

STUDIES IN THE GENUS *MYCENA*. I.¹

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(Received for publication February 1, 1934)

No comprehensive treatment of the genus *Mycena* giving proper emphasis to both microscopic and macroscopic characteristics has been published for the North American species. Atkinson had such a study in mind, and, at the time of his death, had accumulated considerable information toward that end. Unfortunately, however, it was never completed. Kauffman was engaged in a similar study in 1929, but withheld it from publication because he felt that it was incomplete. As a result, Kauffman's treatment of the genus in "The Agaricaceae of Michigan" and that of Beardslee and Coker (1924) on the species found in North Carolina are our most reliable sources of information.

A taxonomic study of the genus *Mycena* was started by the writer in 1930. It was soon found that additional information concerning certain American species was necessary. In this connection most of the Atkinson collections at Cornell University, the collections of Peck at Albany, and Murrill's types at the New York Botanical Garden were studied, and as a result it has been necessary to rearrange the concepts of some of the American species.

Very little authentic European material has been available for comparison, and it has been necessary to rely upon published descriptions and figures. In the following account descriptions have been given of all forms which either have not been recognized in North America or about which some confusion still exists.

MYCENA ALCALINA Fries.—This species is very abundant after warm rains during the latter part of May and the first part of June, but as summer comes on it disappears except for small or occasional specimens. It appears again in the fall after periods of considerable precipitation, but not in great abundance. In the vicinity of Ann Arbor, Mich., it is commonly found on decaying wood of larch, on humus under larch, or on pine débris. At Harbor Springs and Douglas Lake, Mich., it frequently occurs on cedar and hemlock in addition. Rarely have fruit-bodies been collected on the rotting wood of deciduous trees. The following is a description of the fungus as the writer has found it in Michigan:

Pileus 5–30 (40) mm. broad, (5) 10–30 mm. high, usually evenly and obtusely conical with a somewhat flaring margin at maturity, at times nearly

¹ Papers of the Department of Botany and the Herbarium of the University of Michigan, No. 454.

convex or with a broad obtuse umbo, small forms often conic-campanulate or papillate, "bone brown"² to "plumbeous-black" when young, "dusky brown" to "pale drab-gray" at maturity with the margin pallid to whitish, sordid yellowish brown or ashy when faded, surface at first covered by a dense pruinose covering causing a bluish or glaucous sheen, glabrous at maturity, lubricous when moist, subhygrophanous, obscurely striate when young, striate to disk at maturity and with a slightly sulcate striate margin at times; lamellae moderately close to subdistant, adnate or with a slight decurrent tooth, narrow to moderately broad, pure white or grayish when young, usually cinereous or darker at maturity but occasionally nearly white, at times intervenose, edge concolor or occasionally white and then contrasting sharply with the cinereous color of the remainder of the gill; stipe (I.5) 4-9 (II) cm. \times (I) 1.5-2.5 (4) mm. concolorous with the pileus or paler, especially at the apex, when young covered by a faint "bloom" and appearing bluish, glabrous and lubricous at maturity, not viscid, base somewhat mycelioid or white-strigose, tubular to hollow, often compressed in large specimens, cartilaginous and brittle; spores (7.5) 8-10 (II) \times 4.5-6 (7) μ , approximately ellipsoid in outline; cystidia variable in occurrence, rare to absent in some collections, abundant in others, fusoid-ventricose, often becoming nearly cylindrical in age, (35) 40-80 (100) \times 8-15 μ , apex obtuse; sterile cells similar to cystidia but varying greatly in size and shape, clavate to fusoid-ventricose, in age the apex is at times forked or with several contorted projections; pileus-trama corticated by a layer of inflated cells, usually filled with a homogeneous dull brown content, a thin adnate pellicle above; gill-trama homogeneous, of inflated irregularly arranged cells; odor strongly alkaline, faint, or lacking; taste not distinctive or slightly acid; cespitose to gregarious on decaying conifer wood and debris, and densely gregarious to scattered on humus in coniferous regions.

Kühner (1926) mentions a two-spored form of *M. alcalina*, the spores of which measure 11-12 \times 8.5-9 μ . An apparently similar two-spored form has been collected several times around Ann Arbor. It is indistinguishable from the four-spored form macroscopically, but the basidia are two-, or occasionally three-spored, and the spores measure 10-12.5 \times 6-8 μ .

Mycena vexans Peck is doubtless a form of *M. alcalina*. The spores of the type of *M. vexans* measure 8-10 (II) \times 5-7 μ , and are approximately ellipsoid in outline, the cystidia on the sides of the lamellae are 35-40 \times 8-12 μ , scattered or rather frequent near the edge and of the fusoid-ventricose type. The sterile cells are similar to the cystidia but are occasionally found with forked apices. The tenacious stipe, alkaline odor, subdistant lamellae, and blackish brown pileus in addition to the microscopic characters clearly identify the species as *M. alcalina*.

Murrill's description of *Prunulus alcaliniformis* does not allow that species to be placed in *M. alcalina*. In addition, the sterile cells of the type measure 28-30 \times 5-7 μ , and possess several long finger-like prolongations. The spores measure 8-10 \times 6-7 μ .

² All color names within quotation marks are taken from Ridgway, "Color Standards and Nomenclature," 1912.

MYCENA ATKINSONI House.—The collection (32-357, Chelsea, Mich., Sept. 5, 1932, A.H.S.) placed in this species differs from the type in the pale gray stipe and rugose-reticulate disk of the pileus. The stature, colors of pileus and gills, texture, and microscopic characters are those of the type. This species has apparently been reported previously only from New York.

MYCENA ATROALBOIDES Peck (pl. 2, fig. 2).—(Not *Mycena atroalboides* Pk. in Kauffman, *Agaricaceae of Michigan*, p. 808.) This species occurs frequently during the fall months in sphagnum bogs and swampy areas. The following is a description of the fungus as the writer has found it during the seasons of 1931, 1932, and 1933 in Michigan:

Pileus 5-20 mm. broad, broadly and obtusely conic, becoming campanulate or expanded-umbonate, the umbo flattened in a characteristic manner, pellucid-striate when moist, sulcate in age, subhygrophanous, umbo "fuscous" to "bone brown," paler toward the margin which varies from drab to whitish, pruinose when young; lamellae close to subdistant, moderately broad, adnate to uncinata, whitish, becoming cinereous, at times becoming reddish spotted in age; stipe (I) 4-10 cm. long, 1-2 mm. dia., equal, cartilaginous, drab or dark gray, pruinose when young, glabrous, in wet weather the juice often staining the flesh reddish or sordid when the latter is bruised, white strigose at base; basidia two-spored in coll. 1029, two- and four-spored in 11931, two-, three-, and four-spored in coll. 32-509, and four-spored in 33-944 and 33-945; spores $7-8 \times 4 \mu$, $7-7.5 \times 3 \mu$, $8-10 \times 3-3.5 \mu$, and $7-9 \times 4-4.5 \mu$, respectively; cystidia rare on the sides or absent, scattered on the edge, $19-25 (30) \times 6-11 \mu$, smooth and clavate but becoming covered with short rod-like prolongations over the apex at maturity; pileus trama corticated by a layer of inflated cells occupying nearly half of the thickness of the trama, surface covered by a thin adnate pellicle.

The type specimens at Albany, N. Y., have long stems. In the writer's collections this condition was found to be typical of the fruit-bodies growing on sphagnum. In collection 33-945, however, fruit-bodies growing on a firm compact substratum had stems measuring 1-3 cm. long. Within a radius of three feet, in the deep sphagnum typical long stemmed fruit-bodies were found (33-944). The spores of the type measure $8-9 \times 3-4 \mu$, the sterile cells are either smooth and clavate or have short blunt projections scattered over the apex. Lange has reported this species from Denmark. His notes on both microscopic and macroscopic characters compare very well with those of the type.

MYCENA CAPILLARIPES Peck.—Beardslee and Coker (1924) report this species from North Carolina but state that "the margins of the gills are set with rounded obovate cystidia, sometimes extended in a point, and with rod-like processes." The writer has studied the type at Albany, N. Y., and it was found to possess numerous cystidia of the fusoid-ventricose type which measure $42-60 \times 10-14 \mu$ and are abundant on both the sides and edges of the lamellae. None were seen with short prolongations. The spores of the type measure $7-8 \times 3 \mu$ and the basidia are both three- and four-spored.

The writer's collection (33-1021) from Whitmore Lake, Mich., corresponds very closely to Peck's species and has been referred to it. The following is a description of the writer's specimens:

Pileus 8-15 mm. broad, conical, "pale vinaceous fawn" at maturity, dark gray when young, very pale when faded, striate, glabrous; lamellae subdistant, narrow, adnate, white but becoming pale gray, margin tinged vinaceous brown or purplish brown, paler in age; stipe 3 cm. \times 1-1.5 mm. nearly white above, concolor with pileus below, glabrous; odor strongly alkaline; pileus trama corticated by large inflated cells, the layer forming one half of the thickness of the trama, surface covered by an adnate pellicle; basidia two-spored, $30-32 \times 6-7 \mu$; spores $10-12 \times 4-5 \mu$, ovate-pointed to nearly acuminate, tapering into a long narrow point; cystidia abundant on the sides and edges of the lamellae, $40-60 \times 8-14 \mu$, fusoid-ventricose to saccate in outline, surface smooth.

This agrees well with Peck's type in all characters except spore size. However, spores from two-spored basidia usually measure larger than those from four-spored basidia even on the same pileus. This, in addition to the fact that the species is apparently very rare, and that the spores from dried pilei of such small agarics are often the immature individuals which were not lost during the drying process, leads the writer to place his material here without hesitation. Maire (1928) has recently described a species, *Mycena Langei*, which seems to be very close to *M. capillaripes*.

MYCENA CAPILLARIS Fries.—Four-spored specimens (coll. 62, Ann Arbor, Mich.) were collected by the writer which agree essentially with the description as given by Beardslee and Coker (1924), but certain differences are worthy of mention. The pilei were slightly larger (2-4-10 mm. broad), dark gray when young but soon becoming whitish, and often sulcate-striate. However, in such membranous species as this the presence as well as the type of striation is apt to depend entirely on the condition of the plant. For instance, slightly wilted fruit-bodies are very likely to have sulcate-striate pilei, and since these delicate sporophores wither very soon even under the most favorable circumstances, some specimens in a collection always show the sulcate striations. When young the stems were a bluish black above and paler below, but in age they faded to gray and were then concolorous with the pileus. The spores, basidia and cystidia agree exactly with Beardslee's description (spores $8-10 \times 4-5 \mu$, basidia four-spored, and cystidia with thickly set pointed projections). The taste and odor are not distinctive.

A form with two-spored basidia (pl. 3, fig. 5) was also collected (82 and 33-1055, Ann Arbor, Mich.). The spores measure $11-13 \times 6-8 \mu$, and are nearly cylindrical. The sterile cells are similar to those of the four-spored form. The stipe in both forms is not always inserted, and when found rooting, one is apt to place his collection in the section *Filipedes* of Fries. Figure 5 illustrates exceptionally large specimens.

MYCENA CHOLEA A. H. Smith, Mycologia 26: 306. 1934.

Pileus 2–12 mm. broad, conic, campanulate, convex or expanded-plane, "fuscous" to "clove brown," margin abruptly paler and nearly white at first, fading through reddish brown to drab, "Mars brown," "wood brown," "warm buff" or yellowish, sometimes "drab" to ashy; glabrous and polished, striatulate when unexpanded, becoming striate nearly to disk when fading, often sulcate in age, surface lubricous or at times subviscid; flesh thin but firm, white but changing readily to a bright pink or red tint when cut, exuding a scanty white milk-like juice, taste tardily bitter resembling quinine and very lasting; lamellae subcrowded to subdistant, adnate, white, becoming vinaceous brown or gray in age, turning pink or reddish when bruised, narrow to moderately broad; stipe (1) 3–6 (10) cm. long, 1 mm. dia. "fuscous" when young, fading and more or less concolorous with the cap, glabrous, base rooting and somewhat white-strigose, exuding a white milk-like juice when cut; spores 9–12 \times 6–7.5 μ , ovoid, smooth; basidia 2-spored; cystidia numerous, smooth, 55–60 \times 10–14 μ , fusoid, the apex often cuspidate; pileus trama composed of a rather thick pellicle, a region of inflated cells beneath and ordinary filamentose hyphae below the latter, lactiferous hyphae numerous.

The fruit-bodies usually grow singly on old leaves, but caespitose groups have also been collected when the weather conditions were exceptionally favorable. This species is distinct from *Mycena galopoda* in the lasting, bitter taste, the change of color which cut or bruised portions undergo, and the long slender stipe which gives the plant a striking resemblance to delicate forms of *Mycena vitilis*. It is distinct from *Mycena erubescens* Höhn. in the bitter taste, smaller stature, and tougher consistency. From *Mycena fellea* Lange (pl. 4, fig. 2) it differs in the milky juice, the change in color when cut or bruised, and in the more brownish colors. *Mycena cholea* has been collected regularly for three seasons in the vicinity of Ann Arbor, and found to be constant in the characters as described. *Mycena fellea* has been collected but once. A comparison of fresh specimens of both species was made at that time. Figure 3 of plate 4 is a photograph of a short-stemmed form of *M. cholea* found on bare ground in a recently burned area.

MYCENA CITRINOMARGINATA Gillet.—Since the writer has been fortunate in collecting many variations of this species in the vicinity of Ann Arbor, and since it is not very well known in America, the following description is given:

Pileus 5–20 mm. broad, evenly and obtusely conical, broadly convex, with a broad flat umbo or very broadly conical and not umbonate, hygrophanous, color extremely variable but usually some shade of yellow, brownish yellow or nearly white, young buttons "baryta yellow" or "citron yellow," becoming "olive lake," "naphthalene yellow," "medal bronze," or "buckthorn brown" in age, often fading to yellowish or olive gray, glabrous, pellucid-striate at first, widely sulcate-striate in age, the margin often flaring; flesh thick on the disk in large specimens, otherwise membranous; lamellae adnate, equal, distant to subdistant, intervenose, whitish or cinereous, margin pale yellow but often concolor in faded specimens; stipe 3–8 cm. long, 1–2

mm. thick, yellow or grayish olive, paler above, apex pruinose, white-pubescent downward or glabrous, white strigose at base, juice not colored; spores (8) 9-11 \times (4) 5-6 μ , cylindrical to subpyriform; basidia four-spored; no cystidia seen on sides, sterile cells fusoid-ventricose, occasionally forked once or twice at the apex, 30-40 \times 8-15 μ ; odor and taste, none. Gregarious on spruce and pine needles or scattered among the leaves in open oak woods, June to November.

A form bearing two-, three-, and four-spored basidia was found growing on humus in an open frondose woods. The spores measure 12-14 \times 5-6 μ . The majority of the basidia were three-spored.

Collection number 19023 in the Atkinson Herbarium is certainly the above species. *Mycena flavicitrina* Murrill (1916) is doubtless the two-, three-, four-spored form. The spores of the type are 12-14 \times 5-6 μ , and cylindrical; the basidia are 40-43 \times 8-9 μ , two- and three-spored, and the sterile cells are fusoid-ventricose with obtuse apices (38-52 \times 6-12 μ). Macroscopically the type specimen resembles a small fruit-body of *M. citrinomarginata* very closely.

MYCENA CLAVICULARIS Fries.—Both a four-spored and a two-spored form of this species have been collected by the writer in the vicinity of Ann Arbor. The spores of the four-spored specimens measure 8-11 \times 3.5-4 (5) μ , and those of the two-spored, 10-12 \times 5-6.5 μ . The cystidia are the same in both forms, being clavate and covered with short stiff prolongations. They are numerous on both the sides and edges of the lamellae. Lange (1915) and other European authors describe the cystidia as not roughened, a fact which may indicate that the forms treated here should be separated from the above species. However, the writer prefers to follow Kauffman's concept of the species and to include here only the type possessing the clavate-roughened cystidium.

MYCENA DEBILIS Fries.—Beardslee and Coker (1924) have followed Lange in referring a fungus possessing capitate, echinulate sterile cells to this species. Their fungi are more properly referred to *Mycena mirata* Peck. One collection of *M. debilis* has been made by the writer (33-596) at Pinckney, Mich., and the following description is of that collection:

Pileus about 4 mm. broad, convex, glabrous, striate to disk, pale vinaceous brown or sordid brown when faded; lamellae adnate, subdistant, moderately broad, edge even and concolor; stipe 2 cm. \times 0.5-0.75 mm. weak, concolorous with pileus, glabrous; basidia two- and three-spored, 27-30 \times 9-11 μ ; spores 12-14 \times 5-6 (7) μ ; sterile cells fusoid-ventricose, 34-43 \times 8-11 μ , smooth; pileus corticated by a layer or area of inflated cells; gill-trama of inflated cells irregularly arranged. The resemblance to *Mycena sanguinolenta* is very striking, but the colors differ slightly, the juice is not colored and the margins of the gills are not bordered.

MYCENA DISSILIENS Fries.—(Not *M. dissiliens* Fr. var. Kauffman, *Agaricaceae of Michigan*, p. 806.) Favorable weather during the fall of both

1931 and 1932 brought this species out in considerable abundance in several localities around Ann Arbor. The following is a description of the fungus as the writer has found it:

Pileus 1–2.5 cm. broad, conical to broadly convex with an obtuse umbo, fuscous on the disk, margin brownish gray, hygrophane, pellucid-striate when fading, slightly sulcate in age, glabrous, lubricous but not viscid; lamellae narrow, narrowly adnate or attached by a tooth, whitish to gray, close to subdistant, soft; stipe 4–7 cm. \times 2–3 mm., blackish at first, covered by a white fibrillose covering which disappears in age leaving it more or less striate, brittle and splitting longitudinally when broken; spores variable, 7–9 (10) \times 5–6 μ , or 7–8 \times 7 μ (from two-spored basidia); basidia two-, three-, and four-spored, 28–30 \times 6–8 μ ; cystidia either long and cylindrical with obtuse apices, or fusoid ventricose, in older specimens occasionally branched. This fungus was usually found growing cespitose on rotten elm logs. It is easily recognized by the colors and soft, fragile consistency.

MYCENA HEMISPHAERICA Peck (pl. 4, fig. 5).—This species has been collected frequently late in the fall in one locality near Whitmore Lake, Michigan. A description follows:

Pileus 1–3 cm. broad, obtusely conical, becoming convex or campanulate, obtusely umbonate in age, deep "fuscous" or black when fresh, fading through "warm blackish brown" to sordid grayish brown in age, glabrous, no pruinosity on even the young buttons, not striate when young, radially wrinkled; lamellae narrow, ventricose at times, close, adnexed to adnate with a tooth, ashy with a tendency toward brownish tints in age, sordid reddish brown spots often present, margin even, concolor; stipe 2–6 cm. \times 2–3 mm. concolor with pileus above and paler below, later becoming brownish gray over all or pale fuscous, very tough and cartilaginous, odor and taste none; subcespitose to cespitose on oak; spores 7–8 \times 3–3.5 (4) μ ; cystidia none on sides, on edge basidia-like but with blunt projections at the apex.

This species is very close to *Mycena galericulata* but differs in the small spores, blackish satiny pileus, glabrous stipe when young, and more cartilaginous consistency. It is possible that it is only a very dark form of *Mycena tintinabulum* Fries.

MYCENA GRAVEOLENS Kauffman & Smith.—This species has been collected abundantly in the vicinity of Ann Arbor, and the odor, which somewhat resembles that of iodoform, always develops shortly after the fruit-bodies have been gathered. Both two- and four-spored forms have been reported, but from the writer's experience the two-spored form is much more common in Michigan. In *The Agaricaceae of Michigan* this species is described under the name *Mycena leptcephala* Fr. It approaches *Mycena filipes* but differs somewhat in stature as well as in the peculiar odor.

MYCENA LASIOSPERMA Bresadola.—sensu Kauffman, "The Agaricaceae of Michigan," p. 801. (pl. 3, fig. 6).—The basidia are two-spored, the spores measure 7–8 μ and are roughened with blunt tubercles. Both the velvety

covering on the stipe and the exceptionally rigid-cartilaginous consistency of these fruit-bodies are striking. The specimens illustrated were collected at Wagner's Falls, Munising, Mich., Sept. 7, 1933 (33-893). Photographed by E. B. Mains.

MYCENA LEPTOCEPHALA Fries (pl. 1, fig. 2).—

Pileus 1-3 cm. broad, obtusely conical, expanding or remaining conical with a flaring margin, black when young, soon fading through a series of brownish grays to "pale mouse gray," striate when moist, becoming sulcate in fading, hygrophonous, pruinose when young, glabrous, margin even or slightly lobed; lamellae narrow, equal, gray, adnate with a tooth, subdistant to distant, slightly intervenose; stipe 2-5 cm. long, 1-2.5 mm. thick, fragile, bluish black or brownish, finally fading to pale brownish gray, often darker than the pileus, densely white pruinose over all but becoming glabrous; odor alkaline; spores 7-9 \times 4-5 μ , ellipsoid; cystidia scattered on sides and edge of the lamellae, 30-35 \times 10-12 μ , fusoid-ventricose; basidia 25-28 \times 6-7 μ , four-spored. Growing singly or gregariously on conifer needles, cones and sticks on the forest floor. This species has been found abundantly at Saginaw Forest, Ann Arbor, Mich., during the past three seasons.

Besides the typical four-spored form, a variable form has also been collected at Saginaw Forest in which the basidia are predominantly three-spored. From a single pileus in one collection two rather distinct ranges of spore size were obtained. Spores measuring 11-14 \times 6-6.5 μ were found on two-spored basidia, while spores 8-10 \times 3.5-4.5 μ were found on three-spored basidia. The difference in spore size and the variable number of spores borne on a basidium were the only characteristics which distinguished the typical and the variable form.

MYCENA MARGARITISPORA Lange (pl. 3, fig. 2).—This is an inconspicuous but characteristic species. The following description is based upon specimens collected by E. B. Mains, Sept. 29, 1932, near Ann Arbor, Mich., and coll. 33-705 by the writer at Cross Village, Mich.

Pileus 4-10 mm. broad, obtusely conical, pruinose except in age, deep "fuscous" on the apex or deep glaucous gray, fading through "army brown" to yellowish gray near the margin; margin even, pellucid-striate, becoming slightly sulcate in age; lamellae white, rather narrow, subdistant to moderately close, edge concolor, pruinose from the long cystidia, adnate but seceding in age; stipe 3-4.5 cm. long, filiform, deep fuscous over all or with a paler apex, covered by a dense layer of minute hairs giving it a velvety appearance; spores globose, 5-6 μ , covered by scattered, short, blunt projections 1.5 μ long; cystidia very numerous, fusoid-ventricose with the apex variously forked, 40-65 \times 8-12 μ ; basidia two-spored; odor none, taste not distinctive. Growing solitary on black muck or on decaying herbaceous stems. The photograph is of coll. 33-705 and was taken by E. B. Mains.

MYCENA MEGASPORA Kauffman.—This very characteristic species has been repeatedly collected around Ann Arbor and observed under various weather conditions. It is found on black muck in swampy places in early

summer as well as in the fall. The long rooting stipe, the dark colors, cartilaginous consistency and lubricous surface are characteristic. The young stages show a faint bloom which soon disappears, and the lamellae of old pilei are often covered with brownish stains. The colors of the lamellae vary greatly. In some collections they are dark gray at first, becoming whitish at maturity, while in other collections they may be white at first, becoming cinereous later. The spores of this species are variable, measuring $12-17.5 \times 6-8$ (9) μ . The basidia in the Ann Arbor collections were regularly two-spored, but material from Rock River, Mich., possessed numerous three-spored basidia along with the others. A very pale form has been collected which differs only in the color of the pileus and stipe. These are pale "buffy brown" and fade to "pale olive-buff."

MYCENA METATA Fries (pl. 1, fig. 1).—Both the four-spored and the two-spored forms are reported in North America and Europe, and both have been collected in Michigan. The spores of the four-spored form are a little shorter and narrower ($7-8 \times 3.5$ μ) than those of the two-spored form ($8-9 \times 4-5$ μ). In the collections of the four-spored form the sterile cells were smaller and not as abundant. The macroscopical characters are about the same in the dried specimens. The pileus of the two-spored form varies considerably in shape and color. One form is characteristically long-conical with a prominent flaring margin, while the other extreme is nearly hemispherical. The colors vary from pale cinereous to vinaceous brown.

MYCENA MIRATA (Pk.) Sacc. (pl. 3, fig. 3).—The following description is based upon numerous collections from the vicinity of Ann Arbor, Mich.:

Pileus 2-7 mm. broad, evenly and acutely conical, disk usually minutely rugose-reticulate, colors variable, when fresh the apex "fuscous" or dark brown and the margin gray or whitish, intermediate portions "hair brown" to "avellaneous," fading to drab or whitish in age, the apex usually remaining darker giving the pileus a characteristic appearance, striate when moist, sulcate in age, pruinose at first, glabrous, dry; lamellae broad, narrowly adnate, subdistant to distant, grayish, usually with a distinct tooth, often seceding, edge concolor and not fimbriate; stipe 2-6 cm. long, filiform, flaccid, white or grayish and paler above, when young covered by a faint bloom, either inserted on the substratum with a characteristic strigose-echinulate base or rooting and white strigose, the manner of attachment varies with the type of substratum; spores $9-11$ (12) \times $5-6$ (7) μ , ovate pointed; basidia $18-20$ (22) \times $8-9$ μ , two-spored, sterigmata $7-8 \times 3-4.5$ μ , conical; cystidia usually on the edge but occasionally on the sides also, clavate to globose with a narrow pedicel, rod-like projections at the apex or over the entire enlarged surface, rarely only roughened.

This species has been found on small pieces of pine bark, old hickory nuts, and among leaves and debris around the bases of trees.

MYCENA MURINA Murrill (pl. 4, fig. 1).—This is one of the puzzling fragile gray species without an odor. It has been collected on several occasions on

a bed of pine needles at Saginaw Forest, Ann Arbor, Mich. A description of the writer's collections follows:

Pileus 1.5–3 cm. broad, obtusely conical at first, expanding to conico-campanulate, finally becoming expanded, but always with a decided obtusely conical umbo, dark gray to black or olivaceous-black at first, fading to grayish white near the margin, striate to the umbo, very hygrophanous, brittle, flesh thin; lamellae close to subdistant, adnate, narrow, equal, whitish to gray, edge even, concolor; stipe 3–5 cm. \times 2–3 mm., fragile, rather transparent when in good condition, not pruinose, white strigose at base; spores 9–11 \times 5–7 μ , broadly ellipsoid; basidia four-spored; cystidia and sterile cells similar, 35–44 \times 9–14 μ , fusoid-ventricose, smooth, scattered on sides, numerous on the edge; odor and taste none; gregarious to scattered.

MYCENA POLYGRAMMA var. ALBIDA Kauffman.—The distinguishing macroscopical characteristics of the fruiting bodies of this fungus are the fibrous-striate stipe, the rigid, fragile consistency, and pale colors. The color varies from white to cinereous in the expanding pilei, but the buttons may be fuscous. The nitrous odor was a constant feature of the Ann Arbor collections, and Professor Bisby of the University of Manitoba Agricultural College has informed me by letter that his collections from Manitoba also possessed the odor. Fruiting bodies collected at Harbor Springs, Mich., however, had no odor. The distinguishing microscopic character is the presence of numerous large fusiform-acuminate cystidia, 45–80 \times 10–15 μ .

In some fruit-bodies from a single cluster the majority of the basidia were three-spored, the remainder being two- or four-spored. In other fruit-bodies, however, four-spored basidia were abundant. The spores from two- and three-spored basidia are slightly longer and broader than those from four-spored basidia even when all three types occur on a single pileus (9–11 \times 6–7 μ as compared to 8–10 \times 5–6.5 μ).

MYCENA PRAELONGA (Pk.) Sacc.—This species was considered by Atkinson (1911) to be a form of *Mycena polygramma*. The writer has collected a plant answering to Atkinson's description, and also typical specimens of *M. praelonga*. Collection 32–94 of *M. praelonga* Pk. was made at Bryant's Pond, Topinabee, Mich., June 8, 1932. It was found growing gregariously and very abundantly in a sphagnum bog. On June 17 and 18, 1933, it was found on sphagnum at Rock River, Mich. (no. 33–539 and 33–564). The diagnostic features of the species as observed by the writer are:

Pileus 8–15 mm. broad, obtusely conical or with a pronounced obtuse umbo, black when fresh, fading to blackish brown or at times gray; lamellae moderately close, narrow, broadly adnate, gray or margins pallid; stipe 8–16 (20) cm. long, 1–1.5 mm. broad, glabrous, smooth, equal, odor and taste none; spores 8–9 (10) \times 5–6 μ ; cystidia occasional on sides, scattered on edge, fusoid-ventricose, 30–40 \times 8–12 μ .

The writer's specimens are almost identical with the type at Albany. The spores of the type measure 8–9 (10) \times 5–6 μ , the cystidia are fusoid-

ventricose, rare on the sides but rather numerous on the edges of the gills, and measure $35-50 \times 8-12 \mu$. This species is so closely related to *Mycena alcalina* that it is separated with considerable difficulty. The colors, consistency, time of fruiting, and microscopic characters are those of the typical *M. alcalina*. It differs in the longer and more slender stem, occurrence on sphagnum, and lack of an alkaline odor. The odorless forms of *M. alcalina* collected by the writer were all on coniferous wood.

The fungus described by Atkinson (1911) is common around Ann Arbor in the late fall. It grows scattered, gregarious, or subcespitoso on humus and débris in woods of oak and maple. It is more cartilaginous than *M. praelonga*, the longitudinal striations on the stipe are very pronounced, and the stipe is "vinaceous fawn" or with a strong reddish-vinaceous tint predominating. The gills vary from white to distinctly vinaceous, and the pileus is also characterized by vinaceous drab or grayish vinaceous colors. Whether this species is the *M. polygramma* of Europe is an open question, since nearly every *Mycena* with a longitudinally striate stipe has been referred to that species.

MYCENA PURPUREOFUSCA Peck.—This species is close to *Mycena rubromarginata*, but the decidedly purplish colors of the whole fruit-body readily distinguish it. The writer has collected the species rather abundantly on hemlock débris and wood in northern Michigan. The following description is from the writer's collection 32-48, Harbor Springs, Michigan, June 4, 1932, which was very representative of the species:

Pileus 1-2.5 cm. broad, obtusely conical, glabrous, slightly hygrophanous, striate to apex, margin not crenate or broken, color "vinaceous-lavender," "pale vinaceous-lilac" or "light vinaceous-lilac" when fresh, fading to purplish gray, "slate-purple" to "dull Indian purple"; lamellae moderately close, narrowly adnate, narrow, equal, grayish, edge "dark slate purple" or darker, slightly fimbriate; stipe 3-10 cm. long, 1-1.5 mm. thick, equal, glabrous, concolorous with pileus, often with a long root, odor and taste not distinctive; spores $9-10 \times 7-7.5 \mu$, ellipsoid to broadly ellipsoid; basidia four-spored; sterile cells on edge of gills fusoid-ventricose to subcylindrical, $30-50 \times 7-12 \mu$, filled with a purplish sap; no cystidia seen on the sides; gregarious on hemlock logs. In Michigan this species is quite common, whereas *M. rubromarginata* is very rare.

MYCENA ROSEIPALLENS Murrill (pl. 2, fig. 1).—This species is commonly found on mossy logs in low areas in oak and elm woods in the vicinity of Ann Arbor. The following is a description of the fungus as the writer has found it in Michigan:

Pileus 5-18 mm. broad, obtusely conical, the margin usually flaring in age and often lobed, pellucid-striate when moist, "rufous," varying to yellowish incarnate or yellowish tan, the disk usually darker, whitish on the margin in age, glabrous, slightly pruinose when young; lamellae narrow to moderately broad, adnate, seceding, whitish or pale incarnate when young, often a sordid pale rufous orange in age, rather thick, edge concolor; stipe 2-7 cm.

× 1–2 mm., white to yellowish or discolored in age, white pruinose over all, base usually long-rooting and white mycelioid; spores $7.5\text{--}9.5 \times 6\text{--}8 \mu$, $7\text{--}8 \times 5\text{--}6 \mu$, $6\text{--}7 \times 5\text{--}6 \mu$, often with a prominent apiculus; basidia two-spored, $23\text{--}28 \times 6\text{--}7 \mu$; sterile cells clavate or fusoid-ventricose, $30\text{--}45 \times 8\text{--}12 \mu$, cystidia none or rare on the sides of the lamellae, similar to sterile cells.

The fungi described by Kauffman in "The Agaricaceae of Michigan" under the names *Mycena pulcherrima* Pk. and *M. subincarnata* Pk. are variations of the above species. The specimens in the type collection of *M. subincarnata* have characteristic hemispheric pilei, a surprisingly firm texture, numerous fusoid-ventricose to acuminate cystidia ($51\text{--}67 \times 8\text{--}11 \mu$) on the sides of the gills, and spores $7\text{--}8 \times 3\text{--}4 \mu$. In the dried condition this species can be readily separated from *M. roseipallens*. The type of *M. pulcherrima* Pk. could not be found, but Peck's description does not admit a fungus with reddish tints in the pileus.

Beardslee and Coker (1924) have described and illustrated a species very closely related to *M. roseipallens* under the name *M. adonis* Bull. The writer has studied one of Beardslee's collections (Magnetawan, Ont., Sept. 2, 1921), and it has the same texture and is very similar to *M. roseipallens* except that the cystidia on the sides of the lamellae are abundant.

In Europe *Mycena floridula* (Fr.) Q. seems to present a situation comparable to the *M. roseipallens*—*M. Adonis* complex as outlined above. Jossierand (1930) discusses *M. floridula* and *M. flavo-alba*, and in both describes the cystidia as "faciales et marginales comparables, renflées à la base, longuement atténuées . . ." Bresadola (1928, pl. 229) figures and describes under the name *Mycena floridula* the two-spored form of the plant described as *M. roseipallens* by Murrill. Whether *M. roseipallens* should be separated from *M. floridula* depends entirely on the amount of emphasis given to the distribution of the sterile organs. In other species, such as *M. alcalina*, some pilei in a single cluster were found to have cystidia on the sides of the gills, while in other pilei they would be infrequent to absent. If the distribution of sterile elements is found to be unreliable, *M. roseipallens* Murr. would, in the writer's opinion, become a synonym of *M. floridula* (Fr.). *M. Adonis* Bull. sensu Beardslee should no doubt be referred to the latter species.

MYCENA RUBROMARGINATA Fries.—Typical specimens of this species were collected on fir sticks, Miner's Castle, Munising, Mich., June 8, 1933 (33–195).

Pileus 10–16 mm. broad, convex or obtusely conical, "pale grayish vinaceous" varying toward "vinaceous brown" when moist, fading to pale gray or whitish, glabrous, not viscid, hardly striate, margin even to subcrenate; lamellae broad, oval in outline, adnate with a tooth, subdistant, concolorous with the pileus, edge near "Bordeau," red predominates but a purplish brown tint is present; stipe 1–3 cm. × 1–1.5 mm., concolorous with

the pileus, glabrous, fragile, attached by fibers to fir sticks; spores 11-13 \times 7-8 μ , ellipsoid, slightly apiculate; basidia four- and two-spored, 30-36 \times 7-8 μ ; sterile cells fusoid-ventricose, filled with a red content, 40-45 \times 10-12 μ , a few were also found on the sides as cystidia; odor and taste none.

MYCENA RUBROMARGINATA var. *LARICIS* A. H. Smith, *Mycologia* 26: 307. 1934. (Pl. I, fig. 4.)

Pileus 5-20 mm. broad, obtusely conic, then expanded and plane, at times broadly campanulate to convex, glabrous, striate, sulcate in age, "dark vinaceous-brown" on the umbo, distinctly vinaceous toward the margin, fading to "fawn color" or "wood brown" in age; lamellae pallid to cinereous, subdistant to distant, adnate, edge reddish to concolorous; stipe concolorous with the pileus, 2-4 cm. \times 1-1.5 mm., glabrous; fragile; spores 10-12 \times 5-7 μ , subpyriform, smooth; basidia 26-28 \times 6-8 μ , two-spored; cystidia fusoid-ventricose, 40-75 \times 5-12 μ . Single or gregarious on larch stumps.

The margins of the gills are very faintly colored, and at times even concolorous with the remainder of the gill. This in addition to the darker colors of the cap and stem and the more rigid-cartilaginous consistency easily distinguish the variety.

MYCENA RUGOSA Fries (pl. 3, fig. 1). Murrill excludes this species from North America, but, as he indicates, it has been reported rather frequently. The writer has collected it twice (84 and 33-1125) in Michigan, and it seems to be typical in practically every respect when compared with descriptions given for the species by European writers. The following is a description of the writer's collections:

Pileus 2-4 cm. broad, obtusely conical to broadly campanulate, "sooty black" but fading to ashy gray, hygrophanous, glabrous, pruinose when young, deeply sulcate striate; lamellae narrow to moderately broad, uncinata, subdistant, equal, dark gray at first with a nearly white border, intervenose, edge even; stipe 4-10 cm. long, 2-5 mm. dia., tough, fibrous-dotted when young, soon glabrous, dark gray or pallid, somewhat transparent, base strigose and rooting; spores 8-10 \times 5-7 μ , broadly elliptic; basidia 30-35 \times 6-7 μ , four-spored; cystidia none on sides; sterile cells 35-40 \times 8-12 μ , smooth or with finger-like prolongations; odor and taste none; gregarious on elm stumps.

MYCENA STANNEA Fries.—sensu Bresadola.—A common species in the vicinity of Ann Arbor during the months of October and November, 1931, rare in 1932, and not found in 1933. This is another of the gray species without an odor, and is found in larch swamps as well as on humus in open deciduous woods.

Pileus 1-3 cm. broad, evenly and obtusely conical, expanding in age to campanulate and umbonate or tending toward convex in larger plants, when young nearly black on the apex and paler toward the margin, covered by a faint pruinosity which soon disappears, fading to watery or pale gray, remaining darker but not blackish on the umbo, hygrophanous, distinctly pellucid-striate when moist; margin splitting slightly in age, becoming some-

what crenate or subrimose at times; flesh membranous and fragile; lamellae narrow, subdistant, equal, adnate with a slight tooth, gray with whitish even margin; stipe 4–8 cm. long, 1–4 mm. dia., often compressed, pale watery gray, faintly pruinose when young, paler above, white strigose at the base, tubular, strict; spores 8–10 \times 5–6 μ , ellipsoid, basidia four-spored; cystidia fusoid-ventricose and smooth, on the sides of the lamellae, those on the edge with several finger-like prolongations, or a few remaining unbranched, 30–40 \times 6–10 μ ; odor and taste none or slight.

This species differs from *Mycena murina* in the dull pileus, sterile cells, and less fragile consistency, and from *M. atroalba* chiefly in its smaller spores.

MYCENA SUPINA Fries (pl. 3, fig. 4).—

Pileus 2–7 mm. broad, conic, campanulate or convex, margin at times flaring in mature specimens, glabrous, hygrophanous, striate to the apex, faintly pruinose, disk at times slightly reticulate, "fuscous" when young but with a hoary sheen, fading to "army brown" or "wood brown," becoming a sordid yellowish gray or cinereous in age, sulcate striate when faded, margin even or only slightly lobed; flesh cartilaginous and tough; lamellae subdistant to close, often distant in small specimens, adnate, moderately broad, whitish or gray, often stained a sordid vinaceous brown in age; stipe 1–3 cm. \times 1 mm., drab, vinaceous, or whitish, often evenly gray or drab, at times the apex paler and white pruinose, cartilaginous, often rooting on débris or on the bark of old logs; odor and taste not distinctive; spores 7–7.5 \times 6–6.5 μ (94, basidia four-spored), 8–9 \times 6–7.5 μ (32–496, basidia four-spored), 8–11 \times 7.5–8 μ (1031, basidia two-spored), 7–8 μ (32–374 and 32–454, basidia four-spored), 8–10 \times 7–8 and 7–8 μ (32–463, basidia both two- and four-spored on a single pileus); cystidia rare on sides, numerous on edge, 20–30 \times 8–12 μ , capitate and with numerous short prolongations over the surface. All of the collections mentioned above were made in the vicinity of Ann Arbor, Mich.

MYCENA TENERRIMA Berk. (pl. 4, fig. 3).—This species is quite common in Michigan and is to be found during late spring or early summer as well as in the fall. Lange (1915) has reported both a two-spored form (which he considers typical of the species) and a four-spored form (which he named var. *carpophila*) in Denmark. Oort (1928) has reported the two-spored form from the Netherlands. The writer has collected both forms in Michigan and finds them identical in every respect except in the number of spores borne on a basidium and a difference in spore size. The spores obtained from fruit-bodies in collection 33–597 (collected by E. B. Mains at Pinckney, Mich., July 18, 1933) measure 10–12 \times 5–6 μ and the basidia are two-spored. Spores from collection 33–933 (Marquette, Mich.) measure 7–8 \times 3–4 μ , and two collections from Ann Arbor in 1931 have spores measuring 7–8 \times 3 μ and 8–9.5 \times 3–4 μ .

MYCENA TENUICULA Murrill (pl. 1, fig. 3).—This species has been collected in abundance in certain localities near Ann Arbor, Mich. The following description is based on collections 32–249, 32–301, 32–566, 32–621, 33–1051, and 33–1052, which were made by the writer:

Pileus 5–20 mm. broad, obtusely conical to convex or with the apex flattened and the sides nearly parallel, becoming nearly expanded in age, color variable, "dark vinaceous drab," "Benzo brown," "hair brown," or "pale vinaceous brown" on the disk, fading to pale gray or whitish on the margin, vinaceous tints usually persisting on the disk, seldom present near the margin, hygrophanous, glabrous, not striate when young, in age sulcate, pruinose when young, becoming dingy refescent-spotted in age or where bruised; lamellae moderately broad, subdistant to distant, broadly adnate to arcuate, whitish becoming cinereous and finally reddish spotted in age, intervenose at times; stipe 3–6 cm. \times 1–3 mm. dark gray or blackish at first often with dull vinaceous tints, becoming pale gray or sordid purplish, covered by sparse, delicate fibrils when very young, soon glabrous, apex pruinose, base white-strigose; spores 9–10 \times 5–5.5 μ (33–249), 7–9 \times 5–5.5 μ (32–301), 8.4–9.9 \times 5.5–6.5 μ (32–566 and 32–621), 8–10 \times 5–6 μ (33–1051 and 33–1052); cystidia and sterile cells similar, 40–60 \times 10–18 μ , clavate, smooth or with one to several short obtuse projections, often mucronate, scattered or rare on the sides, numerous on the edge.

This species is usually densely cespitose on decaying sticks and branches in oak woods. The odor and taste were not distinctive. The spores of the type specimen at the New York Botanical Garden measure 9–10.8 \times 6–7.5 μ and are broadly ellipsoid in outline; the basidia measure 26–28 \times 6–8 μ and are both two- and four-spored. Cystidia are present on both the sides and edges of the lamellae, and vary in shape from fusoid ventricose to clavate-mucronate. Some were found bearing several short stubby projections.

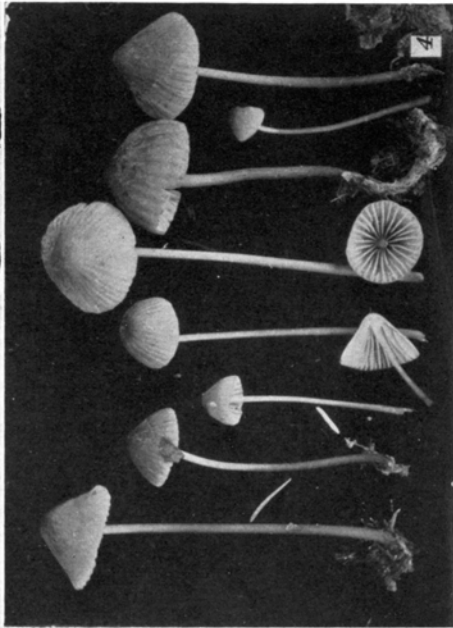
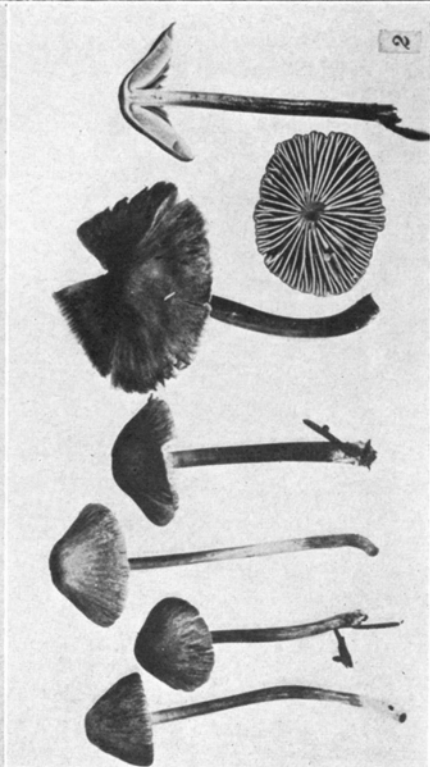
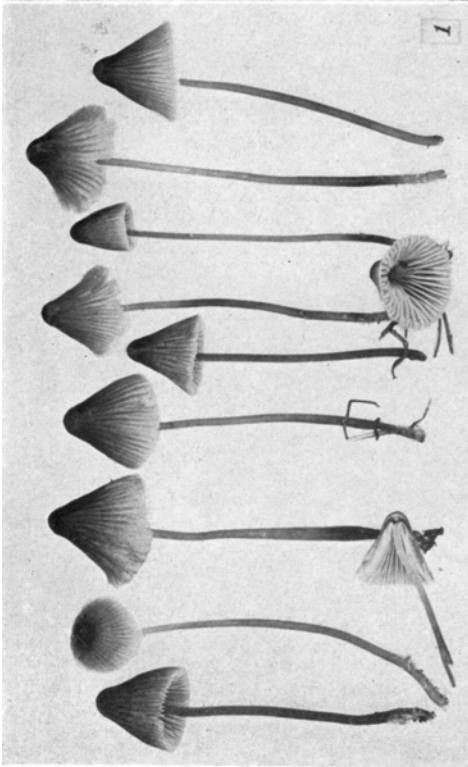
MYCENA VISCOSA Maire.—The variations of this species and *M. epipterygia* are puzzling, but the writer believes that they are separable. The form with the strong, disagreeable odor and taste, and flesh which turns a dark reddish brown when bruised, is here considered to be *M. viscosa*. It is commonly found on needles under conifers, in larch swamps, and under bushes of a species of *Vaccinium* in oak woods. Both a two-spored form with spores measuring 9–11 \times 6.5–8 μ and a four-spored form with spores measuring 8–9 \times 5–6 μ were collected.

The writer wishes to express his appreciation to Professor E. B. Mains for advice and guidance during the course of the present investigation, and also to acknowledge the courtesies extended to him and the facilities placed at his disposal by Professor H. M. Fitzpatrick of Cornell University, by Dr. H. D. House at Albany, and by Dr. F. J. Seaver at the New York Botanical Garden.

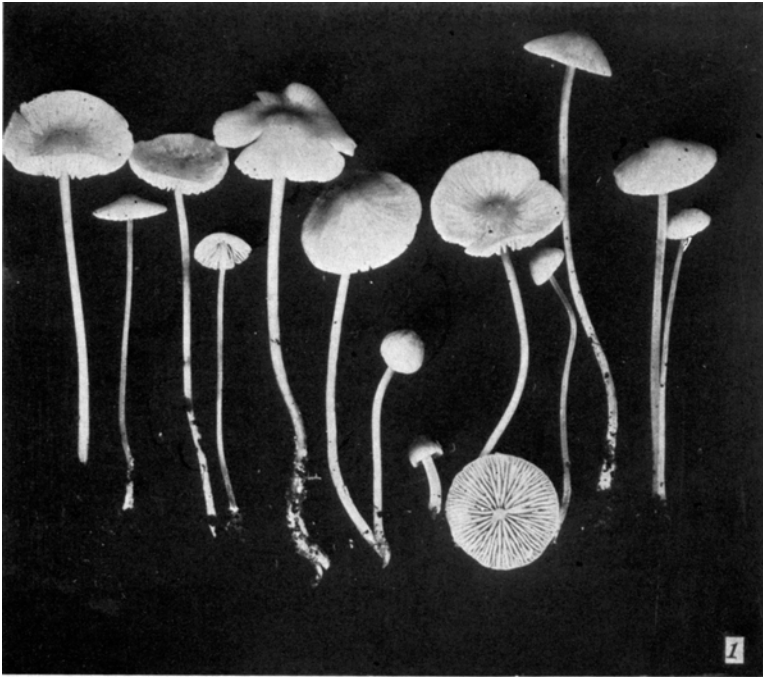
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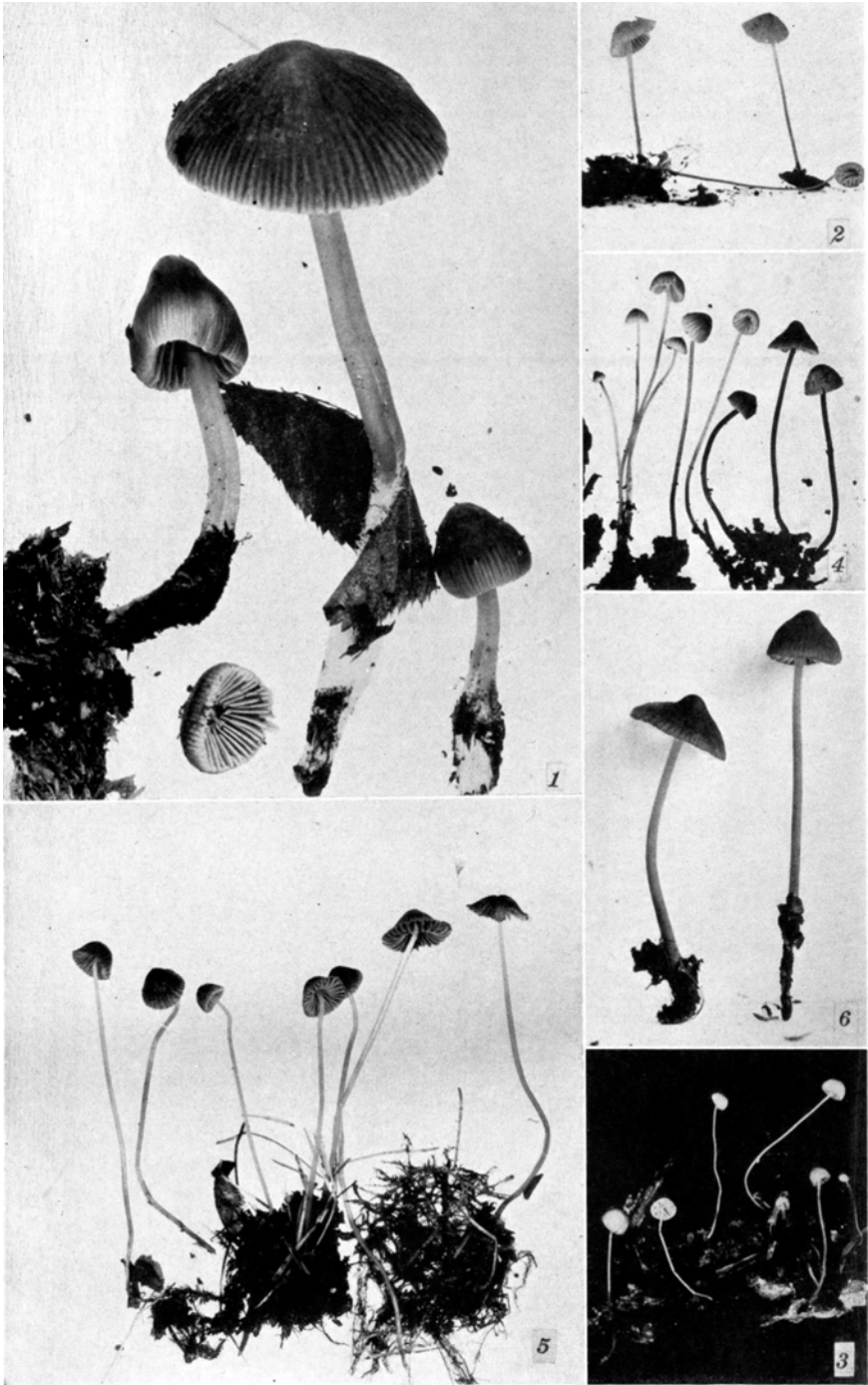
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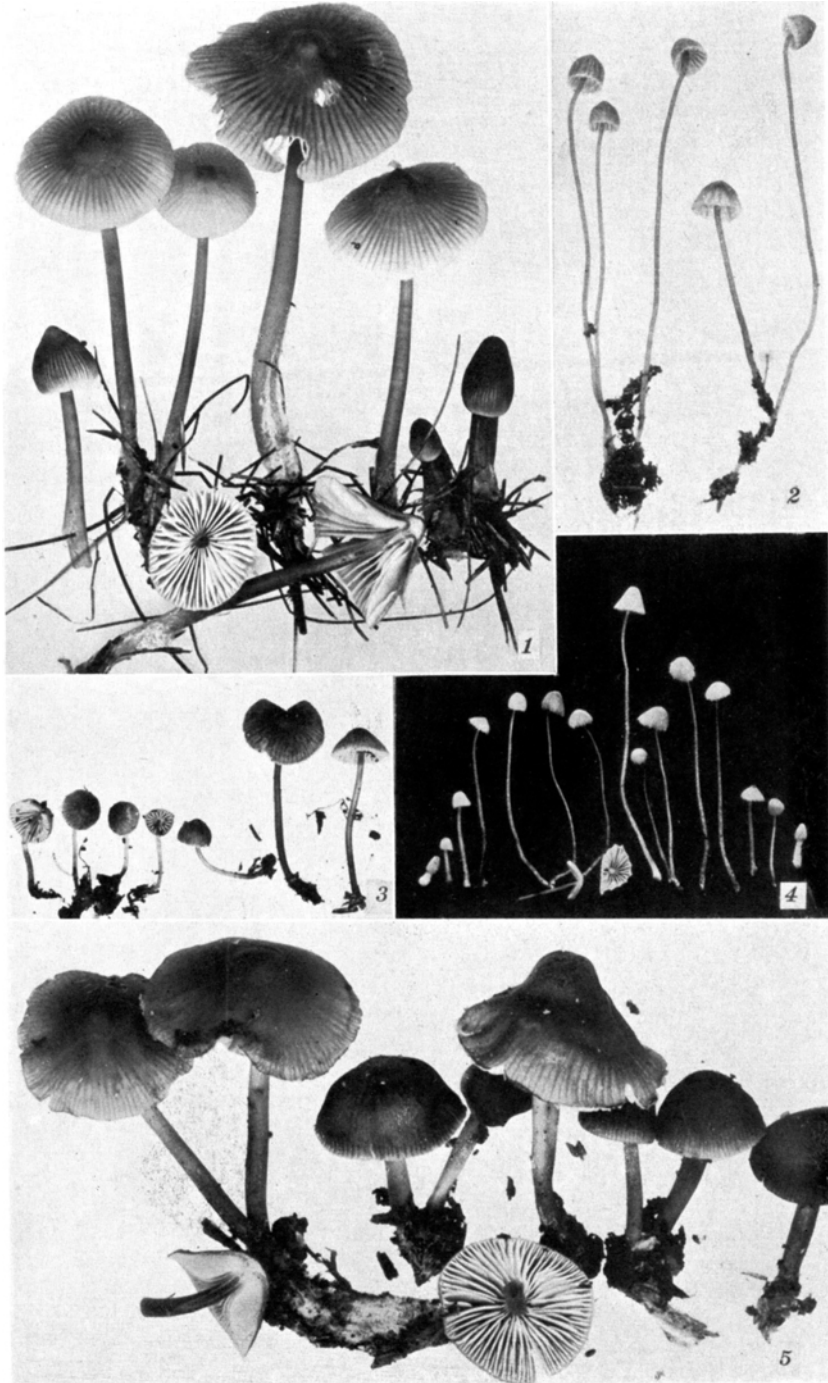
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EXPLANATION OF PLATES

PLATE 1. Fig. 1. *Mycena metata* Fries. Fig. 2. *Mycena leptcephala* Fries. Fig. 3. *Mycena tenuicula* Murrill. Fig. 4. *Mycena rubromarginata* var. *Laricis* Smith. (All $\times 1$.)

PLATE 2. Fig. 1. *Mycena roseipallens* Murrill. Fig. 2. *Mycena atroalboides* Peck. (Both $\times 1$.)

PLATE 3. Fig. 1. *Mycena rugosa* Fries. Fig. 2. *Mycena margaritispora* Lange. Fig. 3. *Mycena mirata* Peck. Fig. 4. *Mycena supina* Fries. Fig. 5. *Mycena capillaris* Fries. Fig. 6. *Mycena lasiosperma* Bresadola. (All $\times 1$.)

PLATE 4. Fig. 1. *Mycena murina* Murrill. Fig. 2. *Mycena fellea* Lange. Fig. 3. *Mycena cholea* Smith. Fig. 4. *Mycena tenerrima* Berkeley. Fig. 5. *Mycena hemisphaerica* Peck. (All $\times 1$.)