187. Coprinus ovatus Fr. (Edible)

Fries, Epicr., p. 242.

Illustrations: Schaeffer, Icon., Tab. 7.
Cooke, Ill., Pl. 659.

PILEUS about 5 cm. across when expanded, at first ovate and covered with an even pale ochraceous cuticle, which becomes broken into large concentric scales, the apical portion remaining intact like a cap, margin striate. FLESH, thin, white. GILLS about 4 mm. broad, free, distant from the stem, whitish then black. STEM 6-10 cm. long, 10 mm. thick, attenuated upwards, flocculose or fibrillose, white, hollow, the lower portion bulbous, solid, rooting, ring evanescent. SPORES smoky black, 11-12 x 7-8 micr.

This plant, which is often considered as a smaller form of *Coprinus comatus* Fr., was found but once growing upon a lawn at Palmyra, Mich. It differs from *Coprinus comatus* Fr. in that it has a smaller ovate pileus and smaller spores. In the specimens found the pileus was about 3 cm. high and the spores 11-13 x 7 mm. But for its much smaller spores the plant might easily be taken for a form of *Coprinus sterquilinus* growing in soil. In shape and color the spores of *Coprinus comatus, C. ovatus* and *C. sterquilinus* are very similar. In size, however, there is much variation, the measurements running from 11 microns in *C. ovatus* to 26 microns in *C. sterquilinus.*

188. Coprinus sterquilinus Fr. (Edible)

Fries, Epicr., p. 242.

Illustrations: Patouillard, Tab. Analyt., No. 437.
Gillet, Champignons de France, Pl. 130 (as *C. oblectus* Fr.).
Cooke, Ill., Pl. 660.
Murrill, Mycologia, Vol. 3, Pl. 49, Fig. 3.
Plate XXXII of this Report.

PILEUS 5-6 cm. broad when expanded, at first short cylindrical, conical then expanded, white tinged with brown or fuscous at disk, cuticle at first villous or silky, later torn into squarrose scales especially at disk. FLESH thin, white, sulcate half way to disk. GILLS free, white then purplish, soon becoming black. STEM 10-15 cm. high, slightly attenuated upward, subfibrillose, white slowly becoming discolored when bruised, often entirely black with spores,

hollow, base solid, thickened, peronate, the sheath or volva with a free margin. SPORES 18-25 micr., smoky black.

In old manure, straw, or in manured ground. June.

This plant has been reported as *Coprinus stenocoleus* Lindb. It is also *Coprinus macrosporus* Pk. When growing in manured ground, the volva is not as evident as when the plant grows in old manure or straw. From plates and descriptions it appears that this plant has also been called *Coprinus oblectus* Fr. In the herbarium of the New York Botanical Garden a specimen from Kew labeled *Coprinus oblectus* Fr. is very plainly *Coprinus sterquilinus* Fr. Moreover in a collection of many individuals, specimens may be picked out which fit the description of *C. sterquilinus, C. stenocoleus, C. oblectus* and *C. macrosporus* respectively. It is very probable that these names are all synonyms.

The plants are frequently found in June upon old manure which has been lying out in the open over winter or in heavily manured ground. The young unexpanded plants resemble rather small short specimens of *C. comatus* Fr. Undoubtedly *C. sterquilinus* Fr. is frequently taken for *C. comatus* or *C. ovatus.* In fact the writer has had typical specimens of *C. sterquilinus* pointed out to him by a mushroom collector as "the shaggy mane mushroom, very good to eat."

The gills sometimes remain perfectly white for several hours and then change rapidly through a purplish color to a smoky black. The flesh is thin and, as the pileus expands, it often becomes revolute and in bright sunshine it dries in this condition. Sometimes the stem becomes dark when bruised or when dried. Usually, however, it remains white unless it becomes covered with spores.

This mushroom is edible and has a more pronounced "mushroom" flavor than the ordinary Coprinus. McIlvaine says, "*Coprinus macrosporus* is an excellent species, higher in flavor than any other Coprinus."

Section II. Atramentarii. Ring imperfect, not volvate, squamules of pileus minute, innate.

189. Coprinus atramentarius Fr. (Edible)

Fries, Epicr., p. 243.

Illustrations: Cooke, Ill., Pl. 622.
Gillet, Champignons de France, No. 172.
Atkinson, Mushrooms, Fig. 39-42.
Hard, Mushrooms, Fig. 271-272.
Murrill, Mycolgia, Vol. 1, Pl. 3, Fig. 4.

PILEUS 5-8 cm. broad when expanded, ovate then expanded, firm, often lobed and plicate, grayish, silky fibrous, or minutely mealy, apex brownish, often minutely squamulose. FLESH thin. GILLS crowded, broad, ventricose, free, white then black, often with a purplish tinge. STEM 10-15 cm. high by 1-2 cm. thick, white, silky shining, hollow, ring basal, very evanescent. SPORES 11-12 x 5.5-6 micr. CYSTIDIA numerous, large, subcylindrical.

Common, gregarious or densely caespitose, about stumps or on rich soil, but not upon dung.

Both the smooth and the scaly, or squamulose, forms are found. These characters often seem to depend upon weather conditions, the smooth form being found under moist atmospheric conditions and the scaly form under dry atmospheric conditions.

Its close broad gills make it very thick and meaty in the unexpanded condition. For this reason some people consider this species the most desirable Coprinus for the table.

190. Coprinus insignis Pk.

Peck, N. Y. State Mus. Rep. 26, p. 60, 1874.

Illustration: Plate XXXIII of this Report.

PILEUS 5-7.5 cm. broad, ovate then campanulate, thin, sulcate-striate to the disk, grayish brown, glabrous or with a few innate fibrils, disk sometimes cracking into small areas or scales. GILLS free, ascending, crowded. STEM 10-14 cm. high, 10 mm. thick, hollow, slightly fibrillose, striate, white. SPORES 10 x 7 micr., rough.

About trees in woods.

This plant was found but twice in low woods at Ann Arbor. It resembles *C. atramentarius* in some respects but differs very decidedly in the distinctly warted spores.

Section III. Picacei. Universal veil flocculose, at first continuous, then torn into superficial areolate patches by the expansion of the pileus.

191. Coprinus quadrifidus Pk.

N. Y. State Mus. Rep. 50, p. 106, 1897.

Illustration: Plate XXXIV of this Report.

PILEUS 5-8 cm. broad, oval then campanulate, finally more or less expanded, thin, margin becoming revolute; covered at first with a floccose-tomentose veil, which soon breaks into evanescent flakes or scales and reveals the finely striate surface of the pileus; whitish, becoming gray or grayish brown with age; margin often wavy or irregular. GILLS broad, thin, crowded, free, at first whitish, then dark purplish brown, finally black. STEM 7-10 cm. long by 6-8 mm. thick, equal or slightly tapering upward, hollow, white, floccose-squamose, sometimes with an evanescent ring at the base. SPORES 7.5-10 x 4-5 micr.

Gregarious or caespitose upon or near decaying stumps or logs, growing from an abundant rhizomorph. Ann Arbor, Bay View.

Although nothing is said in the original description about the rhizomorph, some few strands may be seen at the base of the stem in some of the type specimens. The writer has found this plant growing in New York from richly developed rhizomorph upon the roots and trunk of dead basswood.

192. Coprinus ebulbosus Pk.

Bull. Torr. Bot. Cl. 22, 1895.

Illustrations: Hard, Mushrooms, Fig. 274.
Plates XXXV and XXXVI of this Report.

PILEUS 5-7 cm. broad, thin, campanulate, somewhat striate, grayish brown, margin at length revolute, lacerated, cuticle breaking into broad superficial persistent whitish scales. GILLS narrow, thin, crowded, free, slate-colored becoming black. STIPE 7-15 cm. long, 10-15 mm. thick, equal, hollow, white. SPORES 7.5-10 x 5 micr., elliptical.

Caespitose near or upon decaying trees or stumps.

193. Coprinus laniger Pk.

Bull. Torr. Bot. Cl. 22, 491, 1895.

Illustration: Plate XXXVII of this Report.

PILEUS 12-25 mm. broad, thin, conical or campanulate, pallid, tawny or grayish-ochraceous, sulcate-striate, covered with tawny, tomentose or floccose scales, which wholly or partly disappear. GILLS crowded, whitish, then brownish black. STEM 2.5 cm. long, 2-4 mm. thick, slightly thickened at base, hollow, white, pruinose. SPORES 7-10 x 4 micr., oblong-elliptical.

Caespitose or gregarious upon or near decaying wood. Unfortunately the type specimens of this species have been lost. The plants referred to this species are found growing from a more or less profusely developed yellow ozonium upon various kinds of decaying wood.

The three species *C. laniger, C. ebulbosus* and *C. quadrifidus,* seem to be distinct forms in a perplexing group of brown-spored wood-inhabiting Coprini, which are as yet very imperfectly known. *C. laniger* is smaller than either of the others and we have always found it associated with the fine strands of yellow ozonium. It resembles *C. radians,* but it has a thicker veil, which breaks into evident patches instead of minute particles as in *C. radians.*

C. quadrifidus and *C. ebulbosus* are not readily distinguished and may both prove to be the species which have been known as *C. flocculosus* (DC) Fr. or *C.* (*Agaricus*) *domesticus* Bolt.

Section IV. Tomentosi. Universal veil a loose villose web which becomes torn into distinct floccose scales.

194. Coprinus fimetarius Fr.

Fries, Epicr., p. 245.

Illustration: Plate XXXVIII of this Report.

PILEUS 2.5-5 cm. across, clavate then conico-expanded, soon split and revolute, grayish, apex tinged with brown, at first covered with white floccose scales, then naked, rimose-sulcate; disk even, flesh thin. GILLS free, lanceolate, becoming linear and wavy, very early becoming black with spores and rapidly deliquescing. STEM 12-15 cm. long, 4-6 mm. thick, hollow, thickened at the solid base, white, squamulose. SPORES 12-14 x 7-8 micr. CYSTIDIA large and numerous.

Solitary or in troops. Common upon dung heaps. The clavate caps already dark with spores may be found emerging late in the afternoon or in the evening. In the morning there will be little remaining except a small mass of inky fluid at the apices of the stems.

195. Coprinus fimetarius var. macrorhiza Fr.

Fries, Hym. Eur., p. 324.

Illustrations: Cooke, Ill., Pl. 670.
Massee, Ann. Bot., Vol. 10, Pl. X, Fig. 1.
Hard, Mushrooms, Fig. 275.
Gillet, Champignons de France, No. 178.

PILEUS at first with feathery squamules which become more or less squarrose, especially at the disk where they often form a crown. STEM short, villous, often sub-bulbous and with a more or less elongated base.

The type and this variety are very common, the latter being rather more frequently found than the former. In moist weather they may be found in almost any dung heap, a fresh troop appearing each evening and disappearing early the following day. There seems to be considerable variation in size, length of root and character of scales. In the typical form the root is usually reduced to a rather indefinite mass of hyphae, while the scales are more or less squarrose over the entire surface. In the variety the veil is more silky and closely appressed to the pileus, later becoming squarrose at the disk forming a crown of scales.

196. Coprinus tomentosus Fr.

Fries, Epicr., p. 246.

Illustration: Bulliard, t. 138.

PILEUS 2.5-4 cm. long, sub-membranaceous, cylindrical, narrowly conical, then expanding and splitting, striate, floccose-tomentose, pale gray, the floccose veil becoming torn into more or less persistent flakes or patches upon the expanded pileus. GILLS free, narrow. STEM 5-7 cm. long, 4-5 mm. thick, equal or slightly enlarged below, hollow, velvety, white or grayish. SPORES 12-13 x 7-8 micr., elliptical.

Solitary or gregarious upon dung or various kinds of debris. This is one of the earliest species of Coprinus to appear in the spring. The long cylindrical or narrowly conical pileus distinguishes this plant from the various forms of *C. fimetarius,* which usually appear a little later in the season.

This may be the *C. lagopus* of various authors.

197. Coprinus lagopides Karst.

Karsten, Hatts., 1, 535.

Illustrations: Massee, Ann. Bot., Vol. 10, Pl. 10, Figs. 20-22.

PILEUS 4-7 cm. broad, very thin, companulate, sulcate, grayish, disk livid, ornamented with free white scales joined by hairs. GILLS subcrowded, narrow, remote, black. STEM up to 17 cm. high, white, floccose, hollow, equal. SPORES 6-8 x 5-6 micr., apiculate. Upon very rotten wood in forest.

Found once at Bay View. We have found this plant in New York also.

198. Coprinus jonesii Pk.

Peck, Bull. Torr. Bot. Club 22, p. 206, 1895.

PILEUS 2.5-5 cm. broad, at first blunt, or truncate, becoming campanulate or broadly convex, submembranaceous, grayish, buff at apex, covered at first with white or tawny-cinereous floccose scales which wholly or partly disappear with age, striate, margin revolute and splitting. GILLS crowded, linear, free, whitish, becoming black. STEM 5-9 cm. long, 4-7 mm. thick, equal or slightly tapering upward, minutely floccose, hollow, white. SPORES 7.5-8.5 x 6 micr., broadly elliptical.

Fragile, sometimes caespitose. Found upon the wall in a cellar at Ann Arbor. Peck says "This species is closely related to *C. fimetarius* of which it might easily be considered a variety, but it is easily distinguished by the truncate apex of the young pileus, the differently colored pileus and smaller spores." It grew on what appeared like uncracked hard and dry plaster of the wall.

199. Coprinus arenatus Pk.

Peck, N. Y. State Mus. Rep. 46, p. 107, 1892.

PILEUS 2.5-5 cm. broad, thin, at first broadly ovate or subhemispherical, soon convex or campanulate, adorned with small white tomentose scales, striate on the margin, whitish or grayish-white, becoming grayish-brown with age, reddish brown in dried plant. GILLS crowded, broad, free, grayish-white, soon purplish-brown, finally black, furnished with numerous cystidia. STEM 2.5-5 cm. long, 2-4 mm. thick, equal, glabrous, hollow, white. SPORES 7.5-9 x 6-7.5 micr., broadly ovate or subglobose, purplish brown by transmitted light.

Solitary or gregarious in sandy soil, Ann Arbor. The mycelium binds the sand together in balls at the base of the stem.

200. Coprinus niveus Fr.

Fries, Epicr., p. 246.

Illustration: Cooke, Ill., Pl. 673 B.

PILEUS 1.5-2.5 cm. across, elliptical then campanulate and expanded, submembranaceous, almost persistently covered with snow-white floccose down. GILLS slightly attached, narrow, becoming blackish. STEM 4-8 cm. high, subequal or slightly attenuated upwards, villose, white, hollow. SPORES 16 x 11-13 micr.

This plant is frequently found upon dung heaps, street sweepings or in recently manured ground. Upon the pileus the veil is of a mealy nature but the tomentose character shows at the margin of the pileus and upon the stem. The spores are somewhat flattened, measuring 15-17 x 11 to 13 x 8-10 micr.

The plant referred to this species is *C. stercorarius* (Bull.) Fr. and has been distributed under that name in Sydow Mycotheca Marihoa, No. 2101.

201. Coprinus semilanatus Pk.

N. Y. State Mus. Rep. 24, p. 71, 1872.

Illustrations: N. Y. State Museum Report 24, Pl. 4, Fig. 15-18.

PILEUS 2-2.5 cm. broad, convex then expanded and revolute, sometimes split, submembranaceous, finely and obscurely rimose-

striate, farinaceo-atomaceous, white, then pale grayish-brown. GILLS narrow, close, free. STEM 10-15 cm. high, slightly tapering upward, fragile, hollow, white, the lower half clothed with loose cottony flocci which rub off easily, upper half smooth or slightly farinaceous. SPORES 12.5 micr., broadly elliptical. Rich ground and dung.

This plant is frequently found on cow dung in woods and shaded pastures. It resembles *C. niveus* Fr. but differs from it in its smaller size, free gills and constantly smaller spores. The spores in both species are broadly elliptical and somewhat flattened. This fungus grows readily from spores in laboratory cultures.

202. Coprinus domesticus Fr.

Fries, Epicr., p. 251.

Illustrations: Cooke, Ill., Pl. 684.
Gillet, Champignons de France, No. 176.
Plate XXXVIII of this Report.

PILEUS, 3-5 cm. across, thin, ovate, then campanulate, obtuse, furfuraceous, squamulose, pale grayish-white, disk brown or reddish brown, undulate, sulcate, splitting. GILLS adnexed, crowded, narrow at first, reddish white then blackish brown. STEM 5-7 cm. long, 4-6 mm. thick, slightly attenuated upwards, subsilky, white, hollow. SPORES 14-16 x 7-8 micr.

Usually caespitose, on various kinds of vegetable debris, sometimes in gardens where rubbish has been plowed under.

Section V. Micacei. Pileus at first covered with more or less micaceous squamules or granules, which soon wholly or partly disappear.

203. Coprinus micaceus Fr. (Edible)

Fries, Epicr., p. 247.

Illustrations: Cooke, Ill., Pl. 673.
Atkinson, Mushrooms, p. 44, Figs. 43, 44.
Murrill, Mycologia, Vol. 1, Pl. 3, Fig. 5.
Hard, Mushrooms, Fig. 273.
Plates XXXIX and XL of this Report.

PILEUS 4-6 cm. across, submembranaceous, elliptical then campanulate, coarsely striate, disk even, margin usually more or less repand, ochraceous-tan, disk darker, when young densely covered with minute glistening particles which usually soon disappear. GILLS sub-crowded, lanceolate, adnexed, whitish, then brown, finally nearly black. STEM 5-7 cm. long, 4-6 mm. thick, equal, even, hollow, silky white. SPORES 7-8 x 4-5 micr., dark brown in mass.

Very common, generally densely caespitose about stumps or trees, or growing from decaying wood buried in the earth. Under favorable conditions this Coprinus may be found from early spring until late autumn. It often appears at intervals of one to two weeks in the same place for a considerable length of time and it may be found year after year in the same place. It has a good flavor and is considered by many the best Coprinus for the table.

C. micaceus var. *conicus* Pk. (Not published.)

This variety differs from the type in having a distinctly conical pileus, darker colored, larger spores, 10-12 micr. long. It was found once at Palmyra, Michigan.

204. Coprinus radians (Desm) Fr.

Fries, Epicr., p. 248.

Illustrations: Cooke, Ill., Pl. 676 a.
Lloyd, Mycological Notes, Vol. 1, p. 146, Fig. 69.
Massee, Ann. Bot., Vol. 10, Pl. X, Figs. 6-8.

PILEUS 2-5 cm. across, ovate, conical or campanulate, yellowish-fulvous, soon becoming paler especially at the margin, striate to disk, covered with small brown granules which are more numerous at the disk. GILLS rather narrow, attached, pale then brownish black. STEM 3-6 cm. long, 2-3 mm. thick, equal or slightly swollen at base, hollow, white, smooth or minutely mealy at first, more or less evident yellow or white strands of mycelium radiating from the base. SPORES 7 x 4 micr., elliptical, brownish black.

Rather common, single or sub-caespitose, upon wood, rubbish, etc., or even in humus, sometimes growing from dense masses of yellow ozonium.

This is the plant illustrated by Lloyd and determined by Patouillard as *C. radians* (Desm.) Fr. It is also *C. pulchrifolius* Pk. It is possible also that it may be *C. granulosus* Clements. *C. radians*

as figured by Cooke and Massee always has yellowish brown mycelium radiating from the base of the stem. Saccardo, Syll., Vol. 5, p. 1092, says that in Italy this plant grows upon *Ozonium stuposum* Fr. The writer has sometimes found our plant growing from masses of yellow ozonium, upon decaying maple, black locust and black ash logs. It appeared once in our laboratory cultures upon mycelium which was white at first then gradually became yellowish brown. This is not the only Coprinus, however, which grows from a yellow ozonium. *C. radians* resembles *C. laniger* from which it may be separated by the much smaller scales upon the pileus.

VELIFORMES. Pileus very thin, plicate-sulcate, splitting along the lines of the gills. Plants usually small.

Section VII. Cyclodei. Stem with a movable ring. Plants small.

205. Coprinus bulbilosus Pat.

Patouillard, Tab. Anal. Fung., 60.

Illustrations: Ibid, Fig. 658.
Plate XL of this Report.

PILEUS 8-10 mm. across, convex, margin striate, at first incurved then expanding, gray, disk tinged yellow, covered with white meal. GILLS narrow, gray. STEM 2-3 cm. long, slender, white, base bulbous, ring loose, at some distance from base, white. SPORES 8-9 x 7-8 x 4 micr., compressed, oval to subglobose.

On horse dung. Readily grown in cultures from spores. Saccardo, Sylloge, says "spores angular." In our specimens the spores are slightly angular as seen in one plane.

Section VIII. Lanulati. Pileus covered with a downy or cottony layer which often has the appearance of a dense coat of soft mealy vesicles.

206. Coprinus stercorarius Fr.

Fries, Epicr., p. 251.

Illustration: Cooke, Ill., Pl. 685 A.

PILEUS 1-25 cm. high, ovate then companulate, sometimes expanded and rolling up at the margin, very thin, margin striate, densely covered with a white glistening meal. GILLS adnexed,

2-3 mm. broad, sub-ventricose. STEM 7-12 cm. long, at first ovately bulbous then elongated and equally attenuated upwards from the base, hollow, white, at first mealy. SPORES black, 6-8 x 3-4.5 micr.

The specimens referred to this species are smaller than the dimensions given in the description. Otherwise they agree with the description in the sense of Saccardo. Massee, British Fungus Flora, Vol. 1, p. 326, gives the spore measurements as 14-15 x 8-9.

Found but once upon cow dung in woods near Ann Arbor.

207. Coprinus sclerotigenus E. & E.

Ellis & Everhart, Microscope, 1890.

Illustrations: Microscope, 1890, Fig.
Massee, Ann. Bot., Vol. 10, Pl. XI, Figs. 26-28.
Plate XLI of this Report.

PILEUS .5-1.2 cm. high and broad, ovoid or ovoid-oblong, then campanulate (at first covered with a white mealy veil which later becomes dark and sometimes almost entirely disappears). STEM 2.5-10 cm. high, slender, subequal, usually straight above and more or less flexuous below where it is downy. GILLS adnexed. SPORES obliquely elliptical, 8-10 x 5-6 micr.

Springing from an irregularly subglobose, rugulose, sclerotium which is black outside, white inside. On sheep's dung.

Although nothing is said in the original description about a veil, the type specimens at the New York Botanical Garden still show some of the mealy white covering of the pileus. This plant was first found at Ann Arbor and later in other localities. It was always found growing from sclerotia in dung which had apparently been upon the ground for some time, often over winter. These sclerotia were repeatedly grown from spores in the laboratory and, after a certain amount of drying out, sporophores grew from the sclerotia. By alternately moistening and drying the sclerotia several crops of sporohores were produced. This plant may be identical with *C. tuberosus* Quel.

208. Coprinus narcoticus Fr.

Fries, Epicr., p. 250.

Illustrations: Cooke, Ill., Pl. 680 b.
Plate XLI of this Report.

PILEUS 1-2 cm. across, *foetid,* very thin, cylindric-clavate then expanded, at length revolute, covered at first with recurved, white floccose scales, then naked, grayish white, hyaline, striate. GILLS free but nearly reaching the stem, white then black. STEM 3-5 cm. long, 2 mm. thick, fragile, at first covered with white down, then almost glabrous, hollow. SPORES 11 x 5-6 micr., elliptical.

On dung, caespitose. ODOR strong and disagreeable. Not common.

209. Coprinus brassicæ Pk.

Peck, N. Y. State Museum Rep. 43, 1878.

Illustrations: Peck, N. Y. State Mus. Rep. 43, Pl. 2, Fig. 9-14.
Murrill, Mycologia, Vol. 4, Pl. 56, Fig. 4.

PILEUS 8-10 mm. broad, at first ovate or conical, then broadly convex, squamulose, finely striate to the disk, white becoming grayish-brown, membranaceous, margin generally splitting and becoming recurved. GILLS narrow, crowded, reaching the stipe, brown with a ferruginous tint. STEM 16-20 mm. long, slender, glabrous, hollow, slightly thickened at the base, white. SPORES 7.5 x 5 micr., elliptical, brown. On decaying stems of cabbage and other vegetable debris.

Occasional upon vegetable debris of various kinds. Palmyra, Ann Arbor. We have found this fungus upon corn stalks, weed stalks and dead grass.

It seems very probable that this is the plant figured and described as *C. tigrinellus,* Boudier, Table 139, and *C. friesii* Quel. (Patouillard, Pl. 446.)

Section IX. Furfurelli. Pileus with micaceous particles or mealy granules.

210. Coprinus patouillardi Quel.

Quelet, Assoc. Fr., 1884, p. 4.

Illustration: Plate XLII of this Report.

PILEUS 1-3 cm. broad, ovate, oblong, then conico-campanulate and finally revolute, at first finely striate then deeply plicate, very thin, white or ashy with pulverulent particles, yellowish to brown at the center. GILLS narrow, free but close to stem, white then smoky brown. STEM 2.5-5 cm. long, 1-2 mm. thick, fragile, smooth or slightly tomentose or pulverulent at base, white. SPORES 8-7 x 4.5 micr., ovate-triangular to pentagonal.

Common on dung, usually appearing with *C. radiatus* or a little later. There seems to be considerable variation in this plant both in regard to size and color. In young stages, especially in dry weather, the pileus is densely covered with dead white to gray particles, which gradually become brown as the pileus develops. The shape of the spore is characteristic and the variation in size less than in many other Coprini. In young stages it is readily distinguished from *C. radiatus* by its longer, more cylindrical shape and by its thicker white veil.

211. Coprinus radiatus Fr.

Fries, Epicr., p. 251.

Illustration: Cooke, Ill., Pl. 682 a.

PILEUS 2-15 mm. wide, at first ovate or short cylindrical, then campanulate, finally nearly or quite plane and slightly depressed at the center, very thin, deeply plicate; pileus with a few brown granular flecks or scales, slightly pruinose with a few gland-tipped hairs, pale brown or yellowish brown, darker at disk, becoming gray. GILLS narrow, distant, free. STEM 2-6 cm. high, 1.5 mm. thick, slender, fragile, hollow, white, becoming darker with age, slightly pruinose with glandular hairs. SPORES 10-13 x 8-10 micr., regularly elliptical, very dark.

Very common upon dung. This is probably our most common dung-inhabiting Coprinus. It may be found at almost any time during the summer season upon dung in pastures. If fresh horse

dung be placed in a damp chamber, troops of this fungus will appear within 10-14 days. Larger specimens appear at first; successive plants appear smaller and smaller until they are often only one or two millimeters in diameter and one or two centimeters high. Just as there is much variation in the size of the fungus there is wide variation in the size of the spores. Occasionally the specimens are found with small spores 7-10 x 5-8 micr., as given by Saccardo (Sylloge, Vol. 5, p. 1101). Usually, however, they average as large as given in our description. Specimens of this plant have been distributed in exsiccati under the name of *C. ephemerus* and *C. plicatilis*. The plant figured by Buller as *C. plicatiloides* (Researches in Fungi) is evidently *C. radiatus*.

Section X. Hemerobii. Pileus always glabrous or slightly pruinose with minute hairs. No universal veil. A few scurfy particles may be found by the breaking of the cuticle or trama when the pileus becomes plicate.

212. Coprinus ephemerus Fr.

Fries, Epicr., p. 252.

Illustrations: Cooke, Ill., Pl. 685 f.
Plates XLII and XLIII of this Report.

PILEUS 1-2 cm. across, ovate, then campanulate, finally expanded, often splitting and revolute, margin sometimes uneven, striate, plicate when expanded, very thin, disk even or slightly elevated. Yellowish brown to reddish bay at the disk, at first slightly pruinose with minute hairs. GILLS linear, slightly adnexed or barely reaching the stem, usually white at margin. STEM 3-6 cm. high, 1-2 mm. thick, equal or slightly tapering upward, hollow, white. SPORES 15-17 x 7-8 micr., black in mass.

Common upon dung or freshly manured ground.

In an examination of different exsiccati, we have found abundant evidence of the truth of Saccardo's statement that many different species have been confused under the name of *C. ephemerus*.

We have found well-marked specimens of *C. radiatus, C. plicatilis,* and *C. spraguei* all under the name of *C. ephemerus*. Even as we have limited this species, there are many distinct forms which may be readily distinguished. We have grown several of these varieties from spores and have found them to be constant and, even in young stages, the differences are often apparent to the naked eye. One

common form has shorter spores (11-13 micr.), which are distinctly angular when viewed in one plane. The deep bay disk and peculiar pruinose character of the plants make it possible to identify this form almost as soon as the buttons appear, see plates XLII, XLIII. A less common form resembles in the young stages very small specimens of *C. micaceus*. The spores are elliptical, 11-13 micr. long. We have grown another larger and lighter colored form with two-spored basidia.

213. Coprinus silvaticus Pk.

Peck, N. Y. State Mus. Rep. 24, p. 71, 1872.

Illustrations: Ibid, Pl. 4, Fig. 10-14.

PILEUS 12-30 mm. broad, convex, membranaceous, plicate-striate on margin, dark brown, disk very thin, fleshy. GILLS sub-distant, narrow, adnexed, brownish then black. STEM 5 cm. high, 1 mm. thick, slender, fragile, smooth, hollow, white. SPORES 12.5 micr. long, gibbous-ovate. On ground in woods.

This plant was found once at Ann Arbor and once at Bay View. The gibbous spores are very characteristic.

214. Coprinus boudieri Quel.

Quelet, Bull. Soc. Bot. Fr., 1877.
Peck, N. Y. State Mus. Rep. 26, p. 60, as *C. angulatus*.

Illustrations: Ibid, Tab. 5, Fig. 4.
Lloyd, Mycological Notes, Vol. I, Figs. 21-22, p. 47. (As *C. angulatus*.)

PILEUS 1-2.5 cm. broad, membranaceous, hemispherical, or convex, plicate-sulcate, reddish brown, smooth or minutely pruinose, disk smooth. GILLS subdistant, reaching the stem, whitish then black, the margins often remaining white. STEM 2.5-5 cm. long, 1-1.5 mm. thick, equal, smooth or sub-pruinose, white. SPORES 7-12 x 6-10 micr., compressed, *angular, key-stone shaped.*

Upon soil in woods. Rare.

The peculiar angular sub-ovate or key-stone shaped spores are very characteristic of this plant.

215. Coprinus plicatilis Fr.

Fries, Epicr., p. 252.

Illustrations: Cooke, Ill., Pl. 686 a.
Massee, Ann. Bot., Vol. 10, Pl. XI, Figs. 23-25, 1896.
Gillet, Champignons de France, No. 185.

PILEUS 1-2.5 cm. across, ovate-cylindrical, then campanulate, membranaceous, sulcate to disk, brown, then grayish; disk remaining darker, rather broad, becoming depressed. GILLS distant, narrow, *attached to a collar at some distance from the stem.* STEM 5-7 cm. long, 2 mm. thick, equal, white, smooth, hollow. SPORES 10-12 x 7.5 to 8.5 x 5-6 micr., compressed, broadly ovate.

Rather common among grass at roadsides, etc.

As in the case of *C. ephemerus* there has been considerable confusion of species under the name of *C. plicatilis.* We do not, however, find as much variation in this plant as in *C. ephemerus.*

Psathyrella Fr.

(From the Greek, diminutive of *Psathyra.*)

Black-spored. Gills at length uniformly dark-colored, *not deliquescing,* nor variegate-dotted. Pileus membranous, *striate or sulcate,* margin at first straight, not exceeding the gills. Stem slender, confluent. Veil inconspicuous.

Small, thin-capped mushrooms, growing on debris in woods, on the ground in low grassy places, in gardens, etc. With the exception of *P. disseminata,* the species are not well known. Peck has named twelve species found in the United States and a number of Friesian species are known to occur. The plants often have the appearance of the small, evanescent species of Coprinus, but the gills do not deliquesce. They differ from Panoeolus in the striate pileus, the non-variegated gills and the margin of pileus not exceeding the gills. I have definitely studied only two species.

216. Psathyrella disseminata Fr. (Edible)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 657.
Gillet, Champignons de France, No. 586.
Patouillard, Tab. Analyt., No. 351.
Atkinson, Mushrooms, Fig. 49, p. 48, 1900.
Ricken, Blätterpilze, Pl. 23, Fig. 4.
Hard, Mushrooms, Fig. 280, p. 347, 1908.

PILEUS 5-10 mm. broad, oval then campanulate, at first white, then gray or grayish-brown, *prominently sulcate-plicate* to the small buff umbo, at first covered by microscopic, erect, one-celled hairs, scurfy, glabrescent. FLESH membranous, very thin. GILLS adnate, ascending, rather broad, ventricose, sub-distant, at first white, then ashy and finally uniformly black. STEM slender, 2-3 cm. long, .5 to 1 mm. thick, hollow, *white,* at first minutely hairy with spreading hairs, glabrescent. SPORES 7-10 x 4-5 micr., elongate-elliptical, smooth, purple-black under microscope. BASIDIA subcylindrical, 20-27 x 6-7 micr., 4-spored, interspersed with abundant sterile, inflated cells. CYSTIDIA none. ODOR none. TASTE mild.

On debris and on the ground in woods in extensive gregarious and caespitose clusters of numerous individuals.

Throughout the State. May-October. Common.

This species is well named; the thousands of plants which often cover the ground and debris around stumps are an attractive sight when fresh. It sometimes appears in greenhouses according to Atkinson. The microscopic structure of the hymenium is similar to that of the Coprini, and some authors (vide Ricken) refer it to that genus.

217. Psathyrella crenata (Lasch.) Fr.

Hymen. Europ., 1874.

Illustration: Cooke, Ill., Pl. 847.

"PILEUS 2-3.5 cm. broad, hemispherical, hygrophanous, rufescent or ochraceous, then pallid, atomate, *sulcate-plicate,* margin at length *crenate.* FLESH membranous. GILLS adnate, subventricose, yellowish-fuscous than black. STEM 6-7 cm. long, 1-2 mm. thick, slender, glabrous, whitish, striate and mealy at apex."

The description is adopted from Fries. Our plants had a more convex pileus, at first dark gray then rufescent or ochraceous; the gills were rather narrow, sub-distant, edge white-fimbriate; stem fragile, stuffed-hollow; the spores elliptic-oblong, 10-12.5 x 6-7 micr., smooth, purplish-black under microscope. CYSTIDIA few or none. The crenate folds of the margin of the cap included two to three striae. It agrees well with Cooke's figure.

Panœolus Fr.

(From the Greek, *panaiolus,* meaning all-variegated.)

Black-spored. Gills grayish-black, dotted by the spores, ascending, more or less attached but seceding. Stem central, polished, subrigid. Pileus *not striate,* rather firm but not very fleshy. Veil woven-submembranous or subsilky.

Dung-inhabiting, slender-stemmed, slightly persistent but putrescent mushrooms, whose otherwise glabrous pileus is either appendiculate or slightly white-silky on the margin by the collapsing of the more or less evanescent veil. Often ring-marked on the stem by the spores falling on the remnants of the veil. It is a rather small genus, and the rarer species are not well known. Peck has described five species, of which *P. epimyces* is to be looked for under Stropharia. The spores are opaque, black, smooth and usually lemon-shaped or elliptical; they remain aggregated in tiny clusters on the gills as these mature and so produce the dotted-variegated appearance of the gills. Later the gills become entirely gray-black to black.

218. Panœolus solidipes Pk. (Edible)

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

Illustrations: Ibid, Pl. 4, Fig. 1-5.
Hard, Mushrooms, Pl. 41, Fig. 278, p. 343.
White, Conn. State Geol. & Nat. Hist. Surv. Bull., No. 3, Pl. 27, p. 53.
Plate XLIV of this Report.

PILEUS 4-10 cm. broad, *large,* firm, at first hemispherical then broadly convex, obtuse, moist, glabrous, *white* when fresh, even, *at length rimose-scaly and yellowish,* especially on disk. FLESH rather thick, white, watery near the gills. GILLS ascending, narrowly adnate, *broad, ventricose,* close, white at first, then ashy to black, variegated by the spores, edge white-flocculose. STEM long and rather stout, 8-20 cm. long, 5-15 mm. thick, equal, firm, *solid,* fibrous, glabrous, *white* within and without, *apex striate* and beaded with drops, straight or curved at base, sometimes twisted. SPORES broadly elliptical, abruptly narrowed at base, smooth, 15-18 x 9-11 micr., black. STERILE CELLS on edge of gills, broadly lanceolate, 30-35 micr. long, subobtuse. BASIDIA short-clavate, about 33 x 14 micr., 4-spored. ODOR and TASTE slight. *Edible.*

Gregarious or subcaespitose. On manure piles rich in straw, on dung and on richly manured lawns. Ann Arbor. May-July. Spasmodic.

This is our largest Panœolus and an excellent species for the table. It is probably to be found throughout the southern part of the State; it has only appeared during a few seasons but then in abundance. The large size, white color when fresh, the solid stem and the marked striations on the upper portion of the stem are its distinguishing characters. The striations sometimes extend the whole length of the stem. Its flavor when cooked is quite agreeable. It is often a noble plant and our illustration does not do it justice.

219. Panœolus retirugis Fr. (Suspected)

Epicrisis, 1838.

Illustrations: Gillet, Champignons de France, No. 509.
Murrill, Mycologia, Vol. 3, Pl. 40, Fig. 7.
Atkinson, Mushrooms, Pl. 11, Fig. 45, p. 45, 1900.
Hard, Mushrooms, Pl. 40, Fig. 276, p. 340, 1908.
Reddick, Ind. Geol. & Nat. Hist. Resour. Rep. 32, Fig. 9, p. 1231, 1907.

PILEUS 1-3 cm. broad, rather firm, at first elliptic-oval, then campanulate-hemispherical, obtuse, glabrous, *dark smoky when young and wet,* becoming paler, or in dry weather grayish, pale clay color or creamy-white, *shining-micaceous when dry,* surface usually *reticulate-veined on disk,* sometimes even, margin connected with *stem in young stage by a floccose-submembranous, ring-like veil,* veil soon broken and margin markedly *appendiculate* in expanded pileus. FLESH rather thin, equal. GILLS adnate-seceding, *broad,* ventricose, close, white then variegate-spotted by the

black spores, edge white-flocculose. STEM 5-16 cm. long, 2-6 mm. thick, equal, cylindrical, sometimes flexuous, whitish, *rufescent* or tinged purplish within and without, darker below, hollow, *often covered with frost-like bloom,* sometimes minutely rimulose, bulbillate. SPORES broadly oval-elliptical, ventricose, 15-18 x 9-11 micr., smooth, black. *Sterile cells* on edge of gills, narrow, subcapitate.

Gregarious or scattered on dung-hills, manured lawns, fields, road-sides, etc., in woods or in the open. Throughout the State. May-October. Very common.

The most widely distributed of our species. In favorable weather it occurs abundantly where stock is pastured. In dry weather it is smaller and paler. In the woods or in drizzly weather the stems are large and the colors are very different. Some disagreement exists as to the size of the spores, which are variable in dimension but rather constant in shape. Ricken describes and figures a form which is scarcely our plant, and Cooke's figure is not convincing. It is not poisonous but is rather unattractive and usually avoided when collecting for the table. The older name is *P. carbonarius.* It is possible that this runs into *P. campanulatus* Fr. and is often confused with it.

220. **Panœolus campanulatus** Fr. (Suspected)

Epicrisis, 1836-38.

Illustration: Ricken, Blätterpilze, Pl. 69, Fig. 8.

"PILEUS 2-4 cm. broad, brownish-gray or yellowish-gray, *persistently conic-campanulate,* never expanded, *glabrous,* often somewhat silky-shining, *neither hygrophanous nor viscid,* margin somewhat appendiculate by the rather persistent veil. FLESH thin, concolor. GILLS adnate, ventricose-ascending, broad, close, variegated gray to black by the spores, edge white-flocculose. STEM 7-10 cm. long, 1-2 mm. thick, *straight,* rigid-fragile, equal, *reddish-brown,* pulverulent-pruinose, apex striate, black-dotted and beaded with drops in wet weather. SPORES lemon-shaped, 15-18 x 10-13 micr., smooth, opaque, black."

The description is adopted from Ricken. According to Godfrin (Bull. Soc. Myc. de France, 19, p. 45) this species differs from *P. retirugis* in the structure of the cuticle. In the latter species the surface cells of the pileus are four or five layers thick, gradually passing into the longer, tramal cells below; while in *P. campanulatus* there are only one or two rows of abruptly differentiated cells with large, clavate, erect cystidia-like cells intermingled. The species has not been uniformly conceived by different authors and needs further comparison. It is said to be very common in Europe and is widely reported in this country. The majority of authors give the same spore-size as Ricken.

221. **Panœolus papillionaceus** Fr. (Suspected)

Epicrisis, 1836-38.

Illustration: Ricken, Blätterpilze, Pl. 69, Fig. 3.

"PILEUS 2-4 cm. broad, subhemispherical, *at length* expanded, never viscid nor hygrophanous, *at length rimose-scaly or areolate, pallid or sordid-whitish* to smoky-gray or brownish-pallid, margin with evanescent, pallid veil. FLESH slightly thick, white. GILLS broadly adnate, often very broad, ventricose, close, variegated gray-blackish from the spores, at length black. STEM 6-8 cm. long, 2-5 mm. thick, cartilaginous-toughish, rigid, hollow, somewhat attenuated, *whitish,* with brownish base, apex striate and white-pruinose. SPORES lemon-shaped, 15-18 x 9-11 micr., smooth, black."

The description is adopted from Ricken. The spores are somewhat more narrow according to most authors. This species seems to be infrequent with us. Small forms occur which may be referred here, in which the pileus is less than a centimeter broad and the spores are smaller. The species is not too well known. Its main character seems to be the whitish stem but no doubt the forms with such a stem need segregation as shown by some of my collections.

222. **Panœolus** sp.

PILEUS 1-2.5 cm. broad, campanulate, obtuse, not expanded, 1-1.5 cm. high, hygrophanous, bibulous, *smoky gray when moist,* livid-buff when dry, glabrous, dull and subpruinose, at length coarsely crenate-wavy when dry; veil absent or fugacious. FLESH thickish, rather firm, concolor (moist), then pallid. GILLS rounded behind, adnate-seceding, not broadly attached, ventricose, crowded, gray then variegated black, edge white-flocculose. STEM 5-7 cm. long, slender, 1-2 mm. thick, equal, rigid-fragile, flexuous or straight, hollow, *livid smoky-gray,* concolor within, *pruinose,* glabrescent, base white-mycelioid. SPORES elliptical, ventricose, 9-10

x 6 micr., smooth, obtusely pointed, black. *Sterile cells* on edge of gills, linear, subcapitate, 30-40 x 4-5 micr. ODOR none.

Gregarious. On horse dung and soil, in woods pastured by horses. Ann Arbor. October.

This is close to *P. sphinctrinus* Fr. in most of its characters, but differs in its much smaller spores and in the lack of a persistent, appendiculate veil. The surface portion of the pileus has the same structure that is given by Godfrin (l. c.) for *P. sphinctrinus.*

AMAUROSPORAE

Psalliota Fr.

(From the Greek, *Psallion,* a ring or collar.)

Purple-brown-spored. Stem *fleshy,* separable from the pileus, provided with a persistent or evanescent *annulus.* Gills *free,* usually pink or pinkish in the young stage.

Fleshy, mostly compact and large mushrooms, growing on the ground in woods among fallen leaves, etc., or on lawns, pastures, open ground or cultivated fields. They correspond to Lepiota of the white-spored group. They are all *edible,* the larger ones being among the best known and most widely used of edible mushrooms. Several species have been cultivated a long time and are of considerable commercial importance, especially in Europe. (See remarks under *P. campestris.*)

The PILEUS is glabrous, fibrillose or fibrillose-scaly, either white or whitish or dark colored by the color of the fibrils on its surface; these fibrils compose a thin layer on the very young cap, and as the cap expands are broken up, except at the slow-growing center, into fibrillose scales. The young cap of these species is therefore much more uniformly colored than later in the expanded stage. The surface of the whitish species is often stained somewhat with yellowish of rufescent hues when bruised or in age. The *size* varies; most species may become quite large, *P. subrufescens* reaching a size of 20 cm. across the cap; a few are quite small. The surface is dry, or it may be slightly viscid as in *P. cretacella.* The GILLS are free, as in Lepiota. When the button is quite small it is white, but in some species, e. g. *P. campestris,* becomes pink quickly. This character has been used to separate the species, but is a difficult point for beginners to determine. As the spores begin to take on color, the purplish-brown hues appear and when old, most gills appear blackish-brown because of the dense layer of spores. The STEM is either almost undifferentiated within and is then solid, or has a distinct pith which soon disappears and leaves it hollow, often in the form of a narrow tubule. It is fleshy and when fresh has no cartilaginous cortex; it is, however, of different texture from that of the pileus and easily separates from it.

The VEIL is single or double. When double the substance of the under layer is similar to that of the pileus and the base of the stem and is probably a part of a universal cuticle. Sometimes it is very voluminous and forms a large pendulous annulus, as in *P. placomyces* and *P. subrufescens.* Usually it is quite thick and persistent. The lower layer breaks off soonest, ceases expansion and cracks into radial patches which remain on the under side of the annulus; sometimes, as in *P. abruptibulba,* it is very evanescent.

The genus may be divided into two sections based on the structure of the veil. The Friesian grouping is entirely artificial, and the difference in the color of the young gills, used by some as a basis for grouping, seems too variable a criterion for the purpose.

Key to the Species

(A) Plants large; pileus normally much more than 4 cm. broad. (See *P. campestris.*)
- (a) Growing in forests, thickets, groves, etc.
  - (b) Pileus white, not fibrillose-scaly, usually glabrous.
    - (c) Pileus turning yellowish on disk when rubbed; stem with small, abrupt bulb. 226. *P. abruptibulba* Pk.
    - (cc) Pileus firm, chalky-white, not stained yellow; without abrupt bulb. 223. *P. cretacella* Atk.
  - (bb) Pileus with fibrils or fibrillose scales on the surface.
    - (c) Flesh turning pink to blood-red where broken; fibrils brownish-gray. 231. *P. haemorrhodaria* Fr.
    - (cc) Flesh not or scarcely changing color.
      - (d) Annulus single, not covered on under side with floccose patches; fibrils brown. 230. *P. silvatica* Fr.
      - (dd) Annulus double, as shown by the patches on under surface.
        - (e) Disk of pileus blackish, fibrils brown; odor not marked. 227. *P. placomyces* Pk.
        - (ee) Disk reddish-brown, fibrils tawny; odor of almonds; large. 228. *P. subrufescens* Pk.
- (aa) Growing in fields, open places, cultivated grounds or lawns, not scaly.
  - (b) Annulus as a broad band with spreading edges; gills very narrow as compared to the thick flesh; in cities. 224. *P. rodmani* Pk.
  - (bb) Annulus different.
    - (c) Pileus large, surface stained yellowish on disk when bruised; annulus double. 225. *P. arvensis* Fr.
    - (cc) Pileus medium, surface unchanged; annulus lacerated, simple; gills bright pink. 229. *P. campestris* Fr.

(AA) Pileus 1-5 cm. broad.
(a) Flesh of stem soon blood-red; in hot-houses. 235. *P. echinata* Fr.
(aa) Flesh whitish, not turning red.
(b) Fibrils of pileus grayish-brown or brown; gills at first gray. 232. *P. micromegetha* Pk.
(bb) Not markedly fibrillose.
(c) Pileus creamy-white, with yellowish stains. 233. *P. comtula* Fr.
(cc) Pileus with pinkish to reddish-brown hues, slightly fibrillose. 234. *P. diminutiva* Pk.

Section I. Bivelares. Annulus double, with thick flocculose patches on under side.

223. Psalliota cretacella Atk. (Edible)

Jour. of Mycology, Vol. 8, 1902.

PILEUS 4-7 cm. broad, convex to expanded, thin, *glabrous,* white, sometimes inclined to be slightly viscid in wet weather, even. FLESH white, sometimes with a tinge of pink. GILLS free, crowded, narrow, 3-4 mm. broad, narrowed behind, white at first, *then slowly pink, later dark grayish-brown,* not becoming blackish. STEM 5-8 cm. long, 6-10 mm. thick, tapering from the enlarged base, white, glabrous above the annulus, chalky-white below and covered with minute, white, powdery scales often arranged in irregular concentric rings below, solid, but center less dense. ANNULUS *double,* persistent, white, smooth above, the lower surface with very fine floccose scales similar to those on the stem from which the annulus was separated. SPORES 4-5 x 3 micr. ODOR and TASTE of almonds as in *P. arvensis.*

Gregarious or subcaespitose. On the leaf-mold, debris, etc., in coniferous regions. Marquette, Bay View. August-September. Infrequent.

The description is adapted from that of Atkinson. *P. cretacella* is closely related to *P. cretaceus* Fr. which differs, according to Fries' description, in the hollow stem, the blackish-fuscous gills when mature and in that the pileus becomes at length scaly. Our plants have a glabrous chalky-white pileus and solid stem. Ricken gives spores of *P. cretaceus* as 8-9 x 5-6 micr.

224. Psalliota rodmani Pk. (Edible)

N. Y. State Mus. Rep. 36, 1884.

Illustrations: Peck, N. Y. Mus. Rep. 48, Pl. 9, Fig. 1-6, 1896.
Marshall, The Mushroom Book, Pl. 25, op. p. 76, 1905.
Atkinson, Mushrooms, Fig. 17, p. 19, 1900.
Hard, Mushrooms, Fig. 250, p. 309, 1908.
Plate XLV of this Report.

PILEUS 4-10 cm. broad, (more often medium size), at first depressed-hemispherical to broadly convex, at length subexpanded to plane, firm, dry, *glabrous,* subsilky, *white* or whitish, cream color to subochraceous in age, the margin at first incurved and surpassing the gills. FLESH *thick,* compact, white, not changed by bruising. GILLS free but nearly or quite reaching the stem, abruptly rounded behind, *narrow, width about one-third the thickness of pileus,* crowded, at first dull pink, then purplish-brown, finally blackish-brown, edge entire. STEM *short,* 2-5 cm. long, 1-2.5 cm. thick, *stout, equal, solid,* glabrous below, apex slightly scurfy, white within and without, *provided at the middle or below with a band-like, double,* white ANNULUS, with somewhat spreading edges, sometimes narrow and merely grooved, or somewhat lacerated. SPORES minute, 5-6.5 x 4-4.5 micr., broadly elliptical or broadly oval, smooth, purplish-brown, blackish-brown in mass. BASIDIA 30-36 x 8 micr., 4-spored. ODOR and TASTE agreeable.

Solitary on the ground especially along city pavements, or caespitose on lawns or grassy places. Throughout the State. Ann Arbor, Detroit, Holland, Houghton, etc. May-October. Not infrequent.

A well-marked species, whose margined, band-like annulus, narrow gills, solid stem and squatty habit characterize it sufficiently. The young gills are white for a much longer time than in *P. campestris.* The pileus may become yellowish-tinged but the flesh is not changed by bruising except that it becomes slightly rufescent in the stem. Peck says the annulus is rather thick at times; in our specimens it was thin and almost membranous. Sometimes it occurs on lawns in dense, caespitose clusters of 50 to 100 individuals; such a growth was observed in Ann Arbor by myself, and the same condition has been reported to me by Dr. L. L. Hubbard at Houghton. It apparently prefers city conditions, as it is almost exclusively found there. It is edible and much prized by those acquainted with it.

225. **Psalliota arvensis** Fr. (EDIBLE)

Epicrisis, 1836.

Illustrations: Fries, Sverig. ätl. o gift. Swamp, Pl. 4.
Cooke, Ill., Pl. 523.
Gillet, Champignons de France, No. 571 (as Pratella).
Berkeley, Outlines, Pl. 10, Fig. 4.
Michael, Führer f. Pilzfreunde, Vol. I, No. 61.
Ricken, Blätterpilze, Pl. 62, Fig. 2.
Hard, Mushrooms, Pl. 34 and Fig. 252, p. 312.
Swanton, Fungi, etc., Pl. 38, Fig. 13, op. p. 114.
Peck, N. Y. State Mus. Rep. 48, Pl. 8.
Plate XLVI of this Report.

PILEUS 5-20 cm. broad, *large,* subhemispherical at first, then convex-expanded, disk plane, firm, even, *glabrous,* almost shining, or with appressed, small, fibrillose scales, dry, *white or tinged yellowish-ochraceous on disk, especially when rubbed,* sometimes rimose-areolate. FLESH *thick, white,* at length yellowish-tinged. GILLS free, crowded, rather broad, *at first whitish then slowly grayish-pink, finally blackish-brown,* edge entire. STEM 5-20 cm. long, 10-30 mm. thick, *stout,* white, *yellowish-stained where bruised,* silky-shining above the annulus, stuffed by a loose pith, *then hollow,* equal-cylindrical above the abrupt, small and short bulb, *glabrous*; ANNULUS thick, rather large, *double,* the lower layer radially cracked into rather large ochraceous-tinged patches. SPORES 6-7 x 4-4.5 micr., elliptical, smooth, purplish-brown, blackish-brown in mass. ODOR *of anise or of benzaldehyde.*

On the ground, cultivated fields, pastures, on grassy mounds in woods, in the north on lawns; scattered-gregarious or solitary. Throughout the State, more frequent in the Northern Peninsula. July-October. Infrequent in the south part of State.

The "field mushroom" or "ploughed land mushroom" is not limited to cultivated fields. It was found in several cities along Lake Superior on lawns. It is much prized by the inhabitants for the table. It is larger than *P. campestris,* and can be distinguished by the tendency of the center of the cap and base of stem to turn yellowish-ochraceous when rubbed or bruised. The gills, although pink for a brief time at one stage, are white much longer than in the other species. Also there is often a slight but distinct odor of oil of bitter almonds when the flesh is crushed. It is curious to note the various spore-measurements given by authors. Ours agree practically with the size given by Bresadola, Ricken and Massee. On the other hand, Karsten, W. Smith, Schroeter, Saccardo and Peck give them 9 (or 11) x 6 micr. and as one suspects from other remarks about the plant, some other species is probably at times mistaken for it. Ricken, whose figure is numbered, through an error, for that of *P. cretaceus,* emphasizes the point that in his plants the flesh of the stem becomes blackish in age. This has not been observed in our region and the dried specimens do not show it. Its edibility is not to be questioned.

226. **Psalliota abruptibulba** Pk. (EDIBLE)

N. Y. State Mus. Bull. 94, 1905 (as Agaricus).
N. Y. State Mus. Mem. 4, 1900 (as *Agaricus abruptus*).

Illustrations: Ibid, Pl. 59, Fig. 8-14, 1900.
Hard, Mushrooms, Fig. 254, p. 313, 1908.
Atkinson, Mushrooms, Fig. 19-20, 1900 (as *P. silvicola*).
Marshall, Mushrooms, Pl. 26, op. p. 77, 1905.
Plate XLVII of this Report.

PILEUS 7-15 cm. broad, convex then *expanded-plane,* brittle, dry, glabrous or covered with white, appressed silky fibrils, sometimes obscurely appressed-scaly, *white or creamy-white,* often with dingy yellowish stains on disk, silky-shining. FLESH moderately thick, *turning yellowish when bruised,* especially under the cuticle. GILLS free, *remote,* crowded, *narrow, soon pink,* then dark brown, edge entire. STEM 8-15 cm. long, 8-15 mm. thick, cylindrical or tapering upward from a small, *subabrupt bulb,* relatively slender at times, creamy-white, yellowish when bruised, stuffed then hollow, subglabrous. ANNULUS broad, *double,* smooth above, cracking below into thick, sometimes evanescent, yellowish patches. SPORES 5-6 x 3-4 micr., elliptical, smooth, purple-brown. ODOR and TASTE agreeable.

Scattered or subcaespitose on the ground among fallen leaves in frondose or mixed woods. Throughout the State. July-October. Fairly common.

The species is known by its habitat in woods, its flat cap at maturity which is shining-whitish, the rather slender, abruptly-bulbous stem and the tendency for the flesh of the cap and stem to become yellowish where bruised. It differs from *P. arvensis* in its very different stature; from *P. placomyces* in the absence of any brownish or rufous fibrils on the cap, and from *P. sylvaticus* Fr. by its

bulbous stem. Peck first referred it to *P. arvensis* as a variety, later he called it *Agaricus abruptus;* but as this name was preempted it was changed to *abruptibulba.* Sometimes the veil appears to be single, but this is merely accidental. McIlvaine says "it has a strong, spicy, mushroom odor and taste and makes a highly flavored dish. It is delicious with meats; the very best mushroom for catsup." Since it occurs in the woods, it must be carefully distinguished from the deadly, white Amanitas.

227. Psalliota placomyces Pk. (Edible)

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

Illustrations: N. Y. State Mus. Rep. 48, Pl. 9, Fig. 7-12.
Atkinson, Mushrooms, Fig. 21-23, pp. 23-24, 1900.
Hard, Mushrooms, Fig. 255, 257, pp. 314-316, 1908.
Clements, Minn. Mushrooms, Fig. 42, p. 74, 1910.

PILEUS 5-12 cm. broad, at first broadly ovate, convex-expanded, finally *quite plane,* sometimes subumbonate, not striate, *squamulose,* whitish, except where *dotted with the brown scales which are more dense toward the center,* forming a blackish-brown disk, in age the surface may be entirely brown. FLESH white or tinged yellowish under cuticle, *rather thin* except disk. GILLS free, crowded, thin, white at first, *soon pink* then blackish-brown, edge entire. STEM rather long, 7-12 cm. long, tapering upward or *clavate-bulbous,* 4-8 mm. thick, stuffed then hollow, whitish, the bulb sometimes yellowish-stained, glabrous. ANNULUS large, *superior, double,* the under layer cracking radially and leaving patches, finally darkened by the spores. SPORES 5-6 x 3.5-4 micr. (rarely few longer), elliptical-oval, nucleate, smooth, purplish-brown, blackish-brown in mass. ODOR not marked.

Solitary or scattered, sometimes a few caespitose, on the ground in frondose, hemlock or mixed woods, rarely on lawns. Ann Arbor, Lansing, New Richmond, probably throughout the State. July-September. Infrequent, during some seasons rare.

A beautiful plant when one comes across it at its best, with its artistically decorated cap and symmetrical stature. It differs clearly from all others. It is edible although the flesh is thinner than in the preceding species. It is known by the minute brown scales on the flattened cap, the clavate-bulbous stem and the large, flabby annulus. During some seasons, it seems to be absent even under favorable weather conditions.

228. Psalliota subrufescens Pk. (Edible)

N. Y. State Mus. Rep. 46, 1893.

Illustrations: N. Y. State Mus. Rep. 48, Pl. 7, 1896.
Plates XLVIII, XLIX, L, of this Report.

PILEUS 8-18 cm. broad, *large,* at first hemispherical then convex, *finally plane,* becoming wavy and split on the margin, *silky-fibrillose at first,* the fibrillose surface soon breaking up to form *very numerous, appressed, pale tawny fibrillose scales,* disk reddish-brown and not scaly, sometimes rimose, not striate. FLESH white, unchangeable, *rather thin,* soft, fragile at maturity. GILLS free, not very remote, *narrow, crowded,* at first white, then pinkish, finally blackish-brown, edge at first minutely white-fimbriate. STEM 7-15 cm. long, *tapering upward,* 1-1.5 cm. thick at apex, twice as thick below, white and almost glabrous above the annulus, floccose-fibrillose to subscaly toward base, *stuffed by soft white pith then hollow,* the bulb varying clavate to more or less abrupt. ANNULUS very voluminous, reflexed, *double,* rather distant from the apex of the stem, smooth and white above, with soft, floccose, pale tawny scales below, becoming dark from spores. SPORES 6-7.5 x 4-5 micr., elliptical, smooth, dark purple brown, blackish-brown in mass. STERILE CELLS on edge of gills numerous, subcylindrical, very narrow, hyaline. ODOR when crushed, strong of almonds. TASTE of green nuts.

Caespitose, on masses of decaying fallen leaves in frondose woods and in richly manured hot-house beds. (It is also cultivated for the market.)

Ann Arbor, Detroit. August-October. Rather rare.

Our largest Psalliota, probably at times surpassing the size given above. The original description was made by Peck from old material, and later (48th Rep.) he points out that the cap is coated with fibrils which at length give it the scaly character. Peck's description of this species is, therefore, misleading, and probably his specimens did not show the full development of the scales shown in our photographs. Some of our specimens were sent to Dr. Peck who pronounced them *P. subrufescens* Pk. None of our other Psalliotas could be easily confused with *P. subrufescens* when it appears in the woods. Of the European species, *P. augusta* Fr. and *P. perrara* Bres. approach it in size. These are at once distinct, according to Ricken's descriptions, by their paler caps and larger spores. The

spores of *P. augusta* are 12-14 x 6-7 micr., per Ricken; of *P. perrara,* 8-10 x 5 micr., per Bresadola. *P. silvatica* Fr. differs in the smaller size, the simple annulus and differently colored pileus. *P. subrufescens* sometimes appears in hot-house beds and has been reduced to cultivation, where its characters seem to be somewhat changed, so that Peck has made a lengthy comparison between it and *P. campestris,* to which the wild form has no close resemblance.

Section II. Univelares. Annulus simple, not with thick floccose-patches on under side.

229. Psalliota campestris Fr. (Edible)

Syst. Myc., 1821.

Illustrations: (Selected, very numerous.)
- Fries, Sverig. ätl. o. gift. Swamp., Pl. 5.
- Cooke, Ill., Pl. 526.
- Gillet, Champignons de France, No. 573 (As Pratella).
- Michael, Führer f. Pilzfreunde, Vol. I, No. 60.
- Bresadola, I. Fung. mang. e. velenos, Pl. 53.
- Marshall, The Mushroom Book, Pl. 23, op. 74 and Pl. 24, op. 75, 1905.
- Gibson, Our Edible Toadstools and Mushrooms, Pl. 5, p. 83 and Pl. 6, p. 89.
- Murrill, Mycologia, Vol. I, Pl. 3, Fig. 1.
- Hard, Mushrooms, Fig. 248 and 249, p. 307, 1908.
- Atkinson, Mushrooms, Figs. 1-8, pp. 2-8, 1900.
- Atkinson, Bot. Gaz., Vol. 43, p. 264 et. al., Pl. 7, 8, 9, 10, 11 and 12 (showing all stages of development).

PILEUS 4-7 cm. broad (occasionally larger, especially when cultivated), at first flattened hemispherical then convex-expanded or nearly plane, firm, even, *glabrous* or at length minutely floccose-silky or delicately fibrillose-scaly, dry, *white* (scaly forms are brownish, etc.), the margin extending beyond gills, edge often fringed when fresh by the tearing of the partial veil. FLESH thick, white, not changing when bruised. GILLS free but not remote, rounded behind, ventricose, not broad, close, almost from the very *first delicate pink, then deep flesh color,* finally purplish-brown *to blackish,* edge even. STEM 5-7 cm. long, thick, usually *subequal or tapering downward,* rarely subbulbous, solid-stuffed,

usually rather short and firm, *white* or whitish, glabrous. ANNULUS above and near the middle, edge lacerate, often evanescent in age, derived from the thin, simple, white, partial veil. SPORES elliptical, 7-9 x 4.5-5.5 micr., purple-brown, *blackish-brown in mass,* smooth. ODOR and TASTE agreeable.

On the ground in lawns, gardens, golf-links, roadsides, especially in sheep-pastures, sometimes in cultivated fields.

Throughout the State. Less frequent in spring, usually in July-October. Uncommon except locally during some seasons, rare at other times.

This is the well-known "pink-gilled" or "edible" mushroom, by many people in this country considered in addition to the "sponge mushroom," *Morchella esculenta,* as the only mushroom safe to eat; all others are dubbed "toadstools." Some persons, however, know and eat a larger number of kinds; again, all others are "toadstools" to them. The word toadstool, therefore, means nothing definite; it only expresses the ignorance of people concerning those fungi of which they are afraid. The two words refer to the same group of plants and can be used interchangeably.

In the young or "button" stage the gills are soon tinged pink, and as it is possible to mistake the button of the deadly, white *Amanita verna* for it at this stage, every button should be broken open while collecting. By the time the veil breaks the pink color of the gills is quite marked. All who use this mushroom, should read carefully the remarks under Amanita.

This mushroom has been eaten from time immemorial, and its artificial cultivation carried on extensively for centuries. In and around large cities, large establishments exist to raise it for the market, selling it for 75c to 90c a pound in this country. "The annual product of the Chicago mushroom beds is said to be from sixty to seventy-five tons." (Nat. Hist. Surv. of Chicago Acad. Sci. Bull. VII, part 1, p. 90.) Special underground mushroom houses, caves, abandoned mines, cellars, etc., have been adopted for the cultivation of this mushroom. Duggar states that in 1901 the total product of the mushroom industry in the environs of Paris, France, was 5,000 tons or 10,000,000 pounds. This shows the extent to which Europeans eat mushrooms as compared with our American consumption. About the same ratio exists in the use of the many different edible wild species. In this country we have hardly begun to realize the immense amount of palatable food that goes to waste in our fields and woods.

Numerous varieties of *P. campestris* have been described. With

us the white variety is the common form, although an occasional patch of the variety with brownish and more fibrillose caps may be found. The caps are apparently not as large as in more moist climates, although occasionally one finds large plants in cultivated fields. Var. *villaticus* Fr. has been raised to specific rank by Bresadola; the pileus of this species is large and scaly and the stem is scaly and coated or subvolvate by the inferior veil. I have not seen it. No discussion is given here of the cultivated varieties. Those interested in their cultivation should read Duggar's "The Principles of Mushroom Growing, etc." Bull. No. 85, Bureau of Plant Ind., U. S. Dept. Agr., or the chapter in Atkinson's Mushrooms, last edition.

230. Psalliota silvatica Fr. (Edible)

Epicrisis, 1836.

Illustrations: Bresadola, Fung. Trid., Vol. I, Pl. 90.
Cooke, Ill., Pl. 530 (=*P. perrara* per Bres.)
Michael, Führer f. Pilzfreunde, Vol. II, No. 68.

"PILEUS 8-11 cm. broad, campanulate then expanded, *at first cinereous* then yellowish-whitish with a rufous-fuscous center, *covered by brown scales.* FLESH rather thick except margin. GILLS free, remote, crowded, white at first, then rosy-flesh color, *at length reddish-cinnamon.* STEM 6-9 cm. long, 1-1.5 cm. thick, *hollow,* whitish, glabrous, or subfibrillose, equal or with a bulbous base, bulb sometimes marginate, white within when broken, yellowish at apex, slightly rose-red on sides. ANNULUS *simple,* ample, distant, superior, white, substriate, flocculose. SPORES 6-7 x 3.5-4 micr., elliptical, incarnate-fulvous. BASIDIA clavate, 25 x 6-7 micr. ODOR and TASTE agreeable."

Reported by Longyear. In woods.

The description is adopted from Bresadola. The descriptions in our mushroom books are scarcely satisfactory. The figures of Cooke and Gillet are said to depart from the characteristics of the plant. It seems to be rare, and I have never collected it. The gray color of the young plant and the truly brown color of the scales, the hollow stem and spores ought to make it recognizable. Ricken emphasizes the change of gills and flesh to blood-red when bruised and considers *P. haemorrhoidaria* as an autumnal form. This complicates matters, especially in the absence of specimens of our own.

231 Psalliota hæmorrhodaria Fr. (Edible)

Hymen. Europ., 1885.

Illustrations: Cooke, Ill., Pl. 531.
Gillet, Champignons de France, No. 577 (as Pratella).
N. Y. State Mus. Rep. 54, Pl. 75, 1901.

PILEUS 5-10 cm. broad, at first subglobose to subovate then campanulate-expanded, nearly plane, covered by rather dense, fibrillose, brownish-gray, appressed scales, sometimes glabrous toward margin and paler, margin subpersistently incurved. FLESH white, *turning pink to blood-red when broken,* thick on disk, thin on margin. GILLS free, moderately broad, crowded, white at first, then rosy-flesh-color, finally dark brown. STEM 5-10 cm. long, 8-15 mm. thick, subequal, rarely bulbous, *stuffed then hollow,* floccose-fibrillose, glabrescent, white or pallid, darker in age. ANNULUS large, pendulous, persistent, superior, simple, white, at length colored by spores. SPORES 6-7 x 4 micr., elliptical, purplish-brown, smooth. STERILE CELLS on edge of gills, clavate, enlarged-rounded above. ODOR and TASTE agreeable.

Caespitose or scattered, on the ground or about the base of trees in low places in mixed woods, usually near birch and maple trees. Marquette, New Richmond. August-October. Infrequent in the coniferous regions of the State.

Easily known by the change of the flesh to red, which color fresh plants immediately show when broken. This character is said to be found also in the seashore mushroom, *P. halophila* Pk. which has a solid stem and has not been found inland. Peck says its flavor when cooked is similar to *P. campestris,* and gives to the milk in which it is stewed a brownish color. Ricken considers it a mere form of *P. silvatica,* but describes the latter differently from most authors. It is certainly distinct.

232. Psalliota micromegetha Pk. (Edible)

N. Y. State Mus. Rep. 54, 1901. (As *Agaricus pusillus*).

Illustration: N. Y. State Mus. Bull. 116, Pl. 107, Fig. 1-6, 1907.

"PILEUS 2-7 cm. broad, fragile, convex becoming plane, sometimes subdepressed in center, dry, *silky-fibrillose or fibrillose-scaly, grayish-brown or brown in center,* often with yellowish or ferrugi-

nous stains. FLESH white or whitish, *not changing color where wounded.* GILLS free, close, *grayish at first,* soon pinkish, finally brown. STEM 2-5 cm. long, 6-10 mm. thick, equal or slightly tapering upward, sometimes bulbous, stuffed or hollow, slightly fibrillose, white. ANNULUS *slight,* often evanescent. SPORES broadly elliptic or subglobose, 5 x 4 micr. Edible."

Solitary or caespitose, on grassy ground, in sandy or clay soil. September-November. Detroit.

The description is adapted from the revised one in N. Y. State Bull. 116, p. 44, 1907. The original description was made largely from smaller plants sent to Peck from Detroit by Dr. R. H. Stevens, and named *Agaricus pusillus;* later the name was changed to that given above, meaning small to large in size. I have not seen it.

233. Psalliota comtula Fr. (Edible)

Epicrisis, 1836.

Illustrations: Fries, Icones, Pl. 130.
Cooke, Ill., Pl. 533.
Ricken, Blätterpilze, Pl. 62, Fig. 1 (as *P. rusiophylla*).
Atkinson, Mushrooms, Fig. 24, p. 25, 1900.

PILEUS 2-4.5 cm. broad, convex-subexpanded, subumbonate or umbo obsolete, silky, creamy-white to grayish-white, *tinged with yellowish hues on disk,* sometimes rufous-tinged. FLESH whitish, becoming ochraceous under cuticle, thickish on disk. GILLS free, broader in front, narrowed behind, up to 5-6 mm. broad, dingy incarnate, at length smoky-umber. STEM 3-5 cm. long, 2.5-5 mm. thick, subequal, hollow, innately silky, pallid or slightly yellowish-stained. ANNULUS *median,* membranaceous, thin, whitish, often *subevanescent.* SPORES 5-6 x 3-3.5 micr., elliptical, smooth, dark purple-brown. BASIDIA 20 x 6 micr. STERILE CELLS on edge of gills inflated-clavate. ODOR not marked.

On the ground among fallen leaves in pine and beech woods. New Richmond. September. Infrequent.

The description shows a slight variation from that of other authors. Atkinson gives the spore measurements 3-4 x 2-3 micr. Ricken considers Fries' plant as identical with *P. rusiophylla* Lasch, and also gives small spores and basidia. Except for the pale color of the cap, our plants could be referred to Ricken's *P. sagata* Fr. The species needs further study.

234. Psalliota diminutiva Pk. (Edible)

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

Illustrations: N. Y. State Mus. Rep. 54, Pl. 74, Fig. 1-8, 1901.
Plate L of this report.

PILEUS 2-5 cm. broad, fragile, *convex then plane,* sometimes subdepressed, silky-fibrillose, the *fibrils forming delicate, pinkish-drab to reddish-brown scales toward center and on disk,* paler and denuded on margin, white or tinged gray under fibrils, not striate. FLESH thin, whitish. GILLS free, not remote, thin, close, moderately broad, ventricose, *edge entire.* STEM 3-5 cm. long (rarely longer), 2-5 mm. thick, equal or tapering upwards, stuffed by delicate white pith then hollow, glabrous, innately silky, even, whitish, sometimes subbulbous at base. ANNULUS delicate, thin, rather persistent, narrow, whitish. STERILE CELLS on edge none. BASIDIA 27 x 5-6 micr., 4-spored. ODOR and TASTE none.

Solitary or gregarious on mossy ground, or among leaf-mould in low moist frondose or mixed woods. Throughout the State. August-September (rarely in spring). Frequent.

This dainty little Psalliota is known by its delicate pinkish or reddish fibrils on the cap, the entire gills and persistent annulus. It is not supposed to possess, like the preceding, the yellowish stains on cap and base of stem, but specimens are found which have this character which do not seem to belong elsewhere. As they are rather scattered in occurrence no sufficient study has been made of these forms. It may be that several little species run into each other. Peck says they are very palatable when fried in butter, but their small size does not attract the collector who is looking for a meal.

235. Psalliota echinata Fr.

Syst. Myc., 1821.

Illustrations: Patouillard, Tab. Analyt., No. 155 (as Pholiota).
Cooke, Ill., Pl. 395 (as Inocybe).
Ricken, Blätterpilze, Pl. 31, Fig. 6 (as Inocybe).
Montagne, in Ann. Sci. Nat. 1836, Pl. 10, Fig. 3 (as *Agaricus oxyosmus*).

PILEUS 1-3 cm. broad, obtusely campanulate then expanded, margin at first incurved and somewhat appendiculate, then recurved, densely covered with smoky-brown, minute-floccose, wart-like or

pointed scales, not striate, sometimes rimose in age. FLESH whitish at first, *then reddish,* thin. GILLS free, thin, narrow, crowded, bright pink to old rose-color, *finally dark purplish-red.* STEM 2-3 cm. long, 1-3 mm. thick, equal, stuffed with loose white fibrils then tubular, *elsewhere soon blood-red within,* surface floccosely-pulverulent with a smoky bloom below the annulus, often mycelioid-swollen at base. VEIL floccose-submembranaceus, easily lacerated, concolor, forming an imperfect ANNULUS. Spores minute, elliptical, 4-5 x 2-2.5 micr., smooth, *with a tinge of purple-brown* under microscope, many immature and hyaline, *cinnabar-purple brown in mass.* CYSTIDIA none. *Trama* of gills composed of large cells, about 20 micr. in diameter. ODOR and TASTE slight, not of cucumber, even after crushing.

Subcaespitose or gregarious, in a green-house of the Michigan Agricultural College, East Lansing. September. Rare.

As shown by the references, this plant has been placed in three different genera. It is therefore difficult of identification, the more so because of its rarity. It seems that the spores mature slowly, or perhaps in some regions or under hot-house conditions do not take on a purplish tinge. Under the microscope some of the spores of our specimens showed the usual delicate tint in the exospore which is characteristic of many of this group. Fries (in Hymen. Europ.) says he never saw them rosy. Patouillard says they are hyaline under the microscope but that on a white background they appear tawny ("fauve"). Ricken applies the word "erdfarbig." All the illustrations picture our plant well, which, to quote Berkeley, "is a most curious species." In Europe it occurs in hot-houses almost exclusively.

Stropharia Fr.

(From the Greek, *strophos,* a sword-belt, referring to the annulus.)

Purple-brown-spored. Stem fleshy, *confluent with the pileus;* annulus membranous or fibrillose-floccose. Gills *attached.* SPORES purple-brown or violet. Pileus usually *viscid.*

Putrescent, terrestrial or coprinophilous, of medium size, in fields, barnyards, dung hills or forest. They correspond to Armillaria of the white-spored, and Pholiota of the ochre-brown-spored groups in the adnate gills and annulate stem; differing from Hypholoma in that the veil collapses on the stem to form an annulus, instead of remaining as a fringe on the margin of the pileus.

It would be preferable, in my judgment, to limit the genus to

those species with a viscid pellicle; but with the data at hand it seems best to defer this arrangement. Ricken divides the genus by the size of the spores, but this method neglects other more important morphological characters. On the other hand, some species could be better located in the genus Hypholoma as is done by Ricken for *S. caput-medusae* Fr., *S. scobinaceum* Fr. and *S. battarae* Fr. There are then two sections: Viscipelles and Spintrigeri.

Key to the Species

(a) Pileus with bluish-green or olive shades, viscid.
  (b) Stem 4-7 mm. thick, greenish-blue; pileus thick, green; on debris in woods. 236. *S. aeruginosa* Fr.
  (bb) Stem 1.5-2 mm. thick, long and slender; pileus thin, olvaceous-gray; on dung and mud. (See 268. *Psilocybe uda* Fr.)
(aa) Pileus without green or olive.
  (b) Stem ventricose-radicating; pileus umber to tawny-alutaceus, viscid. 237. *S. ventricosa* Mass.
  (bb) Stem not radicating.
    (c) Parasitic on Coprinus, whitish. 244. *S. epimyces* (Pk.) Atk.
    (cc) Not parasitic; pileus viscid or subviscid.
      (d) Growing on dung.
        (e) Pileus citron-yellow, 2-5 cm. broad; common.
          (f) Pileus persistently hemispherical. 242. *S. semiglobata* Fr.
          (ff) Pileus convex-subexpanded. 241. *S. stercoraria* Fr.
        (ee) Pileus ochraceous-brown, 1-2.5 cm. broad, conic-campanulate. 243. *S. umbonatescens* Pk.
      (dd) Not on dung.
        (e) Pileus 5-10 cm. broad, cinnamon-drab, viscid, stem squar-rose-scaly. 238. *S. depilata* Fr.
        (e) Pileus 1-4 cm. broad.
          (f) Gills strongly violet-purplish; pileus ochraceous-pallid. 240. *S. coronilla* Bres.
          (f) Gills strongly gray-tinged; pileus white to buff. 239. *S. albonitens* Fr.

Section I. Viscipelles. Pileus provided with a distinct gelatinous pellicle, hence viscid; glabrous or scaly.

**Growing on the ground or on debris.*

236. Stropharia aeruginosa Fr. (Suspected)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 551.
Gillet, Champignons de France, No. 650.
Ricken, Blätterpilze, Pl. 63, Fig. 4.
Pattouillard, Tab. Analyt., No. 231.
Swanton, Fungi, Pl. 38, Fig. 7-9.
Harper, Wis. Acad. Sci. Trans., Vol. 17, pt. II, Pl. 64, 1913.

PILEUS 2-5 cm. broad (often rather small in our climate). Campanulate-convex, at length plane, subumbonate, *covered with verdigris-green, thick gluten,* hence viscid, sometimes dotted with scattered, white scales, especially on margin, at length fading to yellowish, pellicle separable. FLESH pallid, or tinged blue, rather soft, thickish. GILLS broadly adnate, sometimes emarginate-sinuate, rather broad, close, whitish at first, soon drab-gray or reddish-gray, finally purplish-chocolate-brown, *edge white and minutely flocculose.* STEM 5-7 cm. long, 4-7 mm. thick, equal, hollow, soft, *greenish-blue, viscid,* at first scaly or fibrillose below the annulus. ANNULUS distant from apex, narrow, submembranous, here and there floccose, subevanescent. SPORES pale, smooth, 7-8 x 4-5 micr., oval-elliptical. STERILE CELLS on edge of gills, clavate, lanceolate.

On debris in hemlock woods, and occasionally in frondose woods. Houghton, New Richmond, Detroit. August-October. Infrequent.

Although this is a brightly colored and striking plant, we have come across it infrequently, but in Europe it is said to be very common in forest, field and garden. The gills sometimes run down the apex of the stem in lines. The annulus is sometimes lacking. Our plants are well shown by the figures of European authors, and seem to agree perfectly. It is said to be *poisonous.* It is probably more common northward.

237. Stropharia ventricosa Massee

British Fungus Flora, Vol. I, p. 400, 1892.

Illustration: Cooke, Ill., Pl. 1188 (as *S. merdaria* var. *major*).

PILEUS 3-5 cm. broad, parabolic then convex-expanded, margin for long time decurved, *very viscid,* somewhat uneven when young, glabrescent and shining *pale umber at first, then tawny-alutaceus.* FLESH white, thick on disk, abruptly thin on margin. GILLS adnate, at length decurrent by tooth, close, *rather narrow,* pallid at first, then mouse-gray with purplish tinge, finally purplish-brown. STEM 8-12 cm. or more long, *ventricose-radicating,* up to 15 mm. thick at broadest part, thinner above, rooting-attenuate at base, sometimes subequal, white at first, becoming dingy yellowish, dry, *covered up to the annulus by squarrose scales,* markedly striate above, stuffed, whitish within. ANNULUS persistent, white, large, striate above. SPORES 9-12 x 5-6 micr., elliptical, smooth, with a purple tinge under the microscope, brown in mass. CYSTIDIA

oval or short ventricose, obtuse at apex, about 45 x 24 micr., hyaline.

Caespitose on very decayed debris about stumps and roots in forest of hemlock, maple, etc. Bay View. September. Rare.

This has very much the stature of Cooke's figure of *Pholiota radicosa* (Ill., Pl. 361) and grows in similar places, but the pileus of our plants has a glabrous, viscid pellicle, and the spores are purple-tinged. The odor was not noted. The root-like prolongation pushes deep down into the debris and the mycelium was attached to dead roots. This agrees so well with Massee's description that I have ventured to refer it thither, in spite of its larger size and more scaly stem.

238. Stropharia depilata Fr.

Hymen. Europ., 1874.

Illustrations: Harper, Trans. Wis. Acad. Sci., Vol. 16, Pl. 62 and 63, 1913.

PILEUS 4-12 cm. broad, firm, convex to plane or broadly umbonate, obtuse, glabrous, *viscid,* light cinnamon-drab (Ridg.) when young and *with a smoky tinge,* at length dark olive-buff or pinkish-buff (Ridg.), even on the decurved margin which is sometimes appendiculate when young. FLESH whitish, thick except the thin margin. GILLS adnate, often subdecurrent and running down the stem in lines, close to crowded, broad, pallid at first, *soon pale purple-drab* (Ridg.) or *ashy,* at length purplish-black. STEM 6-12 cm. long, 8-15 mm. thick, subequal or subventricose, stuffed, whitish within and without, becoming yellowish-tinged, *clothed below annulus by subsquarrose, lacerate, fibrillose or floccose whitish or creamy-yellow scales,* apex glabrescent, often deeply immersed at base. ANNULUS distant, membranous, persistent, at first white, firm and erect, then deflected and clove-brown (Ridg.). SPORES elliptical, smooth, 9-12 x 5-6.5 micr., dark-gray with tint of purple under microscope. CYSTIDIA none. Edge of gills with sterile cells. ODOR none. TASTE tardily disagreeable.

Solitary or subgregarious, rarely subcaespitose; among debris or about logs and stumps in mixed woods of balsam, spruce, birch, etc. Northern Michigan. Frequent locally. September-October.

The large size, scaly stem and slate-gray gills are the striking characteristics of this species. Harper reports it from Neebish Island. It is also an inhabitant of the Adirondack Mountains,

where I have collected it. It seems to fruit preferably in the autumn and in dry weather.

239. Stropharia albonitens Fr. (Suspected)

Monographia, 1863.

Illustrations: Fries, Icones, Pl. 130, Fig. 2.
Ricken, Blätterpilze, Pl. 63, Fig. 3.

PILEUS 1-3 cm. broad, *campanulate,* then plane-subumbonate, with a *viscid* pellicle, *white to buff,* sometimes yellowish-tinged on disk, becoming gray on margin, shining when dry, glabrous, even. FLESH white, moist, thin. GILLS adnate becoming emarginate, *subdistant,* rather broad, ventricose, *gray to purplish-gray* then darker, edge minutely white-fimbriate. STEM elongated, 3-7 cm. long, 2-3 mm. thick, equal, stuffed with a white pith then hollow, whitish, *tinged yellow in age,* yellowish within, dry, pruinose or flocculose. ANNULUS superior, white, evanescent, soon colored by spores. SPORES 7-9 x 4-5 micr., elliptical, smooth, purple-brown in mass. CYSTIDIA. ODOR none.

On the ground in open, grassy woods. Ann Arbor. October.

Known by the gray color of the gills and the yellowish tinge to the stem in age.

240. Stropharia coronilla Bres. (Suspected)

Fung. Trid., Vol. I, 1881 (Fr., Syst. Myc., 1821).

Illustrations: Ricken, Blätterpilze, Pl. 63, Fig. 5.
Patouillard, Tab. Analyt., No. 232.
Cooke, Ill., Pl. 535.

PILEUS 2-4 cm. broad, convex-expanded, subviscid, even, *ochraceous-whitish,* glabrous, subpruinose when dry. FLESH white, rather thick. GILLS adnate, rounded behind or sinuate, ventricose, close, moderately broad, *fuscous-violaceous then purple-blackish,* edge white-fimbriate. STEM 3-4 cm. long, 3-5 mm. thick, equal or slightly tapering upward, stuffed then hollow, dry, white, minutely flocculose above the annulus, fibrillose below then shining. ANNULUS thickish-membranous, *persistent,* distant from apex, *striate above.* SPORES 8-9.5 x 4-5 micr., elliptic-ovate, violet-purple under microscope, smooth. CYSTIDIA short, broadly clavate, rounded but apiculate above. ODOR slight, unpleasant. On the ground in woods of white pine and beech. New Richmond. September. Infrequent.

This differs from *S. albonitens* in the strong violet color of gills and spores. The cap is more ochraceous and more convex. The gills are more crowded. This seems to be closely related to *S. melasperma* Fr., and the cystidia figured for that species by Patouillard (Tab. Analyt., No. 555) are characteristic of our specimens. *S. bilamellata* Pk. is a much larger plant, with larger spores, and the thick annulus has radiating gill-like ridges on its upper surface. (See Peck, Pl. 112, Fig. 5-10, N. Y. State Mus. Bull. 122, 1908 and Harper, Wis. Acad. Sci. Trans., Vol. 17, Pt. II, Pl. 65.)

***Growing on dung.*

241. Stropharia stercoraria Fr. (Edible)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 538.
Harper, Trans. Wis. Acad. Sci., Vol. 17, Pt. II, Pl. 67.

PILEUS 2-6 cm. broad, convex-hemispherical, *then broadly convex or subexpanded,* viscid from the separable, gelatinous pellicle, glabrous, even, *citron-yellow,* buff or whitish when dry, often stained by the spores. FLESH white or tinged yellow, thin on margin, soft. GILLS adnate at length subdecurrent, *very broad,* close, umber-fuscous to purplish-olivaceous or blackish, *edge white flocculose.* STEM 6-18 cm. long, 2-6 mm. thick, *elongated-cylindrical,* stuffed by white pith then hollow, base thicker, yellowish-white, covered up to the evanescent, narrow *annulus* by the floccose-scaly thin remains of a membranaceus veil. SPORES large, elongated-elliptical, 15-21 x 8-12 micr., variable in size, smooth, violet-purple under microscope, blackish-purple in mass. "CYSTIDIA *on the sides* and edge of the gills, lanceolate, 50-70 x 12-18 micr." (Ricken.) TASTE of pellicle slightly bitter.

On dung hills, manure piles or similar places; gregarious.

Throughout the State. May-October. Common, apparently more common than the next, at least in southern Michigan.

So close in appearance to *S. semiglobata* that they are difficult of easy separation. *S. stercoraria* is apparently almost limited to dung or manure, while the other has a wider range. It differs microscopic-

ally according to Ricken, by the presence of cystidia which occur also on the sides of the gills and which are absent in *S. semiglobata* except on the edge. The pileus of the latter is more persistently hemispherical. *A sterile form* has been observed, in every particular like the above, except that the gills remained pale yellow or straw-color; spores were lacking at full expansion of the pileus and the hymenium was composed of large, inflated, sterile cells in place of the basidia.

242. **Stropharia semiglobata** Fr. (EDIBLE)

Syst. Myc., 1821.

Illustrations: Cooke, Ill., Pl. 539.
Gillet, Champignons de France, No. 651.
Patouillard, Tab. Analyt., No. 234.
Ricken, Blätterpilze, Pl. 63, Fig. 2.
Atkinson, Mushrooms, Fig. 30, p. 31, 1900.
Hard, Mushrooms, Fig. 260, p. 320, 1908.
Murrill, Mycologia, Vol. 4, Pl. 56, Fig. 3.

PILEUS 1-4 cm. broad, *persistently hemispherical,* very viscid from the pellicle, glabrous and naked, even, citron-yellow, shining when dry, faded in age, stained purplish-black by spores. FLESH thick on disk, thin on margin, pallid, soft. GILLS broadly adnate, *very broad,* close to subdistant, olive-gray to purplish-brown, clouded blackish, edge minutely white floccose. STEM 5-12 cm. long, 2-5 mm. thick, subequal or cylindrical, straight, *hollow,* rigid, often viscid when young or fresh, covered below up to the narrow annulus by the thin, membranous, flocculose veil. SPORES elliptical, 15-18 x 9-10 micr., smooth, violet-purple under the microscope, brownish-purple in mass. CYSTIDIA *only on edge of gills,* short-filamentous, 30-45 x 3-4 micr. (Ricken.)

On dung hills and grassy places in the open. Probably throughout the State. May-October. Frequent.

See notes on the preceding.

243. **Stropharia umbonatescens** Pk. (SUSPECTED)

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

Illustrations: Harper, Wis. Acad. Sci. Trans., Vol. 7, Pt. II, Pl. 65, B.
Plate LI of this Report.

PILEUS 1-2.5 cm. broad, *conico-campanulate,* at length more or less mammilately umbonate, with a viscid pellicle, pale ochraceous-brownish or grayish on margin, *umbo bright ochraceous brown to reddish-brown,* even or obscurely substriate, shining, glabrous. FLESH thin, pallid. GILLS adnate to adnate-decurrent, *broad to subtriangular,* close, at first whitish then gray, finally purplish-brown to blackish. STEM 5-10 cm. long, slender, equal, stuffed then hollow, toughish, *pallid, tinged ochraceous,* covered at first by thin, obscure, scaly remnants of the veil up to the fugacious ANNULUS. SPORES 17-19 x 10 micr., elliptical, smooth, purple-brown under microscope, dark purplish in mass. ODOR *often strong of radish or foetid.*

Gregarious on dung hills or about manure heaps. September-October. Ann Arbor. Not infrequent.

Much more slender and with a thinner, smaller cap than the two preceding; also, the cap is very different in shape. Its rather foetid odor and large spores distinguish it from others. It is close to *S. paradoxa* P. Henn. in the shape of pileus and size of spores.

Section II. Spintrigeri. Pileus without a distinct pellicle, usually innately fibrillose, not viscid.

244. **Stropharia epimyces** (Pk.) Atk.

Plant World, Vol. X, Figs. 21-24, p. 121, 1907.
N. Y. State Mus. Rep. 35, 1884 (as *Panoeolus epimyces* Pk.).
Jour. Mycol., Vol. 8, 1902 (as *Stropharia coprinophila* Atk.).

Illustrations: Atkinson, Plant World.
Hard, Mushrooms, Fig. 227, p. 341, 1908 (as Panoeolus).
Miss Sherman, Jour. Mycol., Vol. II, Pl. 80, opp. p. 169, 1905 (as Panoeolus).

PILEUS 2-6 cm. broad, rarely larger, at first globose-oval, then convex-expanded, sometimes margin is elevated in age, silky-fibrillose, *white* then dingy, even, margin at times appendiculate. FLESH thick except the thin margin, white. GILLS narrowly adnate, rather narrow, broader in front, close, thin, grayish at first then blackish-brown, *edge white-fimbriate.* STEM 2-7 cm. long, 5-15 mm. thick, fleshy, equal or tapering upward, solid-stuffed then hollow, soft, flocculose-mealy, striate, *white-annulate near the base* from the white floccose-veil, often abruptly obconic at base where it is inserted in the depression (often volva-like) of the host mushroom. SPORES oval-elliptical, 7-8.5 x 3.5-5 micr., smooth, *dark purple-*

brown under microscope, almost black in mass. CYSTIDIA on sides and edge of gills, clavate or subventricose on a slender stalk, obtuse at apex, 40-60 x 10-14 micr., abundant on edge. BASIDIA 25-35 x 7-9 micr., 4-spored. ODOR and TASTE mild.

Parasitic, from one to seven on the host; on *Coprinus atramentarius* and *Coprinus comatus.*

Ann Arbor, Detroit, Port Huron. September-November. Infrequent.

This curious Agaric, like *Nyctalis asterophora* and the European *Volvaria loveiana,* seems to have no other home than on the foundation furnished by some species of another Agaric. Rumors have come to me that it occurs also on *C. micaceous,* but no specimens have been seen. It is distributed over northeastern North America, having been seen in the states of New York, Michigan, Wisconsin, Minnesota and by Dr. Pennington in Canada as far west as Winnipeg. It is a good Stropharia, although at first referred by Peck to Panoeolus with a suggestion that it might be put under Hypholoma. As Atkinson has shown (Plant World), the nature of the veil and annulus and the purple tinge to the spores are Stropharia characters. The host mushrooms are deformed and may not develop sufficiently to be recognized. Excellent specimens were received from Mr. A. W. Goodwin of Port Huron. Harper has pointed out (Mycologia, Vol. 5, p. 167) that the figures of an European species, *Pilosace algeriensis* Fr., by Lanzi (Fung. Mang., Pl. 67, Fig. 3) may represent our plant. An examination of these figures has convinced me that there is a probability that they illustrate our species. It remains very doubtful, however, whether Lanzi's plant when fresh had free gills. In any case, our plant is not a Pilosace, although collectors may disagree as to whether it is a Stropharia or a Hypholoma.

Hypholoma Fr.

(From the Greek, *hypha,* a web, and *loma,* a fringe; referring to the fringe left by veil on margin of pileus.)

Purple-brown-spored. Stem fleshy, confluent with the pileus; gills *adnate-seceding.* Veil *breaking away from the stem, leaving shreds or a silky border on the margin of the pileus,* flocculose-fibrillose. Margin of pileus at first incurved.

Putrescent fungi, growing on decaying wood or on the ground, often very caespitose around stumps or decayed roots of trees. The genus corresponds to Tricholoma of the white-spored group, in the lack of a true annulus and by the attached gills. Many of the Hypholomas are, however, much thinner and more fragile than the Tricholomas. It differs from Stropharia and Psalliota in that the veil which is cortinate remains as a fringe on the margin of the pileus instead of forming an annulus on the stem. It is more difficult to separate the thin-capped species from Psilocybe. The latter differs in some cases only in a relative sense. The cortina-like veil in Psilocybe is only very slightly developed and leaves no shreds on the margin of the pileus or on the surface as in the hygrophanous species of Hypholoma. An account of the development of *H. sublateritium* by Miss Allen (Ann. Myc., Vol. 4, p. 387, 1906) shows that the young button is surrounded by a universal veil. This is probably also true of the hygrophanous species where this outer veil often leaves flocculent particles on the surface of the young cap.

The genus is divided into two sections whose species are notably different in their general appearance and the texture of the flesh. In the first section the PILEUS is thick, compact and firm; in the second, it is rather thin, somewhat fragile and soft. The former have usually brighter colors, while the latter are brownish, gray or white. The GILLS vary much in color during the course of their development. This character is often used to separate the species, but is less reliable for the purpose than in the genus Cortinarius. The STEM is fleshy, and in the fragile forms it is soon hollow. The SPORES are elliptical except in *H. populina* Britz. var., where they are variously shaped. In *H. velutinum* and *H. rugocephalum* they are more or less tuberculate. Many species have CYSTIDIA on the sides of the gills, or sac-shaped sterile cells on the edge. The large fleshy ones are *edible,* although at times they develop a disagreeable bitter taste. This is thought by some to be due to the passage of the larvae of insects through the flesh; needless to say, such bitter plants should not be eaten. Of the thin ones, *H. incertum* and allied forms are much sought after.

Key to the Species

(A) Pileus firm, compact, not hygrophanous, dull reddish or yellow; caespitose.
  (a) Pileus dark brick-red, especially on disk.
    (b) Gills at first whitish. 245. *H. sublateritium* Fr.
    (bb) Gills at first yellow. 245. *H. sublateritium* var. *perplexum* Pk.
  (aa) Pileus yellow or yellowish; no red.
    (b) Gills at first sulphur-yellow, soon green. *H. fasciculare* Fr.
    (bb) Gills at first pallid, never with green shades.
      (c) Gills gray or smoky gray. *H. capnoides* Fr.

(cc) Gills purple-gray, at length coffee-brown; stem long-radicating. *H. epixanthium* Fr.
(AA) Pileus rather fragile, sometimes hygrophanous, rarely red or yellow.
(a) Pileus viscid, small, bay-brown. 246. *H. peckianum* sp. nov.
(aa) Pileus not or slightly viscid.
(b) Stem with a wine-colored juice when broken. 250. *H. vinosum* sp. nov.
(bb) Stem not with a colored juice.
(c) Pileus with innate hairy or fibrillose scales.
(d) Pileus 1-3 cm. broad, with umber-brown hairy scales; spores irregular; gregarious-scattered. 249. *H. populinum* Britz. var.
(dd) Pileus 3-10 cm. broad; caespitose.
(e) Pileus whitish, dotted with brownish scales. 247. *H. lachrymabundum* (Fr.) Quel.
(ee) Pileus tawny to yellowish; gills often beaded on edge. 248. *H. velutinum* (Fr.) Quel.
(cc) Pileus soon glabrous and naked.
(d) Pileus 6-10 cm. broad, rugose, subviscid. 251. *H. rugocephalum* Atk.
(dd) Pileus not over 6 cm. broad, hygrophanous.
(e) Growing on lawns, fields or other grassy places, rarely in woods; densely gregarious-subcaespitose. 252. *H. incertum* Pk.
(ee) In woods, swamps, thickets, etc.
(f) Caespitose around stumps, etc.
(g) Pileus when moist watery dark brown; gills at first grayish-brown; spores minute. 255 and 256. *H. hydrophilum* Fr.
(gg) Pileus when moist honey-brown; gills at first persistently whitish. 253. *H. appendiculatum* Fr.
(ff) Gregarious-scattered, singly; gills narrow.
(g) Pileus 4-7 cm. broad, umber-brown when moist; gills very narrow. 254. *H. coronatum* Fr.
(gg) Pileus 1-3 cm. broad, pale watery brown when moist; very fragile. 257. *H. saccharinophilum* Pk.
(ggg) Pileus 3-6 cm. broad; pale honey brown when moist; stem 5-10 cm. long. 252. *H. incertum* var. *sylvestris*.

Section I. Fascicularia. Pileus fleshy, naked and glabrous, *margin at first silky,* brightly colored, not hygrophanous.

**Large, caespitose: pileus not viscid.*

245. **Hypholoma sublateritium** Fr. (Edible)

Epicrisis, 1836-38.

Illustrations: Cooke, Ill., Pl. 577.
Gillet, Champignons de France, No. 357.
Atkinson, Mushrooms, Fig. 25, opp. p. 26, 1900.
Marshall, The Mushroom Book, Pl. 29, opp. p. 81, 1905.

Reddick, Ann. Rep. Geol. & Nat. Res. Ind. 32, p. 1231, Fig. 11, 1908.
Murrill, Mycologia, Vol. 1, (as *H. perplexum*).
Plate LI of this Report.

PILEUS 3-8 cm. broad, *firm,* convex-expanded, obtuse, *dark brick-red,* darker on disk, paler on margin, even, glabrous, naked except the decurved margin, which is white-silky from the veil. FLESH thick, *compact,* whitish, in age slightly yellowish. GILLS adnate, crowded, narrow, *at first whitish, then grayish to sooty-olive,* finally dark purplish-brown, edge minutely white-crenulate. STEM 8-12 cm. long, rather stout, 5-12 mm. thick, equal or attenuated downward, stuffed, whitish above, *ferruginous below,* floccose-fibrillose, glabrescent, ascending or curved from the crowded insertions. SPORES 6-7 x 3-4 micr., oblong-elliptical, smooth, purple-brown, blackish purple in mass. BASIDIA about 24 x 5 micr., 4-spored. CYSTIDIA few or scattered, obclavate with apiculate apex, 36 x 12 micr.; *sterile cells* on edge, shorter, inflated. ODOR none. TASTE mild or bitterish.

Very caespitose, forming large clusters in autumn, growing from the base of trees or stumps or on buried roots, etc.

August-November. Throughout the State. Very common.

Var. *perplexum* Pk. has the *gills yellow at first,* finally dark purple-brown, intermediate stage with olive tints. The STEM becomes hollow. The PILEUS has more yellow on the margin. SPORES etc. the same as in *H. sublateritium.*

This species is widely distributed and common in autumn. It is easily recognized by its dark brick-red cap, by the compact, thick flesh and caespitose habit. It is quite variable, and Peck seems to have based his species *H. perplexum* (N. Y. State Cab. Rep. 23, 1872) on such a variation. The conditions of weather, the nature of the wood and other factors no doubt produce some of these forms. An effort has been made by Peck, followed by McIlvaine (see the latter, p. 355, 1900) to provide a key for the separation of these two and of related European species. In the southern part of the state I have examined many clusters for the purpose of verifying this key but found that the mild or bitter taste, the stuffed or hollow stem, and the various shades of color which the gills possess during the process of maturing, were so variable and unreliable that no distinct species could be separated by them. I have not met the other European species: *H. capnoides, H. epixanthium* and *H. fasiculare,* which lack the *red* color of the pileus of our plants, and

all of which are described with caps colored some shade of yellow.

Our plant is *edible,* and is eaten by many with safety and relish. In Europe, the same species is said to be poisonous, and is so marked by Ricken in the latest, extensive work of that country.

***Pileus viscid.*

246. **Hypholoma peckianum** sp. nov.

PILEUS 1-2 cm. broad, convex, obtuse, subexpanded, *viscid,* glabrous, *bay-brown,* blackish on disk, paler on margin, even, margin bordered by white, silky fibrils from the veil. FLESH whitish, moderately thin, thicker on disk. GILLS adnate, rounded behind, 2-3 mm. broad, abruptly narrower in front, close, *at first flesh-colored* then dark purplish-brown, edge *white-fimbriate.* STEM 3-4 cm. long, 2-2.5 mm. thick, equal, white-floccose above, innately fibrillose elsewhere, *pallid to brownish,* brown within except the white pith, at length hollow, flexuous. SPORES 10-12 x 5-6 micr., ventricose-elliptical, pointed at ends, smooth, tinged purple under the microscope, purplish-brown in mass. CYSTIDIA none. STERILE CELLS on edge of gills, *clustered,* linear-cylindrical, obtuse, about 20 x 4 micr. BASIDIA subcylindrical, 30 x 6 micr., 4-spored. ODOR and TASTE none.

Scattered on debris of leaves and decayed wood in woods of hemlock, beech, maple, etc. New Richmond. September. Rare.

The viscid, dark-colored cap, the flesh-colored young gills and the small size, distinguish the species. The cortina is white and distinctly fibrillose.

Section II. Limbata. Pileus somewhat fleshy or thin, at first innately fibrillose or dotted with superficial floccose scales on the surface or margin.

This group approaches the genus Psilocybe, but the veil is always recognizable under favorable weather conditions by the series of floccose remnants which border the margin of the fresh pileus; in wind and rain these rapidly disappear. In most of the species the remnants of the veil are scattered over the surface of the very young pileus as superficial flocculent particles or minute scales; these usually disappear early. In other species the veil remains hanging to the margin of the pileus in an appendiculate manner.

**Pileus innately hairy, fibrillose-scaly or velvety.*

247. **Hypholoma lachrymabundum** (Fr.) Quel. (EDIBLE)

Syst. Myc., 1821 (Pro parte); Jura et. Vosges, 1872.
(See Maire, Soc. Myc. de France, Bull. 27, p. 441, 1911).

Illustrations: Fries, Icones, Pl. 134, Fig. 1.
Cooke, Ill., Pl. 543 (as *H. storea* var. *caespitosa*).
Quelet, Bull. Soc. Bot. France, Vol. 23, Pl. 2, Fig 5 (as *Stropharia cotonea*).
Plate LII of this Report.

PILEUS 4-10 cm. broad, convex then campanulate, obtuse or discoid, *ground-color whitish to buff,* then pale brownish-ochraceous, moist, covered except on disk by *scattered, rather large appressed brownish hairy scales,* paler on margin, not striate, margin at first incurved and appendiculate from the thickish, floccose-white veil, sometimes rugulose on disk. FLESH thick, thin on margin, firm, white. GILLS adnate-seceding, narrow, crowded, at first whitish, at length purplish-brown, edge white-flocculose, sometimes distilling bead-like drops. STEM 6-12 cm. long, 5-10 mm. thick, equal, hollow, striate above, fibrillose or subscaly below, glabrescent, *whitish* then sordid, base sometimes stained yellowish when bruised, white-mycelioid at base. SPORES 6-7.5 x 3-4 micr., elliptical, slightly curved, smooth, dark brownish-purple under microscope. CYSTIDIA on sides and edge of gills short, rather abundant, 30-40 x 12-15 micr., ventricose.

Densely caespitose at or about the base of trees, in beech, maple and birch woods of conifer regions. Bay View, Houghton. August-September. Rather rare.

This differs from *H. velutina* (which is the *H. lachrymabundum* of most books) in the whitish color, paler gills at first, the small spores and different cystidia. According to Maire (l. c.) the two species were originally combined by Fries, and later segregated by Quelet. It has been described under various names and much confusion has resulted. The unravelling of the tangle is due to Prof. Maire, with the result that the species ordinarily called *H. lachrymabundum* in this country is really *H. velutina. H. aggregatum* Pk. is in my opinion only a smaller form of the same plant. The gills of this species are rarely found "weeping," although in *H. velutina* they are usually "beaded with drops."

248. **Hypholoma velutinum** (Fr.) Quel. (EDIBLE)

Syst. Myc., 1821; Jura et. Vosges, 1872.
(See Maire, Soc. Myc. de France, Bull. 27, p. 144, 1911).

Illustrations: Cooke, Ill., Pl. 563.
Gillet, Champignons de France, No. 358.
Gillet, Champignons de France, No. 356 (as *H. lachrymabundum*).
Patouillard, Tab. Analyt., No. 117 (as *H. lachrymabundum*).
Berkeley, Outlines, Pl. 11, Fig. 2.
Atkinson, Mushrooms, Fig. 28, p. 29, 1900 (as *H. lachrymabundum*).
Hard, Mushrooms,. Figs. 263-264, pp. 325-326, 1908 (as *H. lachrymabundum*).
Plate LIII of this Report.

PILEUS 3-10 cm. broad, convex then broadly campanulate, sometimes obtusely umbonate, finally plane, at first covered by a hairy tomentum, *then appressed fibrillose-scaly,* not striate, *tawny to yellowish,* darker to umber on center, sometimes radially rugulose, margin at first appendiculate from the veil, at length split. FLESH thick on disk, soft, watery-brown to sordid yellowish. GILLS adnate-seceding, broad behind but sinuate, narrowed toward front, crowded, not reaching margin of pileus, *at first pale yellowish then umber* and dotted by spore masses, edge white-flocculose, *beaded with drops.* STEM 2-8 cm. long, variable in length, 4-10 mm. thick, equal, soon hollow, fibrillose to floccose-scaly and tawny up to the obsolete annulus, whitish above; *veil* soft-fibrillose, soon breaking, dingy, white, remnants clinging to the margin of the pileus. SPORES oval to broadly elliptical, 9-12 x 7 micr., *tuberculate,* dark purplish-umber under microscope. CYSTIDIA few or scattered on sides of gills, cylindrical, in groups of several, about 60 x 9-10 micr., abundant on edge, cylindrical-subcapitate, 45-55 x 6-7 micr. ODOR and TASTE earthy.

Caespitose, scattered or solitary on alluvial soil or swampy grounds in woods. Throughout the State. July-October. Frequent.

This is the *H. lachrymabundum* Fr. of most authors. See notes on the preceding. It is distinguished by its tawny or darker color, very characteristic, tuberculate spores and cylindrical cystidia. The gills usually distil drops from their edge in moist weather. These drops are often dark colored from the spores, hence Fries

remarks that the edge is "nigro-punctate." Peck (N. Y. State Mus. Bull. 150, p. 81, 1911) has given (under *H. lachrymabundum*) spore measurements which are misleading; and the rest of the description applies to extreme forms.

249. **Hypholoma populinum** Britz. var.

Bot. Centralbl., Vol. 77, p. 402, 1899.

PILEUS 1-2.5 cm. broad, convex to subcampanulate, obtuse, at length expanded, innately pilose-scaly, not striate, hygrophanous, *grayish-buff, scales umber-brown to purplish-brown,* fading to pale grayish-white, margin appendiculate at first from the veil. FLESH concolor, rather thin. GILLS adnate-seceding, rounded behind, moderately broad, close, thin, at first whitish, soon drab, then dark purplish-brown, edge white-fimbriate. STEM 2-4 cm. long, 1.5-2 mm. thick, equal, *white, dotted with fuscous, fibrillose scales,* stuffed then hollow, shining when dry, base submycelioid. VEIL membranaceus, white, soon disappearing. SPORES *variously shaped,* subtriangular, inequilateral-elliptical, subangular, etc., sometimes curved, 6-7.5 x 4.5 micr., dark purple-brown. CYSTIDIA clavate to obclavate, or subventricose, stalked, not abundant, 50-40 x 15-18 micr. ODOR none.

On very rotten wood, scattered; in frondose low woods or swamps. Ann Arbor, May-June and September. Infrequent.

Characterized by the peculiarly shaped spores, which are often the shape of corn-kernels, or are elliptical, curved or very irregular. Britzelmayr's species is much larger, the cap measuring 7 cm. across; his spores also are a little larger. It is probably a distinct species.

250. **Hypholoma vinosum** sp. nov.

PILEUS 5-20 mm. broad, fragile, convex, then companulate, subumbonate, *pulverulent-floccose,* velvety in appearance, *umber-colored,* obscurely tinged with purple, darker in center, dry, even, obscurely rugulose, margin appendiculate at first by pale fragments of the veil. FLESH thin, dingy-white, fragile. GILLS adnate, seceding, crowded, rounded behind, ventricose and rather broad, *bright vinaceous-umber* (Sacc.) finally dark umber, edge entire. STEM 2-4 cm. long, 1-2 mm. thick, equal, except enlarged base, straight, slender, hollow, *vinaceous-umber, color persisting,* pulverulent like pileus, *with a slight purplish juice when broken* in the fresh condition. SPORES minute, 5-6 x 2.5-3 micr., oblong, smooth, obtuse

at ends, purplish-black in mass, pale under microscope. CYSTIDIA none.

On very decayed wood, or logs in mixed woods of hemlock and beech, etc. Bay View, New Richmond. August-September. Infrequent.

This striking little Hypholoma is known by its tinge of dark wine-color mixed with umber, the purplish watery juice of the stem and the minute spores. The trama of the gills and pileus is composed of large, inflated cells, 75-90 x 20 micr., and the surface layer of the pileus of globose cells, several rows thick, up to 30 micr. diameter, tinged smoky vinaceous. When fresh and young it is provided with a thin, evanescent veil, which sometimes forms a slight ring on the stem, and which soon disappears. It has no relationships to such plants as *Lepiota haematosperma* (Fr.) Bres. and *Armillaria haematites* Berk. & Br. which are much stouter plants, have whitish or red-tinged spores, and well developed annulus. It approaches more closely *Psalliota echinata* Fr., but the gills are not free, and the trama is composed of larger cells. The pileus never has pointed scales, and is differently colored. The base of the stem is slightly bulbous.

***Pileus glabrous, rugose, not hygrophanous.*

251. **Hypholoma rugocephalum** Atk. (Probably Edible)

Mushrooms, 1900.

Illustration: Ibid, Pl. 8, Fig. 29, opp. p. 30.

PILEUS 6-10 cm. broad, convex-expanded to plane, the margin at length elevated, broadly umbonate, *strongly radiately rugulose,* moist or subviscid, glabrous, watery brown to tawny, then alutaceus-tan. FLESH thick on disk, thin on margin, tinged yellowish. GILLS adnate, seceding, rounded behind or sinuate, moderately close, rather broad, 5-7 mm., *black-sprinkled,* edge white-fimbriate. STEM 8-12 cm. long, 6-10 mm. thick, equal, subbulbous, even, glabrous, hollow, concolor below, paler above, subannulate by obscure threads of the veil, marked by the blackish stain from the spores. SPORES 9-11 x 6-8 micr., ventricose-elliptical, abruptly pointed at both ends, *minutely tuberculate,* inequilateral, dark purple brown, black in mass. CYSTIDIA on sides of gills cylindrical, enlarged at apex, clustered, hyaline; on edge narrowly flask-shaped. ODOR and TASTE mild.

On the ground, subcaespitose or gregarious, in low or swampy frondose woods. Ann Arbor, South Haven, New Richmond. July-September. Not infrequent.

This species approaches *H. velutinum* in the character of the spore-surface and habit, the cap lacks the fibrillose covering of that species. The shape of the spores is distinctive.

*** *Pileus hygrophanous, at the first dotted with superficial flocculent particles or scales, glabrescent.*

252. **Hypholoma incertum** Pk. (Edible)

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

Illustrations: N. Y. State Mus. Bull. 25, Pl. 58, Fig. 13-20, 1899.
N. Y. State Mus. Mem. 4, Pl. 60, Fig. 1-9, 1900.
Marshall, The Mushroom Book, Pl. 28, opp. p. 80, 1905.
Atkinson, Mushrooms, Pl. 7, Fig. 26 and 27, p. 27, 1900.
Hard, Mushrooms, Pl. 37, Fig. 262, p. 324, 1908.
Murrill, Mycologia, Vol. 4, Pl. 56, Fig. 1 (as *H. appendiculatum*).
Plate LIV of this Report.

PILEUS 3-7 cm. broad, *fragile,* at first oval, obtuse, then broadly campanulate to expanded, at length split radially, hygrophanous, *pale honey-yellowish,* then buff to white as moisture disappears, white-flocculent or at length glabrous, even or slightly wrinkled when dry, the margin at first hung with loose shreds of the veil, *in age often violaceous, lilac towards margin.* FLESH thin, white. GILLS adnate-seceding, narrow, almost linear, thin, close, *at first white,* then pale dingy lilac or rosy-brown, finally purplish or darker, edge minutely white-fimbriate. STEM 3-8 cm. long, 3-6 mm. thick, rather slender, equal, hollow, subrigid, easily splitting lengthwise, even, *white,* innately silky, flocculose or mealy above. SPORES 7-8 x 4 micr., elliptic-oblong, obtuse, smooth, purple brown in mass. CYSTIDIA none on sides of gills. STERILE CELLS sac-shaped, i. e. inflated above, obtuse, 30-40 x 12-15 micr. BASIDIA 32 x 9 micr., short-clavate. ODOR and TASTE agreeable.

Densely gregarious or subcaespitose, sometimes scattered, among grass on lawns, roadsides, fields or rarely in woods among sticks and debris, nearly always around old stumps or buried remains of stumps, roots or decayed wood; sometimes in greenhouses.

Throughout the State. May to September. (Earliest record May 30.) Very common during rainy seasons in early summer.

This is probably the American form of *H. candolleanum* Fr. The single phrase, "gills at first violaceous," in Fries' description deterred Peck from referring it there. Ricken says "gills at first white, then sordid-rosy or violaceous"; this gives the gill-colors of the European plant without a doubt, and this condition is not much different from that in our plants. As in *H. sublateritium,* the gill-color varies somewhat with the conditions surrounding the development of the plant. Because of the abundance of individuals usually found in a patch, its well-known edibility makes it a plant much sought after. Although the caps are thin, the meat is crisp and of delicate flavor and it often grows at our very doors in the grass over some old hidden remains of a stump. This is also presumably the *H. appendiculatum* of many American authors.

A *variety* occurs in the woods, which only differs in that the plants are mostly *solitary* and long-stemmed, scattered here and there among decayed sticks or leaves; its spores are perhaps slightly longer and slightly variable in shape, but otherwise it is very similar. It may be called var. *sylvestris.*

Illustrations of *H. candolleanum* Fr.
Cooke, Ill., Pl. 546.
Gillet, Champignons de France, No. 352 (as *H. appendiculatum*).
Ricken, Blätterpilze, Pl. 64, Fig. 4.
Patouillard, Tab. Analyt., No. 350.

253. Hypholoma appendiculatum Fr. (Edible)

Epicrisis, 1836-38.

Illustrations: Ricken, Blätterpilze, Pl. 64, Fig. 5.
Patouillard, Tab. Analyt., No. 349 (faded condition).

"PILEUS 2-4 cm. broad, campanulate-hemispherical, hygrophanous, *dark-honey-brown* (moist) isabelline to ochraceous (dry), with a dull luster, *naked, but at first floccose or fibrillose on the surface or appendiculate from the white veil,* slightly wrinkled and almost atomate when dry. FLESH thin, pallid. GILLS broadly adnate, ascending, crowded, 6-7 mm. *broad,* almost equal in width, *at first and a long time whitish, then grayish-purplish,* at length purple-brown. STEM 5-10 cm. long, 3-6 mm. thick, fragile, narrowed upwards, often elongated, mostly curved worm-like, undulate, *white,* silky-shining above, apex mealy and striate, rarely with loose shreds forming a temporary ring. VEIL white, floccose-membranous, at first uniting the margin of the pileus with the stem, *very soon disappearing.* SPORES almost cylindrical-elliptical, 9-11 x 4-5 micr., smooth, red-brown under microscope. CYSTIDIA almost lanceolate, on sides and edge of gills, 40-45 x 10-13 micr."

"*Caespitose,* in beech woods on leaves and about stumps."

The description is adapted from Ricken's Blätterpilze. This species has been much discussed, and is reported in most American books. The pileus is brown when moist according to most European authors and occurs in the forests where it forms caespitose tufts. I have not been able to distinguish it in the southern part of the state, but have given a description from the most recent work on European Agarics, for the sake of comparison.

254. Hypholoma coronatum Fr.

Hymen. Europ., 1881.

Illustration: Fries, Icones, Pl. 134, Fig. 3.

PILEUS 4-7 cm. broad, *fragile,* at first oval, then convex-campanulate, hygrophanous, obtuse or subumbonate, *umber-brown on disk,* gradually paler toward margin, *whitish-tan or pale alutaceous when dry,* disk often retaining an umber shade and *at length blackish stained in spots,* at first dotted with white, flocculent, superficial scales, *soon denuded,* even or obscurely wrinkled on margin, margin hung by remains of veil in a dentiform manner. FLESH thin, *concolor.* GILLS narrowly adnate, seceding, *very narrow,* crowded, at first dingy-white, soon pale lilaceous-brown, *then umber-colored,* edge minutely white-fimbriate. STEM 5-7 cm. long, rather slender, 3-4 mm. thick, *tapering upward* or subequal, hollow, slightly toughish, *white,* dingy in age, often innately flocculose-scaly then glabrescent and *shining,* even, sometimes subcompressed. SPORES elliptical, 6-7 x 4 micr., smooth, purplish-brown. CYSTIDIA none. STERILE CELLS on edge of gills, broadly cylindrical, obtuse, abruptly short-stipitate, 36 x 10 micr. ODOR and TASTE pleasant.

Gregarious or scattered, attached to leaf-mould, fallen leaves and very rotten wood. Ann Arbor. July-August. Rare.

This differs from the solitary form of *H. incertum,* which also occurs in woods, by the umber color of the entire very young pileus

which has evanescent white-floccose scales sprinkled over it, and in the less roseate hue of the gills in the intermediate stage. It has the size and shape of *H. incertum*. The margin of cap does not become violaceous-tinged in age. Fries says "caespitose" in habit, and to that extent our plant is a variety.

255. Hypholma hydrophilum Fr. (sense of Ricken) (SUSPECTED)

Epicrisis, 1836-38. (Hymen. Europ. as Bolbitius.)

Illustration: Ricken, Blätterpilze, Pl. 64, Fig. 6.

PILEUS 2-6 cm. broad, fragile, campanulate-convex, then expanded, watery *cinnamon-brown to chestnut-brown when moist*, hygrophanous, ochraceous-buff when dry, even or pellucid-substriate on margin, often wavy, *margined with a delicate, superficial, white, silky border* which represents the remains of the veil. FLESH thin, *concolor*. GILLS adnate-seceding, thin, ventricose, not broad, crowded, *at first grayish-brown, then purplish-umber or dark brown*, edge minutely white-fimbriate when young. STEM 4-6 cm. long, 3-6 mm. thick, equal, hollow, splitting, elastic, *glabrous* except the pruinose apex, *shining-white*, undulate, base mycelioid. SPORES 5-6 x 2.5-3 micr., *minute*, smooth, pale purplish-brown under microscope. CYSTIDIA few or none. STERILE CELLS on edge of gills inflated-saccate, short, 30-8 micr. ODOR and TASTE none.

Caespitose in extensive clusters on or near stumps and decayed wood, or at base of living trees. Ann Arbor, New Richmond, (probably throughout the State).

September-November. Not infrequent.

Fries says it distills drops of moisture along the edge of the gills, but this is rare in our climate, although it does occur. It is a very fragile plant, with a white stem and a watery-brown cap which fades quickly in the wind as the moisture escapes. Its minute spores distinguish it, although European authors are not agreed on the spore size. Ricken and Massee give them as above. Saccardo seems to be in error, or there may be two closely allied plants as with us. We have another species, which is almost like it.

256. Hypholoma hydrophilum Fr. (sense of Saccardo)

This differs from the preceding as follows: PILEUS at first sprinkled over its surface with white, floccose particles or minute

scales, even on margin when moist. STEM fibrillose-flocculose, glabrescent. SPORES 7-8 x 4-5 micr., slightly unequally elliptical. CYSTIDIA on sides of gills scattered to somewhat numerous, ventricose-sublanceolate but obtuse, about 50 micr. long. STERILE CELLS pyriform-inflated, numerous on edge of gills.

In large or small tufts about logs, stumps, etc., in swampy woods. June-July. Ann Arbor, Detroit, Bay View. Not infrequent.

This may be *Psilocybe polycephala* (Paul.) (see N. Y. State Mus. Bull. 157, p. 98, Pl. 127, Fig. 1-9, 1912), which it approaches very closely. It is not *Psilocybe spadicea* and does not appear to be closely related to it. It is close to *H. hydrophilum* with which it agrees except in the points mentioned. Cooke's figure (Ill., Pl. 1157) which is doubtfully referred to *H. instratum* Britz. is perhaps the same; at least it is not Britzelmayr's plant which has rounded-triangular spores.

257. Hypholoma saccharinophilum Pk.

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

PILEUS 1-3 cm. broad, *fragile*, obtuse, ovate at first, then campanulate to plane, pale watery-brown and *even* when moist, pallid-ochraceous when dry, hygrophanous, *in age assuming a livid-gray or watery-soaked appearance when remoistened*, at first sprinkled with white flecks or flocculent scales, glabrescent and subatomate. FLESH soft, thin. GILLS adnate-seceding, narrow, sublinear or subventricose, close, white at first, slowly becoming pinkish to fuscous-purplish, edge white-fimbriate. STEM 3-7 cm. thick, *fragile*, subequal, undulate, white, silky-fibrillose, pruinose-floccose at apex, hollow, even, subbulbillate at base with radiating mycelium. VEIL delicate, flocculose-fibrillose, white, evanescent. SPORES 6-7 x 3-4.5 micr., elliptical-oblong, smooth, obtuse, purplish-brown in mass, pale under microscope. CYSTIDIA none on sides of gills. STERILE CELLS on edge, large, undulate-cylindrical, abundant, broadly obtuse, 40-50 x 9-11 micr.

Gregarious or scattered, attached to sticks, humus, decaying leaves and wood in low swampy woods of maple, elm, poplar, etc. Ann Arbor. July-August. Frequent.

Although this species was rejected by Peck in his monograph of the New York species (Bull. 150, 1911) it is revived here to supply a name for our species. The cap is characterized by its non-striate margin, and by its peculiar change in color when mature

and when it again becomes moist. On drying the cap finally becomes grayish-white; mature specimens during wet weather assume a livid-gray appearance, which is also the case when kept moist in a box after collecting. It is a rather small, unimportant plant of swamps where it is sometimes plentiful.

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., 1821.

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 4-4.5 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, 10-12 x 5-6.5 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 30 x 10-12 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. Stem and pileus when young flocculose or fibrillose from the universal veil.

261. Psathyra semivestita Berk. and Br.

Ann. 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 subtriangular, 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, 9-12 x 5-6 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, 24 x 9-10 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. foenisecii* 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,* 14-17 x 7-8 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 8 x 5 micr.; W. G. Smith, 9 x 6 micr.; Ricken, 12-13 x 7-9 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, 6-7 x 4-5 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 3-4 cm. long, 1-2 mm. thick, slender, hollow, equal or tapering downward, obscurely flocculose-fibrillose, glabrescent, *rufous-bay color through-*

out. SPORES 5-8 x 4-5.5 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.) Battaille

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, 3-4 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, 3-4 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, 8-9.5 x 4-5 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 1-4 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, 6-7 x 3-4 micr., smooth, purple-brown under microscope. CYSTIDIA none. STERILE CELLS on edge of gills, short, subsaccate, 25 x 7 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 2-4 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-mealy, base with white mycelium. SPORES suboblong, subelliptical, slightly inequilateral, 6-7 x 3-4 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,* 13-18 x 8-10 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, 7-9 x 4-5 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, 9-12 x 3-4.5 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, 50-70 x 10-12 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 x 3-4 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, 3 x 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. III, 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 3-4, 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. luteofolia* 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. erinaceella* 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 subviscid, 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 stem 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 mm. 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 *obsurely* 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. squarrrosa*. 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 Longyear, 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 2-4 cm. long, 3-4 mm. thick, *curved,* stuffed then hollow, tawny, *floccose-fibrillose or granular scaly* up to the fugacious ANNULUS. SPORES short elliptical, 6-7 x 3-4 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 3-10 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, 4 x 2 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, 7-8 x 5 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 æruginosa 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 cm. 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. SPORES 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 6-7 x 4-5 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. Trans., 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, 7-9 x 5-6 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,* dark reddish-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, 7-8.5 x 4-5 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 7-8 x 3-4 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 7-8 x 4 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 8-10 x 5-6 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, subannular 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 moist 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 stem 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. e., 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, Phlegmacium 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. sphoerosperma* 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. purpureophyllus* 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. rubens* 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. olivaceo-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. mucifluus* 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* Kauff.
(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. iodeoides* 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. croceocolor* 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. pholideus* 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. caninus* 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. erugatus* 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. aureifolius* Pk.
(oo) Spores 6-7 micr. long; pileus cinnamon; gills saffron-yellow to orange. 406. *C. croceofolius* 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. III, 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, adnate 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 bands 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