

Additional North American Hygrophori.

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Since our last (1942) communication on the North American species of this group continued collecting has revealed the presence, in our North American *Hygrophorus* flora, of a rather large number of new and interesting species. Some of these are important taxonomically in view of Singer's (1951) efforts to exclude from the genus all species lacking clamp connections. He transferred a number of these to *Armillariella* and one to *Tricholoma*. We consider this disregard for the obvious character of waxy hymenophore in the species concerned to be untenable. In our estimation it produces an artificial classification — in fact one more artificial than the groupings of Fries which have been criticized so regularly in recent years by those purporting to have made a more „natural“ arrangement of the species. To those of us who know both *Armillaria mellea* and *Hygrophorus paupertinus*, the concept of their being con-generic must be substantiated with much more convincing proof than any yet advanced.

In fact, if we were to suggest any changes in our classification of *Hygrophorus* (1939 and 1942), one would be to consider *Camarophyllus* and *Hygrocybe* as a single subgenus parallel to *Pseudohygrophorus* and *Limacium*. Such an idea in its essentials has already been expressed by N ü e s c h (1922). He recognized *Limacium* as a genus and combined *Camarophyllus* and *Hygrocybe* under *Hygrophorus*.

The most controversial group, those without clamp connections but possessing a more or less hymeniform pileus cuticle, at first sight would seem to form a natural series, but, from the species presented here, we believe that this group is derived in part from the true *Camarophylli* on the one hand and from the *H. miniatus* series of *Hygrocybe* on the other. A third and complicating character in the series is the presence of granules in the hyphae and sometimes in the spores, or in both which become dark yellow to bister in Melzer's reagent. This character, when it is better understood, may be of distinct value in grouping species at the stirps level in an area where the arrangement of the hyphae in the gill trama breaks down as an important character.

*) Papers from the Herbarium and Department of Botany of the University of Michigan and the from the Botanical Laboratory, The University of Tennessee, N. Ser. 66.

As it now appears, our subsection hymenocephali of *Camorphyllus* is made ambiguous by certain species showing evolution toward a hymeniform cuticle through a cuticle-structure of the trichodermium type. In view of the discoveries presented here, we are refraining from making any extensive revisions even in this group until further field studies can be made and certain data, now regarded as essential, can be obtained on species previously described from other countries. The essential characters to be restudied are the presence of granules when sections are revived in Melzer's sol., clamp connections on the hyphae of the fruiting body, and the structure of the pileus cuticle. These need to be correlated with the arrangement of the hyphae of the gill trama. Some of the most important species in this regard appear to prefer a habitat on poor soil where vegetation is sparse and they appear to fruit best during wet weather in late summer. At least these are the conditions which prevailed in the vicinity of the Univ. of Mich. Biological Station where an unusual number in the group has been found.

One evolutionary trend in the genus, however, is very evident: the existence of pairs of „parallel“ species differing in only one major character. It is very apparent to us, for instance, that although the subdivision of *Limacium* on the presence or absence of a gelatinous universal veil is a very worthwhile division as an aid in identification, the „natural“ lines of relationship appear to be both parallel to this division as well as transverse — depending on the species one selects for consideration. Furthermore, we have found the same situation to prevail regardless of the character used — whether it be the color of the pileus or a gelatinous veil.

In our estimation considerable work on *Hygrophorus* needs to be done to re-evaluate many of the characters, such as color, which have been used extensively by all of us. It would be desirable to do much of this through culture work, and the day when this can be done may not be too far off. At any rate, in this contribution we shall attempt no major revisions of the classification but instead reserve these or even a consideration of them, for a future date. It is our belief that relationships are best discussed after one has a thorough knowledge of a group and the species have been sufficiently well defined as to be recognized throughout the pattern of their variation.

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All color terms within quotation marks are taken from R. Ridgway (1912). The specimens cited have been deposited in the Herbarium of the University of Michigan, the Herbarium of the University of Tennessee, and the Mt. Rainier National Park herbarium as indicated.

Limacium.

To this subgenus, for North America, we here add the well-known European *H. cossus* subsection Albidi and *H. Karstenii* (Pallidi). *H. pudorinus* f. *subcinereus* f. nov. (Fulvoincarnati), *H. cineripallens* (Atro-cinerei), *odoratus* (Atrocinerei), *H. pseudolucorum* (?), *H. siccipes* (?) and *H. subpungens* (Pallidi) are described as new.

Hygrophorus cossus Sow. ex. Fr.

Pileus 3–5 cm. broad, obtuse with an incurved margin expanding to broadly convex to nearly plane, surface glutinous and glabrous, evenly „pale cinnamon buff“ over all (whitish) but becoming slightly more ochraceous by maturity and retaining this tint in drying; flesh white, fairly soft, odor distinctly aromatic, taste not distinctive, no color change on bruising; lamellae subdistant, decurrent, narrow, whitish, edges even; stipe 4–6 cm. long, 8–12 mm. thick, equal or tapered off at the base, fibrillose-punctate to scabrous at apex, lower two-thirds covered by a gelatinous sheath representing the remains of the universal veil, silky appressed-fibrillose beneath the gluten. — Spores 7–9 \Rightarrow 4–4.5 μ , ellipsoid, smooth, hyaline, hyaline to yellowish in Melzer's sol.; basidia four-spored, 38–46 \Rightarrow 7–8 μ ; pleurocystidia and cheilocystidia none seen; gill trama divergent; pileus trama covered by a thick gelatinous pellicle of narrow hyphae; clamp connections present.

Habit, habitat and distribution: Gregarious around an old oak stump, Ann Arbor, Mich., Sept. 26, 1945, Sm-20681.

Observations: By virtue of the odor and whitish pileus which later develops an ochraceous tone, this collection is referred to *H. cossus*. The carpophores were all young, and this apparently accounted for the fact that a spore-deposit was not obtained. Spores from the gills measure fairly small for the species, but no emphasis is placed on this difference here in view of the immaturity of the carpophores.

Hygrophorus Karstenii Sacc. & Cub. f. *minor* Bres.

Pileus 3—5 cm. broad, broadly convex to nearly plane with an inrolled margin, expanding to broadly convex or with an arched margin, surface glabrous, subviscid to touch when wet but soon dry and then with an unpolished appearance or shining in places along the margin, color a dull creamy white and unchanging; flesh white thickish, soft, odor and taste not distinctive; lamellae waxy, close, becoming subdistant, decurrent, narrow to moderately broad, some forking, creamy yellowish, edges even; stipe 3—5 cm. long, 6—12 mm. thick, solid, equal or nearly so, white within, surface dry and matted-fibrillose causing it to appear unpolished, the fibrillose silky coating extending to apex, no veil present. Spores 7—9 \Rightarrow 4.5—5 μ , ellipsoid to somewhat ventricose-ovate, hyaline, pale yellowish in Melzer's sol., as revived in Melzer's they are seen to have a slightly thickened wall; basidia four-spored, 46—55 \Rightarrow 8—9 μ , clavate and with long often flexuous pedicels; pleurocystidia and cheilocystidia none differentiated; gill trama with a subparallel central strand of narrow hyaline hyphae which on either side diverge toward the subhymenium; pileus trama with a cuticle of narrow, scarcely gelatinous hyphae (in KOH); clamp connections present.

Habit, habitat and distribution: Gregarious under *Populus trichocarpa*, *Thuja plicatilis*, *Tsuga heterophylla* and *Pseudotsuga taxifolia*; Nisqually River, Mt. Rainier National Park, Washington, August 23, 1948, Sm-30480.

Observations: The slight stickiness of the pileus is like that of wet specimens of *Inocybe geophylla* and is not caused by gelatinous hyphae. Hence the statement of Kühner and Romagnesi (1953, p. 58) applies to our collection. *H. saxatilis* and *H. Karstenii* f. *minor* are closely related but distinct. The former has a truly gelatinous pellicle as well as differently colored gills. *H. Karstenii* f. *Karstenii* is a much more highly colored agaric, almost exactly like *H. saxatilis* in appearance, but apparently the latter has more of a salmon tint to the gills and definitely has a thin gelatinous pellicle. The two are very close, however, and would merit a critical comparative study. Also, it may very well be true that *H. Karstenii* f. *minor* is a distinct species but as yet we do not know its range of variation; it could easily be merely a stage in the development of color and size which

has become arrested at the level of small size and pale coloration. It is evident from the account of Favre and C. Poluzzi (1947) that a change in color occurs as the carpophores enlarge and age.

Hygrophorus pudorinus f. **subcinereus** f. nov.

Pileus 3—7 cm. latus, viscidus, glaber, pallide cinereus demum pallidus; lamellae albae; stipes albo-punctatus, siccus, deorsum tactu flavescens; sporae 8—11 \Rightarrow 5—6 μ . Specimen typicum in Herb. Univ. of Mich. conservatum; legit in Wilderness Park, Emmet Co., Mich., Oct. 7, 1953, Smith n. 43858.

Pileus 3—7 cm. broad, obtuse becoming obtusely umbonate with a decurved and inrolled margin, finally plano-umbonate, glabrous viscid, color pallid or with a cinereous shade over the disc (this retained in dried specimens), gradually becoming pallid over all and then the disc finally more or less pale pinkish buff to pinkish buff; flesh white, taste pleasant, odor faintly fragrant; lamellae distant, arcuate, subdecurrent, moderately broad, white; stipe 4—7 cm. long, 8—12 mm. thick at apex, equal, solid, white-fibrillose punctate above, veil none, surface typically dry but base often moist (not truly viscid anywhere), staining yellow where handled, the punctae near the apex becoming orange yellow in drying, white otherwise. Spores 8—11 \Rightarrow 5—6 μ , ellipsoid, smooth, yellowish in Melzer's sol.; basidia four-spored, 50—62 \Rightarrow 7—8 μ ; pleuro- and cheilocystidia none; gill trama strongly divergent from a central strand; pileus with a thick gelatinous cuticle of narrow (3—5 μ) interwoven hyphae; clamp connections present.

Habit, habitat and distribution: Gregarious under balsam and spruce, Wilderness Park, Emmet County, Mich. Oct. 7, 1953, Smith n. 43858).

Observations: Wilderness Park is the one place in the United States where Smith has found *H. pudorinus* fruiting abundantly every fall if there is reasonable rain fall. During the season of 1953 which was relatively dry, there were numerous groups of carpophores, but the individuals averaged smaller than those collected during the wet year of 1951. During 1953 f. *subcinereus* was encountered on several occasions and regarded merely as faded normal fruiting bodies. However, when a good collection of young freshly developing specimens was finally located, it was evident at once that we were dealing with a distinct color form. The cinerous tone in perfectly developing material is of significance since there generally has been a strong tendency to regard color as a primary character in this genus. Singer (1951) has placed considerable emphasis upon it, and all investigators have tended to regard the *H. pudorinus* group as quite distinct from the *H. pustulatus* group.

The discovery of *H. pudorinus* f. *subcinereus* points to a possible, heretofore unsuspected, bridge between these groups.

It would be interesting to culture f. *subcinereus* and get it to produce fruit bodies. On two occasions, groups of carpophores of f. *pudorinus* were found in which there was a sector of the gray capped carpophores of f. *subcinereus*. Both types appeared to be coming from the same mycelium. Such circumstantial evidence as this, of course, is anything but conclusive, but when one meets such a situation twice in a few days, it is very suggestive.

Hygrophorus cinereipallens sp. nov.

Pileus 1—3 (4) cm. latus, convexus demum planus, glaber, viscidus, subavellaneus vel pallide cinereus; lamellae avellaneae demum decurrentes, confertae vel subdistantes; stipes 3—5 cm. longus, 3—8 mm. crassus, siccus, sursum pruinosis, subavellaneus, deorsum glaber vel pruinosis; sporae 6.5—8 \Rightarrow 4.5—5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Point Aux Chenes, Mich. Oct. 4, 1953, S m i t h n. 43736.

Pileus 1—3 (4) cm. broad, convex with an incurved margin, expanding to plane or nearly so, margin at times elevated in age, surface glabrous and viscid, color avellaneous to dingy pinkish buff over disc, cinereous pallid over margin, in age a cinereous shade often pervading the entire cap; flesh thick but very soft, pallid to slightly cinereous, odor and taste not distinctive; lamellae „avellaneous“ or somewhat paler or darker, adnate becoming decurrent, close to subdistant, moderately broad, edges even; stipe 3—5 cm. long, 3—8 mm. thick, equal, solid, soft, dry, more or less concolorous with the gills, densely pruinose above and at times over-all except the mycelioid base; veil none. Spores 6.5—8 \Rightarrow 4.5—5 μ , oblong to ellipsoid, smooth, hyaline, yellowish in Melzer's sol.; basidia four-spored, 42—50 \Rightarrow 6—8 μ ; pleuro- and cheilocystidia none; gill trama divergent; pileus trama homogeneous beneath a thick gelatinous pellicle of narrow (3—6 μ) hyphae bearing clamps.

Habit, habitat and distribution. Gregarious under conifers, Point Aux Chenes, Mich. Oct. 4, 1953, S m i t h n. 43736.

Observations. The densely pruinose dry stipe, avellaneous gills which become cinereous like the pileus in dried material, small spores, and dingy pileus when fresh distinguish it. It is close to *H. subpungens* but stipe does not change where handled, the gills do not become clay color and no pungent odor is present. Perhaps it is actually most closely related to *H. roseibrunneus* and *H. nemoreus*, but differs in the grayish colors.

Hygrophorus odoratus sp. nov.

Pileus 2—4 cm. latus, viscidus, fibrillose virgatus, sordide cinereus vel fusco-griseus; odor valde aromaticus; lamellae distantes latae, decurrentes, pallidae, demum ochroleucae; stipes 4—8 cm. longus, 3—6 mm. crassus, siccus, glaber, sursum sericeus, pallidus; sporae 11—14 \cong 6.5—8 μ . Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Paradise Park, Mt. Hood, Ore. Oct. 20, 1947, S m i t h n. 28387.

Pileus 2—4 cm. broad, obtuse to broadly convex, expanding to almost plane or disc slightly depressed and margin arched, surface viscid, fibrillose streaked to merely matted-fibrillose beneath the viscosity, dark ashy gray over the disc, paler gray to pallid along the margin, when old with a faint ochraceous tinge pervading throughout; flesh, soft, pallid, odor strongly aromatic (somewhat as in *H. agathosmus*) taste insipid; lamellae distant, broad, decurrent, whitish when young, more creamy in age, unchanging when bruised; stipe 4—8 cm. long, 3—6 mm. thick at apex, equal or in some narrowed below, dry, glabrous, apex faintly silky, pallid at first, unchanging when bruised but in drying developing an over-all faint ochraceous tinge. Spores 11—14 \cong 6.5—8 μ , ovoid to broadly ellipsoid, smooth, hyaline, hyaline to yellowish in M e l z e r's sol.; basidia fourspored 50—62 \cong 8—9 μ ; pleurocystidia and cheilocystidia none seen; gill trama of divergent hyphae; pileus with a gelatinous pellicle of narrow hyphae; clamp connections present.

Habit, habitat and distribution. Scattered on moist earth under conifers, Mile Bridge, Mt. Hood National Forest, Ore., Oct. 26, 1947, S m i t h n. 28300; Oct. 28, Paradise Park Trail, 2 miles above Twin Bridges, Mt. Hood, Ore., S m i t h n. 28387.

Observations. In the field this fungus was mistaken for slender specimens of *H. agathosmus*, but the large spores on fourspored basidia make such a disposition untenable. *Hygrophorus Lucandi* Gill. is usually described as having the field characters of *H. odoratus*, and one is tempted to so designate the Mt. Hood collections. However, we have no reliable information on the spore size of G i l l e t's species, and deem it best not to risk confusing a distinct American species with a European species which European authors have regarded as a synonym of *H. agathosmus*. Actually, *H. odoratus* appears to be close to *H. pacificus* Smith & Hesler, but differs in the gray pileus and faint tinge of yellow which is evident in ag \ddot{e} . In spore size, odor and dry stipes both are similar. *H. hyacinthinus* Qu \acute{e} let is a very closely related species by virtue of its pale gray to white cap and spores 9—11.5 \cong 5—6 μ . The apex of its stipe is silky.

Hygrophorus pseudolucorum sp. nov.

Pileus 1—3.5 cm. latus, obtusus, demum planus, viscidus, demum siccus, centro aurantio-salmonaeus, demum subferrugineus, ad marginem luteus; lamellae subdistantes vel distantes, decurrentes, pallidae, demum luteae; stipes 3—5 cm. longus, 3—5 mm. crassus, solidus, albidus, lutescens, siccus, sparsim fibrillosus vel subannulatus; sporae 9—12 \cong 6—7 μ . Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope North Lake, Washtenaw County, Mich. Oct. 25, 1951, Kent McKnight, (Smith n. 38943).

Pileus 1—3.5 cm. broad, obtuse to nearly plane with an incurved margin, expanding to plane or shallowly depressed, with or without a low umbo, surface viscid but soon dry, at first appearing as if covered by a very faint fibrillose coating, color near „apricot orange“ or disc pinker and margin yellow, in age sometimes nearly ferruginous on the disc; flesh thin, pallid, yellowish, no color change seen on bruising, odor and taste none; lamellae subdistant to distant, decurrent, broad, pallid when young, yellowish in age, edges even; stipe 3—5 cm. long, 3—5 mm. thick, solid, nearly equal whitish at first gradually lutescent — especially where handled, dry, with a thin, white, fibrillose veil leaving an inconspicuous apical zone which soon vanishes, silky above the zone. Spores 9—12 \cong 6—7 μ , from deposits, when revived in KOH 8—11 \cong 5—6.5 μ , obscurely inequilateral in side view, in face view elliptic or nearly so, smooth, hyaline, in Melzer's solution yellowish; basidia four-spored, 50—75 \cong 8—9 μ , pedicels flexuous; pleurocystidia and cheilocystidia none seen; gill trama of divergent hyphae from a central strand; pileus trama with a thin gelatinous pellicle of narrow hyphae, clamp connections present.

Habit, habitat and distribution. Gregarious under mixed hardwoods and larch, North Lake, Washtenaw County, Mich. Oct. 25, 1951, collected by Kent McKnight (Smith n. 38943).

Observations: The thin, white, fibrillose veil, dry stipe, large spores, decurrent gills, the orange to pinkish color of the pileus and yellow stains on the stipe are distinctive. When old the fruiting bodies bear some resemblance to those of faded specimens of *H. speciosus* but that has a slimy veil. The same objection holds for *H. nitidus* Fr. as well as *H. lucorum* Kalch. although N u e s c h's interpretation of the latter seems very close to *H. pseudolucorum*. However, Kalchbrenner's original description pretty well excludes any dry stiped *Hygrophorus*. In addition, the spores from a deposit measure larger than given anywhere for *H. lucorum*.

The mycorrhizal association is very likely with larch. *H. lucorum* is said to have a dry stipe by Kühner and Romagnesi (1953) but the spore size as given by them is too small for our species.

H. laricinus Pk. is close to *H. pseudolucorum* but differs in tawny red color and smaller spores.

Hygrophorus sicclipes sp. nov.

H. hypothejo similis sed stipes siccus. Specimen typicum in Herb. Univ. Mich. conservatum; legit prope Rhododendron, Ore., Oct. 27, 1946, S m i t h n. 25005.

Pileus 2—3 cm. broad, convex, margin incurved, expanding to plane or the margin elevated slightly and the disc depressed, glutinous and appearing fibrillose-streaked beneath the gluten, „Isabella color“ with a „warm buff“ margin, disc becoming tinged with cinnamon and then more or less „Sayal brown“; lamellae „ivory yellow“ becoming „warm buff“, narrow, distant, decurrent; stipe 4—6 cm. long, 3—6 mm. thick at apex, equal or narrowed downward, concolorous with gills, dry, with a median fibrillose zone from the partial veil. Spores 8—10 \Rightarrow 4—5 μ , nearly elliptic in face view, smooth, hyaline in KOH, yellowish in Melzer's sol.; basidia four-spored, 38—50 \Rightarrow 8—9 μ ; pleurocystidia and cheilocystidia none seen; gill trama divergent; pileus trama homogeneous beneath a gelatinous pellicle of narrow hyaline hyphae; clamp connections present.

Habit, habitat and distribution: Gregarious in a pine barren, Rhododendron, Oregon, Oct. 27, 1946, S m i t h n. 25005.

Observations: The specimens were in perfect condition, but no evidence of a gelatinous veil over the stipe was present, nor were there indications that any ever had been present. In all other characters the fungus appears to be *H. hypothejus*, and we have previously withheld an account of it hoping for additional collections. However, it appears to be worth putting on record because of the number of „parallel species“ of the kind in the subgenus *Limacium*. There is *H. albidus* Karst. and *H. eburneus* Fr. both common in the Cascades. Also *H. variicolor* Murrill and *H. bakerensis* Smith & Hesler also from the Cascades. Since the subgenus *Limacium* has been divided on the basis of the presence or absence of a universal glutinous veil, it is interesting to see how closely related species can become widely separated in such a classification. However, if one places primary emphasis on color of pileus, one still encounters the same problem, see *H. pudorinus* f. *subcinereus* in the present paper. *H. lucorum* sensu K ü h n e r and R o m a g n e s i may belong here but the color of the pileus as given is too pale and certainly not fibrillose streaked as in *hypothejus*.

Hygrophorus subpungens sp. nov.

Pileus 1.5—3 (4) cm. latus, obtusus, demum late umbonatus vel planus, viscidus, pallidus, demum avellaneus, odor subpungens;

lamellae subdistantes, breviter decurrentes, pallidae, demum argillaceae; stipes 2.5—4 cm. longus, 3—7 mm. crassus, siccus, albidus, pruinosis; sporae 7—8 \approx 4.5—5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope East Fork, Salmon River, Mt. Hood, Ore. Oct. 20, 1944, Smith n. 20027.

Pileus 1.5—3 (4) cm. broad, obtuse when young, the margin incurved, soon nearly plane or with just a trace of an obtuse umbo, in age the disc depressed as a result of the uplifting of the margin, viscid, dull white („tilleul buff“) at first, gradually darkening on the disc in age to near pale avellaneous, the margin remaining dingy whitish; flesh thin, soft, dull white, unchanging or gradually becoming vinaceous buff to avellaneous, taste mild, odor faint but spicy-fragrant; lamellae subdistant to nearly close, 1 tier of lamellulae, broadly adnate and becoming short-decurrent, moderately broad, dark „tilleul buff“ young (pallid), becoming „cinnamon buff“ and in age nearly clay color, edges even; stipe 2.5—4 cm. long, 3—7 mm. thick, equal, sometimes hollow in age, dry, whitish and pruinose over-all at first, glabrescent, becoming dingy where handled but never as dark as the old gills. Spores 7—8 \approx 4.5—5 μ , elliptic in face view, in side view slightly bean-shaped, smooth, yellowish in Melzer's sol.; basidia four-spored, 44—56 \approx 7—8 μ , basidia in sections of hymenium revived in KOH dull pale cinnamon in color; pleurocystidia none; cheilocystidia none; gill trama divergent; hyaline; pileus trama homogeneous beneath a gelatinous pellicle; clamp connections present.

Habit, habitat and distribution: Densely gregarious on wet soil near a beaver point, East Fork, Salmon River, Mt. Hood, Ore. Oct. 20, 1944, Smith n. 20027.

Observations: This species differs from *H. discoideus* in lacking a gelatinous veil. Excellent material was studied and the lack of a glutinous veil definitely established. The colors are pale and dingy compared to typical *H. discoideus* if old material is compared. Young caps of course can be readily distinguished by the pallid color and odor. It appears to be close to *H. russocoriaceus* but that species is not described as having gills which finally become nearly clay color and the habitat is quite different (pastures). In addition, the stipe of *H. russocoriaceus* is usually described as white and not becoming dingy from handling. Also, many authors still use this name for a *Camarophyllus*.

Camarophyllus.

In this subgenus we present data on two previously known species, *H. cremicolor* Murrill and *H. foetans* Phill. as well as 4 here considered to be previously undescribed: *H. fumosellus*, *H. graveolens*, *H. fallax*, and *H. subfuscescens* and its variety *odora*. *H. creami-*

color, *H. fumosellus* and *H. graveolens* belong to *Camarophyllus* in the typical sense i. e. they have intricately interwoven gill trama and clamp connections. *H. foetens*, *H. fallax* and *H. subfuscescens* show a progression toward a similar group of species from *Hygrocybe* (see that subgenus).

Hygrophorus cremicolor Murrill.

Pileus 1—3 cm. broad, obtuse with an incurved cottony margin, expanding to broadly umbonate with a spreading margin, surface canescent, pallid but moist and hygrophanous, white to creamy ochraceous or with a salmon tint, unpolished and whitish faded; flesh cream color to near pale pinkish buff, odor and 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 concolours 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 6—7 \Rightarrow 4—5 μ , broadly ellipsoid to subglobose, smooth, hyaline in Melzer's sol.; basidia four-spored, 40—50 \Rightarrow 5—6 μ ; pleurocystidia none seen; gill trama of interwoven narrow hyphae; pileus trama homogeneous, hyphae of surface loosely arranged; clamp connections present.

Scattered on exposed ground in a dried up pool, Sugar Island, near Sault Saint Marie, Mich. Aug. 19, 1949, Smith n. 33151.

Observations: The material in this collection was in excellent condition. The interwoven gill trama and pale delicate color of the pileus and gills are distinctive. *H. Karstenii* belongs in *Limacium* but has very similar colors and the same stature.

Hygrophorus foetens Phill.

Pileus 1—4 cm. broad, plane to broadly convex, becoming turbinate or the margin uplifted, surface glabrous, moist hygrophanous, "cinnamon brown" to "bister" on disc and over striae, paler between the striae, fading to near avellaneous and then atomate, in age at times somewhat diffracted scaly; flesh concolorous with surface, brittle-waxy, taste mild, odor pungent (reminding one of chloride of lime); lamellae distant, decurrent, thick, waxy, brittle, "wood brown" or darker, edges even; stipe 2—4 cm. long, 2—3 mm. thick at apex, narrowed downward, glabrous, concolorous with pileus or over the lower portion darker, surface scabrous-dotted at first but naked in age. Spores 5—6 \Rightarrow 4.5—5 μ , subglobose to broadly elliptic, smooth, yellowish in Melzer's sol.; basidia four-spored, 34—42 \Rightarrow 5—7 μ , elongate-clavate, lower part often flexuous; pleurocystidia and cheilocystidia none; gill trama interwoven, brownish in H₂O fresh, dull cinnamon revived in KOH; pileus trama colored like the gill trama (pigment thinly incrustated on the hyphae), interwoven; cuticle a

dense palisade layer of more or less upright enlarged elements varying from $20 \rightleftharpoons 12 \mu$ and subglobose (the cross wall just beneath the enlargement) to elongated pyriform to ventricose capitate elements $30-60 \rightleftharpoons 10-20 \mu$; clamp connections absent.

Habit, habitat and distribution: Cespitose in an open young stand of hardwoods, on naked soil, Mackinaw City, Mich. Aug. 16, 1952, Smith n. 39673.

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 incrustated pigment on the hyphae. It appears to be close if not identical with *H. foetans* Phill. and we place our collection there in spite of a slight difference in the odor foetid as against pungent. In our estimation Nüesch's (1922) account of *H. foetans*, in which the stipe is described as olive yellow, applies to some other species. Information on the type of *H. foetans* if it exists, is needed to establish the presence (or absence) of clamp connections and whether or not the cuticle is hymeniform. If Dennis (1948) is right, the American collection cited above represents a new species.

Hygrophorus fallax sp. nov.

Pileus 10-18 mm. latus, convexus, udus, glaber, demum squamulosus, subhygrophanus, fuscus, deinde cinereus; lamellae subdistantes, latae, ventricosae, sordide cinerae; stipes 2-3.5 cm. longus, 2-2.5 mm. crassus, glaber, sursum leniter pruinosis, subfuscus; sporae $5-6 \rightleftharpoons 4-5 \mu$. Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Indian Camp Creek, Great Smoky Mts. National Park, Tenn. Aug. 30, 1938. L. R. Hessler (Smith n. 10661).

Pileus 10-18 mm. broad, convex, moist, glabrous and moist, not becoming squamulose when faded, somewhat hygrophanous, dark smoky gray to fuscous-black moist, opaque at all stages, fading to a dull dingy gray; flesh fragile, no distinctive odor or taste; lamellae subdistant, broad, ventricose, adnexed, dingy drab gray, fragile and edges very readily fracturing, edges usually paler in color than the faces: stipe 2-3.5 cm. long, 2-2.5 mm. thick, equal or enlarged at both ends or at either end, glabrous, apex faintly pruinose, concolorous with pileus or darker, moist to dry. Spores $5-6 \rightleftharpoons 4-5 \mu$, broadly ellipsoid to globose, smooth, hyaline in KOH and yellowish in Melzer's sol.; basidia four-spored, $20-25 \rightleftharpoons 5-6 \mu$; pleurocystidia and cheilocystidia none seen; gill trama interwoven, dingy in KOH, in Melzer's with yellowish granular content variously distributed; pileus trama with a cuticle of hyphae $8-12 \mu$ diam. and some with inflated endcells (but generally remaining closely appressed), content of appressed filaments granular and brownish yellow in Melzer's sol., tramal body compactly interwoven; clamp connections absent.

Habit, habitat and distribution: Gregarious on moss, Indian Camp Creek, Great Smoky Mts. National Park, Tenn., Aug. 30, 1938. Coll. L. R. Hesler (Smith n. 10661).

Observations: This species differs from *H. microsporus* in larger spores and the cap not becoming squamulose. The dark granules in the hyphae as seen in Melzer's sol. are common to both.

Hygrophorus fumosellus sp. nov.

Pileus 2.5—5 cm. latus, udus, hygrophanus, pallide cinnamomeus, striatulatus; lamellae latae, confertae, breviter decurrentes; stipes 3—5 cm. longus, 5—10 mm. crassus, siccus, glaber; sporae 9—11 \Rightarrow 5—6 μ . Specimen typicum in Herb. Univ. of Tenn. conservatum: legit prope New Hopewell, Knox. County, Tenn. Dec. 17, 1941, L. R. Hesler n. 14105.

Pileus 2.5—5 cm. broad, convex, expanding to concave as margin becomes elevated, moist and hygrophanous but not viscid, "Soyal brown" moist, "pinkish cinnamon" faded, margin faintly striatulate when moist, innately silky faded (under a lens); flesh dingy white, thick on disc, thin on margin, odor and taste mild; lamellae arcuate-decurrent, moderately broad and close, intervenose, some forked, near "pale pinkish buff" but with a smoky tint, edges even; stipe 3—5 cm. long, 5—10 mm. thick, solid, tapered downward, glabrous, dry, rigid. Spores 9—11 \Rightarrow 5—6 μ , ellipsoid, smooth, yellowish in Melzer's sol., hyaline in KOH; basidia four-spored, 50—62 \Rightarrow 6—7 μ , with clamp connections at base; pleurocystidia and cheilocystidia none; gill trama compactly and intricately interwoven; pileus trama homogeneous, clamp connections present on the hyphae.

Habit, habitat and distribution: Gregarious on soil in deciduous woods, New Hopewell, Knox County, Tenn. Dec. 17, 1941, Hesler n. 14105.

Observations. The dull cinnamon brown striatulate pileus, peculiar smoky tint to the gills, and 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 the genus *Clitocybe* if one is inclined to disregard the character of waxiness.

Hygrophorus graveolens sp. nov.

Pileus 3—6.5 cm. latus, udus, pallide incarnato-cinnamomeus; odor graveolens; lamellae ochroleucae, distantes, breviter decurrentes; stipes 4—7 cm. longus, 5—14 mm. crassus, sericeo-striatus; sporae 7—9 \Rightarrow 4.5—5.5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope East Fork, Salmon River, Mt. Hood, Ore. U.S.A., Oct. 8, 1947, Smith n. 27411.

Pileus 3—6.5 cm. broad, obtuse when young, expanding 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 disc but becoming "pinkish buff" toward the "pale pinkish buff" margin, some with watery spots around the disc; flesh about concolorous with the surface, not staining when bruised, odor sickening aromatic (sweetish), taste slight and hardly distinctive; lamellae light "pinkish cinnamon" young, "pinkish buff" in age, distant, short-decurrent to broadly adnate, strongly intervenose, edges even; stipe 4—7 cm. long, 5—14 mm. thick, narrowed downward, solid, about "pinkish buff" within, surface silky-striate and about concolorous with the gills, somewhat canescent at first from a silky coating but no veil seen. Spores 7—9 \Rightarrow 4.5—5.5 μ , elliptic or nearly so, smooth, yellowish in Melzer's sol.; basidia 48—60 \Rightarrow 8—10 μ , four-spored; pleurocystidia and cheilocystidia none seen; gill trama intricately interwoven, hyaline in KOH; pileus trama interwoven, hyaline in KOH, surface region of loosely arranged but appressed hyaline hyphae; clamp connections abundant.

Habit, habitat and distribution. Cespitose-gregarious in a swampy area under cedar and alder, East Fork, Salmon River, Mt. Hood, Ore. Oct. 8, 1947, S m i t h n. 27411.

Observations: The interwoven gill trama clearly puts 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 might regard this species as close to *H. russocoriaceus* — if that species is a *Camarophyllus* — but it cannot be considered identical without making major alterations in the concept of the latter.

Hygrophorus subfuscescens sp. nov.

Pileus 6—25 mm. latus, connexus, glaber, udus, olivaceo-luteus, demum olivaceo-brunneus; lamellae distantes, decurrentes, subluteae, demum sordide avellanae; stipes 2—4 cm. longus, 1.5—3 mm. crassus, glaber, pallide luteus, dein cinereus; sporae 5—6 \Rightarrow 4—5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope Mackinaw City, Mich. Aug. 6, 1949, S m i t h n. 32894.

Pileus 6—15 (25) mm. broad, convex young but margin straight to connivent, in age broadly convex or the margin flaring, in some the margin becoming crenate, glabrous, moist, hygrophanous, „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 the grayish cast developing before fading takes

place, *atomate* when faded; flesh brittle, odor none, taste slight and subnauseous; lamellae distant, decurrent, moderately broad, yellowish becoming pallid and soon darkening to „wood brown“ or darker, edges even; stipe 2—4 cm. long, 1.5—3 mm. thick at apex, narrowed downward, often flexuous, naked and polished, „colonial buff“ (pale yellow), becoming paler in age but not entirely losing the yellow tint and not cinerascens like the pileus. Spores 5—6 \approx 4—5 μ , subglobose to broadly ellipsoid, hyaline smooth, yellowish in Melzer's solution; basidia four-spored, 30—42 \approx 7—8 μ ; cheilocystidia and pleurocystidia none; gill trama intricately interwoven, hyaline in KOH; pileus trama compactly interwoven beneath a hymeniform cuticle 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; cells of carpophore lacking dark colored content (as particles or granules) when mounted in Melzer's solution; clamp connections absent.

Habit, habitat and distribution: Densely cespitose under maple, birch and basswood, Mackinaw City Hardwoods, Mich. Aug. 6, 1949, Smith n. 32894.

Observations: This is a striking species by virtue of the changing colors of the pileus, distant, decurrent, waxy lamellae, the well-developed hymeniform cuticle of the pileus, the persistently yellowish stipe which is naked, and the small globose to subglobose spores. The cespitose habit and growth on bare soil under hardwoods is characteristic at the type locality where the fungus has found regularly every season since its discovery. However, a number of collections from various other locations appear to belong here and were all from black muck under arbor vitae. These are from Wolf's Bog, Rees' Bog, and Weimar Lake Bog (near Harbor Springs). 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.

Hygrophorus subfuscescens var. *odora* var. nov.

Var. *subfuscescens* similis sed malodorus. Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope Maple River, Brutus, Mich. July 13, 1947, Smith n. 25670.

Pileus 6—10 mm. broad, convex, becoming broadly convex, margin decurved but not inrolled in young caps, glabrous, moist,

hygrophanous, „Isabella color“ and in age fading to „pale olive buff“, finally ashy gray with scarcely any olive or yellow tint showing, atomate when faded; flesh Isabella color fading through yellow to pallid, waxy, odor very distinctly disagreeable when flesh is bruised, taste mild to slightly farinaceous, no color changes when bruised; lamellae arcuate becoming decurrent, soon subdistant or nearly so, moderately broad, „pale olive buff“ becoming somewhat grayer at maturity; stipe short, 1—2 cm. long, 1—2.5 mm. thick, slightly enlarged above, „deep colonial buff“ (or grayer) at apex, glabrous, moist, no color change when bruised. Spores 5—6 \Rightarrow 3.5—4 μ , broadly ellipsoid, smooth, yellowish in Melzer's sol.; basidia four-spored, 35—42 \Rightarrow 6—7.5 μ ; pleurocystidia and cheilocystidia none seen; gill trama interwoven; pileus trama with an hymeniform layer of vesiculose-pedicellate to vesiculose-sessile or pear-shaped cells 10—35 \Rightarrow 20—50 μ ; hyphae of carpophore without dark staining content in Melzer's sol.; clamp connections not present.

Habit, habitat and distribution: Gregarious on sand bank under bracken ferns, Middle Bridge, Maple River, Cheboygan, Mich., July 13, 1947, Smith n. 35670.

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 sol., lack of clamp connections, in the color change to gray of cap and gills (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.

Hygrocybe.

Known species considered here are: *H. marchii* Bres., *H. miniatus* f. *longipes* f. nov., *H. spadiceus* and f. *odorus* f. nov., *H. subceraceus* and *H. turundus*. Previously undescribed species are as follows: *H. acutoides* (Conici), *H. atro-olivaceous* (Squamulosi), *H. citrino-pallidus* (Viscidipedes), *H. olivascens* (Squamulosi), *H. perplexus* (Viscidipedes), *H. rugulosus* (Laevi), *H. Singeri* (Viscidipedes). *H. tahquamenonensis* (Laevi).

Key to Hygrophori lacking clamp connections.

- | | |
|-----------------------------------------------------------------|--------------------------------------------|
| 1. Odor distinctive and often peculiar | 2 |
| 1. Odor not distinctive | 5 |
| 2. Stipe yellow at least at first | 3 |
| 2. Not as above | 4 |
| 3. Cuticle of pileus fibrillose | <i>H. paupertinus</i> |
| 3. Cuticle of pileus hymeniform | <i>H. subfuscescens</i> var. <i>odorus</i> |
| 4. Pileus cinnamon brown; cuticle an hymeniform layer | <i>H. foetens</i> |

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| 4. Pileus gray; cuticle a trichodermium | <i>H. peckianus</i> |
| 5. Pileus and gills bright yellow-orange (or disc of pileus greenish); gills often remaining orange after pileus has faded; cap. 2—6 cm. broad | <i>H. marginatus</i> and varieties |
| 5. Not as above | 6 |
| 6. Stipe yellowish but pileus and gills soon gray-brown to olive-brown | <i>H. subfuscescens</i> |
| 6. Stipe not yellowish | 7 |
| 7. No distinctive dark yellow granules seen when tissues are mounted in Melzer's reagent | <i>H. rugulosus</i> |
| 7. Yellowish to bister granules present in Melzer's sol. (in basidia, cuticle of pileus, spores, etc.) | 8 |
| 8. Stipe typically dark punctate above; taste subspermatitic; spores 5—7 × 4.5—4.5 μ | <i>H. atropunctus</i> |
| 8. Not as above | 9 |
| 9. Pileus trama lacking a distinctive cuticle (in <i>H. fallax</i> the appressed hyphae may have enlarged end-cells) | 10 |
| 9. Cuticle an hymeniform layer or a trichodermium | 12 |
| 10. Pileus fuscous black young, becoming squamulose when faded; spores 5—6 × 4—5 μ | <i>H. fallax</i> |
| 10. Pileus ± cinnamon to cinnamon brown young | 11 |
| 11. Spores globose, 3—3.5 μ | <i>H. Schulzeri</i> |
| 11. Spores 4—5 × 3—4 μ | <i>H. deceptivus</i> |
| 12. Spores 4—4.5 × 2.5—3 μ | <i>H. microsporus</i> |
| 12. Spores larger | 13 |
| 13. Pileus ± cinnamon at first, slowly becoming dark gray; cuticle hymeniform | <i>H. hymenocephalus</i> |
| 13. Pileus dark olive brown at first, fading to dingy gray-brown; cuticle a trichodermium | <i>H. atro-olivaceus</i> |

Hygrophorus marchii Bres.

Pileus 3—6 cm. broad, convex with an incurved margin, expanding to plane or the margin uplifted and somewhat crenate, glabrous, viscid but soon dry, blood red to scarlet when young but soon fading to orange red and finally to yellow (orange-yellow to yellow dried); flesh yellowish, odor and taste not distinctive; lamellae subdistant, adnate to adnexed, moderately broad, orange yellow to pale yellow, edges even; stipe 4—6 cm. long, 3—6 mm. thick, equal or nearly so, often becoming compressed, glabrous and naked, moist, concolorous with pileus. Spores 8—10 ⇒ 4—5 μ, narrowly ellipsoid, smooth, non-amyloid; basidia four-spored; pleurocystidia and cheilocystidia none seen; gill trama parallel or nearly so; pileus trama homogeneous beneath a thin gelatinous pellicle of narrow hyphae; clamp connections present.

Habit, habitat and distribution: Gregarious under hardwoods and in mixed forests in northern Michigan, during July and August. (Smith n. 25947; 25976; 25978; 32421; 37486).

Observations: This species has been a puzzle to us. It is very close to *H. flavescens*, in fact it differs in color from that species in much the same way that *H. cuspidatus* differs from *H. acutoconicus*.

H. Marchii was reported by Möller (1945) from the Faeröes but he did not describe the pileus as viscid, and we are inclined to question his identification on that basis. His species, by virtue of the non-viscid pileus and somewhat curved-apiculate spores may possibly be the same as *H. quietus* Kühner. Perhaps *H. marchii* should be regarded as a variety of *H. puniceus*, but this is not the impression one gets from seeing both in the fresh condition. *H. puniceus* has a characteristic appearance, it seems to be a fleshier species than *H. marchii*.

Hygrophorus miniatus f. **longipes** f. nov.

Pileus 1—3 cm. latus, valde striatus; stipes 3—8 cm. longus, 2—4 mm. crassus; sporae 7—8 \cong 4.5—5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope Pike Lake, Luce County, Mich. Sept. 11, 1953, Smith n. 42560.

Pileus 1—3 cm. broad, convex becoming plane or slightly depressed, often remaining convex, surface glabrous and moist, only in age slightly squamulose, color „English red“ to „flame scarlet“, gradually fading out to pale yellow margin, distinctly translucent striate when moist (often conspicuously so), surface shining but not viscid, when faded becoming unpolished to faintly furfuraceous; flesh orange to yellowish, odor and taste none; lamellae orange-yellow to pale yellow, close, broad, broadly adnate, edges even, pallid; stipe 3—8 cm. long, 2—4 mm. thick, equal, hollow, fragile, transversely undulating, concolorous with pileus and changing color with it, usually paler below. Spores 7—8 \cong 4.5—5 μ , ellipsoid, smooth, hyaline, yellowish in Melzer's sol.; basidia 48—60 \cong 7—8 μ , four-spored; pleuro- and cheilocystidia none; gill trama parallel; pileus trama floccose-interwoven, cuticle a trichoderm of elongate hyphae which become appressed to the pileus, clamp connections mostly absent at the cross walls, end-cells cylindric to ellipsoid; clamp connections present quite regularly at the base of the stipe.

Habit, habitat and distribution. Gregarious in a sphagnum bog, Pike Lake, Luce County, Mich. Sept. 11, 1953, Smith n. 42560; 42561; 42562; 42563; 42564; 42565.

Observations: This agaric might, at first sight, appear to be a growth form with a long slender stipe, no doubt a variation caused by the habitat. However, the rather conspicuously striate pileus which becomes squamulose only in age is not a combination of characters likely to be influenced by habitat. In addition, clamp connections are relatively rare on the septa of the cuticular hyphae a character which may indicate a trend toward the clampless species most of which appear to have been derived from the *miniatus* group.

Hygrophorus spadiceus Fries.

Pileus 3—4 cm. broad, conic, with a straight margin, expanding to broadly conic, „olive brown“ at first but a lemon yellow reflection

finally pervading in the marginal area causing it to appear near „citrine drab“, viscid, often splitting radially along the margin; flesh pale greenish yellow, not blackening when bruised, odor and taste mild; lamellae „chartreuse yellow“ and scarcely changing, broad, ventricose, ascending-adnate, close, edges eroded; stipe 4—6 cm. long, 6—8 mm. thick, equal, concolorous with gills or paler and some whitish at base, overlaid with a thin layer of „olive brown“ fibrils to give it a dusky appearance, usually more or less lacerate. Spores 8—10 \Rightarrow 5—5.5 μ , ellipsoid, smooth, hyaline to yellowish in Melzer's sol.; basidia four-spored, 32—40 \Rightarrow 9—12 μ , clavate; pleurocystidia and cheilocystidia none; gill trama parallel, yellow in water mounts of fresh material; pileus with a gelatinous pellicle of hyphae having fuscous content and clamp connections at the septa.

Habit, habitat and distribution. Scattered under sumac on dry soil after heavy rains, Univ. of Mich. Biol. Station, Cheboygan County, Mich. July 24, 1952, Smith n. 39219.

Observations: We have indentified this material as *H. spadiceus* knowing that the spacing of the gills is „wrong“ and that the cap is not truly glutinous as described by European authors. Bresadola under this name, illustrates an agaric with a stipe like that of our *f. glabripes*, and close gills, but in the description adheres to the idea of a fibrillose stipe and distant gills. The important characters are the dark pileus toned beneath the cuticle with yellow, the yellow gills, unchanging flesh and pale olive-yellow stipe. We did not get a good spore deposit and hence cannot verify that the deposit is yellowish as Bresadola indicated. He also gives the spores as larger than we found them. Since the species appears to be very rare in North America, we hesitate to describe our material as new on differences that could so easily turn out to be inconstant variations.

Hygrophorus spadiceus Fr. f. **odorus** f. nov.

Pileus 1—5 cm. latus, conicus, viscidus, olivaceo-brunneus vel subisabellinus; odoratus (subraphanoides); stipes glaber. Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope Rees' Bog, Cheboygan County, Mich. Jul. 1, 1953, Smith n. 41403.

Pileus 1—5 cm. broad, conic young, expanding to conic umbonate or with a spreading to recurved margin, margin often lobed or split, surface „brownish olive“ on disc to „Isabella color“ on margin, the yellow flesh showing through in streaks, viscid when wet but soon dry (not glutinous), in age finally darkening to date brown and becoming rimose; flesh very soft and fragile, odor sharp and somewhat raphanoid, taste mild, not blackening when injured; lamellae „pale olive buff“ becoming „deep colonial buff“ at maturity, not staining, ascending and nearly free, close, thickish, ascending and

nearly free; close, thickish, narrow but in age fairly broad and ventricose; stipe 3—6 cm. long, 4—7 mm. thick, equal, very fragile and splitting longitudinally, moist but not viscid, „olive buff“ to „marguerite yellow“ to „colonial buff“, not staining, no dark fibrils present. Spores 8—11 \Rightarrow 5—6 μ , oblong in face view and side view, hyaline in KOH, yellowish in Melzer's sol.; basidia four-spored, 36—48 \Rightarrow 8—11 μ ; pleuro- and cheilocystidia none; gill trama parallel, yellowish in water-mounts of fresh material; pellicle of pileus a layer of narrow (4—7 μ) gelatinous hyphae with pale bister content and clamp connections at the septa, the hyphae appressed and the layer thin.

Habit, habitat and distribution: Scattered to gregarious in a freshly burned area in company with *H. conicus* near Rees' Bog, Cheboygan County, Mich. July 1, 1953, Smith n. 41403 and again July 3, Smith n. 41432.

Observations: The fire occurred about 6 weeks before the date of collection, and was very light. The soil is very sandy in the area. The agaric was quite abundant in the area for a few days following adequate rains, and then was seen no more for the rest of the season. It differs from the type form of *spadiceus* as we know the latter in the sharp odor and glabrous stipe.

Hygrophorus subceraceus Murr.

Found under cedar, Rhododendron, Ore., Oct. 22, 1944, Smith n. 20118. The very small spores, viscid pileus, dry stipe, and sub-decurrent gills distinguish it among yellow species of *Hygrocybe*. The pilei vary in color from orange to pale yellow. The spores in the Oregon collection were 5—5.5 \Rightarrow 3 μ , and clamp connections are present.

Hygrophorus turundus Fries.

Pileus 1—3 cm. broad, convex to flattened or the disc shallowly depressed, margin curved in slightly, expanding to more depressed in the disc and the margin arched, surface dry and fibrillose-squamulose, the squamules fuscous to earth brown, the ground color variable, scarlet to orange to yellow, brightest when young and dingy in age, buttons which have not developed fast may be dingy yellow, in age sometimes grayish over all from appressed fibrils; flesh thin, waxy firm, orange, odor and taste mild; lamellae „cream buff“ or more pallid (pale dingy yellow to pallid), distant to subdistant, broad, decurrent; stipe 3—6 cm. long, 2—3.5 mm. thick, equal or slightly enlarged at base, naked, glabrous, translucent, orange in midportion, paler above and below. Spores 9—14 \Rightarrow 6—8 μ , variable in size, ellipsoid to somewhat bean-shaped (in side view), smooth, hyaline in KOH and Melzer's sol.; basidia 2- or 4-spored, 38—52 \Rightarrow 9—11 μ ,

sterigmata 6—8 μ long; pleurocystidia and cheilocystidia similar, sporadic in appearance and often difficult to locate, 40—60 μ \rightleftharpoons 12—20 μ , clavate to broadly clavate-subcapitate, hyaline, thin-walled, buried in the hymenium; gill trama somewhat interwoven, hyaline in KOH; pileus trama hyaline in KOH except for the cuticle which is yellow to smoky brown (from color of cell content) and formed of a trichodermium of enlarged hyphal cells with cystidioid to elliptic end-cells often having secondary septa; clamp connections present at primary septa.

Habit, habitat and distribution: Scattered to gregarious on moist soil and wet moss, often on sphagnum at high elevations; Mt. Rainier National Park, Wash. It is a common species in the Park and has been recorded as follows: Smith n. 29528; 29365; 29560; 29585; 29586; 29865; ; 29902; 29943; 29953; 29959; 30558; 40152; 40342; Simmons 1583; Imshaug 1790; Smith n. 42481, coll. D. E. Stuntz.

Observations: It fruits during both the summer and fall. We (1942) reported this fungus from North America on the basis of a Kauffmann collection. It now appears that this report is incorrect. The squamules of the true *H. turundus* are fuscous to brown (dark colored). The Mt. Rainier collections showed conclusively that this color was not a discoloration. Möller's (1945) account covers the Mt. Rainier collections very well, even including the inflated cells which we regard as cystidia. At Mt. Rainier both a two-spored and a four-spored form occur, and there is a corresponding difference in spore size. Clamp connections are present at the base of the basidia in both forms, but are often difficult to demonstrate on the hyphae of the carpophore. Here they appear to be fairly regular at the primary septa, but absent at the secondary septa.

Kühner & Romagnesi (1953) described *H. turundus* as having fibrils which become dark colored. We have a collection from among cranberries and other health plants on wet sand between two sand dunes at Whitefish Point on Lake Superior (Smith n. 42481), which appears to check exactly with their account. It was growing in great quantity. The pileus was deep scarlet over all when young but became squamulose and in age the squamules were more or less fuscous. *H. sphagnophilus* Pk., in the light of this study, should be attached to *H. turundus*. Singer (1940) thought they were identical but we have found it to be constant as a form which differs chiefly from the type form in the squamules not darkening. In our estimation this difference is of the order of a form difference and so we propose the following combination: *H. turundus* f. *sphagnophilus* (Pk.) comb. nov. (Syn. *Hygrophorus miniatus* var. *sphagnophilus* Peck, *Hygrophorus miniatus* f. *sphagnophilus* (Pk.) Hongo, J. Jap. Bot. **27**: 160. 1952.

L a n g e (1940) gives a beautiful illustration of brilliantly colored specimens. His treatment of *Hygrocybe* had not come to our hands at the time we published our account of the species. At present we are inclined to regard Kauffman's collection as a variety of *H. cantharellus* but prefer to restudy it from fresh material before reclassifying it.

Hygrophorus acutoides sp. nov.

Pileus 3—5 cm. latus, conicus, viscidus, griseo-avellaneus, demum subspadiceus; odor distinctissimus; lamellae subdistantes, latae, pallidae, tactu rubescentes; stipes 6—8 cm. longus, 4—6 mm. crassus, solidus, albidus, siccus; sporae 7—8 \Rightarrow 5—6 μ . Specimen typicum in Herb. Mich. conservatum; legit prope Mackinaw City, Mich. Sept. 16, 1950, Thiers & Smith n. 35847.

Pileus 3—5 cm. broad, obtusely conic with a straight margin, expanding to broadly conic, in age some with an uplifted margin and low obtuse conic umbo, surface viscid to subviscid, soon dry, margin faintly striatulate in some, disc grayish brown to somewhat fuscous, in age near „Saccardo's umber“, margin pallid watery; flesh watery-pallid, thin, when cut or bruised gradually changing to flesh color, taste mild, odor distinctly of fresh green corn; lamellae subdistant, broad, adnate but becoming adnexed, whitish to pallid and slowly staining pale salmon color where bruised; stipe 6—8 cm. long, 4—6 mm. at apex, equal or slightly enlarged downward, solid, white within, surface dry, naked, white, apex naked to silky, in age or where bruised staining pale salmon color. Spores 7—8 \Rightarrow 5—6 μ , hyaline, yellowish in Melzer's sol., smooth, broadly ellipsoid; basidia four-spored, 38—46(54) \Rightarrow 8—9 (11) μ ; pleurocystidia and cheilocystidia not seen; gill trama subparallel, hyaline in KOH; pileus trama homogenous beneath a thin gelatinous pellicle of narrow hyphae; clamp connections present.

Habit, habitat and distribution: Gregarious to scattered on humus, Mackinaw City Hardwoods, Mich. Sept. 16, 1950, Thiers & Smith n. 35847. In 1953 additional collections were made (Smith n. 42960; 42997; 43540; 43974) .

Observations: The gray-brown to brown disc of the pileus, white to pallid gills, green corn odor which is very distinct, and change to pinkish when bruised are the outstanding characters. In dry weather, however, we have found the odor to remain constant, but the color change of the flesh to be slow to develop or to be absent. It is most closely related to *H. acutus*. It differs from *H. streptopus* in being viscid and in usually turning red when bruised. The color change reminds one of *H. metapodius* and *H. ovinus*, and it is, indeed, very close to *H. metapodius*, but is of strikingly different stature, and there is no blackening following the change to red. K ü h n e r and

Rogmagnesi (1953) describe the gills of *H. metapodius* as „brunâtre“.

Hygrophorus atro-olivaceus sp. nov.

Pileus 1—3 cm. latus, convexus, squamulosus, fuscus, demum subavellaneus; lamellae cinereae, subdistantes, subdecurrentes; stipes 3—5 cm. longus, 5—12 mm. crassus, avellaneus; sporae 5—6 \approx 3.5—4.5 μ . Specimen typicum in Herb. Univ. of Mich. conservatum; legit prope Pellston, Mich., Aug. 10, 1952, Smith n. 39418.

Pileus 1—3 cm. broad, convex with a straight margin, soon convex-depressed, at times plano-depressed with a decurved margin, moist and hygrophanous, squamulose (especially along the margin), „mummy brown“ (blackish brown) on disc and „buffy brown“ (olive-brown) on margin, when moist opaque to translucent-striate, margin often crenate, fading to a dingy gray-brown; flesh brittle, soft, watery, odor and taste mild; lamellae near „drab gray“ young but margins pallid, subdistant, arcuate to subdecurrent, in age at times with decurrent lines, often intervenose to subporoid, edges even; stipe 3—5 cm. long, 5—12 mm. diam. at apex, usually compressed, naked and moist, evenly colored and a paler gray-brown than the pileus. Spores 5—6 \approx 3.5—4.5 μ , ellipsoid to subglobose, hyaline in KOH and Melzer's sol., smooth; basidia four-spored, 28—34 \approx 6—7 μ , flexuous at base; pleurocystidia and cheilocystidia none; gill trama parallel, hyaline in KOH, in Melzer's sol. dark amber brown from granules within the cells which stain dark; pileus trama similar to gill trama in color in KOH and Melzer's sol., cuticle a trichodermium (the elements grouped to form fascicles which are the squamules); clamp connections none.

Habit, habitat and distribution: Cespitose under second growth maple, Pellston Hills, Pellston, Mich., Aug. 10, 1952, Smith n. 39418.

Observations: The lack of clamp connections, squamulose faded pileus (at least along the margin), dark gray-brown colors and reaction of the contents of the hyphae to Melzer's solution along with the small spores are distinctive. Coll. 31052 from Mt. Rainier appears to consist of depauperate specimens. The pilei were 5—12 mm. broad and the stipes 2—2.5 cm \approx 2.5—3 mm. with faintly fibrillose-punctate apices. The dark brown granular bodies evident in mounts in Melzer's solution were characteristic, but clamp connections were found. Hence we are inclined to regard this as a distinct but closely related species. The gill trama was parallel. Specimens which have already faded at the time they are collected may appear fibrillose to fibrillose squamulose (see Smith n. 26159, collected by Henry Imshaug). No final disposition of it is made here because our material has not been adequate.

Hygrophorus citrino-pallidus sp. nov.

Pileus 8—12 mm. latus, convexus, viscidus, citrinus deinde albidus; lamellae valde decurrentes, confertae, subdistantes citrinae; stipes 10—15 mm. longus, 2—3 mm. crassus, glaber, viscidus, citrinus demum albidus; sporae 7—9(10) \cong 4.5—5 μ , subfusiformes. Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Gobler's Knob, 5,000 ft. elev., Mt. Rainier National Park, Wash., Oct. 12, 1952, S m i t h n. 40851.

Pileus 8—12 mm. broad, convex, becoming broadly convex to turbinate, surface viscid, lemon-yellow fading to white, somewhat striate both before and after fading, margin often very irregular; flesh yellow, fading to white, odor and taste not distinctive; lamellae long-decurrent, close to subdistant, broad in midportion but lemon-yellow in age and remaining that color when the cap has faded to whitish; stipe 10—15 mm. long, 2—3 mm. thick at apex, narrowed downward, glabrous and shining, viscid, lemon yellow like the pileus and fading to white. Spores 7—9(10) \cong 4.5—5 μ , broadly fusoid in face view, inequilateral in side view, smooth, hyaline, yellowish in Melzer's sol.; basidia 4-spored, 40—45 \cong 6—8 μ , with a dense content of oil globules (hymenium yellow in section); pleurocystidia and cheilocystidia none seen; gill trama interwoven to almost cellular because of the broad short cells (as seen in sections), yellow in water mounts of fresh material and when revived in KOH; pileus trama with a thin pellicle of gelatinous hyphae; clamp connections present.

Habit, habitat and distribution: Scattered on tundra-like bank, Gobler's Knob, 5,000 ft. elev., Mt. Rainier National Park, Washington, Oct. 12, 1952, S m i t h n. 40851.

Observations: This species would be identical with *H. vitellinus* Fr. were it not for the fusoid spores. Rea (1922) describes the spores of the specimens he found as broadly elliptical, 8—9 \cong 6 μ . Nüesch (1922) gives the dimensions as 5—8 \cong 3—5 μ and also describes them as ellipsoid. Since the spores of the Mt. Rainier collection are clearly broadly fusoid in face view and inequilateral in side view, we believe the American collection represents a distinct species. Lange (1940) comments on the confusion between *H. ceracea* and *H. vitellina*. His *Hygrocybe citrina* (Rea) Lange, however, does not have sufficiently decurrent bright yellow gills to represent our species. There is, of course, the possibility that we have the „true“ *H. vitellinus*, but this should be proven from examination of spores from authentic material before trying to change existing concepts. Möller (1945) has given what we consider to be the best account of *H. vitellina* and figures and describes the spores as ellipsoid and 6—8 \cong 4.5—5 μ .

Hygrophorus olivascens sp. nov.

Pileus 10—25 mm. latus, udus, hygrophanus, glaber, demum squamulosus, luteolus; odor aromaticus; lamellae distantes vel subdistantes, latae, adnatae, tactu olivascentes; stipes 4—6 cm. longus, 5—8 mm. crassus, glaber, demum brunneo-maculatus; sporae 7—8.5 \Rightarrow 5—5.4 μ . Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Tahquamenon Falls, Mich., July 24, 1952, Smith n. 39276.

Pileus 10—25 mm. broad, obtuse with an incurved margin, expanding to plane or with a low flattened umbo, surface glabrous, moist, hygrophanous, when young „chamois“ with a smoky brown cast, becoming a clearer chamois color at maturity and then somewhat translucent, when faded opaque and pale buff, becoming fibrillose squamulose as in *H. miniatus*; flesh very waxy and brittle, pale watery yellow (paler than pileus) or concolorous with pileus surface, odor sharp and fragrant, taste slightly acidulous, when broken staining brownish; lamellae distant to subdistant, broad, depressed-adnate, concolorous with edge of pileus, whitish in age, edges with a tendency to stain olivaceous where bruised; stipe 4—6 mm. long, 5—8 mm. thick, equal or narrowed below, glabrous and naked, concolorous with pileus or brownish spotted from handling. Spores 7—8.5 \Rightarrow 5—5.5 μ , ellipsoid, hyaline in Melzer's sol., smooth but as revived in KOH often appearing granulose but under oil immersion the granules or droplets are found to be just inside the wall; basidia four-spored, 30—40 \Rightarrow 8—9 μ , clavate, the lower half often flexuous; pleurocystidia and cheilocystidia none seen; gill trama parallel or nearly so, hyaline in KOH; pileus trama hyaline and interwoven, with fascicles of hyphal end-cells projecting as the squamules; clamp connections present.

Habit, habitat and distribution: Gregarious on humus, in climax beech-maple forest, Tahquamenon Falls State Park, Mich., July 24, 1952, Smith n. 39276.

Observations: The smoky brown color of young caps, the sharp fragrant odor, and tendency of the gill edges to stain olivaceous are distinctive field characters. The species appears to be most closely related to *H. caespitosus* Murr. but differs in the olive-staining gills and tendency of the stipe to stain brownish where handled.

Hygrophorus perplexus sp. nov.

Pileus 1—3 mm. latus, obtuse conicus, glutinosus, sordide brunneus, demum striatus, hygrophanus, deinde subsalmoneus; lamellae adnatae (non decurrentes), luteae; stipes glutinosus, demum luteus; sporae 6—8 \Rightarrow 4—5 μ . Specimen typicum in Herb. Mich. con-

servatum, legit prope U. of Mich. Biological Station, June 26, 1946, Smith n. 21491.

Pileus 1—3 cm. broad, obtusely conic with the margin curved in against the gills at first, expanding to broadly campanulate or plane with an obtuse umbo, very slimy-viscid, color „Prout's brown“ to near „Rood's brown“ and slowly developing an olivaceous to orange tinge on margin and also becoming translucent-striate, gradually changing to pale orange-tan or pinkish tan, hygrophanous and fading to buff pink („light ochraceous salmon“ to „light ochraceous buff“); flesh very thin and fragile, concolorous with cap and fading like it; odor and taste none; lamellae close to subdistant, ascending and adnate with a tooth or when fully expanded depressed-adnate (never decurrent), „amber yellow“ young, finally „apricot yellow“, edges even; stipe 3—5 cm. long, 2—5 mm. thick at apex, slightly thicker below or equal, slimy-viscid over all, „ochraceous buff“ at base, pallid watery grayish above, finally yellow over all (never seen to have olive tints). Spores 6—8 \Rightarrow 4—5 μ , smooth, hyaline in KOH, yellowish in Melzer's sol., ellipsoid to ovoid; basidia four-spored, 36—44 \Rightarrow 7—9 μ ; pleurocystidia and cheilocystidia none seen; gill trama interwoven, subhymenium not distinctive; pileus trama homogeneous beneath a gelatinous cuticle of narrow, branched hyphae arranged in a turf; clamp connections present but difficult to demonstrate.

Habit, habitat and distribution: Gregarious to subcespitose under aspen and beech on thin sandy soil, Univ. of Mich. Biol. Station, Cheboygan County, Mich., June 26, 1946, Brooks and Smith no. 21491.

Observations: This species has the stature of *H. psittacinus* and the colors of the dried fruiting bodies are similar, but is not to be considered a color-form of that species. The dark brown to vinaceous brown young pilei are significantly different as species go in this group. This agaric has been observed in the Great Lakes Region for the last twenty years, but it was not until the mycological program was started at the University's Biological Station that localities were found where the fungus fruited regularly and could be observed from season to season. Some would very likely refer this species to *H. sciophanus*, but we believe that there is a fundamental difference between it and the true *H. sciophanus*. Fries (1874) placed the latter between *H. colemanianus* and *H. laetus* in his subsection containing species with „Lamellis decurrentibus“ whereas *H. psittacinus* was placed in the following section with gills adnexed to somewhat seceding. *H. perplexus* is so like *H. psittacinus* in gill characters that Fries certainly would have placed it beside that species if he had seen it. Lange's (1940) account of *H. sciophana*

establishes a concept closely in line with that of Fries, and to us indicates a species different from *H. perplexus*. Confusion may have been caused by the description of Fries (1863) in his „Monographia“ where (p. 18) the gills are described as „attenuato-adnatae, primitiis leviter adscendentibus“ but even here he placed the species next to *H. laetus*. In the same description he described the stipe of *H. sciophanus* as „lubricus“ but this should not be misinterpreted as he applied the same term to the stipe of *H. laetus* in the following description. The *H. sciophanus* of Kühner and Romagnesi (1953) is probably *H. perplexus* since they arranged it next to *H. psittacinus* -- but they carefully omitted any reference to the type of gill attachment.

Hygrophorus rugulosus sp. nov.

Pileus 8—12 mm. latus, convexus, glaber, rugulosus, olivaceo-brunneus, demum pallidus; lamellae subdistantes, breviter decurrentes, subavellaneae; stipes 1—2 cm. longus, 1.5—2 mm. crassus, olivaceo-brunneus, glaber; sporae 4—5 μ , globosae. Specimen typicum in Herb. Univ. of Mich. conservatum: legit prope Pellston, Mich. Aug. 10, 1951, Smith n. 37565.

Pileus 8—12 mm. broad, convex when young, broadly convex in age, surface glabrous and rugulose, „buffy brown“ to dark avellaneous in buttons, becoming pallid olive buff and finally fading to whitish as if subhygrophanous; flesh firm but very brittle, no color change when bruised, odor and taste none; lamellae subdistant, arcuate-decurrent, broad, pinkish buff young, becoming avellaneous, concolorous with pileus in age, thickish, edges even; stipe 1—2 cm. long, 1.5—2 mm. thick, equal or narrowed downward, olive brown or grayer at apex, paler (pallid) below, in age \pm concolorous with gills (no yellow anywhere at any time), naked, translucent. Spores 4—5 μ , globose or nearly so, hyaline, yellowish in Melzer's sol., smooth; basidia four-spored, 28—40 \Rightarrow 6—7 μ ; pleurocystidia and cheilocystidia none; gill trama somewhat interwoven, hyaline in KOH; pileus trama interwoven, the cuticle a trichodermium but terminating in an hymeniform layer of vesiculate to pedicellate-inflated cells (end-cells of \pm upright hyphae), thinwalled and readily collapsing; cell content of carpophore-hyphae not distinctively colored in Melzer's solution; clamp connections absent.

Habit, habitat and distribution: Gregarious on humus, Pellston Hardwoods, Pellston, Mich., Aug. 10, 1951, Smith n. 37565.

Observations: The cap cuticle did not become broken into squamules as in *H. Cantharellus* series, and the gill trama is more interwoven than in the other species of this section.

Hygrophorus singeri sp. nov.

H. conico similis sed stipes glutinosus; specimen typicum in Univ. of Mich. conservatum: legit prope Salmon River, Mt. Hood, Ore. Wm. B. Gruber (Smith n. 19162).

Pileus 1—3 cm. broad, conic, becoming broadly conic, glabrous, slimy viscid, color reddish orange to yellow, translucent-striate to apex, blackening in age; flesh very soft, greenish yellow, odor and taste not distinctive, blackening when cut or bruised; lamellae close, broad, ascending and attached at very apex of stipe, 2 tiers of lamellulae, pale orange when young and finally greenish-yellow, blackening where bruised; stipe 4—6 cm. long, 3—5 mm. thick, equal, pale orange yellow becoming greenish yellow, blackening where bruised, slimy viscid over entire length (as in *H. laetus*).

Spores 9—12 \approx 5—6 μ , elliptic in face view, in side view slightly bean-shaped, smooth, yellowish in Melzer's sol.; basidia four-spored, 36—42 \approx 9—11 μ ; pleurocystidia and cheilocystidia none; gill trama parallel; pileus trama homogenous beneath a gelatinous pellicle of narrow hyphae; clamp connections present; stipe with narrow hyphae (3—5 μ), gelatinous in KOH and present as an outer layer; clamp connections present.

Habit, habitat and distribution: scattered on a wet bank under herbaceous plants, East Fork, Salmon River, Mt. Hood, Ore., elev. \pm 4300 ft., Smith n. 19162. This species is not uncommon in wet locations in the higher Cascades. It is known from Mt. Hood and Mt. Rainier, during 1953 was found in Michigan (Smith n. 43520; 43618), and Singer reported it from Tierra del Fuego in South America.

Observations: This species is obviously in the *H. conicus* series, but the character of the viscid stipe is so unusual and striking that it cannot be regarded as other than a major character. One frequently finds specimens of *H. conicus* in which the stipe is soft to the touch and hence subviscid (or even doubtfully viscid in wet weather). These forms, however, are not to be confused with *H. Singeri*. The latter often fruits during dry weather and yet the stipe is as viscid as in *H. laetus* so slimy it is difficult to hold in ones grasp. The distribution of this species as far as it is known at present is peculiar. Singer (1953 a) was the first to report it but he did not publish a description or name it, and when we mentioned our collections to him he expressed the wish that we publish it. Hence it is fitting to dedicate the species to him.

Hygrophorus tahquamenonensis sp. nov.

Pileus 2.5—5 cm. latus, obtuse conicus demum plano-umbonatus, udus, hygrophanus, ochraceus („yellow ocher“); odor nitrosus; la-

mellae pallide luteae, latae, ventricosae, subdistantes; stipes 4—5 cm. longus, 4—7 mm. crassus, glaber, pallide luteus, demum brunneo-maculatus; sporae 7—9 \Rightarrow 5—5.5 μ . Specimen typicum in Herb. Univ. Mich. conservatum; legit prope Upper Falls, Tahquamenon Falls State Park, Mich. Aug. 3, 1953, Hesler & Smith n. 41821.

Pileus 2.5—5 cm. broad, obtusely conic with a flaring margin, surface moist and hygrophanous, color evenly pale ocher yellow and fading to „pinkish buff“ or „pale pinkish buff“, when faded minutely squamulose, margin opaque, soon blackish along the edge where bruised; flesh thin, yellowish then dingy pallid, odor and taste nitrous; lamellae pale yellow young, fading to pale pinkish buff or near it, broad and ventricose, ascending, adnate to adnexed, edges even; stipe 4—5 cm. long, 4—7 cm. thick, equal or slightly enlarged below, soon hollow, glabrous and naked (including the apex), pallid to yellowish-pallid, discoloring to brownish where handled, drying more or less pale fuscous. Spores 7—9 \Rightarrow 5—5.5 μ , oblong to sub-ovoid, smooth, hyaline, pale yellowish in Melzer's sol.; basidia four-spored, 45—50 \Rightarrow 8—9 μ ; pleuro- and cheilocystidia none; gill trama subparallel, nearly hyaline in KOH, yellowish in Melzer's sol., and lacking any dark granules; pileus trama homogeneous but with fascicles of hyphae more or less appressed to upright, dingy buff in KOH and with clamps but the cells of the hyphae not differentiated as to size and shape, 8—12 μ in diam.

Habit, habitat and distribution: Scattered to isolated in a mixed hardwood and conifer forest, Upper Falls, Tahquamenon Falls State Park, Mich. Aug. 3, 1953 Hesler & Smith n. 41821.

Observations: This species would be identified as *H. nitratus* if it were not for the yellow ocher pileus and gills and to some extent the stipe, as well as the staining cap-margin and stipe. *H. nitratus* is essentially a gray species. *H. helvella* Boud. is close in having ocher-gray colors and in blackening, but is described as having more or less globose spores and a farinaceous odor. Boudier's (1905) illustration is not at all suggestive of our fungus. Kühner and Romagnesi (1953) described *H. nitratus* as reddening when bruised but as having a „gris-jaunâtre“ cap. These characters are not those of our species.

Literature Cited.

- Boudier, Émile, 1905. *Icones Mycologicae ou Iconographie des Champignons de France*. Vol. 1. Paris.
- Denis, R. W. G. 1948. Some little known British species of *Agaricaceae*. *Trans. Brit. Myc. Soc.* 31: 191—209.
- Favre, J. et C. Poluzzi. 1947. *Hygrophorus (Limacium) Karstenii* Sacc. & Cub. = *Hygrophorus bicolor* Karst., non Berk. & Br. Schweitz. *Zeitschr. f. Pilzk.* 25: 168—170.

- Fries, Elias.** 1863. *Monographia Hymenomycetum Sueciae*. Vol. 2. Upsala.
— 1874. *Hymenomycetes Europaei sive Epicriseos Systematis Mycologici*, pp. 1—755. Upsala.
- Kühner, R. et H. Romagnesi.** 1953. *Flore analytique des champignons superieurs* i—xiv and 556. Masson et Cie., Paris.
- Lange, Jakob E.** 1940. *Flora Agaricina Danica* Vol. V.
- Möller, F. H.** 1945. *Fungi of the Faeröes*, pp. 1—295. Copenhagen.
- Nüesch, Emil.** 1922. *Die weissporigen Hygrophoreen*. Heilbronn a. Neckar. pp. 1—66.
- Rea, Carleton.** 1922. *British Basidiomycetae*. pp. 1—799. Cambridge.
- Ridgway, R.** 1912. *Color standards and color nomenclature*. Washington, D. C.
- Singer, R.** 1951. *The Agaricales (mushrooms) in modern taxonomy*. *Lilloa* 22: pp. 1—832.
— and Antonio P. L. Digilio. 1952. *Pródromo de la flora agaricina Argentina*. *Lilloa* 25: 5—463.
- Smith, Alexander H. and L. R. Hesler.** 1939. *Studies in North American species of Hygrophorus* — I. *Lloydia* 2: 1—62.
— 1942. *Studies in North American Species of Hygrophorus* — II. *Ibid.* 5: 1—94.

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