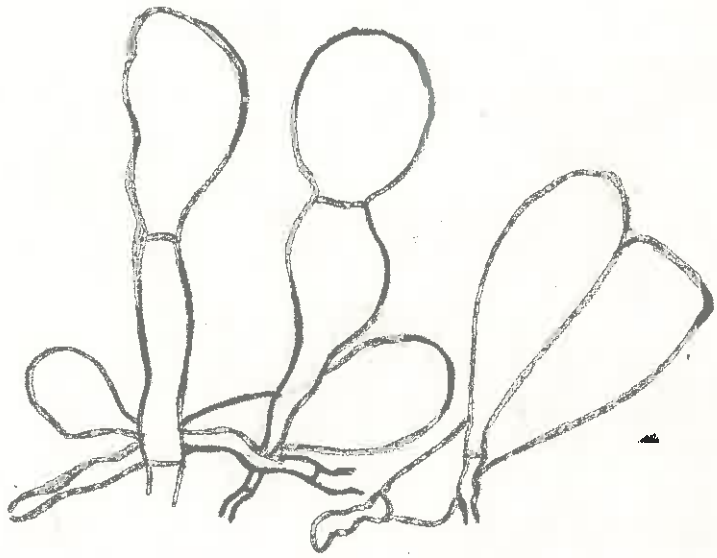
Material studied. - MICHIGAN: Mains 32622; Smith, Oakland County, Oct. 1939; MASSACHUSETTS: Davis, from Stow, August 30, 1906; NORTH CAROLINA: Coker 2620, 2798; Couch 5334; TENNESSEE: Hesler 19241; Smith & Hesler 7397.

Observations. - The whitish gills which become gray furnish a good character to separate this species from H. hymenocephalus. An interesting feature of ~~the Michigan~~ our collections is the manner in which the ends of the hyphae forming the surface of the pileus are frequently differentiated. The end cell is somewhat oval to club-shaped, and slightly thicker than the main filament. All that is necessary here for the production of a hymeniform surface layer is for all these hyphae to produce the same type of end-cell, for these cells to become oriented perpendicularly to the surface and enlarge somewhat. The hymenium and gill-trama of H. peckianus become very dark rusty brown in iodine and the pileus-trama yellowish to sordid yellowish brown.

Camarophyllus

Hygrophorus peckianus Howe

(Davis' Massachusetts collection, Aug 30, 1906, but not the Type)



Cuticular hyphae — x1000

The pileus is dry, fibrillose. The ~~epicu~~ epicuticular elements are fuscous, erect or more or less prostrate, the end-cells inflated (~~globose, ovoid, pyriform,~~ ~~fasciculate~~ clavate, etc), non-gelatinous, — a trichodermium.

HYGROPHORUS PRATENSIS (Fr.) Fr.

Epicr. Myc., p. 326. 1838

Agaricus pratensis Fr., Syst. Myc. 1:99. 1821.

Camarophyllus pratensis (Fr.) Kummer, Der Führer in die Pilzkunde, p. 117. 1871.

Hydrocybe pratensis (Fr.) Murr., Mycologia 6:2. 1914.

Camarophyllus fulvosus Murr., North Amer. Flora 9:387. 1916.

Illustrations:

Plate

Böhme, Norsk Soppbok, pl. 2, fig. 16.

Bres., Funghi Mang., pl. 69.

Bresadola, Icon. Myc., tab. 327.

Bulliard, Herb. Fr., pl. 587, fig. 1.

Dufour, Atl. Champ., pl. 43.

Fries, Sv. Aetl. Svamp., pl. 30.

Gillet, Champ. Fr., pl. 131 (345).

Güssow and Odell, Mushrooms and Toadstools, pl. 47.

Juillard-Hartmann, Icon, Champ., pl. 47, fig. 9.

Lange, Flora Agar. Dan., 5, pl. 165 F & F^1 (as Camarophyllus).

Murrill, Mycol. 2, pl. 27, fig. 1 (as Hydrocybe).

Murrill, Mycol. 6, pl. 113, fig. 3 (as Hydrocybe).

Peck, N. Y. State Mus. Ann. Rep., 48, pl. 28, figs. 11-17.

Pomerleau, Mushrooms of Eastern Canada and the United States, fig. 16 B.

Ricken, Die Blätterp. Deutschl., pl. 7, fig. 2.

Sowerby, Engl. Fungi, pl. 141 (as Agaricus miniatus).

Wakefield and Dennis, Common British Fungi, pl. 33, fig. 3.

Pileus 2-7 cm. broad, obtuse to convex, then more or less expanded, broadly convex, umbonate, or turbinate in age, "rufous" to "zinc orange" when young and moist and becoming "cinnamon rufous", fading slowly to "light ochraceous buff" or remaining some shade of pale tawny, glabrous to minutely fibrillose under a lens, moist then dry, unpolished, often areolate or irregularly cracked around the disk. Context thick, brittle, whitish or pale fulvous; odor and taste mild.

Lamellae decurrent, more or less concolorous with the pileus, or paler, at times "flesh-ocher," "apricot buff" or "ochraceous buff" then "salmon buff", finally pallid, subdistant to distant, thick, narrow to moderately broad, usually intervenose.

Stipe 3-8 cm. x 5-20 mm., whitish or tinged like the pileus, usually tapering downward to nearly equal, dry and unpolished, glabrous, even, stuffed.

Spores 5.5-8 x 3.5-5 μ, ellipsoid, subovoid, or subglobose, smooth, white in deposits, yellowish in Melzer's reagent. Basidia 40-54 x 5-7 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae 3-7 μ broad. Cuticle of the cutis type,—the cuticular hyphae are undifferentiated at the surface. Pileus trama interwoven, hyphae more or less radially disposed. No hypodermium. Clamp connections present on the hyphae of the pileus-trama and gill-trama.

Habit, habitat, and distribution. - Solitary, gregarious, or caespitose, in open places, on grassy areas, in thickets or dense forests, common throughout the United States and Canada,

May-December; also Europe, Greenland, Iceland, Japan, and South America.

Material studied. - CALIFORNIA: Smith 3694, 3829, 3867, 9150, 9175, 9289, 9359, 9418; IDAHO: Slipp 1301; Smith 54579; INDIANA: Cottingham 13; MAINE: Bigelow 3525, 3587; MARYLAND: Kauffman, Tacoma Park, Aug. 24, 1919; Kelly 218, 1548, 1677, 1731; MASSACHUSETTS: Bigelow 7230, 7396, 7670, 7789, 7815, 8360, 8801, 8831; MICHIGAN: Brooks 1252; Koch 3130; Pennington (CHK) 759; Potter 4167; Smith 5047, 6483, 6568, 7677, 7716, 15408, 15463, 15492, 18713, 20548, 21684, 21844, 21858, 32576, 32752, 33405, 43860, 62133, 62137; Thiers 790, 1099, 3161, 3347, 3457, 3511, 3542, 3570, 3590, 3623, 4016, 4177, 4298; NORTH CAROLINA: Hesler 4336, 12256, 16353; King 9395; Sharp 9316; TENNESSEE: Hesler 4464, 9533, 9558, 10387, 10864, 10908, 14432, 12880, 21379, 21388, 22577, 22937; Kauffman, Elkmont, Sept. 13, 1916; Smith 10300, 10899; WASHINGTON: Flett, Zenith, Nov. 1, 1941; Smith 18079, 39902; CANADA (Ontario): Smith 4660, 26422; Smith & Cain 4724; (Quebec) Conners 16324; (Nova Scotia) Smith 668, 778; Belgium: Heinemann, Brussels, Nov. 1, 1960; Netherlands: Bas 1656; > Denmark: J.P. Jensen (H-23963, 23964, 23965), October, 1960, and

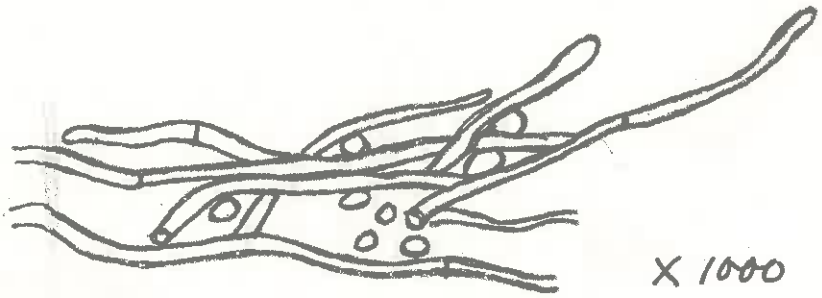
Observations. - Kauffman (1918) listed a var. pallidus and a var. cinereus. We have not seen the latter, but the former is occasionally encountered throughout the range of the species in North America. Since the species is common and does not decay very rapidly, one frequently encounters old faded specimens which are in good condition and which might lead one to think he had one of the typically pale forms.

It has been reported from Japan by Hongo (1958a), from

Argentina by Singer (1950), from Greenland (Lange 1955), Iceland (Larsen 1931), and the Faeröes (Møller 1945).

Orton (1960) has recently described a new species from England, H. berkeleyi, which is close to H. pratensis. His species is characterized by creamy or yellowish creamy gills, paler whitish or creamy pileus and stipe, and tear-drop-shaped spores.

Hygrophorus pratensis
No. 10140



X 1000

This is a cutis-type: the hyphae are undifferentiated at the surface. The pileus trama is of interwoven hyphae which are generally disposed in a radial direction. Thus, in a tangential section the cut-ends of the radial hyphae are conspicuous. No hypodermium.

~~Pileus trama~~

Hygrophorus pratensis

Sm-15492

22577 - Hygrophorus pratensis Fr.

× 5/6

Hygrophorus pratensis (Fr.) Fr.

Sm-5047

22937 — Hygrophorus pratensis Fr.

22577 - Hygrophorus pratensis Fr.

21379 - Hygrophorus pratensis Fr.

21388 - Hygrophorus pratensis Fr.

4392 - Hygrophorus pratensis F.

Hygrophorus pratensis (pallidus?)

Sm - 18713

39637 HYGROPHORUS PSEUDOPALLIDUS sp. nov.

On grassy-soil, in woods, (mixed hemlock-hardwood), Cherokee Nat. Forest, Erwin, July 29, 1974

Pileus 3-4.5 cm broad, convex, expanding, hygrophanous, "pale vinaceous drab," fading to "ecru-drab," disc "wood brown," glabrous, even. Context odor mild, taste mild or slightly astringent; fragile.

Lamellae adnate, becoming slightly decurrent at maturity of the cap, distant or subdistant, medium broad, ventricose or slightly so, white, finally tinged ivory.

Stipe 3.5-4.5 cm long, 5-8 mm thick, white to dingy white, sparsely fibrillose, fragile.

Spores white in deposit 5.5-7 x 5-6 µ, subglobose, ovoid, smooth. Pleurocystidia and cheilocystidia none. Gill trama slightly interwoven. Pileus cuticle hyphoid, the hyphae repent, or some semi-erect.

See also 14439.

HYGROPHORUS RAINIERENSIS SP. NOV.

Pileus 1-3 cm. latus, convexus demum planus, atro-purpureus demum cinereus, viscidus, hygrophanus; odor proprius; lamellae decurrentes, pallido-purpureo-cineraceae demum ochreae, confertae vel subdistantes, angustae; stipes 3-4 cm. longus, 3-5 mm. crossus, siccus, albidus; sporae 5-6.5 (7) x (3.5) 4-5.5 μ, ellipsoideae vel subglobosae. Specimen typicum in Herb. Univ. Mich.; lectum juxta Lower Tahoma Creek, Mt. Rainier Nat. Park, Wash., Sept. 27, 1955, A. H. Smith n. 47958.

Pileus 1-3 cm. broad, obtuse with a decurved margin, expanding to plane with a slightly depressed disc or merely convex, sometimes with a low obtuse umbo, dark purple-drab when moist, fading to cinereous on margin and a tinge of cinnamon buff on disc, surface glabrous, viscid, hygrophanous. Context odor strong of freshly husked green corn.

Lamellae decurrent, pale purplish-drab young, becoming dingy-buff in age or on drying, close to subdistant, narrow.

Stipe 3-4 cm. long, 3-5 mm. thick, equal or nearly so, surface dry, dull white over all and unchanging when bruised, when dried pale tan, solid.

Spores 5-6.5 (7) x (3.5) 4-5.5 μ, broadly ellipsoid to subglobose, rarely globose, thin-walled, hyaline in KOH; yellowish-hyaline in Melzer's reagent. Basidia 4-spored,

38-55 x 6-8 μ, 4-spored (occasionally 2-spored). Pleurocystidia and cheilocystidia none. Gill trama intricately interwoven, hyphae 4-7 μ broad, hyaline to dingy in KOH, yellowish hyaline in Melzer's reagent, (no dark granules present). Cuticle a zone of gelatinous hyphae 1.5-2.5 μ broad, the zone 60-100 μ thick, originating as a trichodermium but the hyphae greatly elongating and becoming appressed, hyaline in KOH and Melzer's reagent. Pileus trama of subparallel, radially disposed hyphae, 4-10 μ broad. Clamp connections present, usually small.

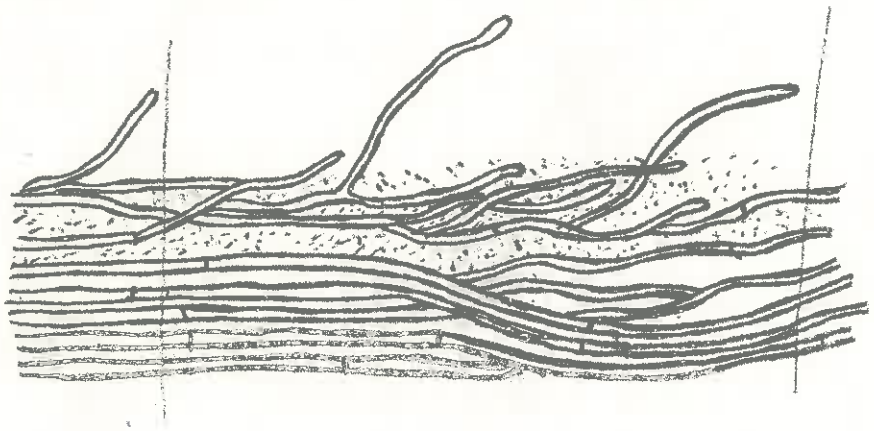
Habit, habitat, and distribution. - Scattered in a mixed conifer-hardwood forest, Washington and Michigan, September-October.

Material studied. - WASHINGTON: Bigelow 16 (Smith-47958, type, from Lower Tahoma Creek, Mt. Rainier Nat. Park, Sept. 27, 1955), Stuntz (Sm-31393); MICHIGAN: Smith 50850.

Observations. - This species can be easily distinguished in the field by the odor of fresh green corn. H. pallidus and H. subviolaceus, the most closely related species, have no odor and the taste of their flesh is mild or bitter finally. The white stipe showed no yellow tints even after handling a character of H. lacmus. In the dried specimens the cap has retained the purplish fuscous tone over the marginal area, but the disc, the gills, and the stipe show varying tones of cinnamon buff to darken ten.

Hygrophorus jaimeensis sp. nov.

Type (SM - 47958)



The epicutis is a thin (60-90μ) zone of ± repent, septate, narrow (1-2μ), gelatinous, loosely arranged hyphae. This zone rests on a dense layer of brownish, ± parallel hyphae, — the hypodermium.

Pileus trama interwoven but disposed in a general ~~tangential~~ pericinal direction.

HYGROPHORUS RECURVATUS Pk.

New York State Mus. Bull. 157:28. 1912

Camarophyllus recurvatus (Pk.) Murr., North Amer. Flora 9:388. 1916.

Clitocybe praticola Murr., Lloydia 5:136. 1942.

Omphalina australis Murr., Florida Acad. Sci. Proc. 7:111. 1945.

Illustration:

Plate
Smith, Torrey Bot. Club Bull., 64, pl. 11c.

Pileus 1-2.5 (3) cm. broad, obtuse to convex at first, in age plane, sometimes with a recurved margin, sometimes with a depressed disk, with or without a papilla, "clove-brown", "olive-brown", or "buffy brown" (dark or pale olive-brown), margin paler in age, lubricous to subviscid when wet, disk rugulose or smooth, at times the margin faintly translucent-striate, margin wavy or subplicate, cuticle often cracking circumferentially in age and at times lacerate. Context thin, dark olive-brown, fragile; odor and taste not distinctive.

Lamellae decurrent, grayish white, distant to subdistant, broad.

Stipe 2-4 cm. long, 3-6 mm. thick, whitish or concolorous with the pileus, grayish within, tapering slightly downward, moist, occasionally faintly longitudinally striate.

Spores 7-9 (10) x 4-5 (6) μ, ellipsoid, smooth, yellowish

in Melzer's reagent. Basidia 42-55 x 6-8 μ, 4-spored, occasionally 2-spored. Pleurocystidia and cheilocystidia none. Gill trama intricately interwoven, hyphae 3-7 μ broad. Cuticle a clearly-defined narrow zone, the innermost layer brownish, the outer colorless, ~~gelatinous~~ gelatinous, an ixocutis, hyphae 2-3.5 μ broad. Hypodermium a distinct layer of brownish hyphae. Pileus trama of ~~periclinal~~ interwoven hyphae. Clamp connections present on the cuticular and gill trama hyphae.

Habit, habitat, and distribution. - Gregarious under conifers and in pastures, New York, Michigan, Idaho, Washington, Oregon, ~~and~~ and Florida; California, October-January.

Material studied. - CALIFORNIA: Smith 3883, 3923, 3944, 8525, 8526, 8897, 9447; FLORIDA: Murrill F 19334 (type of Omphalina australis Murr., Levy Co., Jan. 14, 1940), F 19098 (type of Clitocybe praticola Murr., Gainesville, Jan. 8, 1940); IDAHO: Smith 54976, 55132; MICHIGAN: Smith 62129; NEW YORK: E. C. Webster (type of H. recurvatus Pk., from Canandaigua, Oct. 1911); OREGON: Smith 7997, 18028, 28324.

Observations. - Notes on Peck's type of H. recurvatus: Spores 7.5-9 (10) x 4.5-5.5 (6) μ, ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 44-55 x 6-8 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill trama interwoven, hyphae 4-7 μ broad. Cuticle well-defined, composed of parallel hyphae, with an inner brown zone and an outer, clear, subgelatinous zone. Clamp connections present.

Singer (1949) suggests that both Omphalina australis Murr. and Clitocybe praticola Murr. are synonyms of H. recurvatus. Our studies of the types of ~~each of~~ these species confirm his suggestion.

The species is very common in the pastures and grassy areas of northern California. In the Oregon collections, growing in the shade, the stems were white. ~~These were collected in a shady place.~~ The collections from open fields had darker pilei and darker colored stipes. The gelatinous pellicle is so thin that it can be easily overlooked or lost in sectioning either fresh or dried specimens. It does not appear to be sufficiently well developed to cause fresh wet specimens to be truly viscid.

Hygrophorus recurvatus

Sm-3923

Hygrophorus reconvatus

(Sm-54976)

HYGROPHORUS SUBFUSCESCENS Sm. & Hes. VAR. SUBFUSCESCENS

Sydowia 8:317. 1954

Pileus 6-15 (25) mm. broad, convex when young but margin straight to connivent, in age broadly convex or the margin flaring, "baryta yellow" to "old gold" to "Isabella color" moist, fading to "pale pinkish buff" but then gradually changing to "wood brown" or "olive brown" in age, or a grayish cast developing before fading takes place, atomate when faded, glabrous, moist, hygrophanous, in some the margin becoming crenate. Context brittle; odor none, taste slight and subnauseous.

Lamellae decurrent, "Isabella color" to yellowish becoming pallid, and soon darkening to "wood brown" or "benzo brown," distant, moderately broad, edges even.

Stipe 2-4 cm. long, 1.5-3 mm. thick at apex, "colonial buff" (pale yellow), becoming paler in age but not entirely losing the yellow tint and not cinerascent like the pileus, narrowed downward, often flexuous, makes and polished.

Spores 5-6 x 4-5 μ, subglobose to broadly ellipsoid, hyaline smooth, yellowish in Melzer's reagent. Basidia 30-42 x 7-8 μ, 4-spored. Cheilocystidia and pleurocystidia none. Gill-trama intricately interwoven, hyphae 7-10 μ broad, hyaline in KOH. Cuticle an hymeniform layer of pear-shaped to vesiculose, hyaline cells, 10-30 μ broad and 20-50 μ long, the layer of cells

staggered somewhat in arrangement of the elements but very compact as a layer. Pileus trama of compactly interwoven hyphae radially disposed. Cells of carpophore lacking dark colored content (as particles or granules) when mounted in Melzer's reagent. Clamp connections absent.

Habit, habitat, and distribution. - Densely caespitose under maple, birch, basswood, and conifers, Michigan and Maine, August.

Material studied. - MAINE: Bigelow 4424; MICHIGAN: Smith 22072, 22107, 22149, 22306, 26244, 32894 (type, from Mackinaw City Hardwoods, August 6, 1949), 37356, 39377, 50193.

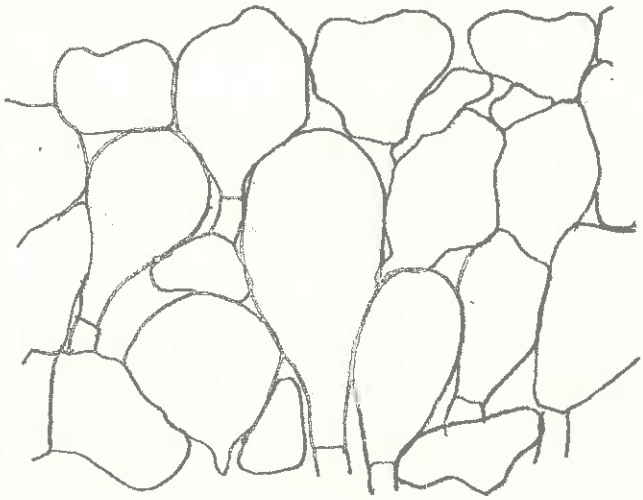
Observations. - This is a striking species by virtue of the changing colors of the pileus, the distant, decurrent, waxy lamellae, the well-developed hymeniform cuticle of the pileus, the persistently yellowish, naked stipe, and the small, globose to subglobose spores. The caespitose habit and growth on bare soil under hardwoods is characteristic at the type locality where the fungus has been found regularly every season since its discovery. However, several collections from other locations appear to belong here and were all from black muck under arbor vitae. In these collections the fruiting bodies were scattered, the gills were "Isabella color" (concolorous with pileus) at first, and often changed to "tawny olive" before becoming "benzo brown." The persistently yellow, naked stipe, however, was characteristic. In view of the changing colors not much emphasis can be placed

on a particular tint or shade at any one stage in the development of the fruiting body. The constant features appear to be the persistently yellow stipe, the cap being atomate when faded as well as the initial yellow to olive tint and the dark brown end-point of the color change.

Camarophyllus

Hygrophorus subfuscescens

Paratype (U-T 23669)

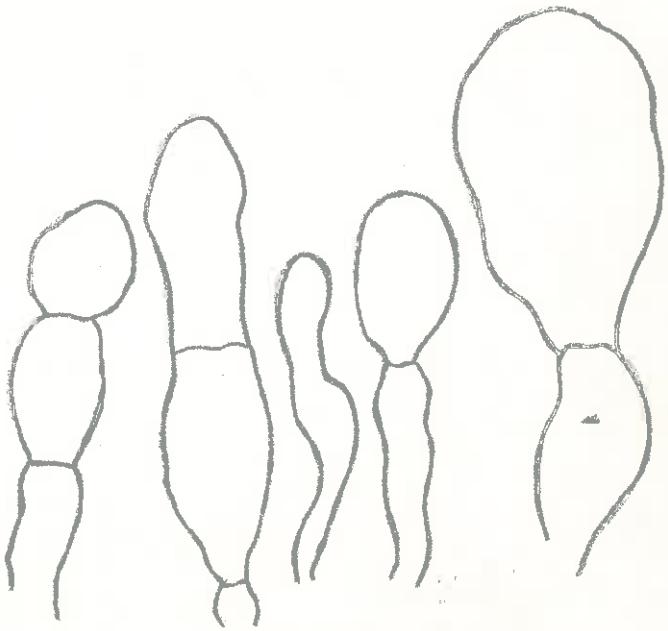


Cuticle = vesiculose to pyriform cells, 10-30 × 20-60μ, not forming a palisade.

Pileus trama = compactly interwoven hyphae, ± ~~tangentially~~ parallelly disposed.

Hygrophorus subfuscescens Sm: & Hes.

Sm - 50193



Hymeniform cells of the cuticle

x 1000

Hygrophorus subfuscescens

(Smith)

Hygrophorus subfuscescens

Sm – 32894

Type

HYGROPHORUS SUBFUSCESCENS var. ODORA Sm. & Hes.

Sydowia 8:318. 1954

Pileus 6-10 mm. broad, convex, becoming broadly convex, margin decurved but not inrolled in young caps, "Isabella color" and in age fading to "pale olive buff," finally ashy gray with scarcely any olive or yellow tint showing, no color changes when bruised, glabrous, moist, hygrophanous, atomate when faded. Context "Isabella color" fading through yellow to pallid, waxy; odor very distinctly disagreeable when flesh is bruised, taste mild to slightly farinaceous.

Lamellae arcuate becoming decurrent, "pale olive buff" becoming somewhat grayer at maturity, soon subdistant or nearly so, moderately broad.

Stipe short, 1-2 cm. long, 1-2.5 mm. thick, "deep colonial buff" (or grayer) at apex, no color change when bruised, slightly enlarged above, glabrous, moist.

Spores 5-6 x 3.5-4 µ, broadly ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 35-42 x 6-7.5 µ, 4-spored. Pleurocystidia and cheilocystidia none seen. Gill-trama interwoven, hyphae 2.5 µ broad. Cuticle an hymeniform palisade composed of vesiculose-pedicellate to vesiculose-sessile or pear-shaped cells 10-35 x 20-50 µ. No hypodermium. Pileus trama of nearly parallel, ~~periclinally~~ radially disposed hyphae which are without dark staining content in Melzer's reagent. Clamp connections

not present.

Habit, habitat, and distribution. - Gregarious on sand bank under bracken ferns, Michigan, July.

Material studied. - MICHIGAN: Smith 35670 (type, from Middle Bridge, Maple River, Cheboygan, July 13, 1947).

Observations. - This is exceedingly close to subfuscescens to which we attach it as a variety, but it differs in the strong disagreeable odor of fresh specimens when their flesh is crushed and in the more ellipsoid spores. It is similar in lacking the curious granules in Melzer's solution, lack of clamp connections, in the color change to gray of cap and gills (but the color not changing when bruised) and hymeniform cuticle of pileus. Also the stipe retains its yellow tone. H. paupertinus Smith & Hesler differs in not having a cellular pileus cuticle, in narrower gills, and less yellow in its coloration.

uliginosus sp. nov.

HYGROPHORUS SUBRADIATUS (Secr.) Fr.

Epicr. Myc., p. 328. 1838

Agaricus subradiatus Secr., Mycograph. Suisse, p. 214. 1833.
Camarophyllus subradiatus (Secr.) Wünsche, Die Pilze, p. 114. 1877.

Illustrations:

Juillard-Hartmann, Icon. Champ., pl. 50, fig. 5.
Konrad & Maublanc, Icon. Sel. Fung., pl. 379, fig. 1.
Lange, Flora Agar. Dan., 5, pl. 165 D (as Camarophyllus)
Wakefield and Dennis, Common British Fungi, pl. 35, fig. 3.

Pileus 2.5-3 cm. broad, convex, glabrous, moist and hygrophanous, not vsicid, "warm sepia" to "russet" or "Rood's brown" overall when moist, fading more or less to "wood brown" (dark rusty brown fading to pale shell vinaceous brown), at times the margin striate in age. Context concolorous to pallid (faded), thin, fragile; odor and taste mild.

Lamellae decurrent, distant, narrow, "fawn color" (pale vinaceous brown) to "wood brown", edges even.

Stipe 3-5 cm. long, 3-4 mm. thick, concolorous with the gills above, "cinnamon drab" (gray tinged with cinnamon) below, equal, hollow, fragile, glabrous.

Spores 8-10 x 4-5.5 μ, ellipsoid, smooth, thin-walled, hyaline in KOH and yellowish in Melzer's reagent. Basidia

38-50 x 7-9 μ, 4-spored, hyaline in KOH, yellowish in Melzer's reagent. Pleurocystidia and cheilocystidia none. Gill trama of intricately interwoven hyphae, 6-9 μ broad, orange-yellowish in Melzer's (subhymenium same color). Pileus trama homogeneous, or showing a rudimentary, non-gelatinous cuticle of radial, repent, brownish hyphae, all tissues yellowish in Melzer's reagent. Clamp connections present.

Habit, habitat, and distribution. - Scattered to gregarious on muck in cedar swamps and in sphagnum bogs, autumn, Michigan, Trinidad, and Europe.

Material studied. - MICHIGAN: Smith 1160, 31925, 31952, 31967; TRINIDAD: Dennis 184A; CZECHOSLOVAKIA: Bas 2100 (ex-herb. Leiden); BELGIUM: Heinemann 2961; SWITZERLAND: Huijsman, Oct. 30, 1960.

Observations. - Kühner and Romagnesi (1953) describe the gills as pallid and the stipe whitish. This is certainly in agreement with the Friesian concept, and may indicate that the American material belongs in a different taxon. Specimens from near Lupton, Michigan, which were not frosted and did not give an amyloid reaction for any of the tissues. H. colemannianus is the most closely related species but differs in its paler stipe and viscid cap.

The lack of a gelatinous pellicle on the pileus, the dark colored stipe, the truly ellipsoid, longer spores, and the amyloid reaction of the subhymenium distinguish this species. The

specimens had been frosted slightly and this might possibly account for the unusual amyloid reaction of the subhymenium. This point needs further study. In our opinion it is questionable whether H. subradiatus sensu Ricken belongs here. From his description it appears quite likely that his H. colemannianus and H. subradiatus represent the two- and four-spored forms of one species. For additional comments on his H. colemannianus, see H. subviolaceus.

HYGROPHORUS SUBVIOLACEUS Pk.

New York State Mus. Ann. Rept. 53:842. 1901

Camarophyllus subviolaceus (Pk.) Sing., Lilloa 22:148. 1951. ~~1949.~~

Illustrations:

Plate

Peck, New York State Mus. Ann. Rept. 53, pl. C, figs. 11-15.

Pileus 2.5-6 cm. broad, broadly convex, expanding, at times depressed and margin upturned, "violet gray," "mouse gray," "dark Quaker drab," or "benzo brown," disk often pallid, viscid-lubricous to subviscid, hygrophanous, glabrous, pellicle separable, margin even when dry, pellucid-striate when wet. Context thick and firm on disk, thin on margin, concolor or paler; odor mild or earthy, [redacted], taste at first mild, soon bitter to subnauseous finally somewhat acrid, at times leaving a burning in the throat.

Lamellae decurrent, arcuate, whitish at first, soon smoky-violaceous or "vinaceous drab," subdistant to distant, medium broad, acuminate at the ends, subtriangular, intervenose, edges even.

Stipe 3-7 cm. x 4-11 (17) mm., white or tinted like the color of the pileus, dry, appressed-fibrillose, usually tapering below, often curved at base, solid becoming hollow.

Spores 6-7 (8) x 4-5 (7) μ, ellipsoid to ovoid, apiculate, smooth, white in mass, yellowish in Melzer's reagent. Basidia (31) 43-62 x (4) 5-8 μ, mostly 4-spored, some 2-spored. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae 3-8 μ broad. Cuticle a colorless zone, 60-90 μ broad, of gelatinous narrow (2-3 μ) hyphae, the surface hyphae more or less erect and forming a turf,-an ixotrichodermium. No hypodermium. Pileus trama of radial hyphae. Clamp connections present on the cuticular and gill-trama hyphae.

Habit, habitat, and distribution. - Gregarious on soil in swamps and deep humus, in deciduous and coniferous woods, Ontario, Massachusetts, New York, Pennsylvania, Michigan, Tennessee, Idaho, and Washington, September-November. Orton (1960) has reported it from England, and we have a collection from Austria, by Moser (H-24128).

Material studied. - IDAHO: Imshaug 4911, 5050; Smith 54587; MASSACHUSETTS: Bigelow 9412; Smith 1166, 21050, 21356, 32061, 33967, 36042, 38534, 38648, 38676, 38717, 38789, 43425, 44044, 51017, 51036; NEW YORK: Peck (type, from Meadowdale, Oct.); OREGON: Smith 27364, 27792; PENNSYLVANIA: Overholts 23073; TENNESSEE: Hesler 22928; Jones 4448; WASHINGTON: Grant, Langley, Nov. 1923; Smith 17516, 17995; Austria: Moser, as H. subradiatus (H-24128).

Camarophyllus

Observations. - Notes on Peck's type: Spores 7-8 (9) x 4.5-6 μ, ellipsoid, to ovoid, smooth, yellowish in Melzer's reagent. Basidia 42-48 x 6-8 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill-trama intricately interwoven, hyphae 3-7 μ broad. Cuticle of colorless, gelatinous hyphae. Clamp

connections present on the cuticular hyphae. The pileus in the dried state is "sayal brown" to "verona brown."

Although Peck (1901) and Murrill (1916) assigned H. subviolaceous to the Section Hygrophorus (Limacium), it is clear that it is a Camarophyllus. Hygrophorus caerulescens Berk. & Curt. (Ann. Mag. Nat. Hist. III. 4:292. 1859), collected by Sprague in New England, is similar to H. subviolaceous in appearance; however, a study of the type H. caerulescens shows that, having a subparallel gill-trama, it is a member of the Section Hygrocybe.

The pellicle of the pileus may not always be bitter. Overholts sent us specimens from Pennsylvania which apparently had no distinctive taste but otherwise belong here. In the two-spored form from Washington, the taste was very slight. Since Peck did not mention the taste in his original account, we cannot be sure which form he had. Because of the uncertainty of this character in this instance, we have not given it the same weight that it was given in separating H. reai and H. minutulus. Ricken's H. colemanianus is very likely the two-spored form of H. subviolaceus. He gives the spore size as 8-9 x 6-7 μ which is exactly the same as in the two-spored form collected in Washington.

HYGROPHORUS UMBRINUS Dennis

Kew Bull. 2:257. 1953

Illustration:

Dennis, Kew Bull. 2, fig. 2.

Pileus 5 cm. broad, expanded, umbonate to depressed, greyish-brown to avellaneous, dry, innately-fibrillose. Context white, firm.

Lamellae decurrent, white then pallid brown ("bubalinae"), broad, margins obtuse.

Stipe white then avellaneous, fibrillose, base attentuated, solid.

Spores 4.5-5.5 μ diameter, globose, smooth, pale yellow in Melzer's reagent. Basidia 46-62 x 5-7 μ, 2- and 4-spored. Pleurocystidia and cheilocystidia none. Gill Trama: (1) a mediostrate of somewhat parallel hyphae, 3-4 μ broad; (2) elsewhere the hyphae are more or less interwoven 4-6 μ broad. Cuticle undifferentiated, surface hyphae non-gelatinous, fuscous to brown, repent or erect, with clamp connections. Pileus trama distinctly radial.

Habit, habitat, and distribution. - On soil, under bamboo, Trinidad ~~(Dennis 177, type)~~.

Material studied.— Trinidad: Dennis 177 (type, from St. Joseph).

Observations. - We have studied the type and have recorded our observations in the account of microscopic characters above. Our observations agree with those of Dennis.

Singer (1955) has also studied the type at Kew. He found the basidia 42 x 6-7.3 μ (the 4-spored ones), and 4.3 μ (the 2-spored ones), and the gill trama is interwoven, and we agree with Singer that it is a good Camarophyllus.

HYGROPHORUS VIRGINEUS (Fr.) Fr.

Epicr. Myc., p. 327. 1838

Agaricus virgineus Fr., Syst. Myc. 1:100. 1821.

Camarophyllus virgineus (Fr.) Kummer, Der Führer in die Pilzkunde, p. 117. 1871.

Illustrations:

Plate

Boudier, Icon. Myc., pl. 37.

Bresadola, Icon. Myc., tab. 328.

Jacquin, Misc, Austr., 2, pl. 15, fig. 1.

Lange, Flora Agar. Dan., 5, pl. 164 C.

Peck, N. Y. State Mus. Bull., 5, pl. 58, figs. 8-12.

Peck, N. Y. State Mus. Mem., 3, pl. 52, figs. 8-12.

Sowerby, Engl. Fungi, pl. 32.

Vittadini, Descr. Funghi Mang., pl. 32, fig. 2.

Wakefield and Dennis, Common British Fungi, pl. 24, fig. 1.

Pileus 2-5 cm. broad, at first convex and usually weakly umbonate, later nearly plane or finally slightly depressed, margin incurved at first, later nearly plane, white, finally tinged yellow at least over the disk, at first moist, later dry and becoming rimose, finally somewhat pruinose or fibrillose, central portion rather fleshy, margin thin, even when dry, at times striatulate when wet. Context white, soft, watery, thick on disk; odor none or slightly pleasant, taste mild.

Lamellae decurrent, white, finally tinged yellow, 3-5 (7) mm. broad, rather thick, subdistant to distant, venose.

Stipe 3-7 cm. long, 3-8 (12) mm. thick, white, rarely pale pinkish lavender downward, smooth, glabrous, sometimes pruinose, narrowed below, often broadened above, sometimes flexuous, solid at first, later stuffed.

Spores 8-10 (12) x 5-7 μ, ellipsoid, more rarely ovoid, smooth, white in mass, yellowish in Melzer's reagent. Basidia 38-60 x 5-8 μ, 4-spored, rarely 2-spored. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 5-12 μ broad. Cuticle of undifferentiated, repent, non-gelatinous hyphae, 2-3 μ broad, - a cutis. No hypodermium. Pileus trama of radially disposed hyphae. Clamp connections on the cuticular and gill-trama hyphae.

Habit, habitat, and distribution. - Gregarious on soil, at times among moss, in deciduous, coniferous, and mixed woods, Colorado, Michigan, Tennessee, and North Carolina, July-November; also Europe and Japan.

Material studied. - COLORDAO: Whetstine, Grand Co., Aug. 9, 1917; MICHIGAN: Kauffman, Saline, July 18, 1923; Smith 62131; NORTH CAROLINA: Hesler 21005; TENNESSEE: Billings and Drew 9511; Hesler 14083, 17214, 19548, 22691, 23449; Sharp 17717, 22693; NETHERLANDS: Bas 1674; DENMARK: J. P. Jensen (H-23960, 23961, 23962).

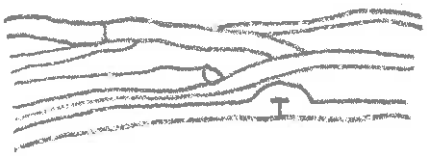
Observations. - This species is related to H. borealis which has a more slender stipe and smaller spores; to H. niveus in which the pileus is viscid and the flesh thin; and to H. pratensis which has a colored pileus (buff, orange, or rufous).

In one North Carolina collection (H-21005), the spore deposit, although white at first, became "maize yellow" on standing in the herbarium. In another collection (from Tennessee, H-19548), the stipe was pale pinkish-lavender downward. This condition suggests H. virgineus var. roseipes Massee. However, Orton (1960:247, footnote) observes that H. virgineus, H. niveus, and H. berkeleyi are all prone to a pathological condition (perhaps bacterial) in which the stipe or pileus surface turns pink in places. He is of the opinion that this condition is var. roseipes, a worthless name.

H. virgineus has recently been reported from Japan by Hongo (1958a).

Hygrophorus virgineus

UT - 21005



Non-gelatinous cuticle

× 1000

23449 - Hygrophorus virgineus Fr.

71005 - Hygrophorus virgineus F.

25009 HYGROPHORUS VIRGINEUS (Fr.) Fr. Photo

in deep humus (beech leaves) under beech, Nov. 22, '62, Hesler's woods

Pileus 2.5-6 cm., convex, finally strongly upturned and depressed, white, striatulate when wet, lubricous.

Stipe 3-7 cm. x 5-12 mm.

Spores 8-9 (10) x 5-6 μ.

25009 - Hygrophorus virgineus (F.) F.

HYGROPHORUS No. 23766

Need more material! Hold!

Pileus 3 cm. broad, convex, disk slightly depressed, hygrophanous, marginal third "benzo brown" to "drab", central portion brownish (not matched), white-silky and subrimose. Context white, thick, abruptly thin on margin; odor none, taste slightly unpleasant.

Lamellae adnexed, pale cream, broad, ventricose, subdistant, many short, interveined above.

Stipe 6 cm. x 6 mm., white, shining, tapering downward, easily splitting, dry.

Spores white in deposit, 6-9 x 4-5 μ, ellipsoid, smooth, yellowish in Melzer's reagent. Basidia 46-57 x 7-9 μ, 2- and 4-spored. Gill trama somewhat interwoven. Cuticle of repent to somewhat erect, septate hyphae, with clamp connections.

Near Sm-48072, which has "quaker drab", decurrent gills.

Both Sm-48072 and H-23766 near H. cinereus of subradiatus.

Sn-62136 HYGROPHORUS

near angustifolius
Smith thinks it a var ? albipes

Notes by Smith

Pileus cream to pinkish tan. Lamellae white, close, medium broad. Stipe pointed rooting.

Notes by Hesler

Spores 5-6(7) x 3.5-4.0 u, ellipsoid, smooth, yellow in Melzer's. Basidia 43-54 x 5-6 u, mostly 2-spored, a few 4 spored. Pleurocystidia and cheilocystidia none. Gill trama interwoven, hyphae 3-7 u broad. Cuticle not well differentiated, hyphae repent. Clamp connections present on the cuticular hyphae.

This appears close to H. angustifolius which however is white, and has spores which are drop-shaped to subglobose.

Not in the Key
Smith making a re-study

HYGROPHORUS Sm-A

On soil, under hardwoods, hickory predominant, St. Clair Co., (Michigan?), Sept. 10, 1949, coll. by F. Boynton.

Notes by F. Boynton

Pileus 15 mm. broad, pea green, plane, glabrous, dry.

Lamellae free, pea green, distant.

Stipe pea green at apex, gradually fading to yellow at base.

Notes by Hesler

Spores 5.5-7 x 4-4.7 μ, ellipsoid, pale in Melzer's reagent. Basidia 37-43 x 5-6 μ, 4-spored, tapering below. Pleurocystidia and cheilocystidia none. Gill-trama interwoven, hyphae 3-5 μ broad. Cuticle a trichodermium, numerous hyphae more or less erect. Clamp connections present on the cuticular hyphae. Pileus trama of radially disposed hyphae.

From the dried specimens, the cap is somewhat fibrillose, margin probably even. Gills subdistant to distant, medium broad. Stipe 3-4 cm. x 5-7 mm., neither pruinose nor punctate, apparently fibrillose, equal.