

species (Bird & Grund 1970), *H. purpurascens* is uncommon in Nova Scotia, and subsequent finds should receive careful consideration.

Hygrophorus purpurascens is distinguished from other members of Series *Rubentes* by its partial veil. It most closely resembles *H. capreolarius*, which is more densely streaked vinaceous overall, and tends to become appressed-scaly on the disc.

Peck (1907) reported that North American specimens differ from the typical European form in having a fibrillose instead of squamulose partial veil, and whitish instead of purplish lamellae. Although our experience with fresh specimens of *H. purpurascens* is limited, ACAD 12277 corresponds well with Peck's observations.

23. *Hygrophorus capreolarius* (Kalchbr.) Sacc.

Fl. Ital. Crypt., Hymen., p. 342. 1915.

Figs 51, 52.

Basidiocarp: Pileus 1-3.5 cm broad, convex with incurved margins young, expanding, at times broadly umbonate at maturity, viscid, soon dry, in age minutely scaly-dotted on disc, obscurely virgate towards margin, photo brown (9F8) (ISCC 44) on disc, slightly paler at margin where the fibrils separate, decolorizing to yellow in KOH; context thick (2-6 mm on disc), pallid cream or tinged vinaceous, soft, spongy; odor and taste not distinctive. Lamellae adnate at first, soon decurrent, pallid at first, becoming pinkish buff with darker, sordid vinaceous spots, in age sordid pinkish buff to dull grayish vinaceous, rather narrow to moderately broad (1-5 mm), subdistant, occasionally intervenose, thickish, brittle, edges even. Stipe 3.5-7 cm long, 6.5-14 (23) mm thick at apex, pallid vinaceous above, heavily streaked below with appressed, dark vinaceous to oxblood fibrils, quickly yellow in KOH, dry, normally equal or long ventricose, at times tapering downwards and subradicating, at times subcompressed; context whitish, stained light vinaceous around worm-holes, solid.

Microscopic Structures: Spores 6-9.5(10.5) x 3.5-7 μm , ellipsoidal, smooth, inamyloid. Basidia 30-55 x 4.5-9.5 μm , long-clavate, slender, mostly 4-spored but frequently 2- and 3-spored in the same gill, the sterigmata stout to slender, up to 10.5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of divergent hyphae 3.5-10.5 μm broad. Cuticle a well-defined ixocutis 95-300 μm deep, of interwoven, more or less repent, colorless to light vinaceous, gelatinous hyphae 3.5-15 μm broad; hypodermium absent. Clamp connections present in the cuticle, the gill trama, and the pileal trama.

Habit and Habitat: Gregarious in coniferous woods. Moderately rare.

Material Studied: ACAD 12205, Beinn Bhreagh, near Baddeck, Victoria Co., 25 Sept. 1968; ACAD 12239, near Denver, Guysborough Co., 14 Oct. 1968.

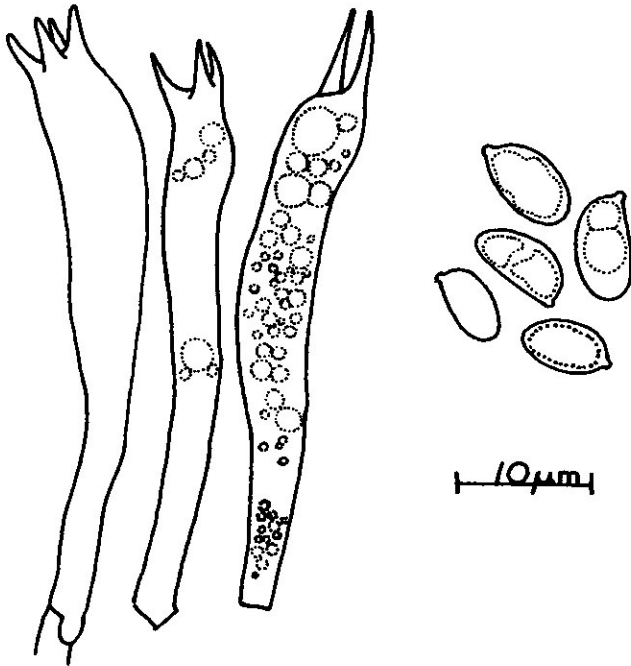
Remarks: This species differs from *H. purpurascens* in its darker, more uniform, vinaceous brown colors and the absence of a fibrillose partial veil. Our specimens differ from descriptions in the available literature in that the lamellae are persistently pallid pinkish buff and not immediately concolorous with the pileus.

Imazeki and Hongo (1957) listed *H. purpureobadius* Imai as a synonym.

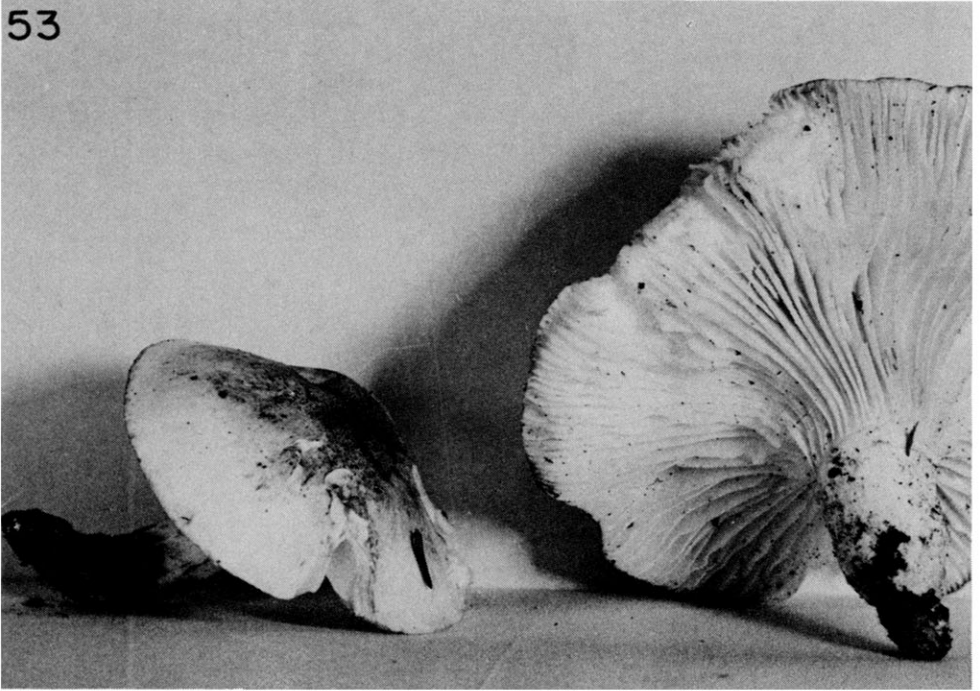
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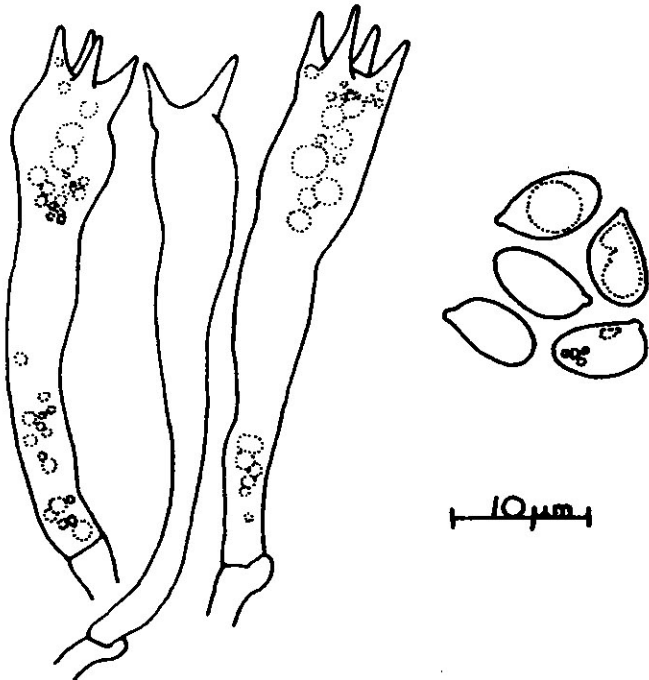
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24. *Hygrophorus erubescens* (Fr.) Fr. var. *erubescens*

Epicr. Myc., p. 322. 1838.

Agaricus erubescens Fr., Syst. Myc. 1: 32. 1821.*Limacium erubescens* (Fr.) Wünsche, Die Pilze, p. 117. 1877.

Figs 53, 54.

Basidiocarp: Pileus 3-9 cm broad, at first convex with involute margin, expanding to planoconvex, at times subumbonate, finally plane with uplifted margin, viscid when moist, soon dry, glabrous to appressed fibrillose and virgate beneath the gluten, occasionally appressed scaly on the disc, disc heavily streaked photo brown (9F8) (ISCC 44), oxblood red (9E7) (ISCC 43), or dark vinaceous, gradually pallid yellowish tan, or pale yellowish white (2A2) (ISCC 92), or milk white (1A2) (ISCC 104) towards the margin, at times uniformly pinkish brown when young, sometimes staining yellowish when rubbed, the vinaceous hyphae quickly decolorizing to yellow in KOH; context thick (2-11 mm on disc), whitish to cream, soft, spongy; odor and taste mild, not distinctive. Lamellae adnate young, soon decurrent, cream (4A3) (ISCC 89) to pale yellowish white (2A2) (ISCC 92), becoming spotted sordid vinaceous near the edges and where insect-damaged, occasionally flushed dull pinkish, narrow to moderately broad (2.5-12 mm), close to subdistant, sometimes obscurely intervenose, rather thin, edges even. Stipe 3-7.5 cm long, 6-26 mm thick at apex, whitish or pale yellowish, sparsely streaked or flushed dark vinaceous brown or pallid brownish over lower portion, sometimes staining yellowish when rubbed, the vinaceous fibrils rapidly yellow in KOH, dry, the colored fibrils sometimes terminating above in a fibrillose annular zone but true veil absent, pruinose to minutely scabrous above, becoming appressed-fibrillose below, equal, or narrowed or expanded towards base; context whitish, rarely streaked pale vinaceous, usually staining dull yellow at the base, solid.

Microscopic Structures: Spores 6-9 x 4-6 μm , ellipsoidal, smooth, inamyloid. Basidia 28-49 x 5.5-9(11) μm , slender, clavate, mostly 4-spored, rarely also 2-spored, the sterigmata slender, up to 6.5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama divergent. Cuticle an ixotrichodermium 50-215 μm thick, of slightly gelatinized, more or less erect, tangled hyphae 2.3-6 μm broad, tending to become repent and form an ixocutis when dried. Pileal trama of radial, interwoven hyphae 5-20 (27) μm broad; hypodermium not seen. Clamp connections present in the gill trama, cuticle, and pileal trama.

Habit and Habitat: Solitary, scattered, or gregarious on soil in old field spruce, or under hemlock in mixed woods. Frequent.

Material Studied: ACAD 12116, Gaspereau Valley, Kings Co., 23 Oct. 1967; ACAD 12119, 12121, Gaspereau Valley, 3 Nov. 1967; ACAD 12241, near Denver, Guysborough Co., 14 Oct. 1968.

Remarks: This rather variable species is easily confused with its close relative, *H. russula*. In general, mushrooms in this series which have a whitish or light yellowish pileus, heavily streaked and dotted vinaceous brown on the disc, are *H. erubescens*

var. *erubescens*. Those having a pinkish or yellowish pileus with little dark vinaceous color are *H. russula*. In addition, *H. erubescens* as treated here has slightly larger spores than *H. russula*. It also is found primarily in coniferous woods, whereas *H. russula* is associated with deciduous trees. Closeness of lamellae, usually attributed to *H. russula*, is a variable feature and can also occur in *H. erubescens* (see *H. russula* for further comment).

The specimens illustrated by Bresadola (1928) and Imazeki and Hongo (1957) are suffused with a rosy tinge. This feature did not occur in any of our specimens, although Hesler and Smith (1963) mentioned "a pink tinge often pervading the entire pileus" with regard to North American material. Moreover, the lamellae were typically whitish with dull vinaceous spots (cf. Bresadola, 1928), and lacked a general pinkish flush (Hesler & Smith 1963). Basidia are considerably shorter in the Nova Scotian specimens than reported previously for this species (Bresadola 1928; Hesler & Smith 1963), while the cuticle tends to be an ixotrichodermium rather than an ixocutis. Finally, we have not observed a layer of parallel periclinal hyphae at the base of the pileal trama (Bird & Grund 1970), said to be a distinguishing feature of var. *erubescens* (Hesler & Smith 1963).

25. *Hygrophorus russula* (Fr.) Quél.

Ench. Fung., p. 49. 1886.

Agaricus russula Fr., Hymen. Eur., p. 52. 1874.

Tricholoma russula (Fr.) Gill., Champ. Fr., p. 91. 1874.

Melanoleuca russula (Gill.) Murr., N. Am. Flora 10: 22. 1914.

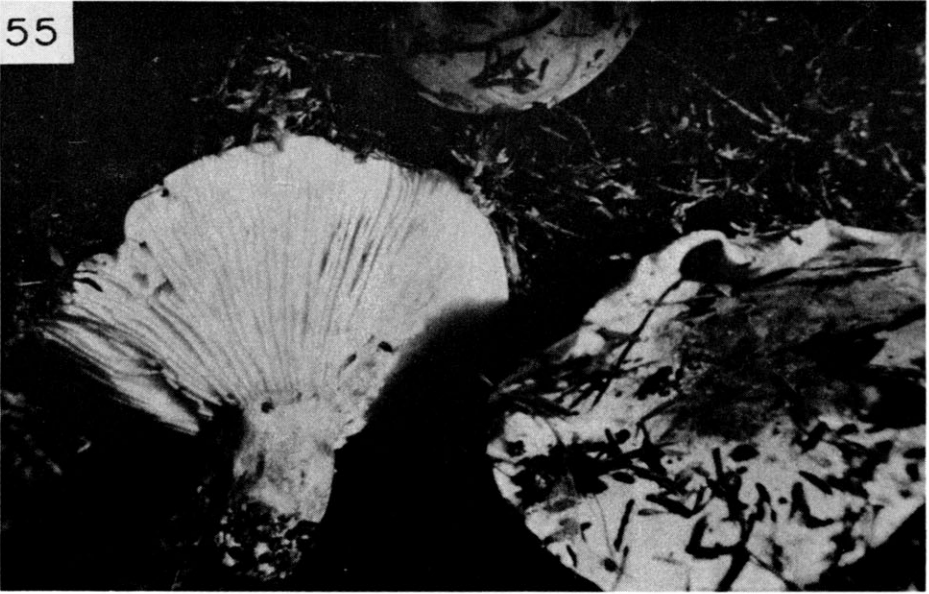
Figs 55, 56.

Basidiocarp: Pileus (1)3.5-7 cm broad, at first convex with strongly involute margin, expanding to broadly convex and umbonate, finally depressed, viscid, soon dry and dull to polished, glabrous to faintly appressed fibrillose, at times rimose-areolate on disc, obscurely virgate towards periphery, margin cottony young, pale yellowish-tan with whitish margin at first, slowly becoming unevenly streaked and flushed shell pink (8A3) (ISCC 28) over cream (4A3) (ISCC 89) ground, finally pink over all; context thick (7-21 mm on disc), fleshy, whitish or flushed pale pink toward margin; odor and taste not distinctive. Lamellae adnate-subdecurrent, dingy white to pale yellowish, soon spotted pink to sordid vinaceous near edges, often flushed pinkish, thin, rather close, narrow (3-5 mm), occasionally intervenose near the stipe, edges even. Stipe (3)5.5-8 cm long, (8)15-19 mm thick at apex, whitish above, yellowish downwards, darkening with handling, rarely tinged pinkish, lacking vinaceous streaks, whitish within, dry, fibrillose-pruinose at apex, coarsely and irregularly fibrillose-striate or appressed fibrillose below, not annulate, stout, long-ventricose young, soon equal or the base tapered and embedded, solid.

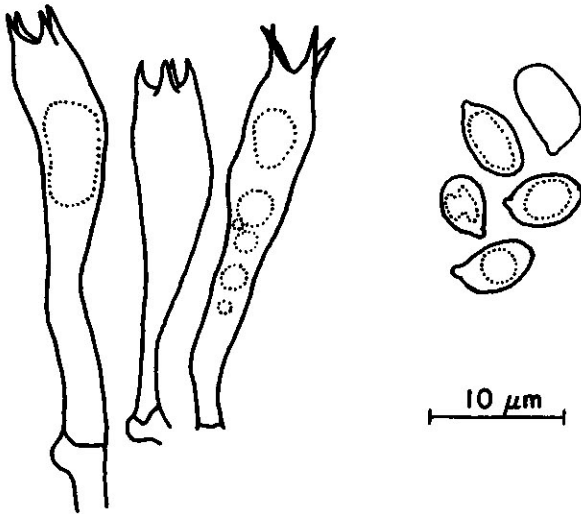
Microscopic Structures: Spores (4.5)5-7 x 3-4 μm , short-elliptical, smooth, inamyloid. Basidia 28-46 x 4.5-7(8) μm , clavate or subcylindrical, slender, 4-spored, the sterigmata slender, up to 6.5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of divergent hyphae 3-12.5 μm broad, distinct from the pileal context hyphae by their more yellow color in fresh section. Cuticle a narrow zone (to 25 μm deep) of roughly radial, interwoven, appressed to erect, slightly gelatinized hyphae 1.7-4.5 μm broad, gradually merging with the context and easily absorbed into it. Pileal trama of radial, interwoven hyphae, often more regular near the cuticle, colorless, sharply demarcated from the yellow subhymenial hyphae; hypodermium absent. Clamp connections present in the cuticle, gill trama, and pileal trama.

Habit and Habitat: Solitary to gregarious on soil under hardwoods in birch-hemlock woods. Infrequent.

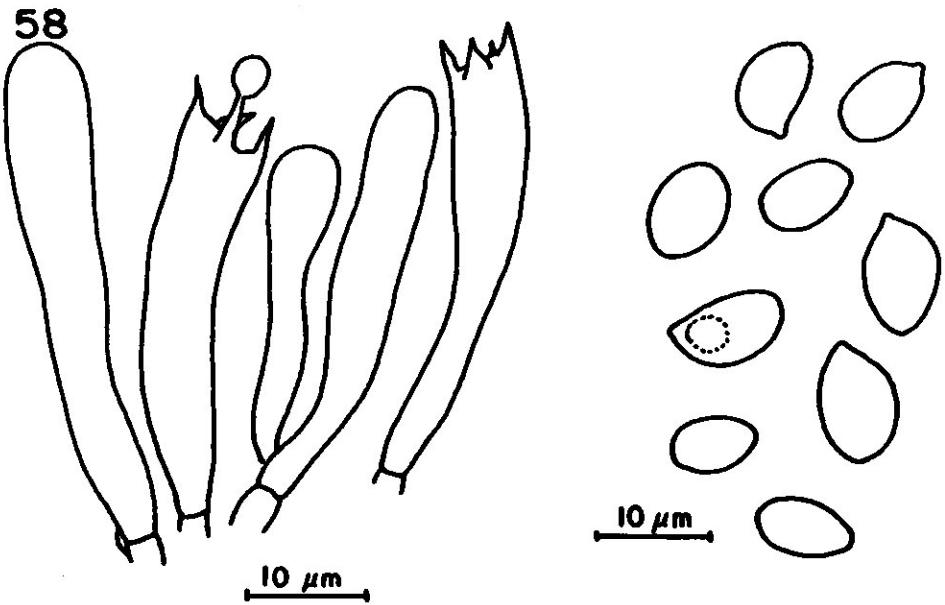
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Figs 55, 56. *H. russula*. Fig 55. Courtesy of K.A. Harrison, X .75. Fig 56. ACAD 12217, basidia and spores.



Figs 57, 58. *H. tennesseensis*. Fig 57. H.-12384 (K.A. Harrison), X .8. Fig 58. ACAD 10551, basidia, basidioles, and spores.

Material Studied: ACAD 12217: Gaspereau Valley, Kings Co., 5 Oct. 1968; ACAD 12281, Gaspereau Valley, Kings Co., 29 Oct. 1968.

Remarks: So far, Nova Scotian material has displayed none of the various vinaceous hues attributed to this species in the available literature. The shell pink tints developed very slowly, sometimes not appearing until after maturity.

Hygrophorus erubescens var. *erubescens* is a very closely related species and is difficult to distinguish from local specimens of *H. russula*. A popular macroscopic feature used to separate the two is the closeness of gills, with the gills being close to crowded in *H. russula*, and subdistant to close in *H. erubescens*. Hesler and Smith (1963) expressed this quantitatively in terms of the number of gills reaching the stipe. We find that this number depends on the diameter of the stipe and that Hesler and Smith's figures cannot be applied to our collections. Spore size is a more reliable feature, with *H. russula* having slightly smaller spores than *H. erubescens*.

It should be remembered that *H. russula* is macroscopically variable, but that the pileus tends to be pinkish over all instead of yellowish white with a dark vinaceous disc as in *H. erubescens*. *H. purpurascens* is darker vinaceous and has a conspicuous fibrillose partial veil in unexpanded sporocarps.

Series FULVENTES (Fr.) Hes. & Sm.

N. Amer. Spec. of *Hygrophorus*, p. 353. 1963.

Pileus rusty brown, tan, pale yellow-orange, or vinaceous; lamellar trama divergent; stipe dry, lacking brownish squamules.

Type species: *H. arbustivus* Fr.

26. *Hygrophorus tennesseensis* Sm. & Hes.

Lloydia 2: 40. 1939.

Figs 57, 58.

Basidiocarp: Pileus 4-10 cm broad, convex with inrolled margins when young, becoming plane to centrally depressed with rounded margins, glabrous, viscid, often with a layer of gluten, light brown (6D8) (ISCC 54) at center, shading to Pompeian yellow (5C6) (ISCC 72) at margin; context firm, pallid, thick; odor of raw potatoes and jasmine; taste bitter. Lamellae adnate to subdecurrent, white; lamellulae interspersed at margin. Stipe 4-8 cm long, 6-15 mm thick, tapering at base, white, glabrous to minutely fibrillose, apex minutely scabrous, moist, not viscid; context white, solid.

Microscopic Structures: Spores 8-10 x 4-5(5.5) μm , ellipsoid, smooth, inamyloid. Basidia 35-45(50) x 5-7 μm , clavate to subcylindric, mostly 4-spored, sometimes 2-spored, hyaline to slightly brownish in KOH. Pleurocystidia and cheilocystidia absent. Lamellar trama with a divergent mediostratum and narrow interwoven subhymenium. Pileal surface a thin pellicle 70-100 μm thick, of gelatinizing, loosely interwoven hyphae. Clamp connections present in the lamellar trama.

Habit and Habitat: Gregarious under conifers in mixed woods during early autumn.

Material Studied: ACAD 1764, Kentville, Kings Co., 24 Sept. 1952; ACAD 2637: Kentville, Kings Co., 24 Sept. 1953; ACAD 10551, 2.4 km from West Gaspereau, Kings Co., 23 Sept. 1973.

Remarks: *Hygrophorus tennesseensis* is a beautiful mushroom, with its brown, multishaded pileus and white lamellae and stipe. The odor of raw potatoes or jasmine is distinctive, along with the bitter taste. This species is, however, easily con-

fused with *H. pudorinus*, and most early collections of *H. tennesseensis* in Nova Scotia were in fact assigned to that species.

27. *Hygrophorus pacificus* Sm. & Hes.

Lloydia 2: 42. 1939.

Fig 59.

"Pileus 3-8 cm broad, convex, margin long remaining incurved, becoming plane and variously lobed, notched or wavy in age, colors evenly 'russet' to 'tawny' when young, at maturity 'tawny' on the disc and 'pinkish buff' on the margin, viscid, glabrous, margin faintly tomentose under a lens, usually plicate crenate when unexpanded. Context whitish, rather thin and rigid; odor strong, penetrating and aromatic, taste mild.

Lamellae bluntly adnate or decurrent by a tooth, edges even, 'marguerite yellow' to 'cream-buff' when young, 'cream color' in age, distant, broad (1 cm), often forking near the margin of the pileus, thickish.

Stipe 4-7 cm long, 8-15 mm thick, concolorous with the lamellae or whitish, equal above a narrowed base, solid or sometimes hollowed at the apex, dry, evenly fibrillose-pruinose over upper half with whitish fibrils, glabrous and unpolished below.

Spores 10-14 x 5.5-7.5 μ , ellipsoid, smooth, pale yellowish in Melzer's reagent. Basidia 50-82 x 7-9 μ , 2- and 4-spored, sterigmata stout. Pleurocystidia and cheilocystidia absent. Gill trama divergent, hyphae 3-8 μ broad. Cuticle an ixotrichodermium, hyphae more or less erect and tangled, 2.5-5 μ broad, at times finally repent and then resembling an ixocutis. No hypodermium differentiated. Pileus trama of radial hyphae. Clamp connections on the hyphae of the cuticle and gill trama. Lactifers present in the gill trama." (Hesler & Smith 1963).

Habit and Habitat: "Densely gregarious under spruce, . . ." (Hesler & Smith 1963). Rare.

Remarks: This primarily western species is not among the collections in the E.C. Smith herbarium at Acadia University. Hesler and Smith (1963) cited a collection made by K.A. Harrison in Kings County, N.S., on 21 Sept. 1955.

H. pacificus is similar in many respects to *H. odoratus*, but the pileus of the latter species is gray, becoming yellow-tinged. *H. agathosmus* has a dry stipe and an odor, but is gray and has smaller spores. Stout, tawny to pinkish buff sporophores may resemble *H. monticola*, which differs in its decurrent gills and its definitely amygdaline odor.

28. *Hygrophorus monticola* Hes. & Sm.

N. Am. Spec. of *Hygrophorus*, p. 359. 1963.

Figs 60, 61.

Basidiocarp: Pileus 2.5-7.5 cm broad, hemispheric young, expanding to convex, at times subumbrate, margin persistently incurved, subviscid when fresh, soon dry, glabrous, salmon-colored, flesh (6B3) (ISCC 57), or vinaceous on disc, paling to apricot yellow (5B6) (ISCC 76) or rarely pale yellowish white (2A2) (ISCC 92) on margin, at times with a drab beige bloom; context thick (3-16 mm on disc) whitish, compact, spongy; odor of bitter almonds; taste similar but less pronounced. Lamellae adnate to decurrent, pale yellowish white (2A2) (ISCC 92), cream, or champagne (4B4) (ISCC 90) subdistant, thick, narrow to moderately broad (2.5-12 mm) at times intervenose, edges even. Stipe 5.5-9.5 cm long, 7-22 mm thick at apex, pallid yellowish above, usually streaked light yellow-brown, apricot yellow (5B6) (ISCC 76),

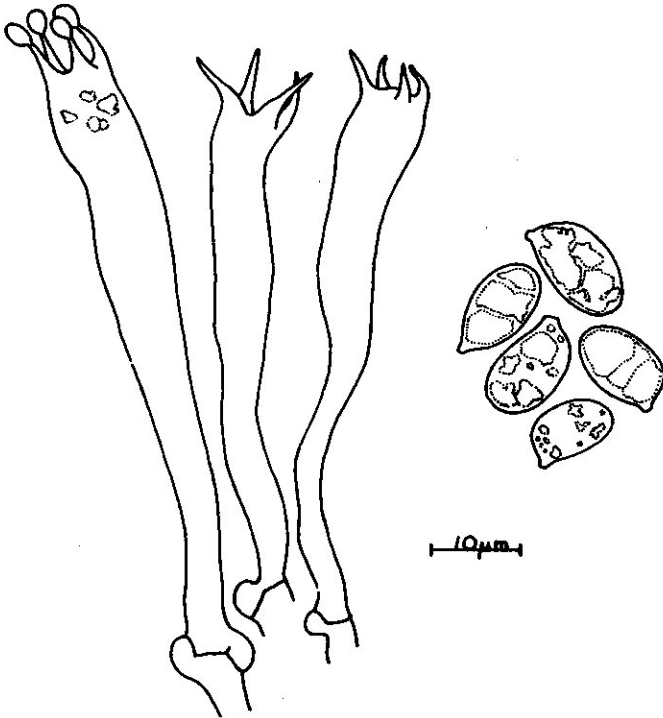


Fig 59. *H. pacificus*. Smith 8732, X .8; from *North American Species of Hygrophorus*, by L.R. Hesler and A.H. Smith, (c) 1963 by the University of Tennessee Press, Knoxville; reprinted by permission of the University of Tennessee Press.

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Figs 60, 61. *H. monticola*. Fig 60. ACAD 12240, X .75. Fig 61. ACAD 12109, basidia and spores.

or tan below, pallid yellowish within, glabrous to pruinose at apex, smooth or fibrillose-ridged below, dry, equal, long-ventricose, or tapering to base, at times sub-compressed, solid.

Macroscopic Structures: Spores (9.5) 10.5-15.5(17.5) x 6-8.5(9.5) μm , elliptical, at times slightly obovate, inamyloid, smooth. Basidia 50-103 x 8-14.5 μm , narrowly clavate, 4-spored, the sterigmata large and prominent, to 9 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of divergent hyphae 3-19 μm broad. Cuticle a thin ixocutis 27-54 μm deep, sometimes apparently absent in older pilei, the hyphae roughly radial and repent, subgelatinized, 3-6.5 μm broad. Pileal trama interwoven; hypodermium absent. Clamp connections large and prominent, present on the hyphae of the cuticle, gill trama and pileal trama, frequently double at the bases of the basidia.

Habit and Habitat: Gregarious to subcespitose in coniferous woods, especially under spruce. Frequent.

Material Studied: ACAD 12109, Wolfville, Kings Co., 6 Oct. 1967; ACAD 12122, Wolfville, Kings Co., 13 Oct. 1967; ACAD 12240, 12244, Aspen, Guysborough Co., 14 Oct. 1968.

Remarks: This robust, buff-colored fungus with its amygdaline odor and decurrent lamellae is unlikely to be confused with any other *Hygrophorus*. *H. pacificus* is similar but has a rusty brown pileus disc, an aromatic odor, and adnate lamellae. *H. agathosmus* has the same odor of almonds, but the pileal cuticle is gray and more gelatinized.

Hygrophorus monticola is one of the few eastern North American agarics that are typically larger than their western counterparts. Collection ACAD 12244 was a pallid, slender form growing among numerous typical specimens. Apart from the rather abnormal color and stature, the only difference was a slight tendency for the spores to be obovate, which we did not consider to be sufficient grounds for establishing a new variety.

Series CAMAROPHYLLI

Pileus gray, gray-brown or blackish brown; lamellar trama divergent; stipe dry.

29. *Hygrophorus inocybliformis* Sm.

Mycologia 36: 246. 1944.

Figs 62, 63.

Basidiocarp: Pileus 1-4 cm broad, conic young with incurved margin, becoming convex with a small, pointed umbo, broadly campanulate, or planoconvex, dry, appressed fibrillose, often appressed scaly or obscurely scabrous with age, earth colored (5F2) (ISCC 62) on disc, paling to hair brown (5E4) (ISCC 80) or bronze (5E3) (ISCC 80) on margin, darkening in KOH; context 1.5-7 mm thick on disc, membranous on margin, white, at times tinged cinereous; odor and taste mild, not distinctive. Lamellae short-decurrent, white at first, becoming cream (4A3) (ISCC 89) to ivory (4B3) (ISCC 90) with age, moderately narrow (2-5 mm deep), thickish, subdistant to distant, at times intervenose, edges even. Stipe 3.5-6.5 cm long, 5-15 mm thick at apex, white and silky to pruinose above the broken veil, streaked below with appressed clay (5D5) (ISCC 76) to soot brown (5F5) (ISCC 78) or light fuscous velar remnants, dry, annulus a superior, evanescent zone of whitish fibrils, not a moist, well-defined ring; context white, silky-shining, solid or loosely fibrous toward center.

Microscopic Structures: Spores 9.5-17 x 6-9 μm , elliptical to oblong-elliptical with apiculus blunt and sometimes apparently almost lateral, smooth, inamyloid. Basidia

44-94 x 8.5-14 μm , narrowly clavate, at times pedicellate, often very long, usually 4-spored but also occasionally 2- and 3-spored in some sporocarps, sterigmata large and prominent, up to 10 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of divergent hyphae 4-17.5 μm broad. Cuticle an epicutis 90-220 μm deep, the hyphae radial, repent or reflexed in tufts, light smoky brown to yellow-brown, 7-15 μm broad, little differentiated in size from the context hyphae, the terminal elements cylindrical. Pileal trama of radial, rather interwoven hyphae 6.5-17.5 μm broad; hypodermium absent. Stipe surface of pale brown to yellow-brown, non-gelatinized hyphae, slightly narrower than the internal hyphae. Clamp connections present on the hyphae of the cuticle, gill trama, and pileal trama.

Habit and Habitat: Solitary, gregarious, or subcespitate on ground in hemlock and other coniferous woods; at times in moss. Infrequent.

Material Studied: ACAD 12122, Gaspereau Valley, Kings Co., 3 Nov. 1967; ACAD 12243, Newtown, Guysborough Co., 14 Oct. 1968.

Remarks: This species is much like *H. olivaceoalbus* var. *olivaceoalbus* but lacks the gelatinous cuticle and stipe veil. The broad, well-defined, brown surface hyphae revealed in sections of the stipe and pileus are quite unlike the surface hyphae of *H. olivaceoalbus* stipes and pilei, which are narrow, less distinct, and show at least a vestige of gelatinization. However, the zone of fuscous fibrils underlying the gelatinous layers in *H. olivaceoalbus* indicates a relationship with *H. inocybiformis*. If unexpanded specimens are available, the dry, fibrillose nature of the partial veil will readily distinguish this species from *H. olivaceoalbus*.

Hygrophorus inocybiformis is typically a western species in North America, with collections primarily from California and Idaho (Hesler & Smith 1963). The eastern counterpart corresponds quite closely except in two respects: (1) the lamellae are persistently white or whitish, developing an ivory to gray tint only in age; (2) the occasional presence of 2- and 3-spored basidia extends the upper limit of the spore size range.

30. *Hygrophorus camarophyllus* (Fr.) Dumée, Grandjean, & Maire

Bull. Soc. Mycol. Fr. 28: 292. 1912.

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

Hygrophorus caprinus Fr., Epicr. Myc., p. 326. 1836.

Camarophyllus caprinus (Fr.) Karsten, Hattsvamp., p. 224. 1879.

Hygrophorus burnhami Pk., N.Y. State Mus. Bull. 116: 56. 1907.

Camarophyllus burnhami (Pk.) Murr., N. Am. Flora 9: 389. 1916.

Limacium coprinus [sic.?] (Fr.) Singer, Ann. Myc. 34: 327. 1936.

Figs 64, 65

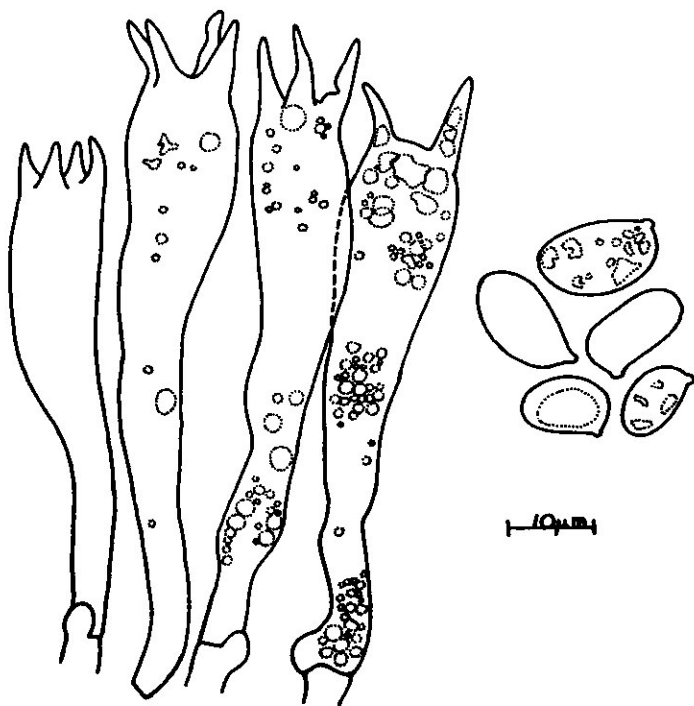
Basidiocarp: Pileus 4-9 cm broad, convex becoming broadly subumbonate-convex to nearly plane, slightly pruinose becoming glabrous, subviscid when wet, color smoky drab; context pallid, thin; odor slightly asphaltic or lacking, taste not distinctive. Lamellae adnate to subdecurrent, usually close, pallid to slightly grayish. Stipe 3-9 cm long, 0.8-2 cm thick, mostly equal, silky-fibrillose becoming glabrous at base, dry, concolorous with pileus commencing at point of lamellar attachment; context grayish, firm, solid.

Figs 62, 63. *H. inocybiformis*. Fig 62. ACAD 12243, X 1.0. Fig 63. ACAD 12122, basidia and spores; redrawn by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 48, pp. 403-411. 1970.

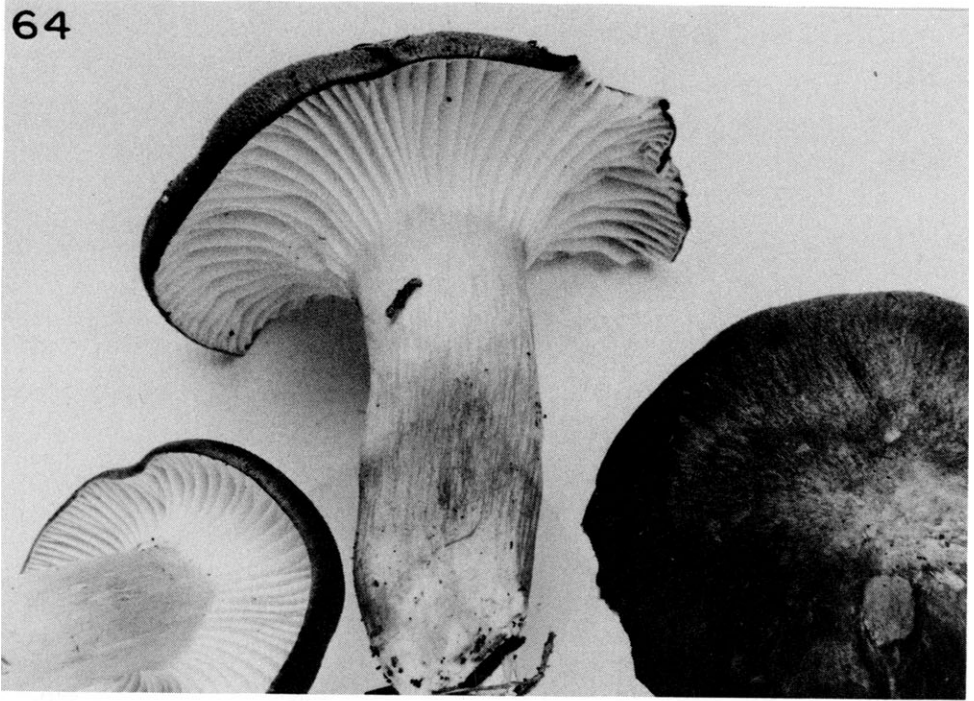
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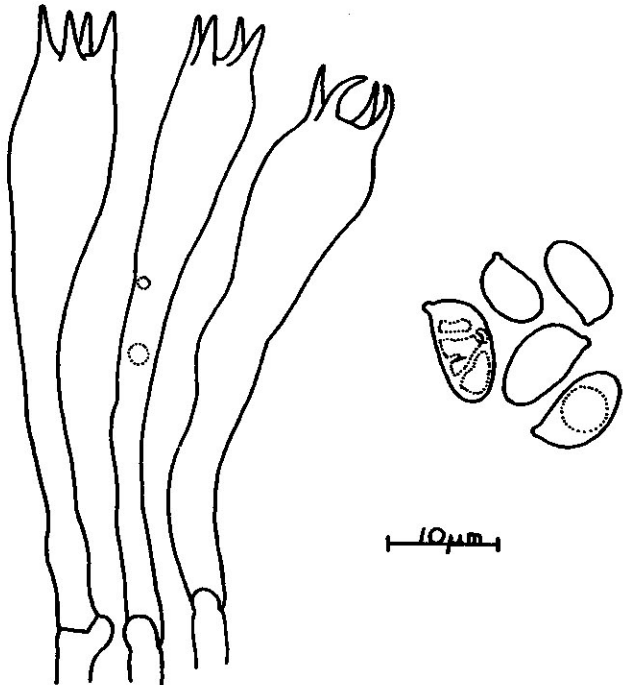
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Figs 64, 65. *H. camarophyllus*. Fig 64. Smith 74012, X .75. Fig 65. ACAD 5254, basidia and spores.

Microscopic Structures: Spores 7-11 x 4-6 (6.5) μm , elliptical to oblong-elliptical, often broader at apicular end, smooth, inamyloid. Basidia (35) 43-71(95) x 6.5-10 μm , narrowly clavate, elongate, 4-spored, the sterigmata stout, up to 8 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of divergent hyphae 3.5-15 μm broad. Cuticle an epicutis 100-260 μm deep, the hyphae light brown, radially appressed, slightly interwoven, nongelatinous, moderately broad (3-10.5 μm), gradually merging with the slightly broader context hyphae. Pileal trama radial and sub-parallel, somewhat interwoven over the hymenium, the hyphae 4.5-22 μm broad; hypodermium absent. Clamp connections present in the cuticle, the gill trama, and the pileal trama.

Habit and Habitat: "Gregarious under pine and spruce" (Hesler & Smith 1963).

Material Studied: ACAD 3939, ravine, Agriculture Experimental Station, Kentville, Kings Co., 13 Oct. 1958; ACAD 5255, Glenmont, Kings Co., 25 Oct. 1955; ACAD 5254, Plaster Mines, Victoria Co., 18 Sept. 1965.

Remarks: *Hygrophorus camarophyllus* is distinguished by its dry, fuscous pileus, its light fuscous to concolorous stipe, and its cinerescent lamellae. *H. inocybiformis* is similar in color of pileus and lamellae, but the stipe has ragged brown zones and streaks derived from a veil, and the spores are much larger (9.5-17 μm long). Old specimens of *H. agathosmus* with grayish to beige stipes differ in their viscid gray or gray-brown pilei and in their amygdaline odor.

The spores and basidia of the material examined are consistently oversized for this species. Ricken (1915) and Rea (1922) reported 9 μm as the upper limit of spore length. Murrill (1916) and Bresadola (1928) described the spores as ranging to 10 μm , and Peck (1907) gave a similar measurement of .004 inch for *H. burnhami*. In the collections cited above, spore length varies from (6.5)7-9.5 μm in ACAD 5255 to (7.5)8-11.5 μm in ACAD 5254.

31. *Hygrophorus agathosmus* Fr.

Epicr. Myc., p. 325. 1838.

Agaricus agathosmus Fr., Obs. Myc. 1: 16. 1815.

Agaricus cerasinus Berk., in Smith Engl. P1. 5²: 12. 1836.

Hygrophorus cerasinus (Berk.) Fr., Hymen. Eur., p. 410. 1874.

Figs 66, 67, 68.

Basidiocarp: Pileus 1-4 cm broad, hemispheric to convex young, becoming plano-convex and often subumbonate, margin inrolled and floccose-cottony at first, persistently decurved, sometimes uplifted, glutinous to viscid, the gluten at times granular on the disc, glabrous or very obscurely virgate beneath the gluten, pellicle separable, dull gray at first, yellowing slightly to bronze (5E5) (ISCC 58) hair brown (5E4) (ISCC 80) clay (5D5) (ISCC 76) or beige (4C3) (ISCC 90), uniformly colored, or else the disc colored as above and the margin fading to ivory (4B3) (ISCC 90) or cream (4A3) (ISCC 89); context thickish (3-6 mm on disc), white, hygrophanous and cinereous under cuticle, soft, fragile; odor faintly amygdaline; taste mild at first, then rather unpleasant and persistent. Lamellae adnate or sinuate young, yellowing slightly with age, subdistant, becoming moderately broad (1.5-6 mm), thickish, edges even. Stipe 2-8 cm long, 4-13 mm thick at apex, white at first, staining pale cinereous to beige with age and handling, white within, evenly pruinose-fibrillose overall at first, later pruinose only at apex and glabrous to appressed-fibrillose below, the apical ornamentation yellow in KOH, the lower stipe not reacting; dry or moist, never viscid, equal or slightly narrowed towards apex, terete or subcompressed, often slightly twisted, solid.

Microscopic Structures: Spores 7-11 x (4)4.5-6(7.5) μm , ellipsoidal to oblong, smooth, inamyloid. Basidia 38-59 x 6.5-10 μm , narrowly clavate, 4-spored, the sterigmata prominent, up to 5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama divergent from a thin, obscure central strand, the hyphae 3-16 μm broad. Cuticle an ixotrichodermium 215-345 μm thick, a broad zone of tangled, branched, generally erect, gelatinous hyphae, slender, not forming a palisade. Pileal trama of radial, slightly interwoven hyphae. No hypodermium seen. Apical stipe with projecting fasciculate hyphae with cystidioid terminal cells, clavate to cylindric, or bulbous at apex, 21-60 x 8-12 μm . Clamp connections small and nub-like, on hyphae of cuticle, gill trama, and pileal trama.

Habit and Habitat: Scattered to gregarious, at times subcespitose, in grass or moss in coniferous woods, particularly under spruce and hemlock. Frequent.

Material Studied: ACAD 12280, Gaspereau Valley, Kings Co., 29 Oct. 1968; ACAD 12283, 12287, 12288, North Mountain, Kings Co., 29 Oct. 1968.

Remarks: The viscid, grayish pileus, the amygdaline odor, and the dry, white or cinerescent stipe distinguish this species. Small specimens might be confused with *H. tephroleucus* var. *tephroleucus*, in which the slightly viscid stipe is soon dry and the pileus is also viscid with the same grayish color. However, *H. tephroleucus* lacks a distinctive odor, and the mature stipe is ornamented with definite brownish punctae instead of cinereous streaks and patches as in *H. agathosmus*.

Hygrophorus agathosmus can also resemble *H. odoratus*, but the mature pileus of the former does not develop yellow tints and the spores are slightly smaller. For a more detailed comparison of the two, see *H. odoratus*.

32. *Hygrophorus odoratus* Sm. & Hes.

Sydowia 8: 310. 1954.

Figs 69, 70.

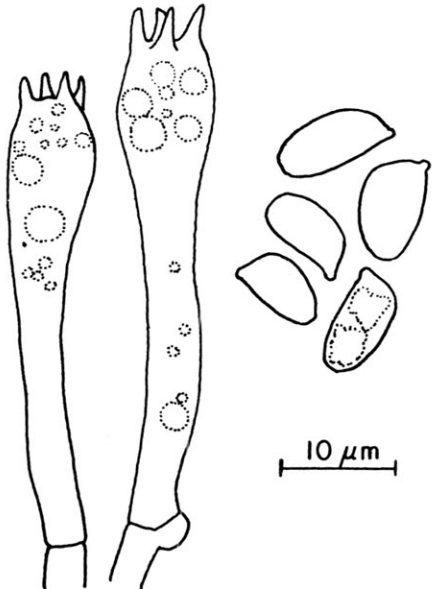
Basidiocarp: Pileus 0.5-4 cm broad, broadly conic to obtuse young, becoming convex to plane, usually with a small, obtuse umbo, occasionally depressed, viscid when fresh, drying glabrous and dull, margin slightly crenate in age, ash blond (3C3) (ISCC 90), beige (4C3) (ISCC 90), bamboo (4C4) (ISCC 90), drab (5E3) (ISCC 80), or hair brown (5E4) (ISCC 80), grayish when young, with yellow tints in age, generally darker on disc; context thin (2-5 mm thick on disc), white, spongy; odor strongly aromatic, of daisies, persisting in recently dried specimens; taste insipid. Lamellae broadly adnate or short-decurrent, white, flushed orange-white (5A2) (ISCC 73) in age, thickish, subdistant, moderately broad (1-6 mm). Stipe 1-7.5 cm long, 2-10 mm thick at apex, white above, yellowish below, especially after handling, white within, glabrous, pruinose, or minutely scabrous above, glabrous below, not viscid, long-ventricose young, equal or slightly narrowed above at maturity, occasionally subcompressed, at times flexuous, loosely stuffed to solid.

Figs 66-68. *H. agathosmus*. Fig 66. ACAD 12283, X .75. Fig 67. ACAD 12280, basidia and spores; redrawn by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 48, pp. 403-411. 1970. Fig 68. ACAD 12283, surface hyphae of apical stipe, with projecting cystidioid terminal cells.

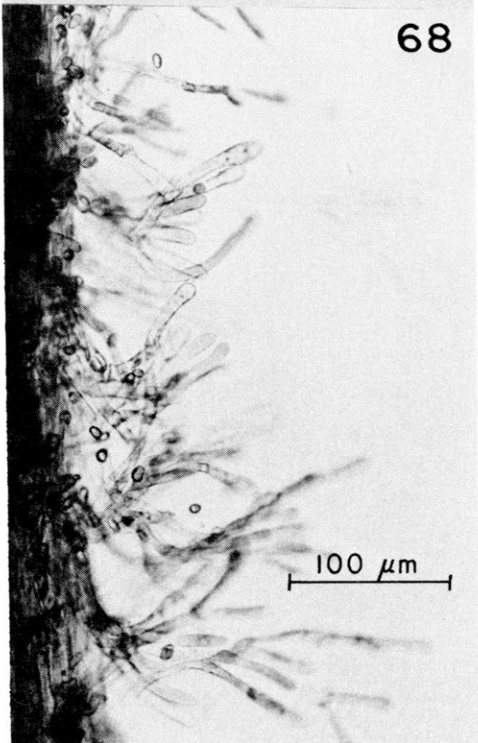
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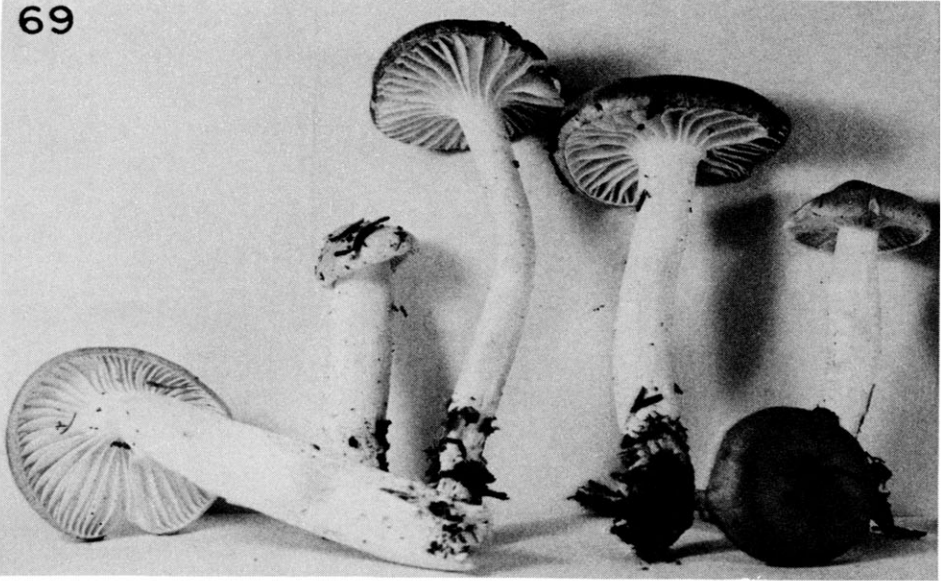
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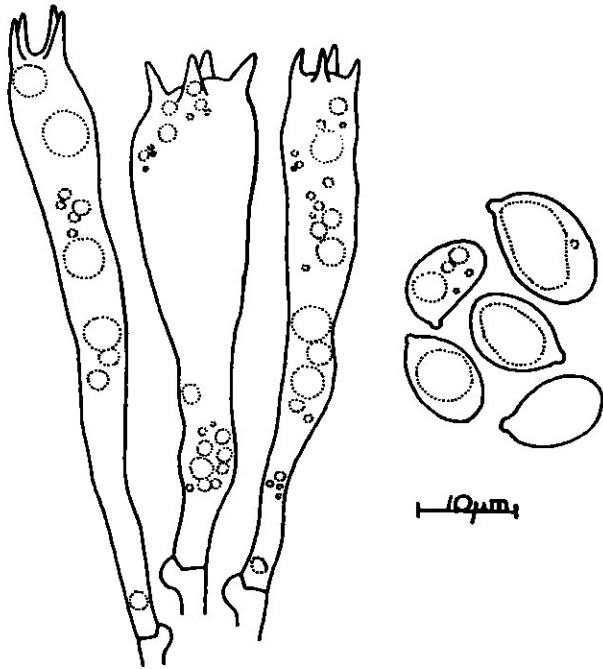
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70



Figs 69, 70. *H. odoratus*. Fig 69. ACAD 12269, X 1.0. Fig. 70. ACAD 12269, basidia and spores; redrawn by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 48, pp. 403-411. 1970.

Microscopic Structures: Spores 9.5-12.5(14) x 6-8(8.5) μm , short-elliptical to obovate, occasionally subglobose, smooth, inamyloid. Basidia 49-66 x 7.5-13.5 μm , narrowly clavate, at times inflated and rather stout, 4-spored, the sterigmata stout, up to 6 μm long. Pleurocystidia and cheilocystidia absent. Gill trama divergent. Cuticle an ixocutis 170-260 μm thick, the hyphae gelatinized, roughly radial, repent, some branched or reflexed, light brown, narrow, arising from a compact layer of darker brown, broader hyphae transitional to the context. Pileal trama radial and slightly interwoven; hypodermium absent. Clamp connections on hyphae of cuticle, gill trama, and pileal trama.

Habit and Habitat: Scattered to gregarious in coniferous woods.

Material Studied: ACAD 12267, Aspen, Guysborough Co., 14 Oct. 1968; ACAD 12260, 12268, Blue Mountain, Pictou Co., 14 Oct. 1968; ACAD 12269, Denver, Guysborough Co., 14 Oct. 1968.

Remarks: This species closely resembles *H. pacificus* in odor, stature, and spore size, but differs in the gray-brown pileus and the tinge of yellow in age. *H. pacificus* is russet to tawny, fading pinkish buff on the margin when old.

In the field, *H. odoratus* might be mistaken for a slender form of *H. agathosmus*, which we find has a distinctly amygdaline odor when fresh, and smaller spores. Moreover, *H. agathosmus* fails to develop yellow tints on the pileus, although the typical gray tends to alter to brownish in old, dry specimens. Also, the stipe of *H. odoratus* becomes yellowish on handling, while the stipe of *H. agathosmus* is cinerescens.

Section LIGNICOLOHYGROPHORUS sec. nov.

Sporocarpia lignatilia; trama lamellarum subparallela; hyphae contexti dimiticae, interdum parietibus crassis; spora inamyloidea.

Species typica: *H. lignicola* sp. nov.

Sporocarpis lignicolous; lamellar trama subparallel; context with scattered thick-walled hyphae; spores white, smooth, inamyloid.

33. *Hygrophorus lignicola* sp. nov.

Figs 71, 72, 73.

Pileus 3-4 cm latus, planoconvexus et parum depressus, siccus, pruinotomentosus, cremeus, demum stramineus; caro albida, solida et plus minusve cohaerens, odore leviter aromatico, sapore parum ingrato. Lamellae uncinatae, albidae, subdistantes. Stipes 4 cm longus, 8 mm crassus, siccus, tomentosus, eburneus, deorsum cremeus, ubi traceaeus atrans, solidus. Spora 7-10(11) x 3.5-4 μm , ellipsoidea, inamyloidea. Hyphae in trama pilei et stipitis dimiticae, pro parte maxima 3-10.5 μm latae parietibus tenuis; aliquot hyphae 4.5-8 cm latae, vix septatae, parietibus crassis, diametro irregulari.

Holotypus ACAD 12222, lignatilis, prope Sunken Lake, comitato Kings, Nova Scotia lectus, in herbario Universitatis Acadiensis conservatus.

Basidiocarp: Pileus 3.4 cm broad, planoconvex and slightly depressed, dry, pruinose-tomentose on disc, the tomentum thinning peripherally, pallid cream, darkening to cream (4A3) (ISCC 89) and pallid yellow towards the margin; context thick (5 mm) on disc, white, tinged pale yellow under the cuticle, unchanging, firm, slightly rubbery; odor faintly aromatic, of caraway; taste slightly unpleasant. Lamellae broadly adnexed and uncinata, almost subdecurrent, white, moderately broad (3.5 mm), subdistant, thickish, intervenose in places and especially near the stipe, edges even. Stipe 4 cm long, 8 mm thick at apex, white above, gradually pallid beige downward, darkening where handled, dry, obscurely and irregularly reticulate where the gills

join, grading downwards to short-tomentose, becoming soft-hirsute below, the mycelial hairs collapsing and forming a tomentum on handling, unchanging in KOH, equal; context white, solid, soft and rubbery.

Microscopic structures: Spores 7-10(11) x 3.5-4 μm , ellipsoidal, smooth, inamyloid. Basidia 30-48 x 5-7 μm , clavate, slender, 4-spored, the sterigmata up to 8 μm long. Pleurocystidia and cheilocystidia absent. Gill trama subparallel, flanked by a narrow, small-cell subhymenium, dimitic, mostly of thin-walled hyphae 3-9 μm broad, rather uniform, with frequent septa, at times crossing the trama at right angles; plus some scattered thick-walled, sparingly septate hyphae. Cuticle a layer up to 175 μm deep of colorless, interwoven, roughly radial, nongelatinous hyphae, little demarcated from the context. Pileal trama interwoven, dimitic; most of the hyphae thin-walled, 3-10.5 μm broad, with slightly irregular diameters and frequent septa; a few hyphae thick-walled, 4.5-8 μm broad, more irregular in diameter and sparsely septate. Clamp connections present in the cuticle, gill trama, and pileal trama.

Habit and Habitat: Solitary, on recently fallen sugar maple *Acer saccharum* Marsh. Rare.

Material Studied: ACAD 12222 (holotype), Sunken Lake, Kings Co., 8 Oct. 1968.

Remarks: This *Hygrophorus* is unique in its lignicolous habit and the thick-walled hyphae scattered in its lamellar and pileal tramas. Both features are more characteristic of the *Tricholomataceae*, but the thick, sharp-edged, waxy lamellae and the long, slender basidia are diagnostic features of the *Hygrophoraceae* (Smith & Shaffer 1964; Shaffer 1968).

The parallel lamellar trama and smooth, inamyloid spores would ordinarily place this species in section *Hygrocybe*, but the fungus is not one of the terrestrial, fragile, waxy and hygrophanous species that constitute this section. Its general appearance is more reminiscent of Section *Hygrophorus*. Thus, a new section, *Lignicolohygrophorus*, is proposed to accommodate it.

Section HYGROCYBE Fr.

Epicr. Myc., p. 329, 1838.

Lamellar trama parallel to slightly interwoven; pileal cuticle not hymeniform or cellular; spores smooth, inamyloid; hymenial cystidia occasionally present; clamp connections present or absent; sporocarps terrestrial, fragile, and often brightly colored.

Type species: *H. miniatus* (Fr.) Fr.

Subsection PSITTACINI Bataille

Flora Monogr. Hygrophores, p. 50. 1910.

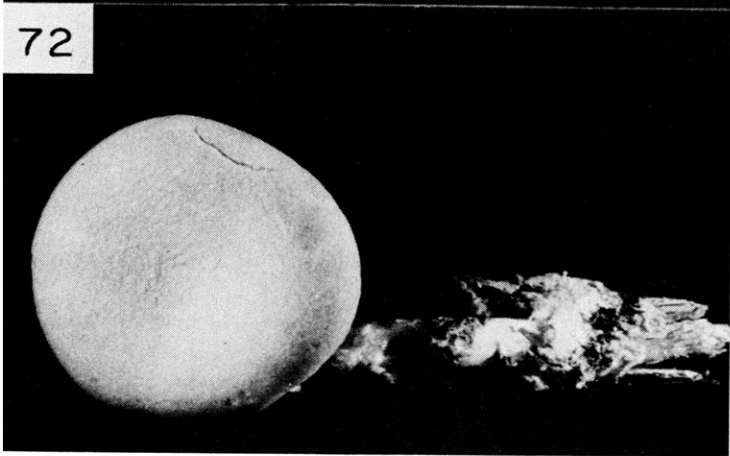
Pileus and stipe viscid.

Type species: *H. psittacinus* (Fr.) Fr.

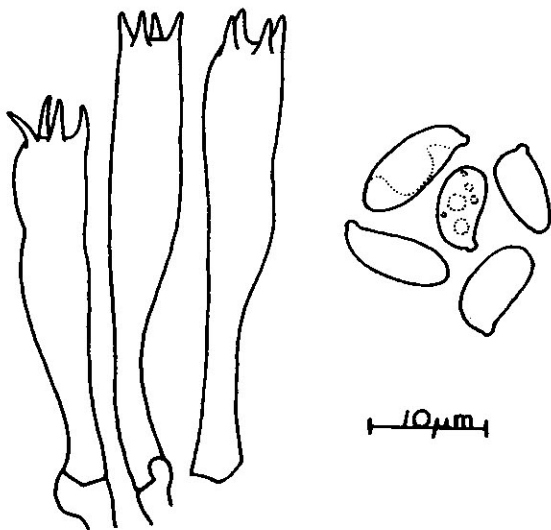
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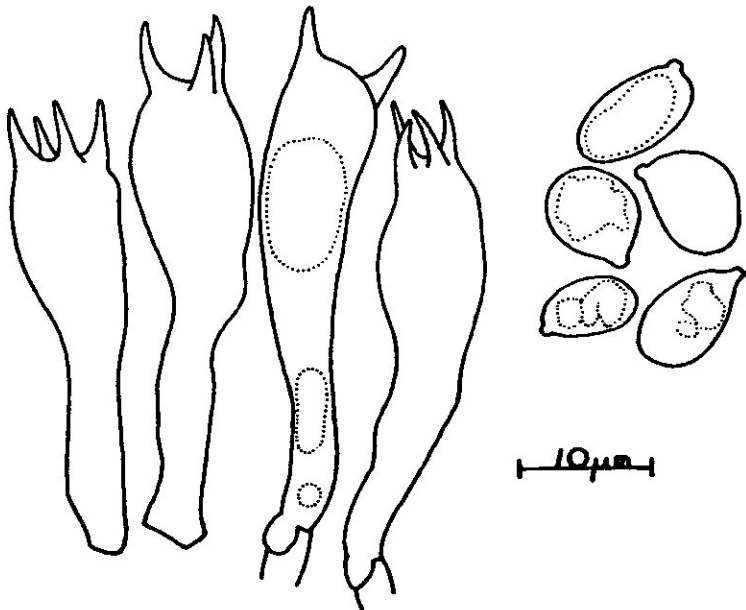
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75



Series PURI Hes. & Sm.

N. Am. Spec. of *Hygrophorus*, p. 214. 1963.

Pileus conic.

Type species: *H. purus* Pk.34. *Hygrophorus ruber* Pk.

N. Y. State Mus. Bull. 116: 32. 1907.

Hydrocybe ruber (Pk.) Murr., N. Am. Flora 9: 379. 1916.

Figs 74, 75.

Basidiocarp: Pileus 0.5-2.5 cm broad, sharply to broadly conic, becoming almost plane with a small, acute umbo, margin persistently incurved, viscid when fresh, eventually dry and shining, glabrous, margin at times translucent-striate moist, scarlet, fading to orange and yellow-orange, not blackening when injured or dried; context thin (to 2.5 mm on disc), fragile, light yellow, or hygrophanous and concolorous with the surface, unchanging; odor and taste not distinctive. Lamellae adnexed and seceding, or adnate and becoming deeply emarginate with a decurrent tooth, pallid yellow, often flushed pale orange when young, broad (2-4 mm), subdistant to close, thickish, brittle, edges even or eroded. Stipe 2.5-6.5 cm long, 2-5.5 mm thick at apex, yellow-orange to orange above, paling to yellow or whitish below, pallid yellow within, very briefly viscid, soon resinous to moist, glabrous, slender, equal or long-ventricose, terete or slightly compressed, stuffed, becoming hollow.

Microscopic Structures: Spores 7.5-12.5 x (4)4.5-8 μm , shape variable in one gill, generally elliptical to oblong, often obovate, occasionally subglobose, smooth, inamyloid. Basidia 29-48 x 7-11.5 μm , long-clavate, relatively short, mostly 4-spored, less frequently 1-, 2-, and 3-spored in the same gill, sterigmata up to 7(10.5) μm long. Pleurocystidia and cheilocystidia absent. Gill trama parallel, of long-celled, scarcely interwoven hyphae. Cuticle an ixocutis 43-345 μm deep, difficult to demonstrate except in fresh, appreciably viscid pilei, the hyphae 1.7-7 μm broad, radial, repent or slightly reflexed, branched, gelatinous to subgelatinous. Pileal trama of radial, parallel hyphae, sparsely septate like the gill tramal hyphae, yellow-red to yellow-brown under cuticle, colorless over hymenium. Stipe surface of narrow, sparse, tangled, subgelatinous hyphae merging with the parallel context hyphae. Clamp connections present on the hyphae of the cuticle and gill trama, rare or absent on the hyphae of the pileal trama and stipe.

Habit and Habitat: Gregarious in mixed woods.**Material Studied:** ACAD 12250, 12270, Moose River, Pictou Co., 14 Oct. 1968.

Remarks: *Hygrophorus ruber* resembles *H. conicus* in shape, color, and structure of the gill trama, but differs in its slightly viscid, non-striate stipe and its persistent, unchanging colors. *H. cuspidatus* Pk. (not in Nova Scotia) is similar in its unchanging red color and conic pileus but has a dry, striate stipe.

Peck's (1907) original description gave the spore size as .00024-.0003 x .00016-.0002 in (6-7.5 x 4-5 μm). Hesler and Smith (1963) found the spores to be 7-9 x 4.5-6 μm . In our material, they were even larger, presumably because of the presence of 1-, 2-, and 3-spored basidia.

Figs 74, 75. *H. ruber*. Fig 74. ACAD 12381. X 1.5. Fig 75. ACAD 12250, basidia and spores. Figs 74, 75 reproduced by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 52, pp. 1243-1247, 1974, and 48, pp. 403-411, 1970, respectively.

The gelatinous layers on the stipe and pileus are poorly organized and difficult to demonstrate in sections of dried material.

Series PSITTACINI

Pileus convex to depressed, some shade or red, yellow or green; stipe and pileus viscid; lamellar trama parallel.

35. *Hygrophorus psittacinus* (Fr.) Fr. var. *psittacinus*

Epicr. Myc., p. 332. 1838.

Agaricus psittacinus Fr., Syst. Myc. 1: 102. 1821.

Hygrocybe psittacina (Fr.) Kummer, Führ. in Pilzk., p. 112. 1871.

Hydrocybe psittacina (Schaeff. ex Fr.) P. Karst., Bidr. Finl. Nat. Folk 32: 237. 1879.

Figs 76, 77.

Basidiocarp: Pileus 0.5-3.5 cm broad, hemispheric or broadly conic young, becoming convex to plane, sometimes remaining subumbonate, glutinous to viscid, glabrous beneath the gluten, margin striate when moist, dark olive or brownish green at first, rarely pale green (27A3) (ISCC 148), very soon fading apricot yellow (5B6) (ISCC 76) to pale orange (5A3) (ISCC 73), generally retaining some green tints at the margin, drying yellow-orange to pinkish orange; context thin (1-2 mm on disc), concolorous with the pileus or paler, eventually whitish, fragile; odor and taste not distinctive. Lamellae variously attached, broadly adnexed to adnate, at times emarginate to unciniate, often seceding, olivaceous at first, fading to dull yellow, yellow-orange, or dingy orange buff, persistently olivaceous at the edges, subdistant, thickish, narrow to broad (1-5 mm), edges even. Stipe 0.5-5.5 cm long, 1.5-4 mm thick, olive green at apex, pale yellow to melon yellow (5A6) (ISCC 70) below, whitish at extreme base, viscid to lubricous overall, soon drying, equal or slightly expanded above, terete or apically subcompressed; context whitish at apex, elsewhere concolorous with the exterior, hollow.

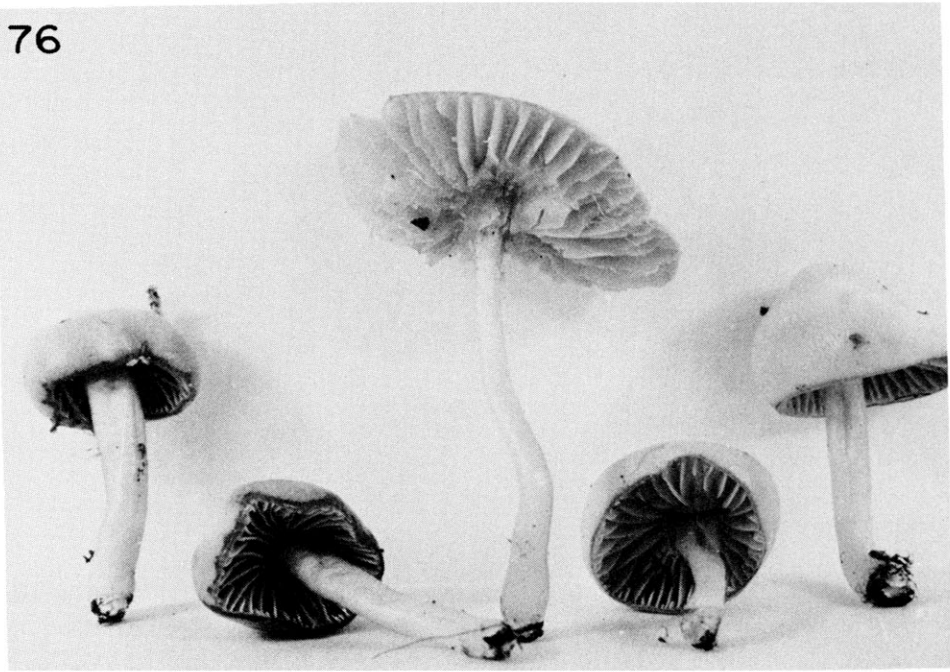
Microscopic Structures: Spores 6-9.5(12) x 4-6 μm , obovate to short-elliptical, smooth, inamyloid. Basidia 24-50 x 6-10.5 μm , narrowly clavate, mostly 4-spored with 3-, 2-, and 1-spored basidia present in varying proportions in the same gill, the sterigmata slender, up to 8(14.5) μm long. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel, inflated hyphae 7-24 μm broad. Cuticle an ixotrichodermium 70-130 μm deep, the hyphae gelatinous, 1.2-3 μm broad, erect, branched, the terminal elements cylindrical to subclavate, forming a palisade on a substratum of similar, interwoven hyphae. Pileal trama of radial, subparallel hyphae; hypodermium absent. Clamp connections common in the subhymenium, less frequent in the cuticle, the gill trama, and the pileal trama.

Habit and Habitat: Solitary to gregarious in boggy areas, in grass, or in leaf mold in mixed or deciduous woods. Frequent.

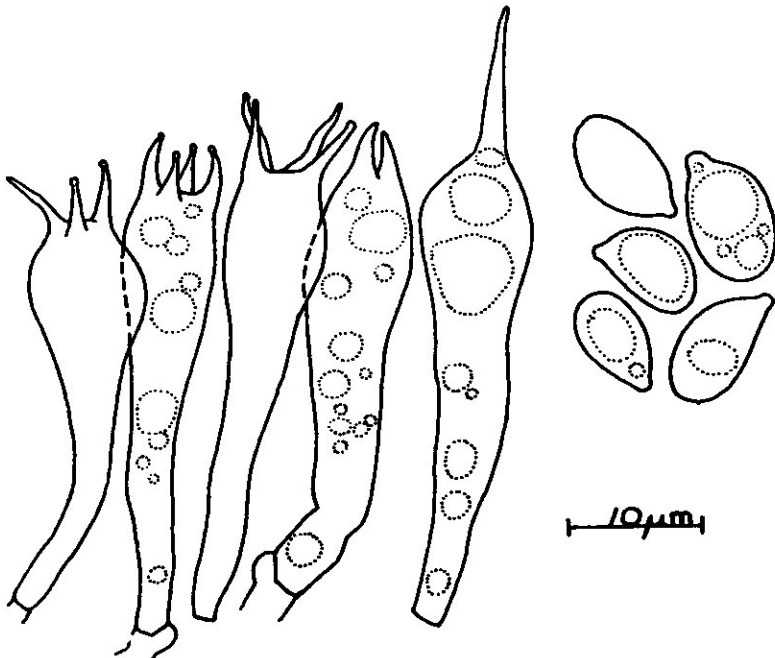
Material Studied: ACAD 12105, ravine, Agriculture Experimental Station, Kentville, Kings Co., 29 Sept. 1967; ACAD 12108, Grand Anse Valley, Inverness Co., 7 Oct. 1967; ACAD 12175, Aylesford Lake, Kings Co., 30 Aug. 1968; ACAD 12143, Hebb's Cross, Lunenburg Co., 14 July 1968; ACAD 12157, Hebb's Cross, Lunenburg Co., 9 Aug. 1968.

Remarks: *Hygrophorus psittacinus* var. *psittacinus* is recognized by the bright olive green color which quickly fades to yellow-orange. The persistently green gill edges and stipe apex distinguish this species from young, olive-tinged specimens of *H. laetus*. However, all traces of green disappear in the drying process, and dried sporocarps of the two species are macroscopically identical.

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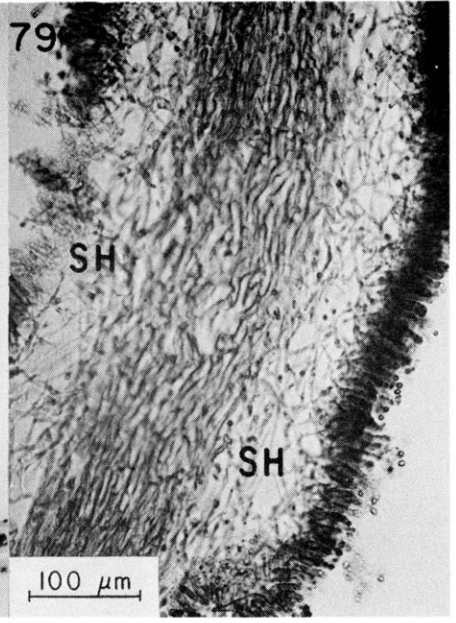


Figs 76, 77. *H. psittacinus* var. *psittacinus*. Fig 76. ACAD 12143, X 1.25. Fig 77. ACAD 12108, basidia and spores.

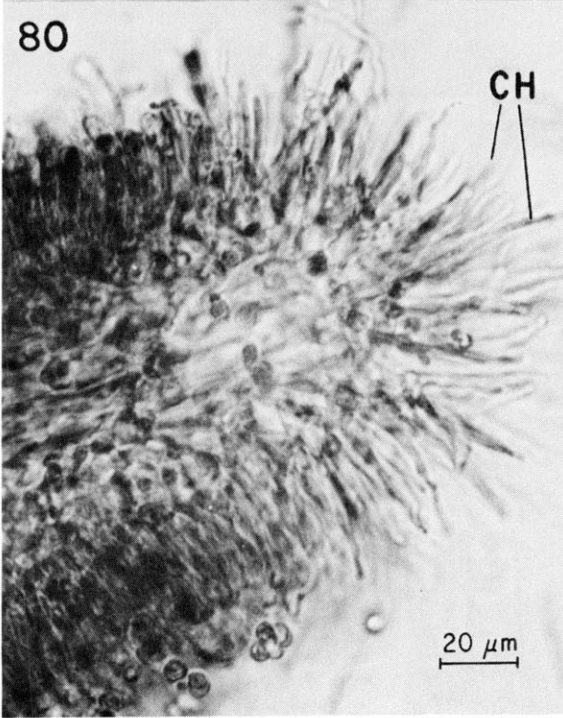
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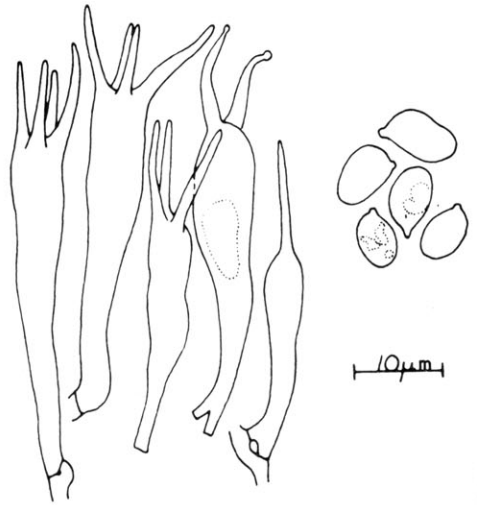
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36. **Hygrophorus laetus (Fr.) Fr.***Epicr. Myc.*, p. 329. 1838.*Agaricus laetus* Fr., *Syst. Myc.* 1: 102. 1821.*Hygrocybe laeta* (Fr.) Kummer, *Führ. in Pilzk.*, p. 112. 1871.*Hygrophorus peckii* Atk., *J. Myc.* 8: 114. 1902.*Hygrophorus davisii* Pk., *Bull. Torrey Bot. Club* 33: 214. 1906.*Hydrocybe davisii* (Pk.) Murr., *N. Am. Flora* 9: 382. 1916.*Hydrocybe roseiceps* Murr., *Lloydia* 5: 138. 1942.*Hygrophorus roseiceps* Murr., *Lloydia* 5: 157. 1942.

Figs 78, 79, 80, 81.

Basidiocarp: Pileus 0.5-3.5 cm broad, hemispheric or obtuse young, later convex, usually centrally depressed or umbilicate, finally plane and depressed, margin often wavy, glutinous to viscid, drying with a dull gloss, glabrous, margin translucent-striate moist, carrot red (6A7) (ISCC 50) tinged with sordid olive when young, soon fading to apricot yellow (5B6) (ISCC 76) or melon yellow (5A6) (ISCC 70) on disc, and pale orange (5A3) (ISCC 73) to cream (4A3) (ISCC 89) on the margin, sometimes with a slight vinaceous tinge, drying pale pinkish orange to yellow-orange; context thin to membranous, (up to 1.5 mm thick on disc), whitish to pale yellow-orange, pinkish orange, or yellow, fibrous, fragile; odor mephitic or resembling tulips; taste not distinctive or else mildly disagreeable. Lamellae short-decurrent to decurrent, at times adnexed and uncinat, at first pale vinaceous, yellow-orange, or sordid olivaceous, later cream (4A3) (ISCC 89), pallid buff, or peach, lacking the olive tinge, waxy, subdistant, edges even. Stipe 1.5-7(10.5) cm long, 1-4 mm thick at apex, apricot yellow (5B6) (ISCC 76), amber yellow (4B6) (ISCC 87), maize yellow (4A6) (ISCC 83), or butter yellow (4A5) (ISCC 86), sometimes light brown (6D8) (ISCC 54), rarely brick red (7D7) (ISCC 43), gradually pinkish livid to pinkish buff above, whitish or hygrophanous within, glutinous to resinous, glabrous, or rarely with conspicuous, reticulate striae over the lower part, equal or long-ventricose, or slightly expanded above, straight or slightly flexuous, stuffed at first, then hollow.

Microscopic Structures: Spores 6-9.5(10) x 4-5(6) μm , short-elliptical, sometimes lacrimoid with attenuated apicular end, smooth, inamyloid. Basidia 21-43(55) x (3.5)4-6.5(8) μm short and clavate to slender and flexuous, often bipedal, mostly 4-spored, occasionally to frequently 2- and 3-spored in the same gill, rarely 1-spored, the sterigmata very long and slender, especially near the gill edge, up to 17.5 μm long. Pleurocystidia absent. Cheilocystidia filiform and gelatinous (examine entire gill fragment under low power), 21-46 x 1-3 μm . Gill trama a central strand of yellow, subparallel hyphae flanked by equally broad gelatinous subhymenium of interwoven, narrower hyphae. Cuticle an ixotrichodermium 130-350 μm deep, the hyphae generally erect, branching, not forming a palisade, gelatinous, 1-3.5 μm broad, usually irregular from scattered protuberances and bulges. Stipe surface similar to pileal cuticle. Pileal trama of radial, parallel hyphae 9-25 μm broad. Clamp connections present in the subhymenium, infrequent in the cuticle and gill trama, not seen in the pileal trama.

Figs 78-81. *H. laetus*. Fig 78. ACAD 12176, X .65. Fig 79. ACAD 12176, section of lamellar trama showing parallel mediostratum and broad, gelatinous subhymenium (SH). Fig 80. ACAD 12153, section of lamella showing filiform cheilocystidia (CH). Fig 81. ACAD 12176, basidia and spores.

Habit and Habitat: Scattered to gregarious, rarely solitary, in *Sphagnum* bogs and adjacent, moist grassy areas, leaf mold, or among other mosses. Common.

Material Studied: ACAD 12150, Aylesford Lake, Kings Co., 30 July 1968; ACAD 12153, Hebb's Cross, Lunenburg Co., 4 Aug. 1968; ACAD 12162, Hebb's Cross, Lunenburg Co., 9 Aug. 1968; ACAD 12170, 12171, Aylesford Lake, Kings Co., 23 Aug. 1968; ACAD 12176, Aylesford Lake, Kings Co., 30 Aug. 1968; ACAD 12179, Lake Woods, Kentville, Kings Co., 29 Aug. 1968; ACAD 12180, ravine, Agriculture Experimental Station, Kentville, Kings Co., 10 Sept. 1968.

Remarks: Olive-tinged pilei of young sporocarps might be confused with those of *H. psittacinus* var. *psittacinus*, but the unmistakable mephitic odor, the gelatinous subhymenium, and the gelatinous, filiform cheilocystidia distinguish *H. laetus* from this and all other members of Section *Hygrocybe*. The livid stipe apex, when it occurs, is another distinctive feature.

Hydrocybe laeta (Pers.) P. Karst., as cited by Murrill (1916), differs too radically to be considered a synonym.

37. *Hygrophorus minutulus* Pk.

N.Y. State Mus. Bull. 1(2): 9. 1887.

Hydrocybe minutula (Pk.) Murr., N. Am. Flora 9: 380. 1916.

Figs 82, 83.

Basidiocarp: Pileus 0.5-2 cm broad, at first convex becoming plane; surface glabrous, viscid, glutinous when wet, margin striatulate; color bright reddish orange or scarlet (ISCC 34) becoming vivid orange (ISCC 48) and sometimes deep orange (ISCC 51); context thin, orange; taste and odor not distinctive. Lamellae adnexed to adnate, close, becoming subdistant at maturity; color light orange (ISCC 67). Stipe 2-5 cm long, 1-3 mm thick, tapering toward base; surface glabrous, viscid to glutinous when wet; red (ISCC 36) at apex, fading to yellow or pallid at base; context soft, stuffed when young, becoming hollow.

Microscopic Structures: Spores 7-9.5(10.5) x 4-6.5 μm , ellipsoidal or slightly broadened at apical end, smooth, inamyloid. Basidia 29-47 x 6.5-10.5 μm , mostly about 33 x 7 μm , narrowly clavate, rather short for the spore size, 4-spored, the sterigmata up to 6 μm long, slender, often with rounded tips. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel, scarcely inflated hyphae 3-14 μm broad. Cuticle an ixocutis 50-140 μm deep, the hyphae 1.7-5.5 μm broad, gelatinous, generally radial and repent but frequently reflexed or erect. Pileal trama of radial, subparallel, scarcely inflated hyphae 4.5-21 μm broad; hypodermium absent. Clamp connections present in the cuticle and gill trama, not seen in the pileal trama.

Habit and Habitat: Gregarious in grass. Rare.

Material Studied: ACAD 6263, Kentville, Kings Co., 30 Aug. 1956.

Remarks: The distinguishing features of *H. minutulus* are its convex, viscid, red pileus and its red to yellow, viscid stipe. The colors persist in dried material.

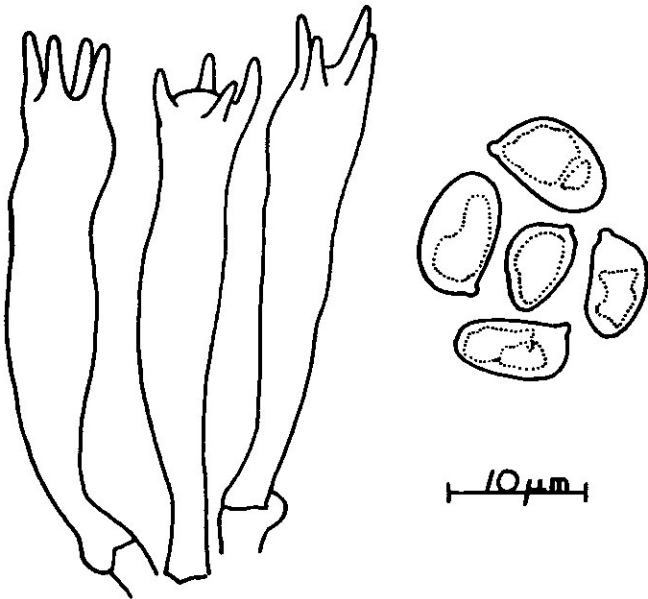
Peck (1907) described the lamellae as whitish, tinged with red or yellow. He also described the stipe as solid, and therefore inconsistent with the general characteristics of Subgenus (now Section) *Hygrocybe*.

Figs 82, 83. *H. minutulus*. Fig 82. Smith 2835 b, X 1.0; from *North American Species of Hygrophorus*, by L.R. Hesler and A. H. Smith, (c) 1963 by the University of Tennessee Press, Knoxville; reprinted by permission of the University of Tennessee Press. Fig 83. ACAD 6263, basidia and spores.

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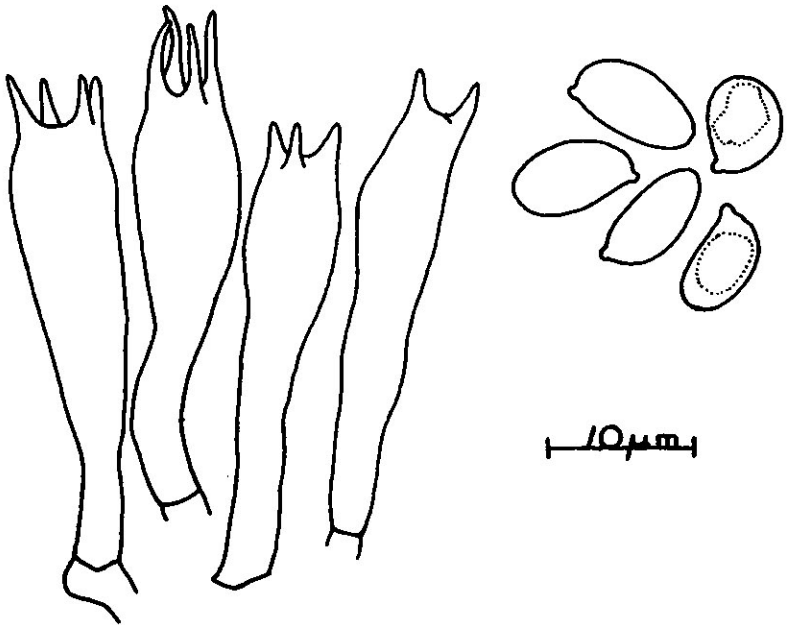


83





85



Figs 84, 85. *H. nitidus*. Fig 84. ACAD 12147, X 1.0. Fig 85. ACAD 12164, basidia and spores.

38. *Hygrophorus nitidus* B. & C.

Ann. Mag. Nat. Hist. 2(12): 424. 1853.

Hydrocybe nitida (B. & C.) Murr., N. Am. Flora 9: 378. 1916.

Figs 84, 85.

Basidiocarp: Pileus 0.3-4 cm broad, at first convex and slightly depressed, with involute margin, soon depressed to subumbilicate, finally infundibuliform but imperforate on disc, margin decurved or spreading, viscid when fresh, glabrous, brownish orange (6C8) (ISCC 54) to dark, golden yellow (5B8) (ISCC 69) when young and fresh, fading to Chinese yellow (4B7) (ISCC 84) to pale yellow (2A3) (ISCC 104), finally whitish; context thin (1-3 mm thick on disc), yellow-orange, fading pallid yellowish, occasionally hygrophanous near surface and over gills, soft, fragile; odor and taste not distinctive. Lamellae subdecurrent at first, soon long-decurrent, cadmium orange (5A8) (ISCC 66) to amber yellow (4B6) (ISCC 87) when young, fading to buttercup yellow (4A7) (ISCC 82) or light yellow, darker than the faded pileus, subdistant to distant, rather thin, narrow becoming broad (0.5-8 mm), at times intervenose near the pileus margin, edges even. Stipe 1.5-6 cm long, 1.5-9 mm thick at apex, more or less concolorous with the pileus but not fading to whitish, slightly paler towards base, pallid yellowish within, viscid, lubricous, or resinous, glabrous, equal or long-ventricose, or slightly expanded above, usually compressed or with median longitudinal sulcus, at times terete, stuffed, soon becoming hollow.

Microscopic Structures: Spores 6-9.5(10) x 4-6(6.5) μm , short-elliptical, rarely subglobose, smooth, inamyloid. Basidia 23-40 x 6-8(10.5) μm , clavate, relatively short, mostly 4-spored, occasionally 3-spored and rarely 2-spored in the same gill, the sterigmata slender, to 7 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel to slightly interwoven, inflated hyphae 9-38 μm broad, with occasional laticifers 1.5-3 μm broad, the subhymenium not gelatinized. Cuticle an ixotrichodermium 90-175 μm deep, the hyphae 1.2-3.5 μm broad, gelatinous, more or less erect, tangled, not forming a palisade. Pileal trama of radial, roughly parallel hyphae; hypodermium absent. Clamp connections small and inconspicuous, on the hyphae of the cuticle and gill trama.

Habit and Habitat: Solitary, gregarious, or subcespitate in deciduous or coniferous woods; often in mosses, particularly *Sphagnum*; occasionally among *Osmunda* spp in forest swales. Common.

Material Studied: ACAD 12130, Harrington Woods, Kings Co., 8 July 1968; ACAD 12147, 12148, Aylesford Lake, Kings Co., 30 July 1968; ACAD 12161, Hebb's Cross, Lunenburg Co., 9 Aug. 1968; ACAD 12174, Aylesford Lake, Kings Co., 23 Aug. 1968; ACAD 12235, St. Catherine's River, Queens Co., 11 Oct. 1968.

Remarks: *Hygrophorus nitidus* is distinguished by the depressed, viscid yellow pileus which eventually fades to whitish, and the viscid stipe. *H. ceraceus* is similar but does not fade to white. Moreover, the viscid layers of *H. ceraceus* are not as well-organized and obvious as they are in *H. nitidus*, and usually disappear in drying.

Hygrophorus laetus may become yellow-orange like *H. nitidus*, but is usually pinkish-tinged and has a mephitic odor. The pileus is also less depressed than in *H. nitidus* and the margin is not as strongly involute in young specimens. Microscopically, the two species are easily distinguished by the presence of gelatinous subhymenium and filiform cheilocystidia in *H. laetus*.

39. *Hygrophorus ceraceus* (Fr.) Fr.

Epicr. Myc., p. 330. 1838.

Agaricus ceraceus Fr., Syst. Myc. 1: 102. 1821.*Hygrocybe ceracea* (Fr.) Kummer, Führ. in Pilz., p. 112. 1871.*Hygrocybe nitida* var. *lutea* Murr., Bull. Torrey Bot. Club 66: 159. 1939.

Figs 86, 87.

Basidiocarp: Pileus 1-3 cm broad, at first convex or the disc slightly depressed, becoming planoconvex and subumbonate, finally plane with uplifted margin, slightly viscid fresh, glabrous, margin striate moist, tangerine (6B8) (ISCC 50) to cadmium orange (5A8) (ISCC 66) when moist, fading to buttercup yellow (4A7) (ISCC 82) or genet (3A7) (ISCC 83), often tinged with orange; context thin (1-1.5 mm on disc), yellow, hygrophanous, very fragile; odor and taste not distinctive. Lamellae arcuate-decurrent young, becoming adnate and uncinatae, pallid orange to light yellow, moderately close to subdistant, medium broad (1.5-3 mm), brittle, edges even. Stipe 1.5-3 cm long, 2.5-4 mm thick at apex, concolorous with the pileus, pallid at base, yellow within, subviscid, soon dry, glabrous with a pearly lustre, equal or tapered to base, stuffed, soon becoming hollow.

Microscopic Structures: Spores 6-8.5 x 3-5 μm , variable in shape, elliptical, oblong-elliptical, obpyriform to obovate, smooth, inamyloid. Basidia 18-46 x 3.5-8.5 μm , long-clavate, stout or slender, mostly 4-spored, rarely 2-spored in the same gill, the sterigmata slender, up to 7 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel or slightly interwoven hyphae 7-29 μm broad. Cuticle a thin, poorly organized ixotrichodermium, the hyphae generally erect and tangled, 2-4.5 μm broad, subgelatinous, scarcely reviving as an ixocutis after drying. Pileal trama of inflated, radial, subparallel hyphae 9-27 μm broad, with a few narrow hyphae 2.5-7 μm broad; hypodermium absent. Clamp connections present in the cuticle, gill trama, and pileal trama.

Habit and Habitat: Scattered to gregarious in moss or on soil, in coniferous or deciduous woods. Infrequent.

Material Studied: Wehmeyer 678, Folleigh (sic) Lake, Colchester Co., 20 July 1931 (MICH., fide A.H. Smith). ACAD 12117, Black River, Kings Co., 1 Nov. 1967.

Remarks: The gelatinous exteriors of the pileus and stipe are thin and poorly organized, and revive little or not at all from the dried state. The ixotrichodermial pellicle, if it persists, is compressed by drying to an ixocutis, while stipe gluten usually cannot be detected at all in dried specimens. Thus, Romagnesi's keys described the stipe of *H. ceraceus* as dry (Romagnesi 1962-63). The disappearance of these viscid layers may cause confusion of this species with *H. parvulus* Pk. (not in Nova Scotia) in series *Coccinei*, which has a dry pileus, a dry, often reddish-tinged stipe, and more decurrent lamellae than *H. ceraceus*.

In Series *Psittacini*, *H. ceraceus* is distinguished from the similarly yellow *H. nitidus* by its less depressed pileus and the failure of its pileus to fade whitish with age. *H. nitidus* is also more persistently viscid than *H. ceraceus*.

Kauffman (1918) reported that the lamellar trama of *H. ceraceus* is interwoven, and thus excluded this species from Subgenus (now Section) *Hygrocybe*.