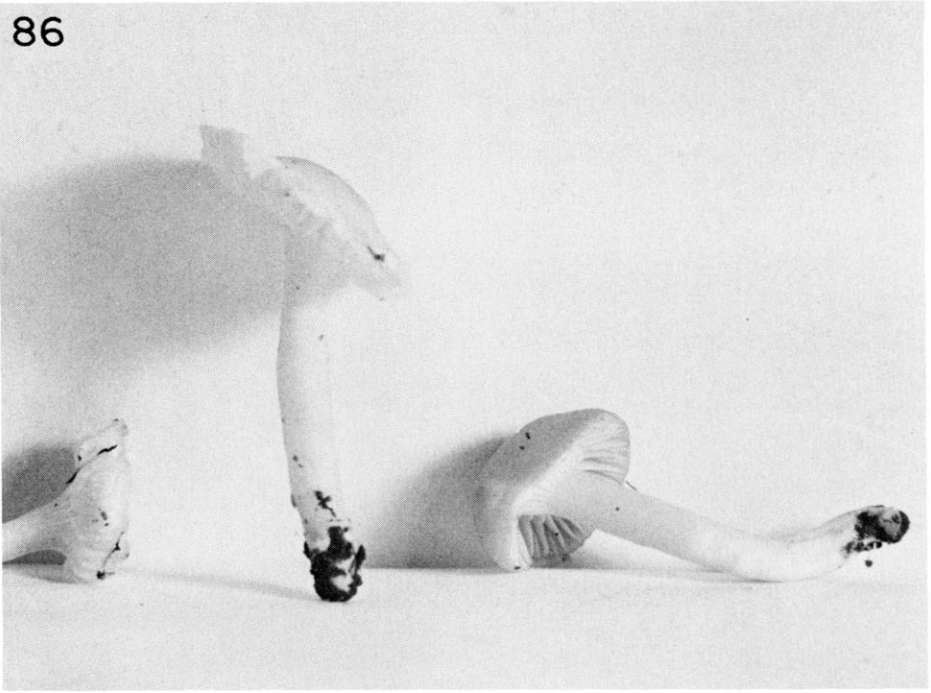
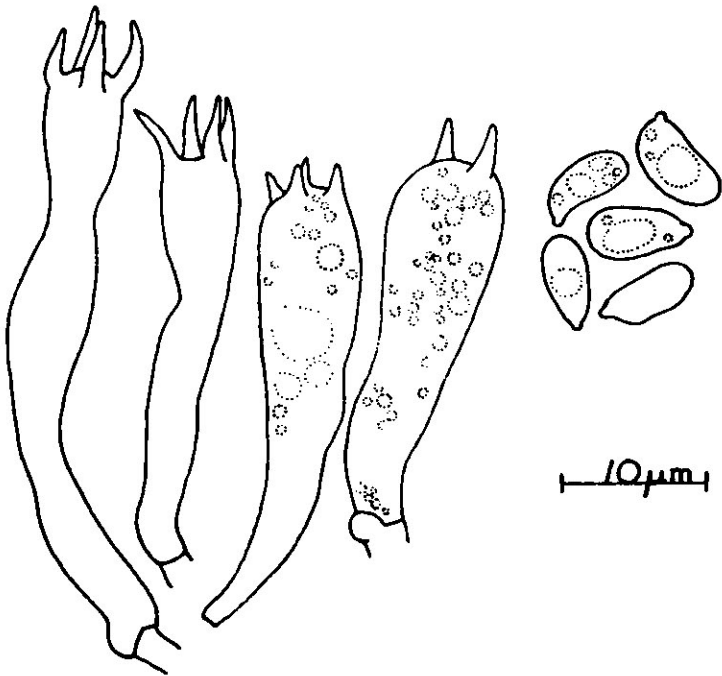


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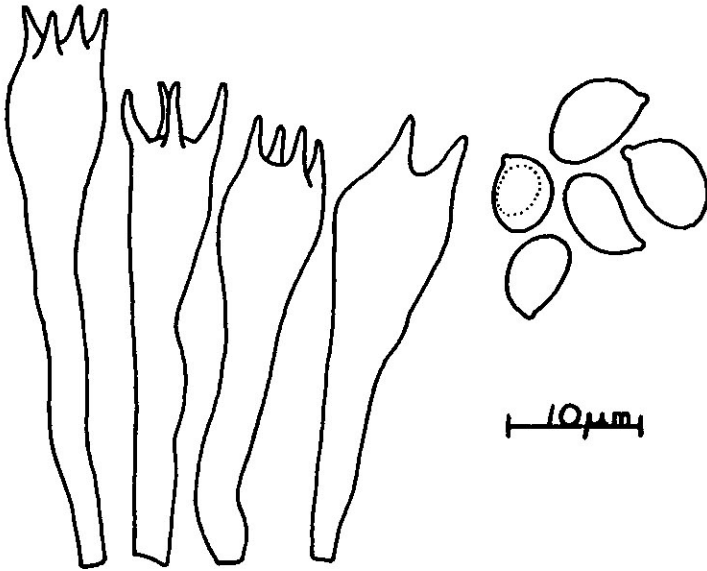


Figs 86, 87. *H. ceraceus*. Fig 86. ACAD 12117, X 1.0. Fig 87. ACAD 12117, basidia and spores.

88



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Figs 88, 89. *H. unguinosus* var. *unguinosus*. Fig 88. Smith 63018, X 1.5. Fig 89. ACAD 8631, basidia and spores.

40. **Hygrophorus chlorophanus (Fr.) Fr.**

Epicr. Myc., p. 332. 1838.

Agaricus chlorophanus Fr. Syst. Myc. 1:103. 1821.*Hygrocybe chlorophana* (Fr) Wünsche. Die Pilze, p. 112. 1877.

"Pileus 2-4 cm broad, convex then expanded, deep lemon yellow, disc at times orange-yellow, viscid, margin striate. Context thin, yellowish; odor and taste mild. Lamellae adnexed, becoming emarginate, whitish to yellowish, rather close, narrow in front. Stipe 3-7 cm long, 4-8 mm thick, viscid, concolorous with the pileus, hollow, glabrous, equal, at times more or less compressed. Spores 6-8 x 4-5 μ , ellipsoid, smooth, yellow in Melzer's reagent. Basidia 34-48 x 5-8 μ , 4-spored. Pleurocystidia and cheilocystidia none. Gill trama parallel, hyphae 8-11(21) μ broad. Lactifers numerous, conspicuously yellow in Melzer's reagent, 3-5 μ broad. Cuticle (an ixocutis) in the form of a thin zone of gelatinous, repent hyphae. No hypodermium differentiated. Pileus trama of radial hyphae. Clamp connections rare on the cuticular hyphae." (Hesler & Smith p. 235, 1963).

Habit and Habitat: "On soil, in open woods . . ." (Hesler & Smith p. 235, 1963).

Remarks: We have not collected this species, and the E.C. Smith Herbarium (ACAD) does not have a specimen. MacKay (1908) first reported it from Halifax County, and Smith and Wehmeyer (1936) later recorded its presence in Colchester County, on bare soil under beech. *Hygrophorus flavescens* has frequently been mistaken for this species (Hesler & Smith 1963), because the stipe of *H. flavescens* tends to become tacky when handled. Therefore, as *H. flavescens* is much more common than *H. chlorophanus*, it is possible that these earlier records may also have been in error. However, K.A. Harrison (in verb.) claims to have seen authentic *H. chlorophanus* in Nova Scotia. Moreover, Hesler and Smith (1963) listed a collection (Bigelow 3142) from Maine; thus, this fungus probably does occur in the province, and we have decided to include it here.

Series INOLENTES (Bataille) Hes. & Sm.

N. Am. Spec. of *Hygrophorus*, p. 218. 1963.

Pileus gray to dull brown, drab; stipe and pileus viscid; lamellar trama parallel.

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

41. **Hygrophorus unguinosus (Fr.) Fr. var. unguinosus**

Epicr. Myc., p. 332. 1838.

Agaricus unguinosus Fr. Syst. Myc. 101. 1921.*Hygrophorus luridus* B. & C. sensu Coker, J. Elisha Mitchell Sci. Soc. 45: 168.*Hygrocybe unguinosa* (Fr.) Karst. Hattsd. p. 237. 1879.

Figs 88, 89.

Basidiocarp: Pileus 2-6 cm broad, convex becoming plane, often subumbonate; surface a glutinous pellicle, extremely viscid when wet becoming polished when dry, translucent striate; color dark umber brown (ISCC 59) becoming brownish gray at maturity (ISCC 61); context soft, thin, pallid, taste and odor not distinctive. Lamellae adnate to subdecurrent, thick, subdistant, grayish brown (ISCC 63). Stipe 3-7 cm long, 2-5 mm thick, mostly equal, smooth, covered with gluten when wet, polished when dry, concolorous with pileus; context soft, hollow at maturity.

Microscopic Structures: Spores 7-9.5 x 4.5-6 μm , short-elliptical, smooth, inamyloid. Basidia 26-43 x 7-8 μm , clavate, slender, mostly 4-spored, occasionally 2-spored in the same gill; sterigmata up to 6 μm long. Pleurocystidia and cheilocystidia absent. Gill trama subparallel. Cuticle an ixotrichodermium 130-175 μm deep, the hyphae 1-4.5 μm broad, erect and tangled, with irregular bulges and protuberances, not forming a palisade. Pileal trama radial and slightly interwoven, the hyphae pallid yellowish to yellow-brown in KOH, rather inflated, 3.5-14 μm broad; subhymenial hyphae near base abruptly smaller, colorless, and interwoven; laticifers frequent, branched, 1-6 μm broad. Stipe surface an ixotrichodermium similar to that of the pileus, about 200 μm thick. Clamp connections rare on the cuticular hyphae, apparently absent from the hyphae of the gill trama, pileal trama, and stipe surface.

Habit and Habitat: "Gregarious to scattered on humus and soil, in coniferous and mixed woods, in swamps, . . ." (Hesler & Smith p. 221, 1963).

Material Studied: ACAD 8631, Boularderie, Cape Breton Co., 12 Sept. 1962.

Remarks: *Hygrophorus unguinosus* var. *unguinosus* is a rare species in Nova Scotia, distinguished by the blackish to gray, viscid pileus and stipe, the slender stature, and the scarcity of clamp connections.

Hesler and Smith (1963) mentioned a distinct hypodermium. Perhaps this refers to the abruptly colorless smaller subhymenial hyphae found at the base of the pileal trama. If there is a hypodermium near the cuticle, distinguished by a different color, such a color difference was not apparent on rehydration of ACAD 8631 in KOH.

Subsection PUNICEI Fayod
Ann. Sci. Nat. Ser. 7(9): 309. 1889.

Pileus viscid; stipe dry; lamellar trama parallel.

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

Series CONICI (Fayod) Hes. & Sm.
N. Amer. Spec. of *Hygrophorus*, p. 108. 1963.

Pileus sharply to bluntly conic.

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

42. *Hygrophorus conicus* (Fr.) Fr. var. *conicus*

Epicr. Myc., p. 331. 1838.

Agaricus conicus Fr., Syst. Myc. 1: 103. 1821.

Hygrocybe conica (Fr.) Kummer, Führ. in Pilzk., p. 111. 1871.

Hydrocybe conica (Fr.) Karsten, Bidr. Finl. Nat. Folk 32: 236. 1879.

Godfrinia conica (Fr.) Maire, Bull. Soc. Mycol. Fr. 18 (Suppl.): 117. 1902.

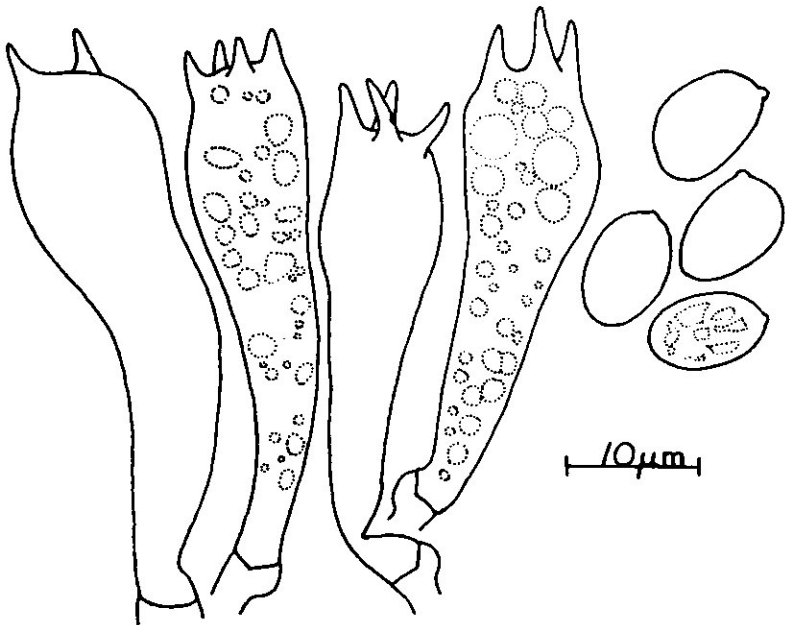
Hygrocybe pseudoconica Lange, Dansk. Bot. Årk. 4: 24. 1923.

Figs 90, 91.

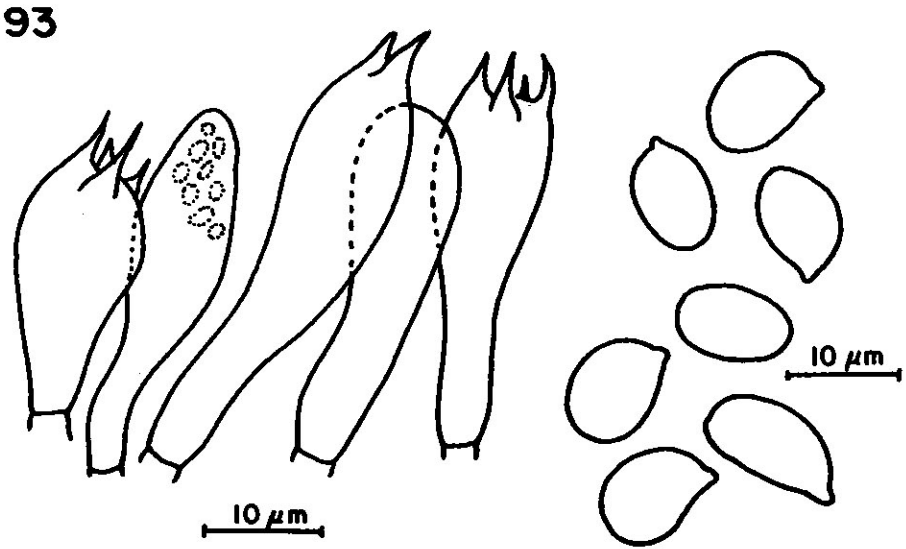
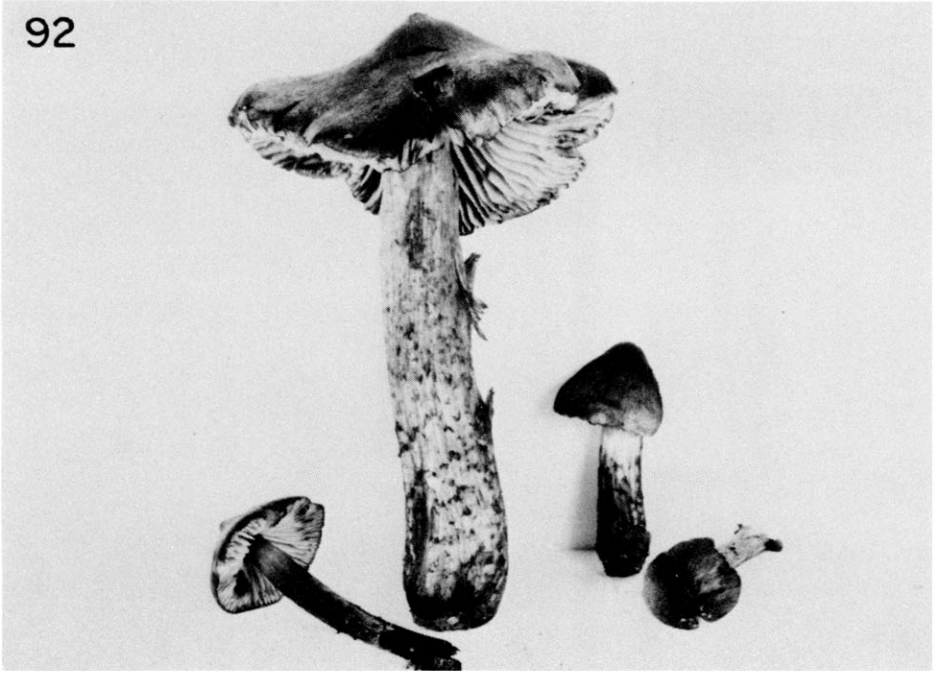
Basidiocarp: Pileus 0.5-4 cm broad, acutely to broadly conic, becoming obtuse, clasping the stipe at first, slightly viscid when fresh, soon resinous to dry and silky-fibrillose, lobster red (9E8) (ISCC 36) to paprika red (8B8) (ISCC 35) when young, fading in streaks to brick red (7D7) (ISCC 43) or drab orange, usually darker on disc, slowly staining gray to black with age or injury, drying dusky red to black; context thin (up to 5 mm on disc), usually hollow on disc, pale yellow to whitish, or hygrophanous and concolorous with the surface, bruising gray to black, fragile;



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Figs 90, 91. *H. conicus* var. *conicus*. Fig 90. ACAD 12125, X 1.0. Fig 91. ACAD 12125, basidia and spores.



Figs 92, 93. *H. conicus* var. *atosanguineus*. Fig 92. ACAD 10375, X .65; reproduced by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 52, pp. 1243-1247, 1974. Fig 93. ACAD 10375, basidia, basidioles, and spores.

odor absent; taste not distinctive or faintly reminiscent of hydrogen peroxide. Lamellae adnexed to nearly free, tangerine (6B8) (ISCC 50) or Persian orange (6A7) (ISCC 50) on faces, paling to yellowish on edges, blackening when injured, subdistant, thick, edges even to eroded. Stipe 2-7 cm long, 4-7 mm thick at apex, at times concolorous with the pileus but usually more yellow, paling to white at base, pallid yellow within, bruising gray to black in all parts, dry, longitudinally striate, equal, usually subcompressed and twisted, easily splitting, hollow.

Microscopic Structures: Spores 8-10 x 5-7 μm , short-elliptical, some approaching oblong, smooth, inamyloid. Basidia 27-46 x 9-12.5 μm , narrowly clavate, relatively short, mostly 4-spored, less frequently 2- and 3-spored in the same gill, the sterigmata stout, up to 5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama parallel, scarcely interwoven, the cells long (up to 200 μm), broad, and with yellow content; laticifers large, scattered. Cuticle a thin, poorly-organized ixocutis of slightly gelatinous brownish hyphae 3.5-7.5(9.5) μm broad. Pileal trama of radial, subparallel hyphae 8.5-39 μm broad, yellowish near the cuticle, with scattered laticifers; hypodermium absent. Clamp connections present in cuticle and upper pileal trama; the large hyphae of the pileal and gill tramas considerably overlapped at the septa but lacking true clamps.

Habit and Habitat: Scattered to gregarious, terrestrial in woods or burned-over forest.

Material Studied: ACAD 12125, Kejimikujik Lake, Annapolis Co., 28 June 1968.

Remarks: *Hygrophorus conicus* is characterized by its reddish, conic pileus and striate stipe which blacken with age or injury. In Nova Scotia, this species is unlikely to be confused with anything but *H. ruber*, which does not blacken and has a viscid, non-striate stipe when fresh. *H. conicus* is actually more common than it would seem from the single collection cited above, and is ubiquitous in temperate North America.

The prevailing number of spores per basidium and, consequently, the spore size varies greatly within the species (Hesler and Smith 1963). Lange (1940) reported only 2-spored basidia for typical *H. conicus*.

43. *Hygrophorus conicus* (Fr.) Fr.

Epicr. Myc., p. 331. 1838.

var. *atrosanguineus* Grund & Harrison

Can. J. Bot. 52: 1243-1244. 1974.

Figs 92, 93.

Basidiocarp: Pileus 1.5-7.0 cm broad, obtusely conic becoming subconic with arched margins at maturity; surface dry, appressed silky-fibrillose, slightly viscid when wet; margins first entire becoming deeply incised, lobed and rimose; dark strawberry red (10D8) (ISCC 13) to violet brown (10E8) (ISCC 16), becoming black when handled or bruised, soon blackening after picking; context thin, concolorous with the pileal surface; odor strongly aromatic, taste not distinctive. Lamellae adnexed; color mustard yellow (3B6) (ISCC 87) to grayish orange (6B6) (ISCC 53) in young specimens, becoming olivaceous ochre (4C7) (ISCC 88) at maturity, blackening upon bruising. Stipe 4.5-10 cm long, 3-10 mm thick, equal, twisted, fragile, and splitting longitudinally; surface subglabrous to minutely fibrillose, dry to moist, not viscid; color reddish orange (7B7) (ISCC 37) to mustard yellow (3B6) (ISCC 87) above, pallid at base; context yellow or concolorous with surface, fibrous, bruising black, hollow.

Microscopic Structures: Spores 8-10 x 5-6.5 μm , smooth, subellipsoid to ellipsoid, some pale yellow, others light brown in Melzer's reagent. Basidia 30-40 x 8-12 (13) μm , normally 4-spored, rarely 2-spored, clavate. Pleurocystidia and cheilocystidia absent. Lamellar trama of parallel hyphae 7-15 μm thick; laticifers present. Pileal surface an epicutis (dried material not rehydrating well in 3% KOH). Clamp connections present on hyphae of cuticle and lamellar trama.

Habit and Habitat: Singly in needle duff in Hemlock woods.

Material Studied: ACAD 10375, ravine 3 km east of Gaspereau, Kings Co., N.S. 24 July 1972.

Remarks: This rare variety has been collected once. The deep blood red pileus that turns black upon handling is striking and characteristic. It differs from *H. conicus* var *conicus* in the darker red pileus and strongly aromatic odor.

Series PUNICEI

Pileus viscid, not conic; stipe dry; lamellar trama parallel.

44. *Hygrophorus flavescens* (Kauff.) Sm. & Hes.

Lloydia 5:60. 1942.

Hygrophorus puniceus var. *flavescens* Kauff., Mich. Acad. Sci. Rep. 8: 34. 1906.

Hygrocybe flavescens (Kauff.) Singer, Lilloa 22: 154. 1951.

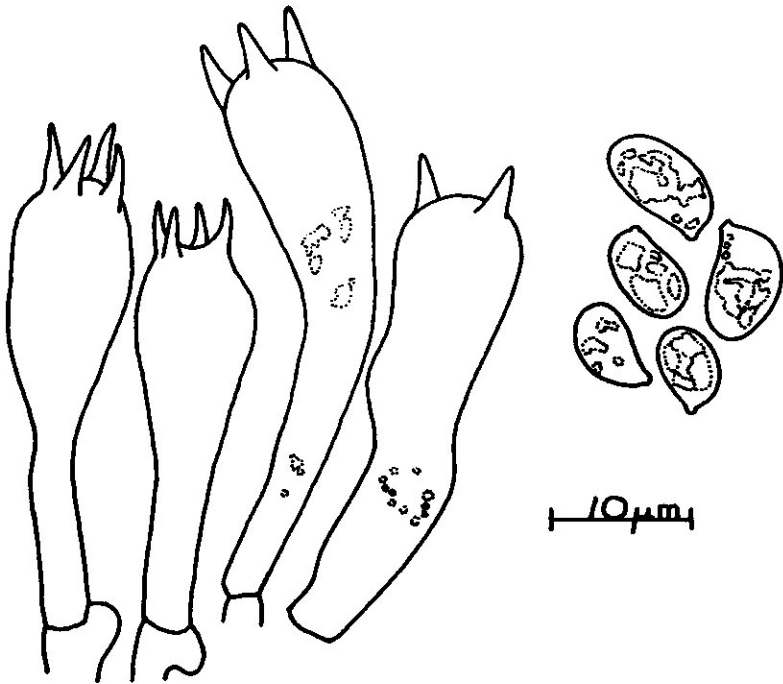
Figs 94, 95.

Basidiocarp: Pileus (0.6)1-5 cm broad, bluntly conic or hemispheric young, becoming broadly convex and then plane with a flat to pronounced umbo, or else slightly depressed, the margin persistently decurved, glutinous to viscid when fresh, drying dull satiny, margin faintly striate moist, copper red (7C8) (ISCC 37), brownish orange (6C8) (ISCC 54), tangerine (6B8) (ISCC 50) or dark orange (6A8) (ISCC 48) when young, soon fading on expansion to cadmium orange (5A8) (ISCC 66) or dark golden yellow (5B8) (ISCC 69), finally Chinese yellow (4B7) (ISCC 84), buttercup yellow (4A7) (ISCC 82), or genet (3A7) (ISCC 83), usually retaining orange hues on disc and margin; context thin and often hollow on disc (up to 2 mm thick), membranous over gills, pale yellow to yellow-orange, darker towards pellicle, or hygrophanous and wholly concolorous with the surface, brittle; odor and taste not distinctive. Lamellae adnexed to deeply emarginate, sometimes uncinata, in age seceding and occasionally appearing free, pale yellow-orange becoming yellow toward the edges, or uniformly buttercup yellow (4A7) (ISCC 82) to cream (4A3) (ISCC 89), pale yellow (2A3) (ISCC 104) in age, close to subdistant, 2-6(9) mm broad, edges even or eroded. Stipe (1.3)2-6.5 cm long, 2-10 mm thick at apex, concolorous with the pileus or paler, darkest over the middle, gradually pallid yellow to white at base, at times unilaterally splashed with darker orange or yellow-orange, pale yellow and hygrophanous within, glabrous and satiny, dry, becoming resinous after handling, narrowed above

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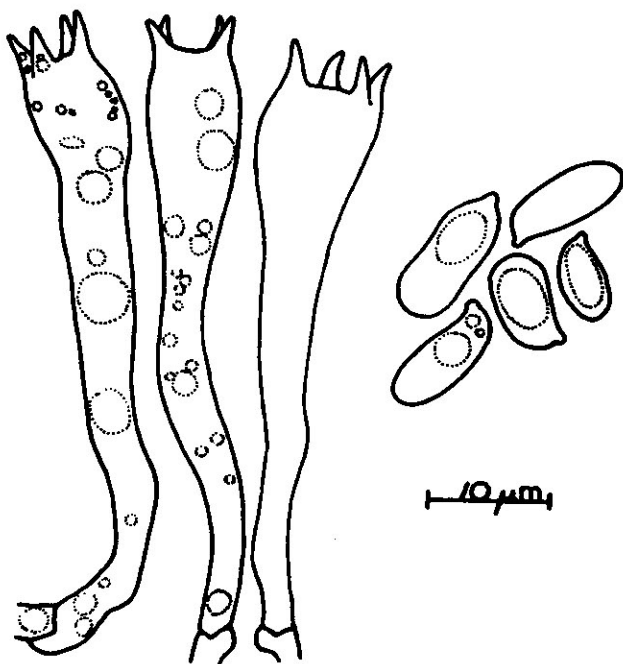
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Figs 94, 95. *H. flavescens*. Fig 94. ACAD 12138, X 1.0. Fig 95, ACAD 12103, basidia and spores.



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Figs 96, 97. *H. puniceus*. Fig 96. ACAD 12246, X 1.0. Fig 97. ACAD 12193, basidia and spores.

when young, later equal or slightly tapered downwards, at times subcompressed with a median longitudinal sulcus, easily splitting, at first stuffed, becoming hollow.

Macroscopic Structures: Spores (6)7-9.5(10.5) x (3.5)4.5-6 μm , short-elliptical or oblong-elliptical at maturity, occasionally broader at apicular end, smooth, inamyloid. Basidia 28-50 x 7-9.5 μm , clavate, slender to rather stout, mostly 4-spored, frequently 2- and 3-spored in the same gill, the sterigmata slender, up to 7 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of parallel or subparallel hyphae 3-18 μm broad, the mediostrate yellow, laticifers scattered. Cuticle an ixotrichodermium 60-300 μm deep, the hyphae gelatinized, more or less erect but some radial and interwoven, 1-6 μm broad, mostly about 2.5-3.5 μm , arising from a dense tangle of yellow hyphae transitional to the context. Pileal trama hyphae radial and subparallel, periclinal over the hymenium, yellowish near the cuticle, 5-15 μm broad; laticifers scattered throughout. Clamp connections frequent in the subhymenium and cuticle, scattered to rare in the gill trama mediostrate and the pileal trama.

Habit and Habitat: Scattered, gregarious, or subcespitate on damp soil in coniferous, mixed, or deciduous woods. Common.

Material Studied: ACAD 12103, ravine, Agriculture Experimental Station, Kenville, Kings Co., 27 Sept. 1967; ACAD 12126, Harrington Woods, Kings Co., 8 July 1968; ACAD 12129, Arlington, Kings Co., 4 July 1968; ACAD 12135, Shell Lake, Kings Co., 8 July 1968; ACAD 12136, Harrington Woods, Kings Co., 8 July 1968; ACAD 12138, 12139, Aldersville, Lunenburg Co., 10 July 1968; ACAD 12249, 12251, Moose River, Pictou Co., 14 Oct. 1968.

Remarks: *Hygrophorus flavescens* has frequently been confused with *H. chlorophanus* in Series *Psittacini*, because the stipe of the former tends to feel sticky after handling. However, sections of fresh material show no gelatinous hyphae on the stipe of *H. flavescens*. Two collections of *H. chlorophanus* from Nova Scotia, Wehmeyer 515 and 515a (Smith and Wehmeyer 1936) are now thought to be *H. flavescens* (A.H. Smith, in litt.).

The elongate, parallel hyphae of the pileal and lamellar tramas are intermediate between the *H. conicus* and *H. coccineus* types. This, plus the bluntly conic pileus of young sporocarps, indicates that *H. flavescens* may be related to Series *Conici*, or even transitional to that group. Because of the variable shape of the pileus this species may be keyed in both the Series *Punicei* and *Conici*.

Hygrophorus marchii is macroscopically similar to *H. flavescens* except for its red to orange color. Hesler and Smith (1963) suggested a close relationship between the two, but we find that *H. marchii* does not display the *H. conicus* type of hyphal arrangement to the same degree as *H. flavescens*, and has a definite ixocutis instead of an ixotrichodermium.

45. *Hygrophorus puniceus* (Fr.) Fr.

Epicr. Myc., p. 331. 1838.

Agaricus puniceus Fr., Syst. Myc. 1: 104. 1821.

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

Hydrocybe punicea (Fr.) P. Karst., Bidr. Finl. Nat. Folk 32: 235. 1879.

Figs 96, 97.

Basidiocarp: Pileus 1.5-5 cm broad, bluntly conic-convex at first, becoming obtuse to planoconvex and subumbonate, margin persistently decurved, viscid, soon drying dull to glossy, appressed fibrillose, deep blood red when moist, fading in radial streaks to copper red (7C8) (ISCC 37), brownish orange (6C8) (ISCC 54), or tangerine

(6B8) (ISCC 50); context thick (4.5-7 mm) on disc, abruptly thinning toward margin, butter yellow (4A5) (ISCC 86) to champagne (4B4) (ISCC 90) often tinged sordid pale orange, soft, fragile; odor and taste not distinctive. Lamellae adnate young, soon deeply emarginate or adnexed, usually with a decurrent tooth, pallid yellow when young, later amber yellow (4B6) (ISCC 87) or corn (4B5) (ISCC 71), often flushed with pale orange, occasionally entirely rosy or grayish orange (6B5) (ISCC 53), glaucous, broad at maturity (up to 10 mm), subdistant, thick, brittle, edges even or eroded. Stipe 2-7 cm long, 5.5-9.5 mm thick at apex, sienna (6D7) (ISCC 54) above, gradually yellowish downwards, soon yellow overall and streaked with orange, whitish at base, light yellow within, dry, more or less fibrillose-striate, narrowed above when young, later subequal or tapering downwards, occasionally flexuous, stuffed at first, soon hollow.

Microscopic Structures: Spores (8)8.5-12.5(13.5) x 4-6 μm , elliptical in dorsal aspect, at times long-obovate or subconstricted in the middle, smooth, inamyloid. Basidia 44-61 x 7-8.5 μm , long-clavate, slender, 4-spored, rarely 2-spored in the same gill, the sterigmata up to 6 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel hyphae 2.5-18.5 μm broad; laticifers frequent, 2.3-6 μm broad. Cuticle an ixocutis (45) 250-480 μm deep, of radial, interwoven, more or less appressed gelatinous hyphae 2.3-3.5 μm broad. Pileal trama radial, slightly interwoven, the hyphae yellowish, inflated, 3.5-21 μm broad. Clamp connections present in the cuticle, gill trama and pileal trama.

Habit and Habitat: Solitary to gregarious on soil or leaf mold in mixed woods. Frequent.

Material Studied: ACAD 12193, Perry Road, Yarmouth Co., 22 Sept. 1968; ACAD 12246, Moose River, Pictou Co., 14 Oct. 1968.

Remarks: It is important to check for a gelatinous cuticle in both fresh and dried material. Often, a specimen will have all the macroscopic and microscopic attributes of *H. puniceus* except for a viscid pellicle. Such specimens belong in the *H. puniceus*-*H. coccineus* complex. (See *Complexes*, p.).

Hygrophorus coccineus resembles *H. puniceus* in habitat, stature, and color, but the pileus of the former species is moist to dry and the lamellae are persistently adnate. It also occurs much less commonly than *H. puniceus*. Spore size and/or color of the stipe base have been used to distinguish the two (Kauffman 1918; Krieger, 1935; Wakefield and Dennis 1950), but these features are variable and intergrading, or only slightly different at best. Spore shape is a more reliable feature, being elliptical in *H. coccineus* and oblong-elliptical or approaching subfusiform in *H. puniceus*.

Hygrophorus marchii is also close to *H. puniceus*, but is a smaller, more slender species with only a very thin gelatinous pellicle and differently-shaped spores. (See *H. marchii* for a more detailed comparison).

Hesler and Smith (1963) noted that spore size in *H. puniceus* varies considerably within 4-spored forms, and that the variability is augmented by the existence of 1-, 2-, and 3-spored forms.

46. *Hygrophorus marchii* Bres.

Icon. Myc. 7: 343. 1928.

Hygrocybe marchii (Bres.) Singer, Lilloa 22: 153. 1951.

Figs 98, 99.

Basidiocarp: Pileus 1-2 cm broad, planoconvex or the disc depressed, viscid but soon dry, glabrous, margin translucent-striate moist, scarlet at first, unevenly fading

red-orange to yellow; context thin (up to 1 mm on disc), yellow, fragile; odor and taste not distinctive. Lamellae adnate and uncinatae, yellow-orange to orange, subdistant, thin, edges even. Stipe 3-4 cm long, 2.5-3.5 mm thick at apex, yellow-orange above, elsewhere concolorous with the pileus, yellow within, glabrous, nonviscid, equal, terete, hollow.

Microscopic Structures: Spores (6.5)7-11(12) x 4-6(7.5) μm , ellipsoidal to oblong, at times slightly constricted in middle, or pear-shaped, smooth, inamyloid. Basidia 29-55 x 6.5-10 μm , clavate to long-clavate, generally rather short, 2- and 4-spored, rarely 1- and 3-spored in the same gill; sterigmata slender, up to 7 μm long in 4-spored basidia, to 9.5 μm long in 2-spored basidia. Brachybasidioles rare and localized, 41-47 x 11-15 μm , sphaeropedunculate. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel hyphae 3-18.5 μm broad, with scattered laticifers 1-2.5 μm broad. Cuticle a thin ixocutis 13-86 μm deep, of radial, repent, gelatinous hyphae 1-3 μm broad. Pileal trama of radial and slightly interwoven hyphae 2-22 μm broad, brownish near the cuticle as revived in KOH; hypodermium absent. Clamp connections present in the gill trama, cuticle and pileal trama.

Habit and Habitat: Scattered in mixed woods. Rare.

Material Studied: ACAD 12255, Moose River, Pictou Co., 14 Oct. 1968.

Remarks: Except for the red color and the pellicle being an ixocutis instead of an ixotrichodermium, *H. marchii* as treated here is almost identical with *H. flavescens*. Perhaps it should be regarded as a color variant of that species, as our specimens are more slender than those illustrated by Bresadola (1928) and Hesler and Smith (1963). However, stature is an arbitrary and variable feature, and further collecting may yield stouter, more typical specimens.

Hygrophorus marchii is rather difficult to separate from *H. puniceus*. Hesler and Smith (1963) used depth of cuticle in their keys, contrasting the well-developed (at least 50 μm thick) pellicle of *H. puniceus* with the thin (10-25 μm) pellicle of *H. marchii*. In our experience, the *H. marchii* pellicle may be only 13 μm thick near the margin, but nearly 90 μm thick on the depressed, moist disc where the gluten accumulates or is better developed. However, even 90 μm is too thin for a typical *H. puniceus* pellicle. We find the spores are a good distinguishing feature, being broader for their length and more frequently oblong-constricted in *H. marchii*. The combination of stature, pellicle thickness, and spore shape seems to be a satisfactory means of correct identification.

Subsection HYGROCYBE

Pileus and stipe moist or dry, not viscid; lamellar trama parallel.

Series MARGINATI ser. nov.

Pileus conicus.

Species typica: *H. marginatus* Pk.

47. *Hygrophorus marginatus* Pk. var. *marginatus*

N.Y. State Mus. Ann. Rep. 28: 50. 1876.

Hydrocybe marginata (Pk.) Murr. N. Am. Flora 9: 378. 1916.

Tricholoma marginatum (Pk.) Singer, Mycologia 35: 154. 1943.

Humidicutis marginata (Pk.) Singer, Sydowia 12: 225. 1958.

Figs 100, 101.

Basidiocarp: Pileus (0.2)0.5-4 cm broad, hemispheric to bluntly conic young, later broadly conic, obtuse, or convex, at times plane and umbonate with uplifted margin, glabrous, hygrophanous, slightly resinous when moist, margin at times obscurely striate moist, reddish orange (7A8) (ISCC 34) when young and moist, soon fading to cadmium orange (5A8) (ISCC 66), melon yellow (5A6) (ISCC 70), buttercup yellow (4A7) (ISCC 82) or a pale, diffuse orange, the disc and margin usually fading last; context thin (to 2 mm on disc), usually hollow on disc, fragile, whitish to pale yellow, hygrophanous, becoming concolorous with the surface towards the cuticle; taste and odor not distinctive. Lamellae ascending-adnate, becoming adnexed or emarginate in age, often uncinatate, reddish orange (7A8) (ISCC 34) to dark orange (6A8) (ISCC 48), fading more slowly than the pileus and the color persisting at least on the edges, thick, subdistant, becoming moderately broad (1-6 mm), brittle, edges even or eroded. Stipe (0.7) 1-4.5 cm long, 1.5-8 mm thick at apex, at first dark orange (6A8) (ISCC 48) above, paling downwards to whitish, soon uniformly melon yellow (5A6) (ISCC 70) to butter yellow (4A5) (ISCC 86), pallid yellow to whitish within, glabrous, not viscid, very fragile, hollow, subequal, at times slightly compressed, often flexuous.

Microscopic Structures: Spores (6.5)7-11.5 x 4.5-6(7) μm , shape variable, subglobose to short-elliptical, at times attenuated to apiculus, smooth, inamyloid. Basidia 22-46 x 8-9.5 μm , clavate, relatively short and stubby, much narrowed or bifurcate at base, 1-, 2-, and 4-spored in varying proportions; basidioles clavate, rarely cylindrical. Pleurocystidia and cheilocystidia absent. Gill trama subparallel, the cells 9.5-119 x 5.5-14 μm , slender to inflated, often short and cyst-like, laticifers frequent, branched, 2.3-4.5 μm broad. Cuticle a thin epicutis of radial, nongelatinous hyphae, generally repent but frequently detached or reflexed, 2.5-8 μm broad, merging with the context hyphae. Pileal trama of radial, subparallel hyphae, similar to gill trama hyphae, with scattered, branched laticifers 3-6 μm broad; hypodermium absent. Clamp connections frequent at the bases of the basidia but absent in the gill trama, the cuticle, and the pileal trama.

Habit and Habitat: Gregarious in damp soil, humus, or *Sphagnum*, in mixed or deciduous woods.

Material Studied: ACAD 12149, Aylesford Lake, Kings Co., 30 July 1968; ACAD 12152, Hebb's Cross, Lunenburg Co., 4 Aug. 1968; ACAD 12178, Aylesford Lake, Kings Co., 30 Aug. 1968; ACAD 12183, ravine, Agriculture Experimental Station, Kentville, Kings Co., 10 Sept. 1968.

Remarks: The most distinctive feature of this species is the brilliant orange hymenophore which retains its color after the pileus fades or after the fungus has been dried. Also, the stipe is more fragile than is usual in section *Hygrocybe*, and breaks or splits unless handled very carefully. Since the pileus may be either conic or convex, the fungus may be keyed in both Series *Marginati* and *Coccinei*.

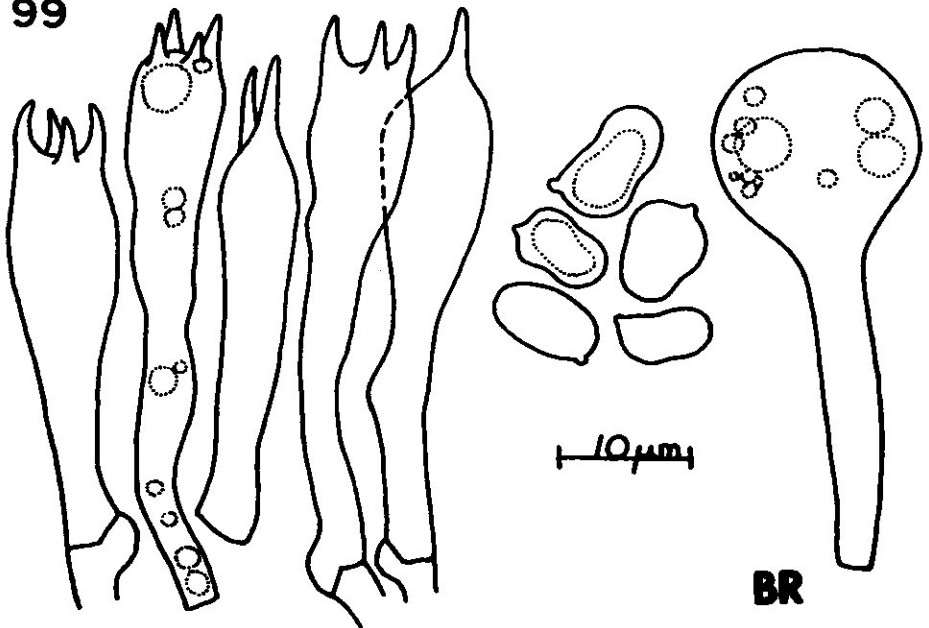
Spore size varies considerably within the species, depending on the prevailing number of spores per basidium. For example, in ACAD 12149, the basidia are typically 4-spored and occasionally 2-spored with spores 6.5-8.5(9.5) μm long. In ACAD 12152, the basidia are usually 1- or 2-spored and rarely 4-spored, with spores 8-11.5 μm long. Thus, spore size is not a reliable diagnostic feature. However, except

Figs 98, 99. *H. marchii*. Fig 98. Smith 63713, X 1.25; 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 99. ACAD 12255, basidia, spores, and brachybasidiole (BR); 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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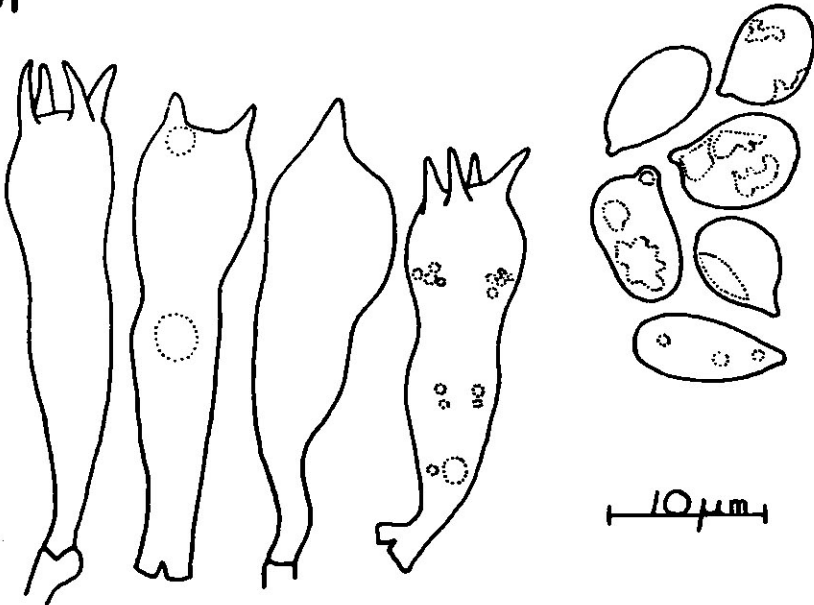


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101



Figs 100, 101. *H. marginatus* var. *marginatus*. Fig 100. Smith 63764, X 1.25. Fig 101. ACAD 12149, basidia and spores.

for the number of sterigmata, basidium morphology seems consistent and distinctive.

Clamp connections, regarded by most authors as absent, occur frequently at the bases of the basidia. Absence of clamps was a diagnostic feature of *Humidicutis*, erected by Singer (1958) to accommodate this and several other species.

48. ***H. marginatus* Pk.**

N.Y. State Mus. Rep. 28: 50. 1878.

var concolor Sm.

Pap. Mich. Acad. Sci., Arts, and Lett. 38: 59. 1953.

Fig 102.

Basidiocarp: Pileus 1.5-3 cm broad, conic, glabrous, moist and hygrophanous to subviscid when wet, striatulate at margin, orange-yellow (4A8) (ISCC 82) becoming butter yellow (4A5) (ISCC 86) in age; context brittle, thin, concolorous; odor and taste lacking. Lamellae adnate, distant, melon yellow (5A6) (ISCC 70). Stipe 3-5 cm long, 4-7 mm thick, equal, Chinese yellow (4B7) (ISCC 84), glabrous; context brittle, concolorous, becoming hollow.

Microscopic Structures: Spores 8-10 x 6-7 μm , subellipsoid to ovoid, thin-walled. Basidia 30-40 x 7-9 μm , subcylindric to long-clavate; some basidioles cystidioid. Pleurocystidia and cheilocystidia absent. Lamellar trama parallel centrally, tending to become interwoven beneath hymenium. Pileal surface undifferentiated, of thin, interwoven, non-gelatinous hyphae. Clamp connections not observed.

Habit and Habitat: Scattered at edges of swamps.

Material Studied: ACAD 12437, Aylesford Lake, Kings Co., 18 Sept. 1977.

Remarks: This beautiful *Hygrophorus* was locally abundant in the vicinity of Aylesford Lake in autumn of 1977, but had not been collected previously in the province. The lamellae are paler than in the type variety, wherein they are persistently deep orange. Its affiliation with the type variety is evident in the conic pileus and fragile stipe, the relatively stubby basidia, and the structure of the lamellar trama.

Series HYGROCYBE

Pileus convex to depressed, fibrillose-scurfy to squamulose on the disc at maturity, not viscid; stipe dry; lamellar trama parallel.

49. ***Hygrophorus cantharellus* (Schw.) Fr.**

Epicr. Myc., p. 329. 1838.

Agaricus cantharellus Schw., Schr. Nat. Ges. Leipzig 1: 88. 1822.

Camarophyllus cantharellus (Schw.) Murr., N. Am. Flora 9: 388. 1916.

Hydrocybe cantharellus (Schw.) Murr., Mycologia 3: 196. 1911.

Figs 103, 104.

Basidiocarp: Pileus 0.5-3 cm broad, convex young, soon convex-umbilicate, at times depressed and the margin recurved at maturity; moist to dry, becoming fibrillose-scurfy to minutely squamulose on or around disc, the detached fibrils concolorous with or paler than the pileus, elsewhere glabrous to appressed fibrillose, margin at times translucent-striate, brownish red (10C8) (ISCC 13) when young and fresh,

fading slowly and unevenly to tangerine (6B8) (ISCC 50), light orange, and finally yellow-orange; context thin (1-1.5 mm on disc), pale yellow to yellow-orange, darker under the cuticle, at times whitish on disc, fragile; odor and taste not distinctive. Lamellae decurrent, pale yellow, sometimes flushed orange, subdistant, thin, narrow to broad (1-5 mm), brittle, edges even or eroded. Stipe (1.3) 3-7.5 cm long, 2-8 mm thick at apex, concolorous with the pileus or paler, sometimes fading more slowly and then darker than the pileus, base pallid orange to yellow, or whitish from a coating of mycelium, glabrous, not viscid, satiny to nacreous, rarely pruinose, equal or slightly enlarged above, terete or subcompressed; context stuffed to hollow, pale yellow to yellow-orange, or else concolorous with exterior with a pale yellow to whitish pith.

Microscopic Structures: Spores 7-11(15.5) x 4.5-7.5(9) μm , short-elliptical, smooth, inamyloid. Basidia 34-68 x (4.5)7.5-13 μm , long-clavate, mostly 4-spored, rarely 1-, 2-, or 3-spored in the same gill, the sterigmata large, stout, 6-10.5(18.5) μm long. Pleurocystidia and cheilocystidia absent. Gill trama subparallel to rather interwoven, the hyphae 3.5-35 μm broad, narrow to inflated, usually yellow within. Cuticle a narrow zone of nongelatinous, colorless to pale brown hyphae, slightly narrower than the context hyphae, radial, repent or reflexed in squamules, the terminal cells cylindrical and sometimes incrustated with amorphous brown matter. Pileal trama radial and slightly interwoven, the hyphae 4-38 μm broad, slender to inflated, yellow-brown near the cuticle, yellow to colorless elsewhere; hypodermium absent. Clamp connections present in the cuticle, gill trama, and pileal trama.

Habit and Habitat: Solitary, gregarious, or subcespitate on soil or leaf mold in mixed woods; occasionally among grass or mosses on sandy soil. Frequent.

Material Studied: ACAD 12124, Aldersville, Lunenburg Co., 26 June 1968; ACAD 12164, Aylesford Lake, Kings Co., 17 Aug. 1968; ACAD 12169, Cape Split, Kings Co., 22 Aug. 1968; ACAD 12256, Moose River, Pictou Co., 14 Oct. 1968.

Remarks: This species differs from *H. miniatus* var. *miniatus* mainly in its usually more slender stature, its decurrent lamellae, and its larger spores. The larger, stouter sterigmata are also characteristic, but this distinction between *H. cantharellus* and *H. miniatus* may not be readily apparent unless material of both species is available for comparison.

Hygrophorus cantharellus is a variable species. Peck (1901; 1907) separated var. *flavipes*, var. *flaviceps*, var. *flava*, and var. *roseus*. The first three are color forms which Hesler and Smith (1963) evidently regarded as variations of the normal fading pattern of the sporophore. Var. *roseus* is a type with a wavy, uplifted margin, such as may occur in old, expanded pilei. Our collections indicate that the general aspect of the fungus depends greatly on weather and habitat; thus, any local *Hygrophorus* with a red to yellow-orange, scurfy, umbilicate cap and pale yellow, decurrent lamellae should be suspected of being *H. cantharellus*, and the identification should be confirmed by measurements of spores and basidia.

Murrill (1916) placed *H. cantharellus* in the genus *Camarophyllus*, presumably because of the occasionally interwoven lamellar trama. However, the tramal hyphae are broad and inflated compared with the narrow, uniform hyphae typical of lamellar trama in Section *Camarophyllopsis*. Moreover, *H. cantharellus* has all the macroscopic attributes of Series *Hygrocybe*, and is too close to *H. miniatus* to be segregated in a different section.

Kauffman (1918) discussed this species as *H. miniatus* var. *cantharellus* Schw., and stated that it intergrades with *H. miniatus* (See also Complexes, p.).

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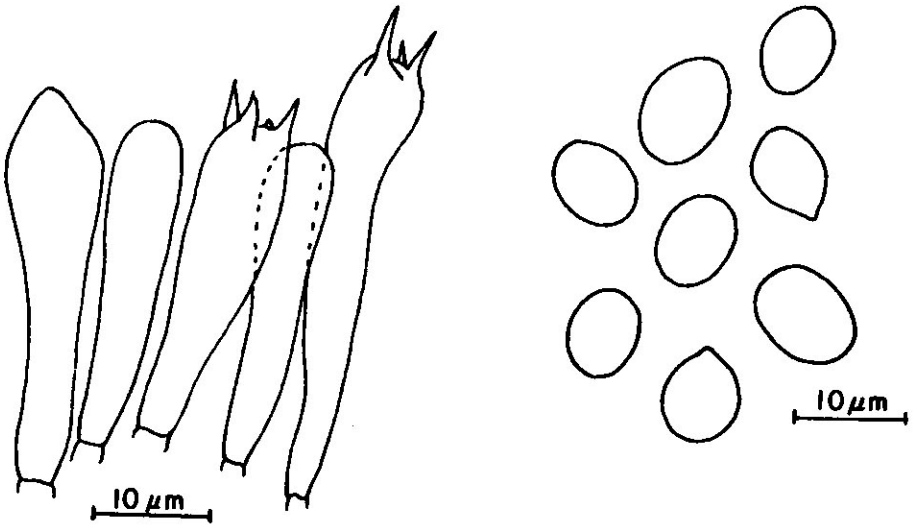
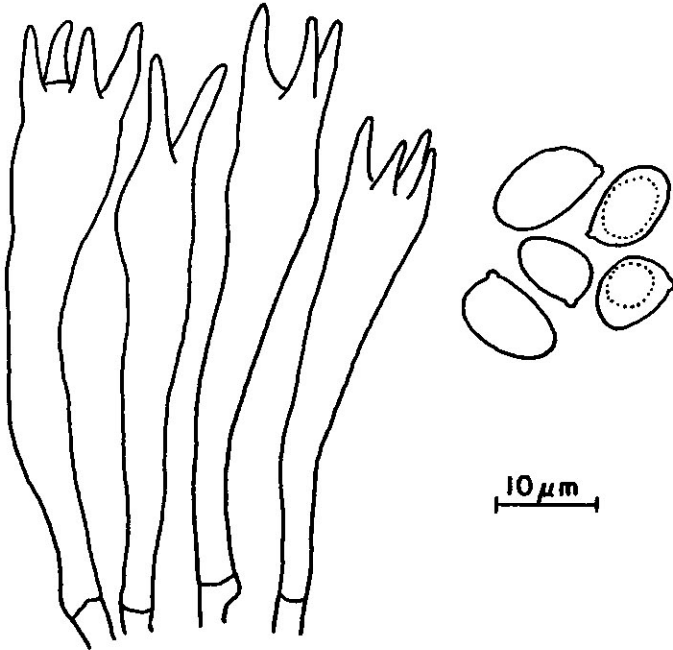


Fig 102. *H. marginatus* var. *concolor*. ACAD 12437, basidioles, basidia, and spores.



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Figs 103, 104. *H. cantharellus*. Fig 103. Smith 63554, X 1.25. Fig 104. ACAD 12164, basidia and spores.

50. *Hygrophorus miniatus* (Fr.) Fr. var. *miniatus*

Epicr. Myc., p. 330. 1838.

Agaricus miniatus Fr., Syst. Myc. 1: 105. 1821.*Hygrocybe miniata* (Fr.) Kummer, Führ. in Pilzk., p. 112. 1871.*Hygrophorus congelatus* Pk., N.Y. State Cab. Ann. Rep. 23: 114. 1873.*Hygrophorus flammans* Schroeter, Die Pilze Schliesens 31: 528. 1889.*Hygrophorus miniatus* var. *congelatus* Pk., N.Y. State Mus. Bull. 116: 61. 1907.*Hydrocybe constans* Murr., Mycologia 4: 208. 1912.*Hygrophorus constans* Murr., Mycologia 4: 217. 1912.*Hydrocybe flammea* (Scop.) Murr., N. Am. Flora 9: 381. 1916.*Hygrophorus miniatus* Fr. var. *typicus* Sm. & Hes., Lloydia 5: 28. 1942.

Figs 105, 106.

Basidiocarp: Pileus 0.5-2.5 cm broad, at first convex or the disc flattened, margin incurved, later planoconvex to depressed, at times umbilicate, becoming fibrillose-scurfy or squamulose at least on disc, margin sometimes faintly translucent-striate or crenate; paprika red (8B8) (ISCC 35) to reddish orange (7A8) (ISCC 34) when young and moist, and then appearing glabrous to appressed fibrillose, fading to orange or yellow or mixtures of these; context thin (0.5-2.5 mm on disc) hygrophanous and concolorous with surface, or else pale yellow to yellow-orange, darker beneath cuticle, fragile; odor and taste not distinctive, or else odor earthy. Lamellae broadly adnate to subdecurrent, usually becoming adnexed, at times deeply emarginate or unciniate, light yellow, often flushed pale orange, narrow when young, becoming broad (1-6.5 mm), subdistant to rather close, thick, brittle, edges even or eroded. Stipe 2-6 cm long, 1.5-5 mm thick at apex, brownish orange (6C8) (ISCC 54) or tangerine (6B8) (ISCC 50) above, becoming yellow downwards, or else orange below and paler above, fading overall to maize yellow (4A6) (ISCC 83), whitish at base, pale yellow or yellow-orange within, glabrous, not viscid, nacreous when moist, equal or narrowed downwards, terete or subcompressed above, stuffed, becoming hollow.

Microscopic Structures: Spores (6)7-10(11.5) x 4-6(7.5) μm , short-elliptical, oblong-elliptical or ovate, smooth, inamyloid. Basidia 29-45 x 6-8 μm , clavate, slender, mostly 4-spored but rare to occasional 1-, 2-, and 3-spored basidia occurring in the same gill, the sterigmata slender, up to 7.5 μm long. Pleurocystidia and cheilocystidia absent. Gill trama subparallel with a yellowish mediostrate, the cells 42-231 x 11-16 μm , with slender hyphae 1.5-4.5 μm broad interspersed. Cuticle a narrow zone of compact, radial, yellow hyphae, nongelatinous, narrower than the context hyphae, repent, or reflexed to form squamules, the terminal cells cylindrical or tapered, or rarely clavate. Pileal trama radial and subparallel, colorless to pale yellow, the cells 32-172 x 17-30 μm , with slender hyphae 2.5-5.5 μm broad interspersed; hypodermium absent. Clamp connections small and inconspicuous, present in the cuticle and the gill trama, infrequent in the pileal trama.

Habit and Habitat: Scattered to gregarious and subcespitate, usually among *Sphagnum* or other mosses; in bogs or swales; often among ferns (*Osmunda* spp) under conifers. Common.

Material Studied: ACAD 12160, Hebb's Cross, Lunenburg Co., 9 Aug. 1968; ACAD 12167, Hebb's Cross, Lunenburg Co., 19 Aug. 1968; ACAD 12187, 12188, Gaspereau Valley, Kings Co., 16 Sept. 1968.

Remarks: *Hygrophorus miniatus* var. *miniatus* is a common and variable species recognized by its red to orange, scurfy pileus and its adnate to adnexed gills. Its close relative *H. cantharellus* is similar but more slender, and has strongly decurrent gills. For additional comments on the 2 species, see the *H. miniatus*-*H. cantharellus* complex. (*Complexes*, p. 11).

The name *miniatus* has been applied to another species of *Hygrophorus*, which will cause confusion unless descriptions accompany the records. Murrill (1916) described *Hydrocybe miniata* (Scop.) Murr. as having a viscid pileus, and listed *Hygrophorus miniatus* Schroet., among others, as a synonym. Because of the viscid pileus, neither of these epithets can be considered synonymous with *H. miniatus* as treated here. (See also *H. coccineus*).

Series COCCINEI (Fayod) Hes. & Sm.

N. Am. Spec. of *Hygrophorus*, p. 171. 1963.

Pileus convex to depressed, glabrous or appressed fibrillose, not viscid; stipe dry; lamellar trama parallel.

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

51. *Hygrophorus nitiosus* Blytt

Norges Hymenomycetes. Vidensk. Selsk. Skr. I. Math. Naturv. Kl. 1904.
No. 6. p. 88. 1905.

Hygrocybe ingrata Jensen & Moeller, Fungi of the Faeröes, p. 136. 1945.

Hygrocybe nitiosa (Blytt) Moser apud Gams, Kleine Kryptogamenfl. von Mitteleuropa, p. 37. 1953.

Figs 107, 108.

Basidiocarp: Pileus 1-2 cm broad, hemispheric, expanding slightly, dry, obscurely fibrillose-scaly or with some of the fibrils recurved near the disc; teak brown (6F5) (ISCC 78), paling to tan (6E6) (ISCC 58) on margin; context 1-2 mm thick on disc, membranous over gills, brownish-white, slowly staining light pinkish brown when injured odor; nitrous; taste acidulous, then of hydrogen peroxide. Lamellae deeply emarginate, seceding, whitish, slowly bruising pinkish brown to dark brown, subdistant, broad (2-4 mm), thick and brittle. Stipe 3.5-5 cm long, 4-7 mm thick at apex, dingy brownish, slowly bruising dark brown, staining light brownish within, drying dark brown, dry, glabrous, equal or slightly expanded above, usually subcompressed or with a median longitudinal sulcus, easily splitting, stuffed to hollow.

Microscopic Structures: Spores 7.5-10 x 4-5.5 μm , ellipsoidal, smooth, inamyloid. Basidia 32-45 x 7-10.5 μm , clavate, stout at first, becoming slender, mostly 4-spored, with 2- and 3-spored basidia frequent in the same gill, the sterigmata slender, to 7 μm long. Hymenial cystidia absent. Gill trama subparallel. Cuticle of dry, brownish hyphae, repent or reflexed in squamules, the terminal elements cystidioid. Pileal trama radial and subparallel; hypodermium not seen. Clamp connections on hyphae of cuticle and gill trama.

Habit and Habitat: Scattered in grassy clearing. Rare.

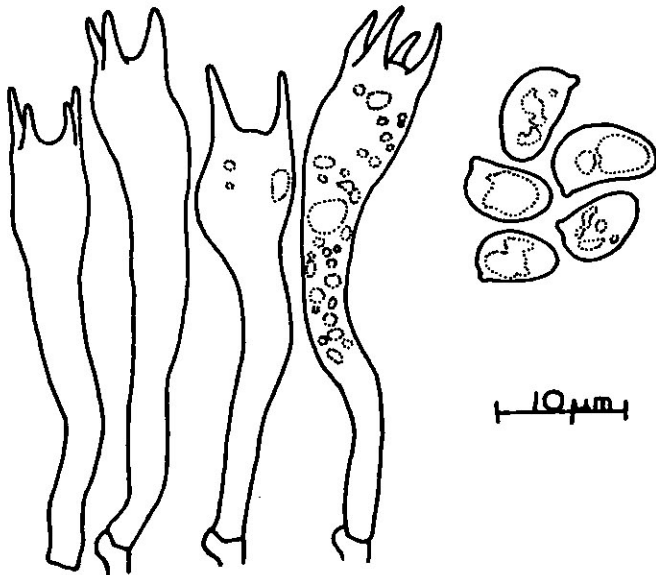
Material Studied: ACAD 12137: Aylesford, Kings Co., 7 July 1968.

Remarks: *Hygrophorus nitiosus* is readily distinguished by its brown, coarsely fibrillose pileus, its nitrous odor, and the slow color change of its flesh to brownish when injured. It stands between *H. nitratus* Fr., which has a nitrous odor but does not stain on injury, and *H. ovinus* (Fr.) Fr., that lacks a nitrous odor but bruises. Neither of the latter two species has yet been found in Nova Scotia.

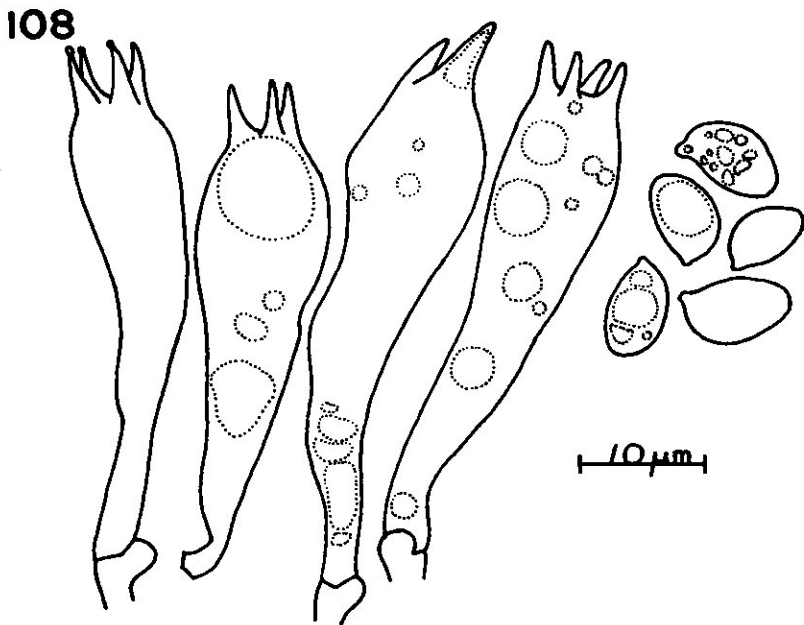
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Figs 105, 106. *H. miniatus* var. *miniatus*. Fig 105. ACAD 12160, X 1.25. Fig 106. ACAD 12160, basidia and spores.



Figs 107, 108. *H. nitiosus*. Fig 107. ACAD 12137, X 1.5. Fig 108. ACAD 12137, basidia and spores; redrawn by permission of the National Research Council of Canada from the *Canadian Journal of Botany*, 48, pp. 403-411, 1970.

Because the surface fibrils sometimes recurve near the disc, *H. nitiosus* also may be keyed in Series *Hygrocybe*. However, the pileus disc does not become truly squamulose or fibrillose-scurfy as in *H. nitratus* and other species of Series *Hygrocybe*.

Note that *H. conicus*, which bruises gray to black, may also taste like hydrogen peroxide.

52. *Hygrophorus coccineus* (Fr.) Fr. *sensu* Ricken

Die Blätterpilze, Band 1, p. 23. 1915.

Agaricus coccineus Fr., Syst. Myc. 1: 105. 1821.

Hygrophorus coccineus (Fr.) Fr. Epicr. Myc., p. 330. 1838.

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

Figs 109, 110.

Basidiocarp: Pileus 1-2.5 cm broad, broadly conic to convex, eventually plane and umbonate with margin uplifted, glabrous, not viscid; strawberry red (10D8) (ISCC 13) when young, fading to orange; context thin (2-3 mm on disc), pale yellow to yellow-orange, or hygrophanous and concolorous with the surface, slowly grayish in FeSO_4 , fragile; odor and taste not distinctive. Lamellae adnate, at times seceding, Pompeian red (9C7) (ISCC 15) to dull peach, paling toward edges to yellow, subdistant, thick, broad (2-4.5 mm), brittle, edges even. Stipe 0.5-4 cm long, 2-6 mm thick at apex, buttercup yellow (4A7) (ISCC 82) splashed with strawberry red (10D8) (ISCC 13), whitish at base from a thin coating of mycelium, maize yellow (4A6) (ISCC 83) within, dry or moist, glabrous, uneven from irregular, shallow indentations, straight or twisted, hollow.

Microscopic Structures: Spores 8-10.5(11) x 4.5-6 μm , ellipsoidal, smooth, inamyloid. Basidia 38-61 x 8-10.5 μm , long-clavate, 4-spored, the sterigmata stout, up to 6 μm long. Pleurocystidia and cheilocystidia absent. Gill trama of subparallel hyphae 4-18.5 μm broad. Cuticle of repent, radial, nongelatinous hyphae 2.3-6 μm broad, little differentiated from the context. Pileal trama of radial, subparallel to slightly interwoven hyphae 5-17.5 μm broad. Clamp connections present on the hyphae of the cuticle, gill trama, and pileal trama.

Habit and Habitat: Gregarious to subcespitose on soil under hemlocks and other conifers. Rare.

Material Studied: ACAD 12100, ravine, Agricultural Experimental Station, Kentville, Kings Co., 23 Sept. 1967.

Remarks: This species resembles *H. puniceus* in color, stature, habitat and spore size. The major feature distinguishing the two is the absence of a viscid cuticle in *H. coccineus*, supported by arbitrary and variable characteristics such as smaller size, typically adnate gills, and slightly smaller spores. However, we found that specimens with nearly all the macroscopic attributes of *H. puniceus* frequently lacked the viscid cuticle, yet could not be *H. coccineus* because of robust stature, and basidia and overly large spores typical of the 1-, 2-, and 3-spored forms of *H. puniceus*. (see *Complexes*, The *H. puniceus*-*H. coccineus* complex for detailed discussion). Thus, it is important to examine the cuticle and basidia carefully, and consider a combination of macroscopic features before deciding the correct name. Hesler and Smith (1963) noted that *H. puniceus* is a common and variable species, whereas *H. coccineus* is rare.

Of the two earlier collections labelled *H. coccineus* in the E.C. Smith herbarium, Acadia University, ACAD 1595 (Marshalltown, Digby Co., 18 Sept. 1952) has proved

to be one of the *H. puniceus*-*H. coccineus* complex because of the large, oblong-elliptical spores on 1- and 2-spored basidia. The other collection, ACAD 9781 (New Albany, Annapolis Co., 19 Aug. 1966), appears to be *H. miniatus* var. *miniatus* because of its slender stature and the depressed, scurfy pileal disc of the most mature specimen. As no field notes exist for the latter collection, and as we have seen too little of *H. coccineus* in Nova Scotia to be familiar with its general appearance here, we hesitate to exclude this collection completely from consideration.

Murrill (1916) relegated *H. coccineus* Fr. to synonymy with *Hydrocybe miniata* (Scop.) Murr. (not a synonym of *H. miniatus* var. *miniatus* as treated in this work). As he described the pileus as viscid, his nomenclature is questionable with respect to both species. Hence, we adopt the concept of *H. coccineus* established by Ricken (1915).

53. *Hygrophorus macrosporus* sp. nov.

Figs 111, 112.

Pileus 3 cm latus, convexus, glaber, non viscidus, flavo-aurantiacus, in sulphate ferri tarde fuscescens; caro tenuis, fragilis, flavida, odore et sapore miti. Lamellae liberae, flavae, aurantiacis pallidis suffusae, subdistantes et latae (6 mm). Stipes 7 cm longus, 7 mm crassus, glaber vel leviter striatus, pileo concolorus; caro flavida, cava. Sporae 12.5-16.5(18) x 6.5-9.5(11) μ m, ellipticae. Basidia 37-56 x 12-15 μ m, clavata, pro parte maxima duobus sterigmatibus, raro uno sterigmate.

Holotypus ACAD 12099, in sylvis coniferis (*Tsuga*) prope Kentville, comitato Kings, Nova Scotia lectus, in herbario Universitatis Acadensis conservatus.

Basidiocarp: Pileus 3 cm broad, convex, glabrous to silky, not viscid, yellow-orange (ISCC 67), drying dull orange, not bruising, slowly grayish brown in FeSO_4 ; context thin (2 mm) on disc, membranous over lamellae, yellow, unchanging, fragile; odor and taste not distinctive. Lamellae free, light yellow flushed with pale orange, subdistant, broad (6 mm), thin, brittle. Stipe 7 cm long, 7 mm thick at apex, concolorous with the pileus, light yellow within, dry, glabrous to faintly longitudinally striate, tapering slightly toward base, subcompressed, hollow.

Microscopic Structures: Spores 12.5-16.5(18) x 6.5-9.5(11) μ m, elliptical to oblong-elliptical, at times almost obovate or reniform, smooth, inamyloid. Basidia 37-56 x 12-15 μ m, clavate, relatively short, at times pedicellate, mostly 2-spored, rarely 1-spored, the sterigmata stout, up to 9 μ m long; basidioles clavate, markedly smaller. Brachybasidioles sporadic, 15-46 x 12-22 μ m, napiform to sphaeropedunculate. Pleurocystidia and cheilocystidia absent. Gill trama parallel, scarcely interwoven, with a dense, darker mediostrate, the hyphae (1.7)3.5-21.5 μ m broad, sparingly septate; laticifers scattered. Cuticle a fairly well-defined epicutis of repent, radial or loosely interwoven, nongelatinous hyphae 2.3-9.5 μ m broad. Pileal trama of radial, parallel hyphae 6-41 μ m broad; laticifers frequent near the cuticle, 1.7-11.5(19) μ m broad, irregular, branched and contorted; hypodermium absent. Clamp connections absent, the hyphae truncated or overlapped at septa.

Habit and habitat: Solitary in hemlock woods.

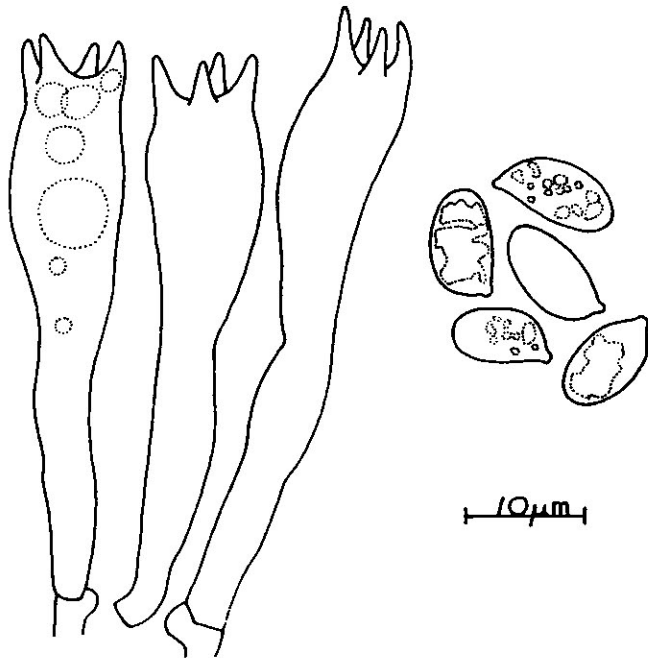
Material Studied: ACAD 12099 (holotype), ravine, Agriculture Experimental Station, Kentville, Kings Co., 18 Sept. 1967.

Remarks: Superficially, *H. macrosporus* resembles *H. flavescens*, but has a dry, more uniformly colored pileus. The large, straight parallel hyphae of the gill and pileal tramas, the broad cuticular hyphae and laticifers, and the faintly striate stipe indicate an affiliation with the conic series. These features plus free lamellae and absence of clamp connections place the species close to *H. cuspidatus* Pk. in Series *Conici*, but *H. macrosporus* is convex and yellow-orange instead of sharply conic

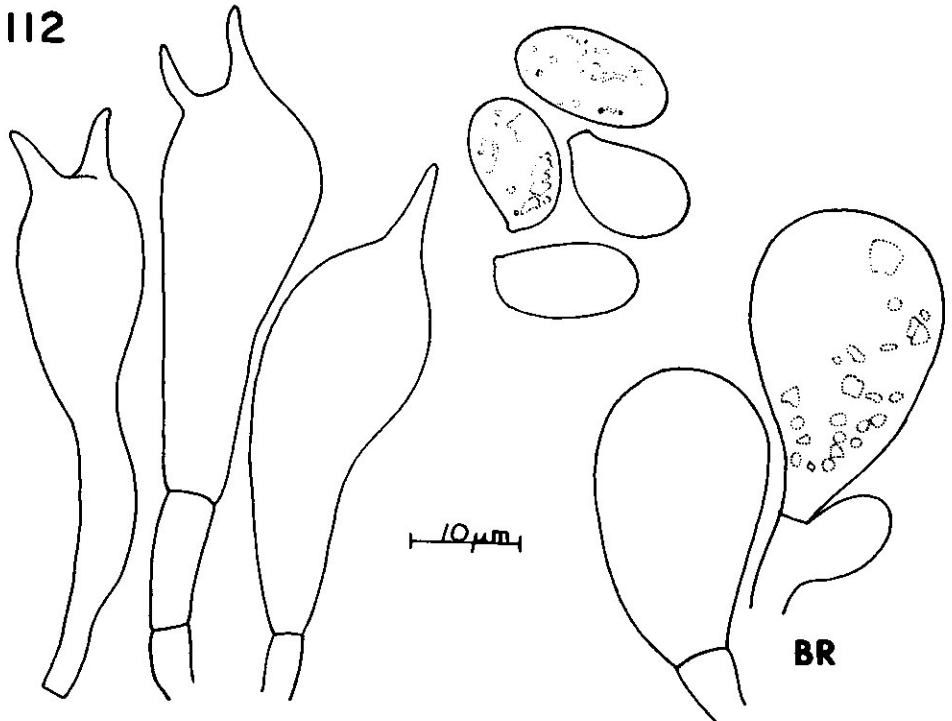
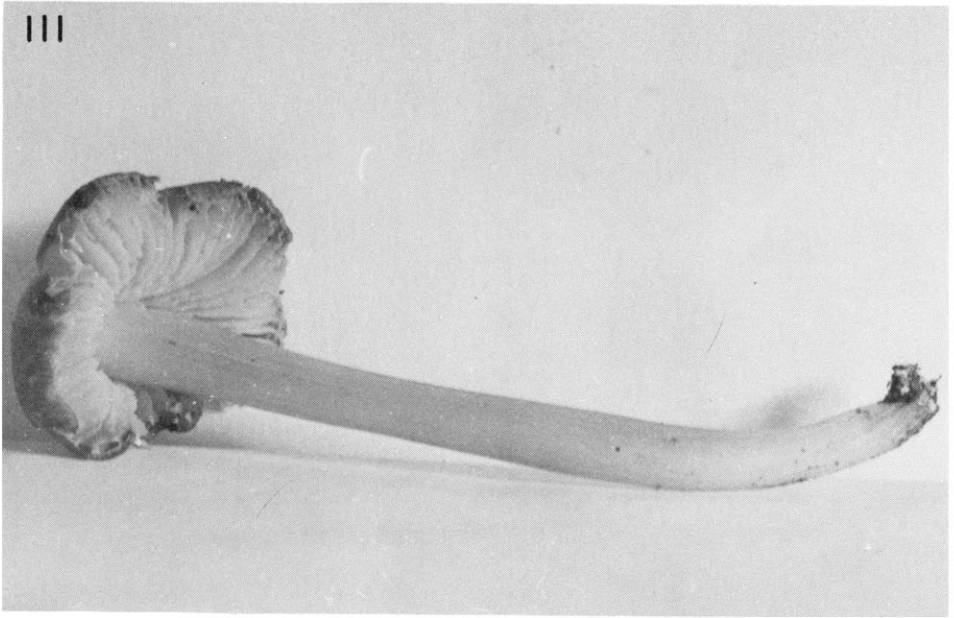
109



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Figs 109, 110. *H. coccineus*. Fig 109. Smith 64644, X 1.5. Fig 110. ACAD 12100, basidia and spores.



Figs 111, 112, *H. macrosporus*. Fig 111. ACAD 12099, X 1.25. Fig 112. ACAD 12099, basidia, spores, and brachybasidioles (BR).

HYGROPHORUS

and persistently red, and lacks a viscid cuticle even in section. Large spores, also characteristic of *H. cuspidatus* and its relatives, in *H. macrosporus* are undoubtedly caused by a prevalence of 2-spored basidia. There may be a 4-spored or a 2- and 4-spored counterpart, as the number of spores per basidium frequently varies within *Hygrophorus* species.

The uniform yellow color and lack of clamps also suggest a relationship with *H. marginatus* var. *concolor* of Series *Marginati*, especially as we have occasionally observed convex pilei in the typical variety of *H. marginatus*. However, the free lamellae and *conicus* type of lamellar trama amply distinguish *H. macrosporus* from *H. marginatus*. Thus, as the pileus of the single specimen of *H. macrosporus* collected to date is convex and dry, we are assigning this species to Series *Coccinei*.

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