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Contents

Psathyra Fr.

(From the Greek, *psathyros*, friable.)

Purple-brown-spored. Stem *with a cartilaginous cortex*, rigid-fragile, slender and hollow. Gills adnate or adnexed. *Margin of pileus at first straight*. Veil either none or universal, in the latter case leaving delicate flecks or fibrils over the surface of the young pileus and stem. *Pileus hygrophanous*.

Putrescent, terrestrial or on decayed wood. The genus corresponds to Mycena of the white-spored group in that the stem is somewhat cartilaginous and the margin of the pileus is at first straight and appressed to the stem; the pileus is therefore likely to be persistently campanulate as in Mycena. See Plate LVI. The species are slender, fragile and hygrophanous. It is somewhat difficult to tell some of the species from Psilocybe except in the presence of very young stages showing the straight margin of the cap.

The genus naturally falls into two sections, the first composed of species without cortina or universal veil; the second, where the young plants are surrounded by a delicate, usually white, fibrillose or flocculose universal veil. The veil breaks up early and leaves thin superficial flecks or scales on cap and stem, or sometimes merely white fibrils, which are unrecognizable in age or after rains. The species occur rather infrequently, but quite a number have been found in the state. Of these only a part are here presented, as it has been impossible to identify the others with any certainty. Their edibility has not been reported.

Key to the Species

(A) Pileus at first with fibrillose flecks or hairs.
  (a) Densely caespitose; pileus even, slightly pelliculose; stem short. 262. *P. microsperma* Pk.
  (aa) Gregarious; pileus and stem superficially white-hairy at first. 261. *P. semivestita* Berk.
(AA) Pileus glabrous; stem polished.
  (a) Caespitose on or near wood; pileus striatulate when moist; stem long. 259. *P. umbonata* Pk.

  (aa) Not densely caespitose; solitary or gregarious.
    (b) Spores 7-9 micr. long; pileus umber. 259. *P. obtusata* Fr.
    (bb) Spores 10-12 micr. long; pileus rufous-brown. 260. *P. persimplex* Britz.

Section I. Conopilae. (Incl. of Obtusatae Fr.) Surface of pileus glabrous; stem polished and shining.

258. Psathyra umbonata Pk.

N. Y. State Mus. Rep. 50, 1897.

Illustrations: Plates LV, LVI of this Report.

PILEUS 2-5 cm. broad at maturity, 2-3 cm. high, subcylindrical at the very first, then conico-campanulate, at length strongly and obtusely umbonate, hygrophanous, *dark bay-brown to purplish-brown and striatulate* (moist), grayish-white, even and atomate (dry), sometimes faintly rugulose when dry. FLESH thin, concolor. GILLS ascending, *adnate-seceding*, rather broad, 3-4 mm., narrowed in front, close, becoming dark purplish-brown, finally almost black, edge white-fimbriate. STEM 5-10 cm. long, 2-3 mm. thick, slender, flexuous, rigid-fragile, *equal*, hollow, sometimes twisted, *shining-white* becoming pallid. SPORES 13-15.5 x 7-8 micr., elliptical, obtuse, smooth, dark purplish under the microscope, black in mass. CYSTIDIA none on sides of gills; sterile cells on edge, cystidia-like, ventricose, apex obtuse. BASIDIA 4-spored, narrowly stalked, inflated above.

Caespitose or gregarious-subcaespitose, on decayed wood, usually stumps and logs. June-September. Ann Arbor, New Richmond. Not infrequent.

Forming large clusters of many individuals, often at the end of old moist logs. Its long slender stems and cone-shaped caps distinguish it at once from Hypholoma clusters. Sometimes only a few individuals occur in one place. It has the stature and general appearance of *P. conopilea* Fr., as shown in the published figures, but differs in the truly adnate gills and the striate margin of the moist cap. Peck compares it with *P. corrugis* Fr. (B) Another species sometimes occurs, which differs from the preceding mainly in the size of its spores: 15-18 x 7-8 micr. This differs from *P. elata* Mass., in the margin being long-striate. The size, shape and colors are the same as in *P. umbonata*. Because of its almost black spores it might be mistaken for *Psathyrella subatrata*, but that species does not grow on wood.

259. Psathyra-obtusata Fr.

Syst. Myc., 1.821.

PILEUS 1-3 cm. broad, campanulate-convex, *obtuse*, hygrophanous, *umber* and faintly or not at all striate *when moist*, pale ochraceous to buff and atomate when dry, glabrous; veil none. FLESH thin. GILLS ascending, adnate, *rather broad*, close to subdistant, umber when mature, edge white-fimbriate. Stem 5-8 cm. long, 1-3 mm. thick, equal, glabrous, hollow, white then pallid, rigid-fragile, flexuous, curved at base. SPORES elliptical, 7-9 x 44.5 micr., smooth, dark purplish-brown.

Solitary or subcaespitose, on very rotten wood. September. New Richmond, Bay View. Infrequent.

Distinguished from the preceding by the obtusely convex pileus, more scattered habit and shorter stems. Form *minor:* This varies smaller, with a pileus .5-1 cm. broad and rather slender stem. The spores, etc., are the same. Cook's figure (Ill.., Pl. 593) does not represent our plants.

260. Psathyra persimplex Britz.

Bot. Centralbl., Vol. 77, p. 436, 1899.

PILEUS 1-2.5 cm. broad, campanulate at first then campanulate-convex, obtuse, *margin soon spreading*, hygrophanous, rufous-brown to fuscous brown and striatulate when moist, whitish-buff to pale ochraceous when dry, atomate, *glabrous*. Veil none. FLESH very thin. GILLS ascending-adnate, rather broad, ventricose, close to subdistant, whitish then gray to grayish-umber, edge white-fimbriate. STEM 4-10 cm. long, *slender*, 1-2 mm. thick, equal, *whitish or pallid*, somewhat fragile, stuffed by white pith then hollow, glabrous, shining, flexuous, pruinate at apex, rooting at base and attached

to wood by hairs. SPORES elliptical, 10-12x5-6.5 micr., obtuse, smooth, dark purple-brown under the microscope. CYSTIDIA scattered or few on sides of gills, up to 70 x 15 micr., sometimes bifurcate at apex, ventricose-lanceolate; smaller on edge, 30-45 x 6-12 micr., obtuse. BASIDIA 30x10-12 micr., 4-spored. ODOR none.

Gregarious on sticks and decayed wood in hemlock woods. New Richmond. September. Rare.

This seems to be a segregate from *P. obtusata*, from which it differs in the size of its spores and the characteristic spreading of the margin of the pileus.

Section II. Fibrillosae. Stein and pileus when young flocculose or fibrillose from the universal veil.

261. Psathyra semivestita Berk. and Br.

Aim. Nat. Hist., p. 920, 1836.

Illustrations: Cooke, Ill., Pl. 578.
Ricken, Die Blätterpilze, Pl. 67, Fig. 4.

PILEUS 1-2 cm. broad, ovate-campanulate, subobtuse, hygrophanous, rufous-umber and pellucid-short-striate when moist, pale isabelline when dry, *surface sprinkled when young by superficial, white fibrillose flecks*. FLESH very thin, soon ochraceous-tinged. GILLS broadly adnate, *narrowed in front*, sometimes almost sub-triangular, close, dark smoky-fuscous, edge at times white-fimbriate. STEM 4-6 cm. long, 1.5-2 mm. thick, *equal*, hollow, even, rigid-fragile, pale fuscous, pallescent, *closely sprinkled over with white, fibrillose flecks*. SPORES elliptical, 9-12x5-6 micr., variable in size, smooth, dark purple-brown. CYSTIDIA few on sides of gills, numerous on edge, ventricose-sublanceolate, obtuse, 50-60 x 12-15 micr. BASIDIA short and stout, 24x9-10 micr. ODOR none.

Gregarious, on horse-dung. New Richmond. September.

Known by the rufous tinge to the color of the pileus and the white fibrils which at the very first cover the cap and stem. *P. vestita* Pk. *is very similar*, if not the same, but the spore-sizes are given somewhat smaller; see description in N. Y. State Mus. Bull. 105, p. 28.

262. Psathyra microsperma Pk.

Torr. Bot. Club, Bull. 26, 1899.

PILEUS 1-2.5 cm. broad, at first ovate or subhemispherical, then convex-campanulate, often irregular, obtuse, *even*, hygrophanous, *slightly pelliculose*, pale watery-brown (moist) cinereous-buff (dry), at first with scattered flocculose white scales, *glabrescent*, margin at first straight. FLESH thin, concolor. GILLS adnate-seceding, close, *not broad*, subventricose, narrowed toward front, at first whitish then grayish-brown tinged purplish, edge white-fimbriate. STEM 2-4 cm. long, 2-3 mm. thick, equal, rigid-fragile, hollow, *pure white*, apex subpruinose, subfibrillose, *at first covered by minute, white fibrils from the universal veil*. SPORES elliptical, 6-8 x 4-4.5 micr., smooth, purplish-brown.

Very caespitose, on grass or about stumps in or near woods. Ann Arbor. October. Rare.

This species was described by Peck from material sent from Ohio; he does not report it from New York State. The pileus is provided with a slight pellicle which is scarcely gelatinous. The stem separates rather easily from the pileus when the gills have receded from it. Our specimens grew out of the turf with no sign of nearby wood. They were sent to Peck who identified them as his species. It is easily mistaken for a Psilocybe, but the margin of the young cap is straight at first.

Psilocybe Fr.

(From the Greek, *psilos*, naked, and *kybe*, head, referring to the lack of veil-remnants on the pileus.)

Purple-brown-spored. Stem with a *cartilaginous cortex*, rigid-fragile or toughish. Gills adnexed to adnate-subdecurrent. *Veil scarcely noticeable or entirely lacking*, neither forming an annulus nor appendiculate on the margin of the pileus. *Margin of pileus at first incurved*.

Putrescent, terrestrial, on very decayed wood or around stumps, buried roots, sticks, etc. The genus corresponds to Collybia of the white-spored group in that the stem has a cartilaginous cortex and the margin of the pileus is at first incurved. The species are usually rather thin and fragile and not large. They are distinguished from the Hypholomas by the scanty or absent veil; those species which possess a veil often show no signs of it in windy or dry weather.

The PILEUS is convex or campanulate and expands in many cases until quite plane. The color is usually dull, even in those with reddish, yellow or olive hues. It is usually glabrous; a few species, however, like *P. canofacious*, have a somewhat fibrillose surface. The GILLS are broadly adnate and mostly slightly decurrent or triangular in the first section; in the other sections they are rounded behind or adnexed-emarginate. In age they are often sprinkled in a variegated manner by the spores. The STEM is neither stout nor truly fleshy. It is often white when young, but varies to brownish, reddish or grayish.

The genus is divided here into three sections, separated fundamentally by the broad, subdecurrent gills of the first group, the pellicle of the pileus in the second group, and the hygrophanous flesh of the plants in the third group. Few species have any record for or against their edibility; *P. foenisecii*, however, is known to be edible.

Key to the Species

(A) Pileus hygrophanous.
  (a) Spores in mass brick-reddish. 277. *P. conissans* Pk.
  (aa) Spores not red in mass.
    (b) Large; pileus 5-12 cm. broad, brown when moist. 270. *P. larga* sp. nov.
    (bb) Smaller; pileus 4 cm. or less in width.
      (c) Spores large, 13-18 micr. long; common on lawns and grassy places. 276. *P. foeniseciì* Fr.
      (cc) Spores less than 13 micr. long.
        (d) Pileus subviscid and rufous-brown when moist; gills very broadly adnate.
          (e) Growing on dung or pastured fields. 264. *P. subviscida* Pk.
          (ee) Growing on the ground in woods. 265. *P. atrorufa* Fr.
        (dd) Pileus not subviscid; gills not subdecurrent.
          (e) Stem pale fuscous, 10-15 cm. long; on sphagnum. 267. *P. atrobrunnea* Fr.
          (ee) Stem white, shorter.
            (f) Spores small, 6-7 micr. long.
              (g) Pileus 1-4 cm. broad, livid-brown when moist and striate. 271. *P. cernua* Fr.
              (gg) Pileus less than 1 cm. broad, dull-brownish when moist, spotted. 275. *P. submaculata* Atk.
            (ff) Spores 8-10 micr. long or longer, pileus dark-brown when moist.
              (g) Stem falsely bulbous from adhering sand, often subcaespitose and clavate. 273. *P. arenulina* Pk; *P. ammophila* Mont.
              (gg) Stem not markedly enlarged by adhering sand, equal.
                (h) Gills narrow; spores 10-12 x 6 micr.; stem slender, 1-2 mm. thick. 272. *P. murcida* Fr.
                (hh) Gills medium broad; spores 7-9 x 4-5 micr.; stem 3-4 mm. thick, shorter. 274. *P. agrariella* Atk.
(AA) Pileus not hygrophanous.
  (a) Pileus with white fibrils or hairy scales on the surface; umber-colored. 268. *P. canofaciens* Cke.
  (aa) Pileus glabrous except margin, viscid or subviscid.
    (b) Stem long, 7-10 cm., pileus grayish-olive; on sphagnum or dung. 268. *P. uda* Fr.
    (bb) Stem shorter; pileus without olive tints.
      (c) On dung; pileus livid-brownish-yellow; gills broadly adnate; spores very large. 263. *P. merdaria* Fr.
      (cc) On the ground in woods; pileus tawny-fulvous; gills emarginate-adnate. 219. *P. ericaea* Fr.

Section I. Deconicae. Gills broad and broadly adnate, sometimes decurrent by a tooth; margin of pileus at first with a flocculose or fibrillose, delicate and very evanescent veil.

This section approaches Stropharia; it was raised to generic rank by W. G. Smith under the name Deconica. The veil, although usually very evanescent, may at times leave a slight annular mark on the stem so as to simulate Stropharia, and hence the species must be carefully compared with species of that genus.

263. Psilocybe merdaria Fr.

Syst. Myc., 1821 (as Stropharia in Hym. Europ.).

Illustrations: Fries, Icones, Pl. 130, Fig. 3 (as Stropharia).
Cooke, Ill., Pl. 537 (?) (as Stropharia).
Gillet, Champignons de France, No. 649 (as Stropharia).
Ricken, Blätterpilze, Pl. 66, Fig. 1.

PILEUS 1-3 cm. broad, campanulate-hemispherical, finally plane, *livid-brownish to livid-yellow*, obtusely subumbonate, slightly darker on umbo, glabrous, *even, subviscid*, at first with slight flecks on the margin. FLESH pallid, thin. GILLS broadly adnate to triangular-subdecurrent, *broad, subdistant, yellowish at first*, then powdered by purple-brown spores, at length dark brown. STEM 2-4 cm. long, 1-3 mm. thick, equal, even or slightly ridged at apex by decurrent gills, delicately flocculose-fibrillose, glabrescent, *pale yellowish*, stuffed then hollow, often with slight annular remnants or fibrils. SPORES *large*, 14-17x7-8 micr., elliptical, smooth, purplish-brown under the microscope. CYSTIDIA none. ODOR mild.

On horse dung along with *Stropharia stercoraria*. Ann Arbor. May-June. Infrequent.

Not to be confused with *Naucoria semiorbicularis*, *N. pediades* and *N. platysperma*, the spores of which are smaller and lack the purple tinge. It is said to differ from *P. coprinophila* by the grayish young gills of the latter. I have followed Karsten and Britzelmayr (quoted by Sacc.) in referring this plant with large spores under *P. merdaria*. Other authors differ widely and it is clear that several species are either confused or that the plant needs segregation. Cooke, in the Illustrations, gives the size 8x5 micr.; W. G. Smith, 9x6 micr.; Ricken, 12-13x7-9 micr. Ricken says "the purplish color of the spores disappears in dried specimens," hence the study of exsicatti is of little value.

264. Psilocybe subviscida Pk.

N. Y. State Mus. Rep. 41, 1888 (as Deconica).

PILEUS 5-15 mm. broad, fragile, ovate-campanulate then subexpanded and obtusely umbonate, hygrophanous, at first viscid and *chestnut-brown or rufous-brown and striatulate when moist*, very soon buff with or without an ochraceous umbo when dry, glabrous, *subviscid*. FLESH thin. GILLS broadly adnate, subtriangular, thickish, *subdistant, broad*, at first whitish, then umber. STEM 2-4 cm. long, 1-2 mm. thick, slender, equal or tapering downwards, pallid to fuscescent, varying to chestnut brown within and without, *at first covered with delicate white fibrils*. SPORES oval or ovate, 6-7x4-5 micr., smooth, pale brown tinged with wine-color under microscope. VEIL slight, fugacious.

In pastured fields among grass, on dung, and on moss in woods. April-June. Ann Arbor. Infrequent.

This approaches *P. physaloides* Fr. (sense of Ricken) in color, but the gills are not crowded and the spores are smaller. It also differs from *P. bullacea* Fr. in the subdistant gills. The latter species is doubtless native here, but the discrepancies in the descriptions by the different authors make it difficult to place. Saccardo following Fries, says cap of *P. bullacea* is fulvous-bay-color when moist, and gives the spores 6-10 x 4-7 micr.; Ricken describes the cap as chocolate-brown when moist, with spores like our *P. subviscida*. Which of these, if any, is *P. bullacea* is therefore hard to tell; nevertheless it is desirable to follow the description of Fries. The chestnut or rufous-brown color, and the visicidity quickly disappear and the pileus is then tan-colored and even.

265. Psilocybe atrorufa Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 571.

PILEUS 5-12 mm. broad, convex-hemispherical, obtuse, hygrophanous, *umber-brown then rufous-brown and striatulate when moist*, glabrous and pale alutaceus when dry, *not viscid*, margin faintly veiled. FLESH thin, concolor, broadly adnate or subdecurrent, subtriangular, close, at length umber-colored. STEM 34 cm. long, 1-2 mm. thick, slender, hollow, equal or tapering downward, obscurely flocculose-fibrillose, glabrescent, *rufous-bay color throughout*. SPORES 5-8x4-5.5 micr., oval, somewhat pointed at ends, smooth reddish-brown, under microscope. CYSTIDIA none. STERILE CELLS on edge of gills, slender, lanceolate-subulate, 30-34 x 5 micr.

Gregarious, on the ground in woods. Ann Arbor, Bay View. (Probably throughout the State). June-July.

Differing from the preceding in the non-viscid pileus and closer gills. Here again two very different spore-sizes have been given, and although Cooke's figure is somewhat illustrative of our plant, his spores are too large, 10-12 x 6 micr.

Section II. Tenaces. Pileus with a pellicle, moist or subviscid when young; veil slight, cortinate. *Toughish and somewhat brightly colored*.

266. Psilocybe canofaciens Cke.

Grevillea, Vol. 14, p. 1, 1885.

Illustration: Cooke, Ill., Pl. 621.

PILEUS 1-3 cm. broad, campanulate-convex, then expanded, obtuse or subumbonate, even, *umber-brown, covered at first by delicate*, white, scattered fibrils, at length somewhat appressed fibrillose-scaly and fibrils concolor. FLESH thickish on disk, concolor. GILLS adnate, rather broad, *ventricose*, subdistant, *dark umber*. STEM 5-7 cm. long, 2-4 mm. thick, equal .or slightly tapering, stuffed then hollow, *dark umber-color*, darker at base, covered with long fibrils which become matted, toughish. SPORES elliptical-oblong, slightly curved in one plane, *very variable in size*, 10-15 micr. long (rarely much longer), 4-5 micr. thick, purple-brown under microscope, umber in mass.

On the ground in woods. Negaunee. August. Rare.

Sent to me by Miss Rose M. Taylor. It is a very characteristic plant, with its dark colors, the fibrillose-hairy covering on the cap and stem and the variable spore-size. This plant is a striking commentary on the value of spore-characters in identification. Massee (British Fungus Flora) states that the spores vary very much in size in the English specimens, and in Michigan this peculiarity is also found.

267. Psilocybe atrobrunnea Fr.

Epicrisis, 1836-38.

Illustration: Plate LVI of this Report.

PILEUS 1-4 cm. broad, *campanulate-convex*, obtusely umbonate, hygrophanous, *umber when moist*, fading to dingy ochraceous, even, glabrous. FLESH thin, concolor. GILLS adnate but rounded behind, not uncinate, *seceding*, rather broad, *subdistant*, brownish - gray, then smoky-fuscous, edge whitish. STEM 5-15 cm. long, *elongated*, 1.5-4 mm. thick, slender, flexuous, equal or subattenuate at base, even, *pale fuscous, covered with white silky fibrils*, stuffed, concolor within, cartilaginous, toughish. SPORES elliptical, 10-12 x 5-6 micr., smooth, dark purplish-brown. ODOR and TASTE slight, somewhat farinaceous.

In tamarack bogs, among sphagnum. September-November. Ann Arbor. Local.

Known by its sphagnum habitat, dark color when moist and its long stems. The superficial white fibrils on the stem seem to indicate a veil.

268. Psilocybe uda (Fr.) Battoille

Syst. Myc., 1821, Bull, de la. Soc. Myc. de France, Vol. 27, p. 374, 1911.

PILEUS 1-2 cm. broad, *campanulate*, mammilate, with a viscid pellicle, *striatulate and grayish-olive with rufous-brown umbo* when moist, shining, fading to creamy white with pale-yellow umbo, glabrous. FLESH thin. GILLS adnate or slightly subdecurrent, very broad, close to subdistant, *gray* then violaceous-blackish, edge white-flocculose. STEM 7-10 cm. long, *slender*, 1.5-2 mm. thick, slightly thicker toward base, equal elsewhere, pallid-whitish, rigid, glabrous, even, hollow, sometimes *annulate* by the delicate, superior, fibrillose remains of the veil. SPORES elliptical, 17-20 x 9-10 micr., smooth, *bright violet-purple under the microscope*, purplish-blackish in mass. STERILE CELLS on edge of gills, narrow, linear. ODOR *none*.

On horse-dung, in low woods. New Richmond. September.

This species is slender-stemmed like *Stropharia umbonatescens,* and its spores are about the same size. It differs from *S. umbonatescens* in the olive-colored, striate pileus, and lack of odor. This is referred to by Fries as var. *elongata* (Hymen. Europ.). The varietal name is used by Ricken for a plant which he calls *Hypholoma elongatum*, which has much smaller spores, while he claims that *P. uda* has no trace of a veil, but has the large spores. Battaille (l. c.) describes our plant well and emphasizes the deep violet color of the spores, which is quite marked in the Michigan specimens, as well as the slight evanescent annulus. The only discrepancy is that the habitat of *P. uda* is on dung instead of sphagnum and while this is important it is deemed best to refer it for the present to the above species. It is a better Stropharia.

269. Psilocybe ericæa Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 136, Fig. 1.
Cooke, Ill., Pl. 568.

PILEUS 2-3 cm. broad, convex then subexpanded, obtuse or umbonate, *even, subviscid*, with a gelatinous separable pellicle, *tawny-fulvous*, glabrous, at first with a whitish, fibrillose cortina on edge. FLESH firm, thickish, rather compact, pallid. GILLS adnate, becoming emarginate, *broad*, close or almost crowded, whitish at first, then fulvous-brown and sprinkled with blackish spots, edge minutely white-fimbriate. STEM 5-8 cm. long, 34 mm. thick, equal, flexuous, *stuffed with a rather persistent pith*, glabrous, apex pruinose, pallid then fuscescent, curved at base and attached to fallen leaves, etc. SPORES oval-elliptical, inequilateral, 9-11 x 5-5.5 micr., pale purplish under the microscope, dark in mass. CYSTIDIA none. STERILE CELLS on edge of gills, subcylindrical, elongate-narrow, 34 micr. diam. ODOR and TASTE mild.

On the ground in mixed woods. New Richmond. September.

Agrees well in size, shape and color with the figures of Fries. Authors give conflicting spore-sizes and it seems impossible to be certain of the plant on this point.

Section III. Rigidae. Cortinate veil none or slight (except in *P. larga*), pileus *hygrophanous*, rigid-fragile when dry, scarcely or not at, all pelliculose.

This section has the appearance of the second section of the Hypholomas except in the absence of or reduced development of the veil; the first species represents a connecting link between them.

270. Psilocybe larga sp. nov.

Illustration: Plate LVII of this Report.

PILEUS *large*, 4-14 cm. broad, oval-campanulate at first, at length expanded-plane and radially cracked or split on the margin, *fragile, hygrophanous, bay-brown* to ochraceous-brown and even *when moist, whitish-tan* and radiately rugulose *when dry, at first dotted with scattered, small, snow-white, floccose, superficial scales*, quickly denuded, often only with white-silky margin. FLESH rather thin, white when dry, scissile, homogeneous, with large cells. Gills adnate, rounded behind, *rather broad*, close to subdistant, white at first, then pale fuscous, *finally umber*, edge minutely white-fimbriate. STEM *stout*, 5-10 cm. long, 5-15 mm. thick, equal or tapering upward, soon *hollow*, terete or compressed, rather firm, *usually striate to sulcate*, furfuraceous but glabrescent, then shining, *white*, cortex subcartilaginous. SPORES elliptical, 8-9.5x4-5 micr., smooth, obtuse, *purple-brown under microscope*, umber in mass. CYSTIDIA abundant on sides and edge of gills, 70-80 x 12-15 micr., subventricose to subcylindrical, narrow-stalked, obtusely rounded above. BASIDIA 4-spored. ODOR and TASTE none.

Gregarious or caespitose around old stumps, buried roots, etc., in grassy clearings or woods. Ann Arbor. May-September. (More frequent in spring.) Not infrequent in elm swamps or clearings.

A large and striking species, related to *P. spadicea* and *Hypholoma sarcocephalum*. From the former it differs markedly in the presence of a veil, the adnate gills and the striate stem; from the latter, in its strongly marked hygrophanous character, and lack of any pellicle. Ricken suggests that these two species are identical. I suspect that all three are variations of the same plant, but at present this cannot be established. Our plant is often found without a sign of the floccose remnants of the veil, especially after a rain or in windy weather. Under favorable weather conditions, however, the developing plant shows the veil well. *Psilocybe spadicea* seems to be differently understood by authors. According to Quelet, Ricken and others it is a large plant, like *P. larga*. If this is true, Cooke's figures are very misleading, and as the English authors have followed his idea, it is not surprising to have it reported by Peck and others for this country in a way to suggest *Hypholoma hydrophilum*, which is a much smaller and more densely caespitose plant. I have not seen *P. spadicea* Fr. in the sense of Ricken and Quelet.

271. Psilocybe cernua Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 574.
Plate LVIII of this Report

PILEUS 14 cm. broad, convex-campanulate, hygrophanous, *livid watery-brown when moist and then striate*, whitish when dry, often areolate cracked and rugulose in age, *veil entirely lacking*. FLESH rather thin, whitish when dry. GILLS adnate-seceding, moderately broad, rounded behind, close, at first whitish, finally purplish-umber, edge minutely white-flocculose. STEM 2-5 cm. long, 2-4 mm. thick, equal or tapering below, delicately stuffed then tubular, *white, rigid-cartilaginous* when dry, subfibrillose, apex pruinose, flexuous or variously curved. SPORES oblong-elliptical, 6-7x3-4 micr., smooth, purple-brown under microscope. CYSTIDIA none. STERILE CELLS on edge of gills, short, subsaccate, 25x7 micr. ODOR and TASTE none.

Caespitose or subcaespitose-gregarious, at the base of trees.

Ann Arbor, New Richmond. September-October. Infrequent.

The pileus is rather firm when dry, not splitting easily on the margin on drying. This species agrees well with the descriptions and Cooke's illustration.

272. **Psilocybe murcida** Fr.

Syst. Myc., 1821.

PILEUS 24 cm. broad, obtuse, *fragile*, campanulate-convex, then expanded, hygrophanous, *dark bay-brown and striatulate on margin when moist*, fulvous-alutaceous or rufous-tinged when dry, then subrugulose and atomate, glabrous. FLESH, thin, subrigid and fragile. GILLS adnate, almost close, *narrow*, attenuate in front, subventricose, becoming fuscous-purplish, edge white-flocculose. STEM 6-8 cm. long, 1.5-2.5 mm. thick, *slender, fragile, white at first*, then pallid, slightly fibrillose, glabrescent, stuffed with a white pith then hollow, undulate. VEIL none. SPORES elliptical-oblong, 10-12x6 micr., obtuse, smooth, purple-brown under microscope, purplish-black in mass. CYSTIDIA scattered, on sides and edge of gills, ventricose-elongated, narrow above, 50-60 x 9 micr. ODOR and TASTE none.

Solitary and scattered. On low, wet ground in low woods. Ann Arbor, New Richmond. May, June and September. Not infrequent in wet weather.

Agrees well with the Friesian description. The gills are perhaps not truly subdistant but rather close. The color of the cap changes from umber to rufous then pale tan. The slender, white, equal stem is a marked character. When moist, the cap is somewhat shining, with a gelatinous appearance, but there is no pellicle and the trama is homogeneous.

273. **Psilocybe arenulina** Pk.

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

PILEUS 1-3 cm. broad, convex then plane, glabrous, hygrophanous, *dark brown and coarsely striate on margin when moist*, dingy white when dry, margin at first incurved and fibrillose-flocculose. FLESH thin, concolor. GILLS adnate, close, not broad, ventricose, becoming brownish then purple-brown and dotted by spore-masses. STEM 3-5 cm. long, 1.5-2 mm. thick, tapering upward, hollow, *whitish*, the lower half covered with adhering sand and sometimes clavate. SPORES 10-11 x 5 micr., elliptical, smooth, purple-brown under the microscope. CYSTIDIA none.

Gregarious or subcaespitose, on sandy soil. Port Huron, New Richmond. September-October.

This seems to be close to *P. ammophila* Mont. (see illustration in Hard's Mushrooms, Fig. 268, p. 330, 1908). The spores of that species appear to be too large, and the habit is different. At least our plants were not like those figured by Hard.

274. **Psilocybe agrariella** Atk.

Ann. Myc., Vol. VII, p. 374, 1909.

PILEUS 1-3.5 cm. broad, campanulate-convex, obtuse, then expanded, *fragile*, hygrophanous, *obscurely rivulose or striatulate and umber-brownish to pale rufous when moist*, glabrous, pallid ochraceous or whitish when dry, margin at first incurved and delicately white-silky from the evanescent veil. FLESH thin, nearly homogeneous, of floccose cells, concolor. GILLS adnate, seceding, moderately broad, ventricose, *close*, at length purplish umber, edge white-fimbriate. STEM 4-6 cm. long, 3-4 mm. thick, equal, *fragile*, white, even, apex pruinose, glabrous, stuffed soon hollow, base white-mycelioid. SPORES elliptical, 7-9 x 4-5 micr., inequilateral, smooth, dark purple-brown under the microscope, blackish-purple in mass. CYSTIDIA scattered on sides of gills, more numerous on edge, 45-55 x 10-15 micr., ventricose-lanceolate, apex obtuse. ODOR and TASTE mild.

Gregarious or scattered, on the ground or leaf mould, in wet places of low frondose woods. Ann Arbor, New Richmond. May, June and September. Infrequent.

The color is somewhat variable in different localities but the other characters are the same. It differs from *P. cernua* in the presence of a very slight veil when young. The pileus is slightly rigid but fragile; its surface has a slight gelatinous feel when wet, but there is no distinct pellicle, merely a somewhat differentiated upper layer of more turgid cells.

A closely related species occurs in low wet ground in woods, which differs from this mainly in possessing a thin subgelatinous pellicle of horizontal narrow hyphae, with narrower gills and pellucid-white stem. The color of cap and stem and the microscopic characters are otherwise the same. Perhaps it is a variety of *P. ericaea* Fr., but the pileus is distinctly hygrophanous.

275. **Psilocybe submaculata** Atk.

Ann. Myc., Vol. VII, p. 375, 1909.

"PILEUS 4-10 mm. broad, convex, glabrous, hygrophanous, *dull brownish*, then dull white with dark watery and yellowish spots, margin at first incurved. FLESH with a surface layer of subpyriform to subglobose angular cells, inner portion floccose and grading into the surface cells. GILLS adnate, emarginate, *rather crowded*, brownish with a purple tinge, edge whitish. STEM 2-3 cm. long, 2-3 mm. thick, fistulose, even, somewhat flexuous, *white and shining*, apex white-meaty, base with white mycelium. SPORES suboblong, subelliptical, slightly inequilateral, 6-7x3-4 micr., purple-brown under the microscope. BASIDIA 4-spored. CYSTIDIA few on sides of gills, very numerous on edge, ventricose, apex crystalline. On very rotten wood."

The description is adapted from that of Atkinson, who reported specimens from Michigan. I have not studied it.

276. Psilocybe foenisecii Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 590.
Gillet, Champignons de France, No. 592.
Ricken, Die Blätterpilze, Pl. 66, Fig. 8.
Swanton, Fungi, Pl. 9, Fig. 1.
Murrill, Mycologia, Vol. 3, Pl. 40, Fig. 5.
Hard, Mushrooms, Fig. 267, p. 329, 1908.
Plate LIV of this Report.

PILEUS 1-2.5 cm. broad, rarely broader, campanulate-convex or subhemispherical, obtuse, seldom plane, hygrophanous, *dark grayish-brown to smoky-fuscous and even when moist*, sometimes rufescent, subzonate on drying, drab-tan-color to buff when dry, glabrous, veil entirely lacking. FLESH thin, dingy-pallid. GILLS adnate, almost subdistant, *broad*, ventricose, sometimes sinuate-emarginate, purplish-fuscous or fuscous-brown, *variegated*, edge white-fimbriate. STEM *slender*, 4-8 cm. long, 1.5-2 mm. thick, equal, rigid-elastic, fragile, hollow, even, glabrous, pruinose at apex, pallid to subrufescent, not rooting. SPORES *variable in size*, 13-18x8-10 micr., broadly elliptical, or in another plane broader at one end, *slightly tuberculate*, apiculate, purplish-brown under the microscope. CYSTIDIA none. STERILE CELLS on edge, narrow, 30-36 x 3-5 micr. ODOR and TASTE none.

Gregarious or scattered, among grass on lawns, roadsides, grassy places in woods, meadows and pastures. Throughout the State. May-June (less often, July-September). Very common.

The "haymarker's Psilocybe" is to be looked for during the warm spring months on our lawns everywhere. Its colors are dull and quite variable, but because of its abundance it can soon be recognized under its many guises. A zonate effect is often seen on the pileus as the moisture dries out. It is edible. The spore-sizes are given incorrectly by several authors, but this is not surprising because of their great variability, even in the same plant. The rough character of the surface of the spore distinguishes it from the others.

277. Psilocybe conissans Pk.

N. Y. State Mus. Rep. 41, 1888 (as Clitopilus).

PILEUS 2.5-5 cm. broad, broadly convex becoming plane, hygrophanous, *watery-brown to pale chestnut when moist*, pale alutaceous to buff when dry, striatulate then subrugulose, glabrous or subpruinose, veil lacking. FLESH thin, whitish. GILLS adnexed, rounded behind, thin, close, brownish *then dusted by the reddish-cinnamon or vinaceous-red spores*. STEM 2.5.5 cm. long, 2-4 mm. thick, *equal*, rather slender, rigid-fragile, hollow, *white*, curved or flexuous, glabrous, pruinose at apex. SPORES elliptical or almost oblong, 7-9x4-5 micr. (rarely longer), smooth, hyaline but with reddish tinge under the microscope, brick-red in mass.

Caespitose around base of stumps in hemlock-maple woods. Marquette and Houghton. August-September. Rather rare.

A peculiar plant, whose spores might well lead one to look for it under the pink-spored group but whose general appearance is that of a Psilocybe. Under the microscope the spores are almost hyaline-white but the exospore is slightly tinged with reddish; when dusted on the cap and stem, as is often the case, they have a brick-red to vinaceous color. Peck originally referred it to Clitopilus, but in the N. Y. State Bull. 122, he changed it to Psilocybe.

OCHRASPORAE

Paxillus Fr.

(From the Latin *Paxillus*, a small stake.)

Ochre-spored. Stem confluent with the pileus, fleshy, tending to be eccentric or lacking. Gills mostly decurrent, forked behind and *anastomosing on the stem, easily separable from the trama of the pileus*.

Fleshy, putrescent, distinct fungi, growing on the ground, forest debris or decayed wood. When present the stems are stout and usually slightly eccentric, sometimes central; in two species the pileus is sessile and lateral, and the stem is lacking. The genus, Paxillus is here limited to include only the plants placed by Fries under the tribe Tapinia. The white-spored species have been referred to Clitocybe under the section Paxilloideae. *P. lepista* Fr., which is said to have reddish spores is not known to me. Ricken has placed some of the species of Clitopilus with reddish spores next to *Paxillus lepista*, an arrangement which hardly solves the problem. Several species of Clitocybe and Tricholoma with a tint of reddish in the spore-print and with gills separable from the pileus are equally close to *P. lepista* as it is described, and an arrangement of these species under a single genus is desirable: such are *Tricholoma panoeolum* var. *caespitosum* and *Tricholoma nudum*. Karsten, Earle and others have raised the tribe Tapinia to the rank of a genus and include under it the species described below. No uniformity of agreement has so far resulted and I prefer to retain the name Paxillus in this report because of its established use for our plants and therefore its practical convenience.

Key to the Species

(a) Stem present; pileus medium large.
(b) Stem covered by blackish-brown, dense, tomentose hairs. 280. *P. atrotomentosus* Fr.
(bb) Stem not tomentose-hairy.
(c) Gills golden-yellow; pileus reddish-yellow-brown. 278. *P. rhodoxanthus* Schw.
(cc) Gills dingy olivaceous-yellowish, becoming brown when bruised. 279. *P. involutus* Fr.
(aa) Stem lacking; pileus lateral.
(b) Gills orange-yellow, corrugate. 281. *P. corrugatus* Atk.
(bb) Gills pale yellowish or yellowish tan; sinuous-crisped. 282. *P. panuoides* Fr.

278. Paxillus rhodoxanthus Schw.

Synopsis Fung., 1822.

Illustrations: Cooke, Ill., Pl. 834 (as *P. paradoxus*).
Bresadola, Fung. Trid., Pl. 207 (as *Phylloporus rhodoxanthus*).
Fries, Icones, Pl. 115, Fig. 2 (as *Flammula tammii*).
Gillet, Champignons de France, No. 136 (as *Clitocybe pelletieri*).
Patouillard, Tab. Analyt., No. 354 (as *Paxillus tammii*).
Ricken, Blätterpilze, Pl. 28, Fig. 1.
Atkinson, Mushrooms, Pl. 47, Fig. 156, 1900.
Hard, Mushrooms, Fig. 234, p. 289, 1908.

PILEUS 4-9 cm. broad, firm, convex, then expanded, depressed or obtuse, somewhat turbinate, color varying *reddish-yellow-brown to chestnut brown*, sometimes pale cinnamon-brown, minutely tomentose, glabrescent, dry, often rimosely cracked. FLESH thick at disk, pallid tinged yellowish. GILLS long, decurrent, arcuate, thickish, rather broad toward stem, close to subdistant, *golden-yellow to chrome-yellow,* sometimes forked, *very intervenose*, sometimes reticulate-porose toward stem. STEM 4-8 cm. long, 5-10 mm. thick, equal or ventricose, solid, pale, reddish-yellow, yellow at base, punctate with small, reddish-brown scales or dots. SPORES elongated-oblong, almost fusiform, 9-12x34.5 micr., yellowish in mass. CYSTIDIA numerous on edge and sides of gills, clavate-lanceolate, 60-70 x 9-15 micr., filled with yellowish content. ODOR and TASTE mild.

Gregarious or scattered. On the ground or among mosses in frondose or conifer woods. Ann Arbor, Bay View. July-August. Infrequent.

This species appears to represent a link between the Boletaceae and the Agaricaceae. The top of the pileus may easily be mistaken for *Boletus subtomentosus* and in its extreme variation the gills anastomose to such an extent as to almost appear porose near the stem. The plant has been placed in Gomphidius, Flammula, and Clitocybe, while Bresadola erected the genus Phylloporus for it, where it might well be left. The plant was first described by Rev. David de Schweinitz from specimens gathered in North Carolina. It occurs also in Europe where it has had a variety of names.

279. Paxillus involutus Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 875.
Gillet, Champignons de France, No. 514.
Berkeley, Outlines, Pl. 12, Fig. 5.
Michael, Führer, f. Pilzfreunde, Vol. I, No. 30.
Ricken, Blätterpilze, Pl. 28, Fig. 2.
Swanton, Fungi, Pl. 40, Fig. 7-8.
Atkinson, Mushrooms, Fig. 155, p. 166, 1900.
Hard, Mushrooms, Fig. 232, p. 287, 1908.
Peck, N. Y. State Mus. Rep. 48, Pl. 28, Fig. 18-23.

PILEUS 4-9 cm. broad, convex then expanded-depressed, firm, pliant in age, *ochraceous-rusty-brown, reddish-brown or olive-brown*, somewhat cottony-tomentose, margin *at first involute* then spreading and furrowed or ridged, sometimes subviscid, shining in spots when dry. FLESH thick, yellowish-pallid, becoming brownish when bruised. GILLS decurrent, arcuate, crowded, rather broad*, anastomosing, or reticulated-porose on the stem*, olivaceous-yellow *becoming brown when bruised*. STEM 4-6 cm. long, 1-2.5 cm. thick, solid, glabrous, even, central or eccentric, somewhat enlarged at base, dingy yellowish-brown or concolor. SPORES broadly elliptical, pallid, rusty-ochraceous, 7-9 x 5 micr., smooth. CYSTIDIA moderately abundant or scattered, lanceolate, 50-70x10-12 micr. ODOR and TASTE mild. *Edible*.

Solitary or scattered. On the ground or among forest debris, sometimes at the sides of logs or base of stumps, etc. More common in the coniferous regions of the State, rather infrequent elsewhere. Isle Royale, Houghton, Marquette, Bay View, New Richmond, Detroit, Ann Arbor, etc. July-October. Common in the north.

The dingy and dull colors are somewhat variable in various stages of development. It is not usually an attractive plant because of the hues assumed by the flesh, etc., in age. I have but seldom found it in the southern part of the State or where conifers are absent.

280. Paxillus atrotomentosus Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 876.
Gillet, Champignons de France, No. 512.
Michael, Führer f. Pilzfreunde, Vol. I, No. 29.
Ricken, Blätterpilze, Pl. 28, Fig. 4.
Atkinson, Mushrooms, Fig. 157, p. 169, 1900.
Hard, Mushrooms, Fig. 233, p. 288, 1908.

PILEUS 5-12 cm. broad, firm, tough, convex then plane or depressed, dry, more or less pruinose-tomentose, at length naked, *rusty-brown to blackish-brown*, even, margin at first involute, persistently incurved. FLESH thick, compact to spongy, white. GILLS adnate-decurrent, separable from the pileus, close, rather narrow, *forked behind* and often anastomosing, sometimes porose on stem. STEM 3-12 cm. long, 1-3 cm. thick, *often eccentric, stout*, solid, tough, straight or curved, arising from a rooting base, *covered by a blackish-brown velvety tomentum*. SPORES oval, smooth, 5-6 x34 micr., yellowish in mass. CYSTIDIA none. ODOR and TASTE slight. *Edible*.

Solitary or caespitose. On decaying logs, stumps, etc., or base of trees, in coniferous woods. Huron Mountains, Bay View, Saginaw, New Richmond. July-September. Infrequent.

Very distinct by the blackish hairs which clothe the stem. It is apparently limited to wood or debris from coniferous sources. Occasional specimens attain quite a large size and often occur singly at the base of pine trees. The cap is sometimes nearly lateral especially when growing in tufts.

281. Paxillus corrugatus Atk.

Mushrooms, p. 170, 1900.

Illustration: Ibid, Pl. 48, Fig. 158.

PILEUS 2-5 cm. broad, *lateral, shelving*, narrowed down in an irregular wedge-form to the sessile base, convex then expanded, *maize-yellow to canary-yellow*, with a reddish-brown tinge near the base, glabrous or slightly tomentose, margin at first involute. FLESH pale yellow, spongy. GILLS 2-3 mm. broad, not crowded, regularly dichotomously forked, thin, *very wavy and crenulate*, sides corrugated, *orange-yellow*, easily separating from pileus. STEM lacking. SPORES minute, broadly-elliptical to oval, 3x 1.5-2 micr., faintly yellow, olive-yellow on white paper. ODOR characteristic, disagreeable.

On hemlock stumps or wood. Houghton, Marquette. August-September. Infrequent or rare.

Known best by the deep orange-yellow color of the corrugated gills and the lack of a stem.

282. Paxillus panuoides Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 878.
Berkeley, Outlines, Pl. 12, Fig. 6.
Michael, Führer f. Pilzfreunde, Vol. lll, No. 50.
Ricken, Blätterpilze, Pl. 28, Fig. 3.

PILEUS 3-12 cm. broad, *sessile*, or laterally extended to a stem-like base, *petaloid* or *conchate*, dull yellow to olivaceous-yellow, tinged with brown, downy at first, glabrescent, margin thin, acute, wavy or crisped. FLESH white, soft, not very thick. GILLS radiating from the base, forked, anastomosing, *often crisped*, close, pale yellow. STEM lacking. SPORES elliptical, smooth, 4-6 x 34, pale yellow in mass. CYSTIDIA none. ODOR and TASTE mild.

Gregarious or subimbricate. On decaying logs, etc., in coniferous woods.

Houghton, Munising, Bay View. July-August. Infrequent.

Paler and with less corrugated gills than the preceding. It is said to be very variable in form and habit. In Europe it occurs in dark places, in cellars, mines, etc., attached to the timbers. It appears to be much less common in this country.

Pholiota Fr.

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

Ochre-brown or rusty spored. Stem continuous with the pileus, provided with a *membranous annulus*, which is formed from a partial veil; no volva, hence no universal veil; gills *adnate becoming emarginate* or decurrent by a tooth, sometimes adnexed.

Putrescent, terrestrial or lignicolous mushrooms, of great variability of types. They correspond to Armillaria of the white-spored group, and Stropharia of the purple-brown-spored group. The nearest genera are Flammula and Cortinarius whose veils differ, when-present, in being cortinate. The large, wood-inhabiting species are often densely caespitose. None are known to be poisonous, and many are excellent when cooked.

The PILEUS varies according to the section to which it belongs. In one section it is often very scaly, in the others it is usually glabrous. It may be dry or hygrophanous. The color is usually whitish or dull yellowish in the first section. Those growing on. wood are often very attractive, with bright yellow colors, in *P. aeruginosa* tinged with dark green, and in others a watery-brown. The GILLS are attached to the stem, adnate, adnexed, or decurrent by a tooth; in all these cases, the gills may secede from the stem during the expansion of the pileus, and they nearly always become emarginate or sinuate at maturity. This separates them from the genus Flammula whose gills never become sinuate. The color changes from the young condition to maturity and it is necessary in many cases to know the color of the young gills to identify the species; this is usually white or yellow, but at length changes to the color of the spores, which are either ochraceous, fuscous or ferruginous. The STEM is fleshy or fibrous, solid or stuffed, and provided with a membranous *annulus* which is either persistent or may break up into easily removed shreds, so that it may appear to be lacking in rainy weather. The SPORES are elliptical or oval, non-angular except obscurely so in a few species; e. g. *P. acericola*, *P. howeana* and *P. aegerita*; in *P. aggericola* they are often somewhat pear-shaped. The color when caught on white paper varies considerably, and has been used to subdivide the sections. CYSTIDIA are present only in two sections, as far as is known, viz. in the Humigeni and Hygrophani. This fact may serve as a basis for raising these sections to generic rank, as has been done by Earle and others.

The genus Pholiota furnishes some excellent species for the table. *P. praecox* and its near relatives are among the early edible mushrooms, and as they occur on lawns and grassy places are within easy reach. A number of the large, caespitose forms, like *P. squarrosa*, *P. squarrosoides* and *P. adiposa* are among those eaten, and in Europe *P. mutabilis* is highly prized as an ingredient of soups, and is often artificially cultivated on the wood on which it is found. On the other hand, wood-inhabiting Pholiotas as well as others, are apt to have a strong odor or taste, derived from the wood, and this does not always disappear on cooking. As far as known, no virulent poisons are present in any of this genus.

The genus is rather large, but many species are found rather infrequently. The following key includes most of the species reported for the north-eastern United States, and no doubt some which are not yet described will be discovered from time to time. Fries divided the genus into three sections; to these I will add the subdivision Hygrophani, as they seem to stand out sufficiently clear from the rest of the species. The four sections follow:

I. Humigeni

II. Truncigeni

III. Hygrophani

IV. Muscigeni

Key to the Species

(A) Pileus viscid when moist. [See also (AA) and (AAA).]
(a) Pileus scaly; often very caespitose; on wood, sometimes on debris.
(b) Pileus bright yellow.
(c) Gills broad, adnate then emarginate, at first yellow; pileus very viscid, ochre-yellow.
(cc) Gills narrow. 297. *P. adiposa* Fr.
(d) Gills yellow at first; pileus sulphur-yellow, covered with tawny or reddish-brown scales; stem peronate. 299. *P. lucifera* (Lasch.) Bres.
(dd) Gills whitish at first; pileus lemon-yellow. *P. limonella* Pk.
(bb) Pileus not at all or tinged slightly with yellow.
(c) Pileus tinged red, pink or purplish; subcaespitose; gills white or yellow-tinged at first. *P. ornella* Pk.
(cc) Pileus not with red or pink.
(d) Very caespitose; pileus and stem with dense, erect or recurved tawny scales on buff ground-color. 290. *P. squarrosoides* Pk.
(dd) Solitary or very few in one tuft.
(e) Edge of gills beaded with white drops; pileus yellowish-fulvous, spotted with removable scales. 291. *P. albocrenulata* Pk.
(ee) Edge of gills not beaded; pileus yellowish-white or sometimes darker; stem bulbous-radicate. 289. *P. destruens* (Lasch.) Bres. (syn. *P. comosa* Fr.), (syn. *P. heteroclita* Fr.)
(aa) Pileus glabrous.
(b) Spores large and variable, 10-15 micr. long, pileus dark brown or blackish brown; on the ground in woods. 288. *P. aggericola* Pk.
(bb) Spores 9 micr. or less in length.
(c) On decaying logs, etc.; pileus hygrophanous, rufous-cinnamon (moist). 304. *P. discolor* Pk.
(cc) On lawns, grassy places, etc.; pileus whitish-buff or white, thick. 283. *P. praecox* Fr.
(AA) Pileus hygrophanous, not viscid.
(a) Growing on moss or sphagnum; pileus small; stem slender to filiform; annulus membranous.
(b) Pileus umbonate; stem solid; annulus slight. *P. minima* Pk.
(bb) Pileus not umbonate; stem hollow; annulus persistent, entire. 308. *P. mycenoides* Fr.
(aa) On decaying logs, stumps, chips, saw dust, etc., sometimes on debris in woods, or on the ground.
(b) Gills at first yellowish or ochraceous.
(c) Large; pileus 5-10 cm. broad, cinnamon (moist); annulus fugacious; flesh yellowish. *P. cerasina* Pk.
(cc) Much smaller; annulus persistent.
(d) Gills broadly adnate, subtriangular; appearance of *P. marginata*, subcaespitose. 305. *P. unicolor* Fr.
(dd) Gills adnexed, relatively broad; solitary; pileus small, rugose. 307. *P. rugosa* Pk.
(bb) Gills never with yellowish tints.
(c) Very caespitose; pileus yellow-cinnamon to pale cinnamon; stem squarrose-scaly, below the blackish-brown annulus. *P. mutabilis* Fr.
(cc) Gregarious; stem not scaly.
(d) Annulus fugaceous, small, scarcely membranous; gills narrow; pileus watery-cinnamon. 306. *P. marginata* Fr.
(dd) Annulus ample, membranous.
(e) Pileus densely floccose-dotted, rufous-cinnamon to brick-red; very fragile. 303. *P. confragosa* Fr.
(ee) Pileus glabrous, rugose-wrinkled, ochraceous-cinnamon then paler. 302. *P. acericola* Pk.
(AAA) Pileus neither viscid nor hygrophanous.
(a) Pileus scaly; on wood, logs, trunks, etc.
(b) Gills yellow, at length ferruginous.
(c) Pileus silky, floccose-squamulose on disk, buff-yellow; taste bitter; annulus fugacious. *P. lutea* Pk.
(cc) Pileus entirely squamulose.
(d) Scales sulphur-yellow, superficial, pilose; stem squarrose-scaly, hollow. 298. *P. flammans* Fr.
(dd) Scales innate, i. e., by the breaking up of the cuticle.
(e) Gills narrow, adnato-decurrent; pileus golden-yellow to tawny; annulus ample, near apex of ventricose stem. 296. *P. spectabilis* Fr.
(ee) Gills broad.
(f) Pileus and stem variegated yellow and green, or with greenish scales; on exposed, hard wood. 301. *P. aeruginosa* Pr.
(ff) Pileus without green shades.
(g) Stem hollow at length; pileus covered with ferruginous, pointed, fasciculate scales. 295. *P. muricata* Fr.
(gg) Stem solid; pileus pale red or yellowish; gills subdistant. 300. *P. lutcofolia* Pk.
(bb) Gills not yellow at first, (becoming yellowish in *P. curvipes*).
(c) Very caespitose; pileus and stem squarrose-scaly; gills pallid-olivaceous at first, narrow. *P. squarrosa* Fr.
(cc) Solitary or subcaespitose.
(d) Stem bulbous, subradicate, solid; gills rounded-adnexed or adnate. (Dry condition.) 289. *P. destruens* Fr.
(dd) Stem equal, stuffed then hollow.
(e) Pileus small, 2-3 cm. broad.
(f) Pileus covered with superficial, erect, small spine-like scales, tawny-brown. 294. *P. crinaccella* Pk.
(ff) Pileus with innate, flocculose minute scales. 293. *P. curvipes* Fr.
(ee) Rather large, 6-12 cm. covered with appressed, tawny fibrillose scales; gills narrow; annulus ample. 292. *P. fulvosquamosa* Pk.
(aa) Pileus not scaly; growing on the ground.
(b) In moist, rich woods.
(c) Moderately large.
(d) Large; pileus covered with white flocci, lacunose-wrinkled; annulus large, persistent and movable. 284. *Pholiota caperata* Fr.
(dd) Pileus glabrous; disk ochre-yellowish.
(e) Gills adnexed or nearly free; stem solid; annulus thick. 285. *P. johnsoniana* Pk.
(ee) Gills adnate, decurrent by a tooth; stem hollow; annulus ample; caespitose. 286. *P. aegerita* Fr.
(cc) Small; pileus ochraceous; spores 7-8 x 3-4; annulus membranous, distant; gills yellowish. *P. togularis* Fr.
(bb) On lawns, grassy places, etc., medium size.
(c) Stem solid, hard. Pileus tan-color but variable; in cultivated fields and gardens. 284. *P. dura* Bolt.
(cc) Stem stuffed then hollow; pileus varying white, whitish tinged with tan or yellowish.
(d) Open places, in fields, thickets, etc. Spores 9-10.5 x 5-5.5, obscurely 5-angled. 287. *P. howeana* Pk.
(dd) Annulus membranous, fragile, subfugacious, brown in mass. *P. duroides* Pk.
(ddd) Annulus membranous, fragile, subfugacious.
(e) On lawns, etc., in the spring; spores 8-10 x 5-6 micr., pileus whitish. 284. *P. praecox* Fr.
(ee) Later in the season; spores 11-12.5 x 7-7.5 micr., similar to the preceding. 284. *P. vermiflua* Pk.

Section I. Humigeni. Terrestrial, rarely caespitose, not hygrophanous, not attached to mosses, cystidia present or absent.

283. Pholiota præcox Fr. (EDIBLE)

Syst. Myc., 1821. (As *Psalliota praecox*.)

Illustrations: Atkinson, Mushrooms, Plate 42, p. 150, 1900.
Murrill, Mycologia, Vol. 3, Pl. 49, Fig. 1.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 27 and 28, 1913.
Hard, Mushrooms, Fig. 209, p. 258, 1908.
Marshall, Mushroom Book, Pl. 30, p. 84.
Ricken, Blätterpilze, Pl. 55, Fig. 4.
Patouillard, Tab. Analyt, No. 112.
Peck, N. Y. State Mus. Mem. 4, Plate 57.
Plate LIX of this Report.

PILEUS 2-6 cm. broad, convex or nearly plane, *soft*, glabrous, or nearly so, even, *moist*, in wet weather often slightly viscid to the touch, *whitish* or *more or less tinged* with yellowish or leather-color when old, margin at first incurved. FLESH white, medium thick. GILLS adnate seceding or becoming emarginate, somewhat rounded behind, close, of medium width, *at first whitish, then tinged gray, finally brownish or rusty brown*, edge crenulate. STEM 3-8 cm. long, 3-5 mm. thick, rather slender, equal or subequal, *usually straight*, glabrous, apex pruinose, almost solid or *stuffed by a fibrous white pith*, even or striate at apex, whitish. VEIL whitish, thin

and frail, *breaking variously*, sometimes forming a thin, fragile ANNULUS, sometimes adhering in shreds to the margin of pileus. Annulus apical, fugacious. SPORES elliptical, 9-13 x 6-7 micr., smooth, rusty-brown in mass. CYSTIDIA scattered, swollen-ventricose with short, broad apex, 35-45 micr. long, 12-15 micr. thick. ODOR farinose. TASTE mild.

Solitary or gregarious, rarely subcaespitose. On lawns, pastures, roadsides, etc., sometimes in woods. Throughout the State. Common in May and early June, after heavy rains.

One of our early edible mushrooms; easy to get, as it grows at our very doors. It has several near relatives and varies somewhat when growing in the woods. Peck has called the wood form var. *sylvestris*; the cap is darker, brownish to rusty-brown. Another form, because of its small size (pileus 2-3 cm.) and appendiculate margin of the pileus, was called var. *minor* by Fries.

The normal form varies also; in wet weather the pileus is sub-viscid, while ordinarily it is dry. The gills of different specimens are attached differently to the stem, adnexed, adnate or even slightly decurrent at times; on expansion of pileus, however, they become sinuate or emarginate; their edge is whitish-crenulate because of the cystidia. Sometimes the base of stein is attached to white strands which enter the turf. The stem is almost homogeneous at first. *P. vermiflua* Pk. is closely related to it. (See illustration: N. Y. State Mus. Bull. 75, Plate 73, 1904.) Authors differ somewhat as to the spore measurements, and may have confused other species with *P. praecox*, *P. dura* Fr. (see illustration: Hard, Mushrooms, Fig. 210, p. 259) has not been detected in Michigan but doubtless grows here. Its solid stem, tan to brownish pileus, which usually cracks on the surface into areas, and its preference for soil which has been cultivated, distinguish it. Ricken gives the spore-size of *P. dura* as 11-13 x 7-8 micr. *P. temnophylla* Pk. is separated by Peck, on account of its dingy-yellow or ochraceous cap and very broad gills. One specimen, which may be this species, was collected in hemlock and spruce woods, Sault Ste. Marie; the very broad gills were obliquely truncate at the inner extremity, but the spores were somewhat smaller than given by Peck. Otherwise it resembles *P. praecox*. Not infrequently specimens of *P. praecox* having the characters of the type rather than those of var. *sylvestris* are found in low, moist woods.

284. Pholiota caperata Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 348.
Ricken, Blätterpilze, Pl. 55, Fig. 2.
Michael, Führer f. Pilzfreunde, Vol. I, No. 49 (as *Rozites caperata*).
Gillet, Champignons de France, No. 520.
Hard, Mushrooms, Pl. 31, Fig. 212.
Harper, Trans. Wis. Acad. Sci. Arts & Let., Vol. XVII, Pt. 1, Pl. 24.

PILEUS 5-10 cm. broad, oval at first, campanulate-expanded, obtuse, markedly wrinkled or furrowed, dry, *at first with a superficial hoariness or floccosity*, straw-color to alutaceous, at length glabrous. FLESH white, thick on disk. GILLS adnate, then emarginate, medium close, whitish then *dingy* pale ferruginous, edge uneven or crisped. STEM *stout*, 7-12 cm. long, 10-20 mm. thick, subcylindrical, firm, solid, glabrous, dingy white, furnished *near the middle with a reflexed, persistant, whitish, membranous annulus*. SPORES 12-14 x 7-9 micr., inequilateral, elliptical, tuberculate, yellowish. ODOR and taste mild.

Gregarious or scattered. On the ground in woods, especially of conifers. Ann Arbor, Bay View, Marquette, etc. August-September. Frequent locally.

This species has been separated from the Pholiotas by Karsten who invented the genus Rozites for it. It is quite distinct from the other species by its peculiar covering when young. Its stout stem, distinct annulus, large size and terrestrial habit make it easily recognizable.

285. Pholiota johnsoniana (Pk.) Atk. (EDIBLE)

N. Y. State Cab. Rep. 23, 1872 (as *Psalliota johnsoniana*).

N. Y. State Mus. Rep. 41, 1888 (as *Stropharia johnsoniana*).

Illustration: Atkinson, Mushrooms, Plate 44, p. 145, 1900.

PILEUS 4-10 cm. broad, convex then plane and subturbinate, *glabrous, ochre-yellowish*, often shading to whitish on margin which is *thin* and sometimes finely striate. FLESH *quite thick on disk*, white, soft. GILLS *adnexed or almost free*, rounded behind, thin, crowded, rather narrow, grayish-white at first, then rusty-brown, at length ascending toward front. STEM 5-10 cm. long (or more), 6-10 mm. thick, equal or slightly thickened at base, *solid*, glabrous, innately fibrillose, rarely floccose-torn, whitish. SPORES elliptical-oval, 5-6 x 3-4 micr., smooth, brown with a slight rusty tinge. CYSTIDIA none, but scattered over the hymenium are *clusters of stellate crystals*. ANNULUS *thick*, swollen, with obtuse edge.

(Dried: Pileus yellowish-alutaceous; gills fuscous-umber; stem buff).

Gregarious. On leaf-mould in rich woods; also said to occur in pastures. Ann Arbor. September. Rare.

As Atkinson points out, the plant is quite readily distinguished by its subturbinate (i. e. top-shaped) pileus and the thick annulus. Variations occur with erect tawny squammules on the center of the pileus, or with its surface innately floccose or fibrillose. The base of the stem is sometimes connected with the soil by white strands of mycelium. A constant peculiarity of the plant seems to be the clusters of stellate crystals which are scattered among the basidia as seen under the microscope.

286. Pholiota aegerita Fr.

Epicrisis, 1836-38.

Illustrations: Gillet, Champignons de France, No. 524.
Cooke, Ill., Plates 453, 365.

PILEUS 4-7 cm. broad, convex then plane, margin at length elevated, fragile, moist, glabrous, disk subrugulose, *ochraceous-yellow to fulvous*, paler on margin, edge even and thin. FLESH not thick, white. GILLS *adnate*, decurrent by a tooth, rather close, broad, whitish at first, then grayish fuscous, finally umber. STEM 8-12 cm. long, 4-8 ram. thick, slender, equal or slightly thicker at base, fibrillose-striate, floccose at base, *stuffed then hollow*, whitish. ANNULUS whitish, membranous, rather thin, sometimes disappearing. SPORES *obscurely* 5-angled, i. e. truncate at one end, subacute at the other, 9-11 x 5-6 micr., fuscous umber. CYSTIDIA scattered, ventricose, obtuse at apex, about 65-70 micr. long.

(Dried: Pileus fulvous-tan; gills fuscous-umber; stem dingy buff).

Caespitose. Among debris in low grounds, poplar, willow, etc., edge of hemlock woods. Houghton. July. Rare.

The figures and description given by Gillet fit our plant well. The spores agree with the size given by Ricken and Bresadola. The caespitose habit, uneven pileus and slender, hollow stem characterize it. It doubtless varies more as to form than my specimens indicate, and Cooke has given very aberrant examples in the figures cited. The peculiar outline of the spores is shown also in *P. acericola* and *P. howeana*. The flesh is very moist, almost hygrophanous, but in other respects differs from the section of hygrophanous species. It approaches *P. acericola*, which has slightly smaller spores and a large, persistent, curtain-like annulus, and is solitary or gregarious. Fries says the annulus is tumid, in which respect our specimens differ. Harper figures a plant under this name, which reminds one of a discolored form of *P. aeruginosa* Pk. Ricken says it has a strong, rather pleasant odor.

287. Pholiota howeana Pk.

N. Y. State Mus. Rep. 26, 1874.

PILEUS 1.5-5 cm. broad, convex expanded, fragile, subumbonate, dry, glabrous, even, pale ochraceous, unicolor or center darker. FLESH white. GILLS adnate, with a tooth, *narrow*, close, subventricose, white at first then rusty-brown, edge entire and concolor. STEM 3-7 cm. long, 1.5-4 mm. thick, *slender, equal*, rather rigid, corticate, glabrous, even, stuffed with white pith, whitish to pale ochraceous. ANNULUS apical, thin, membranous, and easily rubbed off. SPORES *obsurcly* 5-angled or sub-regular, truncate at one end, pointed at the other, 9-10.5 x 5-5.5 micr., fuscous-brown. CYSTIDIA none or very few. ODOR and TASTE mild.

(Dried: Pileus and stem pale-tan, gills rusty-brown.)

Gregarious. In grassy fields. Ann Arbor. June. Infrequent.

Our collections average smaller than Peck's description. The slight angularity of the spores is obscure but easily made out. In shape it looks like a small *P. praecox* but the colors differ and the stem has a different texture. The pileus is sometimes slightly pitted-lacunose on the margin. In size and appearance it resembles *Naucoria semiorbicularis*, but with an annulus; it also approaches Peck's *P. temnophylla*; but that species has very broad gills and the spores are larger.

288. Pholiota aggericola Pk.

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

N. Y. State Mus. Rep. 30, 1878 (as *Pholiota indecens* Pk.).

N. Y. State Mus. Bull. 28, 1899 (as *Pholiota aggerata* Pk.).

Illustrations: Marshall, Mushroom Book, p. 73.
(Compare Cooke's Ill., Plate 358 of *P. erebia*.)
Harper, Wis. Acad. Sci. Trans., Vol 17, Pl. 30 (as *P. erebia* Fr.).

PILEUS 1.5-4 cm. broad, convex then plane and at length with recurved margin, *viscid*, dark fuscous-umber, fading to cinnamon, glabrous, *even, rivulose* or *rugose*, margin obscurely striatulate. GILLS *adnate or arcuate subdecurrent*, close to subdistant, rather broad behind and subtruncate, pallid at first, then grayish, finally rusty-brown. STEM 3-6 cm. long, 4-7 mm. thick, equal or subequal, *fibrillose-striate*, stuffed then hollow, dark fuscous-umber below, pale at apex. ANNULUS membranous, thin, *fragile*, veil fuscous and striate above, pale below; veil sometimes adhering to margin of pileus. SPORES variable in size and shape, *long elliptical*, to *subpyriform*, 12-15 x 5-7 micr., sometimes dominantly 12 micr., sometimes 15, smooth, on slender sterigmata. BASIDIA *bispored*. CYSTIDIA nine-pin shaped, or lanceolate, 40-50 micr. long, scattered, fragile, shorter on edge of gills.

Gregarious. In hemlock mixed woods in paths or among debris, usually in moist ground. Bay View, Houghton, Marquette, New Richmond. July-October. Rather frequent locally.

This species has a confused history. It was given several names by Peck. Under *P. indecens* Peck gives spore-measurements 12-15 micr. long, but in his monograph of the New York State Pholiotas, they are said to be 10-12.5 micr. long. This discrepancy is due to spore variations in different individuals as I have assured myself. Often many spores of a specimen are less than 12 micr., but the majority of collections show a dominance of spores 15 micr. long. Often they vary much in the same specimen. This plant prefers low, moist hemlock woods although it is found elsewhere. Its viscid character disappears in dry weather, and the pileus in luxuriant plants is often very rugose; this is var. *retirugis* Pk. The European species, *P. erebia*, as figured by Cooke and Patouillard remind one very much of our plant. But the pileus of that species is described as hygrophanous although Fries says it is also subviscid. The cystidia are also figured differently by Patouillard, yet I should not be surprised if our plant were to turn out to be identical with *P. erebia* Fr. Some specimens have a distinct fuscous-purplish tinge to the gills, and the spores under the microscope suggest a Stropharia rather than a Pholiota; but this character also seems variable, even where spores and cystidia are the same.

Section II. Truncigeni. Lignatile, caespitose or solitary. Pileus scaly, not hygrophanous. Gills changing color. Cystidia lacking.

**Gills at first white or whitish.*

289. Pholiota destruens (Fr.) Bres.

Fungi Tridentini, I, 1881.

Hymen. Europ., 1874. (As *Pholiota destruens* Fr., *Pholiota comosa* Fr., and *Pholiota heteroclita* Fr.).

Illustrations: Bresadola, Fung. Trid., I, Plate 84.
Cooke, Ill., Pl. 600 (as *Pholiota comosa*).
Cooke, Ill., Plate 366 (as *Pholiota heteroclita*).
Gillet, Champignons de France, No. 522.
Gillet, Champignons de France, No. 521 (as *Pholiota comosa*).
Hard, Mushrooms, Fig. 214, p. 264, 1908 (as *Pholiota heteroclita*).
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 45 (as *P. comosa*).
Harper, ibid, Pl. 46 and 47 (as *P. heteroclita*).
Chicago Nat. Hist. Surv., Bull. VII, Plate 9, 1909 (as *Pholiota comosa*).
Plate LX of this Report.

"PILEUS 6-15 cm. broad, fleshy, convex then expanded, sometimes gibbous or broadly unbonate, *subviscid*, yellowish-white, disk fulvous, *elegantly covered with white, wooly, seceding scales*, margin at first involute and fibrillose. GILLS crowded, rounded-adnexed behind or adnate, decurrent by a line, *whitish at first* then cinnamon-umber. STEM 5-17 cm. long, 2-3 cm. thick, solid, attenuated at apex, bulbous-radicate at base, white-squamose, glabrescent in age, concolor. FLESH white, fulvous-cinnamon at base of stem. SPORES elliptical, or obovate, 8-10 x 4-6 micr., yellow under microscope. BASIDIA clavate, 20-25 x 6 micr. ODOR strong, somewhat nauseous. TASTE rather agreeable."

Solitary or subcaespitose. On trunks of poplar, birch and willow. Autumn. Detroit, Frankfort. Infrequent.

The description is that of Bresadola, who has shown the identity of the three species given by Fries (see above). It was collected by Dr. Fischer near Detroit and one of his photographs was published by Hard as *P. heteroclita*. It seems to be rare in the state. Harper recently reported it from Frankfort.

290. Pholiota squarrosoides Pk. (EDIBLE)

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

Illustrations: Peck, N. Y. State Mus. Rep. 54, Plate 73.
Hard, Mushrooms, Plate 21, p. 42, 1908.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 36 and 37.
Conn. State Geol. & Nat. Hist. Surv. Bull. 3, Plate 21.

PILEUS 3-10 cm. broad, *firm*, subglobose when young, then convex, *viscid when moist, adorned with terete, erect, pointed, tawny scales*, more dense on disk, on a whitish ground-color. FLESH white, thick. GILLS rather narrow, adnate or arcuate subdecurrent, often becoming sinuate in age, close or crowded, whitish becoming brownish-ferruginous. STEM 5-10 cm. long, 5-10 mm. thick, equal, firm, *stuffed, rough* with numerous, thick, floccose, tawny scales, which terminate above in a lacerated, floccose ANNULUS, glabrous and white above the annulus. SPORES oblong, short-elliptical to ovoid, 5-5.5 x 2.5-3.5 micr., smooth, rusty-brown. CYSTIDIA scattered, about 30 micr. long, obtuse at apex.

(Dried: Ochraceous, with tawny scales.)

Very caespitose, up to 50 in a cluster. On trunks of living maple, birch and beech, also on dead wood: logs, stumps, etc., of deciduous trees. Northern Peninsula, frequent; not found elsewhere. August-September. Edible.

The "sharp scale" Pholiota is closely related to the European *P. squarrosa*. It is said (N. Y. State Mus. Rep. 54, p. 183) to differ in the viscid pileus, emarginate gills and smaller spores. The gills, however, are not constant, and frequently I have seen our plant with arcuate-decurrent gills, without a sign of emargination. In 1908 in company of C. G. Lloyd, I came across a tuft of a Pholiota in the grounds of Upsala University, Sweden, which had all the macroscopic characters of our plant; it was slightly viscid (moist), and the colors were the same as in the specimens collected in northern Michigan. Unfortunately, I was unable to get the spore-measurements. Fries in Epicrisis, p. 166, says the color of *P. squarrosa* is croceo-ferruginous, and it is thus

figured by Michael, Vol. II, No. 76, and Cooke, Ill., Plate 367. On the other hand, Patouillard in Tab. Analyt., p. 154 and No. 340, paints it like our species and unites with it *P. verruculosa* Lasch. which Cooke in Illust., Plate 614, figures in such a way as to remind us strongly of *P. squarrosoides*. Either the American plant occurs in Europe also, or there is great variation in the color of *P. squarrosa*, both of cap and gills. The gills of the latter are said by all the European authors, to be pale olivaceous at first, and the spore measurements are given as 8 x 4. Maire (Soc. Myc. France Bull., Vol. 27, p. 437) says the spores are smooth. Further, the odor of *P. squarrosa* is said to be strong, disagreeable. Patouillard, Gillet and Michael describe the flesh as yellow. *P. squarrosa* may then be said to differ from *P. squarrosoides*, in the color of the young gills, the disagreeable odor, the yellow flesh, the crocus-yellow or tawny color, and the larger, smooth spores. It has been reported from the United States by various authors, and it seems desirable that the two species be more carefully studied. I have never found a plant in Michigan which could be referred to *P. squarrosa*, but Harper has illustrated collections from Frankfort, Michigan, under the latter name.

291. Pholiota albocrenulata Pk.

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

Illustration: Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 42 and 43.

PILEUS 3-12 cm. or more broad, firm, broadly convex or campanulate, often unbonate, *very viscid*, orange-fulvous, becoming ferruginous-tawny in age, *spotted with superficial, darker, fibrillose, scales which become whitish on drying*, margin even and at length reflexed, often appendiculate. FLESH thick, *whitish*. GILLS adnate, becoming sinuate and rounded behind, *very broad*, close, whitish at first, then grayish, at length rusty-umber, *edge crenulate and beaded with white drops*. STEM 5-15 cm. long, 5-10 mm. thick, firm, equal or tapering slightly upward, stuffed by a loose pith, soon hollow, dingy whitish or ochraceous, *covered with squarrose, brown scales* up to the fugacious ANNULUS, apex pruinose and white. SPORES ventricose-subfusiform, inequilateral, 11-14 x 5.5-6.5 micr., smooth, rusty-umber. CYSTIDIA none.

Solitary, or two or three in a cluster. Mostly growing out of a crack or wound of living trees, towards the base of the trunk; on living sugar maple, yellow birch and hemlock. July-September. Frequent in the Northern Peninsula, rare in southern Michigan.

This fine plant prefers the sugar maple, and may yet be found to be injurious to the living trees, as it has the characteristic habit of parasitic mushrooms. Peck and Harper report it on prostrate trunks and decaying wood, but I have always found it on living trees. Morgan also reports it from Ohio on the base of standing maple trees. The white-headed edge of the gills, the peculiar scales and large spores distinguish it. The spores average longer than noted by Peck, although they vary considerably in length. The pileus may attain to quite large dimensions. Its edibility is unknown.

292. Pholiota fulvosquamosa Pk.

Torr. Bot. Club. Bull. 30, 1903.

Illustration: Harper, Wis. Acad. Sci. Trans., Vol 17, Pl. 60.

"PILEUS 6-12 cm. broad, fleshy, rather thin, convex becoming nearly plane, *dry*, adorned with numerous, appressed, tawny scales, concentrically cracked about the disk. FLESH white, becoming brownish where cut. GILLS *narrow*, close, attenuated towards the stem and attached to a narrow collar, whitish becoming pinkish-cinnamon. STEM 5-8 cm. long, 8-10 mm. thick, equal, rigid, stuffed or hollow, adorned below with numerous, erect, subfloccose, tawny scales, glabrous above and below the *ample, persistent* ANNULUS, which is white above and tawny floccose-squamulose below. SPORES elliptical, 7-8 x 4-5 micr. ODOR and TASTE of radishes."

About the base of oak trees. M. A. C., East Lansing. September. B. O. Longyear. Neebish Island, October, E. T. Harper.

I have never collected this species. It was discovered by Long-year, and found again by Harper. Its ample annulus, narrow gills, and the tawny scales seem to distinguish it.

293. Pholiota curvipes Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Plate 104.
Cooke, Ill., Plate 370.

PILEUS 1-3 cm. broad, convex then expanded, innately floccose all over when young, then minutely scaly, *tawny-yellow*, dry, not striate, margin incurved. FLESH rather thin, firm when dry. GILLS *adnate*, not emarginate, *broad*, close to subdistant, *whitish at first* then yellowish to rusty-cinnamon. STEM short, 2-3 cm. long, 2-3 mm. thick, curved or ascending, equal, stuffed then hollow, becoming fibrillose. ANNULUS soon vanishing, at first floccose-radiate, almost lacking. SPORES elliptical, 6-8 x 3-4 micr., smooth, pale-yellowish under the microscope, rusty-brown in mass. CYSTIDIA none. ODOR none. TASTE mild.

Solitary or gregarious. On logs of elm, etc. Ann Arbor. June. Infrequent.

Closely related to species of Flammula, because of its poorly developed annulus. The different color of the young gills and the nature of the scales on the pileus, separate it from *P. muricata*. It is evident, from his description of the species (N. Y. State Mus. Bull. 122) that Peck has referred a different plant under this name, since the spores of his specimens are too large, and the gills are yellow and close. From present advices the large-spored species is probably *P. tuberculosa* Fr. On the other hand, Hard (Mushrooms, p. 264, 1908) and Moffatt (Chicago, Nat. Hist. Surv. Bull VII, p. 78)

doubtless had our species. I cannot agree with those who would combine *P. muricata* Fr. with this species, although the spores are very similar.

294. Pholiota erinaceella Pk.

N. Y. State Mus. Rep. 28, 1876 (as *P. detersibilis*).

Illustration: Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 51.

"PILEUS 1-2.5 cm. broad, hemispherical or convex, dry, *densely coated with small, erect, separable pyramidal or spine-like scales*, tawny-brown. FLESH thin. GILLS adnexed, *broad*, close, pallid becoming cinnamon-brown. STEM 1-2.5 cm. long, 2 mm. thick, equal, stuffed or hollow, *densely squamulose below the slight annulus*, often curved, colored like the pileus. SPORES boat-shaped, 7.5-9 x 4-5 micr."

On logs in woods. Frankfort. August. Rare.

Reported by Harper. The description is adapted from Peck, who says that the small, soft, crowded scales of the pileus which can be easily rubbed off, constitute a prominent character of the species. Peck changed the original name in the 30th N. Y. State Mus. Rep. because it had been preoccupied. This species may be an extreme form of *P. curvipes*, which differs in the innate floccosity of the surface of the young pileus. From *P. muricata* it seems to differ mostly in its larger spores, pallid young gills, and the superficial scales on the cap.

***Gills at first yellow, becoming ferruginous.*

295. Pholiota muricata Fr.

Syst. Myc., 1821.

Illustrations: Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 52 and 53.

PILEUS 2-4 cm. broad, convex or nearly plane, dry, obtuse or depressed, *covered with dense, fasciculate or granular, tawny-yellow, pointed scales*, ferruginous on disk, not striate, margin when young often adorned by remnants of the veil. FLESH thin. GILLS adnate, seceding, moderately broad and close, *yellow* at first then ferruginous-stained, edge concolor and minutely fimbriate from the sterile cells. STEM 24 cm. long, 3-4 mm. thick, *curved*, stuffed then hollow, tawny, *floccose-fibrillose or granular scaly* up to the fugacious ANNULUS. SPORES short elliptical, 6-7x3-4 micr., smooth, pale ferruginous-brown. CYSTIDIA none.

Solitary or gregarious. On decaying logs, etc. Ann Arbor, Bay View. August-September. Infrequent.

Our plants fit well the description of Fries, except that the gills are not adnexed. They approach *P. curvipes*, but seem to me sufficiently differentiated by the pointed, fasciculate or granular scales of the cap, which are sometimes also found on the stem, and by the color of the gills which is yellow at first. *P. erinaceëla* Pk. is also close, but the scales on the cap are superficial.

296. Pholiota spectabilis Fr.

Epicrisis, 1836-38.

Illustrations: Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 44.
Fries, Icones, Plate 102.
Ricken, Blätterpilze, Pl. 55, Fig. 1, (As *Pholiota aurea*).
Cooke, Ill., Plate 352.
Gillet, Champignons de France, No. 529.
Plate LXI of this Report.

PILEUS 4-10 cm. broad, convex, then campanulate-expanded, firm, sometimes broadly umbonate, *tawny-orange*, dry, surface *glabrous at first, then broken into minute fibrillose scales*, margin even and sometimes wavy. FLESH thick, compact, yellowish, thin at margin. GILLS adnate becoming emarginate with decurrent tooth, *narrow, crowded*, yellow then ferruginous, edge minutely floccose-fimbriate. STEM stout, 4-10 cm. long, 7-15 mm. thick, compact, often hard, *solid, subventricose, peronate-scaly*, fibrillose in age, concolor to fuscous below the ring, pruinose and paler above. ANNULUS *near apex of stem*, membranaceous, persistent, thin, mostly entire, yellowish. SPORES broadly-elliptical, 7-9 x 5-6 micr., ferruginous, *tuberculate-rough*. CYSTIDIA none, but edge of gills are tufted with sterile cells. TASTE markedly *bitter*.

Growing from the base of yellow birch trunks. Marquette, Neebish Island. August-September. Infrequent.

A very imposing and elegant plant. Its colors, narrow gills, apical annulus, bitter taste and rough spores separate this from all others. *P. adiposa* has similar colors but differs widely in all other respects. The figures of European authors show the plant with a peronate stem in its best condition and they are excellent, but somewhat misleading after the annulus has become pendant. The spores are similar to those of many Cortinarii.

297. Pholiota adiposa Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Atkinson, Mushrooms, Plate 43, Fig. 144, p. 152, 1900.
Hard, Mushrooms, Fig. 211, p. 260, 1908.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 40.
Murrill, Mycologia, Vol. I, Pl. 7, Figs. 1 and 2.
Marshall, Mushroom Book, Plate XI, p. 61, 1905.
Freeman, Minnesota Plant Diseases, Fig. 129, p. 263, 1905.
Clements, Minnesota Mushrooms, Fig. 37, p. 62, 1910.

PILEUS 340 cm. or more broad, compact, convex to hemispherical, obtuse, *very viscid*, covered with separable, *chrome-yellow to orange concentric scales* which are darker in age and often squarrose, margin even, appendiculate, at first incurved. FLESH thick, firm, yellowish-white. GILLS adnate, becoming emarginate,

broad, close, thin, yellow then ferruginous, toughish, edge entire. STEM stout, 3-10 cm. long, 6-12 mm. thick, *solid*, firm, usually curved, subequal, yellow, becoming ferruginous-stained from spores, *scaly*, glabrescent. ANNULUS slight, floccose, fugacious. SPORES 7-8 x 4-5 micr., elliptical, smooth, ferruginous. CYSTIDIA none, and very short; sterile cells on edge of gills. ODOR none, TASTE mild.

Solitary or caespitose. On decaying logs, etc., and from wounds on trunks of living sugar maple and white ash. Throughout the State. June-October. Frequent, especially in the autumn. Edible.

Easily recognized by its bright color and viscid pileus. In wet weather the pileus becomes glutinous. The floccose annulus terminates the scaly part of the stem above, and is often lacking. The stem of our plant is always solid, and Fries (Hymen. Europ.) must have erroneously written "farcto," as other European authors refer to it also as solid. Massee and Ricken give spore-measurements which are too small for the American plants. Occasional specimens become larger than the size of the plant given above. The gelatinous layer of the cap should be peeled before cooking.

298. Pholiota flammans Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 104.
Cooke, Ill., Pl. 368.
Michael, Führer f. Pilzfreunde, Vol. II, No. 75 (as *Pholiota flammula* A. & S.).
Ricken, Blätterpilze, Pl. 55, Fig. 5.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 41 C.

"PILEUS 4-7 cm. broad, convex-expanded to plane, *entirely dry*, subumbonate, *fiery-yellow* to almost orange-red, *clothed by superficial, sulphur-yellow, squarrose-fibrillose scales*. FLESH bright yellow, becoming reddish-brownish. GILLS emarginate-adnexed, *very narrow*, thin, crowded, bright yellow, becoming ferruginous. STEM 5-7 cm. long, 5-10 mm. thick, equal, mostly curved, stuffed then hollow, *bright yellow*, dry, *squarrose-scaly*, up to the torn, somewhat membranous annulus. SPORES *minute*, cylindrical-elliptical, 4x2 micr. ODOR almost like radish."

On decaying stumps and logs, probably only on coniferous wood. Northern Michigan. September.

Known by the paler, sulphur-yellow scales on a more deeply colored background, and by the very small spores and squarrose-scaly cap and stem. It is usually caespitose. Harper reports it from Neebish Island. The description is adapted from Ricken.

299. Pholiota lucifera (Lasch.) Bres.

Fungi Tridentini, I, 1881.

Illustrations: Ibid, Plate 85.
Ricken, Blätterpilze, Pl. 54, Fig. 1.

PILEUS 3-5 cm. broad, convex then plane, at length umbonate, *viscid*, sulphur-yellow to flavus, covered on disk by tawny or reddish-brown, appressed, fibrillose, thin scales, margin even, incurved and appendiculate. FLESH whitish, yellow under cuticle. GILLS adnate-subdecurrent, becoming sinuate, *bright yellow*, at length ferruginous, moderately *narrow*, crowded, edge crenulate from the flask-shaped sterile cells. STEM 2-5 cm. long, 5-7 mm. thick, fibrous, equal or subequal, *yellow*, paler at apex, ferruginous at base, solid, *fibrillosely peronate*. ANNULUS narrow, floccose, fugacious, rusty-yellow. SPORES obovate, 7-8 x 4-5.5 micr., smooth, ferruginous in mass.

Gregarious. On very rotten wood, in mixed woods. Marquette. August-September. Rare.

This is a well-marked plant, found but once, and apparently limited to our northern woods. Our specimens had rather short stems which were solid, and in this respect differ from Bresadola's description. *P. limonella* Pk. appears to be similar, but differs in its gills which are whitish at first and adnexed. *P. adiposa* has broad gills and the scales are large and often recurved.

300. Pholiota luteofolia Pk.

N. Y. State Mus. Rep. 27, 1875.

Illustration: Harper, Wis. Acad. Sci. Trans., Vol 17, Pl. 48.

PILEUS 2-5 cm. broad, compact, convex-expanded, dry, obtuse, *scaly, dotted on disk with fasciculate-pointed pinkish to reddish-brown scales*, elsewhere areolate-cracked and with ochraceous-brown, adpressed scales. FLESH *white*. GILLS emarginate, *broad*, subdistant, *yellow* then ferruginous, edge serrate. STEM short or long, 3-6 cm. long, 4-8 mm. thick, *firm*, stuffed then hollow, curved, fibrillose, subequal, yellowish, floccose-pruinose above the slight, evanescent ANNULUS. SPORES elliptical, 7-8x5 micr., smooth, ferruginous in mass. CYSTIDIA none.

Subcaespitose. On decaying log of white oak. Ann Arbor. September. Rare.

Has the stature of *P. aeruginosa*, but the scales and colors differ. Our plants have pointed tuberculate scales on the disk of the pileus at first, and the stem does not remain solid.

301. Pholiota aeruginosa Pk.

N. Y. State Mus. Rep. 43, 1890, Bot. ed.

Illustration: Plate LXII of this Report.

PILEUS 3-5 cm. broad, hemispherical or convex, obtuse, *firm*, subglabrous to scaly, the scales erect, pointed and mostly on the disk, *often areolate cracked*, dry, varying in color, *dark green, greenish or fulvous-yellow blotched with green*, the scales darker when present, margin incurved at first, often adorned with fragments of the veil. FLESH whitish, tinged green, thin except on disk. GILLS adnate and rounded behind at first, then emarginate with decurrent tooth, *broad*, close, yellowish at first, *becoming bright orange-ferruginous*, edge entire. STEM short, 3-4 cm. long, 4-8 mm. thick, equal or tapering at base, straight or curved, tough, cortex subcartilaginous, fibrillose, sulcate-striate at apex, *colored like pileus below* the lacerate, submembranaceous, fugacious ANNULUS whose remnants are soon colored by bright ferruginous spores. SPORES 6-8 x 3-4.5 micr., subelliptical, smooth, *copious*, bright ferruginous. CYSTIDIA none.

Solitary or gregarious. On old railroad ties, board-walks, old logs in woods, etc. Throughout the State; Ann Arbor, New Richmond and Marquette. June and September. Infrequent.

Like *Lentinus lepideus*, this Pholiota frequents railroad ties and other wood exposed to the light. It is a well-marked species and was found on several occasions about Ann Arbor. The colors are sometimes very striking, since the dark green of pileus and stem contrast sharply with the bright ferruginous gills and ring, while the apex of the stem is at the same time of a rosy hue. A study of a number of collections shows that there is considerable variation in color, as well as in the character of the surface of the pileus, so that Peck's description had to be revised considerably. It is one of our few green mushrooms and must not be confused with *Stropharia aeruginosa*.

Section III. Hygrophani. Pileus hygrophanous. Cystidia present on gills.

302. Pholiota acericola Pk.

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

PILEUS 2-7 cm. broad, broadly convex then plane, sometimes depressed in age, hygrophanous, glabrous, varying *rugose-reticulated to rugulose*, yellowish cinnamon (moist) often darker on disk, paler when dry, not striate on margin. FLESH rather thin. GILLS adnate becoming sinuate, close, somewhat narrow to moderately broad, pallid, or tinged gray at first, then cinnamon. STEM 4-10 cin. long, 5-10 mm. thick, equal or tapering upward, stuffed then hollow, fibrillose-striate, whitish, fuscous at base. ANNULUS *large, membranous, flabby*, persistent, deflexed, radiately striate on upper surface, and stained cinnamon by the spores. SPOKES obscurely 5-angled or obovate, *truncate at one end, pointed at basal end*, 9-10 x 5-6 micr., cinnamon and tinged rusty in mass. CYSTIDIA short, much swollen below, abruptly narrowed to a short obtuse prolongation, 18-20 micr. thick below, about 25-30 micr. long, numerous on sides of gills.

On much decayed logs of hard maple and beech in mixed woods of northern Michigan, and on debris, etc., of maple woods in the south. Common around Bay View, Negaunee, Ann Arbor. June-August.

Well characterized by the reticulate-rugose pileus, the large flabby annulus and the cystidia. Individual caps vary from rugose to almost even, the latter becoming rugose on drying, rarely is the rugosity visible except under a lens. The color of the pileus is often more ochraceous than cinnamon. It prefers to grow on sugar maple wood, often on limbs or decayed twigs or on debris. Peck says the rugosity disappears on drying while in most cases I have found it to become more prominent. White mycelial strands often connect the base of the stem with the substratum.

303. Pholiota confragosa Fr.

Epicrisis, 1836-38.

Illustration: Fries Icones, Pl. 105 (3).
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 41, D. & E. (small plants).

PILEUS 2-6 cm. broad, convex-plane, obtuse, ground-color *almost brick-red*, or vinaceous-cinnamon when moist, dotted with a white flocculose coating easily rubbed off and which disappears with age, *hygrophanous*, pale whitish-tan when dry, margin striate when moist. FLESH thin, fragile. GILLS adnate, crowded, narrow, vinaceous-fawn color (Ridg.). STEM 3-8 cm. long, 2-4 mm. thick, equal, stuffed to hollow, flexuous, *rufous*, silky-fibrillose. ANNULUS apical, membranous, persistent, white below. SPORES 6-7x4-5 micr., even, brown. ODOR and TASTE mild. Northern Michigan. August-September. Infrequent.

The stem is said to be peronate in the young plant, with a fibrillose white coating which terminates in a spreading membranous ring; with age the ring collapses and the stem is merely fibrillose while the cap is denuded. The rufous color of all parts makes it easy to recognize; in dry plants the color of the cap and stem becomes cinnamon or paler, and of the gills darker.

304. Pholiota discolor Pk.

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

Illustration: Harper, Wis. Acad. Sci. Trails., Vol. 17, Pl. 61 B.

PILEUS 2-4 cm. broad, convex, then nearly plane, glabrous, *viscid*, hygrophanous, *rufous-cinnamon and striatulate* (moist), bright ochraceous-yellow and even (dry). GILLS adnate-subdecurrent, *narrow*, close, *whitish at first*, then ferruginous-cinnamon, edge minutely crenulate. STEM 4-8 cm. long, 3 mm. thick, equal, stuffed, *soon hollow*, sometimes compressed, pallid-fuscescent, fibrillose below. ANNULUS

membranous, *persistent*, apical. SPORES elliptical, 7-9x5-6 micr., smooth. CYSTIDIA *few, fusiform*, slender, about 60 micr. long. ODOR none, TASTE mild.

Solitary or caespitose. On decaying wood, in mixed forests. New Richmond, Neebish Island, Ann Arbor. May-September. Frequent.

This species is probably more frequent than my observations so far indicate. The pileus is somewhat viscid, with a thin separable pellicle, and its color when dry is characteristic. *P. autumnalis* Pk. is said to differ in having a non-viscid pileus and a slight annulus; the colors are very similar. Some consider *P. autumnalis* identical with *P. marginata*. *P. discolor* sometimes forms scanty rhizomorphs on logs.

305. Pholiota unicolor (Fl. D.) Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 356.
Ricken, Blätterpilze, Pl. 56, Fig. 4.
Gillett, Champignons de France, No. 531.
Hard, Mushrooms, Fig. 213, p. 262, 1908.

PILEUS 2-4 cm. broad, convex then almost plane, obtuse, rarely umbonate, *hygrophanous*, watery-cinnamon (moist), becoming deep *ochraceous* (dry), glabrous, even, *margin extending beyond the gills*. FLESH thin, concolor. GILLS adnate and broad behind, *subtriangular* behind, often decurrent, close, *broad*, ochre-cinnamon. STEM 2-4 cm. long, 2-3 mm. thick, *stuffed*, equal, fibrillose, concolor, darker toward base, which is often white-mycelioid. ANNULUS thin, narrow, entire, persistent, membranous, apical. SPORES 8-10 x 4-5 micr., elliptical, smooth. CYSTIDIA *few*, broadly ventricose, narrowed above and obtuse, about 45 micr. long.

Subcaespitose. On decaying logs, etc., in woods. Spring and autumn. Ann Arbor. Probably rather frequent in places.

Differs from *P. marginata* by its broader gills, and persistent annulus, but it is likely that intermediate forms will be found. Harper's description of *P. marginata* applies to this plant.

306. Pholiota marginata (Batsch.) Fr. (Suspected)

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 372.
Ricken, Blätterpilze, Pl. 56, Fig. 7.
Atkinson, Mushrooms, Fig. 143, p. 151, 1900.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 54 and 55.

PILEUS 2-4 cm. broad, convex then plane, watery tan (moist), hygrophanous, *darker when dry*, glabrous, *striate on margin*. GILLS adnate, sometimes slightly subdecurrent, *narrow, crowded*, darkreddish-brown at maturity. STEM 2-8 cm. long, 3-5 mm. thick, equal, *glabrous*, stuffed then hollow, concolor, darker at base. ANNULUS distant, *fugacious*. SPORES elliptical, 7-8.5x4-5 micr. CYSTIDIA few or scattered, lanceolate-linear, 60-75 micr., subventricose below.

Solitary or caespitose. On decaying logs, limbs, etc., everywhere in woods. Throughout the State. Records from May 9 to November 2.

A very common little Pholiota, which appears to run into the preceding, although Fries says it is very distinct. It has appeared every month of the season in different years, but is more abundant in spring and fall. Peck has described a species under the name *P. marginella*, which he says differs from *P. marginata* by the even, fibrillose margin of the pileus, the adnexed gills and the paler, unicolorous stem. I have not seen it. *P. autumnalis* Pk. is probably the same and is said to be poisonous.

Section IV. Muscigeni. Growing on moss, wet ground or very decayed wood. Pileus hygrophanous. Cystidia absent, or in form of sterile cells on edge of gills.

307. Pholiota rugosa Pk.

N. Y. State Mus. Rep. 50, 1897.

PILEUS .5-3 cm. broad, (usually about 1 cm.), conical or campanulate, then expanded and *umbonate*, hygrophanous, striatulate on margin and rufous-ochraceous (moist), yellowish or pale ochraceous (dry), *becoming rugose-wrinkled on drying*. FLESH thin, concolor. GILLS *adnexed*, close to subdistant, not broad, slightly ventricose, *pallid ochraceous at first*, then rusty brownish, white-fimbriate on edge. STEM 3-5 cm. long, 1-3.5 mm. thick, slender, equal or slightly thickened at base, *hollow, fibrillose or scaly below the annulus*, white-mealy at apex, concolor or pallid. ANNULUS distant, membranous, *persistent*, beautifully striate on upper side, whitish beneath. CYSTIDIA none; club-shaped sterile cells on edge of gills. SPORES elliptical, 10-12 x 5-6 micr., smooth. ODOR and TASTE none.

Solitary or gregarious. On very decayed wood or on the ground in wet places. In mixed or frondose woods. Throughout the State.

Bay View, Marquette, New Richmond and Ann Arbor. August-October. Frequent.

This species is closely related and perhaps identical with either *P. togularis* Bull, or *P. blattaria* Fr. At the present time it seems impossible to determine its status with certainty. The figures of *P. togularis* by Fries and Ricken show the median annulus and the striations on its upper surface as in our species, and in most other respects they illustrate our plant well. Ricken also gives the spores of *P. togularis* as 10-12 x 5-6 micr. Other European authors give smaller spores. Fries changed his conception of *P. togularis* as expressed in Systema and Epicrisis so that in Hymen. Europ. he omits the hygrophanous character; Ricken, however, says it is hygrophanous, and both authors indicate that it is striatulate on the cap when moist. As to *P. blattaria*, Fries considered it a smaller plant, more ferruginous in color and with almost free gills. Ricken distinguishes it

from *P. togularis* by the nature of the annulus which he says is striate also and at length falls to pieces. He also describes the plant as Galera-like, a comparison which Fries had made of *P. togularis*. Ricken assigns spores to *P. blattaria* measuring 7-8x3-4 micr., Massee gives them smaller yet, while Schroeter and Britzelmayr say they measure 9-11 x 5 micr. With such data not much can be decided. Harper has reported and described the two species, and gives the spore-sizes the reverse of those of Ricken. The markedly rugose surface of the pileus of the American plant described above as *P. rugosa* Pk., the expanded pileus, the colors and the spore size, would indicate that it had better be kept distinct at present.

Illustrations: of *P. togularis* Bull.
Fries, Icones, Pl. 104, Fig. 4.
Gillet, Champignons de France, No. 530.
Patouillard, Tab. Analyt., No. 339.
Ricken, Blätterpilze, Pl. 56, Fig. 5.
Harper, Wis. Acad. Sci. Trans., Vol. 17, Pl. 59 (as *P. blattaria*).

A variety or closely related species of the same stature and appearance as *P. rugosa* was found in low, rich woods. Its PILEUS was hygrophanous, chestnut-brown (moist), pale-alutaceous (dry), never striate nor rugulose, glabrous. GILLS rounded behind, adnate, *pallid at first* (not ochraceous), then pale brown, moderately narrow, close. STEM bulbilate, hollow, innately fibrillose-striatulate, pallid or brownish, subfragile. ANNULUS apical, *subpersistent*, soft-floccose-fibrillose, white. SPORES 7-8x4 micr., smooth. It seemed intermediate between the genera Pholiota and Naucoria.

308. Pholiota mycenoides Fr.

Sys. Myc., 1821.

Illustration: Cooke, Ill., Plate 503.

"PILEUS 2-3 cm. broad, membranaceus, campanulate then convex, *everywhere striate*, hygrophanous, ferruginous-tawny or pale tan when dry. GILLS adnate, rather distant, narrow, ferruginous. STEM 3-4 cm. long, 2 mm. thick, glabrous, ferruginous, hollow. ANNULUS superior, membranaceous, white. SPORES 8-10x5-6 micr.

Among moss in swamps."

This species was reported by Longyear in 4th Rep. Mich. Acad. Sci. as having been found by Beardslee in Montmorency county. The description is adapted from Massee.

Cortinarius Fr.

(From the Latin, *Cortina, a curtain*, referring to the cobwebby threads which hide the gills of the young plants.)

Cinnamon-spored or rusty-brown-spored. Stem fleshy and continuous with the pileus. *When young provided with a cobwebby cortina* which connects the edge of the pileus with the stem; often also with a universal veil which on collapsing leaves an annulus, sub-annular rings, a sheath or shreds on the stem. Gills persistent, dry, adnate becoming emarginate, changing color during process of maturing, at length powdery with the clinging dark brown spores.

Putrescent, terrestrial, mostly forest mushrooms, composing a most natural group. The caps are often brightly colored and when young the gills of different species also assume various shades of color. The genus is divided into seven subgenera: Myxacium, Bulbopodium, Phlegmacium, Inoloma, Dermocybe, Telamonia and Hydrocybe. Of these the first three have a viscid pileus, and in this respect approach the genus Hebeloma. The latter is however, separable by its paler, alutaceus spores and fibrillose or absent cortina. The subgenera Inoloma and Dermocybe agree with the genus Inocybe in having innately silky or scaly dry caps, but Inocybe differs in having paler spores, a more scanty, fibrillose-cortina and often with verrucose-pointed cystidia on the gills. The genus Flammula often has rusty spores, but is lignicolous. Many of the species are known to be *edible* and while no information is at hand that any of them are poisonous, the flavor of many of them is insipid or disagreeable, and others have as yet not been reported on.

The species of the genus Cortinarius are very numerous. Peck has described 83 species from North America. Fries, in his last complete work on the Hymenomycetes of Europe, records 234 species; of these he found a large majority in Sweden, where he had exceptional opportunity to study them by reason of the astonishing number of species and individuals which occur in that anoist and cool climate. To quote from his Epicrisis (1836-38), "No genus is more natural nor more sharply distinguished from others. Beginners alone would confuse them with the brown-spored genera, while experienced persons can distinguish them by their habit at the first glance. But although it is a great natural group, the species are so intimately related among themselves that to distinguish the separate ones is almost to be despaired of. The large mass and number of individuals compose at least half of the Agarics of Northern forests"; and in Systema Mycologia (1821), "I did not admit even one-half the number that I had met by diligent search, and only included those that agreed in their primary characters; very many were disregarded. In the young stage and immediately after a rain, they are quite easily distinguished. After becoming discolored and in age or dry weather even the large, well-marked species are scarcely separable."

The PILEUS may be viscid, dry, silky or scaly, or hygrophanous, and these characters are used in the separation of the subgenera. The color is often very attractive: violet, purple, red, yellow, green or shades of brown, but in most cases it fades into some shade of brown or tan in age. The size varies greatly; in the subgenera Inoloma, Bulbopodium and Phlegmacium the plants are usually of large size. In Dermocybe and Hydrocybe they are rather small. Telamonia is

represented by all sizes. The GILLS are, next to the cortina, the most definite means of recognizing the genus. When young they may be whitish, yellow, green or olive, blue, violet, purple, red or shades of brown. As they mature, they become discolored from the cinnamon or rusty-brown spores which cling to the surface for some time, often producing a powdery appearance. The color of the young gills must be known in order to determine a species correctly, and in the following pages the subgenera are divided into subsections on this basis. The mature gills often show traces of the original color, especially if the spores are removed, and this makes it possible at times to determine even a fully matured plant especially when other characteristic marks are still present. The attachment of the gills varies somewhat but in nearly all species they are at length emarginate-adnate or emarginate-adnexed; a few species have the gills obscurely subdecurrent. Many species are well marked by crowded, subdistant or distant gills and frequently their width can be used to discriminate between them. The edge is scarcely ever sufficiently constant for use in diagnosis; sometimes it is very entire, sometimes much eroded or minutely serratulate, but only a few species show well developed projecting sterile cells. The trama is of the "parallel" type. The STEM is used as a means of distinguishing some of the subgenera. When it is at first covered by the glutinous veil, the plant is referable to the subgenus Myxacium. When it has a sharply defined marginate bulb, the subgenus Bulbopodium is indicated. In the larger forms of the subgenera Phlegmacium, Inoloma and Telamonia the stem is often clavate-bulbous. The veil-remnants on the stem of the subgenus Telamonia separates that hygrophanous group from Hydrocybe. Its texture is most often spongy-fleshy in the large forms, while in the smaller ones, especially of the subgenus Hydrocybe the external layer is rigid and subcartilaginous. The tissue of the stem is continuous with that of the pileus, and hence the stem is not separable from it as in Lepiota, etc.

The CORTINA is composed of loose silky hyphae, almost from the time it is discernible, and forms a "cobwebby" curtain in front of, i. e., below the gills. The threads of this curtain are inserted for some distance vertically along the stern and converge in a wedge-shaped manner toward the edge of the pileus and then coalesce with the tissue of the upper surface of the pileus. In some species it is very copious and as the pileus expands the cortina collapses on the upper portion of the stem forming a loose, fringe-like spurious ring which often becomes discolored by the falling spores. Sometimes it is more scanty and disappears early or is noticeable in the expanded plant only as a slight annular stain on the stem. In other cases, the margin of the pileus as it spreads carries with it the silky threads which remain as decorative shreds near its edge; in this case the margin is at first definitely incurved and the cortina is attached at a little distance from the incurved edge. Although the very young plant shows that the hyphae of the cortina and the surface of the pileus are continuous, as it matures the tissue along the margin of the pileus is differentiated and becomes looser so as to appear superficial along the margin.

Lying adjacent to the cortina and continuous with it on its outer side, is a thin layer of tissue, more intimately woven together—sometimes almost membranous—which is called the *Universal Veil*. It is present in a more or less well-developed form in some of the species of all the subgenera except Hydrocybe. In Myxacium it is composed of gelatinous hyphae and when moist becomes viscid or glutinous; it envelops the young button below and becomes continuous with the gelatinous layer of the pileus. In Bulbopodium and Phlegmacium it is scarcely or not at all gelatinous but fuses above with the gelatinous and similarly colored pellicle of the pileus. In the other subgenera, when present, it leaves shreds, annular zones or a sheath on the stem and is dry and silky-woven. Further descriptions of this veil are given under the subgenera.

The SPORES are of great diagnostic value in this genus, since in the various species they differ sufficiently for use as a check to distinguish forms otherwise very similar. Some authors (Ricken, Die Blätterpilze) have attempted to separate the sections of some of the subgenera on spore-characters. The marks which are useful are size, shape and the structure of the epispore. The color, although not entirely uniform, cannot be used effectively. Their size is most important. "There is no doubt that the size of the spores of a single individual varies, and that it varies when there is every evidence that the spores are mature. But that they vary within limits which are sufficiently constant, any one can determine for himself." (Kauffman, Bull. Torr. Bot. Club., Vol. 32, p. 313, 1905.) Some species have relatively large spores, 12-15 micr. or more in length, others are small, 3-5 micr. in diam. Their shape is elliptical, often almond-shaped (i. e. inequilateral), oval or spherical. The surface is usually covered with tubercular, sometimes spiny processes, which are very marked in some species but are scarcely evident in others; under the ordinary high power objective of the microscope some appear to be quite smooth, unless very highly magnified. In using this as a specific character, one must never lose sight of the fact that when young the epispore is smooth. It is, therefore, necessary to compare the spore-sizes given in the text with spores which are mature. The BASIDIA are also quite constant in size and shape for any species, and in such species as I have measured, their size is given.

The TASTE of some species marks them clearly. In *C. vibratilis*, *C. iodioides*, *C. elegantoides*, *C. infractus* and *C. ochroleucus* the surface of the pileus or of its flesh has a distinctly bitter taste; a few others are sometimes slightly bitterish. Most Cortinarii have a mild or merely fungoid taste. The European *C. damascenus* is said to have an acrid taste. The ODOR is occasionally like that of radish when the plant is crushed, e. g.; *C. annulatus*, *C. armillatus*, *C. evernius*, *C. intrusus*, *etc*., but in the majority of species no special odor is noticeable.

The HABITAT is mostly the forest floor where the rich humus soil is abundant and moist. Like many other

species of Agarics they thrive best on a substratum capable of retaining moisture, i. ev a forest with either a clay subsoil, or with dense masses of humus, mosses or fallen leaves. In forests of pine, hemlock and spruce, in ravines of beech, oak and maple, where the moisture is persistent or the hillside springy, one usually finds them abundantly. Many of them have a tendency to form mycorhiza on the roots of forest trees; in Michigan I have found *C. rubipes*, and *C. elegantior* var. to be thus associated with living roots. They often occur in troops of closely aggregated individuals, sometimes in arcs, pushing up the leaves in late fall like windrows; especially is this true of some of the subgenus Bulbopodium, like *C. glaucopus* and *C. aggregatus*. Others occur in tufts of several individuals or are scattered here and there in limited areas, while not a few are found solitary, especially in dry weather. The subgenera Telomonia and Hydrocybe are much more frequent in northern conifer forests, Phlegmaciuin and Bulbopodium in frondose woods farther south.

The following key and text of this genus includes not only Michigan species, but all the Cortinarii of the northeastern portion of the United States which have been described or which I have seen. Since I have made a more extended study of this genus than of any other, and since Dr. Peck has not monographed this group, it seemed advisable to do this with the material now at hand. Dr. Peck's type specimens have been carefully examined, and during several week's stay in Sweden, near Stockholm, some fifty species of Cortinarii were collected and studied, most of which were recognizable as Friesian species. In addition a thorough study was made of Fries' unpublished plates,—most excellent figures in color—which are deposited in the Royal Museum at Stockholm; these plates illustrate practically all the species described by Fries in his Monograph of Cortinarius and his other works. I have, therefore, included 152 species, 90 of which I have collected in Michigan, and in the latter case the description is always made from Michigan plants. Many others, doubtless definite and distinct species, have not been identified, either because of few collections or because no young stages were found. The work has been based as much as possible on the thorough foundation established for this group by Fries, with the exception that one subgenus, viz. Bulbopodium, has been segregated along lines already recognized by Fries himself. This name was proposed by Earle (N. Y. Bot. Gard. Bull., Vol. 5, p. 441) who raised the .subsection Scauri, of Fries, to the rank of genus. For the sake of uniformity in the present report and since there is no special practical gain in breaking up such a natural genus as Cortinarius, it seemed preferable to raise the subsections of Fries only to subgeneric rank. The descriptions of the species of Peck which I have not collected are given in quotations, with such changes as adapt them to the plan of the report; in some cases additions were made from an examination of the types in order to facilitate their further study. In the key an effort has been made to avoid the use of the hygrophanous character wherever possible, so that dry weather forms may be more easily run down.

Key to the Species

(A) Pileus with a gelatinous cuticle, always more or less viscid or glutinous when moist.
(a) Stem at base with a marginate-depressed bulb. (Bulbopodium.)
(b) Pileus normally between 3 and 5 cm. broad.
(c) In green-houses, mushroom beds, etc.; gills whitish to ochraceous at first; pileus pale alutaceous. 344. *C. intrusus* Pk.
(cc) In woods.
(d) Spores 12-14 x 6-7 micr.; pileus, gills and stem violaceous. 332. *C. caerulescens* Fr.
(dd) Spores 8-9 x 5 micr.; pileus not blue.
(e) Pileus ochre-yellow to citron; gills violaceous at first; bulb shallow. 320. *C. calochrous* Fr.
(ee) Pileus olivaceous-brown; gills olivaceous at first; stem violaceous-blue. 322. *C. herpeticus* Fr.
(bb) Pileus normally between 5 and 12 cm. broad. (See also *C. herpeticus*.)
(c) In some part or wholly with violet blue or purple shades.
(d) Gills white at first, never violaceous, lower part of stem yellow. 334. *C. caesius* Clements.
(dd) Gills violaceous or purplish at first.
(e) Pileus deep purple when young.
(f) Flesh or gills changing to purple when cut or bruised.
(g) Spores spherical; pileus 8-16 cm. broad. 330. *C. sphaerosperma* sp. nov.
(gg) Spores elliptical; pileus 5-8 cm. broad.
(h) Stem solid. 327. *C. purpurascens* Fr.
(hh) Stem stuffed or hollow. 328. *C. subpurpurascens* Fr.
(ff) Flesh and gills not changing to purplish when bruised; mature pileus smoky-olive-gray and streaked; young pileus blue. 329. *C. aggregatus* sp. nov.

(ee) Pileus not purple.
(f) Whole plant pale violaceous to violaceous-white.
(g) Spores 8-10.5 micr. long; pileus and stem tinged lilaceous. 333. *C. michiganensis* Kauff.
(gg) Spores 10-12 micr. long; bulb with remains of a white universal veil. 324. *C. caesiocyaneus* Britz.
(ff) Pileus not entirely violaceous.
(g) Spores 13-16 micr. long; pileus yellow to tawny; stem violet. 319. *C. atkinsonianus* Kauff.
(gg) Spores 10-12 micr. long.
(h) Pileus dull tawny-red; stem pallid, scarcely lilac-violaceous. 331. *C. purpurcophyllus* sp. nov.
(hh) Pileus violet-buff to ochraceous; stem violaceous-blue; cortina copious. 321. *C. velicopia* sp. nov.
(cc) Without violet or purplish color.
(d) Gills with green color at first. 337. *C. virentophyllus* sp. nov.
(dd) Gills not green.
(e) Pileus light red to vermillion at first.
(f) Gills caesius (bluish-gray) at first; spores 15-18 micr. long. 325. *C. rubeus* sp. nov.
(ff) Gills whitish at first; spores 10-12.5 micr. long. 342. *C. sublateritius* Pk.
(ee) Pileus not red.
(f) Gills at first yellow; pileus yellow tawny, rusty or orange-fulvous.
(g) Pileus coarsely corrugate; stem long, 7-12 cm. 341. *C. corrugatus* Pk.
(gg) Pileus not corrugate; stem short, stout, with broad bulb.
(h) Taste of flesh slowly bitter; spores 15-19 micr. long. 326. *C. elegantioides* sp. nov.
(hh) Taste not bitter; spores smaller.
(i) Pileus, etc., pale sulphur-yellow. 339. *C. fulmineus* var. *sulphureus* var. nov.
(ii) Pileus tawny-yellow, orange-fulvous, etc., large.
(k) Spores 12-14 micr. long; bulb of stem scarcely depressed. 340. *C. elegantior* Fr. var.
(kk) Spores 9-12 micr. long, bulb broad, much depressed. 338. *C. fulgens* Fr.
(ff) Gills not yellow at first.
(g) Gills caesius or pallid-bluish at first; flesh of pileus at first whitish.
(h) Pileus fulvous-streaked on a steel-gray ground-color; spores 8-9 micr. long; stem at length yellowish-stained. 336. *C. glaucopus* Fr.
(hh) Pileus not streaked, pallid-alutaceous to russet-tan; spores 10-12 micr. long; stem whitish. 335. *C. aleuriosmus* Maire var.
(gg) Gills at first whitish.
(h) Pileus pale olivaceous-straw color; bulb small. 323. *C. olivacco-stramineus* Kauff.
(hh) Pileus without any olive tint.
(i) Pileus hoary-canescent on an ochraceous-buff to rusty ground-color. Spores 7-9 micr. long. 343. *C. multiformis* Fr.
(ii) Pileus and stem white; spores 9-11 micr. long. 345. *C. albidus* Pk.
(aa) Stem equal, clavate or bulbous; bulb not marginate.
(b) Stem viscid or glutinous from the universal veil. (Myxacium.)
(c) Stem cylindrical, 6-13 cm. long; spores large, more than 10 micr. long.

(d) Stem marked by floccose, concentric interrupted rings; never violaceous. 309. *C. maculatus* Fr.
(dd) Stem scarcely marked by thin adnate patches, or silky-fibrillose.
(e) Stem at first violaceous, lavender or lilac.
(f) Gills at first violaceous; spores 12-15 micr. long. 310. *C. cylindripes* Knuff.
(ff) Gills at first pallid or whitish; spores 15-18 micr. long, stem 5-7 cm. long. 311. *C. splendidus* Pk. 311. *C. elatior pallidifolius* Pk.
(ee) Stem white or pallid.
(f) Pileus tawny-orange; gills yellowish at first; spores 14-17 micr. long. 311. *C. muscigenus* Pk.
(ff) Pileus yellowish-brown; gills creamy-yellow at first; spores 10-12.5 micr. long. 312. *C. submarginalis* Pk.
(cc) Stem subequal to clavate, 3-7 cm. long; spores less than 10 micr. long (except *C. heliotropicus*).
(d) Taste of surface of pileus bitter.
(e) Pileus yellow; stem pure white. 314. *C. vibratilis* Fr.
(ee) Pileus lavender-violet; stem white, tinged violet in spots. 317. *C. iodcoides* sp. nov.
(dd) Taste not at all bitter.
(e) Pileus violet to purplish.
(f) Spores spherical. 316. *C. salor* Fr.
(ff) Spores elliptical.
(g) Spores 8-10 micr. long, odor not of radish. 316. *C. iodes* B. & C.
(gg) Spores 10-12.5 micr. long; odor of radish. 318. *C. heliotropicus* Pk.
(ee) Pileus not violet nor purple; spores globose.
(f) Pileus pale yellow; gills violet-tinged. 313. *C. sphoerosporus* Pk. (See also *C. berlesianus* (Pk.) Sacc.
(ff) Pileus and gills grayish to drab, stem dingy-white. 315. *C. sterilis* Kauff.
(bb) Stem not viscid (Phlegmacium).
(c) Stem annulate or spotted with brown or ochraceous scales.
(d) Pileus 5-10 cm. broad, yellow and ochraceous; stem stout, annulate. 346. *C. triumphans* Fr.
(dd) Pileus 3-6 cm. broad, bay-red; stem spotted with brown scales. 347. *C. maculipes* Pk.
(cc) Stem not spotted nor annulate.
(d) Stem very long, 10-15 cm., (8-10 mm. thick).
(e) Stem round-bulbous at base; on sphagnum; gills and stem at first tinged violet. 348. *C. sphagnophilus* Pk.
(ee) Stem not bulbous, subequal.
(f) Spores subsphoeroid; pileus yellowish-ochraceous. 357. *C. longipes* Pk.
(ff) Spores elliptical; pileus reddish-yellow. 361. *C. ophiopus* Pk.
(dd) Stem not remarkably long, 4-10 cm.
(e) Pileus corrugated, pale ochre; gills violaceous at first; stem subequal. 352. *C. copakensis* Pk.
(ee) Pileus not corrugated.
(f) Pileus reddish to tawny-orange; stem stout, clavate-bulbous; nowhere violet. 360. *C. coloratus* Pk.
(ff) Pileus not reddish.
(g) Pileus olive to smoky-brownish or brownish-ochraceous.
(h) Spores subglobose.
(i) Taste of surface of pileus bitter; plant sooty-olive. 355. *C. infractus* Fr.
(ii) Not bitter; pileus brownish-ochraceous; gills olivaceous. 358. *C. glutinosus* Pk.
(hh) Taste not bitter; spores elliptical.
(i) Gills dark olivaceous at first; stem tinged violaceous. 356. *C. olivaceus* Pk.
(ii) Gills yellow at first; stem whitish. 359. *C. luteofuscous* Pk.
(gg) Pileus grayish to buff color or yellow.
(h) Pileus virgate, becoming yellowish in age; gills violaceous at first.
(i) Stem oval-bulbous at base; at first densely fibrillose. 349. *C. lanatipes* Pk.
(ii) Stem equal; pileus dark gray. 351. *C. lapidophilus* Pk.
(hh) Pileus not virgate, pale.
(i) Stem stout, clavate-bulbous.
(k) Pileus yellow; gills at first caesius. 350. *C. claricolor* Fr.
(kk) Pileus buff; gills pale violaceous. 353. *C. albidipes* Pk.
(ii) Stem 3-7 mm. thick, equal.
(k) Spores subglobose; gills caesius at first. 354. *C. decoloratus* Fr.
(kk) Spores elliptical; gills whitish at first. 362. *C. communis* Pk.
(AA) Cuticle of pileus not composed of gelatinous hyphae, hence neither viscid nor glutinous.
(a) Pileus (and sometimes stem) distinctly scaly, usually large (except *C. flexipes*).
(b) Scales pink-red to cinnabar-red, present on cap and stem; gills whitish or pallid at first. 368. *C. bolaris* Fr.
(bb) Without red-scales on pileus.
(c) Stem marked by cinnabar-red zones; pileus tawny-rufescent; gills pale brown. 422. *C. armillatus* Fr.
(cc) Stem without red bands.
(d) Pileus, gills and stem persistently dark violet; stem long and stout; spores 12-16 micr. long; in conifer forests. 375. *C. violaceus* Fr.
(dd) Pileus not violet.
(e) Pileus some shade of yellow.
(f) Stem arising from a white mycelium; pileus and stem tawny-yellow. 369. *C. annulatus* Pk.
(ff) Stem arising from a yellow mycelium; pileus and stem saffron to chrome-yellow. 371. *C. crococolor* Kauff.
(ee) Pileus brown, umber or chocolate-color.
(f) Stem provided above with a band-like annulus; whole plant soon chocolate-color. 366. *C. squamulosus* Pk.
(ff) Stem squarrose-scaly, brown to umber.
(g) Gills at first lilaceous or purplish; spores subglobose, 5-7 micr. 365. *C. pholidens* Fr.
(gg) Gills at first fulvous-brown; spores elliptical, 12x6 micr. 374. *C. squarrosus* Clem.
(aa) Pileus not distinctly scaly, rarely fibrillose or tomentose.
(b) Wholly or in part violet, purplish or lilaceous, at least the gills when young.
(c) Pileus normally large, 5-10 cm. broad.
(d) Gills narrow and close.
(e) Pileus, gills and stem unicolorus, pale violaceous; spores 8-10 micr. long. 377. *C. argentatus* Fr. var.
(ee) Pileus brownish-lilac; stem whitish, spores 12-15 micr. long. 381. *C. braendlei* Pk.

(dd) Gills broad, subdistant.
(e) Pileus, gills and stem unicolorous, lilaceous; stem clavate-bulbous. 376. *C. lilacinus* Pk.
(ee) Pileus and gills not unicolorous.
(f) Stem peronate or annulate from the whitish universal veil.
(g) Gills at first dull deep purple; pileus grayish-buff at first; spores 9-10.5 micr. long. 364. *C. subpulchrifolius* sp. nov.
(gg) Gills at first pallid, lilaceous or pale lavender.
(h) Pileus densely fibrillose-tomentose; gills pallid at first; stem violaceous. 412. *C. plumiger* Fr.
(hh) Pileus subglabrous.
(i) Pileus hygrophanous, purplish-umber, fading to pinkish-buff. 414. *C. umidicola* Kauff.
(ii) Pileus not hygrophanous, violaceous-fulvous to rusty-fulvous, micaceous-glistening. 391. *C. canimus* Fr.
(ff) Stem not peronate, pileus reddish-gray; gills purple. 379. *C. pulchrifolius* Pk.
(cc) Pileus medium or small in size.
(d) Pileus 3-7 cm. broad (medium).
(e) Stem distinctly peronate.
(f) Pileus and stem silvery violaceous-white; stem clavate. 363. *C. alboviolaceus* Fr.
(ff) Pileus some shade of dark purplish brown; gills smoky-purplish.
(g) Stem clavate-bulbous, stout; spores 8-11 micr. long. 411. *C. torvus* Fr.
(gg) Stem equal or subattenuate downwards; spores 7-8 micr. long. 415. *C. scutulatus* Fr.
(ee) Stem not peronate.
(f) Stem marked by reddish, subannular scales, subequal, 4-9 cm. long. 393. *C. spilomeus* Fr.
(ff) Stem not variegated with red.
(g) Stem long or much elongated, 8-18 cm. long, marked by remnants of veil.
(h) Pileus grayish-tawny, dry; stem thickened toward base; universal veil violaceous. 367. *C. erraticus* Pk.
(hh) Pileus at first violet-fuscous, hygrophanous, fading; stem intense violet at first, attenuated below; veil whitish. 413. *C. evernius* Fr.
(gg) Stem rather short, 3-7 cm. long.
(h) Stem rather stout, 7-12 mm. thick or more.
(i) Bulb of stem obliquely marginate-depressed; gills at first heliotrope or deep violet. 378. *C. obliquus* Pk.
(ii) Bulb if present not marginate; stem bulbous, clavate or tapering upward.
(k) Pileus reddish-ashy, not hygrophanous; stem with an oval bulb. 382. *C. rubrocinereus* Pk.
(kk) Pileus paler, without any reddish tinge; stem not round-bulbous.
(l) Pileus hygrophanous.
(m) Stem marked with remnants of a universal veil. 416. *C. deceptivus* Kauff.
(mm) Stem silky at first, glabrescent. 441. *C. saturninus* Fr. var.
(ll) Pileus not hygrophanous; gills and flesh at first only slightly violaceous. 392. *C. anomolus* Fr.
(hh) Stem smaller, 4-7 mm. thick.
(i) Pileus, stem and gills unicolorous, pale violaceous-drab; stem abruptly bulbillate at base. 394. *C. subtabularis* sp. nov.
(ii) Pileus not violet; gills, flesh and apex of stem violaceous at first.
(k) Pileus hygrophanous.
(l) Pileus chestnut color when moist; stem solid. 440. *C. imbutus* Fr.
(ll) Pileus sooty-brown to olive-gray; in pine woods. 442. *C. livor* Fr.
(kk) Pileus not hygrophanous.
(l) Pileus pale brownish-tan; stem solid. 383. *C. clintonianus* Pk.
(ll) Pileus dingy-white to clay-color; stem hollow, very short. 395. *C. brevissimus* Pk.
(dd) Pileus small, 1-3 cm. broad.
(e) Pileus at first conical, blackish-brown.
(f) Stem subannulate, slender; spores 6-7.5 x 3-4 micr. 419. *C. subflexipes* Pk.
(ff) Stem not annulate; spores 7-9 x 5-6 micr. 456. *C. erythrinus* Fr.
(ee) Pileus campanulate-convex, chestnut-color.
(f) Stem 4-6 mm. thick. 443. *C. castaneus* Fr.
(ff) Stem 1-2 mm. thick. 455. *C. fuscoviolaceus* Pk.
(bb) No violet, purple nor lilac colors present.
(c) Pileus large, 5-10 cm. broad.
(d) Bulb of stem oval-clavate and dark brick-red; pileus hygrophanous, rufous-brown. 421. *C. rubripes* Kauff.
(dd) Stem not red.
(e) Pileus with a rufous tinge either when fresh or on drying.
(f) Pileus hygrophanous, very glabrous, stem pallid-whitish, subclavate. 444. *C. armeniacus* Fr. 448. *C. glabrellus* Kauff.
(ff) Pileus dry, reddish to brownish-orange, stem yellow or concolor, long and equal. 387. *C. whitei* Pk.
(ee) Pileus without reddish tinge.
(f) Pileus creamy-yellow, yellow, ochraceous, orange-yellow or rusty-yellow.
(g) Stem peronate by a close-appressed sheath.
(h) Sheath pale tawny-yellowish; pileus tawny-yellow, often scaly on disk. 369. *C. annulatus* Pk.
(hh) Sheath whitish; pileus pale.
(i) Pileus creamy-buff, large; spores subglobose. 370. *C. flavifolius* Pk.
(ii) Pileus pale ochraceous; spores elliptical. 372. *C. ochraceus* Pk.
(gg) Stem not sheathed.
(h) Pileus hygrophanous, dark ochraceous; stem almost equal, subannulate. 423. *C. morrisii* Pk.
(hh) Pileus not hygrophanous.
(i) Pileus pale yellow to buff; stem white, caespitose. 388. *C. caespitosus* Pk.
(ii) Pileus and stem chrome-yellow to rusty-yellow.
(k) Pileus streaked with rusty fibrils; stem with an oval bulb. 385. *C. autumnalis* Pk.
(kk) Pileus not streaked; stem clavate, streaked lengthwise. 384. *C. callisteus* Fr.
(ff) Pileus neither reddish nor yellow.
(g) Stem white or whitish.
(h) Pileus hygrophanous, brown when moist.

(i) Pileus conic-campanulate; stem clavate; silky-fibrillose. 446. *C.* sp.
(ii) Pileus convex-plane; stem tapering down, glabrous. 445. *C. duracinus* Fr. var.
(hh) Pileus not hygrophanous, pale gray; stem clavate-bulbous.
(i) Stem peronate by a white sheath. 373. *C. canescens* Pk.
(ii) Stem not peronate.
(k) Spores 7-8 micr. long; gills watery-cinnamon at first. 386. *C. catskillensis* Pk.
(kk) Spores 10-12 micr. long; gills at first pallid. 418. *C. griseus* Pk.
(gg) Stem brown or fuscescent.
(h) Stem annulate by a white band; spores 10-12 micr. long. 432. *C. brunneofulvus* Fr.
(hh) Stem annulate at times by a fuscous zone; spores 8-9 micr. long. 433. *C. brunneus* Fr.
(cc) Pileus medium size or small, between 1 and 5 cm.
(d) Stem not very slender, more than 3 mm. thick, sometimes clavate-bulbous at first.
(e) Gills blood-red or cinnabar-red; stem equal, not stout.
(f) Pileus and stem tawny-yellow to cinnamon-yellow. 408. *C. semisanguineus* Fr.
(ff) Pileus and stem blood-red to cinnabar.
(g) Pileus rather broader than the length of the stem; spores 8-9 x 5-5.5 micr., in oak woods. 409. *C. cinnabarinus* Fr.
(gg) Pileus narrow, stem longer; spores 6-7 x 4 micr.; on moss, conifer regions. 409b. *C. sanguineus* Fr.
(ee) Gills not red.
(f) Stem clavate, subclavate or at least tapering upward, often clavate-bulbous at first.
(g) Pileus hygrophanous.
(h) Pileus conic-campanulate at first; on mosses.
(i) Spores 10-12 x 6 micr.; stem long, cylindrical, pallid to fuscescent. 390. *C. gracilis* Pk.
(ii) Spores 7-8.5 x 5-6 micr.; stem subzonate from the veil; wholly fawn-brownish. 424. *C. mammosus* sp. nov.
(hh) Pileus not conic.
(i) Stem distinctly fuscescent, solid, pileus dark fuscous-brown. 451. *C. rubricosus* Fr. var.
(ii) Stem not becoming dark fuscous.
(k) Pileus white-hoary at first on a chestnut-bay-brown ground color. 450. *C. subrigens* sp. nov.
(kk) Not markedly white-hoary at first.
(l) Pileus grayish-umber, with rufous tinge when moist. 447. *C. crugatus* Fr.
(ll) Pileus fuscous-brown, never rufous. 449. *C. privignus* Fr. var.
(gg) Pileus not hygrophanous.
(h) Gills cadmium-yellow; narrow; pileus and stem olivaceous-cinnamon. 402. *C. cinnamomeus* Fr. var.
(hh) Gills pallid or whitish at first.
(i) Pileus whitish, tinged pale yellowish; stem variegated with pallid-yellowish scales. 396 *C. albidifolius* Pk.
(ii) Pileus alutaceous; stem subfibrillose, concolor. 389. *C. modestus* Pk.
(ff) Stem equal, attenuated below or subventricose; not definitely thickened at the base.
(g) Pileus watery-brown, bay-brown or chestnut color when moist.
(h) Gills distant or subdistant, brownish at first.
(i) Stem rather stout, 5-12 mm. thick.
(k) Stem normally annulate by a white zone; gills distant. 434. *C. distans* Pk.
(kk) Stem not annulate.
(l) Stem subequal, gills brown, close to subdistant. 452. *C. uraceus* Fr.
(ll) Stem equal; gills purplish-brown, distant. 417. *C. adustus* Pk.
(ii) Stem 3-5 mm. thick, pallid at first. 453. *C. juberinus* Fr. var.
(hh) Gills close or crowded.
(i) Stem with remnants of the veil; gills brownish-ochre at first; spores 7 x 3.5 micr. 435. *C. nigrellus* Pk.
(ii) Stem subsilky; gills reddish-umber at first; spores 7-10 x 6.5 micr. 454. *C. praepallens* Pk.
(gg) Pileus not dark brown.
(h) Flesh olivaceous to green.
(i) Pileus and stem fulvous to tawny-fulvous. 407. *C. malicorius* Fr.
(ii) Pileus and stem light olive. 410. *C. raphanoides* Fr.
(hh) Flesh not olivaceous-green.
(i) Stem stout, 8-12 mm. thick.
(k) Pileus, gills and stem yellow; spores subglobose. 404. *C. luteus* Pk.
(kk) Pileus, gills and stem white or whitish, taste bitterish. 397. *C. ochroleucus* Fr.
(ii) Stem 3-6 mm. thick.
(k) Stem peronate by a yellow sheath; gills saffron-yellow; pileus rusty color when moist. 425. *C. paludosus* Pk.
(kk) Stem not peronate.
(l) Stem with white annular zone; pileus yellowish, fragile. 426. *C. hinnuleus* Fr. var.
(ll) Stem not annulate.
(m) Pileus hairy, tawny; stem short, pallid to pale tawny. 400. *C. basalis* Pk.
(mm) Pileus silky to appressed tomentulose; gills yellow.
(n) Stem rather long, 4-10 cm.
(o) Pileus obtusely conic-campanulate, rufous-fulvous; with stem streaked with rufous-fulvous fibrils. 403. *C. croceoconus* Fr.
(oo) Pileus campanulate-convex, yellowish-cinnamon, tawny, etc., stem chrome-yellow. 401. *C. cinnamomeus* Fr.
(nn) Stem short, 2-4 cm. long.
(o) Spores 10-12.5 micr. long; pileus cinnamon-brown; odor of radish. 405. *C. aurcifolius* Pk.
(oo) Spores 6-7 micr. long; pileus cinnamon; gills saffron-yellow to orange. 406. *C. croccofolius* Pk.

(dd) Stem slender, 1-3.5 mm. thick.
(e) Pileus conical, then campanulate.
(f) Pileus fibrillose-hairy, fuscous to umber.
(g) Stem slender, with delicate white zones, fuscescent.
(h) Spores 10-12 x 5-6.5 micr. 429. *C. iliopodius* Fr.
(hh) Spores 6-8 x 4-5 micr. 439. *C. paleaceus* Fr.
(gg) Stem short annulate by single median whitish zone, fuscescent. 431. *C. impolitus* sp. nov.
(ff) Pileus glabrous, or soon glabrous.
(g) Pileus not hygrophanous, chestnut color; spores large, 15-16 micr. long. 398. *C. sericipes* Pk.
(gg) Pileus hygrophanous, watery-brown, fulvous or chestnut color at first.
(h) Stem attenuated-subrooting, soon rigid, whitish and shining when dry. 459. *C. scandens* Fr.
(hh) Stem equal.
(i) Stem "rubello"-tinged or yellowish at first.
(k) Stem pallid or rufous-tinged; pileus even, with blackish umbo. 457. *C. decipiens* Fr.
(kk) Stem yellowish at first; pileus striate when moist. 462. *C. acutus* Fr.
(ii) Stem not yellowish.
(k) Growing on decayed wood, gills broad; stem cingulate. 460. *C. lignarius* Pk.
(kk) Not on decayed wood.
(l) Gills narrow; pileus pale chestnut color when moist, spores 8-10 micr. long. 461. *C. acutoides* Pk.
(ll) Gills rather broad; pileus watery-cinnamon when moist; spores 7-8 micr. long. 458. *C. leucopus* Fr. var.
(ee) Pileus campanulate-convex to plane.
(f) Pileus canescent with superficial fibrils. 438. *C. hemitrichus* Fr.
(ff) Pileus glabrous, chestnut-brown when moist.
(g) Pileus not hygrophanous, umbo blackish. 399. *C. castanellus* Pk.
(gg) Pileus hygrophanous.
(h) Spores 10-12 micr. long; stem 2-4 cm. long; gills at first yellowish, cream color or whitish. 428. *C. badius* Pk.
(hh) Spores 6-7.5 micr. long.
(i) Gills rufous-cinnamon; stem fuscescent, with whitish median annulus. 436. *C. rigidus* Fr.
(ii) Gills yellowish or yellowish-cinnamon; stem pallid, spotted by subannular, white zones. 427. *C. castaneoides* Pk.

SUBGENUS MYXACIUM: Provided with a glutinous or *viscid* universal veil; pileus and stem becoming polished by the drying of the gluten.

This group corresponds to the subgenus Limacium of the genus Hygrophours. The entire plant when young is covered by a differentiated gelatinous layer which becomes glutinous in moist weather, and which breaks up on the stem so as to leave shreds, patches or rings of various degrees of definiteness. In some species the glutinous remnants on the stem are very thin and subevanescent and not easily made out; in others, e. g. *C. mucifluus*, the thick layer of the universal veil is cracked and torn crosswise, and the resultant bands or rings are rather marked and persistant, while in still other cases the stem is peronately but very thinly sheathed. Because of their great variability, especially in color, which varies with habitat, weather, age, etc., the species of this group have as yet uncertain limits and are differently interpreted by different authors.

309. Cortinarius mucifluus Fr. (EDIBLE)

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 148, Fig. 1.
Cooke, Ill., Pl. 740 (fresh condition).
Cooke, Ill., Pl. 738 (older stage, as *C. collinitus*).
Gillet, Champignons de France, No. 206 (as *C. collinitus*).
Ricken, Die Blätterpilze, Pl. 34, Fig. 1 (as (*C. collinitus*).
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 85 (as *C. collinitus*).
N. Y. State Mus. Rep. 48, Pl. 13, Fig. 1-6 (as *C. collinitus*).
Plate LXIII of this Report.

PILEUS 3-8 cm. broad, at the very first subglobose, then campanulate-convex and margin incurved, finally campanulate-expanded to plane, obtuse, *glutinous when moist*, the gluten derived from the very thick gelatinous pellicle varying in color from whitish when young to *straw-yellow, orange-yellow or tawny-fulvous*, sometimes stained with rusty or sulphur hues, shining when dry. FLESH pallid or stained in age with yellow or rust color. GILLS *at first pallid or grayish-white* (*caesious*), then clay color to rusty-cinnamon, adiiate to subemarginate, medium broad, close. STEM 6-12 cm. long, 7-12 mm. thick, *cylindrical or tapering downward*, rather stout from the first, rigid, spongy-stuffed, at the very first whitish and covered by the thick gelatinous layer of a *universal veil*, which cracks transversely, *forming scaly, thick, sometimes squarrose hands of dried gluten*, especially below, soon becoming discolored and then yellowish, rusty or tawny, terminating above with the discolored cortina in the form of a collapsed ring. SPORES 10-13 x 6-7 micr. (rarely up to 14.5 micr. long), almond-shaped, tuberculate, inequilateral-elliptic, rusty-cinnamon in mass. BASIDIA 4-spored, 36-42 x 9-10 micr. ODOR and TASTE not marked.

Gregarious. In low, rich ground of coniferous or frondose woods, copses, swamps, etc., among mosses or on humus, or rich loam. Throughout the State. August-October. Frequent.

This species is distinguished from all others by its peculiar transversely-banded stem, although often only the lower portion shows this character distinctly. The white *cortina* extends down the stem inside the gelatinous layer as a soft, floccose layer, and when the outer glutinous layer breaks across on drying, the floccose, cortinate layer is exposed and gives the floccose effect to the bands. The young plants often arise deep in the humus, and the stout stem at this time has almost the diameter of the young cap. The gluten on the upper half of the stem, often of most of the part above the substratum, is inclined to dry or dissolve, so that the diffracted-scaly character is found only in the lower protected part. In the young stage the arrangement of the two veils can be easily made out. It is edible but should be peeled before cooking.

This is *Cortinarius collinitus* Fr. of all authors, except of Fries himself. Of this I satisfied myself by an examination of the plates of Fries which are deposited in the Royal Museum at Stockholm, Sweden, and by collections around Upsala and Stockholm. In the persistently moist climate of that region, the thick.rings on the stem develop much more perfectly than with us, and this is well shown by Fries in the published plate in Icones referred to above. Furthermore, there exists in the same collection an unpublished plate by Fries, marked *C. collinitus* Fr., illustrating, in all its stages, a plant frequent in conifer forests around Stockholm. This is very similar to *C. cylindripes* Kauff., differing only in having larger spores. Fries, himself, has brought about the confusion, in his description of the two species. For example, the description accompanying Plate 148, Fig. 1, in Icones, does not apply to those figures, nor does his description of *C. collinitus* in any of his works, apply to the figures of the unpublished plate at Stockholm. Starting with his description of *C. collinitus* in "Systema," where he says the gills are "purpurascens" or "violascens," he gradually changes it in his later works, and in Hymen. Europ. describes them as at first "argillaceous" or "caesious." In Systema the scales are said to be "appressed" to the stem, and his whole diagnosis in the Systema might be interpreted—although somewhat forced— to refer to his unpublished plate. In view of these facts, I have ventured to correct what appears to have become an established error. In the case of the descriptions the matter remains debatable, but there can be no doubt about the plates.

This is a very variable species, and a number of ecological forms migiit be separated. Ricken has discovered two forms with different spore sizes, one which he calls the type has spores 13-15 x 7-8 micr.; the other, which he calls var. *repanda* has spores 11-13 x 6-7 micr. All collections examined by nie, including two of Peck's and several from Ithaca, N. Y., yielded the spore-size given in my description. Two of Peck's collections, from Sand Lake and Catskill Mountains referred to in his 23rd Report, when examined had spores measuring 15-19 x 7-8.5 micr., and in other respects showed that they did not belong here, but are probably close to *C. muscigenus* Pk.

310. Cortinarius cylindripes Kauff.

Bull. Torr. Bot. Club, Vol. 32, p. 321, 1905.

Illustrations: Ibid, Fig. 2, p. 306.
Jour. of Mycology, Vol. 13, p. 36, Pl. 98, 1907.
Mycological Bull., Vol. V, Fig. 244, p. 318, 1907.
Plate LXIV of this Report.

PILEUS 3-7 cm. broad, *very glutinous at first* and shining, later opaque, at the very first lavender, then yellowish with a violaceous tinge, at length brownish-ochraceous, somewhat stained by these colors at various stages, obtusely orbicular when young, then campanulate and expanded, rather small in comparison with the length of the stem, margin incurved and pellucid-striate, surface smooth, *at length longitudinally wrinkled*. FLESH thick on disk, thin elsewhere, *violaceous*, soon sordid-white. GILLS rather broad, at length 5-8 mm., adnate, emarginate, not attenuate in front, *violaceous or lavender* when *young*, becoming pale cinnamon, not crowded, thin, edge serratulate-flocculose and paler, somewhat wrinkled at the sides but not veined. STEM 8-10 cm. long, 5-9 mm. thick, elastic, *remarkably equal, covered by a violaceous, glutinous, universal veil*, which remains as evanescent, adnate patches and at its junction with the partial veil as a slight annulus, smooth or fibrillose-striate at the apex, violaceous to dingy white within, solid stuffed. SPORES *almond-shaped*, rough-tuberculate, inequilateral-elliptic, 12-15 x 6.5-8 micr., dark brown. BASIDIA 40-45 x 10-13 micr., 4-spored, with sterigmata, 5-7 micr. long. ODOR and TASTE not specific.

Gregarious or subcaespitose. On low, rich ground or humus, conifer and frondose woods. Throughout the State. From late July to early October. Frequent.

C. cylindripes usually occurs in considerable numbers where found. Its cylindrical stem is at first a beautiful pale azure-blue, due to the thin universal veil, which fades and leaves whitish thin patches which sometimes disappear. The species corresponds to Fries' species, figured in his unpublished plates at Stockholm and named *C. collinitus*. (See notes under *C. mucifluus*.) Specimens of that species collected in Sweden are in my herbarium and have spores measuring 14-18 micr. long, much larger than in the American form. I consider that species, common around Stockholm, as Fries' original *C. collinitus*. Our species, described above, has violaceous or blue tints just like that one, and as Fries has described no other species to which the Stockholm plants could be referred, the indication is strong that he considered them *C. collinitus*. For the present the difference in the spore size will be sufficient to keep *C. cylindripes* distinct. The violaceous gills, etc., distinguish *C. cylindripes* from both Fries' and Ricken's conception of *C. mucosus*, and from the related species of Peck: *C. muscigenus* Pk., *C. splendidus* Pk., and *C. elatior pallidifolius* Pk.

311. Cortinarius muscigenus Pk.

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

"PILEUS 3-6 crn. broad, at first ovate, then convex, or concave from the recurving of the margin, subumbonate, glabrous, *viscose with a separable pellicle, tawny-orange* and widely striate on the margin when moist, tawny and shining when dry. FLESH dingy white, tinged with yellow. GILLS broad, ventricose, adnate, with a broad, shallow emargination, somewhat rugose on the sides, *yellowish*, becoming cinnamon. STEM 7-10 cm. long, 6-8 mm. thick, elongated, subequal, *viscid*, even, silky, solid, white or whitish." SPORES almond-shaped, rough-tuberculate, 14-17 x 7-9 micr. (rarely up to 18.5 micr. long).

"Mossy ground under balsam trees. Wittenberg Mountains, New York. September."

This species appears to have the stature of *C. cylindripes*, but has larger spores and lacks the violaceous color entirely. The spores of the type specimens are larger than given by Peck in the original description. The color of the pileus is similar to that of *C. mucifluus* Fr.

Cortinarius splendidus Pk. (N. Y. State Mus. Rep. 29, 1878), differs from *C. muscigenus* in smaller size and *violaceous stem*. Its spores are similar, 15-18 x 6-8 micr., larger than given by Peck. The dried type specimens indicate that they are closely allied, and that one is a variety of the other.

Cortinarius elatior pallidifolius Pk. is also probably a variety of *C. muscigenus* Pk. The spores are the same, 15-17.5 x 7.5-9 micr., but *the stem is tinged with lilac*. Both varieties have a shorter stem than *C. muscigenus*, and the caps are said to be pale fuscous, although in the dried specimens they have the same shining, tawny-tan color as in that species. The last variety is described and figured in N. Y. Mus. Rep. 54, 1901.

312. Cortinarius submarginalis Pk.

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

Illustrations: Ibid, Plate L, Fig. 6-10.

"PILEUS 5-10 cm. broad, firm, convex becoming nearly plane, concave by the elevation of the margin, viscid when moist, *yellowish-brown*, generally *a little paler on the rather definite and commonly fibrillose margin*. FLESH whitish. GILLS thin, close, rather broad, adnate, creamy-yellow when young, soon cinnamon. STEM 7-15 cm. long, 8-12 mm. thick, elongated, equal or slightly thickened at the base, solid, silky-fibrillose, *slightly viscid*, whitish or pallid." SPORES almond-shaped, slightly rough, 10-12.5 x 5-6 micr.

"Low moist places in Woods. Bolton, New York. August. The margin is separated from the rest by a definite line, is 6-12 mm. broad and conspicuously fibrillose." The description is adopted from that of Peck.

313. Cortinarius sphærosporus Pk.

N. Y. State Mus. Rep. 26, 1874.

Illustration: Plate LXV of this Report.

PILEUS 3-7 cm. broad, hemispherical-convex then expanded-plane, glabrous, even, *with a thick gelatinous straw-yellow pellicle*, which is glutinous when moist. FLESH thin on margin, *violaceous at first*, soon pallid. GILLS *violaceous at the very first, soon whitish* then cinnamon, adnate-subemarginate, close, rather broad. STEM 5-10 cm. long, 5-8 mm. thick, subclavate or tapering upward, equal above, spongy-stuffed, *glutinous when moist from the thin universal veil, which on drying leaves thin yellowish patches on the lower portion*, apex at first pale violaceous, soon white. SPORES oval-subglobose, slightly rough-punctate, 6-7.5 x 5.5-6.5 micr.

In low, moist woods or swamps. August-September. Coniferous regions. Infrequent.

This species corresponds closely with the European *C. delibutus* Fr. which also has subglobose spores. In the American plant the spores are constantly a little smaller, as shown by two collections from Sweden. In that species the spores measure 7-8.5 x 6-7 micr. Britzelmayr reports under the name *C. delibutus*, a species with spores 14-16 x 6 micr. Such a plant, with all other characters similar to *C. delibutus* Fr., has been collected by me, but not sufficient data are at hand to describe it. It is possible that *C. berlesianus* (Pk.) Sacc. of which the spores of the type specimens measure 7-8 x 6-6.5 micr., is a form of the European *C. delibutus* Fr., but its stem has a rounded bulb.

314. Cortinarius vibratilis Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Plate 744.
Gillet, Champignons de France, No. 256.
Ricken, Blätterpilze, Pl. 35, Fig. 2.

PILEUS 2-5 cm. broad, *surface bitter to the taste*, convex, obtuse, gibbous, *with a glutinous pellicle*, hygrophanous, *yellow, ochre-yellow to fulvous-yellow*, paler when dry, glabrous, even. FLESH soft, thin except disk, white or whitish, *bitter*. GILLS *adnate to slightly subdecurrent* or subemarginate, thin, close, rather narrow, *pallid to pale ochraceous*, then pale ochraceous-cinnamon. STEM 3-7 cm. long, variable in length, 4-10 mm. thick, subclavate or tapering either way, *soft, pure white, clothed when young by a glutinous, hyaline, universal veil* which soon dries, often viscid only at base, soft-stuffed. SPORES narrowly elliptical, almost smooth, 6-7.5 x 4-5 micr. BASIDIA 26-28 x 7 micr., 4-spored. ODOR mild or subaromatic. TASTE of *every part intensely bitter*. CORTINA white.

In conifer and frondose woods, among leaves or humus. Throughout the State. August-September. Infrequent.

The American plant, named *C. amarus* by Peck, does not differ from *C. vibratilis* Fr. as it occurs around Stockholm. The spores, bitter taste of all parts and the hyaline gluten of the universal veil are the same. *C. amarus* Pk. was originally referred to the subgenus Phlegmacium (N. Y. State Mus. Rep. 32, p. 30, 1879) but later, Dr. Peck referred it to its proper position. *C. vibratilis* is distinguished by its pure white stem, pallid gills and yellow cap; the last may take on fulvous or rufous brown hues on the disk. An occasional individual of larger dimensions occurs. The stem varies in length and shape, and in mossy wet places often becomes more elongated. The gluten often drips from the edge of the cap in moist weather and on drying the cap becomes shining. This species might be confused with *C. causticum* Fr., unreported in Michigan, in which only the viscid pellicle of the pileus is bitter. Two other European species, *C. emollitus* Fr. and *C. crystallinus* Fr. possess bitter flesh and somewhat similar colored caps, but they belong to the subgenus Phlegmacium and their stems are not pure white.

315. Cortinarius sterilis Kauff.

Torr. Bot. Club Bull., Vol. 32, 1905.

Illustrations: Ibid, Fig. 1, p. 304.
Jour, of Mycol., Vol. 13, Pl. 96, p. 36, 1907.
Mycol. Bull., Vol. 5, Fig. 242, p. 316, 1907.

PILEUS 1.5-4.5 cm. broad, suborbicular when young then convex-expanded, margin incurved, drab, *drab-gray to olive buff*, even, smooth, *viscid*, somewhat umbonate at times. FLESH white, soft, thin. GILLS relatively broad, 4-6 mm., drab-gray at first, then light-cinnamon, rounded behind, then emarginate, not at all ventricose, rather crowded, edge serratulate and white, later eroded, *provided with sterile cells*. STEM 4-8 cm. long, 4-6 mm. thick, at base up to 10 mm., clavate or tapering upward, solid, spongy, or tapering upward, dingy-white, tinged with light blue toward apex, clothed when fresh with the delicate patches of the *viscid*, universal veil, which is of the same color as the pileus, within pale bluish at apex, white below. SPORES subsphoeroid, almost smooth, 6-7 x 5-6.5 micr. CORTINA white or sordid. '

Gregarious in swamps of cedar, etc. Bay View. August-September. Rare.

The spores and the peculiar color of cap and veil distinguish this species. It has been found only twice, in low, wet, sphagnous or mossy swamps. Its name refers to the sterile cells on the edge of the gills.

316. Cortinarius iodes B. & C.

PILEUS 2-6 cm. broad, campanulate-convex, glabrous, even, *with a tough, viscid, separable pellicle, dark violet to purplish*, at length often yellowish on the disk. FLESH thick on the disk, abruptly thin on the margin, violaceous then paler. GILLS adnate, close, moderately broad, *violaceous at first*, then gray-cinnamon. STEM 5-7 cm. long, equal or clavate-thickened or tapering to either end, 4-8 of 5-15 mm. thick, *viscid*, solid, subfibrillose. CORTINA pale violaceous. SPORES broadly-elliptical, minutely rough-punctate, 8-10 x 6-6.5 micr. TASTE *mild*. ODOR none.

Gregarious or subcaespitose. On the ground in low, wet places in woods. August. Detroit. Infrequent.

This is very similar in color and stature to *C. iodeoides* but lacks the bitter taste of the pellicle of the cap. The color is deeper and the spores are larger than in that species. It appears to be related to the European *C. salor* Fr. which has similar colors but whose spores are truly spherical. It has been received from the eastern part of the United States where it occurs more frequently.

317. Cortinarius iodeoides sp. nov.

Illustration: Plate LXVI of this Report.

PILEUS 2-5 cm. broad, convex then expanded, broadly umbonate to plane, *deep lavender-violet or bluish-violet when young or fresh*, fading to livid-ashy, sometimes faintly yellowish or buff-spotted, *with a bitter pellicle which is glutinous* when moist or young, glabrous, even. FLESH at first pale violaceous, soon white, thin on margin, thickish on disk. GILLS adnate then emarginate, rather narrow, close, pale violaceous, *soon whitish*, at length pale ochraceous-cinnamon. STEM 2-6.5 cm. long, clavate-thickened at base or variously thickened or subeompressed, 4-8 mm. thick, white but *covered when young by the thin, delicately violaceous, glutinous, universal veil*, stuffed, silky or glabrous. SPORES elliptical, almost smooth, 7-7.5 x 4-4.5 micr., pale ferruginous-cinnamon in mass. ODOR none or slight. TASTE of flesh mild, *of pellicle of pileus bitter*.

Subcaespitose or gregarious. Among leaf-mold, often hidden by leaves, in frondose woods of maple, oak, etc. August-October. Ann Arbor, New Richmond. More frequent than the preceding.

This species is easily confused with the preceding, but is clearly distinct because of the bitter surface of the cap which is quickly recognized; and the different spores. A more careful comparison shows slight differences in the colors. It is often hidden by the leaves, especially in the late fall.

318. Cortinarius heliotropicus Pk.

N. Y. State Mus. Bull. 94, 1905.

Illustration: Ibid, Pl. P., Fig. 1-7.

"PILEUS 2.5-6.5 cm. broad, broadly campanulate, convex or nearly plane, fibrillose, *viscid, heliotrope-purple, generally spotted or variegated by yellowish-white spots*. FLESH whitish, thin. GILLS narrow, thin, close, rounded behind, adnexed, *concolorus with the pileus when young*, cinnamon when mature. STEM 3.5-7 cm. long, 4-8 mm. thick, *firm*, solid or spongy within, usually slightly thickened at base, silky-fibrillose, *viscid, whitish and spotted with purple or colored like the pileus*, white within. SPORES 10-12.5 x 5-6 micr., elliptic. TASTE mild or slightly acrid. ODOR slightly of radish.

"In woods. Smithtown, New York. August.

"This is one of the most beautiful species of Cortinarius. In some specimens the spots on the pileus are large or confluent, in others they are almost or entirely absent, but usually they are small and distinct. The purple color of the gills is persistent for some time. In large specimens the margin is sometimes adorned by fibril-lose scales of the veil."

This and the two preceding are all of medium size and beautifully colored. The description and notes are adopted from Peck. This species seems to differ from *C. iodes* mainly in the larger spores and perhaps in taste and color.

SUBGENUS BULBOPODIUM: Stem dry, *at first hidden*, then usually stout, with a thick, abrupt, marginate-depressed bulb, to whose margin is attached the cortina; the universal veil is either manifest or lacking in the young stage. Pileus with a *viscid* pellicle; equally fleshy.

This is the section "Scauri" of Fries. The structure of the bulb and the development of the stem is unique among the Cortinarii, and the group deserves equal rank with the other subgenera. The "button" stage of the young plant consists only of pileus and bulb, the former smaller than and closely pressing on the bulb. The rest of the stem is invisible, since its beginnings are enclosed undeveloped under the pileus. The margin of the pileus rests on the broad bulb and produces the typical, abruptly depressed edge of that body. The cortina extends from the margin of the pileus to the bulb, to whose upper surface it is attached and, during development, is carried up on the lower part of the elongating stem. The universal veil when present envelops the bulb and extends to the surface of the pileus in the form of a thin, slightly woven membrane, which breaks away in a circumscissile manner from the margin of the pileus at an early stage and is only noticeable, after the expansion of the plant, on the exterior of the bulb or where the torn fringes of its upper portion extend above the margin of the bulb and lie against the stem; it is usually of the same color as the surface of the pileus and this shows on the bulb and on the stem immediately above it. Sometimes this veil is slightly gelatinous. Species occur which are intermediate between this and the following subgenus, where the bulb is scarcely depressed or marginate, or where the margin of the pileus almost covers the slight bulb so that the latter is margined only about its base. The stem is never peronate nor annulate by the universal veil in this subgenus. The connection of the margin of the bulb with the cap and the circumscissile manner in which the universal veil breaks across are somewhat similar to the conditions in some Amanitas.

The species of this group are numerous, and many more will probably be found in Michigan. Fries appears to apologize for including and naming so many species under the section Scauri, as witness his remarks under that section in Epicrisis: "An astonishing number of closely related forms, which, although they were all constant, I was ashamed to separate in Sys. Myc., but published them under titles which were much broader. But I am compelled to recognize them lest the limits appear to be arbitrary, since their existence in nature has been verified many times." Not a few others have already been found in the State, but their identity is not yet established.

Section I. Universal veil present.

**Gills, flesh or stem at first violaceous, bluish, or purplish, rarely olivaceous or white.*

319. Cortinarius atkinsonianus Kauff. (EDIBLE)

Bull. Torr. Bot. Club, Vol. 32, p. 324, 1905.

Illustrations: Ibid, Fig. 6, p. 316.
Jour. of Mycol., Vol. 13, Plate 99, p. 36, 1907.
Plate LXVII of this Report.

PILEUS 6-9 cm. broad, convex then expanded, *wax-yellow or flavus at first*, tinted with olivaceous, then alutaceous or reddish-tawny in places, with a *viscid separable pellicle*, glabrous, even. FLESH thick, rather soft, *at first deep violet* or lavender, slowly fading. GILLS adnate becoming slightly sinuate, rather narrow, width uniform, *deep violet or purplish at first*, edge sometimes olivaceous-yellowish, at length cinnamon. STEM 6-8 cm. long, stout, 12-18 mm. thick, *deep violet or violaceous blue*, concolor within, solid, dry, equal or tapering upward from a rather thick, marginate, broadly turbinate *bulb* up to 3 cm. thick, and externally clothed by the *olivaceous-yellow universal veil*, apex of stem fibrillose, elsewhere hung with the fibrillose remains of the *olivaceous-yellow cortina*. SPORES almond-shaped, elliptical, *very tuberculate*, 13-15 (rarely 16) x 7-8.5 micr., rusty-cinnamon in mass.

Gregarious. In leaf-mould or among fallen leaves, in rich, mixed or frondose woods. Ann Arbor, Detroit, New Richmond. September-October. Infrequent.

This noble species is the prince of known American Cortinarii. Several collections in all stages of development have made it possible to emend the original description and refer it to its proper place in the genus. The colors of the fresh plants are vivid and most beautiful. The flesh is at first intense violet, and by peeling the pileus this color is at once exposed under the yellow pellicle. There is an olivaceous tinge in the yellow color of the pileus, cortina and universal veil in the young plant, and the edge of the gills may also be laved with the olivaceous-yellow coloring. The taste and odor are mild. It seems closely related to *C. arquatus* Fr. in the sense of Ricken, from which it differs mainly in its intensely violet or purplish flesh. The figure of Ricken (Blätterpilze, Pl. 36, Fig. 4) however, gives a very inadequate conception of our plant. It is barely possible that this is the American form of that species.

320. Cortinarius calochrous Fr.

Syst. Myc., 1821 (segregated, Epicrisis, 1836-8).

Illustrations: Gillet, Champignons de France, No. 200.
Plate LXVIII of this Report.

PILEUS 3-6 cm. broad, *not large*, convex, soon expanded-plane, *bright ochre-yellow to citron-yellow*, fulvous on disk, *with a viscid pellicle*, glabrous, even. FLESH thickish, rather compact, whitish. GILLS emarginate-adnexed, crowded, thin, rather narrow, *rosy-violet to violaceous-purple at first*, at length pale clay-

cinnamon, *edge serratulate*. STEM 3-5 cm. long, 5-9 mm. thick, solid, pale violaceous or whitish at first, soon becoming dingy yellowish, equal above the *rather small, abrupt, marginate-depressed, shallow bulb*, which is clothed at first by the *yellow universal veil*. SPORES sub-inequilateral, elliptical, 8-9 (rarely 10) x 4-5.5 micr., cinnamon in mass. BASIDIA 28-30 x 7-8 micr., 4-spored. ODOR and TASTE mild.

Solitary or scattered. In low, rich woods of maple, beech, etc. Ann Arbor. September-October. Infrequent.

A medium-sized plant, never becoming large. Known by its peculiar bulb which, in the typical condition, has the shape of a small porcelain evaporating disk with a rim, into which the stem appears inserted. Shreds of the yellow universal veil cling to the rim and the base of the stem. The plant is excellently figured by Fries in the unpublished plate in the Royal Museum at Stockholm, showing the remains of the universal veil. Gillet's figure is,also accurate as to color and shape. Cooke's figure (Ill., Plate 713) cannot apply to our plant. Ricken, Saccardo and Britzelmayr give spore-measurements which indicate a related species with much larger spores.

321. Cortinarius velicopia sp. nov.

PILEUS 6-9 cm. broad, convex at first, soon broadly expanded to plane, *violet to buff at first, becoming dingy yellowish-ochraceous* as if stained, with a viscid, separable pellicle, even, glabrous, margin incurved and at first appendiculate from the copious cortina. FLESH pale blue-violaceous, *soon white*, thick, moderately compact. GILLS narrowed behind, narrowly adnate, moderately broad, close, at length dingy yellowish or pallid, hung with the fibrillose remains then cinereous, finally rusty-cinnamon, *edge minutely fimbriate*. STEM 6-8 cm. long, 8-18 mm. thick, *violaceous-blue, fading to bluish*, at length dingy yellowish or pallid, hung with the fibrilllose remains of the cortina, dry, equal, solid, *with a marginate, subdepressed, hemispherical bulb*, which is clothed by a thin, ochraceous-buff, universal veil. CORTINA very copious, white or faintly bluish. SPORES ventricose-elliptical, *with a prominent, papillate apiculus, very tuberculate*, rather symmetrical, 9-12 x 6-7 micr. Edge of gills provided with inflated, sterile cells. ODOR and TASTE mild.

Gregarious or subcaespitose. Among fallen leaves in mixed or frondose woods. Ann Arbor, New Richmond. September-October. Infrequent.

This may be considered a segregate of *C. caerulescens*, and corresponds to Ricken's description of that species (Blätterpilze, p. 129), but is different from the conception of Maire (Bull. d. la. Soc. Myc. de France, Vol. 27, p. 426) and that shown by the Friesian unpublished plates. The spores of our plant, as well as the very abundant cortina, are quite distinguishing. The colors of the gills and stem incline to blue. Several collections show that the pileus may be deep violet at first in some forms, but eventually the ochraceous-buff color of the universal veil pervades also the surface of the pileus. The universal veil is less manifest and less persistent than in the preceding species.

322. Cortinarius herpeticus Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 849.
Ricken, Die Blätterpilze, Pl. 37, Fig. 4.

PILEUS 3-10 cm. broad, convex, subexpanded, firm, smoky-olive or *olivaceous*, tinged brownish on disk, fading, *with a viscid, separable pellicle*, even, glabrous, margin at first incurved, thin. FLESH thickish, firm, abruptly thin on margin, evanescently violaceous, then whitish. GILLS rounded behind, adnexed-emarginate, close, moderately broad, smoky-violet or *olivaceous* at first, smoky-brown at length clay-color (Ridg.), then smoky-cinnamon. STEM 3-5 cm. long, 8-18 mm. thick, solid, *violaceous-blue at first*, fibrillose by the *whitish cortina*, equal above the marginate-depressed bulb, which is covered by the remains of a greenish or whitish, thin, universal veil, bulb 1-2 cm. thick. SPORES broadly elliptical, rough, 8-10 x 5-6 micr. ODOR and TASTE mild.

Gregarious. Among mosses in cedar and balsam swamps. Bay View, Michigan, and North Elba, New York. August. Rare.

This was considerd a new species in the "Key" (Jour, of Mycol. 13, p. 35, 1907) as *C. olivaceoides*. It agrees well with the Friesian species as characterized in Monographia. In the llth Report of the Mich. Acad. Sci., p. 32, it is reported as *C. olivaceus* Pk. *C. olivaceus* Pk. has larger spores and belongs to the section Phlegmacium. *C. herpeticus* appears to be close to *C. scaurus* Fr.

323. Cortinarius olivaceo-stramineus Kauff.

Bull. Torr. Bot. Club, Vol. 32, 1905.

Illustrations: Ibid, Fig. 3, p. 309.
Jour, of Mycol., Vol. 13, Pl. 95, 1907.
Mycological Bull., Vol 5, Fig. 243, p. 317, 1907.

PILEUS 4-7 cm. broad, broadly convex, slightly depressed in the center when expanded, *pale straw-yellow with an olivaceous tinge*, slightly rufous-tinged in age, glabrous or silky-fibrillose, disk sometimes covered with minute scales, *viscid from a gelatinous pellicle*, margin incurved at first, shreds of the cortina attached to it on expanding. FLESH very thick, abruptly thin on margin, white, dingy-yellowish in age, *soon soft and spongy*. GILLS sinuate-adnexed, rather narrow, crowded, *whitish at first*, then pale cinnamon, edge serratulate and paler. STEM 6-8 cm. long, 5-18 mm. thick, spongy and soft within, sometimes becoming hollow, white and pruinate above the fibrillose remains of the cortina, *with a slight, subobsolete, submarginate* bulb from whose margin arises the copious white CORTINA; bulb when young covered by a thin universal veil of the same color as the pileus. SPORES ventricose-elliptical, with stout apiculus, almost smooth, granular within, 10-

12 x 5.5-6.5 micr. BASIDIA about 38 x 9 micr. ODOR and TASTE mild.

Subcaespitose. On the ground in mixed and frondose woods. August-September. Ann Arbor. Rather rare.

It is with some hesitation placed in this section, as the universal veil is not well developed. The bulb is at first slightly marginate and the cortina is attached to it; later the bulb almost disappears at times. The plants are sometimes deformed by a fungous parasite, *Mycogone rosea*, causing the gills to remain sterile. It has been found in several states, but is apparently rare.

324. Cortinarius cæsiocyaneus Britz. (EDIBLE)

Bot. Centralbl., 1895, p. 10, 1899, p. 58.

Maire, Bull, de la. Soc. Myc. de France, 26, 1910.

Illustrations: Maire, Bull. de. la. Soc. Myc. de France, Vol. 26, Pl. 8, Fig. 1-2.

PILEUS 5-12 cm. broad, convex then expanded-plane, sometimes depressed on the center, *bluish-violaceous-white to silvery-violaceous*, glabrous, even, *with a viscid, separable pellicle*, silky-shining when dry, margin becoming silky and at first incurved. FLESH pale violet, fading slowly, thick. GILLS rather *narrow, adnexed*, rounded behind then sinuate, thin, *pale violaceous, soon pale alutaceous*, then cinnamon, crowded, edge even or becoming eroded. STEM stout, 4-7 cm. long, 1-2 cm. thick, solid, pale violaceous-white, concolor within, equal above the *large, flattened, marginate-depressed bulb*, which is white on the surface from the *white universal veil*, attached to white mycelium. CORTINA *violaceous-white*. Spores 10-12 (rarely 13) x 6-7 micr., almond-shaped, elliptical, tuberculate, cinnamon in mass. ODOR and TASTE mild.

Gregarious or subcaespitose. On the ground among leaves in frondose woods of oak, maple, etc. Ann Arbor. September-October. Infrequent.

This is a segregate of *C. caerulescens* Fr. The whole plant has a rather uniform pale violaceous-whitish color almost exactly like *C. michiganensis*. As in that species, the gills are not at first intensely colored nor at all purple or rosy. It has the large size of *C. atkinsonianus* with which it sometimes occurs. The flattened tmlb is white below and on the sides, where it is clothed by the white subgelatinous veil. The spores are larger than in *C. michiganensis* with which it is easily confused and which belongs to another section. Cooke's figures of *C. caerulescens* (Ill., Pl. 721) show the stature and color, but not the characteristic bulb and spores; that plate is referred by Maire (Bull, de la Soc. Myc. de France, Vol. 26, p. 18) to *C. caesiocyaneus* Britz. Ricken places this plant under *C. camphoratus* Fr. but without any good grounds.

325. Cortinarius rubens sp. nov.

PILEUS 3-7 cm. broad, hemispherical then convex-expanded, *vermillion-red to orange-fulvous*, unicolorous, *with a viscid, separable, toughish pellicle*, glabrous, even, shining when dry. FLESH thick, whitish. GILLS adnexed, becoming emarginate, rather broad, close, caesious or pale drab at first, then argillaceous-cinnamon, edge entire and tinged dull citron-yellowish. STEM 4-7 cm. long, 1-1.5 cm. thick, solid, dry, *pale straw-yellow to whitish*, citron-yellowish within, fimbriate from the cortina, equal above the *rounded, marginate-depressed bulb* which is clothed by the *vermillion-red universal veil* except below where it is white and attached to white mycelium. SPORES almond-shaped, very inequilateral, tuberculate, 15-18 x 7-8.5 micr. BASIDIA 45 x 13-15 micr., stout, 4-spored. CORTINA white or tinged with red. ODOR faintly aromatic. TASTE of flesh bitterish-disagreeable, slowly more intense.

Gregarious or subcaespitose. On the ground among leaves in frondose woods of oak, maple, etc., its mycelium attached to *mycorhiza* of undetermined roots. Ann Arbor. October. Rare.

The bright red color of the pileus and the universal veil is striking and is rarely seen in this subgenus. The veil is very evident on the fresh plants and shows on the margin of the bulb as a bright red to orange-red decoration, and in the button stage is continuous with the pellicle of the pileus, breaking in a circumscissile manner like the yellow veil of *C. atkinsonianus*. There is no violet or purple present in the cap although the young gills have a dull violaceous-gray tint called "caesious." The edge of the gills is citron-straw-yellow and, when seen from below, gives the impression of that color to the rest of the gills. It differs from *C. sublateritius* Pk. in its much larger spores and the distinct universal veil. It agrees closely with the description of *C. testaceus* Cke., except in details. Maire, however, says Cooke's plant is identical with *C. rufo-olivaceous* Fr. to which our plant cannot be referred, although related to it. Specimens of our species have also been received from Madison, Wisconsin.

***Gills, flesh and stem yellow at first.*

326. Cortinarius elegantioides sp. nov.

Illustration: Plate LXIX of this Report.

PILEUS 4-7 cm. broad, convex then expanded-plane, *cadmium-yellow, orange-fulvous on disk*, becoming fulvous-ferruginous in age, glabrous, even, *with a glutinous separable pellicle*. FLESH thick, whitish or tinged greenish-yellow. GILLS adnate, becoming deeply emarginate and uncinate, close, *rather broad, varying pale yellowish-white, bright citron-yellow or sulphur-yellow*, at length ferruginous, thin, edge minutely crenulate. STEM 5-8.5 cm. long, rather stout, subequal, 10-18 mm. thick, dry, spongy-stuffed, yellowish-white or citron-yellow, *flesh tinged greenish-yellow*, with a marginate, subdepressed, subturbinate *bulb, which is clothed on the surface by the yellow to subferruginous,*

subgelatinous universal veil. CORTINA slight, fugacious. SPORES almond-shaped, elliptical, very tuberculate, 15-18 (rarely 19-20) x 7-9 micr. BASIDIA 48x12-13 micr., 4-spored. TASTE of flesh tardily but distinctly bitter. ODOR mild.

Solitary or subcaespitose. On the ground in frondose woods of oak, maple, etc. Ann Arbor, Detroit, New Richmond. September-October. Infrequent.

Nearly always solitary or of few individuals. Known by its large spores, bitter taste of the flesh and the tinge of green in the yellow color of the flesh, etc. It has the stature of *C. multiformis* of Cooke (Ill., Pl. 708 and 709), but the spores are distinctive. The bulb is not very broad as compared with that of *C. fulgens* Fr.; it is rather soft and decays early. The stem is narrower upwards at first and colors of the stem. It is closer to *C. sulfurinus* Quel. (sense of Ricken) but differs in its spores, less abundant cortina and the colors of the stem. It is closer to *C. sulfurinus* Quel. (sense of Ricken), but neither Quelet nor Ricken mention the bitter taste nor the universal veil.

Section II. Universal veil not manifest.

**Gills, flesh or stem at first caesious, violaceous, bluish or purplish.*

327. Cortinarius purpurascens Fr. (EDIBLE)

Epicrisis, 1836-38. Obs. 2, 1818.

Illustrations: Cooke, Ill., Pl. 723.
Gillet, Champignons de France, No. 224.
Plate LXXI of this Report.

PILEUS 5-8 cm. broad, broadly convex to subexpanded, *dark purplish-umber or entirely violet-purple when young*, soon discolored and variegated with clay-color or brown, opaque, glabrous, even, *with a viscid, separable pellicle*. FLESH thick, compact, tinged azure or purplish, fading to whitish in age, *but changing rapidly to deep purple when bruised*. GILLS adnexed and rounded behind, then emarginate, rather narrow, close, at first azure-blue or darker, *changing to deep purple when bruised*. STEM usually short, stout, 2-5 cm. long, 10-20 mm. thick, *solid*, subequal, fibrillose from the cortina, *bulb not large, subemarginate* to distinctly marginate, scarcely ever depressed, soon oval, purplish, *flesh quickly deeper-colored when bruised*. SPORES 8-9.5 (rarely 10) x 5-5.5 micr. elliptic-ovate, rough-echinulate, dark in mass. BASIDIA 40-45 x 8-9 micr., 4-spored. ODOR and TASTE mild.

Gregarious, solitary or subcaespitose. On the ground in open woods, sometimes in bare, exposed places where soil is hard. Ann Arbor, Detroit. September-October. Infrequent.

The American plant has more purple in the pileus than shown in my collection from Sweden and as given by European authors. In all other respects it agrees with that of Europe. This is *C. subpurpurascens* in the sense of Ricken. The spore-measurements as given by Massee are too large. We have three related species which might be easily confused by not taking account of the spores: *C. aggregatus* has smaller spores and its flesh and gills do not change to purple when bruised. *C. sphaerosperma* is a much larger plant, with almost spherical spores. The common form of *C. purpurascens* is small, stout and squatty, although more luxuriant specimens occur in favorable weather.

328. Cortinarius subpurpurascens Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 725.
Ricken, Blätterpilze, Pl. 36, Fig. 3. (As *C. purpurascens*.)

PILEUS 5-10 cm. broad, firm, campanulate, discoid or gibbous, then expanded, at length depressed, *viscid, tinged* purple at first, yellow-ochre to ochraceous tawny with smoky-brown stains, scarcely virgate, glabrous, *zoned by the decurved margin*. FLESH soon whitish, *not changing* to purple when bruised, compact. GILLS adnexed-emarginate, crowded, rather narrow, purplish at first then pecan-brown (Ridg.), *becoming purplish when bruised*, edge entire. STEM 5-7 cm. long, 10-15 mm. thick, subequal above the rather small depressed-marginate flattened bulb, pale violaceous, *purplish where bruised*, violaceous within, cortinate-fibrillose, *stuffed then tubular*. SPORES elliptical-oval, 8-9x5-6 micr., rough. ODOR slightly of radish after picking, somewhat pungent. TASTE mild.

Gregarious to subcaespitose. On the ground under balsam and spruce. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Infrequent.

This species differs from *C. purpurascens* in its habit, its stuffed to hollow stem and, the almost immutable color of the flesh. The gills and stem, however, change to purplish where bruised. It is *C. purpurascens* in the sense of Ricken who seems to have exchanged the Friesian names. It seems to be a species of the higher mountains, and perhaps of the northern forests.

329. Cortinarius aggregates sp. nov.

PILEUS 5-12 cm. broad, convex then subexpanded, obtuse and usually irregular from crowding, at length undulate, glabrous or white-pruinose when young, *at first bright purple-blue* to purplish-gray, at maturity *becoming smoky olive-gray and streaked*, with a viscid pellicle, margin at first incurved. FLESH thick, *violaceous* then faintly olivaceous-gray to dingy white, *not turning purple when bruised*. GILLS adnexed and rounded behind, then emarginate, close, moderately broad, *violet-purple at first*, then gray to cinnamon. STEM 4-7 cm. long, 10-20 mm. thick, rather short, solid, dry, purplish, darker at base, *the small bulb at the very first subemarginate*, not depressed, disappearing during development. CORTINA *deep violaceous*, rather copious, *attached to bulblet at first*, collapsing on the stem. SPORES narrowly elliptical, 7-8 x 4-4.5 micr. ODOR and TASTE mild.

Caespitose, often in troops forming arcs of scores of individuals. In frondose woods of oak, maple, etc., in the late fall after heavy rains, half hidden by the leaves.

September-November. Ann Arbor. Infrequent, in very wet seasons.

This species is usually quite abundant in its particular woods. As the clusters or closely crowded rows of the fruit-bodies develop, they push up the thick mat of leaves in humps, an appearance which is very commonly produced in frondose woods by the late-growing mushrooms. The young clusters may be so thoroughly hidden by the leaves that they are usually not found till more or less expanded and the changes in color by that time are often extremely confusing. In that case the deep bluish-purple color of the young cap is lost and in the expanded state its surface assumes a distinct olive-gray color and is then often markedly streaked with darker shades. The bulb becomes soft, is often infested by grubs and stained yellowish. It differs from *C. purpurascens* in habit, in different shade of blue on the cap and stem, in the flesh not changing to darker purple when bruised and in the smaller spores. A vigorous cluster of young plants are intensely colored, and often silvery as if covered with hoar-frost. It is related to *C. cyanopus* Fr.

330. Cortinarius sphaerosperma sp. nov. (EDIBLE)

Illustration: Plate LXX of this Report.

PILEUS 8-16 cm. broad, *large*, broadly convex-expanded, with a *very viscid*, separable pellicle, glabrous, even, *deep violet-purple*, micaceous-shining when dry. FLESH soon whitish, *changing* to *purple when bruised*, thick, compact. GILLS adnate *then sinuate-subdecurrent*, crowded, not broad, *purple at first*, then rusty-umber. STEM 6-9 cm. long, 15-20 mm. thick, solid, stout, dry, hung with the dense, spore-stained fibrils of a very copious, purplish CORTINA, *deep purple* like the cap, *the rather small bulb subemarginate and disappearing*, at length clavate-bulbous, whitish within, becoming purple when bruised. SPORES spherical or subsphoeroid, very tuberculate-rough, 7-8.5 x 6-7.5 micr., dark ferruginous in mass. BASIDIA 30 x 9 micr., 4-spored, the slender sterigmata 3-4 micr. long. ODOR slightly of radish. TASTE mild.

Solitary or scattered. On the ground in frondose woods of oak, maple, etc. August-September. Ann Arbor, Detroit. Rather rare.

This magnificent species has only been seen thrice. It was at first passed by as *C. purpurascens* but a careful examination revealed important differences. It may be considered as a segregate of that species, although very likely it is a native of this country. No European author seems to have referred spherical spores to *C. purpurascens* or *C. subpurpurascens*, and in the European plants, both of these species entirely or partly lack the purple color of the cap. No very young specimens were found, and it needs further study. Both this species and the preceding approach the next sub-genus in the scarcely marginate bulb.

331. Cortinarius purpureophyllus sp. nov.

PILEUS 5-8 cm. broad, convex-expanded, *dull tawny-red*, fading to ochraceous-fulvous, glabrous, even, *with a viscid*, separable pellicle, margin incurved. FLESH whitish, thick, compact. GILLS rounded behind and adnexed, deep *lilac-purple, color persistent*, narrow, crowded, thin, edge entire or suberoded. STEM 4-6 cm. long, 12-18 mm. thick, equal or slightly narrower upwards, *pallid or slightly tinged* lilac-violaceous at first, spongy-stuffed or solid, fibrillose from cortina, apex violaceous within, *with a marginate-depressed, flattish bulb*, which is white throughout, attached to a white mycelium. CORTINA copious, whitish (?). SPORES almond-shaped, elliptical, tuberculate, 10-12 x 6-7 micr., rusty-cinnamon in mass. BASIDIA 36-42 x 8-9 micr., 4-spored. ODOR slight or none. TASTE slowly disagreeable, somewhat bitter.

Gregarious. Among fallen leaves in frondose woods of maple, oak, etc. Ann Arbor. October-November. Infrequent.

Known by the contrasting colors of pileus, gills and stem, and the size of the spores. The flesh is scarcely tinged with violaceous except at the apex of the stem. The young gills have a deep color as in *C. purpurascens*, but the flesh has none of the characteristics of that species.

332. Cortinarius cærulescens Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 722.
Quelet, Grevillea, Vol. VI, Pl. 105, Fig. 3.
Maire, Bull, de la Soc. Myc. de France, Vol. 26, Pl. 8, Fig. 3-5.

"PILEUS 3-6 cm. broad, convex then convex-plane, quite thick, *with separable, viscid pellicle*, glabrous, even, *violaceous-blue, tinged ochraceous on disk*, sometimes entirely ochraceous-yellow, not hygrophanous, margin at first incurved pubescent and white, then spreading and violaceous. FLESH *pale violaceous-blue*, especially under the cuticle, then whitish, at length ochraceous-stained. GILLS arcuate, then plane or slightly ventrieose, attenuate in front, rounded behind, thin, *broad*, rather broadly adnate, *violet-amethyst or violet-blue at first*, then rusty-brown, edge serratulate. STEM 3-5 cm. long, 10 mm. thick, cylindric-conic, *with a marginate bulb*, fibrous-fleshy, dry, silky-fibrillose, *violaceous-blue to amethyst-blue*, bulb white, solid. CORTINA violaceous at first. Universal veil rapidly evanescent. SPORES 12-14 x 6-7 micr., sub-amygdaliform, elliptic, tuberculate. ODOR feeble, like that of *C. purpurascens*. TASTE mild or slightly bitterish."

The description has been adopted from that of Prof. Maire (Bull, de la Soc. Myc. de France, Vol. 27, p. 424, 1911). In America I have seen specimens of this species only from Tennessee. The species stands out

from the segregates of the old species as it was variously interpreted, by its large spores. In specimens from Sweden, I find the same sized spores. In size, color of the young gills and in stature it is much like *C. calochrous*. Cooke's figures (Ill., Pl. 721) and Gillet's figures (Champignons de France, No. 208) are referred by Maire to *C. caesiocyaneus*, which they illustrate fairly well. As Fries did not give spore-measurements, I prefer to follow the decision reached by Maire after he had compared the species which occurs near Stockholm, with those of France. Our American references to this plant must be considered as usually, if not always, based on collections of *C. caesiocyaneus*, *C. michiganensis* or perhaps *C. calochrous*. It is possible that a number of intermediate forms also occur as I have some collections which .apparently support such a conclusion.

333. Cortinarius michiganensis Kauff. (EDIBLE)

Jour, of Mycology, Vol. 13, p. 35, 1907 (synopsis).

PILEUS 8-14 cm. broad, compact, firm, broadly convex then slowly expanded, *pale violaceous to lilac*, unicolor, *color persistent*, glabrous, even, *glutinous when moist or young*, then viscid, margin persistently inrolled and tomentose-silky. FLESH very thick, white or tinged with lilac, not changed by bruising. GILLS rounded behind and adnexed, or almost free, *narrow, crowded, thin*, acuminate in front, *pale violaceous-white at first*, then pale ashy, finally ochraceous-cinnamon, *edge serratulate from the first*. STEM stout, 3-6 cm. long, 18-30 mm. thick, solid, *pale violaceous-lilac* to whitish, fibrillose from cortina, *marginate-bulbous*, bulb large, up to 4 cm. broad, white beneath, flesh white except the violaceous apex. CORTINA bluish-white, at first attached to the bulb, evanescent, not copious. SPORES narrowly elliptic-ovate, almost smooth, 8-10.5 x 4.5-5.5 micr., pale ochraceous-cinnamon in mass. ODOR and TASTE mild.

Caespitose, in small clusters of large individuals. On the ground, among grass or leaves, in low, rich, frondose woods of beech, maple, etc. Ann Arbor, Detroit, New Richmond. August-October. Infrequent.

This species is known by its large size, caespitose habit, pale gills of which the spores mature slowly, and by the lilaceous color of cap and stem. When fresh or young a clear gluten covers the pileus and sometimes the base of the young bulb, as if by a universal veil. It is very like *C. caesiocyaneus* in size and shape, but has a different habit, different color and spores and lacks the white universal veil of that species. It is doubtless in part the *C. caerulescens* of some American lists. *C. caesius* Clem. according to the description, approaches it, differing in its scarcely viscid pileus, the much thicker spores and the white gills.

334. Cortinarius cæsius Clements.

Bot. Surv. of Nebraska, IV, 1896.

"PILEUS 4-8 cm. broad, campanulate-convex, then expanded, fleshy, glabrous, *not or scarcely viscid*, obscurely *dark blue-violaceous*, finally brown-punctate, margin involute. FLESH *bluish-gray*, unchangeable. GILLS adnate, subdistant, *white then cinnamon*, not violaceous. STEM 1-5 cm. long, 10-15 mm. thick, fleshy-fibrous, solid, violaceous above, *bright yellow below*, turbinate-bulbous, subglobose-when old, bulb 3-4 cm. high and 4 cm. broad, violaceous. CORTINA bluish-gray. SPORES subelliptical or globose, 8-10 x 7-8 micr., verrucose, tawny-brown.

"Related.to *C. glaucopus* Schaeff."

The description is adopited from the original. The plant was found in Nebraska and I have not seen it.

335. Cortinarius aleuriosmus Maire var.

Bull. de la Soc. Myc. de France, Vol. 26, p. 22, 1910.

Illustrations: Ibid, Pl. 7, Fig. 4-5.
Ricken, Die Blätterpilze, Pl. 39, Fig. 4.

PILEUS 5-10 cm. broad, very compact, firm, broadly convex *alutaceous-whitish at first, soon dingy ochraceous-tan to russet-tan*, sometimes sordid tawny-yellowish in age, glabrous, *with a glutinous pellicle* when moist or young, surface becoming reticulate-rivulose from the drying gluten, margin inrolled at first. FLESH thick, white or with an evanescent violaceous tinge. GILLS adnexed, *narrow*, crowded, *caesious at first* (i. e., pale livid-grayish), sometimes pallid, then rusty-cinnamon, edge erose-serratulate. STEM 4-6 cm. long, *stout, short*, 10-20 mm. thick, solid, compact, *white or scarcely violaceous-tinged*, fibrillose from the cortina, *with a thick, turbinate, marginate bulb*, bulb not depressed, white below and arising from white mycelium. SPORES elliptical-almond-shaped, minutely tuberculate, 10-12 x 5-6 micr. BASIDIA 30-35 x 7 micr., 4-spored. ODOR and TASTE mild or slight.

Subcaespitose or gregarious. On the ground in frondose woods of oak, maple, etc. Ann Arbor. August-September. Infrequent.

This is doubtless the species reported by Ricken under *C. aleuriosmus* Maire. (See Blätterpilze, p. 136, No. 428). Both Ricken's and my collections seem to be the same species, but differ from the description of the type, given by Maire, in lacking the "bitter taste" in the pellicle of the pileus, and in the slightly smaller spores. Maire's species also had a distinct farinaceous odor and no violaceous nor blue tints in the flesh and stem. The latter point, however, is a variation easily overlooked. There is evidently a series of closely related forms, differing slightly in the amount of violet present and the presence or absence of a slight odor and taste. However, I suspect the species with the bitter pellicle should be kept distinct. Some of my collections had caps which were more tawny or rusty-ochraceous than

the descriptions allow. The fundamental characters are the caesious or pale gray-drab young gills, the white flesh of the stem and mostly of the cap, and the spores. This species is a segregate of *C. glaucopus* Fr. and some of my collections agree well with the color, size and shape of the Friesian plates at Stockholm, but the flesh, especially of the stem, does not turn yellowish. The European authors agree that the spores of *C. glaucopus* measure 8-9 x 5-6 micr. Forms occur which have a subaromatic odor, resembling ripe pears. As is often the case in this subgenus, when the plant develops during heavy rains, the glutinous pellicle dissolves away in part, and the pileus is later merely subviscid.

336. Cortinarius glaucopus Fr.

Syst. Myc., 1821.

Illustration: Ricken, Die Blätterpilze, Pl. 35, Fig. 7.

PILEUS 5-12 cm. broad, convex, then expanded-plane, firm, rigid, *often wavy on the geniculate margin*, viscid or glutinous, *variegate fulvous-streaked* on a slate-gray or steel-gray ground-color, *margin greenish-gray*, at first inflexed, disk fulvous. FLESH whitish then yellowish-tinged, thick, compact. GILLS adnexed then emarginate, moderately broad, close to crowded, *at first violaceous-blue*, then clay-cinnamon. STEM 5-10 cm. long (sometimes shorter), 15-25 mm. thick, rigid, pallid with a pale violaceous-blue tinge, *becoming yellowish in age*, flesh violaceous-bluish to whitish then sordid yellowish, solid, almost equal above *the abrupt, marginate, scarcely bulbous base*, attached to a white mycelium. SPORES almond-shaped, subinequilateral, slightly rough-punctate, 8-9 x 4-5 micr. BASIDIA 28-30 x 7 micr., 4-spored. ODOR and TASTE mild.

In dense, caespitose troops. On the ground, under or among leaves, in frondose woods of oak, maple, etc. Ann Arbor. September-October. Abundant locally, but infrequent; after heavy rains.

Only the luxuriant form of this species is known to me. A squatty form is said to occur, probably in dry weather. The colors are difficult to describe and vary during development. The fresh, mature pileus usually has a steel-gray metallic lustre in wet weather, its margin is bent down forming a faint zone, and fulvous shades radiate in streaks from the fulvous center. The bulb is narrow, somewhat thicker than the stem, and scarcely depressed. Its caespitose habit is very marked. No good plate seems to exist. Cooke's figure (Ill., Pl. 712) is entirely misleading, and Gillet's figure (Champignons de France, No. 224), doubtless illustrates another species. It is not at all commmon in the regions I have visited.

***Gills, flesh or stem at first green.*

337. Cortinarius virentophyllus sp. nov.

PILEUS 5-8 cm. broad, convex, expanded-plane, regular, *viscid*, glabrous, *green to olivaceous-yellowish, fading* to pale ochraceous or straw-yellow, sometimes tinged fulvous, slightly streaked by the drying gluten. FLESH thickish on disk, very thin on margin, pallid-greenish, fading, subhygrophanous, with dark watery-green border along the gills. GILLS adnexed-emarginate, thin, close, somewhat narrow, *gray-olive or green at first, becoming deep green*, edge entire. STEM 5-7 cm. long, 10-15 mm. thick, silky-fibrillose at length, *stuffed* by a fibrous pith, becoming hollow, *distinctly cyaneous or pale blue*, fading to violaceous-whitish, bluish within but fading, equal along *the subemarginate bulb*, which becomes oval or subobsolete. SPORES almond-shaped, broadly elliptical, distinctly tuberculate, 9-11 x 6-7 micr. BASIDIA 36 x 9 micr., 4-spored. ODOR mild. TASTE of flesh and pellicle of cap mild.

Subcaespitose in clusters of few individuals. On the ground, among grass in frondose woods of oak, maple, etc. Ann Arbor. October-November. Rare.

This attractive species was found only twice. The cap and gills are deep green when fresh, while the stem is pale blue. The color of the cap and flesh soon fades to pale yellowish except near the gills. The axis of the stem is composed of softer, paler, fibrous tissue which fades quickly and disappears in part leaving the stem tubular. The bulb is not truly depressed-marginate unless in the button stage which was not seen. The species is related to *C. scaurus*, but the pileus is differently colored, not "tiger-spotted," and the stem not solid. The gills and stem are also more brightly colored than in that species. It may be an American variety. The spores agree closely with the measurements given by Ricken for *C. scaurus*. It differs from *C. prasinus* in the glabrous pileus, in stature, and in the spores, which according to Ricken are 13-16 x 6-7 micr. in size. Specimens were seen from Madison, Wisconsin.

**** Gills, flesh or stem yellow, fulvescent, or ferruginous.*

338. Cortinarius fulgens Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 716 (doubtful).
Gillet, Champignons de France, No. 223 (doubtful).

PILEUS 6-15 cm. or more broad, firm, broadly convex to plane, bright orange to *orange-fulvous*, disk orange-ferruginous, *somewhat virgate streaked*, very viscid when moist, margin incurved at first. FLESH thick, yellowish then alutaceous. GILLS dilute yellow then *deep ferruginous-orange*, emarginate, *broad*, close, *edge entire*. STEM 4-7 cm. long, 15-25 mm. thick, firm, solid, yellow, *covered by the dense rusty-stained fibrils* of the cortina, equal or subequal above *the large, depressed-marginate bulb*. SPORES almond-shaped, abruptly apiculate, 9-12x6-7 micr. ODOR and TASTE mild.

Solitary or subgregarious. On the ground in open beech woods. Ann Arbor. September. Infrequent.

This large species is here interpreted in the sense of Fries as expressed in his unpublished plates at Stockholm. Authors are not agreed as to its identity as shown by their plates, different spore-measurements, etc. Fries' plates show larger plants than indicated in his

description, although he says they are "showy, robust and golden." His figures of this and the following species show that the virgate appearance of the pileus of *C. fulgens* was to his mind one of the essential differences. The microscope has shown that probably several species are included under the old ones. Specimens from Bresadola with spores 15-18 x 9-10 illustrate this view. *C. phyllophilus* Pk. (N. Y. State Mus. Bull., 157, 1912), seems to approach our specimens rather closely.

339. Cortinarius fulmineus Fr. var. **sulphureus** var. nov.

Epicrisis, 1836-38.

Illustration: Plate LXXI of this Report.

PILEUS 5-10 cm. broad, convex then plane, *sulphur-yellow*, scarcely changing to darker, sometimes with spot-like scales on the disk, *viscid*, even, glabrous. FLESH thick on disk, yellow or yellowish-white, rather soft. GILLS adnate, then emarginate, moderately broad, close, *sulphur-yellow at first*, finally ochraceous-cinnamon, edge becoming eroded. STEM *short*, 3-5 cm. long, 8-18 mm. thick, dry, *pale, sulphur-yellow*, sometimes merely yellowish-white, yellowish within, sometimes compressed, subfibrillose then glabrescent and shining, equal above *the shallow, marginate-depressed bulb* which is yellowish beneath and attached to a yellow mycelium. CORTINA scanty, whitish. SPORES almond-shaped, slightly rough, ventricose, 8-10 x 4-5.5 micr. BASIDIA 30 x 7-8 micr., 4-spored. ODOR none. TASTE mild, of pellicle not bitter.

Solitary or gregarious. On the ground among humus, in frondose or mixed woods. Ann Arbor, Bay View, New Richmond. September-October. Infrequent.

When young the whole plant is pale sulphur-yellow, sometimes paler but uniform in color. In this respect it differs markedly from *C. fulmineus* as described. The figures of the unpublished plates of Fries, however, show a much less orange or fulvous plant than is indicated by the descriptions. It is paler than *C. elegantioides* and lacks the bitterish taste of the pellicle. In the list of the 9th Mich. Acad. Rep. it was referred to *C. sulphurinus* Quel., which differs, in the sense of Ricken, in having much larger spores. Our variety agrees quite closely in the size of the spores with the European *C. fulmineus* as given by Ricken and Saccardo.

340. Cortinarius elegantior Fr. var.

Epicrisis, 1836-38.

Illustration: Ricken, Die Blätterpilze, Pl. 38, Fig. 2.

PILEUS 7-15 cm. broad, compact, firm, convex then expanded, at length wavy and depressed, *tawny-yellow to ferruginous*, glabrous, even, *with a very viscid, separable pellicle*. FLESH whitish or tinged ochraceous, thick. GILLS adnate becoming emarginate, close, rather broad, *yellowish-pallid at first, at length rusty-cinnamon*, edge serrate-eroded. STEM 4-6 cm. long, 10-25 mm. thick, solid, pallid, *becoming rusty-yellow*, fibrillose from the abundant cortina, equal above *the marginate bulb* which is scarcely depressed, *becomes rusty-yellow* and is attached to a yellowish mycelium which forms *mycorhiza*. SPORES almond-shaped, elliptical, tuberculate, 12-14 x 7-8 micr. ODOR and TASTE mild.

Subcaespitose or gregarious. On the ground, among leaves, in frondose woods. Ann Arbor. October. Rare.

This species forms mycorhiza on the red oak; the yellow mycelium was found connecting the mushrooms and the rootlets of the tree and on examination the latter were found to be ectotrophic mycorhiza. Our plants depart somewhat from the descriptions of the European *C. elegantior*, but the spores and color and other major characters are the same. It may be considered as a variety until more extensively collected. It differs from *C. fulgens* in its large spores, the pallid color of the very young gills and stem and the serrate edge of the gills. The color changes markedly to rusty or fulvous as the plant becomes mature. The bulb is not as large and depressed as in *C. fulgens*. In the European plant the color shades slightly into olive, as in our *C. elegantioides*.

341. Cortinarius corrugatus Pk.

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

Illustrations: N. Y. State Mus. Mem. 4, Pl. 58, Fig. 8-15, 1900.
White, Conn. State Geol. & Nat. Hist. Surv., Bull. 15, Pl. 21, 1910.

PILEUS 5-10 cm. broad, broadly campanulate, obtuse, *viscid* when moist, coarsely and radiately corrugate or reticulate, *tawny or yellowish-ferruginous*, varying to yellow or ochraceous. FLESH white, thin on margin. GILLS adnate, rather broad, close, *transversely striate*, pallid or obscurely purplish-tinged at first, *soon ferruginous-cinnamon*, edge eroded at length. STEM 7-12 cm. long, 6-16 mm. thick, *long cylindrical*, often fibrillose, spongy-stuffed, often hollowed by grubs, scurfy at apex, yellowish or tawny-yellow, *with a rather small, rounded-oval bulb* which is clothed when fresh by the thin, tawny, adnate and viscid remains of a *universal veil*, pallid or concolor within. CORTINA almost lacking, evanescent. SPORES broadly elliptical, very rough-tuberculate, variable in size 10-15 x 7-10 micr. (usually 12-13 x 8-9 micr.). BASIDIA clavate, 45-48 x 12 micr., 4-spored. ODOR rather pleasant. TASTE mild.

Gregarious or subcaespitose. On mossy or moist ground in low or swampy, fronclose woods. Vicinity of Detroit; but probably throughout the State. July-October. Not infrequent in appropriate habitats.

This is a curious species whose early button stage alone shows its relation to the subgenus Bulbopodium. Later there is no margin noticeable on the bulb, and no sign of the early attachment of the cortina. The cortina, in fact, disappears very early, if present at all. In the young stage, however, the cap has a much smaller width than the bulb, and appears to rest upon it in the way

characteristic for this sub-genus. The species is easily known by its corrugated cap, the peculiar yellow or tawny-yellow color of the long stem and the large spores. Saccardo quotes the size of spores incorrectly. Peck has named a form with "appressed spot-light scales" on the pileus, var. *subsquamosus*.

*****Gills, flesh and stem at first white, pallid or pale alutaceous.*

342. Cortinarius sublateritius Pk.

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

"PILEUS 5-7.5 cm. broad, broadly convex or nearly plane, glabbrous, *viscid, light red*, margin incurved. FLESH white. GILLS adnexed, emarginate, close, thin, plane, *pallid at first*, becoming *cinnamon*. STEM short, 3-6 cm. long, 6-10 mm. thick, equal or slightly tapering upward, stuffed, silky, *whitish, abruptly bulbous*. SPORES ventricose-elliptic, abruptly-short, pointed at each end, rough-tuberculate, 10-12.5 x 5-6.5 micr.

"Woods. Westport, N. Y. October."

The description is adopted from that of Peck who says it is apparently related to *C. testaceus* Cke. which, according to Maire is *C. rufo-olivaceus* Fr., but from which it differs in its smaller size, stuffed stem and smaller even spores. It also differs from *C. rubens* in the spore character, as I satisfied myself by a study of the type specimens at Albany, N. Y.

343. Cortinarius multiformis Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 708, 709.
Quelet, in Grevillea, VI, Pl. 104, Fig. 4.
Ricken, Die Blätterpilze, Pl. 39, Fig. 1.
Plate LXXII of this Report.

PILEUS 5-10 cm. broad, soon convex then expanded-plane, regular, *canescent-white-hoary when young, viscid*, soon ochraceous-buff, *becoming pale ferruginous-orange*, with a separable pellicle, at length somewhat dry and subshining, sometimes wrinkled in age from the drying gluten, margin inrolled. FLESH pallid-white at first, at length somewhat discolored, sublutescent. GILLS attenuate-adnate, then emarginate, close, not broad, *at first whitish, then alutaceous-cinnamon*, edge eroded at maturity. STEM 4-9 cm. long, 10-20 mm. thick, spongy-solid, subfibrillose, *white at first* then alutaceous, equal above the *marginate or sometimes scarcely marginate bulb*, which becomes oval at length. CORTINA *white*, scanty, *fugacious*. SPORES subfusiform-elliptical, scarcely at all rough, 7-9x4-5.5 micr., pale, *not becoming rusty*. BASIDIA 25-30x7-8 micr. ODOR and TASTE mild.

Gregarious. On the ground, in mixed woods, so far only collected in the conifer regions of the State. Bay View, New Richmond, September. Infrequent.

The button stage is white or whitish throughout, but during development it discolors more or less, assuming yellowish or rusty-ochraceous shades. Our plants never become as deep orange-rusty, so far as I have seen, as do the European plants. Specimens collected near Stockholm, showed a tendency to change from white in the button to tawny-orange in age. The species is distinct from others in the peculiar delicate hoary-white covering of the young plant, which sometimes remains on the surface of the pileus as hoary spots even after expansion. This may be considered as a form of universal veil, but is quite different in texture from the universal veil of the first section. This hoariness is best seen when plants are growing in dry weather, and reminds one of that of *Pholiota caperata*. The spores and gills are rather pale for a Cortinarius, and the species therefore approaches Hebeloma.

344. Cortinarius intrusus Pk. (EDIBLE)

Bull. Torr. Bot. Club, Vol. 23, p. 416, 1896.

Illustration: Plate LXXIII of this Report

PILEUS 2.5-6 cm. broad, convex-expanded, *soon plane* and subdepressed, glabrous, *whitish to dull clay-color*, sometimes tinged tawny-ochraceous or reddish, *viscid when moist*, even or radiately wrinkled. FLESH whitish, *thin*. GILLS rounded behind, adnexed or almost free, thin, close, not broad, *whitish at the very first*, soon creamy-yellowish to tawny-ochraceous, *finally umber-brown*, edge subcrenulate. STEM 3-6 cm. long, 4-10 mm. thick, *stuffed to hollow*, *whitish*, at length stained by the spores, even or striate above, minutely floccose at first, glabrescent, equal or tapering, *more or less abruptly bulbous*. SPORES elliptic-oval, smooth, 6-7.5 x 4-5 micr., brownish-cinnamon in mass. BASIDIA 25-26x5-7 micr., 4-spored. Sterile cells on edge of gills, small, capitate, as in Galera. ODOR and TASTE slightly of radish.

Singly or in small clusters in mushroom beds, in flower beds in conservatories, plant pots, etc.

In the winter months. Received from green-houses in Michigan; reported from various points in New York, New Jersey and Massachusetts.

To quote from Dr. Peck, "Its habitat is peculiar, but it possibly finds its way into conservatories and mushroom beds through the introduction of manure or soil or of leafmould from the woods. It seems strange that it has not been detected growing in the woods or fields." McIlvaine says, "Several pints of it were collected in February—usually a famine month for the mycophagist. The crop continued well into the spring. They grew on the ground, in beds among plants, and with potted plants in a hot-house. The species is delicate, savory and a most accommodating renegade of its kind."

This species is not only unusual in its selection of a place to fruit but also departs somewhat from the usual generic characters of the genus Cortinarius. Its spores are of a peculiar color and in some respects it resembles the genus Hebeloma, and may yet be referred to that genus. Its development has not been sufficiently studied.

345. Cortinarius albidus Pk.

N. Y. State Museum, Rep. 44, 1891.

Illustration: Ibid, Pl. 3, Fig. 1-4.

PILEUS 5-10 cm. broad, convex, then expanded, *white or whitish*, even, glabrous, *with a separable, viscid pellicle*, shining when dry. FLESH thick, white. GILLS adnexed-emarginate, moderately broad, close, thin, *white at first*, then pale alutaceous to cinnamon, edge even. STEM 5-8 cm. long, 8-16 mm. thick, solid, white, fibrillose from the cortina, *with an oblique, marginate-depressed bulb*, attached to white mycelium. CORTINA white, copious. SPORES elliptical, scarcely rough, 9-11 x 5 6.5 micr. ODOR and TASTE mild.

Gregarious. On the ground in low, frondose woods. Ann Arbor. September-October. Infrequent.

Known by the white color of all its parts, although the pileus may become buff in age and sometimes the bulb is discolored somewhat by rusty hues. It differs from pallid forms of *C. multiformis* in its spores and larger bulb.

SUBGENUS PHLEGMACIUM: Stem dry, firm, *exposed from the beginning*, becoming clavate-bulbous to equal, never marginate-bulbous; cortina superior, collapsing on the upper or medium portion of the stem. Pileus with a *viscid* pellicle.

This includes the sections "Cliduchii" and "Elastici" of Fries. The development from the "button" stage is very different from that of the subgenus Bulbopodium. The stem is evident from the first, and the cortina is necessarily attached differently, connecting stem and margin of pileus. A universal veil, similar in structure to that of the preceding subgenus, may be present in the young stage and in such cases persists under favorable conditions as delicate shreds or as a closely adnate sheath to the lower part of the elongated stem. Of the European species which have this veil, e. g. *C. cumatilis* Fr., *C. varicolor* Fr., *C. triumphans* Fr., etc., only one has been with certainty observed in this country. Details on this point, with respect to American species, are also not at hand, so that I am compelled to arrange our species on a merely temporary basis. The number of Michigan species which belong to this subgenus that have so far been observed are relatively few, and, except for the type specimens of Peck's species which have been examined, I have seen few collections that can be placed here.

Section I. Universal veil clearly manifest.

346. Cortinarius triumphans Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 141, Fig. 1.
Gillet, Champignons de France, No. 252.
Cooke, Ill., Pl. 692.
Ricken, Blätterpilze, Pl. 41, Fig. 2.

PILEUS 5-10 cm. broad, convex-plane, obtuse, viscid, spotted with superficial patches of the veil, or glabrous and appressed-subtomentose on drying especially on disk, even, *apricot-yellow to ochraceous-orange* (Ridg.), finally becoming tawny. FLESH soft, white, thick on disk. GILLS at first adnate-subdecurrent then sinuate to emarginate, close, moderately broad, *at first caesius-whitish*, then ochraceous-buff to argillaceous, edge entire. STEM 8-12 cm. long, 1-2 cm. thick above, clavate-bulbous or rounded-bulbous, solid, at first sheathed by a whitish universal veil which is at length broken into *yellowish-ochraceous annular patches terminating above in a ring*. SPORES elliptical, almond-shaped, 12-15 x 6-7.5 micr., tuberculate, rusty-yellow. ODOR and TASTE slightly of coal-tar or radish.

Gregarious to subcaespitose. On the ground in forests of balsam-fir. Adirondack Mountains, North Elba, New York. Collection Kauffman. September, 1914. Rare.

A large, northern species agreeing in all respects with specimens which I collected at Stockholm, Sweden. The collapsed cortina unites with the upper portion of the universal veil to form a band-like annulus. It was reported from New York by Peck in N. Y. State Mus. Bull. 150, 1910. Not yet found in Michigan.

347. Cortinarius maculipes Pk.

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

"Pileus 3-6 cm. broad, convex, becoming nearly plane, glabrous, but *covered with a tenacious gluten, bay-red*, becoming paler with age. FLESH whitish. GILLS thin, close, rounded behind, slightly adnexed, *whitish at first*, becoming brownish-cinnamon. STEM 5-7.5 cm. long, 6-12 mm. thick, equal or slightly tapering upward, *sub-radicating*, solid or stuffed, silky-fibrillose, scaly-spotted, sometimes slightly annulate. SPORES elliptical, scarcely rough, 7.5-9 x 5-6 micr."

The pileus of dried specimens is chestnut-brown and shining. Saccardo gives the spore-measurements much larger, which is clearly an error. Peck says "its prominent characters are the dark-colored pileus smeared with tenacious gluten, the pale young gills and the spotted stem. The spots are formed by the brown fibrils that at first coat the stein, and resemble those of *Armillaria megalopus* Bres." as shown in Fung. Trid., Pl. 47. These scaly spots are clearly the remains of a universal veil. The type specimens are of moderate size.

Section II. Universal veil not manifest.

**Gills at first violet, bluish, purplish or caesious*.

348. Cortinarius sphagnophilus Pk.

N. Y. State Mus. Rep. 29, 1878.

"PILEUS 5-7.5 cm. broad, convex to expanded, glabrous, *viscid, pale brown*, marked *with dark watery spots* especially on the margin. GILLS moderately broad, *subdistant*, transversely rugulose, *at first violaceous* then cinnamon. STEM 10-15 cm. long, silky, striate, *violaceous-white*, then cinnamon, *with an oval bulb at base*. SPORES oblong-elliptical, slightly rough, 10-11.5 (rarely 12.5 micr.) x 5.5-0 micr."

Found in sphagnous marshes, New York. The description is adapted from that of Peck and from his drawings. The pileus is represented as pale smoky brown, the stem almost white and with an oval bulb. "The spotted pileus is a distinctive feature."

349. Cortinarius lanatipes Pk.

N. Y. State Mus. Rep. 42, 1889.

"PILEUS 2.5-7.5 cm. broad, broadly convex or nearly plane, *viscid, grayish*, often tinged with yellow, becoming yellowish or subfulvous and *virgate* with innate tawny fibrils when old. FLESH whitish. Gills adnexed, narrow, close, *pale violaceous at first*. STEM short, 3-5 cm. long, 6-10 mm. thick, *equal or tapering upward above the oval bulb*, solid, subannulate, silky above the annulus, loosely fibrillose-tomentose below, white. CORTINA white. SPORES elliptical, 7.8.5 x 4-5 micr."

In spruce groves, New York. September. The cortina is probably very copious, although it is possible that a white universal veil is also somewhat in evidence. The virgate pileus which changes color in age and the "woolly" covering of the stem are, according to Peck, the distinguishing marks. The type-specimens show that its place is in this group. The plants are not large. This approaches *C. glaucopus* Fr. in some respects.

350. Cortinarius claricolor Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 142, Fig. 2.
Gillet, Champignons de France, No. 205.
Cooke, Ill., Pl. 693.
Ricken, Blätterpilze, PI. 41, Fig. 1.
Quelet, Grevillea, Vol. VI., Pl. 102, Fig. 1.

PILEUS 5-10 cm. broad, firm, obtusely convex, at length broadly convex to plane, subdiscoid, glutinous when moist, shining when dry, even, glabrous, raw-sienna color to *orange-buff* (Ridg.), *unicolorous*, not virgate, margin incurved and cortinate. FLESH compact, *white*, thick on disk. GILLS emarginate-adnexed, *rather narrow*, close, *at first caesious to pale brownish-drab* (Ridg.), finally clay-color, *edge erose-serrate*. STEM 5-8 cm. long, round-bulbous to clavate-bulbous, 12-15 mm. thick above, bulb up to 2 cm. thick, *white*, firm, solid, fibrillose or floccose-fibrillose. SPORES almond-shaped, 8-10 x 5-6 micr., punctate-rough, pale rusty-ochraceous. ODOR and TASTE mild.

Gregarious or subcaespitose. On the ground among spruce and white pine needles. Adirondack Mountains, North Elba, N. Y. September, 1915. Collection Kauffman. Infrequent.

The cracked surface of the pileus and the densely floccose stem, said to be characteristic of the species in Europe, were not characters of the North Elba plants. The stems however, were quite silky-fibrillose with white fibrils. The universal veil is lacking. The spores agree only with the measurements of Britzelmayr. Other authors give larger spores, 10-12 x 7-8 micr., and segregation may become necessary. The bulb may be subemarginate at first, but it is not depressed and the cortina is superior.

351. Cortinarius lapidophilus Pk.

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

"PILEUS 5-7.5 cm. broad, at first hemispherical, then convex-expanded, *at first cinereous*, becoming ochre-tinged, often crowded and irregular, *virgate* with appressed fibrils. FLESH whitish. GILLS crowded, *dark-violaceous at first*, then argillaceous-cinnamon. STEM 5-10 cm. long, 6-10 mm. thick, solid, *equal or slightly thickened at base*, whitish." SPORES (of type specimens) broadly elliptic-oval to *subglobose*, rough-punctate, 7-8-x 6 micr.

Subcaespitose. Rocky soil in woods, New York. August.

The pileus of the dried type specimens is dark cinereous. It appears to approach *C. infractus* Fr. in some of its forms and especially as to its spores.

352. Cortinarius copakensis Pk.

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

"PILEUS 3-7.5 cm. broad, convex then expanded, often crowded and irregular, *viscid, corrugated, pale ochre* slightly tinged red. GILLS broad behind, subdistant, *violaceous at first*, the interspaces veiny, edge eroded. STEM 5-7 cm. long, rather slender, 4-8 mm. thick, *equal or tapering upwards*, stuffed, silky, whitish." SPORES broadly elliptical to *subglobose*, rough-punctate, 7-9.5 x 7 micr.

"*Subcaespitose*. On the ground in woods. New York. October."

The plants are not large, and the pileus is said to be glabrous and shining when dry. The gills are alutaceous-cinnamon in the dried type-specimens.

353. Cortinarius albidipes Pk.

N. Y. State Mus. Bull. 157, 1912.

Illustrations: Ibid, Pl. 128, Fig. 1-6.

"PILEUS 5-10 cm. broad, compact, hemispheric then broadly convex, obtuse or subumbonate, *viscid*, glabrous and shining when dry, *buff color*. Flesh white. GILLS 4-6 mm. broad, moderately close, *pale violaceous at first*, cinnamon when mature. STEM 5-8 cm. long, 10-

15 mm. thick above, *clavate-bulbous and tapering upward*, firm, solid, silky-fibrillose, *white*. SPORES subglobose, 8-10 x 7-9 micr. TASTE mild.

"Among fallen leaves in woods. New York. September.

"A fine, large species, easily recognized by its buff, viscid cap, its violaceous young gills and its white stem thickened or bulbous at the base." As in most of this subgenus, the spores are said to lodge on the remains of the white webby cortina, and form a conspicuous rusty or cinnamon-colored ring near the top of the white stem.

354. Cortinarius decoloratus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 729.
Quelet, in Grevillea, Vol. 7, Pl. 107, Fig. 4.

PILEUS 3-7 cm. broad, convex then expanded, *buff or pallid clay-color*, regular, viscid, slightly corrugate when dry. FLESH thin, watery, *soft*, white. GILLS adnate, sometimes subdecurrent, sinuate, close, moderately broad, *caesious or pallid-gray at first* then pale cinnamon. STEM 5-7 cm. long, 3-8 mm. thick, equal or tapering upward, stuffed then hollow, *whitish*, sometimes striate above, obscurely spotted with ochraceous shreds of the veil. SPORES sub-globose to oval, almost smooth, 8-9 x 6-7.5 micr.

Gregarious or scattered. In moist places in frondose woods. Ann Arbor. September. Infrequent.

A closely related form has a bitter taste according to some authors. The caesious color of the gills is soon obscure or lacking. It has not been found in quantity and the spores of our plants are slightly too large.

***Gills at first olivaceous or sooty-olivaceous.*

355. Cortinarius infractus Bres. (ex. Pers.)

Fung. Trid., Vol. 2, 1892.

Illustrations: Ibid, Pl. 163.
Cooke, Ill., Pl. 704 (Pl. 705 as *C. anfractus* Fr.).
Quelet, in Grevillea, Vol. 6, Pl. 104, Fig. 3 (as *C. anfractus*).
Ricken, Die Blätterpilze, Plate 43, Fig. 2, et. al.
Plate LXXIII of this Report.

PILEUS 5-10 cm. broad, convex then expanded, *viscid*, glabrous, even, *dark olive or sooty-olive* then tinged fulvous, *margin broadly incurved*, then spreading and often with a broad zone. FLESH whitish or slightly violaceous-tinged, firm, thick except on margin. GILLS narrowed-adnate, sometimes emarginate or spuriously subdecurrent, crowded to almost subdistant, rather narrow, sometimes broader, *dark olive or sooty-olive*, at length umber, edge crenulate-eroded. STEM 5-9 cm. long, 8-15 mm. thick, solid, clavate or with oval bulb, fibrillose, *dull violaceous above*, dingy whitish to olivaceous below. SPORES subglobose to oval, rough-punctate, 7-8 x 5-6.5 micr. BASIDIA 30 x 7 mier., 4-spored. ODOR slight. TASTE of pellicle or pileus *bitter*. Gregarious. On the ground in mixed and frondose woods. August-October. Ann Arbor, Marquette, New Richmond. Infrequent.

This is a variable species, and was placed by Fries under two names: *C. infractus* and *C. anfractus*. Bresadola combined these and gives an excellent description. Ricken (Blätterpilze, p. 144) has again attempted to segregate them. There is no doubt that forms occur which might be kept apart on the basis of different shades of color, stature, etc. Our plants often have narrow adnate gills but luxuriant specimens occur with broad gills. In all forms which seemed to belong here, the pellicle of the pileus was bitter. According to Ricken this would be *C. subsimile* (Pers), but the colors do not agree with that. In all these forms the spores are said to be practically of the same size and shape. Further study on our plant is necessary if they represent different species.

356. Cortinarius olivaceus Pk.

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

"PILEUS 3-5 cm. broad, convex then expanded, glabrous, *viscid*, dark brown with a greenish or olivaceous tinge. FLESH *grayish*. GILLS close, rather broad, at length ventricose, *dark olivaceous at first*, then cinnamon. STEM 6-8 cm. long, 6-10 mm. thick, equal, stuffed to hollow, *white-violaceous*, thickened below *with an oval bulb*." SPORES elliptical, very rough, tuberculate, 10-12.5 x 6-7.5 micr.

On the ground, in woods. New York. September. A study of the type-specimens and accompanying drawings show that this species is to be placed in the present subgenus. The spores differ markedly from those of *C. infractus* and *C. herpeticus*, both in size and shape. It approaches *C. luteofuscus* more closely.

357. Cortinarius longipes Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 5-8 cm. broad, convex to expanded, slightly fibrillose, *viscid, yellowish or pale ochraceous*. GILLS close, plane, *brownish-olivaceous at first*, then cinnamon. STEM *elongated*, 10-15 cm. long, 6-8 mm. thick, *tapering upward*, slightly fibrillose, whitish." SPORES broadly elliptical to subglobose, slightly rough, 6-7.5 x 5-6 micr.

Ground in woods. New York. September.

Related to *C. anfractus* by the spore-characters, but it differs much in the elongated stem and color of pileus. In statue it is more like *C. ophiopus* Pk.

358. Cortinarius glutinosus Pk.

N. Y. State Mus. Rep. 43, 1890.

"PILEUS 2.5-7 cm. broad, convex, *glutinous, brownish-ochraceous*, margin narrowly involute. FLESH yellowish. GILLS adnexed, rather broad, *olivaceous*. STEM 3-7 cm. long, 6-10 mm. thick, solid, whitish or pallid, thickened at the base, *scarcely bulbous*."

SPORES broadly elliptical to subglobose, minutely rough, 7-8 x 5.5-6.5 micr.

On mossy ground, Adirondack Mountains, New York. July.

The type-specimens show a rather medium-sized plant; the pileus is dark, dull, rufous-brown when dried, the gills rather broad and not crowded. "The prominent features," says Peck, are "the dull ochraceous pileus, olivaceous gills and pallid stem. The margin of the pileus is sometimes rimose." It seems related to *C. infractus* by its spores and gills, but is apparently distinct because of the change of color of the pileus on drying.

****Gills at first yellow.*

359. Cortinarius luteo-fuscous Pk.

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

"PILEUS 5-6 cm. broad, broadly convex, even, glabrous, *viscid, pale fuscous to smoky-brown*. GILLS deeply emarginate, rather broad, rather close, *yellow at first*, at length cinnamon. STEM 9-10 cm. long, 6-8 mm. thick, equal above, *with a rounded-oval bulb* below, solid, silky-striate, *whitish*." SPORES broadly elliptical, obtuse, somewhat rough, 12-13 x 6-7.5 micr.

On the ground in woods. New York. October.

This species is closely related to *C. olivaceus* Pk. both in stature, habit and spore-size. The colors differ somewhat and it needs further study. The spores are given too large in the original description. The measurements given above were made from the type specimens.

*****Gills at first white or pallid.*

360. Cortinarius coloratus Pk.

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

Illustration: Plate LXXIV of this Report.

PILEUS 5-10 cm. broad, convex then broadly campanulate and discoid, *bright reddish-yellow to tawny-orange and shining*, becoming dull testaceous, glabrous, even, sometimes radially cracked on drying, *with a viscid pellicle*, margin at first incurved. FLESH whitish, thick except margin, firm, compact. GILLS adnate at first, becoming emarginate, *rather broad*, close, rigid becoming crisped on drying, thin, *whitish or pallid at first*, then pale clay-color to cinnamon-brown, *not reaching the margin of the pileus*, edge paler. STEM 5-12 cm. long, *clavate-bulbous*, 8-12 mm. thick above, 20-30 mm. thick at bulb, solid, firm, at first white and silky-fibrillose from the cortina, *white within, slightly* lutescent, marked at times by the thin remains of an evanescent, yellowish-tawny universal veil, attached at base to delicate *white* mycelioid strands. CORTINA white, cobwebby, not very copious. SPORES almond-shaped, elliptical, distinctly rough, 9-11 x 6-7 rnicr. BASIDIA 35-40 x 8-9 micr., 4-spored. ODOR and TASTE slight.

Gregarious. On the ground among fallen leaves m frondose woods of oak, maple, etc. Ann Arbor. September-October. Infrequent.

This is a noble species, well-marked and brightly colored when fresh. It seems closely related to *C. saginus* Fr. and may be the American form of that species. See figures of *C. saginus* (Cooke, Ill., Pl. 703, and Quelet, in Grevillea, Pl. 92), which show a much stockier plant without the reddish color which pervades the pileus of our species. The universal veil is almost obsolete and leaves only one or a few very narrow yellow-tawny marks across the stem. The bulb varies from heavy clavate to rounded-oval, depending on the amount of elongation of the stem. When crushed the flesh sometimes gives forth a slight aromatic-radishy odor. It has been collected in several states.

361. Cortinarius ophiopus Pk.

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

PILEUS 5-10 cm. broad, convex or subcampanulate, then expanded, sometimes irregular, *viscid*, glabrous, *reddish-yellow*, the paler margin sometimes roughened by adhering patches of the whitish veil. FLESH white. GILLS close, rather broad, *brownish-cinnamon*, edge often eroded. STEM 10-15 cm. long, 8-12 mm. thick, equal, *long* and usually much bent or variously curved, at first shaggy-scaly from the subconcentrically arranged fragments of the copious veil, *white or yellowish*. SPORES elliptical, inequilateral, 11-12 x 6-7 micr.

On the ground, among leaves in woods. Maryland. September.

The dried type-specimens have much the appearance of *C. corrugatus* in stature and colors, with a yellowish stem; the spores, how ever, are smaller, and the bulb seems to be lacking.

362. Cortinarius communis Pk.

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

PILEUS 2-6 cm. broad, convex-expanded, obtuse, *whitish with a gray tinge at first*, becoming yellowish or brown in age, *subviscid*, sometimes reddish, *glabrous*, margin decorated at first by white fibrils of the cortina. GILLS emarginate, at length subdecurrent by tooth, medium broad, close, *white to pallid at first*, then pale ochraceous-cinnamon. STEM 4-6 cm. long, 4-6 mm. thick, stuffed to hollow, *equal* or nearly so, curved at base, mealy at apex, subfibrillose, *white* then yellowish-stained. SPORES ventricose-elliptical, 9-10.5 x 5-6 micr. Smooth. TASTE slightly bitterish. CORTINA white.

Gregarious. On grassy ground, in frondose woods. May. Ann Arbor. Infrequent.

The spores and gills are pale brown at maturity, and in this respect depart from the characters of the genus. As Peck has pointed out (N. Y. State Mus. Rep. 30) it is much like Pholiota in these characters. The cortina,

however, forms no annulus. The plants appear early with us, while Peck reports it for September-October,

SUBGENUS INOLOMA: Pileus and stem *neither viscid nor hyproghanous*. Pileus at first innately scaly, fibrillose or silky; flesh rather thick. STEM stout, the base enlarged and tapering upward, i. e., clavate-bulbous. Universal veil present or lacking.

This subgenus is composed of species which have the stature of the larger Telamoniae but in that sugbenus the pileus is hygrophanous and subglabrous and when silky or fibrillose the fibrils are superficial. A few species are included here which have a slight hygrophanous character. A few more are added which have a rather equal stem, but show their affinity by the stout habit. One group possesses a universal veil which persists on the stem in the form of an adnate sheath or annulus. In my paper (Bull. Torr. Bot. Club., Vol. 32, p. 305, 1905) this group was eliminated from the diagnosis of this subgenus as there given, but further study has convinced me that a more consistent and natural arrangement would be the recognition of the universal veil under it. The smaller Inolomas gradually approach the subgenus Dermocybe, so that the species of these two groups cannot always be readily distinguished. The stout clavate stem and scaly pileus throw a plant into the Inoloma group, while the small size, the thin flesh of the pileus and the more slender, equal stem indicate a Dermocybe.

Section I. Universal veil manifest on the stem in the form of an appressed sheath.

**Gills at first violaceous, lilac or purplish.*

363. Cortinarius alboviolaceus Fr. (Edible)

Syst Myc., 1821.

Illustrations: Fries, Icones, Pl. 151, Fig. 3.
Cooke, Ill., Pl. 747 (faded).
Gillet, Champignons de France, No. 191.
Marshall, The Mushroom Book, Pl. 14 op. p. 65, 1905.
Hard, Mushrooms, Fig. 237, p. 295, 1908.
Ricken, Die Blätterpilze, Pl. 44, Fig. 5.

PILEUS 3-6 cm. broad, companulate at first, then convex and broadly umbonate, dry, beautifully appressed silky, *shining*, varying pale violaceous to caesious-buff, *soon silvery-white and scarcely violaceous-tinged*, even, margin persistently decurved. FLESH thin on margin, *caesious or tinged violet*, surface differentiated into a thin layer, up to 15 micr. thick, composed of narrow, horizontal hyphae about 3 micr. in diam. GILLS at first adnate, then emarginate or slightly subdecurrent, close, moderately broad, varying *pale violet to ashy-purplish at first*, soon paler, at length cinnamon-brown, edge eroded-crenulate. STEM 4-8 cm. long, *clavate-thickened at or near the base, narrowed* upwards, 5-9 mm. thick above, up to 20 mm. below, spongy-stuffed, *usually peronate by thin, white, appressed, silky-interwoven, soft universal veil*, violaceous above and beneath the veil. CORTINA white. SPORES 6.5-9 x 4-5 (rarely 10 x 5.5), elliptic-oval to narrow-elliptical, scarcely rough, *variable in size*. BASIDIA 30 x 6-7 micr., 4-spored. ODOR and TASTE mild. MYCELIUM white.

Gregarious. Among leaves or in deep humus of hemlock, mixed or frondose woods. Throughout the State. August-October. Scarcely infrequent.

It is possible that this species may be composed of an aggregation of several forms. One form has more uniform and smaller spores and the surface layer of the pileus becomes subgelatinous in wet weather. I would call this forma *pulchripes*, since the stem is beautifully marked by the violaceous color above the white sheath. Its spores measure 6-7.5 x 4-5 micr. In all other respects it shows the characteristics of *C. alboviolaceus*. All forms have the same development. In the young plant, the stem is relatively stout and clavate-subconic, with a more or less helmet-shaped young cap, scarcely broader than the stem, mounted on its apex. The mature stem is somewhat irregularly ventricose-thickened, sometimes above the base, sometimes truly clavate-bulbous. The color is typically violaceous-white but varies to deeper violaceous in the gills and flesh and the very young button is deeper violet in the interior. The color fades somewhat, but dried specimens always show the gray or violet tints. I have not been able to distinguish *C. malachius* Fr., an European plant, in this region. The nearest relative of *C. malachius* with us seems to be *C. obliquus* Pk.

364. Cortinarius subpulchrifolius sp. nov.

Illustration: Plate LXXV of this Report.

PILEUS 4-10 cin. broad, firm, subhemispherical at first, then broadly convex to expanded, often gibbous, obtuse, *not hygrophanous, innately silky-tomentose*, glabrescent, even, *grayish-buff*, becoming ochraceous or rusty stained in age, margin at first incurved, then spreading and whitened by the veil. FLESH *thick*, compact, pale caesious then whitish. GILLS adnate at first, becoming sinuatersubdecurrent, *broad*, subventricose, *subdistant, at first dull purple*, color subpersisting, at length cinnamon-umber, thickish, edge entire. STEM stout, 5-10 cm. long (often of medium length), 10-15 mm. thick, equal or slightly enlarged below, *firm*, solid, *sheathed by the distinct, appressed, dingy-white universal veil*, which terminates at or above the middle in an evanescent floccose-fibrillose ring, sometimes only marked by the thin subannular patches of this veil, apex violaceous or pale drab, whitish to drab within. CORTINA white, rather copious. SPORES broadly elliptical, distinctly rough-punctate, maturing slowly, 9-10.5 x 5-6.5 micr., rusty-umber in mass. BASIDIA 36-40 x 9, 4-spored. ODOR slightly of humus. TASTE mild.

Gregarious or subcaespitose. On the ground, among fallen leaves, in frondose and mixed woods. September-October. Ann Arbor, New Richmond. Rather frequent.

This species approaches *C. pulchrifolius* in possessing purple gills which remind one of *Clitocybe ochrapurpurea* except that they are not as bright as in that species. An examination of the type-specimens of *C. pulchrifolius* showed that our plant is distinct. The spores never come within the sizes of Peck's species, and the pileus has no reddish shades. The dried plants are also different. In spite of these things the two species are close together. Except for its lack of the hygrophanous flesh, and the character of the surface of the cap it also approaches *C. impennis* Fr. and *C. torvus nobilis* Pk. The universal veil is usually well-developed, but sometimes the remnants show only as thin patches on the mature stem. The purplish color of the gills is retained to late maturity. The spores mature slowly and the measurements must be made from mature plants. It must not be mistaken for either *C. torvus* Fr. nor *C. impennis* Fr.

365. Cortinarius pholideus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 761.
Quelet, in Grevillea, Vol. VII, Pl. 117, Fig. 1.
Ricken, Die Blätterpilze, Pl. 46, Fig. 4.
Plate LXXVI of this Report.

PILEUS 4-8 cm. broad, hemispherical-campanulate at firstr then expanded, broadly umbonate, *surface covered by dense, innate, erect or squarrose, dark, cinnamon-brown or blackish pointed hairy scales*, fawn-color at first, not hygrophanous. FLESH thin, slightly violaceous, soon whitish or sordid brownish, usually infested with larvae. GILLS narrowly adnexed, medium broad, close, lilaceous at first, soon clay color to brown, edge entire. STEM 4-8 cm. long (sometimes longer), 5-12 mm. thick, spongy-stuffed and tunneled by larvae, slightly narrowed upwards, violaceous or lilac-tinged above the concentric, squarrose, brown scales which represent the sheathing universal veil. CORTINA sparse, fibrillose. SPORES oval, rough-punctate, 6-7.5 x 5-5.5 micr. BASIDIA 27 x 6 micr. ODOR and TASTE mild.

Gregarious or caespitose. In moist forests, near decaying debris or on very rotten logs, in the conifer regions of the State. Bay View, Marquette. August-September. Infrequent.

This well-marked species is probably frequent enough in its particular localities. I have collected it a number of times on much decayed wood in wet places, a preference which authors do not appear to have noticed for it elsewhere. The color varies somewhat as to the shade of brown which the veil and the pileus possess, but the characteristic scales of the cap and stem serve for easy identification. Two European species approach it closely. *C. arenatus* Fr. differs in its entire lack of violaceous hues. This has been reported in the state list, but it is probable that it was confused with a Pholiota. *C. penicillatus* is said to lack the squarrose scales, as well as the violaceous tints of the gills and flesh. *C. asper* Pk. may be only a variety of this species.

366. Cortinarius squamulosus Pk.

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

Illustrations: Ibid, Pl. 3, Fig. 1-3.

PILEUS 4-10 cm. broad, semiglobose at first, then convex to subexpanded and broadly umbonate, surface densely appressed-tomentose at first, *soon broken up into dense, rather large, fibrillose scales*, sometimes warty on disk, brown and purplish-tinged at first, *soon chocolate-brown*. FLESH thick on disk, abruptly thin toward margin, watery-spongy, pinkish-white to grayish-white at first. GILLS adnate then deeply emarginate, rather broad, close, *purplish at first, soon dark cinnamon to chocolate-brown*, edge minutely flocculose. STEM 8-15 cm. long, stout, *swollen near the base into a large, ventricose-clavate bulb*, tapering below the bulb, 10-20 mm. thick at apex, bulb 2 to 3 times as thick, watery-spongy within, at first purplish, *soon chocolate-brown*, sometimes subscaly, sometimes fibrillose, *annulate above by a definite band-like collar*. CORTINA pallid to brownish, closely woven. SPORES 6.5-8.5 x 6-6.5 micr., broadly elliptical to subsphoeroid, distinctly rough, dark rusty-brown in mass. BASIDIA 33 x 6 micr., 4-spored. ODOR somewhat spicy when fresh becoming strong on drying. TASTE at first mild.

Gregarious, sometimes in troops. On the ground, in low, moist, frondose woods or swamps of maple, beech, etc. Detroit, Ann Arbor. August-September. Infrequent.

Easily known by its entirely chocolate color when mature, the ventricose, pointed bulb and the band-like annulus. It absorbs water in rainy weather and becomes watery-spongy, but on drying out it takes on a tough consistency. It can scarcely be confused with any other species. Sterile outgrowths border the edge of the gills so that they appear flocculose.

367. Cortinarius erraticus Pk.

N. Y. State Mus. Rep. 42, 1889.

"PILEUS 5-7.5 cm. broad, firm, subcampanulate or convex, obtuse, dry, silky or obscurely scaly with innate fibrils, *canescent, often becoming grayish-tawny*. FLESH dingy white. GILLS ad-nexed, subdistant, pale tawny, becoming darker with age. STEM 5-10 cm. long, 6-12 mm. thick, firm, solid, *thickened toward the base*, white and tomentose below, *violaceous above*. UNIVERSAL VEIL *violaceous*, often forming an imperfect annulus and sometimes remaining in fragments or floccose scales on the margin of the pileus." SPORES elliptical, scarcely rough, 7.5-10 x 5-6 micr.

On the ground in groves of balsam. New York. September.

A study of the type-specimens showed that it has a universal veil, and that the spores average larger than the size given by Peck. The color of the gills when young is not certain. It would be a rather unusual relation to find the apex of the stem violaceous while the young gills are "pale tawny." For this reason, I have

included it under the present section, where it probably belongs.

***Gills without violaceous or purple tints at the first.* (Likewise pileus, flesh and stem.)

368. Cortinarius bolaris Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 760.
Gillet, Champignons de France, No. 199.
Quelet, in Grevillea, Vol. V, Pl. 79.
Ricken, Die Blätterpilze, Pl. 46, Fig. 2.
Plate LXXVII of this Report.

PILEUS 3-6 cm. broad, convex-expanded, obsoletely umbonate, *variegated by appressed, pink-red, saffron-red or cinnabar red, hairy scales* on a white ground, dry, fading, the thin incurved margin surpassing the gills. FLESH white, tinged creamy-yellow, thin. GILLS adnate, close, medium broad, distinct, pallid, *soon pale cinnamon*. STEM 5-6 cm. long, 5-10 mm. thick, tapering upward and *subequal*, stuffed then hollow, *covered like the pileus by red, fibrillose-hairy, appressed scales*, sometimes subglabrescent, *flesh becoming saffron or reddish when bruised*. CORTINA white. SPORES broadly oval to subsphoeroid, scarcely rough, 6-7 x 5-5.5 micr. BASIDIA 30 x 6 micr., 4-spored. ODOR and TASTE none. MYCELIUM red.

Gregarious or subcaespitose. In the conifer regions of the State, in mixed woods of hemlock and beech. Bay View, New Richmond. August-September. Infrequent.

This Cortinarius is known by its delicate hairy-fibrillose ornamentations on the cap and stem; these are saffron-red or darker in contrast with the whitish or yellowish flesh beneath. The cap is dry, not hygrophanous, but the fibrillose scales appear as if glued thereon. This must not be confused with *C. rubripes* which is markedly different, usually very glabrous on the pileus and much larger. The figures referred to above illustrate our plant well, except that of Ricken which emphasizes the scales and shows a stem tapering downwards. The decoration on the stem apparently represents the remnants of a universal veil.

369. Cortinarius annulatus Pk.

N. Y. State Mus. Rep. 43, 1890.

Illustrations: Ibid, Pl. 2, Figs. 1-4.
Plate LXXVIII of this Report.

PILEUS 3-9 cm. broad, broadly convex at first, then subexpanded, obtuse, dry, disk or entire surface usually *covered with innumerable, minute, pointed, erect floccose and tawny scales*, sometimes smooth, ground color, golden-tawny or tawny yellow, with a bronze lustre, margin at first incurved. FLESH thick, whitish, scarcely or not at all hygrophanous. GILLS adnate, becoming emarginate, *rather narrow*, 4-9 mm. sub-distant, distinct, *at first pallid ochraceous*, then rusty-cinnamon, rather rigid, edge paler. STEM 4-8 cm. long, apex 8-15 mm. thick, *clavate*, twice as thick below, sometimes subequal, *peronate three-fourths to apex by the thin, silky-woven*, appressed, *pale tawny or yellowish universal veil*, which terminates above in an obscure ring, solid, yellowish within, whitish and fibrillose above the veil from the *white* CORTINA, base whitish, arising from a *white mycelium*. SPORES *globose*, distinctly rough, 6-7 x 5-6 micr., dark rusty-brown in microscope. ODOR of radish. TASTE mild or slightly astringent.

Gregarious, or scattered, sometimes in troops. On the ground in frondose or mixed, rich woods. August-October, usually rather early. Ann Arbor, Detroit. Not infrequent.

This species seems to represent the American form of *C. tophaceus* Fr., but the figures of that species as given by Fries, Cooke and Quelet do not remind one at all of our species. It is not easy to bring out in a figure the metallic, somewhat glittering, luster shown by a typical pileus of this plant. Ricken's figure of *C. tophaceus* comes nearer to the exact color, but he describes that species with the edge of the gills bright yellow. *C. annulatus* differs from *C. flavifolius* in the color of the universal veil and the scaly pileus. Specimens have been seen, however, in which the color of the pileus varied to ochraceous or clay-color, with brown scales. The scales, when well-developed, radiate in a star-like or bird-foot manner connecting with one another and raised in the center to a needle-like point. In the very young plant the surface of the cap is merely densely and finely tomentose, this layer connecting with the veil on the stem. Sometimes the scales are almost entirely lacking except on the center of the disk. *C. lutescens* Pk. seems to represent the latter condition. (N. Y. State Mus. Rep. 42, 1889.)

370. Cortinarius flavifolius Pk.

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

Illustrations: Atkinson, Mushrooms, Plates 45 and 46, Figs. 152 and 153, 1900 (as *Cortinarius ochroleucus*).
Plates LXXIX, LXXX of this Report.

PILEUS 4-15 cm. broad, (usually 4-8 cm.), convex then expanded, almost plane, *creamy-buff at first*, sordid, buff to ochraceous, or pale tawny-yellowish in age, *appressed tomentose or minutely fibrillose-scaly*, sometimes only silky-tomentulose, margin at first incurved. FLESH thick, abruptly thin toward the margin, whitish, scarcely hygrophanous but moist. GILLS adnate then emarginate, *subdistant*, broad, *dull pale yellowish at first*, then *ochre-yellow*, finally yellowish-cinnamon or rusty. STEM 4-12 cm. long, *clavate or clavate-bulbous*, 6-18 mm. thick above, 15-30 mm. below, sometimes subequal, spongy-solid, *covered at first by a thin, silky-woven, appressed whitish universal veil, at length peronate* or becoming naked. CORTINA white, silky, copious, sometimes forming a rusty-stained ring above the veil. SPORES sphoeroid to oval-elliptical, minutely but distinctly rough, with an abrupt, long apiculus (as in species of Russula), 6-9 x 5-6 (incl. apiculus). BASIDIA 36-40 x 6-7 micr., 4-spored.

Gregarious. On the ground in rich humus or among fallen leaves, in frondose woods of oak, maple, etc. Throughout the State. August-October. Frequent.

A well-marked plant, often of large size and distinguished by the white universal veil which forms a very thin sheath on the stem, by the prevailing silky-tomentulose pileus and rather broad gills. It was referred by Peck to the subgenus Telamonia, but the flesh is scarcely hygrophanous, and the pileus not glabrescent. The gills are rarely "rich sulphur-yellow" as described by Peck, but the spores of the type-specimens are described above and are quite distinct. It differs from *C. annulatus* and *C. croceocolor* in the pale, delicate yellowish-white colors of cap and stem. It is apparently a native American species. *C. newfieldiensis* Ellis of the N. A. F. exsiccati No. 3052 is identical.

371. Cortinarius croceocolor Kauff.

Bull. Torr. Bot. Club, Vol. 32, 1905.

Illustrations: Ibid, Fig. 5, p. 314.
Jour. of Mycology, Vol. 13, Pl. 93, 1907.
Mycological Bull., Vol. 5, Fig. 240, p. 314, 1907.
Plate LXXXI of this Report.

PILEUS 3-7 cm. broad, convex then expanded, *saffron-yellow, with dense, minute, dark-brown, erect squamules on disk*, scarcely hygrophanous, not striate. FLESH yellowish-white, thick on disk, thin toward margin, slightly hygrophanous, scissile. GILLS cadmium-yellow, scarcely subdistant, rather thick, emarginate, rather broad, width uniform. STEM 4-8 cm. long, clavate or clavate-bulbous, 9-15 mm. thick below, *peronate three-fourths of its length by the chrome-yellow to saffron-yellow universal veil*, paler at apex, solid, saffron-colored within, soon dingy, attached to strands of yellowish mycelium. SPORES subsphoeroid to short-elliptical, 6.5-8 x 5.5-6.5 micr., echinulate.

Gregarious or solitary in mixed woods, Ithaca, N. Y. Not yet found within the borders of the State. Probably to be looked for in the north. The whole surface of the pileus has a velvety appearance and feel. The entire plant is often saffron-colored. It approaches *C. callisteus* Fr. on the one side and *C. limoneus* Fr. on the other. It was originally placed under the subgenus Telamonia, but the present characterization of Inoloma admits it here. *C. croceofolius* Pk. seems to be somewhat related, but averages much smaller and its pileus is more brown and lacks the scales, and the stem is not peronate.

372. Cortinarius ochraceous Pk.

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

PILEUS 5-8 cm. broad, convex, *broadly subumbonate* or gibbous, glabrous, *pale ochraceous*, even or obscurely wrinkled. FLESH thick, whitish. GILLS emarginate, rather broad, subdistant, *pallid to pale ochraceous at first*, then rusty-cinnamon. STEM 5-10 cm. long, rather stout, 8-12 mm. thick at apex, *clavate or clavate-bulbous*, bulb 20-38 mm. thick, fibrillose, ochraceous above *the white, appressed, sheath of the universal veil*. SPORES broadly elliptical, slightly rough, obtuse at ends, 9-11.5 x 6-7.5 micr.

Under balsam trees. New York. October.

The original description has been completed by a study of the type specimens and of the drawings made by Dr. Peck. The sheath on the stem is white and much as in *C. flavifolius*, but the spores are much larger.

373. Cortinarius canescens Pk.

N. Y. State Rep. 42, 1889.

"PILEUS 5-7.5 cm. broad, subcampanulate or convex, obtuse or somewhat umbonate, *silky or scaly with innate grayish fibrils, whitish gray when young,* tinged with yellow or rufous hues when old. GILLS thin, subdistant, rounded behind and adnexed, *pallid at first*. STEM 5-10 cm. long, 8-12 mm. thick, solid, *white*, equal or tapering upward from a large, soft, spongy, *clavate-thickened base, peronate and subannulate by the silky-fibrillose, white veil*." SPORES elliptical, subinequilateral, slightly rough, 10-12 x 5.5-6.5 micr. ODOR not marked. TASTE unpleasant."

Gregarious. In spruce groves. New York. September.

Peck states that it is distinct from its allies by the absence of violaceous hues in the young gills. The pileus of the dried type specimens is of a dark smoky-gray color.

374. Cortinarius squarrosus Clements

Botanical Survey of Neb., 1901.

"PILEUS 2.5-3 cm. broad, campanulate then convex, dry, subumbonate, *clothed on disk by dense, squarrose, umber scales*, fasciculate-fibrillose on the margin, pallid umber. GILLS slightly adnate, ventricose, sometimes uncinate, *fulvous to umber*. STEM 34 cm. long, 5 mm. thick, subequal, hollow, fibrous-fleshy, clothed with fulvous-umber, subsquarrose fibrils. CORTINA fibrillose, umber, fugacious. SPORES irregularly elliptical, smooth, 12 x 6 micr.

"Among vegetation on the ground in woods. Nebraska."

This species approaches *C. pholideus* and *C. squammulosus*, but the spores are larger and the gills are not described with any purplish tint when young. It is a rather small Inoloma.

Section II. Universal veil lacking or obsolete.

**Gills at first violaceous, purple, lilac or caesious.*

375. Cortinarius violaceus Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 257.
Fries, Sveriges ätlig. o. gift, Pl. 58.
Peck, N. Y. State Mus. Rep. 48, Pl. 12, 1894.
Cooke, Ill., Pl. 770 (deceptive).
Patouillard, Tab. Analyt., No. 127. (Immature.)
White, Conn. State Geol. and Nat. Hist. Surv., Bull. 15, Pl. 23.
Ricken, Die Blätterpilze, Pl. 44, Fig. 4.

PILEUS 5-12 cm. broad, convex, obtuse, subexpanded, *dry, dark violet, covered with villose, minute suberect tufts or scales*, at length metallic-shining. FLESH rather thick, varyin gray to dark violet, not becoming purple when bruised. GILLS adnate, becoming sinuate or emarginate, thick, *broad, subdistant, very dark violet*, becoming ashy-cinnamon. STEM 7-12 cm. long, *long and stout*, clavate or clavate-bulbous, 10-15 mm. thick above, *dark violet*, fibrillose, spongy in the rounded bulb, violaceous within, bulb large. SPORES *large*, rough, broadly elliptical, 12-16 x 7-9 micr. (often 16-18 micr. long, then smoother and more elongated). ODOR and TASTE mild.

Solitary or scattered. Among mosses, fallen leaves and debris of conifer woods. Found only once in Michigan; Isle Royale, Lake Superior. Frequent at North Elba, Adirondack Mountains, New York. August-October.

A striking species, not to be confused with dry specimens of the viscid-capped species, such as *C. purpurascens, C. sphaerosperma*, etc. The stem is usually long as compared with these, and the cap correspondingly smaller. The peculiar metallic luster of the dry mature pileus was observed in both our native collection and in Sweden. Both also had the characteristic fine-hairy-scaly surface not easily shown in figures but approached by Fries. No photographs exist which show this character well. The abnormally large spores were present in both our own and the Swedish plants. The whole plant is at first dark deep violet with an indigo tinge. Although nearly always mentioned in the "lists" of various American writers, its local or northern distribution leads me to suspect that other species have been mistaken for it. It seems to be more frequent in the east.

376. Cortinarius lilacinus Pk. (EDIBLE)

N. Y. State Mus. Rep. 26, 1874.

Illustration: Plate LXXXII of this Report.

PILEUS 5-9 cm. broad, firm, hemispherical, then convex, *minutely silky* or glabrous, *lilac-colored*, margin at first incurved. FLESH very thick on disk, compact and firm, tinged with lilac. GILLS adnexed, rounded behind, rather broad, thick, close to subdistant, sometimes transversely rivulose, *lilac at first*, then cinnamon, edge entire. STEM *stout*, 6-12 cm. long, *with a very large clavate bulb*, 15-20 mm. thick above, bulb 24 cm. thick, solid, compact, bulb spongy, fibrillose, lilaceous. SPORES broadly elliptical, rather obtuse, scarcely rough, 8-10 x 4.5-6.5 micr.

Gregarious. In low, moist swampy places in mixed or frondose woods. Detroit, Marquette. August-September. Infrequent.

The lilac color persists in the dried specimens. The bulb is much broader in the young plant than the unexpanded pileus. It is quite distinct from *C. alboviolaceus* in habit and stature, as well as color. The color of the pileus is like that of the European *C. traganus* Fr., and so is the general shape of the plant, but that species is quite distinct by a strong odor and by its ochre-yellow gills at the first. More slender plants have been found which apparently belong here and these are not easily distinguished from the related species such as *C. argentatus, C. obliquus*, etc., except by the color.

377. Cortinarius argentatus Fr. var.

Syst. Myc., 1821.

Illustrations: (Fries, Icones, Pl. 152, Fig. 2 of *C. camphoratus*.)
Cooke, Ill., Pl. 745 (771 of *C. camphoratus*).
Gillet, Champignons de France, No. 194.

PILEUS 5-9 cm. broad, convex to almost plane, *silvery-violaceous-whitish*, sometimes with a lilac or amethystine tinge, *dry*, beautifully appressed silky, even, not umbonate. FLESH whitish or at first tinged violaceous, thick on disk, abruptly thin on margin. GILLS narrowly sinuate-adnate, narrow, *close, pale violaceous*, rarely deep violaceous at first, soon pale alutaceous-cinnamon, edge minutely eroded-crenulate. STEM 5-8 cm. long, 10-20 mm. thick, solid, subequal *above the oval-bulbous or rounded-bulbous base*, bulb sometimes subemarginate, not depressed, sometimes subobsolete, *soon silvery-violaceous-whitish*, at first somewhat deeper violet at apex, concolor within, at first subfibrillose from the *violaceous-white* CORTINA, then innately silky, not at all peronate. SPORES elliptical, slightly rough, 7-9.5 x 5-6 micr. BASIDIA 30 x 9 micr., 4-spored. ODOR mild. TASTE slight.

Solitary or scattered. On the ground in woods of white pine and beach or in low frondose woods. Detroit, New Richmond. September. Infrequent.

This seems to be intermediate between *C. argentatus* and *C. camphoratus*, and differs from both in the more abrupt bulb than is shown by the figures of those plants. On the other hand, variations occur in the same collections in which the clavate-bulbous condition is present. On several occasions single plants were found, which agreed with the others except that there was present a distinct, penetrating odor, of an earthy-radishy nature. I have here considered them all the same. The narrow gills are always close, sometimes crowded, and this distinguishes it from the preceding. The surface of the pileus is scarcely or not at all differentiated into a

pellicle or other layer although a very slight viscidity develops if the plant is kept enclosed for a time in a tight receptacle. In habit, size and paler gills it differs markedly from *C. obliquus*. There is no universal veil.

378. Cortinarius obliquus Pk.

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

Illustrations: Ibid, Pl. L, Figs. 1-5.

PILEUS 3-6 cm. broad, broadly convex, subexpanded, dry, silky-fibrillose, *violaceous-white or grayish-white*, margin at first incurved. FLESH thickish on disk, concolor. GILLS adnate, thickish, *narrow, heliotrope-purple to deep lavender at first*, at length cinnamon-brown, close, obscurely transversely rivulose, edge minutely crenulate. STEM 3-6 cm. long, short and rather stout, 6-12 mm. thick above, solid, silky-fibrillose, *whitish*, violet-tinged within and without, *equal above the abrupt, depressed-marginate, oblique bulb*. SPORES narrowly elliptical, slightly rough, 7-9.5 x 4.5-5.5 micr., rather variable. ODOR and TASTE mild.

Gregarious. On the ground in frondose or mixed woods. August-September. Detroit, New Richmond, Marquette. Infrequent.

Well marked by the white or grayish-white pileus, the deep violet or almost amethystine or heliotrope color of the young gills and the oblique, flattened bulb of the stem. It has a dry pileus, without a viscid pellicle and must not be confused with the species of the subgenus Bulbopodium. When young, the color of the gills is in sharp contrast with that of the cap and stem. *C. brevipes* Pk. (41 st. Rep. N. Y. State Mus.) cannot be placed without further study.

379. Cortinarius pulchrifolius Pk.

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

"PILEUS 5-10 cm. broad, convex or expanded, obtuse, silky-fibrillose, *whitish or reddish-gray*, the margin whitened by the veil. GILLS emarginate, *broad, subdistant, bright purple or violet-purple*, then umber. STEM 5-10 cm. long, 6-10 mm. thick, solid, *cylindrical above the clavate or oval bulb*, silky-fibrillose, white, often tinged violet, violaceous within. CORTINA copious. SPORES elliptical, rough, 10-12.5 x 6.5-7.5 micr."

Oak woods. September. New York. Rare.

"This rare species is well-marked by the peculiar color of the young gills, which resembles that of the gills of *Clitocybe ochropurpurea*." A study of the type showed the spores to be markedly larger than in my *C. subpulchrifolius*, and without the peronate stem. I have not collected it.

380. Cortinarius rimosus Pk.

N. Y. State Mus. Rep. 48, 1896.

"PILEUS 5-10 cm. broad, firm, convex or plane, glabrous, *at first pale grayish-violaceous*, then tinged reddish-brown, the surface cracking into appressed scales or *becoming variously rimose*. FLESH whitish. GILLS emarginate, *rather broad, distant*, subventricose, *violaceous at first*, becoming brownish-ochraceous. STEM 4-8 cm. long, 8-12 mm. thick, *equal to slightly* enlarged at base, white and silky with the white veil, tinged violaceous within." SPORES elliptical, rough, obtuse at ends, 9-12 x 5.5-6.5 micr.

"Grassy ground in open places, thin woods. New York. September. A rather large and stout plant, remarkable for the tendency of the epidermis to crack in areas. The thin margin is often split." Peck considered it to be near *C. caninus* Fr. and *C. azureus* Fr., but its stout habit seems to bring it closer to this group. It must be remembered that other species often have a rimose pileus under certain weather conditions.

381. Cortinarius braendlei Pk.

Bull. Torr. Bot. Club, Vol. 32, 1905.

"PILEUS 7-12 cm. broad, firm, convex, silky, *brownish-lilac*, often varied by yellowish-brown stains, margin at first incurved and covered by the grayish-white silky cortina. FLESH lilac, especially in the young plant. GILLS adnate, slightly rounded behind, narrow, close, eroded on the edge, *grayish tinged with lilac*. STEM 5-7 cm. long, 10-15 mm. thick, stout, solid, silky-fibrillose, *bulbous*, white or whitish, bulb often pointed below. SPORES oblong-elliptic, obscurely granular, 12-15 x 7-8 micr. ODOR of radish.

"Among fallen leaves in woods. Washington, D. C. October. Sometimes the pileus loses all its lilac color and becomes wholly yellowish-brown."

383. Cortinarius rubrocinereus Pk.

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

"PILEUS 5-7 cm. broad, convex then expanded, silky-fibrilloser *reddish-cinereous*. FLESH at first violaceous. GILLS emarginate, rounded behind, subdistant, *dingy violaceous* at first, soon pale cinnamon. STEM 4-5 cm. long, 8-12 mm, thick, *short*, solid, *oval-bulbous*, silky-fibrillose, whitish tinged with violet." SPORES 8.5-11.5 (a few up to 14) x 6-7.5 micr., variable in size, broadly elliptical, obtuse at ends.

"Gregarious. On sandy soil. New York. September. Closely related to *C. pulchrifolius*, from which it is separated by its darker colored pileus and differently colored gills. CORTINA whitish-cinereous."

383. Cortinarius clintonianus Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 2-5 cm. broad, convex to expanded, with a few ap-pressed silky fibrils (*pale dingy brownish-tan*), more or less tinged with gray. GILLS close, moderately broad, *dull-violaceous at first*, then cinnamon. STEM 5-7 cm. long, *rather slender*, 4-6 mm. thick, tapering upward from a subclavate base, *violaceous above*, silky fibrillose. SPORES broadly elliptical to *subglobose*, rough-punctate, 7-8 x 6-7 micr."

Ground in woods. New York State. September-October. A revised description is given above, from the study of the type-specimens and the accompanying colored figures. The cap is said to be "reddish-brown," but if so, the colors of the drawing are very pale.

***Gills at first yellow, clay-yellow, or pale cinnamon.* (Becoming rusty-cinnamon or watery-cinnamon in age.)

384. Cortinarius callisteus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 153, Fig. 2.
Cooke, Ill., Pl. 774 and 864.

PILEUS 4-8 cm. broad, convex to subcampanulate, subumbonate, moist but not hygrophanous, *deep chrome-yellow to ochraceous-fulvous*, not fading, innately silky, glabrescent, margin at first incurved and silky. FLESH thick, thin on margin, whitish or tinged yellowish. GILLS adnate, subdistant, moderately broad, *yellow at first* then argillaceous to rusty-cinnamon, edge entire. STEM 4-9 cm. long, *clavate-bulbous*, 8-10 mm. thick above, 2 to 3 times as thick below, tapering upward, firm, solid, *yellow* (luteus) within and without, *streaked longtitudinally with fulvous, innate fibrils*. CORTINA fugacious, sometimes adhering at first to the margin of the pileus, yellowish-white. SPORES elliptical-oval, 7-8.5 x 5-5.5 micr., rough. ODOR weak, subnitrous.

Gregarious. On the ground in mixed hemlock, pine and oak woods. Ithaca, New York. September. Rare.

This species differs from the yellow-gilled group of the preceding section in the obsolete or absent sheath on the stem. Ricken has described and figured a species under this name with a minutely squarrose-sealy pileus and a differently shaped stem. Our plant seems to fit the Friesian species more closely than his, and the spores agree with those of specimens from Stockholm. Its colors and shapely form make it an attractive species. It does not appear to occur often. The colors become deeper in age.

385. Cortinarius autumnalis Pk.

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

Illustration: Hard, Mushrooms, Fig. 236, p. 294, 1908.

"PILEUS 5-9 cm. broad, convex to expanded, *dull rusty-yellow*, variegated or streaked with innate, ferruginous fibrils. GILLS moderately broad, close, with a wide, shallow emargination, *at length rusty yellow*. STEM 6-10 cm. long, 10-12 mm. thick, *equal above the oval bulb*, pale rusty-yellow, solid, firm. FLESH white. "SPORES elliptical, slightly rough, 7.5-9 x 4-5 micr.

"Pine woods. Bethlehem, Pennsylvania. November."

This is a somewhat confusing species. Including the type. I have seen specimens from several sources so named, but have not been able to refer any of my collections to it. The description as given by Peck is incomplete and although I have amended it so far as the type-specimens and an accompanying drawing permits, it remains uncertain as to the color of the young gills. The specimens of Peck show that it changes markedly towards rusty colors in age. The photograph of Hard represents a plant which appears familiar but as he omits a description of his own no certainty can be felt about it.

386. Cortinarius catskillensis Pk.

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

"PILEUS 5-8 cm. broad, convex or subcampanulate, then sub-expanded, even, *grayish-drab*, (pale ferruginous?) variegated with minute, scattered white fibrils. GILLS deeply emarginate, close to subdistant, rather broad, *watery cinnamon at first*, becoming darker with age. STEM 6-9 cm. long, 10-20 mm. thick, *stout*, solid, fibrillose, whitish, *clavate-bulbous*, tapering upward." SPORES narrowly elliptical, somewhat pointed at one end, 7-8 x 4-4.5 micr.

On the ground in open places. Catskill Mountains, New York. October.

The colored drawing accompanying the type-specimens shows a stout, clavate-bulbous plant with a grayish-drab pileus. Dr. Peck told me the pileus never had any reddish hues and the original description of a "pale ferruginous" pileus also is not borne out by the appearance of the dried specimens. A plant, apparently intermediate between this and the preceding occurs in Michigan. *Cortinarius robustus* Pk. belongs under this division but like that of the preceding two species, the description is insufficient.

387. Cortinarius whitei Pk.

Bull. Torr. Bot. Club, Vol. 29, p. 560, 1902.

"PILEUS 6-12 cm. broad, hemispherical at first, then nearly plane, with a lobed, wavy or irregular margin, dry, glabrous, *subpruinose, reddish or brownish-orange*, verging to tawny. GILLS deeply and broadly emarginate, subdistant, reddish-brown (?) at first, then brownish-cinnamon. STEM 7-12 cm. long, 15-20 mm.

thick, *long, equal*, solid, fibrous, colored like the pileus, adorned with darker, fibrous lines or striations. SPORES subglobose, 7-8 x 7 micr.

"Woods. Mt. Desert Island, Maine. August.

"A large species, intermediate between Dermocybe and Telamonia, related to the former by its dry pileus, to the latter by its general aspect and stout, solid stem." It is placed here for want of necessary additional data on its development. Specimens at the New York Botanical Garden have every appearance of belonging to Telamonia.

****Gills at first white or whitish.*

388. Cortinarius cæspitosus Pk.

N. Y. State Mus. Rep. 42, 1889.

"PILEUS 5-10 cm. broad, firm, convex, often irregular from its crowded mode of growth, *pale yellow or buff*, a little darker on disk, margin silky-fibrillose. FLESH *white*. GILLS adnexed, rounded behind, thin, close, rather broad, whitish at first, then subochraceous. STEM 3-7 cm. long, 8-12 mm. thick, subequal above, *with a clavate-bulbous base*, silky-fibrillose, floceose-villose at apex, subannulate, *white*." SPORES narrowly elliptical, *pale*, smooth, 8-9.5 x 44.5 micr.

"Mossy ground in open places. Catskill Mountains, New York. The *caespitose* mode of growth, yellowish pileus, pale gills and white flesh distinguish the species."

389. Cortinarius modestus Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 2-4 cm. broad, convex to expanded, subfibrillose, even or slightly rugulose-wrinkled, *alutaceous*. FLESH white. GILLS close adnexed, moderately broad, nearly plane, *pallid at first*, then cinnamon. STEM 5 cm. long, 4 mm. thick above, clavate-bulbous, subfibrillose, hollow or stuffed with white pith, concolor." SPORES broadly elliptical, 7-8.5 x 5-6 micr.

"Ground in woods, New York. September. Distinguished from *C. clintonianus* by its paler color, more bulbous stem and entire absence of the violaceous tinge of the gills." An examination of specimens on the sheets with the type, showed that several of the larger specimens had different spores and could not belong there. It is sometimes caespitose. I n size it approaches the Dermocybes, and appears to be close to *C. albidifolius* Pk. In a letter, preserved at the New York Botanical Garden, Peck states that it is near *C. intrusus* but has different spores.

390. Cortinarius gracilis Pk.

N. Y. State Mus. Bull. 2, 1887.

PILEUS 1.5-4 cm. broad (occasionally up to 7 cm.), *conical at first* and Roods brown (Ridg.) then campanulate and margin decurved, *with a prominent subacute umbo*, pinkish-cinnamon to *light vinaceous-cinnamon* (Ridg.) when drying, subhygrophanous, even, glabrescent, margin at first incurved and white-cortinate, elsewhere *silky-shining* with innate white fibrils. FLESH very thin except on center, concolor. GILLS adnate then emarginate, moderately broad, close, pallid at first, *soon cinnamon* to cinnamon-brown (Ridg.), edge at length crenulate-eroded. STEM 5-15 cm. long, *elongated*, thickness variable, usually 4-8 mm. thick (rarely up to 15 mm.), *cylindrical*, sometimes tapering upward, at length flexuous, *solid*, white fibrillose-silky, *soon pallid* or tinged fuscous, concolor within, glabrescent. CORTINA white, persistent, rarely forming an evanescent ring. SPORES elliptical, 10-11.5 x 6 micr., smooth, pale ochraceous under the microscope. ODOR and TASTE mild.

Solitary, scattered, rarely subcaespitose, deeply imbedded at base of stem *in sphagnum and mosses* in balsam and tamarack swamps. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Frequent.

Variable in size of cap and thickness of stem but very distinct from all other Cortinarii. The pale colors, the conic-eampanulate cap, the sphagnum habitat and the spores distinguish it. The type specimens in Peck's herbarium appear to have been specimens of small size. Only the young rapidly developing plants show the hygrophanous character well; they soon fade. Although the species is quite frequent in the swamps, I never saw a well-developed annulus nor definite signs of a universal veil, so that it appears to be intermediate between Telemonia and Inoloma. Occasionally the stem is subclavate below. The gills are not dark at first in good specimens and Peck may have had young, dry weather forms in which the gills sometimes become dark prematurely. It would be remarkable to find the young gills "ferruginous-brown" as described by Peck, in plants colored like this one.

SUBGENUS DERMOCYBE: Pileus and stem *neither viscid nor hygrophanous*. Pileus innately silky at first, glabrescent, flesh thin. STEM *equal* or *attenuated toward apex*, stuffed to hollow, at length slender, rather rigid or exterior. Universal veil rarely present.

Composed of medium-sized or small, rather slender-stemmed and often elegantly colored plants. The cortina is fibrillose, usually of the same color as the pileus. Fries says "easily distinct from the Inolomas by the thinness and substance of the pileus and by the stem." Several species, however, approach the subgenus Inoloma closely, especially those Dermocybes included under my first section. The stem of the species of Dermocybe is at length equal or attenuated and this character combined with the small size and the lack of distinct scales on the pileus, separates them from the subgenus Inoloma. The absence of a truly hygrophanous pileus distinguishes them from the subgenus Hydrocybe, which they simulate in size. Some of the species are quite variable and many intermediate forms occur, some of which have been given names, especially the forms near *C. cinnamomeus*.

Section I. Universal veil more or less manifest, evanescent.

**Gills at first violaceous or purplish.*

391. Cortinarius caninus Fr.

Syst. Myc., 1821.

Illustrations: Ricken, Die Blätterpilze, Pl. 46, Fig. 5.
Marshall, The Mushroom Book, Pl. 31, op. p. 85, 1905.

"PILEUS 6-10 cm. broad *violaceous-fulvous, soon beautifully rusty-fulvous* to almost orange-fulvous, *micaceous-glistening*, often almost zoned on margin by the remains of the veil, sometimes scaly-cracked, campanulate-convex, obtuse, thin, compact on disk. FLESH pallid, tinged lilac. GILLS *lilac-clay color at first*, soon watery-cinnamon, at length cinnamon-fulvous, emarginate, *broad, subdistant*. STEM 7-10 cm. long, 10-20 mm. thick, *pallid*, at length rusty-fibrillose, narrowed upwards, elastic, stuffed then hollow, at first almost girdled by a pallid veil. SPORES globose, 8-9 x 7-8 micr. BASIDIA 30 x 9-10 micr. ODOR and TASTE mild."

The description is adapted from Ricken. It has been reported several times from this country but I have never recognized it. Except in size it seems to approach some of the forms of *C. anomalus* closely. Saccardo and Stevenson give slightly longer spores. Miss Marshall's plant had a disagreeable odor.

392. Cortinarius anomalus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 154, Fig. 2.
Cooke, Ill., Pl. 776. (Pl. 850 as *C. lepidopus* Cke.)
Gillet, Champignons de France, No. 192 (as var. *proteus*).
Ricken, Die Blätterpilze, Pl. 47, Fig. 1.

PILEUS 2-5 cm. broad, hemispherical-convex then sub-expanded, obtuse, even, *covered when young* by an interwoven appressed *gray silkiness, becoming pale fulvous-alutaceous when expanded*, sometimes tinged at first with a violaceous-grayish tinge, at length glistening with a micaceous sheen. FLESH thin, dark grayish-violet at first, *soon pallid*, not truly hygrophanous. GILLS adnate at first becoming sinuate-emarginate, *not broad*, close, *at first caesious, violet or grayish-purplish*, then alutaceous-brown, edge lacerate-crenulate. STEM at first clavate and 10-18 mm. thick, then elongated and slender, 5-10 mm. thick, 4-9 cm. long, *spongy-stuffed, at first violet*, soon dingy pallid, or only the apex violaceous-tinged, gray-violet within, when fresh dotted with dingy ochraceous to yellowish scales, *glabrescent* or fibrillose, soon infested with larvae, elastic on drying. SPORES almost spherical, rough-punctate, 7-9 x 67 micr. BASIDIA 34 x 7 micr., 4-spored. ODOR and TASTE mild.

Gregarious. On moist debris and humus, mosses, etc., in beech and hemlock woods. New Richmond. September. Infrequently found, probably not uncommon in the north.

This agrees exactly with the species around Stockholm, where I first saw it. It is sometimes variable especially as to shades of color and the presence or absence of the dingy yellowish remnants of an evanescent universal veil. When mature these little patches on the stem are scarcely visible. In the fully developed condition the violaceous colors have almost or entirely disappeared from the gills and stem. The flesh is moist or shot through with watery streaks when fresh but it is not truly hygrophanous. *C. deceptivus* Kauff. is very close, but is truly hygrophanous and the color is at first deeper. *C. lepidopus* Cke. is apparently also one of its forms. *Cortinarius simulans* Pk. (N. Y. State Mus. Bull. 2, 1887) is another closely allied species and perhaps identical.

393. Cortinarius spilomeus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 154, Fig. 3.
Ricken, Die Blätterpilze, Pl. 47, Fig. 2,

"PILEUS 2-5 cm. broad, convex to expanded, *fuscescent, rufescent or argillaceous*, gibbous, dry, glabrescent, fading. FLESH rather thin. GILLS emarginate or adnate, crowded, thin, narrow, *caesious or violaceous at first*, at length watery cinnamon, edge very entire. STEM 4-9 cm. long, 6-12 mm. thick, subequal, stuffed to hollow, whitish, tinged lilac or violaceous at first, *variegated by reddish or fulvous, delicately appressed subconcentric scales*.

"Very elegant. The stem is colored similarly to that of *C. bolaris*, but subequal and the cortina is white." In *C. bolaris* no violet is present in the young plant. The flesh of the cap is thin.

The above is adapted from the descriptions of Fries, especially from that in the Icones, where elegant figures are to be found. Peck has reported it from New York and it is desirable to get data of its distribution in America. It seems to be very rare. The size of the spores is not agreed upon by European writers. Ricken says they are 6 x 5 micr., while Saccardo and Stevenson give them 8-9 x 7-8 micr. One collection from Sault Ste. Marie seems to belong here but the reddish color was not nearly as intense as in Fries' figure.

Section II. Universal veil obsolete or lacking.

**Gills at first whitish or pallid, or tinged slightly with violaceous or grayish.*

394. Cortinarius subtabularis sp. nov.

PILEUS 2-6 cm. broad, campanulate-convex at first, *then plane* or obsoletely umbonate, *discoid, dry, caesious or violaceous-drab* to silvery-fuscous, *silky-shining with white silky fibrils*, even. FLESH thin, soon *pallid*. GILLS adnate then sinuate, rather broad, close but distinct, ventricose, *at first pallid with obscure violaceous tints*, at length cinnamon, never truly violet or purplish, edge entire. STEM 3-5 cm. long, 4-6 mm.

thick, *equal except a slight, subabrupt, bulbillate* base, apex slightly scurfy, *pale violaceous-drab*, color persistent, silky-fibrillose and shining, sometimes marked at the base by the remnants of the *white* CORTINA, stuffed, hollowed by larvae, usually strict, later flexuous or curved. SPORES elliptical, scarcely rough, 9-10 x 5 micr. BASIDIA 30 x 7 micr. ODOR none or slight. TASTE mild.

"Scattered or gregarious. On the ground among or under fallen leaves of oak and maple woods. Ann Arbor. October-November. Frequent locally.

Characterized by the peculiar, small, abrupt bulblet of the stem and the "erythrinus" or subviolaceous color when fresh. The cap often becomes a little darker or stained in age, while the color of the stem is more apt to persist. It has the stature of an Inocybe. The young gills are scarcely of the "violet" type. It seems to approach *C. tabularis* Fr. and its size and the nature of the cap are fairly well shown by Cooke (Ill., Pl. 783), differing however in the shape of the stem and in color. Old dried specimens sometimes do have the color shown by Cooke's figure. It was found frequently in the region between Ann Arbor and Detroit.

395. Cortinarius brevissimus Pk.

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

"PILEUS 1.5-2.5 cm. broad, convex, often irregular, at first minutely silky, then glabrous, *dingy-white to argillaceous*. FLESH whitish. GILLS adnexed, close, *at first pale violaceous* then whitish to cinnamon. STEM *very short*, 1-1.5 cm. long, 6-8 mm. thick, equal, *hollow*, silky-fibrillose, *white*, pale violaceous within. SPORES broadly elliptical, 6-7.5 x 5-6 micr.

"Thin woods. Catskill Mountains, New York. September. Related to *C. brevipes* Pk., but smaller, with a hollow stem and shorter spores."

396. Cortinarius abidifolius Pk.

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

"PILEUS 3-5 cm. broad, convex, subglabrous, *whitish tinged with yellow or pale ochraceous*, the epidermis sometimes cracking and forming scales. FLESH thin, whitish. GILLS adnate, emarginate, subdistant, *whitish at first*, then cinnamon. STEM 5-8 cm. long, 4-8 mm. thick, equal or slightly enlarged at base, solid, *white but variegated with yellowish, floccose scales below*, silky-fibrillose above. Spores subglobose, 6-7.5 x 5-6 micr.

"Woods. Catskill Mountains, New York. September."

Closely related to this, if not the same, is a species occurring about Ann Arbor. It differs mainly in its slightly larger size and stouter stem; the shred-like appressed scales of the stem are dingy, not yellowish and the spores are slightly larger, subsphoeroid, 7-9 micr. The cuticle of the pileus is composed of differentiated, narrow, horizontal hyphae, subgelatinous, but scarcely subviscid in moist weather. Its dimensions are as follows: pileus 3-7 cm. broad, stem 5-7 cm. long, 5-12 mm. thick. Both forms differ from *C. ochroleucus* Fr. in the stem being enlarged toward the base and in the scale-like remnants of a universal veil. It should probably be included in the preceding section. It is possible that this is var. (B) of *C. ochroleucus*, mentioned in "Monographia," p. 57, which is compared with *C. sebaceoides* as to stature and shown as an almost white plant in Fries' figure at the Stockholm Museum.

397. Cortinarius ochroleucus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 775.
Quelet, in Grevillea, Vol. V, Pl. 85, Fig. 1.

"PILEUS 4-5 cm. broad, convex, gibbous and *obtuse*, even, glabrous or minutely silky, *pallid-white*. FLESH firm, white. GILLS broader behind, adnexed, then seceding, *crowded, whitish at first* then argillaceous-ochraceous. STEM 5-7 cm. long, 8-12 mm. thick, solid, firm, *ventricose, white, naked*, except apex which is fibrillose from the cortina." SPORES (8 x 4-5 micr. Massee) rarely given. "ODOR none. TASTE *bitterish*."

The description given above has been adapted from Fries' "Monographia" and "Hymen. Europ." The species is occasionally reported from this country and is not well understood, not even in Europe if we may take the meager notes into account. The figures referred to have too much of an ochraceous color to agree with descriptions. It seems to be rare as Fries has indicated, and its medium size, ventricose or downward-tapering stem and bitterish taste distinguish it from any American plants I have studied.

398. Cortinarius sericipes Pk.

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

"PILEUS 1-2.5 cm. broad, conical to subcampanulate, glabrous, *chestnut color*, often darker on umbo. GILLS ascending or ventricose, narrowed behind, *broad, close, whitish at first*, then tawny to tawny cinnamon, white on edge. STEM 2-7 cm. long, *slender*, 2-4 mm. thick, equal, hollow, silky-fibrillose, slightly mealy at apex, shining, *white*." SPORES almond-shaped, *large*, rough, 15-16 x 8-9 micr., ventricose, somewhat pointed at ends.

"Damp ground in woods. New York. October."

The type-specimens indicate a slender plant with the Inocybe habit. The spores were found to be narrower than given by Peck. The stem seems to have been subannulate by a white silky zone.

399. Cortinarius castanellus Pk.

N. Y. State Mus. Rep. 29, 1878.

PILEUS 1-2.5 cm. broad, convex then expanded, *umbonate*, innately silky, shining, glabrous, even, *dark cinnamon to chestnut color*, umbo blackish, streaked blackish when old. FLESH thin, pallid. GILLS adnate and rounded behind, then emarginate, close, moderately broad, pallid, *soon cinnamon-brown*. STEM 4-5 cm.

long, 2-4 mm. thick, *slender*, equal or attenuated downwards, *dingy white then tinged fuscous*, stuffed then hollow, glabrescent. SPORES elliptical, rough, 7-9 x 4.5-6 micr.

Gregarious or subcaespitose. On bare ground "in open fields" and borders of lakes. Ann Arbor. (Whitmore Lake.) October. Infrequent.

In color it resembles *C. nigrellus* Pk. but that species is almost twice as large, with a distinct universal veil and smaller spores. It is a slender plant, reminding one of the Hydrocybes.

400. Cortinarius basalis Pk.

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

"PILEUS 1-2 cm. broad, convex then expanded, *hairy, tawny*, FLESH thin. GILLS subventricose, *pale tawny at first*, cinnamon when old. STEM 2-2.5 cm. long, 5-6 mm. thick, short, hollow, fibrillose, pallid or pale tawny, usually with a slight, webby annulus below the middle of the stem." SPORES elliptical, smooth, 7-8.5 x 3-4 micr., pale under the microscope.

"Naked soil in woods. New York. *Caespitose*, September."

This seems to approach *C. impolitus* in its hairy pileus and in size and color, but that species has larger spores, hygrophanous pileus, shorter stem and grows in coniferous woods. The plants are small and tufted. It probably has pallid gills when very young since the change of color indicated by the description is very unusual.

****Gills at first yellowish, red or cinnamon.* (Usually elegant plants.)

401. Cortinarius cinnamomeus Fr.

Syst Myc., 1821.

Illustrations: Cooke, Ill., Pl. 777.
Gillet, Champignons de France, No. 204.
Michael, Führer f. Pilzfreunde, II, No. 70.
Ricken, Die Blätterpilze, Pl. 47, Fig. 6.
Hard, Mushrooms, Fig. 239, p. 298, 1908.
Peck, N. Y. State Mus. Rep. 48, Pl. 13, Fig. 7-14.

PILEUS 2-4.5 cm. broad, campanulate-convex, obtuse or subumbonate, umbo often vanishing, *yellowish-cinnamon, yellowish-tawny*, etc., silky or minutely and densely scaly *from the innate or appressed, yellowish fibrils, shining*. FLESH pale citron or straw-yellow, rarely deep-yellow, thin. GILLS adnate, varying to adnexed-emarginate or scarcely subdecurrent, rather *broad*, close (not truly crowded), *cadmium-yellow, citron-yellow or cinnamon-yellow*, shining. STEM 3-8 cm. long, 3-6 mm. thick, *equal*, often flexuous, *chrome to citron yellow when fresh*, darker when handled, fibrillose, stuffed, *becoming tubular*, olive-cinnamon-yellow within, *attached to a yellow mycelium*. CORTINA citron-yellow, fibrillose. SPORES short elliptical, smooth, 6-7.5 x 4-4.5 micr. (few 8 x 5 micr.) BASIDIA 24 x 6 micr., 4-spored. ODOR and TASTE mild.

Gregarious or subcaespitose. On moist rich ground, very decayed wood or mosses, in conifer regions, in sphagnum swamps, or more rarely in frondose woods. Throughout the State, Marquette, New Richmond, Ann Arbor, etc. August-October. Infrequent.

This species is usually marked "common" by the writers of books or lists; a statement which is correct enough if *C. semisanguineus* and its forms are included. The segregated plant as described above even with its variations is rarely common according to my experience in Michigan and about Ithaca and North Elba, New York. It may be more common in special localities. It is quite variable and Fries says "innumerable forms have been set up by authors." The colors and shape vary with the habitat, so that sphagnum forms, e. g., have longer stems and shaded pilei deeper colors. The spores of the American plant seem to be slightly smaller than in those reported by Saccardo, Massee, Ricken, etc., and in Swedish specimens collected by myself. These have spores measuring 7-8.5 x 4-5.5 micr. The following species seems closely related but differs in the spore-character.

402. Cortinarius cinnamomeus Fr. var.

Illustration: Cooke, Ill., Pl. 778 (as *C. cinamomeus* var.).

PILEUS 2-6 cm. broad, campanulate or subhemispherical, obtuse or discoid, umbonate, regular at first, then wavy-margined, *olivaceous-cinnamon-brown, tinged rufous* on disk, innately and minutely fibrillose-scaly or silky, edge incurved. FLESH yellowish-white, rather fragile. GILLS adnate, *narrow*, close to crowded, cadmium-yellow with olivaceous tint, thin, eroded-crenulate on edge. STEM 5-9 cm. long, 4-7 mm. thick, *slightly enlarged below* and tapering upward, fibrillose-striate, pale yellow, olivaceous-tinged, becoming tubular, yellowish-olivaceous within. CORTINA yellow, fibrillose. SPORES elliptical, smooth, 7-9 x 4-5 micr. ODOR and TASTE mild.

Gregarious. Among mosses in a sphagnum swamp. Bay View, Ann Arbor. August-September. Infrequent.

Differs from *C. cinnamomeus* in the rufous cast on the pileus, the narrow gills, subclavate stem and slightly longer spores. It is well represented by the figure of Cooke cited above. Variety *croceus* is smaller, gills less crowded, gills and stem *tinged olivaceous*. (See Cooke, Ill., Pl. 780.)

403. Cortinarius croceoconus Fr.

Monographia, 1851.

PILEUS 1-3 cm. broad, *obtusely conico-campanulate*, umbo persisting, firm, *rufous-fulvous to fulvous-cinnamon*, silky, *dry*, even, subshining, margin incurved. FLESH whitish, tinged red at the upper surface, yellowish toward stem, thick at umbo, thin elsewhere. GILLS adnate then somewhat seceding, ascending, rather narrow, close, *pale yellow at first, then cinnamon*, opaque, edge minutely eroded. STEM elongated, 5-12 cm. long, 3-5 mm. thick, *equal, flexuous*, fibrillose with

rufous-fulvous fibrils, *yellowish within*, elastic, stuffed then tubular. CORTINA pale rufous-fulvous, becoming pallid, subfibrillose. SPORES elliptical, almost smooth, 8-9.5 x 5 micr.

Gregarious or subcaespitose. On low, mossy ground of pine, poplar, etc., near Stockholm, Sweden. September, 1907.

This species has been reported at various times in America. The figures of Cooke (Ill., Pl. 780) and of Gillet (No. 210, Champignons de France) are, however, very misleading. The above description was made from plants which I collected near Stockholm. It seems probable to me that errors have been made in referring plants to this species and that a full description at this place of what is undoubtedly the Friesian plant is desirable.

404. Cortinarius luteus Pk.

N. Y. State Mus. Rep. 43, 1890.

"PILEUS 2-5 cm. broad, conical or convex, unpolished, *yellow*, often darker on disk. FLESH yellow. GILLS adnexed, yellow, *subdistant*, moderately broad. STEM equal, 5-10 cm. long, 10-20 mm. thick, *stout, solid* (!), silky-fibrillose, *yellow*. SPORES subglobose or broadly elliptical, 7.5 x 6-7 micr.

"Mossy woods. New York. July."

This seems to be closely related to the preceding, but the stem is stouter and the type-specimens show the gills to be subdistant and rather broad. The spores are also somewhat different.

405. Cortinarius aureifolius Pk.

N. Y. State Mus. Rep. 38, 1885.

PILEUS 1-4 cm. broad, convex-campanulate, then plane, *cinnamon-brown* or darker, dry, densely fibrillose-tomentose, sometimes scaly, especially on disk. FLESH thin, yellowish brown or pallid. GILLS adnate, subventricose, *broad*, close, thin, *yellow then ferruginous-cinnamon*. STEM 3-6 cm. long, 3-6 mm. thick, subequal, rather short, solid, fibrillose, *yellow*, brown within. SPORES 10-12.5 x 5 micr., *oblong*, smooth, ochraceous-cinnamon in mass. ODOR of *radish*. TASTE mild.

"Sandy soil, in thin pine woods." New York, Massachusetts. October. Specimens sent to me from Massachusetts were apparently this species except that they had more slender stems than the type. As Peck has already pointed out, the species reminds one of an Inocybe and the peculiar oblong spores are further evidence of such a position for it. It seems to be rare and needs more study.

406. Cortinarius croceofolius Pk.

N. Y. State Mus. Bull. 150, 1911.

Illustrations: Ibid, Pl. VI, Fig. 1-8.

"PILEUS 2.5-5 cm. broad, broadly convex or nearly plane, obtuse or obtusely umbonate, dry, *slightly fibrillose* especially on the margin, *brownish-cinnamon*, often paler or saffron-yellow on the margin. FLESH thin, pale yellow, grayish or dingy when dry. GILLS thin, close, *saffron-yellow verging to orange at first*, then brownish-cinnamon, often yellow, crenulate on margin. STEM 2.5-4 cm. long, equal or slightly thickened at the base, fibrillose above, *saffron-yellow*, hollow. CORTINA concolor. SPORES broadly ellipsoid, 6-7 x 4-5 micr.

"Mossy ground on the borders or in woods of spruce and balsam fir. New York. September."

This approaches *C. cinnamomeus* in some of its forms except that the gills are more deeply colored.

407. Cortinarius malicorius Fr.

Epicrisis, 1836-38.

Illustration: Fries, Icones, Pl. 155, Fig. 1.

PILEUS 2-6 cm. broad, obtusely convex to subexpanded, *fulvous or tawny-fulvous*, tinged golden yellow, *silky-tomentose*, subzonate in age. FLESH *intensely olivaceous* when fresh, scissile, thick on disk. GILLS sinuate or adnate-subdecurrent, close, not broad, *rusty-yellow then dark golden-fulvous*. STEM 5-7 cm. long, 6-12 mm. thick, equal or subequal, *becoming hollow*, fibrillose from the *orange-fulvous cortina*, tinged olivaceous, *soon yellow-fulvous*, or reddish-stained, *olivaceous within*. SPORES short elliptical, slightly rough, 6-7 x 4-4.5 micr. ODOR and TASTE mild.

Gregarious. Under hemlock and cedar in swampy woods. Sault Ste. Marie. August. Rare.

The Michigan plants had all the characters attributed to the species by Fries. The flesh of the growing plant is distinctive. In the pileus it is intensely olivaceous to greenish, bordered by a narrow zone of yellow or fulvous next to the surface; in the stem the axis soon breaks down leaving a tubular cavity, the rest of the flesh being yellowish-olivaceous, bordered by the narrow, yellow cuticular zone which is well shown in Fries' figures. There is a tendency for the cap and stem to become stained dark reddish in age. Ricken has changed the description somewhat as to the color of the young gills. In our plants, however, they were not olive-yellow although such a variation is to be expected where the flesh has that color. Ricken also gives spore-measurements which are too large for those of my collection. A variety of *C. cinnamomeus* was found under white pine and beech at New Richmond, which was fulvous on the cap and stem and with a slight olive tinge on the gills. A series of intermediate forms between this and *C. cinnamomeus* seems to exist.

408. Cortinarius semisanguineus Fr.

Syst. Myc., 1821 (as var. of *C. cinnamomeus*).

Illustrations: Cooke, Ill., Pl. 779.
Gillet, Champignons de France, No. 250.
Atkinson, Mushrooms, Fig. 151, p. 162, 1900.
White, Conn. State Geol. & Nat. Hist. Surv., Bull. 3, Plate 20, 1905.
Peck, N. Y. State Mus. Rep. 48, Pl. 13, Fig. 15-20, 1896.

PILEUS 2-6 cm. broad, campanulate-convex, subumbonate, (varying to conic-campanulate or broadly hemispherical, often at length expanded and split on margin) *tawny-yellow to cinnamon-yellow*, silky or delicately fibrillose-scaly, sometimes shining-zoned. FLESH dingy yellowish-white, rather firm. GILLS adnate-subdecurrent, *narrow, crowded, cinnabar or blood-red.* STEM 3-6 cm. long (longer on sphagnum), 3-6 mm. thick, equal or subequal, solid-fibrous, chrome to citron-yellow, fibrillose from the *yellow or tawny-yellow* CORTINA, elastic. SPORES elliptical, smooth, 5-7x3-4 micr. BASIDIA 24 x 6 micr., 4-spored. ODOR and TASTE mild.

Gregarious or subcaespitose. In low moist swamps, sphagnum, etc. Throughout the State. August-October. Frequent.

Usually considered a variety of *C. cinnamomeus*. There are some forms which could be called varieties of this in turn. This shows that in the present group we have what is well known to exist in the higher plants, namely, an innumerable number of very closely related species, or varieties, or forms, or any other term which expresses difference. For convenience we group a larger or smaller number of these "different" but almost like forms together and call them species. As details accumulate it is easier to keep the details in mind if we make several species from an old group of one species. Hence varieties are raised to the rank of species, and forms to the rank of variety, etc. This method is not used by the theoretical biologist but is very useful for practical every day arrangements for study. The above species is easily distinguished as such in the majority of cases hence it is now kept distinct. In order to produce fundamental proof that *C. cinnamomeus* and *C. semisanguineus* are one and the same species, absolutely expressed, it would be necessary to grow one kind from spores derived from the other kind.

409. Cortinarius cinnabarinus Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, Pl. 154, Fig. 4.
Gillet, Champignons de France, No. 203.
Patouillard, Tab. Analyt, No. 647.
Quelet, in Grevillea, Vol. VII, Pl. 110, Fig. 4.
Ricken, Die Blätterpilze, Pl. 47, Fig. 5.

PILEUS 3-6 cm. broad, campanulate, umbonate, sometimes plane, innately *silky-shining, bright cinnabar-red*, dry, even or rimose, sometimes split on margin. FLESH pallid-reddish, fading. GILLS adnate, then emarginate, *rather broad*, ventricose, subdistant, *cinnabar-red* then dark rusty-red, velvety-shimmer ing, edge entire. STEM 2-5 cm. long, 4-8 mm. thick, equal or tapering upward, *cinnabar-red*, shining, stuffed then hollow, fibrous, fibrillose. CORTINA concolor. SPORES elliptical, slightly rough-punctate, 7-9 x 4.5-5.5 micr. BASIDIA 36 x 7, 4-spored.

Gregarious or scattered. On the ground, in frondose woods, almost exclusively *in oak woods*. Throughout the State; Marquette, Ann Arbor, New Richmond, etc. July-August. Frequent (rare September and October).

This is one of the early Cortinarii of the season. It frequents rocky or hilly oak woods and in this respect shows a preference which is different from that of the same species in Europe where it is said by Ricken and Fries to occur almost exclusively in beech woods. As data from beech woods in this country are lacking this may also be true here but not so far as my own observation extends. This preference might seem to indicate a mycorhizal connection with the oak roots, but so far every examination showed that the reddish mycelium merely vegetates in the leaves and humus.

The species is quite distinct from the preceding ones inasmuch as every part is at first cinnabar-red. This color is dissolved out by a weak solution of caustic potash; and this is also true of *C. semisan-guineus* and even of some of the preceding species in which the red color is otherwise obscured. The nearest approach to it is *C. sanguineus* Fr., which I collected near Stockholm and in the Adirondack Mountains.

409b. Cortinarius sanguineus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 786.
Gillet, Champignons de France, No. 246.

PILEUS 2-4 cm. broad, obtuse, or umbonate, campanulate, dry, innately silky or minutely scaly, opaque, *dark blood-red*. FLESH blood-red, thin on margin. GILLS adnate, rather broad, close, dark blood-red. STEM 5-10 cm. long, 3-7 mm. thick, elongated in moss, squal or tapering, stuffed then hollow, *relatively slender*, blood-red, darker where bruised. CORTINA fibrillose, tinged red. SPORES narrow-elliptical, 7-8 x 4-5 micr., tinged red, roughish. ODOR mild; TASTE slightly like radish.

Gregarious in deep moss or sphagnum in conifer woods.

Isle Royale, Sault Ste. Marie, etc., mostly in the northern part of the State. Infrequent.

Distinguished from *C. cinnabarinus* by its habitat, its longer stem and more blood-red color. European authors do not emphasize the mossy habitat, but with us this seems to be the usual place of growth.

The color of every part of this species is dark blood-red, the pileus is silky-scaly and not as broad as that of *C. cinnabarinus*, the stem is more slender and usually

longer; the spores are similar. It grows on thick moss or sphagnum under conifers. Ricken gives measurements which are too large for the Swedish plant. Peck's specimens, reported in the 23d Report, are doubtless *C. cinnabarinus*.

*****Gills at first greenish or olivaceous.*

410. Cortinarius raphanoides Fr. var.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 833 (typical).

PILEUS 1.5-4 cm. broad, campanulate-convex, *obtuse*, then subexpanded and subumbonate, not striate, *densely innately fibrillose-hairy*, unicolorous, *light brownish olive* (Ridg.), scarcely shining, margin decurved. FLESH thin except disk, concolor, fading. GILLS adnate then emarginate, close, rather broad, *at first chrysolite-green* (Ridg.), then darker, thickish, edge entire. STEM 7-10 cm. long, 3-5 mm. thick, *equal*, stuffed then hollow, *olivaceous*, concolor within, fibrillose, mycelioid at base and attached to sphagnum. CORTINA *olivaceous*. SPORES 8-9x5-6 micr., oval-elliptical, slightly rough. ODOR and TASTE mild or slight.

Gregarious-scattered on sphagnum moss in balsam and tamarack swamps. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Rare.

The typical *C. raphanoides* is said to have a strong radish odor and acrid taste. These were lacking in our plants, and only in some respects is it very close to that species. Its sphagnum habitat in conifer woods also seems to point to a distinct species. It differs from *C. valgus* in its fibrillose hairy pileus and stature. No such plant is described from the United States. There are no violaceous hues present.

SUBGENUS TELAMONIA. Pileus *hygrophanous*, its color changing on losing moisture, not viscid, glabrous or *sprinkled on the margin with the superficial fibrils of the universal veil*; flesh relatively thin, scissile. Stem *peronate or annulate* from the remains of a universal veil.

This and the following subgenus are closely related by the hy-grophanous character of the pileus, by which they are both separated from the subgenera Inoloma and Dermocybe. To quote Ricken: "By 'hygrophanous' we designate a pileus whose surface is not compact but composed of loose tissue which absorbs water readily and when soaked with moisture has quite a different color than when dried out. After several experiences this peculiarity is recognized at the first glance. If one is uncertain about it, the plants collected in dry weather are placed in a dish of water," and then allowed to dry again. The presence of a universal veil separates this subgenus from Hydrocybe. This veil is composed of a thin, woven, slightly membranous texture and extends from the base of the stem in the young plant over the marginal portion of the pileus. On its inner surface it is continuous with the *cortina*, at least part way. As the plant expands the veil collapses, sometimes adhering to the stem in the form of a sheath (peronate) sometimes leaving only remnants along the stem and often indicating its presence by delicate superficial fibrils on or toward the margin of the pileus. Since the cortina itself, when copious, may leave a slight ring on the stem of those species which belong to the subgenus Hydrocybe, one has to become familiar with the characteristics of the two veils—universal veil and cortina—in order to refer a species properly. This subgenus includes a number of large species, but many others are of medium to small size. The Michigan species of this group are not yet very well studied and a number of collections belonging here are for the present omitted. For this reason the following arrangement must be considered temporary.

Section I. Plants wholly or in part with violet, purplish or ashy hues.

411. Cortinarius torvus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 157.
Cooke, Ill., Pl. 801.
Gillet, Champignons de France, No. 251.
In Grevillea, Vol. VII, Pl. 117, Fig. 2.
Ricken, Die Blätterpilze, Pl. 49, Fig. 6.
Plate LXXXIII of this Report.

PILEUS 4-6 cm. broad (rarely broader), broadly convex to plane, obtuse or subumbonate, firm, *subhygrophanous, violaceous-fulvous, purplish-brown or copper-brown at first*, at length paler, disk rusty-fulvous, *covered with a hoary frostiness*, sometimes furfuraceous-scaly, at length glabrous, sometimes radiately wrinkled, often punctate. FLESH at first dull grayish-purple at length brownish or pallid. GILLS at first adnate, then emarginate-adnexed, *broad, subdistant*, thickish, subrigid, *dark or dull purplish at first*, then dark cinnamon-umber. STEM 4-7 cm. long (sometimes longer), 7-8 mm. thick above, *clavate-bulbous*, tapering upward, bulb 12-16 mm. thick, *peronate* to or above the middle by the whitish universal veil, which terminates above in a flaring, membranous ring, *dull violaceous and silky above the veil, spongy-solid*. SPORES 8-11 x 4.5-6 micr., ventricose-elliptical, rough-tuberculate, *maturing slowly*, rusty-umber in mass. BASIDIA 36 x 6-7 micr. ODOR at first slight, *sweet-aromatic* after crushing the flesh. TASTE mild.

Gregarious or subcaespitose. Among humus and decayed debris in frondose or pine woods. Houghton, New Richmond, Detroit. August-September. Infrequent.

Well marked by the peculiar, though variable color, broad gills and the membranous, annular-terminated sheath of the stem. The young plants have a very bulbous stem which becomes clavate-elongated. Two forms occur as to the shape of the stem, a short-stemmed, stocky, bulbous form and a long-stemmed one in which the bulb has almost disappeared; the former seems to be more frequent and is shown by the figure in

Grevillea and by our own plate. The figure in Fries' Icones represents much larger specimens than usually occur with us. Maire points out (Bull. d. 1. Soc. Myc. de France, Vol. 26, p. 27) that it is distinguished from the European *C. impennis* Fr. by its membranous annulus. The stem is often curved at the swollen base and is sometimes ventricose. Its odor reminds one of faintly aromatic substances. The spores may easily be given too small since they mature slowly. Ricken says they measure 8-9 x 5-6 micr. Peck has a variety *"nobilis,"* which may be a distinct species; it needs further study.

412. Cortinarius plumiger Fr.

Epicrisis, 1836-38.

PILEUS 5-12 cm. broad, firm, campanulate, rarely conical-campanulate, obtuse or subumbonate, expanded, *densely appressed, fibrillose-tomentose or fibrillose-hairy*, hygrophanous, fading, sepia-brown at first then light pinkish-cinnamon (Ridg.), margin often decorated by narrow shreds of the universal veil. FLESH thick on disk, thin toward margin, pallid brownish (moist) soon faded. GILLS adnate then emarginate, close, *rather broad*, pallid at first, rarely faintly tinged caesious-violaceous, then *clay color* to mikado-brown (Ridg.), edge subcrenulate or entire. STEM 5-10 cm. long, 10-18 mm. thick above, clavate-bulbous, *stout*, at length subcylindrical above, spongy within but firm, *very fibrillose, grayish-blue-violet* (Ridg.) when fresh, quickly fading, concolor within, at length pallid or dingy. CORTINA whitish, thin. UNIVERSAL VEIL white at first, leaving thin subannular shreds or a slight annulus on the lower part of stem, soon sordid brownish. SPORES elliptical, slightly rough, 8-10 x 5-6 micr., pale ochraceous under microscope. ODOR and TASTE slight.

Gregarious. Bulb imbedded in wet moss and soil under spruce and balsam trees. North Elba, Adirondack Mountains, New York. August-September, 1914. Collection Kauffman. Frequent locally.

Well marked by the dense tomentosity of the cap when young and by the pallid gills. Even under the most favorable conditions the violet-bluish tint of other parts than the stem was scarcely noticeable. It agrees well with the Friesian description, but is not the plant of Quelet (Grevillea, Vol. 7, Pl. 112, Fig. 1), nor that of Ricken. At times the hygrophanous character is deceptive as the cap becomes darker with age. The universal veil is thin in small plants and the species could be looked for under Inoloma. It differs from *C. canesceus* by its spores and by the violaceous stem when young. It is possible that *C. catskillensis* is a dry weather form of this species.

413. Cortinarius evernius Fr.

Syst. Myc., 1821.

Illustrations: Cooke, III, Pl. 866.
Ricken, Die Blätterpilze, Pl. 49, Fig. 2.
Hard, Mushrooms, Fig. 246, p. 305, 1908.

PILEUS 3-10 cm. broad, *fragile, conico-campanulate*, prominently umbonate when expanded, *hygrophanous*, sometimes irregular or gibbous, *purple-fuscous to brownish-vinaceous* (Ridg.), faded and silky in dry weather, margin soon wavy, at first incurved and silky from the veil, glabrescent. FLESH thin, concolor or violaceous when moist. GILLS emarginate, adnate, thickish, *broad, rather distant*, ventricose, *at first violaceous-purple* then cinnamon-brown, edge whitish. STEM 10-15 cm. long (rarely 15-20 cm.), 8-20 mm. thick, *cylindrical or attenuated toward base*, sometimes flexuous, *pale lavender to deep violet*, more deeply colored at the base, *marked by annular shreds* of the *violaceous then whitish universal veil* over most of the surface, spongy and solid, concolor within. SPORES elliptical, slightly rough, 8-9.5 (rarely 10) x 5-6 micr. ODOR slightly of radish. CORTINA fibrillose, whitish, evanescent.

Gregarious or subcaespitose. On moss, decayed debris and humus in coniferous woods. Bay View, Marquette and North Elba, New York. August-September. Infrequent—almost rare.

Known by its elongated stem, which is usually rather stout and tapering at the base; the young, conical pileus is scarcely wider than the stem. It differs from related species in the shape of the pileus. In dry weather the color is often pale violaceous, shading to lavender and when old the pileus is likely to be split on the margin. The violaceous universal veil collapses and forms thin and adnate annular patches above the stem, scarcely ever forming a membranous annulus as in *C. umidicola*. The description of our plants differs somewhat from the European descriptions in the differently shaped spores and stem although Fries says the stem is sometimes attenuated below. The unpublished plate of Fries at the Stockholm Museum shows a much deeper violet color than the figures of Cooke. The inconsistency of the spore-sizes and spore shapes of European authors indicates that the species is not clearly understood. Fries states that the stem has the characteristics of *C. elatior* Fr., but, except for its mode of development, this is not strikingly apparent in our plants. When deeply imbedded in moss the stems are very long.

414. Cortinarius umidicola Kauff.

Bull. Torr. Bot. Club, Vol. 22, 1905.

Illustrations: Ibid, Fig. 4, p. 312.
Jour. of Mycology, Vol. 13, Pl. 94, 1907.
Mycological Bull., Vol. V, Fig. 239, 1907.

PILEUS 5-10 cm. broad, (rarely up to 14 cm.), hemispherical then convex-expanded, firm, *hygrophanous, dull heliotrope-purplish at the very first*, soon umber and glabrous on disk, *fading to pinkish-buff* and covered with innate, whitish, silky fibrils, *punctate*, margin persistently incurved and decorated by narrow, whitish, transverse strips from the universal veil. FLESH lavender when young, soon faded to sordid whitish, thick on disk, abruptly thin on margin. GILLS emarginate with tooth, very broad, plane then ventricose, subdistant, thick, *at first lavender*, soon pale-tan to cinnamon, edge subserratulate, concolor. STEM 6-10 cm. long, (rarely 10-13 cm.), 10-20 mm. thick, subequal, usually thickened below, sometimes narrowed below or curved, always *stout*, solid, *lavender above the woven, sordid white universal veil* which at first covers the lower part as a sheath, but soon breaks up so as to leave a band-like annulus half-way or lower on the stem, or forming adnate patches, concolorous, lavender within and soon cavernous from grubs. CORTINA violaceous-white. SPORES elliptic-ovate, slightly rough, 7-9 x 5-6 micr. BASIDIA 40 micr. long.

Gregarious, often in troops or partial rings. In wet, swampy places, frondose or mixed woods. Marquette, Houghton, Detroit. July-September. Infrequent.

This species is probably identical with one occurring in Europe. I collected a very similar plant, with the same gregarious habit, near Stockholm, Sweden, while in company with Romell, Maireand Peltereux, who did not recognize it as a species definitely known to them. It had the same spores, and all the characters of the American plant except the less marked lavender color. I suspect it is *C. lucorum* Fr. Two other collections from Sweden brought to this country and labeled *C. impennis* Fr., the one determined by Robert Fries with spores like *C. umidicola*, the other determined by Romell, with spores measuring 11-12 x 6-7 micr., seem to show that two similar species are being confused in Europe. One of these corresponds to *C. umidicola*, and is well illustrated by Gillet (Champignons de France, No. 228), the other is the true *C. impennis* Fr. (Icones, Pl. 157, Fig. 2). If this inference is correct, then Ricken's description of *C. impennis* also applies to the former species. The taste of the plants which I collected in Sweden was like ours, not of radish. The unpublished plate of *C. lucorum* Fr. in the museum at Stockholm represents a plant very much like *C. umidicola* with several band-like rings on the stem. Cooke's figure (Pl. 1192, Ill.) seems to belong elsewhere.

415. Cortinarius scutulatus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 158.
Cooke, Ill., Pl. 820.
Gillet, Champignons de France, No. 249.
Ricken, Die Blätterpilze, Pl. 49, Fig. 1.

PILEUS 2-4 cm. broad, at first subhemispherical and sometimes gibbous, then campanulate, firm, *brittle*, hygrophanous, *dark-purplish-chestnut or smoky-violet-umber*, unicolorous, becoming canescent with grayish-white innate fibrils, inflexed margin at first silky. FLESH concolor under cuticle, soon whitish elsewhere. GILLS adnate then emarginate, rather broad, *subdistant*, thickish and rigid, *at first pale smoky-purple* then dark rusty-umber. STEM 3-7 cm. long, 4-10 mm. thick, equal or subattenuate below, *rather stout*, sometimes slender, rigid, thinly *peronate at first by the grayish-white or purple-tinged universal veil*, soon subannulate by the breaking up of the veil, at length silky-fibrillose, solid. CORTINA whitish. SPORES short elliptical, almost smooth, 7-8 x 4-4.5 micr. BASIDIA 30x7 micr., 4-spored. ODOR none.

Gregarious. On open sandy soil under poplar. New Richmond. September. Rare.

I have referred this collection here with some hesitation. The plants are well illustrated by the figures of Gillet and Ricken. The illustrations of Fries are apparently from selected and perfect plants such as are more common in the moist climate of Sweden than in that of our State. The description given above applies to plants entirely different from any other species of the group by their peculiar colors, the brittle flesh and the habitat. It differs most from the European descriptions in the absence of the radishy odor. It seems to have some relationship with *C. sciophyllus* Fr., but the spores of that species, according to Battaile (Bull. d. 1. Soc. Myc. de France, Vol. 26, p. 336), measure 8-9 x 6-8 micr.

416. Cortinarius deceptivus Kauff.

Bull. Torr. Bot. Club, Vol. 32, 1905.

Illustrations: Ibid, Fig. 7, p. 324.
Plate LXXXIV of this Report.

PILEUS 2-7 cm. broad, suborbicular to hemispherical, becoming convex-campanulate, *subhygrophanous, fawn-colored tinged with lavender*, fading to light tan, disk alutaceous-buff, covered with minute, brownish scales when young, becoming glabrous, rugulose in age. FLESH thin except on disk, rather spongy, *lavender when young*, then pallid or sordid tan. GILLS 3-5 mm. broad, thick, moderately close, adnate, emarginate, narrowed in front, *lavender at first*, pale tan when old. STEM 3-6 cm. long, rather stout and clavate at first, then elongated and slender, solid, *at first covered by the thick, fibrillose universal veil, which is lavender*, soon fading to whitish, at length remaining as oblique, fugacious, brownish scales or partial rings, terminating

above in the cortina. SPORES 7-9.5 x 6-7 micr., subsphoeroid to broadly elliptical, rough. ODOR mild.

Gregarious. On moist liumus or debris in hemlock or mixed woods. Ann Arbor, Marquette, Bay View, etc. August-October. Frequent.

This species is close to *C. anomalus* Fr., indeed it may be considered as a hygrophanous form of that species. The group to which it belongs is composed of a number of closely related species, unless one considers the fluctuating variation of the one species as quite extensive. The colors of this species are much deeper violet or lavender at first than in the typical *C. anomalus* and the flesh is distinctly hygrophanous. Nearly all these related plants (see *C. anomalus*) have a punctate pileus.

417. Cortinarius adustus Pk.

N. Y. State Mus. Rep. 42, 1889.

"PILEUS 2-3.5 cm. broad, broadly campanulate or convex, obtuse, *hygrophanous, bay-brown when moist* sometimes canescent on the margin, paler when dry, smoky-brown with age and generally rimose-scaly. FLESH yellowish-gray. GILLS subfree, rather thick, distant, *purplish-brown*. STEM 2-8 cm. long, 6-10 mm. thick, *equal*, stuffed or hollow, fibrillose, brownish with a white mycelioid coating at the base, colored within- like the flesh of the pileus." SPORES broadly elliptical, 8-10 x 5.5-6.5 micr.

"Subcaespitose. In balsam groves. New York. September."

The dried type-specimens are blackish-brown, showing a rather stout stem and small pileus. It seems closely related to the next.

418. Cortinarius griseus Pk.

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

"PILEUS 2-7.5 cm. broad, convex, obtuse or gibbous, fibrillose-scaly with grayish hairs or fibrils, pale gray when moist. GILLS adnexed, subdistant, *at first pallid then* brownish-ochraceous. STEM 5-7 cm. long, 6-12 mm. thick, tapering from *a thickened or bulbous base*, silky-fibrillose, whitish." SPORES broadly elliptical, obtuse, 10-12 x 6-7 micr.

"Mossy ground under balsam trees. New York. September.

"The fibrils of the pileus are similar to those of *C. paleaceus*, but the plant is much larger and stouter and the spores are larger. It is well marked by its grayish color." The color of the young gills distinguishes it from *C. adustus* and *C. scutulatus*. It seems to approach *C. canescens* in all its characters except the lack of a peronate stem.

419. Cortinarius subflexipes Pk.

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

PILEUS 1-2 cm. broad, *conical* then campanulate and subacutely umbonate, glabrous, *hygrophanous, blackish-brown* and the thin margin incurved and whitened by the veil *when moist*, sub-ochraceous when dry. FLESH concolor, thin. GILLS adnexed, thin, close, rather broad, ventricose, *at first clay-color tinged violaceous* then cinnamon. STEM 3-6 cm. long, 24 mm. thick, equal, slender, flexuous, silky-shining, violaceous within, subannulate by the whitish universal veil, *pale violaceous when young*, especially above the annulus, pallid or reddish when old. SPORES narrow elliptical, scarcely rough, 6-7.5 x 3.5-4 micr.

Thin woods. North Elba, Adirondack Mountains and Catskill Mountains, New York. September.

Hardly related to *C. flexipes*, from which Peck separated it because of its more glabrous pileus and different gills. It has the stature of *C. fuscoviolaceus*.

420. Cortinarius flexipes Fr. minor

Syst. Myc., 1821.

Illustrations: Ricken, Blätterpilze, Pl. 49, Fig. 4.
Quelet, Grevillea, Vol. VIII, Pl. 113, Fig. 3.

PILEUS 1-3 cm. broad, at first conical then *conic-campanulate*, hygrophanous, ground-color cinnamon-brown, *densely covered with shining grayish-white subagglutinate fibrillose scales* up to the apex of the *acute umbo*, scales small, superficial and easily rubbed off. FLESH at the very first violaceous, soon pallid or brownish. GILLS adnate-emarginate, *at first or when moist walnut-brown* (Ridg.) *with a purplish tint*, soon sudan-brown (Ridg.), broad, close to subdistant, edge entire, at first whitish. STEM 3.5-5 cm. long, 2-4 mm. thick, at first strict then flexuous, stuffed then hollow, dark violaceous at apex, soon grayish-brown, *annulate by a distinct white annulus above the middle*, concentrically subannulate below with white flecks, at first violet within. SPORES elliptical, pale, 7-7.5 x 4-5 micr., slightly rough, pale ochraceous. ODOR and TASTE none.

Gregarious. In low swamps under spruce in moss. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Infrequent.

This is a pretty plant. When fresh the general effect of the pileus is that of a scaly-capped smoky-gray or drab-gray Inocybe. The universal veil leaves a well-marked annulus. The species seems to be taller and slightly larger in Sweden according to Fries. The pileus is more densely fibrillose than that of *C. paleaceus* from which it differs also in the dark-colored gills when young. The figure of *C. paleaceus* in Icones (Pl. 160, Fig. 4) is an exact reproduction of the size, shape and habit of our form of *C. flexipes*.

Section II. Universal veil red, tawny, cinnamon or yellow.

421. **Cortinarius rubripes** Kauff.

Rep. Mich. Acad. of Sci., 1906.

Illustrations: Bot. Gaz., Vol. 42, 1906.
Jour, of Mycol., Vol. 13, Pl. 100, 1907.

PILEUS 5-12 cm. broad, convex-campanulate then expanded, hygrophanous, *watery-cinnamon when moist, or tinged rufous*, obtuse or subumbonate, more or less ferruginous-stained, fading to pinkish-ochraceous, in zones from the umbo outward, at length with innate, silky-shining fibrils, sometimes wavy and irregular, *glabrescent*, even. FLESH thin except on disk, scissile, with a rufous tinge. GILLS *subdistant*, distinct, rather rigid, adnate, seceding in age, often with hoary fibrils at point of attachment to stem, *pale cinereous-purple or rufous-tinged at first*, soon reddish-cinnamon, edge entire. STEM 5-7.5 cm. long, with an oval or clavate bulb, 5-15 mm. thick at apex, *bulb deep brick-red to vermillion*, paler upwards, elastic, spongy-stuffed within, *glabrous, except for the fibrillose remains of the thin, evanescent, pale reddish, universal veil*. SPORES elliptical, smooth, granular within, 8-9 x 4-5 micr. BASIDIA 30-35x7 micr., 4-spored. MYCELIUM *brick-red* and sometimes forming mycorhiza on roots of forest trees.

Gregarious or subcaespitose. On the ground in frondose woods. July-September. Ann Arbor. Frequent locally.

Well marked by the tinge of brick-red which pervades the whole plant on drying and shades into a deep red towards the base of the stem. The hygrophanous character is unmistakable. The universal veil is not always manifest. This species approaches the European *C. bulliardi* Fr. and *C. colus* Fr. From the former it is to be separated by the hygrophanous pileus and the spores. It is, however, uncertain what the spore-size of the Friesian plant really is. Ricken refers a plant to *C. bulliardi* whose spores measure 6-7 x 3-4 micr., "spindle-almond-shaped." Others give larger spores, and apparently deal with a different species. Boudier (Icones), gives a figure of *C. bulliardi* which resembles our plant closely. *C. colus* Fr. appears to differ in the absence of the universal veil and, according to Ricken, in the slightly larger spores, and its gills are without any purplish tint. It is similar in its "fiery-red" mycelium, and general aspect (see Pl. 50, Fig. 6, Die Blätterpilze). To add to the confusion, Peck described a species sent to him under the name *C. rubripes* Pk. (N. Y. State Mus. Bull. 105, 1906), which he says is related to *C. cinnabarinus*. It has violaceous gills when young, a grayish-ferruginous to pale alutaceous pileus, and bright red stem. The spores measure 7.5-10 x 5 micr. It is a smaller plant than any of the others mentioned. For the present our plant must be considered a distinct species.

422. **Cortinarius armillatus** Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 158.
Cooke, Ill., Pl. 802.
Gillet, Champignons de France, No. 197.
Ricken, Die Blätterpilze, Pl. 48, Fig. 5.
Michael, Führer f. Pilzfreunde, II, No. 71.
Marshall, Mushroom Book, Pl. 32, p. 86, 1905.
Hard, Mushrooms, Fig. 243, p. 301, 1908.
Plates LXXXY, LXXXVI of this Report.

PILEUS 5-12 cm. broad, campanulate with decurved margin, then expanded, not truly *hygrophanous, tawny rufescent to red-brick color*, moist when fresh, innately fibrillose or minutely scaly, with shreds of the universal veil often clinging to the margin, sometimes glabrescent. FLESH rather spongy, not very thick considering its size, dingy pallid. GILLS adnate, sometimes sinuate and uncinate, *broad*, distant, *pale cinnamon at first, then dark* rusty-brown. STEM 7-14 cm long, *clavate or elongated-bulbous*, 10-20 mm. thick at apex, up to 35 mm. thick below, solid, firm, fibrillose, brownish or pale tawny-rufescent, *encircled by several cinnabar-red zones or bands from the rather membranous red universal veil*. CORTINA at first whitish, collapsing, and forming a slight annulus colored by the spores. MYCELIUM whitish. SPORES elliptical, rough-tuberculate, 10-12 x 5-6.5 micr. BASIDIA 35 x 8 micr., with long, slender sterigmata. ODOR more or less of radish. TASTE mild.

Solitary or gregarious. On thick humus, debris, very rotten wood, etc., in the coniferous forests of northern Michigan. Isle Royale, Huron Mountains, Marquette, Bay View. July-September. Frequent.

A noble species. It is the chief of this group, as already noted by Fries. The 2-4 reddish bands, scattered along the stem, mark it conspicuously. Its large size and tawny-rufescent color help to distinguish it readily from others of the subgenus. The lack of the hygrophanous character and the rather scaly pileus at times ally it to the Inolomas with which it is more easily confused, but the texture of the pileus and its general characteristics show it to belong to the subgenus Telamonia. I have not seen it in the southern part of the State, although it probably occurs wherever hemlock trees and other conifers are native. Some consider *C. haematochelis* Fr., which has a single red zone on the stem, as identical.

423. **Cortinarius morrisii** Pk.

Bull. Torr. Bot. Club, Vol. 32, 1905.

PILEUS 3-10 cm. broad, convex then campanulate-expanded, *hygrophanous*, wavy or irregular on the margin, *dark ochraceous or tawny-ochraceous*, covered with minute, silky fibrils, radially rugose at times. Flesh thin except on disk, *yellowish*. GILLS adnate then emarginate-adnexed, rounded behind, *broad*, subdistant, yellow at first, then rusty-cinnamon, edge eroded. STEM 6-10 cm. long, *equal or subequal,* 8-20 mm. thick, stout,

solid, fibrous-fleshy, *yellow within*, whitish or pale yellow above, *yellow to ochraceous* and becoming ferruginous to blackish-umber below, *imperfectly annulate by adnate shreds of the yellowish universal veil*. SPORES oval or broadly-elliptic, slightly rough, with an oil-globule, 7-9 x 5.5-6 micr., (rarely up to 10 x 7). ODOR weak, of radish.

"Moist shaded woods, under hemlock trees. Massachusetts. August-October."

The above description was made from specimens sent to me by G. E. Morris in whose honor Peck named it. The yellow color of the flesh, and the tendency of the cap and stem to become rusty in age is a marked characteristic. The caps of dried specimens are blackish-umber-brown. I have not seen it in Michigan.

424. Cortinarius mammosus sp. nov.

PILEUS 2-8 cm. broad (mostly 4-6 cm.), *conico-campanulate at first*, then expanded and obtusely *umbonate, hygrophanous*, fawn-color to brownish-cinnamon, scarcely tinged with olivaceous, sub-ferruginous on umbo when dry, *beautifully silky-shining*, glabrescent. FLESH thin except on disk, concolor when moist, pallid when dry. GILLS adnate, becoming emarginate, subventricose, medium broad, close to somewhat subdistant, *at first pallid with tinge of fawn-color*, then pale cinnamon-umber, edge even. STEM 5-9 cm. long, tapering upward from a subclavate base or almost equal, 5-8 mm. thick above, pale brownish, paler above, *subannulate or with thin, concentric, fawn-colored zones from the universal veil*, sometimes abruptly pointed below, stuffed. SPORES 7-8.5 x 5-6 micr., broadly elliptical, slightly rough, obtuse.

Among mosses and debris of a sphagnum swamp. Gregarious. Chelsea (near Ann Arbor), Michigan. September. Rare.

Differs from the similar species in the Dermocybe group, of which *C. cinnamomeus* is the center, in its hygrophanous flesh, lack of yellowish gills and habit, as well as by the presence of the universal veil. In this last respect it approaches *C. sublanatus* Fr. and *C. valgus* Fr. (sense of Cooke), but is much more slender. The umbo is very obtuse and well-developed from the first, and the gills are not yellow nor saffron at any stage.

425. Cortinarius paludosus Pk.

N. Y. State Mus. Rep. 43, 1890.

“PILEUS 2-4 cm. broad, conical or convex, *ferruginous when moist*, buff-yellow or pale ochraceous when dry, hygrophanous. FLESH yellowish. GILLS broad, subdistant, adnate, saffron-yellow. STEM 5-8 cm. long, about 4 mm. thick, equal, long, flexuous, solid, *peronate and sub-annulate by the fibrillose yellow universal veil*. SPORES 7.5-9 x 5 micr.

"Mossy ground in swamps, New York. August."

Section III. Universal veil white or whitish.

**Gills at first yellowish or pallid-ochraceous.*

426. Cortinarius hinnuleus Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 805.
Gillet, Champignons de France, No. 227.
Patouillard, Tab. Analyt, No. 648.
Ricken, Die Blätterpilze, Pl. 48, Fig. 3.

PILEUS 3-6 cm. broad, campanulate at first, then expanded and recurved, subumbonate, *rusty-ochraceous or yellowish tawny*, variegated with rusty stains in age, very *hygrophanous*, paler when dry, glabrous. FLESH thin, watery-soft, fragile when fresh. GILLS adnate-emarginate, *broad*, subdistant, pale yellowish-fulvous at first, stained rusty in age, edge minutely lacerate. STEM 5-7 cm. long, 4-7 mm. thick, rather slender, unequal, *soft and fragile*, easily split longitudinally, stuffed, *curved*, yellowish-pallid becoming dingy, glabrescent, *cingulale when fresh by a white zone* about the middle. SPORES broadly elliptical, scarcely rough, 7-9.5 x 5-6 micr. BASIDIA 30 x 7 micr., 4-spored. ODOR none.

On the ground among decayed debris, in beech and pine woods. New Richmond. September. Infrequent.

This plant seems to be very close to the European one, but differs in some minor particulars. It is more yellowish on the pileus, quite fragile and the gills are less broad and distant. It is placed here provisionally. At maturity the watery-rusty stains on the cap give it a spotted appearance; its flesh is thin and at length splits radially. The stem is variously thickened or almost equal, soft and usually curved. The white band-like zone on the stem at length disappears.

427. Cortinarius castaneoides Pk.

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

Illustration: Ibid, Pl. 4, Fig. 10-15.

PILEUS 1-2 cm. broad, campanulate-convex, then expanded, *chestnut-brown to dark watery-cinnamon*, brownish-ochraceous when dry, subumbonate and usually darker on center, *hygrophanous*, scarcely silky with a few superficial fibrils, even, margin sometimes whitish from the veil. FLESH *thin*, watery-brownish then pallid. GILLS adnate then emarginate, *rather broad*, subdistant, yellowish at first, then yellowish-cinnamon to dark cinnamon, edge almost entire. STEM 2-5 cm. long, 1.5-3 mm. thick, equal, slender, stuffed then hollow, subflexuous, pallid, *annulate from the cortina and the fugacious universal veil which remains as subannular, delicate shreds on the stem below*. SPORES elliptical, smooth, 6-7.5 x 3.5-4.5 micr. ODOR and TASTE none.

Gregarious or subcaespitose. On the ground in low frondose or conifer woods or in mossy places. Ann Arbor, New Richmond, Marquette, etc. August-October. Infrequent.

This has the stature and spores of *C. subflexipes* Pk., but the pileus is more convex, and the gills and stem not at first with any violet tint. *C. badius* Pk. is also of about

the same size, but itsspores are almost twice as large as those of *C. castaneoides*. These three approach the slender species of the subgenus Hydrocybe, and cannot always be distinguished easily from that group, especiallywhere the annulus or other evidence of the universal veil have disappeared. *C. decipiens* Fr. differs in its conic pileus, different spore-size and the tint of rufous present on the stem.

428. Cortinarius badius Pk.

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

Illustration: Plate LXXXVII of this Report.

"PILEUS 1-2.5 cm. broad, varying conical to campanulate-convex, umbonate, *hygrophanous, blackish-chestnut-color when moist*, bay-red or chestnut when dry, sometimes tinged gray, the umbo darker, usually whitish-silky on the margin when young. FLESH concolor when moist, thin. GILLS *broad*, subdistant, ventricose, adnexed, *at first yellowish or cream-color*, then subochraceous. STEM 2-4 cm. long, about 2 mm. thick, slender, equal, hollow, *silky-fibrillose and subannulate by the whitish veil, concolor within and without*." SPORES large, broadly elliptical, 11-12.5 x 6.5-7.5 micr., scarcely rough.

"Mossy ground. Catskill Mountains, New York. September.

"The species is related to *C. nigrellus*, from which it differs in its broad gills which are paler in the young plant and in its larger spores." The Michigan collections formerly referred here differ somewhat and are described below, the gills are at first whitish or pallid.

***Gills at first whitish or pallid.*

429. Cortinarius iliopodius Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 839 (form).

PILEUS 2-3 cm. broad, campanulate-subexpanded, mammillate, hygrophanous, *sorghum-brown* (Ridg.), *with blackish umbo when moist*, avellanus (Ridg.) when dry, and then canescent-fibrillose and silky shining, margin at first incurved and white-silky from the veil. FLESH brownish (moist), thin, scissile. GILLS *pallid at first* then cinnamon (Ridg.), adnate, rounded behind, ventricose, *rather broad*, thin, close to subdistant. STEM *slender*, elongated, 5-9 cm. long, 3-4 mm. thick, *equal*, stuffed, at length flexuous, decorated by the delicate white silky remnants of the veil, pale incarnate, *fuscescent*, fuscous-brown or ochraceous toward base within, cortex subcartilaginous. SPORES elliptical-almond shaped, slightly rough, 10-12 x 5-6.5 micr., pale yellowish-cinnamon. ODOR and TASTE mild.

Scattered-gregarious on sphagnum swamp of spruce and tamarack. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Infrequent.

It soon fades to the colors of *C. paleaceus*, with a slight drab tint. It differs from *C. paleaceus* in its scattered mode of growth, in its sphagnum habitat and especially in its large spores. In shape and size it imitates *C. decipiens*, but is usually more slender. The species as conceived by Fries is evidently very variable and the plant described above is a definite form. In Monographia, Fries speaks of the yellow flesh of the interior of the stem. In Systema, he says the stem is occasionally fuscous, lilaceous, etc. In the plates at the Stockholm Museum there is a "rubellus" tint to the stem and gills but otherwise the figures would represent the Adirondack specimens well.

430. Cortinarius badius Pk. var.

Differs from the type in the *gills becoming at first whitish*, stem whitish, pileus watery cinnamon to bay-brown when moist, fading *to ochraceous or pale tan, obtuse*. The spores measure 10-12 x 6-7 micr., elliptical, scarcely rough, cinnamon-brown in mass.

On mossy ground, frondose woods. Ann Arbor. May and October. Infrequent.

This little plant approaches *C. badius* quite closely in the size of the spores, and by neglecting the colors, was formerly referred to it. It needs further study. *C. punctata* Fr. (sense of Ricken) differs in its darker-colored stem and gills.

431. Cortinarius impolitus sp. nov.

PILEUS 8-20 mm. broad, *small*, firm, conic-campanulate then expanded, obsoletely umbonate, obtuse, *minutely fibrillose-scaly*, fibrils often dense at first, *hygrophanous, umber to chestnut-cinnamon at first*, becoming pale fawn or sometimes rufous-ochraceous, silky on the decurved margin, even. FLESH thin, concolor. GILLS adnate, *relatively broad*, sub-distant, thickish, *at first whitish or pallid* then cinnamon, edge entire. STEM 2-2.5 cm. long, 1-3 mm. thick, slender, equal, stuffed, *brownish or fuscescent, annulate about the middle* by a floccose, subpersistent, whitish ring, silky fibrillose, *cortina* dingy whitish. SPORES narrow subfusi-form, subacute at ends, 9-10 x 4-4.5 micr., smooth. BASIDIA 27 x 7 micr. ODOR and TASTE none.

Gregarious or subcaespitose. On sandy soil among mosses in low, moist places in white pine and beech woods. New Richmond. September-October. Rather frequent locally.

A small species, marked by the median, subpersistent annulus, the dense, minute fibrils on the pileus and by the color and the spores. The annulus may appear below the middle or rarely be absent altogether; in the latter case faint whitish zones mark the stem. It seems to be partial to sandy regions.

***Gills at first brownish or fuscous.*

432. Cortinarius brunneofulvus Fr.

Epicrisis, 1836-38.

Illustration: Ricken, Die Blätterpilze, Pl. 50, Fig. 4 (as *C. brunneus* Fr.).

PILEUS 3-7 cm. broad, convex, hygrophanous, *dark watery-brown*, glabrous, even, subvirgate on drying, *margin white from the veil*, decurved. FLESH concolor when moist, thick on disk, scissile. GILLS adnate then sinuate, distinct, thickish, broad, subdistant, *soon brown to dark umber-cinnamon*. STEM 5-8 cm. long, 10-15 mm. thick, *narrower upwards* from a clavate or bulbous base, solid, brown, longitudinally streaked with paler fibrils, *annulate by a distinct whitish band at or below the middle*, from the whitish, universal veil. SPORES elliptical, distinctly tuberculate, 10-12 x 6-7 micr. ODOR and TASTE slightly of radish.

Subeaespitose. On the ground in frondose woods. Ann Arbor. September. Infrequent.

This corresponds to Ricken's notion of *C. brunneus*. But according to specimens of *C. brunneus* collected by myself and others near Stockholm, that species has spores measuring 8-9 x 5-6 micr. and the universal veil is more nearly fuscous than white. It appears as if Ricken had interchanged the two species. In order to compare the two plants I give below the description of the Stockholm *C. brunneus* which is a common plant there. Fries says *C. bruneofulvous* has the stature of *E. evernius*, which does not apply as far as the stem of the latter is concerned. No violet tints are present in our plant.

433. Cortinarius brunneus Fr.

Syst. Myc., 1821.

"PILEUS 5-8 cm. broad, campanulate or somewhat obtusely conical at first, then *campanulate-expanded and broadly umbonate*, moist, hygrophanous, glabrous on center, *umber-brown when moist*, fulvous-alutaceous when dry, margin decurved and becoming innately fibrillose. FLESH umber when moist, fading, scissile, thin on margin. GILLS adnate, rather broad, distant to subdistant, thick, *dark livid-brown at first*, sometimes with an obscure purplish tinge then cinnamon-brown, edge entire and concolor. STEM 7-10 cm. long, 5-15 mm. thick, rather stout, firm, *umber or becoming fuscous* and innately streaked with paler fibrils, spongy-stuffed, *clavate-elongated to subequal, at times cingulate above by the* remains of the fuscous universal veil which fades in such a way that the annulus may become paler than the stem. CORTINA whitish, not copious. SPORES elliptical, almost smooth, 8-9 x 5-6 micr., (rarely up to 10 micr. long).

"On the ground among mosses in moist forests of pine and spruce. Stockholm, Sweden. Collected by C. H. Kauffman and confirmed by Romell. September, 1908."

It has somewhat the general appearance of *C. distans* Pk., but is much stouter and its larger gills are less distant, spores slightly longer and universal veil different. It is evident that European authors have confused different species under this name, and hence it seemed advisable to describe the plants from the collecting grounds of Fries. Other collections from Sweden have the same spores as mine. Cooke's figure (Ill., Pl. 868) illustrates the plant well when it is fresh, but his spore-size is wrong. Britzelmayr (Bot. Centralb., Vol. 51, p. 37) reports two species under this name, one of them with the spores in the sense of Cooke. Ricken has also described a different species as shown by the spores (Blätterpilze, p. 174). Quelet's figure (Grevillea, Pl. 113, Fig. 2) does not show the plant well either as to color or veil. Saccardo and Schroeter have given the spore-size approximately correct if we may assume that the Swedish plant is the proper starting point for a revision.

434. Cortinarius distans Pk.

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

Illustration: Plate LXXXVIII of this Report.

PILEUS 2-5 cm. broad, *campanulate*, sometimes obtusely conical at first, then campanulate-expanded, *umbonate*, minutely furfuraceous-scaly, *hygrophanous, watery-cinnamon to bay-brown when moist*, tawny or subferruginous when dry, margin usually deflexed, even, often splitting radially. FLESH thin, sordid, brown then dull yellowish. GILLS adnate, then sinuate, *distant, broad*, rigid, thick, *brownish or tawny-yellow at first*, then dark cinnamon. STEM 4-8 cm. long, 5-12 mm. thick, variously thickened to equal, *often attenuated below* and curved, stuffed, fibrillose, watery-brown and unicolor when moist, the universal veil at first concolor but on breaking up leaving *a whitish, medium, somewhat persistent annular zone*. CORTINA whitish, fibrillose. SPORES oval, *rough-tuberculate*, 6-8 x 5-6 micr. ODOR sometimes slightly of radish. TASTE mild.

Gregarious or caespitose. On grassy ground in frondose woods. Houghton, Ann Arbor, Detroit, etc. July to September. Frequent.

This is one of the earliest summer Cortinarii, appearing preferably in low, grassy woods, about the time that *C. cinnabarinus* appears in the higher lying oak woods; it announces the fact that the Cortinarius season is open. It is somewhat difficult to see much difference in the formal descriptions between this and *C. brunneus* Fr., *C. brunneofulvous* Fr. and *C. glandicolor* Fr., but our plant has quite a distinct habit as compared with those. Its gills are truly distant while *C. brunneus* in spite of Fries' description, has more nearly subdistant gills, according to my use of those terms. *C. glandicolor* Fr. is a more slender-stemmed plant, according to Fries' unpublished plates, well shown also by Cooke (Ill., Pl. 789), although figured as rather stout by Ricken (Blätterpilze, Pl. 50, Fig. 3). Peek, in the original description, seems to have had specimens whose caps were "convex." All the specimens seen by me had a tendency toward the campanulate and umbonate form of pileus. The white

zone at or below the middle of the stem is best seen in dry weather. The young stem is sometimes peronate. *C. furfurellus* Pk. is without doubt a synonym.

435. Cortinarius nigrellus Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 2-5 cm. broad, at first conical, soon convex or expanded or subumbonate, minutely silky, hygrophanous, *blackish-chestnut when moist*, paler when dry. GILLS close, *narrow*, emarginate, *brownish-ochre at first*, then cinnamon. STEM 5-7 cm. long, 4-6 mm. thick, subequal, silky-fibrillose, pallid, often flexuous (slightly peronate by a rufous-tinged sheath in the dried type specimens). ANNULUS slight, evanescent." SPORES inequilateral, minute, smooth, 7 x 3.5 micr.

"Mossy ground in woods, New York. October. When moist the pileus has the color of boiled chestnuts, when dry of fresh chestnuts. The incurved margin of the young pileus is whitened by the veil. The gills are darkest when young. The taste is unpleasant, resembling that of *Armillaria mellea*."

This is very close to *C. rigida* (sense of Ricken) in stature, colors and spores. *C. rigida* is, however, not uniformly described by European authors, especially as to its spore-size.

436. Cortinarius rigidus Fr. (var.)

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 791.
Quelet, in Grevillea, Vol. VII, Pl. 113, Fig. 4.

PILEUS 1-2.5 cm. broad, convex or conico-convex, umbonate or obtuse, *glabrous*, shining, *rufous-brown to chestnut when moist*, ochraceous to buff color when dry, hygrophanous, even and sometimes with white-silky margin, *elsewhere naked*. FLESH thin, rather firm. GILLS adnate then emarginate, rather close, moderately broad, ventricose, *rufous-cinnamon*. STEM 4-5 cm. long, 2-4 mm. thick, equal, flexuous, *fuscescent*, subfibrillose below the whitish, *median annulus*, apex pruinose. SPORES elliptical, smooth, 6-7.5 x 4 micr. ODOR somewhat fragrant, noticeable.

Gregarious or solitary. On the ground in frondose woods. Ann Arbor. September.

It is quite difficult to get any correct idea of this species from European notices. The spore-measurments per Saccardo are "6-11 x 4-6," per Ricken, "6-7 x 3" and according to others, intermediate in size. Our plants are more slender and less dark-colored than *C. nigrellus*. The species has the size of *C. paleaceus* but has a glabrous cap.

437. Cortinarius rigidus (Scop.) Ricken

Blätterpilze, 1912.

PILEUS 2-5 cm. broad, broadly campanulate-expanded, umbonate, firm and glabr.ous at first, hygrophanous, even, walnut-brown (Ridg.) when moist, *fawn-color on losing moisture*, soon hoary, silky-shining, margin at first incurved and white-silky. FLESH concolor, soon pallid, scissile. GILLS adnate, close, thin, moderately broad, at first pinkish-buff (Ridg.) then clay-color (Ridg.), edge paler. STEM 3-5 cm. long, 4-8 mm. thick, equal, stuffed, soon hollowed by grubs, brownish within, *white-silky-fibrillose*, sometimes annulate from the white veil. SPORES *minute*, narrowly elliptical, 5-6.5 x 3-3.5 micr., smooth, pale clay-color in mass. ODOR and TASTE mild.

Gregarious or subcaespitose. On mosses under spruce, birch, etc. North Elba, Adirondack Mountains, New York. Collection Kauffman. Infrequent.

The typical Friesian species is said to have a marked odor and specimens from Sweden have larger spores. I have included it (in the sense of Ricken) for comparison. In shape and size it imitates *C. hemitrichus*.

438. Cortinarius hemitrichus Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 160, Fig. 2.
Cooke, Ill., Pl. 825.
Gillet, Champignons de France, No. 226.
Ricken, Die Blätterpilze, Pl. 49, Fig. 5.

PILEUS 2-5 cm. broad (rarely larger), campanulate, umbonate, sometimes umbo is obsolete, umbo varying acute or obtuse, *ground color umber, watery-cinnamon or fuscous when moist*, hygrophanous, *more or less canescent from the white, superficial, cirrate fibrils* which at first cover it, sometimes glabrescent in age, color fading to fuscous-gray or ochraceous-tan when dry, margin persistently white-silky. FLESH concolor, thin. GILLS adnate then emarginate, *broad*, close in front, *subdistant behind, at first brownish-gray* to subochraceous, at length dark cinnamon, edge erose-crenulate. STEM 3-6 cm. long, 2-5 mm. thick, equal, hollow, rigid, more or less *annulate at or below the middle* by the white, appressed ring, watery fuscous-brown within, fuscescent or brownish-fuscous without, fibrillose below the annulus. SPORES elliptical, smooth, 6-8 x 4-5 micr. (rarely 9 x 5.5). BASIDIA 30 x 7 micr., 4-spored. ODOR and TASTE mild.

Among mosses or debris in moist places or swampy woods. New Richmond. August-October. Not infrequent.

An extensive study of many specimens showed considerable variation and after some experience it was possible to distinguish two forms with respect to color. Both are conical when very small and become distinctly umbonate. Form (A) had a dark fuscous cap at first umber when mature, fading to brownish-gray with a chestnut colored umbo; the gills were fuscous at first, and the annulus less fully developed. Form (B) had a watery cinnamon-brown cap when mature, fading to ochraceous-tan; the gills were pallid, ochraceous at first, and the annulus more persistent. The pileus of both had the characteristic villose covering, the same spores and habit. The gills of our specimens are never truly crowded, and in this respect differ from the European

descriptions and from specimens which I collected in Sweden. The microscopic structure of both forms was alike. The upper surface of the fresh pileus is composed of a differentiated layer of two kinds of cells, one forming erect, fasciculate fibres alternating with a layer of larger cells; these fasciculate tufts of narrow cells arise from separate points in the surface of the pileus and produce the villose effect. This upper layer is easily dissolved by rains and often disappears leaving the pileus glabrous. The stem is usually hollow, but it is not rare to find a stuffed or solid axis. Both forms are caespitose. The variation in size is such, even in the same collections, that it is very doubtful whether *C. paleaceus* should be kept separate.

439. Cortinarius paleaceus Fr.

Epicrisis, 1836-38.

Illustrations: Fries, Icones, PI. 106, Fig. 4.
Gillet, Champignons de France, No. 241.
Cooke, Ill., Pl. 826.
Plate LXXXIX of this Report.

Differing from *C. hemitrichus* Fr. in more slender habit, longer stem, the universal veil forming delicate, evanescent, subannular, white fibrillose zones along the stem, and in the pileus being more acutely conical. The colors are fuscous, paler.

In moist, mossy places in woods of oak, etc. Ann Arbor. September-October.

The spores, variability and habitat are the same as in the preceding from which it is separated with difficulty.

SUBGENUS HYDROCYBE. No universal veil. Pileus *hygrophanous*, glabrous or innately silky, changing color on losing moisture. Flesh quite thin, scissile. Stem rarely and then slightly subannulate from the remains of the cortina.

Composed of two sections: those with thicker caps whose margin is at first incurved, and the smaller, slender species with sub-membranaceous pileus whose margin is at first straight on the stem in the manner of the genus Galera. They are distinguished from the Telamonias only by the absence of the universal veil although several have at times a slight aiinulus from the collapsing of the copious cortina and not from the outer veil. The pileus is never viscid; it is moist when growing but the moisture disappears quickly in sun and wind so that in our climate the dry, faded plant is more often found than the moist plant. However, for identification of most of the species of this subgenus it is absolutely necessary to know the colors of both the moist and dry pileus since in many of the species the pileii have a similar color when dry. I consider this the most difficult of the subgenera of Cortinarius both because of the great variability of the colors of most species, and because of the unsettled condition in which the European authors have so far left it. While at Stockholm, Sweden, I paid special attention to this group, and found a number of Friesian species; in many cases, however, these do not agree well with the spore characters as given by various authors. It is clear that only a temporary arrangement can be given of our species and it seemed best to put on record descriptions of such species as are close to the Friesian ones, as unnamed variations under the Friesian names. In Michigan the Hydrocybes seem to be much more numerous in the coniferous regions of the State than in froiidose woods as appears to be also the case in Europe. I have no doubt we have quite a number of species which are truly American.

Section I. Margin of pileus at first incurved. Pileus thickish, of a medium or fairly large size. Stem somewhat stout.

**Stem or gills at first violaceous.*

440. Cortinarius imbutus Fr.

Epicrisis, 1836-38.

Illustration: Cooke, Ill., Pl. 870.

PILEUS 2.5-7 cm. broad, *convex* then expanded, obtuse or subumbonate, even, *hygrophanous, chestnut-brown when moist*, changing color, alutaceous or rufous-tinged on disk when dry and then becoming somewhat hoary, margin at first incurved and sometimes decorated by whitish fibrillose scales from the cortina. FLESH thickish on disk, thin on margin, watery to pallid. GILLS adnate then subemarginate, *broad*, close, not crowded, *violaceous at first* with lavender tinge, soon cinnamon, edge concolor. STEM rather stout, 3-5 cm. long, 5-10 mm. thick, *equal* or nearly so, *solid*, at first violaceous, especially at apex, then silky-whitish and shining, violaceous within at apex, rarely subannulate from the whitish cortina. SPORES narrow, elliptical, smooth, 7-8.5 x 4-4.5 micr. BASIDIA 25-27 x 8 micr., 4-spored. ODOR none.

Gregarious or subcaespitose. On naked ground in low frondose woods. Ann Arbor. October. Infrequent.

This species is based here on the figures of Cooke and those of Fries, unpublished plate at Stockholm. The latter shows a pileus colored like ours and somewhat the same as that of Cookers figures, but is not "gilvus" as described by Fries in his works. Cooke's figures do not show the violaceous character as do those of Fries. Other authors differ considerably in the application of this name and in the spore-size. The figure of Quelet (in Grevillea, Vol. VIII, Pl. 127, Fig. 2) is referred by Maire (Bull. d. 1. Soc. Myc. de France, Vol. 26, p. 28), to *C. bicolor* Cke. and is not at all our plant. The cortina sometimes leaves a row of spot-like shreds on the margin of the pileus, sometimes it forms a slight annulus on the stem, but more often it is entirely evanescent. This species is near *C. castaneus*, from which it differs by its larger, stouter habit, its slightly smaller spores, but especially by the solid stem. Ricken considers it a variety of *C. subferruginea*, but he evidently had a plant with larger spores.

441. Cortinarius saturninus Fr. minor.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 161, Fig. 2.
Gillet, Champignons de France, No. 247.

PILEUS 3-6 cm. broad, campanulate, expanded, sometimes gibbous, glabrous, hygrophanous, pale watery brown when moist, ochraceons-gray-buff when dry, silky around margin. FLESH thin, scissile, violaceous then pallid. Gills adnate then emarginate, adnexed, *close*, moderately broad, *violaceous or tinged purplish at first* then ashy-cinnamon, thin, edge entire. STEM 4-6 cm. long, 6-12 mm. thick, subequal, slightly thicker downwards, terete or compressed, *stuffed, violaceous above*, whitish below, fibrillose, glabrescent and shining when dry. CORTINA whitish. SPORES elliptical, slightly rough, 7-8 x 5-6 micr. ODOR and TASTE mild.

Subcaespitose. On the ground in frondose woods. Ann Arbor. September. Rare.

This is well illustrated by the figures of Fries and of Gillet. Hicken describes a plant with spores measuring 10-12 x 5-6 micr., and with a much darker pileus. The pileus soon fades. It is to be noted that although Fries describes the moist pileus as "dark bay" color, his figures are much paler. I have not seen it dark-colored and that character may belong to another species such as the one described by Ricken.

442. Cortinarius livor Fr.

Epicrisis, 1836-38.

PILEUS 34 cm. broad, firm, campanulate, obtuse, sometimes gibbous, *sooty-brown, obscurely olive-gray on center*, scarcely hygrophanous, *not fading*, even, innately subtomentose on disk, margin at first incurved. FLESH thickish on disk, sooty-brown under the center, pallid or whitish elsewhere. GILLS adnate then emarginate, close, relatively *broad, pallid-cinnamon at first*. STEM 4-5 cm. long, sub-equal, sometimes narrower at base, sometimes subbulbous, slightly *violaceous above*, becoming dingy olivaceous to brownish below, solid, firm, at first violaceous, within. SPORES broadly elliptical, slightly rough, obtuse, 7-8 x 5 micr. BASIDIA 30 x 7 micr., 4-spored. ODOR slight.

Solitary. On the ground in beech and pine woods. New Richmond. September. Rare.

There is an olive to sooty tinge on cap and base of stem, which along with the violaceous apex of the stem is quite characteristic. The plate of Fries at Stockholm, marked typical, shows a plant with a much shorter stem, otherwise our plant is very like it.

443. Cortinarius castaneus Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 842.

"PILEUS 2-5 cm. broad, firm, campanulate-convex, expanded or gibbous, even, *subumbonate*, scarcely hygrophanous, *dark chestnut color*, shining when dry, *hardly fading*, margin at first white-silky. FLESH thin, rigid-tough, concolor to pallid. GILLS adnexed, *not broad*, ventricose, *close, violet at first*, then rusty-cinnamon, *edge whitish*. STEM 2-4 cm. long, not truly slender, 4-6 mm. thick, cartilaginous, *stuffed then hollow, violaceous or pallid-rufescent*, silky from the white cortina. SPORES elliptical, rough, 7-9 x 4-5 micr. ODOR and TASTE slight."

Gregarious. On the ground in open woods, etc.

The description is adapted from the works of Fries and his unpublished plate at Stockholm. The characteristic features, by which it is separable from *C. imbutus* and other related species with violet gills, are the *hollow stem* and smaller stature. The figures of Cooke agree with those of Fries, except that they lack the markedly violet stem and gills. Patouillard's figures (Tab. Analyt., No. 128) remind one more of *C. badius* Pk., and Gillet's figure (Champignons de France, No. 202), has aberrant colors. Peck's specimens have the correct spores. The species has been reported by various authors in this country but I have not seen any typical specimens.

***Stem at first white or pallid.*

444. Cortinarius armeniacus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 793.
Ricken, Blätterpilze, Pl. 51, Fig. 4.

PILEUS 5-7 cm. broad, firm, campanulate-subexpanded, broadly *umbonate*, obtuse, glabrous, even, hygrophanous, *sudan-brown when moist* (Ridg.), orange-buff on umbo while drying, orange-buff or tan throughout when dry, margin when dry white silky from the cortina. FLESH thin on margin, scissile, soon pallid. GILLS adnate, emarginate, *broad*, ventricose, close, thin, *at first pallid*, then mars-yellow (Ridg.) to cinnamon, edge entire. STEM 5-7 cm. long, tapering upward, 5-8 mm. thick above, twice as thick below, watery-pallid y/hen moist, dingy whitish when dry, *silky-fibrillose*, rind cartilaginous, stuffed, spongy at base. CORTINA whitish, sparse. SPORES elliptical, slightly rough, 8-9 x 5-5.5 micr. ODOR and TASTE mild or slightly of radish.

Gregarious. Among mosses under spruce and balsam. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914.

Similar in stature to *C. glabrellus*, but differs in the nature of the surface of the pileus both in color and in the structure of the cuticle. As the moisture disappears the umbo fades to pale ochraceous. It agrees well with the figures of Fries at the Stockholm Museum and also with

the conception of Ricken. Fries states that the plants are more robust among fallen leaves and the stem is then stout and clavate-bulbous and some of his figures show this.

445. Cortinarius duracinus Fr. var.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 809 (not typical).
Ricken, Die Blätterpilze, Pl. 51, Fig. 2 (not typical).
Quelet, Grevillea, Vol. VII, Pl. 115, Fig. 1 (dry form).

PILEUS 4-10 cm. broad, *convex* then expanded, obtuse, sometimes gibbous, *hygrophanous, watery cinnamon-brown when moist*, tinged rufous on disk, pale ochraceous-tan to buff when dry, *glabrous*, even, margin at first incurved then geniculate and obsoletely silky. FLESH rigid-brittle, *thin*, scissile, concolor, at length pallid. GILLS adnate or slightly subdecurrent, thin, *subdistant*, moderately broad, pallid at first but *soon watery-cinnamon*, edge even or scarcely crenulate. STEM 4-12 cm. long, *tapering downwards or fusiform-subradicate*, 6-15 mm. thick, glabrous, rigid, stuffed then hollow, sometimes compressed, at length shining, *white*, at first cortinate-fibrillose. CORTINA white. SPORES elliptical-almond-shaped, scarcely rough, 7-9.5 x 5-5.5 micr. BASIDIA 32-36 x 8-9 micr. ODOR and TASTE mild.

Gregarious, often in troops or subcaespitose. On the ground, grassy places, etc., in frondose woods of southern Michigan. August to October. Frequent in very wet weather.

One of the larger Hydrocybes, usually found in quantity when it occurs. No good plates seem to exist of the plant as it occurs with us. Our specimens agree in stature, colors, spores, etc., with a collection I found at Stockholm. Ricken gives spores much larger, but Massee's spore-measurements are much smaller. It seems clear that the species of Fries is yet uncertain. A plant agreeing in the spore-character with that of Ricken and otherwise similar to the above species occurs with us in the same habitat. The rigid-brittle, convex pileus, the tapering-subradicating stem and the colors and size distinguish our *C. duracinus*. It has somewhat the appearance of *C. dolobratus* Fr. as figured by Cooke (Ill., Pl. 811) except in shape of stem and the brown color; furthermore the margin of the pileus of that species is at first incurved. Neither the pileus of our plant nor that occuring at Stockholm had a truly ferruginous or testaceous color when moist.

446. Cortinarius sp.

PILEUS 2-8 cm. broad, *conico-campanulate*, subexpanded, glabrous, even, hygrophanous, rufous-cinnamon when moist, *pale tan when dry* and subshining, margin white-silky at first. FLESH thin, scissile, at length whitish. GILLS adnate-emarginate, *broad*, broadest behind, tapering in front, medium close, ventricose, *pallid-brownish at first* then dark cinnamon, edge erose-crenulate, concolor. STEM 6-10 cm. long, 7-12 mm. thick above, *subbulbous to clavate below, stuffed*, soon cavernous, soft-spongy within, silky-fibrillose, *whitish to pallid*. CORTINA white. SPORES broadly elliptical, 8-9 x 5-6 micr., scarcely rough. ODOR and TASTE mild.

Gregarious to subcaespitose. On the ground in frondose woods, among grass, etc. Ann Arbor. September. Infrequent.

In size this species corresponds to the preceding, but differs in its somewhat cone-shaped, rather acute pileus, broad gills and bulbous to clavate stem. *C. candelaris* Fr. is half-way between the two in having a conic-campanulate pileus and a radicating stem and the spores, according to Ricken, measure 9-11 x 4-5 micr. Found in quantity, but all with clavate-bulbous stems. Specimens of *C. candelaris* from Bresadola had spores measuring 6-7.5 x 5 micr.

447. Cortinarius erugatus Fr.

Epicrisis, 1836-38.

PILEUS 3-6 cm. broad, campanulate-convex, obtuse to broadly subumbonate, *hygrophanous*, pale *umber-cinnamon to grayish-brown with rufous or fulvous umbo when moist*, on drying becoming pale reddish-gray with innate silky fibrils and *silvery sheen*, glabrous, even, margin at first incurved and entirely white-silky. FLESH thin, splitting on margin which is at length recurved. GILLS adnate-emarginate, rather broad behind, tapering in front, *close*, thin, *pallid-brownish at first*, then alutaceous to ferruginous, edge minutely erose-lacerate. STEM 4-7 cm. long (when elongated 8-10 cm.), 5-12 mm. thick, variable in length and thickness, *at first clavate-bulbous* then elongated, soft-spongy, stuffed, *pallid and streaked with silky white fibrils*, becoming sordid, not cingulate. CORTINA white. SPORES elliptical, rather narrow, smooth, variable in length, 6-8.5 (rarely 9) x 4-4.5 micr. BASIDIA 30 x 6-7 micr., 4-spored. ODOR and TASTE mild.

Gregarious or scattered in thick leaf-mould of hemlock, pine and beech ravines. New Richmond. September-October. Infrequent.

When young the pileus is firm and very silky on edge, when old it becomes soft; the stem is early affected by grubs and soon decays at the base. The color of the pileus changes markedly and hence is very variable. Sections of very young buttons show no universal veil.

448. Cortinarius glabrellus Kauff.

Jour. of Mycology, Vol. 13, p. 35, 1907 (synopsis).

Illustration: Plate XC of this Report.

PILEUS 5-10 cm. broad, hemispherical-convex at first, campanulate-expanded, obtuse or *broadly umbonate*, glabrous, *hygrophanous, with a slight pellicle*, watery cinnamon when moist, *becoming brick-color on drying*, then paler, even, margin at first incurved and white-silky. FLESH concolor then pallid, rather thin. GILLS adnate, moderately broad, broadest behind, close, *distinct*, thin, *at first brownish-pallid* then cinnamon-brown. STEM 4-8

cm. long, 8-18 mm. thick, *varying equal* to subclavate below, rather stout and firm, straight or curved at base, *pallid or whitish*, silky-fibrillose and shining when dry, stuffed. CORTINA white. SPORES elliptical, 6-8.5 x 4-5 micr., smooth. ODOR and TASTE slightly of radish.

Gregarious. On ground in moist, low, frondose woods. Ann Arbor. September-October. Infrequent.

This species was originally referred to the subgenus Phlegmacium. The pellicle of the pileus is, however, scarcely gelatinous although the surface feels somewhat slippery. This and the reddish coloi which appears on the pileus as it loses moisture are the most striking characters.

449. Cortinarius privignus Fr. var.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 827 (pale, dry, small).
Ricken, Die Blätterpilze, Pl. 52, Fig. 2 (non Fr.).

PILEUS 4-6 cm. broad, gibbous, campanulate-convex, obtuse, hygrophanous, *fuscous-brown when moist, innately variegated-micaceous-silky*, paler and with tinge of drab when dry, glabrous, even, margin at first incurved at length splitting radially. FLESH thin except disk, concolor to pallid. GILLS adnate-emarginate, *rather broad*, ventricose, not crowded, *brownish at first*, then cinnamon, edge concolor. STEM 4-7 cm. long, 7-10 mm. thick, equal or subequal, sometimes *with a bulbous base, pallid with tinge of drab*, silky-shining when dry, glabrous, even, not cingulate, *stuffed then hollow*. SPORES broadly elliptical, obtuse, rough, 8-9 x 5-6 micr. ODOR and TASTE mild.

Solitary or gregarious. On the ground among humus in pine and beech woods. New Richmond. September-October. Infrequent.

The figures of this by Cooke and Ricken do not seem to apply to the same plant. Ours is intermediate between the two and fits more closely to the Friesian sense. The stem is usually clavate or even bulbous at base but equal elsewhere. The color of the pileus is soon similar to that of *C. paleaceus*, but the character of its surface'is quite different and the plant is stouter.

450. Cortinarius subrigens sp. nov.

PILEUS 3-5 cm. broad, broadly *convex* from the first, then expanded-plane or subdepressed, *bay-brown* to chestnut and *variegated with white hoariness* when moist, fading quickly to cinnamon-rufous and then *hoary isabelline when dry*, hygrophanous, even, margin at first incurved and cortinate. FLESH rigid-brittle, thin, dingy pallid or brownish. GILLS sinuate-adnate, close, medium broad, *pallid to brownish* then cinnamon, edge entire and concolor. STEM 3-5 cm. long, equal or tapering downward, 5-10 mm. thick, rigid, base often curved, *stuffed then hollow*, at first cortinate-fibrillose, glabrescent and silky-shining, *pallid to white*, rarely subannulate from the white CORTINA. SPORES narrow-elliptical, subinequilateral, slightly rough, 9-10 x 4.5-5.5 micr. BASIDIA 30-32 x 6-7 micr. ODOR and TASTE mild.

Caespitose. On the ground in oak woods. Ann Arbor. October. Infrequent.

Known by its whitish stem, hoary silkiness on the pale chestnut-brown ground-color of the moist cap, the stuffed to hollow stem and its medium size. The stem and cap become firm and rather rigid when dry. When the stem tapers down it approaches *C. rigens* Fr. but the incurved margin of the convex pileus, its hoary-silkiness and more manifest cortina separate it. *C. scandeus* Fr. is distinguished by its smaller spores, conic to umbonate pileus and more slender stem. *C. leucopus* Fr. has a conic to umbonate pileus and different spores.

****Stem and gills becoming brown or fuscescent.*

451. Cortinarius rubricosus Fr. var.

Epicrisis, 1836-38.

PILEUS 3-7 cm. broad, convex-campanulate, broadly umbonate, *fuscous-bay-brown*, subhygrophanous, margin grayish, white-silky, at first incurved, elsewhere glabrous, even. FLESH thickish on disk, watery to pallid. GILLS adnexed-emarginate, *rather narrow*, close to subdistant, *soon umber-brown*, pallid-brownish at first, edge white-fimbriate. STEM 3-5 cm. long, 8-12 mm. thick above, rather stout, *clavate-bulbous*, 12-18 mm. thick toward base, firm, *solid*, grayish-pallid, *soon fuscescent*, at length dark fuscous umber below and within, at first densely white-fibrillose from cortina. SPORES broadly elliptical, rough-tuberculate, 8-10 x 6-7 micr. BASIDIA 40-45 x 9 micr., often with dark brownish content; *sterile cells* on edge of gills, slender, subclavate above.

Solitary or gregarious. On the ground among humus in hemlock woods. New Richmond. September. Infrequent.

This differs somewhat from the Friesian plants in its lack of reddish tints on the cap, and from the plant of Ricken in its larger spores. Britzelmayr gives the spores the same size as ours, and my collection from Sweden also has such spores but shows the slight rufous color when dry. It needs further study but surely belongs in its present position in the group.

452. Cortinarius uraceus Fr.

Epicrisis, 1826-38.

Illustration: Fries, Icones, Pl. 162, Fig. 3.

PILEUS 2-5 cm. broad, firm, at first ovate or campanulate then convex-subexpanded, often with a mammillate umbo, hygrophanous, *smoky, chestnut brown* (Ridg.) *when moist*, even, fading to cinnamon-brown or isabelline, with blackish streaks, often *blackish on umbo*, margin persistently decurved. FLESH thin except disk, scissile, watery chestnut (moist), fragile when dry. GILLS broadly adnate, *broad*, close to subdistant, *dark watery brown at first*, then auburn to dark rusty-brown (Ridg.), edge at length black. STEM 4-

9 cm. long, 4-10 mm. thick, equal or tapering slightly upward, becoming flexuous, *firm, stuffed then hollow*, pallid when fresh, soon brownish-streaked, *fuscescent, in age blackish*, rarely with narrow white evanescent annulus. CORTINA whitish, forming a silky zone on the young margin of pileus, fuscescent. SPORES broadly elliptical, 7-8 x 5-6 micr., rough. ODOR of radish when plants are crushed. TASTE mild.

Gregarious-subcaespitose. Among moss under balsam, spruce, etc. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Frequent after heavy rains.

The species is interpreted here in the sense of the Icones of Fries. It is well marked by its spores, dark colors and broad gills. In dry weather it is scarcely recognizable; it is then often pale tan and streaked with blackish stains, quite fragile and split on the margin of the cap. There is no universal veil in the young stage, the lack of which separates it from *C. glandicolor* which is nearest to it in color and habit. As characterized by Fries, an olivaceous color is sometimes present. This form appears to be that of Ricken with very large spores. In the Monographia, Fries himself raises the question whether it is not a composite species. Cooke (Ill., Pl. 796) figures a slender plant and it is possible that this is also a separate form, as I collected such a plant in Sweden with spores 8-10 x 5-6 micr.

453. Cortinarius juberinus Fr. var.

Epicrisis, 1836-38.

Illustration: Cooke, Ill., Pl. 797.

PILEUS 2-4 cm. broad, campanulate-convex, then expanded, umbonate or umbo obsolete, *chestnut-brown to watery cinnamon* when moist, ochraceous when dry, subhygrophanous, glabrous, even, *silky-shining when dry*, margin at first incurved and white-silky from the cortina. FLESH concolor, thin. GILLS adnate then subemarginate, *subdistant*, rather broad, thin, at length ventricose, pallid-brown then cinnamon, interspaces somewhat venose, edge concolor. STEM 3-7 cm. long, 3-5 mm. thick, moderately slender, equal or sub-equal, even, *stuffed then hollow*, pallid at first, then brownish or fuscescent, innately silky-fibrillose. CORTINA white, fugacious. PORES 6.5-7.5 x 4.5-5 micr., broadly elliptic-oval, scarcely rough. BASIDIA 27-30 x 6-7 micr. ODOR and TASTE slight or none.

Solitary or scattered. On the ground near wet or springy places in woods or swamps. Ann Arbor, New Richmond. September. Infrequent.

Distinguished by the spores, subdistant gills, hollow stem and colors. The pileus does not become black-stained nor black-streaked in age as do some similar species of this subgenus. The color of the pileus is variable, sometimes approaching tawny-cinnamon, and its surface is silky-shining as in *C. cinnamomeus*. Our plant agrees better with the unpublished figures of Fries and those of Cooke, than with the description of Fries; in his description, Fries states that the pileus is very bright cinnamon-fulvous, but this is not shown in his figure. The habitat is also different. The spores agree with the size given by Cooke, and doubtless we have his species here.

454. Cortinarius præpallens Pk.

N. Y. State Bull. 2, 1887.

"PILEUS 1-4 cm. broad, subconical, then convex or expanded, glabrous, *hygrophanous, brown or chestnut color when moist*, pallid-ochraceous when dry. FLESH yellowish-white, thin. GILLS rounded behind or subemarginate, *crowded*, lanceolate, *reddish-umber* then fuscous-cinnamon. STEM 2-7 cm. long, 4-8 mm. thick, equal, subflexuous, fleshy fibrous, subsilky, *pallid or brownish*. SPORES subellipsoid, 7-10 x 6.5 micr.

"On bare ground in woods, New York."

Section II. Margin at first straight on the stem, Galera-like. Slender-stemmed, with the pileus mostly conical-campanulate and almost membranous.

**Stem or gills at first violaceous.*

455. Cortinarius fuscoviolaceus Pk.

N. Y. State Mus. Rep. 27, 1875.

"PILEUS 1-2 cm. broad, convex (?) umbonate, soon expanded and centrally depressed, *glabrous, hygrophanous, chestnut-brown tinged with violet*, the margin whitened by silky fibrils. GILLS rounded behind, at first plane then ventricose, rather distant, *dark violaceous at first* becoming subcinnamon. STEM 2.5-4 cm. long, slender, flexuous, equal, solid, silky-fibrillose, colored like pileus." SPORES broadly elliptical, minute, smooth, 6-7 x 3-4 micr.

"Sphagnous marshes, New York."

A very similar plant occurs at Ithaca, New York., with spores 7-10 x 3-4 micr. The type-specimens, however, show the spores as given above.

456. Cortinarius erythrinus Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 798, A.
Ricken, Blätterpilze, Pl. 53, Fig. 2.
Quelet, Grevillea, Pl. 115, Fig. 2.

PILEUS 1-2 cm. broad, rather firm, *conic-campanulate*, then sub-expanded and subacutely umbonate, chestnut brown, *umbo umber or blackish*, paler toward margin, hygrophanous, glabrous, even, soon fading. FLESH thin on margin, scissile, watery-brown when moist. GILLS rounded behind and adnexed, *rather broad*, ventricose, close to subdistant, pallid or pale brownish then cinnamon, edge entire. STEM slender, 4-6 cm. long, 3-4 mm. thick, fragile, *equal*, flexuous, stuffed then hollow, *apex violet at first*, pale brownish elsewhere, sometimes violet-tinged throughout, sparsely cortinate, glabrescent, shining when dry. S PORES short, elliptical, 7-9 x 5-6 micr., almost smooth, pale ochraceous. ODOR and TASTE mild.

Gregarious. On bare soil in mixed woods. North Elba, Adirondack Mountains, New York. Collection Kauffman. September, 1914. Infrequent.

The slender form of the species is illustrated by Cooke. It agrees in all respects with plants found in Sweden. The stouter forms approach *C. castaneus*.

***Stem white, pallid or dingy brownish.*

457. Cortinarius decipiens Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 798, B.
Ricken, Blätterpilze, Pl. 53, Fig. 8.

PILEUS 2-4 cm. broad, at first *conico-campanulate*, then subex-panded with decurved margin, *prominently umbonate*, vinaceous-cinnamon (Ridg.), *umbo blackish while losing moisture*, hygrophanous, *glabrous*, silky-shining, margin with white-silky fibrils. FLESH thin, concolor. GILLS adnate, then emarginate-uneinate, close, *rather broad*, at first pallid or cinnamon-buff, *at length mars-yellow* (Ridg.), edge white-crenulate at first. STEM slender, 7-10 cm. long, 4-7 mm. thick, scarcely incrassate downward, stuffed then hollow, becoming flexuous, fragile, *pallid to silky-shining*, glabrous, brownish within. SPORES narrowly elliptical, 7-9 x 4-4.5 micr., scarcely rough. ODOR and TASTE slightly of radish.

Gregarious or subcaespitose. North Elba, Adirondack Mountains, New York. On mosses, sphagnum, etc., in balsam and tamarack swamp. Infrequent.

This species is placed here in the sense of Ricken. I doubt whether it is the typical Swedish species which I collected near Stockholm; the stem of that was rubello-tinged, the gills were truly cinnamon and the spores measured 9-10 x 6 micr. Britzelmayr also gives the latter size. When young and moist the cap of our plants is chestnut-brown.

Var. *minor*. PILEUS 1-2 cm. broad, stem 2-3 cm. long, 2-3 mm. thick. GILLS tawny at first then mars-orange (Ridg.), thickish, edge entire. STEM short, sub-bulbillate at base, often tinged sub-orange or reddish-orange by deposit of the spores. SPORES 7-9 x 5-5.5 micr. Under conifers, New York.

Both forms are known by the gills becoming mars-orange at maturity. Sometimes the silky fibrils on the margin of the cap are slightly rufous. No universal veil is present. The cortina is whitish.

458. Cortinarius leucopus Fr. (var.)

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 843.

PILEUS 1-3 cm. broad, conico-campanulate, at length expanded and umbonate, even, *glabrous*, roods-brown (Ridg.) when moist, *cinnamon-buff* (Ridg.) *when dry*, hygrophanous. GILLS adnate-sinuate, ventricose, not broad, subdistant, *pallid at first*, then *ochraceous-tawny* (Ridg.), edge entire. STEM 34 cm. long, 2-4 mm. thick, rather slender, *equal, silky-fibrillose or sometimes subcingulate* from the white cortina, stuffed to hollow, *white or pallid*. SPORES narrow, elliptic-oblong, scarcely rough, 7-8x 3.5-4.5 micr. (rarely 9 micr.). ODOR none.

Gregarious or subcaespitose. On the ground or moss in pine and spruce woods. North Elba, New York, and New Richmond, Michigan. September-October. Infrequent.

This approaches *C. juberinus* Fr., but pileus is more acute, spores of a different shape and stem scarcely brownish. The spores agree with those given by Ricken and Britzelmayr, but the colors, habit and the occasionally cingulate stem are shown in Fries' unpublished plate. No form has been seen with a pure white stem as described by Fries. Cooke's figures show the faded condition. The moist young pileus is margined by the white silky remains of the cortina.

459. Cortinarius scandens Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 830 (dry condition).
Cooke, Ill., Pl. 845 (as *C. obtusus*).
Gillet, Champignons de France, No. 236 (as *C. obtusus*).
Fries, Icones, Pl. 163, Fig. 3 (as *C. obtusus*).

PILEUS 1-3 cm. broad, *rigid*, conico-campanulate, *then expanded-umbonate*, glabrous, *watery rusty-fulvous at first when moist* and striatulate on margin, *soon* honey-colored or alutaceous to paler when dry, soon even, hygrophanous. FLESH thin, concolor. GILLS adnate, sometimes emarginate, *narrow*, close to subdistant, thin, *pallid-brown then cinnamon*, edge concolor. STEM 3-8 cm. long, 2-5 mm. thick, *tapering downward*, thickened above, *attenuated at the slender curved base*, flexuous, *soon rigid*, stuffed then hollow, fulvous (moist) pallid or white and shining when dry, scarcely fibrillose at the first by remains of the scanty white CORTINA. SPORES short-elliptical, almost smooth, 6-7.5 (rarely 8) x 4-5 micr. BASIDIA 25-30 x 6-7 micr. ODOR none or slight.

Solitary, scattered or subcaespitose in pairs. Among leaves and humus in frondose and conifer woods. Ann Arbor, New Richmond. September-October. Frequent in-the late autumn.

It is very variable in color, and the gills are sometimes rather broad, while the spores are consistently small. The plants are often the shape and color of *C. obtusus* Fr. as illustrated by various authors, so that it seemed advisable to refer to these figures. It seems that *C. obtusus* Fr., of which I obtained several collections at Stockholm, differs mostly in its larger size, its quite broad gills and larger spores; these measure 9-10 x 5.5-6.5 micr. It is to be noted that the figures of Fries (Icones, Pl. 163, Fig. 1) of *C. scandens* can scarcely be the form referred to in his descriptions. In "Monographia" he says distinctly that the stem is "incrassate at apex, always attenuate at the base," while in the figures the stem is not attenuate. The colors of his figures also do not correspond with the descriptions. I have followed the

idea of the description, as did Cooke, Ricken, Britzelmayr and others. We doubtless have forms of *C. obtusus* also, but they need further study. Fries' unpublished plate of *C. rigens* Fr. shows that species to differ from *C. scandens* in its larger, stouter habit and convex or gibbous pileus; its gills are not broad.

460. Cortinarius lignarius Pk.

N. Y. State Mus, Rep. 26, 1874.

Illustration: Plate XCI of this Report.

PILEUS .5-3 cm. broad, *conico-campanulate, subacutely umbonate*, hygrophanous, glabrous, *watery-cinnamon to chestnut-fulvous when moist*, not striate, fading to pale fulvous-tan, innately silky-shining, margin at first straight and soon naked. FLESH submembranaceous, concolor. GILLS adnate-seceding, *broad*, close, thin, *ochraceous-pallid at first* then somewhat rusty-brown. STEM 2-5 cm. long, rather slender, 2-3 mm. thick, equal, pallid or subrufous toward base, often curved at base, silky-fibrillose below, *subcingulate at or above the middle by silky-white remnants of the rather copious cortina*, at length tubular, base white-mycelioid. SPORES narrow-elliptical, smooth, 6.5-7x4-5 micr. BASIDIA 25 x 6 micr., 4-spored. ODOR none. TASTE slight.

Subcaespitose or solitary on very rotten wood, in coniferous or mixed woods. New Richmond. September. Infrequent.

Known by the very marked subacute umbo, reddish-fulvous pileus, the cingulate stem, spores and habitat. Peck placed it under the Telamonias, but although slight colored floccules are sometimes present on the edge of the annulus, there is no other indication of a universal veil. When fresh there is sometimes a fleeting tint of violaceous at the apex of the stem. Sometimes it grows on logs when these are far advanced in decay.

461. Cortinarius acutoides Pk.

N. Y. State Mus. Bull. 139, 1909.

Illustrations: Ibid, Plate X, Fig. 4-8.

"PILEUS 8-16 mm. broad, *conic or subcampanulate*, acutely umbonate, hygrophanous, not striate, *pale chestnut color at first*, floccose and margined by the fibrils of the cortina, *whitish and silky-fibrillose when dry*. GILLS adnexed, subdistant, ascending, *narrow*, yellowish-cinnamon. STEM 2.5-5 cm. long, 2-3 mm. thick, solid or with a small hollow tubule, *white*, then whitish. SPORES 8-10 x 6-7 micr., ellipsoid.

"Swamps. Massachusetts. October. Closely allied to *C. acutus*, from which it differs in the darker color of the young moist pileus and whiter color of the mature dry pileus, the white color of the young stem, the adnexed gills, and especially by the larger spores and absence of striae from the pileus."

****Stem yellowish or ochraceous.*

462. Cortinarius acutus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 845.
Quelet, in Grevillea, Vol. VII, Pl. 112, Fig. 5.
Engler and Prantl, Pflanzenfamilien, Part I, Sect. 1,** Fig. 118 A.

PILEUS 5-25 mm. broad, *conical* or conic-campanulate with acute umbo, *striate to the umbo* and watery rufous-cinnamon when moist, pale alutaceous when dry, hygrophanous, minutely silky, margin white-cortinate, glabrescent. FLESH submembranaceous, yellowish. GILLS adnate seceding, close or scarcely subdistant, thin, not broad, *pale ochraceous at first* then ochraceous-cinnamon, edge entire. STEM 4-8 cm. long, *slender*, 1-2 mm. thick, equal, flexuous, tubular, *yellowish at first* becoming paler, silky from the evanescent white cortina, glabrescent. SPORES elliptical, smooth, 7-9.5 x 5-5.5 micr.

In moist places, swamps, etc. September-October. Specimens from Massachusetts by G. E. Morris.

Distinguishable from the preceding two by the clearly striate pileus and yellowish stem when fresh and moist. It is easily mistaken for a Galera.

Inocybe Fr.

(From the Greek *is*, a fibre, and *kybe*, a head, referring to the silky-fibrillose covering of the pileus.)

Ochre-brown-spored. Pileus conical or campanulate at first, *innately silky, fibrillose or fibrillose-scaly*; the cuticle continuous to the stem in the form of a more or less evanescent, fibrillose cortina. Volva none. Gills and spores pale and sordid; *edge of gills provided with cystidia or saccate, sterile cells*.

Putrescent, mostly terrestrial, often with a characteristic odor. *Mostly small or medium-sized plants;* intermediate between Hebeloma and Cortinarius, lacking mostly the viscid pileus of the former, and the delicate, cobwebby cortina and the darker brown or rusty spores of the latter; formerly joined with the genus Hebeloma. They are usually omitted from the list of edible species on account of their mostly disagreeable odor and taste. Some are known to be markedly, poisonous, e. g., *I. infida* Pk., *I. infelix* Pk., *I. fibrosa* Bres., etc.

The PILEUS has a cuticle composed of radiating, parallel fibrils, which breaks up more or less during development and in age, so as to form minute radiating cracks (rimose), or still more so, to form fibrillose scales, which in some species become recurved (squarrose-scaly); in others, the surface fibrils remain more or less interwoven and do not become rimose; in a few species the cuticle is at first viscid. These different modes of adjustment of the fibrils form a basis for a division of the species into sections. The color of the cap is rarely bright, it is mostly of whitish, ochraceous, grayish or brownish shades; *I. frumentacea* and its variety *jurana*,

have sometimes a beautiful vinaceous or purple color, and are well-marked by it. Others, like *I. pyriodora*, have a characteristic pinkish tint to the flesh as they grow older. In most cases, however, color-descriptions are apt to be confusing, as the shades of brown, fawn, gray, or ochraceous vary in the same species and the same plants. For a satisfactory study of this group, the interested student should attempt to make colored sketches of the species he finds, accompanied by spore and cystidia drawings. It is practically impossible to be sure of a species of this genus without the use of the microscope. The GILLS may be adnexed or almost free, occasionally entirely free; adnate to subdecurrent in a few species. The color of the mature gills is usually of a dull, sordid or pale fuscous, hard to describe, but characteristic for many of the species, so that one soon learns to distinguish an Inocybe by the tints of the gills. The color of the gills is very similar to that of the genus Hebeloma. However, it may vary in some species to brown, yellow or olivaceous shades, and in one species becomes dingy purplish. A few have been described with pale violet or blue gills when young, but usually the young gills are whitish. The STEM is fibrous, usually rather rigid at maturity, its surface varying from slightly silky to fibrillose or squarrose-scaly. In the last case the stem is somewhat peronate or sheathed by the remains of the fibrillose-scaly covering which was continuous in the young plant from cap to stem; such species belong to the "Squarrosae" section. The apex of the stem is usually mealy or scurfy. It may be stuffed and later hollow, but most species have a solid stem. Some species are well marked by the striking color of the lower part of the stem. The stem of *I. calamistrata* Fr. has a dark greenish-blue base. The base of the stem of *I. hirsuta* Lasch., is said to be bright green; this species has not been found with us. In *I. cincinnata* Fr., the apex of the stem as well as the young gills are said to be dark violet. The FLESH is characterized in some species by changing to a reddish color in age, e. g., *I. pyriodora* Bres., *I. repanda* Bres., *I. trinii* Bres., *I. incarnata* Bres. and *I. bongardii* Weinn. Some of these have not been found here. The SPORES are of great importance in the diagnosis of species. They may be spiny, angular or smooth. For the convenience of the student, each *section* may therefore be divided into the rough-spored and the smooth-spored species. Some authors have gone so far as to suggest the use of this character to establish genera. In some species, however, the spores are scarcely angular, i. e., they are intermediate between the smooth and angular shapes; an example of this condition is *I. decipiens*. In two of our species, *I. calospora* and *I. asterospora*, the spores are spiny, i. e., the surface of the spores is covered with slender, rod-like tubercles producing a pretty effect when seen under the microscope. Even the smooth spores often vary sufficiently in size and shape so as to provide means for the identification of species. CYSTIDIA are present in many species on the sides and edge of the gills; they are usually ventricose-lanceolate, mostly obtuse and covered at the apex by crystal-like deposits. In other species the cystidia are lacking, and only the edge of the gills is provided with differentiated structures; these are inflated-rounded at the apex in the form of obclavate or saccate, *sterile cells*, somewhat longer than the basidia. Ricken has used the rough and smooth characters of the spores, and the presence or absence of cystidia in such a way as to group the species under three divisions: (a) those with rough spores; (b) those with smooth spores and cystidia and; (c) those with smooth spores and without true cystidia. I have preferred to retain the more natural Friesian arrangement, modified so as to use the spore character under the sections.

The species included below have been interpreted from the point of view of the eminent mycologist, Ab. Bresadola, who has revised the older conceptions, and cleared up the complicated mass of synonyms for the European forms. The recent work of Ricken, which is also based on Bresadola's opinions, has helped not a little to arrive at definite conclusions.

Key to the Species

(A) Spores angular, tubercular or spiny.
  (a) Pileus viscid, small, tawny-ochraceous. 493. *I. trechispora* Berk.
  (aa) Pileus not viscid.
    (b) Pileus squarrose-scaly, fuscous to cinnamon.
      (c) Spores spherical, with rod-like spines. 468. *I. calospora* Quel.
      (cc) Spores subrectangular or wedge-shape in outline, irregular. 467. *I. leptophylla* Atk.
    (bb) Pileus not squarrose-scaly.
      (c) Pileus appressed fibrillose-scaly.
        (d) Stem fulvous-tinged; pileus 3-6 cm. broad, umbo fulvous. 487. *I. repanda* Bres.
        (dd) Stem whitish; pileus brownish-ochraceous, large; spores elongated-oblong in outline. 474. *I. decipientoides* Pk.
      (cc) Pileus soon rimosely cracked, fibrillose or silky.
        (d) Disk of pileus white and glabrous, pale grayish-lilac or grayish-drab on the margin. 485. *I. albodisca* Pk.
        (dd) Disk not sharply marked in color.
          (e) Pileus creamy-white or tinged ochraceous, large, 4-8 cm. 484. *I. fibrosa* Bres.
          (ee) Pileus not whitish.
            (f) Spores subglobose, with blunt spines; pileus brown or rufous-brown. 486. *I. asterospora* Quel.
            (ff) Spores irregularly-angular; pileus dark fuscous-brown. 483. *I. radiata* Pk.
(AA) Spores smooth, (i. e., not angular, etc.).
  (a) Cystidia present on sides of gills.
    (b) Stem squarrose-scaly or floccose-scaly; pileus brown, squarrose-scaly.
      (c) Spores 10-13 micr. long; stem squarrose-scaly. 463. *I. hystrix* Fr.
    (bb) Pileus not squarrose-scaly.
      (c) Pileus fibrillose-scaly, rarely or not at all rimose.
        (d) Spores elongated-subcylindrical, 11-18 x 4-6 micr.; pileus brown, umber, etc. 471. *I. lacera* Fr. 472. *I. infelix* Pk.
        (dd) Spores not markedly elongated.
          (e) Small plants; pileus 1-2.5 cm. broad, tawny-brown; stem tinged rufous-brown. 473. *I. flocculosa* Berk.
          (ee) Larger; pileus 2-6 cm. broad.
            (f) Flesh tinged reddish or pinkish in age; pileus whitish then sordid brownish-ochraceous; taste sweetish. 469. *I. pyriodora* Bres.
            (ff) Flesh not changing to reddish.
              (g) Pileus and mature gills smoky-brown; spores 7-8 x 5 micr. 470. *I. scaber* Fr.
              (gg) Pileus dark brown or rufous-brown, umbo darker; stem faintly rufous-tinged; spores 8-10 x 5-5.5 micr. 477. *I. destricta* Fr.
      (cc) Pileus at length rimose, fibrillose or subscaly. [See also (ccc).]
        (d) Spores obscurely angular, or almost even; pileus large, whitish, 4-8 cm. broad. 484. *I. fibrosa* Bres.
        (dd) Spores smooth; pileus not whitish.
          (e) Pileus dark brown or rufous-brown with chestnut-brown umbo; stem rufous-tinged. 477. *I. destricta* Fr.
          (ee) Pileus paler; stem not rufous-tinged.
            (f) Gills, when young, pale violaceous; pileus grayish-buff; spores 8-10 x 5-6 micr. *I. violaceifolia* Pk.
            (ff) Gills not violaceous; pileus fawn-color, almost chestnut-brown when young and cortinate, often appressed-scaly. 482. *I. eutheloides* Pk.

(ccc) Pileus neither scaly, nor rimose, but persistently silky or fibrillose.
(d) Pileus violaceous-lilac. 491. *I. lilacina* Pat.
(dd) Pileus some other color.
(e) Pileus small, 1-2.5 cm. broad.
(f) Pileus and stem white, glossy-shining. 490. *I. geophylla* Fr.
(ff) Pileus and slender stem rufous; in wet places. 492. *I. scabella* Fr. var. *rufa*.
(ee) Pileus larger, 2-6 cm. broad.
(f) Pileus whitish to straw-color or tinged ochraceous, woolly-fibrillose; stem white. 488. *I. sindonia* Fr.
(ff) Pileus ochraceous or ochraceous-yellow, fibrillose-subscaly; stem pale ochraceous in age. 489. *I. subochracea* Pk.
(aa) Cystidia lacking on sides of gills; edge of gills provided with sac-shaped sterile cells.
(b) Pileus when fresh squarrose-scaly or floccose-warty; stem sheathed by floccose or fibrillose scales.
(c) Gills purplish-red; pileus smoky-brown, stem blood-red within; mostly in gardens and greenhouses. (See 236. *Psalliota echinata*.)
(cc) Gills not red.
(d) Stem dark greenish-blue towards base; pileus coffee-brown to wood-brown. 465. *I. calamistrata* Fr.
(dd) Stem and pileus fulvous-yellowish or ochraceous; stem at length tubular. 466. *I. cæsariata* Fr.
(bb) Pileus not squarrose-scaly.
(c) Pileus appressed-scaly.
(d) Pileus large, 3-8 cm., smoky-purple, tinged wine-color, broadly umbonate. 475. *I. frumentacea* (Fr.) Bres.
(dd) Pileus olivaceous-fulvous; gills at first olive or fawn-yellow; flesh citron-yellowish; cortinate; spores 10-11 x 5.5-6.5 micr. *I. dulcamara* Schw.
(cc) Pileus at length rimose, fibrillose or subglabrous.
(d) Pileus smoky-purple, vinaceous, conico-campanulate. 475. *I. frumentacea* Bres. var. *jurana* Pat.
(dd) Pileus not purplish.
(e) Pileus whitish, tawny, ochraceous or yellowish.
(f) Center of pileus covered with white hoary-silky fibrils, convex and obtuse. 481. *I. lanatodisca* sp. nov.
(ff) Not hoary-silky.
(g) Spores 9-12 x 5-6 micr.; pileus conic-campanulate, pheasant-yellow to ochraceous-tan, virgate. 478. *I. fastigiata* Bres.
(gg) Spores smaller.
(h) Pileus pale yellow to straw color, lutescent; stem lutescent. 480. *I. cookei* Bres.
(hh) Pileus ochraceous to tawny-yellowish, gibbous; stem irregularly clavate. 479. *I. curreyi* Berk.
(ee) Pileus some shade of brown.
(f) Pileus glabrous, sublubricous on umbo, sordid livid-brown, putrescent. 494. *I. glaber* sp. nov.
(ff) Pileus fibrillose-virgate and very rimose, brown; spores 7-9 x 5-6 micr. 476. *I. rimosa* Fr. (Sense of Ricken.)

Section I. Squarrosae. Pileus at first densely scaly or squarrose-scaly; stem concolor.

**Spores smooth.*

463. Inocybe hystrix Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 106.
Cooke, Ill., Pl. 424.

PILEUS 2-5 cm. broad, convex-expanded, broadly umbonate, *clothed* with *dense wood-brown, pointed or squarrose scales*, not rimose, nor striate; flesh white. GILLS adnate, not broad, close, pallid-alutaceous then brown, edge white-floccose. STEM 4-8 cm. long, 3-6 mm. thick, equal or enlarged below, *peronate to above the middle by squarrose scales,* concolor. SPORES elliptic-ovate, inequilateral, 9-13 x 5-5.5 micr., *smooth*, brown. CYSTIDIA on sides and edge of gills, ventricose below, obtuse, 70-90 x 12-17 micr. ODOR none.

Scattered or solitary. On the ground in mixed woods of northern Michigan. Marquette, Ishpeming. August. Rare.

Known by the dense recurved scales on the stem and by the large spores.

465. Inocybe calamistrata Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 106.
Gillet, Champignons de France, No. 360.

PILEUS 1-4 cm. broad, campanulate-convex, obtuse, surface soon broken up into dense, coffee-brown, squarrose scales, not rimose; flesh thin, *tinged dilute reddish*, darker in age. GILLS adnate-seceding or becoming sinuate, *broad*, close, soon cinnamon, at length ferruginous-sprinkled, edge thickish, white-flocculose. STEM firm, 4-8 cm. long, 2-5 mm. thick, tapering upward, *smoky-greenish-blue below*, fuscous or tinged rufous-brown above, *clothed with recurved fibrillose scales*, at length merely fibrillose, solid. SPORES elliptic-oblong, subreniform, obtuse at ends , 10-12 x 5-6 micr., *smooth*, ferruginous-brown in mass. CYSTIDIA none. STERILE CELLS on edge of gills obclavate, rounded-inflated above, about 30 x 12 micr. ODOR slight.

Scattered or subcaespitose. On the ground in low woods, throughout the State. Marquette, Houghton, Bay View, New Richmond, Detroit, Ann Arbor. July-September. Infrequent and never plentiful.

Known by the smoky-blue lower part of the stem. The flesh turns pinkish-red in young fresh specimens where cut. When old or dry the stem is almost black below.

466. Inocybe cæsariata Fr.

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 109.
Ricken, Die Blätterpilze, Pl. 31, Fig. 4, 1911.

PILEUS 2-5 cm. broad, broadly convex and obtuse, *at first covered by dense, leather-yellow, ochre-yellowish or fulvous, tomentose-fibrillose or erect warts or scales*, becoming loosely fibrillose scaly, appressed fibrillose on margin, not rimose, margin incurved and at first connected with stem by a dingy-white or ochraceous fibrillose cortina. FLESH white or whitish, at length sub-ochraceous, *thick and compact on disk*, thin on margin. GILLS rounded-ascending behind, adnate-seceding or at length subdecurrent by tooth, rather broad, *ventricose*, dull ochraceous-yellowish then ferruginous-ochraceous or cinnamon, edge white-flocculose. STEM 1.5-4 cm long, 2-6 mm. thick, *usually rather stout and short*, equal, at first floccose-scaly below, usually densely floccose-fibrillose, *concolor*, apex flocculose-scurfy, *soon definitely tubular*, ochraceous-whitish within. SPORES short oblong, rounded-obtuse at both ends, subreniform, 8-10 x 5-6 micr., ochraceous-cinnamon in mass, *smooth*. CYSTIDIA none; *sterile cells* on edge of gills variable, from inflated-pyriform to flexuous-cylindrical. ODOR none. TASTE mild.

Gregarious, usually many individuals in favorable spots, as if sown. On the ground in moist places, naked soil or among short grass, near springs, lakes or water courses.

Spring and autumn. Ann Arbor, New Richmond. Not infrequent locally.

A rather variable plant when found under different weather conditions. In the luxuriant state or when fresh the cuticle of the pileus is broken up into dense floccose warts the bases of which radiate and connect with one another by silky white fibres; after being exposed for some time to rain or wind, the scales become more appressed-fibrillose, straw color or paler. The color is well shown in Fries' figures, but the scales on the cap and stem are more highly developed at times, so that it should be referred to this section, to which Ricken also referred it. It is easily mistaken for a Cortinarius. *I. unicolor* Pk., *I. subtomentosa* Pk., *I. subdecurrens* E. & E. and I*. squamosodisca* Pk. are related to it.

**Spores tubercular-spiny.*

467. ***Inocybe leptophylla** Atk.

Amer. Jour. of Bot., Vol. V, p. 212, 1918.

PILEUS 1-4 cm. broad, convex-expanded, obtuse, *covered with dense, cinnamon or umber, squarrose or pointed scales*, fibrillose on margin; flesh thin, whitish. GILLS rounded behind, adnexed, broad, *ventricose*, pallid becoming ferruginous-cinnamon, *edge white-crenulate*. STEM 2-4 cm. long, 2-4 mm. thick, equal, solid, *floccose-fibrillose* to tomentose-scaly, concolor, paler within, apex pruinose. SPORES subrectangular in outline, almost twice as long as wide, varying in shape, *with scattered obtuse tubercles* which are wider at base, 7-11 x 5-7 micr., ferruginous-brown. CYSTIDIA lacking; sterile cells on edge of gills, short, rounded-obclavate.

Solitary or gregarious. On the ground, in coniferous woods, or in swamps. Bay View, New Richmond, Ann Arbor. June-September. Rare.

This is apparently one of the American forms of *I. lanuginosa* (Fr.) Bres., to which Peck referred his species in his monograph of the New York Inocybes. (N. Y. State Mus. Bull. 139, p. 51.) But this seems unwarranted in view of the spore-measurements of *I. lanuginosa* given by such authorities as Bresadola and Schroeter who agree that the spores of the European species are much larger 5 about 11-15 x 8-9 micr. Specimens from three widely different local!' ties in Michigan and New York yielded the same, smaller-sized spores. Schroeter has described a similar species, *I. lanuginella*, of which the spores are given the same size as ours, but have "prominent angles;" this may be our plant.

*This species was reported as *I. entomospora*, (see Mich. Acad. Sci. Rep. 8, p". 26) but became a *nomen nuda* by the publication of the above name by Atkinson after this report was in press.

468. Inocybe calospora Quel.

Bresadola, Fungi Trid., 1881.

Illustrations: Ibid, Pl. 21.
Plate XCI of this Report.

PILEUS 1-3 cm. broad, conic-campanulate at first, then expanded, umbonate, fuscous-rufescent, fading to ochraceous, umbo darker, covered, except umbo, by loose or recurved fibrillose scales, margin fibrillose and paler; flesh thin, pale. GILLS adnexed to almost free, rather narrow, subventricose, pallid then pale fuscous-cinnamon, edge white-fimbriate. STEM 3-6 cm. long, 1.5-2.5 mm. thick, firm, rigid-elastic, subequal, stuffed then hollow, pale brown, rufescent, sprinkled with a delicate pruinosity, bulbillate. SPORES spherical or nearly so, 9-12 micr. diam. (incl. aculeae), *covered with cylindrical, blunt aculeae*, 2-3 micr. long. CYSTIDIA few or scattered on sides, numerous on edge of gills., subventricose, apex granulate, 40-55 x 8-12 micr. ODOR none.

Gregarious. On the ground in low frondose woods. Ann Arbor. June-September. Rather frequent locally.

This pretty little plant usually occurs in patches of about a dozen. There is a slight rufescent tinge developed as the plant dries. Our specimens had longer and more slender stems as a rule than those shown in Bresadola's figure. *I. rigidipes* Pk. is said to approach it, but to "differ in the tawny-gray color, slightly adnexed lamellae, solid flexuous stem and larger spores." N. Y. State Mus. Bull. 139, p. 59.

Section II. Lacerae. Cuticle of pileus appressed-scaly or fibrillosely-lacerate, not rimose. Stem pallid at first.

**Spores smooth*.

469. Inocybe pyriodora Fr.

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 368.
Bresadola, Fungi Trid., Vol. I, Pl. 52.
Patouillard, Tab. Analyt., No. 528.

PILEUS 3-5 cm. broad, campanulate then plane-expanded and *umbonate*, sometimes irregularly lobed on margin, whitish when young, *soon dingy ochraceous or pale fuscous-clay color*, at length here and there *faintly stained with pinkish-red*, at first silky-fibrillose, at length appressed fibrillose-scaly, radially split on margin in age. FLESH white at first, slowly pale red where cut, thick on disk. GILLS sinuate-adnexed, medium broad, close, whitish then sordid cinnamon, in age diluted with a rufous tinge, edge white-flocculose. STEM 4-7 cm. long, 4-10 mm. thick, subequal, at the very first white-cortinate, subfibrillose, apex furfuraceus, strict, subbulbous at base, white at first, becoming light-red in age, solid but soon cavernous from grubs. SPORES broadly elliptical, subreniform, smooth, 8-10.5 x 5-6 micr. CYSTIDIA rather abundant on sides and edge of gills, ventricose above the short pedicel, broadly cylindrical

above, 45-55 x 12-18 micr. ODOR *sweet*, spicy or like bumble-bee honey, becoming disagreeable.

Gregarious. On the ground in frondose woods of oak, etc. Ann Arbor. August. Infrequent.

This Inocybe is well described by Bresadola, and can be recognized by its peculiar light-red stains, especially between the gills or where they have been removed by snails or slugs. On the cap this color-change is not very marked. The odor has been described as being like that of ripe pears or clove pinks, and is quite characteristic. Except that the pileus is usually fully expanded, Patouillard's figure shows the old stage, which is most often found. The gills are sometimes narrow instead of broad, as indicated by Bresadola.

470. Inocybe scaber Fr.

Syst. Myc., 1821.

Illustrations: Ricken, Die Blätterpilze, Pl. 30, Fig. 1, 1911.
Patouillard, Tab. Analyt, No. 539.
Gillet, Champignons de France, No. 375.

"PILEUS 5-8 cm. broad, conical-campanulate, at length plane and broadly umbonate, *pale smoky*, with smoky, almost overlapping, fibrillose scales, the disk olive-blackish, at times tesselated, at the very first with a white-woolly cortina on margin, *fleshy*. Gills pale clay-color, finally almost smoky, close, broad, ventricose, emarginate-adnate, seceding. STEM 5-8 cm. long, 7-10 mm. thick, solid, subequal, *stout*, pallid or streaked with reddish-brown, silky-fibrillose with a slightly pruinose apex. SPORES almond-shaped, small, 7-8 x 5 micr., *smooth*. CYSTIDIA on sides and edge of gills, flask-shaped, 50-65 x 15-25 micr., sparse. ODOR weak, somewhat like pears, agreeable."

Reported by Longyear. The description has been adapted from Ricken, who gives the characters most fully. Ricken's diagnosis agrees in microscopic details with most other authors, except that his plants are very large. Patouillard gives the same spores as Ricken, but figures a small plant. Cooke (Ill., Pl. 391) figures a plant whose spores measured 11 x 6 micr. Cooke's spore-size has been copied by Massee and Schroeter. Thus, there seem to be two species at present confused under this name. I have not seen a plant which could be referred to either.

471. Inocybe lacera Fr.

Syst. Myc., 1821.

Illustrations: Ricken, Die Blätterpilze, Pl. 30, Fig. 4, 1911.
Patouillard, Tab. Analyt, No. 531.
Cooke, Ill., Pl. 583.

"PILEUS 3-5 cm. broad, umbonate-expanded, at times depressed, umbo obtuse, *fawn-brown to mouse-gray*, at first almost glabrous-fibrillose, soon fibrillose-scaly, becoming ragged around the umbo; FLESH thin, whitish. GILLS rounded-adnexed, broad, ventricose, subdistant, brownish-clay color, at length concolor. STEM 3-4 cm. long, 4-5 mm. thick, subequal, *brownish*, with red-brown fibrils, *apex naked*, white-mycelioid at base, stuffed, *reddish within*. SPORES almost *cylindrical, long and narrow*, straight, 12-18 x 4-6 micr., smooth. CYSTIDIA on sides and edge of gills, narrow-lanceolate, 54-70 x 14-17 micr., rounded above. ODOR slight; *taste* mild."

Reported by Longyear.

Apparently well-marked by the long, cylindrical spores. Patouillard gives the spores of somewhat different size, 10-13 x 6-7 micr. The above description is adapted from Ricken. An unusual mark of this species is the naked apex of the stem; in most species this is pruinose or scurfy. A form occurred at New Richmond, which agreed except that the spores were the size of those of *I. infelix*.

472. Inocybe infelix Pk. (POISONOUS)

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

PILEUS 1-2.5 cm. broad, *rather small*, campanulate then expanded-plane, *umbonate*, grayish-brown, *umbo cinnamon or umber*, fibrillose at first, becoming fibrillose-scaly or floccose-scaly, flesh thin, whitish. GILLS adnexed, rather broad, ventricose, close, whitish becoming cinnamon. STEM 2-5 cm. long, 2-3 mm. thick, equal, stuffed, silky-fibrillose, whitish or faintly violaceous at apex, becoming dingy brown below, white within. SPORES *elongated-oblong*, smooth, 10-14 x 4-6 micr. CYSTIDIA flask-shaped, 50-70 x 15-20 micr., apex crystallate. ODOR slight.

Solitary or gregarious. On low, wet ground. Ann Arbor, Bay View. May-July. Frequent.

Scarcely differs from preceding except in size. In those plants which grow in wet places the stein is hollow. Peck says the cuticle of the pileus is more lacerated in wet weather than in dry weather.

473. Inocybe flocculosa Berk.

Eng. Flora.

Illustration: Cooke, Ill., Pl. 393.

PILEUS 1-2 cm. broad, subcampanulate, expanded-umbonate, *tawny-brown with tinge of fuscous*, fibrillose-scaly, not rimose. GILLS rounded-adnate, broad, *ventricose*, almost subdistant, brownish-ashy then concolor, edge fimbriate-crenulate. STEM 1-2 cm. long, 1-2 mm. thick, equal, hollow, pruinose-hoary, scurfy at apex, *tinged brown*. SPORES 8-9 x 4-6, elliptical-ovate, *smooth*. CYSTIDIA on sides and edge of gills,, flask-shaped, apex crystallate, about 60 micr. long.

Among spruce needles and on the ground in swamps. Bay View. New Richmond. August.

This little species is usually found in low, wet places. The stem is tinged rufous-brown in most cases.

***Spores angular*.

474. Inocybe decipientoides Pk.

Torr. Bot. Club Bull. 34, p. 100, 1907.

PILEUS 1-4 cm. broad, campanulate-convex, expanded-umbonate, umbo subconic, *silky-floccose*, then scaly-diffracted, dry, brownish-ochraceous; flesh thin, pallid. GILLS adnate, broad, close, whitish at first then *lurid-cinnamon*, edge white-fimbriate. STEM 4-5 cm. long, 2-5 mm. thick, equal, usually slender, glabrous to subfibrillose, slightly striate, whitish or pallid, apex white-pruinose, base bulbillate, stuffed. SPORES irregularly wedge-shape, subrectangular, etc., *tuberculate*, 9-13 x 5-7 micr. CYSTIDIA on sides and edge of gills, ventricose-elliptical, slender pediceled, 50-60 x 12-18 micr. ODOR and TASTE slight.

Gregarious. On the ground, grassy places in low frondose woods. Detroit. June. Rare.

This is a species very clearly marked by the peculiar spores.

Section III. Rimosae. Pileus radiately fibrous, soon rimose, sometimes subscaly or adpressed-scaly.

**Spores smooth*.

475. Inocybe frumentacea Bres.

Fung. Trid., Vol. II, 1892.

Illustrations: Ibid, Pl. 200.
Bres., Fung. Trid., Vol. I, Pl. 87 (as *I. rhodiola* Bres.).
Patouillard, Tab. Analyt., No. 551 (as *I. jurana* Pat.).
Plate XCII of this Report.

PILEUS large, 3-8 cm. broad, rigid-firm, campanulate at first, then expanded and broadly umbonate, fibrillose, becoming rimose or scaly, *fibrils and scales brown-purplish to reddish-chestnut with a dark vinaceous tint*, umbo darker; flesh thick, white, vinaceous under cuticle. GILLS adnexed, at length emarginate-uncinate, close, not broad, thickish, white at first, then grayish-brown, edge white-flocculose, becoming rufescent-spotted. STEM 3-8 cm. long, rather stout, 6-12 mm. thick, equal, terete or compressed, sometimes twisted, fibrillose, apex glabrous or sub-floccose, whitish, *rufous-vinaceous below*, becoming spotted with the same color where handled, solid. SPORES broadly elliptic-subreniform, *smooth*, epispore strongly colored, 10-13 x 6-7 micr. CYSTIDIA none. *Sterile cells* on edge of gills obclavate, or subcylindrical, rounded-inflated above, 45-60 x 9-12 micr. ODOR and TASTE slight, of meal.

Gregarious. On the ground in low places under frondose trees in Belle Isle Park, Detroit and near Ann Arbor. August and July.

This large, wine-colored Inocybe was found in abundance in the above localities during two seasons. It corresponded accurately to the figures of Bresadola, Plate 200, in shape and stoutness. In age or after lying for a day, the characteristic dark vinaceous color becomes more marked. The umbo is broad and in half-expanded caps a gibbous condition is not unusual. It has the appearance of a Tricholoma.

I. jurana Pat. seems to be a distinct plant, although referred to by Bresadola as a synonym of *I. frumentacea*. Our photograph shows the shape and habit well. The pileus is at first conic-elliptical, then campanulate. The stem is more slender than that of *I. frumentacea*, and the spores are smaller, 9-10 x 5-6 micr. There are no cystidia, and the sterile cells on the edge of the gills are of the same size. The other characters are very similar.

Gregarious. On the ground, in low frondose woods. Ann Arbor. August.

476. Inocybe rimosa Pk. (SENSE OF RICKEN)

Syst. Myc., 1821.

Illustrations: Gillet, Champignons de France, No. 371.
Cooke, Ill., Plate 384.
Ricken, Die Blätterpilze, Pl. 30, Fig. 8.
Murrill, Mycologia, Vol. 4, Pl. 56, Fig. 7.

PILEUS 3-6 cm. broad, oval-campanulate then expanded and obtuse or subumbonate, silky-fibrillose, *at length rimose* and virgate, often split on the margin, *brown*, tinged yellowish in age, margin at length recurved; FLESH pallid, fragile. GILLS almost free, *narrow*, scarcely ventricose, crowded, cinereous-clay color, edge white-fimbriate. STEM 4-8 cm. long, 5-7 mm. thick, equal, straight or curved at base, whitish or pallid, solid, subglabrous, apex white-mealy, *base usually with a marked rounded or subdepressed bulb*. SPORES *short*, reniform, very obtuse at ends, smooth, 7-9 x 5-6 micr. CYSTIDIA none; STERILE CELLS on edge of gills, saccate, 30-40 x 12 micr. ODOR after crushing rather strong and nauseous; TASTE disagreeable.

Gregarious. On the ground, in low frondose woods. Ann Arbor. August. Infrequent.

Dark individuals of this species have the appearance of non-scaly forms of *I. destricta* and a microscopic examination is usually necessary to distinguish them. In age the color of different caps varies considerably in intensity. It is probably widely distributed, but I have few collections. The figure of Patouillard (Tab. Analyt., No. 114) shows the presence of cystidia and belongs elsewhere.

477. Inocybe destricta Fr. (MINOR)

Epicrisis, 1836-38. (As var. *I. rimosa*.)

Illustrations: Fries, Icones, Pl. 108.
Cooke's Ill., Pl. 387.
Ricken, Die Blätterpilze, Pl. 29, Fig. 9.

PILEUS 2-4 cm. broad, conic-campanulate, then expanded-umbonate, at length depressed around the darker abrupt umbo, dark brown, rufous-brown or ochraceous-brown, *umbo persistently dark chestnut* or umber, fibrillose at first, *at length lacerate-scaly or rimose, or both;* FLESH thin, whitish. GILLS sinuate-

adnexed or deeply emarginate, uncinate, *ventricose*, medium broad, close to subdistant, whitish then *pale brownish-ashy*, edge white-fimbriate. STEM 2.5-5 cm. long, 2.5-5 mm. thick, equal, scarcely bulbillate, *pallid, tinged with rufous*, varying flocculose-fibrillose to glabrous, apex pruinate, solid, white within. SPORES subreniform, inequilateral, *smooth*, 8-10 x 5-5.5 micr. CYSTIDIA abundant on sides and edge of gills, ventricose, stout above, apex crystallate, 50-65 x 15-18 micr. ODOR at first slight then somewhat nauseous.

Gregarious. On the ground in coniferous forests of pine and hemlock. Bay View, New Richmond. August-September. Frequent.

This is a variable plant, and when developed under moist weather conditions the cap becomes lacerate-scaly and often excoriate in part, and is then non-rimose; in dry weather it becomes markedly rimose and less scaly. When young or freshly expanded the pileus is usually densely fibrillose and its edge minutely appendiculate by the remains of the rather copious, white cortina. At first the pileus is dark brown, but in age it becomes somewhat ochraceous-brown beyond the umbo. The faint tinge of rufous on the older stems is a well-marked character, duly noted by Fries. The spores are markedly subreniform in one view, short fusiform-ovate in the other view. Our collections contain mostly plants with a rather longer stem and narrower cap than shown by the figures of Cooke and Fries. It is easily confused in some of its forms with *I. rimosa*, but differs in possessing abundant cystidia. Occasionally a troop of dwarf forms occurs, which, however, scarcely differ except in the shorter stem.

478. Inocybe fastigiata Bres.

Fung. Trid., Vol. I, 1881.

Illustrations: Ibid, Pl. 57.
Cooke, Ill., Pl. 383.
Patouillard, Tab. Analyt, No. 343.
Fries, Icones, Pl. 108.
Ricken, Die Blätterpilze, Pl. 31, Fig. 1.
Plate XCIII of this Report.

PILEUS 2-7 cm. broad, *typically very conical or conico-campanulate*, sometimes oval-campanulate, at length subexpanded, *usually with a prominent umbo*, radially fibrillose, *rimose*, virgate, *rich yellowish-fuscous*, ochraceous-tan or straw-color, margin at length split or lobed; FLESH white. GILLS adnexed, becoming sinuate-free, and narrower behind, not broad, ventricose, close, whitish at first, soon tinged *olive or gray*, darker in age. STEM 4-8 cm. long, 4-10 mm. thick, equal or tapering upwards, solid, more or less fibrillose or scurfy, white or slightly fuscescent, sometimes twisted or obscurely striate. SPORES elliptic-subreniform, *smooth* (not angular), obtuse at ends, 9-12 x 5-6 micr. CYSTIDIA none. STERILE CELLS on edge of gills saccate. ODOR strong and disagreeable or entirely lacking.

Gregarious. On the ground, in low, moist places in frondose or conifer woods. Throughout the State. July-September. Frequent.

This is a striking species, and quite variable. The stem may be dull whitish to pale ochraceous. Small forms occur with cap less campanulate and at length papillate. The odor may be very strong or altogether absent. All these forms agree in having the same size spores, gills of the same color and no cystidia. The color of the pileus is sometimes a rich pheasant-yellow, sometimes fulvous-ochraceous, at other times much paler. The English authors, Massee and Berkley, were in error when they assigned rough, nodulose spores to this species. (British Fungus Flora and Outlines.)

479. Inocybe curreyi Berk.

Outlines of Brit. Fung., 1860.

Illustration: Cooke, Ill., Pl. 398.

PILEUS 2-4 cm. broad, irregularly convex-campanulate, obtuse, not umbonate, gibbous at times, appressed-fibrillose, at length rimose, *pale tawny-yellowish*, edge undulate; FLESH white. GILLS slightly adnexed, rather broad, close, *becoming smoky-olivaceous*, edge white-fimbriate. STEM 2-4 cm. long, variously curved, *tapering upward from a subclavate base*, not bulbous, solid, slightly fibrillose, glabrescent, whitish at first, furfuraceus-scaly at apex. SPORES elliptic-subreniform, obtuse at ends, 7-9.5 x 5-5.5 micr., *smooth*, fuscous-cinnamon in mass. CYSTIDIA none. STERILE CELLS on edge of gills saccate. ODOR strongly earthy when crushed.

Gregarious. On the ground among grass in frondose woods. Ann Arbor. July-August. Not infrequent.

This plant is referred to this form with some hesitation as published details of Berkley's species, especially as to the microscopic characters, are insufficient. The color of the pileus approaches *I. fastigiata* rather closely, but it is not conical nor truly umbonate, and the spores are constantly smaller. From the following it is distinguishable by the very different form of the stem and by the color of the pileus. Patouillard gives the spores 6 x 4 micr., in which he is quite at variance with the British authors.

480. Inocybe cookei Bres.

Fung. Trid., Vol. 2, 1892.

Illustration: Ibid, Pl. 121.

PILEUS 1.5-4 cm. broad, subconic-campanulate, expanded-umbonate, silky-fibrillose, at length rimose, glabrous on center, *straw-yellow, becoming sordid lutescent*, margin at length wavy or split; FLESH whitish. GILLS sinuate-adnexed or almost free, scarcely ventricose, narrow, close, whitish at first, soon tinged ashy-ochraceous-cinnamon, edge white-fimbriate. STEM 2.5-5 cm. long, 3-5 mm. thick, equal, solid, silky-fibrillose, pruinose at apex, *with a marginate distinct bulb*, whitish at first, *lutescent*. SPORES 8-9.5 x 4.5-5.5

micr., elliptic-subreniform, obtuse at ends, *smooth*. CYSTIDIA none. STERILE CELLS on edge of gills, inflated-obclavate, 30 x 12-15 micr.

Gregarious. On moist ground in frondose and coniferous woods. Ann Arbor, Bay View, New Richmond. August-September. Infrequent.

The uniform pale yellow color of the pileus which becomes deeper in age, the lutescent stem and margined bulb are characters which separate this from the two preceding species. The odor is scarcely noticeable at times but occasionally it is rather strong of rancid meal.

481. Inocybe lanotodisca sp. nov.

PILEUS 2-4 cm. broad, rarely broader, convex-campanulate, obtuse or broadly umbonate, ground-color pale ochraceous-brownish or pale tawny, *at first covered by a white, mouldy-like silkiness on the center, when expanded subzonate by the subconcentric arrangement of the downy-silky fibrils*, at length rimose; FLESH white, rather thick on disk. GILLS adnexed-emarginate, moderately broad, close, at length cinereous-alutaceous, edge white-fimbriate. STEM 3-5 cm. long, 4-6 mm. thick, equal or subequal, solid, glabrescent, apex pruinate-scaly, white, becoming pale sordid yellowish in age. SPORES elliptic-subreniform, *smooth*, obtuse at ends, 9-10.5 x 5-6 micr. CYSTIDIA none. STERILE CELLS on edge of gills, obclavate, attenuated downward. BASIDIA clavate, 33 x 9 micr., 4-spored. ODOR nauseous on crushing the plant.

Gregarious to subcaespitoise. On the ground in low frondose woods. Ann Arbor. August-September. Infrequent.

A well-marked species; to be known by the hoary-silkiness on the central portion of the pileus and by the lack of cystidia. It approaches *I. sindonia* in appearance, but that species has abundant cystidia, the cap is not rimose, and the covering of the pileus is differently disposed. The habit varies from rather slender forms to those quite stout. As the pileus expands the white fibrils are disposed over a larger area.

482. Inocybe eutheloides Pk.

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

PILEUS 1-2.5 cm. broad, conico-campanulate, then expanded-umbonate, *fawn-color to grayish-fawn*, darker to chestnut when young or on the *distinct umbo*, silky-fibrillose, at length rimose, sometimes appressed-scaly. GILLS adnexed, rather broad, ventricose, close, whitish then brownish-cinnamon, white-fimbriate on edge. STEM 2-5 cm. long, 2-4 mm. thick, equal, subbulbillate at base, solid, densely white-fibrillose when young, subglabrescent, apex scurfy-pruinate. SPORES 8-10 (rarely longer) x 4.5-5.5 micr., variable in shape, subreniform-fusoid, ends somewhat narrowed, *smooth*. CYSTIDIA *rather abundant* on sides and edge of gills, narrowly flask-shaped, apex crystallate, 50-70 x 12-16 micr. BASIDIA 30 x 9 micr., 4-spored. ODOR slight.

Gregarious. Common in southern Michigan; on the ground in low frondose woods. June-September.

This is closely allied to *I. destricta*, form minor, in its microscopic characters. The colors are, however, constantly distinct, and *I. destricta* seems limited to coniferous regions. *I. eutheloides* also approaches *I. eutheles* as interpreted by some authors, e. g., Massee. But according to Patouillard that species is devoid of cystidia. The stem is usually markedly silky-fibrillose, and the umbo is dark chestnut in young and fresh specimens. In young specimens the margin of the pileus is often crenately fringed by the white cortina.

***Spores angular-tuberculate.*

483. Inocybe radiata Pk. (POISONOUS)

Torr. Bot. Club Bull. 22, p. 488, 1895.

PILEUS 1.5-5 cm. broad, campanulate, fuscous-brown to ochraceous-brown, *very umbonate by an obtuse, dark umber umbo*, which remains glabrous, elsewhere appressed-fibrillose with brown fibrils, not at all viscid, becoming rimose; FLESH white, thickish on disk. GILLS *adnate*, broad, at length sinuate-uncinate, close, becoming ochraceous-cinnamon to subferruginous, edge white, flocculose. STEM 3-6 cm. long, 2-4 mm. thick, equal, stuffed, silky-fibrillose, *becoming umber-fuscous-brown*, apex paler, subbulbillate and white-myceliod at base. SPORES irregularly oblong-rectangular to sub-wedge shape in outline, angular and with few scattered tubercles, 7-9 x 5-6 micr. CYSTIDIA few or scattered, on sides and edge of gills, 55-65 x 12-18 micr., broadly ventricose, apex somewhat pointed and crystallate, on slender pedicel. ODOR earthy. TASTE mild.

Gregarious. On the ground, in frondose woods. August. Ann Arbor.

This seems to be intermediate between *I. carpta* Bres. and *I. umbrina* Bres. in its microscopic characters. The umbo does not become warty nor scaly and is not subviscid as in the latter species. The same species has been received from Massachusetts; it was sent by Simon Davis, who reports it poisonous.

484. Inocybe fibrosa Bres. (POISONOUS)

Fung. Trid., Vol. I, 1881.

Illustrations: Ibid, Pl. 56.
Cooke, Ill., Pl. 454.
Ricken, Die Blätterpilze, Pl. 29, Fig. 8.
Plate XCIV of this Report.

PILEUS 4-8 cm. broad, *large*, obtusely campanulate, then broadly umbonate and expanded, dry, *creamy-white or tinged straw-color*, sometimes ochraceous-stained, silky, at length rimose and margin lobed, split or recurved; FLESH white, *thick*, thin on margin. GILLS free, rounded behind, *ventricose*, broader toward front, close, whitish at first, then ashy-cinnamon, edge white-fimbriate. STEM 4-8 cm. long, 6-15 mm. thick, fibrous, splitting longitudinally, subequal, striatulate to

subsulcate, glabrescent, apex pruinate, white then sordid, base often subbulbous. SPORES angular-oblong, *with obscure, scattered tubercles*, 9-13 x 5-7 micr., epispore reddish under the microscope. CYSTIDIA fusoid, crystallate at apex, abundant on sides and edge of gills, 60-75 x 10-15 micr. ODOR earthy. TASTE mild.

Gregarious. On the ground, in low, moist, frondose woods. June-August. Ann Arbor. Infrequent.

Apparently our largest species. The spores are inclined to be more or less sinuate-tuberculate, but the angularity is not as marked as in many others. The character of the surface of the pileus is much like *I. fastigitata* except in color. It appears earlier than most Inocybes, and is said to be *poisonous*. (See Bresadola, Fung. Trid.)

485. Inocybe albodisca Pk.

N. Y. State Mus. Rep. 51, 1898.

PILEUS 1.5-3.5 cm. broad, conical at first, soon campanulate-umbonate or expanded, *umbo lubricus-glabrous, obtuse and whitish*, elsewhere silky, at first pale lilac-flesh color, at length *grayish-drab* and rimose; FLESH whitish, not changing color. GILLS rather narrow, close, narrowly adnate, whitish at first, then subferruginous, edge minutely white-flocculose. STEM 3-5 cm. long, 3-5 mm. thick, equal, subbulbillate to somewhat marginate-bulbous, solid, *glabrous* or upper part pruinate, at first tinged by color of pileus, fading, even. SPORES *sinuate-angular*, subrectangular to sub-globose in outline, shape variable, 7-8 x 5-6 micr., nucleate. CYSTIDIA very abundant on sides and edge of gills, crystallate at apex, fusoid-ventricose, about 50 x 15 micr. Basidia 33 x 9 micr., 4-spored. ODOR slight, subnauseous.

Gregarious-scattered. On the ground, clay soil of hemlock and beech woods. New Richmond. September. Infrequent.

Known by its glabrous, whitish, obtuse umbo, submarginate bulb, and the peculiar shade of pale lilac-incarnate color when young. This color disappears in older specimens where the cap takes on a grayish shade and becomes rimose. The spores distinguish it sharply from *I. lanatodisca*, and the smaller size of the plant and spores separate it from *I. fibrosa*. It is closely related to *I. umbratica* Bres. and *I. fallax* Pk.

486. Inocybe asterospora Quel.

Bull. Soc. Bot. France, Vol. 26, p. 50, 1879.

Illustrations: Ricken, Die Blätterpilze, Pl. 29, Fig. 1.
Cooke, Ill., Pl. 385.
Patouillard, Tab. Analyt, No. 546.

PILEUS 2-5 cm. broad, conic-campanulate to convex-umbonate, brown or rufous-brown, *very rimose*, fibrillose-scaly; FLESH pallid, rather thin. GILLS narrowly adnate, emarginate, ventricose, close, at length olivaceous-cinnamon or grayish-brown. STEM 4-6 cm. long, 2.5-6 mm. thick, equal above the subemarginate or rounded bulb, *rufescent*, innately striatulate, *mealy-pubescent*, fibrous, solid. SPORES subsphoeroid, slightly longer than broad, covered with blunt, subcylindrical tubercles which are broader toward base, 9-11 micr. CYSTIDIA abundant on sides and edge of gills, 50-75 x 15-24 micr., ventricose, apex crystallate. ODOR slight or subnauseous.

Gregarious. In low, sandy, frondose woods. Ann Arbor. June-August.

It is rather difficult to keep *I. asterospora* and *I. calospora* distinct. The rimose and scaly characters by which they are set apart may vary under certain weather conditions so as to be obliterated. The spores are very similar, but those of *I. asterospora* are not as truly spherical as in *I. calospora*. With us this species tends to be smaller than the figures show it. It is at once separable from the other red-brown species by the spiny-tuberculate spores.

Section IV. Velutinae. Pileus not rimose, cuticle of interwoven fibrils, glabrescent or appressed-scaly.

**Spores angular-tuberculate*

487. Inocybe repanda Bres.

Fung. Trid., Vol. II, 1892.

Illustrations: Ibid, Pl. 119.
Plate XCV of this Report.

PILEUS 3-5 cm. broad, obtusely conic-campanulate, then expanded and broadly umbonate, umbo fulvous and glabrous, *elsewhere covered with orange-fulvous fibrils on a whitish foundation*, sublubricous, margin at length split or subrimose, sometimes scaly-cracked. FLESH white, rather fragile, thick on disk. GILLS adnexed or almost free, broad, subventricose, close, at first white, *rufescent*, finally argillaceous-cinnamon, edge white-fimbriate. STEM 3-6 cm. long, strict, 5-6 mm. thick, equal above the abrupt or rounded bulb, stuffed, terete, even, slightly silky fibrillose, *the fibrils fulvous-tinged toward base*, apex white-pruinose. SPORES angular, 7-9.5 x 6-7 micr., longer than wide, sometimes rectangular in outline, *with minute papillate tubercles*. CYSTIDIA moderately abundant on edge and sides of gills, ventricose-fusiform, apex crystallate, 60-75 x 12-18 micr. ODOR and TASTE mild.

Gregarious. On the ground, in low frondose woods. Ann Arbor. July-August. Infrequent.

This is one of our larger Inocybes and is well-marked. The flesh does not readily become rufescent in our plants, jet there is little doubt that the plant is the one described by Bresadola.

***Spores smooth.*

488. Inocybe sindonia Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 400.
Ricken, Die Blätterpilze, Pl. 30, Fig. 7.

PILEUS 2-6 cm. broad, at first obtusely conic-oval, then campanulate-expanded and *broadly umbonate, cortinate, at first woolly-fibrillose from dense white fibrils*, later subglabrescent, not rimose, whitish becoming straw-yellow to dingy ochraceous in age. FLESH compact, thick on disk, white. GILLS emarginate-adnexed or almost free, moderately broad, ventricose, close, at first pale grayish-white then grayish-clay color. STEM 3-6 cm. long, 4-9 mm. thick, equal above the subemarginate bulb, *white*, stuffed, often striate, silky shining, at first fibrillose, flesh satiny-shining. SPORES subreniform, *smooth*, relatively broad, 8-10 x 5-6 micr. CYSTIDIA abundant on sides and edge of gills, ventricose-lanceolate to subcylindrical, apex crystallate, 60-75 x 15-20 micr. ODOR rather strong, somewhat nauseous.

Gregarious. On the ground, in low, rich, frondose woods. Ann Arbor. August-September. Infrequent.

Without an examination of the microscopic characters, this species might easily be confused with *I. lanatodisca*. In the young stage the white woolly-fibrillose cortina is continuous with the fibrils on the margin of the cap. At maturity the pileus becomes glabrous, especially on the disk, while in *I. lanatodisca* the disk is marked at last by the white fibrils. It is probable that Hard's Fig. 218, p. 269, Mushroom Book, of *I. subochracea* var. *burtii* Pk. is referable to this species.

489. Inocybe subochracea Pk.

N. Y. State Mus. Rep. 23, 1872 (as Hebeloma).

Illustration: N. Y. State Mus. Rep. 54, Pl. H. (as var. *burtii*).

PILEUS 2-3.5 cm. broad, *conical at first*, then convex-campanulate, umbonate, *ochraceous or ochraceous-yellow*, appressed fibrillose subscaly, darker and more scaly on disk, *not rimose*. FLESH *white, thin*. GILLS sinuate-adnexed, scarcely close, moderately broad, whitish then pale ochraceous-brown to rusty-brown. STEM 2.5-5 cm. long, 2-4 mm. thick, *equal*, solid, subglabrous, whitish, pallid ochraceous in age. SPORES broadly elliptic-subreniform, 7-9 x 4.5-5 micr., *smooth*. CYSTIDIA scattered on sides and edge of gills, apex crystallate, lanceolate, stipitate, *yellowish*, 70-90 x 12-20 micr. ODOR and TASTE mild.

Gregarious. On the ground, frondose woods. August-September. Ann Arbor.

This species has a smaller and more yellowish pileus than *I. sindonia*; the spores and cystidia are similar. A variety has been described by Peck with a distinct, webby cortina and more fibrillose stem, as var. *brutii*.

490. Inocybe geophylla Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 401.
Gillet, Champignons de France, No. 364.
Patouillard, Tab. Analyt, No. 228.

PILEUS 1.5-2.5 cm. broad, conical at first, then expanded-umbonate, *very silky and glossy, white or whitish*, not rimose; FLESH white, thin. GILLS adnexed, close, rather broad, ventricose, whitish then pale grayish-clay color. STEM 2-5 cm. long, 2-3 mm. thick, slender, equal, firm, stuffed, *white*, silky, apex pruinose. SPORES elliptic-subreniform, *smooth*, 8-9 x 5 micr. CYSTIDIA fusiform, 40-55 x 12-15 micr. ODOR "slightly nauseous."

Gregarious or scattered. On the ground in frondose and conifer woods. Throughout the State. July-October. Common.

One of our commonest Inocybes, although not often found in abundance at one place. The clear, white, glossy cap and stem are characteristic. Other white species which have been described are: *I. comatella* Pk., a smaller plant, which has a hairy pileus and at times a reddish-brown stem, but the spores and cystidia are the same, usually grows on rotten wood; *I. fallax* Pk., with angular or nodulose spores; *I. infida* Pk., also with nodulose spores and a subscaly, reddish-brown umbo. Both the latter species have cystidia.

491. Inocybe lilacina (variety of preceding by authors)

Illustrations: Patouillard, Tab. Analyt., No. 545.
Ricken, Die Blätterpilze, Pl. 30, Fig. 2.
Hard, Mushrooms, Fig. 219, p. 270, 1908.

PILEUS lilaceous-violet, the umbo darker, almost smoky-purple at first STEM pale lilac-violaceous to whitish. Otherwise like *I. geophylla*.

Gregarious. On the ground, in frondose and conifer woods. Throughout the State. August-October. Less frequent than *I. geophylla* Fr.

This is a pretty little plant, and is usually combined with *I. geophylla*. It is usually found in gregarious groups of several individuals and not mixed with *I. geophylla*. This fact and its constantly independent color, leads me to believe that it does not arise from the same mycelium as *I. geophylla*. The general appearance during development and the character of the surface of the cap, although not easily differentiated in words, seem sufficiently different from the white species.

492. Inocybe scabella Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 110, Fig. 1.
Bresadola, Fung. Trid., Vol. I, Pl. 86, Fig. 1.
Patouillard, Tab. Analyt., No. 229.

PILEUS 1.5-2.5 cm. broad, conico-campanulate, then expanded and *with a naked, glabrous, obtuse, rather small umbo*, silky elsewhere, dry, cinnamon-brown to

sordid alutaceous, at length minutely appressed-fibrillose-scaly. FLESH thin, pallid. GILLS sinuate-adnexed, *subdistant, ventricose*, pale grayish-white, then sordid cinnamon, edge white-fimbriate. STEM 2.5-3.5 cm. long, 2-4 mm. thick, equal, stuffed, subfibrillose, *soon glabrescent, pallid or slightly fuscous, slightly rufous upwards*. SPORES almond-shaped, almost golden-yellow in microscope, *smooth*, 10-13 x 5-6 micr. CYSTIDIA fuscoid-ventricose, on sides and edge of gills, apex crystallate, 60-70 x 13-14 micr. ODOR slightly rancid-subfarinaceous. TASTE sweetish.

Var. *rúfa:* Whole plant pale rufous to sordid brick color. STEM more slender, 5-6 cm. long, 1-2 mm. thick. SPORES inequilateral, elongated-elliptic, subacute at ends, smooth. CYSTIDIA abundant, ventricose flask shaped.

Gregarious. The variety is common in swampy or mossy wet places on rich soil, of cedar and hemlock woods. It scarcely differs except in color from the typical form as described by Bresadola. The wet habitat easily accounts for the more slender stem. The color however, is constant in young and old plants, or may become brownish on the cap. The typical form is less easily distinguished, and approaches *I. trechispora*, an angular-spored species. In fact, Bresadola has pointed out that Patouillard's figure No. 547, and Cooke's Plate 402 are illustrations of *I. trechispora*, June-September. In coniferous regions. Houghton, Bay View, New Richmond.

Section V. Viscidae. Pileus viscid, more or less silky when dry.

**Spores angular-tubercular.*

493. Inocybe trechispora Berk.

Outlines of Brit. Fung., 1860.

Illustrations: Ibid, Pl. 8, Fig. 6.
Cooke, Ill., Pl. 403 (Pl. 402 as *I. scabella*).

PILEUS 2-2.5 cm. broad, convex, expanded-umbonate, *viscid*, silky when dry, *umbo tawny* and naked, elsewhere tawny-ochraceous and paler. GILLS sinuate-adnexed, moderately broad, ventricose, close, white then grayish-brown, edge white-fimbriate. STEM 2.5-5 cm. long, 2-3 mm. thick, subequal, usually tapering upwards, *marginate-bulbous at base*, glabrous, apex pruinose, solid, *white*. SPORES tubercular-angular, slightly longer than wide, irregular in outline, 6-8 x 4-6 micr. CYSTIDIA ventricose, flask-shaped, 50 x 16-18 micr., apex crystallate and obtuse.

Gregarious. On the ground, among debris, in conifer swamps. Houghton, Bay View, New Richmond. August-September. Infrequent.

A small species, known by its viscid pileus with shining, naked and tawny umbo, by the rather abruptly marginate bulb of the stem and by the tuberculate spores. Our plant agrees with Berkeley's species in the spore character as given by Massee. Ricken has applied the name to a plant with spores 14-15 x 6-7 micr.

***Spores smooth.*

494. Inocybe glaber sp. nov.

PILEUS 1.5-3.5 cm. broad, at first narrowly elliptic-oval, then campanulate-expanded and umbonate, *umbo glabrous-sublubricous*, sordid ochraceous-brown or livid-brown, at length darker on margin, paler on umbo, at first glabrous, at length subfibrillose, moist and shining, *becoming soft and fragile in moist weather*. FLESH thin. GILLS almost free, rather narrow, close, pallid then pale fuscous-brown, edge white-fimbriate. STEM 3-5 cm. long, 2.5-4 mm. thick, equal above the bulbillate base, glabrous, even, solid, white or pallid. SPORES subreniform, *smooth*, 7-9 x 4-5 micr. CYSTIDIA *none*. STERILE CELLS on edge of gills subcylindrical to rounded-enlarged at apex. ODOR nauseous to slightly radishy.

Gregarious. On the ground, in low frondose woods. Saginaw, Ann Arbor. July-September. Infrequent.

This species approaches the genus Hebeloma in some of the characters. The pileus becomes soft and watery at maturity and is easily crushed, and the odor is obsoletely of radish. The shape of the young pileus is however distinctly Inocybe-like, and the plants were found growing with a number of other Inocybes. It seems to approach *Hebeloma discomorbidum* Pk., but lacks the reddish tint on the cap, the hollow stem and the spores of that species. It is not truly viscid, even in moist weather, although the umbo is somewhat lubricous.

Hebeloma Fr.

(From the Greek, *hebe*, the vigor of youth, and *loma*, a fringe, referring to the presence of the cortina in the young plant.)

Ochre-brown-spored. Stem continuous with the pileus, *without a membranous annulus*; fleshy to fibrous; *partial veil in the form of a fibrillose cortina or lacking; no volva;* gills adnexed or emarginate; pileus *viscid or subviscid*, its margin at first incurved; *spores alutaceous*, never ferruginous.

Putrescent, *terrestrial*, often with a strong odor. They approach the terrestrial Pholiotas on the one hand, but without the membranous annulus, and Inocybe, Flammula and Cortinarius on the other. Inocybe differs in its silky or fibrillose-scaly pileus and verrucose-pointed cystidia; Flammula, in its non-emarginate, subdecurrent or broadly adnate gills, and mostly lignicolous habit; Cortinarius, in having a more delicately woven, spider web-like cortina and darker brown to ferruginous spores. Hebeloma corresponds to the genus Tricholoma of the white-spored group. Their *edibility* is not established and a number of species are under suspicion.

The PILEUS is glabrous, somewhat viscid, mostly with pale colors: whitish, tan, brownish, dingy ochraceous or rufous, often with shades of these colors variously distributed. The small amount of variation in the colors of different species makes it difficult to become rapidly acquainted with them, and often one has to rely on

somewhat minute or variable characters to distinguish them. The young plants should always be examined for the fibrillose *veil or cortina* which disappears in most mature specimens and which is entirely wanting in one section. The viscidity should also be established before referring a plant to this genus since this is hardly noticeable in dry weather. The GILLS at length become emarginate, and this character, as in the genera Tricholoma and Entoloma, limits the genus. Variations sometimes occur in individual specimens, where the gills are adnate-decurrent or arcuate, and hence a single specimen is very unsatisfactory for a definite diagnosis. The edge of the gills is sometimes minutely fimbriate on account of the long sterile cells or cystidia and in a few species the edge distills drops of liquid which give it a beaded appearance under a lens; in many cases the edge remains white or whitish after the spores have colored the rest of the gills. The STEM often has a distinct outer, fleshy or fibrous rind which varies in thickness, while the interior, which is of varying diameter in different species, is stuffed by a white pith. While the stem is developing this pith breaks down leaving a hollow axis, although in some species the pith persists a long time. When no pith is present, the stem is said to be solid and is then composed of a fibrous texture which does not disappear. In both cases, however, grubs nearly always hollow out the stem at maturity, a condition which must be clearly distinguished from the term "hollow stem," which is not applied in that case. The SPORES are usually pale in color, ochraceous, brownish or alutaceous, coloring the mature gills a similar shade. The paler color of the gills and spores usually provides the means of separation from the genus Cortinarius. The shape of the spores varies but is generally elliptical-ovate, inequilateral and apiculate at one end; they are almost smooth except in a few species in which they are obscurely rough. CYSTIDIA are rather rare in this genus on the sides of the gills, *H. albidulum* being the only one known to me with cystidia. *Sterile cells*, usually elongated beyond the hymenium, are found on the edge of the gills, and furnish important microscopic details for the certain identification of many of the species of this genus. Their shape and size vary, and at maturity they give to the edge of the gills a white, fimbriate or flocculose appearance. The ODOR is often like that of radish, especially when the flesh is rubbed or bruised. The TASTE also is sometimes radishy or bitter and disagreeable. McIlvaine, who studied the *edibility* of so many mushrooms, has given us little information on this genus. Some are probably poisonous, and as far as known, even where a species has been proved harmless, the taste when cooked is not found to be appetizing, so that the Hebelomas are hardly to be considered of much value for the table. This is a difficult genus for the amateur, and much uncertainty is prevalent, even in the minds of mycologists, as to the limits of the species.

The genus may be divided into two sections, those with a cortina when young, Indusiati; and those without a visible cortina, Denudati. It does not seem to me that Fries' section "Pusilli," which included the smaller species, is a satisfactory grouping, and the species which have been placed in "Pusilli" are distributed under Indusiati and Denudati. Even the two divisions retained run into each other imperceptibly.

Key to the Species

(A) Stem solid, rarely becoming cavernous.
  (a) Cortina present when young.
    (b) Edge of gills beaded with drops in moist weather; pileus pale yellowish-tan; odor of radish. 496. *H. fastibile* Fr.
    (bb) Edge of gills not beaded.
      (c) Cystidia numerous on gills; spores 6-7 x 3-4.5 micr.; gills arcuate-adnate, rather narrow; pileus yellowish-tan, etc. (See 513. *Flammula lenta*.)
      (cc) Cystidia lacking; spores larger.
        (d) Pileus conical when young, 2-3 cm. broad, pale yellowish, clay-color, darker on disk; stem slender. 497. *H. mesophaeum* Fr.
        (dd) Pileus soon convex, umbonate or subumbonate.
          (e) Growing in open woods, fields, bare places, etc.; pileus 2-5 cm., brownish-clay-color, rufescent. 499. *H. pascuense* Pk.
          (ee) In coniferous woods; pileus 5-7 cm., mature gills dark. *H. firmum* Fr.
  (aa) Cortina not present.
    (b) Stem stout, scaly-torn, white; pileus large, sordid grayish-brown to pale tan, odor of radish. 500. *H. sinapizans* Fr.
    (bb) Stem flexuous, silky fibrillose, base enlarged by adhering sand; pileus alutaceous to tan. 508. *H. colvini* Pk.

(AA) Stem stuffed by a pith, or hollow.
  (a) Cortina present at first.
    (b) Pileus glutinous (wet), sprinkled with superficial white scales. *H. glutinosum* Fr. (See also *Flammula lenta*.)
    (bb) Pileus glabrous; gills whitish at first; odor of radish.
      (c) Cortina cottony-fibrillose, somewhat persistent on stem or on margin of pileus; pileus chestnut, reddish-gray or grayish. 495. *H. velatum* Pk.
      (cc) Cortina fugacious; pileus brick-red to reddish-ochraceous; spores 10-13 x 6-7 micr. *H. testaceum* Fr.
      (ccc) Cortina fugacious; stem slender; pileus 2-3 cm. broad, pale ochraceous-tan. 498. *H. gregarium* Pk.
  (aa) Cortina not present.
    (b) Gills bright flesh-colored or pink, turning brown only in extreme age; pileus chalk-white to dingy-white. 506. *H. sarcophyllum* Pk.
    (bb) Gills not pinkish.
      (c) Edge of gills beaded with drops in moist weather; odor strong; pileus pale tan, darker on disk. 501. *H. crustuliniforme* Fr.
      (cc) Edge of gills not beaded.
        (d) Stem short, 2-4 cm. in length.
          (e) Spores 12-13 x 6-7 micr.; pileus pale tan. 502. *H. hiemale* Bres.
          (ee) Spores 6-9 x 4-5 micr.
            (f) Pileus brick-red (moist), umbonate; spores 7-9 x 4-5 micr. 510. *H. magnimamma* Fr.
            (ff) Pileus yellowish-white, not umbonate; in pastures, etc. *H. sociale* Pk.
        (dd) Stem long and rather stout in normal specimens, white.
          (e) Stem bulbous; cystidia long, slender, cylindrical; pileus whitish. 504. *H. albidulum* Pk.
          (ee) Stem equal or attenuated downward.
            (f) Stem fragile, partially hollow; pileus whitish to tan; odor not of radish. 503. *H. longicaudum* Fr.
            (ff) Stem firm.
              (g) Pileus white or whitish, tinged tan.
                (h) Gills narrow, adnexed; pileus white; spores 12-16 x 6-8 micr. 507. *H. album* Pk.
                (hh) Gills rather broad, adnate at first; sterile cells on edge of gills clavate-thickened at apex; stem floccose; spores 11-13 x 6-7 micr. 505. *H. simile* sp. nov.
              (gg) Pileus darker colored.
                (h) Gills intervenose, costate; pileus ochraceous to tawny-ochraceous; edge of gills with clavate, sterile cells. Spores 12-15 x 7-8 micr. *H. neurophyllum* Atk.
                (hh) Gills not costate; pileus tinged reddish to ferruginous, with a viscid separable pellicle; spores 9-11 x 5-6 micr. 509. *H. syrjense* Karst.

Section I. Indusiati. Cortina present in young stage.

495. Hebeloma velatum Pk.

N. Y. State Mus. Bull. 139, 1909.

PILEUS 2-6 cm. broad, bullate-convex at first, then expanded, obtuse or umbonate, viscid (moist), glabrous, *becoming appressed-silky, on drying*, livid-bar, fading to tan with reddish disk, m*argin decorated by the remains of cortina*, even. FLESH white, thin, hygrophanous, soft and pliant. GILLS adnexed-seceding, close, rather narrow, subventricose, whitish then alutaceous, edge

minutely white-fimbriate. STEM 3-6 cm. long, 4-6 mm. thick, equal, stuffed then hollow, *white at first then dingy ochraceous*, fibrous-fleshy, flexuous, twisted at times, pruinose-floccose at apex, *floccose above middle from the subpersistent cortina*, at length fibrillose, splitting longitudinally in age. SPORES 10-12 x 5-7 micr., narrowly elliptic, acute at one end, subobtuse at distal end. CYSTIDIA none; sterile cells on edge of gills short, slender, 30-45 x 6 micr. ODOR and TASTE slight.

Gregarious. Ground, in mixed woods. New Richmond. September. Infrequent.

Peck says it is very variable in color and in the development of the cortina. Sometimes a distinct annulus adheres to the stem and is then easily mistaken for a Pholiota, other specimens show a slight development of the cortina. The odor of radish was slight in our specimens and the gills were hardly ventricose and rather narrow. It appears as a plant of small stature at times. The colors of the pileus, the rather floccose stern, and the short sterile cells of the gills distinguish it.

496. Hebeloma fastibile Fr. (SUSPECTED)

Syst. Myc., 1821. Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 111.
Patouillard, Tab. Analyt., No. 342.
Ricken, Blätterpilze, Pl. 32, Fig. 1.

PILEUS 3-7 cm. broad, compact, convex-plane, often wavy, obtuse, viscid (moist), glabrous, *yellowish-ochraceous to alutaceous-whitish*, margin pubescent and incurved. FLESH white. GILLS *emarginate, subdistant*, unequal, whitish then argillaceous-cinnamon, *edge* white-fimbriate and *beaded with aqueous drops in moist weather*. STEM 4-6 cm. long, 5-10 mm. thick, solid or slightly hollow, *firm*, bulbous, fibrillose, *white*, decorated above by the remains of the cortina which is sometimes annular. SPORES 10-12 x 5-6 micr., elliptical-ovate, smooth. CYSTIDIA clavate. ODOR *disagreeable*. TASTE *bitter*.

Gregarious. In woods. New Richmond, etc. Frequency unknown. September.

The beaded gills, color of pileus, subdistant to distant gills, odor and taste are the distinguishing features. The odor is somewhat of radish.

497. Hebeloma mesophæum Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 411.
Ricken, Blätterpilze, Pl. 32, Fig. 3.

PILEUS 1-3 cm. broad, *campanulate or subconical at first*, then convex-expanded and subumbonate, sometimes wavy on margin, slightly viscid, buff to whitish on margin, brownish to chestnut or rufous on disk, glabrous, silky-shining, even, the margin at times decorated with the delicate remnants of the dingy-white cortina. GILLS soon emarginate, adnate, close, rather broad, whitish at first then pale rusty-alutaceous, edge white-fimbriate. STEM 4-6 cm. long, 3-5 mm. thick, mostly slender, fleshy-fibrous, *equal, silky-fibrillose*, sometimes twisted, mealy at apex, whitish, becoming dingy, with a small tubule. ODOR and TASTE slight.

Gregarious to subcaespitose. On sandy ground among grass or on bare ground in woods, fields, etc. Ann Arbor. October. Sometimes frequent.

Known by its rather small, subconical pileus when young, its tough, equal stem, peculiar cast to the pileus and lack of a distinctive odor. The spores are rather larger than the size given by Massee, but otherwise it agrees well with Fries' description. The stem is at first solid but develops a slight tubule in age. It differs from *H. hiemale* in the presence of a cortina which sometimes forms a slight, fugacious ring on the stem. Dried, the cap and stem remain whitish-tan. The surface of the cap is often quite silky. Ricken says it is known by its rusty-brown flesh when old, a character I have not noticed.

498. Hebeloma gregarium Pk.

N. Y. State Mus. Rep. 49, 1896.

PILEUS 1.5-3 cm. broad, *convex*, obtuse, slightly viscid, isabelline to ochraceous-tan, sometimes darker on disk, glabrous, even. FLESH rather thin, *whitish*. GILLS adnate at first, then emarginate, close, thin, rather broad, subventricose, whitish at first then rusty-cinnamon. STEM 4-10 cm. long, 2-4 mm. thick, slender, equal, *stuffed then hollow*, subcartilaginous, fibrillose below, slightly mealy at apex, pallid, at length dingy-brown. SPORES 9-12 x 5-6 micr., variable, elliptical, smooth, alutaceous-cinnamon in mass. CYSTIDIA none. ODOR strong, radishy or almost lacking. TASTE slightly disagreeable. CORTINA scanty, fibrillose, evanescent.

(Dried: Pileus rusty-tan to brown, gills cinnamon-brown, stem sordid brownish.)

Gregarious. Under shrubbery or trees, on lawns, etc. Ann Arbor, East Lansing. May, June, September, October. Infrequent.

This species is closely related to *H. mesophaeum*. Its spores are the same, and usually it has a similar stature. As far as I can see, *H. gregarium* is distinguished from *H. mesophaeum* only by its darker gills and spores, its truly convex pileus and sometimes by its odor. Specimens identified by Peck as his species were compared with the above. It has been reported by Peck and others as occurring in October and November although I have seen it also in early spring, a seasonal distribution quite frequent in the case of certain species of mushrooms. Its cortina and general appearance suggest a Cortinarius; it is clearly not distantly related to that genus and I suspect has been referred to it more often than to Hebeloma. On drying it becomes much darker than *H. mesaphaeum*, as the latter is diagnosed above. It has slender sterile cells on the edge of the gills.

499. Hebeloma pascuense Pk.

N. Y. State Mus. Rep. 53, 1900.

Illustrations: Ibid, Pl. C, Fig. 21-27.
Hard, Mushrooms, Fig. 222, p. 274.

PILEUS 2-5 cm. broad, convex then plane, obtuse, viscid when moist, *brownish-clay color*, tinged rufous on disk, becoming pale (dry), subhygrophanous, glabrous, *innately streaked or variegated by fibrils*, margin whitish at first from the cortina. FLESH whitish. GILLS adnexed, becoming ventricose and sinnuate, *rather broad*, close, pallid then pale ochraceous-cinnamon, edge white-fimbriate at first. STEM 2-5 cm. long, 3-6 mm. thick, solid or apex hollow, sometimes with a tubule, cortex subcartilaginous, fibrillose or subfloccose, apex floccose-scurfy, often somewhat twisted or curved, pallid but soon darker or tinged umber toward base. CORTINA cobwebby, evanescent, slight remnants at apex of stem or on margin of pileus. SPORES 8-10 x 4-6 micr. (mostly 8-9 x 4-5), elliptical, smooth, pale ochraceous-cinnamon in mass. CYSTIDIA none; *sterile cells* on edge of gills are prominent, *cylindrical*. 40-50 x 4-5 micr. ODOR radishy.

Gregarious or subcaespitose. On denuded or grassy soil in open, pastured woods or similar places, often on sterile, gravelly soil. Washtenaw County. May and June (as early as May 3). Frequent locally.

This Hebeloma loves sterile or gravelly soil which has scanty grass. It is early with us, although Peck reports it for October. In its seasonal habit it corresponds, therefore, with *H. gregarium* from which, it differs in size, color, and its smaller spores. Peck says it is closely related to *H. fastibile* but is smaller, with a more slender stem, differently colored pileus and more crowded gills. The margin of the pileus sometimes shows a differentiated brown zone. Small forms are easily confused with *H. hiemale*, except for the spores and the presence of a cortina.

Section II. Denudati. Cortina lacking.

500. Hebeloma sinapizans Fr.

Epicrisis, 1836.

Illustrations: Cooke, Ill., Pl. 413.
Plate XCVII of this Report.

PILEUS 6-12 cm. broad, *compact*, convex-expanded, obtuse, *viscid* (moist), glabrous, even, somewhat irregular, *ashy-brown to clay-color* or whitish-tan, sordid. FLESH thick, soft in age. GILLS adnexed to deeply emarginate, *broad*, close, dry, pallid then pale alutaceous-cinnamon, *edge entire and concolor*. STEM stout, 6-12 cm. long, 1.5-2.5 cm. thick, rigid, *equal*, even or striate above, fibrillose, upper part *becoming squarrose-scaly* from the tearing of the cuticle, stuffed but soon cavernous, *white* then dingy, apex squamulose-floccose. SPORES broadly elliptical, hyaline-apiculate at both ends, obscurely rough, 11-13 x 7-8 micr., pale-cinnamon in mass. CYSTIDIA none. ODOR and TASTE usually strongly of radish.

In troops, subcaespitose or gregarious. On the ground, wooded hillsides, oak, maple and beech woods. Washtenaw County. September. Infrequent.

This is one of our largest and most luxurious Hebelomas, appearing after heavy rains. The stout, scaly-torn white stem, lack of cortina, broad gills and large spores, distinguish it. In age and in wet weather it decays rapidly. Fries says it is solitary, but with us it grows in troops as described by Stevenson, often forming dense rows along hillsides where Cortinarii flourish. Cooke's figures illustrate our plant well. It approaches *H. sinuosum* Fr. (sense of Ricken).

501. Hebeloma crustuliniforme Fr.

Epicrisis, 1836.

Illustrations: Michael, Führer f. Pilzfreunde, Vol. II, No. 69.
Engler and Prantl. I, .1**, Fig. 117, p. 242.
Swanton, Fungi, Pl. 40, Fig. 5-6, 1909.
Cooke's Illus., Pl. 507.
Ricken, Blätterpilze, Pl. 32, Fig. 2.
Plate XCVII of this Report.

PILEUS 4-8 cm. broad, broadly convex, then plane, subrepand, slightly viscid (moist), glabrous, even, *pale whitish-tan, disk reddish* or yellowish, *zoneless*, margin at first incurved. FLESH thickish, rather firm, white. GILLS adnexed, *crowded*, narrow, rounded behind, thin, whitish then watery cinnamon-brown, *edge crenulate and beaded with drops* when young or moist. STEM 4-8 cm. long, 4-6 mm. thick, equal or subbulbous, stuffed then hollow, somewhat *floccose-squamulose*, glabrous below, white or whitish, pruinose at apex. SPORES 10-12 x 5-7 micr., apiculate, ovoid elliptical, smooth, pale brown. Sterile cells on edge of gills, cylindric-saccate, 24-30 x 6 micr., abundant. ODOR strong of radish. TASTE disagreeable. Said to be *poisonous*.

Solitary or gregarious, sometimes forming interrupted rings. In frondose grassy woods. Washtenaw County. October. Infrequent.

The description given above is that of the continental mycologists. My own notes and specimens were lost.

Form *minor:* is smaller, pileus 2-3 cm. broad. It has no cystidia on the sides of the gills, and the spores measure 8-10 x 5-7 micr. Sterile cells on the edge of the gills are clavate at the apex. The edge of the gills exudes drops. Found in the same woods as the type.

Form *sphagnophilum:* These plants grew on dense sphagnum. PILEUS 4-7 cm. broad. STEM 7-9 cm. by 5-8 mm. There are no cystidia on the sides of the gills; the sterile cells on the edge are slender, slightly thickened below, cylindrical above. The edge of the gills distils drops. The odor, when the plants are fresh, is similar to alcohol ethers. Otherwise as the type. See Plate XCVII of this Report.

The most striking characteristic of this species and its varieties is their habit of distilling drops from the gills when fresh or moist. In this respect it imitates *H. fastibile*, but lacks the cortina and has more crowded gills. It is considered poisonous, and is said to be called "poison-pie" in England, no doubt because the color of the cap simulates a baked pie crust. In dry weather it is easily confused with other species, and the occurence of the forms mentioned above shows that it needs further study. It does not seem to be as common here as in Europe.

502. Hebeloma hiemale Bres.

Fungi Tridentini, 1892.

Illustration: Ibid, Pl. 160.

"PILEUS rather fleshy, 24.5 cm. broad, convex-subhemispherical then plane and gibbous or depressed, viscid, glabrous, margin at first involute and white flocculose, pale alutaceous, marked by a crustuline center or broad zone. GILLS crowded, white then argillaceous-subcinnamon, edge white-floccose, sinuate-adnate or adnexed and almost free. STEM 2-3 cm. long, 5-7 mm. thick, white, becoming yellowish below, stuffed then somewhat hollow, equal, subfibrillose, apex white-furfuraceous. Spores obversely pyriform, 12-13 x 6-7 micr., golden-yellow under the microscope; basidia clavate, 30-35 x 7-8 micr. ODOR scarcely any. TASTE somewhat bitter.

"Approaching nearest to *H. crustuliniforme*, from which it differs by its constantly smaller stature and scarcely noticeable odor."

The description is that of Bresadola, as my own notes are not full enough. It is with some hesitancy included under Michigan species but is said to occur in the United States and is easily confused with the preceding. It is at least of value to make Bresadola's description accessible in English.

503. Hebeloma longicaudum Fr.

Syst Mycol., 1821.

Illustrations: Cooke, Ill., Pl. 415.
Gillet, Champignons de France, No. 309.
Berkeley, Outlines, Pl. 9, Fig. 2.
Ricken, Blätterpilze, Pl. 33, Fig. 2.

PILEUS 3-6 cm. broad, convex-expanded, subumbonate, glabrous, viscid (moist), even, somewhat irregular, *pale ochraceous-tan*, becoming whitish. FLESH soft, watery, white. GILLS *arcuate-adnate* then emarginate, medium broad, narrowed behind, crowded, whitish then pale clay-color, edge minutely fimbriate. STEM 5-10 cm. long, 4-9 mm. thick, *white*, equal, subbulbous below, stuffed then somewhat hollow, *fragile*, fibrillose-striate, mealy at apex or throughout. SPORES obliquely-elliptical, inequilateral, narrow at one end, smooth, 12-15 x 6-7 micr. CYSTIDIA none. *Sterile cells* slender, slightly enlarged at base, numerous on edge of gills. ODOR scarcely noticeable or none. TASTE mild, not of radish.

Gregarious. In or near cedar and tamarack swamps, sometimes on sphagnum, sometimes on rich humus. Ann Arbor, New Richmond. September-November. Infrequent.

The white stem, medium size, lack of cortina and large spores distinguish this species. The white-stemmed species of Hebeloma are quite distinct from those with sordid or brownish stems, although the former may become dingy or brownish by handling. The gills are at first adnate-decurrent and often do not become emarginate until late maturity, a character found in several other species. European authors do not agree upon the size of the spores for this species and usually give smaller spores; but our plant agrees so well with descriptions and the figures referred to above that it seems best to place it here. It differs from *H. elatum*, for which Massee gives large spores, by its lack of a radish odor, and the smaller average size of the pileus. Two other related species with persistently white stems were found at New Richmond: (a) had a more slender stem up to 9 cm. long, tapering downward, flocculose at apex, elsewhere innately fibrillose-striate; its pileus was up to 7 cm. broad, yellowish ochre on disk and white on margin; gills rather broad; odor none. (b) was smaller, with a stem about 5 cm. long, hollow and torn-scaly as in *H. sinapizans*; its cap was testaceous-tan and it had a radishy odor. Both forms had spores 9-12 x 5-6 micr. in size. They need further study.

504. Hebeloma albidulum Pk.

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

PILEUS 3-6 cm. broad, convex-expanded, obtuse, *glabrous*, viscid (moist), dingy-white, buff, or tinged ochraceous or grayish, even. FLESH white, thick on disk. GILLS adnexed, emarginate, *narrow, crowded*, whitish then isabelline to pale rusty-brownish, minutely white-fimbriate on edge. STEM 3-9 cm. long, 4-10 mm. thick, equal or subbulbous at base, glabrous and innately *silky-shining*, stuffed then hollow, *white*, pruinose at apex. SPORES elliptical, inequilateral, 10-12.5 x 5-7 micr., pale-brownish under the microscope, smooth. CYSTIDIA rather abundant on sides and edge of gills, *cylindrical*, slender, obtuse, about 75 x 5-6 micr. Odor none; taste mild.

(Dried: Pileus rufous-brown to tan; gills rusty-brown; stem pallid to dingy white.)

Gregarious to subcaespitose. On the ground, mixed or frondose woods. Ann Arbor, New Richmond. September-October. Infrequent.

Definitely known by its peculiar cylindrical cystidia; its dingy-white or ochraceous-buff pileus, white stem and narrow gills also help to place it. It is related to *H. album* Pk. which has larger spores, measuring 12-16 x 6-8 micr., and a more persistent white pileus and stem. Both *H. albidulum* and *H. album* can be easily distinguished from *H. sarcophyllum* which is also a pure white species, by the pink gills of the latter. *H. neurophyllum* Atk. may also be confused with it. Some of our specimens had a

rather abrupt, oblique and marginate bulb, in this respect approaching Cortinarii, but fresh young specimens lack the cortina. The gills and spores have a peculiar shade of brown, showing their relation to *H. sarcophyllum*.

505. Hebeloma simile sp. nov.

PILEUS 2-6 cm. broad, convex-expanded, whitish tinged ochraceous, subviscid (moist), lustre dull (dry), glabrous, even. FLESH thick on disk, white. GILLS adnate at first, becoming emarginate, *rather broad*, not crowded, ventricose, thin, whitish then alutaceous, edge minutely floccose-denticulate, not costate. STEM 3-8 cm. long, 2-5 mm. thick, *slender*, equal, *not bulbous, white, floccose to mealy throughout*, glabrescent, at length innately fibrillose-striatulate, *stuffed with a persistent pith*, white white and without, texture fibrous. SPORES fusiform-elliptical, inequilateral, smooth or obscurely rough, apiculate, 11-13 x 6-7 micr. CYSTIDIA none. *Sterile cells* on edge of gills, *clavate-thickened at apex*, 55-65 micr. long. ODOR and TASTE slightly of radish.

(Dried: Pileus and stem whitish, dingy; gills cinnamon-brown.)

Gregarious. On the ground, in copses, woods, etc., among grass. Ann Arbor, Detroit. September-October. Infrequent.

Differs from *H. neurophyllum* Atk. in the lack of costate gills, the persistent pith of the stem, smaller spores and broader gills. Its *sterile cells* are clavate-thickened like the upper portion of many paraphyses among the Pezizaceae, a character which is said to belong to the sterile cells on the gills of *H. neurophyllum* Atk. It differs from *H. album* Pk. by the broader gills, floccose-mealy stem and smaller spores; and from *H. albidulum* by the lack of cystidia, broader gills, etc.

506. Hebeloma sarcophyllum Pk.

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

Illustrations: Ibid, Pl. I, Fig. 7-11.

PILEUS 3-6 cm. (or more) broad, *chalk-white*, becoming dingy white, convex, obtuse, glabrous, subviscid (moist), soon dry, even. FLESH white, thickish. GILLS rather narrow, adnexed, *deeply emarginate*, close, *deep rose to flesh color*, edge minutely fimbriate. STEM 3-8 cm. long, 4-8 mm. thick, equal or tapering upward, clavate-bulbous at first, *white*, firm, stuffed by a persistent pith, finally hollow, fibrillose, glabrescent, minutely scurfy-mealy at apex, subshining. SPORES ventricose-elliptical, subinequilateral, ovate-pointed at both ends, obscurely rough, at first *deep-flesh color in mass*, but changing to dark brown, 9-12 x 5-6 micr. STERILE CELLS on edge of gills, cylindrical, slender, 5-6 micr. diam. CYSTIDIA similar, rarely found. ODOR subfarinaceous, TASTE bitterish.

Solitary, scattered or gregarious. On grassy ground, in frondose or mixed woods. Ann Arbor, Huron Mountains. June-August. Infrequent.

Remarkable for the deep pinkish color of the mature gills and spores which simulate those of a Psalliota. There is no cortina, else the shape and structure of the spores would indicate a Cortinarius. The spores lose their pink color in the herbarium. Luxuriant specimens, with caps 15 cm. across, have been found, whose surface was minutely silky-floccose. When fresh the plants present a beautiful appearance because of their chalky whiteness of cap and-stem as contrasted with the deep flesh-colored gills. It is an aberrant species and approaches the genus Entoloma.

507. Hebeloma album Pk.

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

Illustrations: Ibid, Pl. G, Fig. 1-7.
N. Y. State Mus. Bull. 139, Pl. 117, Fig. 1-6, 1910.

"PILEUS 2.5-5 cm. broad, fleshy, firm, convex becoming nearly plane, or concave by the margin curving upward, glabrous, subviscid, *white or yellowish-white*. FLESH white. GILLS thin, *narrow*, close, sinuate, adnexed, whitish *becoming brownish-ferruginous*. STEM 3.5-7 cm. broad, 4-6 mm. thick, equal, firm, rather long, *solid or stuffed*, slightly mealy at the top, white. SPORES subellipsoid, pointed at both ends, 12-16 x 6-8 micr."

Specimens sent from Detroit have been referred by Peck to this species. Its large spores, narrow gills and white or almost white cap distinguish it from related species. Compare *H. albidulum*, *H. simile* and *H. sarcophyllum*.

508. Hebeloma colvini Pk.

N. Y. State Mus. Rep. 28, 1876.

"PILEUS 2-7.5 cm. broad, convex or nearly plane, sometimes gibbous or broadly umbonate, rarely centrally depressed, glabrous, grayish or alutaceous with an ochraceous tint. GILLS close, broad, sinuate, adnexed, whitish, becoming brownish-ochraceous. STEM 2-8 cm. long, 2-6 mm. thick, equal, flexuous, silky-fibrillose, stuffed or hollow above, solid toward the base, whitish. SPORES ellipsoid, 10-12 x 5-6 micr. Sandy soil in open places. The mycelium binds the sand into a globose mass which adheres to the base of the stem."

The description is that of Peck. One collection at New Richmond is closely related. The plants grew in sand which adhered to the cap and stem. Our plants varied from the type in having narrow gills and a solid stem which becomes cavernous.

509. Hebeloma syrjense Karst.

PILEUS 2-5.5 cm. broad, convex-expanded, firm, glabrous, *viscid*, provided with a gelatinous, separable pellicle, even, *rufous or brick-red*, fading to ochraceous-brown, margin at first incurved. FLESH toughish, pallid or tinged rufous-brown. GILLS adnate at first, then emarginate, close, moderately broad, whitish then rufous-brown to cinnamon-brown, edge obscurely flocculose. STEM 4-6 cm. long, 3-5 mm. thick, subequal or attenuated downward, *floccose-scaly above*, glabrescent below, *toughish*, elastic, stuffed then hollow,

whitish, becoming sordid brownish below, even. SPORES elliptical, inequilateral, apiculate, smooth, 8-10.5 x 5-6 micr., pale rusty-cinnamon in mass. CYSTIDIA none. *Sterile cells* short, slender, cylindrical, on edge of gills. ODOR slight. TASTE slightly astringent.

Gregarious or caespitose. On the ground in frondose woods. Ann Arbor. September-October. Infrequent.

This species has the appearance of a Cortinarius, but no cortina is present in the young stage; on this account it is also to be distinguished from *H. testaceum*. The brick-red color, caespitose stems and separable pellicle are characteristic features. The somewhat tough texture is also a marked character. When young, the pileus is often bay-brown and in age may become irregular or repand.

510. Hebeloma magnimamma Fr.

Hymen. Europaei, 1874.

Illustration: Cooke, Ill., Pl. 508.

PILEUS 1-2 cm. broad, *umbonate*, convex, *brick-red* (moist), paler on margin, fading, glabrous, viscid (moist), even. GILLS adnate, close, thin, narrow, width uniform, ochraceous-isabelline, edge white-fimbriate. STEM 3-4 cm. long, 1-2 mm. thick, equal, even, *glabrous*, narrowly fistulose, pallid-ochraceous, apex pruinose. SPORES elliptical, smooth, mostly with a large nucleus, 7-9 x 4-5 micr. *Sterile cells* on edge of gills numerous, narrow-cylindrical, about 65 x 4-5 micr.

Gregarious. Ground in cedar swamp. New Richmond. September. Rare.

Flammula Fr.

(From the Latin, *flamma*, a flame.)

Ochre-brown to rusty-spored. Stem central, continuous with the pileus, without an annulus, *fleshy or fibrous*; partial veil in the form of a fibrillose or subarachnoid cortina, evanescent. Gills *adnate or subdecurrent at first*. Spores *dark brown, rusty-brown or rusty-yellow*. Pileus viscid or dry. Mostly *on wood*.

Fleshy, putrescent, lignicolous, rarely terrestrial fungi, characterized by the habitat and the spore-color. To be separated from Pholiota by the non-membranous inner veil; from Hebeloma by the darker brown or rusty-yellow gills and spores; from Naucoria by the fleshy-fibrous stem; from Continarius by the habitat on wood. It corresponds to Hypholoma of the purple-spored group in habit. By reason of the bitter taste or odor, the Flammulas are not attractive for food, and although no definite information is available to prove that they are not edible, they are usually considered unpalatable and looked upon with suspicion. The genus is difficult and the species appear to run into one another. They occur mostly in the northern forests.

The PILEUS is often very viscid, with a separable pellicle, or, in the section Sapineae, with a dry adnate cuticle; it is usually tinged with yellowish, olivaceous or fuscous hues. The margin or surface is sometimes dotted with thin, fibrillose scales but becomes denuded in age or after rains; it is therefore important to obtain fresh plants for study. The fibrillose *cortina* is more copious in some species than in others and this fact must be kept in mind. The GILLS are referred to by authors as adnate-decurrent and some emphasize the decurrent character as a means of recognizing the genus; there is, however, considerable variation in this respect, and more often the gills are adnate or slightly rounded behind and in age may become emarginate as in related genera. The color of the gills at maturity is conditioned by the spores and is markedly different in the first and last section. *F. polychroa* is unique by the gray and purplish hues which cloud them. *F. carbonaria* has dark dirty-brown gills. In the last section they are bright rusty-ochre or yellow. The STEM is fleshy or fibrous, usually more or less fibrillose, glabrescent, mostly naked at the apex and with a tendency to become darker, sordid, brown or rusty in age, especially at or toward the base. The SPORES are usually elliptical or oval, smooth or slightly rough under high magnification. A spore-print is very important for the diagnosis of species, because of the considerable difference in the color. CYSTIDIA are present and rather abundant on the sides and edge of the gills. The ODOR is an important character and was frequently employed by Fries, especially in the Monographia, to separate the species. The TASTE is often bitter, sometimes strong, and tends to turn away the searcher who is after edible mushrooms.

The species are not yet well understood, especially in this country. Peck has described some twenty-five species but most of these are poorly known. Only about half of my different collections have been included here since the rest are still doubtfully determined. Few species seem to be common at least in the southern part of the State but it is likely that more species occur in the north during favorable seasons.

Key to the Species

(A) Pileus dry, golden-tawny, minutely floccose-scaly; gills chrome-yellow. 519. *F. sapinea* Fr.
(AA) Pileus glutinous, viscid, subviscid or moist.
(a) Gills grayish to olive-purplish-fuscous; pileus glutinous, with superficial scales. 511. *F. polychroa* Berk.
(aa) Gills without gray or purple tints.
(b) Pileus 6-12 cm. or more broad, viscid, flesh white. 512. *F. lubrica* Fr.
(bb) Pileus 3-8 cm. broad, glutinous; flesh white. 513. *F. lenta* Fr.
(bbb) Pileus 2-7 cm. broad; flesh yellowish.
(c) Gills smoky-brown to fuscous-brown; pileus not truly yellow. 514. *F. carbonaria* Fr. var.
(cc) Gills yellow or pallid-ochraceous.
(d) Pileus with viscid or glutinous separable pellicle.
(e) Pileus sulphur-yellow, with fulvous center; stem slender; flesh thin. 515. *F. spumosa* Fr.
(ee) Pileus pale ochraceous-olivaceous-buff; flesh thick. 517. *F. gummosa* Fr.
(dd) Pileus without a viscid pellicle.
(e) Odor strong, bitter; pileus pale, cadmium-yellow, lubricous; stem elongated. 518. *F. alnicola* Fr.
(ee) Odor slight or none; pileus bright yellow, glabrous, margin cortinate. 516. *F. flavida* Fr.

Section I. Phaeotae. Spore mass sordid brown. Pileus with a more or less viscid or glutinous, separable pellicle.

511. Flammula polychroa Berk.

Lea's Catalog, Plants, Cinn. 1844.

Illustrations: Atkinson, Mushrooms, Fig. 147, p. 156, 1900.
Moffatt, Chicago, Nat. Hist. Surv., Bull. No. VII, Part I, Pl. 10, Figs. 1-2, 1909.

PILEUS 3-7 cm. broad, broadly convex, then expanded, obtusely depressed, sometimes broadly umbonate, very viscid, *varying dull orange to yellowish on disk, paler yellowish toward the olive on greenish margin*, in age variegated yellowish-olivaceous-brown, at first *decorated toward margin by wedge-shaped, creamy to vinaceous, fibrillose, detersile, delicate scales*, concentrically arranged, the outermost forming an interrupted fringe at the edge of the pileus, glabrescent in age, margin even, at first incurved. FLESH soft, moist, thick on disk, thin on margin, yellowish-white. GILLS adnate, rounded behind or sinuate, often seceding or subdecurrent in age, rather broad behind, tapering anteriorly, close to crowded, at the very first creamy-buff, soon grayish-fuscous, *finally dark olive purplish-gray*, edge white-flocculose. STEM 3-6 cm. long, 3-5 mm. thick, *slender*, rigid-tough, subequal, curved, solid-fibrous within, in age hollow, fibrillose and *dotted with small, recurved scales up to the evanescent annulus*, yellowish above, becoming dull reddish-brown below. VEIL rather well-developed at the first, varying white to vinaceous, lilac or purplish-tinged, floccose-fibrillose. SPORES oval or short oblong, 6-7.5 x 3.5-4.5 micr., smooth, dark, fuscous-brown *with a slight purplish tinge in mass*. CYSTIDIA numerous on sides and edge of gills, subventricose below, lanceolate above, about 55 micr. long.

Solitary to subcaespitose. On logs, sticks, dead branches, etc., frondose and mixed coniferous woods.

Marquette, New Richmond, Ann Arbor, etc. Throughout the State. July-October. Rather frequent.

This species is distinguished from all the other Flammulas by the peculiar color of the gills and spores; the tint of gray and purple which these possess may easily lead the student into placing it among the purple-spored genera. The other characters, however, ally it to the genus Flammula. The colors of the pileus are, furthermore, quite variable, but there is nearly always an olivaceous tint present, especially on the margin when young. The pelliculose cap is usually glutinous and when fresh dotted with the triangular, hairy, appressed scales. It is apparently indigenous to America.

512. Flammula lubrica Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 116, Fig. 1.
Ricken, Blätterpilze, Pl. 57, Fig. 4.

PILEUS 6-12 cm. broad, tough, broadly convex, then expanded, obtuse or depressed, *tawny-orange or fulvous on disk*; yellowish on margin, sometimes paler, with a separable, *viscid* pellicle, loosely *scaly-dotted*, glabrescent, even. FLESH whitish, moist, rather thick, tinged yellow under pellicle. GILLS adnate, then emarginate or seceding, sometimes subdecurrent or uncinate, medium broad, close to crowded, sulphur-yellow to greenish-yellow, *then dingy-ochre to olive-brown*, edge minutely fimbriate. STEM 4-6 cm. long, 8-15 mm. thick, equal or slightly tapering downwards, curved or straight, subbulbous at base, spongy-solid or hollowed by grubs, at first *whitish within and without*, tinged yellowish or at base rusty-brown in age, fibrillose. SPORES minute, elliptical, 5-6 x 3-3.5 micr., smooth, pale rusty-brown in mass. CYSTIDIA very abundant on sides and edge of gills, ventricose, obtuse, 45 x 12-15 micr., rarely longer. ODOR and TASTE mild or very slightly of radish.

Gregarious or subcaespitose. On decaying logs in mixed or frondose, low woods. Bay View, New Richmond. September. Infrequent or local.

Our plant departs slightly from the accepted characters for the species. It is known by its large size, viscid or glutinous, scaly-dotted, yellow-tawny cap and whitish stem when fresh. The colors of the pileus are shown in the figures of Fries, although a form, such as is shown in Ricken's figure, has been found in the same locality with the Friesian plant. The flesh of both forms is white in the fresh plant. The color of the spore-mass indicates the next section; but it must not be confused with *F. spumosa* which is a smaller plant, whose cap is not dotted with scales, and whose flesh is greenish-yellow. *F. lubrica* appears to be limited to the coniferous regions of the State.

513. Flammula lenta Fr.

Syst Myc., 1821.

Illustrations: Cooke, Ill., Pl. 439 and 440.
Gillet, Champignons de France, No. 284.
Ricken, Blätterpilze, Pl. 57, Fig. 3.

PILEUS 3-7 cm. broad, firm, convex-expanded, obtuse, *glutinous*, dotted toward margin with scattered, concentric, superficial, fibrillose scales, or glabrous and white-silky on the incurved margin, *dingy white to buff*, brownish-tan on disk, even. FLESH pallid, slightly thick. GILLS adnate-subdecurrent, rather narrow, close, white at first then pale alutaceous, buff-color, edge minutely white-flocculose. STEM 4-7 cm. long, 8-11 mm. thick, varying equal, tapering down or subbulbous, stuffed then narrowly tubular, firm, floccose-pruinose at apex, floccose-scaly up to the obsolete annulus, white, becoming brownish toward base in age. SPORES

elliptical, slightly curved, smooth, pale, 5-7 x 3.5-4 micr., grayish-brown in mass. CYSTIDIA abundant on sides and edge of gills, lanceolate, ventricose, obtuse at apex, 50-55 x 12 micr., deep in the subhymenium. ODOR and TASTE slight.

On decaying logs or on the ground among debris in conifer woods. New Richmond. September. Infrequent.

Known by its pale color, glutinous cap and the remnants of the whitish cortina on the margin of the cap or on the stem. It differs from *F. lubrica* mainly in color, especially in the color of the gills. It is seldom reported in this country, although very abundant in Europe. The flesh is white. *Hebeloma glutinosum* also has a glutinous, scaly-dotted pileus, but the gills are said to be emarginate, and the flesh of the stem to become blackish toward the base. (Ricken, Blätterpilze.) In drier weather the pileus is less viscid and may appear to be entirely naked. It is easily mistaken for a Hebeloma because of its pale gills and its frequent development on the ground. *Hebeloma parvifructum* Pk. may be a form of this species, although Peck does not report any cystidia.

514. Flammula carbonaria Fr. var.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 442.

PILEUS 2-6 cm. broad, pliant, convex, *then plane*, usually depressed in age, more or less viscid or subviscid, pellicle somewhat separable, dull crustuline to fulvous-yellowish, *dull dingy rufous-brown in age*, disk rusty-yellow, glabrous, even, at first with remnants of cortina on edge. FLESH pallid then tinged yellowish, rather thin. GILLS adnate-subdecurrent, sinuate in age, crowded, rather narrow, at first pallid, *finally pale smoky brown or fuscous-brown*, edge white-fimbriate. STEM 3-5 cm. long, 3-5 mm. thick at apex, *tapering downwards*, tough, rigid-elastic, flexible, dilated and cavernous at apex, elsewhere soon *hollowed in form of tubule*, fibrillose, at length *dark sordid-brown or smoky-fuscous*, curved or bulbillose at attached base. SPORES elliptic-oblong, smooth, 6-7.5 x 3.54 micr., pale ochraceous under microscope, *solid fuscous-brown in mass*. CYSTIDIA on sides and edge of gills, scattered, flask-shaped to subcylindrical, variable, 30-55 x 10-15 micr. ODOR and TASTE slight or mild.

Solitary, gregarious or caespitose, on roots, sticks, stumps, etc., in low, swampy woods or wet places. New Richmond, Ann Arbor. September-October. Infrequent. "

At least two forms have been referred here: a small plant, with cap 2-3 cm. broad, growing on burnt-over ground, and a larger plant not always on charcoal remains, to which I have referred my collections. Cooke's figures illustrate our plants well except in the slightly smaller size. The principal characteristic is the color of gills and spores, in which it approaches *F. fuscus*. No critical notes of such a plant other than the description of *F. carbonarius* are at hand, and authors vary considerably in their conception of it except that they hold closely to the idea that it occurs always on charred soil or wood. Hard illustrates what appears to be the small form, and Ricken likewise emphasizes the small size in which respect they follow the Friesian tradition. Under this name Peck has described a still different form, whose spores measure 7-10 x 4-5 micr., and which also grows on charcoal beds. The species clearly needs further study in this country, as it is not likely that either Peck's or my plants represent the Friesian species. *F. highlandensis* Pk. may represent the true species.

Section II. Caespitose, spores rusty-brown in mass. Caespitose or crowded. Pileus with subviscid, subseparable pellicle.

515. Flammula spumosa Fr.

Syst. Myc., 1821.

Illustrations: Fries, Icones, Pl. 116, Fig. 3.
Cooke, Ill., Pl. 475.
Ricken, Blätterpilze, Pl. 57, Fig. 5.

PILEUS 2-5 cm. broad, convex-plane, with viscid, separable pellicle, *sulphur-yellow*, sometimes greenish-tinged, fulvous on *center*, paler on margin, glabrous, even, sometimes obscurely virgate, provided when young with a yellowish-white cortina on the margin. FLESH *yellowish or greenish-yellowish*, rather thin. GILLS adnate-emarginate or decurrent by a tooth, close, moderately broad, *sulphur-yellow or greenish-yellow at first*, finally pale ferruginous. STEM 3-7 cm. long, 3-7 mm. thick, *often slender*, equal, hollow by a narrow tubule which is at first stuffed, *fibrillose*, yellowish above, soon sordid rusty-fulvous toward base. SPORES elliptic-oval, smooth, 6-8 x 4-5 micr., contracted toward one end. CYSTIDIA on sides and edge of gills, 60-70 x 12 micr., lanceolate-ventricose. ODOR slight or of radish.

Gregarious or scattered. On the ground among forest debris or on mossy logs, etc., in coniferous regions in moist places. Marquette, Houghton, Bay View, New Richmond, Detroit. July-September. Rather frequent.

This is probably as common as any of the Flammulas but is to be sought in the regions once covered with hemlock or pine. The color of the pileus and flesh varies from youth to age, becoming darker or more dingy, and individual specimens vary from sulphur-yellow to greenish-yellow but are never as green on the margin of the cap as *F. polychroa*. The usual distinguishing marks are the sulphur-yellow margin of the cap, its fulvous to tawny disk, the marked viscidity, the slender, fibrillose stem and the yellowish or citron-yellow flesh. T he spores have a rather characteristic shape as compared with nearly related species.

516. Flammula flavida Fr.

Syst Myc., 1821.

Illustrations: Cooke, Ill., Pl. 444.
Ricken, Blätterpilze, Pl. 58, Fig. 1.

"PILEUS 4-7 cm. broad, campanulate-expanded, subumbonate, moist, *not viscid*, even, *glabrous*, rather regular, *bright yellow* (flavus), sometimes almost sulphur-yellow with pale fulvous disk, decorated *along the margin by the adherent, white or pallid remains of the cortina*. FLESH white then yellowish. GILLS adnate, close, thin, rather narrow, at first white, soon yellowish *then rusty-fulvous*, edge white-fimbriate. STEM 5-10 cm. long, 6-10 mm. thick, either narrowed or enlarged toward base, stuffed then hollow, fibrillose, flavus-yellow, rusty toward base, at length entirely rusty-brown, *sometimes with evanescent annulus*. CORTINA whitish. SPORES elliptical, 8-9 x 4-5 micr., smooth, ferruginous. CYSTIDIA clavate, 36-40 x 8-9 micr."

Reported by Lonygear from Chandlers, Michigan. The description is adopted from the Monographia of Fries, with additions from Ricken. It seems to be well-marked by the non-viscid pileus, the shreds of the cortina on its margin or on the apex of stem and the spores.

517. Flammula gummosa Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 441.
Fries, Icones, Pl. 116, Fig. 2.
Ricken, Blätterpilze, Pl. 57, Fig. 1.

PILEUS 3-7 cm. broad, convex-plane, at length subdepressed or subumbonate, with a *glutinous*, separable pellicle, even, *pale ochraceous mixed with buff and olivaceous hues*, glabrescent. FLESH thick on disk, concolor when moist, paler when dry. GILLS adnate-subdecurrent, broad behind, tapering in front, close, *pale ochraceous-cinnamon*, edge minutely flocculose. STEM 4-6 cm. long, 4-10 mm. thick, rather firm, subequal, *floccose-scaly above*, fibrillose below, stuffed, *pallid above*, umber downwards, dull reddish-umber when bruised at base. SPORES oblong-elliptical, 6-7 x 3-4 micr., smooth, pale rusty-brown. CYSTIDIA scattered, ventricose, tapering, 45-50 x 15 micr. ODOR and TASTE mild.

Solitary or subcaespitose and crowded. At the base of stumps in mixed woods. New Richmond. September. Rare.

Our specimens are well illustrated by Cooke's figures. The species differs from *F. lubrica* in its usually glabrous pileus and the rusty-red base of stem; the spores are slightly smaller.

518. Flammula alnicola Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 443.
Gillet, Champignons de France, No. 282.
Grevillea, Vol. VI, Pl. 90.
Ricken, Blätterpilze, Pl. 58, Fig. 5.

"PILEUS 5-7 cm. broad, convex then expanded, obtuse, *not truly viscid*, lubricous, at first superficially fibrillose toward margin, sometimes minutely scaly, *cadmium-yellow*, becoming rusty and sometimes greenish. FLESH slightly compact, concolor. GILLS subadnate, at times decurrent or rounded behind, broad, plane, *at first dingy-pallid* or yellowish-pallid, at length ferruginous. STEM 5-10 cm. long, 6-12 mm. thick, attenuated-rooting at base, commonly curved or flexuous, *fibrillose*, at first cadmium yellow then becoming rusty. CORTINA manifest, fibrillose or arachnoid. SPORES elliptical, 9 x 4 micr. ODOR *strong and pungent, bitter*. TASTE *bitter*.

"On old stumps of frondose trees especially of alder and willow."

This has been reported from the State, but I have found no typical specimens. Ricken describes and figures a plant with smaller spores, which departs considerably from the figures of Cooke, Gillet and those in Grevillea. The description given above is adopted from that of Fries in Monographia, and the figures of Cooke, etc., fit it well. *F. alnicola* should be recognized by its long, rooting, caespitose steins, by the color and by the strong bitter odor. Peck reports it from the Catskill and Adirondack Mountains only.

Section III. Sapineae. Spore mass ochre-yellow. Gills fulvous-golden yellow. Pileus dry or nearly so.

519. Flammula sapinea Fr.

Syst Myc., 1821.

Illustrations: Fries, Icones, Pl. 118, Fig. 3.
Cooke, Ill., Pl. 447.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 90.
Moffatt, Chicago Nat. His. Surv., Bull. 7, Part I, Pl. 9, Fig. 2,

PILEUS 2-7 cm. broad, *firm*, convex, then subexpanded, obtuse, golden-yellow to tawny, paler toward margin, velvety or *minutely floccose-scaly, dry*, at length fading and rimose-cracked. FLESH thick, *yellowish*. GILLS adnate, plane, rather narrow, thin, *chrome-yellow* then rusty-yellow, edge minutely fimbriate. STEM 4-7 cm. long, 6-12 mm. thick, rather stout, stuffed then hollow, *sometimes compressed and irregular*, fibrous, innately fibrillose, yellowish, brownish below when handled. CORTINA yellowish, scanty. SPORES elliptical, 6-8 x 4-5 micr., smooth, rusty-yellow. ODOR strong.

Subcaespitose, scattered or solitary. On wood of conifers in the north; on tamarack stumps and logs in the southern part of the State. Bay View, New Richmond, Ann Arbor, Detroit. August-October. Infrequent.

This is a rather variable plant, not yet sufficiently studied. The forms on tamarack are apparently the same as the species in pine and hemlock woods but often the pileus is almost glabrous. In the young state the colors are rich, in age they often fade.

Galera Fr.

(From the Latin, *Galera, a little helmet*.)

Ochre-brown or rusty-yellow spored. Stem *subcartilaginous*, tubular, slender. Partial veil none or fibrillose; volva lacking, Pileus thin, conical, campanulate or oval, *its margin at first straight and appressed on the stem*. Spores elliptical or oval, usually smooth. Cystidia lacking.

Putrescent, fragile, small mushrooms, growing on dung, mosses, grass or on the ground. They correspond to Mycena of the white-spored group in the nature of the stem, the straight margin of the young pileus and in the slender habit; they also correspond to Nolanea of the pink-spored group. Their small size, growth on dung and scarcity in number makes them useless for food.

The PILEUS is thin and membranous, either conical, oval or elliptical when very young, becoming campanulate, or, in a few species, expanded. It is hygrophanous and in many species is striatulate on the margin when moist. The color varies within narrow limits, mostly rusty, ochraceous, brownish, yellowish or whitish ; when dry they usually fade to a much paler shade. Many develop an atomate or delicate silky surface after losing their moisture, such "atoms" being due to microscopic erect cells.

The GILLS are never decurrent, but are either narrowly adnate or adnexed to the stem within the cone of the pileus. They are more generally narrow and linear, although some species possess ventricose, rather broad gills. *Galera ovalis*, described in European works, has very broad gills, and seems to be a rarity with us, if it is not entirely lacking. It has been reported from the United States but may have been confused with others. Ricken omits it from the list of German Galeras. The mature gills of this genus are usually a pale rusty-yellow which is a convenient mark of recognition; sometimes this color shades into cinnamon. The edge of the gills is provided with microscopic sterile cells. In the first section they have the shape of nine-pins or Indian clubs, with a rounded knob at the apex, i. e., capitate, but with a more narrowed base. These can scarcely be seen, unless a portion of a gill is mounted sideways under the microscope. In the other groups, these cells vary in shape from lanceolate to filiform, and are never capitate. True cystidia are wanting. The *trama* of the gills is usually composed of large-celled hyphae, and a careful comparative study may bring out good specific characters here. The STEM is always slender, hollow, and usually fragile. In some species, however, it is toughish or flaccid as in certain Mycenas. In texture it is somewhat cartilaginous. It is usually equal throughout but species are known where a marked thickening occurs at the base in the form of a bulb; others may develop a slight bulblet or even a long root-like prolongation as in *G. antipus*. The CORTINA is lacking in most or all of the section Conocephalae. In the second group there is a delicate, fibrillose cortina which disappears early. Another section, of which no examples are included below, includes species which have a more highly developed superficial veil whose delicate remnants are visible after the pileus has expanded. Some of these, e. g., *G. pellucida* Fr., *G. stagnina* Fr. and *G. paludosa* Fr., are now placed in the genus Tubaria, because of their decurrent or broadly adnate gills. *G. rufipes* Pk. seems at present the only species of this third section likely to be found within our limits.

About 24 species of Galera have been reported or newly described for the United States east of the Rocky Mountains. Some of these will probably be found to be synonyms. Several unnamed species are included below whose identity is not established and which as yet seem to be distinct from the others. This genus needs considerably more microscopic study in order to place its species on a firm basis. Special pains were taken to obtain material throughout the course of this study but a comparatively small number of the described American species came to hand. See Plate XCVII for habit.

Key to the Species

(A) Edge of gills provided with microscopic, capitate, sterile cells. (Growing on dung, or on the soil among grass of manured lawns, gardens, fields and pastures.)
  (a) Stem long, rooting below the enlarged base; primarily on dung-hills. 520. *G. antipus* Lasch.
  (aa) Stem without root-like prolongation.
    (b) Stem bulbous-enlarged at base; gills narrow; on dung-hills. 522. *G. bulbifera* sp. nov.
    (bb) Stem equal.
      (c) Gills very broad, almost free, ferruginous; plants large, very fragile; rare. *G. ovalis* Fr.
      (cc) Gills narrow to medium broad.
        (d) Stem striatulate and pubescent; spores 10-12 x 6-7 micr. 523. *G. pubescens* Gill.
        (dd) Stem not markedly striatulate.
          (e) Spores small, 7-8.5 x 4-5 micr., pileus soft and very fragile, finally expanded. 527. *G. tenacroides* Pk.
          (ee) Spores 10 micr. or more in length.
            (f) Pileus markedly cylindric-conical, longer than wide, pale isabelline. 521. *G. lateritia* Fr.
            (ff) Pileus not narrowed-conical.
              (g) On cow-dung; spores 15-18 x 9-10 micr; pileus not striatulate when moist. 524. *G.* sp.
              (gg) In grassy places, lawns, etc.
                (h) Stem tough, filiform; spores 9-12 x 6-7 micr. 528. *G. capillaripes* Pk.
                (hh) Stem fragile.
                  (i) Gills crisped and interveined. 526. *G. crispa* Longyear.
                  (ii) Gills not crisped; very common on lawns. 525. *G. tenera* Fr.

(AA) Edge of gills with sterile cells of a different form. (Growing attached to mosses, grass, sedges, etc., in moist places.)
  (a) Stem bluish to greenish-gray; on mosses in swamps. 529. *G. cyanopes* sp. nov.
  (aa) Stem whitish or pallid.
    (b) Pileus sulcate, convex; gills narrow; on grass. 530. *G. plicatella* Pk.
    (bb) Pileus even or striatulate when moist; gills broad.
      (c) Spores 8-10 x 5-6 micr., pileus conic-campanulate; very common on mosses; small. 531. *G. hypnorum* Fr.
      (cc) Spores 10-12 x 6 micr., pileus hemispherical-convex; on grass. *G.* sp.

Section I. Conocephalae. Pileus conico-campanulate at first; gills ascending and on the edge with microscopic differentiated, capitate cells; cortina none. Habitat on dung or manured ground.

520. Galera antipus Lasch.

Illustrations: Fries, Icones, Pl. 128, Fig. 2.
Gillet, Champignons de France, No. 293.
Ricken, Die Blätterpilze, Pl. 60, Fig. 9.

PILEUS 1.5-2.5 cm. broad (rarely up to 5 cm.), *broadly campanulate*, dingy ferruginous-cinnamon (moist), hygrophanous, yellowish-isabelline (dry), glabrous or subpruinose, not striatulate, atomate when dry, subflaccid. FLESH submembranous, slightly fleshy on disk. GILLS narrowly adnate, ascending, *crowded, narrow*, sublinear, pale cinnamon-ochraceous, finally dark ferruginous. STEM 3-5 cm. long and 2-4 mm. thick above substratum, *subfusiform-enlarged at base, and with a very long, subhorizontal, thickish, flexuous, whitish root-like prolongation*, pruinose or scurfy, *striate or twisted*, concolor or paler than pileus. SPORES lemon-shaped, obscurely 6-angled, otherwise smooth, 8-9 x 6 micr. BASIDIA 18-25 x 7-8 micr.; *sterile cells* on edge of gills, small, capitate. ODOR none.

Gregarious on dung-hills in beech and pine woods. New Richmond. September. Locally abundant.

This is often a large-capped species, known by its long root-like prolongation, which may extend 5-8 cm. below the point of entrance. Dung-hills on which the plants are plentiful, are often penetrated by a thick mass of these "roots" which interweave in a horizontal position. The stem appears clavate or fusiform where it enters the substratum, and easily separates at this point, so that the “root" is easily overlooked. All stages of development were observed; the very young pileus is oval and whitish, and is scarcely broader than the stout young stem; it becomes campanulate and finally is broadly expanded. No cortina is present at any stage. The spores are very characteristic and agree entirely with Ricken's description. Cooke gives the spores entirely too large in connection with Plate 463 of the Illustrations.

521. Galera lateritia Fr.

Syst. Myc., 1821.

Illustrations: Fries, lcones, Pl. 127.
Michael, Führer f. Pilzfreunde, Vol. Ill, No. 94.
Ricken, Die Blätterpilze, Plate 60, Fig. 11.
Cooke, Ill., Plate 460.

PILEUS 2.5-3 cm. high, 2-2.5 cm. wide, almost *cylindrical-conical*, later subcampanulate, *pale isabelline*, hygrophanous, glabrous, finely striate on margin. FLESH membranous. GILLS nearly free, *narrow*, linear, ascending, crowded, fulvous-rusty-ochraceous. STEM 5-10 cm. long, 2-3 mm. thick, rigid, equal, hollow, *fragile, pure white*, mealy-frosted. SPORES elliptical, ferruginous, 12-15 x 8-9 micr., smooth. STERILE CELLS on edge of gills capitate.

On dung or rich grassy places. Reported by Longyear as abundant; rarely seen by the writer. June-September.

The color of the cap is not as dark as in some of the Friesian figures; a fact noted by European as well as American observers. The narrow, elongated pileus is unique among the Galeras.

522. Galera bulbifera sp. nov.

PILEUS .5-2.5 cm. broad, oval-campanulate, obtuse, *ferruginous-cinnamon* when moist, hygrophanous, ochraceous and atomate when dry, rivulose-reticulate. GILLS ascending-adnate, *narrow, sub-linear*, close to crowded, ferruginous-cinnamon, sprinkled by ferruginous spores. STEM 6-15 cm. long, 1.5-3 mm. thick, strict when moist, equal above the bulbous base, pale ferruginous, hollow, glabrous-shining when dry, sometimes faintly striatulate. SPORES elliptical, obtuse at ends, smooth, ferruginous in mass, 12-15 x 8-9 micr. CYSTIDIA none. STERILE CELLS on edge of gills small, capitate. ODOR none.

On horse dung; dung-hills in mixed woods. New Richmond. September.

Variable in size; solitary specimens attain the large size, while a patch of them is apt to be composed of smaller sizes. It has the appearance, in the large condition, of *G. ovalis*, but differs by the narrow gills, etc. It is well marked by the gills, the bulblet at base of stem, and the spores. The whole plant is ferruginous-cinnamon when moist, and in large plants the pileus is finely rugose-reticulate.

523. Galera pubescens Gill.

Champignons de France, 1874.

Illustrations: Ibid, No. 296.

PILEUS 1-4 cm. broad, *oval-campanulate* or obtusely conical-campanulate, *ferruginous-cinnamon* to rufous-brown when moist, hygrophanous, buff to ochraceous-tan when dry, sometimes reticulate-rivulose or obscurely rugulose, atomate when dry. FLESH submembranous. GILLS ascending-adnate, *rather narrow, close*, subventricose, cinnamon-ochraceous. STEM 3-10 cm. long, 1-3 mm. thick, *equal*, often *striatulate, minutely pubescent or glabrous*, hollow, brownish-ochraceous, becoming pallid and shining. SPORES elliptical, smooth, obtuse, 10-12 x 5.5-7 micr. CYSTIDIA none. STERILE CELLS capitate, on edge of gills.

Common locally on cow-dung, cultivated fields, etc. Ann Arbor, New Richmond. June-September.

This differs from *G. bulbifera* in the size of the spores and of the stem which is of equal size to the base. The stem is usually pubescent as is also the surface of the pileus; but not too much stress must be laid on this character since it is not unusual for other species of Galera to develop pubescence on cap and stem when growing on dung in shaded, moist situations. The stem

also varies considerably as to the striations; these are normally well-marked but may be entirely lacking.

524. Galera sp.

Plate XCVII of this Report,

PILEUS 12-16 mm. broad, campanulate, *not striatulate*, watery-cinnamon-brown when moist, hygrophanous, pale whitish-ochraceous and atomate when dry; FLESH submembranous, concolor. GILLS adnate-seceding, ascending, *rather broad, ventricose*, close to subdistant, ferruginous at maturity. STEM about 5 cm. long, 14.5 mm. thick, *equal*, not bulbillate, fibrous-rigid, hollow, even, glabrous or pruinate, white at first, then pallid or pale ochraceous. SPORES large, broadly elliptical, obtuse, smooth, ferruginous in mass, 15-18 x 9-10 micr. CYSTIDIA none. STERILE CELLS on edge of gills, capitate.

On cow-dung in pine woods. New Richmond. September.

Differing from the preceding two, in the large spores, broad and ventricose gills and paler colors. It was distinguished only once and no name is as yet applied to it. It is included merely for comparison. It may prove to be a form of *G. pygmaea-affinis* Fr.

525. Galera tenera Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 461.
Hard, Mushrooms, Fig. 223, p. 276, 1908.
Murrill, Mycologia, Vol. 3, Pl. 40, Fig. 6.

PILEUS 8-16 mm. broad, *obtusely conic-campanulate*, hygrophanous, pale ferruginous and striatulate when moist, *whitish to creamy-white and even when dry*, glabrous, atomate when dry; FLESH submembranous. GILLS ascending-adnate, close to subdistant, rather narrow, uniform in width, cinnamon when mature. STEM 3-7 cm. long, 1-1.5 mm. thick, equal or subequal, straight, slender, *fragile*, subshining, hollow, concolor (moist and dry), pruinose at apex, even or faintly striatulate. SPORES variable in size, 11-16 x 6-9 micr., elliptical, smooth, obtuse. CYSTIDIA none. STERILE CELLS on edge of gills capitate.

Gregarious or scattered. Especially on lawns in our cities everywhere; also among grass by road-sides, in fields, pastures, etc., sometimes on dung-hills. May to September. Throughout the State. Very common.

This must not be confused with *Bolbitius tener* Berk., which is much more delicate and collapses quickly at maturity. When growing in the same place the two are easily distinguished. *Bolbitius tener* is rather rare, but may appear in similar situations. There seem to be some discrepancies in the spore-measurements of *G. tenera* as given by different authors, a fact easily explained by their variability. The gills, too, are usually said to be “broad,” while in most individuals they are relatively somewhat narrow.

526. Galera crispa Longyear

Bot. Gazette. 1899, p. 272.

Illustration: Hard, Mushrooms, Fig. 226, p. 278, 1908.

PILEUS 1.5-3 cm. broad, *persistently conic-campanulate*, subacute, rivulose-striate, sometimes rugulose, *brownish-ochraceous at apex when moist*, whitish-buff elsewhere, glabrous, atomate when, dry; FLESH membranous. GILLS adnexed, close to subdistant, rather narrow, *crisped and interveined*, at first white then ferruginous-brown. STEM 5-9 cm. long, 1-2 mm. thick, slender, base slightly bulbous, hollow, *fragile, pure white or tinged ochraceous*, sometimes faintly striatulate. SPORES very *variable in size and shape*, elliptical, ovate or elliptic oval in some individuals, varying 15 x 13 or 12 x 8, etc., (11-16 x 8-14 micr.), smooth. CYSTIDIA none. STERILE CELLS on edge of gills, capitate.

On lawns, pastures, etc., among grass. June-July. Ann Arbor, Lansing, etc. Infrequent.

This species was described by Longyear from our State. The peculiar, crisped appearance of the gills, and the slight development of the hygrophanous character in the pileus distinguishes it from *G. tenera*. Hard gives an excellent photograph of it.

527. Galera teneroides Pk.

N. Y. State Mus. Rep. 29, p. 39, 1878.

PILEUS 5-20 mm. broad, conic-ovate at the very first, then *campanulate-expanded, soft, very fragile*, sublubricous, hygrophanous, *brownish-cinnamon* and striatulate when moist, paler when dry, glabrous. FLESH membranous. GILLS narrowly-adnate, *narrow*, close, pale brown then ochraceous-cinnamon or watery-brown. STEM slender, 3-6 cm. long, 1-1.5 mm. thick, elastic, straight then flexuous, equal, *slightly toughish*, subpubescent, glabrescent and shining, often striatulate. SPORES elliptical, small, 7-8.5 x 5 micr., smooth, obtuse, pale ochraceous-brown. BASIDIA 18 x 8 micr., inflated above, narrowed-stipitate, 4-spored. STERILE CELLS on edge of gills capitate.

On horse-dung and ground or decayed debris in woods. Ann Arbor, New Richmond. August-September.

Remarkable for the soft, fragile pileus and somewhat toughish, persistent stem; the latter separates from the rather watery flesh of the pileus and is found in good condition after the pileus has collapsed. It has affinities with Bolbitius but the gills are Galera-like. The small spores separate it from related species on dung. It seems close to *G. spartea* Fr., but that species is said to prefer mossy or burned-over places in woods. Furthermore, Massee says the gills of *G. spartea* are broadly adnate, while Ricken says they are narrowly-attached, so that a clear idea of that species is hard to obtain.

528. Galera capillaripes Pk.

Torr. Bot. Club. Bull, No. 26, p. 66, 1899.

PILEUS 8-12 mm. broad, obtusely canipanulate, hygrophanous, pale ferruginous and faintly striatulate when moist, paler and atomate when dry. FLESH membranous. GILLS ascending adnate, rather broad, subdistant, pale, ferruginous. STEM filiform, 2-5 cm. long, flexuous, tough, glabrous, concolor, persistently rufous-shining, apex pruinate. SPORES 9-11.5 x 5-6.5 micr., elliptical, smooth, obtuse, epispore ferruginous under microscope. CYSTIDIA none. STERILE CELLS on edge of gills capitate, about 20 x 7-8 micr. ODOR none.

Among grass, near woods. Ann Arbor. September. Infrequent.

Similar to *G. tenera*, but with different spores, smaller size and tough stem. It was originally described by Peck from specimens growing on lawns and grassy places in Ohio.

Section II. Bryogeni. Pileus campanulate-convex, always striatulate; gills scarcely ascending, provided on the edge with filiform, awl-shaped or lanceolate sterile cells. Habitat on mosses, sedges, etc.

529. Galera cyanopes sp. nov.

PILEUS 8-12 mm. broad, convex-campanulate, hygrophanous, pale watery cinnamon and striatulate when moist, whitish-buff and almost even when dry, atomate; FLESH membranous. GILLS adnate, narrow, sublinear, close to subdistant, pale cinnamon-ochraceous, edge minutely flocculose. STEM 5-7 cm. long, 1-1.5 mm. thick, filiform, *pale greenish-gray to bluish*, equal or minutely bulbillate at base, elastic, hollow, pruinose at apex, glabrous elsewhere, concolor within. SPORES broadly elliptical, smooth, 8-9.5 x 6.5-7 micr., ochraceous. CYSTIDIA none. STERILE CELLS on edge of gills. ODOR and TASTE none.

On Polytrichum, a species of moss, in a poplar swamp. Ann Arbor. July. Rare.

A beautiful little Galera, well-marked by the blue-gray stem, habit on Polytrichum and its striatulate pileus when moist. In the light from a kerosene lamp the greenish-blue color is intensified. *G. mniophila* Lasch. is said to grow on moss and has an olive-yellow stem, but the spores are larger, according to Ricken 10-12 x 5-6 micr., and according to Massee, 14 x 6 micr.

530. Galera plicatella Pk.

N. Y. State Mus. Rep. 26, p. 59, 1874 (as *Galera coprinoides* Pk.).

PILEUS 10-12 mm. broad, convex-expanded, *plicate-sulcate* to the small even disk, often split on margin, yellowish or ochraceous when moist, straw-whitish when dry, glabrous. FLESH membranaceous. GILLS adnexed, moderately broad, ventricose, close to subdistant, distinct, pale rusty-ochraceous. STEM 2-3 cm. long, 1 mm. thick, slender, equal, flexuous or straight, hollow, minutely pruinose, *white* to pallid. SPORES elliptical, smooth, 6-7.5 x 5 micr., rusty-ochraceous. BASIDIA 15 x 6-7 micr., 4-spored.

On the grass, lawns, roadsides. August-October. Ann Arbor. Rare.

The pileus imitates small species of Coprinus in its plicate margin. The trama, of the gills is composed of large, vesicular sub-hymenial cells, between which runs a narrow layer of axillary, slender parallel hyphae.

531. Galera hypnoram Fr.

Sys. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 230.
Cooke, Ill., Plate 465.
Gillet, Champignons de France, No. 295 (var. *bryorum*).
Ricken, Die Blätterpilze, Plate 60, Fig. 8.

PILEUS 4-12 mm. broad, canipanulate, *cinnamon-yellowish* or yellowish-ochraceous and *striate when moist*, glabrous, yellowish-white or buff and even when dry. FLESH membranaceous; GILLS adnate, *broad, not ascending*, subdistant, fulvous-cinnamon, edge minutely flocculose. STEM short, 3-4 cm. long, 1-2 mm. thick, equal, slender, hollow, flexuous, glabrous, apex pruinose, concolor, often darker toward base. SPORES elliptic-ovate, subinequilateral, 8-10 x 5-6 micr., smooth, ochraceous. CYSTIDIA none. STERILE CELLS on edge of gills *fusiform-lanceolate*.

Gregarious on mosses. Throughout the State. May-October. Common.

This is our commonest little Galera with a moss habitat. Doubtless closely related species are confused with it and a microscopic study may be necessary to distinguish them. A number of varieties have been described, but an account of them here would only confuse the student. Sometimes the pileus is provided with a little umbo, sometimes the plants attain a larger size than that given. A form growing on sphagnum is especially large.

Bolbitius Fr.

(From the Greek, *bolbiton*, cow's-dung.)

Ochre-brown to rusty-ochraceous-spored. Gills *dissolving somewhat* in wet weather, narrowly attached. Margin of pileus at first straight; flesh very thin. Stem fragile and slender. Partial veil very evanescent or none.

Putrescent, delicate, dung-inhabiting fungi, with hollow, elongated stems, with gills which dissolve more or less into a soft mass in age and very thin caps which usually split on the margin. They approach the genus Coprinus in habit and in the structure of the hymenium, differing in the rusty-ochraceous spores. They have something of the appearance of Galera, but their gills are clearly different. Only three species are included below. Some consider *Pluteolus reticulatus* to be a better species of Bolbitius. The genus Pluteolus, in fact, differs only in

degree from Bolbitius. Species with free gills and the stem separable from the pileus are referable to Pluteolus; species with gills more or less narrowly attached and with a tendency of the gills to become soft, belonging to Bolbitius. But apparently these characters vary or intermediate forms may occur. The gills of *Pluteolus reticulatus* are sometimes narrowly adnate and those of some species of Bolbitius are free in occasional specimens. The texture of the stem in both genera is different from that of the pileus and the stem is more or less separable. The pileus is viscid or slightly so in nearly all species of both genera. In spite of these facts, the nature of the gills of Bolbitius remains a real distinguishing character and the genus Pluteolus will be retained in its proper place.

Key to the Species

(See Pluteolus FR.)

532. Bolbitius tener Berk.

Outlines, 1860.

Illustrations, Ibid, Pl. 12, Fig. 2.
Cooke, Ill., Pl. 691.
Fries, Icones, Pl. 139, Fig. 4.
Gillet, Champignons de France, No. 46.

PILEUS conical, 1-1.5 cm. high, finally-expanded, obtuse, *dull white*, apex creamy-yellow, sometimes slightly subviscid, *even or scarcely striatulate*, glabrous, at ornate when dry. FLESH very thin, delicate. GILLS free or nearly so, narrow, close, *dissolving quickly* and becoming brownish-ochraceous. STEM *slender*, 6-12 cm. or more in length, 1-2 mm. thick, equal, *flaccid*, glabrous, hollow, *bulbillate at base, pure white*. SPORES broadly elliptical, smooth, 13-16 x 9-10 micr., rounded-obtuse, ochraceous.

Gregarious or scattered. Among grass on lawns, parks, golf-links.

Marquette, Ann Arbor, Ypsilanti, etc. July-August. After heavy rains. Rare.

This plant must not be confused, with *Galera lateritia* which has a larger pileus, a rigid-fragile stem and slightly smaller spores and gills which do not dissolve. This little Bolbitius seldom appears, according to my experience, and only during sultry, rainy weather. It develops overnight and in early morning stands up on its slender stem without difficulty, but soon after the sun strikes it the stems bend over, the gills dissolve and the cap collapses into soft masses which cling to the apex of the flaccid stem. On cloudy days the cap may expand and persist longer but usually it is seen as shown in Cooke's figure. It is described with salmon-colored gills, but in our plants the gills were brownish-ochraceous.

533. Bolbitius fragilis Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 720, A.
Swanton, Fungi, Pl. 40, Fig. 2.

PILEUS 2-5 cm. broad, conical-expanded, subumbonate, more or less viscid, light yellow, fading, umbo slightly deeper yellow, thin, almost pellucid, glabrous, *striate on the margin*. FLESH membranaceous. GILLS narrowly adnate, attenuate behind, sometimes free, *yellow*, then sordid pale cinnamon, moist and *somewhat dissolving*. STEM 7-9 cm. long, 2-3 mm. thick, fragile, hollow, slightly attenuated upwards, *glabrous*, naked at apex, yellow. SPORES elliptical, smooth, 11-13 x 6-7 micr., rusty-ochraceous.

Solitary or gregarious. In cultivated fields. Ann Arbor. May-July. Infrequent.

This is rather difficult of separation from *B. vitellinus*. It differs apparently in its less plicate pileus and the naked, more yellow stem; but these characters are variable in this genus and intermediate forms seem to be quite frequent.

534. Bolbitius vitellinus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 923.
Gillet, Champignons de France, No. 47.
Ricken, Blätterpilze, Pl. 23, Fig. 9.

PILEUS 2-5 cm. broad, at first oval, obtuse and *egg-yellow*, at length campanulate-expanded, cinereous toward margin, *sulcate-striate or plicate up to the egg-yellow obtuse umbo*, viscid, glabrous, margin at first straight. FLESH very thin. GILLS narrowly adnate, close, subdistant at full expansion of pileus, narrow, soft, *ochraceous-clay-color and with white edge when young*, rusty-ochraceous in age, *scarcely dissolving in wet weather*, crisped in dry weather. STEM 6-12 cm. long, 2-4 mm. thick, equal or slightly tapering upward, slender, fragile, *pruinose-scaly at apex* or throughout, *white* or slightly sulphur-yellow-tinged, often pellucid-shining, even or innately fibrillose. SPORES elliptical, smooth, 10-12.5 x 6-7.5 micr., rusty-ochraceous. *Hymenium* with large, inflated, sterile cells intermingled with basidia and of the same length as the basidia but much broader. ODOR and TASTE none.

On dung, especially cow dung, in fields, woods, etc., where cows are pastured. Ann Arbor, New Richmond, probably throughout the State. May-July. Rather frequent.

To be looked for in early June. It is a rather variable plant, changing in color as it develops, and again as it ages. Some specimens have white stems, others have stems tinged with sulphur-yellow. The distinctive character is the egg-yellow umbo on the center of the pileus, and before expansion the whole pileus is yellow. In the very young unexpanded stage, the surface of the

pileus is provided with a delicate, thin, viscid pellicle, composed of glistening particles; this membrane disappears as the pileus expands. The species is not uncommon in Sweden, where I was able to verify the identity of our plant. The flesh of the stem is sometimes pale yellow. It should be carefully compared with *Pluteolus expansus*.

Pluteolus Fr.

(Diminutive of *Pluteus*.)

Ochre-brown to rusty-ochraceous spored. Gills *free*, not dissolving in wet weather. Stem *distinct from the pileus*, subcartilaginous. Pileus *viscid*, margin at first straight. Veil none.

Putrescent, thin-capped, slender-stemmed fungi, whose distinguishing characters are the spore-color, free gills, separable -stem and viscid pileus. Bolbitius differs by the greater or less degree of the softness of the gills which tend to dissolve in wet weather. In Galera the gills are attached, the stem not truly separable and the cap not viscid. In Naucoria the margin of the pileus is at first incurved. Pluteolus corresponds to Pluteus of the pink-spored group in its free gills. The gills are, however, not always free, but may be attached slightly by the upper corner; this is true, in *P. expansus* and *P. reticulatus*, which are somewhat intermediate between Pluteolus and Bolbitius. Ricken has discarded this genus, referring the European species to Bolbitius. A consideration of the extremes as shown by *Bolbitius tener* and *Pluteolus coprophilus* will make it evident that a real basis exists for these two genera. For purposes of identification, however, it seems helpful to include the species of both genera in one key.

Key to the Species

(a) On decaying wood; pileus deep violet-gray, fading. 538. *P. reticulatus* Fr.
(aa) On dung, straw piles, grassy places or ground in woods.
(b) Gills dissolving quickly; pileus conical, 1-1.5 cm., dull white. (See 532. *Bolbitius tener* Berk.)
(bb) Gills dissolving slowly or not at all.
(c) Spores large, 12-16 micr. long, pileus rose-gray, striatulate. 535. *P. coprophilus* Pk.
(cc) Spores 9-13 micr. long.
(d) Pileus drab-color to grayish-brown; on the ground in woods. 536. *P. aleuriatus gracilis* Pk.
(dd) Pileus yellow when young.
(e) Pileus umbonate, umbo yellow.
(f) Stem yellow, glabrous; pileus striate on margin. (See 533. *Bolbitius fragile* Fr.)
(ff) Stem white, rarely tinged yellow; pruinose-scaly at apex; pileus sulcate-plicate. (See 534. *Bolbitius vitellinus* Fr.)
(ee) Pileus sulcate-plicate, not umbonate; stem citron-yellow. 537. *P. expansus* Pk.

535. Pluteolus coprophilus Pk.

N. Y. State Mus. Rep. 46, 1893.

PILEUS 2-4 cm. broad, fragile, conical-campanulate then expanded, depressed on disk, *viscid* when moist, striatulate on margin, whitish at first, *soon rosy-gray or pinkish-cinnamon*. FLESH thin, submembranaceous. GILLS *free*, narrow, crowded or close, pale rusty-cinnamon, dotted by the spores. STEM 6-11 cm. long, 2-4 mm. thick, straight or flexuous, *slender*, hollow, *pure white*, rarely tinged with pink, glabrous or obscurely squamulose, equal or attenuated at base. SPORES oval-elliptical, smooth, variable in size, 12-16 x 7-10 micr., bright-cinnamon in mass.

Caespitose or gregarious. On decaying straw piles, on compost heaps or on dung, especially on lawns, fields, around trees, etc., where coarse manure was used. Ann Arbor. Probably throughout the State. May-June. Infrequent.

During continued wet and sultry weather it is often very abundant on manure mixed with straw. In June of one year specimens appeared around every tree on the campus of the University of Michigan where such manure had been deposited. Some think *Bolbitius radians* Morg. is identical with it.

536. Pluteolus aleuriatus gracilis Pk.

Syst. Myc., 1821 (as *P. aleuriatus* Fr.).

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

PILEUS 1-2 cm. broad, fragile, soon expanded-plane, *viscid*, striate-sulcate on margin, hygrophanous, *drab color to grayish-brown*, paler on depressed disk, glabrous. FLESH thin. GILLS free or nearly so, narrow, close, whitish at first then pale rusty-cinnamon. STEM 2.5-3.5 cm. long, 1.5-3 mm. thick, equal or narrowed upwards, glabrous or minutely pulverulent, hollow, white, or pallid. SPORES elliptical, smooth, 9-12 x 4-6 micr., pale ferruginous.

On the ground among decaying leaves in mixed woods. Houghton, Bay View. July. Rare.

This species does not seem to be very well known. Only a few specimens were found which are here considered to be identical with Peck's variety.

537. Pluteolus expansus Pk.

N. Y. State Rep. 26, 1874 (as *Galera expansus*).

Illustration: Plate XCVIII of this Report.

PILEUS 3-6 cm. broad, *fragile*, oval at first, then expanded-plane, *not umbonate*, slightly depressed in centre, *viscid* when moist, *cinereous-ochraceous* tinged with brownish or greenish hues, margin at first sulphur-yellow, *striate-sulcate or plicatulate*. FLESH thin, submembranaceous. GILLS free or slightly and narrowly adnexed, narrow, close to crowded, at first white, soon ochraceous-cinnamon, edge minutely flocculose. STEM 5-10 cm. long, 2-6 mm. thick, fragile, equal or slightly tapering upward, hollow, sometimes compressed, splitting longitudinally, pruinose or floccose, *citron-yellow*, yellow within except the evanescent pith. SPORES elliptical, smooth, 10-12 x 7.5 micr., ochraceous-cinnamon under microscope. *Hymenium* composed of large, inflated subglobose sterile cells intermingled with basidia which are narrow below, inflated above and 4-spored.

Gregarious or solitary. On rich manured -lawns, fields, etc., sometimes on dung; sometimes in woods. Ann Arbor, Houghton, etc. Throughout the State. May-July. Infrequent.

This species seems to differ from *Bolbitius vitellinus* mainly in the absence of the yellow umbo or a yellow centre in the expanded pileus, in the constant yellow stem and the somewhat different distribution of color on the cap. It was first described by Peck from specimens on decaying wood, but later he reported it from "rich ground." The microscopic structure is very similar to that of *Bolbitius vitellinus*. The gills, although rather soft, do not dissolve as in a typical Bolbitius, but are fairly persistent. Var. *terrestris* Pk. is here made an integral part of the species.

538. Pluteolus reticulatus Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 495.
Gillet, Champignons de France, No. 546.
Berkeley, Outlines, Pl. 9, Fig. 5.
Ricken, Blätterpilze, Pl. 23, Fig. 10.
Plate CXIX of tins Report.

PILEUS 2-5 cm. broad, campanulate-expanded, obtuse, sometimes slightly depressed, *glutinous when fresh*, the gluten drying so as to form *reticulate veins*, radiately-rugose on disk, *violaceous-gray* when fresh, livid to blackish on disk, margin obscurely striate, very pale in age. FLESH rather thin. GILLS almost free or narrowly adnate, rounded behind, *seceding*, crowded, ventricose, moderately broad, whitish at first, then rusty-cinnamon, edge white-fimbriate. STEM 3-6 cm. long, 2-6 mm. thick, equal or slightly tapering upwards, elastic, toughish, *white*, minutely floccose-scaly, fibrillose-striatulate, hollow, straight or curved. SPORES elliptical, smooth, 9-11 x 5-6 micr., rusty-brownish. ODOR none.

Caespitose or subcaespitose. Around the base of stumps and standing trees, on decayed wood. Ann Arbor. October. Rare.

When fresh the plants are markedly tricolored; pileus deep gray with violet tinge, gills rusty-cinnamon and stem white. Later the color of the pileus fades somewhat as in the plates referred to above, all of which show the cap much decolorized. The gills of our specimens depart somewhat from the character of the genus in being narrowly adnate; on this account it was at first referred by the writer to Naucoria. Ricken places it under Bolbitius because of the structure of the gills. In our plants the gills showed no sign of dissolving or becoming soft under the weather conditions in which they were collected.

Naucoria Fr.

(From the Latin, *Naucum*, a nut-shell, referring to the shape of the pileus.)

Ochre-brown or rusty-brown-spored. Stem *subcartilaginous*, hollow or stuffed. Partial veil none or fugacious. Pileus slightly fleshy, convex, *its margin at first incurved*. Spores smooth.

Putrescent, terrestrial or lignicolous, usually small, sometimes minute, growing on grassy ground, mosses, sticks, decayed wood, or on the ground in various places. They correspond to the genus Collybia of the white-spored group in the nature of the stem, the incurved margin of the young pileus and in habit and habitat. They differ from Pholiota in lacking an annulus; from Flammula in the subcartilaginous stem, and from Galera in the more convex pileus and darker spore-mass. They are usually devoid of any special odor, but may have a slightly disagreeable taste. Their edibility is mostly uninvestigated, and their small size gives them no special value as edible mushrooms.

The PILEUS is slightly more fleshy in many species than in Galera; others have very thin flesh. It may be hemispherical and convex, even conical in a few species, but then it tends to expand and become plane or depressed. It is often somewhat viscid, sometimes hygrophanous, frequently dry. It is rarely striate on the margin. The color is usually ochraceous or of dark shades of fuscous, brown, etc. The surface is glabrous in two sections, (Gymnolae and Phaeotae), flocculose, scaly or silky in the other (Lepidotae). The GILLS are adnate or adnexed, never decurrent, often broad or ventricose. Most of them have differentiated sterile cells on the edge, which gives a paler or white distinctness. A more careful study of the color in the young stage may make it possible to separate species with greater ease. The STEM is often toughish, when dry somewhat cartilaginous. It is short as compared with the species of Galera, except in a few forms growing on sphagnum or dung. The CORTINA is entirely lacking in the first section, slightly developed in the second and third. It is probable that a universal veil is present in some of the species of the third group.

The species of Naucoria are rather numerous and seem to occur over the whole world. Only a comparatively small number are here described, and a careful study needs to be made of many others found in the State. Fries includes 48 species from Europe in his Hymen. Europ. Peck has described 19 from this country. These species all need microscopic study.

Key to the Species

(A) Growing in grassy places or pastures.
(a) Pileus dark watery brown when moist; hygrophanous. 548. *N. tabacina* Fr.
(aa) Pileus yellowish or ochraceous.
(b) Pileus dry, slightly tomentose or silky on margin. 547. *N. pediades* Fr.
(bb) Pileus more or less viscid.
(c) Stem compressed; gills yellowish at first, some spores angular. 546. *N. platysperma* Pk.
(cc) Stem terete; gills pallid at first; spores never angular. 545. *N. semiorbicularis* Fr.
(AA) Growing in the woods and thickets, on ground, mosses, decayed wood, etc.
(a) Pileus scaly, dark reddish-brown. 549. *N. siparia* Fr.
(aa) Pileus glabrous; on wood.
(b) Pileus 2-4 cm. broad, dark-fuscous, with a separable pellicle. 539. *N. nimbosa* Fr. var.
(bb) Pileus not over 2.5 cm., without a pellicle.
(c) Pileus with marked olivaceous tints. 540. *N. centuncula* Fr.
(cc) Pileus without olivaceous tints.
(d) Pileus with a conical umbo, minute.
(e) Pileus hygrophanous, watery-cinnamon (moist); gills narrow. 543. *N. lignicola* Pk.
(ee) Pileus dark reddish-brown; gills ventricose. 542. *N. triscopoda* Fr.
(dd) Pileus hemispherical or convex.
(e) Pileus cinnamon-brown; gills broad; stem short. 541. *N. horizontalis* Fr.
(ee) Pileus and stem reddish-fulvous or darker, gills yellow; spores minute. 544. *N. bellula* Pk.

Section I. Gymnotae. Pileus; veil none. Spores rusty in mass. (The following species grow on decayed wood.)

**Pileus with a separable pellicle.*

539. Naucoria nimbosa Fr. var.

Hymen. Europ., 1885.

PILEUS 24 cm. broad, *convex*, firm, obtuse or subumbonate, even, *dark-fuscous with a rufescent center*, almost blackish-fuscous, wood-brown when dry, *with a subgelatinous separable pellicle*, not viscid, glabrous, subpruinate when dry, veil none. FLESH concolor, pallid when dry, rather thin but compact. GILLS rounded behind, narrowly adnate, medium broad, *crowded*, thickish, fuscous-brown, edge white-fimbriate. STEM 24 cm. long, 34 mm. thick, stuffed then hollow, equal, straight or curved, *densely white-flocculose above*, fibrillose or fibrillose scaly below, striate, *pallid to fuscous-brown*, dark brown within, *rigid-elastic*, white-mycelioid at base. SPORES 6-7 x 3.5-4.5 micr., elliptical, smooth, rusty-brown. CYSTIDIA scattered on sides of gills, abundant on edge, 35-45 x 10-12 micr., obtuse, ventricose, stout. ODOR none. TASTE sometimes unpleasant, astringent.

On decaying logs or debris in hemlock woods; gregarious. Bay View, New Richmond. September. Infrequent.

This species seems to be intermediate between *N. nimbosa* and *N. cidaris* Fr. It differs from the latter in its flocculose stem and from both in its habitat. The plant is quite well marked by its dark colors, the separable pellicle, firm texture and flocculose stem. The pellicle is composed of erect, clavate cells with fuscous-brown content, and gives to the surface of the cap a gelatinous feel, but is scarcely at all viscid in wet weather. The spores are not genuinely rusty as in the other forms of this section.

***Pileus without a separable pellicle.*

540. Naucoria centuncula Fr.

Syst. Myc., 1821.

Illustration: Cooke, Ill., Pl. 601.

"PILEUS 1.5-2.5 cm. broad, convex-expanded, then plane, obtuse, subundulate, hygrophanous, *sooty-olive to brown-olive and delicately striate when moist*, fading to yellowish, dull, silky under lens, margin at first with sulphur-yellow dust. FLESH submembranaceous, concolor. GILLS rounded behind, adnate, *thickish, broad*, crowded, yellow-gray to olive-brown, *edge crenulate with yellowish-green flecks*. Stem 2-3 cm. long, 2-3 mm. thick, often eccentric, equal, *curved*, hollow, sometimes compressed, paler olive, white-mealy above, white-mycelioid at base. SPORES almost kidney-shaped, 6-7 x 4 micr., smooth, rusty-brown. CYSTIDIA 30-36 x 4-6 micr. ODOR mild."

On decayed wood, in frondose woods. Ann Arbor, New Richmond. July-September.

Usually small and known from all others by the olivaceous coloring of the pileus and gills. The description is adapted from Ricken.

541. Naucoria horizontalis Fr.

Epicrisis, 1836-38.

Illustration: Cooke, Ill., Pl. 601.

"PILEUS .5-1 cm. broad, *hemispherical*, at length depressed, dry, *cinnamon-brown*, even or wrinkled. FLESH relatively thick. GILLS adnexed, *thickish, broad*, close to subdistant, cinnamon-brown, edge white-fimbriate. STEM short and curved, 1 cm. long, 1 mm. thick, brown. naked, base white-mycelioid. Spores somewhat almond-shaped, 14-18 x 6-7 micr., smooth. CYSTIDIA on edge of gills, fusiform, 50-60 x 8-10 mm.

On bark of standing trees (like *Mycena corticola*). Not found with certainty in the State. The description is adapted from Ricken.

542. Naucoria triscopoda Fr.

Monographia, 1863.

Illustrations: Fries, Icones, Pl. 124, Fig. 3.
Cooke, Ill., Pl. 458.

PILEUS 3-10 mm. broad, small, *at first conical*, then campanulate *with a marked acute umbo*, striatulate to the umbo, *chestnut-brown to rufous-brown*, glabrous. FLESH *submembranaceous*. GILLS adnate, ascending, thickish, ventricose, close, ochraceous-cinnamon then darker, edge white-fimbriate. STEM 2-3 cm. long, 1 mm. thick, *slender, reddish-brown*, darker below, glabrous, hollow, apex pruinose, innately silky. SPORES minute, 6-7 x 3-4 micr., rusty-brown, smooth. CYSTIDIA none. STERILE CELLS on edge of gills, slender, subcylindrical, about 35 micr. long.

On much decayed wood in mixed forests of beech and hemlock. Bay View, New Richmond. September. Infrequent.

A dainty little plant, well-marked by its shape and color. The descriptions omit the striations of the pileus, but they are well shown in Fries' excellent figures. Ricken has referred it to the genus Galera but without explanation. This is the plant referred to in the list of the 8th Rep. Mich. Acad. Sci., p. 35, under *N. cuspidata* Pk. (in ed.) which Peck never published. It is clearly Fries' species.

543. Naucoria lignicola Pk.

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

PILEUS 5-20 mm. broad, convex-campanulate, markedly umbonate when young, at length expanded and depressed around the small umbo, *hygrophanous*, *watery-cinnamon* and *striatulate* when moist, dull ochraceous when dry, glabrous. FLESH thin. GILLS adnate, seceding, plane, close to subdistant, *narrow*, cinnamon-brown, edge concolor. STEM 2-4 cm. long, 1 mm. thick, slender, toughish, equal, subfistulose, curved, glabrous or obscurely pruinate-fibrillose. SPORES

elliptic-ovate, inequilateral, 7-8 x 3-4 micr., smooth, rusty-brown. ODOR none. TASTE slightly farinaceous.

On decayed wood. Ann Arbor. July.

Differs from *N. triscopoda* by its hygrophanous, paler pileus and slightly longer spores.

544. Naucoria bellula Pk.

N. Y. State Mus. Rep. 26, 1874.

PILEUS 1-2.5 cm. broad, firm, moist, convex, obtuse, minutely flocculose or glabrous, even, bright watery-cinnamon to rusty-fulvous, pliant. FLESH rather thin, yellowish. GILLS adnate-seceding, sometimes emarginate with tooth, rather narrow, close to crowded, yellow then rusty-yellow and spotted. STEM 2-2.5 cm. long, 1-2 mm. thick, slender, equal, short, toughish-elastic, straight or curved, reddish-brown to rusty-bay, darker below, stuffed then hollow, fibrillose-scurfy at apex, sometimes scurfy throughout. SPORES minute, oval, 5-5.5 x 3 micr., smooth, ferruginous, staining; the gills. CYSTIDIA none. TASTE bitter. VEIL none.

On decayed coniferous wood in hemlock and pine woods, sub-caespitose or gregarious. September. Bay View, New Richmond.

A distinct plant of the conifer regions of the State. The whole plant has a tendency towards a fulvous-rusty more or less red color. The stem and gills become darker colored with age. The identification was made by Peck. It must not be confused with *Flammula limulata* Fr.

Section II. Phaeotae. Pileus glabrous. Spores and gills dull-colored, fuscous, cinnamon or ochraceous. Veil scarcely noticeable. (The following species grow on cultivated ground.)

545. Naucoria semiorbicularis Fr.

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 493.
Gillet, Champignons de France, No. 489.
Berkeley, Outlines, Pl. 9, Fig. 4.
Plate XCIX of this Report

PILEUS 1-3 cm. broad, *hemispherical-convex*, obtuse, somewhat viscid when moist, *fulvous-yellow*, darker on disk, ochraceous in age, *glabrous*, sometimes rimose, even, veil none. FLESH thin or thickish on disk, pallid. GILLS adnate, often seceding, *broad*, close, *pallid or alutaceous at first*, then rusty-brown, edge white-fimbriate. STEM 4-6 cm. long, 1-3 mm. thick, equal or slightly thickened toward base or apex, subrigid, toughish, *terete*, somewhat silky-shining, stuffed by a white pith, *ochraceous*, darker in age. SPORES elliptical-oval, 12-15 x 8-9 micr., smooth, rusty-brown in mass. CYSTIDIA on edge of gills ventricose flask-shaped, sometimes capitate, 25-35 x 9 micr. ODOR none. TASTE slightly disagreeable.

Gregarious or scattered. On lawns, roadsides and grassy pastures. Throughout the State. May-September. Common.

This species occurs on lawns with *Psilocybe foenisecii* and *Pholiota praecox*, during the warm and rainy weather in May and June, although it may be found throughout the season. Its hemispherical cap and rusty-brown spores distinguish it from similar species of the purple-brown-spored group. Its spores and size separate it from nearby species of Naucoria. *N. verracti* Fr. has been reported from Ohio. According to Ricken, this has spores measuring 12-17 x 8-12 micr. Its stem is said to be rough-fibrillose.

546. Naucoria platysperma Pk.

Torr. Bot. Club, Bull. 25, p. 324, 1898.

PILEUS 24.5 cm. broad, *convex* then subexpanded, slightly viscid when moist, *ochraceous*, somewhat darker when young, glabrous, fading, even, veil slight. FLESH white, thick on disk. GILLS adnate, broader behind, close, thin, *yellowish-ochre at first* then fuscous-cinnamon, edge pallid-fimbriate. STEM 3-5 cm. long, 2-4 mm. thick, tough, *hollow and usually compressed*, equal or tapering below, *ochraceous*, often striate above, slightly flocculose with whitish floccules. SPORES 13-15 x 7-10, elliptical, or *sometimes of various shapes, triangular, heart-shaped, lobed, etc*., fuscous-brown in mass. STERILE CELLS on edge of gills fusiform.

Gregarious. On dung-hills, pastured woods and grassy places. Bay View, Ann Arbor, New Richmond. May, June and September. Frequent during some seasons.

Characterized by the flattened or irregular spores which are present in each mount, although in small numbers. The size of the plant and its compressed stem are often good marks for its identification. Peck gives a greater width for the spores, but this is rare in our plants, which were referred to him and verified. The original description was made from California specimens.

547. Naucoria pediades Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., PI. 492.
Gillet, Champignons de France, No. 488.
Patouillard, Tab. Analyt., No. 346.
Hard, Mushrooms, Fig. 228, p. 282, 1908.

"PILEUS 2.5-6 cm. broad, campanulate-hemispherical, at length plane, obtuse, *dry, not shining*, fulvous-ochraceous then isabelline-yellow, *delicately tomentulose toward margin*, margin silky-floccose. FLESH pallid, slightly fleshy. GILLS broadly adnate, rounded behind, rather broad, close to subdistant, ventricose, *brownish-pallid at first*, at length sordid-brown. STEM 4-7 (or more) cm. long, 2-3 (or more) mm. thick, often twisted, unequal, *stuffed*, silky-fulvous, concolor or yellowish, *granular-flocculose*. SPORES oval, 10-12 x 6-7 micr., argillaceous-brown in mass. CYSTIDIA (on edge) ventricose-fusiform, 45-50 x 8-10

micr. ODOR subfarinaceous. TASTE sometimes nauseous."

Reported as common on lawns and roadsides by Longyear. Description adapted from Ricken.

548. Naucoria tabacina Fr.

Epicrisis, 1836-38.

Illustration: Cooke, Ill., Pl. 493.

PILEUS 6-18 mm. broad, convex, obtuse, *then almost plane*, glabrous, *hygrophanous*, even, *watery bay-fuscous* (moist), dull ochraceous-cinnamon (dry). FLESH concolor, thin. GILLS adnate-seceding, narrowed in front, rather broad behind, close, at length horizontal, alutaceous-brownish, edge white-flocculose. STEM 2-3 cm. long, 1-3 mm. thick, *tapering downward*, straight or curved, stuffed then hollow, toughish, *brownish-umber, fibrillose-floccose*. SPORES elliptic-ovate, 6-8 x 4-4.5 micr., smooth, fuscous-brown in mass. ODOR none. TASTE bitterish.

Caespitose or subcaespitose, on the ground in a cornfield, etc. Ann Arbor. June. Infrequent. Known by its dark colors and small spores. The gills often run down the stem by a line.

Section II. Lepidotae. Pileus flocculose or scaly. Veil manifest (universal). Spores rust-colored.

549. Naucoria siparia Fr.

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 480.
Patouillard, Tab. Analyt, No. 642.

PILEUS 5-15 mm. broad, broadly convex to plane, obtuse, moist, at first densely tomentose, *breaking up into illicit scales of fascicled tufts*, especially on disk, *dark reddish-brown*. FLESH soft, brownish-ochraceous. thin. GILLS adnate, *broad*, close to subdistant, ventricose, brownish-clay-color, edge white-flocculose. STEM 1-2 cm. long, 1-1.5 mm. thick, short, equal, stuffed, lower two-thirds *loosely floccose-fibrillose and reddish-brown*, apex glabrous and whitish. SPORES very variable in size and shape, 9-13 (few 15) x 5-6 (few 7) micr., inequilateral-elliptical, smooth, rusty-brown in mass. CYSTIDIA none. STERILE CELLS on edge of gills numerous, subcylindrical or narrowly clavate, about 40 x 8-9 micr. BASIDIA 4-spored, 27 x 6 micr. ODOR none.

Gregarious, on soil or moss in frondose woods, among debris. Ann Arbor. August.

Although this plant is said to usually inhabit the stalks of ferns, our specimens agree so closely with the descriptions that scarcely a doubt can be raised concerning their identity.

Crepidotus Fr.

(From the Greek, *krepis*, a slipper and *ous*, an ear.)

Ochre-brown to rusty-spored. Stem lateral, eccentric or none. Pileus dimidiate, eccentric or lateral, often at first resupinate. Veil lacking. SPORES sphoeroid or elliptical.

Putrescent, shelving or resupinate mushrooms, from 1 to 5 cm. broad, growing on decaying wood. They correspond to those Pleuroti of the white-spored group which have no veil.

The PILEUS is usually of a soft consistency and soon collapses; in some species it is firmer or tougher and a few have a gelatinous surface layer. The surface of some forms is tomentose or hairy, of others glabrous; when hygrophanous, they often become pruinose when dry. The hygrophanous species are usually striatulate on the margin of the pileus when moist, but become even when dry. The color of most species is white, dingy-white or yellowish, but *C. cinnabarinus* has a deep scarlet-red color. The GILLS radiate from the point of attachment of the pileus, where they either run down to a point or are abruptly rounded behind. They are often broad and soft and collapse when mature, but sometimes are very narrow and crowded; in age they become stained or spotted by the copious spores. The short STEM or tubercle-like point of attachment is usually somewhat tomentose or villose even in otherwise glabrous plants. The SPORES are an important means of diagnosis of the species of this genus, since a number of species have a very similar general appearance. Peck points out that European mycologists have neglected to give us careful measurements for the spores of their species. I have used the spore character in the keys, since it is the only reliable method of studying the group, and as the species are not as a rule used for food, the mycophagist will not need much attention. The spores in different species vary from brown to ferruginous and often stain the pilei when the latter grow in an imbricate fashion.

Fifteen species are reported from Michigan; all but two I have collected.

Key to the Species

(A) Spores elliptical or oval.
  (a) Pileus scarlet-red, substipitate. 555. *C. cinnabarinus* Pk.
  (aa) Pileus not red.
    (b) Pileus viscid, hygrophanous, sessile, white when dry. 550. *C. haerens* Pk.
    (bb) Pileus not viscid.
      (c) Pileus with a subgelatinous surface, sessile, glabrous. 551. *C. mollis* Fr.
      (cc) Pileus not gelatinous.
        (d) Pileus distinctly stipitate, minutely scaly, 4-8 mm. broad, tawny, tinged gray. 556. *C. sepiarius* Pk.
        (dd) Pileus sessile.
          (e) Pileus glabrous, whitish, resupinate. 552. *C. albidus* E. & E.
          (ee) Pileus not glabrous.
            (f) Pileus covered by a white villosity or tomentum.
              (g) Pileus 4-10 mm. broad; spores 7.5 micr. long. 553. *C. herbarum* Pk.
              (gg) Pileus 8-20 mm. broad; spores 9-10 micr. long. 554. *C. versutus* Pk.
            (ff) Pileus covered by a dense dark-colored tomentum when young.
              (g) Spores 8-10 x 5-6; pileus with a thin tawny tomentum, hygrophanous. 557. *C. fulvotomentosus* Pk.
              (gg) Spores 5-6 x 4-4.5; pileus with a rufous-brown tomentum, not hygrophanous. 558. *C. calolepis* Fr.
(AA) Spores spherical.
  (a) Pileus white or whitish.
    (b) Pileus subtomentose, densely villose at base; gills broad; spores 6-7 micr. 559. *C. putrigenus* B. & C.
    (bb) Pileus glabrous except at attachment.
      (c) Stipitate, stem 2-4 mm. long; pileus usually marginate behind. Spores 5-5.5 micr. 562. *C. stipitatus* sp. nov.

(cc) Not stipitate, i. e., pileus sessile.
(d) Gills narrow and decurrent; spores 4-5.5 micr. 561. *C. applanatus* Fr.
(dd) Gills broad, rounded behind; spores 5.5-7 micr. 560. *C. malachius* B. & C.
(aa) Pileus not white.
(b) Pileus flabelliform, narrowed to the base, ochraceous; gills concolor. Spores 4.5-5.5 micr., with a cavity on one side. 563. *C. crocophyllus* Berk.
(bb) Pileus dimidiate or subreniform, reddish-yellow, tomentose-scaly; spores 6 micr. 564. *C. dorsalis* Pk.

(*C. distans* Pk. has an *eccentric* stem; pileus small, 4-8 mm., *sulcate-striate*, pubescent and *tawny*, spores elliptical, 10-12 x 6-7.5 micr.; the gills are very distant. *C. latifolius* Pk. came from Ohio; pileus is sessile, 3-6 mm. broad, *hygrophanous*, white, almost glabrous; gills *very broad;* spores globose, 5-6 micr. *C. croceotinctus* Pk. has a pileus 1.5-2.5 cm. broad, *glabrous*, sessile, yellowish; gills whitish *becoming dull saffron-yellow;* spores short elliptical, 5-6 micr. long.)

550. Crepidotus hærens Pk.

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

PILEUS 1-5 cm. broad, rarely broader, sessile, flattened-convex, dimidiate, reniform, broadly cuneate, etc., *hygrophanous, viscid* from the thin but tough, gelatinous, separable cuticle, glabrous or slightly floccose-squamulose, obscurely striatulate when moist, watery-brown or tinged gray (moist) white or whitish (dry), white-villose at the base, margin at first inrolled. FLESH thin. GILLS close, narrow, radiating, whitish then brownish. SPORES broadly ovate-elliptical, obtusely pointed at ends, smooth, 7-9 x 5-6 micr., pale rusty-cinnamon in mass.

On decaying woods of deciduous trees. In Washtenaw County it was found in several localities, but not detected elsewhere. June-September. Infrequent.

This is our only truly viscid Crepidotus; *C. mollis* may become slightly so in very wet weather. Our plants average larger than those described by Peck, and the spores are slightly longer.

551. Crepidotus mollis Fr.

Syst. Mycol., 1821.

Illustrations: Swanton, Fungi, Pl. 40, Fig. 10-12, 1909.
Gillet, Champignons de France, No. 262.
Ricken, Blätterpilze, Plate 61, Fig. 1.
Cooke's Ill., Pl. 498.

PILEUS 1-5 cm. broad, rarely broader, sessile or subsessile, *soft*, obovate to reniform, soon plane *with a gelatinous cuticle* which gives it a gelatinous feel, sometimes subviscid, flaccid, *glabrous*, substriate on the margin, livid (moist) becoming ochraceous-whitish (dry). FLESH thin. GILLS *narrow, crowded*, decurrent, radiating, whitish then cinnamon. SPORES elliptical-ovate, sub-acute at one end, rounded at the other, smooth, 7-8.5 x 4-5 micr. ODOR and TASTE not noticeable.

Often imbricated, on decaying logs and limbs. New Richmond. September. Rare.

C. mollis differs from *C. haerens* in that the gills are more crowded and narrow, the spores are slightly smaller and the surface is not viscid as a rule, even when moist and fresh.

552. Crepidotus albidus E. & E.

Proceedings Amer. Acad. of Phila., 1894.

"PILEUS sessile, *resupinate at first*, whitish, *glabrous*, dry, margin incurved. GILLS thin, rather broad, pallid then yellowish-brown, radiating from a point. SPORES unequally elliptical, yellowish-brown, 5 x 3.5 micr. On bark of tilia, Ann Arbor."

This species has not been recognized, apparently, since it was described. It is included as a basis for further observation. It approaches *C. latifolius* but the spores are not spherical and the pileus is not hygrophanous. Specimens of the type material are in the University of Michigan herbarium. It is very close to the following.

553. Crepidotus herbarum Pk.

N. Y. State Mus. Rep. 26, 1874.

"PILEUS 3-10 mm. broad, sessile, resupinate, suborbicular, *clothed with a white, downy villosity*, incurved on the margin when young, sometimes becoming reflexed. GILLS rather narrow, sub-distant, radiating from a naked lateral or eccentric point, white, then subferruginous. SPORES elliptical, 6-7.5 x 3-4 micr."

On dead stems of herbs, decaying wood, etc., in woods. Throughout the State. June to November. Frequent.

This little species grades into the next, but the spores seem to be constant. The pileus is often only villose toward the base.

554. Crepidotus versutus Pk.

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

Illustrations: Atkinson, Mushrooms, Fig. 150, p. 160, 1900.
Hard, Mushrooms, Fig. 227, p. 280, 1908.

"PILEUS 8-20 mm. broad, at first resupinate, then reflexed, reniform or dimidiate, sessile, white, *clothed with a soft, downy or tomentose villosity*, incurved on the margin. GILLS rather broad, subdistant, rounded behind, radiating from a lateral or eccentric point, whitish then ferruginous. SPORES subelliptical, 9-10 x 6-7.5 micr."

On logs, decaying wood, etc., in woods. Throughout the State. June to October. Frequent.

The larger spores and size of pileus distinguish *C. versutus* from *C. herbarum*.

555. Crepidotus cinnabarinus Pk.

Torr. Bot. Club, Bull. 22, 1895.

PILEUS 5-10 mm. broad, subsessile to slightly stipitate, soon reflexed lateral, *scarlet* to cinnabar-red, villose-tomentose, glabrescent, even on the margin. GILLS rather broad, subdistant, sinuate behind, *scarlet on edge*, which is minutely fimbriate-crenulate. STEM short, 1-2 mm. long, or almost lacking, lateral, minutely red-dish-tomentose, continuous with the base of the pileus on the upper side. SPORES elliptical-oval, 7-9 x 4.5-5.5 micr., smooth, pointed at one end, slightly tinged reddish. BASIDIA 20-25 micr. long by 7-9 wide, with 1, 2 or 4 sterigmata.

On decaying bass-wood log, etc., in low moist woods, southeast of Ann Arbor. September-November. Rare.

This brilliant red but small species was rediscovered by the writer years after it was first collected, when it was sent to Peck from Ann Arbor by L. M. Johnson, then instructor in Botany in the University. All efforts to get a definite spore print failed, as my plants were collected November 12 and the spores matured slowly in the cold atmosphere. Under the microscope they had a slight tinge of red like that of the edge of the gills and pileus, and some uncertainty remains as to whether the form should not be referred to Claudopus. Quite a number of the spores were abnormal, and in one case one spore grew from the side of another which was the only one attached to that basidium. The *trama of the gills* is composed of narrow, parallel hyphae, 3 micr. thick, hyaline towards the pileus but filled with a red homogeneous substance toward the edge of the gills, where the hyphae terminate in inflated, *sterile*, oval or elliptical *large cells;* this coloring matter gradually breaks up into refractive red globules. The *trama of the pileus* is hyaline toward the gills, composed of interwoven narrow, long hyphae, about 6 micr. thick, which become narrower toward the surface of the pileus and are filled with the red coloring matter, finally ending in tufts or fibrils which stand out from the surface and are intensely scarlet-red.

556. Crepidotus sepiarius Pk.

Torr. Bot. Club, Bull. 25, 1898.

"PILEUS 4-8 mm. long, convex, subumbilicate, even, very minutely scaly, *grayish-tawny*. GILLS adnexed, minutely crenulate on edge, tawny. STEM short, 2-4 mm. long, curved, *generally eccentric*, rarely central, brownish, sometimes mealy or pulverulent. SPORES broadly elliptical, 9-10 x 6 micr., nucleate.

On oak rails. Michigan Agricultural College grounds. Leg. Prof. W. J. Beal. January.

The grayish tint of the pileus is due to the minute, grayish floccose squammules." When central-stemmed the species might be mistaken for a Naucoria. I have not collected it.

557. Crepidotus fulvotomentosus Pk.

N. Y. State Mus. Rep. 26, 1874.

PILEUS 1-5 cm. broad, scattered or gregarious, suborbicular at first then reniform or dimidiate, sessile or attached by a short, villose tubercle, *hygrophanous*, densely tawny tomentose when young, *tomentum breaking up into small, tawny scales as pileus expands*, i. e., variegated, ochraceous beneath the tomentum, margin at first incurved. FLESH firm, thin. GILLS medium close, broad, subventricose, radiating from the tubercle, rusty-tan color, *white-fimbriate on edge*. SPORES elliptical-ovate, inequilateral or with a depression on one side, 8-10 x 5-6 micr., rusty-ochraceous.

Gregarious. On decaying wood, logs, etc., of frondose trees. Throughout the State. Recorded from June 9 to October 12. Common.

This differs from *C. calolepis*, if my motion is correct, by its spores and the tinge of red in the color of the pileus. It is very close to *C. calolepis*, but if the spores are constant must be kept separate. Both are distinguished from other species by the dense tomentum when young, which breaks up into separate but small hairy scales. Both are rather persistent and may remain on logs in a dry condition for quite a time. Peck says the cuticle of *C. fulvotomentosus* is separable. It sometimes forms large colonies with pilei of all sizes.

558. Crepidotus calolepis Fr.

Vet. Ak. Förhandl., 1873 (Hymen. Europ. 1874).

Illustrations: Fries, Icones, Pl. 129, Fig. 4.
Cooke, Ill., Pl. 499.

PILEUS 1-2 cm. broad, suborbicular when young, convex, twice as wide as long, sessile or attached by a white villose tubercle, reniform or dimidiate, *not hygrophanous nor gelatinous*, covered by a dense *reddish-brown* tomentum when young, breaking up into rufous scales on expanding, margin at first incurved. FLESH firm, thin. GILLS radiating from the obsolete stem, those in the center not always reaching the inner point of the radius, medium close, *broad*, rusty ochraceous at length, edge minutely, white villose. SPORES *oval*, 5-6 x 4-5 micr., smooth, fuscous-brown in mass.

On dead .branches of basswood. Houghton. July. Infrequent or rare.

Differs from the preceding in the character of the tomentum, scales and spores. It was at first considered undescribed, as no spore-measurements were found in European descriptions. The spores of this and the preceding species are certainly distinct and they must be kept separate. The plants found were smaller than is usual for *C. fulvotomentosus*.

559. Crepidotus putrigenus B. & C.

Annals Sat. Hist., 1859.

PILEUS 3-9 cm. broad, sessile, dimidiate or subreniform, convex to conchate or subexpanded, *densely short villose-tomentose*, lustre *dull, whitish or yellowish-white*, moist or watery, even on margin when dry, margin incurved. FLESH thickish behind, white (dry) under the somewhat separable pellicle. GILLS *close, broad* (width 4-5 times the thickness of the flesh), radiating from the villose basal tubercle, narrowed in front, rounded-adnate behind, becoming crisped on drying, *edge entire*. SPORES *spherical*, smooth, about 6 micr. diam. rusty-fuscous. BASIDIA 4-spored. CYSTIDIA none. ODOR rather disagreeable. TASTE tardily somewhat nauseous.

Gregarious or imbricate on decaying logs, stumps, etc., of mixed woods. South Haven and New Richmond. July to September. Infrequent.

Whether this species is a mere form of *C. malachius* is hard to determine. The spores are alike, but in our plants the pileus averaged a large size (for a Crepidotus) and its surface was villose throughout, the villosity becoming denser at the .base; this may be the result of luxuriant development. All my collections of *C. malachius* average smaller, and the pileus is glabrous except the base. The gills are somewhat closer than in *C. malachius*, and I am not certain that the pileus is truly hygrophanous. It would seem that the villose, non-hygrophanous, large pileus with margin not striate (dry) and the closer gills separate it.

560. Crepidotus malachius B. & C.

Annals Nat. Hist., 1859.

Illustrations: Peck, N. Y. State Mus. Bull. 122, Report for 1907, Pl. 112, Fig. 1-4.
Conn. Survey, Bull. 3, Pl. 22, p. 43.

PILEUS 1-4 cm. broad, convex to plane, varying subreniform, cuneiform or flabelliform, often depressed behind, *sessile or with a very short, white, tomentose stem*, hygrophanous, watery in wet weather, *glabrous* except above attachment, watery-white, *grayish-white or hoary, striatulate on margin* (dry) as well as at first, surface with a slight gelatinous feel. FLESH firm at first, becoming soft. GILLS almost close, *broad, rounded or abruptly narrowed behind* but reaching the stem-like base, ventricose, thin, whitish then tinged flesh color, finally rusty-brown. SPORES spherical, smooth, 6-7 micr. diam., rusty-brown.

Var. *plicatilis* Pk. has a deeply striate pileus. Found at Bay View.

On decaying wood of frondose trees. Throughout the State. June to November. Common.

The smaller size, presence of striations on the margin of the pileus even when dried, the glabrous surface of the pileus and its tinge of gray, for the most part distinguish this species from the preceding. From *C. applanatus* it is easily separated by the gills, which in the latter species are very narrow toward the base and run together almost in lines.

561. Crepidotus applanatus Fr.

Epicrisis, 1836.

PILEUS 1-3 cm. broad, variable in shape, suborbicular, reniform, cuneiform or spatulate, convex, soon plane, often depressed behind, sessile or with a short, compressed, white, tomentose base, *glabrous, hygrophanous*, watery-white and striatulate on the margin when moist, white when dry. GILLS *very narrow, decurrent, crowded*, white then cinnamon. SPORES globose, 5-6 micr. diam., smooth.

Gregarious on decayed wood, logs, stumps, etc. Ann Arbor, New Richmond. September. Infrequently found.

Known from the other species by its crowded, narrow gills which taper almost to lines where they reach the stem. The pileus becomes convolute on drying and often retains its striations on the thin margin. It has not been found in the State very often, but is probably widely distributed. Ricken interprets it differently, assigning to it elliptical spores.

562. Crepidotus stipitatus sp. nov.

PILEUS 1-3 cm. broad, *convex*, suborbicular to reniform, *hygrophanous, glabrous*, watery-white to white, *stipitate*, faintly striatulate on the margin when moist, silky when dry, margin decurved. FLESH white, firm, rather thick behind, thin in front. GILLS somewhat close, rather broad, broadest behind, narrow in front, white then pale ochraceous-brown, edge entire. STEM distinct, 2-4 mm. long, *eccentric to nearly lateral*, 1-1.5 mm. thick, equal, white, pruinose, villose at base, somewhat prolonged to the gills. SPORES spherical, 5-6 micr. diam., smooth, pale ochraceous-brown. ODOR and TASTE not noticeable.

Gregarious, on very rotten wood. Low swampy woods. Ann Arbor. September. Found but once.

The texture is rather firm; the stipitate character separates it from *C. malachius*, and the globose spores from *C. sepiarius*. The pileus is marginate behind and with a minute, floccose "tuft on the side of the stem. *C. tiliophila* Pk. and *C. haustellaris* Fr. are also said to have a short stem, but the pilei of these are brown or alutaceous and their spores are elliptical.

563. Crepidotus crocophyllus Berk.

Dec. Hooker's Jour., 1856.

PILEUS 1-3 cm. broad, reniform to flabelliform, *convex*, slightly lobed, narrowed into a stem-like base, delicately hairy or glabrous in front, *basal half covered with a dense cottony white tomentum*, watery-ochraceous when moist, *becoming pale chrome when drying*, even on margin. GILLS rather broad, close, thickish, converging at the very base, ochraceous-buff, becoming rusty-ochraceous from the spores. SPORES spherical,

4.5-5.5 micr., *with a depression or cavity on one side*, ochraceous under the microscope.

Scattered on decaying beech log. Bay View. September. Rare.

Originally collected at Waynesville, Ohio, in 1844 by Thomas G. Lea, and named by Berkeley, along with a list of other fungi sent to him by the same collector. (See Cinn. Soc. of Nat. Hist., Vol. 5, 1882, p. 199.)

Our plant was at first referred to *C. ralfsii* B. & Br., but it is much more like Lea's plant. The ground color of the pileus and gills is yellow to ochraceous, and the peculiar spores add a definite distinguishing character. It is close to *C. dorsalis*.

564. Crepidotus dorsalis Pk.

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

PILEUS 1-3 cm. broad, convex, sessile, at first suborbicular, then reniform, or dimidiate, *reddish-yellow to tawny-yellow when fresh*, fading to grayish-brown, *adorned with small, tawny, fibrillose scales*, scarcely striate on the margin, which is decurved. FLESH pliant, thin. GILLS close, rather broad, slightly ventricose, rounded behind, *yellow at first*, becoming ochraceous-fuscous then rusty, radiating from the villose point at the attachment of the pileus. SPORES spherical, 6 micr. diam., smooth, nucleate.

On decaying logs and rotten wood, in low swamps. Ann Arbor, New Richmond. July to September. Infrequent.

The color of the pileus varies from a strong tinge of red in some specimens to no red in others. At times the species may be easily taken for small forms of *Claudopus nidulans*, as the coloring is somewhat similar. The young growing specimens are entirely tomentose-squamulose, forming a variegated surface when the pileus is expanded. The perfectly globular spores as well as the absence of a white tomentum on the basal part of the pileus separate it from *C. crocophyllus*. It is probably found throughout the State.

RHODOSPOREAE

Volvaria Fr.

(From the Latin, *Volva*, a wrapper.)

Pink-spored. Stem provided at its base with a *volva* which is formed from a discrete *universal veil; without an annulus;* stem *separable* from the pileus. Gills *free*, ventricose, rounded behind.

Terrestrial or lignicolous. With the exception of *V. bombycina* and *V. speciosa*, the species are small and rather rare. They correspond to Amanitopsis of the white-spored group, and differ from all the pink-spored, except Chamaeota, in the free gills, the volva, and the separable stem. *V. bombycina* is known to be edible; the others are mostly poisonous.

The PILEUS is soft in texture, corresponding in this respect with the Amanitas. Its surface may be glabrous or beautifully silky, in a few species viscid, margin even or striate. Most of them have a whitish pileus, but a few vary to grayish or brown. The GILLS are broad, ventricose, do not reach the stem, and are soft as in Amanita. The STEM is glabrous, silky or villose, some covered with minute spreading hairs; there is no distinct cortex, but a few species are said to be partly hollow. We need more accurate information concerning the interior stem-structure of the rarer species. The VOLVA is membranous and persists at the base of the stem; in all our species, except one, it splits apically and leaves no shreds on the pileus, showing the splitting in the form of lobes which are often quite constant for a particular species. There is never any ANNULUS. The SPORES are rounded, i. e., not angular, smooth, rose-colored, sometimes nucleate. CYSTIDIA are present in *V. volvacea* Fr., *V. pusilla* Fr., *V. murinella* Quel. and *V. speciosa* Fr. I have followed Patouillard's idea of the species of Europe.

Key to the Species

(a) On tree trunks, large; pileus very silky, white; volva large, firm, tough; spores 6-7 x 5 micr. 565. *V. bombycina* Fr.
(aa) On the ground, among grass, herbs, etc., in woods, on dung or manured places.
(b) Pileus viscid, grayish-white or smoky-gray; odor disagreeable; rather large.
(c) Pileus striate on margin, smoky-gray; gills flesh color, without cystidia. 567. *V. gloiocephala* D. C.
(cc) Pileus even on margin; gills rosy, cystidia present. 566. *V. speciosa* Fr.
(bb) Pileus only slightly viscid, or not at all.
(c) Pileus umbonate, striate; stem glabrous and solid. 568. *V. umbonata* Pk.
(cc) Pileus not markedly umbonate.
(d) Pileus 5-8 cm. broad, grayish-brown, blackish-brown on disk, streaked with black fibrils; spores small, elliptic-ovoid. *V. volvacea* Fr.
(dd) Pileus less than 5 cm. broad, whitish.
(e) Stem densely villose with minute spreading hairs; growing in woods. 569. *V. pubescentipes* Pk.; *V. plumulosus* Quel.
(ee) Stem glabrous, except at the very base.
(f) Pileus at length striate or rimulose on margin, white, dry.
(g) Spores subglobose, 7.5 micr. long; stem rather long, 3-4 cm., gills narrow. *V. striatula* Pk.
(gg) Spores truly elliptical, 6-8 x 4-5.5 micr.; stem 1-2 cm.; gills medium broad. 571. *V. pusilla* Fr.
(ff) Pileus not striate, 1-3 cm. broad, conico-campanulate, dry, silky, white or ashy-tinged; stem solid, pubescent; volva bilobed. 570. *V. hypopithys* Fr.

565. Volvaria bombycina Fr. (EDIBLE)

Syst. Mycol., 1821.

Illustrations: Atkinson, Mushrooms, Fig. 134, p. 141, 1900.
Hard, Mushrooms, Pl. 29, Fig. 191-3, 1908.
McIlvaine, American Fungi, Pl. 59, 1900.
Michael, Führer f. Pilzfreunde, Vol. III, No. 102.
Plate C of this Report.

PILEUS 5-20 cm. broad, globose-ovate at first, then campanulate or convex-expanded, obtuse, *white, very silky*, in age somewhat squamulose, even on margin, edge floccose. FLESH rather thin, white, soft. GILLS free, *remote*, broad, very *ventricose, crowded*, flesh color, edge eroded. STEM 8-20 cm. long, 1-1.5 cm. thick, solid, glabrous, tapering upward, usually curved, white, deeply inserted at the base into the *large, thick, loose* VOLVA, which splits at apex, and persists as an ample bag-like or cup-like sheath, sometimes entire, sometimes torn. SPORES oval to broadly elliptical, 6-8 x 5.5 micr., smooth, rosy in mass.

Solitary or few together on trunks of living trees or decayed wood, of maple, beech, elm, horse-chestnut, etc.; usually from a crack or wound. Throughout the State. July-September. Infrequent.

A noble mushroom, often ensconced on a tree trunk, out of reach, its perfect shape and silky dress evoking admiration from everyone. In the egg-stage it reminds one of the large Phalloids. Brought into the house at this stage, and placed in a drinking-glass with a moist cloth about its base, it will expand in all its perfection. It has not been shown as yet that it lives parasitically on the trees from which it grows. Once located, it may be looked for each succeeding year on the same spot. A maple tree on the campus of the University of Michigan is the home of one which fruits regularly every summer. It attains a considerable size. The species occurs throughout the world.

566. Volvaria speciosa Fr. (POISONOUS)

Syst. Mycol., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 640.
Ricken, Blätterpilze, Pl. 70, Fig. 1.
Cooke, Ill., Pl. 297.
Bresadola, Fungh. mang. e. vel., Pl. 44.
Gillet, Champignons de France, No. 714.

PILEUS 5-10 cm. or more broad, globose-ovate at first, then expanded to plane, subumbonate, *very viscid, glabrous, white* or tinged gray, margin *not striate*. FLESH thin, soft, putrescent. GILLS free, crowded, rather broad, *ventricose*, deep flesh-color or rosy. STEM 10-20 cm. long, 1-2 cm. thick, equal or nearly so, *at first villose*, glabrescent, base tomentose, white. VOLVA large, splitting apically, close-fitting, flaccid, edge torn. SPORES large, broadly-elliptical, smooth, variable in size, 12-18 x 8-10 micr. CYSTIDIA clavate, obtuse. ODOR strong and disagreeable at times, especially when old.

Solitary or gregarious. On manured ground, dung, rich leaf-mould in woods; often in rich cultivated fields. So far found in the southern half of the State only. May, June and July. Infrequent.

Atkinson says plants from Lansing, found in a potato patch, had the odor of rotting potatoes. Sometimes the *odor* is not evident, *especially when the plant is young*. Solitary specimens occur in low woods and are somewhat smaller, but in all cases the large, broad spores are characteristic and separate it from the next species. It is considered poisonous in Europe, but McClatchie, in California, reports it perfectly safe. Bresadola warns against confusing it with *Lepiota naucina* and *Palliota campestris*.

567. Volvaria gloiocephala Fr. (POISONOUS)

Syst. Mycol., 1821.

Illustration: Patouillard, Tab. Analyt., No. 224.
Bresadola, Fung. mang. e. vel., Pl. 45.
Gillett, Champignons de France, No. 711.
Ricken, Blätterpilze, Pl. 70, Fig. 2.
Cooke, Ill., Pl. 298.

PILEUS 5-10 cm. broad, ovate at first then campanulate-expanded to plane, obtuse, sometimes umbonate, glabrous, viscid to glutinous when moist, *smoky-gray to pearl-gray*, with a metallic luster when dry, margin striate. FLESH thin, fragile, white. GILLS free, rather close, broad toward front, narrowed behind, subventricose, edge concolor. STEM 8-15 cm. or more long, 1-2 cm. thick, tapering upward, solid, even, glabrous above, somewhat villose toward base. VOLVA thin, splitting apically or circularly, sometimes three-lobed, sometimes regular or lacerated on edge, adherent, externally tomentose. SPORES 11-13 x 6-7.5 micr., elliptical, smooth, flesh color. CYSTIDIA none. ODOR and TASTE disagreeable, quite strong.

Solitary. On decaying vegetation, old leaves, rotten wood, in low woods. August. Ann Arbor. Rare.

Except for the darker colors, smaller spores, striations on the pileus and lack of cystidia, this seems close to the preceding, and might perhaps be considered as a variety of it. The spores and colors in these two species are very variable and no doubt intermediate forms occur. Striations are never very satisfactory characters to separate species, although they are useful. The species is considered *very poisonous*, and if so, is easily confused with *V. speciosa*. The authors note that the volva breaks in a circular manner, sometimes leaving shreds on the pileus like some Amanitas. Atkinson has shown that in Amanita the volva of the same species may undergo the two different modes of breaking, and the same holds true of this form. Our plants did not show any shreds on the pileus, and the volva was angularly lobed. The pileus was not truly umbonate. It must not be confused with the gray form of *Amanitopsis vaginata.*

568. Volvaria umbonata Pk.

Torr. Bot. Club, Bull. 26, 1899.

"PILEUS 2-3 cm. broad, conico-campanulate or campanulate, then expanded and *furnished with a prominent umbo, white*, slightly viscid when moist, *silky when dry, strongly striate*. FLESH thin. GILLS free, remote, medium close, pale flesh color. STEM 5-6 cm. long, 4 mm. thick, *solid*, glabrous, white, slightly thickened below. VOLVA white, membranous, persistent, irregularly split into segments, forming a shallow cap. SPORES variable in size, broadly elliptical, nucleate, smooth, 5-7 x 4-5 micr.

"On lawns and grassy places."

The above is taken from Peck's and Lloyd's descriptions. Lloyd finds it in Ohio. It is probably to be found in our State if careful search be made.

569. Volvaria pubescentipes Pk.

N. Y. State Mus. Rep. 29, 1878 (*V. pubipes* in Sylloge).

Illustrations: Ibid., Pl. I, Fig. 1-3.

PILEUS 1-2 cm. broad, *dry, white*, obtuse, covered with adpressed, silky squamules, *not striate on margin*. GILLS free, remote, close, not very broad, white then flesh color, *edge persistently white-fimbriate*. STEM 2-4 cm. long, 1-2 mm. thick, usually slender, equal or subequal, *densely minutely villose* with spreading hairs, even, *white*. VOLVA white, membranous, subappressed, sometimes 3-lobed. SPORES suboval to broadly elliptical, smooth, 5-7 x 4-5 micr., pale flesh color.

(Dried: Buff to pale ochraceous-brown.)

Scattered. On the ground, among debris in hemlock and cedar swamps of northern Michigan, sparingly in frondose woods of the southern part. Marquette, Houghton, Bay View, New Richmond, Ann Arbor, etc. July-September. Frequent locally.

Slender, pure white, with minute hairs all over the stem. Its habitat in woods is a distinguishing character. Patouillard's figure of *V. plumulosus* Quel. of Europe (No. 333, Tab. Analyt.) is somewhat illustrative of our plant. I find the stem of *V. pubescentipes* of the woods always rather long and slender, and the cap and gills more narrow than in Patouillard's figure.

570. Volvaria hypopithys Fr.

Hymen. Europ., 1874.

PILEUS *conico*-campanulate, 6-15 mm. high, dry, *silky*, whitish, *even on margin*. FLESH thin. GILLS free, ascending, rather narrow, close, white then flesh-color, edge minutely crenulate. STEM 2-3 cm. long, 2-3 mm. thick, *solid*, equal, adpressed-silky, whitish. VOLVA vaginate, bilobed, tomentose externally, whitish. SPORES 5-7.5 x 3-4 micr., smooth, elliptical.

I have referred here a collection made by Messrs. Hill and Fischer of the Detroit Mycological Club, and given the description of their plant. It appears to lack the pubescent stem of the typical description, but its conical-shaped cap even at maturity seems to require its reference to this species or to a closely related one. The finders referred it to *V. murinella* because of the gray tinge of the pileus. Patouillard's figure, however, shows the pileus of that species expanded-plane and the plant smaller. Peck (in N. Y. State Bull. 54) reports *V. hypopithys* for New York, but without any notes. Our plant differs from *V. umbonata* Pk. in its pileus being even, not at all viscid, although the spores are the same. Further collections are necessary to determine its true place.

571. Volvaria pusilla Fr.

Syst. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 332 (as *V. parvula*).
Ricken, Blätterpilze, Pl. 70, Fig. 3.
Gillett, Champignons de France, No. 713 (as *V. parvula*).
Hard, Mushrooms, Fig. 195, p. 243, 1900.
Clements, Minn. Mushrooms, Fig. 31, p. 57, 1910.
Plate CI of this Report.

PILEUS 5-12 mm. broad, at first ovate then campanulate-convex, finally plane, *white*, silky-fibrillose, *dry*, even then rimose or striatulate on margin, obtuse or slightly depressed, rarely mammillate. FLESH thickish. on disk only, white. GILLS free, close to sub-distant, moderately broad, white then bright flesh color. STEM 1-2 cm. long, 1-3 mm. thick, white, equal, *glabrous, solid*, even. VOLVA split into 3 or 4 nearly equal lobes, firm, loose, white becoming sordid. SPORES elliptic-ovate, 6-8.5 x 4-5.5 micr., smooth, nucleate, incarnate in mass. CYSTIDIA scattered on sides and edge of gills, ventricose, very obtuse, 35-40 x 9-18 micr. ODOR none.

Solitary or scattered, under herbs in moist ground. Detroit, Ann Arbor. July-August. Rarely found.

This species is distinguished by its small size, white color, the regular, three to four-lobed volva and by its cystidia and spores. Dr. Fischer collected the Detroit specimens, from which Hard's figure was obtained; Dr. E. B. Mains found the Ann Arbor specimens of our photograph. It seems to be the same plant described by C. G. Lloyd in Mycological Notes, Vol. I, p. 9. Whether it is the true *V. pusilla* of Persoon remains an open question. Fries, in the Systema, does not mention the striations of the pileus, and in his later works includes the form under *V. parvula*, which he always describes with a dry cap. Ricken (Blätterpilze), however, says the cap is at first viscid, soon dry. Berkeley (Outlines) also speaks of the cap of *V. pusilla* as viscid and not striate. The stem is said to be somewhat stuffed to hollow, and hence our plant departs from Berkeley's also in this respect.

From the remarks of various authors it would seem that the species referred to *V. pusilla* by some and to *V. parvula* by others is an unusually variable plant, inasmuch as the pileus may be somewhat viscid or dry, even on the margin or striatulate, umbonate or plane, and the stem is either solid or with a narrow tubule. Careful study of the caps of our plants failed to reveal more than mere rudiments of a cuticle which could scarcely become viscid in wet weather. The stem was solid and practically homogeneous. There were no signs of striations on the pileus, although the expanded margin became slightly rivulose in age. The trama of the gills was convergent, composed of large, inflated cells. It remains for those who are lucky enough to find it often,

to note to what extent it may vary as to the contested points.

Chamæota Smith, W. G.

(From the Greek, *chamai*, on the ground. The old generic name Annularia is pre-occupied.)

Pink-spored. Stem *fleshy, separable* from the pileus, with a persistent or evanescent *annulus*. Gills free. Spores rounded. Terrestrial or lignicolus. Fleshy, putrescent, *rare* mushrooms, corresponding to Lepiota of the white-spored group. They differ from Volvaria in having an annulus but no volva. The annulus is derived from an *inner veil*, which is thin. The annulus is usually movable. About a dozen species are known throughout the world. The two following species seem to be the only ones known in the United States, and their discovery is due to the careful and acute observations of Mr. Bronson Barlow of Greenville, and Dr. O. E. Fischer of the Detroit Mycological Club.

572. Chamæota mammillata (Longyear) Murrill

Mich. Acad. of Sci. Rep. 3, 1902. (As Annularia.)

Illustration: Ibid, Pl. I, Fig. 4.

PILEUS 1-2 cm. broad, plane at maturity *with a prominent mammiform umbo at the center*, whitish, umbo lemon-yellow, surface minutely rough. FLESH very thin, soft. GILLS free, ventricose, broad, thin, close, 3 mm. broad, pale flesh color. STEM 3.5 cm. long, 1.5 mm, thick at apex, gradually enlarging toward base, glabrous above and silky below the ring. ANNULUS membranous, persistent, white. SPORES subglobose, smooth, 5-6 micr. diam., pale flesh color. CYSTIDIA fusiform, inflated in the middle, 50 x 20 micr.

Solitary. On decaying logs in woods. Greenville. July. Rare. Reported by Longyear, collected by Mr. Barlow.

The type material is in the herbarium of Michigan Agricultural College, East Lansing.

573. Chamæota sphærospora (Pk.)

Torr. Bot. Club, Bull. 33, p. 216, 1900. (As Annularia.)

Illustrations: Plates VI, CII of this Report.

PILEUS 3-6 cm. broad, conic or subcampanulate, becoming expaneled, umbonate, silky-fibrillose, yellow, fading to whitish in part, *umbo brownish*. FLESH thin. GILLS free, close, thin, whitish or cream-colored when young, flesh-color when mature, moderately broad, *edge white-fimbriate*; trama of .parallel hyphae. STEM 3-8 cm. long, 4-8 mm. thick, equal or tapering upward, *solid*, fibrous, substriate, whitish. ANNULUS white, median or below the middle. SPORES globose or subglobose, 5-6 micr. diam., smooth, non-apiculate, dull flesh-color. BASIDIA 4-spored, at maturity projecting beyond the younger hymenium, about 25 x 8-9 micr. CYSTIDIA none, except on edge, which is densely covered by slender stalked long cells, enlarged at apex.

Subcaespitose. On rotten wood of elm trunk. Detroit. Collected by Dr. Fischer. August. Rare. Cotype in the University of Michigan herbarium.

Described by Dr. Peck from material collected near Detroit by O. E. Fischer. It has been suggested that it is identical with *C. fenzlii* Fr., illustrated as follows:

Kalchbrenner and Schulzer, Icones, Hymen Hung., Pl. 10, Fig. 1.
Gillet, Champignons de France, No. 30.
Engler and Prantl. I, 1** Fig. 121. B. p. 258.

In some respects it certainly has similar characters, but Gillet, who gives a full description, says the spores are "large" and his figures confirm this if we compare them with those in which he shows small spores of other species. Unfortunately neither Gillet nor any one else appears to have recorded the spore-measurements of *C. fenzlii*. Furthermore, the latter species is described as smaller, the annulus and stem yellow, or yellowish, the former evanescent. Gillet says the stem of *C. fenzlii* is at first solid then hollow. Further information concerning the variation of our plant is necessary before it can be reduced to synonymy. It seems to be a very rare plant and is only recorded from the one locality.