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Pluteus Fr.

(From the Latin, *Pluteus*, a protective military covering.)

Pink-spored. *Without volva or annulus*. Stem *fleshy to fibrous*, not cartilaginous, separable from the pileus. Gills *free*, rounded behind, soft. Spores rounded, rarely angular. Hymenium *provided with cystidia*.

Small, soft mushrooms (except *P. cervinus* Fr. which is rather large), *lignicolous* for the most part, i. e., growing on wood, on logs, stumps, decayed wood, forest debris, or sawdust, rarely on manure. The smaller forms are found in very moist situations. *P. cervinus* is common; the others tend to be rare or infrequent.

The PILEUS may be glabrous, silky, velvety, minutely scaly or torn, fibrillose or granular; its surface is even, striate on the margin or varying to quite rugulose. The upper layer of hyphae is sometimes differentiated into a separable, somewhat viscid pellicle, or it is composed of loose, rounded cells of a different color; the shape, size and color of these surface hyphae or cells under the microscope provide a helpful means of definitely determining some of the species. The color of the pileus varies white, yellow, brown, blackish, or rarely orange to red. The GILLS are soft, not attached to the stem but rounded behind and often remote. Usually they are white, in a few cases yellowish, and all become tinged by the flesh-colored or rosy spores. They are coherent, i. e., collapsing on each other as in Coprinus, and often become moist and nearly deliquescent in wet weather. They are provided with large cells projecting beyond the basidia, either on their edge or sides or both, called CYSTIDIA; the shape and structure of the cystidia vary, and can be used with the spores to separate the otherwise often similar species. They are called STERILE CELLS when they occur on the edge of the gills, where they are sometimes arranged in clusters. The STEM is central, fleshy, often with a fibrous cuticle, not cartilaginous except under dry weather conditions; it is solid except in a few species, as e. g., *P. admirabilis* Pk. and *P. salicinus* Fr.; it is usually slender and fragile, equal, rarely subbulbous, glabrous or velvety, etc., like the pileus. The SPORES of the different species .are very much alike, minute, subglobose or short-oblong, white and smooth, not angular in our species. They include a number of edible forms according to McIlvaine, although the older authors considered them with suspicion. Not all the species have been tested, and all, except perhaps the edible *P. cervinus*, are too small to consider from a food-value standpoint.

The species can for the most part only be identified with the aid of a microscope, since the character of the cystidia must be known before certainty can prevail. Hence the following key is based on the only certain method which can be followed in this genus. Of the species not yet found in the State, *P. stercorarius* Pk. grows on manure heaps, and its spores are exceptionally large, measuring 12-15 micr. long; *P. sterilomarginatus* Pk. has angular spores. It is possible that *Pleurotus subpalmatus* Fr. which as it occurs with us is well illustrated by Cooke under *Pluteus phlebophorus*, Plate 422, B., has been reported as a Pluteus; its adnate gills, however, should prevent confusion.

Fries divided the genus into three sections, given below.

Key to the Species

(A) Pileus white or whitish. [See also (AA) and (AAA).]
  (a) Cystidia with 2-4 horns at apex; pileus subglabrous to fibrillose or rimose, 5-15 cm. broad. 574. *P. cervinus* Fr. var. *albus* Pk.
  (aa) Apex of cystidia without horns; pileus villose-tomentose, 2-7 cm. broad. 578. *P. tomentosulus* Pk.
  (aaa) Cystidia rare, not pronged; pileus glabrous, 2-3 cm. broad. 579. *P. roseocandidus* Atk.
(AA) Pileus yellow, orange or red.
  (a) Pileus orange to vermillion; spores short-oblong. 582. *P. caloceps* Atk.
  (aa) Pileus yellow, sometimes smoky tinged.
    (b) Pileus rugose-reticulate on disk.
      (c) Stem stuffed to hollow, yellow; pileus glabrous, umbonate. 584. *P. admirabilis* Pk.
      (cc) Stem solid, pinkish-white; pileus 4-5 cm. broad, smoky velvety on disk. *P. flavofuligineus* Atk.
    (bb) Pileus not rugose on disk, striate on margin; stem pellucid-white. 585. *P. leoninus* Fr.
(AAA) Pileus brown, fuscous, umber, blackish, etc.
  (a) Cystidia with 2-4 horns at apex; pileus not striate on margin; stem fibrillose.
    (b) Gills with their edges smoky-brown. 575. *P. umbrosus* Fr.
    (bb) Gills unicolorous.
      (c) Pileus usually rather large, 3-15 cm. broad; color dingy pale brown, but variable; common. 574. *P. cervinus* Fr.
      (cc) Pileus small to medium; pileus and base of stem tinged bluish or with a distinct olivaceous tinge; cystidia longer than in the preceding; rare. 576. *P. salicinus* Fr.
  (aa) Cystidia without horns at apex.
    (b) Pileus not truly striate on the margin.
      (c) Stem glabrous, pellucid, innately striatulate.
        (d) Stem and gills white at first. 581. *P. nanus* Fr.
        (dd) Stem and sometimes the gills, yellowish. 581. *P. nanus* var. *lutescens* Fr.
      (cc) Stem velvety to squamulose, brownish, etc.
        (d) Edge of gills of same color, cystidia hyaline. 580. *P. granularis* Pk.
        (dd) Edge of gills with yellowish cystidia. 580. *P. granularis* Pk. var. *umbrosellus* Atk.
      (ccc) Stem silky, whitish or tinged fuscous; spores oblong, 6-6.5 x 3 micr. 577. *P. ephebius* Fr. var.
    (bb) Pileus short- or long-striatulate on margin.
      (c) Pileus slightly striate on margin, glabrous, cinnamon-brown. *P. chrysophaeus* Fr.
      (cc) Pileus long-striate on margin, minutely velvety or obscurely granulose.
        (d) Pileus 1-3 cm. broad; stem fibrous-striate, glabrous, white or brownish. (See 617. *Leptonia seticeps* Atk.)
        (dd) Pileus 2.5-5 cm. broad; stem innately striatulate, glabrous. 583. *P. longistriatus* Pk.

Section I. Surface of the pileus at length fibrillose or floccose, by the breaking up of the horizontal layer of the fibrils of the cuticle.

574. Pluteus cervinus Fr. (EDIBLE)

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 301.
Patouillard, Tab. Analyt., No. 335.
Ricken, Blätterpilze, Pl. 71, Fig. 1.
Atkinson, Mushrooms, Fig. 132, p. 138, 1900.
Hard, Mushrooms, Fig. 188, 189, p. 235, 1908.
Marshall, Mushroom Book, op. p. 87, 1905.
N. Y. State Mus. Rep. 54, Pl. 74, 1901.
McIlvaine, American Mushrooms, Pl. LXI, p. 243.
Plate CIII of this Report.

PILEUS 5-10 cm, broad, rarely smaller, campanulate, then broadly convex to expanded, *varying glabrous to fibrillose*, fibrils darker, disk sometimes scaly, even on margin, white, dingy-tan, grayish brown or darker, provided with a somewhat separable, sometimes subviscid, pellicle; FLESH white. GILLS close, free, broad, rounded behind, white then flesh-colored from the spores. STEM equal, or slightly tapering upward, 5-15 cm. long, 6-18 mm. thick, firm, solid, dingy white to

brownish-tan, glabrous or somewhat fibrillose. SPORES inconstant in size and shape, *short-oblong, oval*, broadly elliptical, 5-8 x 4-5 micr., sometimes longer or broader, more rarely globular, often nucleate, smooth, flesh-colored in mass. CYSTIDIA abundant, fusoid, stout, terminating in 2-4 short, blunt horns. ODOR and TASTE somewhat disagreeable.

Solitary, scattered, or when growing on sawdust, etc., often caespitose. On stumps, logs, from underground roots or wood, on boards, sawdust, etc. Throughout the State, mostly in broad-leaved woods. June to October (earliest record is May 28; latest, October 4). Very common. Edible.

Like *Armillaria mellea* its frequent fruiting makes it possible to find a great amount of variation, and many varieties have been named. Var. *alba*. Pk. is whitish, often caespitose and frequents sawdust piles. Var. *viscosus* Lloyd is described as very viscid on the cap, and with narrow gills. Var. *petasatus* Fr. has the cap striate to the middle. It is probable that all of these forms intergrade with the typical plant which along with the varieties varies into many shades of color. Slender forms occur in low woods, on debris, with the stature of *P. leoninus*, but the pileus is almost white.

This species can be distinguished from Entoloma by its free gills and its lignicolous habitat, although of similar appearance otherwise. As Entoloma contains poisonous species, this is important. In Europe, *P. cervinus* has been marked as "suspected"; in this country, however, it is highly praised by mycophagists, since the disagreeable odor and taste disappear on cooking. It has a characteristic relation to the stump on which it is often found, in being so attached that it is difficult to get a piece of the wood and mushroom together, since its stem grows in the vertical cracks of the stump. With us it is found on wood, rarely on soil, although the condition of the woody substratum varies exceedingly. Small plants imitate some of the other species and can only be separated with certainty by the use of the microscope. The pronged cystidia are usually the decisive character. Patouillard says that the flesh has yellowish lactiferous hyphae scattered throughout it.

575. Pluteus umbrosus Fr.

Sys. Mycol., 1821.

Illustrations: Bresadola, Fung. Tricl., Vol. 2, Pl. 116.
Ricken, Blätterpilze, Pl. 70, Fig. 4,

PILEUS 5-10 cm. broad, campanulate then convex-expanded, broadly umbonate, *smoky umber* or blackish brown, *rugose-reticulate and floccose-scaly on disk*, even and fibrillose on margin. FLESH white. Gills free, close, broad, ventricose, whitish then flesh-colored from the spores, *edge fimbriate and smoky brown* from the dark cystidia. STEM 3-8 cm. long, 4-8 mm. thick, solid, firm, equal or slightly tapering upward, dingy white to brownish, covered with smoky-brown fibrills. SPORES oval-elliptical, 5-7 x 3-4 micr., smooth, flesh color in mass. CYSTIDIA fusoid, 75-85 x 15-20 micr., apex with 2-4 horns. ODOR and TASTE slightly disagreeable.

Solitary or scattered on rotten wood, in conifer woods, usually on hemlock or pine. Huron Mountains, Houghton, New Richmond. August and September. Infrequent except locally.

Distinguished at once by the smoky-brown edge of the gills. It tends to be smaller than *P. cervinus* and darker in color. *P. granularis* var. *umbrosellus* has yellowish edged gills, and its cystidia are not horned. There seem to be a number of varieties connecting *P. cervinus* and *P. umbrosus*. McIlvaine pronounces it edible.

576. Pluteus salicinus Fr. var.

Syst. Mycol., 1821 (as *Leptonia salicinus*).

Illustration: Cooke, Ill., Pl. 1169.

PILEUS 2-5 cm. broad, convex to expanded, broadly umbonate, smoky-umber, pruinose-velvety, disk flocculose, margin even. GILLS free, close, not broad, reaching margin of cap, *edge concolor*, white then flesh-colored from the spores. STEM equal, 2-4 cm. long, 2-4 mm. thick, base bulbillose, curved, shining, silky-fibrillose, stuffed, whitish but covered with smoky fibrils, *base smoky-olive*. SPORES broadly elliptical, 7.5-8.5 x 5-6 micr., smooth, flesh color. CYSTIDIA 2-4 pronged at apex, 75-90 x 15-17 micr., fuscoid, stout.

Solitary. On rotten wood, in willow and alder swamp. July-August. Ann Arbor. Rare.

The green tinge is not very marked on the pileus but is quite marked at the base of the stem. It agrees best with Massee's description (British Fungus Flora). The typical bluish form has not been seen by me in the State, although collected elsewhere. The horned cystidia separate it from other smoky-umber species, and the white edge of the gills distinguishes it from *P. umbrosus*.

577. Pluteus ephebius Fr. var.

Syst. Mycol., 1821.

Illustration: Cooke, Ill., Pl. 517.

PILEUS 2.5 cm. broad, convex-expanded, *delicately silky-fibrillose*, shining, becoming somewhat fibrillose-scaly, not at all granular, *mouse-gray*, unicolorous, even on margin. GILLS free, rather remote, not broad, pruinose, white then bright pink from spores, edge concolor. STEM about 2 cm. long, equal, curved, silky, white or tinged fuscous, *striate*. SPORES *oblong*, 6-6.5 x 3 micr., smooth, pink. CYSTIDIA about 50 micr. long, slender, sometimes curved and rounded at the apex, abundant on sides and edge of gills.

Solitary. On rotten logs, in woods. New Richmond. Rare.

The fibrillose pileus allies this form with this section. The oblong spores, characteristic of the species according to Massee, induced me to place it here although the absence of "bluish down" which Fries italicises may indicate that it is a different or undescribed species. It

seems to be close to var. *drepanophyllus* Schultz, the status of which is uncertain.

578. Pluteus tomentosulus Pk.

N. Y. State Mus. Rep. 32, 1879.

Illustration: Atkinson, Mushrooms, Fig. 133, p. 139, 1900.

PILEUS 3-7 cm. broad, thin, soon expanded, obtuse, umbonate, *floccose-tomentose*, more densely so on disk, *white* or tinged with pink, especially on the margin, margin even. FLESH thin, white. GILLS free, rather remote, crowded, *broad*, white then rose-colored from the spores, edge fimbriate. STEM 5-10 cm. long, 4-8 mm. thick, equal, solid, fibrillose-*striate*, subbulbous at base, slightly tomentulose, bulb tomentose, white. SPORES subglobose, or broadly short elliptical, 5-7 x 4.5-5.5 micr., smooth, rose-flesh color in mass. CYSTIDIA stout, 85-95 x 22-25 micr., not horned, bottle-shaped on a rather slender stalk, scattered, more numerous on edge of gills.

Solitary or scattered. On rotten logs or prostrate trunks, especially in hemlock, tamarack or cedar swamps. Throughout the State: Marquette, Houghton, Sault Ste. Marie, New Richmond, Ann Arbor, July, August, September. Frequent in the northern part of State.

This is a beautiful species but prefers deep swamps. In Europe *P. pellitus* Fr., a more glabrous species, takes its place. According to Peck, the pileus often has a pink tinge.

579. Pluteus roseocandidus Atk.

Ann. Mycol., Vol. VII. p. 373, 1909.

PILEUS 2-3 cm. broad, *fragile*, convex then expanded, glabrous, dry, *pure white*, sometimes tinged rose or brownish-buff in wet weather, *striatulate on the thin margin*, with a dull lustre. FLESH thin, white. GILLS free, reaching the stem, elliptical, close, rounded behind, moderately broad, hyphae of trama converging, white at first then pink. STEM 3-4 cm. long, 2.5-4 mm. thick, equal, even, hollow, glabrous, slightly mealy at apex, *fragile*, terete or compressed, subbulbillate, innately fibrillose, *pure white*. SPORES globose, smooth, 6-8 micr., pale diam., flesh color under microscope. CYSTIDIA few or lacking on sides of gills. *Sterile cells* on edge, globose or ventricose-inflated, obtuse, 50-80 x 20-35 micr. *Basidia* 30 x 8-9 micr., 14-spored. ODOR none.

Gregarious. On grassy ground in woods near tamarack swamp. Ann Arbor. October. Rare.

This white species is said to have a two-layered trama in the pileus, the inner floccose, the outer forming a cuticle two to three cells thick of pyriform to subglobose cells. I have found it but once.

Section II. Surface of pileus granulose, pruinate or pulverulent, composed of enlarged globular pyriform or fusoid-elongated, colored cells.

580. Pluteus granularis Pk.

Buffalo Soc. Nat. Sci., Bull. 1, 1873.

Illustration: Hard, Mushrooms, Fig. 190, p. 237.

PILELTS 2-5 cm. broad, convex to plane, subumbonate, *rugose-wrinkled*, yellowish-brown to umber, or chestnut color, *granulose* or *villose-granulose* like plush. GILLS free, crowded, rather broad, ventricose, white then flesh-colored from spores, *edge concolor*. STEM 3-7 cm. long, 2-4 mm. thick, slender, equal, solid, pallid, *velvety pubescent* or covered with brown scales towards base. SPORES globose, 4-5 micr. diam., apiculate, nucleate, smooth, flesh color. CYSTIDIA globose-obovate, about 35-25 micr., infrequent, hyaline.

Solitary or scattered. On rotten logs, etc., in conifer and frondose woods.

Throughout the State: Houghton, Huron Mountains, Marquette, Bay View, Ann Arbor. July-September. More frequent in mixed hemlock woods; never common.

The villosity and granulosity on the cap, when present, is due to globular or elongated-fusoid cells, filled with coloring matter. These cells correspond to the fibrils of such species as *P. umbrosus*, from which this species is separated by the spherical spores and cystidia without prongs at the apex. Peck describes the spores in the 26th report as spherical, later, in the 38th report, he says "broadly elliptical, 6-7.5 x 5-6 micr." Our plants, like Lloyd's (Mycol. Notes, 2), have spherical spores.

Var. *umbrosellus* Atk. nov. var. is distinguished by the more villose pileus and the tinge of *yellow on the edge of the gills*. The villosity is caused by long, yellowish brown cells, 200-300 micr. long, 20-30 micr. wide, often crowded into erect, pointed scales, arranged in sooty, radiating or reticulate, velvety ridges. The edges of the gills are provided with sterile cells filled with a pale yellow coloring matter. The cystidia are scattered, globose or pyriform, not pronged. The spores are 4-5 x 3-4 micr., longer than broad, subglobose, similar to those of *P. umbrosus;* the cystidia, however, separate it from the latter.

Var. *intermedius* nov. var. approaches *Leptonia seticeps* in size of spores, and white-fimbriate edge of gills; but the stem is stuffed, then hollow, and 4-5 cm. long, 4-5 mm. thick. The cap is ruglose-villose and 2-5 cm. broad.

Solitary or scattered. On rotten wood. Detroit, etc. Infrequent.

581. Pluteus nanus Fr.

Syst. Mycol., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 334.
Ricken, Blätterpilze, Pl. 70, Fig. 6.

PILEUS 2-3 cm. broad, convex then expanded, obtuse, *radiately rugose on disk*, margin even or nearly so, *velvety-pruinose*, granulose or *pulverulent, brownish ashy*, umber or darker when young. GILLS free, close, ventricose, narrowed toward ends, white then flesh color

from spores, edge fimbriate. STEM 2-3 cm. long, 2-3 mm. thick, *solid*, equal, rigid often curved, *glabrous*, pellucid-white, striatulate or innately fibrillose. SPORES *subglobose*, 4-5.5 micr. diam., smooth, flesh color. CYSTIDIA fusiform bottle-shaped, sometimes tapering to a point at apex, not horned, *vaculoate*, 75-80 micr. long, on the sides and edge of the gills.

Solitary or scattered. On decaying logs, sticks, etc., in low woods and swamps. June to October. Throughout the State: Huron Mountains, New Richmond, Ann Arbor. Infrequent.

The velvety character of the pileus is only apparent since the surface under a lens is granulose or pulverulent; this is due to globular or fusoid cells which compose the surface layer and give it the brown appearance. It is separated from a number of others by the glabrous stem, small size and subglobose spores. It may appear quite early. There is sometimes a smoky tinge on the cap.

Var. *lutescens* Fr. *Stem* and sometimes the *gills* are *yellow*. The spores seem to be more truly spherical in the variety; stem *solid*, striate.

Habitat, etc., as in the type: New Richmond, Ann Arbor. Infrequent.

582. Pluteus caloceps Atk.

Ann. Mycol., 1909.

"PILEUS 2.5-4.5 cm. broad, convex, umbonate, orpiment-orange to vermillion, orange-vermillion on center, glabrous or slightly granular by separation of the cells, or somewhat rimose on margin; trama two-layered, outer layer composed of globose cells. FLESH white. GILLS free, rounded 'behind, broadly elliptical to subventricose, pale dull flesh color, edge flocculose, tramal hyphae converging. STEM 3-6 cm. long, 3-5 mm. thick, pallid, fibrous-striate. SPORES suboblong, 5-8 x 4-6 micr. CYSTIDIA ventricose on sides of gills, clavate to subfusoid on edge, 60-75 x 12-20 micr."

Solitary. On rotten wood and on the ground. Ann Arbor. Rare.

583. Pluteus longistriatus Pk.

N. Y. State Mus. Rep. 30, 1878.

Illustration: Plate CIV of this Report.

PILEUS 2-5 cm. broad, very thin, convex then expanded, pale brownish-gray to *brownish-ashy*, minutely scaly on disk and cuticle at length breaking into minute granules, *long-striate or subsulcate when old*. GILLS free, close, *rather broad*, width almost uniform, rounded behind, white then pale flesh color from spores, edge pulverulent. STEM 3-5 cm. long, 2-3.5 mm. thick, equal, *solid*, fibrous, innately striatulate, *white*, pulverulent. SPORES sub-globose, 6-7 x 5 micr., slightly longer than wide, granular within,, smooth, *pale* flesh color. CYSTIDIA ventricose, cylindrical in upper part, 75-90 micr. long, not horned, apex broadly obtuse to pointed.

Solitary. On rotten wood in moist places. Ann Arbor, South Haven. June-July. Infrequent.

Peck describes the stem glabrous; our plants had a distinctly pulverulent stem when fresh. The spores also did not seem to be dented on one side as indicated by Peck. Nevertheless, the description fits closely in other respects. It differs from *P. chrysophaeus* in the long striations of the pileus and the fibrous-solid stem; the color, also, is not cinnamon. In age, the longitudinal fibres within the stem loosen, so that it appears falsely fistulose. The larger size and truly free gills separate it from *Leptonia seticeps*, which is long-striatulate on cap.

Section III. Surface of pileus glabrous; moist or hygrophanous.

584. Pluteus admirabilis Pk.

N. Y. State Mus. Rep. 24, 1872.

PILEUS 1-2 cm. broad, thin, convex-campanulate then expanded, usually umbonate, *glabrous*, hygrophanous, *rugose-reticulate, ochre-yellow to luteous*, brownish when young, striatulate on margin when moist, subeven when dry. GILLS free, rounded behind, moderately broad, ventricose, close, whitish or yellowish then rosy-flesh color from the spores. STEM 3-5 cm. long, 1-2 mm. thick, slender, equal, subrigid, glabrous, *stuffed then hollow, yellow*, white-myceloid at base. SPORES subglobose, 5.5-7 x 5-6 micr., smooth, rosy flesh color in mass. CYSTIDIA ventricose, cylindrical in upper part, rounded at apex, 55-65 x 18 micr., scattered, more abundant in the interspaces, more ovoid on the edge of the gills.

Scattered or subgregarious. On logs and decayed wood, in mixed conifer or frondose woods. Houghton, Munising, Marquette, New Richmond, Ann Arbor. July, August and September. More frequent in hemlock woods of the northern part of the State.

The surface of the pileus is composed of spheroid stalked cells containing the yellow coloring matter; these are 30-35 x 20-25 micr. in diam. The hyphae of the gill-trama converge and are long and cylindrical. From *P. leoninus* this form is separated by its yellow stem and rugulose pileus; the rugosity, however, may be almost lacking at times. Variations occur approaching other species, like *P. chrysophaeus*, *P. flavafuligineus* and *P. leoninus*, and such are often difficult to place. I have never seen *P. chrysophaeus* Fr. but include it in the key, as it has been reported by Longyear.

585. Pluteus leoninus Fr.

Syst. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt, No. 639.
Ricken, Blätterpilze, Pl. 71, Fig. 5.
Gillett, Champignons de France.

PILEUS 2-5 cm. broad, campanulate-convex, subumbonate, *not rugulose*, glabrous, moist, *yellow*, striate on margin, GILLS free, moderately broad, close, white then deep flesh color. STEM 5-7 cm. long, 2-5

mm. thick, equal or enlarged below, striatulate, glabrous, *solid*, pellucid-white or whitish. SPORES subglobose to oval elliptical, 6-7 x 5 micr., smooth, dull *rose-colored*. CYSTIDIA about 60 micr. long, fusiform, subacuminate above, not abundant, not horned.

Solitary. On rotten wood. Infrequent in the hemlock forests of the north. Negaunee, etc.

A form was found with the surface of the pileus minutely velvety. Patouillard says the surface is glabrous, composed of long slender hyphae. In this respect the form differs markedly from *P. admirabilis* Pk.

Entoloma Fr.

(From the Greek, *entos*, inside; and *loma*, the border of a robe.)

Pink-spored. Without volva or annulus. Stem *fleshy or fibrous*, not cartilaginous, soft, *confluent with the pileus*. Gills *adnate or adnexed, emarginate* or sinuate. Spores *angular*, rarely rounded. Cystidia rarely present in a few species.

Mostly large, soft, putrescent mushrooms; *terrestrial*, frequent in rainy weather; some of the species are *poisonous*. A difficult genus to study.

The PILEUS may be glabrous, pruinose, silky or fibrillose, hardly ever strongly scaly; it is either hygrophanous; viscid or dry, in the last case fibrillose or somewhat scaly. The cuticle varies in structure, the viscid species being provided with a pellicle composed of gelatinous hyphae while in many cases the surface has a gelatinous feel but is not truly differentiated and does not become viscid except in very prolonged wet weather. In one section the surface is distinctly fibrillose, the fibrils sometimes forming definite scales on the disk. In only a few species is the margin striate or striatulate. Many become water-soaked in rainy weather, and it is then often difficult to determine whether they are hygrophanous. The colors vary from white, watery-whitish, grayish, grayish-brown to dark brown; more rarely tinged violet, reddish or yellowish and always with only the soft shades of these colors. The colors are hard to describe in terms which are sufficiently clear, and this has caused considerable confusion; hence other characters must be used as much as possible. Nearly all the species are somewhat fragile, but may become tougher in dry weather.

The GILLS are adnate-sinuate as in Tricholoma, sometimes adnexed, often seceding from the stem in age. It is important to note their color before they become pink from the spores; this is either *white, yellowish* or *ashy*. They are rather broad, even in the small species rarely narrow. In distinction from Pluteus, there are no cystidia except in a very few species, the edge is therefore usually entire. The STEM is central, fleshy or with the outer rind fibrous and spongy within, sometimes loosely stuffed and then hollow, not cartilaginous except under peculiar weather conditions. In the larger species the stem is stout as in Tricholoma. It is intimately connected with the pileus the trama of the stem extending unaltered into that of the pileus as in all the genera with adnate gills; it is therefore not separable as in Pluteus and Volvaria.

The SPORES are *irregularly-angular*, the general outline varying from spherical to elliptical, often with a prominent, oblique apiculus at the angle where it was attached to the basidium; a few species have rounded spores, i. e., not angled. Their color in mass varies from pale to deep flesh color, to rosy or salmon. *Tricholoma personatum* Fr., *Tricholoma nudum* Fr. and *Tricholoma panoeolum* var. *caespitosa* Bres. have flesh-colored spores in mass and will be looked for here.

A number of the species are known to be very *poisonous; E. lividum* Fr. has been proved so by both Romell and Worthington Smith; *E. grande* Pk. is suspected by its author. The species are difficult for the amateur and even for the expert, and hence it is necessary to proceed with extreme caution when collecting for the table. *It is best not to eat Entolomas at all* because of the danger of confusing the species. The common saying, "only the mushroom which is pink underneath the cap is sure to be safe," illustrates another error in so-called "rules to know mushrooms," since here we have a whole genus which the unsuspecting amateur who is told the above, would be likely to take for *Agaricus compestris*.

This genus corresponds, by its sinuate-adnate gills, its fleshy-fibrous stem, and lack of volva and annulus, to *Tricholoma* of the white-spored group and to *Hebeloma* of the pink-spored group. Peck reports 23 species in New York; we have been able to identify 18 species of those that have been found in Michigan. Others have been collected within our limits but need further study. Some occur seldom; others are more common, especially in showery weather. To what extent certain species are limited to the conifer regions of the State has not yet been determined.

Fries divided the genus into three sections: Genuini, Leptonidei and Nolandei. To these Peck has added a fourth section of American species, which he calls Conoidei.

Key to the Species

(A) Pileus scaly, scabrous, flocculose or superficially silky-fibrillose.
(a) Pileus white, 5-15 mm. broad, silky, spores 9-12 x 7-8 micr. 588. *E. sericellum* Fr.
(aa) Pileus not white, 1-5 cm. broad.
(b) Pileus scabrous, dark brown, 1-3 cm. broad; stem slender. 587. *E. scabrinellum* Pk.
(bb) Pileus not scabrous.
(c) Pileus and stem tinged purplish or wine color; stem solid. 589. *E. cyaneum* Pk. (cf. also *E. jubatum* Fr.)
(cc) Pileus and stem not tinged purplish.
(d) Gills ashy or smoky at first; pileus mouse-gray; stem hollow. 590. *E. jubatum* Fr.
(dd) Gills white at first; pileus ashy or ashy-brown. 601. *E. peckianum* Burt.
(AA) Pileus glabrous, moist, hygrophanous or viscid.
(a) Pileus pelliculose or the surface viscid, gelatinous.
(b) Pileus 2-5 cm., gelatinous above, flesh color, coarsely reticulate; stem eccentric; rare. (See 699. *Pleurotus subpalmatus.*)
(bb) Pileus not reticulated.
(c) Stem loosely stuffed then hollow, stout; pileus livid-brownish (moist), 7-10 cm. broad. 586. *E. lividum* Fr.
(cc) Stem longer, solid; pileus viscid, smaller, grayish. *E. prunuloides* Fr.
(aa) Pileus not viscid.
(b) Pileus hygrophanous.
(c) Odor and taste farinaceous, at least when plants are fresh and crushed.
(d) Gills gray at first; pileus dark brown, 2-5 cm. broad, striatulate (moist). 596. *E. sericeum* Fr.
(dd) Gills white or pallid at first.
(e) Pileus conic-campanulate or umbonate, streaked with darker fibrils; stem short. 591. *E. clypeatum* Fr.
(ee) Pileus convex or finally plane, subumbonate, grayish-brown (moist).
(f) Stem at length tinged gray; pileus scarcely fading, with a delicate, separable pellicle. 595. *E. griseum* Pk.
(ff) Stem white; pileus fading to whitish; gills narrow. 594. *E. scricatum* Britz.
(cc) Odor and taste not farinaceous.
(d) Odor of fresh plant nitrous. 593. *E. nidorosum* Fr.
(dd) Odor not nitrous.
(e) Pileus umber, fuscous or cinnamon (moist).
(f) Pileus conic-campanulate or umbonate; stem twisted; spores elongated-angular. 597. *E. strictius* Pk.
(ff) Pileus at length plane; stem pure white; gills rather broad; spores globose-angular. 592. *E. rhodopolium* Fr.
(ee) Pileus whitish or yellow-tinged (moist).
(f) Stout and firm, pileus watery, whitish or tinged yellowish, 5-12 cm. broad; stem 10-20 mm. thick. 598. *E. grayanum* Pk.
(ff) Rather slender and fragile, pileus whitish, 2-6 cm. broad; stem 3-8 mm. thick. 599. *E. speculum* Fr.
(bb) Pileus neither viscid nor hygrophanous.
(c) Pileus conic or campanulate, usually unexpanded, 1-5 cm. broad; among moss, especially sphagnum.
(d) Color of pileus changing darker in age, from pale yellow to reddish-brown. *E. variabile* Pk.
(dd) Pileus fading or scarcely changing.
(e) Spores quadrate, 4-angled.
(f) Pileus strongly cuspidate at apex, pale yellow. 602. *E. cuspidatum* Pk.
(ff) Pileus not cuspidate.
(g) Pileus yellow, smoky-yellow, or greenish-yellow. *E. luteum* Pk.
(gg) Pileus salmon-colored, subacute at apex. 600. *E. salmoneum* Pk.
(ee) Spores 5-6 sided, irregular, longer than wide; pileus gray to smoky-brown, umbonate. 601. *E. peckianum* Bert.
(cc) Pileus convex-expanded, large, yellowish-white or tinged brownish; gills broad; stem solid; spores angular-sphaeroid, 8-10 micr. *E. grande* Pk.

Section I. Genuini. Pileus fleshy, glabrous, moist or viscid; not hygrophanous.

586. Entoloma lividum Fr. (POISONOUS)

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 311.
Ricken, Blätterpilze, Pl. 72, Fig. 2.
Gillet, Champignons de France, No. 271.

PILEUS 7-10 cm. broad, campanulate then expanded, *glabrous, pelliculose*, the cuticle composed of subgelatinous hyphae about 6 micr. diam., splitting into fibrillose parts on drying, viscid in very wet weather, *pale livid-tan* faded when dry, repand, wrinkled-rugose, margin striate. GILLS *adnexed*, abruptly rounded behind, broad, subventricose, subdistant at stem, pallid then bright flesh color. Stem 6-8 cm. long, 1.5-2.5 cm. thick, stout, *white, glabrous*, apex subpruinose, even, subequal, *stuffed then hollow*. SPORES sphoeroid-angular, 8-10 micr. diam., *bright flesh color in mass*, apiculus prominent, 5-6 angled. CYSTIDIA none or very few, fusoid. ODOR faint. TASTE strongly farinaceous.

Gregarious. On the ground in white pine and beech woods of western Michigan. New Richmond. September. Rare. *Poisonous*.

This rare Entoloma is a rather stout plant. Its pileus is viscid in wet weather, although the descriptions merely call it "pelliculose," so that it is identified with difficulty when one follows the European authors. A specimen from Sweden, which was referred to *E. lividum* by Romell, agrees with our specimens in having sub-gelatinous thick hyphae in the cuticle, and when dried has the appearance of a surface once viscid or subviscid like that of our plant. Furthermore *E. lividum* is described with a stuffed to hollow stem, while its near relatives *E. sinuatum* and *E. prunuloides* have solid stems. If Gillet's and Cooke's figures of the latter are correct, then I have never collected such Entolomas with a viscid cuticle on the pileus. Romell told me he tested the edibility of *E. lividum* with serious consequences, and hence he ought to know the plant. It seems to be rare and will on that account cause little damage. The gills are often tinged yellowish and the pileus may have a livid-brown color. *E. prunuloides* Fr. is said to have an umbonate ashy cap, sometimes tinged yellowish, considerably smaller according to Cooke's, Gillet's and Patouillard's figures, and the stem is slightly striate and solid. It is said to be viscid.

Section II. Leptonidei. Pileus campanulate-expanded or convex-plane, dry, flocculose or subsquamose; not hygrophanous.

587. Entoloma scabrinellum Pk.

N. Y. State Mus. Rep. 33, 1880.

PILEUS 1-3 cm. broad, broadly convex, expanded and subumbonate, dry, scabrous, densely covered by minute, erect, spine-like scales, *dark mouse-brown or smoky-brown*, the thin incurved margin slightly surpassing the gills. FLESH thin, pallid or tinged brown. GILLS adnexed, rounded behind, becoming deeply emarginate, *broad*, ventricose, at first grayish-white, becoming pink, edge white-flocculose. STEM 3-8 cm. long, 2-3 mm. thick, tapering upward, thicker at base, stuffed then hollow, fibrillose, glabrescent, scurfy-pruinose at apex, white-mycelioid at base, pallid or tinged brownish. SPORES coarsely tuberculate-angular, elliptic in outline, 7-10 x 5.5-6.5 micr., flesh-pink. CYSTIDIA none. *Sterile cells* on edge of gills, capitate, nine-pin shaped. BASIDIA 40 x 9 micr., 4-spored. ODOR none.

Gregarious. On the ground, low mossy woods of pine, beech, etc. New Richmond. September. Rare.

It seems to be nearest to *E. scabrosa* Fr., but it does not possess an umbilicate pileus, the apex of the stem is not black-punctate and the gills are not segmentoid. Our

plants were somewhat larger and darker than those found by Peck.

588. Entoloma sericellum Fr.

Syst. Mycol., 1821.

Illustrations: Fries, Icones, Pl. 95, Fig. 3.
Ricken, Blätterpilze, Pl. 73, Fig. 4 (as *Leptonia sericellum*).
Cooke, Ill., Pl. 307.

PILEUS 5-15 mm. broad, convex then plane, small, pure *shining* white, or pellucid-white, *silky* or minutely squamulose, even on margin which is incurved at first. GILLS broadly adnate, becoming sinuate, slightly decurrent by a tooth, rather *distant and broad*, white then bright flesh color from the spores. STEM 2-5 cm. long, 1-2 mm. thick, *slender*, pellucid shining white, stuffed then hollow, equal, even, pruinose at apex, glabrous, soft, or slightly toughish and fibrous. SPORES elongated, angular-tuberculate, 9-13 x 6-8 micr., variable in size, apiculus prominent, bright flesh color in mass.

(Dried: Stem pale rufous; pileus pale brownish-buff, tinged rufous.)

Scattered. On debris or humus in low frondose woods, cedar or hemlock swamps, etc. August-September. Throughout the State, Ann Arbor, Bay View, Marquette, Houghton. Frequent.

The color sometimes varies to a creamy tint. The pileus may be obtuse or depressed. It has the stature of an Eccilia, and the depressed pileus and subcartilaginous stem remind one of a Leptonia. It is smaller than *E. speculum* and has very different spores.

589. Entoloma cyaneum Pk.

Buffalo Soc. Nat. Sci., Bull. 1, 1873.

PILEUS 2-3.5 cm. broad, *umbonate*, convex-campanulate, dry, *fibrillose-squamulose*, dark vinaceous-murinus (Sacc.), paler at length, margin even. FLESH white, thin except disk. GILLS adnate, later seceding, close, rather broad, at first white-tinged vinaceous then flesh color tinged ashy, *edge white-fimbriate*. STEM 3-6 cm. long, 2-4 mm. thick, equal or subequal, *solid*, fibrillose-striate, *furfuraceous-squamulose* especially upwards, twisted at times, vinaceous above, pallid below, white and fibrous-fleshy within, cuticle subcartilaginous. SPORES angular-tuberculate, subelliptical in outline, 7-9 x 4.5-6 micr., flesh color in mass. CYSTIDIA few on sides of gills, ventricose; sterile cells numerous on the edge and nine-pin shaped.

(Dried: Pileus dark amber-brown.)

Solitary or scattered. Sandy soil and humus, in birch and hemlock swamps of our coniferous regions. August and September. Marquette, Negaunee, New Richmond. Infrequent or rare.

It has the habit of a Leptonia, and might be mistaken for one. Peck describes the stem as hollow; our specimens invariably had the interior filled with a solid fibrous-fleshy substance; this sometimes loosens longitudinally so as to give a false "hollow" interior. It has much the appearance of *E. jubatum* Fr. as illustrated by Cooke, and of *E. griseo-cyaneum* Fr. as figured by Fries (Icones, Plate 94, Fig. 1). It differs from both these in its solid stem and in the color of the pileus. It is said to occur sometimes on decaying wood or mossy logs.

590. Entoloma jubatum Fr.

Syst. Mycol., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 136, 1900.
Cooke, Ill., Pl. 317.
Fries, Icones, Pl. 92, Fig. 1.

"PILEUS 2-5 cm. broad, *mouse color*, dry, campanulate then expanded umbonate, *villose-scaly or fibrillose*. GILLS *slightly adnexed*, seceding, ventricose, *crowded, at first dark fuligineous*, then *purple fuligineous*. STEM 5-8 cm. long, 4-6 mm. thick, fleshy-fibrous, rigid, fragile, *hollow*, equal, becoming fuscous and clothed with fuligineous fibrils. SPORES extremely irregular, 9-12 x 6-7 micr., (Ricken). Inodorous."

In woods. East Lansing. Reported by Longyear.

The description is taken from Fries' Hymenomycetes Europei and Stevenson's British Fungi. Atkinson has described a form with a dull heliotrope-purple pileus and stem, with spores 7-11 x 6-7 micr., irregularly oval, coarsely angular, nucleate and 5-7 angled. This species differs from *E. cyaneum* in the hollow stem, adnexed, almost free gills and larger spores. It is rare in Michigan.

Section III. Nolanidei. Pileus thin, hygrophanous, somewhat silky when dry, often wavy and irregular.

591. Entoloma clypeatum Fr. (EDIBLE)

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 319.
Gillet, Champignons de France, No. 270.
Ricken, Blätterpilze, Pl. 73, Fig. 1.
Peck, N. Y. State Mus, Rep. 53, Plate D. (As *E. strictius* var. *irregulare*.)

PILEUS 3-10 cm. broad, *campanulate*, with an obtusely conic umbo, hygrophanous, lurid-brown, (moist), *brownish-ashy* (dry), often *virgate* with darker lines, glabrous, margin even, often wavy. FLESH thin, white. GILLS adnexed, *rounded behind*, seceding, sometimes emarginate with decurrent tooth, moderately broad, sub-distant to close, whitish then sordid rose-colored, *edge serrate-eroded*. STEM 4-6 cm. long, 6-12 mm. thick, often rather stout, and short, stuffed or hollow, sometimes compressed, fragile, silky-fibrillose, white or whitish, apex subpruinose, often rivulose. SPORES subglobose, angular, 7-9.5 x 6-7.5 micr., rosy in mass. Taste and odor *farinaceous*.

(Dried: Pileus ashy-brown, gills rose-colored.)

Gregarious to subcaespitose. On the ground in low woods, maple, elm, beech, etc., sometimes in grassy

places near woods. Ann Arbor, New Richmond. July to September. Infrequent.

Usually known when dry by the grayish-brown pileus streaked with darker fibrils, by the rosy gills at maturity and by the whitish stem. When moist the color varies considerably. Sometimes it becomes almost white on drying. *E. clypeatum* has had the reputation in Europe of being *poisonous*, but is eaten with impunity by some who claim it is harmless. Even if its edibility is established, the amateur may have some difficulty in being certain of the species. The pileus is often persistently campanulate with an obtuse apex which separates it from forms having grayish caps.

592. Entoloma rhodopolium Fr. (SUSPECTED)

Syst. Mycol., 1821.

Illustrations: Patouillard, Tab. Analyt, No. 338.
Murrill, Mycologia, Pl. 92, Fig. 4 (as *E. grayanum*).
Gillet, Champignons de France, No. 275.
Plate CV of this Report

PILEUS 4-8 cm. broad, *campanulate* then expanded-plane, *firm*, hygrophanous, *umber to fuscous* (moist), pale livid-gray and silky shining (dry), *glabrous*, cuticle slightly differentiated with sub-cartilaginous hyphae, with a gelatinous feel but not viscid, undulate and even on the margin. FLESH watery then white, scissile. GILLS *adnate*, becoming emarginate, somewhat *subdistant*, sometimes veined, moderately *broad*, whitish then *deep rose color*, edge minutely eroded. STEM 4-10 cm. long, 0-12 mm. thick, *pure white*, subequal, tapering up or down, sometimes curved, *glabrous*, apex furfuraceous, white, spongy-stuffed then hollow, with a thickish, fibrous, subcartilaginous cuticle, readily splitting longitudinally on drying. SPORES subglobose, 5-6 angled, 6-9 micr. in diameter, (with a few larger ones), deep rose color in mass. CYSTIDIA none. ODOR and TASTE *none*.

Solitary or subcaespitose. On the ground, mixed or frondose woods. August-September. New Richmond, Ann Arbor.

The deep rosy spores, pure white stem, the toughish subcartilaginous pileus and colors are characteristic for our plants. The species may have an odor at times. Fries says it has scarcely any odor; others report a farinaceous odor. Our plants differ from the typical description in the toughish cuticle on the pileus and stem although collected in moist weather. The pileus is often dusted on top by the rosy spores as in *Clitopilus abortivus*. It differs fundamentally from *E. griseum* Pk. in the deep rose-colored gills and the glabrous and shining-white stem, but agrees with it in being firm, and in the structure of the cuticle of pileus and stem. *E. griseum* has a farinaceous odor and taste.

593. Entoloma nidorosum Fr. var. (SUSPECTED)

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 94, Fig. 3.
Swanton, Fungi, Pl. 42, Fig. 17.

PILEUS 2-5 cm. broad, convex, obtuse, grayish-*brown* (moist), hygrophanous, edge incurved, minutely tomentose-silky. FLESH thin, white, *fragile*. GILLS adnexed, *broad, subdistant*, flexuose, pale flesh color. STEM 4-7 cm. long, 4-8 mm. thick, equal or sub-equal, stuffed soon *hollow*, pruinose at apex, slightly fibrillose, whitish. SPORES angular, ovate, angles not definite except the very marked angle at the oblique prominent apiculus, 8-10 micr. long (with apiculus), 6-7 micr. wide; flesh color. ODOR *strongly acid* or alkaline.

Solitary. On mosses, in a sphagnum bog. Ann Arbor. September. Rare.

Differs from the type in the obtuse to subumbonate cap, less slender habit and by not being entirely glabrous. The European plant is said to have an umbilicate or depressed pileus and slender stem.

594. Entoloma sericatum Britz.

PILEUS 3-8 cm. broad, campanulate then plane, subumbonate, grayish-brown (moist), *fading*, paler to creamy-buff or whitish (dry), *umbo darker while drying*, hygrophanous, margin faintly striatulate (moist) elsewhere even, glabrous, silky-shining (dry), surface scarcely differentiated, margin at length splitting or recurved. FLESH thin, concolor, scissile. GILLS *narrow*, narrowed to a point in front, moderately close, thin, *adnexed* becoming emarginate, white at first, maturing slowly, at length *pale flesh color*, edge rather eroded. STEM *long and somewhat slender*, 5-10 cm. long, 5-10 mm. thick, *pure shining white*, variously curved, obscurely undulate, innately silky-striatulate but *glabrous*, equal or somewhat attenuated below, white-fibrous-stuffed within then somewhat hollow, splitting longitudinally (dry), apex pruinose. SPORES angular-tuberculate, slightly longer than wide, 8-10 x 6-8.5 micr., apiculus prominently oblique, flesh color in mass. CYSTIDIA none. TASTE and ODOR farinaceous.

Gregarious or subcaespitose. On the ground among leaves and debris in conifer and frondose woods. Ann Arbor, New Richmond. September. Frequent, abundant locally.

The fading colors of the pileus, the pure white, glabrous, long stem, the narrow gills and pale spores distinguish this species. Britzelmayr gives no description except the color of the pileus and the size of the spores, and hence I have used his name to avoid a new one. It has the stature and the colors of *E. rhodopolium*, but differs in its farinaceous odor, the spores, narrow gills and the striate margin of the pileus.

595. Entoloma griseum Pk.

N. .Y. State Mus. Bull. 75, 1904.

PILEUS 3-7 cm. broad, campanulate-convex, obtuse, *firm*, then fragile, glabrous, *margin even* and often wavy at length, subhygrophanous, *grayish-brown*, sometimes pale umber (moist), scarcely fading, innately silky (dry), *cuticle somewhat differentiated forming a thin, separable pellicle*, margin decurved. FLESH hygrophanous, very scissile, moderately thin. GILLS adnexed, becoming emarginate, moderately broad, close or slightly subdistant, whitish-grayish, slowly flesh color, sometimes veined. STEM 3-8 cm. long, 4-10 mm. thick, subrigid, equal or attenuated either upwards or downwards, silky-fibrillose, *whitish or tinged gray*, stuffed to hollow, sometimes solid below, subshining. SPORES tuberculate-angular, 7-9 x 6.5-8 micr., *sphoeroid*, apiculus prominent, pale flesh color in mass. ODOR and TASTE farinaceous, at least when flesh is crushed, rarely lacking this odor.

Gregarious or solitary. On the ground in low woods, both coniferous and frondose. Throughout the State, Marquette, New Richmond, Ann Arbor. May-October. Frequent but scattered.

This species is similar at times to *E. sericeum* Fr.; it is a stouter plant, usually without an umbo on the pileus, and the colors are paler. The margin of the cap is not striate in typical plants, but this character is sometimes obscure. Specimens which lack the mealy odor are not infrequent in spring. The flesh is rather firm but shot through with watery lines and is scissile. The stem is often abruptly attenuated below and its interior is composed of a fibrous pith at first which disappears in places leaving cavities. The cuticle of the pileus lias a slight gelatinous feel but is never viscid. The gills are not always noticeably grayish but merely pallid. Forms which seem otherwise to belong here have a slight alkaline odor. Solitary specimens appear as early as May around Ann Arbor. I have found this species in the Adirondack Mountains, and it agrees in all respects with our plants except that the spores are slightly smaller, 6-7.5 x 6-7 micr., the size assigned to them by Peck.

596. Entoloma sericeum Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 320.
Gillet, Champignons de France. No. 276.
Ricken, Blätterpilze, Pl. 72, Fig. 5.
Plate CVI of this Report.

PILE US 2-6 cm. broad, convex expanded, *more or less* umbonate, glabrous, hygrophanous, *umber-brown* (*moist*), umbo darker, fading to grayish-brown and silky-shining (dry), striatulate on margin when moist, margin at first regular then wavy. FLESH thin, concolor, moist. GILLS adnexed-emarginate or broadest behind and rounded-adnate, moderately *broad*, close to subdistant, gray or grayish-white at first, edge entire. STEM 2-6 cm. long, 3-5 mm. thick, stuffed then hollow, equal or tapering upward, sometimes compressed or twisted, *grayish-brown or tinged with gray*, innately silky-fibrillose. SPORES sphoeroid, tuberculate-angular, 8-9.5 (incl. apiculus) x 6-7 micr., apiculus prominent, deep flesh color in mass. ODOR and TASTE farinaceous.

Gregarious. On the ground, in open woods among grass or fallen leaves. Ann Arbor. June-July. Infrequent.

This species is characterized by its medium to small size, dark brown cap, the presence of an umbo, the grayish gills and the mealy odor. The umbo almost disappears. In Europe it is said to be abundant and to grow in grassy pastures or meadows. I have not found it in such a habitat. The surface of the cap has a sheen almost velvety as shown in our illustration. *E. griseum* differs in the truly convex cap without an umbo, and is usually larger. The spores of these two species are alike, and there is some question whether they do not run into each other.

597. Entoloma strictius Pk. (SUSPECTED)

N. Y. State Mus. Rep. 23, 1872.

Illustrations: Ibid, Pl. 2, Figs. 6-9.
Atkinson, Mushrooms, Fig. 138, p. 146, 1900.
Plate CVII of this Report.

PILEUS 2.5-6 cm. broad, rigid-fragile, obtusely conic-campanulate to broadly campanulate, then expanded and often *strongly umbonate*, glabrous, hygrophanous, umber to watery cinnamon (moist), pearl-gray and silky-shining (dry), margin even or pellucid-striatulate when moist, somewhat wavy, thin and at length splitting. FLESH quite thin, concolor, scissile. GILLS adnexed, then emarginate or sinuate, *ventricose, broad*, narrowed in front, close to subdistant, white or pallid then rosy-incarnate, edge minutely eroded. STEM 6-10 cm. long, 3-7 mm. thick, *slender, cylindrical* or tapering slightly upward, sometimes obscurely bulbous, *strict*, stuffed then hollow, rigid-fragile, twisted, fibrillose-striate, pallid to pale grayish-white. SPORES elongated-angular, curved toward apiculus, 10-12 x 6-8 micr., nucleate, cinnamon-rose color in mass. BASIDIA about 40 x 8-9 micr., 4-spored. CYSTIDIA none. ODOR and TASTE none.

Subcaespitose. In swampy or low woods or near sphagnum swamps, near or on much-decayed stumps, etc. July-August. Ann Arbor, New Richmond, East Lansing. Infrequent.

Very distinct. The pileus is usually markedly campanula te, with a strikingly inanimate umbo, very hygrophanous becoming silvery shining when dry, and the thin flesh is at length split on the margin. The stem is very straight and easily splits longitudinally. The spore-mass is peculiarly colored; when deposited thickly on white paper it has a deep rufous or cinnamon-rose color. The width of the spores are given too large by Peck. The striations on the margin of the cap soon disappear or are lacking. The smaller specimens have the appearance of a Nolanea.

598. Entoloma grayanum Pk.

N. Y. State Mus. Rep. 24, 1872.

Illustrations: Atkinson, Mushrooms, Fig. 157, p. 145, 1900.
Plate CVIII of this Report.

PILEUS 4-12 cm. broad, carnpanulate-convex, then expanded and obtuse or broadly umbonate, *firm, glabrous, hygrophanous*, watery-white, *whitish or yellowish-white* (moist), shining and whitish (dry), not striate, sometimes wrinkled on disk. FLESH *relatively thin*, whitish or tinged yellowish, *scissile*, not compact. GILLS adnexed, becoming emarginate, at first rounded behind, *broad*, ventricose, rather close, thickish, white then deep flesh color, edge entire or eroded-crisped. STEM 5-12 cm. long, 10-20 mm. thick, equal or subequal, firm, *stout*, variously thickened, fibrous-stuffed, solid at base, straight or curved, glabrous, silky-shining, watery-white or tinged faintly with yellowish. SPORES sphoeroid, angular, 5-6 angled, 8-10 (incl. apiculus) x 7-9 micr., bright flesh color in mass. CYSTIDIA and STERILE CELLS none. BASIDIA clavate, 45 x 12 micr., 4-spored. ODOR and TASTE *none* or rarely subfarinaceous to slightly pungent.

(Dried: Pileus fuscous; stem sordid; gills dingy flesh-color.)

Solitary or subcaespitose-gregarious. On the ground in woods. August-October. Ann Arbor, Negaunee.

Distinguished by its whitish or yellowish-white pileus which has a watery cast, the hygrophanous hence scissile flesh, and the spores. It is often a noble plant and our forms surpass considerably the sizes given by Peck. In fact its characters are in some respects so near those of *E. grande* Pk., that only its hygrophanous flesh and thinner pileus seem to separate it. The spores are sharply angled and the apiculus usually stands out straight instead of obliquely as in many others. Atkinson (1900) describes a form with a drab-colored pileus. In dry weather the yellowish hues may be altogether lacking.

599. Entoloma speculum Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 95, Fig. 2.
Cooke, Ill., Pl. 308.
Plate CIX of this Report.

PILEUS 2-6 cm. broad, convex-expanded then expanded-plane or slightly depressed around the umbo, margin somewhat wavy, *hygrophanous, pinkish-white* (moist), white and silky-shining (dry), the umbo obtuse and when moist whiter than *the rest of the pileus*, margin even or obscurely striatulate (moist). FLESH thin, fragile, white. GILLS emarginate, broad behind, *subdistant*, sometimes veined, *white at first* then *deep rose-colored*, edge suberoded. STEM 3-9 cm. long x 3-8 mm. thick, *equal*, stuffed by loose pith then hollow, sometimes compressed, *fragile, shining-white*, silky-fibril-lose or striatulate, pruinose at apex. SPORES sphoeroid-angular, or slightly longer in one direction, 7-9 (including apiculus) x 6-7.5 micr., apiculus suboblique, nucleate. CYSTIDIA none. ODOR and TASTE *none*.

(Dried: Pileus dark rufous-brown or fuscous-brown, stem brownish.)

Solitary or subcaespitose. In grassy places in woods or on debris. Ann Arbor, New Richmond. Infrequent.

The persistently white umbo, deep color of the gills, fragile texture and the silvery shining-white pileus when dry, characterize the species. The size varies in different collections, normally rather small, but in favorable situations becoming larger than figured in the plates. The stem tends to elongate and is very fragile. The color is not retained on drying. The spores are a little large in some specimens but do not agree with the large 'size given by Saccardo and Massee, each of whom must have dealt with a different species. The surface of the pileus lacks any kind of differentiated cuticle. The trama of the gills is parallel and the margin of the cap is at first incurved.

Section IV. Conoidei. Pileus conic or campanulate, not expanded, moist; stem slender, long and hollow; on mosses, especially sphagnum.

600. Entoloma salmoneum Pk. (SUSPECTED)

N. Y. State Mus. Rep. 24, 1872.

Illustrations: N. Y. State Mus. Rep. 24, Pl. 4, 1872.
Hard, Mushrooms, Fig. 199, p. 247, 1908.

PILEUS 10-25 mm. broad, often longer than wide, thin, *conical* or campanulate, *papillate* or subacute, subhygrophanous or moist, *deep salmon color* or tinged with orange, margin even or nearly so. GILLS adnexed, *broad*, subdistant, ascending, ventricose, salmon-yellow or salmon-colored. STEM 5-12 cm. long, 2-4 mm. thick, slender, equal, glabrous, pruinose at apex, *hollow*, salmon-colored, innately silky-striatulate, becoming subcartilaginous. SPORES quadrate-nodulose, measuring 10-12.5 micr. diagonally, about 9 micr. wide from side to side, apiculus prominent, rosy-salmon in mass. CYSTIDIA few or none.

(Dried: Reddish-cinnamon to chestnut color.)

Gregarious or scattered. On the ground in conifer woods, in moist places, usually among mosses. August and September. In northern Michigan, Bay View, Negaunee, Detroit. Infrequent and local.

A beautiful little Entoloma, easily mistaken for a Nolanea. The spores are unique for the most part; under the microscope they appear like 4-sided crystals, but with the sides less straight. Simon Davis reports that the stem and sometimes the pileus may be tinged greenish.

601. Entoloma peckianum Burt. var.

N. Y. State Mus. Rep. 54, 1901.

Illustration: Ibid, Pl. F., Figs. 9-16.

PILEUS 3-5 cm. broad, canipanulate or convex-expanded, *brownish-ashy* to grayish, *streaked with brown-gray fibrils, umbonate*, glabrescent, even on margin. FLESH white, thin. GILLS adnate, becoming emarginate-sinuate, rather broad, white then bright flesh color. STEM 5-7 cm. long, 4-6 mm. thick, *whitish*, sometimes ashy-tinged, equal or tapering downward, straight or flexuous, stuffed then hollow, white-mycelioid at base, glabrous, sometimes fibrillose-striatulate, *flocculose-pruinose* at apex, subshining and subcartilaginous when dry. SPORES angular, slightly longer than wide, 5-6 angled, 8-9.5 x 6-7.5 micr., apiculus prominent, nucleate. CYSTIDIA none.

Subcaespitose or solitary. Low grounds and swamps of frondose trees. July, August and September. Ann Arbor, New Richmond, Marquette and Houghton. Infrequent.

This Entoloma seems to have characters of both *E. peckianum* and *E. murinum* Pk. It differs from the former in its smaller spores, color and size, as these are given in Peck's description. Our plants were referred to *E. peckianum* by Peck. This species differs from *E. murinum* in the smaller spores and size and in the even margin of the cap. From both it would seem to differ in its lack of a conical pileus and in its stouter habit, so that it may turn out to be a distinct species belonging to the section Leptonidei. In his remarks on *E. murinum*, Peck indicates that it is smaller than *E. peckianum*, although he gives the same size in the published descriptions. Our plants always have spores of the size given.

602. Entoloma cuspidatum Pk. (SUSPECTED)

N. Y. State Mus. Rep. 24, 1872.

Illustrations: Ibid, Pl. 2, Fig. 14-18.
Plate CX of this Report.

PILEUS 1.5-5 cm. broad, conical or persistently *conical-campanulate*, 1-3 cm. high, glabrous, silky-shining, *pale yellow*, even or at length rimulose, *bearing an elongated papilla at the apex*, margin at first straight, at length irregular. FLESH thin. GILLS ascending, narrowly adiiate, broad in middle, subdistant, *pale yellow at first*, then bright flesh color, edge uneven. Stem 4-12 cm. long, 2-3 mm. thick, equal, hollow, strict, sometimes twisted, glabrous, *pale yellow*, fibrous or with a subcartilaginous cuticle. SPORES subquadrate, coarsely angular, nucleate, apiculus prominent, 9-12 micr. diam., bright flesh color. CYSTIDIA none; STERILE CELLS lacking on edge of gills. Trama of gills parallel. ODOR and TASTE mild.

Gregarious. On mosses, sphagnum, leucobryum, etc., in swamps and bogs.

Eloise, near Detroit. August. Rare.

A unique plant, collected by Mrs. T. A. Cahn of the Detroit Mycological Club near Eloise. It does not seem to have been reported outside of New York. The pileus and stem fade on losing moisture, but it is not hygrophanous. It is a close relative of *E. salmoneum*, but with different colors and marked by the prominent cusp at the apex of the cap.

Clitopilus Fr.

(From the Greek, *klitos*, a slope, and *pilos*, a felt-cap.)

Pink-spored, without volva or annulus. Stem *fleshy or fibrous*, not cartilaginous, confluent with the pileus whose margin is at first involute. Gills *decurrent or adnate* but *not becoming sinuate nor seceding*. Pileus usually depressed or umbilicate.

Terrestrial plants, often with a farinaceous odor or taste; none are known to be poisonous. The decurrent gills ally them with the genus Clitocybe of the white-spored group.

The PILEUS is glabrous or pruinose in most species; in *C. abortivus* a delicate silky tomentum covers the surface; in a number it is hygrophanous, and in *C. orcella* it is slightly viscid. The larger species are of a firm consistency; the smaller, membranous or fragile. The colors are usually dull or pale, whitish, grayish or brownish. The GILLS furnish the characteristic mark of the genus. Although usually decurrent, they are sometimes broadly adnate as in Entoloma and Leptonia, but in that case do not become sinuate-emarginate in age, nor readily separate from the stem. When decurrent, they are usually narrowed behind and end in a point on the stem as in many Clitocybes. When mature the gills of the different species present the same variation of color as those of Entoloma. Some are pale flesh-colored or deep rose; Peck grouped them into three groups with this difference in color as a basis. At first the gills are usually white or whitish, but in *C. micropus*, *C. albogriseus, C. abortivus* and *C. novaboracensis* they are pale gray or ashy at first. The STEM is fleshy-fibrous but may become rather rigid in the smaller forms. It is solid in .all the larger forms and in this respect differs markedly from most Entolomas. There is no cartilaginous cuticle as in Eccilia. The SPORES are angular in some species like those of Entoloma, rounded in others as in Clitocybe, varying in intensity of color as shown by the mature gills or spore-prints. Ricken has moved all those with non-angular spores to other genera and omits the genus Clitopilus entirely. CYSTIDIA are absent as far as known. The TASTE is often farinaceous, sometimes quite strong; that of *C. novaboracensis* is bitter; in others it is mild or insipid.

Fries divided the European species into two sections: one with deeply decurrent gills and the margin of the pileus at first flocculose; the other with adnate or subdecurrent gills and the margin of the pileus naked. Peck suggested the use of the different shades of pink of the mature gills as a basis for the sections. It seems to me that the character of the spores is more fundamental

than any of these, since the angular spores simulate those of Entoloma, the rounded ones those of Clitocybe. In this sense, there would be two sections; the Angulosporae and the Globosporae. The genus is not well represented in Michigan.

Key to the Species

(A) Spores angular.
  (a) Pileus hygrophanous, 1-3 cm. broad, fragile.
    (b) Odor and taste farinaceous; pileus grayish-brown (moist). 605. *C. subvilis* Pk.
    (bb) Not farinaceous; pileus pinkish-white (moist). Spores smaller than in the preceding. 604. *C. woodianus* Pk.
  (aa) Pileus not hygrophanous.
    (b) Pileus 5-10 cm. broad, grayish-brown, often abortive. 603. *C. abortivus* B. and C.
    (bb) Pileus less than 5 cm. broad, whitish to grayish or smoky-cinereous.
      (c) Odor none.
        (d) Gills white then somewhat rosy; stem stuffed to hollow. 609. *C. subplanus* Pk.
        (dd) Gills dark ashy; stem solid or fibrous. 606. *C. undatus* Fr.
      (cc) Odor farinaceous; gills gray at first.
        (d) Stem slender, 3-6 cm. long, solid; pileus glabrous. 608. *C. albogriseus* Pk.
        (dd) Stem short, 1-2 cm. long, solid; pileus silky. 607. *C. micropus* Pk.
(AA) Spores not angular. (Slightly in *C. novaboracensis.*)
  (a) Pileus somewhat viscid (moist), white or whitish, 3-7 cm. broad. 611. *C. orcella* Fr.
  (aa) Pileus not viscid.
    (b) Taste bitter; pileus concentrically-cracked, brownish-gray; gills deeply decurrent. 612. *C. novaboracensis* Pk.
    (bb) Taste not bitter.
      (c) Plants very caespitose, fragile, pileus 5-15 cm. broad, whitish, moist. 613. *C. caespitosus* Pk.
      (cc) Plants gregarious, firm; pileus 3-10 cm. broad, white or tinged gray. 610. *C. prunulus* Fr.

Section I. Angulosporae. Spores angular or tuberculate.

603. Clitopilus abortivus B. & C. (EDIBLE)

Ann. Nat. Hist, 1859.

Illustrations: Hard, Mushrooms, Fig. 202, p. 250, 1908.
(Abortive form) Ibid, Fig. 203.
(Abortive form) Minnesota Mushrooms, Fig. 33, p. 57, 1910.
N. Y. State Mus. Bull. 54, Pl. 78, 1902.
Plate CXI of this Report.

PILEUS 5-10 cm. broad, firm, convex then plane to subdepressed, dry, at first covered with a delicate silky tomentum, glabrescent, *grayish-brown, dull, becoming isabelline*, margin even. FLESH *white*. GILLS decurrent, varying to merely adnate with a tooth, thin, close, *pale gray at first*, then *rosy to salmon color*, rather narrow. STEM 3-9 cm. long, 6-12 mm. thick, solid, fibrous, subequal, minutely flocculose, sometimes striate, pale grayish-brown to isabelline. SPORES elongated angular, irregular, 8-10 x 5-6 micr., nucleate, *pale rose color* or almost salmon color *in mass*. CYSTIDIA none. ODOR and TASTE somewhat farinaceous.

(Dried: Pileus brownish-gray, stem sordid white, gills dingy deep flesh color).

Subcaespitose, gregarious, occasionally solitary. Habitat varies: found frequently in low woods of elm, maple, etc., on wooded hillsides, ravines, of frondose or mixed woods; sometimes on rotten wood. Late August to middle October. Common in southern Michigan.

Often some of the individuals of one patch are attacked—apparently by some other fungus—and do not develop the cap and gills, but remain as *abortive*, whitish masses, with the appearance of puff-balls; the interior however retains its whitish color, and does not become brown, olive or purple as in puff-balls. Their shape varies from globular to depressed, often umbilicate above. Sometimes all of the specimens are found in this condition, but careful searching of the locality usually brings to light normal individuals. McIlvaine says the abortive ones are fair eating.

604. Clitopilus woodianus Pk.

N. Y. State Mus. Rep. 24, 1872.

PILEUS 2-5 cm. broad, convex, then plane, obtuse or slightly depressed, sometimes umbonate, fragile, *hygrophanous, brownish-buff or watery-white* (moist), white or tinged slightly yellowish or brownish and silky shining (dry), glabrous, margin *striatulate* (moist). FLESH thin, white. GILLS *broadly adnate to subdecurrent,* not sinuate, moderately close, rather broad, thickish, whitish then *deep flesh-colored*. STEM 4-6 cm. long, 2-5 mm. thick, equal or tapering upward, glabrous, stuffed with a firm pith, cuticle subcartilaginous, innately silky-striatulate, somewhat pellucid-white, elastic. SPORES sphoeroid-angular, 7 micr. diameter, nucleate, deep flesh color in mass. TASTE and ODOR none.

Solitary. On the ground or on rotten logs in frondose or cedar woods. Ann Arbor, Marquette. September. Rare.

This differs from *C. subvilis* in its small spores, whitish color, close gills and lack of odor. The stem is rather elastic for the genus and inclines to that of Nolanea. The pileus is depressed .around the low limbo and tinged brownish there. It has a stouter stem and smaller spores than *Entoloma sericellum*, and is hygrophanous.

605. Clitopilus subvilis Pk. (EDIBLE)

N. Y. State Mus. Rep. 40, 1887.

PILEUS 1.5-3 cm. broad, fragile, convex-campanulate, depressed to umbilicate, *hygrophanous, brown or watery grayish-brown* (moist), paler and silky-shining when dry, margin decurved and somewhat wavy, slightly striatulate (moist), glabrous. FLESH thin, moist. GILLS broadly adnate or subdecurrent, *subdistant*, rather broad, whitish then flesh-colored, edge uneven. STEM 2-5 cm. long, 2-3 mm. thick, fleshy-fibrous, stuffed then hollow, equal or subequal, glabrous, tinged brownish, silky-shining. SPORES strongly 4-6 angled, sub-quadrate to subrectangular in focus, sides straight or concave, apiculus oblique, 8-10 x 7-9 micr., nucleate. CYSTIDIA none. ODOR and TASTE *farinaceous*.

(Dried: Dark brown to umber.)

Solitary. Ground in hemlock woods. Houghton. July-August. Infrequent.

It differs from *C. woodianus* in the color, subdistant gills and spores. From similar species in other pink-spored genera, it differs by its fleshy-fibrous stem and its adnate, not seceding gills.

606. Clitopilus undatus Fr.
(Sense of Patouillard.)

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 96, Fig. 4.
Patouillard, Tab. Analyt, No. 428.
Cooke, Ill., Pl. 486.

PILEUS 1.5-3.5 cm. broad, *fragile*, deeply umbilicate to subin-fundibuliform, *dark smoky-gray* (moist), fading, opaque, silky when dry, splitting radially in age, sometimes obscurely zonate, *margin wavy*, fleshy, concolor. GILLS *decurrent*, broad in the middle, thin, close, *dark cinereous*, at length tinged by the spores, edge entire. STEM short, 1.5-2 cm. long, 1.5-3 mm. thick, equal, terete, solid, even, tough-elastic, glabrous, *brownish-ashy to pale brown*. SPORES irregularly subglobose-oval, angular, 7-9 x 6-6.5 micr., nucleate, reddish-flesh color in mass. CYSTIDIA none. ODOR none.

On mossy ground or much decayed wood, in open frondose woods. Ann Arbor. August. Infrequent.

Known by its dark gray gills, lack of odor and angular spores. Ricken refers it to Paxillus and assigns to it smooth spores, in which he differs from other authors. Our plants had a solid stem while Fries describes the stem with a cavity. In all other respects it agrees well with the Friesian description. Patouillard reports the stem either solid or hollow and doubtless he had our species.

607. Clitopilus micropus Pk.

N. Y. State Mus. Rep. 31, 1879.

Illustration: N. Y. State Mus. Bull. 54, Pl. 78, 1902.

PILEUS small, 1-2 cm. broad, *fragile*, convex then depressed, *umbilicate, silky, gray*, usually slightly zoned on margin, margin decurved. GILLS adnato-decurrent, *narrow*, narrowed in front and behind to a point, close, gray then *salmon-colored*. STEM *short*, 1-2 cm. long, 2-3 mm. thick, solid or with a slight cavity, *pruinose*, gray, white-mycelioid at base. SPORES elongated angular-tuberculate, 9-10 x 5-6 micr., nucleate, pale salmon color. ODOR and TASTE *farinaceous*.

(Dried: Dark gray.)

Gregarious or subcaespitose. On the ground, grassy places, sandy fields or thin woods. July-September. Throughout the State. Ann Arbor, Detroit, New Richmond, Marquette. Frequent.

Sometimes it occurs in abundance in one place. There is a pale variety, almost white, which is widely distributed. The short stem, umbilicate and subzonate pileus distinguish it from *C. albogriseus*. It is rarely if ever found in deep woods. It differs from *C. subplanus* in its fragile cap.

608. Clitopilus albogriseus Pk. (EDIBLE)

N. Y. State Mus..Rep. 31, 1879.

PILEUS 1-3 cm. broad, convex, *firm*, then plane, depressed or umbilicate, glabrous, pale gray, margin even. GILLS adnato-decurrent, close, *rather broad*, grayish then flesh color. STEM 3-6 cm. long, 2-5 mm. thick, solid, subequal, glabrous, pale gray. SPORES elongated-angular, 10-12 x 6-7 micr., apiculus oblique and prominent. ODOR and TASTE *farinaceous*.

Gregarious or solitary. Ground, in conifer or frondose woods. Ann Arbor, Marquette, Houghton. July-September. Not infrequent in northern Michigan.

The large spores and longer stem separate it from *C. micropus*; the solid stem and the spores from *C. subplanus*. These three are closely related.

609. Clitopilus subplanus Pk.

N. Y. Mus. Bull. 122, 1908.

PILEUS 2-3 cm. broad, convex-expanded, somewhat plane, depressed or umbilicate, glabrous, innately silky, *grayish-white* or whitish. GILLS adnato-decurrent, close, moderately broad, *white then flesh color*. STEMS 2-4 cm. long, 2-4 mm. thick, *toughish*, terete or subcompressed, subsilky, cuticle subcartilaginous, even. SPORES angular, 9-1.1 x 6-7 micr., flesh-colored in mass; no cystidia.

Scattered. On decaying leaves, etc., in mixed woods. New Richmond, Bay View. July-September. Frequent locally.

This species differs from the two preceding in its white gills when young and its stuffed to hollow stem. The whole plant is rather tough and its taste and odor are not farinaceous.

Section II. Globosporae. Spores rounded, neither angled nor tubercular.

610. Clitopilus prunulus Fr. (EDIBLE)

Syst. Mycol., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 135, p. 142, 1900.
Hard, Mushrooms, Fig. 200, p. 248, 1908.
N. Y. State Mus. Rep. 48, Pl. 14, 1896, Bot. ed.
Swanton, Fungi, Pl. 42, p. 131, 1909.
Ricken, Blätterpilze, Pl. 27, Fig. 5 (as *Paxillus prunulus*).
Clements, Minn. Mushrooms, Fig. 34, p. 58, 1910.
Cooke, Ill., Pl. 322.

"PILEUS 5-10 cm. broad, at first obtuse, convex then nearly plane, *firm, dry, pruinate*, white to dark-gray, often eccentric, margin even and often wavy. FLESH white. GILLS deeply decurrent, *subdistant, narrow*, white then flesh-colored. STEM 3-8 cm. long, 5-15 mm. thick, solid, naked, *striate*, subequal, or tapering, sometimes ventricose. SPORES subfusiforni to subelliptical, pointed at ends, 10-12 x 5-7 micr., smooth, with three deep

longitudinal furrows, tinged salmon. ODOR and TASTE *farinaceous.*"

Ground in open woods. July-September. Ann Arbor, Lansing. Infrequent.

The general appearance is that of *C. orcella* but its cap is firm and not viscid and the stem is glabrous. Massee and Hard give the spores too small. Only Hennings, in Engler and Prantl, and Ricken mention the characteristic furrows of the spores. It has not been seen by me in abundance and is apparently rather rare in the State. Its edible qualities are highly praised. In France it is called the "Mousseron" by the peasants. An abortive form is described by McIlvaine.

611. Clitopilus orcella Fr. (EDIBLE)

Syst. Mycol, 1821.

Illustrations: N. Y. Mus. Rep. 48, Pl. 14, 1896, Bot. ed.
Hard, Mushrooms, Fig. 201, p. 249, 1908.
Cooke, Ill., Pl. 323.
Gillet, Champignons de France, No. 145.
Patouillard, Tab. Analyt., No. 427.

PILEUS 3-9 cm. broad, convex at first, soon expanded, plane then depressed, *soft, somewhat viscid*, silky, white to whitish or tinged yellowish, margin often undulate-lobed, even. FLESH white. GILLS deeply decurrent, *close*, narrow, edge entire, white, then pale salmon-colored from spores. STEM 3-5 cm. long, 4-10 mm. thick, rather short, solid, soft, *flocculose*, sometimes eccentric, sub-equal to subventricose. SPORES 9-11 x 4-6 micr., fusiform to oval-elongated, narrowed toward apiculus, nucleate, pale salmon color in mass, furrowed, smooth. ODOR and TASTE *farinaceous*.

(Dried: Pileus and stem dull-white; gills salmon-colored.)

Solitary or gregarious. On the ground or on moss, in low oak and maple woods, grassy places, etc. July-September. Ann Arbor, Detroit, Jackson. Frequent in southern Michigan.

This apparently differs from *C. prunulus* in its viscid pileus when moist, in its closer gills and the soft texture. It is more abundant than that species. Its edibility is the same and for that purpose need not be distinguished from the preceding. I have not found it in conifer regions. It is often considered identical with *C. prunulus*, but is at least a variety.

612. Clitopilus novaboracensis Pk.

N. Y. State Cab. Rep. 23, 1872.

Illustrations: Hard, Mushrooms, Fig. 204, p. 251, 1908.
Compare illustrations of *C. popinalis* Fr.
Fries, Icones, Pl. 96, Fig. 1.
Cooke, Ill., Pl. 485.

PILEUS 3-6 cm. broad, convex, plane or umbilicato-depressed, *concentrically rivulose*, glabrous, obscurely zonate toward margin, which is inrolled at first and often wavy, dingy-white, tinged ashy. FLESH thin, white, flaccid. GILLS deeply decurrent, crowded, narrow, brownish-ashy to pallid with a slight flesh color, becoming ashy-stained, edge entire. STEM 3-6 cm. long, 2-5 mm. thick, rather slender, *flexible*, stuffed then hollow, *pruinose or tomentose*, white-mycelioid at base, subequal, coiicolor or paler than pileus. SPORES oval, obscurely or not at all angular, 5-6 x 4-4.5 micr., apiculate, pale flesh color in mass. ODOR farinaceous. Taste bitterish or very bitter.

(Dried: Pileus and gills brownish-gray.)

Subcaespitose or solitary. On the ground in hemlock woods. Ann Arbor, Bay View. August. Infrequent.

Var. *brévis* Pk. is reported by Longyear in frondose woods, East Lansing. This variety is pure white, with gills merely subdecurrent and stem short. The species is referred by some to *C. popinalis* Fr. The spores of the American plant appear rounded under ordinary magnification, but when magnified about 1500 diameters, it is seen that they are slightly angled. The angles are not sharply marked and the spores never appear tubercular-angled as figured by Cooke for *C. popinalis;* some appear to be altogether rounded. The dark plants may be mistaken for *Clitocybe cyathiforme*, but the pileus of the latter is not rivulose-cracked. Some Tricholomas have a pileus of the same color and markings. The plants often turn ashy where bruised.

613. Clitopilus caespitosus Pk.

N. Y. State Mus. Rep. 41, 1888.

Illustrations: Plates CXII, CXIII of this Report

PILEUS 5-15 cm. broad, at first convex, soon expanded and plane to depressed, somewhat firm but brittle, *very fragile* when moist or water-soaked, glabrous, whitish to gray-tinged when young, watery-dingy-white (moist), *dull whitish to pale tan* and silky-shining (dry), even, margin at first inrolled, often recurved and split in age. FLESH pallid to white, thin, subhygrophanous, somewhat scissile. GILLS very *crowded*, and *narrow*, adnate-decurrent, thin, dingy *pale* flesh color, edge sometimes minutely crenulate. STEM 3-7 cm. long, 5-12 mm. thick, *equal or tapering downward*, silky-fibrillose, scurfy at apex, stuffed, fragile in age, pallid, easily splitting. SPORES short-oblong, 4-5 x 2.5-3 micr., smooth, sordid-while with a pink tinge in mass. ODOR slightly fragrant. TASTE none.

(Dried: Pileus and stem dingy-white tinged tan color; gills brownish-flesh color.)

Very caespitose, sometimes singly. On the ground in open oak and maple woods of southern Michigan; in mixed woods of maple and pine in the north. August-October. Throughout the State. Infrequent.

This is easily mistaken for a Clitocybe. The spores have a dingy flesh tinge in mass, like *Tricholoma personatum* and *Tricholoma panoeolum* var. *caespitosum*. In rainy weather it is water-soaked and appears as if hygrophanous. Its fragile flesh and its usually large size separate it from other Clitopili. It seems to be much

more closely related to the genus Clitocybe than to Clitopilus.

Leptonia Fr.

(From the Greek, *lepidion*, a small scale.)

Pink-spored. Pileus at length *subexpanded and depressed in center*, umbilicus minutely squamulose, margin at first *incurved*. Stem *cartilaginous*, confluent with the pileus, stuffed, soon hollow. Gills adnexed or adnate, seceding. Spores *angular*.

Terrestrial, lignicolous or sphagnicolous. Rather small, slender-stemmed plants of low wet places in woods or swamps. They correspond to Collybia of the white-spored group. From Nolanea they are distinguished by the more expanded, subumbilicate pileus whose margin is at first incurved instead of straight on the stem.

The PILEUS is often minutely scaly or fibrillose, sometimes glabrous; hygrophanous or merely moist; even or striate on the margin. The colors are often bright, rosy, violet, yellowish, greenish or blue-black. As in Collybia, the pileus tends to expand rather fully, because of the position of the margin when young. The peculiar lustre is due, according to Patouillard, to the presence of air between the hyphae of the surface layer. The GILLS secede from the stem at maturity as in Nolanea; at first they are either adnexed or adnate. The color when young is to be noted, as it varies in different species, at first it may be gray, bluish, or whitish, at length the gills are colored by the spores. The STEM, as in Nolanea and Eccilia, is cartilaginous, hollow (sometimes stuffed), confluent with the pileus but of a different texture; it is composed of parallel hyphae, with long cells, which are regularly cylindrical. It is usually glabrous and polished, but some species are dotted with colored squamules. It is often compressed and furrowed longitudinally. The SPORES vary from flesh color to bright rose, and are often prominently angled, sometimes tuberculate. CYSTIDIA are uusually lacking except in *L. seticeps*.

The species of this genus are rather difficult to diagnose. In some cases the color is rather striking, as for example, of *L. formosa* and *L. rosea*; in others the color varies considerably in different specimens of the same species, e. g., *L. asprella*, so that a microscopic study must be the final resort. Not much is known concerning their edibility, although several species appear quite frequently. Some of the species are rarely found and this accounts for the smaller number of species for the State. All species likely to occur in the State are included in the key.

Key to the Species

(a) Stem and pileus rose-tinged; on sphagum. 616. *L. rosea* Longyear.
(aa) Stem and pileus white, becoming blackish on drying; pileus striate; gills adnexed; spores 10-12.5 x 7-9 micr. *L. transformata* Pk.
(aaa) Stem and pileus waxy-yellowish; pileus scaly to fibrillose. 618. *L. formosa* Fr.
(aaaa) Stem and pileus neither rosy, white nor yellowish.
(b) Pileus, stem and gills green (aeruginous).
(c) Odor strongly of mice. *L. incana* Fr.
(cc) Odor not mentioned. *L. aeruginosa* Pk.
(bb) Pileus and stem grayish-brown to fuscous, dark brown, or light-leather color.
(c) Pileus hygrophanous, striatulate.
(d) On rotten wood; gills rounded behind, nearly free, whitish; spores 10 x 7.5 micr. *L. undulatella* Pk.
(dd) On the ground; gills adnate-seceding, tinged gray; spores elongate, 10 x 6-8 micr. 621. *L. asprella* Fr. var.
(cc) Pileus not hygrophanous.
(d) On rotten wood; pileus walnut-brown; gills slightly adnexed. Spores subglobose. 617. *L. seticeps* Atk.
(dd) On the ground; pileus paler.
(e) Pileus innately silky and substriatulate; gills whitish, broad, adnexed; stem glabrous; spores quadrate, 9-11 x 9-10 micr. *L. solsticialcs* Fr. (Sense of Ricken.)
(ee) Gills, stem and pileus gray, gills broad; spores sphoeroid, 8-10 micr. *L. grisea* Pk.
(bbb) Pileus and stem violet, bluish-black, smoky or steel-blue.
(c) Stem dotted with dark squamules, at least at apex.
(d) Gills with a black serrulate edge; on the ground. 619. *L. serrulata* Fr.
(dd) Gills with edge concolor; pileus fuscous, squamulose; stem tinged lavender, squamulose; on rotten wood. 614. *L. placida* Fr.
(c) Stem glabrous or with few evanescent squamules.
(d) Gills with a black serrulate edge; pileus grayish-white, umbilicus darker and scaly. *L. subserrulata* Pk.
(dd) Gills unicolorous.
(e) Pileus hygrophanous, striate (moist), squamulose to glabrous; gills grayish, adnate; spores 11-14 x 6-8 micr. 621. *L. asprella* Fr.

(e) Pileus not hygrophanous, not striate.
(f) Pileus at first bluish-black, then smoky-fuscous; gills adnate, ventricose, stem concolor; spores 9-12 x 6-7 micr.; on the ground. 615. *L. lampropoda* Fr.
(ff) Pileus, gills and stem rather dark violet; squamulose-fibrillose on pileus; spores subsphoeroid, 8-10 x 7-8 micr.; on wood, sawdust, etc. 620. *L. cachrea* Fr.

Section I. Nonhygrophanae. The species of this section are not truly hygrophanous nor markedly striate on the pileus but in wet weather they may appear somewhat hygrophanous, and a few species are faintly or finely striate on the pileus.

**Gills white or whitish at first.*

614. Leptonia placida Fr.

Syst. Mycol., 1821.

Illustrations: Fries, Icones, Pl. 97.
Cooke, Ill., Pl. 330.
Plate CXIV of this Report.

PILEUS 3-5 cm. broad, campanulate, then convex, obtuse, rarely depressed, ground color *pale fuscous, covered with brown to blackish silky scales which are denser and darker on disk*, often with an obscure tinge of violet, *not striate*. FLESH pallid, with a pinkish tinge, thin. GILLS *broad behind* but abruptly narrowed and *adnexed*, sometimes subarcuate and subdecurrent, narrowed in front, crowded, thickish, whitish then flesh color from spores, edge concolor, often eroded-crenate. STEM 2-5 cm. long, *rather thick*, 3-8 mm., cartilaginous, stuffed then hollow, often compressed and grooved, sometimes twisted or variously curved, *loosely dotted by lavender or dark blue to blackish squamules above*, squamules rosy or violet below, apex usually thickened, base wrhite mycelioid, sometimes glabrous except at apex. SPORES tuberculate-angular, oblong, 8-10.5 x 5-6 micr., apiculus oblique. CYSTIDIA none.

(Dried: Dark fuscous throughout.)

Gregarious. On rotten wood, stumps and logs, in low woods of elm, maple, etc. June to October. Ann Arbor, Detroit. Frequent at times.

A beautiful plant, with a stouter and more curved stem than the terrestrial Leptonias. The shades of lavender and blue vary considerably in different collections, but the peculiar dark scales on the pileus and stem are unmistakable. The gills of our plants always have a decurrent tooth.

615. Leptonia lampropoda Fr.

Syst. Mycol., 1821.

Illustrations: Cooke, Ill., Pl. 331.
Gillet, Champignons de France, No. 434.
Ricken, Blätterpilze, Pl. 73, Fig. 7.
Swanton, Pl. 42, Figs. 3-5, 1909.

PILEUS 1-3 cm. broad, convex then plane, umbilicate or depressed, *bluish-black to jet-black when young*, becoming smoky-fuscous when old, *becoming minutely squamulose* by the breaking up of the cuticle, innately-fibrillose at first, squamules dense in center, *never striate*, not papillate, sometimes rimose, margin decurved then raised. FLESH at first bluish-black, then gray to white, subhygrophanous, thin. GILLS adnate-seceding, moderately broad, subdistant, *ventricose*, white at first *then rose-colored*, edge entire and concolor. STEM 2.5-5 cm. long, 1-3 mm. thick, equal or tapering upward, stuffed then hollow, often compressed and grooved, straight or curved, *glabrous*, even, firm, elastic, *bluish-black at first, becoming fuscous*, white mycelioid at base, apex not punctate. SPORES variable in size, tuberculate, angular, 9-13 x 6-7 micr., *rosy in mass*. CYSTIDIA none. ODOR and TASTE none.

Gregarious. On the ground, wet places in mixed hemlock and maple woods. Bay View, New Richmond, Marquette. July-September. Frequent in conifer regions.

Easily known by its bluish-black color when young, the lack of striations on the pilens and the rather firm stem. It approaches *L. asprella*, and I at first referred it to that species, but the margin of the pileus is never striate and the gills are not gray. It has the colors of *L. serrulata* but the edge of the gills does not become black-dotted. The figures of European authors do not illustrate our plant well; this is not surprising, since it is always reported as growing "among grass." In fact, the majority of species in England are reported from grassy places, while with us the high winds and dryer conditions seldom favor their appearance in fields or meadows, and the forest forms are slightly different in appearance. It agrees well with the description of Fries given in his Monographia. Ricken gives broader spores; those of our plants agree with the size given by Saccardo.

616. Leptonia rosea Longyear

Mich. Acad. of Sci. Rep. 3, 1902.

Illustrations: Ibid, Plate I, Fig. 5.
Plate CXIV of this Report.

PILEUS 1.5-3.5 cm. broad, convex, then expanded, depressed or subumbilicate at center, *not striate, rose color when young*, fading to isabelline with reddish umbilicus, minutely fibrillose-scaly, especially at center. FLESH thin, white. GILLS adnate with slight tooth, close, moderately broad, ventricose, broadest behind, *white then flesh color*. STEM 5-8 cm. long, *slender*, scarcely 1.5 mm. thick, *equal*, cartilaginous, glabrous, *stuffed*, appearing solid, *pale roseate*, white-mycelioid at base, subpellucid-striatulate. SPORES angular, 10-12 x 7-8 micr., flesh color in mass.

Scattered. On sphagnum, in cedar and tamarack swamp (35 specimens). Bay View. "Burnt ground on a sandy hillside, Kent County. Longyear." July-September. Rarely seen.

The difference in habitat of the two localities where this has been found is remarkable. My own collection was made entirely on thick sphagnum, but Longyear found the two type specimens on burnt-over sandy soil. Its pretty colors are attractive and it is not easily mistaken. Gillet's figure of *Nolanea rufocarnea* Berk, reminds one somewhat of *L. rosea*, but our species is a true Leptonia with a non-striate pileus, without the bitter taste of *N. rufocarnea* and with a different color.

617. Leptonia seticeps Atk.

Jour. of Mycol., Vol. 8, 1902.

PILEUS 1-3 cm. broad, convex to expanded, umber to brownish-gray, darker on disk, *faintly and finely long-striate*, minutely granulose under a lens, margin somewhat incurved at first. FLESH whitish, very thin, composed of two layers, surface layer of oval or clavate long-pediceled cells mixed with longer, lanceolate to fusoid cells, all with smoky content. GILLS *slightly adnexed* or free, subdistant to close, broad, elliptical, white then flesh color, edge eroded; the trama composed of converging hyphae. STEM short, 1-2 cm. long, 2-3 mm. thick, glabrous or sometimes villose-dotted, whitish or brownish, subcartilaginous, solid, fibrous-striate, equal or bulbilose, straight or curved, sometimes slightly eccentric. SPORES broadly-elliptical to subglobose, *not angular*, minute, 6-7 x 5-6 micr. in diameter, pale flesh color in mass. CYSTIDIA more or less numerous on the edge of the gills, clavate to elliptical, sometimes hair-pointed, hyaline, 50-60 x 10-15 micr. ODOR and TASTE not marked.

Scattered. On rotten logs. Bay View, Houghton, Ann Arbor. July-September. Frequent in hemlock or tamarack woods; mixed with maple or birch.

This little Leptonia is partial to rotten wood. Its finely striate, granulose pileus reminds one of some of the small species of Pluteus and it approaches that genus

also in its smooth spores and clavate cystidia. The gills are slightly adnexed or, in expanded specimens, they may be free, and the stem is subcartilaginous. It seems to form a connecting link between Leptonia and Pluteus.

***Gills yellowish-tinged.*

618. Leptonia formosa Fr.

Syst Mycol., 1821.

Illustration: Fries, Icones, Pl. 98.

PILEUS 1-3 cm. broad, convex then plane and umbilicate, *yellow-wax color*, covered with minute fuscous squamules, *margin striate*. FLESH thin, yellow, toughish, membranaceous. GILLS adnate, with a tooth, *rather broad*, subdistant, *tinged yellow* then flesh color, edge entire, concolor. STEM 4-5 cm. long, 1.5-2 mm. thick, strict, equal, cartilaginous, stuffed then hollow, *yellow*, glabrous, shining, *striatulate*. SPORES tuberculate-angular, rather rectangular in outline, 10-12 x 6-7 micr., apiculus oblique, flesh color. CYSTIDIA none. ODOR and TASTE mild.

Scattered. In low, swampy woods of hemlock, etc., in northern Michigan, in maple and elm woods in southern Michigan. July-September. Throughout the State. Frequent locally.

Easily recognized by the yellow cast to the whole plant and the striate and squamulose pileus. Fries says "scarcely different from *L. asprella* except in color." This is borne out by the fact that it is subhygrophanous, which makes it difficult to place not only this but other swamp species in the non-hygrophanous section.

****Gills bluish or blackish at first.*

619. Leptonia serrulata Fr.

Syst. Mycol., 1821.

Illustrations: Hard, Mushrooms, Fig. 207, p. 254, 1908. Gillet, Champignons de France, No. 437.

PILEUS 1-3 cm. broad, convex then plane, umbilicate-depressed, *not striate, at first bluish-black*, then smoky-umber or fuscous squamulose, especially in the umbilicus. FLESH thin, not hygrophanous, whitish. GILLS adnate, white, tinged bluish-gray, *edge black-serrulate*, ventricose. STEM 2-5 cm. long, 1-2 mm. thick, cartilaginous, *blackish to steel-blue*, stuffed then hollow, rigid, equal, *glabrous, except the black-dotted apex*, white-mycelioid at base. SPORES 11-4 x 7-8 micr., tuberculate-angular, elongated. *Sterile cells* on the edge of the gills, filled with blackish coloring matter.

Scattered or gregarious. In low wet places, of mixed hemlock woods in the north; ash, elm and maple woods of southern Michigan.

Throughout the State. July-September. Frequent locally.

This species and *Eccilia atrides* appear to run into each other. Both are characterized by the black-serrulate edge of the gills. In Eccilia they run down the stem by a broad tooth. The colors remind one much of *L. lampropoda*, which differs mainly in that it has not black-edged gills and is not black-dotted at the apex of the stem. Varieties and related species have been described, indicating that these two species run into each other. Var. *expallens* Fr. is *paler;* var. *laevipes* Maire has no black dots on the stem; var. *berkeleyi* Maire has entire gills.

620. Leptonia euchroa Fr.

Syst Mycol., 1821.

Illustration: Cooke, Ill., Pl. 334.

PILEUS 1-2 cm. broad, convex then plane, not umbonate nor truly umbilicate, *covered with fibrillose squamules, violaceous to wine-color*, not striate, margin fibrillose-scaly. GILLS subdistant, *very ventricose*, narrowed at both ends, narrowly adnate, sometimes pseudo-decurrent when pileus is expanded, *violet at first then pallid*. STEM slender, equal, 2-3 cm. long, 2 mm. thick, stuffed then hollow, toughish, *glabrous* or very delicately fibrillose with *purple fibrils on a dark violet ground*. SPORES tuberculate-angular, elongated, 10-12 x 6-7 micr. (occasionally wider), angles obtuse. CYSTIDIA none.

Subcaespitose. On sawdust, rotten wood, etc. Bay View. July-August. Rare.

This beautiful little plant is a wood-inhabiting species like *L. placida* but much more slender. The spores of our plants are longer than the measurements given by the English mycologists and their coarse obtuse angles make them somewhat unique. When old, the translucent margin of the pileus shows the lines of the gills so as to appear striate, a condition often found in other non-striate species when old.

Section II. Hygrophanae. Pileus hygrophanous, margin striate when fresh and moist.

621. Leptonia asprella Fr.

Syst Mycol., 1821.

Illustration: Atkinson, Mushrooms, Fig. 139, p. 147, 1900.

PILEUS 24 cm. broad, convex, becoming somewhat expanded, umbilicate-depressed, *glabrous or fibrillose, striatulate when moist*, cimbilicus villose or scaly, *hygrophanous*, silky-shining when dry, from pale umber to grayish-brown, variable in color, margin becoming split. FLESH watery to whitish, thin, rather fragile. GILLS adnexed to adnate seceding, *subdistant, rather broad, narrowed in front*, whitish to grayish, then rosy from the spores, edge concolor, entire. STEM 3-8 cm. long, 2-3 mm. thick, slender and usually straight, rigid and elastic but fragile, *glabrous*, livid-fuscous to pale, stuffed then hollow, sometimes twisted, white-mycelioid at base, apex pruinose. SPORES angular, angles sharp, 9-13 x 6-8 micr., broadly elliptic-elongate in outline. CYSTIDIA none. ODOR and TASTE mild.

Solitary or gregarious. On the ground in woods. Bay View, New Richmond, Ann Arbor. Infrequent. August-September.

This species varies considerably, and there seems to be no settled notion of its exact limitations. Cooke figures a plant quite different in color and size from that of the above description. The striations are not always definitely present, especially in the dry plant. The spores are variable in size, even in the same plant. One variety occurs in low, mossy or sphagnous places. Its pileus is pale isabelline or pale brownish-gray when moist, slightly virgate with fibrils, scarcely or not at all striatulate. The gills are white at first. The stem is of the same color or is slightly paler than the pileus, so that the whole plant has a uniform color when fresh and mature. The cap is apt to be truncate at the apex and campanulate; in all other respects it agrees with the species. *L. asprella* is found in coniferous regions, e. g., Bay View, New Richmond. See Eieken's figure of *L. anatina*, Pl. 73, Fig. 9. That species, however, has markedly narrow gills.

Nolanea Fr.

(From Latin, *Nola*, a little bell.)

Pink-spored. Stem *hollow* and cartilaginous or tough, usually slender. Gills adnate, adnexed or almost free, seceding, not decurrent. Pileus thin, *campanulate*, usually *papillate*, margin at first straight and applied to the stem. Spores *angular*.

Terrestrial, small, slender plants, corresponding to Mycena of the white-spored group, approaching the smaller Entolomas, and separated from Leptonia by the unexpanded bell-shaped pileus. It is a small genus.

The PILEUS is glabrous, silky or scurfy, dry or hygrophanous; and its campanulate shape which is rather persistent and is due to the position of the straight margin on the stem when young, is quite characteristic. It is usually fragile. The color is some shade of brown in our species except in *N. caelestina*. The GILLS are often broad or ventricose, and generally secede (i. e. separate) from the attachment at the stem, in which respect they differ from those of Clitopilus. The STEM is central, tubular and elastic or fragile in most species; in some, however, it is toughish-cartilaginous like that of certain Mycenas. It has a tendency to become compressed or longitudinally furrowed because of its hollow interior. It is usually glabrous or minutely flocculose; in *N. dysthales* (Pk.) it is densely fioccose-hairy. There is *no annulus, nor volva*, and the flesh is confluent with that of the pileus. The SPORES are angular, often irregularly tuberculate-angular. CYSTIDIA are usually absent; in *N. babingtonii* and *N. dysthales* they may be found on the edge of the gills. A few species have a slight ODOR; that of *N. mammosa* is similar to rancid meal. The Nolaneas are difficult to identify to the species, and a microscope is essential to any final decision.

Key to the Species

(a) Pileus and stem lavender to violaceous. 630. *N. caelestina* var. *violacea* Kauff.
(aa) Pileus and stem some other color.
(b) Spores quadrate or cruciate-four-angled; pileus umber or smoky-umber. 623. *N. pascua* Fr.
(bb) Spores not distinctly four-angled.
(c) Pileus with greenish tint, fuscous-brownish, livid or smoky, very shining. 624. *N. versatilis* Fr.
(cc) Pileus without greenish or olivaceous tints.
(d) Stem and pileus hairy, fibrillose-scaly or flocculose; gills subdistant.
(e) Spores 14-20 x 8-9 micr.; whole plant smoky-brown. 622. *N. dysthales* (Pk.) Atk.
(ee) Spores subglobose, 8-9 micr.; pileus small, covered with loose brown fibrils. 625. *N. babingtonia* Berk.
(dd) Stem and pileus glabrous, silky and shining.
(e) Gills white or whitish at first; pileus hygrophanous.
(f) Pileus conical, cinnamon-brown then pale and shining; gills narrow. 628. *N. conica* Pk.
(ff) Pileus campanulate, grayish-brown; gills medium broad. 629. *N. fuscogrisella* Pk.
(ee) Gills grayish at first; odor somewhat rancid-farinaceous. 626. *N. mammosa* Fr. 627. *N. papillata* Bres.

**Gills at first gray, brown or fuscous.*

622. Nolanea dysthales (Pk.) Atk.

N. Y. State Mus. Report. 32, 1879 (as *Entoloma dysthales*).

Jour. of Mycol., Vol. 8, p. 114, 1902 (as *Nolanea nodospora* Atk.).

PILEUS 6-18 mm. broad, rarely larger, thin, campanulate-convex, obtuse, densely floccose-hairy, sometimes furfuraceous and striate, more often even, the hairy tufts sometimes squarrose, *smoky-umber or dark fuscous*, margin at first straight. FLESH submembranous. GILLS adnate, ascending, *broad*, ventricose, subdistant to distant, thickish, dark fuscous-gray or smoky, tinged flesh color at maturity, edge flocculose. STEM 1-4 cm. long, 1.5-4 mm. thick, equal, more or less densely *floccose-tomentose, dark fuscous* or seal-brown, becoming smoky, toughish-cartilaginous, stuffed then hollow, concolor within. SPORES large, variable, *elongated tubercutate-angular*, 14-20 x 8-9 rnicr., deep flesh color in mass, faintly colored under the microscope. CYSTIDIA only on edge of gills, *variable*, sometimes elliptical to ventricose and obtuse, sometimes ventricose-lanceolate and pointed, 60-70 x 20-25 micr. ODOR and TASTE mild.

Solitary or scattered. On low, wet, mossy or swampy ground, on leaf mold, etc., in hemlock regions. Bay View, South Haven, New Richmond. July-September. Infrequent.

This species is known by the covering of the cap and stem, its color and the very large tuberculate spores. It is very variable and was considered an Entoloma by Peck, who first described the form with the thin, striate pileus whose surface is only granular-furfuraceous or mixed with the characteristic hairs. Later Atkinson described the form in which the hairy covering is more highly developed, often as if matted, as *Nolanea nodospora*. I have found the two forms in different parts of the state and consider them variations of the same plant. The trama of the pileus is two-layered, the layers being separated by a dark line of narrow hyphae. A form occurs in frondose woods, of which the hair-like fibrils of the stem are almost ferruginous. The gills of *N.*

dysthales remain dark grayish-brown a long time and hence it is easily mistaken for an Inocybe; at length, however, they are somewhat colored by the rather bright spores. It seems that in very moist situations the cap is less hairy-scaly and then striate, especially when more fully expanded. The size of the basidia varies as the plant slowly matures and the cystidia seem to take on a different shape in age.

623. Nolanea pascua Fr.

Syst Myc., 1821.

Illustrations: Cooke, Ill., Pl. 376.
Gillet, Champignons de France, No. 493.
Ricken, Blätterpilze, Pl. 74, Fig. 3.
Swanton, Fungi, Pl. 42, Fig. 10-12.

PILEUS 2-4 cm. broad, *fragile, conico-campanulate*, obtuse or umbonate, hygrophanous, umber-brown and striatulate (moist), fading and even (dry), glabrous, silky-shining. FLESH thin, concolor. GILLS rounded behind, adnexed, rather broad, *ventricose*, grayish, then gray-flesh color, seceding, close. STEM 4-10 cm. long, 2-4 mm. thick, pallid grayish-brown, cartilaginous, hollow, equal, often twisted, *fragile*, splitting longitudinally, fibrillose-striate. SPORES *subquadrate or almost cruciform*, 8-11 micr. diam., deep flesh color in mass. CYSTIDIA none; sterile cells absent on edge of gills.

Gregarious. On low mossy ground in open woods by lakes. Ann Arbor. September. Infrequent.

This species is said to be very common in Europe. I have only one record and the specimens are lost. It was most sharply marked by the quadrate, 4-angled spores. This is a character given by nearly all authors and by the figures. Our plants approached closely *N. staurospora* Bres. (Fung. Trid., Vol. I, p. 18), and this species and *N. pascua* (sense of Ricken) seem to be very similar. It certainty is not a common species with us and I did not observe any olive tints, such as occur in our *N. versatilis*.

624. Nolanea versatilis Fr.

Monographia, 1863.

Illustrations: Fries, Icones, Pl. 98, Fig. 5.
Ricken, Blätterpilze, Pl. 74, Fig. 7.
Plate CXV of this Report.

PILEUS 1-3 cm. broad, at first conic or elongated-oval, then campanulate, fragile, obtuse, at length expanded and subumbonate, silky-shining, sometimes *silky-fibrillose, almost glittering*, color variable, livid-fuscous, olivaceous-brown, smoky-tinged, subhygrophanous. FLESH thin, submembranous, grayish. GILLS narrowly adnexed, almost free, ventricose and *broad in front*, subdistant, *gray*, becoming smoky-flesh color, edge minutely fimbriate. STEM 3-6 cm. long, 1-4 mm. thick, equal, hollow, *often twisted or compressed*, splitting longitudinally, fibrillose-striate, *shining*, glabrous or flocculose, pallid then pale fuliginous or fuscous. SPORES tuberculate-angular, longer than wide, 9-11 x 6-7.5 micr. (few longer), flesh color in mass. CYSTIDIA numerous on edge of gills, few elsewhere, ventricose, often acuminate-pointed, 45-65 x 12-16 micr. ODOR and TASTE slight or none.

Gregarious. Among grass in low moist woods. Ann Arbor, New Richmond. July-August. Infrequent.

This species was abundant in a single wood-lot during one season; elsewhere it occurred as few individuals. It varies in size and shape (within limits); often it has the shape and size of Cooke's figures of *N. pascua*, at other times the caps may be narrow and stem slender and longer, all in the same patch. The cap is beautifully silky and shining and usually has a somewhat olive or greenish hue which suggests the glitter of metal. The shape of the young plant is often like that of *Hygrophorus conicus* or of an Inocybe. In our specimens the stem was frequently somewhat flocculose. Except for the spores it approaches *N. pascua* quite closely in color and shape. It is here conceived in the sense of Ricken.

625. Nolanea babingtonii Berk.

Outlines of British Fungology, 1860.

Illustrations: Patouillard, Tab. Analyt, No. 429.
Cooke, Ill., Pl. 377.

"Pileus 6-12 mm. broad, conico-campanulate, pale gray, *covered with dark brown fasciculate fibrils free at one end*, silky-shining, disk subsquamulose. FLESH very thin. GILLS adnate, *distant*, gray, ventricose, edge minutely flocculose. STEM 2-3 cm. long, 2 mm. thick, equal, *covered with dark-brown down*, hollow, slightly undulate. SPORES angular-nodulose, subglobose or slightly oblong, 7-8 micr., apiculate."

Lewiston. On moss, in wet places. Rare. Reported by Longyear.

The description is taken from Massee's British Fungus Flora, and the spore-measurements were doubtless made from the type specimen. Patouillard gives spore size as 9-10 x 5-6 micr. It is a delicate little plant, characterized by the loose fibrils which stand out from its pileus and stem. There is some doubt of this determination.

626. Nolanea mammosa Fr. (Sense of Bresadola.)

Epicrisis, 1836.

Illustrations: Bresadola, Fung. Trid., Vol. I, Tab. 82, 1881.
Gillet, Champignons de France, No. 491.

PILEUS 24 cm. broad, conic to broadly campanulate, margin decurved, *mammilately umbonate*, faintly striate, umber (moist), soon grayish-brown or fuscous, innately fibrillose and shining when dry. FLESH dingy, browrnish near surface, thin, subscissile. GILLS rather broad, rounded behind, usually narrowly adnate but seceding, *subdistant*, thickish, *pale gray at first* then tinged flesh color by spores, edge often uneven. STEM 5-9 cm. long, elongated, 2-5 mm. thick, tubular, terete or compressed, *tinged fuscous*, not white, cartilaginous, slightly fibrillose-striate, *white-pruinose at apex*,

otherwise glabrous. SPORES tuberculate-angular, elongate, distinctly longer than broad, 9-11 x 6-7 micr., deep flesh color, nucleate. CYSTIDIA none. ODOR and TASTE of rancid meal.

(Dried: Gills pale brown.)

Gregarious. On the ground in woods, copses, etc., sometimes in grassy places. Throughout the State. July-October. Frequent.

This is our commonest Nolanea. It may be known by its elongated stem which is often furrowed longitudinally, by its gray gills and by the spores; the latter are distinctly longer than broad, and the angles are not as clearly and sharply marked as in other species. It is somewhat hygrophanous. The gills are often broadly adnate. There are short sterile cells on the edge of the gills.

627. Nolanea papillata Bres.

Fungi Tridentini, Vol. I, 1881.

Illustrations: Ibid, Pl. 82.
Fries, Icones, Pl. 98, Fig. 4 (as *Nolanea mammosa* var. *minor* Fr.).

PILEUS 2-3 cm. broad, campanulate, *then expanded, papillate*, umber to watery-brown and striate (moist), paler when dry, glabrous. FLESH thin, scissile, subhygrophanous, fragile. GILLS sinuate-adnate, seceding, broader toward front, subdistant to close, subventricose, livid-whitish then somewhat salmon-colored from spores. STEM *slender*, 3-5 cm. long, 1-2 mm. thick, tubular, pale grayish-brown, glabrous, slightly pruinose at apex, white-mycelioid at base, straight or curved, cartilaginous, sometimes striatulate. SPORES angular, 9-11 x 6-7 micr., nucleate, salmon-colored in mass. ODOR none or slightly of rancid meal. CYSTIDIA none.

Scattered. Low places in moist frondose woods. Ann Arbor, Bay View, New Richmond. September. Infrequent.

Differs mainly from *N. mammosa* in its more slender habit, smaller size and closer gills.

***Gills white at first.*

628. Nolanea conica Pk.

N. Y. State Mus. Rep. 24, 1872.

PILEUS 5-15 mm. broad, *conical*, then expanded and papillate, *hygrophanous*, watery-cinnamon and striatulate (moist), paler, .silky-shining and subzonate (dry). FLESH thin. GILLS nearly free, close, moderately broad, narrowed behind, white at first, *bright flesh color* from spores. STEM slender, 2-5 cm. long, 1-2 mm. thick, equal, straight, tubular, cartilaginous, elastic, white-mycelioid at base, tinged ashy-brown. SPORES tuberculate-angular, 7-9 (including apiculus) x 5-6 micr., longer than broad, *apiculus prominent*. CYSTIDIA none.

Solitary or scattered. On moss or low places in swamps or wet conifer or mixed woods. Northern Michigan. July-September. Infrequent.

The conical, shining, hygrophanous pileus and small spores distinguish it. The length of spores rarely passes 8 microns unless apiculus is included.

629. Nolanea fuscogrisella Pk.

N. Y. State Mus. Rep. 39, 1886.

PILEUS 1-2.5 cm. broad, campanulate, more or less palillate, *hygrophanous*, glabrous, grayish-brown and striatulate (moist), paler and silky-shining (dry), papilla darker. GILLS rather broad, narrowed behind, adnexed, almost subdistant, whitish then bright flesh-colored. STEM 5-7 cm. long, 2-4 mm. thick, glabrous, white-mycelioid toward base, apex pruinose, brownish, often darker than pileus, tubular, cartilaginous. SPORES 7-9 x 5-6 micr. (incl. apiculus), angular, apiculus prominent.

Gregarious. On moss, etc., of low mixed woods. Sault Ste. Marie. July. Infrequent.

This differs from the preceding in its stouter stem, and less conic pileus. The spores are very similar. The gills are broader. In our specimens the stem was invariably darker than the pileus, and hoary at base and above by the white mycelium. The spores are slightly shorter than the measurements given by Peck.

630. Nolanea caelestina var. **violacea** Kauff.

Mich. Acad. Sci. Rep. 10, 1908.

PILEUS 8-10 mm. broad, *conico-campanulate, lavender*, acutely papillate, innately silky-fibrillose, margin even. GILLS adnexed, rather narrow, *subdistant*, white then flesh color, not reaching to the margin of pileus. STEM slender, 5 cm. long, 1 mm. thick, even, glabrous, pruinose at apex, equal, lavender, darker than cap. SPORES tuberculate-elliptical, 9-11 x 6-7 micr. CYSTIDIA none. ODOR none.

Solitary. In low elm swamp. Ann Arbor. Rare.

A beautiful little plant, usually hidden among the debris of the woods. The stem is flexible, subcartilaginous and does not turn reddish when bruised. It differs from the descriptions of the type in the narrow gills. It appears close also to *N. cruenta* Quel. except in color.

Eccilia Fr.

(From the Greek, *ekkoilo*, I hollow out.)

Pink-spored. Stem *cartilaginous*, hollow or stuffed, slender. Gills *decurrent*, either attenuated behind or broadly adnato-decurrent. Pileus *umbilicate* or depressed, its margin at first incurved. Spores *angular*.

Terrestrial or lignicolous. Small, slender plants, corresponding to Omphalia of the white-spored group; differing from the small Clitopili in the cartilaginous stem. A very small genus composed of rather rare species.

The PILEUS is glabrous, silky, or somewhat squamulose in the umbilicus; dry or hygrophanous. It is usually expanded and then the center is depressed to strongly umbilicate. Its margin is at first incurved and this character may persist until maturity. The color varies

from white to grayish and brown. The GILLS are attached in two ways, either attenuate-long-decurrent or broadly adnate and then slightly decurrent, remaining attached, i. e., not seceding as a rule. They are often quite distant as in *E. rhodocylix* Fr. or crowded as in *E. atrides Fr.* and *E. polita Fr*. They vary from narrow in some species to broadly triangular in others. In *E. apiculata Fr*., *E. vilis* Fr. and *E. rhodcylicioides* Atk. they are distinctly gray; in others, white or dingy white, finally colored by the spores. Some species possess cystidia, giving the edge a minutely fimbriate appearance. The STEM is usually enlarged somewhat at the apex where it expands into the membranaceous pileus. It is truly cartilaginous, slender, and soon hollow or tubular within. Some species have been described as solid, but it remains to be seen whether these are not really only stuffed at first by a differentiated pith. The color is often that of the pileus or paler. The angular SPORES correspond to those of Leptonia, Nolanea, Pluteus and one of the sections of Clitopilus. CYSTIDIA usually absent; in *E. pirinoides*, *E. rhodeylicioides* Atk. and *E. roseoalbocitrina* Atk. cystidia-like cells are present on the edge of gills.

The group is difficult, and the rarity of specimens makes it hard to learn much concerning their variability. A microscopic study is essential to determine the species with any satisfaction, as the size of spores and basidia, the structure of the trama, and the presence or absence of cystidia must often determine the final judgment.

Because of their rare occurrence, it seems best to include in the key all forms which may possibly be found in the State. *E. polita* and *E. carneo-grisea* have been reported from the neighboring States.

Key to the Species

(a) Gills crowded or close.
  (b) Edge of gills black-dotted. 631. *E. atrides* Fr.
  (bb) Edge of gills concolor, not black dotted.
    (c) Pileus 2-4 cm. broad, hygrophanous, livid (moist); gills very crowded, broad. *E. polita* Fr.
    (cc) Pileus 5-20 mm. broad, not hygrophanous, mouse-gray; gills close, broad; spores 5-angled, 8-10 micr. 634. *E. pentagonospora* Atk. var.
(aa) Gills subdistant to distant.
  (b) Pileus 2-5 cm. broad, hygrophanous, tough, sordid-brown; stem tough, concolor; taste tardily pungent; gills close to subdistant; on the ground. 635. *E. mordax* Atk.
  (bb) Pileus smaller (rarely as large in *E. carneo-grisea*).
    (c) On wood; pileus deeply umbilicate, 1-1.5 cm., hygrophanous; gills very distant, broad, long-decurrent. *E. rhodocylix* Fr.
    (cc) Not on logs, stumps or wood.
      (d) On sphagnum; pileus umbonate, small, dark-brown; gills long-decurrent, distant, broad. Spores 10-12.5 x 6-7.5 micr. *E. sphagnicola* Pk.
      (dd) On lawns, fields, or in woods on humus, etc.
        (e) Pileus white, 1-2.5 cm., silky; gills adnato-decurrent, subdistant; stem long, white. Spores elongate, 9-11 x 6-9 micr. *E. roseoalbocitrina* Atk.
        (ee) Pileus grayish-brown to fuscous.
          (f) Pileus hygrophanous; gills without cystidia.
            (g) Edge of gills darker, crisped; pileus gray flesh color, margin micaceous; gills distant, spores 6-7 x 4-5 micr. *E. carneo-grisea* B. & Br.
            (gg) Edge of gills concolor; pileus brownish-gray (moist); gills subdistant, broad. 632. *E. grisco-rubella* Fr.
          (ff) Pileus not hygrophanous; gills with cystidia.
            (g) Gills adnato-decurrent, broad behind, distant; spores sphoeroid, angles not sharply marked. 633. *E. pirinoides* sp. nov.
            (gg) Gills arcuate, distant, decurrent; spores prominently angled, quadrate. *E. rhodocyliciodes* Atk.

Illustrations:
E. vilis Fr.: Ricken, Blätterpilze, Pl. 73, Fig. 10.
E. carneo-grisea Fr.: Hard, Mushrooms, Fig. 205, 1908.
E. parkensis Fr.: Icones, Pl. 100, Fig. 5-.
E. polita Fr.: Atkinson, Mushrooms, Fig. 140, 1900. Fries, Icones. Pl. 100, Fig. 3. Hard, Mushrooms, Fog. 206, 1908.
E. rusticoides Gill.: Ricken, Blätterpilze, Pl. 73, Fig. 11.
E. rhodocaylix Fr.: Swanton, Fungi, Pl. 42, 1909. Fries, Icones, Pl. 100. Fig. 6.
E. sphagnicola Pk.: N. Y. Mus. Rep. 54, Pl. 1, 1900.

631. Eccilia atrides Fr.

Epicrisis, 1836.

PILEUS 1-2 cm, broad, deeply umbilicate, dark *umber*, umbilicus darker, striate to umbilicus, somewhat virgate, pruinose. FLESH thin. GILLS decurrent, narrowed behind, close, pallid, *edge black*. STEM 2-3 cm. long, 1-2 mm. thick, brownish, apex paler and floc-cose-dotted, dots sometimes black, sometimes pallid, hollow, glabrous below, equal and slender. SPORES tuberculate-angular, elongated, 11-13 x 6-7 micr. (incl. apiculus), bright flesh color in mass.

Solitary or gregarious. On very rotten wood. Houghton, Bay View. July-August. Infrequent in maple and hemlock woods of northern Michigan.

This species approaches *Leptonia serrulata* Fr. which also has black-edged gills. At times this character is almost or entirely absent except in old plants. Our plants had truly decurrent gills, but not extending far down the stem. It is usually found on debris or on very rotten logs in forests. Ricken considers it identical with *L. serrulata*.

632. Eccilia griseo-rubella Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 100, Fig. 4.
Gillet, Champignons de France, No. 568.
Cooke, Ill., Pl. 613.

PILEUS 1-2.5 cm. broad, campanulate, umbilicate, hygrophanous, striate and brownish-ashy (moist), umbilicus darker, minutely squamulose, *elsewhere with innate white fibrils*. FLESH concolor, thin. GILLS *broadly adnate*, slightly decurrent, broad, subdistant, pallid then flesh color, edge even. STEM 2-4 cm. long, 1-2 mm. thick, pallid to buff, *glabrous*, equal, even, cartilaginous, hollow. SPORES tuberculate-angular, elongated, 8-9 x 5-6 micr.

Solitary or scattered. On the ground in cedar swamps. Bay View. September. Infrequent.

Our plant has rather broad gills as is shown in Fries' Icones. The other authors figure narrower gills. The pileus becomes hygrophanous-streaked on drying.

633. Eccilia pirinoides sp. nov.

PILEUS 1-2 cm. broad, campanulate, then subexpanded, margin decurved, depressed-umbilicate, grayish-brown to fuscous, moist, silky shining when dry, *with dense appressed small squamules on disk*, appressed-fibrillose elsewhere. GILLS adnato-decurrent, *broad behind, subdistant*, thin, whitish then rosy-tinged to bright flesh color. STEM 4-6 cm. long, 1-2.5 mm. thick, distinctly cartilaginous, white, slightly fuscescent, pruinate, equal, even, stuffed with a white pith, finally hollow. SPORES sphoeroid-subangular, angles not prominent, 8-10 micr. diam. (without apiculus), *abruptly narrowed to an apiculus which is 2-3 micr. long*, obscurely 5-6 sided. CYSTIDIA not numerous, slender, acuminate, about 75 micr. long. BASIDIA 4-spored, clavate, 45-50 micr. long. ODOR none.

Gregarious. On the ground, among forest debris, hemlock, oak and maple woods; clay ravine. September. New Richmond.

Except for its lack of a strong malic odor, it agrees with all the descriptions which we have of *E. pirina* B. & C. It also approaches *E. rhodocylicioides* Atk.; but it differs from the latter in its bright colored spores, even pileus and broadly adnate, white gills; the shape of the spores is also different. It has so far been found only in one locality.

634. Eccilia pentagonospora Atk. var.

Jour. of Mycol., Vol. 8, p. 113, 1902.

PILEUS 5-20 mm. broad, fragile, convex-plane, umbilicate, hygrophanous, *at first blackish-gray, fading to steel-gray and shining*, even, at first minutely tomentose-flocculose over the entire surface, later appressed scurfy. FLESH thin, membranous. GILLS broad behind and *adnate-subdecurrent*, at first grayish then dark flesh color, close to subdistant, thickish, somewhat crisped, edge concolor. STEM 1-2.5 cm. long, 1-1.5 mm. thick, equal, hollow, entirely *glabrous*, cartilaginous, *metallic gray*, whitish-mycelioid at base. SPORES tuberculate-angular, mostly 5-angled, angles obtuse, 7-9.5 micr. (incl. apiculus), deep flesh color in mass. CYSTIDIA none. BASIDIA about 30 x 9-10 inter.

Gregarious. On moist soil in frondose woods. Ann Arbor. August.

This collection departs from Atkinson's description in the more flocculose, hygrophanous pileus and the hollow stem. The microscopic characters seem to be the same.

635. Eccilia mordax Atk.

Jour. of Mycol., Vol. 8, p. 113, 1902.

PILEUS 2-5 cm. broad, convex, *tough*, umbilicate, hygrophanous, glabrous, *dull-reddish-brown to pale chestnut or cinnamon* (*moist*), sordid isabelline (dry), even, margin inrolled. FLESH dirty white, thin. GILLS adnate to subdecurrent, close, *dingy brown at first* then tinged flesh color, narrow. STEM 3-6 cm. long, 3-5 mm. thick, *tough*, equal, fibrous-cartilaginous, fistulose, often compressed, *concolor*, glabrous or pruinose, white mycelioid at base. SPORES oval, 6-7 x 4-5 micr., smooth, pale flesh color. CYSTIDIA none. BASIDIA clavate, 25-30 x 6-8 micr., 4-spored. TASTE at first mild, after 15-20 minutes pungent in the throat and causes nausea.

Gregarious. On the ground, springy sides of ravines. Ann Arbor. August. Infrequent.

This species approaches *Clitocybe cyathiforme* in external appearance, but differs by its flesh-colored spores, its urnbilieate pileus and the habitat on the ground. It seems to be our largest Eccilia and is probably somewhat poisonous.

Claudopus Smith.

(From the Latin, *claudus*, defective, and *pes*, foot.)

Pink-spored. Stem *eccentric, lateral or wanting*. Pileus dimidiate or resupinate, irregular. Gills not seceding nor anastomosing, radiating from an eccentric or lateral point. Spores angular or rounded.

On rotten wood or humus. Corresponding to the genus Pleurotus of the white-spored group. With the exception of *C. nidulans*, they are small, insignificant, soft plants, often growing in small hollows of decayed wood or on humus at the base of stumps, etc. The small forms are white, grayish or brown; *C. nidulans* is *yellow to buff*. All except one of the small species are at first resupinate, i. e., applied to the substratum with gills uppermost, but finally becoming reflexed with gills in the usual position. The stem is entirely lacking or is small and inconspicuous, usually tomentose or villose at the point of attachment of the stem or pileus. Only a few species are known in our flora.

Key to the Species

(a) Pileus medium to large, yellowish; gills orange yellow. 636. *C. nidulans* Fr.
(aa) Pileus small, 3 cm. or less in diam.; not yellow.
  (b) Pileus white or whitish, at first resupinate.
    (c) Spores angular; pileus silky to villose-floccose. 637. *C. depluens* Fr.
    (cc) Spores not angular; pileus tomentose. *C. variabilis* Fr.
  (bb) Pileus gray to brown.
    (c) Pileus hygrophanous, striatulate (moist); gills scarcely reaching stem. *C. griegensis* Pk.
    (cc) Pileus not hygrophanous, subdecurrent. 638. *C. byssiscdus* Fr.

636. Claudopus nidulans Fr.

Syst. Mycol., 1821. (As Pleurotus.)

Illustrations: Atkinson, Mushrooms, Pl. 41, Fig. 141, p. 149, 1900.
Hard, Mushrooms, Fig. 208, p. 256, 1908.
Clements, Minn. Mushrooms, Fig. 35, p. 59, 1910.
Plate CXV of this Report.

PILEUS 1-7 cm. broad, shelving, sessile or narrowed behind into a short stem-like base, nearly orbicular, dimidiate or reniform, *coarsely hairy or tomentose on the surface*, rich yellow or buff, margin at first involute, even. FLESH soft, rather tough. GILLS *orange-yellow*, medium broad, close to subdistant, adnate, rarely subdecurrent. STEM or attached base tomentose next

to the gills beneath. SPORES elongated, slightly curved, 6-8 x 3-4 micr., smooth, *pink in mass*. ODOR *very disagreeable* when fresh. TASTE becomes rather mild at length; not desirable for the table.

Gregarious or imbricately caespitose. On decaying logs, etc., of frondose trees. Throughout the State; Marquette, Houghton, Ann Arbor, etc. July-October. Infrequent.

Panus dorsalis Bosc. is now agreed to be the same. The toughish consistency of *C. nidulans* approaches that of the genus Panus. In general appearance it looks like a Pleurotus and was so called by Fries, and as its spore-color is not a very bright pink it would seem to fit that genus as well as *Pleurotus subpalmatus* does. The latter, in my opinion, might equally well be made a species of the pink-spored group. The beginner will be apt to refer *C. nidulans* to the ochre-spored group in Crepidotus if he neglects to make a spore-print. This all emphasizes the fact that nature takes no account of the convenience of the student and probably no system can ever be devised in which some plants will not be found half-way between the groups. This is the largest of the genus, and is not easily confused with other mushrooms except *Crepidotus dorsalis* which resembles it in colors but is smaller and has globose, ochre-brown spores. The pileus is more often dimidiate or kidney-shaped rather than the shape given in Atkinson's illustration.

637. Claudopus depluens Fr.

Syst. Mycol., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 431.
Cooke, Ill., Pl. 344.

PILEUS 1-5 mm. broad, *white*, resupinate at first then reflexed, suborbicular, subreniform, conchate, etc., *variable in form, floccose*, almost sessile or attached by a *short*, white, villose STEM. FLESH membranous, very thin. GILLS radiating from the stem, *broad*, subdistant to distant, rose-colored at maturity. SPORES *angular*, somewhat longer than broad, sphoeroid-angular from the end-view, 7-10 x 6-7.5 micr., distinctly rose-colored in mass, nucleate.

On very decaying wood or black humus, in hemlock and birch mixed woods, in springy places. New Richmond. September. Rarely found.

Massee gives the spores as sphoeroid; Patouillard and Peck give them slightly longer. It may be that varieties occur which might explain the difference. There was no tinge of red or gray present in our plants, as described by Fries. They are small and insignificant plants. *C. variabilis* is similar, but has non-angular spores. Ricken reports the above species under Crepidotus and with smooth spores.

638. Claudopus byssisedus Fr.

Syst. Mycol., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 432.
Cooke, Ill., Pl. 344.

"PILEUS 5-20 cm. broad, at first resupinate, then reflexed, nearly plane, reniform, covered with a fine pruinosity, gray tinged with pink, or grayish-brown, *striate on the margin*. FLESH thin, membranous. GILLS subdecurrent, grayish, rosy from the spores. STEM short, eccentric, or lateral, incurved, villose, *white fibrils radiating from the base* forming an interlaced membrane." SPORES elongate-angular, 9-11 x 6-7 micr., rosy in mass.

On very rotten wood. Swamps of frondose or conifer trees. Throughout the State. Summer. Infrequently found.

The description is taken from Fries and Patouillard. As in the preceding species, there is a difference in the spore-measurements given. Our plants have spores agreeing with those of Peck, while in Europe they seem to be smaller. Patouillard and Massee, give them 7-8 x 6 micr. The American form must, therefore, be considered as a variety. It is scarcely distinct from *C. griegensis* Pk.

LEUCOSPORAE

Amanita Fr.

(From the Greek *Amanos*, the name of a mountain in Asia Minor, which doubtless abounded in edible fungi, for the Roman physician Galen used the term Amanites to refer to *Agaricus campestris*. Per soon first applied it to this genus, using *Amanita caesarea* as the type.)

White-spored; stem provided with an *annulus* and a *volva*, and separable from the pileus. The gills are *free* or attached by a line, *white*, cut off squarely at anterior extremity. The volva is formed from a *universal veil* which covers the whole plant in the egg-stage and is *discrete* from the cuticle of the pileus. The hyphae of the trama of the gills are *divergent*.

Soft-fleshy, terrestrial, mostly *poisonous* mushrooms, usually of rather large size, never truly caespitose; mostly in forests or on the border of woods and thickets; sometimes, however, in fields or lawns.

The PILEUS is soft, entirely enveloped at the beginning, along with the stem, by a differentiated layer of tissue called the universal veil. When this splits above the pileus during the enlargement of the plant, it is pulled off from the pileus and leaves the surface of the pileus glabrous; when it splits circularly around the edge of the pileus (circumscissile) the loose layer left on top ceases to grow and as the pileus expands and enlarges, this covering is broken into patches or warts, sometimes called scales; if the universal veil is of a powdery or loose consistency, it tends to disappear on the surface, or remains as floccose or mealy granules either irregularly disposed over the pileus or only on the

margin; all intermediate arrangements occur when affected by the weather, as when rains wash off the scales, etc., or dry weather causes slow expansion and corresponding irregularities. The margin is markedly striate in some species like *A. caesarea* and *A. russuloides*, or striations may be entirely lacking as in *A. phalloides*. The shape of the pileus varies in the young stage, usually ovoid or spherical, sometimes campanulate or somewhat conical. Many species have the surface of the pileus, under the scales, provided with a delicate viscid pellicle, which causes fresh specimens when wrapped in tissue paper to adhere to the paper, and indicates one of the ways of recognition. The color of different species varies from pure snowy white to smoky brown, yellow, orange or bright red; bright green or blue colors do not occur in our species of this genus, olive, ashy to lead-color or livid-purplish being the only shades in this connection.

The GILLS are white or whitish, in some species tinged yellow. They are free from the stem, sometimes remote leaving an open space around its apex, sometimes reaching it by the narrowed point which may run down the stem as a line. Their shape varies, sometimes ventricose, often broader in front, sometimes almost equal in width except at stem; the anterior end is more or less sharply truncate, and this can be used to distinguish this genus and Amanitopsis from other Agarics even after cooking. Shorter gills alternate with those of full length. The trama of the gills is composed of hyphae which in this genus diverge toward the hymenium, instead of being noticeably parallel; in this respect it agrees with the genera Armillaria and Hygrophorus.

The STEM is usually soft; the interior is *stuffed by a pith* which is sometimes weblike and evanescent, sometimes forming a spongy column in the stem, and only disappearing at full maturity; in both cases the stem may become hollow. In *A. strobiliformis*, *A. solitaria* and *A. chlorinosma* the pith approaches the condition of solid stems, but all Amanitas have practically a form of stuffed stem. The texture of the stem is not homogeneous with that of the pileus and the apex separates rather easily from the pileus leaving a socket. It is cylindrical or tapers upward, the base enlarged in most cases into a bulb, but occasionally cylindrical throughout as in *A. spreta*. The base is enveloped in the volva which is found in various degrees of development or persistency and which can be grouped under three heads: (1) The VOLVA is the remains of the whole universal veil which has split above the pileus and has formed a true cup or sheath at the base of the stem, the margin usually extends above the bulb or base. (2) The VOLVA in this case is only the lower half of the universal veil and adheres closely around the bulb, sometimes forming circular rolls or scaly rings on the lower part of the stem. (3) The VOLVA is very incomplete and fragmentary, floccose, mealy or minutely warty; this is due to the loose, friable texture of the universal veil, the remnants of which disappear easily when the stem as pulled from the soil. Thus the presence of a *volva* is not a safe or positive characteristic in case persons depend on the "death-cup" for their identification of the poisonous Amanitas. Besides the volva, the stem is provided with an ANNULUS. The annulus is sometimes formed from an outer layer of the stem. In the young, "button" stage the gills lie with their edges closely against and adnate to the stem, and during elongation of stem and "expansion of pileus, this thin outer layer is pulled loose from the stem by the fact that it adheres more closely to the gills than to the stem. If it begins to tear off from the stem in the early stage of elongation, it peels the entire stem upwards and after loosening from margin of pileus it drops down on the low^er part and forms an "inferior" annulus. When it is not loosened from the gills or margin of pileus until the stem is nearly elongated, it peels off only from the apex of the stem and later from the gills and margin of pileus and forms a "superior" annulus. The latter is much the commonest method, and the layer of tissue which in this case holds on to the gills for a time and conceals them is called the "inner veil." Sometimes this inner veil separates at the stem instead of at the margin of the pileus and so hangs in shreds or in pieces from the margin of the pileus. In fact conditions of weather, etc., may cause all sorts of variations from the above two most common methods. The surface of the stem where the outer layer has been peeled off to form the annulus, usually becomes roughly floccose. Sometimes also the outer rind is split and broken in various ways by drying, as shown in our figures of *A. rubescens*; at other times the stem is glabrous.

Properties. This is usually called the "poisonous genus," as some of the species are sure to cause death. Poisonous species occur also in many other genera, but the poisons are not as deadly. Some Amanitas are known to be edible, as for example, *A. caesarea* and *A. rubescens*. But one who has not a thorough knowledge of most of the mushrooms, including their microscopic characters, would be unwise to eat any of the species of Amanita, since the poisonous species sometimes approach the edible ones quite closely in general appearance. And to serve them to others under ordinary circumstances is worse than criminal. For further discussion see "Chapter on Mushroom Poisons," and remarks on individual species.

Identification of Amanitas is not always easy. Even those who know all the genera and their characters will proceed cautiously. The stems with their volvas are often deep in the ground and one must get the whole plant if amateurs are to be asked to pass upon them, else they may not take account of this danger-signal—the presence of a volva "death cup". The species with a powdery volva often lose the remnants by the time they are fully expanded, and might be referred to Lepiota by mistake. *When both volva and annulus are present on a plant with white gills or white spores, an Amanita is certain*. Young undeveloped "buttons" are the more dangerous, since they then imitate to an extent the common widely used, edible mushroom *Agaricus campestris* in its button stage. Of course, an experienced mycologist would "feel" the difference when picking it up, but amateurs and those who collect only

the "pink gilled" mushroom, may in this way easily make a sad mistake. The prudent collector of mushrooms for the table, no matter where they grow, or how many he has examined, will always look on the under side of the cap for the white gills, and at the bottom of the stem for the remains of the volva.

The SPORES vary from spherical to elliptical. They are rather large, smooth, granular or nucleate, and white, and their size and shape are most important in diagnosing closely related species.

The TASTE of fresh Amanitas varies. The deadly *A. phalloides* has a bitter taste due to its poisonous content. The edible *A. caesarea* is considered in Europe one of the finest flavored mushrooms, and is highly prized. The ODOR is sometimes strong, as in *A. chlorinosma* Pk. In this species it resembles chloride of lime. In many species the odor is not marked, and cannot be used to recognize species.

HABITAT. Amanitas prefer the woods or borders of woods and thickets. Rarely, however, they are found on lawns, or in fields, especially in towns which have groves or whose outlying residences are situated among the original forest trees. Some species prefer conifer forests, others hardwoods, while others are partial to particular soils. *A. spreta, A. russuloides* and *A. peckiana* have been found in Michigan only in the sandy regions. *A. phalloides* prefers the deep moist forest humus. *A. verna* is partial to the edge of groves, although widely found elsewhere. I have occasionally found it growing from the very rotten cavities of stumps or logs. There is no rule which we can be sure that they may not break in their selection of a place to grow.

The genus is with difficulty divided into natural sections. Those mycologists who laid the foundations of classification, like Fries and Quelet, divided the genus by the different ways in which the universal veil forms a volva. Prof. Atkinson has shown that a single species, *A. phalloides*, may act, under different weather and growth conditions, so that some specimens can be placed under one section, other specimens under another section. Monsieur Bondier (Bull. Soc. Myc. France, 18, 1902) has pointed out that although this is true, we can still tell them apart if we take account of the differences in the structure of the universal veil. For example, in the "Phalloides" section the universal veil is membranous and composed of narrow-celled hyphae, and the veil when it does tear in a circumscissle manner, leaves thin shreds on the cap, never in the form of elevated warty-scales; while in the "Muscaria" section the universal veil is composed of large, rounded cells which do not cohere well, and hence the veil breaks in a circumscissle manner, and leaves thick floccose warts on the cap. We will therefore follow the old divisions and group them in sections with reference to the texture and dehiscence of the universal veil. Twenty-two species have been so far found in the State. Since the genus Amanita, by virtue of its species with poisonous properties, is of great interest, and its species need to be known as widely as possible, it has seemed best to include in the following synoptical key all of the species of the northeastern part of the United States that one might be likely to find in Michigan.

Key to the Species

(A) Base of stem, or bulb, provided with a distinct, membranous, loose cup-like sheath, or rarely with a shallow cup.
(a) Pileus orange-red, yellow or straw-colored.
(b) Volva entire, large; pileus deep yellow to orange, striate on margin, glabrous. 639. *A. caesarea* Fr.
(bb) Volva saucer-shaped; pileus straw-yellow, usually with floccose warts, margin even. 649. *A. mappa* Fr. (form B).
(aa) Pileus white with delicate pinkish or cream-colored appressed, fibrillose scales; inner veil evanescent; volva large; stem faintly rubescent. 645. *A. peckiana* Kauff.
(aaa) Pileus pure white; bulb rounded below.
(b) Pileus conical at first; inner veil adhering to gills or edge of pileus. 643. *A. virosa* Fr.
(bb) Pileus convex to subcampanulate; stem with a well-formed annulus.
(c) Plant rather stout; basidia 4-spored; volva large. 641. *A. verna* Fr.
(cc) Plant slender; basidia 2-spored; otherwise like preceding. 642. *A. bisporigera* Atk.
(aaaa) Pileus brown, umber, gray, drab or shades of these.
(b) Base of stem cylindrical, not bulbous; pileus pale brown to umber. 646. *A. spreta* Pk.
(bb) Base of stem bulbous, bulb rounded.
(c) Pileus viscid, pale smoky olive, umber, or smoky white, often with shreds of veil on top; annulus apical, white. 640. *A. phalloides* Fr.
(cc) Pileus scarcely viscid or dry; stem slender.
(d) Spores elliptical, 11-13 x 7-9 micr.; pileus brown or grayish-brown; disk with white patch-like scales. 648. *A. recutita* Fr.
(dd) Spores globose.
(e) Pileus scarcely viscid, fuscous to pale brown, glabrous; annulus distant, brownish; bulb rather small. 644. *A. porphyria* Fr.
(ee) Pileus with numerous ash-colored appressed scales; ash-colored pulverulence on stem. 647. *A. tomentella* Kromb.
(AA) Base of stem or bulb without a cup-like, free-margined volva.
(a) Pileus orange, yellow or straw colored.
(b) Margin of pileus markedly tubercular-striate, yellowish to straw color; annulus evanescent; volva usually evanescent or a few scales on bulb. 656. *A. russuloides* Pk.
(bb) Margin even or only slightly striate; pileus orange to bright yellow; annulus persistent.
(c) Flesh of stem changing to reddish when bruised or in age. 658. *A. flavorubescens* Atk.
(cc) Flesh not reddish.
(d) Pileus large, more than 7 cm. broad; stem stout, provided with prominent, concentric scales or rings on or above bulb. 650. *A. muscaria* Fr.
(dd) Pileus less than 7 cm. broad.
(e) Bulb with an adherent, inrolled, collar-like ring on its upper margin; spores spherical. 651. *A. frostiana* Pk.
(ee) Bulb and pileus with a few, flocculent masses of the friable, yellow volva; spores oval; common. 659. *A. flavoconia* Atk.
(aa) Pileus not yellow nor yellowish.
(b) Odor strong of chlorine or chloride of lime; stem bulbous-napiform, more or less deeply rooting; plant entirely white and very densely floccose-scaly. 655. *A. chlorinosma* Pk.
(bb) Odor not penetrating like chlorine.
(c) Base of stem more or less deeply rooting below an enlarged or concentrically furrowed bulb.
(d) Pileus white to grayish; plants large and stout, densely floccose scaly. 654. *A. solitaria* Fr. *A. strobiliformis* Fr.
(dd) Pileus or its scales grayish-brown to umber-brown; plants slender, covered with a loose pulverulence; spores 8-12 x 4-6 micr. *A. cinereoconia* Atk.
(cc) Base of stem rounded, or at most short conical below.
(d) Flesh of stem or of whole plant turning to reddish where bruised or in age.
(e) Pileus decorated with yellow powdery masses; flesh changing to red only toward base of stem. 658. *A. flavorubescens* Atk.
(ee) Pileus decorated with grayish or reddish-stained, floccose warts; whole plant becoming reddish, never yellow. 657. *A. rubescens* Fr.

(dd) Flesh not turning red when bruised.
(e) Pileus, etc. white or whitish.
(f) Bulb at base of stem provided with a concentrically grooved close-fitting inrolled sheath; annulus superior. 652. *A. cothurnata* Atk.
(ff) Bulb with remnants of volva variously disposed.
(g) Stem floccose-scaly or torn, below with an ovate bulb, which is concentrically scaly.
(h) Annulus adorned with yellow floccules, ample, distant; stem stuffed by pith, soon hollow; pileus covered with dense, white, floccose patches. 653. *A. chrysoblema* Atk. sp. nov.
(hh) Annulus white, ample, apical; stem solid-stuffed; pileus with angular or pyramidal warts. *A. caudida* Pk.
(gg) Stem slender, glabrous or pulverulent, bulb naked or with remains of friable volva.
(h) Entirely white; pileus 5-10 cm. broad, with angular, erect warts; bulb subglobose, abrupt; annulus persistent. *A. abrupta* Pk.
(hh) Pileus grayish-white or yellow-tinged, 2-5 cm. broad, adorned with flocculent scales; annulus evanescent, slight; edge of gills crenulate-floccose. *A. crenulata* Pk.
(ee) Pileus brown-gray, smoky brown to umber.
(f) Annulus inferior, broadly pendant; pileus rich hair-brown to umber-brown; bulb ring-margined above. *A. velatipes* Atk.
(ff) Annulus superior.
(g) Margin striate; upper margin of bulb with appressed ochreate volva, sometimes with rings above it. *A. pantherina* Fr.
(gg) Margin not striate; pileus with grayish scales.
(h) Volva friable; pileus with mealy scales; gills adnexed by decurrent lines; bulb oval or globose. Spores 8-9 x 5-6 micr. 660. *A. spissa* Fr.
(hh) Volva friable-floccose; gills free; bulb marginate-rounded, concentrically grooved. Spores 11-13 x 6-8 micr. (Boudier). *A. excelsa* Fr.

Section I. Universal veil splitting at apex; volva *persistent* on bulb or base of stem, usually *forming a true cup*, its upper part free from stem or merely collapsing on it, *membranous;* surface of pileus bare (except occasionally in *A. phalloides* and *A. spreta* in which thin membranous shreds or patches remain on pileus).

639. Amanita caesarea Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Michael, Vol. II, No. 97.
Bresadola, Fungh, mang. e. vel., Pl. 1.
Atkinson, Mushrooms, Plate 18 and 19, 1900.
Hard, Mushrooms, Fig. 28 and 29, 1908.
Marshall, Mushroom Book, Pl. 4. op. p. 50, 1905.
Peck, N. Y. State Mus. Rep. 48, Pl. 15, 1897.

Not yet reported in Michigan. It is occasionally found farther south. The present known range seems to be as far north as latitude 43°. This would bring it into southern Michigan where no doubt it will yet be found. Its name indicates that it is the emperor of its genus, and its large, showy, orange to red cap and perfect volva fully justify the name. *The pileus is striate and glabrous; gills and stem are yellow*. "The thick volva, before splitting is about the size of a hen's egg and of like shape and color." It is edible, and was served to the Caesars of Rome as a delicacy long ago. It approaches the deadly *A. muscaria* in color, except that the gills of the latter are white. Avoid eating it unless intimately acquainted with both species. It often forms large fairy rings.

640. Amanita phalloides Fr. (DEADLY POISONOUS)

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 3 (as *A. bulbosa*, the green variety).
Bresadola, Fungh. mang. e. vel., Pl. 2, (green variety).
Cooke, Illustrations, Plate 2, (yellow variety).
Ricken, Blätterpilze, Pl. 75, Fig. 2.
Fries, Sverig. ätl. u. gift. Svamp., Pl. 2.
Farlow, Bull. No. 15, U. S. Dept. Agr., Plate XXIII, 1898. (See also Hard, Mushrooms, Fig. 11, p. 21, 1908, for same figure.)
Atkinson, Mushrooms, Plate 14, Fig. 56, 57 (umber to olive variety).
Marshall, Mushroom Book, p. 48, 1905.

PILEUS 5-12 cm. broad, at first ovate or rounded, then subcampanulate to expanded, quite *viscid* when moist, *umber-brown* to *smoky olive*, sometimes virgate, often paler or whitish on margin, glabrous or with few remnants of the universal veil in the form of thin shreds or patches, *margin even*. GILLS free or adnexed by a line, medium broad, close, white. STEM 8-20 cm. long, 6-12 mm. thick, cylindrical above bulb, varying stout to slender, *glabrous* to subsquamulose, stuffed by fibrils then hollow, white or tinged by color of pileus. ANNULUS superior, *white*, ample, pendant, membranous. VOLVA mostly buried in the ground, forming a loose or appresised cup, sometimes entire and lobed, often irregularly torn, formed by the *universal veil dehiscent or tearing in shreds at the apex*, not truly circumscissile, *its texture membranous*, not floccose. SPORES spherical-ovate, the ovate-pointed side ending in a rather stout apiculus, 9-12 (with apiculus) to 8-9 micr., granular within, white, smooth. ODOR rather nauseous.

Scattered or gregarious. In conifer oir froiidose woods, borders of woods, thickets, rarely on lawns, etc. Common throughout the State. July to September (earliest record July 9, latest September 24).

The form with circumscissile universal veil belongs under *A. mappa*. The typical form with dark cap described above is rather common and recognizaible by the umber to olive-brown colors or paler shades of these colors, the even margin, the rather ample volva which may be reduced in size by the shreds it sometimes leaves on the cap, by the subglabrous stem and spherical-ovate spores. It is distinguished from *A. mappa*, form (*A*) by the membranous texture of its universal veil which does not split in a truly circumscissile manner, by the more ample volva, and by the shreds which when present on the cap are membranous, not floccose-warty. In this separation, I have followed Boudier, the eminent French mycologist. This is one of our most deadly mushrooms, no antidote having yet been discovered for its poison. The amateur need not attempt to keep *A. phalloides* and *A. mappa*, form (*A*) apart, as they are equally poisonous. The autumnal yellow form is more easily distinguished but is also a deadly species. See Chapter on Poisons.

In Europe, the green variety is very common; their yellow variety (*A. bulbosa*) is referred by Ricken to *A. mappa*. We do not seem to have these color forms here.

641. Amanita verna Fr. (DEADLY POISONOUS)

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Plate 3 (bulb imitates that of *A. mappa*).
Gillet, Champignons de France, (as *A. bulbosa* var. *alba*).
Bresadola, Fungh. mang. e. vel., Pl. 4.
Atkinson, Mushrooms, Fig. 59 and 60; also Fig. 55 (as *A. phalloides* var. *alba*), 1900.
Marshall, Mushroom Book, p. 48 (probably *A. verna*, given as *A. phalloides*), 1905.
Murrill, Mycologia, Vol. 5, Pl. 87, Fig. 1. (As *A. phalloides*.)
Hard, Mushrooms, Fig. 16, p. 27, 1908.
Plate CXVI of this Report.

PILEUS 5-12 cm. broad, elongated ovate then *convex* to subcampanulate, finally expanded, *pure white*, viscid when moist, *glabrous*, without patches from the veil, *even* on margin. GILLS free or adnexed by a line, not broad, subventricose, crowded, *white*, edge floccose or pulverulent. STEM pure white, 8-20 cm. long, *rather stout*, 8-15 mm. thick, cylindrical above bulb, or tapering upward, *stuffed*, then somewhat hollow, glabrous or floccose-scaly, bulb oval or orbicular, not as wide as in *A. mappa, sunk in the ground*. ANNULUS ample, superior, pendant, white, membranous, not disappearing normally. VOLVA firm, thick below, thinning out toward lobed margin, derived from the entire universal veil, which dehisces at its apex, membranous, white, forming a genuine cup the ample free margin of which is at first rigid then appressed to stem. SPORES spherical-ovate, the ovate-pointed end terminating in a rather stout apiculus, granular within, white, 9-12 (with apiculus) x 8-9 micr., immature spores smaller. BASIDIA 4-spored. ODOR nauseous or slightly so.

Solitary or scattered gregarious. In conifer, mixed or frondose woods or thickets, rarely on lawns, often in clearings. Very common throughout the State. July-October (latest record October 11.)

This beautiful, pure white, stately and deadly poisonous Amanita is called the "destroying angel." In the egg-stage it is easily confuted by the inexperienced with *Agaricus campestris*. *The hidden volva must be looked for in every white mushroom gathered for the table so as to avoid it*. *A. verna* has spores like *A. phalloides;* and spores which are larger and less truly spherical than in *A. mappa*. From the next species it is separated by its four spores to each basidium and by its stouter habit. But to the amateur, *A. verna*, *A. bisporigera* and *A. virosa* will look alike, and as they are equally poisonous, he need not separate them. They are only kept distinct for scientific reasons. The bulb, as well as the adjustment of the volva on it varies considerably so that unless it can be shown that the microscopic characters differ, the so-called "*alba*" var. of *A. phalloides* and *A. verna* proper are here combined into one. It seems to have no soil preference with us, although Boudier says it is partial to limestone land. I have found it on clay and sandy soil in southern Michigan, and on the rocky foundations of the Lake Superior region. See Chapter on Poisons.

642. Amanita bisporiger Atk. (DEADLY POISONOUS)

Botanical Gazette, Vol. 41, 1906.

Illustration: Atkinson, Mushrooms, Fig. 61, 1900 (as *A. verna*).

Like *A. verna*, except in its more slender habit, and the *2-spored basidia*. Pileus 4-7 cm. broad. Stem 8-12 cm. long, 5-8 cm. thick above the bulb which varies from 2-4 cm. in thickness. Whole plant is pure white, and only separable from *A. verna* in the field after some experience. I have examined the -2-spored character frequently and it seems to be constant.

Usually solitary. Throughout the State, in hemlock or frondose woods. One specimen was found growing from a rotten hemlock trunk near its base, in the Huron Mountains. July to September. Frequent. Poisonous.

643. Amanita virosa Fr. (DEADLY POISONOUS)

Hymen. Europ., 1874.

Illustrations: Fries, Sverig. ätlig. u. gift. Svamp., Pl. 84.
Cooke, Ill., Pl. 1.
Gillet, Champignons de France, No. 6.
Atkinson, Mushrooms, Fig. 62, p. 62, 1900.

Like *A. verna*, except that it has a conical pileus when young; the annulus is rarely formed, because the inner veil remains attached to gills and edge of pileus and becomes torn into parts or shreds; the stem has a tendency to be eccentric, and is usually floccose or squamulose, and the spores are slightly smaller, spherical-ovate, 8-9 (with apiculus) x 7-8 micr., white. It seems to be partial to sandy soil in this State. Ann Arbor, New Richmond. September. Infrequent. Poisonous.

644. Amanita porphyria Fr. (SUSPECTED)

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 5.
Plate CXVII of this Report.

PILEUS 3-6 cm. broad, at first campanulate then expanded, *glabrous, pale brown*, disk smoky-brown, moist or subviscid, silky and obscurely virgate when dry, *margin even*. Flesh thin, white. GILLS white, slightly *adnexed*, close, medium in width, subventricose, thin. STEM rather slender, 7-12 cm. long, 4-6 mm. thick, sub-equal, soft, even, glabrous, stuffed then hollow, whitish to pale brown, *with a small bulb*. ANNULUS (Superior but distant, thin, membranous, white *becoming brown-tinged, pendant*. VOLVA white, thin, flaccid, membranous, forming a thin cup, imbedded with the bulb in the soil, somewhat evanescent. SPORES spherical,

7-9 micr. diameter, granular within, smooth, white. BASIDIA 4-spored.

In low, swampy ground, among poplars and willows. July. Ann Arbor. Rare.

Distinguished from *A. tomentella*, by its siheathing cup and glabrous pileus. Our plants did not have the purplish tinge reported as frequent in European plants. Gillet gives a good figure. The annulus becomes brownish and is thin and drapes the stem at some distance from the apex. In this and other respects it differs from small forms of *A. phalloides*. This appears to correspond with Ricken's "*forma volvata*." (Blätterpilze, Pl. 75, Fig. 3.)

645. Amanita peckiana Kauff. (SUSPECTED)

Mycologia, Vol. V, p. 67, 1913.

PILEUS 5-9 cm. broad, at first ovate, becoming broadly convex or nearly plane, white, glabrous at first, *then fibrillose or somewhat scurfy with numerous minute pinkish or cream-colored squamules, not striate*, margin at first incurved and bordered by the thickisli union of the universal and partial veil, at length crenate-fringed or lacerate-appendiculate. FLESH firm, thickish, white. GILLS free or attached by a line, reaching the stem, moderately broad, much broader in front, subellipsoid, pure white, flocculose on edge, trama divergent. STEM 5-9 cm. long (rarely up to 13 cm., 1-2 cm. thick, stout, tapering slightly upward, stuffed by loose pith, then hollow, white, *at first bulbous*, the bulb covered by a thick, firm, loose VOLVA which is margined with ovate lobes, the flesh often pinkish or salmon-colored, especially toward base. ANNULUS evanescent, but in the young plants the gills are concealed by the very thin inner veil. SPORES elongate-oblong or sub-cylindrical, obtuse, 13-16 x 5-7 micr., sometimes slightly narrower toward one end, white in mass. BASIDIA 46-50 x 9 inicr., elongate-clavate, 4-spored. STERILE CELLS on edge of gills, inflated, pyriform, variable in size. ODOR none or very slightly of radish.

Gregarious. On sandy ground under white pine in open groves. New Richmond. September. Infrequent.

Known by the fringed margin of the pileus, the large, two-layered volva, the thin, evanescent inner veil, the peculiar delicate innate, fibrillose scales on the cap and stem and the large subcylindrie spores. The volva is entirely immersed in the sand; it splits usually at the top of the young cap into ovate lobes and at length seems spuriously two-layered below by the separation of a thick layer of the bulb so that finally the stem is removable and appears subcylindrical at base. Rarely the volva breaks so as to leave a large thick piece on top of the cap as in *A. coccola* Scop. In some respects it approaches *A. spreta* Pk., but differs distinctly in color and spores. Sometimes the surface of the cap is beautifully dotted by the pale salmon-colored, delicate scales. The volva may reach a large size, 4 to 5 cm. high and 3 to 4 cm. across. The inner veil is very thin and often remains adnate to the stem at first, and appears to be absent; in the mature plant it is rarely to be made out. This species is close to if not identical with *A. coccola* Scop, (sense of Boudier, Soc. Myc. d. France, Bull. 18, p. 253 and Pl. 13). The shape and size of the spores are figured and described like those of our species. The margin of the pileus. however, is said to be always striate, Saccardo isays "sulcate." On the other hand, the inner veil of *A. coccola* is said to be very thin and evanescent, and the figures, showing the volva, are very suggestive of our plant. Furthermore, Ricken (Blätterpilze, under *A. ovoidea*) quotes Quelet as authority for the statement that the flesh of *A. coccola* assumes a reddish hue. Some consider the latter species a form of *A. ovoidea* Fr. to which our plant cannot be referred, but to which it may be related.

646. Amanita spreta Pk. (DEADLY POISONOUS)

N. Y. State Mus., Rep. 32, 1879.

Illustrations: Atkinson, Mushrooms, Fig. 71, p. 69, 1900. Plate CXVIII of this Report.

PILEUS 7-12 cm. broad, ovate at first, then broadly convex-expanded, *pale brown to umber-colored*, often unicolorous, *glabrous* or with a few large patches of the white universal veil, slightly viscid, *margin even* or obscurely striatulate. FLESH white, soft, thick, abruptly thin at margin. GILLS crowded, *reaching the stem* and adnexed by a decurrent line, rather broad, narrowed behind, subventricose, pure white, edge fimbriate-serrulate, its trama with diverging hyphae. STEM 10-15 cm. long, *stout*, 10-20 mm. thick, equal or tapering slightly upward, stuffed then hollow, striate and mealy above the annulus, subglabrous or subfibrillose below, *whitish, not bulbous*, inserted at base into the *rather large, thickish, persistent, membranous, sheathing, white* VOLVA. ANNULUS white above, tinged umber beneath, thin, membranous, superior. SPORES elliptical, 11-12 x 6-7 micr., *nucleate* at maturity, smooth, white. No cystidia. Basidia 4-spored.

Solitary or gregarious. On *sandy soil,* in the pine plains of western Michigan now covered with scrub-oak, etc., where it is frequent. September. New Richmond, along the Kalamazoo River.

Known by the sheathing volva and the bulbless stem, which are both deeply immersed in the sandy soil and imitate *Amanitopsis vaginata* in this respect. The color of the pileus is uniformly darker than it is given by Peck. It prefers sandy soil. Its stout habit and its spores, as well as the base of the stem, are strikingly different from *A. porphyria*. *A. cinerea* Bres. of Europe also lacks the bulb but is a much smaller plant.

Section II. Universal veil splitting In a circular line between bulb and pileus (*circumscissile*), the upper half adhering on the pileus in the form of *floccose scales, warts or pyramids*, the lower half adhering to the bulb or the base of the stem and forming abrupt inrolled sheaths, or several imperfect rings. The universal veil is composed of globose, inflated cells, at least in the upper part.

**Annulus median or inferior.*

647. Amanita tomentella Kromb. (SUSPECTED)

Naturgetreue Abbildungen, 1831.

Illustrations: Krombholtz, ibid.
Ricken, Blätterpilze, Pl. 76, Fig. 1. (As *A. porphyria*.)

PILEUS 4-9 cm. broad, convex then expanded, umber-brown or paler, with a tinge of violaceous (ecru-drab, Ridg.), almost dry, *radiately-silky*, shining, covered by numerous, delicate, pulverulent-floccose, appressed, ash-colored scales, *margin even* and decurved. FLESH white or tinged ashy under the separable pellicle. GILLS white, rather narrow, of equal width, close, free or decurrent by a line, *edge minutely fimbriate and sometimes ashy-tinged*. STEM 7-9 cm. long, tapering upward from the thick, ovoid bulb, stuffed then hollow, often *with an ashy pulverulence both above and below the distant annulus*, innately scaly below, whitish. VOLVA thick, circumscissile, covered with tomentose pulverulence, its margin thick, short and somewhat angled. ANNULUS median, usually ample, membranous, thin, persistent, ashy-colored on under side, somewhat striate above. SPORES *spherical*, 8-9.5 micr. in diam., smooth, white with minute apiculus.

(Dried: Cap shining, chestnut, scales paler; gills pale alutaceous.)

Solitary. In conifer and mixed woods of northern Michigan. Isle Royale, Houghton, Munising. August-October. Infrequent.

I have restored Krombholtz's name in order properly to limit our plant. According to Boudier *A. recutita* has oval spores, 11-12 x 7-9 micr. in size. Except for this discrepancy, this form would be referred to that species. It differs from *A. porphyria* in belonging to this section, by reason of its circumscissile universal veil and the floccose structure of the scales on the cap, which are numerous; the spores, however, are the same. No doubt our plant is one of three different species, which are closely related. It is easily known by the ashy-colored pulverulence on cap and stem, and the median, pendant annulus. The main color of the pileus varies from umber-brown to drab; with an obscure tinge of lilac or purplish. It is art autumnal Amanita of the conifer forests.

648. Amanita recutita Fr. var. (SUSPECTED)

Epicrisis, 1830-38.

Illustration: Michael, Führer f. Pilzfreunde, Vol. 3, No. 124.

PILEUS 5-8 cm. broad, convex-plane, dry, grayish, *brown on disk*, disk dotted with patch-like whitish scales, striate on margin. FLESH rather thin, white. GILLS free but with decurrent line, *rather narrow*, close, white or whitish, trama divergent. STEM 8-9 cm. long, *slender*, 7-10 mm. thick, *silky*, white, equal above the small rounded bulb. ANNULUS membranous, thin, subpersistent, distant narrow, whitish. VOLVA sheathing but short, truncate, thickish, extending above bulb, whitish. SPORES broadly elliptical, oval to subpyriform, 11-13 x 7-9 micr., variable in shape, smooth, white. BASIDIA 40-45 x 10 micr., attenuated downward, 4-spored. ODOR none.

On sandy soil, coniferous region, under thickets. New Richmond. September. Rare.

This species is distinct from *A. porphyria* and *A. tomentella,* which it imitates in size and coloring, and by its large spores. It differs also from *A. porphyria* in the mode of breaking of the universal veil, the greater part of which remains at the base of the stem in the form of a thimble. The spores agree with the species as known to Boudier. (Soc. Myc. d. France, Bull. 18, p. 259.) The striations of our plants extend halfway to the center of the cap and this seems to be an aberrant feature, although the descriptions by European authors are not very full.

**Annulus superior.*

649. Amanita mappa Fr. (DEADLY POISONOUS)

Hymen. Europ., 1874.

Illustrations: Cooke, Ill., Pl. 4 (shape, etc., but not with the colors of the American plant).
Bresadola, Fungh. mang. e. vel., Pl. 5.
Rolland, Bull. de la soc. Myc. de France, Pl. IV, Fig. 1.
Ricken, Blätterpilze, Pl. 77, Fig. 2.
Atkinson, Mushrooms, Fig. 58, p. 58 (as *A. phalloides*), 1900.
Hard, Mushrooms, Fig. 24, p. 35, 1908.

PILEUS 4-8 cm. broad, convex then expanded, usually very regular, *margin even*. FLESH white, not very thick. GILLS *free* or adnexed by a line, close, medium broad, *white*. STEM subcylindrical above the *very broad, abrupt, subdepressed bulb*, stuffed then hollow.

There are two forms with us: (A) PILEUS *smoky-umber varying to dark olive*, sometimes almost white, often paler in color or umber color only present on disk, the rest being whitish covered with floccose soft scales, the upper part of the universal veil. STEM writh a very abrupt, depressed, margined bulb above the edge of which the margin of the circumscissile volva may project slightly, bulb rounded below, surface of stem glabrous or nearly so, white or tinged smoky brown. SPORES globular, 8-9 micr., apiculate. ANNULUS superior, white, membranous. VOLVA evanescent on bulb, but remaining on cap. This form is usually confused with *A. phalloides*.

(B) PILEUS *yellowish-white to straw-color*, rarely approaching sulphur-yellow, covered with more or less persistent, *floccose*, sordid-white or pale brownish scales. GILLS with edge floccose-crenulate, due to globose-pyriform sterile cells, its trama with divergent hyphae. STEM with *depressed saucer-shaped* wide bulb, up to 3 cm. diameter, cylindrical above, 10-15 mm. thick, pallid, or tinged very slightly with drab, almost

glabrous, 6-9 cm. long. ANNULUS superior, *straw-colored* as a rule, membranous, rather ample. VOLVA appressed on the bulb, its short, thick, cup-margin free from stem and leaving a space between it and the stem, rarely obtusely short-lobed. SPORES *perfectly globular*, with an abrupt apiculus, 7-9 micr. diameter, or smaller when immature, granular within, white.

Form (B) is autumnal, rarely appearing before September, when it is common throughout the State. September to November (earliest record August 25th, latest November 2). It seems to prefer sandy soil, but also occurs in sandy-clay soil. Boudier says it seems to be lacking in clay soil in France; he also gives spores slightly larger. Found in white pine or hemlock forests, as well as in oak, maple, etc. Both forms have a circumscissile volva, the upper part of which is floccose in structure, the lower membranous. It is therefore intermediate between the first and second sections. The European form is said to have a nauseous odor. It is *poisonous* like *A. phalloides*. The spores of the yellow form are entirely spherical and the apieulus is abrupt and very slender and short; in this it differs from *A. phalloides*, which has spores with the spherical shape but on the side of the apieulus becomes somewhat ovate-pointed, the point ending in a rather stout apieulus; this diameter is therefore a few microns longer, sometimes 10-12 micr. long to 9 broad.

650. Amanita muscaria Fr. (DEADLY POISONOUS)

Syst. Myc., 1821.

Illustrations: Gibson, Our Edible Toadstools and Mushrooms, Pl. IV (colored), 1895.
Farlow, Bull. No. 16, U. S. Dept. Agr., Pl. 22, copied by Hard, Mushrooms, Fig. 13, 1908.
Atkinson, Mushrooms, Frontispiece (colored), also Pl. 12-13, Figs. 52, 53 and 54, 1900.
Marshall, Mushroom Book, Pl. III (colored), 1905.
Murrill, Mycologia, Vol. 5, Pl. 85 and Pl. 87, Fig. 3.
McIlvaine, Amer. Mushrooms, Pl. IX, 1900.

PILEUS 8-20 cm. broad, at first ovate or hemispherical, then broadly convex to plane, viscid when young and moist, *yellow*, sometimes orange or orange-red, rarely whitish, *covered with numerous, whitish or pale yellowish warts*, margin at maturity *slightly striate*. FLESH white, or yellowish under the separable pellicle. GILLS reaching the stem, but free or decurrent by a line, crowded, broadest toward front, *white*. STEM 10-20 cm. high, equal or tapering upward, loosely stuffed then hollow, ovate-bulbous below, *white* or tinged yellow, with a white annulus above, the lower half floccose-scaly or somewhat lacerate, and near the bulb *provided with prominent concentric scales or rings*, which are the remains of the broken *veil*. ANNULUS large, thick, superior, white. VOLVA is much torn and surrounds the bulb and the stem just above the bulb in the form of scales or rings. SPORES broadly oval, 9-10.5 x 6-7.5 micr., smooth, usually with a large oil-globule nearly filling the spore, obliquely apiculate, white. ODOR and TASTE usually insipid in the fresh condition of the mushroom; its poison when extracted is, however, extremely bitter.

(Dried: More or less ochraceous to alutaceous throughout, the scales on pileus always paler.)

Gregarious or closely massed, often in large fairy rings. In thickets of poplar, wood-lots of oak and maple, forests of pine or hemlock, cemeteries, roadsides, etc., widely distributed *throughout the State*. Sometimes on poor, gravely soil, sometimes in swampy poplar woods, usually on denuded or pastured ground if found under conifers. July-October. Frequent.

One of the most showy and attractive mushrooms of the State. Known by its size, its yellow caps ornamented with whitish patches, its white gills and scaly bulb. *A. frostiana* and *A. flavoconia* have similar colors, but are much smaller. In Europe, the colors are bright scarlet and very striking. With us this form does not occur. Our species is really a color-variety of the European plant, much like that which European mycologists name var. *formoso*, except that our plant has white scales on its pileus. *A. flavorubescens* has soft yellow scales but is otherwise much different from var. *formosa* as described, with which it must not be confused. I have no record of the European var. *formosa*, and am not sure that it exists in this country. The color of *A. muscaria* varies somewhat, and in deep shaded places may be white; this is var. *alba*. The stately var. *regalis* with a pale liver colored cap has not been found in the State, although I have seen it in Sweden; it is very large. In wet situations the veil may split as in the preceding section and leave the cap bare; this is var. *puellaris* and is usually smaller.

The deadly *A. muscaria has few uses*. Its poison may yet be found to be of medicinal value, and the early settlers used an infusion of it to make "fly paper," which was an effective remedy for the troublesome house-fly—sometimes, but which caused disaster if small children partook of it. It is a delightful object for the artistic eye of the nature lover but in all other respects a menace.

651. Amanita frostiana Pk. (NOT POISONOUS)

N. Y. State Mus. Rep. 33, 1880.

Illustration: Atkinson, Mushrooms, Frontispiece, Fig. 2 (colored), 1900.

PILEUS 3-6 cm. broad, convex or expanded, bright orange or yellow, only slightly viscid, decorated with yellowish scales or warty patches, which are sometimes lacking, striate on margin. GILLS free, white or slightly tinged with yellow, close, broadest toward front. STEM 5-8 cm. long, 4-5 mm. thick, white or yellowish, *stuffed*, bearing a slight, sometimes evanescent annulus, *with a distinct bulb which is margined above with a collar-like ring*. ANNULUS superior, thin, fragile. VOLVA floccose-membraiious, adhering on bulb in concentric scales or prominent rings as in *A. muscaria*, but less marked. SPORES globose, 7.5-10 micr., smooth, white, granular within.

Solitary or few. On very rotten hemlock logs and debris, in hemlock and mixed woods of the northern part of the State. Huron Mountains, Marquette. August-September. Infrequent.

This species is doubtless most often confused with *A. flavoconia* which is sometimes of similar size but has a universal veil composed of a powdery yellow substance, and whose bulb has therefore a different appearance. *A. frostiana* appears more like a small form of *A. muscaria* and prefers shady conifer woods, while *A. flavoconia* is more common in the southern part of the State in frondose woods, even in the open. McIlvaine says it becomes reddish-orange to scarlet farther south and imitates *A. caesarea* in color; but no confusion should be possible between the two since they have different volvas. *A. frostiana* has globose spores; *A. muscaria* has oval spores; besides the spores, the size seems the only important difference. Ford and Sherrick found it contained no deadly poison.

652. Amanita cothurnata Atk. (SUSPECTED)

Studies of Amer. Fungi, Mushrooms, etc., 1900.

Illustrations, Ibid, Figs. 68, 69, 70, pp. 67-68.
Hard, Mushrooms, Fig. 26, p. 37.
Pl. CXIX of this Report.

PILEUS 3-8 cm. broad, at first globose to hemispherical, then convex-expanded, viscid, especially when moist, *white*, sometimes slightly tinged on centre with yellow or tawny-olive, *covered with numerous, white floccose scales*, margin finely striate when mature. GILLS free, remote, rounded behind, crowded, white, broader in front, edge floccose. STEM 6-12 cm., cylindrical, even, white, hollow, minutely floccose-scaly, with a large oval bulb below. ANNULUS superior, white, rather persistent. VOLVA forming a close-fitting covering for bulb and ending above the bulb by a circular roll which is often abrupt. SPORES globose, 8-9 micr., smooth, white, almost filled by a large oil globule.

Gregarious. In oak and maple woods. Ann Arbor, Detroit. July-August. Infrequent.

Have seen only the pure white form in Michigan. This species approaches *A. pantherina*, common in Europe. The latter has a brown to fawn-colored pileus which is long-striate and has whitish warts; its annulus is median, and there are usually several oblique rings of the volva a little above the bulb. Murrill's figure in Mycologia, Vol. 5, Pl. 87, is not of a typical plant. *A. cothurnata* has the bulb abruptly terminated by a close-fitting roll; its cap may have a slight tinge of umber or yellow on the disk. Quelet and Battaile give the spores of *A. pantherina* as oval-elongate, 10-12 micr. long; Karsten and Smith give them 8-9 x 4-5 micr.

653. Amanita chrysoblema Atk. sp. nov. (PROBABLY DEADLY POISONOUS)

Illustration: Plate CXX of this Report.

PILEUS 8-10 cm. broad, convex-expanded, *pure white*, densely covered with white floccose patches or scales, *viscid*, margin finely striate. GILLS free, somewhat remote, *narrow*, close, *white*, plane, heterophyllous. STEM stout, 10-14 cm. long, 1 cm. thick above, *tapering from the clavate-bulbous base*, 2 cm. thick, stuffed by a pith then hollow, very torn-scaly below annulus, floccose above, white, bulb and lower part of stem somewhat adorned by narrow thick rings, the remains of the volva. ANNULUS superior, rather ample, thin, pendant, somewhat distant, *white except a sprinkling of yellow floccules on upper side*. VOLVA floccose, rather fragile, white, in broken rings on bulb and lower stem. SPORES broadly-elliptical, 9-10 x 6-7 micr., smooth, white, granular within.

Solitary. On the ground, in the edge of a sphagnum swamp. September-October. Ann Arbor. Rare.

Differs from *A. cothurnata* in its bulb and animlus characters, and in its elliptical spores. The scales of the stem are due to its torn surface and point upward. The floccose structure of the universal veil and its manner of breaking separates it from *A. verna*, *A. phalloides* and *A. virosa*. The yellow floccules on the annulus are a character peculiar to this species. *A. crenulata* differs from *A. chrysoblema* in its very evanescent volva, in its gills which reach the stem and have a strongly floccose edge, the floccules of which are sometimes yellow, and in its nucleate spores.

654. Amanita solitaria Fr. (EDIBLE, BUT USE CAUTION)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Pl. 21 and 22, 1900.
Gillet, Champignons de France, No. 16 (as *A. pellita*), No. 8 (as *A. echinocephala*).
Cooke, Ill., Pl. 939.
Var. (A) (*A. strobiliformis*) ?

PILEUS 10-15 cm. broad, globose-hemispherical at first, finally expanded-plane, *at an early stage covered by large, firmly adhering, pyramidal warts*, when expanded dotted with floccose, rather soft, brownish warts, not striate, whitish. FLESH white. GILLS free or almost so, crowded, narrow, white or tinged cream-color, *edge entire*. STEM 10-15 cm. or more in length, solid, *rooting napiform-bulbous at first*, then elongated and 1-2 cm. thick, the thick bulb at the first concentrically corrugated by thick, pointed warts, when full grown oval ending below in a large, tapering "root" which penetrates the soil deeply, the bulb then covered with smaller, scattered warts, becoming almost glabrous upward to the ring, whitish. ANNULUS pendant, apical, white then dingy yellowish and disappearing. SPORES variable in shape, 9-12 x 6-7.5 micr., elliptical, smooth, white. ODOR none at any stage.

Solitary on the ground in low woods of maple, oak, etc. Ann Arbor. August. Infrequent.

The spore-measurements agree with the spore-measurements by Bresadola, but not at all with his figure (Fungh. Mang. et. vel., Pl. 8), which shows the surface of the stem torn-scaly like the surface of an open pine cone. It is more like the forms photographed by Atkinson (Mushrooms, Pl. 21, 1900), except for the more napiform bulb and larger spores. Authors disagree widely as to the characters of *A. solitaria* and *A. strobiliformis*. Boudier (Soc. Myc. de France, Bull. 18, 1902) differentiates *A. solitaria* by its larger spores, 13-15 x 8-10 micr., by its floccose, thinner warts, by the thin, fragile and the cream-colored annulus; and his *A. strobiliformis* has spores 10-13 x 6-8 micr., a turbinate, napiform bulb, and grayish cap covered with very large, thick, adnate angular scales. Ricken (Blätterpilze) reverses the spore size and also considers them smaller: 9-10 x 5-6 micr. for *A. solitaria;* 12-14 x 8-9 for *A. strobiliformis;* at the same time his other characters agree pretty well with those of Boudier's description of the two species. Both Bresadola and Atkinson consider the two species identical under *A. solitaria*, assuming that great variations occur in the nature of the scales on the cap and stem, and in the shape of bulb and stem. That weather conditions cause great variation in these plants, whether a single or composite species, is quite certain. But with such data as those given above, as to size of spores, it becomes necessary to explain by further studies the discrepancies reported by these eminent mycologists.

All European mycologists agree in omitting any mention of an odor of chloride of lime. Hard and McIlvaine report both *A. solitaria* and *A. strobiliformis* with such an odor. I infer from this that American plants which have often been referred here, belong to *A. chlorinosma* Pk. or one of its varieties.

655. Amanita chlorinosma Pk. (EDIBLE, BUT USE CAUTION)

Torr. Bot. Club. Bull., Vol. 6, 1878.

Bot. Gazette, Vol. IV, 1879.

Illustration: Hard, Mushrooms, Pl. 3, Fig. 22, 1908. (As *A. strobiliformis*.)

PILEUS 8-15 cm. or more broad, subglobose at first then convex to expanded, *white* or tinged dingy cream-color, surface with a very variable covering of *dense white floccose scales* or *warts*, sometimes mealy-floccose, sometimes as rounded masses, sometimes pyramidal pointed warts, *always floccose in structure*, except in age they may become hard and adherent, sometimes few and large then again smaller and numerous, margin appendiculate with shreds of veil. FLESH thick, compact, pure white, thinner on margin. GILLS free or adnexed by a point, relatively narrow, subventricose, broader in front, white tinged cream-color, *edge minutely flocculose*. STEM 6-15 cm. long, rooting, root up to 10 cm. long, ventricose varying to napiform and then very thick, up to 3 cm. at bulb, equal upwards, firm and hard, solid below; spongy-stuffed within the hard outer rind, sometimes becoming cavernous, *floccose-torn* from bulb to annulus, often concentrically floccose near bulb, white. ANNULUS fragile, lacerated, sometimes remaining as a ring with margin quite torn, sometimes adhering to gills or margin of pileus. VOLVA densely floccose, white, mostly left on pileus, sometimes attached to bulb or stem as floccose, irregular concentric, soft scales. SPORES *not large*, 8-12 x 5-7 micr., varying in both dimensions. Young immature spores are spherical then ovate, *elliptical at maturity*, granular within. ODOR *strong of chlorine or chloride of lime, disagreeable*.

(Dried: Dingy-white.)

Solitary or gregarious. In woods on the ground, often on hard, gravelly soil. Lansing, Detroit. Infrequent.

The original description, copied by McIlvaine, was made by Peck from a single specimen. Austin the finder, also published a description at the same time. Since the plant is very variable, in the manner so fully described for *A. solitaria* by Atkinson in his mushroom book, the original description must naturally have many short-comings. Hence I will assume, until we have further data, that all our plants with the strong chlorine odor belong under this species.

Like *A. solitaria, A. chlorinosma* is a large and striking species, usually pure white, becoming dingy cream color; the surface of the whole plant is sometimes thick with a mass of cottony scales. The spores have been found variable and add to the confusion of species. Under the microscope the young and matured spores are shown detached. The young spores naturally measure much less than the mature spores. *A. radicata* Pk. (Bull. Torr. Bot. Club, Vol. 27, p. 609) is described as having large and firm scales; the odor, the spores and the rooting stem are the same as in *A. chlorinosma*. It seems to bear th'e same relation to *A. chlorinosma* as *A. strobiliformis* bears to *A. solitaria*.

656. Amanita russuloides Pk. (SUSPECTED)

N. Y. State Mus. Rep. 25, 1873.

PILEUS 5-12 cm. or more broad, ovate at first, then convex-expanded, *pale yellow or straw-color*, paler on margin, surface viscid, covered with whitish, floccose warts which are often lacking entirely or in part, *margin* markedly *tuberculate-striate, striae* 1 to 3 cm. long. GILLS *white*, free or at first reaching the stem, crowded, rather narrow, broadest in front and tapering to stem. STEM 8-15 cm. long, *tapering upward* from bulb, varying in thickness 5-10 mm. at apex to 8-20 mm. above bulb, bulb 1.5 to 2.5 cm. thick, stuffed-by webby pith then hollow or cavernous, *white*, glabrous or fibrillose-floccose, the cortex sometimes squarrose-torn. ANNULUS superior, thin, *mostly evanescent*, sometimes loosened and near the bulb, edge sometimes fioccose. VOLVA circumscissile, thin, fragile, *often disappearing* or forming at first a few subcon-centric delicate rings on

bulb. SPORES 9-10 x 5-6 micr., elliptical, *nucleate* when mature, smooth, white, apiculate.

Gregarious, rarely subcaespitose, often in large circular patches. *On the sand plains* along the Kalamazoo River, originally white pine forest, now scrub oak, etc. New Richmond. Abundant locally. September.

Known by its peculiar long tuberculate-striae on the margin of the pileus and its thin evanescent volva. The annulus separates and breaks early, and often clings to the apex of the bulb, simulating the species with close-fitting inrolled volva. It was found in great abundance all over the oak-barrens about New Richmond during September, 1910, and is partial to sandy soil which clings to its caps.

This species cannot be *A. junquillea* Quel., as some authors intimate. The spores are larger, the colors paler and the long striations are markedly tuberculate.

Section III. Universal veil *friable* and pulverulent-fioccose, circumscissile, *fugacious*. Pileus with soft floccose masses or warts, rarely bare. Bulb of stem bare or with flocculent masses which soon vanish.

657. Amanita rubescens Fr. (EDIBLE, BUT USE CAUTION)

Syst. Myc., 1821.

Illustrations: Fries, Sverig. ätlig. u. gift. Svamp., Pl. 74.
Cooke, Ill., Plate 1163.
Bresadola, Fungh. mang. e vel., Pl. 9.
Gillet, Champignons de France, No. 16.
Patouillard, Tab. Analyt., No. 303.
Ricken, Blätterpilze, Pl. 80, Fig. 1.
Atkinson, Mushrooms, Plates 19, 20, and Fig. 73, 1900.
Hard, Mushrooms, Fig. 27, 1908.
Plate CXXI of this Report.

PILEUS 5-12 cm. broad, oval at first, then broadly convex or campanulate, sometimes expanded, *obtuse*, subviscid when moist, *pale brownish-buff to sordid reddish-brown*, covered with floccose masses or soft warts which are whitish, grayish or reddish-stained, margin even or obscurely striatulate. FLESH soft, thin, whitish, *becoming reddish-stained* when bruised or in age. GILLS narrowed toward stem and free, moderately broad in front, close, *white or whitish*, edge pulverulent under lens. STEM 10-20 cm. long, 8-15 mm. thick, subcylindrical above, clavate-bulbous to rounded-bulbous below, *stuffed*, subglabrous, even or the apex slightly striate and mealy, pink-tinged within and without, dull red where bruised. ANNULUS *broad*, superior, membranous, fragile, often striate on the upper side. VOLVA mostly lacking, *evanescent*, grayish. SPORES elliptical, 7-9 x 6 micr., when mature (immature plants shedding smaller spores), smooth, white.

Solitary or scattered. In oak and maple woods of southern Michigan, mixed woods of conifer regions; it seems to prefer clay soil. Especially common in open or pastured woods. Throughout the State. July to September, far more common in July. Edible.

The color is quite variable, soon tinged with the reddish stains which separate this species from all others except *A. flavorubescens*. When fresh the flesh turns red rapidly where bruised. The stem has a rather hard cortex in dry weather which cracks across and peels in part. Sometimes there are minute, reddish or tawny scales on the stem. The spores are 1 to 2 micr. shorter than in the European plant as shown in specimens I have from Sweden, and by the measurements given by Boudier. Cooke in the Illustrations refers to shorter spores, so that they were probably immature. It is easy to find expanded specimens whose spores are not fully developed. The annulus is usually large and pendant. It is edible, but one must be extremely careful.

658. Amanita flavorubescens Atk. (SUSPECTED)

Jour. of Mycology, Vol. 8, 1902.

Illustrations: Murrill, Mycologia, Vol. 5, Pl. 87, Figs. 4 and 7.
Plate CXXII of this Report,

PILEUS 10 cm. broad, convex to expanded, *covered with floccose or powdery chrome-yellow patches or masses*, which are easily rubbed off, beneath which the surface is lemon-yellow to brownish on disk, margin even or faintly striatulate. FLESH thin, *yellowish*. GILLS *white*, long-elliptical, rather narrow, free or adnexed by a line, close. STEM 8-13 cm. long, 6-12 mm. thick, white, covered above with fine floccose yellow scales, below with reddish scales, its base ending in an oval bulb, stuffed then hollow; its flesh turning slowly reddish when bruised. ANNULUS superior, distant, thin, membranous, fragile, yellow below, white above. VOLVA yellow, powdery, evanescent. SPORES oboval, 8-10 x 6-8 micr., smooth, granular within; basidia 4-spored.

Solitary or gregarious. In frondose woods mixed with Larix. Ann Arbor. Rare. July.

The bright yellow volva, annulus and margin of pileus, and the reddening of the flesh of the stem are its chief distinguishing characters. The pileus may be entirely yellow at first, becoming reddish or sordid brown in age.

659. Amanita flavoconia Atk. (PROBABLY POISONOUS)

Jour. of Mycology, Vol. 8, 1902.

Illustrations: Hard, Mushrooms, Fig. 15 (as *A. frostiana*).
Plate CXXIII of this Report.

PILEUS 3-8 cm. broad, convex then expanded, obtuse, viscid, chrome yellow to orange yellow, *covered with numerous, yellow, flocculent masses of the universal veil*, which are easily rubbed off, sometimes bare, margin even. FLESH thin, white. GILLS free, close, medium broad to narrow, *white*, edge minutely fimbriate, trama with divergent hyphae. STEM 6-10 cm. long, 5-10 mm. thick, stuffed then hollow, straight or flexuous, subequal, covered with flocculent scales which are sometimes tinged sulphur-yellow, yellow-pulverulent

above annulus, bulbous. ANNULUS superior, membranous, sulphur-yellow to chrome-yellow. VOLVA evanescent, yellow-pulverulent at first adhering to bulb as small, chrome-yellow, pulverulent masses. SPORES oval, 6-9 x 4-5 micr., white, smooth.

Solitary or scattered. In low, conifer or frondose woods, among decayed debris, on mosses, etc. Throughout the State: Ann Arbor, Detroit, Palmyra, New Richmond, Bay View, Munising, Marquette, Houghton. July-September. Common.

In the even margin of the pileus and the powdery volva it differs from *A. frostiana* which it resembles most, and from small forms of *A. muscaria*. It is about the same size as *A. frostiana*, sometimes larger, and is often erroneously referred to it. With us, *A. frostiana* occurs only in the conifer regions of the State. *A. flavoconia* occurs annually on a bed of *Polytrichum commune* bordering a small lake north of Ann Arbor. It is our commonest, small yellow Amanita and like *A. muscaria*, is widely distributed. The bulb does not become reddish when bruised as in *A. flavorubescens*.

660. Amanita spissa Fr. (DEADLY POISONOUS)

Epicrisis, 2836-38.

Illustrations: Cooke, Ill., Pl. 69.
Gillet, Champignons de France, No. 3 (as *A. ampla*) and No. 19.
Bresadola, Fungh. mang. e. vel., Pl. 7.
Ricken, Blätterpilze, Pl. 80, Fig. 2.
Plate CXXIV of this Report.

PILEUS 6-10 cm. broad, convex then canapanulate-expanded, obtuse, subviscid when moist, shining when dry, *gray with brown or sooty-brown disk*, covered by small, angular, *floccose or pulverulent*, soft grayish scales or warts, glabrescent, margin *not striate*. FLESH rather thin, white. GILLS free but reaching the stem and decurrent by a line, medium broad, crowded, *shining white*, obscurely flocculose on edge. STEM 8-12 cm. long, 1 cm. or more thick, stuffed by a pith, firm, tapering upward, white or grayish, pruinose above, the ring, the clavate or globose bulb, and sometimes the stem above the bulb, covered at first by loose, gray floccose masses. ANNULUS membranous, apical, pendant, entire, white or tinged gray below. VOLVA pulverulent, floccose, evanescent, gray. SPORES broadly elliptical, obtuse, 7-9 x 6 micr., smooth, white. STERILE CELLS on edge of gills inflated-pyriform or globose on a slender stalk. ODOR mild.

Gregarious or scattered. On the ground in frondose woods of oak, maple, etc. Ann Arbor. July. Infrequent.

This species has usually been considered of doubtful occurrence in this country. It has been one of the last of the Amanitas mentioned in this report that I have collected. It is certainly distinct and usually agrees thoroughly with the descriptions, but seems to be rare. Its gray to smoky-brown cap, the pulverulent-floccose, friable, gray universal veil, the non-striate pileus and spores characterize it well. Only the little gray masses on the lower part of the stem and on the surface of the cap, indicate the presence of an outer veil. The anmilus is distinct, far up on the stem and sometimes with gray particles on the lower side. After rains there may be no remnants of the veil either on the cap or stem.

Amanitopsis Roze

(From the Greek, *opsis*, appearance of, and *Amanita*.)

White-spored. Stem inserted at base into a volva formed as in Amanita; *partial veil and annulus are lacking*; otherwise like Amanita.

Soft, fleshy, terrestrial, long or slender-stemmed, non-caespitose mushrooms, growing mostly in forest humus, rarely in fields or lawns.

The characters, except the absence of an annulus, imitate so closely the species of Amanita, that the reader is referred to the discussion of that genus. None are definitely known to be poisonous, but the ease with which they can be confused with Amanitas should make everybody extremely cautious. The poisonous *Amanita spreta* Pk. imitates some of the species of Amanitopsis closely, because of its thin, close-appressed annulus. Other Amanitas sometimes lose their annulus, and might be taken for Amanitopsis. Only three species have been collected in the State; about twelve species have been reported from the United States. The following species, not yet found, but included in the key, may be looked for: *A. albocreata* Atk. (this is considered the same as the one described by Peck in the 33d N. Y. State Rep. under *A. nivalis*); *A. farinosa* (Schw.) Atk. which has, however, a somewhat southern and eastern distribution and is one of the smallest Amanitopses; *A. adnata* (Smith) Sacc. reported from the Chicago region, departs from the demands of the genus in having adnate gills. *A. pusilla* Pk. is another small species, its pileus hardly 3 cm. broad. *A. parcivolvata* Pk. has a brilliant orange pileus shading to whitish on the margin; it has been found from New Jersey to North Carolina. (See colored plate, Marshall, Mushroom Book, Frontispiece, 1905.)

Key to the Species

(A) Volva membranous, cup-shaped or sheathing the base of the stem.
(a) Pileus small, 2-3 cm. broad, pale brown; stem bulbous, slender; spores elliptical, 5-6 x 4 micr. *A. pusilla* Pk.
(aa) Pileus larger; spores 8 micr. or more in the longest diameter.
(b) Gills adnate; pileus even on the margin, yellowish-buff; volva close-fitting, white. *A. adnata* Smith.
(bb) Gills free; pileus more or less striate on margin.
(c) Pileus hairy-squammulose; volva large, firm, cup-shaped. 661. *A. volvata* Pk.
(cc) Pileus glabrous except for occasional patches of the universal veil; volva sheathing, flabby.
(d) White. 662. *A. vaginata* Fr. var. *alba* Sacc.
(dd) Tawny-yellowish. 662. *A. vaginata* Fr. var. *fulva* Sacc.
(ddd) Gray to mouse-colored. 662. *A. vaginata* Fr. var. *livida* Pk.

(AA) Volva friable, floccose, etc., not membranous.
(a) Pileus orange to yellow, plicate-striate on margin; stem and gills pale yellow; volva thin and evanescent. *A. parcivolvata* Pk.
(aa) Pileus some other color.
(b) Pileus small, 2-3 cm. broad, pulverulent, striate, grayish to mouse-colored. *A. farinosa* Schw.
(bb) Pileus larger, with floccose patches or warts on its surface.
(c) Pileus white to pale yellowish, finely striate on the margin; volva ocreate, as in *Amanita pantherina*. *A. albocreata* Atk.
(cc) Pileus grayish-brown, sulcate striate, covered with mouse-colored warts; volva breaking up into sub-annular fragments on stem. 663. *A. strangulata* Fr.

Section I. Universal veil membranous, splitting at the apex; the volva vaginate or cup-shaped at the base of the stem, entire.

661. Amanitoposis volvata Pk. (POISONOUS)

N. Y. State Mus. Rep. 24, 1872.

Illustrations: Murrill, Mycologia, Vol. 5, Pls. 86 and 87, Fig. 2.

PILEUS 5-7 cm. broad, convex then plane, even or slightly striate on margin, *covered with fibrillose or floccose scales, whitish to brownish*. GILLS free, close, white. STEM 5-10 cm. long, 5-10 mm. thick, white to brownish-gray, equal or tapering slightly upward, stuffed, densely pulverulent-floccose or shaggy above the volva, *with a very large, persistent, membranous, firm, brown volva* sheathing the base. SPORES elliptic-oblong, 9-11 x 6-7 micr., smooth, white, granular within.

In open frondose woods, solitary. August-September. Detroit. Rare.

This is easily separated from *A. vaginata* by its oblong spores and floccose-scaly pileus. The volva is also more firm and ample. It is said to be identical with *A. agglutinata* B. & C. Our specimens were brownish throughout on cap and stem. The gills become dull-brown on drying. According to Peck the volva sometimes leaves patches on the pileus.

662. Amanitopsis vaginata Fr. (EDIBLE)

Var. *alba* Sacc.
Var. *fulva* Sacc.
Var. *livida* Pk.
Syst. Myc., 1821. (As Amanita.)

Illustrations: N. Y. State Mus. Rep. 48, 1896, Bot. ed.
Atkinson, Mushrooms, Plate 23, p. 75, 1900.
Marshall, Mushroom Book, op. p. 54, 1905.
Hard, Mushrooms, Figs. 30 and 31, p. 44, 1908.
Bresadola, Fungh. mang. e. vel., Pl. 12.
Ricken, Blätterpilze, Pl. 75, Fig. 1.
Minn. Mushrooms, Fig. 5, p. 11, 1910.
Plates CXXV, CXXYI of this Report.

A composite species; according to the present custom including a number of *color forms*, here called varieties. The constancy of these varieties indicates that they could, with entire propriety, be referred to under species names, e. g., *Amanitopsis alba*, *Amanitopsis fulva*, and *Amanitopsis livida*. The description, however, applies equally well to all forms except as to color.

PILEUS 5-10 cm. broad, ovate to campanulate at first, then convex to plane, *glabrous* or rarely with fragments of the universal veil, slightly viscid when young or moist, *sulcate-striate* on the thin margin, *white, fulvous, or grayish-mouse color* in the corresponding varieties. FLESH white. GILLS free, white or whitish, close, broad, broadest in front, narrowed behind. STEM 8-18 cm. long, 4-8 mm. thick, rather slender, fragile, glabrous or mealy-squamulose, stuffed then hollow, subcylindrical, *base without a bulb* and inserted deep into the ground with the elongated, sheathing, flabby, white VOLVA. SPORES spherical, 8-10 micr. diam., nucleate by a large oil-globule, smooth, white.

Solitary or scattered. In conifer or frondose forests; in open, low woods; in copses, sometimes on much decayed wood. July, August and September, rarely earlier or later. Throughout the State. Very common. *Edible*.

In some localities the white and tawny forms prevail, as at Ann Arbor; in others, especially in conifer regions, the tawny and livid forms are found more commonly. The pileus and stem are rather fragile, and the volva is apt to break and adhere to the soil so that the extracted stem appears to be without a volva. The variation in size and color seems to be greater in Europe than with us; Secretan differentiated ten forms and raised them to the rank of species. The spores of our plants, at least of the fulvous form, are always spherical, with an obscure angle on the apiculus side. Saccardo gives them ovate and 10-15 micr. long, and Patouillard figures them ovoid. Quelet and Battalle agree with us, calling them spherical and 10 micr. diam. The gray form must not be confused with *Amanita spreta* Pk. which is also without a bulbous stem. The beauty and symmetry of the different forms are a constant delight to the field botanist.

Section II. Universal veil breaking into floccose or powdery scales or fragments, which cover the pileus and base of stem.

663. Amanitopsis strangulata Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: Marshall, Mushroom Book, p. 53, 1905.
N. Y. State Mus. Rep. 51, Plate 50, 1898.
N. Y. State Mus. Mem. 4, Plate 44, 1900.
Fries, Icones, Pl. II.
Gillet, Champignons de France, No. 11. (As *A. inaurata*.)
Patouillard, Tab. Analyt., No. 401.
Cooke's Ill., Plate 13.

PILEUS 5-10 cm. broad, ovate to campanulate at first, then convex to plane, slightly viscid when young or moist, *sulcate-striate* on margin, pale umber colored, *decorated with floccose, cinereous* to *mouse-gray scales or warts*, the remnants of the veil. GILLS free, close, white or ashy-tinged, broader in front. STEM 8-15 cm. long, 5-12 mm. thick, equal or tapering upward, stuffed then hollow, subglabrous, or furfuraceous, white above, darker to pale umber *below where it is somewhat decorated by the fragments of the mouse-gray volva*. SPORES spherical, 9-12.5 micr., granular within.

Solitary or scattered. In mixed forests of hemlock, maple and yellow birch, of the northern part of the State. Bay View, Marquette, Houghton. July-September. Not infrequent at times. Edible.

It is remarkable that this species does not occur in the southern part of the State; at least I have never seen it there. Peck and McIlvaine say it occurs "in open grassy

places, in wheat-stubble, etc." as well as in the woods, in Pennsylvania, New Jersey and West Virginia. So far I have seen it three different summers in the Northern Peninsula, always in hemlock woods.

The SPORES are not in entire agreement with the European measurements. With us they are spherical or nearly so. Saccardo is evidently in error when he says they measure 9-15 micr. and are ovate; Stevenson quotes Smith's measurements as 16 x 8 micr., and Boudier gives them as 12-13 micr. Peck considers it clearly distinct from *A. vaginata* and in the 51st Report has given an excellent account of the plant.

Lepiota Fr.

(From the Greek *lepis*, a scale.)

White-spored (except *L. morgani*); stem *fleshy, separable* from the pileus, provided with a persistent or evanescent *annulus;* gills *free* (except in some of the "granulosi" section).

Fleshy, firm or soft mushrooms, growing on the ground, on debris, or on more or less rotten wood in forests; large and small.

The PILEUS is scaly from the breaking up of the cuticle, rarely smooth, most often white, but also tinged yellow, brown or red; there are a few species with a viscid pileus. The STEM is stuffed or hollow, firm or soft, fleshy and different in texture from the trama of the pileus, and easily separable from it. The GILLS are white, but may change color in age or when bruised; (in *L. morgani* they become sordid-green from the greenish spores). They are usually free, but a small group has adnate or adnexed gills, although otherwise like the genus; e. g., *L. granosa*, *L. amianthina*, etc.

The VEIL is theoretically double, as in Amanita, but the outer or "universal veil" is concrete with the pileus and does not split or break to form a volva on the stem or to form superficial patches on the cap. Sometimes it breaks away early at the base of the stem and is pulled up on the stlem as the latter elongates, like a movable ring, as in *L. procera;* then again it breaks away only from the margin of the pileus, leaving a sheath on the stem terminated above by a flaring margin, as in *L. rugosa*. The inner veil is quite variable in texture, membranous to fibrillose, floccose or granulose; sometimes the delicate structure soon disappears or is washed away by the rain. The TASTE is mild, and all the large species except the green-spored *L. morgani* can be eaten with safety. Some of the smaller species, like *L. clypeolaria* Fr., *L. helvola* Bres. and *L. charcarias* are suspected. The SPORES are white in mass (except one species) and varying in shape, usually longish, sometimes subfusiform, often minute and then elliptical or ovate, in a few cases somewhat angled; they often mature slowly, so that measurements must be made with care.

The genus can be divided into three natural groups with reference to the character of the cuticle of the pileus or of the veil; these groups can be further subdivided into sections, as follows:

A. Cuticle of pileus glutinous or viscid; trama of gills divergent (= Limacella Earle):

I. Lubricae
II. Viscidae

B. Cuticle dry; annulus terminating a sheath or such other remnants of the veil as remain on the stem:

III. Clypeolariae
IV. Asperae
V. Granulosae

C. Cuticle dry; annulus independent, often movable; stem without any other remains of the veil:

VI. Subclypeolariae
VII. Procerae

Key to the Species

(A) Pileus viscid.
(a) Pileus small, 2-5 cm. broad, stem slender.
(b) Stem and pileus both very viscid or glutinous, white. 664. *L. illinita* Fr.
(bb) Stem not viscid; pileus with a subviscid, thin separable pellicle, tinged pink. 667. *L. delicata* Fr. var.
(aa) Pileus larger, 5-10 cm., and stem stout.
(b) Pileus whitish to pinkish-tan, slightly viscid; stem fibrillose-glabrescent. 666. *L. fischeri* sp. nov.
(bb) Pileus reddish-bay, viscid; stem scaly. 665. *L. glioderma* Fr.

(AA) Pileus not viscid.
(a) Growing in fields, pastures, gardens, lawns, and on decomposing vegetable matter (rarely in open woods); large to medium-sized.
(b) Annulus movable; plant very large.
(c) Plant taller than broad; spores white, 14-18 x 9-11 micr. 686. *L. procera* Fr.
(cc) Plant as broad or broader than tall; spores greenish, 10-13 x 7-8 micr. 687. *L. morgani* Pk.
(bb) Annulus not freely movable (except sometimes in *L. americana*).
(c) Plant assumes a dull reddish color when bruised or on drying; annulus rather large; spores 8-10 x 5-8 micr. 688. *L. americana* Pk.
(cc) Plant not changing as above.
(d) Stem thickened toward base like the seed-stalks of onions, densely caespitose. 680. *L. cepaestipes* Fr.
(dd) Stem not of the above shape.
(e) Gills becoming pink in age; pileus firm, medium large, white; stem with persistent annulus. 689. *L. naucina* Fr. (syn. *L. naucinoides* Pk.).
(ee) Gills remaining whitish; pileus *small*, rugulose, widely striate, whitish. *L. rugulosa* Pk.
(aa) Growing in forests, open woods, under copses, bushes, etc. (rarely on lawns); medium to small.
(b) With some shade of blue or purple, either when fresh or on drying; small.
(c) Gills, stem, flesh etc. changing to blue when drying; annulus membranous, persistent; pileus brownish-scaly. *L. caerulescens* Pk.
(cc) Gills, etc., not changing to blue when drying; annulus powdery, evanescent.
(d) Odor foetid; pileus lavender; stem dark brown to blackish below. *L. ecltodora* Atk.
(dd) Odor not foetid; plants small.
(e) Pileus whitish, covered with a heliotrope-purple, powdery substance; flesh tinged yellow. *L. purpureoconia* Atk.
(ee) Pileus whitish, tinged with blue around margin; flesh turning brownish where bruised. *L. cyanozonata* Longyear.
(bb) Without shades of blue or purple.
(c) Stem clothed with a floccose, squamose or filamentous sheath; pileus not granular nor mealy.
(d) Spores 12 micr. or more in length.
(e) Pileus and lower stem brown; spores truncate at base, with oblique apiculus. *L. genicalospora* Atk.
(ee) Pileus ochraceous or yellowish-white, sometimes reddish-tinged; spores subfusiform, 13-18 x 4-6 micr. 668. *L. clypeolaria* Fr. (*L. metulaespora* B. & Br.)
(dd) Spores less than 12 micr. long.
(e) Growing on rotten wood, small; pileus pale tawny to subalutaceous, floccose-scaly; spores 8-11 micr. long. 673. *L. acerina* Pk.
(ee) Growing on the ground, or among debris; spores usually smaller.
(f) Pileus medium size, with erect, tomentose or floccose wart-like scales; veil copious.
(g) Spores 7-9 micr. long.
(h) Gills crowded, much forked. 671. *L. friesii* Lasch.
(hh) Gills crowded, not forked. 670. *L. acutaesquamosa* Wein.
(gg) Spores 4-5 micr. long. 672. *L. asperula* Atk.
(ff) Pileus with *appressed*, tomentose, spot-like or patch-like scales.

(g) Annulus persistent; stem slender, about 1 mm. thick, blackish-brown. *L. gracilis* Pk.
(gg) Annulus evanescent or obscure.
(h) Pileus 4-8 cm. broad, patches tawny-olive; stem stout; spores attached at basal angle. *L. caloceps* Atk.
(hh) Pileus dark-brown, usually less than 4 cm. broad.
(i) Spores minute, 4 x 2 micr.; veil forming a dense, brown tomentum on stem. *L. eriophora* Pk.
(ii) Spores larger, 6-8 x 4-5 micr.; veil of more delicate and loose floccose filaments. 669. *L. felina* Fr.

(cc) Stem without evident sheath, but provided either with an evanescent or a persistent annulus. (See ccc.)
(d) Spores 9 micr. or more in length.
(e) Pileus moderately large, with red appressed scales; annulus persistent. 681. *L. rubrotincta* Pk.
(ee) Pileus small, minutely squamulose; annulus evanescent; base of stem mycelioid, forming a "sand-bulb." *L. arenicola* Pk.
(dd) Spores less than 9 micr. long.
(e) Pileus rather small, 1.5-4 cm. broad, with reddish-brown scales on a white surface; spores attached at basal angle; with a marked odor. 682. *L. cristata* Fr.
(ee) Pileus white, small, minutely fibrillose-squamulose; spores minute; annulus thin and fragile. 684. *L. miamensis* Morg.
(eee) Pileus with minute pale-yellow hairy scales. 683. *L. alluviinus* Pk.

(ccc) Stem clothed or peronate with squamulose, granular, furfuraceous, or minutely warty scales; pileus granular, warty or furfuraceous.
(d) Gills adnate.
(e) Pileus distinctly rugose on disk.
(f) Plant growing on rotten logs, stumps, etc., large; the sheath membranous-margined above. 674. *L. granosa* Morg.
(ff) Plant growing on the ground or on leaf-mould, small; the floccose-scaly sheath not margined above. 675. *L. rugoso-reticulata* Lorin.
(ee) Pileus not rugose.
(f) Stem long, slender; pileus often umbonate. *L. amianthina* Fr.
(ff) Stem short, stouter; pileus not umbonate. 676. *L. adnatifolia* Pk.
(dd) Gills adnexed or emarginate.
(e) Growing on rotten wood; color whitish to pale tawny. 678. *L. pulveracea* Pk.
(ee) On the ground; color rusty-yellowish. 677. *L. granulosa* Fr.
(eee) Like preceding but whitish throughout. 677. *L. granulosa* var. *albida*.
(ddd) Gills free; plants quite small; soft, fragile.
(e) Pileus dingy-white, or brownish. 679. *L. pusillomyces* Pk.
(ee) Pileus white, disk pinkish. 685. *L. cristatatellus* Pk.

Section I. Lubricae. The young plant enclosed in a universal glutinous veil. The trama of the gills divergent.

664. Lepiota illinita Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 16, Fig. 1.
Patouillard Tab. Analyt, fasc. VII, No. 609.
Gillet, Champignons de France, No. 425.

PILEUS 2-6 cm. broad, thin, soft, ovate then campanulate-expanded, subumbonate, *glutinous* (moist), *glabrous, white*, or whitish, even or substriate on margin. GILLS free, close, moderately broad, white, soft, trama divergent. STEM 5-8 cm. x 3-6 mm., white, glutinous, equal, stuffed to hollow, not scaly. FLESH white, soft, thin. SPORES 4-6x3-4 micr., subglobose to ovoid, smooth, white. TASTE and ODOR none. ANNULUS obsolete, glutinous.

Singly or gregarious. Ground, white birch woods near Marquette. Elm and maple woods, southern Michigan. September.

Known by its glutinous and slimy cap and stem. The European plants are a little larger.

Section II. Viscidae. Surface of pileus provided with a continuous gelatinous, separable pellicle; stem dry. Trama of gills divergent (except in *L. delicata*).

665. Lepiota glioderma Fr.

Monographia, 1857.

Illustration: Cooke, Ill., Pl. 118 A.

PILEUS 2-5 cm. broad, obtusely convex, *viscid, reddish-bay* fading to dull ferruginous, glabrous, even, cuticle separable. FLESH thin, white or tinged rufous. GILLS close, *broad*, subventricose, white, free but reaching apex of stem by a point, edge very even, trama divergent. STEM 5-7 cm. long, 4-6 mm. thick, *dry*, covered with *reddish-floccose scales* up to the slight ANNULUS, equal or attenuated downwards, solid, fibrous. SPORES globose, 4-5 micr. diam., smooth; basidia 4-spored; no cystidia. TASTE farinaceous. ODOR none.

(Dried: Cap and gills brownish-tan to fuscous.)

Singly or few. Debris on ground, in hemlock, maple or birch woods. Marquette, Houghton, Bay View and New Richmond, apparently limited to conifer territory. August and September. Infrequent.

This Lepiota approaches the genus Armillaria in appearance, but the gills are not attached to the stem. The annulus is sometimes well-developed and flaring.

666. Lepiota fischeri sp. nov.

Illustration: Plate CXXVII in this Report.

PILEUS 4-9 cm. broad, convex-campanulate, obtuse, even, *subviscid*, cuticle separable and continuous, fleshy, rather soft, *white to pale alutaceous*. FLESH white, thick, rather soft. GILLS crowded, rather narrow, free and somewhat remote, plane, white, edge entire. STEM 4-10 cm. long, 4-10 mm. thick, subbulbous, somewhat curved, *striate*, fibrillose, *solid, firm*, fibrous-fleshy, separable from pileus. ANNULUS superior, large, membranous, at length pendulous, white, subpersistent, fragile. SPORES minute, 3-4 x 2-3 micr., smooth, oval; *basidia* small, with 1 to 2 long sterigmata, (5-7 micr. long), rarely 3 or 4, rarely also a forked sterigma, tramal hyphae of gills divergent. TASTE slight; odor becoming strong on drying, like that of *Tricholoma sulfureum*.

(Dried plants: Pale alutaceous, gills brownish.)

Gregarious. On ground in low frondose woods. Near Detroit. September and October. Infrequent.

Related to *L. lenticularis* (*Amanita lenticularis* Fr.), and is perhaps its American counterpart. Our plants differ in lacking the dark green drops oozing from apex of stem and annulus, (see Quelet and Battaile, Flora Monographic des Amanites et des Lepiotes, 1902), and in character of stem which is said to be stuffed or hollow and floccose-scaly in the European plant. Quelet, Ricken and Battaile give the spores 6 to 8 micr. It also differs from *L. persoonii* Fr. in stem and gill characters. I have dedicated it to the energetic student of mushrooms, Dr. O. E. Fischer of Detroit, who found it.

667. Lepiota delicata Fr. var.

Syst. Myc., 1821.

Illustration: Fries, Icones, Pl. 15, Fig. 2.

PILEUS 2-4 cm. broad, thin, subumbonate, campanulate-expanded, with a continuous, separable, *subviscid cuticle*, delicately *pink-colored*, sometimes shading to white on margin, even, radiately innately silky. FLESH pure white, *unchanged* when bruised, thin, fragile. GILLS narrow, close, free, somewhat remote, pure white. STEM 5-9 cm. long, 3-5 mm. thick, tapering upwards from a subclavate bulb, dry, *glabrous*, curved or straight, soft, stuffed. ANNULUS membranous, thin, subpersistent, white, median, at length pendant. SPORES 5-6.5 x 3-4 micr., elliptical, subacute at ends, white, smooth. CYSTIDIA on edge of gills subeylindrical, clustered, numerous, 7 x 4.5 micr., none on sides of gills; basidia 4-spored. ODOR and TASTE none.

(Dried: Annulus *snow-white*, stem and gills pale alutaceous, cap pink with brownish umbo.)

Gregarious. On the ground in swampy woods of elm, etc., also under hemlock in ravines. New Richmond. September. Infrequent.

L. oblita Pk. differs in its viscid stem and more tawny pileus; the spores are similar. It is apparently much like *L. incarnata* Clem, and *L. rufescens* Morg. The presence of a separable gelatinous cuticle, the unchangeable flesh, and the cystidia distinguish it from these. A hot-house variety is said to occur in Europe.

Section III. Clypeolariae. Stem clothed at first by a floccose or filamentous sheath. Pileus pruinose, floccose or appressed scaly, the cuticle at first continuous.

668. Lepiota clypeolaria Fr. (SUSPECTED)

Sys. Mycol., 1821.

Illustrations: Fries, Icones, Pl. 14, Fig. 2.
N. Y. State Mus. Rep't. 54, Pl. 76, 1901.
Gillet, Champignons de France, No. 416.
Ricken, Blätterpilze, Pl. 85, Fig. 2.
Plate CXXVIII of this Report.

PILEUS 2-5 cm. broad, campanulate-convex to expanded, obtuse or umbonate, floccose-scaly, even or striate beneath the scales on margin when old, color of scales variable: white, yellowish, rufous-ochraceous or ochre, the disk often darker, brown or reddish-brown, white beneath scales, margin often appendiculate from remnants of the veil. FLESH white, thin, *flaccid*. GILLS free, close, white, narrower in front, edge minutely flocculose. STEM slender, 3-10 cm. long, 3-5 mm. thick, equal or tapering upward, sheathed up to the evanescent, floccose annulus, by soft, loose, floccose, white or yellowish scales or tomentum, hollow, fragile, whitish under scales and at apex. SPORES very variable in size, even in the same specimen, 10-16 x 4-6 micr., subfusiform, elongated-elliptical, broader at the distal end or symmetrical, etc., smooth, white.

(Dried: Pileus pale ochraceous or rufous-tan; stem covered by a *white* floccose sheath.)

Scattered. Ground or debris in woods. Marquette, Bay View, Ann Arbor, New Richmond; throughout the State. July to October. Frequent.

There is much uncertainty among all mycologists concerning the limits of this species. *L. metulaespora* is said to be a very similar plant. Studies so far made, both of the European and American plant, seem to have increased the confusion. Some (Morgan, Mycol., Vol. 12) give the spores of *L. clypeolaria* 15-20 x 5-6 micr., and *L. metulaespora* 9-12 x 44 micr. Others (Beardslee, Jour. Mycol., Vol 13, p. 26, 1907) reverse this. The spore-sizes of the Michigan specimens overlap both. I have so far found none with spores 18-20 micr. long, but, of course, shorter, immature spores are always present. Most European authors omit the spore-size of *L. clypeolaria* Massee (Massee, European Fungus Flora Agaric-acese, 1902) gives 15-16 micr. for *L. metulaespora*, which is close to ours; for, *L. clypeolaria*, he gives 6 micr. Peck (Peck, N. Y. State Mus. Rep. 54, 1901, p. 173) has come to the conclusion that there is no essential difference except the striatious on the cap of *L. metulaespora;* this is hardly a specific distinction. A number of varieties have been split from these species, (Quelet & Battaille, Flore des Amanitos et des Lepiotes, 1902, p. 66) and they are evidently very variable in color, and this may be true of the spores within certain limits. For the present we will use one name for all the forms.

669. Lepiota felina Fr.

Hym. Europ., 1874.

Illustrations: Pat., Tab. Analyt., No. 505.
Ricken, Blätterpilze, Pl. 86, Fig. 3.

PILEUS 3-5 cm. broad, campanulate-convex, subunibonate, whitish under the numerous subtomeiitose or floccose *blackish scales*. FLESH white, thin. GILLS free, close, rather narrow, white. STEM slender, equal or tapering upward, base with slight bulb, hollow, whitish, clothed below by floccose, brown or blackish scales. ANNULUS slight, evanescent, inferior or median, sometimes tinged black on edge. SPORES 6-8.5 x 4-5 micr., elliptic-ovoid, white; basidia 4-spored.

On the ground, hemlock woods. Bay View. August-Sept ember. Infrequent or rare.

Distinguished from *L. clypeolaria* by its spores, from *L. cristata* by the blackish scales and floccose stem. SPORES 8-10 x 3-4 micr., as given by Ricken. The Michigan plant may be *L. fuscosquamea* Pk.

Section IV. Asperae. Pileus fibrillose-sealy at first, then with pointed, or pyramidal or fasciculate, erect or squarrose scales or warts; stem variously sheathed or glabrescent.

670. Lepiota acutæsquamosa Fr.

Epicrisis, 1836-38.

Illustrations: Hard's Mushrooms, Fig. 38, p. 55 (from Michigan plants).
Gillet, Champignons de France, No. 409.
Michael, Führer f. Pilzfreunde, III, No. 122.
Ricken, Blätterpilze, Pl. 86, Fig. 1 (as *L. friesii*).

PILEUS 5-15 cm. broad, soft, at first subhemispherical then convex-expanded, obtuse, even, at first covered by a soft tawny or pale umber tomentum which usually breaks up into brown or rufous-brown, *pointed, pyramidal, erect scales or warts*, the tips of which become blackish, are crowded and darker on disk, the cracks showing the white flesh beneath, margin extending beyond gills. FLESH white, moderately thick. GILLS *crowded*, free, rather narrow, thin, not forked, white becoming dingy, edge serratulate. STEM 6-12 cm. long, 6-12 mm. thick above, tapering upward from a bulbous base, sometimes equal and subbulbous, stuffed to hollow, soft, whitish, at first covered by the fibrils of the veil, with scattered brown squamules, terminating in a floccose-fibrillose, often oblique and broken, rather evanescent ANNULUS. SPORES elongated oblong, smooth, white, 7-9 x 2.5-3 micr. ODOR and TASTE not marked.

(Dried: Cap, gills and stem alutaceous to wood-brown.)

Gregarious. On the ground or on very rotten wood in forests, on flowerbeds, conservatories, etc. Ann Arbor, Bay View, New Richmond. September. Frequent.

Much the appearance of the next two species; separable with certainty from *L. friesii* by its entire gills, from *L. asperula* by the spores. The veil is composed of silky filaments woven into a membrane which is at length lacerated vertically so as to appear like a "cortina" of the genus Cortinarius.

671. Lepiota friesii Lasch.

Epicrisis, 1836-1838.

Illustrations: See Hard's Fig. of *L. acutaesquamosa*, which it imitates in appearance.
Marshall, Mushroom Book, 1902, op. p. 65.

The description of the preceding species is sufficient for all the characters except the following: GILLS very narrow, *abundantly forked*, very crowded. SPORES 6-9 x 2 micr., narrowed at one end, smooth, white, elongated-oblong to subfusiform. Sterile cells on edge of gills as in the preceding species. Habitat, etc., same as in *L. acutaesquamosa*.

Ann Arbor, Houghton, Munising, New Richmond.

The spores in our plants are narrower than in *L. acutaesquamosa*, which may be a constant character. The forking of the crowded gills is very marked. The pointed warts are crowded on the disk, or may be scattered over the entire surface of the pileus, and easily rubbed off.

672. Lepiota asperula Atk.

Atkinson, Mushrooms, p. 82, 1900.

Illustration: Ibid, Pl. 26, Fig. 84, p. 82.

PILEUS 1-4.5 cm. broad, campanulate-convex to expanded, obtuse, "hair-brown to olive-brown" or ochraceous-brown, cuticle breaking up into erect, rather pointed, blackish-brown warts, more numerous on disk, sometimes *subconcentrically rimose*, not striate. FLESH white, thickish, scissile, rather fragile. GILLS free, rather narrow to medium width, crowded, white becoming dingy, not forked, edge minutely eroded. STEM 2-6 cm. long, 4-6 mm. thick, *cylindrical* above the bulbous base, stuffed by fibrils, then hollow, covered at first by the loose, silky or fibrillose veil which collapses at the pileus and terminates on the stein by an evanescent ANNULUS, glabrous or fibrillose above annulus, below annulus sometimes minutely brown-squamulose. SPORES *minute*, 4-5 x 2-3.5 micr., oblong, smooth, white. Basidia 4-spored; sterigmata slender. No cystidia. ODOR and TASTE not marked.

(Dried: Like *L. acutaesquamosa* and *L. friesii*.)

Gregarious. Hemlock or mixed woods, on the ground among debris. Bay View, New Richmond. August-September. Infrequent.

Differs from *L. acutaesquamosa* in minute spores, and smaller size. Probably often confused with that species and difficult of separation from it. The veil is sometimes quite copious and cobwebby.

673. Lepiota acerina Pk.

N. Y. Mus. Rep. 51, p. 283, 1898.

PILEUS 1-2.5 cm. broad, convex then expanded, covered with tawny or pale rufous-brown, appressed, fibrillose or floccose scales, darker and erect and pointed on the disk, margin even. FLESH thin, white. GILLS free, close, thin, rather broad, white or whitish, edge minutely finibriate. STEM 2-4 cm. long, 1.5-4 mm. thick, stuffed to hollow, equal or slightly bulbous, covered up to the obsolete ANNULUS by small, dark, fibrillose scales colored like those of pileus. SPORES 8-11 micr. long, 3-4 micr. wide, obliquely apiculate and truncate at one end, narrowed toward other end, smooth, white; sterile cells on edge of gills clavate.

(Dried: Pileus and gills umber or fuscous-brown.)

Gregarious. On very decayed wood, in woods of maple, birch, hemlock, etc. Houghton, Munising, Bay View, New Richmond. July, August and September. Infrequent.

Shape of spores like those of *L. boudieri* Bres. (see Tab. XLVI, Fungi Trid.), but different in other respects. *L. cristata* has similar spores.

Section V. Granulosae. Pileus and stem granular, furfuraceous, pulverulent or minutely warty.

674. Lepiota granosa Morg.

Jour. Cincinnati Soc. Nat. Hist., 1883.

Illustrations: Marshall, Mushroom Book, Pl. 12, op. p. 63, 1905.
Hards, Mushrooms, Pl. VIII, Fig. 36, p. 52.
Plate CXXIX of this Report.

PILEUS 5-9 cm. diam., ovate then convex-expanded, umbonate or obtuse, ochraceous to fulvous, *furfuraceous-granulose, rugose-wrinkled* to almost even, margin regular or undulate. FLESH thick, whitish or tinged ochraceous. GILLS narrow, *crowded, adnate*, sometimes subarcuate, whitish to ochraceous. STEM 5-10 cm. long, 8-15 mm. thick, equal or tapering upward from the clavate base, straight or curved, fibrous-stuffed to hollow, *peronate* by furfuraceous or floccose scales, colored like the pileus and terminating above in a *rather large, flaring or reflewed, membranous, persistent* ANNULUS, yellowish within, pallid or brownish above the annulus. SPORES smooth, white, 4-5 x 3 micr.

Gregarious or subcaespitose. On rotten wood; maple, birch and beech woods. Marquette, Bay View. September. Infrequent.

In size, it stands at the head of this group. It is easily known by its large, persistent annulus. It differs from *L. amianthina* in size and the character of sheath and annulus.

675. Lepiota rugoso-reticulata Lorin.

Oest. Bot. Zeitschrift, 1879.

PILEUS 1-4 cm. broad, convex, *rugose-reticulate*, covered with dense, glistening granules, pale cinnamon-brown, *tinged reddish*, mostly unicolorous, margin appendiculate. FLESH thick, *white*. GILLS adnate, sometimes subdecurrent, crowded, rather narrow, whitish, edge entire. STEM 4-7 cm. long, 3-4 mm. thick, equal or tapering upward, *solid*, peronate with cinnamon- or reddish-brown floccose scales, terminating in an *incomplete or obsolete* ANNULUS, pallid above, white-mycelioid at base. SPORES 4-5.5 x 3 micr., smooth, ovoid, apiculate. ODOR not noticed.

(Dried: Pileus pale brick-red, gills alutaceous, stem white-mycelioid at base.)

Gregarious. On mosses, low woods of white birch in northern Michigan, elm, etc., in south. Ann Arbor, Marquette. August-September. Infrequent.

This species resembles *L. granulosa* in color, etc., but differs in its slender stem and rugose pileus; it approaches *L. granosa* in pileus characters but is small and the annulus is rarely persistent. It differs from *L. amianthina* in its lack of an umbo, and its small spores.

676. Lepiota adnatifolia Pk.

N. Y. State Mus. Bull. 54, p. 947, 1902.

PILEUS 2.5 cm. broad, broadly convex, granulose to warty or scaly on disk, dark *ferruginous-red*, not umbonate, even, margin appendiculate. FLESH white. GILLS *adnate*, close, narrow, thin, whitish, edge entire. STEM 2-4 cm. long, 4-6 mm. thick above, tapering upward from a clavate base, solid, peronate by reddish or whitish squamules, and terminating in an evanescent *annulus*, apex white or tinged pink. SPORES minute, 5-5.5 x 2.5-3 micr., oval-oblong, slightly curved in one view. CYSTIDIA very slender, hyaline, about 50 micr. long, 3 micr. thick, subcylindrical, apex capped by conical covering, sometimes infrequent or entirely lacking, on edge and sides of gills. ODOR slight.

On debris or decayed logs in woods of hemlock, maple, etc. New Richmond, Ann Arbor. September-October. Rare.

Differs from *L. amianthina* and *L. granulosa* in the presence of cystidia and lack of an umbo, and by its color. The spores are smaller than given by Peck. The main part of the cap is covered closely with appressed, flat, tomentose warts.

677. Lepiota granulosa Fr.

Syst. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 611.
Ricken, Blätterpilze, Pl. 81, Fig. 3.
Cooke, Ill., Pl. 18, Vol. I.

PILEUS 3-6 cm. broad, ovate then convex-expanded, obtuse or subumbonate, *furfuraceous-granular*, often radiately wrinkled, ochraeeous *tinged brick-red*, but varying to buff or dark-rufous with a hoary lustre. FLESH thin, white, rufescent. GILLS *adnexed, rounded behind*, close, medium width, white. STEM short, 2-5 cm. long, 4-8 mm. thick, stuffed to hollow, equal or tapering upward, granulose to floccose-scaly and pale reddish up to the *slight* evanescent annulus, whitish at apex. SPORES minute, 4-5 x 3-3.5 micr., ovate, smooth; cystidia none.

(Dried: Cap and scales of stem rufous-ochraceous, gills ochra-ceous-alutaceous.)

Gregarious to subcaespitose. On leaf-mould, mosses, etc., in open woods of maple, oak, hemlock, etc. Ann Arbor, Marquette, New Richmond. August-October. Local but frequent.

The spores are smaller than given by Patouillard (Tab. Analyt.) and Quelet and Battaille (Flore des Am. et des. Lep.). Hennings in Engler & Prantl, however, gives the size as found in American plants. Also our plants are usually shorter and thicker stemmed than the figures of Patouillard and Cooke would indicate, i. e., the plant is more squat, except possibly when it grows in low, wet situations. It approaches other species, like *L. charcharias* and *L. amianthina*, which were formerly called varieties of it. There is a hoary sheen to the

granularity on the cap, by which one may know it. The way the gills are attached distinguishes it from the three preceding species.

678. Lepiota pulveracea Pk.

N. Y. Mus. Rep. 54, p. 144, 1900.

"PILEUS 1-2.5 cm. broad, hemispheric then convex-expanded, *pulverulent* or minutely granulose and squamulose, even, tawny or paler. GILLS *adnexed*, close, thin, narrow, yellowish-white. STEM equal, hollow, sheathed with *delicate* brownish, small granulose scales terminating in the obsolete ANNULUS, pruinose and whitish at apex." SPORES minute, oblong-elliptical, obscurely curved, smooth, white, 4-5.5 x 3 micr.

(Dried: Cap pale fulvous, stem paler with scattered floccose-squamules.)

Gregarious. On *moss* growing over an old hemlock log. Marquette. September. Rare.

The spores are not ovate as in *L. granulosa*, and the adnexed gills and color, etc., separate it from *L. rugoso-reticulata*. The dried specimens lack the rich tints of the others of this group.

679. Lepiota pusillomyces Pk.

N. Y. Mus. Rep. 28, p. 48, 1876.

Illustration: Ibid, Plate I, Figs. 1-3.

PILEUS 4-8 mm. broad, thin, convex, obtuse, furfuraceous or *covered with minute granular floccules*, white or nearly so, remains of veil clinging in granular floes to edge of pileus. TRAMA of pileus composed of vesicular cells, pulverulence on surface also of thin-walled globular cells. GILLS *broad*, free, ventricose, moderately close, white. STEM 1-3 cm. long, 1-2 mm. thick, slender, equal, stuffed with fibrils, rufescent beneath the white mealiness which terminates at the obsolete ANNULUS. SPORES elliptic-oblong, 4-5 x 2.5-3 micr., smooth, white.

Single and scattered. On rich soil in woods. Ann Arbor, Bay View. August. Infrequent.

This is close to *L. seminuda* of Europe, and may be the same, unless the microscopic characters are shown to be different. Patouillard figures the spores of *L. seminuda* more ovate then elliptical, but other authors give the latter shape. This is a delicate Lepiota and approaches *L. cristatatellus* Pk. which is distinguished by the pinkish tinge usually present on the pileus, and the glabrous stem.

Section VI. Subclypeolariae. Pileus thin, minutely scaly, pruinose or pulverulent. Annulus membranous, persistent or evanescent. STEM for the most part glabrous or denuded.

680. Lepiota cepæstipes Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: N. Y. State Mus. Bull. 94, Pl. 87, 1905.
Hard's Mushrooms, Fig. 37, p. 54.
Gillet, Champignons de France, No. 414.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 94.
Plate CXXX of this Report.

PILEUS 2-8 cm. broad, thin, oval then eampanulate-expanded, obtuse, soft, at length umbonate, *striate-plicate* and splitting on the margin, covered with minute, numerous, *mealy* or wart-like scales, which are often brown, elsewhere white. FLESH white. GILLS narrow, free, close, white then dingy, thin, edge pruinose. STEM 4-12 cm. long, 4-6 mm. thick at apex, tapering upward or often *somewhat ventricose*, flexuous, glabrous or occasionally with floccose particles, hollow, white. ANNULUS thin, membranaceous, subpersistent, white. SPORES oval-elliptical, smooth, white, 9-10 x 5-7 micr., nucleate. ODOR and TASTE mild.

Caespitose. On rich soil of gardens, conservatories, etc., decaying straw-piles, sawdust, stumps, or decomposing vegetable matter of any kind. Ann Arbor, Bay View, New Richmond. June-September. Not common. Edible.

Often in dense clusters. Sometimes the pileus is yellow-tinged. The name refers to the shape of the stem which often resembles the enlargement on the seed-stalk of the onion. The plants soon droop and collapse in the wind. Hennings (in Engler and Prantl) says this mushroom was introduced into Europe from Brazil and also states that at first there is a small *sclerotium*.

681. Lepiota rubrotincta Pk.

N. Y. State Mus. Rep. 35, p. 155.

PILEUS 2-6 cm. broad, ovoid then convex-expanded, obtuse or subumbonate, the unbroken cuticle at first even, and innately fibrillose *and uniform reddish-pink*, darker or reddish-brown on disk, *at length breaking up into appressed red scales* and rimose. FLESH white, thin. GILLS free, narrow, tapering toward stem, crowded at first, less so after expansion, white, edge minutely flocculose. STEM 4-9 cm. long, 3-8 mm. thick, tapering slightly upward or clavate at base, stuffed then hollow, even, *easily splitting lengthwise*, silky-nbrillose or glabrous. ANNULUS *well-developed*, membranous, persistent, edge thickish and often tinged red. SPORES 9 x 5 micr., but variable, often larger, narrow-elliptical, apiculate; CYSTIDIA on edge of gills about 36 x 6 micr.

(Dried: Color of cap red, gills dingy white, stem pale fuscous.)

Scattered or singly. On the ground among decaying leaves, mixed or hardwood forests. Ann Arbor, Detroit, New Richmond. August-September. Infrequent.

682. Lepiota cristata Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 83, p. 81, 1900.
Gillet, Champignons de France, No. 417.
Patouillard, Tab. Analyt., No. 504.
Ricken, Blätterpilze, Pl. 84, Fig. 3.
Cooke, Ill., 29.
Plate CXXXI of this Report.

PILEUS 1.5-4 cm. broad, thin, ovate then campanulate-convex or expanded, obtuse or umbonate, cuticle at first continuous, and entirely dull reddish or reddish-brown, then *broken into small concentric reddish-brown scales* except the darker umbo, the cracks white, margin often denuded of cuticle. FLESH white, thin. GILLS free, rather close, narrow to subventricose, white, edge minutely crenulate. STEM 3-5 cm. long, 2-5 mm. thick, slender, equal, hollow or stuffed with loose pith, glabrous or silky-fibrillose below ring, whitish or tinged dingy lavender, pinkish within. ANNULUS white, small, soon broken and deciduous. SPORES somewhat wedge-shaped, or angular, sometimes irregularly fusiform to oblong, depending on the view, white, 6-7 x 3-4 micr. ODOR rather disagreeable.

(Dried: Stem rufescent, pileus brownish to alutaceous.)

Gregarious. In grassy places or on the ground in low woods, etc., often on lawns. Marquette, Ann Arbor, Detroit, Houghton, New Richmond, etc. July-October. Common.

An effort was made by Morgan (Jour. of Mycol., Vol. 12, p. 244, 1906), to separate this into two species, *C. cristata* Fr. and *C. angustana* Britz. The separation was based on the spores and odor. Our plants sometimes have angular spores and no odor, and the spores vary, even in the same plant. Atkinson (Mushrooms, 1900, p. 92) has already pointed out that they are identical. The odor seems to be strong, weak or absent under different conditions. The pileus may be as much as 5 cm. across.

683. Lepiota alluviinus Pk.

N. Y. State Mus. Rep. 35, p. 157, 1884.

"PILEUS 1-3 cm. broad, thin, convex or plane, sometimes reflexed on margin, *white, adorned with minute pale-yellow hairy or fibrillose scales*. GILLS free, thin, close, white or yellowish. S TEM 2-4 cm. long, 2-3 mm. thick, slender, fibrillose, whitish or pallid, slightly thickened at the base. ANNULUS slight, subpersistent, often near the middle of the stem. SPORES elliptical, 6-7.5 x 4-5 micr."

Alluvial soil among weeds and shrubs. East Lansing. August. Reported by Longyear.

"In drying the whole plant assumes a rich yellow hue."

684. Lepiota miamensis Morg.

Jour. Cincinnati Soc. Nat. Hist., 1883.

PILEUS 2-4 cm. broad, soft, convex-expanded, subumbonate, even, *fibrillose-scaly* except disk, *white*, disk sometimes brownish. FLESH white, very thin, fragile. GILLS free, *rather broad*, rounded behind, ventricose, *white*. STEM 3-5 cm. long, 2-4 mm. thick, slender, hollow, subequal, glabrous or pruinose at apex, often compressed, *white*. ANNULUS thin, fragile, subpersistent, *median*. SPORES oblong-oval, 5-6 x 3-3.5 micr., white.

(Dried: Pileus whitish, with brownish center, gills dingy-white, stem pallid.)

Singly or few. On the ground in rich woods among leaves. Ann Arbor. September. Rarely found.

Apparently similar to *L. alluviinus*, differing in lack of yellow color, especially on drying, and rather broad gills.

685. Lepiota cristatatellus Pk.

N. Y. State Mus. Rep. 31, p. 31, 1879.

PILEUS 5-8 mm. broad, soft, oval then convex, covered by minute granular-mealiness, *at first tinged pink all over*, then white with pinkish disk, margin mealy. GILLS free, white, medium broad, rounded behind, subventricose, *subdistant*. STEM 2-3 cm. long, 1 mm. thick, slender, equal, hollow or stuffed with fibrils, whitish, subglabrous below the *evanescent* ANNULUS, pruinose above. SPORES minute, subelliptical, 4-5 x 3 micr., smooth, white.

Scattered. In low, moist woods, on mosses, etc. Ann Arbor, Bay View, New Richmond. September. Frequent.

A small Lepiota, near *L. pusillomyces*, from which the pink of the cap and the white stem seem to distinguish it so that the two are quite easily recognized in the field. *L. cristatellus* is also said to have narrower gills, and its stem is usually glabrous, while *L. pusillomyces* has broad gills and a mealy stem below the annulus.

Section VII. Procerae. Pileus thick and fleshy, the cuticle commonly broken into large scales (continuous in *L. naucina* in most cases); annulus thick, mostly movable.

686. Lepiota procera Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Pl. 25, Fig. 81, p. 79.
Peck, N. Y. State Mus. Rep. 48, Pl. 18, 1896.
Hard, Mushrooms, Pl. VI, Fig. 32, p. 46.
Freeman, Minn. Plant Diseases, Fig. 18, p. 39, 1905.
McIlvaine, Amer. Fungi, Pl. XIII, p. 34.
Fries, Sverig. ätl. u. gift. Svamp., Pl. 3.
Michael, Führer f. Pilzfreunde, No. 53.
Gillet, Champignons de France, No. 429.
Ricken, Blätterpilze, Pl. 83, Fig. 1.
Plate CXXXII of this Report.

PILEUS 8-15 cm. broad, elliptic-ovate before opening, then campanulate-convex to subexpanded, *umbonate*, at first covered with a reddish-brown or umber-brown *cuticle, which breaks up into large brown scales or patches* during expansion of pileus, with smaller floccose scales between and exposing the white flesh beneath, cuticle on umbo often continuous. FLESH thick, white. GILLS free, remote from stem, *broad anteriorly*, narrowed behind, thin, close, white or tinged pink, brownish in age, edge flocculose. STEM *15-30 cm. long*, cylindrical or tapering upward from a bulb, 6-12 mm. thick above, apex sunk deep into the flesh of the pileus as into a socket, hollow or stuffed with delicate long fibrils, *surface layer breaking up into small brownish scales*, or furfuraceous so as to appear variegated, white beneath and within. ANNULUS *movable*, thick, formed of the firm, membranous veil which breaks away early, its outer and lower surface covered with small brown scales, representing a continuation of the cuticle of the pileus at a very early state. SPORES 14-18 x 9-12 micr., elliptical, smooth, white; no cystidia found. Sterile cells on edge of gills, numerous, 35-45 x 10-15 micr., subcylindrical.

(Dried: Pileus buff with fuscous scales, stem pale fuscous, gills dingy-buff.)

Solitary or gregarious. On the ground, in meadows, pastures, open woods, or preferably in pastured clearings. August, September, October. Throughout the State. Edible.

Its long stem, movable annulus and *shaggy, spotted cap*, distinguish it from all others. Its height is often surprising, sometimes reaching a foot and a half, with a cap six to ten inches broad. Its cap is delicious, when after removing the scales, it is fried in butter. Its distribution is world-wide.

687. Lepiota morgani Pk. (POISONOUS)

Botanical Gazette, Vol. 4, 1879.

Illustrations: Hard, Mushrooms, 1908, Pl. VII, Fig. 35, p. 50.
McIlvaine, Amer. Mushrooms, 1900, Pl. XIV, p. 36.
Plates CXXXIII and CXXXIV of this Report.

PILEUS 10-20 cm. broad, at first globose then convex and expanded, cuticle at first continuous, buff to pale umber, soon *broken up* except on disk, *into irregular scales or patches*, which are drawn apart and disappear in part. FLESH thick, firm, white. GILLS free, remote (4-5 mm.) from stem, close, rather broad, ventricose, *at first white then changing to dull green*. STEM *stout*, 10-20 cm. long, 1-2 cm. thick above, 2-4 cm. at base, tapering upward from a clavate base, stuffed with fibrils, *hard and firm*, glabrous, whitish or grayish-white to pale umber. ANNULUS thick, *movable*, superior, toughish but soft. SPORES bright to dull *green in mass*, subelliptical, obliquely apiculate, 9-12 x 6-8 micr., nucleate.

Gregarious, often in large fairy rings. In meadows, pastures and open woods. In southern Michigan, Ann-Arbor. Frequent but local.

Unsafe. Eaten with impunity by some persons, but others suffer vomiting, etc. This is our largest-capped meadow mushroom known; it attains a diameter of 14 inches. Its *large size, movable ring* and *greenish spores and gills* distinguish it. The underside of the ring next to the stem is at first covered by the remains of the cuticle which was continuous with the pileus. All the cuticle of the pileus except the center may disappear. The young margin of the cap is beautifully torn-serrate and floccose at first. Reports have come in that the whole plant is sometimes green or greenish.

688. Lepiota americana Pk. (EDIBLE)

N. Y. State Cab. Rep. 23, p. 71, 1872.

Illustrations: N. Y. State Rep. 49, Pl. 44, 1896.
Atkinson, Mushrooms, Fig. 82, p. 80, 1900.
Hard, Mushrooms, Fig. 34, p. 49, 1908.
Murrill, Mycologia, Vol. 3, Pl. 49, Fig. 6.
McIlvaine, Amer. Mushrooms, Pl. XV, p. 48, 1900.

PILEUS 3-10 cm. broad, ovate then convex-expanded, umbonate or subumbonate, cuticle at first reddish-brown and continuous, *then broken up* except on umbo into large, scattered, *reddish or bay-brown scales*, elsewhere white when young and fresh but *becoming dingy-red in age*, more or less striate on margin. FLESH thin, white, *reddening when bruised or in age*. GILLS free, close, rather broad in front, narrowed behind, white. STEM 7-12 cm. long, 4-6 mm. thick at apex, *tapering upward from a clavate base*, sometimes fusiform, stuffed then hollow, glabrous, white becoming reddish where handled. ANNULUS rather large, membranous, flaccid, sometimes movable, sometimes evanescent. SPORES elliptic-ovate, 8-10 x 5-7 micr., nucleate, white. ODOR and TASTE mild.

(Dried: Whole plant tinged dull red or smoky-red.)

Solitary to caespitose. On rich soil in grassy places, in fields or around old stumps. Ann Arbor and Ludington. August. Apparently rare in Michigan. Edible.

Bresadola (Tab. Analyt, Vol. 2, p. 83) suggests that our plant is the same as the European *L. haematosperma* (*Agaricus haematosperma* of Hymen. Europ.), as well as *L. badhami* Berk. In these also the flesh changes to reddish in age or on drying. The French mycologists (Quel. and Battaile, Aman. et Lep., 1902, p. 73) have taken exception to this view, claiming that *L. haematosperma* actually has reddish or purplish spores when mature; while *L. badhami* has white spores. Hence the American name must be retained. Our plants can be distinguished from our other Lepiotas by this character of the flesh. The shape of the stern imitates at times that of *L. cepaestipes*, being enlarged just above the base, sometimes, however, it merely tapers from the very bottom; in the former case the base is sometimes short-pointed. The pileus is sometimes almost entirely white when fresh. The gills and flesh may assume a yellow tinge at first.

689. Lepiota naucina Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: N. Y. State Mus. Rep. 48, Plate 19, 1896.
Gillet, Champignons de France, No. 428.
Atkinson, Mushrooms, Figs. 79-80, p. 76-78.
Bresadola, Fungh. mang. e. vel., Pl. 15.
McIlvaine, Amer. Mushrooms, Plate XV, p. 44.
Ricken, Blätterpilze, Pl. 84, Fig. 2.
Plates CXXXV, CXXXVI of this Report.

PILEUS 4-8 cm. broad, at first subglobose to ovoid, then convex to subexpanded, obtuse, soft, *glabrous*, rarely broken into scales on the surface, white or smoky-white. FLESH white, thick, rather firm, abruptly thin on margin. GILLS free, not remote, close, moderately broad, narrowed behind, white at first, *slowly changing to pinkish then dingy-brown*, edge minutely flocculose. STEM 5-10 cm. long, 6-12 mm. thick above, tapering upward from a thickened base, sometimes subequal, stuffed then hollow, glabrous or silky below the ring, pruinose above, *white within and without*. ANNULUS formed from the membranous veil and outer layer of stem; the latter is shown peeled off up to the ring in the section of thef young plant in our illustration. It is white, rolled together in the form of a collar, persistent and superior, in age it often becomes movable. SPORES elliptic-oval, 7-9 x 5-6 micr., but variable, some longer, occasionally abnormal and then spherical, nucleate, smooth, white. ODOR and TASTE mild.

Gregarious. Grassy ground, in pastures, fields, roadsides, and parks. Ann Arbor, Marquette, New Richmond, etc. September-November. Common throughout the State. *Edible*.

(Dried: Gills pale cinnamon-brown to umber, pileus smoky-buff, stem buff tinged umber or fuscous-brown.)

It seems to be agreed that there is an European plant like ours with elliptical spores. (Beardslee, Jour. Mycs., Vol. 13, p. 27, 1907.) Whether there is also one in Europe with uniformly globular spores is as yet uncertain. (Morgan, Jour. Mycs., Vol. 13, p. 10.) Our species will probably be known henceforth as *L. naucina* instead of *L. naucinoides* Pk., a name it has held so long. The spores vary remarkably in some individuals, while in others they are quite constant. All our specimens had mostly elliptical-oval spores; in some cases a few spheroid spores were present, but such occur in other mushrooms, and must be considered abnormal. This is one of the best mushrooms for the table. Its white gills and veil when young might lead the novice to think it to be an Amanita. The stem is firmer and lacks remnants of a volva, and the gills turn brown when heated or toasted, while in Amanita they remain white" (McIlvaine). It is not infested by larvae, and some method of cultivation is awaited eagerly by mushroom gardners. *Lepiota excoriata* Fr., as figured by Bresadola, has the same general appearance, but differs in the torn surface of the cap near its margin, in the bulblet at the base of the stem and in the much larger spores, which measure 15-17 x 9 micr.

Armillaria Fr.

(From the Latin, *armilla*, a ring.)

White-spored. Stem continuous with the hymenophore, provided with an *annulus*. Volva none. Gills adnexed, adnate or decurrent, partly with a diverging trama.

Fleshy, often compact, firm mushrooms; either terrestrial or on wood; mostly autumnal.

The PILEUS is either viscid or dry, glabrous or scaly, often provided with a separable pellicle; the surface sometimes cracked in dry weather. Most of the rarer species are large and stout, the pileus of dull shades of color: whitish, yellowish, brownish or reddish. The margin is often incurved. The scales on the pilei of some species represent the broken cuticle which is continuous with the veil but concrete. The GILLS are variously attached, and Fries used this character to subdivide the genus into three groups, e. g., Tricholomata, with sinuate-adnexed gills; Clitocybae, with gills attenuated behind and subdecurrent; Collybiae, with gills equal. No examples of the Collybiae are known from the State. The steins of these three groups are normally central. With Patouillard (Les. Hymen. Eur., p. 95) it seems to ine desirable to include here a fourth group: the Pleurotoidae, with eccentric or lateral stein, to include the species *Armillaria dryina* and *Armillaria corticata*. The gills are usually white but may turn yellowish or become stained in age, depending on the species. Some species possess a gill-trama with diverging hyphae, but in other species the hyphae are parallel. The relationships shown by this character in this genus are not yet very clear. The STEM is usually stout; in *A. bulbigera* it is marginate-bulbous as in some Cartinarii. Usually it is solid, and often peronate by a more or less persistent sheath when young, later scaly-

spotted by the breaking up of this sheath. The VEIL is probably double in such species as *A. caligata* and *A. aurantia*, the outer veil being continuous with the cuticle of the pileus, the inner veil closely adherent to it between the margin of the pileus and the underside of the young gills. It is mostly membranous, but inclines to a cobwebby or fibrillose texture in *A. bulbigera* and when it sheathes the stem it breaks away from the margin of the pileus to form the spreading annulus. Sometimes it is lacerated at the junction of cap and stem and parts of it may remain on the margin of the pileus so that the pileus becomes appendiculate. In *A. mellea* the veil is extremely variable; it is usually membranous, but sometimes floccose-fibrillose or very thin and webby so that no annulus is formed on the stem. In other characters also *A. mellea* is quite variable. The SPORES are white, varying much in shape and size; in most species they are small and almost spherical; in some, as in *A. macrospora* Pk. from Colorado, they are elliptical and measure 10-15 x 6-8 micr. Several species have a distinct ODOR; that of *A. nardosmia* Ell. is said to resemble oil of almonds; that of *A. viscidipes* Pk. is strong and penetrating, somewhat alkaline. Nearly all the species are said to have a slight odor of some kind by which they can be distinguished. *A. mellea* Fr. is very common and plentiful in its season; the other species of Armillaria are infrequent and can be considered rare during any series of years. So far only five of the latter class have been found in the State, although doubtless our northern hemlock and pine forests hide others. It has seemed best, therefore, to include in the key such species as may occur within our area. About 18 species of Armillaria have been mentioned in the literature as having been observed in the United States; only about half of these were reported east of the Mississippi River. Ricken, (Blätterpilze), refers all Armillarias to the genus Tricholoma. Some species of Clitocybe, Tricholoma, and Pleurotus will be looked for here.

Key to the Species

(A) Stem lateral or eccentric; pileus white. 694. *A. dryina* Fr. 695. (*A. corticata* Fr.)
(AA) Stem usually central.
(a) Pileus or stem viscid.
(b) Lignicolous, growing on tree-trunks, etc., pileus glutinous. *A. mucida* Fr.
(bb) Terrestrial.
(c) Only the stem viscid; pileus large, whitish, or yellow-tinged; odor penetrating, alkaline. *A. viscidipes* Pk.
(cc) Stem not viscid; pileus with a slightly viscid pellicle.
(d) Pileus and stem covered with tawny-orange to ochraceous-rufous scales. 691. *A. aurantia* Fr.
(dd) Pileus glabrous, pale-brick red; stem covered with pink-red floccose scales. 692. *A. focalis* Fr. var.
(aa) Pileus and stem not viscid.
(b) In caespitose clusters about stumps, trunks, etc., honey-yellow, becoming rusty-stained; gills adnate to subdecurrent. 693. *A. mellea* Fr.
(bb) Not caespitose; gills emarginate or rounded behind, not decurrent.
(c) Veil cortina-like, white, fugaceous; stem marginate-bulbous; pileus glabrous, gray, brownish or rufescent; spores 7-10 x 5 micr. *A. bulbigera* Fr.
(cc) Veil membranous; stem not marginate-bulbous.
(d) Pileus white or whitish.
(e) Stem sheathed by the subviscid, persistent veil; pileus large, 10-15 cm. broad, white or yellowish, glabrous. Spores globose, 4 micr. diameter. *A. magnivelaris* Pk. *A. ponderosa* Pk.
(ee) Stem not sheathed; veil fibrillose—membranous, not viscid; pileus 5-10 cm. broad, whitish to rusty-tinged; spores subelliptical, 7.5 x 5 micr. *A. appendiculata* Pk.
(dd) Pileus or scales dark brown, reddish-brown or grayish brown.
(e) Pileus glabrous, hard and compact; veil ample, gills broad; spores 7 micr., ovoid-globose. *A. robusta* Fr.
(ee) Pileus with brown or reddish-brown scales; gills narrow.
(f) Odor strong, of spikenard or oil of almonds; pileus whitish, except the brown scales; spores 6 micr., globose. *A. nardosmia* Ell. (See *A. caligata*.)
(ff) Odor none, scales reddish-brown to chestnut-brown; spores globose-ovate, nucleate, 6-7.5 x 5 micr. 690. *A. caligata* Fr.

A. TRICHOLOMATA. Gills sinuate-adnexed; stem fleshy, similar in substance to the pileus.

690. Armiliaria caligata Vitt.-Bres.

Hymen. Europ., 1874.

Illustrations: Bresadola, Fungh. mang. e, vel., Pl. 17.
Gillet, Champignons de France, No. 33.
Barla, Champignons de Nice, Pl. 10, Fig. 4-7.
Patouillard, Tab. Analyt, No. 306.
Hard, Mushrooms, Fig. 42, p. 59 (as *A. nardosmia* Ell).
Van Hook, Ind. Acad. Sci. Proc., 1911, Fig. 1, p. 348 (as *A. nardosmia*).
Plate CXXXVII of this Report.

PILEUS 6-10 cm. broad, firm, convex then expanded and depressed, *spotted by appressed, rufous-brown or* dark brown, elongated *fibrillose scales*, elsewhere silky, white between scales or brunescent, margin at first incurved and margined by remnants of the veil. FLESH white, thick, compact. GILLS sinuate-adnate, at length with decurrent tooth, medium *broad* (5-8 mm.), heterophyllous, white, crowded, edge entire, trama of parallel hyphae. STEM *stout*, 4-7 cm. long, 2-3 cm. thick, subequal or tapering down, solid, sheathed at first to the middle or above it by *the veil* which *terminates above by an ample, flaring, thickish, membranous* ANNULUS, later breaking below into subconcentric, *rufous-brown* scales, white and rough-scurfy above the ring, then glabrous and shining, white within. SPORES spherical-ovoid to short elliptical, 6-7.5 x 5 micr., smooth, white in mass. BASIDIA 38-40 x 7-8 micr., 4-spored. ODOR none. TASTE of nuts or slightly bitterish-acrid.

Solitary or in caespitose pairs. On the ground, oak hillside bordering a tamarack bog. Ann Arbor. October. Rare.

Our plants agree so well with Bresadola's description and figure of *A. caligata* that I have no hesitancy in referring them there. There is a slight discrepancy as to odor. Bresadola describes the European plant with an agreeable, fruit-like odor. On this point our specimens also differ from the description of *A. nardosmia* Ell. Several correspondents from the eastern part of the United States inform me that their specimens of *A. nardosmia* often or always lack the odor of almonds attributed to it. Peck (Rep. 33) first referred the New York species to *A. rhagadisma* Fr., but in the 43d Report assigned it to *A. nardosmia*. I am inclined to think the New York species all belong to *A. caligata*. I have collected the same but smaller plant in New York, and it seems usually to be smaller farther south and east. Whether any microscopic characters accompany the almond odor remains to be seen. As in *A. aurantia*, the parallel hyphae of the gill-trama are an exception for this genus.

691. Armillaria aurantia Fr.

Svst. Myc., 1821. (As *Tricholoma aurantia*.)

Illustrations: Fries, Icones, Pl. 27.
Gillet, Champignons de France, No. 31 (too pale).
Bresadola, Fungh. mang. c. vel., Pl. 18.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 121.
Atkinson, Mushrooms, Fig. 86, p. 85, 1900.
Ricken, Blätterpilze, Pl. 87, Fig. 2. (As Tricholoma.)

PILEUS 5-7 cm. broad, convex then expanded, subumbonate, viscid in wet weather, *ochraceous-fulvous to tawny-orange-red*, with a pellicle which soon breaks up into numerous, crowded, appressed, concolorus scales, *margin at first inrolled and glutinous floccose*. FLESH white, thick, abruptly thin on margin. GILLS rounded behind, slightly adnexed, rather narrow, close, *white*, rusty-brown-spotted in age, a few forked, edge entire, trama of parallel hyphae. STEM 4-7 cm. long, 8-15 mm. thick, equal or narrowed downwards, *covered by concolorous subconcentric scales* up to the obscure annulus, white at apex and between scales, solid. SPORES minute, globose-oval, variable, 4-5 x 3-4 micr., smooth, nucleate, white. CYSTIDIA and sterile cells none. BASIDIA 25-28 x 4-5 micr., 4-spored. ODOR strongly farinaceous, somewhat disagreeable.

Scattered. On sandy ground under hemlock trees. New Richmond. September. Infrequent.

This is *Tricholoma peckii* Howe. The quite young plant has an ovate obtuse pileus with an inrolled margin, and an external, colored layer which breaks up into appressed floccose patches or scales, but scarcely ever leaves an annulus. That it is a better Tricholoma, where Fries at first placed it, is shown by the structure of the gill-trama whose hyphae lie in a parallel position. The tawny-orange red color of the scales is a distinguishing character. Cooke's figure (Ill., Pl. 33) evidently illustrates a different species. Bresadola says it has the odor of stale olives, while Maire (Soc. Myc. France, Bull. 27, p. 404) reports a slight dextrine odor.

692. Armillaria focalis Fr. var.

Epicrisis, 1836-38.

Illustration: Cooke, Ill., Pl. 245.

PILEUS 3-6 cm. broad, campanulate-convex, *soft-fleshy*, obtuse, even, *glabrous*, provided with a thin, separable, *viscid* cuticle, *bright brick-red*. FLESH thin, tinged pink. GILLS *sinuate-adnexed*, rather broad, about 5 mm., ventricose, soft, close, white or tinged brick-red, edge thin. STEM 4-11 cm. long, 5-8 mm. thick, rather slender, isubequal, attenuated below, soft, solid, fragile, *covered by brick-red, floccose scales up to the evanescent, median annulus*, whitish and silky-shining above. SPORES globose, 3-4.5 micr., white, smooth; basidia 4-spored, slender, about 24 micr. long. CELLS of the gill-trama large, 75-125 micr. long, about 12 micr. wide, *divergent*. Cells of the cuticle of pileus long, narrow, 5-6 micr, wide, gelatinous. ODOR and TASTE farinaceous.

Gregarious or solitary, on the ground, in mixed hemlock and maple woods, clay ravines. New Richmond. September. Rare.

This plant seems to be intermediate between *A. focalis* and *A. aurantia*. Its pileus is somewhat viscid and in this respect differs from *A. focalis* and is related to *A. aurantia*. Its spores also approach those of *A. aurantia*. In stature, texture of the flesh, character of pileus, etc., it is, however, quite different from *A. aurantia*. The soft texture is given as an important character of *A. focalis*, and Cooke's illustration gives a good idea of the coloring and the appearance of the stem of our plants, except that the stem is much more elongated and attenuated downward. No critical studies of *A. focalis* Fr. could be found, and it is possible that its cap may be provided with a viscid pellicle in wet weather.

B. CLITOCYBAE. Gills attenuated behind, more or less decurrent; stem solid.

693. Armillaria mellea Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 32.
Atkinson, Mushrooms, 1900, Pl. 27, p. 84.
Hard, Mushrooms, 1908, Figs. 39, 40, p. 56, 57.
Marshall, Mushroom Book, p. 61.
Murrill, Mycologia, Vol. 1, Pl. 1, Fig. 2.
Conn. Nat. Hist. Survey, Bull. No. 3, Pl. IV.
Plates CXXXVIII, CXXXIX, CXL of this Report.

PILEUS 3-10 cm. and more broad, oval to subhemispherieal at first, then convex to almost plane, obtuse, normally honey-colored, varying to yellowish-brown, rusty-brown, or quite pale, adorned with dark-brown or blackish pointed tufts or scales, sometimes glabrescent, striate on margin in age. FLESH whitish. GILLS *adnate* or decurrent, subdistant, whitish or dingy yellowish, becoming rusty-stained in age, not broad, at

length powdered by the white spores. STEM variable in length, 5-15 cm. long, 6-20 mm. thick, *equal*, stuffed then hollow, often spongy within, fibrous without, elastic, floccose-scaly, glabrescent, glabrous or striate and mealy at apex, whitish above, dingy yellowish, brownish or rusty-stained below. The VEIL is usually well-developed, membranous, and at first conceals the gills, at length collapsing to form a superior *annulus;* sometimes both veil and annulus are almost or entirely lacking; they are white or whitish, sometimes stained like cap and stem. SPORES elliptical-ovate, 8-9.5 x 5-6.5 micr., white, smooth, nucleate; basidia 4-spored; trama of gills composed of divergent hyphae. TASTE somewhat disagreeable or acrid.

Caespitose. At base of living tree-trunks, around stumps, decaying roots, etc., of all sorts of trees, both conifer and broad-leaved. Throughout the State. July-November (earliest record July 13, latest November 2). Very common. Parasitic and saprophytic.

In an abundant species like this, the variations are much more easily observed than in a rare plant, so that about ten varieties have been named and described. The most important of these is var. *exannulata* Pk. This is an ecological form, doubtless, whose dense, caespitose clusters, stem attenuated below, undeveloped annulus and small glabrous pilei, are the result of unfavorable conditions. Other varieties, like *obscura, flava, glabra, radicata, bulbosa*, etc., differ from the normal condition in the characters indicated by their respective names. An abortive form occurs, doubtless parasitized like *Clitopilus abortivus*, by some other fungus whose identity is unknown. This form consists of irregular roundish white masses composed of fungus mycelium. For a fuller account see N. Y. State Mus. Rep. 48, page 262.

Armillaria mellea is of considerable economic importance. At times it grows from living roots to which it is connected by black, twine-like strands called Rhizomorphs. These are often found even where no fruit-bodies are present, and before their connection with this species was known, the strands were referred to an independent fungus and called *Rhizomorpha subcorticalis*. These strands extend under the bark of living roots and eventually injure or kill the trees. The American *A. mellea* is safely edible. Large quantities are collected by the foreign-born population of some localities—Detroit and the mining regions of the Northern Peninsula; they are dried, and used for the table during the winter. The taste is somewhat disagreeable, and many people do not think them particularly palatable.

Clitocybe monodelpha Morg. has been considered by some as a variety of this species. It is, however, clearly separated by the character of the hyphae in the gills, which do not diverge as in the genus Armillaria, but lie parallel between the subhymenial layers.

C. PLEUROTOIDAE. Stem eccentric or lateral; gills decurrent.

694. Armillaria dryina Fr.-Pat.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 226. (As Pleurotus.)
Patouillard, Tab. Analyt., No. 517.
Atkinson, Mushrooms, Pl. 32, Fig. 106, 1900. (As Pleurotus.)

PILEUS 4-8 cm. broad, firm, convex-plane, *floccose-tomentose at first*, in dry situations *becoming scaly* from the breaking up of the floccose covering, *white*, scales darker in age, margin at first involute. GILLS decurrent, subdistant, attenuated at ends, broadish in the middle, white, not anastomosing behind. STEM eccentric or lateral, 2-4 cm. long, 1-1.5 cm. thick, subequal, sometimes stouter at first, covered by a more or less dense tomentum, especially toward base, above with a somewhat temporary *annulus* from the thin, membranous veil, which is quickly lacerated and disappears as pileus expands. SPORES oblong, 9-10 x 4-4.5 micr., smooth, white. ODOR very strongly of oil of bitter almonds (benzaldehyde).

From base of stumps, on trunks, etc. Marquette. August. Infrequent.

The plants described above were growing near the ground and in a moist situation and this may account for the unusual tomentosity on the stem. The size of the spores, which appeared to be mature, would seem to be one basis of separation from the next species. When the stem is lateral or nearly so, the pileus is usually subreniform.

695. Armillaria corticata Fr.-Pat.

Syst. Myc., 1821.

Illustration: Atkinson, Mushrooms, Pl. 33, Fig. 107. (Small forms as Pleurotus.)

PILEUS 6-15 cm. or more broad, convex-expanded, obtuse or depressed, *firm, dull white or becoming brownish* tinged, finely floccose at first, then the *cuticle breaks up into scale-like areas*, margin at first involute and appendiculate. FLESH thick, white. GILLS decurrent, moderately close, *rather broad*, narrowed behind, white becoming yellowish, *anastomosing on the stem*, edge entire. STEM 4-10 cm. long, eccentric or almost lateral, sometimes stout and short, solid, firm to rigid, subtomentose or floccose, rteticulate in large specimens, equal or tapering down. VEIL attached near apex, leaving a thin, white floccose-membranous evanescent ring, or sometimes remnants on the margin of the pileus. SPORES *cylindrical-elongated, large*, 13-17x 4-5 micr., smooth, white. BASIDIA 4-spored. ODOR slightly acid-aromatic to foetid.

Solitary or caespitose, on wood, especially on living trunks of hickory, maple, etc. Ann Arbor, Marquette. September-November. Infrequent.

This is considered by Atkinson (Mushrooms, p. 106, 1900) as merely a form of *A. dryina*, and as far as the variation of stem-length and size of plant are concerned, such a conclusion is well supported. The difference in the size of the spores in our collections has, however, opened up the question again, and further study seems necessary. Schroeter gives 13-15 x 4-5 micr. as the size of the spores of *A. corticata*, a measurement nearly equal to the spore length of our form. The size of the spores of *A. dryina* is not mentioned by most authors; Massee says they are 10 x 4 micr. Large specimens of this species when the veil has disappeared, might be mistaken for *Pleurotus ulmarius* or *Panus strigosus*; but *P. ulmarius* has sinuate-adnexed gills and *P. strigosus* has a nap of strigose-villose hairs on cap and stem and is much larger.

Pleurotus Fr.

(From the Greek, *pleuron*, a side, and *ous*, an ear.)

White-spored, (except *P. sapidus* and *P. subpalmatus*). Stem fleshy, *eccentric, lateral or lacking*, continuous with the pileus. Gills adnate, adnexed or decurrent. Veil *none*.

Putrescent, (except *P. atrocaeruleus P. atropellitus*, *P. niger*, and *P. striatulus*), lignicolous, medium to large, or often small and then resupinate. Intergrading with the genera Clitocybe and Armillaria. They correspond to the genera Claudopus and Crepidotus of the pink-spored and ochre-brown-spored groups respectively. All are believed to be *edible*, and are considered by many people the most delicious of our mushrooms when properly prepared.

The PILEUS varies from quite large in those attached laterally or with a stem, to quite small when it is resupinate. *P. ulmarius* and *P. ostreatus* and their near relatives have a thick, fleshy pileus and ample gills, thus providing a large amount of food for the mushroom enthusiast. The small species are rather thin, often membranous; four of the species revive on moistening. Our large species are nearly all white when fresh, becoming tan-colored or darker when old, and are always firm and even tough in age. The medium-sized species are ashy, greenish, yellowish or reddish in color. The small forms are white, gray or blackish. Several are hygrophanous. Several have a gelatinous or viscid upper layer, of which the thick-fleshed *P. serotinus* is the most note-worthy. The GILLS are fastened to the stem, but their mode of attachment is so different in the various species as to have given some authors ground for making distinct genera out of the sections. In some they are deeply decurrent as in Clitocybe, in others, sinuate-ad-iiexed as in Tricoloma, and in the resupinate and lateral species they radiate from the point of attachment of the pileus as in Crepidotus of the ochre-brown-spored group. In the large species they are usually very broad. Among the medium-sized forms there are cases where the gills are very narrow and very crowded, reaching the base almost as lines; examples of this class are *P. petaloides, P. borealis*, and *P. porrigens*. The small, resupinate forms expose the gills on the upper side while the pileus is closely applied to the substratum; later the pileus becomes reflexed so that the gills project downward, giving the older a different appearance than the younger plant. This genus is often separated from Clitocybe with difficulty, especially in the cases where the stems are only slightly eccentric, so that different authors have placed the same plant under the two genera. The STEM is occasionally almost central in the large-stemmed species, which may then be mistaken for Tricholomas; the latter, however, grow practically always on the ground. Otherwise, the stem is lateral, eccentric or entirely wanting. The interior of the stem is fleshy-fibrous in most species, but several have a stuffed to hollow axis, with a tough exterior, as in *P. lignatilis*.

The SPORES are white except in the aberrant species *P. sapidus*, *P. euosmus* and *P. subpalmatus* in which the spores have a slight flesh color or lilac tint. *P. sapidus* and *P. euosmus* resemble *P. ostreatus* so closely in other respects, that placing them among the pink-spored agarics would not improve matters. *P. subpalmatus* seems to me nearer Entoloma as its stem is sometimes central; its reticulate, toughish, gelatinous pileus is rather unique, and reminds one of the genus Heliomyces. The spores of the Pleuroti are smooth, mostly spherical and then minute, or oblong; in a few species, elliptical. CYSTIDIA are known to be present in *P. serotinus*, *P. stratosus*, *P. petaloides* and *P. mastrucatus*. *P. ostreatus* is said to produce scattered conidia on top of its pileus, which represent another kind of spore. The ODOR is often fragrant and agreeable, and the flavor of most of the species makes them very desirable for the table.

The genus may be divided into three sections:
Section I. Eccentrici.
Section II. Dimidiati.
Section III. Kesupinati.

The subdivision which was used by Fries and others for those forms with an inner veil is omitted here, since our two species *P. corticatus* and *P. dryinus* have been transferred to the genus Armillaria, where it seems to me they more properly belong, and for which they have often been mistaken. A few species not yet found in the State have been included in the key.

Key to the Species

(A) Stem eccentric; pileus entire or at least marginate behind; plants of medium size to very large.
(a) Pileus brown or blackish brown, umbonate, 2-7 cm.; gills subdistant, broad; spores 5-6 x 4-5 micr. *P. umbonatus* Pk.
(aa) Pileus yellow, yellowish or reddish. [See also (aaa).]
(b) Pileus glabrous, gelatinous on top, coarsely-reticulate, pinkish or flesh color; spores globose, echinulate. 699. *P. subpalmatus* Fr.
(bb) Pileus strigose hairy, scaly or fibrillose.
(c) Very large; pileus lateral, cream-color then yellowish, strigose hairy; gills very broad; stem short. (See 12a. *Panus strigosus* B. & C.)
(cc) Medium-size; stem medium long and not very eccentric.
(d) Pileus and stem densely dotted with brown or blackish scales; spores globose, minute. (See 760. *Clitocybe decora* Fr.)
(dd) Pileus unicolorous, silky-fibrillose, umbonate; spores elliptical, 7-9 x 5-6 micr. 698. *P. sulfuroides* Pk.
(aaa) Pileus white when young or fresh.
(b) Plant large, on standing elms, etc., stem rather long and stout; gills emarginate or sinuate, rounded behind, broad. 696. *P. ulmarius* Fr. 697. *P. elongatipes* Pk.
(bb) Gills adnate, adnate-decurrent or long-decurrent.
(c) Spore print pale dingy lilac; pileus thinner and more flaccid than *P. ostreatus*. 702. *P. sapidus* Fr.
(cc) Spore print white.
(d) Stem stout, usually quite short.
(e) Gills running down the stem in lines and anastomosing; plant rather stout. 700. *P. ostreatus* Fr.
(ee) Gills not anastomosing on stem, but strongly decurrent. Spores longer than in the preceding two, 12-15 x 5 micr. 701. *P. subarcolatus* Pk.
(dd) Stem slender, 2-5 mm. thick; gills narrow and crowded.
(e) Pileus hygrophanous, hyaline-white, thin; stem solid, pruinose-floccose. 705. *P. fimbriatus* var. *regularis* var. nov.
(ee) Pileus not hygrophanous, tough, medium size to small.
(f) Dingy-white; pileus irregular; stem curved, subvillose, odor farinaceous-oily. 703. *P. lignatilis* Fr.
(ff) Entirely white; pileus regular, orbicular; stem straight, glabrous; odor faint. 704. *P. circinatus* Fr.
(AA) Stem none or very short; pileus sessile or continuous with the stem.
(a) Pileus at first resupinate.
(b) Upper layer of pileus gelatinous, forming a pellicle.
(c) Pileus 2-5 cm. broad, more or less reniform to obovate.
(d) Pileus gray or blackish-brown, margin paler, villose, gills not very broad, whitish. 714. *P. atrocaeruleus* Fr. var. *griseus* Pk.
(dd) Pileus rich brown, covered with squarrose or erect scales; gills broad, grayish-white. 713. *P. mastrucatus* Fr.
(cc) Pileus minute, in the shape of a pendulous, reversed vase or cup, pale gray; on herbaceous stems. *P. cyphelliaeformis* Berk.
(bb) Pileus without a gelatinous pellicle.
(c) Pileus pure white, rarely varying to pale tan.
(d) Pileus 3-7 cm. long, flabelliform, obovate or cuneate; gills narrow, crowded, forked.
(e) Pileus tomentose; spores spherical; gills scarcely forked. 713. *P. albolanatus* Pk.
(ee) Pileus glabrous, margin involute; spores longer than broad; gills forked. 710. *P. porrigens* Fr.

(dd) Pileus minute, 3-10 mm. broad, plane; gills rather broad, subdistant. 711. *P. septicus* Fr.
(cc) Pileus gray to blackish, minute.
(d) Pileus glabrous, striate; gills few, distant. *P. striatulus* Fr.
(dd) Pileus not glabrous.
(e) Spores elliptical; pileus 7-16 mm. broad; gills close, blackish. 716. *P. atropellitus* Pk.
(ee) Spores globose; gills broad, thick.
(f) Pileus dark cinereous, subpruinate, margin striatulate. 715. *P. applicatus* Fr.
(ff) Pileus black, plicate on margin, pulveraceous; gills close. *P. niger* Schw.
(aa) Pileus never resupinate, sessile nor attached by a short lateral stem, but pileus not marginate behind.
(b) Upper layer of pileus gelatinous or viscid.
(c) Pileus smoky yellowish green, dimidiate; flesh thick; spores oblong, 4.5 x 1.5 micr. 706. *P. serotinus* Fr. (Syn. *P. serotinoides* Pk.)
(cc) Pileus whitish or tinged alutaceous coreaceous-fleshy, cuneate, spathulate or fan-shaped, spores minute, globose; cystidia abundant. (See 16. *Panus angustatus* Berk.)
(bb) Without a gelatinous surface layer.
(c) Pileus hygrophanous, grayish-brown; gills rather distant, narrow, stem lateral. *P. tremulus* Fr.
(cc) Pileus not hygrophanous.
(d) Pileus sessile, pure white, small, flattened, radiately rugose; gills subdistant, broad. 709. *P. candidissimus* B. & C.
(dd) Pileus not pure white, 1-2 cm. broad, cuneate, or spathulate.
(e) Spores elliptical, 7.5 x 4-5 micr. 708. *P. spathulatus* Fr.
(ee) Spores globose, 3-4 micr. diam. 707. *P. petaloides* Fr.

(Morgan, Cinn. Soc. Nat. History, Vol. 6, p. 78) reports *P. craspedius* Fr. a rather large, brown, stipitate species, margin of pileus crenate or lobed, gills close, narrow and white, spores globose, 5-6 micr.)

Section I. Eccentrici. Pileus entire or at least marginate behind; stem eccentric.

**Gills sinuate emarginate, or obtusely adnate.*

696. Pleurotus ulmarius Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 102-3, p. 102, 1900.
Hard, Mushrooms, Fig. 119, p. 156, 1908.
Clements, Minnesota Mushrooms, Fig. 19, p. 32, 1910.
Chicago Nat. Hist. Surv. Bull. VII, Part I, Plate V, 1909.
N. Y. State Mus. Rep. 48, Plate 26, Fig. 14, 1906, Bot. ed.
Freeman, Minnesota Plant Diseases, Frontispiece, 1905.
Plate CXLI of this Report.

PILEUS 5-15 cm. or more broad, compact, firm, convex then expanded, obtuse, moist, *glabrous* or somewhat tomentose, *white or whitish*, becoming dull leather color in age, sometimes with yellowish or brownish shades, even on margin but often cracked in age. FLESH white, thick. GILLS *sinuate-adnexed* becoming emarginate or rounded behind, broad, close to subdistant, *white or whitish*. STEM 3-7 cm. long, variable, 1-2 cm. thick, *stout, solid*, firm, eccentric, straight or curved, glabrous, sometimes slightly or densely tomentose, whitish. SPORES spherical, 5-7 micr. diam., smooth, *white in mass*. ODOR and TASTE pleasant.

(Dried: Brownish-tan throughout.)

Solitary or caespitose. On decayed or living wood of elm, hickory, maple trunks, etc.; often from a crack or wound of the living tree. Throughout the State. September-November. Rather infrequent except locally.

This Pleurotus apparently occurs only on frondose trees, especially on the elm—whence its name. It is not known whether it is parasitic on the living trees or not. Shade-trees in cities are frequently its home. It is one of our best edible mushrooms when young, but in age it becomes somewhat leathery. Once located on a tree, it may often be found fruiting in successive seasons. It often appears on the pruned ends of branches, and may be found far up on the tree. This species is largely free from grubs, especially in the late fall, and often persists or dries in place. It forms a good article of diet in winter, if it is collected when young and the caps are dried. Some of its characters are quite variable. It may appear in dense clusters, or only as a single individual. When growing from the side of a trunk, the steins often grow downward and the cap develops horizontally. Others grow erect, especially when they appear on top of the branch. When the plant grows to considerable size, it is usually quite tomentose on the pileus and stem, which normally are glabrous. The color is often quite deceptive. Early, fast-growing individuals are pure white, but late, slow growing ones become brownish or tan-colored; all of them tend to become darker in age. The stems are mostly eccentric, but erect plants may have central stems. The mode of attachment of the gills

is the most important distinction between this species and *P. ostreatus* and *P. sapidus;* for although the latter have short and lateral stems, *P. ulmarius* also may have stunted sterns growing far to one side. As all of them are equally edible, this point is only of diagnostic importance. Several varieties have been described, based on the variations mentioned above.

697. Pleurotus elongatipes Pk. (EDIBLE)

Jour. of Mycology, Vol. 14, 1908.

PILEUS 5-10 cm. broad, convex or nearly plane, glabrous, white, even on the margin. FLESH *rather thin*, white. GILLS *adnexed then emarginate*, rounded behind, close, moderately broad, thin, white. STEM very long, 5-15 cm., 6-10 mm. thick, *stuffed then hollow*, variously curved or flexuous, usually eccentric, glabrous above, more or less tomentose toward base, white. SPORES minute, sphoeroid, 4-5 micr. in diam., smooth.

(Dried: Pileus and gills ochraceous-tan, stem dingy buff.)

Subcaespitose or solitary. On prostrate trunks or decaying logs. Whitmore Lake, Washtenaw County and Stevens Lake, Wayne County. October. Rare?

This species seems most closely related to *P. ulmarius*, and is no doubt often confused with it. Peck, who described it from the Wayne County specimens sent him by Dr. O. E. Fischer, considers it most closely related to *P. lignatilis*. It differs from *P. lignatilis* in its much stouter habit, and adnexed-emarginate gills. From *P. ulmarius* it seems separable by its stuffed to hollow stem. All of the cotype specimens in my possession have a rather large hollow stem when dried. Those in another collection have the habit and appearance of *P. ulmarius*, but with the characteristic hollow stem in the dried condition. Dr. Peck's acuteness has thus, I believe, found that our common *Pleurotus ulmarius* is composed, at least in this region, of two distinct species. It is no doubt edible and the separation is only of scientific interest. The stems of the type specimens were very long, but it is likely that those were plants of an extreme form.

698. Pleurotus sulfuroides Pk.

N. Y. State Mus. Rep. 23, 1872.

Illustration: Atkinson, Mushrooms, Fig. 108, p. 107.

PILEUS 2-7 cm. broad, convex, *umbonate*, subexpanded, silky-fibrillose or minutely scaly, glabrescent, pale yellow, variegated when moist. FLESH thin, soft. GILLS slightly decurrent at first, *soon emarginate* and rounded behind, close, rather broad, *sulfur-yellow to yellowish*, white-floccose on edge when young. STEM 3-8 cm. long, 5-7 mm. thick, *eccentric*, rigid-elastic, variously curved, equal, fibrillose, *pale yellow, stuffed then hollow*, apex floccose, even. SPORES oval to short elliptical, 6-9 x 5-6 micr., granular within, smooth, white. CYSTIDIA none.

(Dried: Bay-brown throughout.)

Gregarious or subcaespitose. On decaying logs, hemlock or mixed woods. Bay View, New Richmond. September. Rare.

This species is usually rather long-stemmed, but it also occurs with a short, firm stem. Sometimes it is rather soft in texture but in dry weather it becomes firm. It is easily distinguished by the pale yellow color of the whole plant. In one collection the color was more truly sulfur-yellow. When it is dried, it assumes a bay-brown or dingy chestnut color.

699. Pleurotus subpalmatus Fr.

Epicrisis, 1836-38.

Illustrations: Lloyd, Mycological Notes, Vol. I, Fig. 23, p. 51.
Cooke, Ill., Pl. 255. (This has not the appearance of our plant.)

PILE US 3-5 cm. broad, fleshy, convex-plane, obtuse, *the cuticle gelatinous, coarsely reticulated* and separable, *brick-red to flesh color*, glabrous. FLESH rufescent, thick except at margin. GILLS *adnate*, moderately broad, subventricose, close, thin, a few forked at times or interspaces venose, *becoming salmon color*. STEM coricaceous-fleshy, confluent with pileus, 2-3 cm. long, 5-6 mm. thick, equal, *somewhat eccentric*, curved, fibrillose, fibrous-stuffed, reddish within and without. SPORES globose, *echinulate*, whitish, *flesh color in mass*.

On prostrate maple trunk, cut timber, etc. Houghton, Detroit (Grosse Isle). August-September. Rare.

This rare species has been collected in this country in a small number of widely separated localities. Morgan and Lloyd both report it from Ohio. It seems to have been collected in Kansas and Minnesota. We have it from the northern and southern sections of our State. It departs so widely from the genus Pleurotus in its echinulate spores, which are flesh-colored, and the peculiar raised net-work of reticulations on the upper surface of the pileus, that it might be considered well marked as an independent genus. It is just as properly an Entoloma as a Pleurotus; and why not a Heliomyces? Its flesh becomes tough at maturity, at least in dry weather. Lloyd's figure is an excellent illustration of the plant as I found it at Houghton.

***Gills adnate-decurrent or deeply decurrent, narrowed to a point or line on the stem.*

700. Pleurotus ostreatus Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Pl. 30, Fig. 104, 1900.
Hard, Mushrooms, Pl. 18, Fig. 117, 1908.
McIlvaine, Amer. Mushrooms, Plates 35 and 35a, 1900.
Marshall, Mushroom Book, Pl. 9, 58, 1905.
Michael, Führer f. Pilzfreunde, Vol. II, No. 79 (dark form).
Plate CXLII of this Report.

PILEUS 5-20 cm. or more broad, firm, ascending or shelving, *conchate*, subdimidiate to elongated, convex or depressed, white or whitish becoming darker or brownish-ashy, moist, glabrous, margin thin and even, sometimes subrimose. FLESH thick, somewhat soft. GILLS, close to subdistant, *decurrent and running down the stem in raised lines which anastomose*, broad in the middle, narrowed at ends, white or whitish. STEM *lateral, short or almost lacking*, stout, solid, firm, often tomentose or strigose-hairy at base, whitish. SPORES oblong, 7-10 x 4 micr., smooth, *white in mass*. ODOR and TASTE agreeable.

Caespitosely imbricated, often in large shelving clusters on standing dead trunks of poplar, maple, elm, birch, willow, etc.; rarely on hemlock or pine; often on sawed logs scarcely decayed. Throughout the State. May to November. Common.

Distinguished from *P. sapidus* and *P. ulmarius* by the peculiar cross-connections of the decurrent gills on the stem. It has usually stouter and thicker pilei than *P. sapidus* and has white spores. *P. ostreatus* is apparently more common in southern Michigan, while *P. sapidus* is the usual form in the north, although both are found in the same region. It varies in color from dirty-white to smoky-white, becoming brownish-tan in age like the two related species. In luxuriant specimens the gills are very broad, but taper at the ends. It is called the "Oyster Mushroom" because of its conchate pileus. Authors differ as to whether it is of first or second quality for the table—the difference in quality is probably due to the manner of cooking. Dr. Cooke says it may be spoiled by improper preparation. Hard says they must be carefully and thoroughly cooked, and this is an important fact. My own preference is the method used in frying oysters, only it is better to cut the cap *into small pieces* since they do not cook as quickly as an oyster. The caps should be collected within a few days of their appearance, as they become infested with small beetles; these, however, usually hide only between the gills, and can be shaken out, leaving the plants still fit to eat. At the first signs of decay they are no longer desirable.

701. Pleurotus subareolatus Pk. var.

N. Y. State Mus. Rep. 30. 1878.

PILEUS 3-8 cm. broad, almost as long, firm, convex, spatulate, *cuneate or flabelliform*, lateral but marginate behind, *white then dingy*, tomentose behind, silky tomentose in front, obscurely areolate, margin at first involute. FLESH thick, surpassing width of gills, rather soft. GILLS decurrent, scarcely or not at all anastomosing on stem, *rather broad*, attenuate at ends, *subdistant*, white, at length brownish, edge entire. STEM short, almost lateral, ascending, 2-3 cm. long, about 1 cm. thick, firm, solid, sometimes spongy within, equal, even, white then dingy or subrufescent, tomentose. SPORES *long, subcylindrical*, 12-15 x 4-5 micr., smooth, white. CYSTIDIA none. BASIDIA about 45 x 7 micr., attenuated downward, 4-spored. ODOR and TASTE mild or slightly nauseous.

Solitary or few in cluster. On living trunks of maple, basswood, etc. Ann Arbor, New Richmond. September-October. Infrequent.

This species is referred here with some hesitancy. Peck described his plants from a single collection, and emphasizes the areolate character of the surface of the cap. He does not give the shape of the pileus, but the stem is said to be eccentric, so that the pileus was probably much more regular than in our plants. The spores, gills and most of the other essential characters agree. It is probable that if we had accounts of the spore-size of some of the European species, our plant could be easily placed. The margin remains involute a long time, and Peck, in a note (Rep. 54, p. 164) states that his species had a small, white membranous veil in the young condition, showing its relation to Armillaria. No such veil was observed in my plants.

702. Pleurotus sapidus Kalch. (EDIBLE)

Hymen. Hungariae, 1873.

Illustrations: Atkinson, Mushrooms, Plate 31, Fig. 105, 1900.
Hard, Mushrooms, Pl. 20, Fig. 123, 1908.
N. Y. State Mus. Rep. 48, Pl. 27, 1896, Bot. ed.
Cooke, Ill., Pl. 954.

PILEUS 5-10 cm. or more broad, firm, ascending or shelving, subdimidiate or elongated, convex to subexpanded, depressed behind, *glabrous*, often irregular and with wavy margin, white or whitish, often tinged tan, yellowish, gray or brownish, margin thin and even. FLESH white, moderately thick. GILLS close to subdistant, decurrent, *rarely anastomosing*, broad, white or whitish. STEM short or almost lacking, strongly eccentric or lateral, solid, firm, glabrous or slightly tomentose at base. SPORES narrowly oblong, 7-11 x 3-4.5 micr., smooth, *tinged lilac in mass* on white paper. ODOR and TASTE agreeable.

Caespitosely imbricated, habit variable, as in *P. ostreatus*. On dead tree-trunks and firm logs, of maple,

elm, beech, oak, birch, willow, etc. Throughout the State. May to November. Very common.

Like *P. ostreatus* in general appearance and in practically all of its characters except the lilac tinged spores. The gills anastomose only at times, and the flesh is on an average thinner in Michigan plants. Our plant is mostly shelving and lateral-stemmed as shown in Atkinson's figure. Only occasionally does one find sub-erect, eccentric or almoist central-stemmed plants like those figured by Peck and Cooke. The lilac tinge of the spores is aberrant within the white-spored group, and yet the plant is so close to *P. ostreatus* in other respects that it would be a stranger in the pink-spored group; this species illustrates again that 'no grouping can be made perfect. Its edible qualities are just like those of the oyster mushroom, and the remarks made under that species apply equally here. Both of these species are much sought in Europe, and the peasants there often water the trunks of the trees where they occur, and in this way obtain a new crop of the mushrooms. Both are apt to appear, after the spring or autumn rains, in the same logs and trunks, so that one may visit the same place year after year and obtain a supply.

703. Pleurotus lignatilis Fr. (Edible)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 257.
Hard, Mushrooms, Fig. 126, p. 163 (as *P. abscondens*).
Gillet, Champignons de France, No. 538.
Plate CXLIII of this Report.

PILEUS 2-5 cm. broad, tough, *irregular*, convex, sometimes depressed or umbilicate, flocculose-pruinose, then glabrous, *whitish*. GILLS adnato-decurrent, *crowded, narrow*, white. STEM 2-4 cm. long, 2-4 mm. thick, slender, *stuffed then hollow*, equal, irregular-curved, eccentric, somewhat villose. SPORES minute, oval, 3-5 x 2-3 micr., smooth, white. ODOR markedly *farinaceous*.

Gregarious on logs, etc. Bay View. August-September. Infrequent.

Var. *abscondens* Pk. has gills truly adnate becoming emarginate; spores elliptical, 4-5 micr. long.

The plants referred here agree with the figures of European authors in having the gills acuminate-adnate on the stem, so that as the pileus expands they appear subdecurrent. This is also true of the following two species. On account of this characteristic, it seems to me these three species had better be grouped under our second section than with *P. ulmarius*, where Fries and all others have placed them. *P. lignatilis* and *P. circinatus* and *P. fimbriatus* var. are very much alike in general appearance. To distinguish the species one has to rely on the farinaceous odor of *P. lignatilis*, on the subsolid stem and peculiarly hygrophanous pileus of *P. fimbriatus* var., and on the very regular cap of *P. circinatus*. The spores in all three are minute and somewhat alike. The pileus of *P. lignatilis* often tends to be subinfundibuliform.

704. Pleurotus circinatus Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Plate 88.
Cooke, Ill., Pl. 257.

PILEUS 2-5 cm. broad, or less, *regular, tough*, convex, then plane and slightly depressed, *white or whitish, silky pruinate*. FLESH thickish, white. GILLS adnato-decurrent, *crowded, narrow*, white. STEM 2-5 cm. long, *stuffed then hollow*, equal, eccentric, slightly curved or straight, *glabrous*, mycelioid at base. SPORES minute, elliptical, 4-5 x 2-3 micr., smooth, white. ODOR slight, *not farinaceous*.

(Dried: Gills yellowish-ochraceous; pileus and stem ochraceous-tan.)

Gregarious. On logs in hemlock woods of northern Michigan; frondose woods in the south. Bay View, Detroit (Grosse Isle). August-September. Infrequent.

The plant is white at first but becomes dingy-tan when old. It is toughish and the flesh is rather thick as in *P. lignatilis*. Both lack the thin, hygrophanous appearance of the next species. The stem is usually longer than the width of the pileus. It lacks the distinct farinaceous odor of *P. lignatilis*.

705. Pleurotus fimbriatus Fr. var. **regularis** var. nov.

Sys. Myc., 1821. (As *Clitocybe fimbriatus*.)

Illustration: Plate CXLIV of this Report.

PILEUS 2-5 cm. broad, broadly convex, then plane, obtuse, depressed or subinfundibuliform, *pseudohygrophanous, hyaline-white*, then opaque-pruinose, wavy, irregularly lobed or almost regular, glabrous, even on margin. FLESH thin, slightly tough, white. GILLS acuminately adnato-decurrent, *narrow, crowded*, thin, whitish becoming yellowish in age. STEM 1-3 cm. long, 2-5 mm. thick, slender, curved, toughish, equal, *solid* except a narrow tubule, floccose at apex, pruinose or silky fibrillose, pallid. SPORES minute, ovate, 4 x 3 micr., smooth, white. CYSTIDIA none; sterile cells on edge of gills, slender. ODOR somewhat *farinaceous* to oily. TASTE slightly bitterish-astringent.

On hemlock, elm, etc., logs in woods. Bay View, Ann Arbor. June-September. Infrequent.

The pileus when moist has the appearance of a delicate, translucent, immature egg-shell; its margin is sometimes concentrically rivulose. The stem is at first firmly stuffed then tubular. For comparisons see notes on the preceding two species.

Section II. Dimidiati. Pileus lateral, not marginate behind, not at first resupinate, sessile or continuous with the stem-like base.

706. Pleurotus serotinus Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Hard, Mushrooms, Fig. 24, p. 161, 1908 (as *P. serotinoides* Pk.).
Cooke, Ill., Pl. 258. (Without the olive tints, etc.)
Patouillard, Tab. Analyt., No. 629.

PILEUS 3-8 cm. broad, campact, convex or nearly plane, lateral, orbicular, dimidiate or reniform, *with a gelatinous pellicle* which becomes viscid when moist, *olivaceous-umber* but varying to yellowish greenish or brown, surface often covered with a short, dense tomentum. FLESH white, thick, firm. GILLS abruptly subdecurrent, thin, broad, narrow in front, close, whitish or tinged ochraceous or tan. STEM *very short*, lateral, continued above with the pileus, stout, 5-20 mm. long, 8-10 mm. thick, *yellowish beneath*, subtomentose or dotted with brown or blackish scales, solid. SPORES minute, linear-oblong, slightly curved, 4-6 x 1-1.5 micr., smooth, white in mass. CYSTIDIA fusiform, yellowish, about 25 micr. long. BASIDIA 4-spored. ODOR-and TASTE none.

(Dried: Colors similar to those of fresh condition.)

Caespitose, imbricated, often laterally connate, sometimes solitary. On fallen elm trunks, or dead branches of various frondose trees. Southern Michigan; probably throughout the State. August-November. Frequent locally.

The mode of growth is similar to that of *Claudopus nidulans*, but lacks the odor of the latter and is usually more compact and the colors are dingy. The spores usually found deposited on the lower pilei from those above are white. The tomentum on the pileus often breaks up into punctate scales. The short stem, seen only below, has a yellow-tomentose covering. It may appear in considerable quantity on a single tree trunk.

707. Pleurotus petaloides Fr.

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 109-10, p. 108, 1900.
Cooke, Ill., Pl. 259.

PILEUS 1-5 cm. broad, elongated in a *wedge-shaped to spathulate* manner, 2-10 cm. long, tapering to a stfcm-like base, *glabrous* except sometimes tomentose toward base, *whitish to brown, tan or reddish-brown*, margin at first inrolled and finely striate when moist. FLESH rather thin, white, homogeneous. GILLS decurrent, very narrow, crowded, whitish or yellowish, *edge fimbriate*. STEM not apparent from above, on the underside it is somewhat distinguishable as a compressed, short, somewhat villose portion on which the gills descend. SPORES *globose*, minute, 3-4 micr. in diameter, white in mass. CYSTIDIA abundant.

Caespitose on decaying wood, logs, stumps, from underground portions of wood, etc. July to September. Marquette. Infrequent.

Close to *P. spathulatus*, which has oval-elliptical spores. The European authors as a rule give the spores under the description of this species as oval-elliptical, so that if Peck's conception is correct their measurements were taken from a form like Peck's *P. spathulatus*. Fries and apparently most others have considered *P. spathulatus* as a variety with a more broadly expanded and lobed pileus. Our species is distinguished from *P. porrigens* and *P. albolantus* by the presence of cystidia, as well as by the non-resupinate pileus in the young stage.

708. Pleurotus spathulatus (Fr.) Pk.

N. Y. State Mus. Rep. 39, 1886.

Illustration: Hard, Mushrooms, Fig. 120, p. 108, 1908. (As *P. petaloides*.)

"PILEUS 1-5 cm. broad, ascending, spathulate," petaloid, subflabelliform, "tapering behind into the stem, glabrous, convex or depressed on the disk and there sometimes pubescent, *alutaceous* or *brownish tinged with gray, red or yellow*. FLESH rather thin. GILLS decurrent, crowded, linear, whitish or yellowish. STEM compressed, sometimes channeled above, grayish-tomentose. SPORES *elliptical*, 7.5 x 4-5 micr. ODOR and TASTE *farinaceous*."

This description was taken from Peck's Report. It is submitted, so that more data may be obtained on the relation of this and the preceding species. Patouillard's figure of *P. petaloides* var. *lobatus* (Tab. Analyt., No. 421) may be this species, as he figures the spores elliptical-ovate. Hard gives the spore measurements elliptical, although he says "globose." His figure could be either species. Galtfelter (Trans. St. Louis Acad. of Sci., Vol. XVI, No. 4, p. 44) gives the spores of *P. petaloides* as 3-4 micr., and globose. There is thus considerable discrepancy between European and American notices of *P. petaloides*, so that Peck appears justified in separating the one with globose spores from the one with elliptical spores. It is more than likely, however, that American authors have confused *Panus angustatus* Berk, with *P. petaloides* in which case *P. spathulatus* would revert to *P. petaloides* as a variety, just as Fries placed it, and the elliptical spores would belong to *P. petaloides* as in Europe. All these species are doubtless edible so that the mycophagist is unaffected by the situation. Both *Panus angustatus* and *Pleurotus petaloides* have abundant cystidia, and both have been found in northern Michigan.

709. Pleurotus candidissimus B. & C.

Ann. Nat. History, 1859.

PILEUS 2-18 mm. broad, flaccid, reniform or dimidiate, soft-membranous, ascending, convex then plane, attached laterally, *never resupinate*, subsessile i. e. stem very short, sometimes sessile, *pure white, pulverulent*, with a chalky lustre, villose at point of attachment, *margin sulcate*, varying to rugose-striate. GILLS radiating, decurrent, *subdistant to distant*, broader in front, narrowed to the villose base, thin, white. SPORES *globose*, 4-6 micr. diam., smooth.

Gregarious, on rotten wood. Mixed hemlock, maple and beech woods. Houghton, Bay View, New Richmond. July to September. Infrequent.

This little species is easily mistaken for *P. septicus* from which it differs in its globose spores and its sulcate and non-resupinate pileus. The pileus may become resupinate on drying or when old. It varies from sulcate to obscurely striate or lacunose-rugose, but vigorous specimens show this character well. Other Friesian species differ as follows: *P. mitis* has an even pileus; *P. limpidus* is hygrophanous and the gills are crowded and linear; and *P. acerosus* has crowded gills. Our plant seems to be overlooked usually, as it is delicate and soon shrivels.

Section III. Resupinati. Pileus at first resupinate, then reflexed, sessile.

**Pileus fleshy, rather thick; trama homogeneous*.

710. Pleurotus porrigens Fr.

Syst. Myc., 1821.

Illustrations: Michael, Führer f. Pilzfreunde, Vol. Ill, No. 100.
Cooke, Ill., Pl. 259.

PILEUS 2-4 cm. broad, elongated ear-shaped, obovate or fan-shaped, 3-8 cm. long, *at first resupinate* and suborbicular *with persistently inrolled margin*, then reflexed and prolonged, ascending or horizontal, *pure white, sessile, glabrous* except the base which is villose-tomentose, margin regular or lobed. FLESH thin, rather brittle. GILLS radiating, *narrow, crowded*, linear, thin, *much forked* or even anastomosing at base, at length creamy-yellowish. SPORES slightly longer than wide, oval, or subglobose, 6-7 x 5-6 micr., smooth. CYSTIDIA none.

Caespitosely imbricated. On decayed wood of conifers. In the hemlock and pine regions of the State. August-September.

Easily confused with *Panus angustatus* and *Pleurotus albotomentosus*. It differs from these in the absence of a gelatinous layer in the pileus. From *P. petaloides* it is distinguished by its white color and absence of cystidia on the gills. Its home is usually on very rotten wood of hemlock or pine. *P. nephretus* Ell. is said to be the same thing.

711. Pleurotus septicus Fr.

Syst. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 627. \
Cooke, Ill., Pl. 259.

PILEUS 5-20 mm. broad, *resupinate at first*, then reflexed, convex then plane, *short-stipitate, white, pubescent, even on margin*. FLESH thin, not truly membranous. GILLS *subdistant, rather broad*, radiating, white. STEM slender, short, incurved, *pubescent*, disappearing, surrounded at the base by a webby zone of filaments, white. SPORES elliptic-ovate, pointed-apiculate, *8-10 x 6 micr*., white in mass. CYSTIDIA none.

On decaying wood, etc., in woods. Probably throughout the State. July-September. Infrequently found.

Often confused with *Claudopus variabilis* when the latter is young and white-gilled. It has no doubt also been mistaken for *P. candidissimus* which however is not resupinate at first and has globose spores. Probably several other small white species occur, but have not been distinguished.

***Pileus fleshy, with a gelatinous layer on or just beneath the surface.*

712. Pleurotus albolanatus Pk., sp. nov.

Illustration: Plate CXLV of this Report.

PILEUS 5-10 cm. or more broad, *resupinate at first*, fleshy, lateral, sessile, becoming obovate, reniform or flabelliform, convex to subexpanded, trama slightly differentiated into several layers, *upper part subgelatinous*, surface *pulverulent-tomentose*, margin involute at first. FLESH rather thin, white, scissile, *becoming brittle*. GILLS decurrent on stem-like base, *very crowded, narrow*, white to yellowish, somewhat forked, thin. SPORES *spherical*, 4-6 micr. diam., smooth, white in mass. CYSTIDIA *none*.

Caespitosely imbricated. On decaying logs of beech, hemlock, etc., of northern Michigan. Bay View, Marquette, Houghton. August-October. Frequent.

This species approaches *Panus angustatus*, but differs consistently in the lack of cystidia, in its larger spores, and perhaps in its resupinate pileus. No record seems to be on hand that *P. angustatus* is at first resupinate. The pileus has a gelatinous feel and is composed of several layers, but in some specimens these are hard to distinguish. Specimens referred to Peck, were labelled by him *P. porrigens* var. *albolanatus*. The spherical spores, which are constant, and the subgelatinous layer in the upper part of the pileus warrant me in using Peck's varietal name for a distinct species. Luxuriant specimens become lobed as in the related species, and measure up to 14 cm. in width. The flesh becomes brittle on drying and is rather thin throughout. The tomentosity extends usually over the whole pileus but sometimes the margin is glabrous. There are no

striations. Sometimes the base arises from a white, mycelioid subiculum.

713. Pleurotus mastrucatus Fr.

Syst. Mycol., 1821.

Illustration: Cooke, Ill., Pl. 243.

"PILEUS 2.5-10 cm. broad, *at first resupinate* then reflexed and expanded, sessile, subdimidiate, obovate, sometimes lobed, flaccid, *trama with an upper gelatinous layer*, mouse-gray, *rough-squamulose with blackish* hairs and rigid points intermixed, margin involute at first. GILLS converging to the base of pileus, (without a rudimentary stem), broad, subdistant, whitish-gray. SPORES oblong, oblique, 8-9 x 4-5 micr., white.

"Caespitosely imbricated. On logs or decaying wood. September-November."

This species has been found in surrounding States and no doubt occurs with us, though I have not found it. Eeported in the Chicago Nat. Hist. Surv. Report, and in Morgan's Flora of the Miami Valley, Ohio. It is rare.

714. Pleurotus atrocaeruleus Fr. var. **griseus** Pk.

N. Y. Mus. Rep. 44, 1891. (Syst. Myc., 1821.)

PILEUS 2-5 cm. broad, *at first resupinate*, then reflexed and horizontal, obovate or reniform, *upper layer of trama gelatinous and tough*, dark grayish-brown shaded with bluish or blackish tints, *coarsely villose* toward the base, glabrous on margin, even or slightly wrinkled, margin often lobed. FLESH stratose, gelatinous above, composed of floccose-hyphae below, the lower layer varying in thickness, thinner in front. GILLS radiating, decurrent to the region of the attachment of pileus or to the hairy stem-like base, moderately broad, somewhat close, whitish or yellowish, edge minutely fimbriate. SPORES elliptic-oblong, narrower toward one end, 6-7.5 x 3-4 micr., smooth, white in mass. CYSTIDIA slender, acuminate and scattered on the sides of gills and then about 45 micr. long; more numerous but shorter, about 30 micr., on the edge of the gills, often capped with coarse granules.

(Dried: Pileus blackish, gills ochraceous-tan.)

Caespitose, subimbricate, on the bark of various trees, in woods, lawns, etc. On mountain ash on a lawn at Marquette. July-September. Throughout the State. Infrequent.

The plants, like the plants of the genus Marasmius, revive when moistened. Mounted in water under the microscope, a section through the pileus shows a gelatinous upper layer of uniform thickness, bounded by dark hyphae on both sides of this layer, the upper hyphae forming the villosity on the pileus, the lower forming an opaque line next to the white flesh beneath. In front the flesh is thinner than the pellicle, behind it is several times thicker. Whether the variety is entirely distinct from the European species, cannot be decided from'data at hand. The cystidia are thick-walled, slender, penetrate deep into the subhyinenium, and do not project far above the hymenium.

715. Pleurotus applicatus Fr.

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. Ill, p. 109, 1900.
Hard, Mushrooms, Fig. 125, p. 162, 1908.
Cooke, Ill., Pl. 244.
Patouillard, Tab. Analyt., No. 519.

PILEUS 3-6 mm. broad, *minute*, arising from an orbicular re-supinate tubercle, soon horizontal but *cupulate*, convex, submembranous, *trama mainly gelatinous*, surface pruinate to villose behind, obscurely striatulate, *dark gray to blackish*, tinged blue, sessile or with a villose, base-like tubercle. GILLS *subdistant*, relatively broad, radiating, whitish at first, soon gray or even darker than the pileus. SPORES spherical, minute, 4-5 micr. diam., smooth, white in mass. CYSTIDIA none.

Gregarious, on rotten wood, often on old steins of grape vines, in moist woods. Probably throughout the State; Ann Arbor, etc. June-September. Infrequently collected.

The dark color of this little Pleurotus causes it ordinarily to escape detection, but persistent examination of the lower side of moist logs or brush-heaps is likely to disclose it. It revives on moistening, and so simulates a Panus. It differs from *P. atropellitus* in its globose spores and gelatinous trama. A large portion of the thin pileus is composed of gelatinizing hyphae, on the top of which are dark floccose threads which form the villose surface of a part of the pileus. The gills are subdistant with alternating shorter gills, which often develop poorly so that the main gills appear quite distant. When growing from the underside of wood the pileus is attached at its center.

****Pileus membranous, trama homogenous, not gelatinous.*

716. Pleurotus atropellitus Pk.

N. Y. State Mus. Rep. 39, 1886.

PILEUS 5-15 min. broad, small, *resupinate at first*, very thin, membranous, toughish, suborbicular, then obovate or reniform, convex to nearly plane, *villose-tomentulose*, glabrescent in front, sessile by a villose tubercle, ashy-gray to blackish, *widely-striate to subsulcate on margin* when moist. FLESH homogeneous, with dark hyphae on the surface of pileus. GILLS close to subdistant, relatively broad, short ones often narrow, concolor, radiating from the stem-like villose base. SPORES *elliptical-oval*, 7-9 x 4-5 micr., smooth, white in mass. CYSTIDIA none.

On decayed wood, low woods. New Richmond, Ann Arbor. March (21, 1909), September, etc. Infrequent.

This is similar to *P. applicatus*, but more flaccid, more definitely striate on the pileus, and with broadly elliptical spores. Our plants were paler than those described by Peck. The closeness of the gills varies in these small plants and makes a poor character to emphasize. It

revives poorly when moistened as compared with *P. applicatus*. Another small species, related to these two, is *P. niger* Schw. This has subglobose spores and is plicate on the margin of the pileus. *P. striatulus* Fr. has very distant gills, subglobose spores and a pendulous, obconic, striate brown or ashy pileus. I have not found these two in the state.

Tricholoma Fr.

(From the Greek *thrix*, genitive *trichos*, a hair; and *loma*, a fringe, referring to the remnants of the cortina in some species.)

White-spored. Stem continuous with the pileus, *without an annulus, spongy-fleshy to fibrous*, central; partial veil in the form of a slight fibrillose or floccose cortina, or lacking. Volva none. Gills adnate or truncate-adnexed, *becoming emarginate*. Pileus viscid or dry.

Putrescent, *terrestrial*, fleshy, firm and rather large mushrooms. A large genus, approaching Clitocybe and Pleurotus, being separated from the former by the non-decurrent gills, from the latter by the central stem. Collybia is distinguished by its cartilaginous stem, and by the absence of a cortina, and more often grows on wood or decayed leaves, etc. The trama of the gills is composed of parallel hyphae which distinguishes them from those Hygrophori which are similar in appearance. The genus corresponds to Hebeloma, Entoloma and Hypholoma of the ochre, pink and purple-spored groups. Many of them are edible, and their thick flesh furnishes considerable substance; on the other hand several species are known to be poisonous and must be avoided.

The PILEUS may be glabrous, silky or in some species scaly; viscid, dry or hygrophanous. Accordingly they are placed under *corresponding sections* of the genus. The colors are seldom bright, although several are sulfur-yellow and others purplish or lavender. Many of them are dull whitish to gray or tan, sometimes umber or blackish. The character of the *margin of the pileus* is used extensively to determine to which sub-genus they belong. It is, therefore, important to observe carefully the presence or absence of silky fibrils or flocci on the margin, as their presence indicates a slight *cortina* in the very young stage and suggests the sub-genus Cortinellus. The viscidity indicates the subgenus Limacina, although species of other sections sometimes become slightly viscid or gelatinous in very wet weather. The GILLS are used to separate this genus from Clitocybe. Theoretically, they are always *emarginate* behind, but this condition varies considerably. It is true, that in the mature plant, when the pileus is fully expanded, they become either sinuate or emarginate in most cases, although a single specimen may not always be normal in this respect. When young, however, they often do not show this character clearly, but are then adnexed, rounded-adnate, or adnate in such a way that they are merely a little less broad at the attached portion than they are a few millimeters away from the stem, and this short distance is often marked by a straight edge rather than by a rounded edge. Such a condition may be referred to as *truncately-adnate*, rather than as adnexed. In old stages the gills may even become spuriously decurrent, and their Tricholoma nature is then evident only by a slight sinuate portion near the stem, since in Clitocybe the edge is uniformly continuous or straight. Fayod (Ann. d. Sci. Nat., 7 Ser., Vol. 9, p. 346), says that in the very young button stage they are truly decurrent but his observations were limited to few species. The *color of the gills* changes at maturity or in age in some species, and this character is used to separate the species under each section into two groups. The color changes to reddish-spotted, flesh-color, ashy or even black in age or when bruised, and hence it is often impossible to locate a species properly until it has been kept several hours after picking. In some species the gills are very narrow; in others, very broad, and this is a reliable character when well-developed plants are at hand; poorly-developed or stunted specimens often produce narrow gills in broad-gillecl species. The gills of some species are easily separable from the trama of the pileus, and such species have been referred by some authors to a separate genus: Lepista. There is, however, not sufficient data at hand to know with certainty what species have this character and why, and hence in this report they are included under Tricholoma. The STEM varies from fibrous-fleshy to fibrous-spongy; more often quite firm, compact and stout. It lacks the cartilaginous rind of the stem of Collybia, although in dry weather forms a rind is sometimes simulated. *T. albiflavidum* Pk. often has a distinct cartilaginous stem and is grouped under Collybia. There is no annulus, the cortina being evanescent when present at all, or in a few extreme cases leaving only slight fibrillose remnants on its surface, as in *T. vaccinum* Fr. and *T. imbricatum* Fr. It is nearly always dry, and scarcely ever sharply bulbous. The SPORES are white except in a small aberrant group including *T. personatum*, *T. nudum* and *T. panoeolum*, where they are tinged pale dingy-flesh color in mass. They vary from elliptical to oval or spherical, and are usually medium to small or minute in size. The epispore is rarely rough, e. g., in some of the species under the subgenus Melanoleuca. CYSTIDIA are lacking in this genus; *sterile cells* are seldom present on the edge of the gills; they have been noted in *T. rutilans* and *T. acre*. The ODOR is quite characteristic of many species; many have a farinaceous odor, while some are distinguishable by a heavy disagreeable odor. When it is not otherwise noticeable, the odor may often be obtained by crushing a piece of the cap between the fingers. The TASTE varies also. In those species with the farinaceous odor, there is a corresponding taste. Some species have an acrid taste. The Tricholomas usually have a terrestrial *habitat*. They are most common in open woods, mossy places and thick forests. Some grow in meadows or grassy places, but these are rare in the vicinity of Ann Arbor. *T. rutilans* grows on wood, and *T. ustale* is partial to the remains of very rotten logs, etc. Their EDIBILITY varies. Some of them, like *T. resplendens* and *T. personatum* are among our very best mushrooms for the table.

Others like *T. equestre*, *T. transmutans*, *T. sejunctum* and *T. terreum* are fairly good when properly cooked. Some, such as *T. laterarium*, are very bitter, or have various kinds of disagreeable flavors which, however, almost disappear in cooking. In serving those mushrooms of disagreeable flavor it is safer to discard the liquid in which they were prepared, as this contains the objectionable constituents. In several species, of which *T. sulfureum* is an example, the disagreeable flavor cannot be removed, and such should not be eaten. In all cases, except those species which are well-known, it is necessary to exercise extreme caution, since the genus includes several *poisonous* species. *T. venenatum* for example, has a mild taste and odor, and is yet known to cause severe sickness. Many of those with a farinaceous taste and odor, on the other hand, are known to be edible. One must therefore be able to discriminate in order to be on the safe side.

The grouping of this large genus is fraught with considerable difficulties. The separate species are often closely related, and some of them approach other genera in such a way as to cause disagreement among authors as to their generic position. I have attempted an arrangement along conservative lines until our data are more complete. The species included in this report do not, I am sure, represent more than half the species occurring within the State. It has been impossible to make a search for Tricholomas in the northern part of the State in the late fall, so that doubtless that region is poorly represented. Hence, also, it was impossible to study the genus in such a way as to form a definite opinion as to the value of various arrangements which have been proposed. Some have segregated it into four or more genera. Others have separated those species with rough spores under the genus Melanoleuca, while still others have placed those species in which the gills separate easily from the traina of the pileus under Lepista Fr. The most natural arrangement with the data at hand, seems to be a division into subgenera, based on (1) the viscid pileus: Limacina; (2) the dry pileus, with a fibrillose cortina when young: Cortinellus; and (3) the moist or hygrophanous pileus: Melanoleuca. I am inclined also to consider those with separable gills as a distinct subgenus, but have avoided that arrangement in this report for lack of data.

The key to the species includes a number which have not yet been found in Michigan but which occur in neighboring States.

Key to the Species

(A) Pileus viscid, medium to large. [See also (AA) and (AAA).]
  (a) Pileus pure white. 721. *T. resplendens* Fr.
  (aa) Pileus not pure white.
    (b) Gills sulfur-yellow; pileus not virgate. 717. *T. equestre* Fr.
    (bb) Gills not sulfur-yellow.
      (c) Gills becoming discolored in age, often spotted with brownish-red.
        (d) Flesh and gills yellowish; stem at first viscid; pileus brown. *T. flavobrunneum* Fr.
        (dd) Flesh and gills white at first.
          (e) Pileus pale pink to rosy-red, margin at first involute. (See 163. *Hygrophorus russula* Fr.)
          (ee) Pileus reddish-brown to bay-brown.
            (f) Odor distinctly farinaceous when flesh is crushed; taste of surface of pileus bitter. 722. *T. transmutans* Pk.
            (ff) Odor not farinaceous; stem mostly rooting. 723. *T. ustale* Fr.
      (cc) Gills not discolored, not rufescent.
        (d) Pileus streaked with innate blackish fibrils.
          (e) Taste bitterish or nauseous; pileus whitish to yellowish. 718. *T. sejunctum* Fr.
          (ee) Taste mild; pileus gray, smoky, lurid. 719. *T. portentosum* Fr.
        (dd) Pileus not streaked.
          (e) Stem floccose-fibrillose; pileus alutaceous. 720. *T. terriferum* Pk.
          (ee) Stem glabrous.
            (f) Pileus slightly viscid, greenish-yellow; stem white. *T. intermedium* Pk.
            (ff) Pileus glutinous, yellow-tawny, disk reddish-brown; base of stem brown. *T. viscosum* Pk.
(AA) Pileus hygrophanous (water-soaked plants of the (AAA) group sometimes have an hygrophanous appearance).
  (a) Stem sulcate or coarsely striate; pileus reddish or reddish-fawn color (moist), 5-10 cm. broad. *T. grammopodium* Fr.
  (aa) Stem not sulcate; pileus usually less than 6 cm. broad.
    (b) Gills violaceous (young), then smoky; often in greenhouses, gardens, etc. 754. *T. sordidum* Fr.
    (bb) Gills not at first violaceous.
      (c) Pileus 1-3 cm. broad, stem hollow.
        (d) Pileus olive-gray (moist); odor of rancid meal. *T. putidum* Fr.
        (dd) Pileus watery-brown (moist); odor farinaceous. *T. rimosum* Pk.
      (cc) Pileus 3-7 cm. broad.
        (d) Odor strongly farinaceous; pileus grayish-brown or brown (moist); gills whitish. 753. *T. leucocephaloides* Pk.
        (dd) Odor not farinaceous.
          (e) Stem brown within and without, short; pileus ashy, grayish-brown, darker on disk. *T. brevipes* Fr.
          (ee) Stem whitish within; in fields, gardens, open ground, etc.

(f) Stem streaked with blackish fibrils, elastic; pileus smoky-brown. 752. *T. melaleucum* Fr.
(ff) Stem covered with a cinereous pulverulence, soft; pileus gray. *T. humile* Fr.

(AAA) Pileus neither viscid nor hygrophanous.
(a) Pileus white or whitish at first, disk often with tints of other colors.
(b) Taste acrid, bitter or unpleasant (often tardily).
(c) Gills becoming dingy flesh color. 751. *T. panaeolum* var. *caespitosum* Bres.
(cc) Gills white or whitish, not becoming dingy incarnate in age.
(d) Stem stuffed or hollow; pileus with grayish-brown disk; taste and odor strong, unpleasant. *T. terreolens* Pk.
(dd) Stem solid.
(e) Gills broad; pileus minutely scaly; taste slowly acrid or unpleasant.
(f) Pileus with ochraceous, drop-like scales on disk. 726. *T. nobile* Pk. (*T. serratifolium* Pk.) (See also *T. venenatum* Atk.)
(ee) Gills not broad; pileus glabrous.
(f) Taste very bitter; gills narrow and crowded. 743. *T. acerbum* Fr.
(ff) Taste tardily acrid; gills medium broad and close. 742. *T. album* Fr.
(bb) Taste mild or farinaceous.
(c) Stems connately joined at base or several growing from a thick fleshy mass.
(d) Pileus mottled with reddish scaly spots. *T. albellum* Fr.
(dd) Pileus mottled with watery spots. 741. *T. unifactum* Pk. var.
(cc) Stems simple or subcaespitose.
(d) Pileus small; gills broad; stem solid; taste farinaceous. *T. silvaticum* Pk.
(dd) Pileus usually more than 2-3 cm. broad.
(e) Odor and taste farinaceous.
(f) Pileus large, 8-12 cm., scaly with brownish scales; spores 9-11 x 6 micr. *T. grande* Pk.
(ff) Pileus 3-6 cm., glabrous; spores 6-8 x 3-4 micr. 745. *T. leucocephalum* Fr.
(ee) Odor and taste mild.
(f) Stem rooting and tomentose at base. *T. lascivum* Fr.
(ff) Stem not rooting. (*Clitocybe candida* Bres. may be sought here.)
(g) Margin of pileus with short, radiating ridges; gills narrow and crowded. 744. *T. laterarium* Pk.
(gg) Margin even.
(h) Gills rather broad.
(i) Plant pure shining white, but without a separate pellicle. 727. *T. columbetta* Fr.
(ii) Plant dingy whitish, pileus fibrillose-scaly. 725. *T. venenata* Atk.
(iii) Plant whitish, caespitose. (See 774. *Clitocybe multiceps*.)
(hh) Gills narrow and crowded, pileus not pure white; stem striate. (See 813. *Collybia albiflavidum* Pk.)
(aa) Pileus yellow, yellowish or smoky-yellowish. [See also (aaa).]
(b) Growing on wood; edge of gills flocculose.
(c) Pileus yellow beneath the dark reddish scales. 724. *T. rutilans* Fr.
(cc) Pileus pale yellow, slightly silky. *T. flavescens* Pk.
(bb) Growing on the ground.
(c) Odor strong of coal tar, etc., disagreeable or farinaceous.
(d) Plant sulfur-yellow to olivaceous-yellow; odor disagreeable, strong. 737. *T. sulfureum* Fr.
(dd) Plant pale yellow or smoky-yellow.
(e) Stem solid; gills yellowish, taste farinaceous. 738. *T. chrysenteroides* Pk.
(ee) Stem stuffed or hollow; gills rather broad.
(f) Pileus smoky-yellowish; taste and odor farinaceous; gills white. 746. *T. fumosilutescens* Pk.
(ff) Pileus pale yellow; gills whitish tinged pink; odor rather strong. 739. *T. odorum* Pk.
(cc) Odor none or slight.
(d) Pileus large, 4-10 cm.
(e) Pileus very fragile, bright yellow, variegated with other hues; gills broad, white. *T. davisiae* Pk.
(ee) Pileus firm, yellow, umbonate; gills white; stem solid, white within; spores globose. *T. sublateum* Pk.
(dd) Pileus small, 1-3 cm., dull saffron; gills yellow. *T. fallax* Pk. (See also *T. cerinum* Fr.)

(aaa) Pileus neither white, whitish, yellow nor yellowish.
(b) Pileus violet, lilac or purplish.
(c) Pileus 6-12 cm. broad; stem stout, lavender or lilac; common. 747. *T. personatum* Fr.
(cc) Pileus smaller; stem more slender.
(d) Pileus at first conic-campanulate and flocculose on the margin; gills whitish. *T. ionides* Fr.
(dd) Pileus at first convex and naked on margin, gills bluish to lavender. 748. *T. nudum* Fr.
(bb) Pileus not violet, lilac or purplish.
(c) On wood or rotten logs.
(d) Pileus covered with dense, minute, blackish or brownish scales; flesh yellow. (See 760. *Clitocybe decora* Fr.)
(dd) Pileus covered with reddish tomentum or scales, flesh yellow. 724. *T. rutilans* Fr.
(cc) On the ground.
(d) Pileus cinereous, grayish-brown, smoky or blackish. [See (dd).]
(e) Gills becoming blackish or bluish-black when bruised. Pileus 2-7 cm. broad.
(f) Gills narrow, crowded. 733. *T. fumescens* Pk.
(ff) Gills moderately broad, close to subdistant. 734. *T. fuligineum* Pk.
(ee) Gills not becoming black when bruised; some changing to ashy, yellowish or flesh color in age.
(f) Taste acrid, peppery or disagreeable.
(g) Stem rooting; gills white; pileus grayish-brown, taste disagreeable. *T. radicatum* Pk.
(gg) Stem not markedly rooting.
(h) Pileus virgate with gray or blackish fibrils.
(i) Pileus acutely and prominently umbonate; gills and stem white. *T. subacutum* Pk. (cf. *T. virgatum* Fr.)
(ii) Pileus obtuse; gills at length pale cinerascent. 731. *T. acre* Pk.
(hh) Pileus not virgate.
(i) Pileus buff, grayish-brown or dingy-tan, large, caespitose; gills crowded, narrow, soon flesh color. 571. *T. panaeolum* var. *caespitosum* Bres.
(ii) Not caespitose; pileus livid-brown; flesh of stem becoming reddish. 735. *T. saponaceum* Fr.
(ff) Taste mild or farinaceous.
(g) Very large; pileus 10-20 cm. broad, grayish-tawny; stem rooting. *T. grave* Pk.
(gg) Moderate size.
(h) Pileus 2-6 cm. broad, innately fibrillose or fibrillose-scaly. 732. *T. terreum* Fr.
(hh) Pileus 5-10 cm. broad.
(i) Pileus smoky-umber to blackish; gills broad, cinerascent. 736. *T. laticeps* sp. nov.
(ii) Pileus grayish or grayish-brown.
(k) Gills broad, subdistant.
(l) Streaked with darker fibrils; gills white. (See 816. *Collybia platyphylla* Fr.)
(ll) Pileus usually water-spotted not streaked; gills slightly cinerascent; autumnal. 749. *T. tamidum* Fr.
(kk) Gills close or crowded.
(l) Gills easily separable from flesh of pileus, becoming dingy-yellowish in age; stem stuffed. 751. *T. cinerascens* Fr.
(ll) Gills not separable, veined on the sides. *T. patulum* Fr.
(dd) Pileus reddish, tawny, tan, fuscous-livid, etc.
(e) Growing on wood; pileus and stem covered with tawny, tomentose scales. *T. decorosum* Pk.
(ee) Not on wood.
(f) Flesh of pileus or stem changing to reddish when bruised or in age; pileus red-brown.
(g) Stem hollow. 729. *T. vaccinum* Fr.
(gg) Stem solid. 728. *T. imbricatum* Fr.
(ff) Flesh not turning reddish.
(g) Becoming ferruginous-stained when handled; pileus whitish to brownish. *T. submaculatum* Pk.
(gg) Not becoming rusty-stained.
(h) In pastures, etc., in the spring; pileus pale tan, watery-spotted; odor farinaceous. *T. gambosum* Fr.
(hh) In the woods.
(i) Pileus pale alutaceous to russet; gills pale yellow; stem white. 730. *T. tricolor* Pk.
(ii) Pileus flesh color, 1-2 cm. broad. 740. *T. carneum* Fr.

SUBGENUS I. LIMACINA. Pileus provided with a gelatinous pellicle, viscid, not hygrophanous. Cortina none.

**Gills not at length brown or rufescent-spotted.*

717. Tricholoma equestre Fr. (EDIBLE)

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 72.
Berkeley, Outlines, Pl. 4, Fig. 2.
Gillet, Champignons de France, Pl. 672.
Ricken, Blätterpilze, Pl. 90, Fig. 3.

PILEUS 5-10 em. broad, compact, convex-expanded, obtuse, pale yellow, variegated with reddish or smoky-reddish especially on disk, *viscid*, somewhat scaly on broad disk, not virgate, margin even and naked. FLESH white or tinged yellow under cuticle, thin on margin. GILLS slightly adnexed or nearly free, rounded-truncate behind, *sulfur-yellow*, close, rather broad, ventricose, edge entire or suberoded. STEM stout, 3-6 cm. long, 1-2 cm, thick, equal or sub-bulbous, solid rarely cavernous, pale yellow or white, *white within*, even, minutely scaly or glabrescent. SPORES elliptical-oval, 6-7 x 4 micr., smooth, white. CYSTIDIA and sterile cells none. ODOR slight or none; TASTE subfarinaceous, tardily disagreeable.

Gregarious or subcaespitose. On the ground among or under leaves in conifer and frondose woods. Ann Arbor, Detroit, Jackson, Houghton, Marquette. August-October. (Earliest record July 28.) Infrequent.

This is usually a large and noble species, but late in the fall it is often found with smaller dimensions. The color of the stem is pale yellow or even white, but in Europe it is said to be sulfur-yellow, as is also the flesh. The scales on the pileus are not always developed. The margin of the cap is at first incurved and irregularly wavy. It differs from *T. sejunctum* by lacking the radiating sooty lines which characterize the pileus of that species, and by its yellow gills. It is found sparingly, and rather late in the fall. When covered with leaves the yellow color of the cap is more highly developed.

718. Tricholoma sejunctum Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 89, p. 88, 1900.
Hard, Mushrooms, Fig. 60, p. 82, 1908.
Cooke, Ill., Pl. 53.
Gillet, Champignons de France, No. 700.
Fries, Icones, Pl. 23 (luxuriant form).
Ricken, Blätterpilze, Pl. 89, Fig. 2.

PILEUS 4-8 cm. broad, convex-expanded, obtuse or umbonate, *subviscid*, whitish to yellowish, *streaked with innate blackish fibrils*, often gibbous or irregular. FLESH white or slightly yellowish, fragile. GILLS emarginate, *white*, usually broad, subdistant to close, edge entire. STEM elongated, 5-8 cm. long, 1-1.5 cm. thick, subequal or *variously thickened and flexuous*, solid, sometimes cavernous, subglabrous, even, white or tinged yellowish. SPORES oval to subspherical, 6-7 x 4-5.5 micr., white. CYSTIDIA none. ODOR slight; TASTE bitterish to nauseous.

Gregarious or subcaespitose. On the ground in oak and maple woods. Ann Arbor, New Richmond. September-November.

Frequent around Ann Arbor in the late fall. Usually this species is more slender than *T. equestre*. Its virgate pileus and white gills distinguish it from that species. The color is quite variable; sometimes the pileus is a dull white with a few yellow stains, while the other extreme, with the pileus almost entirely smoky-brown or blackish on disk, is equally common. The disk of the pileus sometimes develops blackish fibrillose scales while normally it is glabrous. In any case there is usually some sign of the streaked condition. Specimens have been found in which slight yellowish stains appeared on the edge of the gills in the older specimens, but these could not be referred to *T. coryphaeum* Fr. which species is said to have yellow-edged gills. Peck remarks that the taste is scarcely bitter. In our plants a bitterish-nauseous taste was nearly always present. *Tricholoma intermedium* Pk. is said to be halfway between *T. equestre* and *T. sejunctum*, and is distinguished by its crowded gills. It should be considered as a variety, since it is doubtless an example of the extreme variation of *T. sejunctum*.

719. Tricholoma portentosum Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Hard, Mushrooms, Fig. 63, p. 87, 1908.
Michael, Führer f. Pilzfreunde, Vol. II, No. 93.
Peck, N. Y. State Mus. Mem. 4, Pl. 45, Figs. 1-5, 1900 (var. *centrale* Pk.)
Cooke, Ill., Pl. 54.
Gillet, Champignons de France, Pl. 692.
Fries, Icones, Pl. 24.
Ricken, Blätterpilze, Pl. 89, Fig. 3.

"PILEUS 6-12 cm. broad, convex-expanded, subumbonate, sometimes irregular and repand, *viscid*, even, glabrous, generally *fuliginous*, sometimes violet-tinged, *lurid*, virgate with innate black fibrils, margin always naked and thin. FLESH white, obsoletely lutescent, fragile. GILLS rounded behind, slightly adnexed, *broad* (up to 2 cm.), *distant* when mature, whitish at first, *finally yellowish or grayish-tinged*. STEM 6-8 cm. long, 1-2 cm. thick, *stout*, firm, solid, subequal, *innately fibrillose-striate, whitish*. SPORES 6-7 x 3-4 micr., elliptical. ODOR none; TASTE *mild*."

Said to occur in conifer woods. Perhaps in the northern part of the State.

It has not been found with certainty in America, but is reported by some American authors. The figures of European authors vary considerably as to color of cap. Schroeter says it is gray or rusty-brown; Gillet figures it pale gray with black lines radiating from center. In Michael and Fries' Icones, the gray color is mixed with a dark lurid hue. It is in the sense of the last author that

the description taken from the Icones applies. The spore measurement is Schroeter's; the English authors give .smaller measurements. According to Fries' Icones, and others (see Louis Maire, Bull. d. 1. Soc. Myc. France, Vol. 26, p. 251) the lack of odor and taste separate it from *T. sejunctum*.

Var. *centrale* Pk. is said to have the sooty-brown color on disk only; elsewhere it is yellow or greenish-yellow. The gills are moderately broad and close, white or yellowish. The flesh is white and the taste is mild. Spores 7.5 x 5 micr. It has not been identified within our territory.

720. Tricholoma terriferum Pk.

N. Y. State Rep. 41, 1888.

PILEUS 6-12 cm. broad, convex-plane, irregular or wavy on margin, glabrous, *viscid, alutaceous*, even, margin at first incurved. FLESH white, thick on disk, thin on margin. GILLS adnexed, emarginate, *crowded*, thin, narrow, whitish, *not becoming rufescent*. STEM 2-3 cm. long, 1-2 cm. thick, equal or subequal, solid, *floccose-scaly at apex*, floccose-fibrillose elsewhere, white. SPORES *minute*, subglobose, 3 x 2 micr., white. CYSTIDIA none. BASIDIA 20-24 x 4-5 micr., 2 to 3-spored. TASTE and ODOR not marked.

Solitary or gregarious. Frondose woods. Detroit. October. Apparently rare.

Our specimens had a subhygrophanous character and the flesh was scissile. The minute spores separate it from related species. More data are needed to place this species on a firm footing.

721. Tricholoma resplendens Fr. (EDIBLE)

Hymen. Europ., 1874.

Illustrations: Fries, Icones, Pl. 29.
Hard, Mushrooms, Fig. 504, p. 600, 1908.
Cooke, Ill., Pl. 55.
Gillet, Champignons de France, 695.

PILEUS 4-10 cm. broad, convex-plane, *viscid*, glabrous, *white, shining* when dry, even, margin naked and at first straight. FLESH white, rather soft, thin on margin. GILLS narrowly adnexed, emarginate, *close*, medium broad, ventricose, scarcely thickish, white, sometimes intervenose, edge entire. STEM 4-8 cm. long, 7-15 mm. thick, subequal or tapering downward, often subbulbous at base, *solid*, rarely with tubule or cavernous, glabrous, *dry*, even, white. SPORES 6-7.5 x 4 micr., short elliptical, smooth, white. CYSTIDIA and *sterile cells* none. ODOR and TASTE mild.

Gregarious or scattered. On the ground, in conifer or frondose woods. September-November (earliest record August 9). Marquette, Bay View, New Richmond, Detroit. Common in the vicinity of Ann Arbor.

The viscid pileus distinguishes this from other white Tricholomas of this size which have a mild taste and odor. Slender forms imitate *Hygrophorus eberneus*, but that has a glutinous or viscid stem. Stout forms approach *Hygrophorus sordidus* Pk. which, however, has more distant gills, a stouter stem and waxy decurrent gills. When dry, it imitates *Tricholoma columbetta*, but the pileus of the latter is said to become silky-fibrillose and the margin is at first involute and subsquainulose. The pileus is sometimes yellowish or hyaline-spotted on the disk. The stem tends to be variously curved toward base. The plant varies considerably and several *forms* have been found. (A) Pileus conical-ovate when young, then expanded and subacutely umbonate; stem fibrillose striate. Entirely white. In woods of white pine, beech, etc., at New Richmond. (B) Stem blue-spotted toward base, with a narrow tubule. Entirely white elsewhere, stature smaller than type. After frosts in the late fall. In oak, etc., woods, at Ann Arbor. This would seem to correspond to the blue-spotted form of *T. columbetta* mentioned by various authors; in our plant the pileus was distinctly viscid, and the stem dry. They grew under the fallen leaves during November. The spores of both these forms were typical.

***Gills becoming rufescent or reddish-spotted in age.*

722. Tricholoma transmutans Pk. (EDIBLE)

N. Y. State Mus. Rep. 29, 1878.

Illustrations: Peck, N. Y. State Mus. Rep. 48, Pl. 21, Fig. 1-5, 1896.

PILEUS 4-10 cm. broad, convex-expanded, obtuse, *surface of pellicle bitter*, brownish, *reddish-brown* or tawny-red, *viscid*, glabrous or nearly so. FLESH white, rufescent in age, thin on margin. GILLS adnexed, emarginate, narrow, close, whitish or pale-yellowish, *at length rufescent or reddish-spotted*, finally sordid-blackish. STEM 6-8 cm. long, 6-12 mm. thick, equal or subequal, dry, glabrous or subfibrillose, *whitish or rufescent, solid*, sometimes cavernous above. SPORES oval-globose, 5 x 4 micr., sometimes nucleate. CYSTIDIA none. ODOR and TASTE of flesh distinctly *farinaceous*, pellicle of cap bitter.

Gregarious, scattered or subcaespitose. On the ground in frondose woods, sometimes *forming mycorhiza on the roots of the black oak*. Ann Arbor, Jackson, Detroit, New Richmond. September-October (earliest record August 9). Common in southern Michigan.

It is related to the European species *T. flavobrunneum* Fr. and *T. frumentaceum* Fr. which possess a farinaceous odor. The former has a viscid stem at first and the flesh is usually yellow. As to *T. frumentaceum*, there seems to be some uncertainty. The English authors say the spores are elliptical, and Cooke figures it as an Entoloma (Ill., Plate 470). That cannot be our plant. On the other hand, continental authors are silent as to the size of spores, although Barla mentions a variety with spherical spores. The stem of *T. transmutans* is usually solid, but often tunnelled by grubs in warm weather. When growing in the open, in pastures, etc., it is usually tufted and the pileus is irregular. It is said to be excellent eating.

723. Tricholoma ustale Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 26.
Cooke, Ill., Pl. 88.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 115.
Ricken, Blätterpilze, Pl. 88, Fig. 3 (represents form B.).
Plate CXLVI of this Report.

PILEUS 4-10 cm., broadly convex, obtuse or subumbonate, sub-gibbous, *reddish-bay to dark chestnut*, sometimes paler, viscid, *naked, even*, not virgate nor scaly, margin persistently incurved. FLESH *white*, thickish, firm, rufescent. GILLS adnate-seceding or emarginate, moderately broad, *crowded, pure white at first* then rufescent or *reddish-brown when bruised*, edge eroded. STEM 5-8 cm. long, 8-15 mm. thick, subequal or irregularly compressed, *often rooting, stuffed*, sometimes hollow, white, becoming reddish downwards, *floccose-pruinose*, sometimes twisted. SPORES elliptical-ovate, 6-8 x 4-5 micr., white. CYSTIDIA and *sterile cells* none. ODOR *none;* TASTE *bitter.*

Solitary or subcaespitose. On very decayed wood or leaf-debris in conifer or frondose woods. Ann Arbor, New Richmond. September-October. Rare.

This is allied to the European species *T. flavobrunneum* and *T. pessundatum* which are said to possess a distinct farinaceous odor, while in *T. ustale* this odor is lacking. From *T. transmutans* it is separable by the spores and the rooting stem. Two forms—already mentioned by Fries (Icones)—have been found in the State. (A) Large, with the base of the stem ending in a root-like prolongation which is 2-5 cm. long, and occurs in conifer woods (white pine). (B) Smaller, with a narrowed, short subrooting base, growing in frondose woods. Form (A) is illustrated by Plate CXLVI, and is rather well represented by Cooke's figure of *T. flavobrunneum* (III., Plate 58), which may be the same plant. There was no yellow present in our specimens.

SUBGENUS II. CORTINELLUS. Pileus *dry*, not absorbing water, nor hygrophanous; silky, fibrillose or somewhat scaly, sometimes subglabrous. Margin of pileus slightly fibrillose or floccose with remains of an evanescent cortina, except in species of "Rigida."

Cortinellus has been raised to the rank of an independent genus by some authors, e. g. Roze, (Bull, de la Soc. bot. de France, 1876), Schroeter, (Die Pilze Schlesians, Vol. 1, 1885), and Earle, (Bull. N. Y. Bot. Garden, Vol. V., 1908). The first two authors include only species whose cortina is sufficiently developed to leave a slight ring on the stem. Earle extended it as above. It seems better to keep the species which belong here subordinate on account of their close relation to the genus Tricholoma as a whole. Some of its species need further study to determine their exact position. The following sections are taken in the sense of Fries.

Section I. Genuina. Pellicle of pileus torn into fibrillose or floccose scales, its margin at first involute.

**Gills not becoming rufescent, cinereous nor blackish.*

724. Tricholoma rutilans Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 89.
Gillet, Champignons de France, No. 697.
Michael, Führer f. Pilzfreunde, Vol. I, No. 54.
Ricken, Blätterpilze, Pl. 91, Fig. 1.

PILEUS 4-8 cm. broad, campanulate-expanded, dry, at first covered with a purplish-red tomentum, *soon tomentose-scaly with dark reddish scales* on the yellowish surface beneath, margin at first involute. FLESH yellow, moderately thick. GILLS rounded-adnate then emarginate, *crowded*, rather narrow, *yellow or golden-yellow*, thickish, *edge flocculose*. STEM 5-10 cm. long, curved, equal, stuffed then hollow, yellow or yellowish within and without or *variegated with minute reddish tomentose scales*, even. SPORES oblong, 6-7 x 3-4 micr., white. CYSTIDIA none; *sterile cells* on edge of gills numerous, large, clavate-infiated, narrowed toward base, 65-100 micr. long, 15-20 micr. thick above. ODOR and TASTE mild.

Solitary or caespitose on decaying wood of pine, balsam and hemlock. Isle Royale, Bay View, Houghton, New Richmond. July-October. Infrequent.

This is one of the few species of Tricholoma inhabiting wood. It also departs from the other Tricholomas in having well-developed sterile cells on the edge of the gills, a modification which causes the fine floccosity and is sometimes abnormally developed. The fine tomentum of the pileus is seen under the microscope to be composed of long, intertwined fibrils filled with reddish-yellow substance. This covering of pileus and stem in well-developed specimens is quite marked and represents a sort of universal veil. This species must not be confused with *Clitocybe decora* Fr., in which the gills do not become emarginate, and the scales are blackish-brown and fibrillose.

Var. *variegatus* (*T. variegatus* Fr.). Differs in smaller size, gills white or whitish, scarcely tinged yellowish, and without sterile cells. Flesh white or yellowish-white. New Richmond. Infrequent. In both the color varies somewhat, and the reddish scales are sometimes practically lacking on the stem.

725. Tricholoma venenata Atk. (POISONOUS)

Botanical Gazette, Vol. 46, 1908.

"PILEUS 4-7 cm. broad, convex-expanded, subumbonate, center fleshy, moist, not viscid, *pale buff to clay-color*, minutely scaly with fibrous scales, with a subtomentose area over the center, the scales possessing the darker color, under the lens some of them appear nearly black. FLESH white with a dull clay-colored tinge and stain. GILLS adnexed, broadly sinuate, subdistant, whitish, thin, *dull clay color where bruised*. STEM subbulbous, with a bulb like that of *Lepiota lenticularis* (see *L. fisheri*), fibrous-striate, solid, sordid white, becoming *dull-clay color* in age or when

handled. SPORES oval to broadly elliptical, smooth, 5-7 x 3.5-5 micr., white. CYSTIDIA none. ODOR and TASTE mild."

Gregarious. On the ground in frondose woods. Rochester, Oakland County. September.

This *poisonous* Tricholoma caused severe illness of a family at Rochester, Michigan, who were advised that it was harmless because of its mild taste and odor. The species was not known to the persons to whom it was referred but it was thought to be a Tricholoma and hence, since mushroom amateurs usually think that the species of that genus when mild are perfectly safe, they felt safe in its use. It is only another case in favor of the argument that it is necessary to know mushrooms by their specific distinctions, and to use only those whose identity is known to the user. Better learn a few species well than take chances. The description is adapted from that of Atkinson, and was made from some of the specimens growing in the same place as those which caused the sickness. It does not have very striking characteristics, but can be distinguished by the tendency of the plant to assume an ochraceous or dull clay color in age or when bruised. Specimens which were doubtless the same species were collected at Ann Arbor, September, 1907, and August, 1909, and were at first thought to be *T. nobilis;* the spores, however, were found to be elliptical and the plants could not be placed until after the publication of Atkinson's species. The spores of our plants were up to 8.5 micr. long, the gills rather broad, and the pileus covered with delicate ochraceous, fibrillose scales except toward the margin which was silky-fibrillose to silky-tomentose. There was no odor at first, but a slight, disagreeable odor developed. The species seems closely related to the following, and apparently imitates it in its general appearance. Hence both species should be let alone.

726. Tricholoma nobile Pk. (SUSPECTED)

N. Y. State Mus. Rep. 42, 1889.

Illustration: Plate CXLVII of this Report.

PILEUS 5-10 cm. broad, convex-expanded, subplane, obtuse, dry, whitish, *dotted by minute, drop-like grayish-ochraceous scales*, at least on disk, even, margin irregularly-wavy at maturity. FLESH pure white, thick on disk, brittle, thin on margin. GILLS truncate-adnate, varying emarginate-adnexed to spuriously decurrent, *broad*, close to subdistant, white becoming dingy yellowish in age, edge entire. STEM 4-7 cm. long, 8-16 mm. thick, *stout*, equal, sometimes slightly tapering downward, *solid*, subglabrous, innately fibrillose-striate, white becoming dingy in age. SPORES minute, spherical, smooth, subnucleate, 5-6 micr., white. CYSTIDIA and *sterile cells* none. BASIDIA 35 x 5-6 micr. ODOR slight or lacking; TASTE at first slight, slowly *unpleasant or burning*.

Gregarious. On the ground, on a lawn which was recently a grove. Ann Arbor. October. Infrequent.

This species has superficial resemblances to *T. album*, both in stature and color, but differs in its slightly scaly cap and in spores. In moist weather the pileus appears watery-stained and this indicates an affinity to the section Guttata, but the presence of scales on the pileus and its rather dry flesh point to the position here given it. It is easily confused with *T. venenata* when the spores are not examined, and hence should not be eaten. It is also likely that both *T. nobile* and *T. venenata* have been referred to *T. columbetta*, in the absence of available information on these plants, as both these species when young and fresh are rather white. The description of *T. serratifolium* Pk. very closely approximates this of *T. nobile*. It is entirely distinct from *Clitocybe piceina*.

727. Tricholoma columbetta Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 29.
Bresadola, Fungh. mang. e. vel., Pl. 23.
Gillet, Champignons de France, Pl. 671.
Cooke, Ill., Pl. 48.

"PILEUS 5-10 cm. broad, convex-plane, obtuse, dry, rigid, *pure white, satiny-shining*, at first glabrous, then silky-fibrillose or minutely scaly, *often with stain-like, carmine, yellow, or blue spots*, margin at first incurved and minutely tomentose. FLESH white. GILLS emarginate, almost free, close, rather broad, white, not changing color, edge uneven. STEM 5-9 cm. long, 1-1.5 cm. thick, equal or unequal, *not bulbous, solid, white*, shining, fibrillose-striate. SPORES 6-7 x 4-5 micr. ODOR none. TASTE mild."

In beech and birch woods, on the ground. The silky-shining and dry, white cap and stem, mild taste and elliptical spores distinguish this species from our other white plants of the genus. It must not be confused with *T. album* Fr. which has a bitter taste, nor with *T. nobile* which has a slight burning taste; both of these lack the pure white color of *T. columbetta*. The name refers to the satiny sheen of white pigeons. Several varieties, based on the different habit and various color-stains, have been described. It has not been found with certainty in the State; see remarks under *T. resplendens*.

***Gills becoming rufescent, cinereous or blackish*.

728. Trichoioma imbricatum Fr. (EDIBLE)

Sys. Myc., 1821.

Illustrations: Hard, Mushrooms, Fig. 53, p. 73, 1908.
N. Y. State Mus. Rep. 48, Pl. 21, Fig. 6-11, 1896.
Fries, Icones, Pl. 30.
Cooke, Ill., Plates 60 and 199.
Gillet, Champignons de France, No. 676.
Ricken, Blätterpilze, Pl. 90, Fig. 1.

PILEUS 5-8 crn. broad, convex-plane, obtuse or subumbonate, *dry*, brownish-red to pale reddish-umber, *innately fibrillose-scaly*, disk lacerate-scaly, margin thin, at first incurved and pubescent. FLESH compact, firm, white, *changing to light red when bruised*. GILLS slightly adnexed, sinuate, close, moderately broad, altogether

white at first, changing to reddish in age or rufescent-spotted. STEM 5-9 cm. long, 1-1.5 cm. thick, *solid*, firm, equal or subequal, white, reddish-brown at base, *apex white-mealy*, elsewhere fibrillose. SPORES broadly elliptical, 5-6.5 x 4 micr. CYSTIDIA and sterile cells none. BASIDIA 24-28 x 5 micr., 2-4-spored. ODOR and TASTE mild or slightly farinaceous.

Gregarious or subcaespitose. On the ground in coniferous and mixed woods.

Frequent in the north. Rare in southern Michigan. Detroit. October.

It must not be confused with *T. transmutans*, which has a viscid cap, whose surface is bitter to the tongue. The stem is solid or hollowed by grubs. *T. vaccinum* Fr. differs mainly from this in the stuffed to hollow stem and the more scaly cap; it occurs also in conifer woods.

729. Tricholoma vaccinum Fr. (SUSPECTED)

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 707. Ricken, Blätterpilze, Pl. 90, Fig. 4.

PILEUS 4-7 cm. broad, subhemispherical to campanulate, then expanded, obtuse or subumbonate, dry, cinnamon-rufous to dark *reddish-brown*, not striate, rimose in wet weather, *at first densely scaly*, becoming fibrillose-scaly, *margin at first involute and tomentose*. FLESH rather thin except disk, white at first, becoming tinted with rufous hues. GILLS subadnate then sinuate, moderately broad, broader than the thickness of the flesh, close, pallid then *rufescent in age* or when bruised. STEM 5-7 cm. long, 10-15 mm. thick, subequal, somewhat irregular, *hollow*, fibrillose or lacerated-fibrillose, fibrils reddish-brown, pallid elsewhere but rufescent. SPORES sphoeroid, 5 x 4 micr., smooth, white. TASTE somewhat disagreeable, subastringent. ODOR similar.

Gregarious-subcaespitose. On the ground under conifers. In the northern portion of the State. August-September.

The stuffed then hollow stem and the dense fibrillose scales of the reddish-brown cap distinguish it. The color of the cap in large specimens approaches umber, but the rufous shades are always present. The margin of the pileus is distinctly tomentose.

730. Tricholoma tricolor Pk.

N. Y. State Mus. Rep. 41, 1888.

"PILEUS 5-10 cm. broad, broadly convex or nearly plane, sometimes slightly depressed in the center, firm, dry, obscurely striate on the margin, *pale alutaceous, inclining to russet*. FLESH white. GILLS adnexed, thin, narrow, close, *pale yellow*, becoming brown or purplish-brown in drying. STEM stout, 5-7 cm. long, 1-2 cm. thick, short, firm, tapering upward from the thickened or subbulbous base, *white*. SPORES broadly elliptical or subglobose, 7 micr. long."

Reported by Longyear from Chatham in the north, and from Lansing. I have not found it. The peculiar hue of the dried gills is said to characterize it.

731. Tricholoma acre Pk. (SUSPECTED)

Bull. Torr. Bot. Club, Vol. 24, 1897.

Illustration: Plate CXLVIII of this Report.

PILEUS 4-9 cm. broad, campanulate at first, then subexpanded, plane to obtuse, virgate, *dry, pale silvery-gray or mouse-gray with innate silky fibrils*, or fibrillose-scaly on disk, sometimes whitish, even. FLESH rather thin, *firm*, white, at length tinged ashy. GILLS adnexed, eniarginate, rather broad, ventricose, close, white, at length pale cinereous, edge minutely fimbriate. STEM 3-6 cm. long, 7-15 mm. thick, equal or subequal, sometimes subbulbous or tapering downward, short, *stuffed then hollow, white* or slightly cinereous, innately silky-fibrillose, shining, apex flocculose. S PORES broadly elliptical, 6-7 x 4-5 micr., smooth, with a clear cavity on one side. CYSTIDIA none; *sterile cells* on edge of gills, 30-35 x 9 micr., subclavate. ODOR none. TASTE *acrid*, sometimes tardily so.

Gregarious or subcaespitose. On the ground in frondose woods, especially oak and maple. Detroit, Ann Arbor, Jackson. September-November. Rather frequent.

The acrid Tricholoma is probably the American form of *T. murinaceum* Bull., in the sense of Berkeley and Gillet, but digers in the closer gills and glabrous, not scaly, stem. The figures of Cooke (Ill., Plate 49) and Gillet, (Champignons de France, No. 683), are very suggestive of our plant, except in the character of the stem. *T. murinaceum* in the sense of Fries has a disagreeable, strong odor, and was originally referred by him to Hygrophorus, now *H. nitratus* Fr. Gillet's figure of *T. portentosum* is a fairly good picture of some of our plants when the gills and stem are white. *T. acre* is quite variable in size and in the shade of gray of the cap. Normally the radiating fibrils of the pileus are pale gray or silvery-gray, but in luxuriant individuals are much darker gray or blackish, and in such examples the stem may be streaked with dark fibrils. Sometimes the cap is almost entirely white or buff and then silky or obscurely virgate, sometimes somewhat fibrillose-scaly on disk. The plant is closely related to *T. terreum*, from which it differs in its acrid taste, its firmer flesh, larger size, presence of cystidia and flocculose, edge of gills and broader spores.

732. Tricholoma terreum Fr. (EDIBLE)

Epicrisis, 1836.

Illustrations: Hard, Mushrooms, Fig. 55, p. 76, 1908.
Swanton, Fungi, Pl. 8, Fig. 9.
Michael, Führer f. Pilzfreunde, Vol. II, No. 92.
Bresadola, Fungh. mang. e. vel., Pl. 24.
Patouillard, Tab. Analyt, No. 307.
Ricken, Blätterpilze, Pl. 92, Fig. 4.
Gillet, Champignons de France, No. 704.
Cooke, Ill., Pl. 50.
Peck, N. Y. State Mus. Mem. 4, Pl. 45, 1900 (as var. *fragrans*).
Plate CXLIX of this Report.

PILEUS 2.5-6 cm. broad, *thin*, convex-campanulate or nearly plane, dry, subumbonate, *gray*, grayish-brown or mouse-color, *innately fibrillose to fibrillose-floccose and at length scaly*, not striate. FLESH white, cinerascent or gray near surface of pileus, thin. GILLS adnate, then emarginate and uncinate, close but distinct, white, pale ashy or cinerascent, sometimes yellowish-stained, medium broad, edge entire. STEM 2.5-4 cm. long, 4-8 mm. thick, equal, straight or slightly curved, *solid or persistently fibrous-stuffed, readily splitting lengthwise*, white, whitish or cinerascent, subrigid, *fragile*. SPORES *minute, nucleate*, narrowly ofolong-ovate, 5-6 x 3, smooth. CYSTIDIA *none, sterile cells* short or lacking. ODOR and TASTE *farinaceous*, especially when plant is crushed.

Gregarious or subcaespitose. On the ground in grassy places in frondose woods, thickets, etc. Ann Arbor, Detroit, New Richmond. August-November. Rather frequent about Ann Arbor.

After reading the descriptions and remarks of a dozen writers concerning this species and related ones such as *T. scalpturatum* Fr. and *T. squarrulosum* Bres., and adding one's own observations, it becomes clear that we have here a series of many forms which run so close into each other that the amateur will hardly be able to diagnose them satisfactorily in most cases. This fact is already recognized by the number of varieties which have been described both under *T. terreum* and *T. scalpturatum*. The above description applies to the plants which have been found in frondose woods of southern Michigan. Variations will be found in which the pileus is more densely scaly with almost blackish scales on center, and others where the color is pale silvery-gray. The color of flesh and gills may remain almost white, or there may be an ashy tinge in all parts of the plant. Several characters seem to be constant in our plants, viz. the fragility, the nucleated narrow spores, and the fibrous nature of the interior of the stem. By these characters and the taste it is separable from *T. acre*. Authors give various shapes and sizes for the spores, which fact indicates that there are several independent species at present not separated. Bresadola has segregated a dark, scaly species whose spores measure 7-9 x 4-5 micr., as *T. squarrulosum*. *T. scalpturatum* (Fr.) Bres. has a well-developed but evanescent cortina at first; this approaches our form, and has the same spores, but lacks the distinct farinaceous odor. Our typical plants had no sterile cells on the edge of the gills. A form found at New Richmond had short cystidia and gills whose edges were minutely flocculose and spotted with drab-color, darker than the rest of the gills. Peck has named our form with the farinaceous odor var. *fragans*. The farinaceous odor seems to be the most common character of the American form of *T. terreum*.

733. Tricholoma fumescens Pk.

N. Y. State Rep. 31, 1879.

Illustration: Hard, Mushrooms, Fig. 54, p. 75.

PILEUS 2-6 cm. broad, convex-plane, regular at first, then undulate, obtuse, dry, *covered with a minute, appressed tomentum*, whitish to pale grayish-brown, darker where handled, even, margin at first incurved. FLESH rather thin. GILLS rounded behind at first, then acuminate adnexed, narrow, *very crowded*, whitish, *changing to bluish-black in age or when bruised*, easily separable from trama of pileus. STEM 2-6 cm. long, 5-10 mm. thick, short, rather stout, *whitish then brownish*, solid, becoming cavernous and splitting, pruinose at apex. SPORES narrow, subfusiform-elliptical, 5-6.5 x 3 micr.; *sterigmata* prominent, 3-4 micr. long. ODOR and TASTE slightly farinaceous.

Gregarious or subcaespitose. On the ground, in low, frondose woods. Jackson, Ann Arbor. September-October. Infrequent.

Recognizable by the narrow, crowded gills, which become bluish-black in fresh specimens if bruised; in age or when dried they are almost as black as old gills of *Agaricus campestris*. The pileus and stem do not change as much, inclining to brownish, and in this differ markedly from *T. fuligineum*. The latter also possesses subdistant and broader gills. Our plant is not frequent, having been collected only thrice. The separable gills ally it to those species which W. G. Smith placed under the genus Lepista.

734. Tricholoma fuligineum Pk.

N. Y. State Rep. 41, 1888.

Illustration: Plate CXLIX of this Report.

PILEUS 3-7 cm. broad, convex, then expanded-subdepressed, or obtuse, often irregular, sometimes with sinus on one side, *sooty-brown to dark grayish-brown*, becoming blackish on handling, dry, minutely innately scaly, or fibrillose, even. FLESH white at first, cinerascent, scissile. GILLS adnate or adnexed, then emarginate, *subarid*, very tough when dry, *close to subdistant*, moderately broad, whitish or cinereous, *becoming black when bruised*. STEM 3-6 cm. long, 6-10 mm. thick, short, rarely elongated, solid or spongy-stuffed, equal or subequal, innately fibrillose, pruinose at apex, whitish or cinereous, *blackish when handled*. SPORES narrow, elliptical-fusiform, 7-9 x 4-5 micr., smooth, white. CYSTIDIA and *sterile cells* lacking.

BASIDIA about 30 x 6-7 micr. ODOR and TASTE more or less farinaceous.

Gregarious or caespitose. On the ground among mosses, leaves, etc., frondose woods of oak and maple. Jackson, Detroit, Ann Arbor. September-October. Infrequent.

Somewhat variable in size and shape, etc., under different conditions of weather and situation. It differs from *T. fumescens* in that the entire plant becomes sooty when dried, and it has larger spores and gills. The gills often assume a reddish hue when bruised, then become black, as in *Russula nigricans*. The stem is sometimes slightly floccose at first, as if frosted, and occasionally becomes cavernous. Small forms of *T. cinerascens* have a more watery pileus and the gills do not turn sooty-black. Dr. O. E. Fisher reports that it has appeared abundantly in his back yard on discarded mushroom beds.

Section II. Rigida. Pellicle of the pileus rigid, with a tendency to crack into small smooth scales, sometimes punctate-granulose; neither viscid, floccose-scaly nor fibrillose. Flesh of pileus rigid, somewhat cartilaginous.

**Gills not becoming reddish nor cinereous, nor yellow-stained.*

735. Tricholoma saponaceum Fr. (UNPALATABLE)

Epicrisis, 1836.

Illustrations: Hard, Mushrooms, Fig. 56, p. 77, 1908.
Michael, Führer f. Pilzfreunde, Vol. II, No. 90.
Ricken, Blätterpilze, Pl. 93, Fig. 1.
Cooke, Ill., Plates 91 and 216.
Gillet, Champignons de France, No. 698.
Fries, Icones, Pl. 32.

PILEUS 4-8 cm. broad, convex-expanded, firm, glabrous or becoming cracked to form small scales, not virgate, pale *livid-brown to lead-gray* but variable in color, often olive tinged, margin at first naked and incurved. FLESH white, *becoming pinkish*, thick, firm. GILLS adnato-emarginate then uncinate, subdistant, *distinct*, rather broad, *whitish, not cinerascent*, edge entire. STEM 5-8 cm. long, 1.5-2 cm. thick, rather stout, *ventricose, attenuated or subradicating below*, solid, fibrous-fleshy, apex flocculose, *becoming pink within*, white without, glabrous varying to floccose or minutely dark-scaly. SPORES minute, elliptical-ovate, smooth, 5 x 3-3.5 micr. ODOR and TASTE strongly oily-farinaceous (soapy), distasteful.

Solitary or gregarious. In frondose woods, on the ground. September-October. Ann Arbor, New Richmond, Detroit. Infrequent.

The colors of the pileus vary and are difficult to describe, sometimes varying from whitish to grayish-brown, or smoky-brown. The gills are said to become greenish or rufescent at times. The odor, color of the flesh and minute spores distinguish it. Where bruised the flesh of the stem retains the pink tinge in a persistent manner, and this character is quite marked. It is unfit for food on account of its taste. The odor and taste are sometimes very slight. *T. pallidum* Pk. is probably a variation of this species.

***Gills becoming stained or changing to ashy or reddish in age.*

736. Tricholoma laticeps sp. nov.

Illustration: Plate CL of this Report.

PILEUS 3-10 cm. broad, *rigid*, broadly convex, obtuse, *smoky-umber to blackish*, moist, even, *glabrous, or punctate-granulose on disk,* margin at first strongly decurved, then spreading naked. FLESH firm, brittle, *thick*, thinner at margin, *cinerascent, scissile*. GILLS broadly adnexed, emarginate, close to subdistant, *broad*, white, at last cinereous, edge sometimes eroded. STEM *short*, rigid, spongy-solid, 1-3 cm. long, 7-16 mm. thick, equal or subequal, white or pallid, cinerascent within, innately silky. SPORES short and broadly elliptical to subglobose, smooth, 6-7 x 5-6 micr., white. BASIDIA 30 x 6-7 micr. CYSTIDIA and *sterile cells* none. ODOR and TASTE mild.

Gregarious to caespitose. On the bare ground or among mosses or in grassy places, in conifer or frondose woods or groves. Ann Arbor, Detroit, New Richmond. September-November. Infrequent.

Distinguished by its very short stem and relatively broad pileus which hugs the ground so as to hide the stem. The pileus is often broader in one diameter. It seems to be related to *Tricholoma cartilagineum*, but the gills are broad and subdistant in well-developed specimens, and the pellicle is rarely granular-punctate and then only on the disk. The pellicle is rather adnate and composed of long, narrow, horizontal cells. It cannot be referred to *T. lugubre* Pk. since that species is described as having narrow and close gills; nor to *T. tumidum* Fr. whose stem is longer, and whose gills have a rufescent tinge. The scissile flesh indicates a hygrophanous condition, but this is not marked. Its edibility was not tested.

Section III. Sericella. Pileus without a distinct pellicle, silky or glabrous, very dry; neither moist, viscid, hygrophanous, nor distinctly scaly. Pileus opaque, rather thin.

737. Tricholoma sulphureum Fr. (UNPALATABLE)

Syst. Myc., 1821. (As Clitocybe.)

Illustrations: Cooke, Ill., Pl. 62.
Gillet, Champignons de France, No. 703.
Bresadola, Fungh. mang. e. vel., Pl. 27.
Patouillard, Tab. Analyt. No. 507.
Berkeley, Outlines, Pl. 4, Fig. 4.
Swanton, Fungi, Pl. 44, Fig. 1.
Hard, Mushrooms, Fig. 46, p. 65.

PILEUS 2-8 cm. broad, convex-expanded, mostly *umbonate*, at first silky, soon glabrous, *sulphur-yellow to olivaceous-yellow*, usually tinged brown on disk, subgibbous, even, margin decurved. FLESH yellow or yellowish, thick on disk. GILLS adnexed with tooth,

emarginate at length, *subdistant, yellow*, moderately broad, thick, firm. STEM 4-8 cm. long, 5-10 mm. thick, equal or variously enlarged, sometimes curved, fleshy-fibrous, innately fibrillose, stuffed, sometimes compressed, yellow to olivaceous-yellow, yellowish within. SPORES elliptical-oval, 8-10 x 5-6 micr., smooth. ODOR strong, foetid or of coal-tar; TASTE disagreeable.

Gregarious. On the ground in frondose woods of maple, birch, oak, etc. Houghton, Ann Arbor. July-September. Infrequent.

Our plant is well illustrated by Cooke, but it is usually a less deep yellow, and often tinged with olive or reddish-brown on the cap. It is well marked by the disagreeable, coal-tar odor and taste, by the subdistant gills and by the spores. Bresadola (Funghi mang. et. vel.) gives the spores as warty; this cannot be our plant. In Stevenson the spores are given too small, being nearer those of *T. sulphurescens* Bres., which also has the odor and color of *T. sulphureum* but whose gills are said to be crowded and whitish. Under a lens the dry pileus is often seen with micaceous-shining spots. It differs from *T. chrysenteroides* Pk. in its disagreeable odor, subdistant gills and stuffed to hollow stem.

738. Tricholoma chrysenteroides Pk.

N. Y. Mus. Rep. 24, 1872.

"PILEUS 2.5-5 cm. broad, convex or plane, *not umbonate*, firm, dry, slightly silky or glabrous, *pale yellow or buff*, becoming dingy with age. FLESH pale yellow. GILLS *close*, emarginate, yellowish, dingy or pallid in age, marked with transverse veinlets along the upper edge, intervenose. STEM 5-7 cm. long, 6-8 mm. thick, firm, equal, *solid*, glabrous, fibrillose-striate, yellowish within and without. SPORES elliptical, 7-10 x 5-6 micr. ODOR and TASTE *farinaceous*."

Gregarious. On the ground in woods.

This species has not with certainty been collected within the State. The description is adopted from Peck, and included for the sake of comparison.

739. Tricholoma odorum Pk.

Torrey Bot. Club. Bull., Vol. 25, 1898.

PILEUS 2-5 cm. broad, convex-expanded, obtuse, glabrous, "soft like kid," shining when young, *waxy yellow to pale tan*, even. FLESH thick, concolor. GILLS adnexed, emarginate, *rather broad*, subdistant, thick, *whitish, tinged flesh-pink*, edge entire. STEM 3-7 cm. long, 4-10 mm. thick, equal or subbulbous, *stuffed then hollow*, subflexuous, silky-fibrillose, yellowish white, darker yellow at base and within, pruinose at apex. SPORES broadly elliptic-ovate, smooth, 7-9 x 5-6 micr., variable, white. CYSTIDIA and *sterile cells* none. ODOR rather strong, reminding one of that of *T. sulfureum;* TASTE farinaceous.

Gregarious. On the ground in beech and pine woods. New Richmond. September. Rare.

This seems to approach *T. sulfureum* and is probably a variation of it. Further data are necessary to establish it fully. The incarnate tinge to the whitish gills, and the peculiar odor are characters which distinguish it.

740. Tricholoma carneum Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 40, Fig. 3.
Cooke, Ill., Pl. 96.
Patouillard, Tab. Analyt, No. 614.

PILEUS 1.5-2 cm. broad, convex-plane, obtuse, sometimes umbonate, even, glabrous or *subpruinose*, testaceous when young, then *flesh color* to whitish tan, margin thin and at length spreading or recurved. FLESH thickish on disk, white, soft, rather fragile. GILLS sinuate-adnexed, uncinate, at length subdecurrent, *crowded*, rather narrow, *pure white*, edge mostly even. STEM 1.5-2.5 cm. long, 2-3 mm. thick, equal, *fibrous*, hollow, sometimes compressed, *tinged flesh color*, pruinose above, subtomentose below. SPORES minute, oblong, 4-5 x 2.5 micr., smooth, white. ODOR and TASTE none or subfarinaceous.

Gregarious or subcaespitose. On the ground among leaves and debris in frondose woods. Ann Arbor. August-September. Infrequent.

This small species of Tricholoma is well-marked by the incarnate color of cap and stem which contrasts with the pure white of the gills. Fries has described a species near it, *T. paeonium*, which is said to differ in the "ruber"-red color of cap which does not fade as in our plants; the latter species also has a softer stem than ours.

SUBGENUS III. MELANOLEUCA. Pileus glabrous, either watery-spotted, moist or hygrophanous; not viscid (except when very water-soaked), nor silky, scaly nor granular. FLESH soft, spongy, or very thin, moist, watery or hygrophanous.

Section I. Guttata. Pileus fleshy, fragile, watery-spotted or rivulose. Usually caespitose.

741. Tricholoma unifactum Pk. var.

N. Y. State Mus., Bull. 105, 1906.

Illustration: Ibid.

PILEUS 3-8 cm. broad, *convex*, dull white *mottled with watery spots*, subpruinose, even, creamy-buff in age. FLESH thick on disk, thin elsewhere, white, fragile. GILLS adnexed, becoming emarginate, narrow, narrowed anteriorly, crowded, whitish, edge entire. STEM 5-10 cm. long, prolonged by insertion into a crack in the log, 8-15 mm. broad, equal or tapering upward, curved, solid, even, floccose-pruinose, tomentose at base. SPORES subglobose, minute, 3-4.5 x 3.5 micr., smooth, white. CYSTIDIA and *sterile cells* none. ODOR and TASTE slight.

Caespitose. On decayed charred log, probably hemlock, in mixed woods of ravines. New Richmond. September. Rare.

The plants from which Peck derived his description grew on the ground under hemlock trees and in that situation formed a thick fleshy mass from which the stems arose. Although our plants were caespitosely united only at the base, and grew from a woody substratum, I have scarcely any doubt that they are the same. When dried, the cap, gills and base of stem are ochraceous. In some ways it approaches *Pleurotus elongatipes* Pk. but the stem is solid and scarcely eccentric, and the pileus is spotted with watery marks. *T. conglobatus* Fr. (Eddelbuttel, Ann. Mycol., Vol. 9, p. 512) differs in its brownish-gray pileus and spores 6-7 x 5 micr., although Schroeter (Die Pilze Schlesiens, p. 660) says the cap of that species is often whitish. Our plants are very close to *T. boreale* Fr., whose spores, according to Massee (European fungus Flora) are the same, but whose pileus is at first bright flesh color, then fades to whitish.

Section II. Spongiosa. Pileus fleshy, compact, becoming spongy, obtuse, even, glabrous, moist. Neither hygrophanous nor viscid. (Water soaked specimens sometimes become subgelatinous; the pileus in all cases absorbs water in wet weather.)

742. Tricholoma album Fr. (Sense of Fries) (UNPALATABLE)

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 43.
Cooke, Ill., Pl. 65.
Berkeley, Outlines, Pl. 4, Fig. 6.
Patouillard, Tab. Analyt, No. 615.

"PILEUS 6-10 cm. broad, convex then plane and depressed, not umbonate, *glabrous*, dry, even, margin at first involute at length repand, *sometimes entirely white, sometimes yellowish especially on the disk*. FLESH tough, moderately thick, but not compact. GILLS more or less emarginate, close, up to 8 mm. broad, white, unchanging. STEM 6-10 cm. long, 8-12 mm. thick, attenuated upwards, *solid, elastic*, externally fibrous, glabrous, obsoletely pruinose at apex under lens, concolor. ODOR none; TASTE acrid, unpleasant." SPORES (Massee, Stevenson, Winter) elliptical, 5-6 x 2.5-3; (Romell) 6-7 x 4-4½; (Ricken) lanceolate, 7-8 x 3-3.5 micr.

This species has not yet been found with certainty in the State. The description is adopted from that of Fries in Icones *T. venenata* Atk. and *T. nobile* Pk. approach it by their external characters, but if the spore-measurements given by the English authors actually belong to this species, then *T. nobile* is quite distinct by its spherical spores, and *T. venenata* by its larger spores. It is easy to confuse *T. album* with *T. panoeolum* in some of its forms when young and white, but later the changing gills of the latter species mark it sufficiently. The pileus is said to be entirely glabrous, and this also separates *T. album* from *T. venenata* and *T. nobile*. The taste is given by Fries as "acrid" in Icones, and "bitter" in Hymen. Europ. In Lindblad's Svampbok the pileus is said to become sordid-stained an hour after being bruised, the odor is said to be strongly radishy; and the plant is said to have a sharp burning taste after being chewed awhile. Some authors consider it *poisonous*, and it is evidently not edible, and must be regarded close to *T. venenata* in this respect. It appears that this species needs further study, and it is desirable that continental authors give us exact data concerning the spores of their plants.

743. Tricholoma acerbum Fr. (UNPALATABLE)

Syst. Mycol., 1821.

Illustrations: Gillet, Champignons de France, No. 662.
Plate CLI of this Report.

PILEUS 7-10 cm. broad, firm, convex-expanded, *obtuse*, dry, subpruinose, soft to the touch, *dull buff to yellowish-white, or whitish with a flesh color tinge*, margin at first inrolled and *obscurely ridged*. FLESH white, thick on disk, thin on margin. GILLS emarginate with elecurrent tooth, *narrow, crowded*, whitish becoming creamy-white or slightly rufescent, edge entire. STEM 4-6 cm. long, 1-2 cm. at apex, 2-2.5 cm. below, sometimes abruptly short-rooting, *solid*, firm, at first bulbous then *tapering upward*, at first covered by a thin satiny tomentum or pruinosity, becoming fibrillose, whitish becoming dingy where handled. SPORES minute, spherical, nucleate, 4-5 micr., white. CYSTIDIA none. BASIDIA about 30 x 5-6 micr. TASTE *very bitter;* ODOR scarcely agreeable, somewhat aromatic-farinaceous.

Gregarious to subcaespitose. On the ground in frondose woods. Ann Arbor, Detroit, New Richmond, Bay View. June-October (earliest record, June 11). Frequent.

The bitter taste and changing gills and stem distinguish *T. acerbum* from *T. laterarium* Pk. with which it is easily confused. Both species are marked by the narrow, crowded gills, spherical spores, the whitish to pale yellowish-tan cap, and the slight ridges which are found on the margin of the cap. The gills are sometimes spuriously decurrent, when it might be confused with small forms of *Clitocybe Candida*, but the latter has a mild taste and its pileus becomes concave. Superficially it approaches *T. panoeolum* var. *caespitosum* also. Bresadola (Fungh. mang.) assigns to it obovate spores, measuring 6-7 x 3-3.5 micr., while others give them globose.

744. Tricholoma laterarium Pk. (EDIBLE)

N. Y. State Mus. Rep. 26, 1874 (Buffalo Soc. Nat. Hist., 1873).

Illustration: Hard, Mushrooms, Fig. 47, p. 66, 1908.

"PILEUS 5-10 cm. broad, convex-expanded, sometimes slightly depressed in center, pruinose, whitish, *disk often tinged with brick-red or brown*, the thin margin marked with slight, subdistant, short, radiating ridges. FLESH white. GILLS emarginate, decurrent in slight lines, *narrow, crowded, white*. STEM 5-7 cm. long, nearly equal, solid, white. SPORES globose, 4-5 micr. diameter."

Gregarious. On the ground in conifer woods. Probably in the northern part of the State.

I have no notes on this species, hence have given Peck's description. No data are at hand as to its taste and odor. It is close to *T. acerbum*, apparently only distinguishable by its mild taste and white gills, and may prove to be identical with that species.

745. Tricholoma leucocephalum Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 43.
Cooke, Ill., Pl. 78.

PILEUS 3-6 cm. broad, *thin*, convex then plane, obtuse, even, moist, glabrous, the slight silkiness disappearing, *white*. FLESH compact, *white, watery in wet weather*. GILLS rounded behind, *free*, thin, crowded, *pure white*, edge very entire. STEM 5-7 cm. long, 4-8 mm. thick, subcartilaginous to fibrous, *hollow, solid at the narrowed, rooting base, glabrous*, white. SPORES 6-8 x 3-4 micr. (perhaps longer when fully mature), elliptic-ovate, apiculate. ODOR and TASTE distinctly *farinaceous*.

Gregarious. On the ground in conifer woods. Marquette. September. Rare.

The description is adapted from the Icones of Fries. The figures cited represent a plant like that of form (B) of *T. resplendens* (which see), whose stem was minutely hollow, but whose cap was distinctly viscid. *T. leucocephalum* has been found but once, and is apparently rare. It has been confused, according to Fries, with *T. columbetta* and *T. album;* "the former is mild and edible, the latter bitter and very poisonous, while *T. leucocephalum* has a strong odor of fresh meal."

746. Tricholoma fumosiluteum Pk.

N. Y. State Mus. Rep. 27, 1875.

"PILEUS 3-7 cm. broad, convex-expanded, *moist, glabrous*, smoky-*yellow*. FLESH white or yellowish under the subseparable cuticle. GILLS rounded behind, deeply emarginate at length, *broad*, close, white. STEM 6-10 cm. long, *rather elongated*, 6-10 mm. thick, glabrous, *hollow*, white. SPORES globose, 4.5-6 micr. diameter. ODOR and TASTE farinaceous when flesh is crushed."

Gregarious to subcaespitose. On the ground in frondose woods. Ann Arbor. October. Rare.

The description is adapted from that of Peck. "The disk of the pileus is often darker, and sometimes spotted." My specimens show a tendency for the stem to become elongated relative to the width of the pileus.

747. Tricholoma personatum Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 87 and 88, 1900.
Murrill, Mycologia, Vol. 2, Pl. 19, Fig. 1.
Hard, Mushrooms, Fig. 61 and 62, p. 84, 1908.
Marshall, Mushroom Book, Pl. 21, p. 72, 1905.
Ricken, Blätterpilze, Pl. 95, Fig. 3.
Michael, Führer f. Pilzfreunde, Vol. II, No. 89 (as T. *bicolor*), and Vol. Ill, No. 113.
Peck, N. Y. Mus. Rep. 48, Pl. 22, 1896.
See also Cooke, Gillet, Berkeley, etc.

PILEUS 5-12 cm. broad, convex-expanded to plane, obtuse, glabrous, moist or water-soaked, *variable in color*, grayish to brownish, *tinged with lilac, lavender or purplish hues*, fading in age to pale livid or sordid-white, even, *margin at first involute and villose-pruinose*, at length spreading, naked and undulate. FLESH lavender-tinged when fresh, fading to whitish, often water-soaked in wet weather. GILLS slightly truncate-adnate to almost free, rather broad, crowded, *at first blue, then lavender, grayish-rufescent, etc*., separable from pileus, edge entire. STEM 3-7 cm. long, 1-2 cm. thick, rather short, stout, at first bulbous, becoming clavate or tapering upwards or sometimes equal, *solid, at first blue then persistently lavender or lilac*, sometimes fading to pale livid, etc., *frosted by minute, furfuraceous-squamules*, glabrescent, pale grayish within. SPORES narrowly elliptical, smooth, non-nucleate, 7-8 x 4-5 micr. (rarely longer), *pale flesh color in mass*. CYSTIDIA and *sterile cells* none. BASIDIA 28-30 x 6-7 micr., 2-4-spored. ODOR and TASTE mild.

Gregarious or subcaespitose. On the ground among decaying leaves or brush piles, in mixed or frondose, open or thin woods. Throughout the State. September-November. (Earliest record August 25.) Common.

This is a favorite for the table. It is easily known among the large Tricholomas by its bluish or lavender colors when fresh, and in this respect imitates some of the Cortinarii, but such confusion will not lead to trouble, as the latter are equally safe. *Cortinarius michiganensis* and *Cortinarius albatus* have similar colors, but are distinguished by the cortina when young, and the darker gills when old. It is not easily confused with *Cortinarius violaceous*, as some have stated, since that species is long-stemmed, has a much darker color and the cap is minutely scaly. *T. nudum* is a more slender plant, and differs mainly in its deeper blue or purplish colors on cap and stem, and the naked margin when young. All are edible. Our plant loves to grow among heavy masses of fallen or decaying leaves which often completely hide it in the late autumn. It varies in color, so that several varieties have been named; these varieties are mostly the result of weather conditions, of habitat or of late growth. After having been soaked by rains it is less palatable. The color of the spores shows it to be intermediate between Tricholonia and Entoloma, and

induced W. G. Smith and others to call it *Lepista personata*.

748. Tricholoma nudum Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: N. Y. State Mus. Bull. 116, Pl. 104, Fig. 1-9, 1907.
Cooke, Ill., Pl. 67 (too faded).
Gillet, Champignons de France, No. 685.
Bresadola, I. Funghi mang. e. vel., Pl. 30.
Ricken, Blätterpilze, Pl. 95, Fig. 4.

PILEUS *3-8 cm. broad, thin*, convex-expanded to plane, obtuse, sometimes depressed, glabrous, even, soft to the touch, moist, *purplish-violaceous to lavender*, fading to pale violaceous-brown or dingy rose-color, *margin at first incurved and naked*. FLESH tinged violet, at length whitish, thin, rather firm. GILLS truncate-adnate then subdecurrent and slightly sinuate, crowded, narrow, violaceous at first. STEM 3-7 cm. long, 4-10 mm. thick, *slender or moderately stout*, solid, equal or slightly enlarged at base, silky-pruinose, glabrescent, purplish-violaceous then grayish-brown. SPORES 6-7 x 4-5 micr., elliptical, sordid flesh color in mass. ODOR and TASTE mild or slightly acid.

Gregarious or subcaespitose. On the ground in woods. Ann Arbor. September.

This is intermediate in size between *T. personatum* and *T. ionides*, and all three have similar colors. *T. ionides*, which has been reported from the state by Longyear, is known by its conic-campanulate pileus, which is at first flocculose on the margin, its stuffed to hollow stem, and whitish gills and spores; its cap is 2-5 cm. broad. Huyot (Soc. Myc. de France, Vol. 16, p. 95) states that it can always be distinguished, since the flesh of the stem is uniformly *blue*, while that of *T. personatum* is pallid or grayish. Peck says the stem of his plants was stuffed or hollow, while European authors describe it as solid. The spores, as in *T. personatum*, are pale flesh color, and show the relation of these plants to the rosy-spored group; but as it is now pretty well admitted that the sum of the other characters of a plant are of more generic importance than the spore-color, especially where it is not very marked, it would seem best to keep them in this genus.

749. Tricholoma tumidum Fr.

Syst. Mycol., 1821.

Illustrations: Cooke, Ill., Pl. 93.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 111.
Plate CLII of this Report.

PILEUS 6-10 cm. broad, firm, convex-expanded, then plane or broadly depressed, *moist*, regular at length wavy, glabrous, sometimes watery-spotted, clouded with *gray to brownish-gray especially on disk*, whitish on margin, even, margin thin and *at first tomentulose*. FLESH white, slightly and slowly cinerascent, thin on margin, rather brittle. GILLS adnexed, then deeply sinuate, *broad, subdistant*, ventricose, at first shining white then slightly cinerascent, brittle, scarcely intervenose, edge entire. STEM 5-7 cm. long, 1.5-2 cm. thick, *stout, solid*, compact spongy within, subequal or sub-bulbous, sometimes abruptly subradicating, *glabrous*, slightly scurfy at apex, white then slightly cinerascent. SPORES minute, subfusiform-elliptic, smooth, 5-6 x 3 micr., white. CYSTIDIA and *sterile cells* none. ODOR and TASTE mild.

Scattered or singly. On the ground among fallen leaves, etc., in frondose woods. October. Ann Arbor. Infrequent.

A rather noble plant when fresh, rather firm at first, becoming brittle. It was placed by Fries in section Rigida, but is placed here because of its similarity to *T. cinerascens*. The pileus has a slightly raised circular ridge a short distance from the margin as indicated in Cooke's figure. In some individuals the pileus was marked by watery spots toward the margin (like those on the stem of *Lactarius scrobiculatus*) and sometimes it was slightly ochraceous-stained. The thin margin at length becomes subplicate-crenate. The stems are not ventricose nor is the cap as dark, but otherwise it seems to have all the marks of the species figured by Cooke and Michael. It differs from *T. cinerascens* which it approaches closely in color, by its more rigid habit and by its subdistant gills which do not separate easily from the traina of the pileus.

750. Tricholoma cinerascens Fr. (EDIBLE)

Monographia, 1863.

Illustration: Ibid, Pl. 153.
Ricken, Blätterpilze, Pl. 97, Fig. 2.
Plate CLIII of this Report.

PILEUS 5-10 cm. broad, convex then expanded, obtuse, obscurely floccose-tomentose or glabrous, *white or buff, then gray*, sub-unicolorous, *moist*, even, margin thin, naked. FLESH white, thick on disk. GILLS adnexed, slightly emarginate, *close, medium broad*, dingy white, becoming yellowish, *easily separable from pileus*, edge entire. STEM 5-7 cm. long, 1-1.5 cm. thick, equal, except spongy-thickened base, which is often mycelioid-tomentose, *spongy-stuffed to hollow*, sometimes curved, white, then cinerascent, subglabrous, pruinose at apex. SPORES minute, elliptical, 5 x 3 micr. (rarely longer). TASTE when crushed, farinaceous. ODOR subfarinaceous.

Gregarious to caespitose. On the ground among decaying leaves in frondose woods. October. Ann Arbor. Infrequent.

The pileus is more spongy and less firm than in *T. tumidum*, the gills are close and become more or less dingy yellowish. The pileus feels glabrous, although there is an innate floccosity to it. The gills separate from the trama of the pileus as in the genera Lepista, Paxillus and Gomphidius, etc. It belies its name, since the fresh plant may become only slightly cinereous.

751. Tricholoma panoeolum var. **caespitosum** Bres.

Fungi Trid., Vol. 2, 1892.

Illustration: Ibid, Pl. 153.

PILEUS 5-12 cm. (sometimes up to 20 cm.) broad, convex-expanded, then irregular or sinuate-lobed, sometimes eccentric, *whitish, buff, grayish-brown or dingy tan*, sometimes *shining white*, glabrous or obscurely flocculose on disk, *cuticle subcartilaginous, margin persistently incurved*. FLESH rather firm, very moist in wet weather or water-soaked and then fragile. GILLS *very crowded, narrow, easily separable from the pileus, varying subdecurrent or truncate adnate or slightly sinuate*, white at first, *soon dingy-flesh color*. STEM 3-8 cm. long, 8-15 mm. thick, subequal, solid or spongy within, at first covered with white frostiness, then fibrillose, apex scurfy, pallid-whitish. SPORES elliptic-ovate, minute, smooth, 5-6 x 3-3.5 micr., whitish or pale dingy flesh color in mass. ODOR slight or of rancid meal. TASTE slowly peppery or disagreeable, remaining in the mouth a long time.

Caespitose, rarely solitary. On the ground in frondose or conifer woods. Ann Arbor, Detroit, Bay View, Marquette and New Richmond. September-November. Frequent.

This is one of the most difficult species of Agarics to place properly. Its gills which are often subdecurrent tend to throw it into the genus Clitocybe; and the ease with which they separate from the trama of the pileus is characteristic of the genus Paxillus. The attachment of the gills varies furthermore, sometimes becoming sinuate, sometimes not at all decurrent. In other respects the gills form the very best means of recognizing this species, as indicated in the description. The plants also vary in size and color; clusters composed of several very large specimens are sometimes found, which simulate *Clitocybe gigantea* and *Clitocybe candida*, but differ from both in that the gills become flesh color, and in the tardily peppery taste. After being exposed to rains, the plants become water-soaked, take on a flesh-tint throughout and are quite fragile. It is probable that *T. rancidulum* Banning is the same plant.

Section III. Hygrophana. Pileus thin, hygrophanous. Flesh at first compact, then soft, moist and hygrophanous.

The color of the pileus changes as the moisture escapes, usually becoming much paler. Patouillard (Les Hymenomycetes d'Europe, p. 36, 1887) has separated certain species, e. g., *T. melaleuca*, from this section on the basis of their echinulate spores, spongy consistency and grayish or blackish tinge, and erected the genus Melaleuca for them. Fayod (Ann. d. Sci. Nat., 7 ser., vol. 9, p. 348) did the same, including *T. brevipes, T. nudum, T. grammopodium*, *T. personatum* and *T. sordidum* in that genus, and using mainly the irregular hyphae of the gill-trama as the separation character. It has seemed best however, to keep the Friesian arrangement of this section until the data are more complete. Only a few species of this section have so far been identified.

752. Tricholoma melaleucum Fr.

Syst. Mycol., 1821.

Illustrations: Fries, Icones, Pl. 44.
Ricken, Blätterpilze, Pl. 96, Fig. 5.
Gillet, Champignons de France, No. 682.
Cooke, Ill., Pl. 119.
Hard, Mushrooms, Fig. 50, p. 69, 1908.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 112.
Murrill, Mycologia, Vol. 3, Pl. 49, Fig. 4.

PILEUS 3-7 cm. broad, thin, *convex-plane*, regular or wavy, obscurely umbonate, glabrous, moist, hygrophanous with a somewhat separable cuticle, *smoky-brown or fuliginous* (*moist*), ochraceous-tan, buff or paler (dry), umbo darker. FLESH scissile, grayish, or grayish-white. GILLS adnexed, emarginate, narrow to moderately broad, subventricose, rather close, thickish, pure white at first becoming dingy. STEM 3-8 cm. long, 3-6 mm. thick, *strict*, elastic, equal or thickened at base, whitish, *streaked with smoky fibrils*, persistently stuffed. SPORES 6-8 x 4-5 micr., minutely rough, elliptical-oval, white.

Scattered or growing singly. On the ground or among grass in cultivated fields, gardens, lawns, etc., rarely in woods. Spring and autumn, June, September-October. Ann Arbor, New Richmond, Marquette. Frequent.

This is usually an open ground Tricholoma. The somewhat rigid, subcartilaginous stem reminds one more of Collybia than of Tricholoma. The pileus is sometimes quite blackish and the stem streaked with black fibrils. It was formerly (Mich. Acad. Sci.) referred to *Collybia stridula* because of the spores. The measurements given by Massee for *T. melaleucum* are 10 x 4-5 micr. Schroeter and Ricken, however, find spore measurements the same as in our plants, and hence, as it agrees well otherwise, it is referred to *T. melaleuca*. The gills vary from linear to subventricose. The stem is sometimes smoky, covered with white fibrils.

753. Tricholoma leucocephaloides Pk.

N. Y. State Mus. Rep. 49, 1896.

PILEUS 3-6 cm. broad, convex, obtuse, undulate or irregular, *hygrophanous*, brown or grayish-brown (moist), whitish or whitish-tan (dry), subviscid in wet weather, even. FLESH becoming white, thin. GILLS adnate to subdecurrent, slightly emarginate, close to subdistant, moderately broad, whitish. STEM 3-6 cm. long, 5-8 mm. thick, equal, curved, spongy-stuffed, apex floccose, elsewhere glabrescent, whitish (dry). SPORES minute, elliptical, smooth, 5-6 x 3-4 micr. ODOR and TASTE *strongly farinaceous*.

Gregarious. On the ground, frondose woods. Ann Arbor. October. Rare.

754. Tricholoma sordidum Fr.

Syst Myc., 1821.

Illustrations: Fries, Icones, Pl. 45.
Cooke, Ill., Pl. 100.
Hard, Mushrooms, Fig. 44, p. 63, 1908.
Ricken, Blätterpilze, Pl. 95, Fig. 5.

PILEUS 2-6 cm. broad, convex then expanded and depressed, with or without an obscure umbo, hygrophanous, *flesh color* to *avellanus* (Ridg.) when young, wood-brown in age, fading, glabrous, even or substriatulate on the naked and incurved margin. FLESH thin, except disk, toughish, drab color when young or moist, pallid in age. GILLS adnate, at length emarginate-sinuate, *vinaceous-drab* to subviolaceous, close, thin, moderately broad, edge entire. STEM *short*, 2-4 cm. long, 4-8 mm. thick, equal, solid, toughish-fibrous, *fibrillose*, naked at apex, whitish or sordid, curved, base mycelioid or subrooting. SPORES elliptic-oblong, 6-7.5 x 3-4 micr., smooth, white. *Trama of gills* parallel. CYSTIDIA none. BASIDIA clavate, 30-32 x 4-5 micr. ODOR and TASTE mild.

Caespitose or gregarious-subcaespitose. On decaying vegetable matter, straw-heaps, etc., in fields and gardens. August-October. Ann Arbor. Infrequent.

Known by the caespitose habit, by the dingy flesh-colored or sub-violaceous pileus and gills and by the place of growth. Usually it appears only after abundant rains. The stem is said to be sometimes eccentric. It must not be confused with *T. nudum*.

Clitocybe Fr.

(From the Greek, *clitos*, sloping, and *cybe*, head.)

White-spored; stem *spongy-fleshy to fibrous*, elastic, its fibers continuous with the trama of pileus, hence not separable. Gills *decurrent* or acutely adnate, often separable from the pileus, *not emarginate* nor sinuate, margin of pileus at first involute. No annulus.

Fleshy, firm or soft mushrooms, growing mostly on the ground or decaying leaves, sometimes on wood, in fields, road-sides or forest. Mostly medium to large size.

The PILEUS is mostly glabrous or silky fibrillose, scaly in a few species, sometimes with rather thick flesh, often quite thin and flexible. Many are hygrophanous and change color during dry weather and have scissile thin flesh, others are merely moist and have thicker unchanging flesh. The surface is never viscid. The shape of the pileus varies greatly, convex to plane, obtuse, depressed in the center, umbilicate or infundibuliform; very regular, irregular or compressed when clustered, or often merely wavy in outline. The color of the pileus is generally white to tan, gray, dull reddish or brownish, although a few bright-colored species like *C. illudens* and *C. anisearia* are quite common. The STEM lacks the true cartilaginous rind of the genus Collybia; its outer layer being fibrous or sometimes soft-fleshy, (though it may become hard and cartilaginous-like in dry weather). Within it may be fibrous throughout, i. e., solid, or spongy-stuffed and becoming more or less hollow. The fibrous structure is length-wise and is continued into the trama of the pileus and gives the stem considerable elasticity. The color of the stem is usually like that of the pileus. The GILLS are mostly white, some are ashy-brown, or become ashy-colored in age; in the subgenus Laccaria, they are colored reddish, violet or yellow. They are always attached to the stem, sometimes deeply decurrent, sometimes adnate at first and later pseudo-decurrent when the expanding pileus is elevated anteriorly; whatever the mode of attachment, the gills are narrowed to a point where they terminate on the stem. In one species, *C. laccata*, the gills are aberrant, being emarginate-adnate as in Tricholoma. The gills, when decurrent, are often unequally so, some extending farther down the stem than others, especially when the pileus is irregular. In many species the gills are of different texture from the trama of the pileus and can be peeled off from it, in this character approaching the genus Paxillus as set up by Fries. It has seemed best, however, to follow Peck, by referring white-spored species with decurrent and separable gills, even if they anastomose on the stern, to the genus Clitocybe instead of Paxillus. The VEIL is poorly developed or entirely lacking in this genus. Where it becomes evident, as in *C. praecox* sp. nov. we have a transition to the genus Armillaria. But no species in which the veil forms an annulus can be included here. The SPORES are white, mostly small, elliptical and smooth in the larger number of species, globose and echinulate in others. As seen below, this character with others will be used to separate the two subgenera. The spores of *Clitopilus caespitosa* are only slightly tinged with flesh color, so that it is easily mistaken for a Clitocybe. The TASTE is mild in nearly all the species; sometimes it is farinaceous; in *C. piccina* and a few others it is disagreeable. Two species are known to be poisonous, viz. *C. illudens* and *C. morbifera;* as far as known, the others are safe, and become tender and palatable when properly cooked. *C. sudorifica* Pk. (N. Y. State Mus. Bull. 157) causes profuse perspiration and should be avoided.

The genus is large, and may be divided into two subgenera: Clitocybe (propria), and Laccaria.

The former is again divided into sections and groups as follows:

SUBGENUS CLITOCYBE.

Section I. Paxilloideae.

Section II. Squamulosae.

Section III. Siccae.

Section IV. Hygrophanae.

SUBGENUS LACCARIA.

Key to the Species

(A) Pileus hygrophanous, changing color from wet to dry weather; flesh usually scissile.
(a) Pileus becoming furfuraceous-squamulose; spores spherical, markedly echinulate; gills adnate.
(b) Plant large; stem 8 mm. or more thick; gills purplish. 796. *C. ochropurpurea* Berk.

(bb) Plants rather small; gills flesh color, pallid or violaceous.
(c)) Stem 3-7 cm. long; spores 8-9 micr. diam., very common. 794. *C. laccata* Fr.
(cc) Stem 1-2 cm. long; spores 12-14 micr. diam., rare. 795. *C. tortilis* Fr.
(aa) Pileus glabrous or dotted with dark points.
(b) Pileus thin, funnel-form, cup-shaped or deeply umbilicate at maturity.
(c) Gills distant or subdistant.
(d) Growing on lichens; pileus grayish-brown (moist), very small. 790. *C. peltigerina* Pk.
(dd) Growing on wood, sometimes on the debris of forests.
(e) Pileus virgate, with black scaly points; gills yellowish. 783. *C. ectypoides* Pk.
(ee) Pileus, stem and gills smoky to ashy-brown (moist), pileus glabrous. 782. *C. cyathiforme* Fr.
(cc) Gills crowded or close.
(d) Pileus grayish-brown when moist at least in the center; gills close.
(e) Caespitose; pileus infundibuliform; gills long-decurrent. 787. *C. caespitosa* Pk.
(ee) Not truly caespitose; pileus umbilicate; gills subdecurrent. 786. *C. albidula* Pk.
(dd) Pileus white or whitish-tan, gills very crowded.
(e) Stem attached by long white strands to decayed wood or debris, often eccentric; gills decurrent. 785. *C. eccentrica* Pk.
(ee) Stem without such strands; gills long decurrent. 784. *C. adirondackensis* Pk.
(bb) Pileus obtuse to convex-depressed; plants rather small.
(c) Gills, pileus and stem ashy-colored or brownish-gray.
(d) Taste farinaceous. 789. *C. ditopoda* Fr.
(dd) Taste mild. 788. *C. metachroa* Fr.
(cc) Gills, pileus and stem white or tinged tan color.
(d) Pileus shining-white when dry. 793. *C. angustissima* Fr.
(dd) Pileus not shining-white.
(e) On lawns, etc., among grass. 791. *C. morbifera* Pk.
(ee) In woods, among leaves. 792. *C. compressipes* Pk.
(AA) Pileus not hygrophanous.
(a) Stem 2-6 cm. thick; pileus very large, ochraceous tan, obtuse; gills soon dingy yellowish. 758. *C. maxima* Fr.
(aa) Stem not as stout.
(b) Caespitose, often in large clusters; plants large.
(c) Gills extending down the stem in lines or ridges; pileus dull-white or pale tan. 757. *C. piceina* Pk.
(cc) Gills rarely decurrent in lines.
(d) Pileus becoming deep funnel-shaped or depressed-concave; very large.
(e) Margin of pileus sulcate; gills anastomosing on stem. 755. *C. gigantea* Fr.
(ee) Margin of pileus even; gills rounded behind at first. 756. *C. candida* Bres.
(dd) Pileus obtuse, umbonate or only slightly depressed.
(e) Pileus becoming scaly, reddish-tawny to honey-colored. 759. *C. monodelpha* Morg.
(ee) Pileus glabrous.
(f) Whole plant saffron or dingy golden-yellow. 773. *C. illudens* Schw.
(ff) Plants not at all yellow.
(g) Pileus with a cartilaginous cuticle, smoky-tan or paler. 775. *C. cartilaginea* Bres.
(gg) Pileus without cartilaginous cuticle; whole plant whitish. 774. *C. multiceps* Pk.
(bb) Singly, gregarious or subcaespitose; plants small to medium size; stems seldom over 8 mm. thick.
(c) Pileus yellow, covered with dark brown scales; on wood. 760. *C. decora* Fr.
(cc) Pileus not like the preceding.
(d) Pileus greenish, bluish or yellowish, not scaly.
(e) Whole plant yellowish, soft; spores globose, minutely echinulate. 781. *C. pulcherrima* Pk.
(ee) Tinged green or blue.
(f) Stem solid.
(g) Pileus green or tinged green. 767. *C. odora* var. *viridis* Fr.
(gg) Pileus tinged blue. 771. *C. connexa* Pk.
(ff) Stem stuffed then hollow; pileus greenish.
(g) Gills narrow, crowded. 767. *C. odora* var. *anisearia* Pk.
(gg) Gills rather broad, close. 767. *C. odora* Fr.
(dd) Pileus not green, blue nor yellow.
(e) Pileus funnel-form or deeply concave at maturity.
(f) Pileus buff-white. 776. *C. catina* Fr.
(ff) Pileus reddish-tan fading to dingy white. 777. *C. infundibuliformis* Fr.
(ee) Pileus obtuse, umbilicate or slightly depressed.
(f) Pileus smoky-brown, ashy brown or clouded with gray.
(g) Gills deeply decurrent.
(h) Pileus obtuse, 3-7 cm. broad; gills white or tinged yellowish, subdistant; stem clavate, stout. 763. *C. clavipes* Fr.
(hh) Pileus more or less depressed, 1-3 cm. broad; gills dingy white, close; stem equal, slender. 779. *C. parilis* Fr.
(gg) Gills short-decurrent.
(h) Stem slender, 1-3 mm. thick; pileus depressed; gills tinged ashy. 766. *C. vilescens* Pk.
(hh) Stem stout, 8-16 mm. thick; pileus obtuse to umbonate.
(i) Gills rather crowded. 762. *C. nebularis* Fr.
(ii) Gills subdistant; stem subequal.
(k) Gills entire. 764. *C. media* Pk.
(kk) Gills forked. 765. *C. carnosior* Pk.
(ff) Pileus rufous-brown to brick red; 2-5 cm. broad.
(g) Gills very crowded; flesh thin; pileus umbilicate. 780. *C. sinopica* Fr.
(gg) Gills hardly close; flesh thick on disk; pileus obtuse. 761. *C. praecox* Kauff.
(fff) Pileus whitish to shining white.
(g) Growing on wood; gills narrow and crowded. 772. *C. truncicola* Pk.
(gg) On the ground among leaves, or in grassy places.
(h) Pileus dingy-white to pale tan, umbilicate; on pine needles on the ground. 778. *C. pinophila* Pk.
(hh) Pileus shining-white when dry.
(i) Pileus 3-8 cm. broad; stem solid; spores minutely echinulate. 770. *C. albissima* Pk.
(ii) Pileus smaller, 1-4 cm. broad; stem stuffed to hollow; spores smooth.
(k) Stem cartilaginous; pileus regular; in woods. 768. *C. candicans* Fr.
(kk) Stem fibrous-tough; pileus wavy on margin; usually in fields and pastures. 769. *C. dealbata* Fr.

SUBGENUS CLITOCYBE (propria). Spores elliptical to ovate, when spherical not spimilose (see *C. pulcherrium*).

Section I. Paxilloideae. Pileus firm; flesh thickish, not hygrophanous. Gills separable from trama of pileus, more or less anastomosing on the stem. Plants medium to very large.

755. Clitocybe gigantea Fr. (EDIBLE)

Sys. Mycol., 1821.

Illustrations: Gillet, Champignons de France, Pl. 100. Cooke, Ill., Pl. 106.

PILEUS *large*, 15-25 cm. broad, relatively thin, soon expanded, plane *then infundibuliform*, soft, glabrous, *white* or tinged tan, slightly flocculose when dry, *margin* involute, then spreading, at length *coarsely silicate*. Flesh thin, white. GILLS subdecurrent, *very crowded*, rather *broad*, (2-3 times thickness of pileus), some forked, *anastomosing on the stem*. STEM short and *stout*, 2-6 cm. long, 2-3 cm. thick, *solid*, glabrous, even, whitish. SPORES 5 x 3 micr., elliptical, apiculate, white. ODOR and TASTE mild.

(Dried: Pileus rufous-brown in patches, dingy whitish elsewhere. Gills cinnamon brown.)

Caespitose. Ground, in rich woods of maple, oak, basswood, etc. Ann Arbor. September-October. Infrequent. Edible.

Certain remarks found in fungi books indicate that this species needs further study in its relation to *C. maxima* and *C. candida*. Massee says the gills are not separable from the hymenophore, although Fries does not mention the matter in Hymen. Europ., Epicrisis and Systema. The lengthy quotations of McIlvaine do not meet the difficulties in deciding between the three mentioned. This is one of our largest fungi, often a foot across the cap, and a caespitose cluster of them is a marked feature of the forest. It differs, according to our diagnosis, from *C. maxima* by the anastomosing gills, the sulcate-ridged margin of the pileus, lack of any umbo and smooth stem; and from *C. candida* in the character of the gills and the sulcate margin of the pileus. Large fresh clusters of *Tricholoma panoeolum* var. *caespitosum* have all the appearance of this plant, but in that species the gills turn slowly flesh color and the spores are smaller. The illustrations of *C. gigantea* fail to show its size and caespitose character.

756. Clitocybe candida Bres.

Fungi Tridentini, 1881.

Illustrations: Ibid, Pl. XVIII, Vol. I.
Atkinson, Mushrooms, p. 89, 90, Plates 28, 29, Figs. 90, 91.

PILEUS 10-20 cm. broad, convexo-plane, *then depressed and infundibuliform*, relatively thin, glabrous to obscurely scaly on disk, *white*, somewhat shining, *even* or obscurely striate on margin, not umbonate. FLESH white, unchanging, very *scissile*. GILLS subdecurrent, rounded at point of attachment, not emarginate, *very crowded, narrowly linear*, few forked, many shorter, edge entire. STEM 5-9 cm. long, stout, about 2 cm. thick, subequal, spongy-stuffed, white, fibrillose, mycelioid-tomentose at base. ODOR and TASTE mild. SPORES 6-7 x 3-4 micr., elliptical, apiculate, white.

(Dried: Pileus whitish-tan, gills pale fuscous-cinnamon.)

Caespitose. On the ground, under balsam-fir, in conifer forest. Marquette. August. Infrequent.

Differs from preceding in even pileus, in narrow gills which do not anastomose; from *C. maxima* in lack of umbo, gills not long de-current and pileus not squamulose. Atkinson says gills are broad; in our plants they are narrow as shown in Bresadola's figure. It is made a variety of *C. gigantea* by Quelet, and present information, seems to show that the two forms run into each other.

757. Clitocybe piceina Pk.

Torr. Bot. Club. Bull., Vol. 31, p. 178, 1904.

Illustrations: Chicago Nat. Hist. Surv. Bull. VII, Part I, Pl. 2, Fig. 2.
Plate CLIV of this Report.

PILEUS 5-20 cm. broad, rarely more, firm, convex-expanded to *plane*, dull white or tinged ochraceous to tan, dry, obscurely silky, tomentose, margin *even, involute*. FLESH white, rather thick, not scissile. GILLS close, rather narrow, thin, whitish or tinged yellowish, *decurrent* especially *by lines or ridges* running down the stem and *anastomosing*, separable from hymenophore, transversely split in age, edge entire. STEM 5-8 cm. long, 1-3 cm. thick, short and *stout*, solid, firm, sometimes spongy, subequal to subbulbous, whitish, *minutely tomentose*, often curved at base, *rigid at apex*. SPORES broadly elliptical, 6-7 x 4-5 micr., apiculate, with a large oil-drop nearly filling the interior, white. ODOR strong, somewhat aromatic to disagreeable. TASTE unpleasant, bitter.

(Dried: Cap and gills dingy ochre to ochraceous-buff.)

Single or subcaespitose. On very rotten wood, or on debris under hemlock trees in northern Michigan; under maple, etc., in the southern part of the State. Ann Arbor, New Richmond, Detroit, Houghton, Huron Mountains, Marquette. Infrequent. Edibility not tested.

This is one of the large Clitocybes, one of my specimens measuring 25 cm. across the cap. It is easily known by the peculiar gills and the narrow ridges at the apex of the stem. The change to yellow on drying is very marked, and distinguishes this species from *C. gigantea* and *C. candida*. Small to medium plants are apparently more common than those of full size. The oil-drop in the spores is large and simulates a globular spore. The white mycelium gives a white, mouldy appearance to the neighboring leaves, etc. It appears to be the same as *Paxillus extenuatus* Fr., in the sense of Ricken.

758. Clitocybe maxima Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: Barla, Champignons des Alpes-maritimes, Pl. 50.
Plate CLV of this Report. (Much reduced.)

PILEUS 10-30 cm. or more broad, thick-fleshy, firm, *at first broadly convex with broad umbo, then plane*, scarcely subinfundibuliform in age but obtuse or broadly umbonate, always dry, with a thin, interwoven, silky-tomentosity on surface, slightly floccose-scaly in age, at first pallid, *soon ochraceous-tan to rusty alutaceous*, margin at first involute and pubescent-tomentulose, then spreading and *even* or only obscurely short-striate. FLESH *thick and compact on disk*, abruptly thin toward margin, later attenuated, whitish becoming dingy. GILLS at first subemarginate becoming decurrent to long-decurrent in fully expanded plants, relatively narrow (4-10 mm.), acuminate at both ends, *close*, not ventricose,

whitish at first, *soon dingy yellowish*, pale tan in age, separable from pileus, edge entire. STEM *stout* and usually *short*, 6-12 cm. long, inflated-bulbous to clavate-bulbous, 2-5 cm. thick above, 3-8 cm. at bulb, *spongy-solid, covered by a thin*, continuous, appressed white *tomentum*, often ferruginous-stained, white or whitish, bulb at length color of pileus. SPORES elliptic-oval, 7-7.5 x 5-5.5 micr., obscurely echinulate, nucleate, white . CYSTIDIA none; *sterile cells* on edge of gills acicular. ODOR *rather strong*, oily-farinaceous. TASTE mild.

Gregarious or subcaespitose. On the ground in frondose woods. Ann Arbor, Detroit. August-September. Infrequent.

In America this huge and massive mushroom is distinguished by its exceedingly stout stem, by the compact flesh of the half-grown plant, by the gills which soon become deep straw-yellow and by the odor. When developing slowly the pileus remains compact and thick on the central portion, but under favorable growth-conditions it expands more fully, the flesh becomes thinner throughout and it tends to become infundibuliform. The majority of plants found, although many of them very large, had a plane or obtuse pileus, sometimes with a very broad umbo. Solitary, relatively small specimens approach the appearance of the figures given for *C. geotropa* Fr. and such specimens being the only ones seen the first time the species was found, I referred them to *C. geotropa* Fr.; later collections showed me the error. The gills in the young plants are merely sinuate-emarginate, but when the pileus expands they become decurrent. The decurrent character of the gills is not as strongly marked as the European descriptions indicate, and our plant departs from European forms in several particulars. Fries (Monographia) says the gills are whitish, not changing, whereas the yellowish to tan color which the gills soon assume in our plants is one of the most marked characteristics, becoming more noticeable after the specimens are picked. The thin tomentose coating on the stem, its bulbous tendency and the rusty-tan color of the old plants is also not mentioned. Clearly we have a distinct American form. The relation between *C. maxima* and *C. gigantea* does not seem to be clear to most European authors. The two are very distinct as Fries has pointed out. The American *C. gigantea* has a whitish, thinnier, much more infundibuliform pileus and its gills are more crowded and anastomose on the stem, and the margin of the pileus is strongly marked by sulcate-ridges. The attachment of the gills relates this to the genus Tricholoma. But in all other respects it is a Clitocybe of the Paxilloideae group.

Section II. Squamulosae. Surface of pileus broken up into scales, dry; flesh rather thick, stem scaly or fibrillose.

759. Clitocybe monadelpha Morg. (EDIBLE)

Jour. Cinn. Soc. of Nat. Hist., Vol. VI, 1883.

Illustrations: Ibid, Pl. 4.
N. Y. State Mus. Memoir, Vol. Ill, No. 4, Pl. 46, 1900.
Hard, Mushrooms, p. 103, Pl. XXI, Fig. 75, 1908.
McIlvaine, Amer. Mushrooms, p. 88, Pl. XXVII.

PILEUS 3-10 cm. broad, size very variable in a cluster, convex then plane, obtuse, depressed in age, entire surface dry, *becoming innately fibrillose-scaly*, scales floccose and more dense on disk, *rufous-tawny* to chestnut on disk, honey-colored beneath scales, margin recurved and splitting in age. FLESH white or tinged ochraceous-brown, very thick on disk. GILLS subdecurrent, subdistant, rather broad in the middle, tapering to both ends, intervenose, *pallid then dull flesh color* and often stained with brown spots, edge entire. STEM *elongated*, 7-20 cm. long, tapering downward and *attenuated at the caespitose and crowded bases*, fibrous-stuffed, at length hollow, densely fibrillose or fibrillose-scurfy, glabrescent, twisted, pallid then fuscous-brown, darker to blackish-brown at base, brownish within. SPORES broadly elliptical, 6-7.5 x 5-5.5 micr., smooth, white. ODOR and TASTE mild, or slightly bitter.

(Dried: Umber-brown.)

Very caespitose. On the ground in woods, usually attached to old roots or rotten wood. New Richmond. September. Rare.

This is apparently the American form of *C. tabescens* Bres. of Europe. In the few collections examined, the spores of the native plant rarely measured over 7 micr. long, while Bresadola gives 8-10 x 5-7 micr. for his species. When young this species simulates *Armillaria mellea*, but without a veil, later it is not easily confused with it. The scales on the cap are often well-developed.

760. Clitocybe decora Fr.

(= *Tricholoma multipunctum* Pk.)

Syst. Mycol., 1821. (N. Y. State Mus. Rep. 25, 1873.)

Illustration: Fries, Icones Select, Vol. I, Pl. 60.

PILEUS 3-6 cm. broad, convex, rather thin, depressed in center or plane, yellow (luteous) or tinged brown or olivaceous, covered with dense, innate, fibrillose, minute, blackish or brownish scales, disk darker. FLESH yellowish. GILLS *obtusely adnate*, crowded, seceding, yellow, rather narrow. STEM 3-6 cm. long, 4-10 mm. thick, subequal, stuffed then hollow, yellow, dotted with minute scales, central or eccentric. SPORES variable, broadly-ovate to subelliptical, 6-7 x 4.5-5.5 micr., mixed with a large per cent of young globose spores 4-5 micr. diameter.

Single or subcaespitose. On rotten logs, in hemlock and spruce swamp. Sault Ste. Marie. July-September.

The generic position of this species is unsettled. Fries first placed it under Clitocybe, then Pleurotus. Gillet referred it to Clitocybe; Quelet to Tricholoma; Saccardo to Pleurotus. Peck name it anew *Tricholoma multipunctum*, then referred it back to *Clitocybe decora*, where it is to be hoped it will remain. It is an aberrant Clitocybe, like *C. laccata*, in departing from the manner in which in this genus the gills are attached.

761. Clitocybe praecox sp. nov.

Illustration: Plate CLVI of this Report.

PILEUS 2-5 cm. broad, fleshy, *dry*, convex, then plane or obtuse, somewhat irregular, or deformed, sometimes lobed, *flocculose or covered toith minute rufous-brown scales*, umber-brown or paler when young; margin incurved at first, obscurely fibrillose, even. FLESH whitish, thick on disk. GILLS acutely subdecurrent, close to subdistant, not broad, narrowed toward both ends, whitish or ward, obscurely bulbous, curved, *solid*, fibrous, dotted below with venose. STEM 3-4 cm. long, 6-8 mm. thick, equal or tapering downward, obscurely bulbous, curved, *solid;* fibrous, dotted below with delicate floccose scales from the veil, mealy at apex, at length silky-fibrillose throughout, pallid to brownish, white within, outer rind subcartilaginous. VEIL thin, fibrillose, whitish, evanescent. SPORES broadly elliptical, 7-9.5 x 5-6 micr., smooth, obtuse, white; basidia 4-spored. CYSTIDIA none. ODOR and TASTE strong, farinaceous.

Singly or subcaespitose. On lawns, parks, etc. Ann Arbor. April 20-June 1. Edibility not tested.

First found on the Campus of the University of Michigan among moss and grass through which it pushed and which probably caused its deformed appearance. The earliest specimens mature slowly. The collapsing veil at first leaves remnants on the stems in the form of obscure, transverse, delicate rings or scales, which soon disappear. Its scaly cap and veil indicate that it is related to the Friesian section "Versiformis" but the flesh is not hygrophanous. It has some affinities with *C. incilis* Fr.

Section III. Siccae. Pileus not scaly nor hygrophanous; flesh not watery nor scissile.

Subsection I. Disciformis. Pileus convex, then plane or depressed, obtuse, *regular;* gills equally decurrent. Stem *simple* or somewhat subcaespitose.

**Pileus cinereous or fuscous.*

762. Clitocybe nebularis Fr. (EDIBLE)

Syst. Mycol., 1821.

Illustrations: N. Y. State Mus. Rep. 48, Pl. 23, 1896.
Fries, Sverig. ätl. u. gift. Svamp., Pl. 45.
Gillet, Champignons d. France, Pl. 115.
Bresadola, Fungh. mang. e. vel., Pl. 33.
Cooke, Ill., Pl. 79.
Michael, Führer f. Pilzfreunde, Vol. II, No. 84.

PILEUS 5-9 cm. broad, convex, then plane, obtuse, rarely depressed, margin often wavy, even, *subpruinose*, glabrescent, *smoky-brown to grayish-buff*, margin pliant and soft. FLESH pure white, thick on disk, thin on margin. GILLS subdecurrent finally decurrent, *crowded*, attenuate at both ends, narrow, white then dingy or tinged gray, edge entire. STEM stout, 5-7 cm. long, 1-2.5 cm. thick, sub-clavate at base, or subventricose, *fibrous-spongy and solid, pruinose, smoky-buff*, concolor, even. SPORES minute, 5-6 x 34 micr., elliptical-ovate, smooth, white. ODOR and TASTE mild or very slightly acrid.

(Dried: Cap grayish-brown to smoky-isabelline; gills ochraceous-buff.)

Subcaespitose. Ground in woods of oak, maple, etc. Ludington, Ann Arbor. September. Infrequent.

This is called the "Clouded Clitocybe," because of the smoky hue of cap and stem. The spores of the American plant seem to be smaller than those of the European species, since Bresadola gives them 9 x 6-7 micr. Some specimens have a bit of acridity to the taste, a fact also recorded by Barla in Europe. McIlvaine, Bresadola, Cooke, Badham, Quelet and Michael report it as edible. Older authors in Europe have reported it as unsafe, e. g. Cordier, Paulet and Barla. The American plant has no evidence against it. It is sometimes attacked by another mushroom, *Volvaria loveianus*, which forms fruit-bodies on its cap. (See Fig. 7, Pl. XI, Swanson, Fungi.)

763. Clitocybe clavipes Fr. (EDIBLE)

Syst. Mycol., 1821.

Illustrations: N. Y. State Mus. Mem., Vol. Ill, No. 4, Pl. 46, 1900.
Fries, Icon., Vol. I, Pl. 47.
Gillet, Champignons de France, Pl. 117.
Cooke, Ill., Pl. 80.
Hard, Mushrooms, p. 94, Fig. 69.

PILEUS 2-7 cm. broad, soft, convex then plane, almost obconic, rarely umbonate, obtuse, even, *glabrous, sooty-brown*, fuscous-cinereous to brown, sometimes paler. FLESH white, thick on disk. GILLS deeply *decurrent, subdistant*, rather broad in middle, narrowed toward both ends, flaccid, white or tinged yellowish, edge entire. STEM 2-6 cm. long, 6-8 mm. thick at apex, clavate at base, tapering upwards, sometimes bulbous, concolor, -spongy-solid, white within, fibrillose. SPORES 6-7.5 x 4-5 micr., subelliptical, smooth, white. ODOR and TASTE agreeable.

(Dried: Pileus fuscous-cinnamon; gills sordid gilvous.)

Scattered or tufted. On the ground, mostly reported in conifer woods, but also in southern Michigan, under maple, oak, etc. September-October. Infrequent. Edible.

Water-soaked in wet weather. Differs from *C. nebularis* in its subdistant, decurrent gills, and slightly larger spores.

764. Clitocybe media Pk. (EDIBLE)

N. Y. State Mus. Rep. 42, 1899.

Illustrations: Ibid, Pl. 1, Figs. 9-12.
N. Y. State Mus. Rep. 48, Pl. XXIII, Fig. 1-7, 1896.
Hard, Mushrooms, p. 88, Fig. 64, 1908.

This is a variety of the preceding, recognizable by the subequal, not bulbous stem, broader and more distant gills, varying decurrent. The spores are 7.5-8 x 5 micr. TASTE mild. Edible.

On the ground, in oak, maple or birch woods. Marquette, Ann Arbor.

765. Clitocybe carnosior Pk.

N. Y. State Cab. Rep. 23, p. 76, 1872.

This may be considered as another *variety* of *C. clavipes*, distinguished by the forked gills. The pileus is brown to grayish-brown. TASTE pleasant. Habit, etc., of the type. Marquette. August.

766. Clitocybe vilescens Pk.

N. Y. State Mus. Rep. 33, 1880.

PILEUS *small*, 1-3 cm. broad, convex then plane and obtuse or slightly umbilicato-depressed, fragile, glabrous, even, pale-ashy to brownish-ashy, sometimes subpapillate, slightly pruinose at first on the involute margin. FLESH whitish, soft, thickish. GILLS sub-decurrent, whitish tinged ashy, close, moderately narrow, occasionally veined. STEM *slender*, 2-5 cm. long, 1.5-4 mm. thick, concolor or paler, solid, glabrous, equal, straight or curved, white-mycelioid at base. SPORES short and subglobose or broadly elliptical, 5-6 x 3-5 micr., smooth, white. ODOR and TASTE mild.

(Dried: Cap grayish, gills dingy pale tan.)

In frondose or mixed woods. July-August. Marquette, Ann Arbor. Infrequent.

***Pileus greenish.*

767. Clitocybe odora Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Michael, Führer f. Pilzfreunde, No. 86.
Fries, Sverig. ätlig. u. gift Svamp., Pl. 85.
Gillet, Champignons de France, No. 113.
Marshall, Mushroom Book, p. 71, Pl. XV. (As *Clitocybe* or *virens*.)
Conn. Nat. Hist. Surv. Bull. 3, Pl. XVII.

PILEUS 3-8 cm. broad, rather thin, convex then expanded-plane, subrepand, even, glabrous, margin incurved and pliant, sometimes substriate, *pale dingy-green to bluish-green* varying to whitish. FLESH white, *rather tough*. GILLS *rather broad*, close, adnate-decurrent, white then yellowish or tinged green. STEM 3 to 8 cm. long, 4-6 mm. thick, equal or thickened below, pruinose at apex, stuffed then hollow, white mycelioid or often soft-spongy at base, white or tinged green. SPORES 6-8 x 4-5 micr., broadly elliptical, smooth, white. ODOR *fragant*, sometimes evanescent. "Flavor, when cooked, rather strong, but not unpleasant." (McIlvaine.)

(Dried: Green color disappears; pileus grayish-tan to dark fuscous; the deep green colored pileus darkest when dried, those merely tinged green, paler; gills alutaceous.)

Subcaespitose, base of stem often deeply sunk in leaves and forest-mould. In conifer and broad-leaved forest. Marquette, Houghton, Ann Arbor. August-September. This typical form is rare.

This species runs into two varieties, *C. anisearia* Pk. and *C. viridis* Fr., of which the first variety is by far the commonest of the three in Michigan. The odor is usually strongly fragrant, but is variable, so that a normal green plant may be almost inodorous in age, further, the color varies to white with no sign of green, in which case the odor may be very marked. The color may therefore be white, or tinged a delicate green, dull uniformly green, grayish-green to bluish-green. The variability of the plant has caused some uncertainty as to whether our form is the same as the European plant. Our commonest form or variety has *narrow, crowded* gills, and is given below as *C. anisearia* Pk. Fries and others describe *C. odora* with *broad* gills, not crowded; and *C. viridis* with *crowded, white* gills and *solid* stem. I believe that all these characters are variants of one species, and have been unduly emphasized. The European plants as

well as ours are *edible*, though strong-flavored when alone.

Var. *anisearia* (*Clitocybe anisearia* Pk.) (EDIBLE.)

N. Y. State Mus. Rep. 32, 1879.

Like the preceding, of which it may be considered a variety. It differs in the *narrow, crowded* gills, and perhaps in the stronger development of the fibrillose cuticle of the cap. The gills "are white then cream-color. SPORES, etc., the same. Habitat the same.

Houghton, Marquette, Ann Arbor, Detroit, New Richmond, etc. Common throughout the State. August-October. Edible.

Var. viridis (*Clitocybe virdis* Fr.)

Syst. Myc., 1821.

This variety, with the *solid* stem, has not been found in Michigan. Fries separated it because of information he obtained from others. He never saw it. Cooke and others consider it identical with *C. odora*. Under certain conditions of growth, the interior "stuffed" center of istems of mushrooms often appears as if composed of the same substance and texture as the rest of the stem, i. e., as if "solid," and care must be taken to distinguish between such appearances.

****Pileus white or whitish.*

768. Clitocybe candicans Fr.

Syst. Myc. Fr., 1821.

Illustrations: Fries, Icones, Pl. 51, Fig. 3.
Cooke, Ill., Pl. 82.
Gillet, Champignons de France, Pl. 110.

"PILEUS 2-3 cm. broad, thin, dry, convex then plane or depressed, *shining white* in dry weather, with a superficial micaceous silkiness, dull white when moist, even, *margin decurved, regular*. FLESH white, thin. GILLS adnate then decurrent, crowded, very thin, narrow, white, edge entire. STEM 2-5 cm. long, 2-4 mm. thick, even, equal, *waxy-shining, cartilaginous, glabrous*, stuffed then hollow, curved and villose at base, somewhat rooting among the leaves, etc., to which it is attached. SPORES *broadly-elliptical* to subglobose, 5.5-6 x 4 micr., smooth, white. ODOR and TASTE mild."

Subcaespitose. Among leaves, etc., in woods. Reported by Longyear.

The cartilaginous stem and broader spores separate it from *C. dealbata* and the other Clitocybes. In the character of the stem it approaches the genus Omphalia.

769. Clitocybe dealbata Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 104.
Gillet, Champignons de France, Pl. 111.

PILEUS 1-4 cm. broad, convex then expanded, depressed in center, or umbilicate, glabrous, even, dry, *shining-white*, margin *undulate and becoming recurved* or ascending, very thin. FLESH white, thin. GILLS adnate then subdecurrent, persistently white, rather narrow, *crowded*, thin, edge entire or minutely erose. STEM 2-3 cm. long, 2-5 mm. thick, rather slender, stuffed then hollow and often compressed, white to pallid, *tough* and fibrous, straight, glabrous, even, equal, base oblique and villose, apex subpruinose. SPORES narrowly elliptical-oval, 4-5.5 x 2.5-3 micr., apiculate, nucleate, smooth, white; basidia 4-spored. ODOR and TASTE mild.

(Dried: Cap buff-white, gills whitish, stem sordid.)

Subcaespitose, usually in *twos* as figured by Cooke. Attached to decaying leaves in pastured woods of deciduous trees; also on lawns and pastures. Ann Arbor, etc. September-November. Frequent.

This species is known by its persistently white cap and gills, small size, etc. The tendency of mycologists to describe new varieties of it shows that it varies considerably. Peck has named a variety growing in mushroom beds var. *deformata*. The above description applies to the Ann Arbor form. It is very probable that there are intermediate grades between this species and *C. candicans*. Our plants were thin, and hence more like *C. candicans*. The two differ from such species as *C. albissima* Pk. and *C. phyllophila* Fr. in the entire absence of a yellowish color in cap or gills when old or dried. The stem is toughisli-nbroiis instead of cartilaginous as in *C. candicans;* the other points of difference are italicised, but may all vary. Some say the caps of both species are sometimes mamillate. Our plants grow in the woods among leaves, in twos or singly, and might be taken for *C. candicans* if one failed to examine the stem structure and the spores. The minute spores are only slightly different in the two species, but can be used as a good diagnostic character, since those of *C. candicans* are broader and shorter.

770. Clitocybe albissima Pk.

N. Y. State Mus. Rep. 26, 1874.

PILEUS 3-8 cm. broad, *medium large*, convex to expanded, dry, *thin and flexible, pure shining white;* not changed by weather, very regular, margin subzonate. FLESH white. GILLS close, short decurrent, narrow, whitish. STEM 5-8 cm. long, 5-10 mm. thick, subequal or tapering upward, *solid* or sometimes with cavity at one place, glabrous above, subtomentose towards spongy base. SPORES 6-8 x 4-5 micr., broadly elliptical, thin-walled, *minutely spinulose*. ODOR sometimes slightly of radish. TASTE slightly bitter or mild.

(Dried: Cap soft and white; gills yellowish.)

Gregarious, sometimes in fairy-rings.

In conifer woods of northern Michigan, Marquette, Greenville. August-September. Infrequent.

The snowy-white cap and size distinguish *C. albissima* from *C. candicans* and *C. dealbata*. In our specimens, which were identified by Peck, the gills become yellowish in dried specimens, while the cap, as in *C. dealbata*, retains its whiteness. The spores are unique in being very minutely echinulate, like those of *C. pulcherrima*. It is said to be close to *C. cerussata* Fr. of Europe, which has globose spores. Our specimens reported as *C. cerussata* in 12th Report, Michigan Academy of Science, were found to belong here.

771. Clitocybe connexa Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 5-7 cm. broad, convex, then expanded, subumbonate, minutely silky, *white, sometimes faintly tinged blue*, especially on margin. GILLS crowded, narrow, decurrent, whitish. STEM 5-7 cm. long, 4 mm. thick, equal or tapering upwards, *solid*, whitish. SPORES ovoid, 7 x 5 micr."

Reported by Longyear, Jackson County. Apparently rare.

Morgan says the pileus is sometimes quite bluish. The gills are said to be rounded behind and to imitate the genus Tricholoma. The odor is weak but aromatic.

772. Clitocybe truncicola Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 2-5 cm. broad, thin, firm, expanded and slightly depressed, glabrous, dry, white. GILLS narrow, thin, crowded, adnato-decurrent, white. STEM equal, stuffed then hollow, glabrous, often eccentric and curved. SPORES oval, 4-5 x 3-4 micr."

On logs and branches of maple. Our specimens were found on old roots of maple. September. Detroit.

A few other species of Clitocybe are partial to wood, e. g., *C. cyathiforme* Fr., *C. leptoloma* Pk., *C. ectypoides* Pk., and *C. decora* Fr.

Subsection II. Difformis. Pileus thick on disk, convex to plane, obtuse or umbonate, irregular. Gills unequally decurrent or variable in this respect, some rounded behind as in Tricholoma. Stem caespitose, stout in our species.

773. Clitocybe illudens Schw. (POISONOUS)

Synopsis Fung. Carolina, 1822.

Illustrations: McIlvaine, Amer. Fungi, Pl. 29 a, p. 96, 1900.
Marshall, Mushroom Book, p. 70, 1904.
Hard, Mushrooms, Pl. 10, Fig. 67, p. 92, 1908.
Conn. Nat. Hist. Surv. Bull. 3, Pl. 18, 1905.
Rep. 32, Geol. and Nat. Resources Ind., p. 1231, Fig. 8, 1907.
N. Y. State Mus. Mem. 4, Pl. 68, 1900.

PILEUS 8-20 cm, broad, thick, convex to expanded, plane or depressed, glabrous, often umbonate, bright *golden or saffron yellow, irregular*, or lobed, margin elevated in age but often decurved. FLESH white to yellowish. GILLS unequally long decurrent, close, *yellow*, becoming discolored, narrowed to both ends, sometimes forked. STEM *long*, 7-20 cm. long, 1-1.5 cm. thick, *firm*, solid, glabrous, *irregularly and variously curved or twisted, narrowed at base, concolor*, becoming darker at base. SPORES globose, 4-5 micr. diameter, white, copious. ODOR and TASTE strong and disagreeable.

Caespitose. On and around old stumps or decaying roots, forming large clusters often of 25-50 individuals. August-October. Frequent. Unsafe.

An attractive-looking mushroom, forming large golden-yellow masses, which catch the eye from a distance. It has poisonous properties, however, which affect most people with nausea and vomiting. When fresh clusters are brought into a dark room, it is shown to be strongly phosphorescent. This phenomenon is accompanied by a liberation of heat. The species is not found in Europe, and was first discovered by Louis de Schweinitz in North Carolina. Most of the photographs mentioned above look like *Armillaria mellea* without rings. I have seen it but occasionally about Ann Arbor, though Longyear marks it "common."

774. Clitocybe multiceps Pk. (EDIBLE)

N. Y. State Mus. Rep. 43, 1890.

Illustrations: N. Y. State Mus. Bull. 139, Pl. 117, 1910.
Clark & Kantor, Mycologia, Vol. 3, Pl. 52.
Atkinson, Mushrooms, 2d ed.
McIlvaine, Amer. Mushrooms, Pl. 27 a, p. 94, 1900.
Plate CLVII of this Report.

PILEUS 3-8 cm. broad, thick on disk, *firm*, convex, *white or whitish*, sometimes tinged gray or yellowish-gray, even, moist, glabrous, regular or irregular. FLESH pure white. GILLS *close, adnate to slightly decurrent*, sometimes sinuate, whitish, medium broad. STEM 5-10 cm. long, 6-12 mm. thick, *stout, solid*, equal or slightly

thickened at base, glabrous or pruinose at apex, white or whitish. SPORES globose, 5-8 micr. in diameter, smooth, white. TASTE slightly unpleasant.

(Dried: Caps grayish-fawn color, gills pale cinnamon.)

Very caespitose. Pastures, fields, grassy roadsides, open woods usually of broad leaved trees. Ann Arbor, Bay View, Marquette, New Richmond, etc. June to October. Frequent. Edible but not of the best variety for culinary purposes.

Except in color and in the nature of the cuticle of the cap, this species approaches *C. cartilaginea* Bres. The variations in the attachment of the gills shade into the genus Tricholoma. *C. multiceps* appears after prolonged rainy weather, and when developed rapidly it is quite tender and sweet. The clusters are often densely crowded and may usually be recognized by their firmness and dull white color.

775. Clitocybe cartilaginea Bres.

Fungi Tridentini, 1892.

Illustration: Ibid, Pl. 111.

PILEUS 4-8 cm. broad, convex, obtuse, dry, *provided with a cartilaginous cuticle, smoky-tan or whitish-tan*, tinged with gray or brown, glabrous, even, margin splitting. FLESH white, *thick*. GILLS *crowded*, attenuate subdecurrent, sometimes adnate and becoming sinuate or almost free when old, *narrow*, tough, subcartilaginous, attenuate at both ends, sordid white to *pale straw color*. STEM 5-7 cm. long, tapering upwards or subequal, 1-2 cm. thick at apex, stout, paler than pileus, somewhat spoiigy-clavate at base, cuticle toughish, solid, pruinose above, subfibrillose, bases somewhat connate. SPORES globose, 5-7 micr., nucleate, smooth, white. CYSTIDIA none; basidia 30-32 x 6-7 micr. ODOR and taste mild.

Caespitose. In woods. June, etc.

Sent in from outside the southern boundary of the State, and apt to occur within the State. The darker colors of the cap, and the straw-colored, truly crowded gills seem to be the only characters besides the cartilaginous cuticle of the pileus, by which to separate pale forms of *C. cartilaginea* from *C. multiceps*. Superficially, the habit, etc., of the two species are much the same. It was placed among the Tricholomas by Fries as *T. loricatum*. When quite young the color of the pileus is smoky-black.

Subsection III. Infundibuliformis. Pileus at length infundibuliform or deeply umbilicately depressed. Gills deeply and equally decurrent from the first. Color of pileus often fading but not hygrophanous.

776. Clitocybe catina Fr.

Epicrisis, 1836-38.

Illustration: Fries, Icones, Pl. 51, Fig. 4.

PILEUS 3-5 cm. broad, pliant, convex-infundibuliform, *regular, glabrous*, with a gelatinous feel when moist, not striate on margin (moist or dry), buff-white, after repeated rains pale dingy brownish, moist, not hygrophanous, never becoming shining-white, margin decurved. FLESH thin, *white, toughish*. GILLS decurrent, *crowded*, narrow, *dull whitish*, never yellowish nor cinereous, simple, edge entire. STEM 3-4.5 cm. long, 3-5 mm. thick, equal, terete, *straight*, stuffed then hollow, *tough*, white becoming sordid, pruinose above, tomentose toward base. SPORES ovate, 4-5.5 x 3 micr., smooth, white. CYSTIDIA none. ODOR farinaceous.

Gregarious or scattered, on the ground among leaves and pine needles in woods of beach and white pine. New Richmond. September-October. Abundant locally.

This seems to be merely a form of *C. catina*, from which it varies slightly. The gills are more crowded and after rains no incarnate tint is noticeable. It agrees very well in other respects with the figures and descriptions of Fries. The plants have the size and much the shape of *C. infundibuliformis*, but the latter has a reddish-tan colored cap when young, fading in age. *C. catina* is watery-whitish when fresh and the surface of the pileus becomes perfectly smooth and almost slippery, but is not truly hygrophanous. The shape of the cap is that of a regular vase or deep bowl and this character gives it the name. The pileus is more regular and smaller than *C. phyllophila* although the two species may apparently be easily confused.

777. Clitocybe infundibuliformis Fr. (EDIBLE)

Elenchus Fungorum, 1828.

Illustrations: Cooke, Ill., Pl. 107.
Bresadola, Fungh. mang. e. vel., Pl. 38.
Gillet, Champignons de France, Pl. 107.
Hard, Mushrooms, p. 89, Pl. 9, 1908.
Conn. Geol. and Nat. Hist. Surv. Bull. 3, Pl. 19, 1905.
Plate CLVIII of this Report

PILEUS 5-7 cm. broad, at first convex and *subumbonate* then depressed and finally entirely *infundibuliform*, dry, flaccid, coated with a delicate silkiness, *reddish to pale tan color*, fading with age, margin even and thin. FLESH white, thickish on disk. GILLS deeply decurrent, close, *thin*, white or whitish, narrow, acuminate at both ends, edge rather serratulate. STEM 4-8 cm. long, 5-10 mm. thick, tapering slightly upward, .glabrous, spongy within, externally firm, rather elastic, pale reddish or pallid, white-myeelioid at base where attached to leaves, etc.

SPORES ovate to sub-pyriform, obliquely sharp-pointed and apiculate, 5-8 x 3-4 micr. when mature, smaller when immature; basidia 4-spored. ODOR pleasant, TASTE mild.

(Dried: Cap reddish-tan, gills alutaceous to tan.)

Single or somewhat caespitose. Attached to decaying leaves and debris in both conifer and non-coniferous woods. Throughout the State as far as Isle Royale. July-October. My first record is July 8, the last October 20. Very common.

This is one of the first species to appear after the July rains set in. It becomes very robust at times, simulating *C. geotropa*, but the spores are longer than in that species. (See Patouillard, Tab. Analyt.) The color of the cap changes in a definite direction; when young and fresh the red color is predominant, when old the whitish hues appear. *C. flaccida* Fr. is said to differ in the tawny to rust-colored pileus which does not fade in age; I have been unable to recognize it in this State. The gills become yellowish. Its shape and habit are like *C. infundibuliformis*, and are therefore well shown in the illustrations of the latter. Both are edible and not likely to be confused with any injurious mushrooms.

778. Clitocybe pinophila Pk.

N. Y. State Mus. Rep. 31, 1879.

PILEUS 2-3 cm. broad, convex, then plane and slightly umbilicate, subinfundibuliform in age, moist, glabrous to minutely squamulose, *tan-color* to dingy-white, even on margin. FLESH whitish. GILLS subdecurrent, close, *narrow*, intervenose, whitish. STEM short, 1.5-2 cm. long, 2 mm. thick, equal, even, *solid*, fibrillose to pruinose, concolor. SPORES elliptical-ovate, narrowed to the apiculus, 5-6 x 4 micr., smooth, white. CYSTIDIA none; basidia 4-spored. ODOR farinaceous. TASTE farinaceous slowly becoming biting to the tongue.

Gregarious. On beds of pine needles, under white pine. New Richmond. September. Infrequent.

The plants do not agree in every respect with Peck's description. The stem is solid when fresh and young. It seems to approach two other species, *C. gallinacea* Fr. and *C. pithyophila* Fr. From *C. gallinacea*, *C. pinophila* differs in color and habitat and in the tendency to become infundibuliform; from *C. pithyophila*, *C. pinophila* differs in its small size, color and solid stem, etc. The acridity is slight. We need more microscopic data on these three species.

779. Clitocybe parilis Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Vol. I, Pl. 48.
Cooke, Ill., Pl. 281.

PILEUS 2-3 cm. broad, convexo-plane, obtuse, depressed or cup-shaped, dry, *minutely flocculose-scaly, brownish-ashy*, margin even, decurved and flexible, splitting when old. FLESH thin, white, soft. GILLS close to subdistant, long decurrent, arcuate, narrow, becoming dingy-white, *at first slightly cinereous*, few forked. STEM 3 cm. long, 2 mm. thick, equal or subequal, even, pruinose, glabrescent, terete, toughish, stuffed, pale ashy to pallid, base white mycelioid. SPORES 6 x 3.5 micr., elliptic-ovate, smooth, white. TASTE slightly but tardily disagreeable. ODOR somewhat farinaceous.

Singly or gregarious. On the ground in frondose and mixed woods. Ann Arbor. New Richmond. October. Infrequent.

Our specimens had close gills, whereas the European plant is said to have crowded gills. Otherwise it seems to belong here. Barla says the odor is like that of *Armillaria caligata*, or of *jasmine*, at first agreeable then nauseous.

780. Clitocybe sinopica Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 647.
Fries, Icones, Pl. 55, Fig. 2.
Gillet, Champignons de France, No. 105.

"PILEUS 2-3 cm. broad, thin, soon plane and depressed, *umbilicate*, dry, at first glabrous then flocculose, brick-red then becoming pale. FLESH white, elastic. GILLS decurrent, *very crowded, rather broad*, white becoming yellowish. STEM 2-4 cm. long, 3-8 mm. thick, stuffed, *equal*, subfibrillose, concolor or yellowish. SPORES 6-8 x 4-5 micr. ODOR and TASTE strong, farinaceous."

Woods. Spring and summer. Infrequent. Reported by Longyear. *C. praecox* might be mistaken for it, but that species has a stouter habit, is quite fleshy on the disk, and the gills are not at all crowded.

781. Clitocybe pulcherrima Pk.

Jour. of Mycology, Vol. 14, 1908.

PILEUS 3-7 cm. broad, convex, then umbilicate-depressed, *citron-yellow to cream-color* (Sacc.), fading, opaque, moist, not hygrophanous, *soft*, slightly silky-tomentose on disk, margin even. FLESH white or sometimes tinged cream color, thin on margin. GILLS equally decurrent, *narrow*, subdistant, *ochraceous-yellow*, few forked, edge entire. STEM 4-8 in. long, equal or subequal, spongy at base, stuffed then hollow, at first silky-tomentose then fibrillose with loose longitudinal fibrils, even. SPORES globose, 4-5.5 micr. diameter, *minutely echinulate*, white. ODOR and TASTE mild.

On decaying leaves or wood. Detroit, New Richmond. September-October. Infrequent.

The above description was made from fresh co-type material, at the time the type was sent to Peck. The spores have an obscure angularity, and are very minutely spinulose. In this character they approach *C. spinulosa* Smith, a British species, whose spinulose spores are said to be larger, as much as 8-9 micr. The type was found near Detroit by members of the Detroit Mycological Society. I found it again in the western part of the State. It seems to be rather rare. Its yellow color

is unusual in this genus. *C. sulphurea* Pk. has a streaked yellow pileus and stem, adnate gills and larger spores.

Section IV. Hygrophanae. Pileus thin, hygrophanous, not scaly. Flesh soft, watery, scissile.

Subsection I. Cyathiformis. Pileus depressed then cup-shaped: flesh scissile, thin.

**Gills cinereous.*

782. Clitocybe cyathiforme Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 113.
Plate CLIX of this Report.

PILEUS 2-7 cm. broad, thin, convex, soon plane and umbilicate-depressed, or *cup-shaped*, hygrophanous, fuliginous-brown when young and moist, becoming brownish-gray, glabrous or innately fibrillose, opaque, margin involute and even. FLESH watery, concolor, scissile. GILLS becoming acuminate-decurrent, narrow, *subdistant*, intervenose, varying to close or distant, grayish-brown, edge entire. STEM 4-7 cm. long, 3-6 mm. thick, tapering upwards, *spongy-stuffed, elastic, brownish to cinereous*, fibrillose when fresh, the fibrils forming reticulations, tomentose at base. SPORES 7-9.5 x 5-6 micr., occasionally some larger, elliptical-ovate, with an oblique apiculus, smooth, white; sterigmata stout; basidia 4-spored. ODOR slightly aromatic or none, TASTE mild.

(Dried: Pileus smoky-fuscous to smoky cinnamon; gills brownish-gray.)

Scattered, *on rotten wood*, logs, etc. Ann Arbor, Bay View, Marquette, New Richmond. In coniferous, mixed or frondose woods. September-October. Infrequent.

This is an autumnal species, and with us always occurs on rotten wood. The gills are said to be distant in the European plants. The gills of our plants are never separated to such extent; they are either truly subdistant or rather close. *C. expallens* Fr. is a species with close gills, but European mycologists seein to consider that this is an ecological variant of *C. cyathiforme*. Excepting the gills all the characters of our specimens are those of the European *C. cyathiforme*, and I am inclined to think that variations with close gills will also have to be included under *C. cyathiforme*. The spores of our collections are all alike, although quite variable in single plants. Barla says the odor is that of hay. Although the gills are ashy-brown, the spores are white. Peck has described two related species, *C. subcyathiforme* and *C. subconcava*. *C. subcyathiforme* is watery-white on the cap when moist, and the gills are white, but the ,stem is fibrillose-reticulate as in *C. cyathiforme*, the spores slightly smaller; *C. subconcava* has a brownish to reddish-brown cap, its gills are close and subcinereous, but the spores are only 5-6 x 3-4 micr. I have not seen them.

***Gills yellowish.*

783. Clitocybe ectypoides Pk.

N. Y. State Mus. Rep. 24, 1872.

PILEUS 2-5 cm. broad, thin, broadly umbilicate to infundibuliform, finely *virgate* with close-pressed blackish fibrils, *squamulose-punctate, the black points seated on the radiations*, hygrophanous, watery-gray to dull watery-yellow, margin spreading and even. FLESH with an aqueous juice, concolor. GILLS long decurrent, narrow, sometimes forked, *subdistant* or nearly so, *yellowish*. STEM 2-5 cm. long, 2-4 mm. thick, equal, firm, *solid*, concolor or paler, white-mycelioid at base. SPORES elliptical, 8-9 x 4-5 micr., smooth, white.

Scattered, on rotten logs in conifer or mixed woods of northern Michigan. Bay View, Marquette, Huron Mountains. August-September. Frequent locally.

The pileus is sometimes irregular, and the stem may be eccentric. In our plants the gills are always more nearly subdistant than close.

****Gills whitish.*

784. Clitocybe adirondackensis Pk. (EDIBLE)

N. Y. State Cab. Rep. 23, 1872.

Illustrations: N. Y. State Mus. Rep. 54, Pl. 69, 1901.
Hard, Mushrooms, Fig. 71, p. 97, 1908.

PILEUS 2-5 cm. broad, thin, convex then plane and *umbilicato-depressed* to infundibuliform, glabrous, hygrophanous, *white or tinged tan-color*, margin at first decurved, then elevated, even, *with a narrow zone near the edge when moist*. FLESH white, thin. GILLS long decurrent, *crowded, very narrow*, thin, white. STEM 3-7 cm. long, 2-4 mm. thick, cylindrical, *glabrous, stuffed then hollow*, even, white or whitish, mycelioid-thickened at the base. SPORES minute, elliptical-ovate, smooth, 4-5.5 x 3-3.5 micr. TASTE alike that of the common mushroom," Peck.

(Dried: Cap and gills ochraceous-tan, stem paler.)

Gregarious or subcaespitose among leaves, etc., in frondose and mixed woods. Ann Arbor, Marquette, Detroit. Frequent. August-October.

The characters are well shown in Dr. Fischer's photograph in Hard's book. The crowded narrow gills, the dingy white color of the cap varying into a circular zone near the edge, and the stuffed stem distinguish the plant. It seems to be quite common on wooded hillsides of southern Michigan. It approaches *C. eccentrica*.

785. Clitocybe eccentrica Pk.

Bull. Torr. Bot. Club, Vol. 25, p. 321, 1898.

PILEUS 2-5 cm. broad, convexo-plane, umbilicate then infundibuliform and turbinate, glabrous, subhygrophanous, *watery-white and shining when moist*, sometimes tinged ochraceous, buff whitish when dry, the thin surface layer slightly differentiated into long

subgelatinous cells, the thin margin even, often lobed, split and finally recurved. FLESH thin, whitish. GILLS *short-decurrent* from beginning, *very crowded, narrow*, somewhat forked, *dingy-white*. STEM 2-4 cm. long, 2-4 mm. thick, slender, equal, stuffed, fibrous, elastic, whitish, pruinose above, *base inserted by a tuft of strigose hairs and continued into the substratum by long white strings or rhizomorphs*, often eccentric. SPORES very minute, 4-5 x 2-3 micr., elliptical-ovate, smooth, white. ODOR mild, TASTE sometimes slightly bitter.

(Dried: Cap and gills pale rufous-tan.)

Caespitose or scattered. On very rotten wood in mixed and frondose woods. Ann Arbor, Bay View, Houghton, etc. July-September. Frequent throughout the State.

This species approaches *C. adirondackensis*, from which the short decurrent gills, the different lustre of the cap and the rhizomorphs at the hairy base of the stem separate it; the spores too, average half a micron smaller. These differences may be merely an expression of habitat, since the one grows mainly on rotten wood, the other among leaves and humus. Another species of Peck, said to grow on rotten wood, is *C. leptoloma*. Here also, the strigose base of the stem and the rhizomorphs are about the only characters of *C. eccentrica* which separate it. It is likely that these three species are variations of one of them.

786. Clitocybe albidula Pk.

N. Y. State Mus. Rep. 46, 1893.

Illustrations: N. Y. State Mus. Rep. 53, Pl. C, Figs. 16-20.

PILEUS 1-4 cm. broad, thin, convex-plane, umbilicate, subhygrophanous, *pale grayish-brown* to whitish, the *umbilicus always darker and brown*, glabrous, margin faintly striatulate. GILLS subdecurrent, crowded, narrow, thin, sometimes forked, intervenose, whitish. STEM 2-5 cm. long, 2-4 mm. thick, equal, stuffed then hollow, concolor, fibrous-toughish, even, white-mycelioid at base. SPORES 5-6 x 3-4 micr., elliptic, smooth, white. ODOR and TASTE farinaceous.

Gregarious, in woods of hemlock and cedar. Bay View. September. Infrequent.

A form occurs with creamy-white pileus and brown umbilicus with spores the same. This form has only a faint odor, but no doubt belongs here. The brown umbilicus and slightly larger spores, along with the grayish tinge in the color, separate this species from the preceding two. It never becomes truly cyathiform nor infundibuliform.

787. Clitocybe caespitosa Pk.

N. Y. State Mus. Bull. 41, 1888.

"PILEUS 2-4 cm. broad, convex-plane then infundibuliform, *often irregular*, slightly silky, hygrophanous, *grayish-brown when moist*, subcinereous or argillaceous when dry. GILLS decurrent, narrow, close, somewhat forked, white. STEM 2-3 cm. long, 4-6 mm. thick, equal, stuffed then hollow, silky, white. SPORES minute, subelliptical, 3-4 micr. long."

In woods. Caespitose, the caps deformed and made irregular by mutual pressure. Reported by Longyear.

Subsection II. Orbiformis. Pileus convex then plane or slightly depressed, often obtuse, polished, not squamulose nor mealy.

*****Gills grayish*.

788. Clitocybe metachroa Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 115.
Patouillard, Tab. Analyt., No. 308.

PILEUS 1-4 cm. broad, thin, convex then plane and depressed, *at first dark fuscous* then brownish-gray or livid (moist), dull grayish-white (dry), hygrophanous, glabrous, margin even, substriate (dry). FLESH thin, concolor. GILLS adnate to slightly subdecurrent, sometimes by lines, *crowded*, narrow, dark fuscous when young, *then whitish-ashy*, thin, at length flaccid, edge entire. STEM 3-4 cm. long, 2-4 mm. thick, subequal, even, at first *dark fuscous and pruinose-silky*, then grayish and glabrescent, stuffed then hollow, often compressed, toughish. SPORES minute, ovate, 5 x 2.5 micr., smooth, white. CYSTIDIA none. ODOR none or faintly farinaceous after crushing the flesh. TASTE mild.

Gregarious or scattered. On the ground in frondose and conifer woods. Ann Arbor, Marquette. September-November. Infrequent.

The color of the whole plant changes remarkably from the young stage to maturity and in age. *C. ditopoda* Fr. is similarly colored, differing mainly in its strong farinaceous odor and probably in the spore characters. It should not be confused with *C. cyathiforme*, which is larger, has larger spores and usually grows on wood.

789. Clitocybe ditopoda Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 116.

PILEUS 2-5 cm. broad, convex then subexpanded and *umbilicate-depressed*, pliant, glabrous, even, hygrophanous, *cinereous or grayish-brown* (moist), dull white (dry), margin somewhat irregular. FLESH thin. GILLS adnate or scarcely subdecurrent, *crowded*, rather narrow, pallid at first, soon *cinerascent* and smoky-gray, edge entire. STEM 2-3 cm. long, 3 mm. thick, terete or more *often compressed*, irregular, *pale cinereous*, stuffed soon hollow, pruinose downwards. SPORES elliptic-ovate, 5-6 x 3-4 micr., smooth, white. CYSTIDIA none. ODOR and TASTE farinaceous.

Gregarious or subcaespitose. On the ground, among needles and debris of tamarack trees in wet swamp.

Ann Arbor. October-November. Infrequent.

This species was abundant in this one locality. It has much in common with *C. metachroa*, but differs from it in

the farinaceous odor and in the different color changes in passing from the young to the old stage. The plants also do not have the stiff appearance of *C. metachroa*.

790. Clitocybe peltigerina Pk.

N. Y. Mus. Rep. 30, 1878.

PILEUS 4-10 mm. broad, *small*, subexpanded, umbilicate, hygrophanous, *grayish-brown and striatulate when moist*, whitish to pale gray when dry, glabrous. GILLS decurrent, *distant*, narrow, somewhat forked and intervenose, *grayish-brown*, thickish, pruinose. STEM 1-2 cm. long, 1.5 mm. thick, equal, solid, elastic, pallid or tinged grayish-brown, pruinose below, base minutely tomentose. SPORES elliptical-ovate, pointed-apiculate, 8-10 x 4-5.5 micr., smooth, white; basidia 4-spored; cystidia none. ODOR and taste none.

Singly or subcaespitose. On Peltigera, one of the lichens. Ann Arbor. May 5. Rarely found.

Remarkable for its habitat. It is small and imitates the color of its substratum and is easily overlooked.

***Gills whitish*.

791. Clitocybe morbifera Pk. (POISONOUS)

Bull. Torr. Bot. Club, Vol. 25, p. 321, 1893.

Illustration: Plate CLIX of this Report.

PILEUS 1.5-4 cm. broad, convex then plane, sometimes slightly depressed or obtuse, hygrophanous, or at least moist, glabrous, grayish-brown to grayish-buff when moist, *white to alutaceous when dry*, somewhat reviving, margin even and incurved. FLESH thin, whitish. GILLS adnate-decurrent, moderately close, slightly broad in middle, narrowed to a point at both ends, whitish, becoming pale tan in age, thin, edge entire. STEM 2-3.5 cm. long, 2-4 mm. thick, subequal, *solid* and *spongy-fibrous within, pruinose*, slightly fibrillose, *tough*, colored like pileus or paler, straight or curved, not slender.

Microscopic: SPORES oval, minute, about 5 x 3 micr., white, smooth, usually poorly developed; basidia about 20 micr. long; trama of gills of parallel hyphae, 4 micr. in diameter; trama of pileus only slightly wider, all of the trama being composed of compact, narrow, long hyphae; the cuticle is not noticeably differentiated. Cystidia none. ODOR none. TASTE varies, sometimes slight, when fresh it is slightly astringent.

(Dried: Entirely dirty white or grayish-white.)

Singly or subcaespitose among grass *on lawns*, roadsides, etc. Specimens from Adrian found under a syringa bush and elsewhere. October. Adrian, Ann Arbor, and Detroit. Frequency not yet certain, as it is probably often overlooked. *Poisonous*.

This is apparently a dangerous plant. In the case of *C. illudens*, there is no uncertainty in its recognition, as it is more brightly and differently colored than any related mushrooms; but *C. morbifera* has many near relatives which, like *C. dealbata*, are sometimes difficult of separation. Fortunately, no one except beginners, or extreme mycophagists, collect these small species. Still the fact that it grows on lawns where only edible species are normally found, makes this a troublesome intruder. Several families in different parts of the country are now known to have been made sick from eating it. Peck reports a case from Washington, D. C., from which source came the material for his description. Our specimens were sent by E. D. Smith from Adrian, Michigan. Several persons in Adrian ate *C. morbifera* with a mess of *L. naucina*. The victims suffered blindness, swollen throat, etc. Our specimens did not have the marked taste described by Peck, nor a truly "hollow" stem. It is doubtless the same species however.

792. Clitocybe compressipes Pk.

N. Y. State Mus. Rep. 33, 1880.

PILEUS 2-5 cm. broad, convex then plane and depressed or subumbilicate, hygrophanous, thin, glabrous, *pale watery-brown and even when moist*, whitish or tinged tan when dry, edge of margin persistently incurved. FLESH rather thin, concolor, upper layer of trama differentiated and composed of delicate, long, subgelatinous cells. GILLS subdecurrent, close, rather narrow, *pale watery-ochraceous or brownish when moist*, whitish when dry, intervenose. STEM short, 2-3 cm. long, 2-3 mm. thick, soon hollow and compressed, equal, even, glabrous or subvillose, grayish-brown to pallid, attached by toniemtum to leaves, etc. SPORES 4-5.5 x 2.5-3.5 micr., elliptical-ovate, smooth, white. ODOR and TASTE mild.

(Dried: Cap pale tan to dingy white, gills sordid white.)

Scattered or subcaespitose. Among leaves in frondose woods. Ann Arbor. September-October. Infrequent.

These plants do not have the farinaceous odor which is present in *C. albidula* of conifer woods.

793. Clitocybe angustissima Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 59, Fig. 2.
Grillet, Champignons de France, No. 111.
Cooke, Ill., Pl. 125.

PILEUS 2-5 cm. broad, convex-expanded, *obtuse or subdepressed*, subhygrophanous, glabrous, *watery-white, candicans*, even (moist), slightly striatulate (dry), margin spreading, at length recurved. FLESH thin, whitish. GILLS slightly *subdecurrent*, very narrow, *very crowded*, thin, whitish, edge entire. STEM 3-5 cm. long, slender, 2-5 mm. thick, whitish, flexuous or curved at base, equal or tapering downward, *apex naked*, pubescent at base. SPORES short elliptical, 5-7 x 3-4 micr., smooth. CYSTIDIA none. BASIDIA about 27 x 6 micr., 4-spored. ODOR none or faint.

Scattered, on the ground among leaves in low frondose woods. September. New Richmond. Infrequent.

This is one of a number of similar species, in this case well-marked by the very crowded and narrow whitish

gills, the watery-white color and the lack of odor. *C. albidula* Pk. differs mainly in its farinaceous odor. *C. compressipes* Pk. can probably be differentiated by its close rather than very crowded gills and by the compressed stem; both of Peck's species are said to have the caps tinged brownish when moist, and not shining-white (candicans) as in *C. angustissima*.

SUBGENUS LACCARIA. Spores globose, echinulate; pileus usually minutely scaly or floccose.

794. Clitocybe laccata Fr. (EDIBLE)

(*Laccaria laccata*)

Syst. Myc., 1821.

Illustrations: N. Y. State Mus. Rep. 48, Pl. 25, 1896.
Murrill, Mycologia, Vol. 3, Pl. 40, Fig. 4.
Hard, Mushrooms, Fig. 76, 77, p. 105, 1908.
Cooke, Ill., Pl. 139.
Patouillard, Tab. Analyt, No. 104.
Gillet, Champignons de France, No. 99.

PILEUS 2-5 cm. broad, thin, convex then plane, subumbilicate, variable in shape, hygrophanous, glabrous at first, then scurfy-scaly, pale red to flesh-red when moist, pale ochraceous-whitish when dry. FLESH thin, moist. GILLS broad, *distant*, broadly emarginate, tinged flesh color, white-pruinose. STEM 2-7 cm. long, 2-6 mm. thick, slender, equal, *fibrous and tough*, stuffed, *pale flesh-red*, sometimes striate. SPORES globose, 8-10 micr., echinulate, spines 1 mm. long, white. ODOR agreeable. TASTE fungoid.

Scattered everywhere in woods, groves, swamps or grassy places, on naked soil, mosses, or leaves, etc. Throughout the season; my earliest record is May 5, the last November 8. Everywhere in the State, in coniferous or frondose woods. Very abundant in wet weather. It is edible, but not particularly well-flavored.

Varieties occur, and the common form shades gradually into var. *striatula* Pk., var. *amethystina* Bolt and var. *pallidifolius*. Var. *striatula* Pk. has a very thin cap which is radially striate from near the umbilicate center; spores 9-11 micr. diam., globose, echinulate, the spines about 1 micron long. Var. *amethystina* Bolt, has a darker cap, and beautiful deep-violaceous gills, which are broadly adnate-decurrent. The spores of our specimens of var. *amethystina* are like those of the normal form. Var. *pallidifolia* Pk. is like the common form except that the gills are pallid. This species and its varieties are sometimes confused with *Lactarius subdulcis*.

795. Clitocybe tortilis Fr.

(*Laccaria tortilis*)

Hymen. Europ., 1874.

Illustration: Patouillard, Tab. Analyt, No. 105.

PILEUS 5-12 mm. broad, submembranaceous, convex then expanded and depressed on disk, *distantly radiately striatulate from the center* when moist, hygrophanous, pale reddish or salmon color, pruinose, disk whitish-scurfy, margin sometimes plicate or splitting, often deformed or irregular. GILLS *distant*, rather narrow, *adnate-subdecurrent*, thick, not forked nor veined, salmon-colored, edge concolor. STEM 1-2 cm. long, 1 mm. thick, slender, equal, *fibrous-toughish, stuffed with a white pith*, pellucid flesh color, glabrous, base white-mycelioid. SPORES *large, globose*, long-echinulate, white, 12-14 micr. diam.; basidia 2-spored.

On the ground, in wet places, sometimes on moss. Marquette. August-September.

This is a distinct species and must not be confounded with *C. laccata* nor its varieties. The spores are nearly twice as large as in that species. It is easily mistaken for a species of the rosy-spored genus Eccila. It has sometimes been referred to as a variety of *C. laccata*.

796. Clitocybe ochropurpurea Berk. (EDIBLE)

(*Laccaria ochropurpurea*)

Illustrations: N. Y. State Mus. Bull. 116, Pl. 106, 1907.
Hard, Mushrooms, p. 98, Pl. XI, Fig. 72, 1908.
Chicago Nat. Hist. Surv., Bull. VII, Fig. 2, 1909.

PILEUS 5-20 cm. broad, sometimes large, *subhemispherical*, then convex with a decurved margin or nearly plane or depressed, *compact*, rather thick, hygrophanous, purplish-brown when moist, pale grayish-alutaceous when dry, unpolished, margin regular or wavy, upturned in age. FLESH *tough*, concolor or pallid. GILLS *distant, thick*, broad, *adnato-decurrent, purple*. STEM 5-20 cm. long, 1-2 cm. thick, varying much in length and shape, subequal to fusiform or cylindrical, fibrous, often rigid and hard, solid, concolor or paler, sometimes curved or twisted. SPORES globose, short-echinulate, 8-9.5 micr., white, or tinged in mass with a lilac hue. TASTE rather disagreeable.

(Dried: Cap and stem grayish-white to sordid-white, gills smoky-fuscous.)

Scattered or subcaespitose. On bare ground or open grassy places, preferring a hard soil, often in woods, conifer, mixed or frondose. From Isle Royale to the southern limit of the State, everywhere. July-October.

Not as common as *C. laccata*. In its colors and shape it appears somewhat like a purple-gilled Cortinarius, but its texture is different and it lacks a veil. It becomes tender and of agreeable flavor when cooked.

Collybia Fr.

(From the Greek, *kollybos*, a small coin; probably because of the regularity of the disk-like pileus.)

White-spored. Stem *cartilaginous* or with a cartilaginous cuticle. Pileus *soon expanded*, not very fleshy, *its margin at first involute*. Gills adnate, adnexed or almost free, *not decurrent*. Spores mostly small or minute, smooth. Volva and annulus lacking.

Putrescent, thin capped, mostly lignicolous mushrooms, of slow growth, not reviving when moistened except in the section Marasmioideae, and, with few exceptions, of

medium or small size. They are mostly attached to decayed wood, like stumps, logs, old buried roots, twigs, leaves, etc.; a few species even occur on decayed mushrooms, while others seem to grow on naked soil. The genus is most closely allied to Marasmius, but the plants differ in not reviving after drying up; from Mycena, the involute margin of the pileus, with its resultant expansion at maturity, is the main distinction. As this is only clearly seen in the very young stage, it is often difficult in mature plants to decide whether one has a Collybia or Mycena. In the majority of Collybias, however, the pileus is expanded at maturity, but in Mycena the pileus usually remains canipanulate.

The PILEUS is rarely brightly colored. The color may be brown, ashy, blackish, tan, yellowish, white, or shades of these colors. A few have a viscid cap, and in one section the cap is hygrophanous; it is glabrous except in *C. longipes*, and some of the Marasmioideae. In several of the hygrophanous species the margin is striatulate when moist. The GILLS are submembranous and soft, and continuous with the trama of the pileus. They are usually white, yellowish, rufescent or ashy. In one species they are lilac. Some mycologists have divided the sections by the difference in the width of the gills, some species have quite broad gills, others narrow gills. The mosde of attachment separates the genus from Omphalia and Clitocybe, since they are never decurrent. The STEM is primarily cartilaginous, as in Mycena, Omphalia and many Marasmii. This character is not always easily recognized, and in some large species like *C. platyphylla*, the otherwise soft stem may mislead one. Furthermore, the stems of plants belonging to the fleshy-stemmed genera may, on drying in the wind, become somewhat cartilaginous in texture, so as to be mistaken for true cartilaginous forms. The base of the stem is usually rooting, sometimes remarkably so, as in *C. radicata*, and *C. longipes*. Some species have glabrous stems, while one section is composed of species with hairy, floccose, or pruinose stems. The presence of deep or at least evident striations running up and down the stem is used to set off another section. A few small species form a small sclerotium from which the fruit-body develops.

No poisonous species of Collybia are known, although the smaller species have probably never been tested. Many of the large species are of good flavor and much sought.

It is probable that some forty-five species occur within the State, but so far only thirty-four have been identified. The species have been grouped in various ways by different authors. In the main, the Friesian arrangement is retained, although somewhat modified. It seemed that relationships could be better shown by using the color of the gills to divide the main sections, rather than divide the whole genus into two main groups having white and cinereous gills respectively as Fries had done. A new section has been established to contain those species which approach the genus Marasmius. This is called the Marasmioideae and serves as a bridge to that genus. The genus is therefore composed of the five sections:

I. Tephrophanae.

II. Laevipedes.

III. Striaepedes.

IV. Vestipedes.

V. Marasmioidae.

Key to the Species

(A) Not reviving when moistened. [See also (AA).]
  (a) Stem velvety, tomentose, floccose or pruinose. [For *C. myriadophylla* with lilac gills, see (aa).]
    (b) Stem with a dense, tawny-brown to blackish, velvety covering.
      (c) Pileus with a viscid, even, separable pellicle; mostly caespitose. 818. *C. velutipes* Fr.
      (cc) Pileus not viscid, striatulate; growing scattered. *C. amabilipes* Pk.
    (bb) Stem not densely velvety.
      (c) Flesh changing to purplish-black where cut or bruised; stem fuliginous, pubescent. 820. *C. succosa* Pk.
      (cc) Flesh not changing black; gills white or whitish.
        (d) Pileus 2.5-5 cm. broad.
          (e) Stem very long, deeply rooted; pileus velvety, brown. 819. *C. longipes* Fr.
          (ee) Stem 3-4 cm. long covered with a close white tomentum, not rooting; pileus glabrous, whitish to pale reddish on disk. 825. *C. hariolorum* Fr.
        (dd) Pileus less than 2 cm. broad; stems slender. (Mycena-like plants.)
          (e) Stem arising from a small tuber, on decaying mushrooms or rich mold; pileus small, 1 cm. or less, whitish. 823. *C. tuberosa* Fr.
          (ee) Stem not arising from tuber-like sclerotia.
            (f) Growing on pine cones, needles, etc.
              (g) Pileus 1-3 cm. broad, fuscous; stem elongated by a tomentose "root." *C. conigena* Fr.
              (gg) Pileus 2-10 mm. broad, creamy-white to pale brownish, minutely pubescent. 822. *C. conigenoides* Ell.
            (ff) Growing on the ground, humus, etc.
              (g) Pileus whitish, faintly reddish-tinged; stem white-pulverulent. 824. *C. cirrhata* Fr.
              (gg) Pileus grayish-brown to smoky-brown; stem white, under lens with minute dark points. 821. *C. floccipes* Fr.
  (aa) Stem glabrous (often tomentose-hairy at base and pruinose at apex).
    (b) Stem deeply rooting.
      (c) Pileus viscid, radiately wrinkled, grayish, brown, or almost white; gills pure white; very common. 815. *C. radicata* Fr.
      (cc) Pileus not viscid, hygrophanous, rufous-tan, smaller; gills dingy flesh color. 806. *C. hygrophoroides* Pk.
    (bb) Stem without a long, root-like prolongation.
      (c) Pileus large, 6-12 cm. broad.
        (d) Gills broad, subdistant; pileus grayish-brown, etc., streaked with darker fibrils. 816. *C. platyphylla* Fr.
        (dd) Gills narrow, crowded.
          (e) Stem equal, subbulbous at base; pileus whitish, tinged creamy-yellow. 812. *C. albiflavidum* Pk. (*Tricholoma albiflavidum*).

(ee) Stem narrowed toward base, short-rooting.
(f) Gills yellow or yellowish; pileus ochraceous, not stained. 817. *C. scorzonerea* Fr.
(ff) Gills white or whitish; pileus stained ferruginous in spots. 817. *C. maculata* A. & S.
(cc) Pileus less than 6 cm. broad.
(d) Pileus white, small, 4-10 mm. broad.
(e) Gills narrow; spores narrowly-elliptical, 10 x 4-5 micr. *C. delicatella* Pk.
(ee) Gills broad, ventricose; spores subglobose, 4-5 x 3-4 micr. *C. alba* Pk.
(dd) Pileus not truly white.
(e) Gills lilac-color, narrow, very crowded; pileus 1-2.5 cm. broad. 807. *C. myriadophylla* Pk.
(ee) Gills some other color.
(f) Gills white or whitish.
(g) Gills rather broad, ventricose.
(h) Odor alkaline when crushed; pileus grayish-umber, hygrophanous, striatulate. 801. *C. alcalinolens* Pk.
(hh) Odor not alkaline.
(i) Taste bitter; pileus pale yellowish-brown, umbilicate. *C. edculentoides* Pk.
(ii) Taste farinaceous; pileus and stem dark rufous-brown, obtuse. 814. *C. succinea* Fr.
(gg) Gills rather narrow.
(h) Caespitose or densely gregarious on decaying logs; pileus grayish-brown to buff.
(i) Pileus subumbilicate, not hygrophanous; gills adnate. 813. *C. abundans* Pk.
(ii) Pileus obtuse, hygrophanous; gills nearly free. 802. *C. familia* Pk.
(iii) See also *C. dryophila*.
(hh) Solitary, gregarious or subcaespitose.
(i) Pileus smoky-brown; not hygrophanous; stem 4-6 mm. thick, brown. *C. fuligincella* Pk.
(ii) Pileus pale, chestnut, reddish-brown, yellowish brown, waxy-yellow or tan.
(k) Stem striate; pileus umbonate; gills crenulate on edge. 797. *C. butyracea* Fr.
(kk) Stem not striate.
(l) Stem reddish-brown or yellowish, pileus pale reddish-brown, yellowish, tan, etc. 798. *C. dryophila* Fr.
(ll) Stem white or whitish.
(m) Pileus yellowish-white tinged rufous, slightly rugose; stem strict. 800. *C. strictipes* Pk.
(mm) Pileus reddish-brown to chestnut (moist); gills serrate on edge. 799. *C. lentinoides* Pk.
(ff) Gills not at length white or whitish.
(g) Gills yellow or yellowish.
(h) On decaying wood, scattered; pileus yellow; gills brownish-red on drying. 804. *C. colorea* Pk.
(hh) On the ground, caespitose; pileus watery-rufous-brown at first, then honey-yellow. 803. *C. aquosa* Fr. var.
(gg) Gills soon rufescent or cinerascent or darker.
(h) Pileus pale tan or flesh-reddish (moist); gills tinged flesh color. 805. *C. acervata* Fr.

(hh) Pileus hygrophanous, blackish or smoky-brown at first; gills cinerascent or dark brown.
(i) Odor and taste farinaceous; pileus striatulate (moist). 811. *C. expallens* Pk. var.
(ii) Odor none or slight; pileus even.
(k) Stem 2-3 cm. long, pileus umbilicate, pitch-black (moist); on burnt ground. 808. *C. atrata* Fr.
(kk) Stem longer; pileus blackish-chestnut (moist), obtuse; on mossy ground. 809. *C. plexipes* Fr. var.
(kkk) Stem 2-3 cm. long; pileus grayish-brown; gills fuscous; on wood. 810. *C. atratoides* Pk.

(AA) More or less reviving when moistened.
(a) Pileus umbilicate, fibrillose-hairy.
(b) Pileus 1-2.5 cm. broad, zonate, dark tawny. 827. *C. zonata* Pk.
(bb) Pileus 0.5-1 cm. broad, umbilicus papillate. 828. *C. stipitaria* Fr.
(aa) Pileus not umbilicate.
(b) Pileus and stem sulphur-yellow, tough, sub-rigid. 830. *C. lacunosa* Pk.
(bb) Not yellow.
(c) Pileus 2-5 cm. broad, convex-plane, hygrophanous; stem densely whitish-pubescent; on the ground. 826. *C. confluens* Fr.
(cc) Pileus 5-8 mm. broad, conical-campanulate; stem instititious, on twigs of arbor vitae. 829. *C. campanella* Pk.

Section I. Tephrophanae. Pileus more or less hygrophanous; at least watery.

**Gills white or whitish.*

797. Collybia butyracea Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Michael, Führer f. Pilzfreunde, Vol. III, No. 104.
Cooke, Ill., Pl. 143 (faded).
White, Conn. State Geol. and Nat. Hist. Surv. Bull. 15, Pl. VIII, 1910.
Gillet, Champignons de France, No. 149 (faded).

PILEUS 3-7 cm. broad, convex-expanded, *umbonate* to subumbonate, even, glabrous, reddish-brown, darker when young, fading with age, surface *with a fatty lustre when moist*, subhygrophanous, or watery and soft in wet weather. FLESH becoming white, thickish on disk. GILLS adnexed, almost free, crowded, thin, rather narrow, *white*, edge *crenulate*. STEM 3-7 cm. long, conico-attenuated upwards, 4-6 mm. thick above, at length subequal and subbulbous, *striate*, glabrous or slightly downy toward base, cuticle rigid-cartilaginous, base mycelioid. SPORES 5-7 x 3-3.5 micr., narrowly ovate, pointed-apiculate, smooth, white; CYSTIDIA none. ODOR and TASTE mild.

Solitary or gregarious. Very common in woods of white pine, New Richmond; infrequent in frondose woods, Detroit, Ann Arbor and Marquette. July-October.

The "buttery Collybia" is often hard to separate from *C. dryophila* by descriptions, and there are probably intermediate forms. The typical plant seems to be limited to *coniferous woods*. The striate stem influenced Fries to refer it to the Striaepedes; but it seems to belong more naturally to this group, from its general appearance and the somewhat hygrophanous flesh. The umbo often disappears somewhat in age, but the crenulate gills, and striate stem seem quite consistent for the typical plants of conifer woods. The spores of this species and several of those following are practically the same. It is probable that the form in frondose woods is an ecological variety, as it rarely possesses a distinct umbo.

798. Collybia dryophila Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 204.
Gillet, Champignons de France, No. 156.
Michael, Führer f. Pilzfreunde, Vol. III, No. 103.
Patouillard, Tab. Analyt., No. 315.
Murrill, Mycologia, Vol. 3, Pl. 40, Fig. 8.
N. Y. State Mus. Bull. 122, Pl. 111, 1908 (coloring poor).
Plate CLX of this Report.

PILEUS 3-5 cm. broad, convex-expanded, obtuse or depressed, often irregular, even, glabrous, subhygrophanous, color variable, *tan, with reddish or yellowish shades*, disk darker, sometimes bay-brown, often faded. FLESH white, rather thin and pliant,

somewhat watery. GILLS adnexed or narrowly adnate, *narrow, crowded, whitish* or pallid (yellowish in variety), edge entire or minutely crenulate. STEM 3-6 crn. long, 2-4 mm. thick, equal or tapering upward, *reddish-brown* or yellowish-tinged, usually concolor, glabrous, hollow, cuticle cartilaginous, white-mycelioid at base. SPORES 5-7 x 3.5 micr., smooth, narrowly ovate, white, CYSTIDIA none. ODOR and TASTE mild.

Gregarious or subcaespitose. Typical form in hard-wood forests, groves, etc. June to October. (Earliest record, May 28; latest, October 4.) Very common, throughout the State.

This species is the center of a "group," including *C. butyracea*, *C. lentinoides*, *C. estensis* Morg., *C. aquosa* and *C. acervata*, which may be called the "dryophila" group. There seem to be a whole series of variations, connecting *C. dryophila* and *C. butyracea* on the one hand, and *C. dryophila* and *C. aquosa* on the other. It is difficult in many cases to refer individual collections in a very strict way to the species mentioned, except by generalizing the descriptions. In this report, it seemed best to select plants which well fit the Friesian descriptions, and draw our descriptions from them, and consider intermediate plants as "forms" or "varieties" of these, leaving such identifications to the students. Secretan, long ago, named a number of these varieties; but such names carry very little meaning, as even the varieties may vary. It is very probable that the varieties occur under different influences of habitat, i. e., grow in different soil, under different moisture conditions, etc. The spore print is white at first, but may become yellowish-tinged with age. The plants appear at their best growing from thick mats of leaves and humus, and are then often caespitose and the stems are covered toward the base with a white down. The caps are delicious when fried with bread-crumbs and egg.

799. Collybia lentinoides Pk.

N. Y. State Rep. 32, 1879.

"PILEUS 1-2.5 cm. broad, convex or nearly plane, obtuse, glabrous, *hygrophanous*, reddish-brown or chestnut color when moist, reddish-tan color when dry. GILLS adnexed, narrow, close, *white*, serrate on edge. STEM 3-5 cm. long, about 2 mm. thick, equal, even or slightly striate, hollow, slightly pruinose at top, *white or whitish*. SPORES 6-7.5 x4 micr.

"This species bears some resemblance to *C. dryophila*, from which it is differentiated by its hygrophanous pileus, serrated gills and white stem."

Reported by Longyear. Swamps. Summer. Apparently rare.

800. Collybia strictipes Pk. (EDIBLE)

N. Y. State Mus. Rep. 41, 1888.

Illustration: Plate CLXI of this Report.

PILEUS 2.5 to 6.5 cm. broad, convex then plane, margin at length raised, obtuse to subdepressed, *slightly rugose on disk*, rarely even, glabrous, *subhygrophanous*, yellowish-white, tinged with red, more deeply colored on disk, margin often slightly striate when moist. FLESH thin, watery-white when moist. GILLS adnexed or nearly free, rather crowded, medium width, *white or whitish*, edge minutely fimbriate. STEM 2-5 cm. long, 3-6 mm. thick, strict, *equal*, hollow, terete or subcompressed, sometimes twisted, even, glabrous, pruinose at apex, *white to pellucid*, white-mycelioid or strigose at base. SPORES narrowly elliptic-ovate, 6.5-8 x 3-3.5 micr., pointed at one end, smooth, white in mass. CYSTIDIA none; *sterile cells* on edge of gills short and slender. ODOR and TASTE mild.

Gregarious or scattered. Low, moist, rich frondose woods; on the ground or among mosses. Ann Arbor and New Richmond. Probably throughout the State. September-October. Infrequent.

The straight, pellucid-white stem and rugose cap distinguish it. Luxuriant specimens have rugose lines over the whole surface of the cap. The colors are rather clear compared with those of *C. dryophila* and *C. butyracea*. Peck compares it with *C. maculata*, from which it is easily distinct. *C. estensis* Morg. (Cinn. Soc. of Nat. Hist. Journ., Vol. 6, 1883, Plate 5) is very close, and may be a variety.

801. Collybia alcalinolens Pk.

N. Y. State Mus. Rep. 49, 1896.

Illustration: Plate CLXII of this Report.

PILEUS 1-2.5 cm. broad, at first ovate with incurved margin, *hygrophanous*, glabrous, grayish-umber (moist), grayish-brown or cinereous (dry), *margin striatulate when moist*. FLESH thin, whitish or grayish-tinged. GILLS sinuate-adnexed or emarginate, rather broad, *suhdistant*, subventricose, white then obscurely grayish-tinged, edge entire. STEM 3-5 cm. long, 2-4 mm. thick, rarely thicker, equal, subpruinose, glabrescent, *shining even*, flexuous, stuffed then hollow, cartilaginous, elastic, whitish. SPORES oblong-ovate, narrow, 7-10 x 4 micr., smooth, white. CYSTIDIA and *sterile cells* lacking. BASIDIA about 27 x 5-6 micr., 4-spored. ODOR strong, *alkaline*. TASTE mild.

Gregarious or subcaespitose. On the ground among leaves, rich frondose woods. Ann Arbor. October-November. Frequent locally.

This species is known by its odor, its finally striate pileus and by its shining stem. It has the appearance and size of a Mycena, but the pileus is soon expanded. It reminds one strongly of *Collybia floccipes*, but the latter has numerous cystidia and no odor, although it grows in similar places.

802. Collybia familia Pk. (EDIBLE)

N. Y. State Cab. Rep. 23, 1872.

Illustrations: N. Y. State Mus. Bull. 75, Pl. 84, 1904.
Marshall, The Mushroom Book, Pl. 16, op. p. 67, 1905.
Plate CLXIII of this Report.

PILEUS 1-3.5 cm. broad, *fragile*, convex or hemispherical, then expanded, *obtuse*, glabrous, hygrophanous, even or margin substriatulate when moist, watery-brownish-buff (moist), *creamy-buff to whitish* (dry), margin at length recurved and split radially. FLESH thin, concolor. GILLS adnexed or almost free, crowded, narrow, whitish, edge entire. STEM 4-8 cm. long, 2-3 mm. thick, *slender*, equal, toughish, stuffed then hollow, glabrous, rarely minutely flocculose, subconfluent at base with mycelioid tomentum, whitish. SPORES subglobose to oval, 3-4.5 x 3 micr., few larger, smooth, white. CYSTIDIA and *sterile cells* none. ODOR and TASTE none.

Densely *caespitose*. On decaying trunks and logs of hemlock and tamarack. Huron Mountains, Marquette, Munising, New Richmond, Ann Arbor. August-October. Infrequent.

Because of their edibility, it is fortunate that the abundant clusters of from ten to twenty individuals are rarely attacked by grubs; these clusters often cover a large part of a log. The species has the general habit of *Collybia abundans* from which it is distinguished by the hygrophanous flesh and by the pileus not being umbilicate nor virgate. The European *Collybia lacerata* Fr. has a similar habit and appearance, but its gills are said to be broad and distant. Peck compares it with *C. acervata*, a caespitose species with very different colors. The Ann Arbor specimens were found on tamarack logs.

***Gills yellow or yellowish.*

803. Collybia aquosa Fr. var. (EDIBLE)

Syst. Myc., 1821.

Illustration: Fries, Icones, Pl. 66, Fig. 2.

PILEUS 2-5 cm. broad, convex at first, soon plane or depressed, distinctly *hygrophanous*, watery-brown or rufous-brown *with a yellow cast* (moist), pale tan to buff (dry), obscurely rugulose, *margin striatulate when moist*, even when dry. FLESH thin, subpliant, whitish, soft. GILLS adnexed or almost free, rounded behind, narrow, crowded, *luteous or pallid with sulphur tinge*, becoming erose. STEM 5-7 cm. long, 4-6 mm. thick, *equal or subequal*, hollow, subterete or compressed, minutely flocculose-pubescent, even, cuticle cartilaginous, straight or flexuous, *pallid or tinged sulphur-yellow*, especially above, extreme base slightly inflated-bulbous. SPORES 5-6 x 3 micr., narrowly ovate, smooth, white. CYSTIDIA none. ODOR and TASTE mild.

Caespitose. On the ground, among tamaracks or low frondose woods. Ann Arbor. May 20-June.

This is intermediate between *C. dryophila* and *C. aquosa*, but because of its hygrophanous, watery flesh and finely striatulate pileus it seems closer to *C. aquosa*. The plant has a honey-yellow cap and stem, shading its citron or sulphur when fresh and moist, but soon fading. The gills of *C. aquosa* are said to be pallid, in which respect our plant differs somewhat. It forms tufts among grass in drained tamarack swamps or among leaves in low woods. The base of the stem is slightly enlarged, not truly bulbous nor strigose-hairy. It seems to be somewhat related to *C. acervata*. Whether it has been described is uncertain.

804. Collybia colorea Pk.

N. Y. State Mus. Rep. 26, 1874.

"Pileus 1-3 cm. broad, convex-expanded, subumbilicate, *hygrophanous*, glabrous, "luteous"-yellow, not striate, paler when dry. FLESH rather thin, soft, yellowish. GILLS adnexed, emarginate, close, moderately broad, *luteous* to sordid-ochre, edge entire. STEM 24 cm. long, 24 mm. thick, *equal*, even, subpruinose, hollow, glabrous, colored like pileus. SPORES subglobose or broadly elliptical, 4-5 micr."

Scattered or subcaespitose. On decaying wood, especially of pine. Negaunee, New Richmond, Greenville (Longyear). June-September. Rare.

An unidentified Michigan plant approaches this rather closely. It has-the same colors, etc., but differs in its fleshy-fibrous, solid stem and bitterish taste. The spores are white.

****Gills rufescent.*

805. Collybia acervata Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 64, Fig. 2.
Gillet, Champignons de France, No. 147.
Cooke, Ill., Pl. 267.
Hard, Mushrooms, Fig. 87, p. 117.
Peck, N. Y. State Mus. Bull. 75, Pl. 84, 1904.

"PILEUS 2-5 cm. broad, convex, becoming expanded or nearly plane, glabrous, *hygrophanous*, pale tan color or incarnate red and sometimes obscurely striatulate on the margin when moist, whitish after the escape of the moisture. GILLS close, rounded behind, slightly adnexed or free, whitish, or slightly tinged pink. STEM 5-7.5 cm. long, 3-5 mm. thick, equal, hollow, slender, rigid but brittle, glabrous except the white-tomentose base, *reddish-brown* or purplish-brown. SPORES elliptic, 6-7.5 x 4 micr., white."

Caespitose. On decaying prostrate trunks and leaves, or on half-buried rotten wood. August-September. Ann Arbor. Infrequent.

The description is obtained from Peck, (N. Y. State Mus. Bull. 75), as my own notes are incomplete. This species may be merely an ecological variety of *C. dryophila*. Like Hard, I have found it in localities formerly occupied by saw-mills. The gills become slightly rufescent in age.

Our plant does not seem to agree well with the European descriptions.

806. Collybia hygrophoroides Pk.

N. Y. State Mus. Rep. 32, 1879.

Illustration: Plate CLXIV of this Report.

PILEUS 2-4 cm. broad, *obtusely conical at first* and reddish-brick color, then campanulate to expanded and almost plane, with or without umbo, rufous-tan (moist), dull-tan or isabelline (dry), hygrophanous, glabrous, even, margin straight at first. FLESH thin, whitish. GILLS arcuate-uncinate or deeply emarginate, almost free at times, close, *rather broad*, ventricose, dingy white at first, *then tinged flesh color*, edge becoming eroded. STEM 5-12 cm. long, 2-5 mm. thick, *tough*, often long and twisted, *longitudinally striate* to sulcate, lower third *rooting* and densely white-tomentose, upper part pallid to rufescent and pruinose, stuffed then hollow, curved or straight. SPORES oblong, 5-6.5 x 3-3.5 micr., smooth, white in mass. CYSTIDIA rather abundant on sides of gills, *slender, acuminate above*, 50-60 x 4-5 micr.

Solitary to subcaespitose or scattered. On the ground in low, moist, maple and oak woods. Ann Arbor. May-July. Rare and local; rather common in a single locality.

This is apparently a Mycena as shown by the straight margin of the young pileus. It somewhat resembles Cooke's figure of *M. excisa* (Plate 148), (= M. *berkeleyi* Mass.) which is certainly not the *M. excisa* figured by Fries (Icones). That species, however, grows on trunks of pine, and the color is different from ours according to Fries' description. The young, unopened pileus resembles that of *Hygrophorus conicus* in color and shape, as pointed out by Peck. It seems to have no direct relationship to either Mycena or Collybia. The lower half or third is usually immersed in the soil which adheres to the tomentum when pulled up; this portion may be attenuated or scarcely so as shown in our plate. The older plants have rufescent gills and stem, but the spore-print is white. Our specimens were seen and identified by Peck, who says it is a very rare species.

*****Gills lilaceous.*

807. Collybia myriadophylla Pk.

N. Y. State Mus. Rep. 25, 1873.

Illustration: Hard, Mushrooms, Fig. 85, p. 115, 1908.

PILEUS 1.5-2.5 cm. broad, soon plane or depressed, flexible, *hygrophanous*, glabrous, even, sometimes umbilicate or mammilate, *dull umber-brown with lilac tinge* (moist), ochraceous-buff (dry). FLESH very thin. GILLS slightly adnexed, *very crowded, narrow*, linear, thickish, *dark lilac*, edge entire. STEM 2-3 cm. long, 1-1.5 mm. thick, slender, equal, terete or compressed, stuffed by a white pith, then hollow, *dull lilac to reddish-brown*, subglabrous, sometimes densely silky-pruinate. SPORES very minute, 3-4 x 2 micr., elliptic-oval. CYSTIDIA none.

Gregarious. On mossy hemlock or tamarack logs or wood. July to October. Ann Arbor (on tamarack), New Richmond, South Haven, Bay View and Houghton. Infrequent.

A very distinct little Collybia, sometimes lilac-tinged throughout; this color persists longer on the gills than elsewhere. The gills are often glaucous, and on drying become reddish-brown. The stem is sometimes attenuated below and rooting; at times it is entirely white-pruinose with a tuff of lilaceous strigose hairs at the base. The species seems to be limited to coniferous woods.

******Gills cinerascent or rufescent.*

808. Collybia atrata Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 70, Fig. 1.
Cooke, Ill., Pl. 155.
Gillet, Champignons de France, No. 148.
Hard, Mushrooms, Fig. 83, p. 113, 1908.

"PILEUS 1-2.5 cm. broad, *tough*, plano-depressed, never papillate, convex toward margin, very glabrous, orbicular, umbilicate, *even, pitch-black* and shining (moist), fuscous (dry). FLESH rather thick, firm. GILLS adnate, scarcely decurrent, at first arcuate, then straight, *rather broad, subdistant*, whitish to gray, then fuscous. STEM *short*, 2-3 cm. long, 2-4 mm. thick; tough, equal or subequal, *glabrous*, stuffed then hollow, *cartilaginous, fuscous* within and without." SPORES 5-6 x 4 micr., elliptical (Schroeter, W. G. Smith). ODOR *none*.

Around burned stumps or burned over soil, in exposed places.

The above description is taken from Fries' Icones. The occurence of the species in Michigan is somewhat uncertain, as my notes are incomplete. June. Ann Arbor. Infrequent to rare.

A Marasmius-like plant in appearance, but it does not revive. When young and fresh, it seems to be firm, but the thin margin is soon flexible. The gills are not ventricose, and a section through them reveals peculiar hyphae forming the central layer, which are dark colored from blackish-brown granules in their interior; they are not truly ashy, but dark cinnamon-brown when fresh and mature. The base of the stem is sometimes strigose-hairy with fuscous-brown hairs, and under high magnification the rest of the stem is seen to be covered with short, intertwined or spreading dark hairs. On drying the pileus becomes rusty-reddish, or occasionally appears scorched. There are some very similar species and the group needs further study. It is said to occur in autumn.

809. Collybia plexipes Fr. var.

Syst. Myc., 1821.

Illustration: Plate CLXV of this Report.

PILEUS 1-2.5 cm. broad, campanulate-expanded, *obtuse*, glabrous, hygrophanous, *blackish-chestnut* (moist), *rufous when drying*, obscurely rugulose-striatulate when moist, not shining. FLESH concolor, very thin on margin. GILLS slightly adnexed, narrow, tapering outward, thickish, close to crowded, plane, *brown, glaucescent*, edge entire. STEM 3-5 cm. long, 1.5-2.5 mm. thick, subequal, opaque, tubular, *subterete or compressed and furrowed*, flexuous, cartilaginous, often curved, tough, subglabrous, black, paler at apex. SPORES minute, elliptic-ovate, 5-7 x 2.5-3 micr., white, smooth. CYSTIDIA none. ODOR and TASTE none.

Caespitose or subcaespitose to solitary. On very rotten wood, among moss, etc., about old stumps and mounds, in frondose woods.

810. Collybia atratoides Pk.

N. Y. State Rep. 32, 1879.

Illustration: Hard, Mushrooms, Fig. 86, p. 116, 1908.

"PILEUS 1-2 cm. broad, convex, subumbilicate, glabrous, hygrophanous, *blackish-brown* (*moist*), grayish-brown and shining (dry). FLESH thin. GILLS adnate, *rather broad, subdistant*, intervenose, grayish-white. STEM 2-3 cm. long, 1-2 mm. thick, equal, hollow, glabrous, grayish-brown, with a mycelioid tomentum at base. SPORES nearly globose, about 5 micr. diameter.

"Gregarious or subcaespitose. On decaying wood and mossy sticks in woods."

The description is adapted from Peck. Hard points out that the margin of the pileus is often crenate. It doubtless occurs within the State, and may be confused with Mycena by its shape and size.

811. Collybia expallens Pk. var.

N. Y. State Mus. Rep. 44, 1891.

PILEUS 1-2.5 cm. broad, orbicular, convex-expanded, depressed or subumbilicate on disk, *hygrophanous, at first blackish*, then brown to pale fuscous, *glabrous, striatulate on margin when* moist. FLESH rather thin, brownish then whitish. GILLS adnate, seceding, medium width, close to subdistant, fuscous, edge entire. STEM 1-2 cm. long, 2-4 mm. thick, tapering downward, tough, hollow, sometimes compressed or grooved, cartilaginous, livid-brown, sometimes blackish on handling, pruinose-pubescent. SPORES subglobose, 5 x 4 micr., smooth, white. CYSTIDIA and STERILE CELLS none. ODOR and TASTE *farinaceous*.

Gregarious among fallen needles of white pine. New Richmond. September. Infrequent.

Differs from *C. atrata* and *C. atratoides* by the presence of a distinct farinaceous odor, and a striate margin to the pileus. It approaches *C. ambusta* except in odor and the lack of a papillate pileus. The stem is pruinose, at least at the apex.

Section II. Laevipedes. Putrescent; not hygrophanous; stem *glabrous, not conspicuously striate*.

812. Collybia albiflavida (Pk.) (EDIBLE)

N. Y. State Mus. Rep. 23, 1872 (as *Tricholoma albiflavidum*).

PILEUS 5-12 cm. broad, convex-expanded, then depressed, obtuse or slightly umbonate, umbo subobsolete and darker, moist, *whitish or creamy-yellow*, even, glabrous, margin at first involute. FLESH white. GILLS adnexed-emarginate, *narrow, crowded*, thin, white or whitish, edge entire. STEM 6-18 cm. long, 5-8 mm. thick, equal above the *bulbous base*, solid, fibrous within, *cuticle cartilaginous*, whitish. SPORES elliptical, smooth, obtuse, 7-10 x 4.5-5.5 micr., white in mass. CYSTIDIA lanceolate, scattered or infrequent on sides of gills, often crystallate at apex, 55-65 x 10-15 micr. ODOR and TASTE none.

Solitary, gregarious or subcaespitose. On the ground in frondose or coniferous woods, among fallen leaves. Throughout the State. June-September. Frequent.

This noble plant is found frequently, especially in moist ravines of most kinds of woods. It was referred by Peck to Tricholoma, where he considered it close to *T. lascivum*. Collectors nearly always mistake it for a Collybia, and this tendency is given a basis because of the presence of cystidia on the gills, and by the nature of the stem, whose rind is cartilaginous. The plant presents a stiff appearance due to the straight and rather rigid-elastic stem. It sometimes attains a much larger size than the original description indicates. A form occurs in low, wet or swampy places, with similar habit and structure, but smaller and darker in color. The color is almost smoky-brown, and the general appearance suggests a form of *Tricholoma melaleucum;* its microscopic details, however, agree with the above species; its pileus is 2.5-5 cm. broad. *T. albiflavidum* has a disagreeable odor at times, but this may disappear, especially after it is picked and left overnight.

813. Collybia abundans Pk. (EDIBLE)

N. Y. State Mus. Rep. 29, 1878.

Illustration: Plate CLXVI of this Report,

PILEUS 1-3 cm. broad, convex or nearly plane, *subumbilicate*, whitish or pale grayish-brown, disk darker, *innately fibrillose*, fibrils more dense on disk, the thin margin at length splitting. FLESH thin. GILLS adnate, rather narrow, close, sometimes veiny, white. STEM 3-5 cm. long, 2 mm. thick, rather short, equal, glabrous, hollow, often curved, easily splitting, concolor or whitish. SPORES subglobose, 5-6 micr. ODOR and TASTE mild.

Caespitose. On decaying wood and logs, in frondose and mixed woods, especially in the north. Ann Arbor, Marquette, Houghton. August-October. Infrequent.

The "abundant Collybia" usually grows in great profusion when it occurs. It is very similar in general appearance to *Collybia familia*, but is usually smaller and shorter-stemmed; its pileus has a slight umbilicus; it is not hygrophanous, and when dried usually becomes rufescent,—a special characteristic of the stem.

814. Collybia succinea Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 65, Fig. 3.
Cooke, Ill., Pl. 151.

PILEUS 1-3 cm. broad, convex-campanulate, subexpanded, smoky rufous-brown, becoming paler, moist, glabrous, even, firm at first then flexible. FLESH becoming whitish, rather thin. GILLS *adnexed, broad*, close to *subdistant*, thickish, ventricose, whitish, edge minutely serrulate. STEM 2-3 cm. long, 1.5-3 mm. thick, equal, *glabrous*, stuffed then hollow, even, cartilaginous, tough, pruinose at apex, *dark rufous-brown*. SPORES oblong, obtuse, 8-9 x 3-3.5 micr., white. CYSTIDIA ventricose, acuminate-pointed above, 45 x 12 micr., abundant on edge of gills, few elsewhere. TASTE and ODOR farinaceous.

Gregarious. On the ground in hemlock-beech woods. New Richmond. September. Infrequent.

The colors are well represented by the illustrations referred to. The farinaceous odor is not mentioned by the European authors, but in other respects the characters of our plants are apparently the same as of those of Europe.

Section III. Striaepedes. Putrescent; not hygrophanous; stem *conspicuously striate*, glabrous.

815. Collybia radicata Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Hard, Mushrooms, Fig. 78, p. 107, 1908.
McIlvaine, One Thousand Amer. Mushrooms, Pl. 29, op. p. 112, 1900.
White, Conn. State Geol. and Nat. Hist. Surv., Bull. No. 3, Pl. 6, op. p. 27, 1905.
Cooke, Ill., Pl. 140.
Gillet, Champignons de France, No. 165.
Peck, N. Y. State Mus. Mem. 4, Pl. 48, 1900.
Plate CLXVII of this Report.

PILEUS 3-10 cm. broad, convex to nearly plane, sometimes umbonate, *viscid*, glabrous, grayish-brown to smoky-brown or umber, sometimes nearly white, even or rugose. FLESH rather thin, white. GILLS *adnexed, broad*, thick, subdistant, white. STEM elongated, 5-20 cm. long above the surface of the ground, with a long root-like prolongation penetrating the earth, tapering upward, 4-8 mm. thick, rigid-erect, *glabrous, twisted-striate* to sulcate, white above, usually brownish or smoky-brownish elsewhere, cartilaginous. SPORES broadly elliptical, smooth, 14-17 x 9-11 micr. CYSTIDIA scattered, on edge and sides of gills, 60-80 x 15-18 micr. ODOR and TASTE mild.

Gregarious or solitary. On the ground in woods, groves, clearings, etc., throughout the State. June-October. (Earliest record June 26, latest October 4.) Common.

The "rooted Collybia" is closely related to *C. longipes*, whose stem has a similar root-like prolongation at the base. The viscidity of the pileus is almost absent in dry weather. The stem is usually thickened just above the "root," and as Atkinson has pointed out, this "root" is sometimes attached to dead tree roots deep in the soil. They often grow from much decayed stumps or logs, especially in recent clearings. The clear white of the gills is quite marked. It is one of the first summer mushrooms with which the beginner becomes acquainted, and the great variation in color and size will often mislead him into thinking he has several kinds, especially if he collects without getting the "root." Peck has named two varieties: Var. *furfuracea*: (Ill., Peck, N. Y. State Mus. Mem. 4, Plate 48, Fig. 9-11). STEM *minutely scurfy*. This variety, therefore, differs mainly from *C. longipes* in viscid cap and spores. *Var. pusilla:* (Ill., Peck, N. Y. State Mus. Mem. 4, Plate 48, Fig. 12-14). Cap 1-3 cm. broad, otherwise like the typical form. All of these are edible.

816. Collybia platyphylla Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Marshall, The Mushroom Book, Pl. 15, op. p. 66, 1905.
Hard, Mushrooms, Fig. 79, p. 109, 1908.
White, Conn. State Survey Bull. 15, Pl. 7, 1910.
Peck, N. Y. State Mus. Mem. 4, Pl. 49, 1900.
Michael, Führer f. Pilzfreunde, Vol. III, No. 106.
Fries, Icones, Pl. 61.
Cooke, Ill., Pl. 128.

PILEUS 6-12 cm. broad, at first ovate-campanulate, then convex-expanded, obtuse or depressed, grayish-brown to whitish-gray, *streaked with darker fibrils* or innate scurfy scales, often wavy on margin. FLESH thin, fragile, scissile, white. GILLS adnexed, deeply emarginate, *broad*, subdistant, often transversely striate and splitting, edge entire or eroded, white. STEM 7-12 cm. long, *stout*, 1-2 cm. thick, *fibrous-fleshy*, cuticle subcartilaginous, equal, fibrous-solid becoming cavernous, *fibrillose-striate*, white or whitish, base blunt or attached to thick strands of mycelium. SPORES broadly elliptical, smooth, 8-10 x 6-7 micr., white. (Immature spores abundant in mounts.) CYSTIDIA none. STERILE CELLS on edge of gills, inflated-rounded, 25 x 13 micr. ODOR mild, slightly of anise. TASTE slightly unpleasant when fresh, disagreeable when old.

Solitary, gregarious or subcaespitose. On decaying wood, stumps, humus, etc., in frondose woods, throughout the State after heavy rains. June-October. (Earliest record June 15, latest October 4.)

This species is our largest Collybia although *C. radicata* sometimes has a cap equal in width. The fleshy, scarcely cartilaginous, consistency of its stem may lead

one to refer it to the genus Tricholoma. Peck and others say the stem is stuffed or hollow. I have found the young stem solid-fibrous, later tunneled by grubs, and the interior loosened. Insects attack the plant readily and spoil it for use on the table, but as it does not rank very high in flavor, this is of little consequence. Stevenson has incorrectly given the spore measurements as 19 x 13 micr., and McIlvaine has copied the error.

817. Collybia maculata A. & S. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Marshall, The Mushroom Book, Pl. 15, op. p. 66, 1905.
Hard, Mushrooms, Fig. 82, p. 113, 1908.
Murrill, Mycologia, Vol. 6, Pl. 130.

PILEUS 5-15 cm. broad, *compact*, convex then expanded, obtuse or broadly subumbonate, *glabrous*, even, *white with ferruginous* stains or spots, later becoming rusty-red throughout, margin at first inrolled, then waxy or lobed. FLESH white, firm. GILLS adnexed, or nearly free, *very narrow, crowded*, white or whitish, edge entire. STEM 6-16 cm. long, 6-12 mm. thick, equal or subventricose, *attenuated below* and praemorsely rooting, *firm, cartilaginous, striate* or subsulcate, hollow. SPORES subglobose to short-elliptical, 6 x 3-4 micr., smooth, white. CYSTIDIA none.

Solitary or subcaespitose. On the ground, conifer or mixed woods of northern Michigan. Isle Royale, Marquette, Houghton, Bay View. July-September. Infrequent.

The firm, compact flesh, the narrow crowded gills and stained pileus characterize this plant. The pileus is often narrow compared with the long and rather stout stem. With age the stains spread and the whole plant becomes reddish. Specimens were found in frondose woods of southern Michigan which approach *C. szorconerea* Batsch. with cream-colored to ochroleucous gills, and bitterish taste; the spores of this form measured 6 x 3 micr. The pileus was rufous-tinged or darker on disk. *Tricholoma submaculatum* Pk. has smaller spores and a solid stem; otherwise it seems to approach some of the variations of *Collybia maculata*.

Section IV. Vestipedes. Putrescent; stem *velvety, fibrillose* hairy, *floccose* or *pruinose*.

818. Collybia velutipes Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Hard, Mushrooms, Pl. 15, p. 119, 1908.
Reddick, Dept. of Geol. & Nat. Resources of Indiana, Rep. 32, 1907, Fig. 10.
Peck, N. Y. State Mus. Mem. 4, Pl. 47, 1900.
Cooke, Ill., Pl. 184.
Gillet, Champignons de France, No. 169.
Murrill, Mycologia., Vol. 1, Pl. 3, Fig. 6.
Michael, Führer f. Pilzfreunde, Vol. II, No. 82.
Plate CLXVIII of this Report.

PILEUS 2-5 cm, broad, convex-expanded, *viscid*, obtuse, glabrous, the viscid pellicle separable, tawny, *reddish-yellow*, usually darker on disk and yellowish on margin, even, margin often irregular. FLESH rather thickish, white or tinged reddish-yellow. GILLS adnexed, emarginate, broad, subdistant to close, whitish or yellowish, edge minutely fimbriate. STEM 2-7 cm. long, 3-6 mm. thick, firm, stuffed, then hollow, *densely velvety with short, tawny or blackish-brown hairs*, yellow at apex, *tough*, short-radicating. SPORES oblong, smooth, 7-9 x 3-4 micr. (rarely longer), white in; mass. CYSTIDIA none. STERILE CELLS on edge of gills, slender, awl-shaped. ODOR and TASTE mild.

Caespitose. On decaying stumps, logs, roots, etc., as well as on bark of living trees; throughout the State. Most abundant in autumn, in September to December, occurring, however, occasionally any time during the year. In winter it may be found during warm weather, almost surrounded by ice, seeming *to revive* at each warm period. As soon as the snow is gone fresh specimens, which have developed at the first touch of the warm spring sunshine, may be found.

The viscid, reddish-yellow pileus and dark velvety stem are characters by which it is easily known. It may appear to grow from the ground, but in such cases the "root" is usually attached to dead woody matter below the surface. Specimens which had no pileus, and were composed only of a stem, several feet long, were found in the Calumet mine almost a mile beneath the surface of the ground; the characteristic blackish-brown velvety covering on the lower portion indicated that it was clearly a monstrous form of this species; it was growing on the mine timbers. Whether it is truly parasitic on living trees has not been satisfactorily proven. When preparing it for table use, it is best to peel off the viscous pellicle of the cap.

819. Collybia longipes Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 201.
Gillet, Champignons de France, No. 160.

"PILEUS 3-5 cm. broad, convex-expanded, subumbonate, *dry*, radiate-wrinkled, clear brown, disk darker, *densely velvety with short brown hairs*. FLESH thin. GILLS almost free, rather broad, subdistant, ventricose, *pure white*, edge fimbriate. STEM 8-12 cm. long, 4-5 mm. thick, solid, firm, straight, thicker below, the base prolongated into an oblique "root," white within, leather-brown to chestnut-brown, pale above, *covered with spreading, tomentose, brown hairs*. SPORES broadly elliptical, 9-10 x 6-7 micr., smooth, white. CYSTIDIA large, flask-shaped, 55 x 17 micr., scattered on sides and edge of gills."

On decayed wood, stumps and logs.

Not with certainty found within the State. The description is adopted from Schroeter, as my notes are incomplete. The plant has much the appearance of *C. radicata*, but the pileus is dry and velvety. McIlvaine reports it in West Virginia, but his remark that "it is more glutinous" than *C. radicata* eliminates his claim. It is included for purposes of comparison.

820. Collybia succosa Pk.

N. Y. State Mus. Rep. 25, 1873.

PILEUS 1-3 cm. broad, subcartilaginous, campanulate to convex, *cinereous-brown to fuliginous, minutely pubescent*, margin incurved and surpassing the gills. FLESH thickish, white at first, *becoming purplish-black where wounded*. GILLS adnate with a slight decurrent tooth, becoming emarginate, moderately broad, tapering in front, close, whitish, *turning blackish where bruised*. Stem 2-5 cm. long, 2 mm. thick, equal, cartilaginous, compact except the stuffed axis, often curved, *clothed with a fine, fuliginous pubescence*, becoming blackish. SPORES minute, globose-ovoid, 34 micr. in diameter, smooth, white. CYSTIDIA none; *sterile cells* on edge of gills, abundant, slender, subfiliform. ODOR and TASTE not marked.

Scattered or caespitose. On decayed wood, logs, etc., mostly on hemlock, in coniferous regions. Marquette, Munising, South Haven, New Richmond. July-September.

Easily distinguished by the change of color when bruised. This change is due to lactiferous tubes containing a juice which turns blackish on exposure to the air. These tubes are specialized hyphae interspersed throughout the train a of the pileus, gills and stem. Under the microscope it may be seen that the pubescence is composed of elongated hyaline cells. The presence of a juice which exudes on wounding the plant is unusual in this genus, and reminds one of a section of the genus Mycena; but the incurved margin of the young pileus indicates its relationship with Collybia.

821. Collybia floccipes Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 1168.
Plate CLXIX of this Report.

PILEUS small, 5-20 mm. broad, conic-campanulate, subexpanded to almost plane, *papillate, grayish-brown to sooty-brown*, almost blackish on umbo, glabrous, faintly striatulate and shining when moist, margin at first incurved. FLESH thin, whitish except cuticle, which is composed of erect, vesiculose cells. GILLS narrowly adnexed, medium broad, close to subdistant, subventricose, *white*, edge pulverulent-fimbriate. STEM 3-5 cm. (sometimes up to 10 cm.) long, flaccid, filiform, 5-2 mm. thick, often rooting, *toughish*, equal, flexuous, even, hollow, white, *minutely dotted under lens, with subcolorous to blackish points*, base with white spreading fibrils. SPORES subglobose, prominently apiculate, 5-6 x 4-5 micr. (with apiculus 1 micr. longer), smooth, white. CYSTIDIA *abundant*, on edge and sides of gills, narrowly lanceolate, 60-90 x 7-11 micr., subobtuse at apex. ODOR and TASTE *none*.

Gregarious, scattered or subcaespitose. On humus, decayed leaves, very rotten wood, etc., in frondose woods. Ann Arbor. May-June. Frequent locally.

This species has the appearance of a Mycena, but the pileus has an incurved margin. A lens is often necessary to detect the minute brownish points on the stem, at other times they are easily visible. These points are due to short, microscopic, dark, cystidia-like hairs. Otherwise the stem is shining and whitish. When growing-on much decayed wood the stem may be long, deeply rooting; when on the ground it is scarcely more than attached by the spreading white hairs and is shorter. In size *C. floccipes* reminds one somewhat of *C. alcalinolens* and it grows in similar places, but it has no odor and is not hygrophanous.

822. Collybia conigenoides Ellis

Torr. Bot Club Bull., Vol. 6.

PILEUS small, 1-5 mm. broad, *convex* then plane, pellucid-striate, dingy cream-colored or tinged tan, *covered by a minute pubescence* (under a lens). FLESH thin, white. GILLS slightly adnexed or free, close to subdistant, medium broad, whitish, becoming yellowish, edge minutely pubescent. STEM filiform, 2-3 cm. long, delicate, minutely pubescent under a lens, attached at base by small rooting white hairs, white. SPORES minute, oblong, smooth, 4-5 x 2-3 micr., white. CYSTIDIA mostly on edge of gills, lanceolate, 25-35 micr. long.

On half-buried cones of white pine. New Richmond. September. Rare.

Peck has described a similar species growing on cones, which he called *C. albipilata*. It has the same kind of spores and cystidia as our species. It is said to be larger with an 8-12 mm. pileus which is brown. In other respects *C. albipilata* is like *C. conigenoides*. I suspect

C. albipilata is merely a luxuriant form. Cystidia are apt to vary somewhat in large and small plants. Two European species which grow on pine cones have been critically discussed by Bresadola. They are *C. esculenta* and *C. conigena*. Their spores measure 6-8 x 3-4 micr., and hence our plant cannot be referred to them. Their size is also markedly different, the piled being 1-3 cm. across. Their stems are long, creeping and rooting, and are covered on the rooting portion with a fibriliose to men turn.

823. Collybia tuberosa Fr.

Syst. Myc., 1821.

Illustrations: Michael, Führer f. Pilzfreunde, Vol. II, No. 80.
Gillett, Champignons de France, No. 168.
Cooke, Ill., Pl. 144.

PILEUS *small*, 5-10 mm. broad, convex or nearly plane, obtuse or subumbonate, even, glabrous or nearly so, *whitish, often tinged reddish or yellowish*. FLESH thin, white. GILLS adnate, thin, close, whitish, edge minutely pubescent. STEM slender, 2-4 mm. long, 1 mm. thick, flaccid, hollow, whitish or reddish-tinged, covered by a thin white cortinoid pulverulence, often nearly glabrous above, *arising from a reddish-brown or blackish, small sclerotium*. SCLEROTIUM 2-5 cm. long, 1-2 mm. wide, variable in shape. SPORES elliptical, 4-5.5 x 2-3 micr., smooth, white.

Gregarious or crowded. On the remains of decayed Agarics or damp humus. Throughout the State. July-September. Frequent.

The tuber-bearing Collybia is usually aggregated in numbers on the blackened remains of some mushroom, in which the small, tuber-like sclerotia are imbedded. Occasionally, however, it appears to develop on much decayed leaf-humus on the ground. It resembles *C. cirrata* in color and size.

824. Collybia cirrata Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 144.
Gillet, Champignons de France, No. 150.

PILEUS 5-12 mm. broad, soon plane or slightly depressed, *at length umbilicate*, sometimes papillate, *slightly silky*, toughish, white or tinged reddish. FLESH thin, white. GILLS adnate, *narrow*, close, whitish. STEM 2-5 cm. long, filiform, equal, somewhat hollow, flexuous, pallid, *covered by a white pulverulence*, with a fibriliose, radicating base. SPORES minute, elliptical, smooth, 4-5 x 2-3 micr.

Decaying vegetable matter in woods, throughout the State. July-September. Infrequent.

This little Collybia is closely related to *C. tuberosa*. Authors differ with reference to the presence or absence of a sclerotium. Schroeter (Die Pilze Schliesiens, p. 645) describes a small yellowish sclerotiuin from whicli the stem arises, and which he says forms abundantly between the gills of decaying fungi, especially *Hypholoma fasciculare*. Berkeley also notes that it is "often attached to a little, yellowish, nodular schlerotium." Stevenson remarks that "it never has a radical tuber." Fries, Gillet and others do not mention a sclerotium; I have not observed any. Most authors agree that it occurs on decaying mushrooms, as well as humus, etc. It differs from *C. tuberosa* in its umbilicate pileus.

825. Collybia hariolorum Fr. (EDIBLE)

Syst Myc., 1821.

Illustrations: Cooke, Ill., Pl. 150.
Gillet, Champignons de France, No. 159.

PILEUS 2-5 cm. broad, broadly convex-expanded, thin, flexible, *becoming soft and flabby in moist weather*, even, glabrous, *whitish with a rufescent disk* or altogether rufous-tinged, often fading to pallid-whitish; flesh thin, white, *soft*. GILLS adnexed or almost free, *very narrow, crowded*, hollow, thickish, edge entire, collapsing. STEM 2-5 cm. long, 2-3 mm. thick, equal or tapering slightly upward, pallid or tinged rufescent, *covered by a white tomentum* which is thinner towards apex, hollow, elastic, cartilaginous, becoming soft when wet. SPORES small, 6-7.5 x 3 micr., narrowly oblong-ovate, smooth, white. CYSTIDIA none. ODOR strong and somewhat disagreeable when plants are crushed.

Gregarious, often scattered, sometimes caespitose. Among fallen leaves in frondose woods, probably throughout the State. August-September. Rather frequent.

This Collybia may be known by its soft and somewhat collapsible texture, the white tomentosity of the stem, and the pale rufous-white or whitish cap. It has somewhat the appearance of *C. confluens* to which it seems related, but as a rule it has a shorter stem, and in wet weather, instead of reviving becomes soft and fragile. The figure of Cooke illustrates our plant fairly well. The rufous tinge of the pileus is apparently more characteristic of American than of European plants.

Section V. Marasmioidae. Plants partially or wholly reviving (not truly putrescent). Hygrophanous or dry. Stem pulverulent, floccose, fibrillose-hairy or floccose-hairy.

The species placed under this new section have anomalous characters which ally them equally with the genus Marasmius. In fact this section and the section Collybiae under Marasmius contain species which intergrade between the two genera, and hard and fast lines of separation are impracticable. *Marasmius oreades* might be included here, as its flesh is more like Collybia than Marasmius. *C. confluens* is an equally good Marasmius.

826. Collybia confluens Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Hard, Mushrooms, Fig. 84, p. 114, 1908.
Cooke, Ill., PI. 150.
Gillet, Champignons de France, No. 153.

PILEUS 2-5 cm. broad, tough, flaccid, convex-plane, obtuse, *hygrophanous*, reddish-brown (moist), grayish-flesh-colored to whitish (dry), subumbonate, striatulate when moist. FLESH rather thin toward stem, almost as thick as width of gills, white. GILLS free, *narrow, very crowded*, whitish. STEM 5-10 cm. (or more) long, 2-5 mm. thick, subequal, hollow and often compressed, subcartila-ginous, tough, *reddish under the dense, whitish pubescence*, even, sometimes grooved, often joined at base by a floccose myceliod web which spreacls among the leaves on which it grows. SPORES minute, narrowly pip-shaped, 4-6 x 3-4 micr., white. CYSTIDIA none. STERILE CELLS on edge of gills small. ODOR and TASTE mild or slightly unpleasant.

Coherent in tufts, or gregarious in troops or part-rings. Among fallen leaves on the ground. Throughout the State. July-October. Common.

The colors of the young and old pilei vary considerably; when young they may be almost bay-red, later becoming reddish-brown to grayish or white. The stem is rather long in proportion to the pileus. The species is most common in frondose woods, where its mycelium forms a whitish mould over and among the fallen leaves.

827. Collybia zonata Pk.

N. Y. State Mus. Rep. 24, 1872.

Illustrations: Hard, Mushrooms, Pl. 14, Fig. 81, p. 111, 1908.
White, Conn. State suit. Bull. 15, Pl. 9, 1910.
Murrill, Mycologia, Vol. 4, Pl. 56, Fig. 8 (as *Collybidium zonatum*).
Lloyd, Mycological Notes, Vol. I, No. 5, Fig. 17, p. 43.

PILEUS 1-2.5 cm. broad, convex or nearly plane, *umbilicate, covered with coarse, tawny, densely matted hairs, arranged in obscure zones*. GILLS free, close, narrow, white. STEM 2-5 cm. long, about 2 mm. thick, firm, equal, hollow, covered with tawny hairs similar to those of the pileus. SPORES broadly elliptical, smooth, 5 x 4 micr., white.

Solitary or subcaespitose. On decaying wood. New Richmond. August-September. Infrequent or rare.

The dark tawny color, the zones on the pileus and the fibrillose-hairy covering of cap and stem distinguish our plant. It revives after drying. When dry the pileus becomes concentrically grooved. Some think it is a large variety of *C. stipitaria*, but as it is easily distinguished from that species, such a view is speculative. To prove this point, it would be necessary to grow one form from spores or tissue derived from the other. This has not been done.

828. Collybia stipitaria Fr.

Syst. Myc., 1821.

Illustrations: Lloyd, Mycological Notes, Vol. I, No. 5, Fig. 15, p. 42.
Berkeley, Outlines, Pl. 5, Fig. 6.
Cooke, Ill., Pl. 149.

PILEUS *small*, 5-12 mm. broad, convex-expanded to plane, *umbilicate, with a minute blackish papilla* in umbilicus, whitish, grayish or pale grayish-tawny, *minutely and radiately fibrillose-hairy* or strigose-hairy, radiate-rugulose when dry. FLESH thin, submembranous, soft. GILLS adnexed-seceding, subdistant to close, narrow, white. STEM 2-5 cm, long, filiform, .5-1 mm. thick, equal, *reddish-black when moisty whitish when dry*, tough, cartilaginous, tubular, *instititious*, clothed with a grayish-white fibrillose covering when dry, sometimes twisted-striate. SPORES elliptic-ovate, pointed at one end, smooth, white, 6-8 x 3-4 micr. Odor none.

Gregarious. On twigs, wood, acorns, etc., in mixed or frondose woods. Throughout the State. Frequent and abundant. June-October.

The pileus of this fine little plant has a delicate circular ridge around the papillate umbilicus. The color of the stem changes markedly; when thrown into water it becomes reddish to blackish, on drying the fibrillose covering becomes pale gray or whitish. The margin of pileus is often fimbriate from the minute strigose hairs. Peck has named a long-stemmed form var. *setipes*. This was found in northern Michigan on several occasions.

829. Collybia campanella Pk.

N. Y. State Mus. Bull. 116, 1907.

Illustration: Lloyd, Myc. Notes, Vol. I, No. 5, Fig. 16 (probably as *C. stipitaria* var. *robusta*).

"PILEUS 6-8 mm. broad, *conical or campanulate* with a papilla at the apex, covered with coarse appressed or defiexed strigose hairs, dark tawny. GILLS ascending, moderately close, whitish. STEM 2-3 cm. long, 1 mm. thick, *instititious*, firm, equal, floccose-hairy, colored like the pileus." Spores elliptic-oval, smooth, 7-8 x 3-4 micr., white.

Gregarious. On dead and dry twigs of arbor vitae. Houghton. August.

My specimens were identified by Peck, whose description is reproduced. The plant has the appearance, like all of this section, of a Marasmius. It differs from *C. stipitaria* in its persistent conic-campanulate cap, a character retained when dried. The dark tawny color also remains uniform on the cap and stem of the dried specimens. The floccose-strigose covering of the stem is thick and concolorous. Its habitat seems to be exclusively on cedar twigs.

830. Collybia lacunosa Pk.

N. Y. State Mus. Rep. 26, 1874 (as Tricholoma).

PILEUS 8-15 mm. broad, convex then expanded, dry, *lacunose*, densely furfuraceous, sometimes sulcate-striate to rugose, *sulphur-yellow to golden-yellow*. GILLS adnate to subdecurrent, rather broad, *distant*, thick, sometimes *intervenose*, white, edge pruinose. STEM 2-5 cm. long, about 2 mm. thick, firm, *tough*, solid, equal, instititious, *floccose-scaly or furfuraceous*, sulphur or pallid-yellow. SPORES broadly-oval, or subglobose, granular-punctate, 8-10 x 6-7 micr. STERILE CELLS on edge of gills, subcylindrieal, rounded-subcapitate, about 45-50 x 9 micr.

Solitary or scattered. On fallen branches and decaying wood, in mixed woods of coniferous regions. Marquette, Bay View, New Richmond. August-September.

The attractive color, the tough texture, furfuraceous to floccose covering of cap and stem distinguish this species easily from all other Collybias. The plant has occasionally been wrongly identified as *Lentinus chrysopeplos* B. & C. Its texture is doubtless very similar to Lentinus and Panus, but it lacks the arid gills of those genera. The description of *Omphalia scabriuscula* Pk. also fits our plant rather closely, but if it were that species it would be far removed from *Omphalia umbellifera* to which Peck attached *O. scabriuscula* as a variety. The gills have a tendency to become decurrent, and if referred to the genus Omphalia the plant would become *O. lacunosa*. In many respects it is an anomalous mushroom, half-way between Omphalia, Collybia and Panus.

Mycena Fr.

(From the Greek, *mykes*, a fungus.)

White-spored. Stem *cartilaginous*, slender, hollow. Pileus thin, conic or sub-cylindrical at first, then *campanulate, margin at first straight and applied to stem*. Gills adnexed or adnate, *not decurrent*, sometimes uncinate.

Epiphytal, lignicolous or terrestrial, putrescent, small or minute plants; separated from Collybia by the unexpanded, bell-shaped pileus; from Omphalia by the non-decurrent gills; and from Marasmius by their non-reviving consistency. The genus is a large one. Many species are probably edible, but because of their small size most of them yield very little substance. Peck (N. Y. State Mus. Bull. 167, 1913) reports *M. splendidipes* Pk. as poisonous. They correspond to Nolanea of the pink-spored group, and Galera of the ochre-spored group. The genus is of great interest scientifically.

The PILEUS is either conical at first, or parabolic-cylindrical, or ovate. On opening it usually remains campanulate, except in a comparatively small number of species in which it often develops a marked umbo. In certain species like *M. pelianthina*, *M. pura*, *M. cohaerens*, *M. galericulata*, etc., the mature pileus usually expands like that of Collybia, and the margin may even become recurved; this is more often true of the larger species. The tendency however for the pileus to remain conical or conic-campanulate for quite a time is due to the position of the margin of the young cap on the stem; the growth-tensions in such cases do not easily raise the margin outward, except in the more fleshy and larger caps. The caps may be very fragile or quite tough, usually very thin or membranous in the smaller species. The *trama* of the mature pileus is composed of large, vesiculose cells with a more or less differentiated cuticle of various structures. The color of the caps is often very delicate, red, blue, yellow, brown, gray and white being found in the various shades and tints. The surface is usually glabrous and striatulate on the margin. The GILLS are adnexed or adnate, sometimes running down the stem by a short tooth, and in *M. vulgaris* becoming somewhat decurrent as the pileus expands. In some species they are pure white, in others they become slightly ashy or flesh color in age, and in a few cases, like *M. leajana* and *M. pelianthina*, are brightly colored. There are CYSTIDIA present in a number of species. In one group (Calodontes) these are colored and hence the edges of the gills where they occur have the corresponding color. In others the cystidia are hyaline or colorless. They may be very numerous on both sides and edges as in *M. cohaerens* and *M. leajana*, in which species they give the color. to the entire surface of the gills; in *M. atroalboides*, *M. dissiliens* and *M. polygramna* var. *albidus*, they are hyaline. In some the cystidia are found only on the edge and are then referred to as *sterile cells*, especially if of different shape from the others, e. g., *M. alkalina*, *M. polygramna* and *M. metatus*. In these species the shape of the cystidia varies considerably—they may be flask-shaped, lanceolate, pear-shaped, sac-shaped, or hair-like. In some species no cystidia, or only a few scattered ones occur; e. g., *M. galericulata*, *M. pura* and *M. epipterygia*. It is an open question whether the numbers or shapes do not vary to a considerable extent in a species. The STEM in each of the different groups has quite distinct characters, and these are the most convenient means of distinguishing the species. Some steins exude a colored juice, others are viscous; the base is sometimes attaclied by a disk, and at other times it penetrates the substratum by a hairy, root-like extension. It may be firm, fragile or flaccid. The interior is mostly tubular, and the rind is cartilaginous. The surface may be glabrous, horny and shining, or dull opaque and pruinose or hairy. It is delicate and filiform in the smaller forms. The SPORES with very few exceptions are smooth. It seems to be a marked characteristic of this genus, that the immature spores are easily loosened when sections of the gills are mounted in water. The result is that abundant immature spores are present in a mount, and great care must be taken to get the measurements from mature spores. The immature spores are usually delicately punctate-granular or irregular in shape but practice will soon make the observer properly discriminating. The spores of different species vary from spherical to oval or elliptical, and are white when deposited in a mass. In *M. lasiosperma* the

spores are rough with short knobs. The ODOR of some species is alkaline or *nitrous*, sometimes of radish, and when collecting it is well to test the fresh plant, since the odor may disappear. If the plants are kept in a tight box till one gets home, the odor is often very marked on opening the box. Omission to test for the odor may make it difficult to identify the plant correctly.

Mycenas may be found from early spring until the late autumn. They are usually gregarious or caespitose, and the wood-inhabiting species often form dense clusters of individuals. Many are quite small, and are hidden among leaves, sticks and grass. The caps of others reach a size of one or two inches.

The genus was divided by Fries (in Hymen. Europ.) into nine sections, largely with reference to the characters of the stem. These divisions have been found so fundamental and satisfactory that most later mycologists have followed the Friesian arrangement. The nine sections are characterized in the key, and in the text following.

Key to the Species

I. Stem with a colored or milky juice, (Lactipedes) (A).
I. Stem without colored juice, II.
II. Stem viscous, (Glutinipedes) (B).
II. Stem not viscous, III.
III. Base of stem dilated into a disk or bulb; pileus white or delicately tinted, 4-10 mm. broad, (Basipedes) (C).
III. Base of stem not with abrupt bulb or disk, IV.
IV. Edge of gills darker-colored from colored cystidia, (Calodontes) (D).
IV. Edge of gills not of a different color, V.
V. Stem inserted by the naked base on the wood, leaves, etc., from which it grows, (Insititiae) (E).
V. Stem attached by a villose or fibrilose more or less rooting base, VI.
VI. Gills remaining clear white; mostly on the ground; pileus rarely above 1 cm. broad, white or brightly colored, (Adonidae) (F).
VI. Gills tending to ashy, fuscous or flesh tints in age, VII.

VII. Stem firm, rigid; mostly on wood and usually caespitose, (Rigipedes) (G).
VII. Stem not markedly firm or rigid, VIII.
VIII. Stem fragile, slender; pileus hygrophanous; plants often odorous, (Fragilipedes) (H).
VIII. Stem flaccid, filiform; pileus not hygrophanous; on the ground, mosses, mossy logs, etc., (Filipedes) (I).

(A) LACTIPEDES

(a) Edge of gills deeply colored, provided with red to dark-purple cystidia; juice dull red. 832. *M. sanguinolenta* A. & S.
(aa) Edge of gills not differently colored. Juice reddish; margin of pileus crenate; pileus and gills soon stained. 831. *M. haematopa* Fr.

(B) GLUTINIPEDES

(a) Pileus and stem both with a more or less viscid thin pellicle.
(b) Pileus, stem and gills bright orange-yellow; caespitose; pileus 2-4 cm. broad. 833. *M. leajana* Berk.
(bb) Colored differently, smaller.
(c) Gills at length decurrent; pileus convex, umbilicate, 4-10 mm. 834. *M. vulgaris* Fr.
(cc) Gills at most with decurrent tooth; pileus conic-campanulate, obtuse.
(d) Stem slender, 0.5-1 mm. thick, elongated.
(e) Stem yellowish; spores 8-10 x 4-5 micr. 835. *M. epipterygia* Fr.
(ee) Stem brownish; spores broader, 8-9 x 5-6 micr. 835. *M. epipterygia* var. B.
(dd) Stem yellowish, 1.5-2 mm. thick, not long; spores 9-10 x 6-6.5 micr.
(aa) Pileus without a viscid pellicle; stem viscid, slender.
(b) Pileus, stem and gills white; spores 7-9 x 5 micr. 836. *M. clavicularis* Fr. var. *alba*.
(bb) Pileus, stem and gills yellowish; spores 11-12 x 7-8 micr. 836. *M. clavicularis* var. *luteipes*.

(C) BASIPEDES

(a) Base of stem attached by a flat, orbicular disk to fallen leaves, twigs, etc; gills free. 837. *M. stylobates* Fr.
(aa) Base of stem attached by white radiating hairs, forming a floccose bulblet.
(b) Pileus and stem beset with minute glandular particles; gills close. 838. *M. crystallina* Pk.
(bb) Pileus glabrous, pellucid-striate; gills distant, thick. 839. *M. echinipes* Fr.

(D) CALODONTES

(a) Pileus 2-6 cm. broad, at length fully expanded; gills violet to brown; stem 3-5 mm. thick. 840. *M. pelianthina* Fr.
(aa) Pileus conic-campanulate, less then 2 cm.; stem filiform.
(b) Pileus and stem violet, rosy or purple-tinged, becoming paler; pileus striatulate.
(c) Gills tinged flesh color, edge deeper-colored; spores oblong-elliptic. 841. *M. rosella* Fr.
(cc) Gills white, edge purplish; spores subglobose. 842. *M. purpurcofusca* Pk.
(bb) Pileus livid-gray, grayish-brown or dark-brown; edge of gills purplish-brown.

(c) Pileus striate (moist), hygrophanous; stem fragile. *M. capillaripes* Pk.
(cc) Pileus not striate nor hygrophanous; stem toughish. 843. *M. denticulata* Pk.

(E) INSTITITIAE

(a) On the bark of living tree trunks; common on shade trees; gills broad. 844. *M. corticola* Fr.
(aa) On fallen leaves in woods; stem hairy; gills narrow. 845. *M. setosa* Fr.

(F) ADONIDAE

(a) Pileus 2-5 cm. broad, thick, rose color to pale lilac; odor of radish. 846. *M. pura* Fr.
(aa) Pileus usually less than 2 cm. broad. Pileus, stem and gills entirely white; small; gills rather broad, subdistant.
(b) Stem at first minutely-pulverulent; pileus papillate on disk. 847. *M. minutula* Pk.
(bb) Stem glabrous, pellucid; pileus not papillate. 848. *M. immaculata* Pk.

(G) RIGIPEDES

(a) Pileus bluish at first, 5-12 mm. broad; stem grayish-brown. 855. *M. cyaneobasis* Pk.
(aa) Pileus not bluish, larger, 1-4 cm. broad.
(b) Gills brown from the brown cystidia; stem horny, shining, dark brown. (See 46. *Marasmius cohaerens*).
(bb) Gills not deep brown.
(c) Gills assuming an incarnate tinge in age; stems rufous-brown downwards; odor and cystidia lacking. 849. *M. galericulata* Fr.
(cc) Gills usually cinerascent in age.
(d) Pileus some shade of gray or almost white.
(e) Odor nitrous; cystidia abundant on sides of gills; pileus white to pearl-gray. 853. *M. polygramma* Fr. var. *albida* Kauff.
(ee) Odor not nitrous.
(f) Pileus 1-3 cm. broad, dark ashy to pearl-gray; cystidia few; gills not with decurrent tooth. 852. *M. parabolica* Fr.
(ff) Pileus 0.5-2 cm. broad, dark ashy;gills uncinate; spores tubercular-rough. 854. *M. lasiosperma* Bres.
(dd) Pileus dark fuscous or dark brown, 2-4 cm.
(e) Gills subdistant, with cystidia, rather broad but narrowly adnexed. 851. *M. excisa* Fr.
(ee) Gills crowded, narrow; whole plant brownish-fucescent, dark. 850. *M. inclinata* Fr. var.

(H) FRAGILIPEDES

(a) Odor alkaline or nitrous in fresh plants.
(b) Stem lubricous; spores symmetrically elliptical; pileus grayish-brown to grayish-umber (moist). 856. *M. alcalina* Fr.
(bb) Stem not lubricous; usually gregarious, not very caespitose.
(c) Pileus glaucous-pruinose when dry, soon grayish-white; gills not decurrent by tooth. 859. *M. leptocephala* Fr.
(cc) Pileus not glaucous.
(d) Gills adnate with tooth; odor strong; pileus dark fuscous-gray (moist). 857. *M. ammoniaca* Fr.

(dd) Gills not uncinate; odor weak, evanescent; among mosses and grasses in wet places. 858. *M. metata* Fr.
(ddd) Cystidia abundant on sides of gills. (Not identified).
(aa) Without nitrous or alkaline odor.
(b) Cystidia numerous on sides of gills; pileus 5-15 mm. broad.
(c) Pileus tending to convex, brownish to umber (moist); stem white. 860. *M. dissiliens* Fr. var.
(cc) Pileus conic-campanulate, fuscous-cinereous; young stem and pileus bluish-blackish-gray. 862. *M. atroalboides* Pk.
(bb) Cystidia none on sides of gills.
(c) Pileus 1-2.5 cm., with smoky-fuscous umbo; stem 1.5-2.5 mm. thick, short. 861. *M. atroalba* Fr.
(cc) Pileus 5-15 mm., conic-campanulate, brown tinged lead color; stem very long, filiform; on sphagnum. 863. *M. praelonga* Pk.

(I) FILIPEDES

(a) Plants with bluish, reddish or yellowish tints; small and very slender.
(b) Base of stem adorned with blue hairs or mycelium threads. 865. *M. cyanothrix* Atk.
(bb) Without any blue tints.
(c) Gills somewhat flesh-color, uncinate; pileus rufous-yellowish; on wood. 866. *M. subincarnata* Pk.
(cc) Gills yellowish, not uncinate.
(d) Spores 7-9 x 3-4 micr.; pileus orange-red to bright-red, 2-6 mm. broad. 868. *M. acicula* Fr.
(dd) Spores 7-8 x 5-6 micr.; pileus dull-red to yellow, 5-12 mm. broad. 867. *M. pulcherrima* Pk.
(aa) Plants without any bright colors.
(b) Gills attached to a collar at the stem. 864. *M. collariata* Fr.
(bb) Gills not attached to a collar; small and very slender plants, fuscous.
(c) Gills free, crowded, white. *M. filopes* Fr.
(cc) Gills not free.
(d) Gills broadly adnate, distinct. *M. debilis* Fr.
(dd) Gills attenuate-adnexed, subdistant; pileus brownish to livid ashy. *M. vitilis* Fr.

Section I. Lactipedes. Flesh exuding a juice when broken; stem rooting, not viscid.

831. Mycena haematopa Fr.

Sys. Myc., 1821.

Illustrations: Fries, Icones, Pl. 83, Fig. 1.
Cooke, Ill., Pl. 162.
Gillet, Champignons de France, No. 450.
Atkinson, Mushrooms, Fig. 100, p. 100, 1900.
Hard, Mushrooms, Fig. 90, p. 123, 1908.
Marshall, The Mushroom Book, Pl. 37, op. p. 93.
Conn. State Geol. & Nat. Hist. Surv. Bull., No. 15, Pl. 10, 1910.

PILEUS 1-3 cm. broad, at first narrow elliptical then campanulate, obtuse, at first purplish-maroon then livid-reddish or paler, glabrous, striate, stained darker in age; the sterile *margin extends beyond the gills and is crenate*. FLESH thin, *bleeding when cut*. GILLS narrowly adnate, ascending, narrow, subdistant, whitish *soon reddish-stained*, edge flocculose. STEM 4-8 cm. long, 1.5-3 mm, thick, rigid, fragile, hollow, white-pruinate when young, at length glabrous except the hairy base, even, rufous-tinged, *exuding reddish juice when broken*. SPORES elliptical, 8-10 x 5-6 micr. (few larger), smooth, white. CYSTIDIA none. *Sterile cells* on edge of gills numerous, with swollen-ventricose base and tapering to a narrow acuminate point, about 50 micr. long. ODOR and TASTE mild.

Caespitose or subcaespitose, sometimes confluent, on decaying wood. In frondose and coniferous woods throughout the State. June to September. Rather frequent.

Known by the reddish juice of the flesh, the crenate flaps on the margin of the cap and the caespitose habit. The juice is not always equally abundant depending on weather and vigor of plant. All the parts of the plant become stained darker reddish in age. Fries does not mention the striations on the cap, which are sometimes quite marked.

A variety occurs on hemlock logs whose pileus is often markedly umbonate, at first striate, very rugose striate in age, its margin scarcely crenate. The gills at length secede and remain attached to each other behind by a false collar, often very veiny and staining reddish after being bruised. The stem and cap also become reddish-stained from the watery juice contained in the flesh. The juice itself seems uncolored but causes the bruised parts to assume the reddish stains. The base of the very caespitose stems is imbedded in cracks in the logs and is strigose with white hairs. It was collected during several seasons at New Richmond. It occurs in dense clusters. The spores are like those of *M. haematopa*.

832. Mycena sanguinolenta Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 83, Fig. 3.
Cooke, Ill., Pl. 163, Fig. 1.

PILEUS small, 4-6 mm. broad, soft, campanulate, obtuse or subumbonate, striate, glabrous, pale reddish then fuscous. FLESH membranaceous. GILLS narrowly adnate, broader in front, subdistant, rufous-tinged, *edge dark purple*. STEM 4-8 cm. long, filiform, fistulose, flaccid, soft, glabrous, mycelioid, pallid or pale rufescent, *exuding reddish juice when broken*. SPORES 8-11 x 4-5 micr., long-elliptical. *Sterile cells* on edge of gills numerous, enlarged below, tapering to a point above, about 30 micr. long.

On the ground among leaves in frondose and mixed woods, sometimes in tamarack swamps. Throughout the State. June-September. Infrequent.

This little Mycena is smaller than *M. haematopa* and lacks the crenate margin of that species. It has a somewhat different habitat, is very soft and slender and when young the cap is dark red. It is readily distinguished from *M. haematopa* by the colored edge of the gills. Stevenson says it is common in Great Britain, but with us it occurs rather seldom, and prefers the northern area.

Section II. Glutinipedes. Stem viscid, without juice; gills at length uncinate.

833. Mycena leajana Berk.

Hooker, London Journal, Vol. IV, p. 300.

Illustrations: Hard, Mushrooms, Fig. 94, p. 127, 1908.
Conn. State Geol. & Nat. Hist. Bull. No. 15, Pl. 11, 1910.

PILEUS 2-3 cm. broad (rarely larger), convex, subexpanded, umbilicate, *covered by a tough, viscid, orange separable cuticle*, shining when moist, glabrous. FLESH rather thick, livid-whitish. GILLS adnate, becoming sinuate, rather narrow, close, thickish, yellowish to pale orange, *edge reddish to vermillion*. STEM 3-7 cm. long, 24 mm. thick, equal, even, hollow, tough-cartilaginous, viscid, at first yellow and covered by orange scurfy-pulverulence, varying below to strigose tomentum at times, attached by an orange-colored mycelium. SPORES elliptic-oblong, 8-9.5 x 5-6 micr., smooth, dented on one side. CYSTIDIA none; *sterile cells* on and near the edge of the gills, numerous, reddish-orange, about 45 micr. long, apiculate.

Caespitose on logs, branches and stumps in frondose and conifer woods. Throughout the State. July-September. Rather frequent, especially in the north.

This is a striking and beautiful species, easily recognized at a distance by the reddish-orange color of the rather dense clusters. The cap often fades to a livid-tan and finally to a whitish color, and then develops striations on the margin. This species does not seem to be closely related to other Mycenas, and its position here is uncertain. It belongs more nearly to Heliomyces.

834. Mycena vulgaris Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 191.
Berkeley, Outlines, Pl. 6, Fig. 4.
Atkinson, Mushrooms, Fig. 9, p. 97, 1900.

PILEUS 5-15 mm. broad, convex to subexpanded, subviscid when moist, pale grayish-brown to fuscous, *umbilicate*, striatulate to umbilicus, somewhat darker in center, soft, fragile, sometimes papillate on center. FLESH membranaceous, subhygrophanous. GILLS *broad behind and subdecurrent*, subdistant, thin but sometimes thickish, often venose, white then grayish-white. STEM 2-5 cm. long, 1-1.5 mm. thick, cartilaginous, toughish, hollow, glabrous, somewhat rooting, *very viscid when moist*, straight or flexuous, equal, even, pallid brownish or grayish. SPORES broadly elliptical, 6-8 x 4-5 micr., smooth, white. CYSTIDIA and STERILE CELLS none or few. BASIDIA slender, 30 x 5 micr., clavate. ODOR and TASTE none.

Caespitose or gregarious. Attached to pine needles, leaves and sticks in conifer or frondose woods, so far only in the coniferous regions of the State. New Richmond, Marquette. August-September.

Mycena vulgaris, except for its viscidity, would be looked for under the genus Omphalia. Fries describes the pileus as "depressed," but it usually has the umbilicate character in our plants, and is practically an Omphalia with broad, subdecurrent gills. Authors differ widely as to size of spores. Massee and Karsten (Stevenson's British Fungi) give the measurements very small, 4-5 x 2 micr., while Schroeter says they are 9-11 micr. long. This discrepancy shows that these authors were dealing with different species. American authors do not give any spore measurements. When young and moist the pileus is quite viscid, but soon dries. The species is often very abundant under favorable weather conditions in the localities where it occurs.

835. Mycena epipterygia Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 208.
Patouillard, Tab. Analyt, No. 215.
Gillet, Champignons de France, No. 462.
Atkinson, Mushrooms, Fig. 96, p. 96, 1900.
Hard, Mushrooms, Fig. 96, p. 129, 1908.

Var. *A*. PILEUS 1-2 cm. broad, conic-ovate then campanulate or subhemispherical, obtuse, *subviscid* by a thin, separable pellicle, hygrophanous, at first yellowish-gray *then gray to fuscous*, glabrous, striate on the margin which is at first straight. GILLS arcuate-adnexed, uncinate, rather broad, ventricose, subdistant, whitish at first, grayish-rufescent in age, edge entire. STEM 4-5 cm. long, *2 mm. thick*, yellowish or pellucid pale yellow, *tough*, equal, straight or flexuous, tubular, sometimes twisted or compressed, *viscid by a thin, separable pellicle*, rooting. SPORES broadly elliptical, 9-10 x 6-6.5 micr., smooth, obtuse, white. CYSTIDIA none. ODOR none or slightly farinaceous. BASIDIA attenuated downward, clavate, 45 x 6-7 micr., 4-spored.

On the ground in low, elm woods. Detroit. October.

Form *typical*. This is a much more slender-stemmed plant, described and illustrated by Atkinson and Hard. The pileus is elongated-conical at first and the stem filiform. The colors are similar to Var. A. I have seen this form rather frequently in northern Michigan, but have no notes on it.

Var. *B*. PILEUS 5-8 mm. broad, obtusely conic-campanulate. glabrous, *with a viscid, separable, thin pellicle*, obscurely striatulate, *grayish-brown*. GILLS adnate-arcuate, uncinate, rather narrow, subventricose, *white*, intervenose. STEM *filiform*, 3-8 cm. long, 0.5 mm. thick, equal, *viscid*, flaccid, shining, glabrous, even, pruinose at apex, *pallid with brown tinge*, rooting and mycelioid at base. SPORES broadly elliptical, 8-9 x 5-6 micr., smooth, obtuse, white. CYSTIDIA none. BASIDIA about 24 micr. long. ODOR none or slightly nitrous. TASTE none.

On decorticated, half-decayed logs. New Richmond. September.

Mycena epipterygia, like the following, is probably a composite species, as Maire has pointed out. (Bull. Soc. Myc. France, Vol. 26, p. 160.) Fries placed a series of previously described species under this one and considered the colors insufficient to differentiate them. Color, like size, shape and habitat, is very variable, but Fries did not consider any microscopic characters, hence it is likely he has been too conservative in this series, and sooner or later several species will be segregated. Maire (1. c.) has already separated *M. viscosa* Maire, a plant of the coniferous regions.

836. Mycena clavicularis Fr.

Syst. Myc., 1821 (var. *alba*, N. Y. State Mus. Rep. 28, 1885).

Illustrations: Fries, Icones, Pl. 84, Fig. 1.
Cooke, Ill., Pl. 208.

Var. *álba* Pk. PILEUS 5-7 mm. broad, conico-campanulate, *dull-white*, not changing, sulcate-striate, pruinose, dry (not viscid), without pellicle. FLESH membranaceous. GILLS adnate, moderately broad, close, *white*, edge obscurely nocculose. STEM 5-6 cm. long, *filiform*, .5 mm. thick, *pellucid-whitish, viscid when moist*, glabrous, long-rooting, even, fistulose, flaccid, flexuous, loosely hairy below. SPORES 7-9 x 5 micr., elliptical, obtuse at ends, smooth, white. CYSTIDIA none. *Sterile cells* on edge of gills inflated, rounded-pyriform on narrow stalks, 15-30 micr. in diam. BASIDIA about 24 micr. long, subclavate, 4-spored. ODOR none.

Caespitose or singly, attached to fallen leaves by the rooting, hairy stem, in mixed woods. New Richmond. September. Infrequent.

Var. *luteipes* nov. var. PILEUS 10-15 mm. broad, convex-campanulate, obtuse, striate up to the papilla, silky, not viscid, *sulphur-yellow with olivaceous or green shades*, brownish or grayish in age. GILLS adnate, uncinate or arcuate-subdecurrent, *yellowish, flesh color or rufescent in age*, rather narrow and distant, edge entire. STEM 5-8 cm. long, 1-1.5 mm. thick, slender, equal, hollow, *tough*, pruinose at apex, *viscid*, darker yellow than pileus, rooting at the somewhat attenuated base. SPORES broadly elliptical, 11-12 x 7-8 micr., smooth, white in mass.

On the ground among debris, mosses, etc. Bay View, Detroit. Rare.

M. clavicularis Fr. is doubtless a composite species. Fries, himself, considered it composed of a number of color forms, with caps either whitish, pale yellow or fuscescent. Peck named three varieties: *alba, cinereus* and *filipes*. The size of the spores seems to be omitted by authors. The two varieties described above are probably distinct species but further data on all the supposed varieties are needed. The *M. clavicularis* group differs from the *M. epipterygia* group in the lack of a viscid pellicle on the pileus. Until these two groups have been more fully studied with reference to the microscopic characters, it is better not to segregate new species from them. Fries' figure shows a yellowish plant, somewhat smaller than var. *luteipes*.

Section III. Basipedes. Stem dry, juiceless, not rooting, the base naked and dilated into a disk, or strigose and swollen into a little bulb. Very thin, solitary, becoming flaccid.

837. Mycena stylobates Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 249.
Berkeley, Outlines, Pl. 6, Fig. 5.
Patouillard, Tab. Analyt., No. 624.

PILEUS 3-6 mm. broad, *campanulate-convex*, obtuse, dry, glabrous, *white, striate*. FLESH membranaceous. GILLS free, distinct behind, *distant*, ventricose, *white*. STEM, 2-5 cm. long, *filiform*, hollow, *white*, equal, glabrous, dry, seated upon an *orbicular, plane, striate subvillose base*.

Solitary on fallen leaves, in frondose woods. Ann Arbor. October. Rare.

Only two specimens were obtained. The pileus of our plant was glabrous, lacking the scattered pilose hairs attributed to it. Very delicate and fragile.

838. Mycena crystallina Pk.

N. Y. State Mus. Rep. 41, 1888.

PILEUS 4-10 mm. broad, conical then campanulate, subumbonate, *pure white to creamy-white*, obscurely striatulate, *pruinate* under lens, *due to minute, shining, glandular, capitate hairs and particles*. FLESH membranaceous. GILLS *narrow*, narrowly adnate or scarcely adnexed, thin, close, white. STEM 2-5 cm. long, filiform, hollow, white and adorned like pileus, *attached by a white-hairy strigose base*. SPORES narrow, 7-9 x 3 micr., smooth, white. CYSTIDIA none.

On cedar twigs, mosses, etc., in cedar and tamarack swamps. Bay View and New Richmond. September. Infrequent.

Known by the glandular particles and hairs which cover the surface of cap and stein of the fresh plant. These can scarcely be seen with the lens on account of the minute size. The color varies somewhat as indicated above. This species was referred to the section Basipedes by Peck, but might with equal propriety be placed among the Adonidae. At times the strigose hairy base is not well-developed and it is then easily mistaken for *M. immaculata* Pk., but that species lacks the glandular covering. *Marasmius resinosus* is also glandular-viscid, but is a larger plant.

839. Mycena echinipes Fr.

Epicrisis, 1836 (Lasch, in Linn.).

Illustration: Fries, Icones, Pl. 84, Fig. 5.

PILEUS 2-5 mm. broad, very thin, convex, widely pellucid-striate, *white*, glabrous. FLESH membranaceous. GILLS broadly adnate, thick, distant, subvenose, *white*. STEM 2-3 cm. long, filiform, glabrous, hollow, white, *attached by a villose, bulbillose base*. SPORES 7-8 x 3 micr., smooth, white.

On decaying leaves in birch and hemlock woods. Bay View. September. Rare.

A minute species, closely related to others of the group.

Section IV. Caldontes. Stem juiceless, dry, base not bulbillate or dilated into a disk; edge of gills provided with cystidia which give it a deeper color than elsewhere.

In the preceding sections, *M. sanguinolenta* and *M. leajana* also have this character of the gills, but differ in other respects.

840. Mycena pelianthina Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 156.
Berkeley, Outlines, Pl. 6, Fig. 1.
Patouillard, Tab. Analyt., No. 418.

PILEUS 2-5 cm. broad, hemispherical-convex then expanded, obtuse, moist, *hygrophanous, varying purplish-livid to sordid brownish-violet*, fading to dingy whitish, striate. FLESH somewhat fleshy, white. GILLS adnexed-rounded behind, becoming sinuate, narrow, at first dull violet, becoming brownish, close, *edge purple*. STEM 5-8 cm. long, 2-5 mm. thick, equal, often curved at base, fragile, hollow, even, glabrous, *sordid whitish or streaked with violaceous fibrils*.

Solitary or scattered. Among fallen leaves in frondose woods. Throughout the State. July-September. Frequent.

Has the size of *M. pura*, but differs from it in that the edge of the gills is darker from the colored cystidia, in the more solitary habit and the cylindrical stem. Generally only one or two plants are found in a place. It seems to prefer maple, oak and beech woods. The color of the cap is variable and hard to describe, usually of a dirty color. Fries says it is intermediate between the genera Collybia and Mycena.

841. Mycena rosella Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 131.

PILEUS 4-15 mm. broad, campanulate-convex then hemispherical to subexpanded, obtusely umbonate, sometimes plane on disk, *sulcate-striate, pale rose color*, paler and tinged ochraceous in age, glabrous. FLESH membranaceous, fleshy at umbo. GILLS broadly adnate, slightly subdecurrent, medium broad, subdistant, *pale rose-colored, edge darker*. STEM 4-5 cm. long, 1 mm. thick, *pellucid-flesh color*, filiform, hollow, cartilaginous, slightly tough, *glabrous*, even, attached at base by white, hairy tomentum. SPORES oblong-elliptical, 8-9 x 4 micr., smooth, white. CYSTIDIA on sides and edge of gills, dense on edge, ventricose, narrowed to acuminate above, 60-70 x 12-15 micr., filled with a rosy to flesh-colored sap when mature. ODOR at first none, becoming nitrous after being picked.

Caespitose, usually of 2 or 3 stems, sometimes connate by the white tomentum, sometimes gregarious. On and among pine needles and other fallen leaves, in woods of white pine and oak.

New Richmond, Marquette. September-October. Common locally.

This pretty little Mycena is well named. It can be easily distinguished by the pale rosy coloring of the cap and gills and by its habitat. The surface of the cap and stem is slightly viscid or lubricous when the plant is fresh, and this is due to a very thin layer of subgelatious hyphae which cover these parts. After drying out somewhat it was found that a nitrous odor developed; this fact does not seem to be mentioned elsewhere. Peck reports the species from New York, but elsewhere it seems to have been overlooked. The attachment of the gills is almost like that of the genus Omphalia, and the color of the gills is apt to lead one to place it among the pink-spored group. *Mycena capillaripes* Pk. (N. Y. State Mus. Rep. 41, 1888) is very close to if not identical with it.

842. Mycena purpureofusca Pk.

N. Y. State Mus. Rep. 38, 1885.

"PILEUS 8-16 mm. broad, *not hygrophanous*, campanulate or convex, obtuse, glabrous, *striate, purplish-brown*. FLESH membranous. GILLS adnate, ascending, lanceolate, subdistant, white or whitish, *purplish-brown* on the edge. STEM 2.5-7.5 cm. long, scarcely 2 mm. thick, *slender*, even, hollow, glabrous, with white hairs at the base, colored like the pileus or a little paler. SPORES subglobose or broadly elliptical, 6-7.5 x 6.5 micr."

On mossy hemlock logs in woods. Bay View. September. Rare.

Peck says it is closely related to *M. rubromarginata* Fr., from which it differs in its darker color and non-hygrophanous striate pileus. Longyear, in the 4th Report of the Michigan Academy of Science, lists *M. rubromarginata* Fr. but he is uncertain of the identification; it is probably Peck's species.

843. Mycena denticulata Pk.

Torr. Bot Club, Bull. 32, 1905.

PILEUS 8-18 mm. broad, campanulate, toughish, often obtusely subconic, glabrous, *not striate*, grayish-brown, darker on center, margin soon split. FLESH thin, membranous. GILLS adnate with slightly decurrent tooth, often adnexed-emarginate then broader, *medium*

broad, ventrieose, subdistant, thickish, whitish, *edge dark brown, crenulate*, sometimes venose-connected or a few forked. STEM 3-6 cm. long, 1-1.5 mm. thick, equal, slender, even, hollow, *toughish*, glabrous or subfurfuraceous with minute brown dots, pallid. SPORES sub-globose to elliptic-oval, 7-8 x 5-7 micr., smooth, white. CYSTIDIA none. *Sterile cells* on edge of gills, short, subelliptical-saccate, obtuse, 30-35 x 12-15 micr., filled with brownish substance as shown under microscope.

On rotten wood or humus, in oak and maple woods. Ann Arbor, New Richmond. June-September. Infrequent.

This little Mycena was described by Peck from material sent to him from St. Louis, Mo., by Glatfelter. Peck says the edge is purplish, but there is scarcely any tint of that color in the gills of our specimens; nevertheless the two forms appear to be identical in other respects. In general appearance and habitat it imitates *Collybia floccipes* Fr., but the stem is less purely white, the gills have the brown-dotted edge, cystidia are lacking and the spores are slightly larger.

Section V. Instititiae. Stem inserted (i. e. attached directly to other plant parts without root-like base or tubercle, etc.), dry. Gills adnate, uncinate (not truly decurrent as in Omphalia).

844. Mycena corticola Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 164.
Fries, Icones, PI. 85, Fig. 2.
Gillet, Champignons de France, No. 458.
Hard, Mushrooms, Fig. 93, p. 126, 1908.
Patouillard, Tab. Analyt., No. 217.

PILEUS 4-8 min. broad, hemispherical, obtuse or at length subumbilicate, distantly *striate*, flocculose-pruinate, blackish (when young), becoming fuscous, cinereous, grayish-ochraceous, etc. FLESH thin, membranaceous. GILLS adnate, uncinate, *distant, broad*, subovate, paler than pileus. STEM 6-12 mm. long, 1 mm. thick, slender, *incurved*, glabrous or minutely furfuraceous, paler than pileus.

On the bark of living trunks of frondose trees; everywhere, especially on shade trees of cities. Probably throughout the State, very common in southern part. July-October.

After rains, in late summer and fall, this little Mycena appears in large numbers, scattered over the trunks of our shade trees, elm, maple, etc. It appears to revive somewhat after succeeding rains, but the texture is that of a Mycena rather than a Marasmius. The color is very variable, especially during development. *M. hiemalis* Fr. is said to be its near relative, and to grow in similar situations, but I have been able to distinguish only *M. corticola* within our area.

845. Mycena setosa (Sow.) Fr**.**

Hymen. Europ., 1874.

Illustration: Cooke, Ill., Pl. 193.

PILEUS 1-2 mm. broad, minute, very thin, hemispherical, obtuse, glabrous, *becoming fuscous*. GILLS distant, *narrow*, white. STEM delicately filiform, 10-12 mm. long, *inserted*, capillary, *everywhere shaggy with distant spreading hairs*.

On fallen leaves and pine needles, in woods of white pine and beech. New Richmond. September. Rare.

Section VI. Adonidae. Stem dry and usually growing from the ground. Gills of one color, neither darker on edge, nor becoming ashy nor fuscous.

The plants in this section are usually brightly colored or white, not with ashy or fuscous shades on cap and gills. Those of the following sections often have white gills at first but become tinged with cinereous or fuscous color, although this character is in some cases scarcely determinate in fresh specimens.

846. Mycena pura Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 157.
Gillet, Champignons de France, No. 476.
Gillet, (var. *alba*) No. 477.
Gillet, (var. *lutea*) No. 478.
Bresadola, Fung. Trid., Vol. 2, (var. *multi-color*) Pl. 114.
Patouillard, Tab. Analyt., No. 313.
Atkinson, Mushrooms, Fig. 95, p. 95, 1900.
Hard, Mushrooms, Fig. 95, p. 128, 1908.
Swanton, Fungi, Pl. 8, Fig. 3 and 4, 1909.

PILEUS 2-4 cm. broad, rarely broader, campanulate to convex, finally expanded, more or less obtusely *umbonate*, sometimes broadly so, moist, striatulate on margin, *bright rosy-red*, sometimes rose-purplish, lilac or violet. FLESH thin, moist. GILLS adnate, sinuate, *broad*, ventricose, subdistant to close, varying rose, violet, white, etc., often veined or with the interspaces veiny. STEM 5-10 cm. long, 2-4 mm. thick, *cylindrical*, sometimes twisted, even, toughish, *glabrous*, hollow, more or less hairy at base, colored like or paler than pileus. SPORES elliptic-oblong, 6-7 x 3-3.5 micr., smooth, white. CYSTIDIA few on sides of gills, clavate-cylindrical, about 40-50 x 12-15 micr. *Sterile cells* not abundant on edge of gills, similar but smaller. ODOR somewhat of radish.

Caespitose or scattered to solitary. On humus, moss or much decayed logs in frondose or mixed woods, or tamarack, balsam and cedar swamps. Throughout the State. June to October. (Earliest record June 14, latest October 4.) Common.

A widely distributed Mycena, beautifully colored and one of the larger species of the genus. Its prevailing color, which often extends into the gills, is a pale rose-purple

(Ridgway, new ed.), although it varies, under different conditions, localities or in age, to darker or lighter shades. Peck (23rd Rep.) says the umbo is lacking, but I have seen it often in the form shown by Cooke, Patouillard and Gillet in their illustrations. Schroeter (Die Pilze Schliesiens) says the edges of the gills are densely beset with cystidia. This is shown in Patouillard's figure; these I have usually referred to as "sterile cells." The very young pileus is ovate-subconical, and hoary-pubescent.

847. Mycena minutula Pk.

N. Y. State Mus. Rep. 25, 1873.

PILEUS 2-8 mm. broad, campanulate then expanded, *white, papillate*, glabrous, moist, striatulate to center. GILLS adnate with tooth, subdistant, *rather broad, white*, interspaces venose. STEM 2-4 cm. long, filiform, scarcely .5 mm. thick, *white*, elastic, *covered throughout its length by microscopic*, subcylindrical hairs, about 30 micr. long, 4-6 micr. thick, which give it a mealy appearance. SPORES 6-8 x 3.5-5 micr., elliptical, oval, smooth, white. BASIDIA 4-spored, 18-20 micr. long. CYSTIDIA none. ODOR and TASTE none.

Gregarious or scattered on moss of prostrate trunks, on rotten wood, twigs, etc., of pine, beech and oak woods. New Richmond, Ann Arbor. September-October. Infrequent.

The pruinosity of the stem and the entirely white color of the spores characterize this little species. It must not be confused with *M. crystallina* Pk. and *M. immaculata* Pk.

848. Mycena immaculata Pk.

N. Y. State Mus. Rep. 38, 1885.

PILEUS 4-8 mm. broad, conical or subhemispherical, *glabrous*, slightly striate on the margin, pure *white*. FLESH membranaceous. GILLS adnate or uncinate-decurrent, moderately broad, *distant*, white. STEM 1.5-3.5 cm. long, scarcely .5 mm. thick, slender, *pellucid-white*, glabrous, generally villose-strigose at the base, slightly thickened at apex. SPORES oblong or cylindrical, 7.5-9 x 3 micr.

On mosses and fallen leaves on the ground. Bay View. August.

This seems to differ sufficiently from *M. lacteus* Fr. which has crowded narrow gills; the latter grows caespitosely on wood according to Stevenson (British Fungi), while Fries (Epicrisis) says it is generally found on the ground. *M. minutula* Pk. and *M. crystallina* Pk. should be compared with it.

Section VII. Rigipedes. Stem firm, rigid, somewhat tough, juiceless, somewhat strigose and rooted at the base. Gills becoming tinged with gray, flesh color, fuscous, etc. Pileus *not hygrophanous*.

Tough, persistent, inodorous, normally *growing on wood and caespitose*.

Fries originally (Syst. Myc., Vol. I, p. 13) included some of the following species under *M. galericulata*. In Epicrisis he divided the latter into a number of species. As Fries did not consider any microscopic characters, some of these species have been much misunderstood, and even today no clear account can be given by which they can, with entire certainty, be separated. I have attempted below, by using such critical studies as others have made with the microscope, and adding my own, to separate those which have been found in my collecting by using the characteristics of the spores and cystidia. As Fries pointed out (Epicrisis, p. 104), the color, especially of the stem, is very deceptive in many of these species, and cannot be relied on to any great extent for their separation.

**Pileus and stem usually brown or dark colored, not constantly gray*.

849. Mycena galericulata Fr. (EDIBLE)

Syst. Mycol., 1821 (in part).

Illustrations: Fries, Icones, Pl. 80, Fig. 2 (var.).
Cooke, Ill., Pl. 222 and Pl. 223 (var.).
Gillet, Champignons de France, No. 462.
Patouillard, Tab. Analyt, No. 214 and No. 817.
Hard, Mushrooms, Pl. 16, Fig. 89, p. 121.
Marshall, The Mushroom Book, Pl. 7, op. p. 55.
Michael, Führer f. Pilzfreunde, III, No. 92.
Clements, Minnesota Mushrooms, Fig. 17, p. 30, 1910.
Moffatt, Nat. Hist. Surv. Chicago Acad. of Sci., Bull. 7, Pl. 4.

PILEUS 2-4 cm. broad, campanulate or obtusely conic-campanulate, umbonate, *striate or subsulcate to umbo*, glabrous, *buff on margin, shading to brown or umber on umbo;* ashy white and subshining when old, often with brown or blackish-ferruginous stains. FLESH thin, toughish, whitish. GILLS *adnate* or arcuate-adnate, *uncinate*, moderately broad, subdistant, dull white, *usually tinged with flesh color in age*, often stained when old, edge entire or crenulate-eroded, interspaces usually venose. STEM 4-10 cm. long or longer, 1-3 mm. thick, *tough*, very tough in age, *cartilaginous*, hollow, even or only innately striatulate, flexuous, sometimes twisted, f*rom pallid to rufous-brown or ferruginous-stained below*, paler to whitish at apex, glabrous and shining, base often connate with ferruginous or dingy-yellow strigose hairs, and rooting. SPORES 8-9 x 5-6 micr., broadly-elliptical *when mature*, smooth, white, immature spores with large globule simulating globular spores. BASIDIA 4-spored, with long and stout sterigmata. CYSTIDIA *none*. ODOR none or slightly farinaceous.

Very caespitose on rotten wood, old logs, stumps, etc., of all kinds of trees.

Throughout the State. March-November. (Earliest record March 15; latest, November 2.) Very common.

Reported throughout North America, Europe, Tasmania, etc. The weather and locality bring about much variation in this species, especially as to color and texture. The

essential characters seem to be the lack of cystidia, the absence of a nitrous odor, the caespitose rufous-brown stems, the sulcate-striate cap, which is often stained in moist weather, the tendency for the white gills to assume a flesh tint and the size of the spores. The stains on cap and gills and base of stem are dingy yellow, purplish-brown or dark ferruginous. At other times, especially in dry places, the pilei become silvery-shining and scarcely stained. In mounting a section of the gills the large mature spores with homogeneous contents sink to the bottom of the water on the slide. The immature spores are subspherical and contain a large globule which is more prominent than the wall of the spore and accounts for the fact that to some observers the spores look spherical. Patouillard reports that a common variety has 2-spored basidia; I have not found it. *M. haematopa*, which becomes stained in the old stage must not be confused with this species. Occasionally the stem is striate but this form differs from *M. polygramma* var. *albida* in the lack of cystidia, and in our territory by the different colors.

Var. *calopus* Fr.

Illustrations: Fries, Icones, Pl. 80, Fig. 2.
Cooke, Ill., Pl. 223 A.

Like *M. galericulata*, except that the gills are adnexed, the stem striatulate and coherent or proliferous at base, joined together and covered by rusty or brown strigose hairs, elsewhere rufous-bay color and shining. Spores as in *M. galericulata*. No cystidia. The appearance of the stem reminds one of that of *Marasmius cohaerens*, but the pileus, etc., are very different.

Caespitose, on decaying logs in woods. Ann Arbor. May and June. Infrequent.

850. Mycena inclinata Fr. var.

Epicrisis, 1836-38.

Illustration: Plate CXLIX of this Report.

PILEUS 2-3 cm. broad and high, obtusely conical at first, then persistently conical-campanulate *with a broad oblong strongly marked umbo*, at length with a spreading or recurved margin, often gibbous-cernuous, dry, striate to the middle, *fuscous-brown*, umbo smoky-fuscous, darker colored in age. FLESH thin, concolor or paler. GILLS narrowed behind and sinuate-adnexed, *not uncinate*, narrow, ascending, crowded, soft, whitish or grayish-fuscescent, edge entire. STEM 3-6 cm. long, 2-5 mm. thick, curved, *twisted*, hollow, *often compressed or furrowed*, toughish-fibrous and splitting longitudinally under pressure, subfibrillose, pallid above, fuscous below, *fuscescent or blackish-fuscous throughout in age*, rooting. SPORES broadly elliptical, 8-10 x 5-6 micr., smooth, white. CYSTIDIA none. ODOR fungoid.

Caespitose or subcaespitose on logs in woods of juniper, oak, etc. Ann Arbor. October. Infrequent.

Apparently intermediate between *M. prolifera* and *M. inclinata*, concerning whose microscopic characters little is known. It is allied to the former by its broad and dark umbo and to the latter by the character of the stem, the cernuous pileus which is at first much incurved and the strongly fuscescent colors of cap and stem. The narrow gills are still more narrowed and broadly sinuate behind. The pileus often undulates from umbo to margin, and remains obtusely conic-campanulate. No tendency of the stein to proliferate was observed. It is very distinct from *M. galericulata*. The figure of Gillet does not appear to agree at all with the description of Fries.

851. Mycena excisa Fr.

Epicrisis, 1836.

Illustration: Fries, Icones, Pl. 81, Fig. 1.

PILEUS 1.5-4 cm. broad, *firm*, campanulate, broadly umbonate, gibbous, dark brown, *dark umber or blackish-fuscous, rugulose*, margin at first straight. FLESH concolor or paler. GILLS adnexed by an abruptly much narrower portion, elsewhere *rather broad*, ventricose, *subdistant, thickish*, pallid then tinged brownish. STEM short, 2-3 cm. long, 24.5 mm. thick, equal, floccose-fibrillose, glabrescent, stuffed then hollow, *rigid, toughish*, often twisted, sometimes compressed, *fuscous-brownish*, darker in age. SPORES elliptical, 8-10 x 5-6 micr., smooth, apiculate, white. CYSTIDIA moderately abundant, cylindrical above, ventricose above the slender pedicel, obtuse, 75-110 x 15-18 micr. BASIDIA about 40 x 6 micr., 4-spored. ODOR and TASTE none.

Caespitose or subcaespitose to gregarious. On the ground, among grass in oak woods. Ann Arbor. October-November. Infrequent.

Known by its dark brown cap, its short stem which is rigid and rather tough, and the abruptly narrowed and slightly adnexed gills. It has scarcely any tinge of gray to either cap or stein. The stem is sometimes strongly entwined on the grass-stalks or obliquely attached to buried roots, etc. Fries has not adhered to the same description in his different works; our plants agree best with the description in Icones, although in size and build they are more like the figures of *M. dissliens* of the same work. The cystidia are large and striking,

***Pileus fundamentally gray, or some shade of gray, or white.*

852. Mycena parabolica Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 80, Fig. 3.
Cooke, Ill., Pl. 224.

PILEUS 1-3 cm. broad, campanulate, *margin at length recurved*, umbo obtuse, *striate*, becoming coarsely rugose-striate, *sometimes sulcate*, moist, glabrous, *at first blackish-cinereous*, especially on center, *then gray to pearl-gray* or whitish when dry, disk darker. FLESH thin, *concolor at first*. GILLS narrowly adnate, *not uncinate, narrow*, at first ascending and close, then subdistant, whitish, *then tinged cinereous*, edge entire. STEM 3-10 cm. long, 1.5-2.5 mm. thick, sometimes long

and rooting, cartilaginous, hollow, terete or compressed, *even*, glabrous, *cinereous*, fading, the rooting base white-hairy and curved or flexuous. SPORES 8-10 x 5-7 micr., elliptical, ends obtuse, smooth, white. CYSTIDIA few, lanceolate, soon collapsing, sometimes on the edge of the gills; sterile cells none. BASIDIA 4-spored, 27 x 8 micr., with prominent awl-shaped sterigmata, 6 micr. long. ODOR none.

Solitary, gregarious or subcaespitose. On or around decaying logs, stumps in mixed woods of white pine and beech. New Richmond. September.

This gray Mycena is frequent locally. The margin of the cap becomes expanded or recurved and is then coarsely sulcate on account of the thin flesh. The young stage distinctly shows its non-identity with *M. galericulata*. The stem is not as rigid as that of its neighbors and becomes somewhat flaccid in age.

853. Mycena polygramma Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 223.
Michael, Führer f. Pilzfreunde, III, No. 91.

Var. *albida* Kauff. Mich. Acad. Sci. Rep. 13, p. 219.

PILEUS 2-5 cm. broad, campanulate or conic-campanulate, dry, obtusely subumbonate, *sulcate-striate on margin* in large specimens, *white*, whitish-buff or grayish, glabrous, atomate when dry. FLESH white, thin. GILLS *narrowly adnate, not uncinate*, ascending or arcuate, rather broad in middle, subdistant, white, with a faint flush of pink in the gray forms, edge even. STEM 5-10 cm. long, 2-4 mm. thick, *equal*, cartilaginous, hollow, *striatulate or distinctly striate at apex or throughout*, sometimes twisted, straight or flexuous, firm and rather rigid but fragile, glabrous and *shining*, white or grayish-white, hairy at base. SPORES 8-10 x 5-6 micr., broadly elliptical, ends rounded, smooth, white. CYSTIDIA fusiform-acuminate, *abundant*, 45-75 x 9-15 micr. BASIDIA 4-spored, sterigmata slender. ODOR *nitrous*, varying from slight to strong.

Caespitose, gregarious or solitary on decaying logs of maple, elm, basswood, etc. Ann Arbor. May-June. Frequent locally.

Not to be confounded with *M. alkalina*, which lacks cystidia or possesses but a few of them, and which has pseudo-viscid stems. The typical *M. polygramma* of Europe has not been recognized with certainty and appears to be rare. Atkinson has referred *M. praelonga* Pk. to it, but the latter is kept intact in this report. Our plants, described above, are relatively large, almost pure white and have striate stems and a nitrous odor. It cannot be *M. sudora* Fr. since the cap is not viscid.

854. Mycena lasiosperma Bres.

Fung. Trid., 1881.

Illustration: Ibid, Pl. 37, Fig. 1.

PILEUS 5-20 mm. broad, conic-campanulate then expanded-umbonate, *subviscid*, striatulate to umbo, subhygrophanous, *dark cinereous*, almost black on umbo, paler toward margin. FLESH thin, concolor. GILLS adnexed, with tooth, close, ventricose, whitish then tinged gray, interspaces venose, stem 3-7 cm. long, 1-2 mm. thick, equal or attenuated below, *toughish* and *firm*, flexuous, hollow, white-pulverulent, brownish above, paler below, curved-rooting. SPORES spherical, *covered with blunt, rod-like tubercles*, 6-7 micr. diam., *white*. CYSTIDIA moderately abundant, fusoid, attenuate above, 45-60 x 8-12 micr. ODOR slight or none.

On very rotten wood and debris in beech and maple forest (Quirk's woods, east of Ypsilanti, Michigan). Gregarious or subcaespitose. August. Rare.

An interesting find of a remarkable plant which does not seem to have been noted except by its discoverer. The structure of the spores naturally leads one to suspect an Inocybe, but their color is white (hyaline under the microscope), and the habit of the plants is that of a Mycena. Bresadola describes it as having a strong odor of rancid meal, which our plants seemed to lack. The stems become firmer and tougher on drying and it is placed by Saccardo under the Rigipedes next to *M. raeborrhiza* which is said to have tuberculate spores. The latter is, however, a very different plant both in color and shape, according to the figure of it by Fries. (Icones, Pl. 83, Fig. 4.) Two other species of Mycena have been described with tuberculate spores, *M. bryophila* Vogl. and *M. receptibilis* Britz.

855. Mycena cyaneobasis Pk.

N. Y. State Mus. Rep. 51, 1898.

Illustrations: Ibid, Pl. B, Fig. 1-7.

PILEUS 6-15 mm. broad, tough, firm, elliptic-oval at very first, then conic-campanulate, dark aeruginous-brown at first, at length paler and grayish, especially toward *the bluish margin*, glabrous, papillate or obtuse, striatulate on margin. *Trama* composed of a thick amorphous to subgelatinous upper layer, elsewhere pseudo-parenchymatous. GILLS narrowly *adnate*, not uncinate, ascending, rather narrow, close, whitish or tinged grayish, edge minutely fimbriate. STEM 5-8 cm. long, 1-1.5 mm. thick, equal, slender, *flexuous*, terete or composed, tubular, cartilaginous, elastic, *floccose-pruinose at first*, glabrescent, *grayish-brown*, hairy and rooting at base. SPORES subspherical, 7-8 micr. diam., smooth, white. CYSTIDIA none. *Sterile cells* on edge of gills *filiform*, numerous, 40 x 2 micr., hyaline. ODOR and TASTE mild or slightly of radish.

Subcaespitose, among leaves and much decayed wood in frondose woods. Ann Arbor. June and October. Infrequent.

This differs but little from *M. cyanothrix* Atk. The pileus and stem are slightly gelatinous when moist. The mycelium has a bluish tinge or is dull white. There is a bluish-green tinge to the young pileus which is sometimes slightly zonate. Peck referred it to the Rigipedes where it is somewhat doubtfully retained. *M. cyanothrix* seems to have a, much longer rooting stem, adnexed gills, and the stein is glabrous and differently colored. It may turn out to be identical with *M. cyaneobasis*. In Europe three other small Mycenas with blue tints have been described, *M. marginella* Fr., *M. iris* Berk, and *M. calorhiza* Bres., all closely related. The last, however, has spores very different from either of ours.

Section VIII. Fragilipedes. Stem *fragile*, dry, juiceless, scarcely rooting, neither dilated nor inserted. Pileus *hygrophanous*. Gills white then tinged grayish or fuscous.

Delicate, fragile, often soft, *usually odorous*, normally on the ground, debris, leaves, etc., not densely caespitose on wood (except *M. alkalina*).

This section, like the preceding, needs a revision on a microscopical basis, especially of those species with nitrous or alkaline odor; the latter have been arranged as well as possible in the absence of detailed information from European sources. We have a number of forms with a more or less nitrous odor, some of which have not been included below for lack of data.

856. Mycena alcalina Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 81, Fig. 3.
Cooke, Ill., PI. 187.

PILEUS 1-2.5 cm. broad, campanulate (at first narrowly ovate to conic-campanulate), obtusely umbonate or obtuse, glabrous, *hygrophanous*, deeply striate (moist), *grayish-brown to grayish-umber* (*moist*), fading to grayish when dry, center always darker. FLESH thin, membranous. GILLS narrowly adnate, arcuate ascending, close to subdistant, *whitish then glaucous-gray*, or yellowish in age. STEM 3-7 cm. long, 1-2 mm. thick, rigid, *fragile*, terete or compressed, slippery-subgelatinous, hollow, *even*, glabrous, pallid-brown, sometimes darker at first, fading, the rooting base white-strigose. SPORES 9-10 x 5-6 micr., broadly elliptical, smooth, obtuse at ends, white. CYSTIDIA none or few, then sublanceolate to subfusiform, 45-65 mm. long. *Sterile cells* ventricose below, obtuse-cylindrical above, abundant, 35-42 micr. long. ODOR strongly *nitrous*.

Caespitose, gregarious or solitary, on decayed logs and debris of tamarack, elm, etc. Ann Arbor, New Richmond. May-June and September-November. Not very common.

Characterized by the odor, by the few cystidia, and the slippery pseudo-viscous stem. The surface of the cap is composed of large, brown, erect, vesiculose cells. There is no separable pellicle, and the stern is not truly viscid, but feels gelatinous when applied to the lips. It differs from *M. ammoniaca* in its slippery stem, lack of a decurrent tooth at the attachment of the gills, and in the differently shaped spores. In *M. alcalina* the spores are symmetrically elliptical, in *M. ammoniaca* they are pip-shaped, i. e., narrowed and pointed toward one end. Both may be found on the decayed debris of leaves and wood on the ground and both may occur solitary or gregarious, although *M. ammoniaca* is rarely, if ever, caespitose. Both differ from *M. metata*, *M. leptocephala* and *M. constans* in the marked excess of brown shades instead of gray.

857. Mycena ammoniaca Fr.

Epicrisis, 1836.

Illustration: Cooke, Ill., Pl. 238.

PILEUS 5-15 mm. broad, conic-campanulate, but obtuse (at first elliptic-ovate), umbonate, hygrophanous, *striatulate* on margin, glabrous, fuscous-blackish to grayish-brown (moist), grayish buff or paler (dry). FLESH membranaceous, concolor. GILLS adnate, *uncinate*, close to subdistant, *narrow* and *linear*, interspaces venose at times, whitish then pale cinereous, often dark cinereous at the very first. STEM 3-5 cm. long, 1-1.5 mm. thick, toughish, equal, *straight, hollow, even, not slippery, whitish to pale brownish-ashy*, white mycelioid at base, scarcely rooting. SPORES 8-10 x 6-7 micr., pip-shaped, or elliptical-ovate, *pointed at one end*, smooth, white. CYSTIDIA none or few, *short, stout*, ventricose and obtuse, 36-40 x 15 micr. BASIDIA about 30 x 6 micr., slender. ODOR strongly *nitrous*.

Gregarious or scattered among leaves, remnants of decayed wood, etc. Ann Arbor, New Richmond. May-June and September-October. Infrequent.

Mostly separable from *M. alcalina* by its terrestrial, scattered habit, smaller size and dry stem. *M. metata* has narrower spores, the odor is faint or obsolete, and the shape of the pileus is often more convex. The stem of this species is slightly tough and might on this account be referred to the Filipedes. The trama of the gills is composed of rather large cells, among which globose vesicular cells are conspicuous.

858. Mycena metata Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 228.

PILEUS 5-20 mm. broad, convex-campanulate, varying to *narrowly campanulate, hygrophanous*, umbonate, obtuse, *striate* and *ashy-brown* (*moist*), pale ashy to brownish-ashy (dry), glabrous. FLESH thin, membranaceous. Gills adnate, ascending, *narrow*, close to subdistant, cinerascent or tinged flesh color, *edge obscurely flocculose*. STEM 4-6 cm. long, 1.5-2.5 mm. thick, equal, fragile, toughish, dry, hollow, even, grayish-

brown or paler, flexuous, hairy at base. SPORES 9-11 x 4-5 micr., *narrowly* elliptical, sometimes narrower toward one end, variable, smooth, white. CYSTIDIA none. *Sterile cells* on edge of gills globose-pyriform, about 25-30 x 18 micr., covered above by very short, rod-like protuberances. ODOR weakly alkaline when plants are fresh.

Gregarious or subcaespitose among moss and grass, in tamarack, cedar and hemlock swamps. Ann Arbor, Bay View. September-November. Infrequent locally.

The microscopic characters are the best mark of this species. The color is between grayish-brown and ashy (see Chapman), fading to pale ashy or whitish. The shape of the cap varies considerably in the same patch. Fries, in his later works, Epicrisis and Hymen. Europ., does not give the shape. In Systema, however, he says it is campanulate, one-half inch across. Massee (British Fungus Flora) and Stevenson (British Fungi), mislead by speaking of the young cap as hemispherical. It is apparently most abundant in late autumn, in or on the borders of swamps among sphagnum or other moss and grasses, even after heavy frosts. The trama of the gills is composed of large, cylindrical cells. It differs from *M. ammoniaca* in its microscopic characters and its habitat, and by the paler color of its cap.

859. Mycena leptocephala Fr.

Epicrisis, 1836.

Illustration: Cooke, Ill., Pl. 187.

PILEUS 5-20 mm. high and broad, conico-campanulate, *scarcely hygrophanous*, fuscous-ashy (young and moist) *soon grayish-white or buff*, obtuse umbo tinged drab, often unicolorous, *striate to subsulcate when dry* and with a *glaucous* pruinosity, opaque. GILLS ascending, narrowed behind, adnate, *not uncinate*, not broad, ventricose, close to subdistant, whitish, then tinged pale cinereous. STEM 5-10 cm. long, .5-1 mm. thick, *filiform*, cartilaginous, elastic, glabrous, even, hollow, *darker than pileus when dry*, whitish above, subrooting. SPORES 8-9.5 x 5-6 micr. (rarely up to 10 x 7 micr.), elliptic-ovate, apiculate and somewhat pointed at one end, smooth, white. CYSTIDIA and *sterile cells* lacking. BASIDIA short, about 15-18 x 6-7 micr., 4-spored; sterigmata prominent, 6 micr. long. ODOR nitrous, varying weak or strong.

Solitary, scattered or rarely subcaespitose, among fallen leaves, mosses, decayed debris on the ground in woods. Ann Arbor, New Richmond. September-October. Not infrequent.

This is one of the gray Mycenas. It has been placed here because of the glaucous bloom on the cap when dry, referring to the "pruinosity" of Fries' description. No certainty can be reached in placing it because of lack of detailed data of related European species. It cannot be referred to *M. constans* Pk. which is a small plant and has a decurrent tooth to the gills. It might be referred to *M. consmilis* Cke., but that species is figured with shorter stems, and has no odor. Sometimes the cap and stem have a pale drab or faint purplish tint. The stem becomes flaccid in age, allying it to the Filipedes. The odor is often not noticeable until sometime after the plants have been picked, or when crushed.

860. Mycena dissiliens Fr. var.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 81, Fig. 2.
Cooke, Ill., Pl. 285.

PILEUS 5-15 mm. broad, obtusely convex at first, then campanulate to subexpanded, subumbonate, striatulate and *grayish-brown to umber* (Sacc.) when moist, hygrophanous, fading to whitish, glabrous, substriate or even when dry, *margin at first straight*. FLESH watery brownish then whitish, membranous, not very fragile. GILLS adnate, *with a decurrent tooth*, ascending-arcuate, moderately broad, subventricose, close to subdistant, *white* then tinged with gray. Edge obscurely fimbriate, scarcely venose. STEM 8-4 cm. long, 1-3 mm. thick, often rather thick, *pellucid-white*, shining, glabrous, even, straight, equal, hollow, *fragile, easily split longitudinally*. SPORES 7-9 x 4-4.5 micr., narrowly elliptical, pointed at one end, smooth, white. CYSTIDIA rather abundant, subcylindrical, obtuse, 50-65 x 8-9 micr. on sides and edge of gills. ODOR none.

Scattered-gregarious on the ground among pine needles, moss, leaf mold, in woods of white pine, beech, etc. New Richmond. September. Infrequent.

These plants have been temporarily referred to *M. dissiliens;* they differ in that the pileus is not sulcate and the odor is lacking. The smell of *M. dissiliens* is said to be unpleasant. Our plant has a subgelatinous feel to the cap and stem, but there is no pellicle. The base of stem is scarcely hairy except where the mycelium masses among the decaying leaf mold from which it sometimes grows. The pileus dries to a glistening white, as does that of *M. stannea* Fr. It has the stature of a Collybia, as shown in Fries' figure of his species. It differs from *M. hemispherica* Pk. to which it appears to be related, in the much larger spores. The stem becomes very fragile with age and breaks on picking.

861. Mycena atroalba Fr.

Syst. Myc., 1821.

PILEUS 1-2.5 cm. broad, narrowly elliptical at first, then cam-paiiulate to expanded, umbonate, glabrous, hygrophanous, *umbo smoky-fuscous*, elsewhere pale grayish-white, sometimes uniformly fuscous-gray, fading, striate to the umbo when moist, radiately wrinkled or furrowed when dry, opaque. FLESH thin, concolor, rigid-fragile. GILLS narrowly adnexed, uncinate, close to scarcely subdistant, narrow, subventricose, white then pale cinereous, edge entire. STEM 4-6 cm. long, 1.5-2.5 mm. thick, equal, striate, rigid-fragile, subshining, glabrous, shining, even, *whitish above, dark fuscous below*, toughish, sometimes compressed, hollow, mycelioid-hairy and somewhat rooting. SPORES broadly elliptical, 8-9 x 5.5-6 micr., smooth, white.

CYSTIDIA *none*. STERILE CELLS on edge of gills short, lanceolate, ventricose below. ODOR and TASTE none.

Gregarious. On the ground, moss and debris under tamarack trees. Ann Arbor. October. Infrequent.

The plants have the habitat of *M. metata*, but differ from it in the lack of odor, the dark-colored umbo and the microscopic characters. The gills are not provided with eystidia as in *M. atroalboides* and the stem is differently colored. Despite the similarity of the descriptions the two species are very distinct. Our plants differ from Fries' description in that the base of the stem lacks any marked "bulbous-tumid" root, therefore they are only provisionally referred to *M. atroalba*.

862. Mycena atroalboides Pk.

N. Y. State Mus. Rep. 27, 1875.

PILEUS 5-15 mm. broad, acorn-shaped at the very first, then conico-campanulate, finally umbonate and margin recurved, striatulate and *blackish-fuscous when moist and young*, hygrophanous, fading to fuscous or cinereous, and then subsulcate. FLESH *very thin*, membranaceous, whitish with a gray tinge. GILLS uncinate-adnexed, *narrow, close*, white, faintly grayish at length, edge entire. STEM *slender*, 4-10 cm. long, 1-1.5 mm. thick, equal or attenuated upwards, glabrous and even above, hollow, wavy, *fragile*, shining, terete or compressed, easily splitting lengthwise, *dark bluish or blackish-gray at apex*, tinged gray or fuscous elsewhere, sometimes connate with cottony fibrils below. SPORES 7-9 x 5-6 micr., broadly elliptical, smooth, white. CYSTIDIA numerous on sides of gills, subcylindrical, slightly ventricose below, obtuse, 75-85 x 7-8 micr. STERILE CELLS none.

Solitary or subcaespitose, on decayed wood and mosses, in woods of hemlock, beech, etc. New Richmond. August-September. Infrequent.

Manifestly related to *M. atrocyaneus* Fr. and *M. atroalbus* Fr. *M. atrocyaneus* is said to have the gills joined to a collar and distant, while the pileus is deeply sulcate. From *M. atroalbus*, *M. atroalboides* differs in possessing abundant cystidia on the sides of the gills and by its more uniformly colored pileus. A form occurs with pileus cylindric when very young and at first dotted with white, scattered, silky fibrils on the surface; its cystidia are thicker, 12-16 micr. in diameter. The young stem has a watery juice which is at first dark-colored. The tint of blackish-blue on young cap and stem is common to both forms.

863. Mycena prælonga Pk.

N. Y. State Cab. Rep. 23, 1872.

Illustration: Atkinson, Mushrooms, Fig. 94, p. 94, 1900. (As *M. polygramma*.)

PILEUS 5-15 mm. broad, at first subcylindrical then conic-campanulate or subexpanded, umbonate, glabrous, striate, *dark brown with a leaden tint*. GILLS adnate, uncinate, arcuate-ascending, *narrow*, close to subdistant, white, at length subcinereous. STEM very long, 10-20 cm. long, .5-1 mm. thick, *filiform*, firm, innately striatulate, glabrous, hollow, tinged rufous-brown, white at apex, rooting in the sphagnum. SPORES 8-9 x 5-6 micr. when mature, subglobose or broadly elliptical, smooth, white. CYSTIDIA only on edge of gills, flask-shaped, with narrow, acuminate neck about 45 x 12-14 micr.

Gregarious. On sphagnum in tamarack swamps; local. Ann Arbor. May-June.

This species has been referred by Atkinson to *M. polygramma* Fr. It is known by its very long slender stem, by the leaden tint of the brown cap, and by the microscopic characters. Many of the bog species develop these long stems, apparently the result of the moisture present.

Section IX. Filipedes. Stem *filiform, flaccid*, somewhat tough, rooting, dry, juiceless. Gills whitish or tinged with the color of the cap. Pileus not hygrophanous.

Stem commonly very long in proportion to pileus; very slender, tense and straight when fresh, collapsing with age because of the flaccid texture; growing on the ground among mosses and grass, singly, i. e., not caespitose. Inodorous. Sometimes not easily distinguished from those of the Fragilipedes which have slender, filiform stems; and from the Adonidae, which differ, however, in the persistently white gills. A few brightly colored species are included here, which might perhaps be as well placed under the Adonidae.

864. Mycena collariata Fr.

Epicrisis, 1821.

Illustrations: Fries, Icones, Pl. 82, Fig. 5.
Cooke, III, Pl. 189.

"PILEUS 6-12 mm. broad, campanulate-convex, subumbonate, striate, typically fuscous, but *commonly whitish-gray* and only fuscous on disk, fading, glabrous. FLESH membranaceous. GILLS adnate, *joined in a collar behind*, thin, crowded, distinct, whitish or obsoletely incarnate. STEM filiform, 2-3 cm. long, tough, glabrous, shining, striatulate under a lens. SPORES 8-10 x 4-6 micr. (Sacc. and Berk.)."

Not yet found in the State. I have seen specimens on decayed logs in a neighboring State and it doubtless occurs in Michigan. It has the stature and appearance of *M. vulgaris*, but the cap is not viscid.

865. Mycena cyanothrix Atk.

Mushrooms, Edible, Poisonous, etc., 1900.

Illustrations: Ibid, Fig. 99, p. 99.
Conn. State Geol. and Nat. Hist. Surv., Bull. 3, Pl. 37.

PILEUS 1-2 cm. broad, *ovate to convex*, viscid when young, glabrous, striatulate on margin, *bright blue when young*, becoming pale and whitish in age or fuscous in the center. GILLS free, narrow, close, white then

grayish-white, edge minutely fimbriate. STEM 6-9 cm. long, 1-1.8 mm. thick, .slender, hollow, faintly purple when young, becoming whitish or flesh color, flexuous or nearly straight, even, rooting. SPORES globose, smooth, 6-9 micr., white or with a delicate bluish tinge.

Gregarious, subcaespitose or solitary, on decayed wood, debris, etc. Marquette, Bay View. Not rare in the north.

A slender, delicately tinted plant, so far found in our northern regions only. It differs from *M. cyaneobasis* in its thinner substance, *free gills and brighter colors*.

866. Mycena subincarnata Pk.

N. Y. State Cab. Rep. 23, 1872.

PILEUS 5-12 mm. broad, hemispherical then campanulate-convex, finally subexpanded, fragile, striatulate, *glabrous, pale, incarnate* or yellowish, usually dull reddish on center. FLESH thin, membranaceous. GILLS adnexed, rounded behind, not broad, ventricose, close, whitish *tinged flesh color*. STEM 2-5 cm. long, filiform, *pruinose*, equal, hollow, even, toughish, *pellucid-white*, base rooting and white-villose. SPORES 6-7x4 micr., elliptic-ovate, smooth, white. ODOR none.

Gregarious, on the ground or on mossy logs in hemlock or pine woods. Bay View, New Richmond. September. Infrequent.

Near *M. pulcherrima*, but differing in color, and size of spores. The stem becomes fuscous or darker in age.

867. Mycena pulcherrima Pk.

N. Y. State Cab. Rep. 23, 1872.

PILEUS 5-10 mm. broad, conico-campanulate to subcampanulate, subexpanded, obtuse, faintly striatulate on margin, *dull, yellowish to reddish*, paler toward margin, delicately glaucous, glabrous. FLESH membranaceous. GILLS adnexed, not uncinate, broad in the middle, *ventricose*, close to subdistant, *yellowish* or tinged like pileus. STEM 3-5 cm. long, .5-1 mm. thick, filiform, flaccid, equal, even, flexuous, white-pulverulent when young, glabrescent, *pellucid-white* and shining, white-hairy at base. SPORES 7-8 x 5-6 micr., oval-elliptical, smooth, white. CYSTIDIA none. ODOR none.

Scattered or in twos and threes, on very decayed wood or debris, under hemlock and pine. New Richmond.

A distinct little plant, to be separated from *M. acicula* Fr. by its habitat, larger size and different spores.

868. Mycena acicula Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 85, Fig. 3.
Cooke, Ill., Pl. 190.
Patouillard, Tab. Analyt, No. 108.
Atkinson, Mushrooms, Fig. 98, p. 98, 1900,

PILEUS 24 mm. broad, campanulate-convex, sometimes papillate, glabrous, glaucous, striatulate on margin, *vermillion, reddish-orange or yellowish* with red center. FLESH very thin, membranaceous. GILLS adnexed, ascending, ventricose, rather broad, *subdistant to distant*, yellow, yellowish, creamy white, or white, edge minutely crenulate. STEM 2-5 cm. long, filiform, equal, toughish, hollow, glabrous or minutely pulverulent at first, *pellucid-yellowish or yellow,* more or less rooting. SPORES 7-9 x 2.5-4 micr., *narrow, fusiform or narrowly subovate*, smooth, white. CYSTIDIA none. ODOR none.

Gregarious or scattered. On rotten wood, or among leaves and grass, in woods, meadows, thickets, etc. Ann Arbor, Detroit, etc. May-June and September-October. Frequent.

This is a pretty little Mycena and one of the earliest to appear. It is not by any means limited to the woods or to growing on wood or twigs as most authors remark, but may be found among grass on the ground in low, moist meadows in spring. The spores are quite characteristic and help not a little in its positive identification. I suspect, in fact, that it has been reported as *M. adonis* Fr. when occurring on the ground in grassy places, but no spore measurements of that species seem to have been printed. On decayed wood the stem is rooting and hairy along the root, whereas on the ground it has few hairs and is scarcely at all rooting. Other minute Mycenas with rosy or red caps have been described by Fries from Europe: *M. stipularis* and *M. juncicola* have non-rooting stems inserted on stipules of fallen leaves; *M. pterigenus* has a bulbillose stem attached to roots and leaves of ferns, etc.

Omphalia Fr.

(From the Greek, *omphalos*, an umbilicus.)

White-spored. Stem *cartilaginous*, slender, usually hollow or loosely stuffed, widened above with the pileus in trumpet-form. Gills *decurrent*, or adnate-decurrent. Pileus more or less *membranaceous*, its margin at first either incurved or straight-appressed.

Epiphytal, lignicolous or terrestrial; putresceut plants, with few exceptions small or minute. Very closely related to. Collybia when the margin of the pileus is at first incurved; and to Mycena when it is straight; differing from these by the decurrent gills. Toughish, reviving species are referred to Marasmius. They differ from Clitocybe by the cartilaginous character of the stem.

The PILEUS varies conical, hemispherical, convex or campanulate, often quite expanded in the Collybiariae, and usually marked by a distinct umbilicus which becomes widened in some species to infundibuliform; some species show the umbilicate character only in occasional specimens, e. g., *O. gracillima*, while the other specimens are obtuse or somewhat papillate. Its color is often pure white; it may be gray, fuscous, brown, yellow, orange or reddish. It is generally hygrophaiious and then striate when moist. The surface is usually glabrous or with a very minute pubescence which is rarely glandular. The GILLS are decurrent, sometimes not strongly so, most often running far down as the cap expands. Their width and spacing are used to separate

the species into subdivisions, although this is not always sharply marked. Peck in his monograph of the New York species (Rep. 45, 1892) states that in his opinion this grouping is unsatisfactory, but as no better is offered, it is adhered to in this paper. CYSTIDIA are lacking in moist species, and when present are rather few and inconspicuous. The STEM is usually slender to filiform, and when dry its cartilaginous cortex is like that of Mycena. The surface is glabrous, horny and shining, or varying to pruinose or hairy at base. The SPORES are smooth. As in Mycena the immature spores are loosened in a microscopic mount; so the same precaution must be observed as when studying the spores of Mycena in order that one may get the correct measurements of the mature spores. Very few Omphalias have a distinguishing ODOR, and none of the following are nitrous or fragrant. Their EDIBILITY is of no interest because of their thin texture and small size; none are known to be poisonous, but probably few have been tested.

They are found from early spring to late autumn, during wet weather and in low or damp, shaded places. With the exception of *O. campanella* and *O. fibula*, they occur sporadically, few of them are found in quantities, many are but rarely found. A rather large number of species are described, Peck has named about twenty-five.

Key to the Species

(a) Plant wholly white.
  (b) Gills broad.
    (c) Stem tubular; plant snow-white. 879. *O. gracillima* Fr.
    (cc) Stem solid; plant soon dingy-white. 878. *O. albidula* Pk.
  (bb) Gills rather narrow.
    (c) Gills crowded; plant pure white. 869. *O. scyphoides* Fr.
    (cc) Gills moderately close; plant dull white. 870. *O. scyphiformis* Fr.
(aa) Plant not wholly white.
  (b) Pileus viscid.
    (c) Gills lilac; pileus greenish-yellowish. 872. *O. lilacifolia* Pk.
    (cc) Gills whitish; pileus pale grayish-brown. (See 834. *Mycena vulgaris* Fr.)
  (bb) Pileus not viscid.
    (c) Pileus yellowish, orange or reddish.
      (d) Stem date-brown, horny; on coniferous wood; gills very veiny. 883. *O. campanella* Fr.
      (dd) Stem not date-brown and horny.
        (e) Gills white or cream-colored; on mosses.
          (f) Pileus 10-20 mm. broad; convex. 882. *O. fibuloides* Pk.
          (ff) Pileus 3-8 mm. broad, cucullate. 880. *O. fibula* Fr.
        (ee) Gills not white.
          (f) Pileus brick-red to reddish-brown. 873. *O. pyxidata* Fr.
          (ff) Pileus olivaceous-yellowish; stem dusky yellowish. 871. *O. olivaria* Pk.
    (cc) Pileus with grayish, fuscous or brown shades.
      (d) Pileus 2-7 mm. broad, whitish except the fuscous-brown center. 881. *O. schwartzii* Fr.
      (dd) Pileus usually larger.
        (e) Gills broad, crowded; pileus and stem dark, umber-fuscous to blackish. 884. *O. umbratilis* Fr.
        (ee) Gills rather narrow.
          (f) Pileus dotted with scurfy-blackish points; on sphagnum. 877. *O. gerardiana* Pk.
          (ff) Not with blackish points.
            (g) On decaying wood, logs, stumps, etc.
              (h) Pileus rugose, brown; flesh emitting watery juice when cut. 874. *O. rugosodisca* Pk.
              (hh) Pileus even, ashy to smoky, non-hygrophanous. 875. *O. epichysium* Fr.
            (gg) On the ground, pileus hygrophanous, substriate; gills subdistant. 876. *O. onisca* Fr.

Section I. Collybiariae. Margin of pileus at first incurved.

**Gills narrow; crowded, close or subdistant.*

869. Omphalia scyphoides Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 75, Fig. 2.
Patouillard, Tab. Analyt., No. 419.

"PILEUS 4-8 mm. broad, umbilicate then infundibuliform, often irregular, *pure white*, even, silky. FLESH submembranaceous. GILLS decurrent, *narrow, crowded, white*. STEM 8-16 mm. long, *short*, stuffed, subvillose, white. SPORES 6 x 2 micr. (Sacc., Massee); 6 x 4-5 micr. (Pk.)

"Gregarious, in mossy, grassy places on the ground. (Dead leaves in woods—Longyear.)

"Variable, often flexuous and eccentric, commonly small, not hygrophanous, yellowish on drying, stem woolly at least at base, pileus sometimes often an inch broad."

Reported by Longyear. Greenville. July. Rare.

870. Omphalia scyphiformis Fr.

Epicrisis, 1836.

Illustration: Fries, Icones, Pl. 75, Fig. 3.

PILEUS 5-9 mm. broad, convex, then umbilicate or infundibuliform, glabrous, sometimes silky, *dull white*, margin obsoletely striatulate. FLESH membranaceous. GILLS decurrent, thin, *narrowly triangular*, whitish, close, moderately broad in middle, attenuate at ends, edge entire, trama of interwoven hyphae. STEM 1.5-2.5 cm. long, equal, even, somewhat hollow, whitish, glabrous or loosely pubescent by flexuous longish hairs, base attached to moss by radiating hairs. SPORES 6-7 x 3.5-4 micr., ovate or pip-shaped, pointed at one end, smooth, white. CYSTIDIA none. ODOR none.

Gregarious on mosses or on moist earth. Ann Arbor. August. Rare.

This species is closely related to *O. scyphoides*. It differs in the dull white (albidus) color of the whole plant, whereas *M. scyphoides* is said to be pure white (candidus); the gills are not as narrow and crowded as in that species, and probably the spores differ. Our plants approached *M. scyphoides* in the pubescence toward the base of the stem, which Fries says is glabrous. On moss the silky-webby mycelium sometimes spreads some distance.

871. Omphalia olivaria Pk.

N. Y. State Mus. Rep. 25, 1873.

PILEUS 6-15 mm. broad, convex, subclavate, with decurved margin, *deeply umbilicate*, glabrous, *pale yellowish* to olive-green, even or obscurely striatulate. FLESH thin. GILLS long decurrent, subdistant, *rather narrow, yellow* when fresh, edge entire. STEM 2-2.5 cm. long. 1 mm. thick, *tough*, equal, even, tubular, *dusky yellowish*, minutely pubescent, glabrescent. SPORES 6-

7 x 5 micr., subglobose or broadly elliptical, smooth, white.

On decayed logs. Ann Arbor. September. Rare.

The plant revives somewhat after being moistened. The pubescence of the stem is white after the escape of the moisture. The trama of the gills is composed of interwoven, narrow hyphae, quite compactly arranged. *O. luteola* Pk. differs in having a brown and solid stem. *O. subclavata* Pk. has yellow gills, but the pileus is grayish-brown and stem white.

872. Omphalia lilacifolia Pk.

N. Y. State Mus. Rep. 24, 1872 (as *O. lilacina*).

N. Y. State Mus. Rep. 29, 1878.

Illustrations: Peck, N. Y. State Mus. Rep. 24, Pl. 1, Fig. 10-13.

"PILEUS 1-2 cm. broad, convex, deeply umbilicate, *glabrous, viscid*, hygrophanous, dingy yellow with greenish tinge and striatulate when moist, bright sulphur-yellow when dry. GILLS decurrent, arcuate, close, narrow, *pale lilac*. STEM 1-2.5 cm. long, 1-2 mm. thick, equal, glabrous, hollow, *viscid*, yellowish, *with a pale lilac-colored mycelium* at the base. SPORES subelliptical, 5-6 x 3 micr."

Scattered or solitary, rarely subcaespitose, on decaying trunks of hemlock, in the coniferous regions of the State. Munising. Houghton, Huron Mountains, Bay View, New Richmond. July-September. Infrequent.

The colors and viscidity make this an easily recognized species. *O. lilacina* was described from Lapland, and anteceded Peck's first name; it is said to be violaceous except for the yellow gills; its cap is not viscid.

873. Omphalia pyxidata Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 194.
Patouillard, Tab. Analyt, No. 636.

"PILEUS 1-2 cm. broad, convex, umbilicate to infundibuliform, glabrous, hygrophanous, *brick red or reddish-brown and radiate-striate* when moist, paler and silky when dry. FLESH membranaceous. GILLS decurrent, *narrow, subdistant*, tinged with flesh color then gilvus. STEM 2-3 cm. long, 2 mm. thick, equal, tough, glabrous, even, stuffed or hollow, *pallid rufescent*. SPORES ovoid, smooth, white, 6-8 x 5 micr. (Patouillard.)

"On the ground, roadsides, etc." East Lansing, on the campus. Reported by Longyear.

Evidently rare. Peck says he found it but once. Not much reliance can be placed on the spore-measurements given; Stevenson quotes three different sizes, one of which is followed by Saccardo. The pileus is said by Fries to fade strongly, even to become whitish. Some think that *O. muralis* Fr. and *O. hepatica* Fr. are to be considered as varieties of *O. pyxidata*. (See Barbier, Bull. 1, Soc. Myc. de France, Vol. XX, p. 105, 1904.)

874. Omphalia rugosodisca Pk.

N. Y. State Mus. Rep. 26, 1874.

PILEUS 1-2.5 cm. broad, broadly convex or nearly plane, depressed or umbilicate, sometimes obtuse or slightly umbonate, *rugose*, hygrophanous, *watery cinnamon-brown* and striatulate (moist), paler when dry. FLESH thin. GILLS short-decurrent, *narrow*, close, whitish. STEM 2-3 cm. long, 1-2 mm. thick, glabrous, hollow, cartilaginous, concolor, paler at apex. SPORES elliptical, 6-7 x 4-5 micr., smooth, white.

On decaying prostrate trunks of hemlock. Bay View. July.

Known by the rugose cap, the brown color and the fact that every part of the plant emits a watery juice when cut or bruised. It seems to be limited to decaying wood of coniferous trees. Peck referred this species to Collybia in the 31st New York Museum Report, but later returned it to Omphalia. Saccardo placed it in the genus Mycena without giving any reason for doing so. At times the odor is said to be slightly of radish.

875. Omphalia epichysium Fr.

Syst. Myc., 1821.

Illustrations: Atkinson, Fig. 101, p. 101, 1900.
Plate CLXXI of this Report.

PILEUS 14 cm. broad, convex then expanded and umbilicate or umbilicate-infundibuliform, margin arcuate with decurved edge, *striatulate and dark cinereous to smoky-brown* (moist), even, silky and light gray to whitish (dry). FLESH thin, soft. GILLS acuminate-subdecurrent, ascending-arcuate, *narrow*, close, thin, *whitish-cinereous*, edge entire. STEM 1.5-3 cm. long, 1-3 mm. thick, equal, glabrous, *almost solid* or subfistulose, *smoky-cinereous*, concolor within. SPORES 7.5 x 4 micr., pip-shaped, smooth, white. CYSTIDIA none.

On decaying logs or remains of decayed wood in frondose or mixed woods. Throughout the State. Ann Arbor, New Richmond, Marquette and Houghton. July-September. Infrequent.

The pileus is often fibrillose-floccose on the umbilicate center. The plants are rather soft and watery and the stem soon shrivels. *O. onisca* Fr. differs in the hygrophaiious pileus which is entirely glabrous, the smaller size and large spores; the gills are somewhat different in shape and spacing.

876. Omphalia onisca Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 75, Fig. 3.
Cooke, Ill., Pl. 209.

PILEUS 5-15 mm. broad, convex, soon plane and cyathiform-umbilicate, *glabrous*, flaccid, *hygrophanous*, smoky-fuscous or ashy-brown and striate on margin (moist), pale cinereous and hoary (dry), the umbilicus darker. FLESH thin, concolor when moist, pale grayish-white when dry. GILLS *short, decurrent*, broadish in middle, *subdistant*, thickish, cinereous-fuscous, sometimes forked, edge entire. STEM short, 1-1.5 cm. long, .5-1 mm. thick, slender, equal, toughish, firm, solid, *concolor*, glabrous, becoming pale within. SPORES 9-11 x 5 micr., distinctly *ovate*, apiculus curved, smooth, white. CYSTIDIA and sterile cells none. BASIDIA clavate, 30-35 x 4-5 micr., 4-spored, sterigmata slender, 6-7 micr. long. ODOR and TASTE none.

Scattered or gregarious on the ground, in low, wet places in woods. Ann Arbor. May and September. Rare.

Differs from *O. epichysium* by its habitat on the ground, its glabrous, hygrophanous pileus and by its gills and spores. The hymenium occasionally has sterile basidia intermixed, bearing only a single long abortive sterigma. Authors disagree as to the size of the spores. Britzelmayr gives them as 12 x 7-8 micr. and Massee as 6 x 5 micr. It differs from *O. umbratilis* in the rather distant gills and larger spores.

877. Omphalia gerardiana Pk.

N. Y. State Mus. Rep. 26, 1874 (as Clitocybe).

PILEUS 10-20 mm. broad, nearly plane or soon infundibuliform, hygrophanous, fragile, *grayish-brown to brownish-ashy and striatulate* (moist), paler when dry, *the surface is dotted by scurf-like scattered points which become blackish*. FLESH thin, concolor. GILLS decurrent, *narrow*, subdistant, whitish then tinged with ashy or obscure yellowish, sometimes forked. STEM 3-5 cm. long, 1-2 mm. thick, *cartilaginous*, equal, even, hollow by a narrow tubule, glabrous or pruinose-villose toward base, *at length darker than pileus*. SPORES 7-11 x 3.5-4 micr., variable in size, maturing slowly, oblong-ovate, narrow, smooth, white. CYSTIDIA none. ODOR none.

On sphagnum in cedar and tamarack swamps. Ann Arbor, Houghton. May, July. Local.

Differs from *O. sphagnophila* Berk., in color and spores, according to the description. Cooke (Ill., Pl. 289) gives figures which are very like our plants. *O. sphagnophila* is said to have a dingy pale ochre-colored pileus and gills, is tough, and has smaller spores. Peck vacillates in deciding whether this is an Omphalia or Clitocybe; it was originally described as a Clitocybe, then in the 45th Report it was placed among the Omphalias, finally in the list of species described by Peck (N. Y. State Mus. Bull. 131), it was referred back to Clitocybe. My collections indicate that it has mostly a distinctly cartilaginous stem, hence it is placed here. The color varies considerably during its development; in old specimens the whole plant becomes dingy dark brown. The scurfy points on the cap are somewhat as in that of *Clitocybe ectypoides* Pk.

***Gills broad, distant.*

878. Omphalia albidula Pk.

N. Y. State mils. Rep. 49, 1896.

PILEUS 3-8 mm. broad, *convex-hemispherical*, at times papillate, with or without an umbilicus, glabrous, striatulate, at first pure white, then dingy. FLESH membranaceous. GILLS decurrent, *distant, broad*, white, then dingy. STEM *very slender*, 1-4 cm. long, .5 mm. thick, *toughish*, glabrous above, white, "solid," attached below to leaves, etc., by a very strigose base. SPORES 8-10 x 2-4 micr., elongated-oblong, on slender sterigmata, 4-5 micr. long, smooth, white.

On leaves and bark in frondose or mixed woods. Bay View. July. Rare.

Related to *O. stellata* Fr. which differs mainly in its fragile stem, diaphanous pileus and different spores. *O. papillata* Pk. seems to be very similar, but with a conic or campanulate cap, few gills and different spores; it is said to be pure white.

Section II. Mycenariae. Margin of pileus at first straight, appressed to stern.

879. Omphalia gracillima Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 75, Fig. 5.
Cooke, Ill., Pl. 252.
Gillet, Champignons de France, No. 502.
Plate GLXXI of this Report.

PILEUS 3-10 mm. broad, at first campanulate, becoming *hemispherical*, sometimes *papillate*, sometimes depressed, *snowy-white*, pellucid-striate, soon sulcate, glabrous, subflocculose when dry, fragile. FLESH membranaceous. GILLS decurrent, *triangular, broad*, subdistant to distant, thin, pure white, edge fimbriate. STEM filiform, 2-5 cm. long, .5 mm. thick, equal, tubular, minutely subpruinose, *white* like pileus, toughish, flaccid, attached by floccose base or almost inserted. SPORES 6-8 x 3-4 micr., *oval-lanceolate*, apiculate, smooth, white. CYSTIDIA and *sterile cells* none. BASIDIA 24 x 6 micr., 4-spored.

Gregarious among and on fallen leaves and grass in frondose woods. Ann Arbor, Marquette. Spring and autumn. Infrequent.

A very pretty little plant as its snowy-white color shows against a background of leaves or grass in open woods. The sulcate character of the margin of the cap appears as the plant loses moisture; sometimes a slight papilla is present. The gills are quite distant at times, with shorter gills alternating. Under the microscope the stem is seen

to be covered with very short hair-like cells which under a hand-lens appear only as a slight pruinosity. The trama of the gills consists of interwoven hyphae. Our plants were not attached by floccose hairs as shown in Cookers figures, but were almost free of them.

880. Omphalia fibula Fr.

Syst. Myc., 1821 (c. syn.).

Illustrations: Cooke, Ill., Pl. 274.
Gillet, Champignons de France, No. 500.
Patouillard, Tab. Analyt, No. 110.
Hard, Mushrooms, Fig. 99, p. 134, 1908.

PILEUS 3-8 mm. broad, subhemispherical or *cucullate*, often not expanded, *subumbilicate*, obscurely striatulate, nonhygrophanous, *pallid ochraceous-orange*, fading, even when dry, minutely pubescent under lens. FLESH thin, pallid. GILLS arcuate-decurrent, *narrow*, close (or subdistant after expansion of pileus), rarely forked, subpruinose, whitish or creamy-yellowish, edge entire. STEM 2-5 cm. long, *scarcely 1 mm. thick*, equal, flexuous, at length subtubular, toughish, *whitish or with tinge of yellowish* or straw color, scarcely pubescent under a lens, cartilaginous when dry. SPORES elongated oblong, 4-6 x 2 micr., smooth, white. CYSTIDIA scattered on sides and edge of gills, narrowly fusiform-acuminate, sometimes capitate, 3-4.5 x 7-9 micr. ODOR and TASTE none.

On *mosses*, in low woods or moist places. Throughout the State. May-October. Common.

This is our commonest Omphalia, although often only several specimens are found in one place. Its cap is at the very first almost cylindrical, then the margin turns out like the brim of a hat, so that it has much the shape of a man's "high silk hat;" hence it is said to be cucullate. Under the microscope the stem and cap are found covered with hyaline hairs, 50-60 micr. long. The gills are narrow and deeply decurrent, running up the inside of the unexpanded cap and down below it on the stem. The cap often becomes top-shaped instead of cucullate. Stevenson (British Fungi) and Massee (Fungus Flora) say the gills are broad, a statement which is clearly an error.

881. Omphalia schwartzii Fr.

Epicrisis, 1836 (as var. of *O. fibula*).

Illustrations: Patouillard, Tab. Analyt., No. 420.
Gillet, Champignons de France, No. 504.

PILEUS 4-7 mm. broad, *rather firm*, soon campanulate, obtuse or at first umbonate, at length slightly umbilicate, even or striatulate, subpruinose, *whitish* with a slight fuscous tinge, *disk fuscous-brownish*. FLESH thin, pale fuscous. GILLS adnate-decurrent to strongly decurrent, arcuate, moderately broad, subdistant, whitish. STEM 2-3 cm. long, filiform, hollow, equal, pallid below, *tinged violaceous above*, pruinose, even. SPORES oblong-elliptical, 5-6 x 2.5-3 micr., smooth, white. CYSTIDIA on sides and edge of gills, *scattered*, subventricose, subeapitate at apex, some cylindrical above, 40-45 x 9-12 micr.

Gregarious on moss (Mnium, etc.) in hemlock woods. New Richmond. June. Infrequent.

O. schwartzii is constantly distinct from *O. fibula* to which Fries joined it as a variety. Peck (45th Rep. N. Y. State Mus.) considered it an independent species. Patouillard (Tab. Analyt.) had already pointed out that it was distinct from Bulliard's *O. fibula*, giving figures of spores and cystidia as evidence. It seems to be limited to regions of coniferous forests.

882. Omphalia fibuloides Pk.

N. Y. State Mus. Rep. 24, 1872.

"PILEUS 1-2 cm. broad, convex, deeply umbilicate, glabrous, hygrophanous, *dull orange* and striatulate when moist, paler when dry. FLESH thin. GILLS strongly decurrent, arcuate, rather close, *white*, the *interspaces venose*. STEM 3-5 cm. long, scarcely 2 mm. thick, equal, *glabrous*, hollow, colored nearly like the pileus. SPORES *elliptical*, 7.5 x 5 micr."

On moss. Jackson County. June.

Reported by Longyear. It is unknown to me. It is said to occur on burned, mossy ground like *O. fibula*, "which it resembles in color, but from which it may easily be distinguished by its much larger size, more robust habit and venose interspaces; the spores also are larger than in that species."

883. Omphalia campanella Fr.

Syst. Myc., 1821.

Illustrations: Cooke. Ill., Pl. 273.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 67 (as *O. fragilis*).
Hard, Mushrooms, Pl. 17, p. 131.
White, Conn. State Geol. & Nat. Hist. Surv., Bull. 3, Pl. 16, p. 36.
Murrill, Mycologia, Vol. 4, Pl. 8, Fig. 10.
Plate CLXXII of this Report.

PILEUS 8-22 mm. broad, convex-campanulate, expanded, *umbilicate*, glabrous, striatulate to the umbilicus, *dull orange-yellow* or tinged reddish, watery when moist, paler when dry. FLESH thin, membranaceous, yellow. GILLS adnate-decurrent to deeply decurrent, arcuate, *thick, very veiny*, narrow, tapering to front, *subdistant to distant*, pruinose. STEM 1-4 cm. long, 1 mm. or less in thickness, *horny-cartilaginous*, minutely tabular, curved or straight, even, *dark rufous-bay to date-brown*, yellowish above, concolor within, glabrous above, pruinose elsewhere and *with fulvous strigose hairs at the slightly thickened base*. SPORES oblong, 6-7.5 x 3-3.5 micr., smooth, white. CYSTIDIA widely scattered on sides of gills, more abundant on the edge, subcylindrical or sublanceolate with obtuse apex, 50-55 micr. long. BASIDIA 30-32 x 4-5 micr. ODOR mild. In dense and spreading clusters on hemlock and pine logs, stumps, etc.; also on tamarack

logs, stumps or their remains in the southern part of the State; sometimes on debris on the ground.

Throughout the State; collected from Detroit to Isle Royale in Lake Superior. June-November. (Earliest collection May 6.) Common on coniferous wood.

The Bell-omphalia is a striking and easily recognized plant because of its habit of forming extensive clusters, by its colors, and by its horny stem and veined gills. In the non-coniferous regions it appears on tamarack and perhaps always on remains of wood of coniferous origin. Here it shows a marked variation from the typical plant as it appears on pine and hemlock; the gills are distant, always pruinose, and the stem is also pruinose and often solid. The typical stem of the plant from coniferous regions is usually attenuated "below, but in the plant of the non-coniferous regions the stem is equal. The plants of non-coniferous regions are larger and the surface of the cap somewhat rivulose. Hard has illustrated a species (Mushrooms, Figure 98, p. 123, 1900) which he refers to *O. caespitosa* Bolt. It seems probable that this is a var. of *O. campanella*, perhaps var. *terrestris* Quel. Peck says its mycelium is regarded as destructive to the wood of coniferous trees.

884. Omphalia umbratilis Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 77, Fig. 3.
Cooke, Ill., PI. 274.

"PILEUS 2-2.5 cm. broad, campanulate to convex, then *umbilicate*, glabrous, hygrophanous, *umber-fuscous* (moist), hoary when dry, margin somewhat striate. FLESH submembranaceous. GILLS adnato-decurrent, *broad, crowded*, becoming fuscous. STEM 2-5 cm. long, 2 mm. thick, equal, *tough*, stuffed then tubular, glabrous, *dark fuscous to blackish*. SPORES 6-7 x 4-5 micr." (Britz.)

Reported by Longyear. Chandlers. June. Rare.

Said to be gregarious on the ground, and imitating in color the blackish species of Collybia, like *C. atratus* and *C. ambustus*.