

QH

1

.I59

vol.14

no.1

1931

Polyporaceae of Iowa

M. M. Wolf

Iowa

505

Iog

v.14, no.1

IOWA STATE LIBRARY
DES MOINES, IOWA

#1-84t.f.
comp

New Series No. 213

October 15, 1931

UNIVERSITY OF IOWA STUDIES

STUDIES IN NATURAL HISTORY

Volume XIV

Number 1

THE POLYPORACEAE OF IOWA

by

MARGARET M. WOLF

Published by the University, Iowa City, Iowa

Issued semi-monthly throughout the year. Entered at the post office at Iowa City, Iowa, as second class matter under the Act of October 3, 1917.

Iowa
25
9
17, no. 1

Iowa

505

109

v. 14, no. 1

Wolf

Polyporaceae of Iowa

pam.

TRAVELING LIBRARY

OF THE STATE OF IOWA

To communities, and schools, books for reloaning are loaned for a three month's period. To individuals and to clubs for study use, books are loaned for two to four weeks.

Borrowers are requested to return the books as soon as the need for them is passed, and *always* when books are due. Where books are re-loaned, fines may be charged by the *local* library and *retained* when the books are returned.

DAMAGES. The pages of these books must not be marked and librarians are required to note the condition of books when loaned to borrowers and when returned by such borrowers and to report damages beyond reasonable wear to the State Traveling Library.

JUN-9 '61

Jun 7 '61

23924-1

UNIVERSITY OF IOWA STUDIES IN NATURAL HISTORY

HENRY FREDERICK WICKHAM, Editor

Volume XIV

Number 1

THE POLYPORACEAE OF IOWA

by

MARGARET M. WOLF

TRAVELING LIBRARY
STATE OF IOWA

Published by the University, Iowa City, Iowa

October, 1931

Iowa
505
109
v. 14,
no. 1

THE POLYPORACEAE OF IOWA

The Polyporaceae includes those Hymenomycetes in which the hymenial layer covers the surface of pores, pits or anastomosing folds. These may be cylindric hollow tubes, honeycomb-like pores, anastomosing passages or, rarely, concentric or radiating lamellae. The sporophore may be sessile or stipitate, if sessile, appanate or resupinate; it may vary in texture from fleshy to coriaceous, corky, woody, membranous or even gelatinous. The basidia are usually four spored, and the spores vary in size, form and color. The fructification may be either annual or perennial.

The fungi belonging to the family Polyporaceae include a large number of wood-rotting species, ranging from purely saprophytic forms through nearly all degrees of parasitism. They may be found inhabiting stumps, logs, fallen tree trunks, piers and posts, as well as growing on the ground, and a number attack structural timbers. Once the mycelium becomes established, the fungus spreads and the wood is gradually digested, thus parasitic species may cause the death of living trees.

The mycological herbarium of the State University of Iowa contains the collection on which the following study was based. This material has been accumulating during a period of over forty years and includes all of the common species represented in the state as well as a number of the rarer species. The collections contain numerous specimens gathered by Professor Thomas H. Macbride and Professor Bohumil Shimek, dating back to the '80's, and more recent collections made by Professor George W. Martin and others associated with him in mycological work. These specimens were studied, and the determinations checked; careful drawings were made of spores and other characteristic structures. Undetermined specimens were also studied and named by the writer wherever possible. Species previously reported from Iowa but not contained in the herbarium have been included in the keys.

This study was suggested by Professor George W. Martin, and the work was carried on under his direction in the Department of Botany of the State University of Iowa.

Overholts' Polyporaceae of the Middle-Western United States(34) is the most useful treatment of the polypores occurring in the region of which Iowa is a part, and this work has been drawn upon freely in the preparation of the present paper. The genus *Poria* and the Boleteae, not treated by Overholts in his paper, are included in the present work. Other papers which have been used extensively are Macbride, Saprophytic Fungi of Eastern Iowa(20), one of the first papers on the Polyporaceae of Iowa; Burt, *Merulius* in North America(5); Murrill, Northern Polypores(27), American Boletes(28), and North American Flora, Vol. 9(26); Overholts, Species of *Poria* described by Peck(37); Neuman, Polyporaceae of Wisconsin(32); Fennell, The Polyporaceae of Iowa(8). Other references are cited in the bibliography.

The family is a large one and includes diversified forms. It is to some extent artificial, containing species which merge with the agarics through *Lenzites* on the one hand, and on the other with the Hydnaceae as represented by *Phlebia*, which may be regarded as closely related to *Merulius*.

In studying microscopic characters of spores, setae, cystidia and hyphae, free-hand sections were made and transferred directly to the slide into a drop of Amann's medium which had the effect of expanding the hyphae to their normal size. In most cases the sections were cut dry but in some cases the piece to be sectioned was first moistened with alcohol and water.

Drawings were all made to a common magnification (x1675) using the camera lucida with Zeiss $\frac{1}{12}$ " oil immersion objective and 10x ocular.

The family is here divided into the four natural tribes: Merulieae, Fistulineae, Polyporeae, and Boleteae. The tribes, Merulieae and Fistulineae are represented each by a single genus, *Merulius* and *Fistulina* respectively. The largest tribe, Polyporeae, contains the greatest number of genera, eleven in all, as follows: *Poria*, *Gloeoporus*, *Trametes*, *Cyclomyces*, *Lenzites*, *Daedalea*, *Favolus*, *Ganoderma*, *Fomes*, *Polystictus*,

Polyporus. The tribe Boleteae contains three commonly accepted genera: Boletus, Boletinus, and Strobilomyces.

The genus Solenia is sometimes included in the Polyporaceae but since its relationship seems rather to be with the Thelephoraceae, following Burt(4) it is here excluded.

KEY TO TRIBES OF POLYPORACEAE

- a. Hymenium not distinctly poroid, borne on the surface of shallow pits, or weak, anastomosing veins or folds.....I. Merulieae
- a. Hymenium distinctly poroid, or covering lacerated teeth, or concentric or radiating anastomosing lamellae.....b
 - b. Hymenial cavities tubular, each tube separate and distinct from every otherII. Fistulineae
 - b. Tubes firmly grown together.....c
- c. Hymenophore tough or woody, rarely fleshy; tubes usually not separable as a layer from the context.....III. Polyporeae
- c. Hymenophore fleshy throughout, putrescent; tubes usually separable in a layer from the context.....IV. Boleteae

Tribe I. Merulieae

Sporophore resupinate or reflexed; hymenial layer shallow pitted, at first with a moldy appearance; the pits formed by soft low anastomosing folds.

A single genus.

GENUS MERULIUS Haller ex Fr.

Sporophore soft and watery to dry and coriaceous; resupinate or sometimes dimidiate or effused-reflexed when best developed; epixylous, rarely on earth or brick walls; hymenophore gelatinous, sub-gelatinous, waxy, membranaceous or floccose, consisting of anastomosing folds forming shallow, irregular and often sinuous pores, sometimes obsoletely toothed, especially on drying; edges of pits or pores fertile; spores white to ochraceous; basidia simple.

KEY TO SPECIES OF MERULIUS

- a. Fructification always resupinateb
- a. Fructification effused-reflexed when best developed but sometimes occurring resupinatec
 - b. Fructification adnate; drying ochraceous cream-buff to pinkish buff, rarely paler, often cracking and flaking away; pores 4-6 per mm.; spores hyaline1. *M. ceracellus*
 - b. Fructification not adnate, but separable from the substratum; hymenium drying very dark brown, Brussels brown to bone-brown, with folds becoming raduloid teeth on an inclined

- surface; pores 1-1.5 mm. in diameter; spores dark brown in spore collection, $9 \times 6 \mu$ ----- 2. *M. americanus*
- c. Spores ferruginous or ochraceous in mass; fructification large, 2-10 mm. or more thick when fresh, spongy-fleshy; hyaline and colored hyphae in subhymenial layer, spores citron-yellow under microscope ----- 3. *M. lacrymans*
- c. Spores hyaline ----- d
- d. Fructification fleshy tremellose when fresh, or walls of hyphae of subhymenial layer gelatinously modified ----- e
- d. Fructification not fleshy tremellose when fresh ----- g
- e. Fructification with subhymenial layer having walls of its hyphae gelatinously modified, but thin and somewhat pliant when dry; no cystidia; spores $4-5 \times 2-2.5 \mu$ ----- 4. *M. ambiguus*
- e. Fructification fleshy tremellose; drying hard and horny so that it requires several minutes to absorb water ----- f
- f. Hymenium dark garnet red, sometimes flesh-pink -----
- 5. *M. incarnatus*
- f. Hymenium not dark garnet red but ruddy, somewhat translucent, drying cinnamon-buff and prussian-red ----- 6. *M. tremellosus*
- g. Hyphae of subhymenial layer incrustated; fructification coriaceous, soft, reflexed portion tomentose, concentrically sulcate when broadly reflexed, white to pallid neutral gray; spores $4.5-5 \times 2.5 \mu$ -----
- 7. *M. confluens*
- g. Hyphae not incrustated, reflexed portion white, villose, soft, thin; pores drying pinkish-buff to cinnamon; about 3 per mm.; spores $4.5-5 \times 1.7-2.5 \mu$ ----- 8. *M. corium*

1. *M. ceracellus* Berk. and Curtis

Fig. 1

Fructification entirely resupinate, adnate, thin, margin thin, whitish, 2-5 cm. long, 1-2 cm. broad; hymenium drying ochraceous cream-buff to pinkish buff, rarely paler, even at first, becoming minutely pitted, pores 4-6 per mm., very shallow, forming more or less anastomosing folds, cracking and sometimes flaking away from substratum on drying; subiculum cotton-like, very thin, $60-200 \mu$, folds projecting 140μ ; hyphae hyaline, interwoven, $2-3 \mu$ in diameter, not incrustated, not usually nodose septate; cystidia none; spores hyaline, smooth, $4-4.5 \times 1.5-2 \mu$.

On under side of decaying limbs of oak, linden, and other deciduous trees.

Our specimens agree in every point except that in some there are clamp connections on the hyphae.

2. *M. americanus* Burt

Fig. 2

Fructification resupinate, effused, membranous, thin, fragile, separable, dry, drying dark brown; margin thin, 3-15 cm. in diameter; hymenial layer gyrose-porose, folds growing out into raduloid teeth on an inclined surface; pores 1-1.5 mm. in diameter, up to 1.5 mm. deep; subiculum of two layers, one next to the substratum composed of loosely interwoven, rigid, nodose-septate, colored hyphae 4.5-6 μ in diameter, and hyaline sometimes granular-incrusted hyphae intermixed, the other layer narrow, bearing the hymenium, composed of densely arranged hyaline or nearly hyaline hyphae; cystidia none; spores yellowish-brown, smooth, 9 x 6 μ .

Coniferous logs and boards in moist places. Rarely on deciduous wood. Common.

3. *M. lacrymans* Wulfen ex Fries

Fig. 3

Fructification resupinate, effused-reflexed, or producing large stalked tubercles from a median placenta, thick, large, spongy-fleshy, moist, yellow-ferruginous, drying dark brown to warm sepia, margin tomentose, white; 8-15 cm. in diameter, up to 1 cm. or more thick when fresh; hymenium porose, gyrose-dentate, pores large, 1-2 mm. in diameter, up to 2 mm. deep, dissepiments later growing into raduloid teeth; subiculum 2-10 mm. thick, densely interwoven, hyphae nodose-septate, either colored like spores or hyaline, thick-walled, 5-6 μ in diameter, or hyaline, 3.5-4.5 μ , septate with clamp connections; cystidia none; spores citron-yellow under microscope, warm sepia in spore collection, smooth, elliptical, 9-10 x 5-6 μ , somewhat flattened on one side, 1-guttulate.

On coniferous logs, or structural timbers. Rarely on stumps, or on the ground. Rare. The collections so reported seem usually to be *M. americanus*.

4. *M. ambiguus* Berkeley

Fructification orbicular, sometimes resupinate, usually narrowly reflexed, coriaceous-soft, tomentose, often concentrically sulcate, whitish to smoke-gray when dry, 2-6 cm. broad; hymenial layer tawny olive to Rood's brown when dry, folds

radiate, flexuous and branching, later transversely connected and forming shallow, angular pores about 1 x 0.5 mm.; subiculum of two layers, the layer next to substratum composed of loosely interwoven hyaline hyphae, 50-100 μ thick, and a gelatinous, broader layer bearing hymenium; spores hyaline, smooth, 4-5 x 2-2.5 μ .

On coniferous logs.

This species is reported from Iowa by Fennell. No specimen, however, is contained in the State University of Iowa Herbarium.

5. *M. incarnatus* Schw.

Fig. 4

Fructification effused-reflexed, fleshy tremellose, reflexed portion tomentose, pallid with age; hymenial layer flesh pink to garnet red, in Ridgway as garnet brown and Hessian brown, pores radially elongated, transversely venose and subdivided into smaller angular pores; subiculum 0.5-2 mm. thick, composed of hyaline septate hyphae, 2.5-5 μ in diameter, with clamp connections; spores hyaline, smooth, 1 x 3-4 μ ; cystidia incrusted or unincrusted if present, 5-7 μ broad, projecting 10-25 μ .

On stumps and logs of deciduous trees.

6. *M. tremellosus* Schrader

Fig. 5

Fructification resupinate, reflexed, or effused-reflexed, fleshy-tremellose, upper surface tomentose, white, 2-6 cm. in diameter, reflexed margin up to 1.5 cm. broad, sometimes imbricate; hymenial layer ruddy, somewhat translucent, cinnamon-buff to Prussian red (Ridg.) when dry, pores shallow to rather deep, radially elongated, 1-1.5 x 0.5 mm., transversely venose, finally subdivided into smaller, equal, angular pores; subiculum 0.5-2 mm. thick, composed of a layer next to substratum, of loosely interwoven hyphae, 3-4 μ in diameter, and a broad gelatinous layer, composed of densely arranged, parallel, hyaline hyphae with walls gelatinously modified; cystidia incrusted or unincrusted, sparingly present, 3.5-4.5 μ in diameter, projecting 15-25 μ above basidia; spores hyaline, smooth, allantoid, 3-4 x 0.5-1 μ .

On decaying logs and stumps of deciduous trees, rarely on coniferous logs. Very common.

7. *M. confluens* Schw.

Fig. 7

Fructification resupinate, longitudinally effused, coriaceous, soft, thin, margin free, inflexed, subtomentose, shallowly concentrically sulcate when broadly reflexed, white to pallid or gray when dry, 1-4 cm. in diameter, 4-10 cm. long, usually laterally confluent on a horizontal surface, reflexed portion 1-10 mm. broad; hymenial layer drying pinkish cinnamon to pecan-brown, reticulately porose, shallow, 2-4 pores per mm., 300-500 μ thick, of loosely interwoven hyaline hyphae near the hymenium; subiculum composed of loosely interwoven hyaline hyphae, 3-5 μ in diameter, incrustated near the hymenium; cystidia none; spores hyaline, smooth, cylindric, flattened on one side, 4.5-5 x 1-2.5 μ .

On bark of dead branches of alder, rare on conifers.

8. *M. corium* Fr.

Fig. 8

Fructification resupinate, effused, coriaceous, thin, margin finally free, reflexed, surface of reflexed portion villous, white; hymenium reticulately porose, drying pinkish buff to cinnamon, 1-4 cm. in diameter to 6 cm. long; pores about 3 per mm., shallow; subiculum 300-500 μ thick, composed of loosely interwoven hyaline hyphae 3-4 μ in diameter, hyphae not incrustated, with no clamp connections; no cystidia; spores hyaline, smooth, cylindric, 4.5-5 x 1.7-2.5 μ .

Rare.

Tribe II. **Fistulineae**

Sporophore at first verrucose on lower surface, the warts later developing into peg-like tubes which are open at the lower end, hymenium lining the inner surface of the tubes, each tube being distinct from the others; context soft and watery; basidia with four sterigmata; spores brown.

A single genus.

GENUS *FISTULINA* (Bull.) Fr.

Hymenophore composed of cylindric tubes on the lower sur-

face of a fleshy pileus; tubes remain free from each other, pileus somewhat fleshy.

A single species in Iowa.

1. *F. hepatica* (Huds.) Fr.

Pileus dimidiate, or subspathulate, substipitate or attached by a broad base; thick, fleshy, soft, surface somewhat viscid, fibrous, variegated to blood-red; context white; tubes short, cylindric, crowded, but very distinct, at first pallid, then red to chestnut brown when dry; spores hyaline under microscope, salmon color in mass, smooth, broadly elliptical, 4-5 x 2.5-3 μ ; cystidia present.

Not common.

Tribe III. Polyporeae

Sporophore stipitate, applanate, effused, effused-reflexed, or sometimes resupinate; texture coriaceous, corky, woody, membranous, subfleshy or rarely fleshy; substance of the context firmly attached to the hymenial layer, thus usually not easily separable from the context; pores typically cylindric or angular, varying to honeycomb-like cells, sinuous labyrinthiform chambers, concentric or radiating anastomosing lamellae; basidia four-spored, spores varying in form and color.

KEY TO GENERA OF POLYPOREAE

- a. Sporophore entirely resupinate -----Poria
 a. Sporophore pileate; sessile or stipitate, sometimes effused-reflexed--b
 b. Tubes waxy, separable, texture of pileus somewhat gelatinous
 when moist -----Gloeoporus
 b. Tubes not waxy, rarely separable, texture of pileus coriaceous
 to woody, rarely somewhat fleshy -----c
 c. Context continuous with trama, hence layer of tubes not separable
 from upper part of pileus; tubes generally sunken at unequal depths
 into context -----Trametes
 c. Context and trama of different textures; often separated by a definite
 boundary; tubes usually sunken at equal depths -----d
 d. Hymenium borne on concentric lamellae; pileus usually stipi-
 tate -----Cyclomyces
 d. Hymenium not borne on concentric lamellae-----e
 e. Hymenium covering surface of radiating lamellae which usually
 anastomose -----Lenzites
 e. Hymenium not lamellate -----f
 f. Hymenium covering surface of labyrinthiform folds or pass-
 ages, sometimes breaking up into teeth in older portions.
 -----Daedalea

- f. Hymenium not labyrinthiform -----g
 g. Pores hexagonal in shape, or honeycomb-like radiating from a lateral or central stipe, and longer in the radial direction ----- Favolus
 g. Pores circular to angular ----- h
 h. Surface of pileus lacquered, annual or perennial ----- Ganoderma
 h. Surface of pileus not lacquered, sometimes incrustated ----- i
 i. Sporophore perennial, forming a new layer of tubes each year, or more often ----- Fomes
 i. Sporophore annual, forming only a single layer of tubes ----- j
 j. Sporophore thin coriaceous or membranous ----- Polystictus
 j. Sporophore tough, coriaceous, corky, woody, sometimes fleshy or subfleshy ----- Polyporus

Genus PORIA (Pers.) Fr.

Fructification entirely resupinate, effused; texture membranous, fleshy, coriaceous or woody; pores round, angular, sinuous, labyrinthiform, dentate or lacerate; often placed immediately upon the wood or mycelium without an interposed subiculum; spores usually hyaline and smooth, formation of pores precedes formation of hymenium, lacking a hymenium on the edge of the dissepiments when mature.

KEY TO SPECIES OF PORIA

- a. Fructification white, pallid or pale tinted ----- b
 a. Fructification distinctly colored, usually dark ----- p
 b. Fructification usually remaining distinctly white on drying ----- c
 b. Fructification not as above ----- d
 e. Growing on the ground ----- 1. *P. terrestris*
 e. Growing on decayed coniferous wood, or on charred wood -----
 ----- 2. *P. sericeo-mollis*
 d. Pores becoming yellowish, pallid or cream colored, white or whitish at first ----- e
 d. Pores yellow, pinkish cinnamon, pinkish buff, pinkish ochre or lilac tinted when fresh ----- o
 e. Pores minute ----- f
 e. Pores medium or large ----- l
 f. Spores globose or nearly so ----- g
 f. Spores not globose ----- h
 g. Surface of pores roughened by unequal prominent tubercles, averaging 3-3.5 per mm. ----- 3. *P. subacida* var. *tuberculosa*
 g. Surface of pores smooth, averaging 3-5 per mm., pores white, yellowish or cream colored ----- 4. *P. medulla-panis*
 h. Pores very short, 0.5 mm. long or less ----- i
 h. Pores longer than above ----- j
 i. Pores grayish-white when fresh, spores cylindric, 4-5 x 1-2 μ -----
 ----- 5. *P. griseoalba*

- i. Pores whitish, pale cream-colored or light vinaceous when fresh, spores oval, 2.5-4 x 2 μ ----- 6. *P. semitincta*
- j. Hyphae with clamp connections present, ends of hyphae bulb-like ----- 7. *P. mucida*
- j. Hyphae not as above ----- k
- k. Margin smooth ----- 8. *P. vulgaris*
- k. Margin byssoid, radiately fibrillose ----- 9. *P. mollusca*
- l. Growing on pine, spores large, 5.5-7 x 4-5 μ ----- 10. *P. pinca*
- l. Not growing on pine generally ----- m
- m. Spores large, characteristically with one conspicuous guttule, cystidia absent ----- 11. *P. radiculosa*
- m. Spores not guttulate as above ----- n
- n. Spores large, adhering in groups, cystidia present, hyphae with cross walls distinct, but without clamp connections ----- 12. *P. corticola*
- n. Spores not adhering in groups, cystidia absent, hyphae without clamp connections ----- 13. *P. vaporaria*
- o. Margin fimbriate with a few fine rhizomorphic strands, pores white or lilac tinted ----- 6. *P. semitincta*
- o. Margin not fimbriate, slightly pubescent, pores pinkish ochre to light buff, pinkish cinnamon or light ochraceous salmon when fresh ----- 14. *P. attenuata*
- p. Pores dark or rich salmon colored when fresh, becoming faded when dry, hyphae branched, spores 5.5-8 x 3-5 μ ----- 15. *P. salmonicolor*
- p. Pores not rich salmon color when fresh ----- q
- q. Pores having a resinous appearance when dry, very small, 6-7 per mm.; hymenium not developed, pores orange-buff to ochraceous orange when fresh, dark red when dry ----- 16. *P. spissa*
- q. Not as above ----- r
- r. Pores brown or black ----- s
- r. Pores not brown or black ----- x
- s. Fructification distinctly black; hyphae dark brown ----- 17. *P. nigra*
- s. Fructification not black ----- t
- t. Pores yellowish-brown; margin paler and distinctly hirsute, barbate ----- 18. *P. barbaeformis*
- t. Not as above ----- u
- u. Cystidia present ----- v
- u. Cystidia not present; pores very small, 7-9 per mm. ----- 19. *P. punctata*
- v. Cystidia short, 10-15 x 5 μ ; pores oblique, hyaline network of subhymenial hyphae; spores 4-4.5 x 2-2.5 μ ----- 20. *P. obliqua*
- v. Cystidia longer than above ----- w
- w. Cystidia very long, projecting, 25-40 μ , spores cylindrical, 6-7 x 2 μ ; pores occasionally more or less daedaloid ----- 21. *P. viticola*
- w. Cystidia not as long, projecting 15-30 μ ; spores not quite as long as above, 4.5-5 x 2-3 μ ; pores never daedaloid ----- 22. *P. ferruginosa*
- x. Subiculum brown, 1-5 mm. thick, much thicker than the tubes;

- mouths of pores drab, wood brown or with a grayish pruinosity -----23. *P. setigera*
 x. Subiculum not brown; fructification not as above -----y
 y. Pores red, small, thin walled -----24. *P. rufa*
 y. Pores not red -----z
 z. Margin fimbriate, with a few fine rhizomorphic strands, pores white or lilac tinted -----6. *P. semitincta*
 z. Margin not fimbriate, slightly pubescent, pores pinkish ochre to light buff, pinkish cinnamon or light ochraceous salmon when fresh -----14. *P. attenuata*

1. *P. terrestris* (DC.) Fr.

Fig. 7

Fructification effused on the ground, uneven, thin, separable, annual, white or whitish, moist, irregular in outline; margin sterile, rather wide, pubescent, irregular; pores 1-2 mm. long, mouths angular to round, white, shallow, sunken at unequal depths into context, smaller toward margin, averaging 2-4 per mm.; spores hyaline, smooth, subglobose, 4-5 x 3-4 μ ; hyphae hyaline, byssoid, evanescent, 2.5-4 μ broad, rhizomorphic strands abundant and prominent, penetrating ground in various directions.

On earth walls, in greenhouses, etc.

The two specimens in the State University of Iowa Herbarium were found growing on the ground in the greenhouse, one in October, 1928, the other in October, 1929.

2. *P. sericeo-mollis* Romell

Fig. 8

Fructification effused, soft, uneven, white, remaining so when dry, margin finely tomentose also below where raised up from substratum, separating, thin at edge, thicker in center, 0.5-3 mm. thick; pores 3-4 per mm., not more than 3 mm. long; mouths round to angular, growing obliquely, white, at length cream or pallid; spores hyaline, 4-6 x 2-3 μ , many found in dried specimens; basidia 5 μ broad, 4-spored; hyphae hyaline; clamp connections present, 2-5 μ broad; cystidia incrusted at top, abundant, 5 x 15 μ .

On rotten coniferous wood.

The specimen studied was on a charred log.

3. *P. subacida* (Peck) Sacc.

Fig. 12

Fructification effused, annual, separable from substratum except perhaps on an uneven surface; sterile tomentose margin, 5-6 mm. broad, narrow, and almost disappearing in mature specimens; subiculum very thin, white; pores 2-4 mm. long when well developed, shorter at times or longer in oblique position; mouths whitish or light yellow, pinkish buff to avellaneous when dry, angular or rounded, 3-3.5 per mm.; dissepiments thin but entire; spores hyaline, smooth, ellipsoid or oblong ellipsoid, sometimes obliquely apiculate, 4.5-6 x 2-4 μ ; cystidia clavate, thickened at apex, very hard to find, 5-7 μ in diameter; hyphae unbranched, hyaline, no cross walls or clamp connections, in trama hyphae are compacted parallel to each other, 4-6 μ in diameter.

On trunks and decaying wood of various trees.

The variety *tuberculosis* is in the State University of Iowa Mycological herbarium. "It has the surface roughened by unequal prominent tubercles, which are scattered or clustered. They appear to be a monstrous development of the mycelium on the surface of the pores." (Overholts.) This species is very close to *P. medulla-panis*, especially in microscopic characters.

4. *P. medulla-panis* (Pers.) Cooke

Fig. 9

Fructification effused, often for many centimeters, adnate or separating only with difficulty, annual or reviving for several years, typically with a pubescent or tomentose margin, white to cream buff, becoming yellowish; subiculum a very thin pallid layer almost disappearing in older specimens; pores 0.5-3 mm. long each season; mouths pure white, wood colored to egg yellow, circular, with dissepiments thick, to angular with dissepiments thinner, always entire, often oblique, averaging 3-5 per mm., finally indistinctly stratified in three or four layers or sometimes distinctly so with a thin layer of context separating each tube layer; spores hyaline, smooth, ellipsoid to oblong-ellipsoid or broadly ellipsoid, 4-6 x 3-4.5 μ ; basidia broadly clavate to pyriform, 5-8 μ broad; cystidia

none or represented by pointed fusoid hyaline paraphysis-like bodies; large crystals present in trama; hyphae variable, much branched or unbranched, 1.5-5 μ in diameter, no cross walls or clamp connections.

On bark and wood of deciduous trees. Often on fence posts or structural timbers. Common.

This species varies from a thin, compact, rather hard form to a coriaceous or leathery form, more or less separable from the substratum.

P. pulchella Schw. is considered the yellow form of *Poria medulla-panis*.

Syn.: *P. xantholoma* Schw.; *P. xantha* Schw.

One specimen in the herbarium collected by Holway and labeled *Poria obducens* seems to be the same as *P. medulla-panis*. The only apparent difference is that there seems to be more than one layer of tubes in *P. obducens*.

5. *P. griseoalba* (Peck) Sacc.

Fig. 20

Fructification not widely effused, inseparable, indeterminate, very thin, fertile to margin, annual; subiculum not visible when dry; pores less than .25 mm. long, mouths grayish-white when fresh, pinkish-buff or cinnamon-buff when dry, circular, thin-walled, entire, averaging 4-6 per mm.; spores hyaline, smooth, oblong or short cylindrical, sometimes allantoid, 4-5 x 1-2 μ ; basidia 2-3 μ in diameter, often arising in a series from one side of a hypha in the hymenial region; hyphae hyaline, 5-7.5 μ in diameter, made up of short cells, others 2.5-5 μ broad and longer, branching, anastomosing and usually slightly incrusted, no clamp connections, septate.

On well-rotted wood of deciduous trees.

6. *P. semitincta* (Peck) Cooke

Fig. 13

Fructification generally not widely effused, thin, separable from substratum, annual, sterile margin, from which a few fine rhizomorphic strands are rarely produced, white or with a tinge of lilac; subiculum very thin, soft, cottony, noticeable on the margin; pores as shallow depressions, less than 0.5 mm. long, meruloid in dried specimens, whitish or pale-cream

color when fresh, avellaneous to pinkish cinnamon when dry, or a light vinaceous shade rarely persisting, mouths subrounded, averaging 3 per mm., dissepiments thin, entire, often uneven, more or less toothed on the edges; spores hyaline, smooth, oblong, 2.5-4 x 1-2 μ ; basidia 2-3 μ broad; cystidia present or absent, when present long and incrustated; hyphae hyaline, flexuous and loosely arranged, branching, 4-7 μ in diameter, cross walls present, clamp connections absent.

On wood of deciduous trees, sometimes on leaves.

7. *P. mucida* (Pers.) Fr.

Fig. 10

Fructification effused, rather thick up to 5 mm., somewhat immersed, soft, white, becoming pallid; margin uneven, byssoid; pores 1-3 per mm. medium, angular, unequal, lacerate, received in a crustaceous mycelium, dissepiments thin; spores hyaline, ellipsoid, 4-6 x 2.5-3 μ ; hyphae hyaline, with small rather abundant clamp connections, with bulb-like ends.

On rotten deciduous wood.

Syn. *Irpex sinuosus* Fr.; *Poria sinuosus* Fr.; *Poria radula* (Pers.) Fr.; *Irpex obliquus* (Schrad.) Fr.

These names have been applied in this country. Europeans do not agree on the uses of any of them. Probably our commonest *Poria* on hardwoods. This species is closely related to *P. mollusca*.

8. *Poria vulgaris* Fr.

Fructification broadly effused, thin, dry, closely adnate, inseparable; subiculum very thin; pores about one mm. long, mouths white or yellowish, small, round, nearly equal, sometimes oblique, 5-6 per mm.; hyphae of hymenium hyaline, undulate, 2-4 μ broad.

On dead wood and branches of deciduous trees.

Spores were not seen in the specimen studied but numerous conidia were found which measured 2-4 x 4-5 μ .

9. *P. mollusca* (Pers.) Fr.

Fructification effused, thin, soft, white, sometimes yellowish; margin white, byssoid, radiately fibrillose; pores white, thin, pale ochraceous, 0.5-1 mm. long, developing from vari-

ous centers, small, thin, round unequal, torn; spores hyaline, smooth, subglobose, $4 \times 3.5 \mu$.

On stumps and dead branches of conifers. Macbride has also reported it as occurring on *Salix*.

10. *P. pinca* (Peck) Sacc.

Fructification annual, effused for several centimeters, rather tender, separable, margin sterile, thin, white or yellowish when young, disappearing when older; subiculum very thin, whitish and distinct; tubes 2-6 mm. long, dingy white when fresh, becoming very much darker on drying, fuscous in herbarium specimens; mouths rather large, 2-1.5 per mm., angular, thin walled; spores hyaline, smooth, ellipsoidal or oval, $7.5-11 \times 4-7 \mu$ when mature, $5.5-7 \times 4-5 \mu$ immature; cystidia none; hyphae hyaline, thin walled, a few cross walls, sparingly branching, $1-3 \mu$ in diameter.

On wood and bark of pine.

11. *P. radiculosa* (Peck) Sacc.

Fructification annual, effused, thin, soft, tender, margin of white tomentose mycelium creeping in and over the wood; subiculum of a very thin membrane of interwoven mycelia; pores rather large, at first white then yellow, angular, at first shallow, sunken in mycelium, becoming 1-4 mm. long, dissepiments thin and fragile; spores hyaline, smooth, elliptical, characteristically one guttulate, $5-7 \times 2.5-4 \mu$; cystidia none; hyphae hyaline, branching, with rather conspicuous clamp connections and cross walls, in the subiculum some of the hyphae are slightly granular in appearance, $4-7 \mu$ in diameter.

The specimen studied was found on a coniferous plank.

12. *P. corticola* (Fr.) Cooke

Fructification broadly effused for several centimeters where best developed, adnate when young, separable when mature, soft and watery when fresh; margin membranous, thin, broadly sterile to entirely fertile; subiculum thin, less than 0.5 mm. thick; tubes 2-5 mm. long, mouths white when fresh, drying white, yellowish or cinnamon-buff, angular, becoming dentate-lacerate, 2-4 per mm. or longer; dissepiments thin; spores hyaline, smooth, ellipsoid, showing a tendency to co-

here in groups of two, four or more, 3.5-5.5 x 3-3.5 μ ; cystidia usually present, usually as fusoid, capitate-incrusted bodies, or entirely incrusted bodies, 3-7 μ in diameter; hyphae somewhat branching, cross walls present, no clamp connection, 3-4 μ in diameter in trama, 3-6 μ in subiculum.

On bark and wood of deciduous trees.

13. *P. vaporaria* (Pers.) Fr.

Fig. 11

Fructification effused, thin, the mycelium creeping into the wood, floccose, white, no sterile margin; subiculum thin and papery; pores rather large, angular, up to 1 mm. long, white, becoming pallid, crowded in a firm persistent stratum; mouths becoming compound and labyrinthiform or dissepiments soon breaking up; spores hyaline, smooth, cylindrical, 4-5 x 2.5 μ ; hyphae hyaline to brownish, clamp connections present, 2-3 μ .

On bark and wood of all kinds.

Poria papyracea (Schw.) Cooke is similar to this species but is found on *Vitis* branches.

14. *P. attenuata* (Peck) Cooke

Fig. 21

Fructification effused for several centimeters on wood or bark, annual, separable, thin (less than 1 mm.); margin very narrow, white, thin, slightly pubescent or nearly glabrous, not fimbriate; subiculum thin, light colored; pores less than 0.5 mm. long in dried specimens; mouths pinkish ochre to light buff, pinkish cinnamon, or light ochraceous salmon when fresh, unchanging or changing to more or less cinnamon when dry, usually glistening, angular or subangular, thin walled, entire, 5-6 per mm.; spores hyaline, smooth, ellipsoidal, 3-4 x 2-3 μ ; cystidia very conspicuous, embedded or projecting, hyaline, incrusted, 30-80 x 4-10 μ ; hyphae hyaline, simple, 3-4 μ in diameter, no cross walls or clamp connections.

On dead wood and bark of deciduous trees.

This species may be the same as *P. vinctus* Berk.

Lloyd states in *Mycological Notes* 2:374, 1908, that *Poria europa* Karsten is the same as this species. *Poria nitida* (Pers.) Fr. is probably closely related.

15. *P. salmonicolor* Berk. and Cooke

Fig. 14

Fructification broadly effused, arising from a white mycelium, rich salmon color when fresh, becoming darker, pecan brown to Rood's brown, thin near margin; about 8 cm. long, and 3 cm. wide in our specimen; pores 1-3 mm. long, at first subfleshy, even, medium sized; dissepiments thin, 3-4 per mm., becoming oblique when longer; spores hyaline, smooth, 5.5-8 x 3-5 μ ; basidia 4 μ in diameter; hyphae hyaline, yellowish in mass, 2-4 μ in diameter, simple to branching.

On charred surfaces of wood. Not common.

16. *P. spissa* (Schw.) Cooke

Fig. 15

Fructification perennial, widely effused, thin, with one layer of tubes, but becoming thick when composed of two or more distinct layers, generally separable in a layer from substratum, margin sterile, compactly tomentose, warm buff to ochraceous buff; subiculum thin but conspicuous even in dried specimens, light colored; tubes 0.5-5 mm. long in each layer; mouths orange buff to ochraceous orange when fresh, dark red or blood red when bruised, orange cinnamon to hazel or seal brown when dry, having a resinous appearance, subrounded, 4-6 per mm., when dry almost invisible; dissepiments entire; spores allantoid, hyaline, 3.5-4.5 x 1 μ ; cystidia none; hyphae of subiculum and trama compact, thin-walled, hyaline except for tips which are filled with a brownish substance, branched, 2-4 μ in diameter, often slightly incrustated with small crystals, cross walls present but not conspicuous; clamp connections lacking.

On rotten wood of deciduous and coniferous trees.

This is a very distinctive species and is easily recognized when once known. Overholts describes the species as *Poria laetifica* (Peck) Sacc. from which the above description was adapted. However, Schweinitz's specific name takes precedence over that of Peck, and is so referred to here. The only apparent difference between Overholt's description of *Poria laetifica* Peck and *Poria spissa* (Schw.) or *Polyporus spissus* Fr. is that *laetifera* is annual while *spissa* is perennial. Speci-

mens of both forms are in the State University of Iowa mycological herbarium.

17. *P. nigra* Berk.

Fructification effused, in elongated patches, distinctly black or rich dark brown, hard, rather thick, even, not separable from substratum, margin slightly raised, pubescent, dark brown or black; subiculum hard, 1-5 mm. thick; pores 1-7 mm. long, minute, round, averaging 6-8 per mm., umber within, mouths black; subhymenial layer of a hyaline cellular structure; spores not found; cystidia present but few, brown, small, 15-20 μ long; hyphae dark brown, thick walled, 3-5 μ broad.

On rotten logs.

18. *P. barbaeformis* Berk. and Cke.

"Fungus wholly resupinate, the margin thin, white; the hymenium, fulvous; the pores small elongate with thin dissepiments."

This description was taken from Macbride's paper. There is one specimen in the State University of Iowa herbarium. The specimen, however, is too fragmentary for accurate study.

19. *P. punctata* Fr.

Fig. 18

Fructification effused for several centimeters in elongated patches on wood or bark, adnate, never loosening from substratum, thicker in the center, up to 1.5 cm., becoming thin at the margin with a narrow sterile yellow-brown tomentose border, perennial; subiculum thin, membranous, disappearing; pores 1-2 mm. long each season, separated by a distinct narrow layer of context, mouths minute, hardly discernible to the naked eye, averaging 6-8 per mm., round or subrounded, thick walled, entire, surface of pores yellowish brown, buffy brown or brussels brown (Ridgway); spores hyaline, smooth, globose, or subglobose; basidia inflated, 7-10 μ broad; setae absent, sometimes hyaline; cystidia-like hyphae project from the hymenial surface; hyphae brown, long, slightly branching, septate, 3-4 μ .

On *Ostrya virginiana* and other deciduous trees.

20. *P. obliqua* Pers.

Fructification annual, hard, uneven, thick, pallid becoming chocolate brown, commonly projecting crest at border; subiculum brown, thin, mostly composed of pores; pores long, oblique, minute, 5-6 per mm., angular; spores hyaline, smooth, broadly elliptical $4-4.5 \times 2-2.5 \mu$; cystidia very few, short, pointed, brown, $10-15 \times 5 \mu$; hyphae brown, with cross walls, also a network of hyaline hyphae in subhymenium.

On dead trunks of ironwood (*Ostrya*). Not common.

21. *P. viticola* (Schw.) Cooke

Fig. 17

Fructification often broadly and irregularly effused but frequently in narrow elongated patches, inseparable, annual or persistent, margin narrow, tawny, pubescent or strigose, sometimes disappearing, usually persistent; subiculum very thin, rusty brown; pores 1-2 mm. long, averaging 1-3 per mm., mouths ochraceous brown or tawny olive at first, when dry snuff brown or buffy brown, angular to sinuous or daedaloid, with a finely velutinous surface at first, becoming more glabrous, dissepiments thin, entire; spores hyaline, smooth, cylindrical, $6-7 \times 2-2.5 \mu$; setae abundant, brown, no cross walls or clamp connections, $2-3 \mu$ broad, narrow hyaline, incrustated hyphae present.

On bark and wood of deciduous trees of *Acer*, *Populus*, *Quercus*, *Salix*, *Vitis*, and probably other hosts. The specimens studied were on oak and *Vitis*.

Syn. *Trametes tenuis* Karst.; *P. superficialis* (Schw.) Cooke; *T. setosus* Weir.

22. *P. ferruginosa* (Schrad.) Fr.

Fig. 16

Fructification broadly effused, surface often uneven or undulate, when young with a brown tawny pubescent margin, becoming entirely fertile when mature, closely adhering to substratum, annual or perennial, 0.5-5 mm. thick; subiculum brown, about 0.5 mm. thick; pores 1-2 mm. long in each layer when perennial, brown within or the older layers somewhat whitish pubescent under lens, mouths cinnamon, sayal brown or snuff brown, subrounded or subangular, dissepiments

thin when mature, 4-6 per mm.; spores hyaline, smooth, oblong-ellipsoid or oblong, $4.5-5 \times 2-3 \mu$ (not found in specimens studied); hyphae brown, straight and rigid, no clamp connections, no cross walls, $2-3 \mu$ in diameter, in some specimens narrow incrustated hyaline hyphae project out from hymenial surface of tubes; setae brown, sharp pointed, fairly abundant, projecting $15-30 \mu$ beyond basidia, $5-7 \mu$ in diameter.

On dead and living trees of wood of deciduous trees.

This species differs from *P. viticola* only very slightly. The spores in *viticola* are longer and more slender, measuring $6-7 \times 2 \mu$; in most cases in *P. viticola* the setae are also longer, projecting $25-40 \mu$ and the tubes are occasionally somewhat daedaleoid, a condition not found in *P. ferruginosa*.

23. *P. setigera* Peck.

Fig. 98

Fructification effused, tough, thin, adnate, surface rough, margin whitish or cream buff, sterile; subiculum brown, 1-5 mm. thick, much thicker than length of pores; pores very short, less than 0.5 mm., mouths mostly round, drab to wood brown or fuscous, and often with a grayish pruinosity, dissepiments fairly thick, entire, 4-5 per mm.; spores hyaline, smooth, ellipsoid to reniform, $5-6 \times 2-4 \mu$; setae very prominent, pointed, brown, very large in trama and subiculum, and smaller between basidia; hyphae brown, branching, cross walls present, clamp connections absent, $2-4 \mu$ in diameter in trama and subiculum; marginal subiculum with hyaline, branched hyphae, $2-5 \mu$ broad.

On wood of deciduous trees.

24. *P. rufa* Schrad.

Fig. 19

Fructification effused, more or less fleshy, coriaceous, thin, adnate, even, determinate, rufous; pores minute, 2-3 per mm., acute, thin walled when dry; spores hyaline, smooth, ellipsoid, $5.5-7 \times 2.5-3 \mu$; hyphae hyaline to reddish, simple to branched, septate.

On old trunks.

Syn. *P. haematodes* Rost.

The occurrence of this species in Iowa is doubtful. A

specimen in the mycological herbarium has, however, been referred to this species by Macbride.

Genus GLOEOPORUS Mont.

Sporophore coriaceous or fleshy tough, rather thin, flexible, dimidiate, sessile, velvety to glabrous; margin acute; context usually white; hymenophore when fresh consisting of a superficial gelatinous, at first punctiform layer, later with small round pores, pores white, flesh colored or dark brown, purple on drying; spores hyaline, allantoid.

Our only species may be recognized by the soft, white, conchate pileus and the thin gelatinous, partly separable hymenial layer.

Only one species is represented in Iowa.

1. *G. conchoides* Mont.

Pileus coriaceous, pliant, sessile, reflexed, effused-reflexed or rarely resupinate; whitish, light buff or pinkish buff (Ridg.), velvety to glabrous, margin narrowly sterile below; context white, 1-4 mm. thick; hymenophore when fresh or moist, waxy and separating from the context in a thin elastic layer, flesh colored to cocoa brown or darker, pores less than 1 mm. long, circular, small, averaging 5-6 per mm.; spores hyaline, smooth, allantoid, 3-4.5 x 0.5-1 μ ; cystidia none; hyphae branched, clamp connections present, 4 μ in diameter.

On dead deciduous wood, common on poplar logs and willow. Syn. *Polyporus dichrous* Fr.; *Polyporus nigra-purpurascens* Schw.

Genus TRAMETES Fries

Sporophore coriaceous, corky, or woody; pileate; sessile, reflexed, effused reflexed or sometimes imbricate; epixylous, annual; hymenium not in a distinct stratum, but the tubes sunken to unequal depths in the context so that their bases do not form a continuous line with the context; pores circular, angular, or irpiciform, sometimes decurrent or sub-decurrent; context white or brown; spores hyaline, smooth; cystidia none.

The species in this genus may easily be confused with species of *Lenzites*, *Daedalea*, and *Polyporus*. From *Lenzites* and *Daedalea* they may be distinguished by the less lamellate, and more poroid hymenophore; from *Polyporus* by the fact that

in that genus the pores form a distinct stratum and are not sunken to unequal depths in the context.

KEY TO SPECIES OF TRAMETES

- a. Context white or whitish ----- b
 a. Context tan to light brown, yellowish brown, or rusty brown-----d
 b. Pileus more than 1 cm. thick-----1. *T. suaveolens*
 b. Pileus less than 1 cm. thick-----c
 c. Pileus brown; mouths of tubes averaging three or more per mm.----
 -----2. *T. serialis*
 c. Pileus white or whitish; mouths of tubes averaging 1-2 per mm.;
 growing on wood of deciduous trees, often on structural timbers----
 -----3. *T. sepium*
 d. Pileus hirsute or hispid; fibrous to corky; usually more than
 5 mm. thick; tubes 2-10 mm. long; pores averaging about 1
 per mm.-----4. *T. hispida*
 d. Pileus finely tomentose to glabrous-----e
 e. Context brown, yellowish brown or rusty brown-----f
 e. Context light brown -----g
 f. Pileus grayish brown to cinnamon-brown; pores 2-3 per mm.,
 dissepiments thin ----- See *Lenzites vialis*
 f. Pileus fulvous to umber-black; dissepiments thick, zonate or
 sulcate -----5. *T. protracta*
 g. Pileus umber-brown to almost black; context less than 1 mm. thick
 -----6. *T. mollis*
 g. Pileus palid to wood-colored; context more than 1 mm. thick-----
 -----7. *T. malicola*

1. *T. suaveolens* Linn. ex Fr.

Sporophore sessile; pileus 3-10 x 5-16 x 1-5 cm., white, whitish, gray or yellowish, villous-tomentose to glabrous, azonate, margin obtuse; context white, or whitish, corky, 0.5-2 cm. or more thick; tubes 0.3-1.5 cm. long, the mouths white to dark colored, averaging 1-3 per mm.; spores cylindrical, 8-12 x 3-4 μ ; cystidia none; hyphae sometimes branched, some of them always 8-12 μ ; on dead or diseased willows.

2. *T. serialis* Fr.

"Sporophore often resupinate; pileus, when present, 0-1 x 1-4 x 0.3-0.8 cm., of a uniform brown color, zonate, nearly glabrous; context white, not more than 1 mm. thick; tubes 2-5 mm. long, the mouths white or whitish, circular to angular, averaging 3 per mm.; spores oblong-elliptic, cylindric-elliptic, or narrowly fusoid, 7-8 x 2-3 μ ; cystidia none; hyphae some-

what branched, 2-4 μ ; on dead wood." The above description is adapted from Overholts (23).

One collection from Iowa by Macbride agrees with Sydow's *Mycothica germanica* No. 2259, a European collection.

3. *T. sepium* Berk.

Fig. 23

Pileus coriaceous, sessile or effused reflexed, usually somewhat imbricate, usually distinctly unguulate, white or whitish, broadly attached behind, azonate to slightly zonate, glabrous or nearly so, 0.3-1 x 0.8-2.5 x 0.2-0.7 cm.; context white, 0.1 cm. or less in thickness; pores 2-5 mm. long, mouths white to pallid, circular, angular, or sinuous, averaging 1-2 per mm.; spores hyaline, smooth, cylindric or cylindric-ellipsoid, 8-9 x 2.5-3 μ ; cystidia none; hyphae branched, 3-5 μ in diameter; on wood of deciduous trees, oak, boxelder, etc.; often on fences, posts, etc.

Syn. "*T. (Poria) flavescens* Schw. resupinate species, probably a form of *T. sepium*." Overholts.

4. *T. hispida* Bagl.

Fig. 24

Pileus corky, sessile, reflexed, often imbricate, surface covered with a dense yellowish or dark brown hirsute or strigose pubescence, 1.5-6 x 1.5-12 x 0.5-2.5 cm.; context light brown, 2-10 mm. thick; pores 2-10 mm. long, mouths grayish-brown or darker, angular, often very uneven, averaging about 1 per mm. or larger; spores hyaline, smooth, cylindric, 11-14 x 3.5-4 μ ; cystidia none; hyphae hyaline or light brown, hyaline ones branched 3-4 μ , brown ones unbranched and wider 3-8 μ ; on willow, poplar and cottonwood trees.

Syn. *T. Peckii* Kalchbrenner; *T. funalis* Fries; *T. trogii* Berk.; *Funalia stuppea* Berk. ex Murrill.

5. *T. protracta* Fr.

Pileus coriaceous to rigid, sessile, surface fulvous to umber-black, sometimes grayish with age, glabrous to rimose with age, margin obtuse, sometimes lighter in color, 2-6 x 3-10 x 0.5-3 cm.; context yellowish brown or rusty brown, 5-15 mm. thick; pores 1-10 mm. long, mouths dark brown, angular, ob-

long, or daedaloid, dissepiments rather thick, averaging about 2 per mm.; spores hyaline, smooth, cylindric, 8-12 x 3.5-5 μ ; cystidia none; hyphae 3-5 μ , some broader.

Usually on dead wood of coniferous trees.

6. *T. mollis* Sommerf. ex Fr.

Sporophore effused-reflexed or entirely resupinate; pileus grayish, umber-brown or darker, zonate, not distinctly pubescent, 0-2.5 x 1-4 x 0.1-0.5 cm.; context light brown, less than 1 mm. thick; tubes subcircular to angular or sinuous, sometimes becoming irpiciform, 2-3 mm. long, mouths grayish to brown, averaging 1-3 per mm.; spores cylindric or cylindric-ellipsoid, 8-10 x 3-4 μ .

On dead wood of deciduous trees.

7. *T. malicola* B. and C.

Fig. 25

Fructification corky to woody, effused-reflexed or resupinate; pileus when present, light brown or wood-colored, azonate or lightly zonate, glabrous or nearly so, 0-1.5 x 1-5 x 0.3-1.5 cm.; context light wood color, 2-5 mm. thick, sometimes thicker; pores 2-7 mm. long, occasionally in layers, same color as context, mouths light brown, circular, angular, or sinuous, averaging 1.5-3 per mm.; spores hyaline, smooth, cylindric, 8-10 x 2-3.5 μ .

On dead wood of deciduous trees.

T. serpens Fr., described by MacBride (20) and in N. A. F. No. 1707, is probably a *Poria*.

Genus *CYCLOMYCES* Kunzle and Fr.

Sporophore coriaceous, membranous, tough, stipitate or sometimes resupinate; orbicular, annual, terrestrial; fuscous or cinnamon-brown; hymenophore at first poroid but soon breaking up into continuous concentric lamellae; dissepiments thin, spores brown, smooth, ovoid.

Cyclomyces has sometimes been referred to the Agaricaceae but is here included in the Polyporaceae because of the marginal pores and more coriaceous texture of the pileus. Only one species is represented in this state and this one very rarely found. It is easily distinguished, however, by its concentrically arranged lamellae.

Cyclomyces Greenii Berk.

Pileus coriaceous, stipitate, circular, often depressed, yellowish-brown to dark or purplish brown, tomentose to glabrous, zonate, margin thin, 5-10 mm. thick at center, 2.5-9 cm. broad; context fulvous to ferruginous, 5-10 mm. thick; tubes 5-8 mm. long, soon forming brownish concentric lamellae; stipe central or lateral, velvety, concolorous with context, 2-7 cm. long, 0.7-2 cm. thick; spores brown, smooth, ovoid.

On the ground in woods. Very rare.

Genus LENZITES Fries

Sporophore coriaceous, corky, dimidiate, sessile, sometimes indistinctly substipitate or almost resupinate; epixylous, annual; hymenium covering radiating gill-like anastomosing lamellae, often becoming daedaloid or merging into cylindrical pores; spores hyaline and smooth.

This genus is frequently included in the Agaricaceae. It seems, however, to fit more properly in the Polyporaceae because of the marked coriaceous texture of the pileus, a distinctly polyporaceous character. It is clearly closely allied to *Trametes* and *Daedalea*. Specimens showing intermediate configuration of the hymenium may usually be separated from *Daedalea* by the brown context.

Lenzites vialis seems to fit into the genus *Trametes* at least as well as into the genus *Lenzites*. The context in *L. vialis* extends down into the tubes without a distinct separation of context and hymenophore. I have therefore included this species in the key to *Trametes* also.

KEY TO SPECIES OF LENZITES

- a. Context white ----- 1. *L. betulina*
 a. Context brown ----- b
 b. Pileus glabrous or nearly so, zonate, gray, grayish brown or cinnamon colored; hymenium poroid, daedaloid or lamellate --
 ----- 2. *L. vialis*
 b. Pileus strigose-tomentose, dark rusty brown to yellowish brown; hymenium distinctly lamellate ----- 3. *L. saepiaria*

1. *L. betulina* Linn. ex Fr.

Fig. 26

Pileus coriaceous, corky to rigid, sessile, dimidiate, flabelliform, imbricate, grayish to brownish or pallid, distinctly zon-

ate, densely tomentose or velvety, margin thin, 2-5 x 2-9 x 0.3-1 cm.; context white to cream color, 0.5-1.5 mm. thick; hymenophore lamellate, sometimes poroid, lamellae white, tan or light-wood colored, coriaceous, thin, straight, branching or anastomosing, about 1 mm. apart; 0.3-10 mm. broad; spores hyaline, smooth, cylindric or allantoid, 4.5-7 x 1.5-2.5 μ ; cystidia present, hyaline, sharp-pointed or blunt hairs, 24-40 x 4-5 μ ; hyphae simple to branching.

On dead wood of deciduous trees. Common on oak.

2. *L. vialis* Pk.

Fig. 27

Pileus coriaceous or rigid, sessile, effused-reflexed, or occasionally substipitate when growing on top of a log, to resupinate, grayish-brown to cinnamon-brown, glabrous or nearly so, 1-4 x 2-7 x 0.2-0.8 cm.; context brown, 1-5 mm. thick; hymenophore more or less poroid, or daedaloid, less often completely lamellate, brown, averaging 2-3 per mm., 1-4 mm. broad; spores hyaline, smooth, cylindric, 7-9 x 2.5-4 μ ; cystidia none; hyphae brown to hyaline, rarely branched, 2-6 μ .

On wood of deciduous and coniferous trees, and on structural timbers. Often on coniferous bridge planks, etc.

This species approaches very close to *Daedalea*. It is also a very variable species.

Syn. *Trametes pallido-fulva* Berk.; *Lenzites trabea* Pers. ex Fr.

3. *L. sacpiaria* Fr.

Fig. 28

Pileus coriaceous to rigid, sessile, effused-reflexed to rarely resupinate, bright yellowish brown to dark brown, zonate, strigose tomentose, 1-5 x 2-7 x 0.3-1 cm.; context yellowish brown or rusty brown, 1-5 mm. thick; hymenophore lamellate, sometimes daedaloid or poroid, the lamellae brown, about 1 mm. apart, 2-5 mm. broad; spores hyaline, smooth, cylindric, 8.5-10 x 2.5-4 μ ; cystidia none; hyphae rarely branched, 4-6 μ .

On dead wood of coniferous trees, rarely deciduous trees.

Syn. *Glocophyllum hirsutum* Schaeff. ex Murrill.

GENUS DAEDALEA Pers. ex Fr.

Sporophore coriaceous, corky or somewhat woody; pileate, sessile or effused-reflexed; epixylous; annual or persisting for

two or three years; context white or pallid (never dark brown); trama of context and tubes continuous; hymenium typically labyrinthiform but sometimes varying to poroid, irpiciform or lamellate; spores smooth, hyaline.

KEY TO SPECIES OF DAEDALEA

- a. Pileus densely tomentose to hirsute, thin and coriaceous, flexible; context about 1 mm. thick; hymenium at first labyrinthiform, but soon becoming irpiciform -----1. *D. unicolor*
- a. Pileus velvety or glabrous; rigid, woody or corky; context thicker; hymenium normally labyrinthiform but varying to porose, never irpiciform -----b
- b. Pores less than 0.5 mm. in transverse section, surface of pileus white or whitish -----2. *D. ambigua*
- b. Pores one or several mm. in transverse section; surface usually grayish, brownish or discolored -----c
- c. Pileus thick, triangular, margin usually thick; walls of pores obtuse; found on wood of oak and chestnut -----3. *D. quercina*
- c. Pileus thinner, applanate; margin thin; walls of pores not obtuse; found on other hosts -----4. *D. confragosa*

1. *D. unicolor* Bull. ex Fr.

Fig. 29

Pileus coriaceous, tough, flexible, sessile, effused-reflexed, rarely resupinate, whitish, cinereous, yellowish or brownish, villous, strigose or hirsute, zonate, zones often variously colored, margin thin, 0.5-5 x 2-8 x 0.2-0.3 cm.; context white, 1 mm. or less thick; pores 1-4 mm. long, distinctly labyrinthiform at first, and generally remaining so along margin, averaging 2 per mm., later breaking up into teeth, mouths white, cinereous or umber; spores hyaline, smooth, ellipsoid or ovoid, 5-6.5 x 3-3.5 μ ; cystidia none; hyphae usually not branching, 2-4 μ .

On dead wood of deciduous trees. Elm, birch.

2. *D. ambigua* Berk.

Pileus corky or woody, rigid, sessile, sometimes appearing substipitate, thick, convex, azonate, minutely velvety to glabrous, white to umber or darker at the base, 3-14 x 5-20 x 0.3-2.5 cm.; context white, punky to corky, 0.2-1 cm. thick; pores 2-4 mm. long, mouths circular, to linear or daedaloid, mouths white or yellowish, averaging 2-3 per mm., walls thick

and entire; spores not found; cystidia none, branched paraphyses sometimes present; hyphae simple, 3.5-4.5 μ .

On stumps and trunks of deciduous trees.

The species is reported by Macbride.

No specimen from Iowa in the State University of Iowa Herbarium.

3. *D. quercina* Linn. ex Fr.

Pileus rigid, corky or woody, sessile, whitish or pale wood color, umbrinous or almost black, glabrous, azonate or only slightly zonate, margin usually thick and obtuse, perennial, 4-12 x 4-15 x 1.5-6 cm.; context pallid or light brown, corky, 0.2-1 cm. thick; tubes 1-3 cm. long, the mouths whitish to umber, daedaloid or lamellate, 1 mm. or more broad, the walls thick and obtuse; spores cylindric, smooth, hyaline, 5-6 x 2-3 μ ; cystidia none; hyphae simple, 4-6 μ .

On logs or trunks of oak. Not common.

4. *D. confragosa* Bolton ex Fr.

Fig. 30

Pileus corky to woody, rigid, sessile, dimidiate, sometimes zonate, convex, grayish, cinereous or brownish, glabrous to rugose, scabrose, occasionally imbricate, margin thin, entire, 1.5-9 x 2-14 x 0.2-1.5 cm.; context white, becoming darker with age, 0.1-1 cm. thick; pores 1-10 mm. long, mouths circular or elongated to labyrinthiform or lamellate, tan, cinereous, or flesh-colored, variable in size; spores hyaline, smooth, cylindric or allantoid, 5.5-6 x 1.5-2 μ ; cystidia none, paraphyses hyaline or slightly bluish, branched; hyphae simple, 4-8 μ .

On dead wood or living deciduous trees, especially willows.

This fungus takes on many different forms and is thus sometimes confusing. In the young stages the context seems to be thicker, becoming thinner with increased growth.

Syn. *Lenzites crataegi* Berk.; *Lenzites cookeii* Berk.; *Daedalea corrugata* Klotzsch.

Genus FAVOLUS Fr.

Sporophore coriaceous, fleshy-tough when fresh, semi-stipitate, annual, epixylous; context white, thin; hymenium covering angular or hexagonal pores, often radiating outward from the stipe; stipe typically lateral; spores hyaline.

Polyporus arcularius may be separated from *Favolus* by the centrally placed and usually longer stipe.

KEY TO SPECIES OF FAVOLUS

- a. Pores rather large, 0.5-1 mm., sometimes larger, hyphae 3-4 μ -----
----- *F. canadensis*
a. Pores smaller, 2-3 per mm.; hyphae 5-9 μ -----*F. rhipidium*
This key was taken from Overholts.

1. *F. canadensis* Klotzsch

Pileus fleshy-tough, thin, reniform, to orbicular, generally laterally or excentrically stipitate, stipe very short if present; surface very finely squamulose or innately fibrillose, ranging in color from reddish-brown to cream color or white, becoming glabrous, 1-4 x 1-8 x 0.1-0.7 cm.; context white, 0.5-2 mm. thick; pores 1-5 mm. long, mouths white to yellowish, angular, hexagonal, longer in the radial direction, 0.5-3 mm. long x 0.5-1 mm. broad; spores hyaline, smooth, cylindric, 9-11 x 3-4 μ ; cystidia none; hyphae branched, 3-4 μ .

On dead deciduous trees.

Syn. *F. europaeus* Fr.; *F. microporus* Murrill; *F. ohioensis* Berk. and Mont.; *F. striatulus* Ellis and Ev.; *Hexagona alveolaris* Murrill.

2. *F. rhipidium* Berk.

Pileus coriaceous, reniform, stipitate, stipe more prominent, lateral, pruinose, 0.5-2.5 cm. long, 1-4 mm. thick; surface alutaceous to white, finely squamulose; context white, 1 mm. or less thick; pores 1-2 mm. long, mouths white, denticulate, averaging 2-3 per mm. transversely and about 2 per mm. longitudinally; cystidia none or of a few projecting hyaline hairs, 2-3 μ broad; hyphae 5-9 μ in diameter.

On dead wood of deciduous trees.

Macbride reports having seen a single specimen which agreed with this description. "It occurs in little dense caespitose tufts." This specimen, said to be seen by him, was 2 cm. in each dimension, with a stipe about 6 mm. long. A number of specimens in the State University Herbarium agree with this description.

GENUS GANODERMA Karst.

Sporophore corky to woody, sessile or stipitate, perennial or annual, epixylous, surface sulcate, covered with a reddish

brown varnish or crust-like surface; context punky, brown or brownish; tubes cylindrical, concolorous with context; spores yellowish or brown, ovoid.

KEY TO SPECIES OF GANODERMA

- a. Spores echinulate, sporophore perennial, pileus and stem at first red-varnished, the varnish disappearing and the pileus becoming whitish or yellowish when mature -----1. *G. Curtisii*
 a. Spores smooth, sporophore annual, pileus and stem strongly red-varnished, the varnish not disappearing -----2. *G. sessile*

1. *G. Curtisii* Berk.

Fig. 31

Pileus corky, stipitate, reniform or flabelliform, convex above, concave below, surface glabrous, covered with a thin crust of red varnish at least in part, zonate, margin usually truncate or obtuse, entire, 3-12 x 3-20 x 1-2 cm.; context corky, light colored above, brown and firm next to the tubes, 5-10 mm. thick; pores 3-12 mm. long, the mouths white, yellow or brownish, averaging 3-5 per mm.; stipe lateral with color and context like the pileus, 2-10 mm. long, 5-20 mm. thick; spores ovoid with a truncate base, echinulate, yellowish brown, 9-11 x 5-7 μ ; cystidia none; hyphae hyaline or brown, somewhat branched, 3-5 μ .

On stumps and trunks of deciduous trees.

2. *G. sessile* Murrill

Fig. 32

Pileus coriaceous, corky or fibrous, tough, sessile or stipitate, surface covered with a thin reddish or chestnut colored crust, polished, shining, glabrous, sulcate-rugose, zonate, 3-12 x 3.5-20 x 0.5-3 cm.; context made up of an upper light colored and lower brown layer, never entirely white, 2-15 mm. thick, thicker at base; pores 0.3-1.5 cm. long, mouths white to umber or tan, averaging 3-5 per mm.; stipe when present central, lateral or excentric, color and context like pileus, 0-10 cm. long, 0.5-1 cm. thick; spores light brown, slightly roughened or perforated, 9.5-12 x 6-8 μ ; cystidia none; hyphae hyaline or brown, branched, 4-10 μ .

On stumps and trunks of deciduous trees, especially oak.

Syn. *Polyporus lucidus* (Leyss.) Fries; *Ganoderma subperforatum* Atkinson; *Fomes lucidus* Leyss. ex Cooke.

Genus FOMES Fr.

Sporophore woody or corky from the beginning, seldom soft or watery; sessile, appanate or unguulate, epixylous, perennial, forming a new stratum of tubes each year or more often; context soft and punky to hard and woody, white, reddish or brownish; pileus sometimes incrustated, often rimose; hymenophore poroid, dissepiments usually thick; spores hyaline or brown; setae present or absent.

KEY TO SPECIES OF FOMES

- a. Context white, flesh colored, wood-colored, or rose-colored; spores always hyaline; setae never present ----- b
- a. Context yellowish brown or dark brown; spores hyaline or brown; setae present or absent ----- h
- b. Context flesh colored, pinkish or rose colored; light brown when dried ----- c
- b. Context white or yellowish ----- d
- c. Pilei usually growing on wood of deciduous trees, especially on ash; tubes 3-5 mm. long each season; spores subglobose, 6-7 x 5-6 μ ; hyphae of context 6-9 μ in diameter ----- 1. *F. fraxineus*
- c. Pilei usually growing on wood of coniferous trees; tubes 1-2 mm. long each season; spores cylindric or slightly allantoid, 6-10 x 2-4 μ ; hyphae of context 4-5 μ in diameter ----- 2. *F. roseus*
- d. Sporophore small, scarcely more than 2 cm. broad and 1 cm. thick ----- e
- d. Sporophore larger ----- f
- e. Pileus usually scutellate, uniformly black even when young; growing on limbs of alder, and witch-hazel; spores cylindric, 8-9 x 2.5-3.5 μ ; hyphae of context much branched ----- 4. *F. scutellatus*
- e. Pileus unguulate, becoming black only at the base; zonate and concentrically sulcate with age; growing on structural timbers, and deciduous trees; spores ovoid, with truncate base, 10-12 x 6-7 μ ; hyphae unbranched or nearly so ----- 3. *F. ohioensis*
- f. Pileus even, rarely rimose, surface concolorous with the context; layers of tubes separated by a distinct layer of context; growing on maple ----- 5. *F. connatus*
- f. Pileus rimose or slightly incrustated, surface of pileus darker than context; layers of tubes not separated by a layer of context; growing on other trees ----- g
- g. Pileus appanate, not more than 2 cm. thick; crust brown to black; spores subglobose, 4-5 μ ; hyphae of context 4-8 μ in diameter ----- 6. *F. annosus*
- g. Pileus convex to unguulate, more than 2 cm. thick; surface gray to black; mouths of tubes 2-3 per mm; growing mostly on ash ----- 7. *F. fraxinophilus*

- h. Setae absent, spores hyaline ----- i
 h. Setae present, spores hyaline ----- k
 i. Pileus strongly incrusted; growing on living trees; spores cylindrical elliptic, 12-16 x 4-5 μ ; context punky, the hyphae 5-10 μ in diameter ----- 8. *F. fomentarius*
 i. Pileus not incrusted; spores subglobose, 4-6 μ ; context woody ---- j
 j. Context fulvous, opaque; tubes in older layers generally conspicuously white-stuffed; hyphae of context 3-4 μ in diameter ----- 9. *F. igniarius*
 j. Context honey-colored, lustrous; tubes in the older layers not white-stuffed; hyphae of context 4-6 μ in diameter ----- 10. *F. Bakeri*
 k. Sporophore growing on coniferous trees or the wood of same; tubes not white stuffed or incrusted ----- 11. *F. pini*
 k. Sporophore not growing on coniferous trees or wood ----- l
 l. Pileus thin and conchate, usually partly or entirely resupinate; growing on old logs or rarely on living trees; spores subglobose, 4-6 μ ----- 12. *F. conchatus*
 l. Pileus not thin and conchate, sometimes unguulate, growing on trunks and branches of trees ----- m
 m. Sporophore growing on *Prunus*; tubes in the older layers not white-stuffed or incrusted, spores subglobose, 4-6 μ ----- 13. *F. fulvus*
 m. Sporophore growing on other trees ----- n
 n. Sporophore growing on oaks, birches, etc.; tubes in older layers white-stuffed or incrusted; spores subglobose, 4-6 μ ----- 9. *F. igniarius*
 n. Sporophores not as above, may be growing on above-mentioned hosts, however ----- o
 o. Setae present; spores brown, ellipsoid to globose, 3-3.5 x 4-4.5 μ ; tubes long, over 5 mm. each season; growing on oak ----- 14. *F. everhartii*
 o. Setae absent; spores brown ----- p
 p. Sporophore growing on locust trees (*Robinia*); pileus unincrusted, soon rimose; context woody; spores globose, smooth, 4-5 μ ----- 15. *F. rimosus*
 p. Sporophore usually growing on logs and stumps, sometimes on living trees other than locust; pileus incrusted, never rimose; context punky to soft corky; spores slightly echinulate, ovoid with a truncate base 4-5 x 5-7 μ ----- q
 q. Crust of pileus easily indented; perennial by the addition of a second year's growth of pileus below the first ----- 16. *F. lobatus*
 q. Crust of pileus hard and horny; truly perennial ----- 17. *F. applanatus*

1. *F. fraxineus* Bull. ex Cooke

Pileus applanate, plane, or convex, surface usually light colored with reddish or reddish brown stains or altogether reddish, becoming brown with age, incrusted with a thin hard crust, somewhat zonate, 4-10 x 6-16 x 1-6 cm.; context at first

punky or corky, then hard, 0.4-3 cm. thick, somewhat flesh-colored, often fading out in drying; tubes 2-10 mm. long, often in a single layer, the mouths whitish, pallid, or flesh-colored, averaging 4-6 per mm.; spores subglobose, 5-6 x 6-7 μ ; setae none; hyphae 6-9 μ .

Usually on stumps or trunks of ash trees. Rare.

The above description is adapted from Overholts (34).

This species, reported by Fennell and Overholts, does not seem to be contained in the State University of Iowa Herbarium.

2. *F. roseus* Alb. and Schw. ex Cooke

Pileus unguulate, brownish pink, flesh-colored or pinkish red, often black with age, not incrusted, sometimes sulcate, furrowed on the margin, 2-7 x 2-6 x 2-3 cm.; context pinkish or rose-colored, soft corky or hard, 2-10 mm. thick; tubes 1-3 mm. long, in distinct layers, the mouths pinkish or rosy, averaging 3-5 per mm.; spores hyaline, smooth, oblong-cylindric, 7-10 x 2-4 μ ; cystidia none; hyphae 4-5 μ .

Usually on wood of coniferous trees. Rare.

The above description is adapted from Overholts (34).

Overholts, Fennell and Wilson report this species. It was not studied since there seems to be no specimen in the State University of Iowa Herbarium.

3. *F. ohioensis* Berk. ex Murrill

Fig. 33

Pileus convex to unguulate, dimidiate, sometimes circular and attached by the vertex, pure white at the margin but otherwise brown or black, glabrous and often zonate or sulcate, 0.5-2.5 x 0.5-3 x 0.2-1 cm.; context pallid, indistinctly zonate, 1-3 mm. thick, woody or corky; tubes 1-4 mm. long each season, the mouths chalky-white becoming creameous, 4-5 per mm., circular; spores hyaline, globose, smooth, 5 μ ; conidia ovoid with a truncate base, hyaline, smooth, 10-13 x 6-8 μ ; cystidia none; hyphae simple 3-4 μ in diameter.

On linden, other dead woods, and structural timbers.

Spores described by Murrill (as cited above) were not seen in the specimen studied.

Syn. *Trametes ohioensis* Berk.

4. *F. scutellatus* (Schw.) Cooke

Pileus usually scutellate, rarely dimidiate, small, concave below, surface dark brown or black at least when mature, slightly sulcate, 0.5-1.5 x 0.5-2 x 0.1-0.5 cm.; context isabelline, 2-3 mm. thick, corky to woody; tubes 1-2 mm. long each season, mouths chalky white or pallid, averaging 4-5 per mm., circular or subcircular; spores hyaline, smooth, cylindric, 8-9 x 2.5-3.5 μ ; cystidia none; hyphae much branched, 2-4 μ in diameter; basidia 6-9 μ broad.

Usually on alder and witch-hazel and other soft wood branches, lying on the ground.

Spores were not found in any of our collections.

Syn. *Trametes scutellata* Schw.

5. *F. connatus* Weinmann ex Gillet

Pileus usually imbricate, dimidiate, convex, white to yellowish, yellow or grayish black in old specimens, glabrous, never rimose, rarely sulcate, 2-10 x 3-15 x 0.5-4 cm.; context 0.3-1 cm. thick, white, soft and corky or hard; tubes 1-5 mm. long each season, very distinctly stratified, with a narrow layer of context between the annual layers, mouths yellowish, darker than context, often glistening, minute, averaging 4-5 per mm.; spores hyaline, smooth, ellipsoid to globose, 3-4 x 4.5-5 μ or 3-4 μ broad; cystidia none; hyaline crystalline bodies present (referred to as cystidia by Lloyd); hyphae 2-4 μ .

No specimen from Iowa seems to be present in the State University mycology herbarium. The specimen studied was from Michigan.

Syn. *F. populinus* (Schum.) Cooke.

6. *F. annosus* Fr. ex Cooke

Pileus applanate or subresupinate, woody, usually thin, irregular gray-brown or uniform light brown, darker with age, sometimes slightly incrustated, zonate, 5-12 x 7-12 x 0.5-2 cm.; context whitish, less than 1 cm. thick, corky; tubes 2-6 mm. long, often in a single layer, mouths yellowish, round or elongated, about 3 per mm.; spores hyaline, smooth, subglobose or ellipsoid, 4.5-5 μ ; cystidia none; hyphae 4-8 μ .

On coniferous trees and stumps.

Reported from Iowa by Overholts and Fennell. Apparently

no specimen in the State University of Iowa Herbarium.

This description was adapted from Overholts.

7. *F. fraxinophilus* Peck

Fig. 34

Pileus convex to unguulate, broad at the point of attachment, surface at first white, becoming grayish black to black, hard and rimose with age, or sulcate, 2-25 x 3.5-40 x 1.5-10 cm.; context cinnamon, thick, woody, 0.5-1.5 cm.; tubes 2-4 mm. long each season, indistinctly stratified, mouths white or brownish, averaging 2-3 per mm., edges obtuse; spores hyaline, smooth, ellipsoid or ovoid, 4.5-6.5 x 6-7 μ ; cystidia none; hyphae 3-5 μ .

Common on trunks of living and dead *Fraxinus*.

Fomes ulmarius reported by Macbride seems to be the same as *F. fraxinophilus*.

8. *F. fomentarius* Linn. ex Gillet

Pileus convex to unguulate, with a smooth, horny grayish crust, zonate or sulcate, 3-15 x 6-20 x 2-15 cm.; context dark brown, 0.3-3 cm. thick, punky or soft corky; tubes 0.5-2.5 cm. long, mouths grey to brown, with a distinct pruinose covering, averaging 3 per mm.; spores hyaline, smooth, cylindrical-elliptic 12-16 x 4-5 μ ; setae none; hyphae 5-10 μ .

Common on living wood of deciduous trees, especially on *Betula*.

This species is related to *F. applanatus*, but distinguished from it by the thicker crust, hoof-shaped pileus, and longer tubes.

9. *F. igniarius* Linn. ex Gillet

Fig. 35

Pileus convex or unguulate, first brown then grayish-black or black, surface rimose with age, not incrustated, 3-10 x 5-20 x 2-10 cm.; context brown, ferruginous, zonate, 0.5-3 cm. thick, hard and woody; tubes 2-5 mm. long each season, minute, subhymenial layer hyaline, cellular, mouths brown, averaging 4-5 per mm.; spores hyaline, smooth, globose or subglobose, 4-4.5 x 5.5 μ ; setae present, often scarce, sharp pointed, swollen at base, brown, 16-25 x 6-8 μ ; hyphae brown, 3-4 μ .

On trunks of living deciduous trees.

Fomes nigricans Fr. is a form of *F. igniarius*. The pileus is not roughly rimose, as in *F. igniarius*, but is hard and often found cracking in both directions.

10. *F. Bakeri* Murrill ex Saccardo

Fig. 36

Pileus convex to compressed-ungulate, surface grayish black or blackish on upper surface in our specimens, smooth, not incrustated, 2-3 times sulcate in older specimens; margin brown, rounded or obtuse, 3-8 x 5-14 x 2-5 cm.; context brown, somewhat shining, 1-2.5 cm. thick, woody; tubes 3-5 mm. long each season, mouths brown, circular, averaging 4-6 per mm.; spores hyaline, or in our specimens distinctly yellowish with a prominent greenish guttule when fresh, smooth, globose to subglobose 5-8 μ (5-6 μ in Overholts); setae or cystidia none; hyphae brown, 2-6 μ .

On trunks of living or dead birch trees.

Syn. *F. robustus* Kalch.

Lloyd believes this to be a form of *F. robustus*, without the black rimose crust of the type.

11. *F. pini* Thore ex Lloyd

Pileus unguulate, surface dark brown, rough tomentose, with concentric raised zones, becoming blackish and glabrous, 6-15 x 4-20 x 1-15 cm.; context tawny or ochraceous-tawny, woody, not more than 5 mm. thick; tubes 2-6 mm. long each season, the mouths ochraceous-brown, large, round, elongated, or sometimes daedaloid, 1-3 per mm.; spores hyaline, or brown, smooth, globose, 4-5 μ ; setae present, sharp pointed, projecting 20-30 μ ; hyphae 3-5 μ .

On wood of coniferous trees, both living and dead.

This species is reported as *Trametes pini* by Macbride. Lloyd however found it to be a distinctly perennial species. The specimen reported by Macbride from Iowa was found on pines in Muscatine County. The annual form is referred to as *Trametes abietinus* by Lloyd.

12. *F. conchatus* Pers. ex Gillet

Fig. 37

Pileus sessile, reflexed, effused-reflexed, sometimes mostly resupinate when sessile, thin and conchate, surface dark brown,

grayish brown or almost black, closely concentrically sulcate, roughened, not rimose or incrustated, margin acute, 0-7 x 4-12 x 0.2-3.5 cm.; context light brown, 1.5-3 mm. thick, woody; tubes 1-2 mm. long each season, apparently separated by a layer of context, mouths minute, concolorous or fulvous to dark brown, averaging 4-5 per mm.; spores hyaline, smooth, subglobose, 4-5 μ ; setae present and numerous, sharp pointed, 20-40 x 5-9 μ ; hyphae 2-3 μ .

On dead wood or occasionally on living deciduous trees. Common on *Crataegus* and wild grape.

13. *F. fulvus* Scopoli ex Gillet

Fig. 38

Pileus convex, usually attached by the vertex and subcircular or elongated in form with both margins reflexed or effused-reflexed, rarely strictly sessile, usually dull gray or blackish behind, brown on margin, hardly rimose, somewhat incrustated, 1-4 x 3-8 x 0.5-2.5 or larger in one of our specimens; context brown, woody, 3-8 mm. thick; tubes 1-4 mm. long each season, not at all or not conspicuously white-stuffed in the older layers, mouths round, minute, brown, averaging 4-5 per mm.; spores hyaline, smooth, globose, 3-4 x 4-6 μ ; setae present, sharp pointed, 16-25 x 6-8 μ ; hyphae 3-4 μ .

Common on diseased trunks, stumps, and branches of various species of *Prunus*.

Sny. *Fomes pomaceus* Pers.

C. G. Lloyd uses the name of *F. pomaceus* Pers. instead of *F. fulvus*. Fries, Schroeter, Berkeley, and others held it to be a variety or the same as *Fomes igniarius*.

14. *F. Everhartii* Ellis and Gallister ex von Schvenk

Fig. 40

Pileus convex, rarely unguulate, at first brown, becoming grayish or blackish on upper surface, not incrustated, sulcate, rough and rimose with age, margin remaining brown and velvety, 2.5-11 x 4-20 x 2-15 cm.; context rusty brown, 1-5 cm. thick, woody; tubes 3-6 mm. long each season, mouths brown, changing color when turned in the light, not decurrent but separate by a definite margin, averaging 4-5 per mm.; spores brown, smooth, ellipsoid to globose, 4-5 x 3-4 μ ; setae present,

and numerous, sharp pointed, brown, 2-30 x 7-8 μ ; hyphae brown, 3-6 μ .

Mostly on living *Quercus* trunks.

15. *F. rimosus* Berk.

Fig. 93

Pileus convex to unguulate, surface at first uniformly brown, becoming black, sulcate and rimose with age, no distinct crust, 3-20 x 6-30 x 1.5-10 cm.; context yellowish brown, 0.5-3 cm. thick, woody; tubes 1-4 mm. long each season, mouths minute, brown, averaging 5-6 per mm.; spores brown, globose, 4-5 μ ; setae none; hyphae deep bright yellowish brown, 3-4 μ .

On living trunks of locust trees.

Syn. *Fomes robiniae* Murrill; *Pyropolyporus robiniae* Murrill.

16. *F. lobatus* Schw. ex Cooke

Fig. 41

Pileus plane or depressed, yellowish brown, umber, or rusty brown, thin distinct crust, easily indented, pilei produced for two or three years coming out from below those of the preceding year, sometimes appearing substipitate, margin obtuse, 4-12 x 4-15 x 1-3 cm.; context brown, 0.3-3 cm. thick, soft and punky, harder toward the surface; tubes 1-10 mm. long each season, not white incrustated in the older layers, mouths white, yellowish to brown, darker when bruised, averaging 3-4 per mm.; spores pale brown, minutely echinulate, ovoid, 8-10 x 5.5-7 μ ; setae none; hyphae 2-6.5 μ broad.

Growing on old logs and stumps, sometimes on living trees.

Syn. *Polyporus lobatus* Schw.; *Polyporus reniformis* Morgan.

17. *F. applanatus* Pers. ex Wallroth

Fig. 39

Pileus plane or convex, applanate, or substipitate, usually gray to grayish black, covered with a thick, rigid but fragile, horny crust, indistinctly zonate and sulcate, glabrous, 3-30 x 5-50 x 1.5-7 cm.; context brown, 0.5-5 cm. thick, punky to corky or fibrous; tubes 4-12 mm. long each season, rather distinctly stratified, mouths white, yellowish or umber, becoming darker when bruised, averaging 4-6 per mm.; spores brownish, smooth or slightly echinulate, ovoid with a truncate base, 5-8 x 4-5 μ ; cystidia none, hyphae 2-6 μ .

On logs and stumps, also live trunks of deciduous trees (rarely conifers).

Syn. *Fomes leucophaeus* Mont.; *Elfvingia megaloma* (Lev.) Murrill; *Polyporus leucophaeus* Mont.

Genus POLYSTICTUS Fr.

Sporophore thin, membranaceous or coriaceous, sessile, reflexed, effused-reflexed, stipitate, substipitate or imbricate, epixylous; context 3 mm. or less thick; pores at first superficial punctiform, then becoming deeper; and finally breaking up into teeth, developing from the center or place of attachment toward the margin of the pileus; spores hyaline, smooth.

KEY TO SPECIES OF POLYSTICTUS

- a. Normally with a central stipe-----b
- a. Not stipitate or only substipitate -----c
 - b. Surface of pileus shining cinnamon with silky striations, slightly depressed, the margin often fimbriate or pseudociliate -----1. *P. cinnamomeus*
 - b. Surface of pileus not shining, dull rusty cinnamon to hoary, velvety to glabrous, deeply depressed, margin thicker, less fimbriate -----2. *P. perennis*
- c. Fructification arising from a cup-shaped, sterile body that may disappear or remain for some time near the base on the mature fructification, pileus white or becoming grayish or brownish, found on dead elm branches -----3. *P. conchifer*
- c. Fructification not as above -----d
 - d. Pileus fibrillose-tomentose or glabrous, 1-5 cm. broad, tubes 2-5 mm. long, mouths 1-2 per mm., soon breaking up into teeth -----4. *P. biformis*
 - d. Pileus velvety to hirsute or tomentose -----e
- e. Context more than 1 mm. thick -----f
- e. Context 1 mm. or less in thickness -----g
 - f. Context 1-3 mm. thick, pileus minutely velvety or shortly villose, conspicuously zonate, with zones of different colors -----5. *P. zonatus*
 - f. Context 1-6 mm. thick, dissepiments thick and entire, zonate but not of different colored zones -----*Polyporus hirsutus*
- g. Pileus multizonate, zones variously colored -----6. *P. versicolor*
- g. Pileus sometimes zonate, but not with multicolored zones -----h
 - h. Hymenophore or layer of tubes often violet-tinted, pileus 1-7 cm. broad, cystidia when present not incrusted except sometimes when capitate at the apex -----7. *P. pargamensis*
 - h. Hymenophore always white, narrowly reflexed, never more than 1 cm. and sometimes entirely resupinate; early becoming irpiciform -----*Polyporus tulipiferus*

1. *P. cinnamomeus* Sacc.

Fig. 72

Pileus thin coriaceous, stipitate, orbicular, convex, umbilicate or depressed in the center, surface bright-cinnamon cinereous, brown or ferruginous, shining, strigose, striate, zonate, margin slightly lobed or undulate, sometimes sterile below, 1-3.5 cm. broad, 1-3 mm. thick; context rusty brown, less than 1 mm. thick; tubes not over 2 mm. long, slightly decurrent, mouths ferruginous or cinnamon, angular, rather large, averaging 2-4 per mm.; stipe central, slightly branching, reddish brown, velvety to villous, 1-4 cm. long, 1-4 mm. thick; spores pale yellow brown, smooth, oblong or ovoid, 6-8 x 4-6 μ ; cystidia none; hyphae simple, brown, 6-9 μ .

On mossy soil or decayed wood, almost reduced to humus, or on clay banks, usually among mosses.

Syn. *Polyporus subsericeus* Peck; *Polyporus oblectans* Berk.; *Polyporus parvulus* Klotzsch; *Polyporus cinnamomeus* Jacq. ex Fries.

2. *P. perennis* Karst.

Fig. 73

Pileus thin and coriaceous, stipitate, circular, infundibuliform, convex to umbilicate, surface brown to cinnamon or cinereous, finely tomentose, substriate, zonate, margin very thin, entire to lacerate, 1.5-6 cm. broad, 1-3 mm. thick; context brown, less than 1 mm. thick; tubes 1-2.5 mm. long, mouths whitish when young, soon brown to cinnamon, angular, averaging 2-4 per mm.; spores hyaline or pale yellowish-brown, smooth, ovoid, 7-8 x 5 μ ; setae none; hyphae simple, brown or yellowish-brown under the microscope.

On dry exposed soil in woods, especially on burned-over earth.

Syn. *Polyporus proliferus* Lloyd; *Coltricia perennis* (L.) Murrill; *Polyporus perennis* Linn. ex Fries.

3. *P. conchifer* Schw.

Fig. 42

Pileus coriaceous, very thin, sessile or attached by a lateral tubercle and appearing substipitate, concentrically sulcate, white, yellowish or grayish, glabrous, sometimes zonate, bearing at the base of pileus a small cup-shaped sterile structure,

1-3 x 1-4 x 0.1-0.3 cm.; context white, less than 1 mm. thick; tubes 2 mm. or less long, mouths white or yellowish, angular, thin walled, dentate, averaging 3 per mm.; spores hyaline, smooth, cylindric or allantoid, 6-7 x 1.5-2 μ ; cystidia none; hyphae 2-4 μ .

On dead branches of deciduous trees, especially elm branches.
Syn. *Poronidulus conchifer* (Schw.) Murrill.

4. *P. biformis* Klotzsch

Pileus coriaceous, soft and pliant when fresh, tough, sessile or effused-reflexed, white to alutaceous, subzonate, with innate radiating fibers, giving it a rough appearance, 1-5 x 1.5-6 x 0.2-0.5 cm.; context white, 1-2 mm. thick; tubes 2-5 mm. long, mouths white to yellowish, circular, angular, dentate and lacerate, usually breaking up into teeth at an early stage, averaging 1-2 per mm.; spores hyaline, smooth, oblong, allantoid, 7-8 x 2-2.5 μ ; cystidia none; hyphae simple, 3-4 μ .

On dead wood of deciduous trees.

5. *P. zonatus* Fr.

Fig. 45

Pileus coriaceous to woody, sessile or effused-reflexed, cinereous, gray or ochraceous, minutely velvety or short villous, concentrically zonate, margin whitish, even, thin, 1-3 x 1.5-5 x 0.2-0.4 cm.; context white 1-3 mm. thick; tubes 1-2.5 mm. long, mouths white or yellowish, circular to angular, obtuse, 3-4 per mm.; spores hyaline, smooth, cylindric, 6-8 x 2-3 μ ; cystidia none; hyphae simple, 5-8 μ .

On dead trunks and branches.

This species is very close to *P. versicolor* except that the context is slightly thicker, and the pores are larger. The spores also seem to be slightly larger in this species.

6. *P. versicolor* Linn. ex Fr.

Fig. 43

Pileus coriaceous, sessile, effused-reflexed, or rosetted, thin, rigid, dimidiate, depressed behind, variable in color and marked by many narrow multicolored zones ranging from white to yellow brownish, reddish, greenish, and blackish, villous or tomentose, shining, often alternating glabrous and tomentose

zones, margin acute, wavy, rounded or lobed, 2-5 x 2-7 x 0.1-0.3 cm.; context white, less than 1 mm. thick, or thicker at the base, 7-8 mm.; tubes 1-2 mm. long, mouths minute, white, yellowish or brownish, round, walls thin, nearly entire, sometimes lacerate with age 3-5 per mm.; spores hyaline, smooth, oblong or allantoid, 5-6 x 1-2 μ ; cystidia none; hyphae simple, 2-10 μ .

On all kinds of dead wood.

One of our most common Polypores. It is easily recognized by its coriaceous rigid substance and by its shining zones of many colors.

7. *P. pargamenus* Fr.

Fig. 44

Pileus coriaceous, membranaceous, pliable, sessile, reflexed, dimidiate or imbricate, often narrowed at the base, whitish, cinereous or brownish with age, villous or velvety pubescent, zonate or azonate, 1-7 x 1-7 x 0.1-0.4 cm.; context white, less than 1 mm. thick; tubes 1-3 mm. long, mouths usually violaceous to white or bay, at first small, irregularly dentate, soon irpiciform, 2-3 per mm. in poroid forms; spores hyaline, smooth, cylindric, allantoid, 5-6.5 x 1.5-2.5 μ ; cystidia present or inconspicuous as projecting capped hyphae, 4-5 μ broad, projecting 5-15 μ ; hyphae simple, 4-6 μ .

On dead wood of deciduous trees.

Syn. *Polyporus pargamenus* Fr.; *Polyporus pseudopargamenus* Thum.; *Coriolus prolificans* Fr. ex Murrill; *Coriolus pargamenus* Fr. ex Murrill.

Genus POLYPORUS Mich. ex Fr.

Sporophore fleshy tough, coriaceous, corky or woody in texture; sessile, effused, effused-reflexed, applanate, or stipitate, sometimes imbricate; hymenophore poroid in a well marked stratum; pores cylindric, angular, sinuous, or sometimes when becoming old breaking up into teeth; context white, yellow, red or brown; pileus variously colored, glabrous, hirsute or pubescent; hispid or waxy, zonate or azonate; epixylous or terrestrial, annual; spores hyaline or colored.

Polyporus comprises a large number of species, varying in structure and texture. It contains no typical resupinate forms.

KEY TO SPECIES OF POLYPORUS

- a. Context white, whitish, pallid or yellow; spores hyaline -----b
 a. Context yellowish red, reddish, brown or brownish; spores hyaline or brown -----uu
 b. Sporophore stipitate or substipitate -----c
 b. Sporophore sessile or effused-reflexed -----v
 c. Sporophore consisting of a few or many fleshy pilei arising from a common base, tubercle, or compound, branching stipe; of large size, growing on wood or roots of trees -----d
 c. Sporophore consisting generally of a single pileus, stipe simple or not branching more than once -----j
 d. Pilei regular in outline and centrally attached, branches of the stipe regular and cylindric in form; spores cylindric -----1. *P. umbellatus*
 d. Pilei not regular in outline, stipe not centrally attached -----e
 e. Hymenium some shade of orange or yellow -----f
 e. Hymenium not orange or yellow -----g
 f. Sporophore bright-sulphur yellow, growing on stumps and trunks of various trees -----2. *P. sulphureus*
 f. Sporophore orange, expanded on all sides from a radial tubercle, tubes golden yellow, short, mouths becoming brownish, growing on the ground -----3. *P. heteroclitus*
 g. Spores echinulate -----4. *P. Berkeleyi*
 g. Spores smooth -----h
 h. Surface of pileus white or pallid -----
 -----*P. sulphureus* var. *albolabyrinthiporus*
 h. Surface of pileus not white, usually gray -----i
 i. Pileus fleshy, many pilei arising from a common stalk, pilei always laterally attached, stipe branches irregular -----5. *P. frondosus*
 i. Pileus tough, corkey or leathery, caespitose, surface pallid or light brown, hymenium usually turning black where bruised or on drying -----6. *P. giganteus*
 j. Sporophore small, not more than 1 cm. high, on oak and chestnut wood -----7. *P. pocula*
 j. Sporophore always much larger -----k
 k. Context duplex, soft and spongy above, firm next to the hymenium; often much distorted and porous over most of the surface, cystidia present -----8. *P. distortus*
 k. Context not duplex, pores covering only underside of pilei -----l
 l. Stipe black at the base -----m
 l. Stipe not black at the base -----q
 m. Sporophore growing in the ground; spores very large, 12-15 x 5-8 μ ; pileus some shade of brown -----9. *P. radicans*
 m. Sporophore growing on wood -----n
 n. Surface of the pileus brown, smooth, slightly streaked with fine, lighter colored radiating lines -----10. *P. varius*

- n. Pileus without fine lighter colored radiating lines on surface -----o
- o. Pores large, 1-2.5 mm. broad, surface of pileus with distinct squamules -----11. *P. squamosus*
- o. Pores small or medium sized -----p
- p. Pileus tan colored or ochraceous; 2-5 cm. broad; pores averaging 4-5 per mm. -----12. *P. elegans*
- p. Pileus bay or ochraceous, 4-20 cm. broad; pores averaging 5-7 per mm. -----13. *P. picipes*
- q. Sporophore arising from a cup-shaped sterile body that may disappear; pileus white or grayish white when old; found on dead branches of elm -----*Polystictus conchifer*
- q. Sporophore not arising from a cup-shaped sterile body; rarely found on elm branches -----r
- r. Margin of pileus projecting 5 mm. or more beyond the hymenium; hymenium separating smoothly from the context in fresh specimens, growing only on birch -----14. *P. betulinus*
- r. Sporophore not as above -----s
- s. Pileus more or less imbricate, and attenuate to a stem-like base, context hard and firm when dry -----15. *P. osseus*
- s. Context not hard and bony when dry -----t
- t. Pileus bright sulphur yellow -----2. *P. sulphureus*
- t. Pileus not bright sulphur yellow -----u
- u. Pileus yellowish brown; mouths of the tubes almost 1 mm. in diameter; the walls thin -----16. *P. arcularius*
- u. Pileus darker than above, brown or sooty-black; pores smaller, averaging 2 per mm.; walls at first thick -----17. *P. brumalis*
- v. Pileus arising from a cup-shaped sterile body; found only on dead elm branches -----*Polystictus conchifer*
- v. Pileus not as above -----w
- w. Hymenium bright sulphur yellow -----2. *P. sulphureus*
- w. Hymenium not bright sulphur-yellow -----x
- x. Margin of pileus projecting .5 mm. or more beyond the hymenium, found growing on birch -----14. *P. betulina*
- x. Not as above -----y
- y. Hymenium more or less smoke-colored or black when fresh -----z
- y. Hymenium not at all smoke-colored or black when fresh -----bb
- z. Pileus rather thick; hymenium pallid to smoky; dissepiments thick; tramal tissue hyaline or nearly so in cross section -----18. *P. fumosus*
- z. Pileus thinner; hymenium black or smoky; dissepiments thin; tramal tissue decidedly brown in cross section -----aa
- aa. Pileus finely tomentose, margin even; pores minute; pilei slightly or not at all imbricate -----19. *P. adustus*
- aa. Pileus fibrillose on the margin, strigose toward the base; margin crisped and wavy; pores 3-5 per mm. -----20. *P. crispus*

- bb. Pileus distinctly brown or blackish brown in color; context light brown ----- 21. *P. resinusus*
 bb. Pileus not as above ----- cc
 cc. Pileus thin and coriaceous, not more than 1 mm. thick -- 22. *P. planellus*
 cc. Pileus not thin and coriaceous ----- dd
 dd. Sporophore mostly resupinate ----- 23. *P. semipileatus*
 dd. Sporophore not mostly resupinate ----- ee
 ee. Pileus thin and coriaceous, often zonate, never more than 1.5 cm. thick ----- ff
 ee. Pileus either soft and watery or firm and corky (never coriaceous) when fresh, usually more than 1.5 cm. thick ----- ii
 ff. Hymenium tinted flesh-color when fresh; sporophore becoming rigid on drying; spores globose ----- 24. *P. rigidus*
 ff. Hymenium not flesh-colored; not rigid when dry; spores cylindric ----- gg
 gg. Hymenium soon breaking up into teeth ----- 25. *P. tulipiferus*
 gg. Hymenium not breaking up into teeth ----- hh
 hh. Dissepiments thick and entire; pileus hirsute, tubes not more than 2 mm. long ----- 26. *P. hirsutus*
 hh. Dissepiments thin, velvety to pubescent, tubes more than 2 mm. long ----- 27. *P. pubescens*
 ii. Sporophore growing only on wood of coniferous trees; tubes 3-10 mm. long; pileus hispid to tomentose ----- 28. *P. borealis*
 ii. Sporophore growing only on wood of deciduous trees ----- jj
 jj. Sporophore with a very disagreeable odor when fresh; context hard and bony when dry ----- 29. *P. Spraguei*
 jj. Sporophore without disagreeable odor when fresh ----- kk
 kk. Margin of pileus thick and rounded ----- ll
 kk. Margin of pileus thin, not rounded ----- mm
 ll. Tubes large, 1 mm. or more in diameter, found growing only on oak ----- 30. *P. obtusus*
 ll. Tubes much smaller ----- 31. *P. occidentalis*
 mm. Pileus gray when fresh ----- 32. *P. tephroleucus*
 mm. Pileus pure white, slightly gray, or yellowish when fresh ----- nn
 nn. Spores cylindric-oblong, often allantoid ----- oo
 nn. Spores ellipsoid to globose ----- qq
 oo. Pileus villous-strigose, hymenium often bluish or grayish blue ----- 33. *P. caesius*
 oo. Pileus glabrous or slightly pubescent ----- pp
 pp. Hyphae of context simple or very slightly branched; pileus usually thick, convex or unguulate, and triangular in section; tubes 4-9 mm. long ----- 34. *P. albellus*
 pp. Hyphae of context branch greatly; pileus thin and spreading, 0.5-1.5 cm. thick; tube 1.5-3 mm. long ----- 35. *P. chioneus*
 qq. Sporophore with a sweet acid odor when fresh; surface of pileus conspicuously pubescent, often strigose tomentose at the base ----- 36. *P. galactinus*

- qq. Sporophore without a sweet fragrant odor when fresh -----rr
 rr. Tubes less than 0.5 cm. long -----37. *P. epileucus*
 rr. Tubes 0.5 cm. or more long -----ss
 ss. Context drying soft crumbly -----38. *P. iowensis*
 ss. Context not drying soft and crumbly -----tt
 tt. Pileus strigose-tomentose or strigose-hispid, especially on
 the margin; tubes collapsing on drying; mouths equal, small,
 averaging 3-4 per mm. -----39. *P. spumeus*
 tt. Pileus glabrous or floccose-tomentose; tubes scarcely col-
 lapsing when dry, the mouths usually somewhat sinuous, aver-
 aging 1-2 per mm. -----40. *P. delectans*
 uu. Context yellowish red, reddish, or orange; spores hyaline -----vv
 uu. Context umber, cinnamon, brown, or ferruginous; spores hyaline or
 brown -----yy
 vv. Pileus and hymenium deep cinnabar-red -----ww
 vv. Pileus and hymenium not deep cinnabar-red -----xx
 ww. Pileus less than 5 mm. thick, often zonate -----41. *P. sanguineus*
 ww. Pileus more than 5 mm. thick, never zonate -----42. *P. cinnabarinus*
 xx. Hymenium sulphur-yellow or reddish-yellow when fresh.
 -----2. *P. sulphureus*
 xx. Hymenium not as above, pileus buff or yellowish-orange,
 growing only on wood of *Quercus* and *Castanea*. 43. *P. croceus*
 yy. Sporophore stipitate -----zz
 yy. Sporophore sessile -----ddd
 zz. Surface of pileus distinctly incrusted -----*Fomes lobatus*
 zz. Surface of pileus not incrusted -----aaa
 aaa. Context not more than 1 cm. thick; pilei growing on the ground ..
 -----bbb
 aaa. Context more than 1 cm. thick; pilei growing on wood or attached
 to burned wood -----ccc
 bbb. Surface of pileus shining with silky striations -----
 -----*Polystictus cinnamomeus*
 bbb. Surface of pileus not shining, dull -----*Polystictus perennis*
 ccc. Context duplex; spores hyaline under the microscope. 44. *P. circinatus*
 ccc. Context not duplex; growing on stumps or trunks of pine trees.
 -----45. *P. Schweinitzii*
 ddd. Pilei forming a densely imbricate, globose, or cylindric
 mass of closely overlapping pilei arising from a central solid
 core -----46. *P. graveolens*
 ddd. Pilei not as above -----eee
 eee. Pileus distinctly incrusted -----*Fomes lobatus*
 eee. Pileus not incrusted -----fff
 fff. Sporophore growing on stumps of pine trees or wood -----
 -----45. *P. Schweinitzii*
 fff. Sporophore growing on deciduous stumps, shrubs or trees;
 often on living trunks -----ggg
 ggg. Context very light brown, scarcely colored -----21. *P. resinosus*

- ggg. Context yellowish brown to umber brown or rusty brown ---- hhh
 hhh. Setae none, pileus often soft and watery, usually growing
 on oak wood ----- 47. *P. nidulans*
 hhh. Setae present, sometimes very scarce, either between basidia
 or imbedded in the tramal tissue ----- iii
 iii. Setae-like bodies imbedded in the tramal tissue only; pores greenish
 yellow when fresh; on maple wood ----- 48. *P. glomeratus*
 iii. Setae projecting between the basidia ----- jjj
 jjj. Hyphae 3-4.5 μ ----- kkk
 jjj. Hyphae 5-10 μ ----- lll
 kkk. Pileus very thin; often radiate, zonate ----- 49. *P. licnoides*
 kkk. Pileus of medium thickness; never radiate, not strongly zonate ----
 ----- 50. *P. gilvus*
 lll. Pileus hirsute; growing on various deciduous trees; no cen-
 tral core; spores brown ----- 51. *P. hispidus*
 lll. Pileus fibrillose or glabrous; growing on oak wood or trees;
 with a central solid granular core; spores brown -----
 ----- 52. *P. Rheades*

1. *P. umbellatus* Pers. ex Fr.

Fig. 46

Pileus fleshy to tough, stipitate, umbilicate, 7-20 cm. in diameter, stipe branching repeatedly and giving rise to many centrally attached pilei more or less depressed, 1-4 cm. broad, white to smoky brown, fibrillose to glabrous; context white, not more than 1 mm. thick, fragile, when dry; tubes less than 2 mm. long, decurrent, mouths white, angular, averaging 2-4 per mm.; stipe arising from an underground tuber, branches cylindric in form, central or subcentral, white entirely covered by decurrent tubes; spores hyaline, smooth, cylindric, 7-9.5 x 2.5-3.5 μ ; cystidia none; hyphae 2-6 μ .

On stumps and trees.

Syn. *Grifola ramossissima* Scop. ex Murrill.

2. *P. sulphureus* Bull. ex Fr.

Fig. 47

Pileus fleshy and watery, sessile or attenuate to a stemlike base, appearing substipitate, bright orange or yellow soon becoming pale to white with age, nearly glabrous, rather roughened with ridges, 5-20 x 4-12 x 0.5-5 cm.; context white or yellowish, 0.4-4 cm. thick, cheesy; tubes 1-4 mm. long, mouths bright sulphur yellow when fresh and fading with age, angular, averaging 2-4 per mm., spores hyaline, smooth,

ovoid to subglobose, 5-7 x 3.4-5 μ ; cystidia none; hyphae branching, 3-9 μ .

On stumps and trunks of deciduous trees, also on coniferous trees. Common.

Syn. *Lactiporus speciosus* Batt. ex Murrill; *Polyporus cincinnatus* Morgan.

One specimen in the State University of Iowa Herbarium seems to be the white variety, *Polyporus sulphureus* var. *albo-labyrinthiporus* Rea.

3. *P. heteroclitus* (Bolt.) Fr.

Pileus expanded horizontally on all sides from a radical tubercle, up to a foot in diameter, caespitose, coriaceous, pilei 6 cm. broad, lobed, orange, villose, azonate; context lighter than outside pilei; tubes golden yellow, short; mouths yellow, becoming brownish, irregular and elongated.

On ground or base of a tree or stump. Probably the same as *P. sulphureus*.

4. *P. Berkeleyi* Fr.

Fig. 63

Sporophore stipitate and composed of from 2-5 broad pilei, or simple with but one large centrally depressed pileus; pilei fleshy-tough, becoming hard and corky, very broad, 6-15 cm., 0.5-1.5 cm. thick, whitish to yellowish, nearly glabrous or finely tomentose, sometimes subzonate, rugose-undulate, margin acute, often inflexed; context white, tough, milky in young specimens; tubes 2-8 mm. long, decurrent, the mouths white or whitish, angular, unequal, large, 0.5-2 mm. broad; very fragile when dry; stem short and thick, more or less tubercular, sometimes, at least, arising from an underground sclerotium or tuber, the portion above ground 4-7 cm. long, 3-5 cm. thick; spores globose, hyaline, echinulate, 5.5-8 μ broad; cystidia none; hyphae simple, 3-4 μ .

Growing around trees and stumps, especially of oak.

Syn. *Grifola berkeleyi* Murrill.

5. *P. frondosus* Dickson ex Fr.

Fig. 48

Pileus fleshy-tough, fibrous, stipitate, very much branched and giving rise to numerous overlapping pilei, forming a more

or less globose mass, as much as 60 cm. across, pilei flabelliform or spatulate, surface grayish or drab, nearly glabrous, 2-7 cm. broad by 2-5 mm. thick; context white, not more than 2 mm. thick, tough; tubes 2-3 mm. long, decurrent, mouths white, angular, unequal, averaging 1-3 per mm.; stipes all united into a very short trunk; spores hyaline, smooth, ovoid or elliptic, 5-9 x 4.5-6 μ ; cystidia none; hyphae simple, 3-8 μ .

On or around stumps of trees.

"*Polyporus anax* Berk. does not seem to differ from *frondosus* except in the larger, irregular pores; both are probably forms of the ancient species *intybaceus*." Morgan.

The species *frondosus* is separated from *umbellatus* by the spatulate pilei in contrast with the orbicular pilei, and the flattened stipe branches in contrast with the cylindric stipe of *umbellatus*.

6. *P. giganteus* Pers. ex Fr.

Fig. 49

Pileus fleshy-tough to subcoriaceous, stipitate, composed of a few broad fleshy pilei, dimidiate, flabelliform or spatulate, brown or grayish, often blackish when dry, tomentose to fibrillose, margin thin and acute, recurved on drying, 6-15 cm. in diameter, 0.5 cm. or less in thickness; context white, 1-3 mm. thick; tubes 1-3 mm. long, mouths white to tannish or pallid, becoming blackish where bruised or on drying, angular, irregular, becoming lacerate, 5-7 per mm.; stipe short and thick; spores hyaline, smooth, globose, 4-8 μ ; cystidia none; hyphae nearly simple, 5-8 μ .

On ground around stumps.

Syn. *Grifola sumstinii* Murrill.

7. *P. pocula* Schw. ex Berk. and Curtis

Fig. 50

Pileus coriaceous when fresh, rigid when dry, stipitate, whitish to brown, pruinose or mealy, azonate, pendant from dead branches, 1-5 mm. broad, 1-3 mm. thick; context white, less than 1 mm. thick; tubes 0.5 mm. or less long, mouths whitish or brownish, at first pruinose, circular, very minute, entire, averaging 5-7 per mm.; stipe attached at vertex, expanded into the pileus, pruinose, short, not more than 5 mm.

long; spores hyaline, smooth, globose, 4-5 μ , a few cylindric shaped spores were also found, 4.5-5 x 0.7-1 μ ; cystidia none; hyphae simple to branched, 4-5 μ .

On dead branches of oak, chestnut, etc.

Syn. *Polyporus cupulaeformis* Berk. ex Fr.; *Sphaeria pocula* Schw.; *Porodisculus pendulus* (Schw.) Murrill; *Porodiscus pendulus* Murrill.

8. *P. distortus* Schw. ex Fr.

Pilei fleshy-tough to coriaceous, confluent, usually wholly distorted and almost the entire surface covered with pores, stipitate or substipitate when well developed, orbicular, white to tan, villous-tomentose, 2-10 cm. broad, 0.5-1.5 cm. thick; context white, duplex when mature, 0.2-1 cm. thick; tubes 1-6 mm. long, mouths whitish or pallid, brown when dry, minute, angular to daedaloid, averaging 1-3 per mm.; stipe central, lateral or wanting, usually rudimentary and tubercular; spores hyaline, smooth, ellipsoid to subglobose, 5-7 x 3.5-5 μ ; cystidia present or absent, hyaline, blunt, 20-40 x 6-10 μ ; hyphae simple, 5-8 μ .

On dead wood of deciduous trees.

Syn. *Polyporus abortivus* Peck.

9. *P. radicans* Schw.

Fig. 53

Pileus fleshy-tough, stipitate, orbicular, convex to depressed, yellowish brown or reddish brown, subsquamulose or fibrillose scaly, tomentose, 3.5-20 cm. broad, 3-9 mm. or thicker; context white or cream, 3-6 mm. thick or thicker near center, soft, spongy; tubes 1-5 mm. long, decurrent, mouths white to isabelline, circular, 2-3 per mm.; stipe central, velvety or squamulose with a long black root, 6-13 cm. long, 0.5-2 cm. thick; spores hyaline or light yellow, smooth, ovoid-elliptic or subfusiform, 12-15 x 6-8 μ ; cystidia none; hyphae 4-8 μ .

On ground often around stumps.

Syn. *Polyporus morgani* Peck; *Polyporus kansensis* Ellis and Barth.

10. *P. varius* Fr.

Fig. 51

Pileus fleshy-tough, stipitate, thin, becoming woody, brown, slightly streaked with fine lighter radiating lines, glabrous,

margin thin; context white, less than 1 mm. thick; tubes 1 mm. or less long, decurrent, mouths whitish, then cinnamon-brown, round, unequal, 5-6 per mm.; stipe excentric, lateral or wanting, short, smooth, becoming black at the base; spores hyaline, smooth, oblong, 5-7.5 x 2-3 μ ; cystidia none; hyphae simple, slightly branched.

On trunks and branches of deciduous trees.

11. *P. squamosus* Hudson ex Fr.

Fig. 52

Pileus somewhat fleshy when fresh, corky tough to firm when dry, short stipitate or almost sessile, whitish to dingy yellowish or brownish, covered with large appressed brownish scales, 6-25 cm. broad, 0.5-4 cm. thick; context white, thick, 0.5-3.5 cm.; tubes 2-8 mm. long, decurrent, mouths white or yellowish, large, angular, 1-2.5 mm. broad; stipe excentric or lateral, reticulate above, thick, black at the base, 1-5 cm. long; spores hyaline, smooth, oblong-cylindric, 10-14 x 5-5.5 μ ; cystidia none; hyphae branched, 2-8 μ .

On living wood of deciduous trees. Found abundantly on maple trees in Iowa.

Syn. *Polyporus caudicinus* Scop. ex Murrill.

12. *P. elegans* Bull. ex Fr.

Fig. 54

Pileus coriaceous when fresh, soon hardening, stipitate, convex or nearly plane, orbicular or reniform, surface often distinctly radiate-striate, pruinose to glabrous, pale ochraceous or dull orange, margin thin, at first inflexed, becoming wavy or much lobed with age, 2-6 x 3-10 x 0.2-1 cm.; context white to pallid, 1-6 mm. thick; tubes 1-3 mm. long, decurrent, mouths whitish to avellaneous, angular to subcircular, averaging 4-5 per mm.; stipe eccentric or entirely lateral or central, woody, smooth, pallid above, abruptly black at the base, 1-8 cm. long, 0.2-0.6 cm. thick; spores hyaline, smooth, cylindric, 6-8 x 2.5-3.5 μ ; cystidia none; hyphae branching, 2-5 μ .

On fallen branches and trunks of deciduous trees.

This species is regarded by some as only a form of *P. picipes*.

Syn. *Polyporus fissus* Berk.

13. *P. picipes* Fr.

Fig. 55

Pileus thin, coriaceous and pliant when fresh, becoming rigid stipitate, convex to depressed or infundibuliform, chestnut brown or reddish brown, glabrous, center often darker than margin, margin thin, 4-20 cm. broad; context white to pallid, 1-7 mm. thick; tubes up to 2 mm. long, decurrent, mouths white to brownish, small, averaging 5-7 per mm.; stipe central or eccentric, black at the base, glabrous, 1-6 cm. long, 0.4-1.5 cm. thick; spores hyaline, smooth, cylindric, elliptic, 6-8 x 2-3 μ .

On stumps and logs of deciduous trees.

This species differs from *P. elegans* in the much darker color, more lateral stipe, and usually smaller size. Some regard *P. elegans* as only a form, but to me it seems quite distinct.

14. *P. betulinus* Bull. ex Fr.

Pileus fleshy or corky, sessile or attached by a short umbo behind, compressed-ungulate, convex above, plain below, surface covered with a thin, brown or smoky separating pellicle, glabrous, margin incurved, obtuse and rounded, projecting beyond hymenium nearly 1 cm., 3-15 x 3-20 x 2-5 cm.; context white, 1-3.5 cm. thick, fleshy tough, homogeneous; tubes 3-8 mm. long, separating in a layer from the context, mouths very irregular, white, dissepiments thick, averaging 2-4 per mm.; spores hyaline, smooth, cylindric, curved, 6 x 2.5 μ ; cystidia none; hyphae mostly simple, nodulose, 3-5 μ .

Growing only on birch trees.

Syn. *Piptoporus suberosus* Linn. ex Murrill.

15. *P. osseus* Kalch.

Pileus fleshy tough when fresh, very rigid and firm when dry, imbricate somewhat attenuate to a stemlike base, white or gray, nearly glabrous, 1-4 x 2-8 x 0.3-1 cm.; context white, 3-7 mm. thick, firm when fresh, hard when dry; tubes 1-3 mm. long, mouths whitish, averaging 5 per mm.; spores not obtained; cystidia none; hyphae 6-8 μ .

On old oak stumps.

16. *P. arcularius* Batsch ex Fr.

Fig. 56

Pileus tough, coriaceous, stipitate, orbicular to convex, umbilicate, golden brown to dark brown, squamulose or glabrous, concentrically rugose when dry, margin often ciliate, involute on drying, 1-5 cm. broad, 0.1-0.2 cm. thick; context white, 1-2 mm. thick; tubes up to 2 mm. long, decurrent, mouths white or yellowish, brownish when dry, large, angular, 0.5-2 per mm., edges thin; stipe central, yellowish brown or dark brown, fuscous, squamulose, sometimes hispid at base, 1-6 cm. long, 2-4 mm. thick; spores hyaline, smooth, cylindrical-elliptic, two or three guttulate, $6-8 \times 2-3 \mu$; cystidia none; hyphae branched, $2-5 \mu$.

On stumps and logs.

17. *P. brumalis* Pers. ex Fr.

Pileus fleshy-tough to rigid, stipitate, orbicular, subumbilicate or infundibuliform, dark brown or blackish, sometimes yellowish-brown, minutely hispid to glabrous, stiff hairs easily rubbed off when dry, margin involute when young and when dry, 1.5-6 cm. broad, 0.2-0.4 cm. thick; context white, 3 mm. or less thick; tubes 1-3 mm. long, slightly decurrent, mouths whitish to pallid, circular, thick walled, then angular and thinner, 2-3 per mm.; stipe central or nearly so, grayish or brownish, slender, minutely hispid, solid, equal, 2-3 cm. long, 0.2-0.3 cm. thick; spores hyaline, smooth, oblong, $7-9 \times 2-3 \mu$; cystidia none, but scattered columnar tufts of projecting hyphae; hyphae simple or branched, $2-4 \mu$.

On dead wood.

Syn. *Polyporus polyporus* (Retz) Murrill.

18. *P. fumosus* Pers. ex Fr.

Fig. 57

Pileus fleshy, coriaceous, corky or rigid, sessile or effused-reflexed, white to ochraceous or smoky white, pallid or light brown when dry, finely tomentose to glabrous, azonate, 1-6 x 3-8 x 0.1-0.6 cm.; context white to fibrous, subzonate, 2.5-10 mm. thick, separated from hymenophore by a very narrow dark line, anise-scented, or with a disagreeable odor; tubes 1.5-4 mm. long, mouths small, white to yellowish or grayish

black, becoming darker when bruised, round to angular, averaging 3-5 per mm.; tramal tissue hyaline or nearly so under microscope; spores hyaline, smooth, 4.5-6 x 2-3 μ ; cystidia none; hyphae simple to slightly branched with clamp connections 3-6 μ .

On dead wood of deciduous trees.

Syn. *Bjerkandera fumosa* (Pers.) Karst.; *Polyporus fragrans* Peck.

19. *P. adustus* Willdenow ex Fr.

Fig. 58

Pileus fleshy-tough, corky, sessile, effused or effused-reflexed, slightly or not at all imbricate, white to cream, gray, or cinereous-pallid, finely tomentose, azonate, margin thin, even, often black when dry, sterile below, sterile margin being more or less light colored, 1-6 x 3-7 x 0.1-0.8 cm.; context white to pallid, 1-5 mm. thick, corky when dry, usually separated from hymenial layer by a dark line; tubes less than 2 mm. long, mouths grayish black to black, very minute, round, averaging 6 per mm.; tramal tissue brown under microscope; spores hyaline, smooth, oblong, rarely slightly curved, 3.5-5 x 1.5-2.5 μ ; cystidia none; hyphae hyaline, rarely branched, 3-5 μ .

Common on dead deciduous wood.

This species is distinguished from *P. fumosus* by the darker pores and the brown color of the tramal tissue; from *P. crispus* by the even margin and less imbricate pilei.

20. *P. crispus* Pers. ex Fr.

Pileus coriaceous, sessile or effused-reflexed, dimidiate, closely imbricate, gray or avellaneous, adpressedly fibrillose toward margin and usually strigose toward base, margin thin, crisped or wavy, sometimes becoming black, sterile below, 1-4 x 1-7 x 0.1-0.4 cm.; context white, 1-3 mm. thick, corky, occasionally separating from the hymenium by a narrow dark line; tubes less than 1 mm. long, mouths gray, unequal, averaging 3-6 per mm.; tramal tissue decidedly brown in color under microscope; spores hyaline, smooth, oblong, 3.5-4.5 x 1.5-2.5 μ ; cystidia none; hyphae nearly simple, 4-6 μ .

On dead wood of deciduous trees.

21. *P. resinusus* Schrader ex Fr.

Fig. 59

Pileus fleshy and watery when young, flesh becoming corky when mature, hard when dry, sessile or reflexed, cinnamon brown to darker brown, velvety-tomentose to glabrous, slightly resinous, zonate with darker colored bands, 5-15 x 7-25 x 1-2.5 cm.; context tan or very light brown, 0.5-2 cm. thick; tubes 1-7 mm. long, mouths white to pallid, becoming darker on being bruised or drying, 4-6 per mm.; spores hyaline, smooth, cylindric, or allantoid, 4-6 x 1-2 μ ; cystidia none; hyphae simple 3-6 μ .

Syn. *Polyporus fuscus* Pers.; *Ischnoderma juliginosum* Scop. ex Murrill.

22. *P. planellus* Murrill

Pileus very thin, coriaceous, narrowly attached, sessile or effused-reflexed, finely tomentose to glabrous, multizonate, light brown to umber, the zones darker, 1-3.5 x 1-3 x 0.05-0.1 cm.; context papery-thin, whitish; tubes less than 1 mm. long, the mouths white or yellowish, angular, averaging 5-6 per mm.

On dead limbs of deciduous trees.

The above description was adapted from Overholts.

Syn. *Polyporus planus* Peck.

This species should more properly be placed in the genus *Polystictus*. It is, however, doubtful whether it occurs in Iowa. Fennell has listed it among the Iowa species. No specimen has been seen.

23. *P. semipileatus* Peck

Pileus spongy and watery when fresh, tough and hard when dry, very narrowly reflexed or effused-reflexed, largely resupinate, white, yellowish or brownish, azonate, glabrous to slightly tomentose, margin thin, sometimes inflexed, 0-1.5 x 0.7-3.5 x 0.1-0.5 cm.; context white, 1-4 mm. thick, fleshy-tough to fragile; tubes short, less than 2 mm. long, mouths white to yellowish, often bluish-discolored in spots, circular, angular, averaging 4-7 per mm., dissepiments thin, even, entire; spores hyaline, smooth, slightly allantoid, 3-4 x 1 μ ; cystidia none or of tufts of hyaline projecting hairs; hyphae hyaline, roughened along edge, simple, 2-4 μ .

On dead wood of deciduous trees.

Syn. *Polyporus semisupinus* Berk. ex Curtis.

24. *P. rigidus* Leveille

Fig. 64

Pileus fleshy and pliant when fresh, rigid and firm when dry, sessile, dimidiate or laterally confluent, effused-reflexed or entirely resupinate, whitish to flesh-colored or isabelline, very finely tomentose to glabrous, azonate to zonate when mature, somewhat rugose, margin obtuse, then thin, 0-0.5 x 1-3 x 0.2-2.5 cm.; context white, 1-5 mm. thick, hard and rigid when dry; tubes 1-4 mm. long, mouths flesh-tinted to cream, angular, averaging 4-5 per mm., walls thick and entire; spores hyaline, smooth, globose, 2.5-5 μ broad; cystidia none; hyphae simple, 5-7 μ .

On dead logs, especially of poplar.

Syn. *P. zonalis* Berk.

25. *P. tulipiferus* Schw. ex Overholts

Fig. 61

Pileus coriaceous, thin, sessile, effused-reflexed or resupinate, white or whitish, villous, zonate, 0-1 x 1-5 x 0.1-0.6 cm.; context white 0.5-2 mm. thick; tubes 1-5 mm. long, mouths white or yellowish, soon breaking up into teeth, averaging 2-3 per mm; spores hyaline, smooth, cylindric, allantoid, 4.5-5 x 1-2 μ , spores print slightly greenish, spores 2 guttulate; cystidia scattered, encrusted, having a greenish cast, 35-45 x 10-20 μ , projecting 15-30 μ ; hyphae slightly branched, 4-6 μ .

On dead wood of deciduous trees, on elm, etc.

Syn. *Irpex lacteus* Fr.; *Irpiciporus lacteus* (Fr.) Murrill.

The description of *Polystictus arcticus* Fr. as given by Macbride seems to suggest that it is only a synonym of *Polyporus tulipiferus*.

26. *P. hirsutus* Wulfen ex Fr.

Fig. 62

Pileus coriaceous, flexible or rigid, more or less imbricate, sessile or reflexed, grayish yellowish or brownish, densely hirsute or tomentose, concentrically furrowed, zonate, zones not variously colored, margin thin, sometimes with a narrow sterile margin, 1.5-5 x 1.5-7 x 0.2-1 cm.; context white, 1-6

mm. thick, fibrous, spongy above; tubes 1-4 mm. long, mouths white to yellowish or smoky, circular to angular, entire, averaging 3-4 per mm.; spores hyaline, smooth, 5-8 x 1.5-2.5 μ ; cystidia none; hyphae simple, 2-7 μ .

On dead deciduous wood.

Syn. *Coriolus nigromarginatus* (Schw.) Murrill; *Polystictus hirtellus* Fr.

27. *P. pubescens* Schumacher ex Fr.

Pileus coriaceous or fleshy-tough when fresh, sessile, dimidiate or flabelliform, conchate, white or yellowish (rarely umber) villous tomentose to finely tomentose, finely radiate-lineate in front at times, 1.5-5 x 2.5-5 x 0.4-1 cm.; context white, 1-5 mm. thick, fibrous; tubes 1-4 mm. long, mouths yellowish white to umber, angular, averaging 3-4 per mm., dissepiments thin, often dentate; spores hyaline, smooth, cylindric or allantoid, 5-6 x 1.5-2.5 μ ; cystidia none; hyphae nearly simple, 5-8 μ .

On stumps and old trunks of deciduous wood.

One specimen in the State University of Iowa Herbarium collected by Holway is referred by Macbride to the variety *Grayii* Ellis and Everhart N. A. F. 1933.

Syn. *Polyporus Sullivantii* Mont.

28. *P. borealis* Fr.

Pileus soft but tough and watery when fresh, sessile, white or yellowish, hispid to tomentose, context white, firm and fibrous next the hymenium, soft and floccose above, 3-8 x 4-12 x 0.5-2.5 cm.; tubes 3-10 mm. long, mouths white or yellowish, angular to daedaloid, uneven, averaging 2-3 per mm.; spores hyaline, smooth, ellipsoid to oval, 4-5 x 3-4 μ ; cystidia abundant, hyaline or brown, ventricose, 24-30 x 8-10 μ , projecting but slightly beyond the basidia; hyphae simple, 5-7 μ .

On trunks of coniferous trees.

The above description is adapted from Overholts.

There seems to be no specimen in the State University of Iowa Herbarium. Reported by Fennell.

Syn. *Spongipellis borealis* Murrill.

29. *P. Spraguei* Berkeley and Curtis

Fig. 60

Pileus watery and more or less soft when fresh, fleshy tough, sessile or attenuate behind, convex, white or gray, finely tomentose to glabrous, slightly tuberculose, azonate, margin often blackening with age, 4-12 x 4-15 x 0.6-3 cm.; context white, woody when dry, 0.3-1.5 cm. thick, disagreeable odor when fresh; tubes 0.3-1 cm. long, mouths white becoming brownish with age and on drying, angular, 3-4 per mm., white to yellowish within; spores hyaline, smooth, ellipsoidal, or subglobose, 4-5 μ ; cystidia none; hyphae hyaline, somewhat branched, 4-7 μ .

On dead wood of deciduous trees.

Syn. *Polyporus sordidus* Cooke; *Tyromyces spraguei* (Berk. and Curtis) Murrill.

30. *P. obtusus* Berk.

Fig. 67

Pileus spongy to firm, sessile, somewhat imbricate, dimidiate, often unguulate, surface sordid white to isabelline or fulvus, spongy-tomentose or hispid-tomentose, azonate, margin thick, 3-9 x 4-15 x 3-6 cm.; context white or pallid with age, 1-4 cm. thick, spongy fibrous; tubes 1-3 cm. long, white to isabelline within, mouths white to isabelline, later bay and resinous in appearance, large, circular to angular to irregular, often sinuous, compound, fimbriate, dentate to slightly lacerate, 1 mm. or more in diameter; spores hyaline, smooth, subglobose, 6-8 x 4-6 μ ; cystidia none; hyphae somewhat branched, 5-6 μ .

On trunks of deciduous trees, especially oak.

Syn. *Spongipellis unicolor* (Schw.) Murrill; *Polyporus tomentosiquercinus* Johnson; *Daedalea obtusa* Berk.

31. *P. occidentalis* Murrill ex Sacc.

Pileus spongy, thick, sessile, white to yellowish, hispid-tomentose; 5-8 x 7-10 x 2-3 cm.; margin very thick and rounded; context white to slightly yellowish, 1-2 cm. thick; tubes 1 cm. long, the mouths white to yellowish, minute, angular, averaging 5 per mm., the dissepiments becoming lacerate and collapsing; spores ellipsoid, smooth, hyaline, 6-7 x 4-5 μ ; cystidia none; hyphae 6 μ .

On old logs in woods.

The above description is adapted from Overholts, who has reported this species only for Iowa.

There seems to be no specimen in the State University of Iowa Herbarium. The species is very similar to *P. obtusus* except for the much smaller pores.

32. *P. tephroleucus* Fr.

Pileus soft and watery when fresh, rigid when dry, appanate, avellaneous or decidedly gray, glabrous or nearly so, 1-7 x 2-8 x 0.5-1.5 cm.; context white, 3-10 mm. thick; tubes 2-7 mm. long, the mouths white or whitish, angular, averaging 4-5 per mm.; spores hyaline, smooth, allantoid, 4-5 x 0.6-1.5 μ ; cystidia none.

On dead wood of deciduous trees. Not uncommon on rotten logs in marshy places.

The grayish pileus separates this species from *P. albellus*.

33. *P. caesius* Schrad. ex Fr.

Pileus soft and watery when fresh, rigid when dry, sessile or effused-reflexed, dimidiate, whitish to grayish, often bluish tinted, villose-pubescent or tomentose, azonate; margin thin and acute; context white, 3-10 mm. thick; tubes 2-7 mm. long, mouths white or grayish blue, unequal, angular, 1-5 per mm.; dissepiments thin and lacerate; spores hyaline, smooth, cylindrical or allantoid, 3-5 x 1-1.5 μ ; cystidia none; hyphae simple, 5-7 μ .

On dead wood of deciduous and coniferous trees.

34. *P. albellus* Peck

Fig. 65

Pileus soft and watery when fresh, sessile, dimidiate, somewhat imbricate, convex, more or less triangular in sections, surface grayish cinereous, or yellowish-white, azonate, sodden, pubescent, glabrous or slightly pubescent, covered with a thin pellicle which is more apparent in dried specimens, 1-5 x 1-10 x 1-6 cm.; context white, soft and watery, with a mild acid odor when fresh, when dry homogeneous, mealy and fragile, cutting with a smooth surface, 0.5-3 cm. thick; tubes 4-10 mm. long, mouths white or yellowish, angular or rounded,

grayish, averaging 3-5 per mm.; spores hyaline, smooth, cylindrical or allantoid, 3-5 x 1-1.5 μ ; cystidia none; hyphae simple, clamp connections present, 4-7 μ broad.

On dead wood of deciduous trees.

Syn. *Polyporus lacteus* Fr.; *Tyromyces chioneus* Murrill.

35. *P. chioneus* Fr.

Pileus soft and watery when fresh, thin and applanate, sessile or effused-reflexed, white, grayish or yellowish on drying, covered with a thin gray or yellowish pellicle that is more evident in dried specimens, 2-7 x 1-5 x 0.5-1.5 cm.; context white, usually fragrant when fresh, friable when dry, 2-7 mm. thick; tubes 1.5-3 mm. long, the mouths white or yellowish, angular, averaging 3-4 per mm., the walls nearly entire; spores cylindrical or allantoid, smooth, hyaline, 3-4 x 0.7-1.5 μ ; cystidia none; hyphae much branched, 4-8 μ .

On dead wood of deciduous and coniferous trees

The above description is adapted from Overholts. There seems to be no specimen in the State University of Iowa Herbarium.

Reported from Iowa by Macbride.

36. *P. galactinus* Berk.

Pileus soft and watery when fresh, sessile, white or yellowish, strigose-tomentose at base, short-tomentose on the margin, 3-8 x 5-10 x 1-3 cm.; context white, hard and sometimes resinous when dry, 0.3-2 cm. thick, strongly zonate, with a peculiar fragrant odor when fresh; tubes 5-10 mm. long, the mouths white or yellowish, angular, averaging 4-6 per mm.; spores ellipsoid, smooth, hyaline, 1-guttulate, 3-4 x 2-3 μ ; cystidia none; hyphae simple, 4-6 μ .

On old logs in woods, especially in overflow river bottoms.

Syn. *Polyporus immitus* Peck.

37. *P. epileucus* Fr.

Pileus soft and watery when fresh, sessile or effused-reflexed, white or yellowish, drying ochraceous, nearly glabrous but rugose, 1-2 x 1.5-5 x 1.3-1.6 cm.; context white, firm, tough, 1-4 mm. thick; tubes 1-3 mm. long, the mouths white or yellowish, averaging 2-4 per mm.; spores (teste Lloyd) hyaline, smooth, reniform, 5 x 2.5 μ ; cystidia none.

On dead wood of deciduous trees.

The above description is adapted from Overholts.

There seems to be no specimen in the State University of Iowa Herbarium. Reported by Macbride.

38. *P. iowensis* Lloyd

Fig. 66

Pileus fleshy when fresh, sessile, white, surface anoderm, smooth, dull, margin thin; context white, 0.2-1 cm. thick, when drying crumbly; tubes 0-1 cm. long, mouths small, irregular, surface drying slightly yellowish; spores hyaline, smooth, subglobose, 4-5 x 2.5-3 μ ; cystidia none; hyphae simple to branched, clamp connections present, 4-6 μ .

This is close to *Polyporus galactinus* which, however, has a pubescent surface when fresh, dries hard and discolors.

39. *P. spumeus* Sowerby ex Hornemann

Pileus soft and watery when fresh, sessile, white or somewhat yellowish, villous-strigose or matted strigose-tomentose, 5-20 x 6-20 x 2-6 cm.; context white, 1-3 cm. thick; tubes 0.5-1.5 cm. long, the mouths white or yellowish, angular, averaging 2-4 per mm., the dissepiments thin and acute, collapsing; spores ellipsoid to subglobose, smooth, hyaline, 5-6 x 4-5 μ ; cystidia none; hyphae simple, 4-6 μ .

Growing from wounds in living trees, rarely on logs.

The above description is adapted from Overholts.

Reported by Overholts. This species was not seen or studied. Murrill (26) states that this species is considered by some to be the same as *P. galactinus*.

40. *P. delectans* (Peck) Murrill

Fig. 68

Pileus soft and watery when fresh, fleshy-fibrous to corky when dry, sessile or effused-reflexed, dimidiate or convex, white or slightly yellowish, glabrous or finely tomentose, azonate, margin thin, acute, 3-15 x 5-20 x 1.5-5 cm.; context white, when fresh, 0.5-2 mm. thick, often duplex when dry, spongy above, firm and woody below; tubes 0.5-1.5 cm. long, mouths white to yellowish, large, angular or circular or sinuous, edges thin, entire or slightly dentate; spores hyaline, smooth, subglobose

to ovoid, often 1-guttulate, 5-8 x 4-6 μ , larger than given by Overholts; cystidia none; hyphae simple to slightly branched, 4-5 μ .

Syn. *Spongipellis delectans* (Peck) Murrill.

41. *P. sanguineus* Linn. ex Fr.

Pileus coriaceous, sessile or attenuate at the base and appearing substipitate, bright red, finely tomentose to glabrous, the margin very thin, 2-5 x 2-8 x 0.2-0.5 cm.; context red or yellowish red, floccose, up to 2.5 mm. thick; tubes 0.5-1.5 mm. long, the mouths red, averaging 2-4 per mm.; cystidia none; hyphae nearly simple, 4-6 μ .

On dead wood of deciduous trees.

The above description is adapted from Overholts.

Reported by Fennell. It is a much thinner form than *P. cinnabarinus*.

42. *P. cinnabarinus* Jacquin ex Fr.

Fig. 69

Pileus tough, coriaceous to rigid, sessile, orange to cinnabar red, often paler with age, velvety tomentose to glabrous, 2-6 x 2-10 x 0.5-2 cm.; context red or yellowish red, 0.4-1.5 cm. thick, strongly zonate, floccose-fibrous or soft corky; tubes 1-4 mm. long, mouths cinnabar-red, circular to angular, averaging 2-4 per mm.; spores hyaline, smooth, oblong, 4.5-5.5 x 2-3 μ ; cystidia none; hyphae hyaline to brown, simple, 6-8 μ .

On dead wood of various kinds.

43. *P. croceus* Pers. ex Fr.

Pileus watery, more or less soft when fresh, sessile, dimidiate, convex, surface buff or orange color, fading on drying, rugose, sodden, minutely tomentose to glabrous, margin obtuse becoming thinner at maturity, 5-12 x 6-15 x 1-5 cm.; context pale buff, carneous when dry, conspicuously marked with sordid zones, strong odor, not characteristic, 0.7-2 cm. thick; tubes 0.5-2 mm. long, mouths orange-colored, brownish on drying, angular, averaging 3-5 per mm.; spores hyaline, smooth, ellipsoidal, 3-4 x 2-3 μ ; cystidia none; hyphae simple, 3-5 μ .

On dead oak and chestnut wood.

Syn. *Polyporus pilotae*.

Fennell lists this species as reported by Murrill.

44. *P. circinatus* Fr.

Fig. 73

Pileus subcoriaceous when fresh, stipitate or substipitate, orbicular or flabelliform, plane or depressed in the center, surface velvety, yellowish-brown to ochraceous when mature, white when young, azonate, sterile below, acute, entire to lobed, 3-12 x 0.3-2 cm.; context ochraceous brown, soft and spongy above, firm and woody next to the hymenophore, 1-15 mm. thick; tubes 1.5-4 mm. long, mouths grayish-brown, decurrent, angular, averaging 2-4 per mm.; stipe lateral, central, or rudimentary, tomentose or velvety brown, up to 5 cm. long; spores hyaline under the microscope, colored in mass, smooth, 4-6 x 2-3 μ ; setae abundant, dark brown, pointed, 40-60 x 5-10 μ ; hyphae yellowish to hyaline, 3-10 μ .

On ground or growing on charred wood.

Syn. *Polyporus tomentosus* Fr.; *Coltricia tomentosus* Fr.; *Polyporus dualis* Peck.

45. *P. Schweinitzii* Fr.

Pileus spongy or soft corky when fresh, sessile, dimidiate or irregular, stipitate, surface ochraceous to orange-colored or rusty brown, strigose-tomentose, scrupose in zones or nearly glabrous, margin rather thick, 5-20 cm. broad, 0.5-1.5 cm. thick; context soft spongy when fresh, yellowish to reddish brown, 0.2-1 cm. thick; tubes 1-6 mm. long, mouths yellowish, darker where bruised and on drying, soon irregular, averaging 1-3 per mm.; stipe present or absent, central or lateral, tubercular or very short, concolorous with the pileus, tomentose, soft as the pileus, 0-6 cm. long, 1-2 cm. thick; spores ellipsoid or ovoid, smooth, hyaline, 6-8 x 4-5 μ ; cystidia present, brown, more or less clavate, projecting 30-60 μ , 8-10 μ broad, sometimes knobbed at the apex; hyphae 6-9 μ .

On or about trunks or stumps of pine.

This species is listed by Fennell, but specimens have not been seen from Iowa.

46. *P. graveolens* Schw.

Sporophore made up of numerous overlapping pilei, arising from a solid central core, 5-20 cm. across; pilei corky, rigid, conchate, surface radiate sulcate, slightly zonate, grayish-

brown, cinnamon-brown or grayish-black, pulverulent or glabrous, margin curved concealing pores, 1-3 cm. long, 3-8 mm. thick; context brown, floccose-fibrous, 1-4 mm. thick; tubes 2-4 mm. long, mouths gray-brown to umber, circular, averaging 3-4 per mm.; spores hyaline, smooth, cylindric, 9-10 x 2.5-3.5 μ ; cystidia none, hyphae sometimes encrusted and projecting from hymenium, rarely branched, 4-8 μ .

On logs and trunks of deciduous trees.

Syn. *Polyporus conglobatus* Berk.; *Fomes conglobatus* Berk.

47. *P. nidulans* Fr.

Fig. 70

Pileus soft and spongy when fresh, sessile, or effused-reflexed, dimidiate, usually broadly attached, sometimes slightly imbricate, surface umber to cinnamon or tawny brown, finely tomentose to fibrillose or glabrous, margin purplish or reddish when bruised, 1.5-6 x 2-8 x 0.5-2 cm.; context concolorous with pileus, spongy, friable when dry, 2-8 mm. thick, changes pink with addition of KOH; tubes 2-7 mm. long, mouths yellowish or reddish brown, angular, averaging 3-4 per mm.; spores hyaline, smooth, globose or subglobose, 2-3.5 μ .

On dead wood of deciduous trees, especially on oak.

Syn. *Hapalopilus rutilans* (Pers.) Murrill; *Polyporus rutilans* Pers. ex Fr.; *Polyporus pallido-cerwinus* Schw.

48. *P. glomeratus* Peck

Pileus corky, sessile or effused-reflexed, dark tawny, uneven, minutely velvety-tomentose, 2.5-4 x 4-8 x 0.4-1.5 cm.; context 2-7 mm. thick, tawny; tubes 2-7 mm. long, mouths greenish yellow when fresh, brown when dry, angular, averaging 5-6 per mm.; spores yellowish, smooth, subglobose, 5-6 μ ; setae not projecting into tubes, but large, thick, 8-9 μ , deeply colored; long, cylindric seta-like bodies are present in the trama; hyphae 3-4 μ .

On maple logs.

P. glomeratus is reported as occurring in Iowa by Fennell.

49. *P. licnoides* Mont.

Fig. 74

Pileus corky pliable and thin, sessile, or effused-reflexed, grayish brown to cinnamon brown, glabrous, radiate-lineate,

somewhat rugose, zonate, margin thin and acute, 2-6 x 2.5-8 x 0.2-0.7 cm.; context yellowish brown, 1-6 mm. thick; tubes 1-3 mm. long, mouths dark brown, small, averaging 6-8 per mm.; spores hyaline, smooth, 3-4 x 2-2.5 μ ; setae brown, abundant, awl-shaped 13-30 x 4-7 μ ; hyphae simple 3-4 μ .

On dead wood of deciduous trees.

50. *P. gilvus* Schw. ex Fr.

Fig. 75

Pileus coriaceous, corky to woody, firm, sessile, or effused-reflexed, dimidiate, surface yellowish brown or reddish brown, azonate, roughened with warty granules, somewhat zonate, usually glabrous when mature, margin acute, 1-7 x 2-12 x 0.2-2 cm.; context yellowish brown, 0.1-1.3 cm. thick; tubes 1-5 mm. long, mouths dark brown or reddish brown, averaging 6-8 per mm.; spores hyaline, smooth, oblong-ellipsoid, 5 x 3-4 μ ; setae abundant, brown, pointed, awl-shaped, 10-30 x 5-10 μ ; hyphae simple, 3.5-4.5 μ broad.

On dead wood of all kinds.

Syn. *Polyporus isidioides* Berk.; *Polyporus scruposus* Fr.

Polyporus scruposus is regarded as a synonym by Morgan. He is unable to separate them even as varieties. Differences may be based on form and age of specimens.

51. *P. hispidus* Bull. ex Fr.

Pileus soft and watery when fresh, thick, fleshy, sessile, yellowish brown to rusty red, surface covered with a soft dense hirsute or hispid tomentum, azonate, margin obtuse, 6-20 x 9-25 x 2-6 cm.; context spongy-corky, fragile when dry, usually light yellowish brown above and dark reddish brown next the hymenium, 1-1.5 cm. thick; tubes 0.5-1.5 cm. long, mouths yellowish brown becoming darker where bruised and on drying, averaging 2-4 per mm., dissepiments thin; spores smooth, broadly ovoid to ellipsoid, thick walled, yellowish brown, 7-9.5 x 6.5-7 μ ; setae none; long brown seta-like bodies were found in the trama, 80-20 μ ; hyphae 6-10 μ .

On living trunks of deciduous trees.

Syn. *Polyporus endocrocinus* Berk.

The above description was adapted from Overholts.

Polyporus hispidus is closely related to *P. Rheades*. It is dis-

tinguished from that species by the absence of a central globose granular core.

52. *P. Rheades* Pers. ex Fr.

Fig. 76

Pileus somewhat fleshy or spongy when young, firm when dry, thick, sessile, unguulate, sometimes subimbricate, often subglobose or tubercular, surface tomentose, thin innate pubescent, or scabrous, finally almost glabrous, grayish brown to reddish brown, margin thick, sterile, slightly zonate, 3-15 x 4-22 x 2.5-10 cm.; context brown with two definite regions, a central solid globose, granular core, 3-10 cm. thick, often permeated with white mycelial strands, with a brown outer fibrous zone, changes to black with KOH; tubes 0.3-3 cm. long, mouths cinnamon-brown, averaging 2-3 per mm.; spores brown, smooth, ellipsoidal to subglobose, 6-7 x 4-5 μ ; setae present or absent, when present dark brown, sharp pointed, projecting 10-20 μ ; hyphae nearly simple, 5-8 μ .

On living (rarely dead) oak, poplar, and willow.

Syn. *Polyporus dryophilus* (Berk.) Murrill; *Inonatus dryophilus* (Berk.) Murrill.

Tribe IV. **Boleteae**

Sporophore fleshy, usually perishable, putrescent, the tubes usually easily separable from the pileus in a layer, most forms with a central stipe, annual, usually terrestrial.

KEY TO GENERA

- a. Sporophore very scaly with cone shaped projections, spores dark brown and warty ----- *Strobilomyces*
- a. Sporophore not as above ----- b
- b. Stratum of tubes easily separable from pileus; stipe central ----- *Boletus*
- b. Stratum of tubes not easily separable from the pileus and from each other; tubes of hymenium more or less radiating, adnate or subdecurrent ----- *Boletinus*

GENUS *STROBILOMYCES* Berk.

Sporophore fleshy to tough, stipitate, surface of pileus and stipe distinctly rough-scaled, tubes long, regular, even, not easily separated from the pileus; spores dark brown, netted.

One species in Iowa.

1. *S. strobilaceus* Berk.

Fig. 77

Pileus hemispherical to convex, surface roughened by thick cone-like projecting blackish or blackish-brown scales, dry, soft and spongy; margin fringed with scales and fragments of veil, 3-10 cm. broad; context white or grayish-white, changing to red and then blackish when wounded, taste mild; tubes adnate, whitish, becoming brown or blackish with age, mouths large, angular, changing color like the context, blackish on drying; stipe equal or slightly tapering upward, striate when it joins the tubes, floccose tomentose, color of pileus, solid, 3-12 cm. long, 1-2 cm. thick; spores subglobose, rough, blackish-brown, under oil immersion lens distinctly netted, 10-12 μ ; veil dense, cottony, white to grayish, adhering to margin and stipe when mature.

Genus BOLETUS Dill. ex Fr.

Sporophore fleshy, putrescent, stipe central; hymenophore composed of long or short tubes, free from stipe, or decurrent, round or angular, easily separable from the context of the pileus and from each other; terrestrial, annual; cystidia sometimes present, spores variously colored.

The genus includes many species, and is separated from Polyporus by the absence of a trama descending from the context into the tubes; from Boletinus by the tubes being easily separated from the pileus.

The study of Boletus has been based very largely on dried specimens in the Mycological Herbarium of the State University of Iowa. Since dried specimens of Boletus are very difficult to identify some of the species reported may be open to question. This seems to be the first attempt to classify the Boletes of Iowa. There are undoubtedly many other species represented in the state, but only those which were available for careful study are included here.

KEY TO THE SPECIES OF BOLETUS

- | | | |
|----|---|---------------------|
| a. | Context white at maturity ----- | b |
| a. | Context not white at maturity ----- | m |
| | b. Stipe not at all reticulate with veins ----- | c |
| | b. Stipe reticulate with veins ----- | j |
| c. | Stipe scabrous or punctate-squamulose ----- | 1. <i>B. scaber</i> |

- c. Stipe not scabrous or punctate ----- d
 d. Pileus and stipe black or blackish ----- 2. *B. nigrellus*
 d. Pileus and stipe not black when fresh ----- e
 e. Pileus with a thin separable cuticle which easily cracks and rubs off
 in spots, stipe spongy and white within, sometimes slightly reticu-
 late at base ----- 3. *B. affinis*
 e. Pileus not as above ----- f
 f. Stipe spongy within, soon cavernous or hollow, pileus minute-
 ly velvety tomentose ----- 4. *B. castaneus*
 f. Stipe solid ----- g
 g. Tubes and context unchanging, pileus tomentose, tubes yellowish,
 large angular ----- 5. *B. subtomentosus*
 g. Tubes and context changing to blue when wounded ----- h
 h. Pileus and stipe glabrous ----- 6. *B. pallidus*
 h. Pileus usually tomentose ----- i
 i. Tubes yellow and large, pileus and stipe usually red, often cracked
 ----- 7. *B. chrysenteron*
 i. Tubes at first grayish-white, discolored later by the spores, pileus
 distinctly reticulate rimose ----- 8. *B. fumosipes*
 j. Tubes becoming flesh colored ----- k
 j. Tubes becoming yellow or greenish yellow ----- l
 k. Taste mild, pileus some shade of yellow or brown ----- 9. *B. indecisus*
 k. Taste bitter ----- 10. *B. felleus*
 l. Pileus glabrous, or very finely tomentose ----- 11. *B. edulis*
 l. Pileus not glabrous, squamulose or punctate, reticulate at
 base ----- 12. *B. variipes*
 m. Stipe with an annulus ----- n
 m. Stipe without an annulus ----- o
 n. Spores globose or subglobose ----- 13. *B. sphaerosporus*
 n. Spores oblong-ellipsoid ----- 14. *B. Clintonianus*
 o. Stipe shaggy and scabrous ----- p
 o. Stipe smooth or reticulate ----- q
 p. Stipe shaggy and lacerated with reticulate folds; pileus dry,
 tomentose ----- 15. *B. Russellii*
 p. Stipe scabrous and pileus glabrous, slightly viscid ----- 1. *B. scaber*
 q. Tubes yellowish with reddish or reddish-brown mouths ----- 16. *B. luridus*
 q. Tubes of one color ----- r
 r. Tubes nearly free, stuffed when young ----- 11. *B. edulis*
 r. Tubes adnate, not stuffed when young ----- s
 s. Stipe reticulate with veins ----- t
 s. Stipe not reticulate with veins ----- u
 t. Context and tubes changing to blue where wounded -----
 ----- 17. *B. speciosus*
 t. Context and tubes not changing to blue where wounded -----
 ----- 18. *B. ornatipes*
 u. Pileus viscid or gelatinous when moist, tubes glandular dotted -----
 ----- 19. *B. americanus*

- u. Pileus dry -----v
 v. Tubes not changing to blue when wounded...5. *B. subtomentosus*
 v. Tubes changing to blue when wounded -----w
 w. Context reddish beneath the cuticle -----7. *B. chrysenteron*
 w. Context not reddish beneath the cuticle -----x
 x. Stipe yellow, sometimes with red stains...20. *B. miniata-olivaceus*
 x. Stipe red, yellow at top -----21. *B. bicolor*

1. *B. scaber* Bull. ex Fr.

Fig. 78

Pileus thick, fleshy, convex, glabrous or minutely tomentose, slightly viscid when fresh or when moistened after being dried, varying in color from white to brownish or reddish, margin thick; context white or whitish, darkening when bruised, taste mild; tubes free or nearly so, remote from stipe, mouths convex, small, round, long, white becoming brown when dry, darkening when bruised; stipe solid, attenuate above, whitish especially above, brownish below, scabrous or roughened with small reddish or blackish or brownish dots or scales, not reticulate, 5-15 cm. long, 1-1.5 cm. thick; spores yellowish-brown, smooth, oblong-fusiform, 10-17 x 4-6 μ ; hyphae of context a hyaline reticulate network.

Syn. *Ceratomyces viscidus* (L.) Murrill.

2. *B. nigrellus* Pk.

Fig. 79

Pileus convex or nearly plane, dry, pruinose to finely tomentose, very dark brown to black, margin involute, rather thick, 6-14 cm. broad, 2 cm. thick; context white changing to pinkish gray when dry, taste nutty; tubes adnate, plane or convex, depressed around stipe, 1 cm. long, mouths small, subcircular, pale-gray to flesh-color, changing to black or brown when wounded; stipe solid, subequal, 5-8 cm. long, 1.5-3 cm. thick, concolorous or a little paler than the pileus, velvety at the base, not reticulate; spores greenish to dull flesh colored, smooth, oblong-ellipsoid, epiculate, 8-11 x 4-5 μ .

Syn. *Tylopilus alboater* (Schw.) Murrill.

3. *B. affinis* Pk.

Pileus convex to plane, dry, glabrous or minutely tomentose, slightly viscid when moist, usually dry, brown or chestnut color, fading to tawny or ochraceous with age, sometimes

rimose-areolate or spotted, 5-10 cm. broad; context somewhat spongy, white, sometimes changing to yellowish where wounded; tubes adnate or nearly free, plane or convex, at first white and stuffed, then yellow or subferruginous when wounded, 2-3 per mm.; stipe unequal, narrowed either above or below, even or rarely reticulate at the top, glabrous, colored like or paler than the pileus, spongy within, sometimes tinged with red, 4-9 cm. long, 8-16 mm. thick; spores bright ferruginous-ochraceous, 9-12 x 4-5 μ .

Syn. *Boletus crassipes* Peck.

This species was reported by H. W. Paige, as occurring near Fort Dodge, Iowa, in August.

4. *B. castaneus* Bull. ex Fr.

Fig. 80

Pileus firm, dry, convex, plane or depressed, later expanded, minutely or velvety tomentose, cinnamon, reddish brown or chestnut colored, margin thin, 3-7 cm. broad; context white, unchanging when bruised, nutty odor; tubes free, short, small, white becoming yellow to brown when dried; stipe loosely stuffed, later becoming hollow, equal or tapering upward, cylindrical, tomentose and concolorous with pileus, not reticulate, 3-5 cm. long, 6-10 mm. thick; spores hyaline to pale-yellow, yellow in mass, smooth, oval or ellipsoid, with an oblique epiculus, 8-10 x 4.5-6 μ ; in late summer; fairly common.

Syn. *Gyroporus castaneus* (Bull.) Quel.

5. *B. subtomentosus* Linn. ex Fr.

Fig. 81

Pileus soft, dry, convex to plane, villose-tomentose, often rimose-areolate, yellow in chinks where cracked, yellowish brown, reddish-brown or tawny, margin entire, involute when young; 2-10 cm. broad; context white or yellowish, unchanging, taste mild; tubes adnate, slightly decurrent, dull yellowish, unchanging, mouths large, angular, irregular, elongated near stipe; stipe solid, equal, expanded above or tapering below, yellow, sometimes sulcately ribbed, nearly covered with straight red lines, not reticulated, scurfy with minute dots, yellowish within, 3-9 cm. long, 7-18 mm. thick at top; spores snuff brown in mass, brownish or greenish yellow under micro-

scope, smooth, subfusiform 11-14 x 4-5 μ ; solitary or gregarious; on ground or humus of stumps; a common and variable species.

6. *B. pallidus* Frost.

Fig. 82

Pileus soft, dry, convex, becoming plane or depressed, glabrous, pallid or brownish-white, slightly tinged with red, margin even, rather thin, fertile, 5-10 cm. broad; context white, becoming bluish when wounded; tubes nearly adnate, plane or slightly depressed, pale or whitish-yellow, becoming dark-flavous with age, changing to blue when wounded, mouths small, angular; stipe solid, equal or thickened at the base, glabrous, not reticulated, whitish often streaked with brown or red, often tinged with red within, 6-15 cm. long, 7-15 mm. thick; spores pale ochraceous brown, smooth, oblong-ellipsoid, 8-12 x 4-5 μ .

7. *B. chrysenteron* Fr.

Fig. 85

Pileus convex to expanded, sometimes depressed, surface dry, tomentose to floccose-squamulose, often rimose-areolate, variable in color, some shade of red or purple or cinnamon, especially when older, brown, margin entire, fertile, 4-8 cm. broad, 1-2 cm. thick; context yellowish-white to flavous, reddish beneath cuticle, quickly changing to blue or greenish when wounded, taste mild; tubes adnate, convex in mass, slightly decurrent, becoming much depressed when old, yellow or greenish yellow within, changing like the context when wounded, mouths wax yellow, large, angular, irregular, 1-2 per mm.; stipe solid, subcylindric, tapering at base, red or reddish streaked below, flavous, longitudinally furrowed, glabrous or minutely scurfy or longitudinally furrowed, cortex yellowish within at the base, changing to blue, 3-8 cm. long, 0.3-1.5 cm. thick, not reticulate; spores olivaceous when fresh, fading to pale brownish, smooth, fusiform, 12-14 x 4-5.5 μ ; cystidia brown, 10-35 μ , numerous, projecting 10-20 μ .

Syn. *Ceratomyces communis* (Bull.) Murrill.

8. *B. fumosipes* (Peck) Murrill

Fig. 86

Pileus convex or plane, minutely tomentose, distinctly reticu-

late-rimose, avellaneous to umbrinous or dark-olive brown; margin entire, fertile, 4-7 cm. broad, about 1-1.5 cm. thick; context white, changing slowly and slightly to pale-blue or bluish green, firm, fleshy, taste mild or sweet; tubes plane, convex when older, as long or longer than thickness of context, greenish-white to avellaneous; stipe solid, equal, somewhat ventricose, minutely scurfy, 3-5 cm. long, 0.7-1 cm. thick, avellaneous-umbrinous to fulvous, paler above, paler bluish-green at the apex, not reticulate, dirty white within; spores deep ochraceous brown, cylindric or fusoidsigmoid, smooth, 8-12 x 4-5.5 μ ; these spores are not as large as reported by Murrill. He reports them as 14-16 x 7-8 μ . The species is probably of doubtful occurrence and should be studied more carefully from fresh material.

Syn. *Ceriomyces fumosipes* Pk.

9. *B. indecisus* Pk.

Fig. 87

Pileus thick, dry, convex or nearly plane, slightly tomentose or velvety to glabrous, ochraceous-brown to chestnut, margin entire to wavy, 6-12 cm. broad; context white, firm fleshy, unchangeable, 0.3-1.5 cm. thick; taste mild or sweet; tubes adnate, usually plane, white or grayish, changing to brownish where bruised and when dry, mouths small, subcircular, 0.5-1.5 cm. long; stipe solid, concolorous, surface usually reticulated above and furfuraceous especially below, 6-10 cm. long, 1-2 cm. thick; spores brownish flesh-color in mass, smooth, oblong, 10-15 x 4 μ .

10. *B. felleus* Fr.

Fig. 88

Pileus thick, soft, convex to nearly plane, glabrous, even, variable in color, usually some shade of tan or chestnut, or pale-yellowish to grayish-brown, often changing to flesh color when wounded, 8-15 cm. broad or larger; context white, often changing, flesh-color or pinkish when wounded, taste bitter when fresh, also when dry; tubes adnate, convex, depressed around stem, 0.5-2 cm. long, mouths angular, white becoming flesh-color or darker with maturity of spores; stipe solid, cylindric, equal or tapering upward, sometimes bulbous at the

base, glabrous, usually reticulate above, sometimes to base, 5-12 cm. long, 1 cm. or more thick; spores flesh-colored, smooth, oblong-fusiform, 10-15 x 3-4 μ . Common.

11. *B. edulis* Bull. ex Fr.

Fig. 89

Pileus thick, moist, convex or nearly plane, glabrous, or finely tomentose, at first compact, then soft, grayish-red, reddish-brown, tawny-brown or paler; margin acute or blunt, entire, 7.5-15 cm. broad; context white or yellowish unchanging, sometimes pinkish or reddish tinged beneath cuticle, taste and smell sweet and nutty; tubes semi-free, convex, nearly plane, white, then yellow and greenish, long, mouths small, angular or round; stipe solid, short or long, enlarged at base, stout, more or less reticulate, especially above, whitish pallid or brownish, 5-15 cm. long, 1.5-3 cm. thick; spores greenish-yellow to ochraceous brown, smooth, oblong-fusiform, 11-15 x 4-5 μ ; 1-3 guttulate. This species varies considerably in the size, color, and character of the stipe. Var. *clavipes*—Stipe tapering upward from an enlarged base.

Syn. *Boletus separans* Peck; *Ceriomyces crassus* Batt.

12. *B. variipes* Pk.

Pileus thick, soft, dry, convex to plane, squamulose punctate, or minutely tomentose, grayish or pale-grayish brown, sometimes tinged with yellow or ochraceous; context white, unchanging, sweetish not bitter; tubes nearly plane, slightly depressed around stipe, at first white, then greenish-yellow, mouths small, subrotund, ochraceous, stuffed when young; stipe firm, whitish or pallid, reticulated, variously shaped, often enlarged at base; spores ochraceous brown or tinged with green, smooth, oblong-fusiform, 12-15 x 5 μ .

13. *B. sphaerosporus* Pk.

Fig. 90

Pileus hemispherical, convex, with a veil covering tubes underneath, glabrous viscid, creamy-yellow when young, changing to reddish brown or chestnut color, margin thin, even, often inflexed when dry, 3-15 cm. broad; context pale yellowish-brown, becoming brown when dry; tubes adnate,

slightly decurrent, pale-yellow changing to brown when bruised or olivaceous from spores, edges thin, mouths large, angular, uneven, some elongated into coarse teeth; stipe solid, stout, thick, equal, glabrous, reticulate at apex at least not more than half way down, annulus persistent, sometimes adhering to margin of pileus, 1.5-3 cm. thick, 3-7 cm. long; spores yellowish-brown, smooth, globose to broadly elliptical 5-10 μ , variable in size. Fairly common.

14. *B. Clintonianus* Pk.

Fig. 91

Pileus convex, gregarious, viscid, glabrous, with separable cuticle, golden yellow to chestnut color, margin at first incurved, then thin and spreading; context pale yellow, or golden yellow, becoming less bright or slightly greenish when wounded, taste mild; tubes adnate or subdecurrent, nearly plane, small, pale yellow to dingy ochraceous with age, changing to reddish or purplish-brown when bruised; stipe annulate, subequal, slightly thickened at base, straight or flexuous, yellow at the top, reddish or reddish-brown below annulus, annulus white or yellow, persistent, rather thick; spores brownish-ochraceous, oblong, 10-12 x 4-5 μ .

Shaded grassy places, in woods or open places.

15. *B. Russellii* Frost

Fig. 94

Pileus thick, convex, dry or slightly viscid when moist, tomentose-squamulose, or tomentum agglutinated in raised squamules, appearing somewhat reticulate or rimose areolate, drab gray, yellowish beneath tomentum, 3-10 cm. broad; context yellowish or tan, unchanging, taste mild, salty, 1-2 mm. thick; tubes adnate to subdecurrent, plane or convex, often depressed around stipe, dingy-yellow, yellowish-green, or dark flavous with tinge of green at maturity, mouths large, angular, edges thin; stipe long and slender, equal or tapering upward, very coarsely reticulate and fluted, roughened by lacerated margins of reticular depressions, glutinous, red or brownish-red, yellow within, 5-12 cm. long, 1-1.5 cm. thick at base; spores olivaceous, smooth, ellipsoid, distinctly longitudinally striated, 13-17 x 8-10 μ .

16. *B. luridus* Schaeff. ex Fr.

Fig. 95

Pileus dry, convex, somewhat viscose, glabrous, minutely tomentose or rimose areolate, brown with red-yellow shades chestnut to auburn, 5-10 cm. broad, margin thick, obtuse, entire; context yellowish, turning to blue when wounded; tubes free or nearly so, plane or slightly depressed, yellow, becoming greenish blue when wounded, mouths small, circular, cinnabar red to orange, darker with age; stipe solid, equal or tapering upward, red, dark-reddish within, reticulate or punctate, red or reddish brown below, 4-8 cm. long; spores greenish-gray, smooth, 9-12 x 4-8 μ , variable in size, cystidia present, 15-20 x 8-10 μ , yellowish-brown.

17. *B. speciosus* Frost

Pileus at first thick, subglobose to convex, glabrous or subglabrous, smooth, slightly moist, red; context firm, taste nutty, pale or bright lemon-yellow, changing to greenish-blue when wounded; tubes adnate, small, subrounded, plane or slightly depressed, bright yellow, becoming dingy with age, changing like the context; stipe stout, unequal, solid, reticulate, bright lemon-yellow within and without, or reddish at base, 5-10 cm. long, 2-5 mm. thick; spores pale ochraceous-brown, oblong-fusiform, 10-12 x 4-5 μ .

In woods.

18. *B. ornatipes* Pk.

Fig. 96

Pileus dry, or very slightly viscid when wet, convex, becoming plane or somewhat depressed, glabrous or finely tomentose, sometimes minutely rimose-areolate, reticulate in appearance, avellaneous, clay colored or isabelline, often greenish in center, 5-14 cm. broad, 2-4 cm. thick; context yellowish, unchanging; taste mild or slightly salty; tubes adnate, slightly decurrent, somewhat depressed with age, lemon-yellow when young becoming dull yellow and dark brown when dried, mouths circular to angular, dissepiments thin, 1 cm. or more long; stipe rarely caespitose, firm in outer portion, sometimes becoming spongy within, subequal, often bulbous at base, distinctly and beautifully reticulate, the bottom of

the reticulate chambers buff yellow, the ridges hazel, 5-12 cm. long, 0.5-2 cm. thick; spores olivaceous, or greenish-ochraceous, snuff-brown in mass, smooth, 10-14 x 3-4.5 μ ; cystidia brown and hyaline, 20-35 x 7-12 μ .

Syn. *Ceratomyces retipes* (Berk. and Curt.) Murrill.

19. *Boletus americanus* Peck

Fig. 97

Pileus thin, soft, convex to nearly plane, surface yellow, viscid when moist, slightly tomentose on margin when young, otherwise glabrous, sometimes gray-spotted from drying of gluten, 2.5-7 cm. broad; context pale-yellow, pinkish-gray when wounded, taste mild, 2-5 mm. thick; tubes adnate, hardly decurrent, mouths rather large, angular, yellow to dull ochraceous when dry, covered by glandular dots; stipe solid, equal or slightly tapering toward the top, brown or reddish-brown, glandular dots on surface in fresh and dried specimens; 3-6 cm. long; spores ochraceo-ferruginous, smooth, 8-12 x 4-5 μ .

Syn. *Rostkovites subaureus* (Peck) Murrill.

20. *B. miniato-olivaceus* Frost

Fig. 83

Pileus firm to somewhat soft and spongy with age, convex to plane, glabrous or finely tomentose, sometimes rimose areolate, vermilion changing to olivaceous or ochraceous with age, changing blue when wounded, margin acute or slightly exceeding the pores; context pale yellow, changing to blue when wounded, mild or slightly unpleasant taste; tubes adnate or subdecurrent, slightly depressed, bright lemon-yellow tinged with green becoming brownish-yellow with age, changing to blue when wounded, mouths subangular of medium size; stipe solid, equal, or enlarged above or below, pale-yellow with pink markings especially at base; yellowish within, faintly reticulate at the top, 6-10 cm. long, 5-1.5 cm. thick; spores yellowish-brown, smooth, oblong-ellipsoid, 10-13 x 4-5.5 μ .

Syn. *B. glabellus* Peck.

B. miniato-olivaceus seems to be very similar to *subtomentosus*. According to Murrill and Peck it differs mainly in its context and tubes changing to blue wherever bruised or cut.

There is one specimen so labeled in the State University of Iowa Herbarium.

21. *B. bicolor* Pk.

Fig. 84

Pileus somewhat irregular, firm becoming soft, convex, glabrous, finely tomentose or squamulose, at times rimose-areolate with age, dark red or purplish-red, often becoming paler and spotted with yellow when old, margin irregular; context yellow, usually changing very slightly to blue when wounded, taste mild; tubes adnate, short, nearly plane, yellow, becoming ochraceous with age, changing to blue or greenish-blue when wounded, mouths medium sized, angular, 2-3 per mm.; stipe solid, equal or nearly equal, firm, nearly glabrous with a few dark dots showing under hand lens, red except at the top, where it is yellow and slightly reticulate, flavous within, usually slowly changing to blue, 4-10 cm. long, 7-1.5 cm. thick; spores pale ochraceous-brown, smooth, fusiform, 11-15 x 4-6 μ ; cystidia yellowish-brown, projecting 20 μ , 3-5 μ broad, August to October.

Genus BOLETINUS Kalchbr.

Sporophore fleshy or spongy; annual, terrestrial or epixyloous; context whitish or yellowish; hymenophore composed of broad radiating shallow lamellae connected by very numerous more narrow anastomosing branches or partitions, and forming large angular pores; not easily separable, adnate or slightly decurrent.

Only one species is represented in Iowa.

B. porosus (Berk.) Pk.

Fig. 92

Pileus fleshy, reddish-brown, yellowish-brown, or umber, dry or when moist, viscid, shining, margin thin and even, 3-10 cm. broad; context 5-20 mm. thick; tubes yellow, short, formed by radiating lamellae branching and connecting by numerous irregular veins of less prominence and forming large angular pores; stipe lateral or eccentric, tough, diffused with the pileus, reticulate at the top by the decurrent walls of tubes concolorous with pileus; spores hyaline or yellow, smooth, ovate or semi-ovate, 7-8 x 5-7 μ .

LITERATURE CONSULTED

1. Baxter, D. V., Some Porias from the Region of the Lake States, Mich. Acad. Sci., Arts and Letters 6:67-76. 1926.
2. Berkeley, Rev. M. J., Notices of North American Fungi, Grevillea 1:65-71. 1872.
3. Bulliard, P., Histoire des Champ. 1791.
4. Burt, E. A., Thelephoraceae of North America. Introduction. Ann. Mo. Bot. Gard. 1:185-196. 1914.
5. Burt, E. A., Merulius in North America. Ann. Mo. Bot. Gard. 4:305-362. 1917.
6. Cooke, M. C., Handbook of Australian Fungi. 101-169. 1892.
7. Farlow, W. G., Icones Farlowianae, Illustrations of the Larger Fungi. 77-99. 1929.
8. Fennell, R. E., The Polyporaceae of Iowa. Proc. Iowa Acad. Sci. 31:193-204. 1924.
9. Fries, Elias., Elenchus Fungorum 1:57-129. 1828.
10. Fries, Elias. Systema Mycologicum. 1821-32.
11. Hard, M. E. The Mushroom. 350-431. 1908.
12. Kallenbach, Franz. Die Pilze Mitteleuropas. Band I. 1927.
13. Kauffman, C. H., Polyporus anceps and Polyporus immitus. Mycologia 18:27-30. 1925.
14. Killermann, S. Polyporaceae, in Engler and Prantl, Die Naturl. Pflanzenfamilien. 2nd ed. 6. 1926.
15. Lloyd, C. G., Synopsis of the Section Ovinus of Polyporus. Cincinnati. 1911.
16. Lloyd, C. G., Synopsis of the Stipitate Polyporoids. 1912.
17. Lloyd, C. G., Synopsis of the Section Apus of the genus Polyporus. Cincinnati. 1915.
18. Lloyd, C. G., Synopsis of the Genus Fomes. Cincinnati. 1915.
19. Lloyd, C. G., Mycological Notes. Scattered References.
20. Macbride, T. H., Saprophytic Fungi of Eastern Iowa. Nat. Hist. Bull. State Univ. Iowa. 3:1-30. 1895.
21. Martin, G. W., Notes on Iowa Fungi.—1924. Proc. Iowa Acad. Sci. 32: 219-223. 1925.
22. Martin, G. W., Notes on Iowa Fungi. Proc. Iowa Acad. Sci. 131-133. 1927.
23. McIlvaine, A., One Thousand American Fungi. 396-491. 1900.
24. Moffatt, W. S., The Hymenomycetes. Bull. Nat. Hist. Sur., Chicago, 7:101-125. 1909.
25. Morgan, A. P., The Mycologic Flora of the Miami Valley, Ohio, Jour. Cin. Nat. Hist. Soc. 6:5-174. 1883.

26. Murrill, W. A., Polyporaceae, Boletaceae, in North American Flora 9:1-159. 1907-1910.
27. Murrill, W. A., Northern Polypores. New York. 1914.
28. Murrill, W. A., American Boletes. New York. 1914.
29. Murrill, W. A., Western Polypores. New York. 1915.
30. Murrill, W. A., Southern Polypores. New York. 1915.
31. Murrill, W. A., Murrill's and Saccardo's Names of Polypores Compared. New York. 1918.
32. Neuman, J. J., The Polyporaceae of Wisconsin. Bull. 33, Wis. Geol. and Nat. Hist. Survey. 1914.
33. Overholts, L. O., The Polyporaceae of Ohio. Ann. Mo. Bot. Gard. 1:81-155. 1914.
34. Overholts, L. O., The Polyporaceae of the Middle-Western United States. Washington Univ. Studies 3:1-98. 1915.
35. Overholts, L. O., Comparative Studies in the Polyporaceae. Ann. Mo. Bot. Gard. 2:667-730. 1915.
36. Overholts, L. O., The Structure of Polyporus Glomeratus Peck. Torrey 17:202-206. 1917.
37. Overholts, L. O., The Species of *Poria* described by Peck. Bull. N. Y. State Mus., Report of the State Botanist for 1917. 67-120. 1919.
38. Overholts, L. O., Diagnoses of American *Porias* I. Mycologia 14: 1-11. 1922.
39. Overholts, L. O., Diagnoses of American *Porias* II. Bull. Torrey Bot. Club 5:245-253. 1923.
40. Overholts, L. O., The Species of *Poria* described by Schweinitz. Mycologia 15:207-232. 1923.
41. Overholts, L. O., Diagnoses of American *Porias* III. Mycologia 23:117-129. 1931.
42. Paige, F. W., Fleshy fungi from Webster County, Iowa. Iowa State College Jour. Sci. 2:120-122. 1928.
43. Peck, C. H., Boleti of the United States. Bull. N. Y. State Mus. 8:73-166. 1889.
44. Peck, C. H., Plants of North Elba. Bull. N. Y. State Mus. 6:214-221. 1899.
45. Peck, C. H., Edible Fungi of New York. Mem. N. Y. State Mus. 168-175. 1900.
46. Rea, C., British Basidiomycetes. 555-630. 1922.
47. Saccardo, P. A., Sylloge Fungorum.
48. Sowerby, James, Colored Figures of English Fungi. Vol. 1, 1797; Vol. 2, 1799; Vol. 3, 1803.
49. Strauser, M. C., Boletaceae of Pennsylvania. Proc. Penn. Acad. Sci. 4:2-6. 1930.
50. Wilson, G. W., The Polyporaceae of Fayette, Iowa. Proc. Iowa Acad. Sci. 16:193-204. 1924.

PLATE I

- | | | | |
|---------|-----------------------------|----------|---------------------------|
| Fig. 1. | <i>Merulius ceracellus</i> | Fig. 10. | <i>Poria mucida</i> |
| Fig. 2. | <i>Merulius americanus</i> | Fig. 11. | <i>Poria vaporaria</i> |
| Fig. 3. | <i>Merulius lacrymans</i> | Fig. 12. | <i>Poria subacida</i> |
| Fig. 4. | <i>Merulius incarnatus</i> | Fig. 13. | <i>Poria semitincta</i> |
| Fig. 5. | <i>Merulius tremellosus</i> | Fig. 14. | <i>Poria salmonicolor</i> |
| Fig. 6. | <i>Fistulina hepatica</i> | Fig. 15. | <i>Poria spissa</i> |
| Fig. 7. | <i>Poria terrestris</i> | Fig. 16. | <i>Poria ferruginosa</i> |
| Fig. 8. | <i>Poria sericeo-mollis</i> | Fig. 17. | <i>Poria viticola</i> |
| Fig. 9. | <i>Poria medulla-panis</i> | Fig. 18. | <i>Poria punctata</i> |

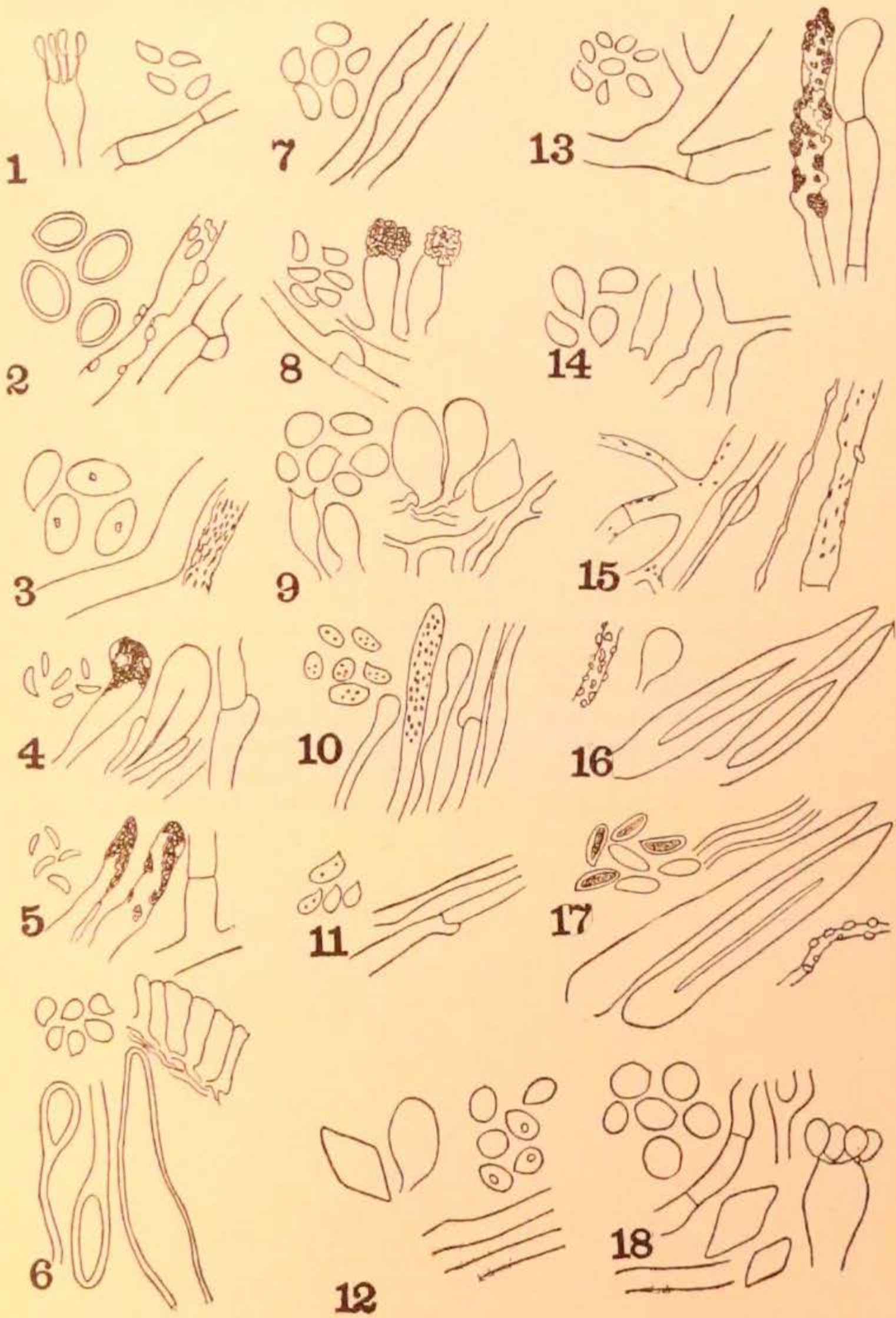


PLATE II

- | | | | |
|----------|------------------------------|----------|----------------------------|
| Fig. 19. | <i>Poria rufa</i> | Fig. 31. | <i>Ganoderma Curtisii</i> |
| Fig. 20. | <i>Poria griseocalba</i> | Fig. 32. | <i>Ganoderma sessile</i> |
| Fig. 21. | <i>Poria attenuata</i> | Fig. 33. | <i>Fomes ohlensis</i> |
| Fig. 22. | <i>Gloeoperus conchoides</i> | Fig. 34. | <i>Fomes fraxinophilus</i> |
| Fig. 23. | <i>Trametes sepium</i> | Fig. 35. | <i>Fomes igniarius</i> |
| Fig. 24. | <i>Trametes hispida</i> | Fig. 36. | <i>Fomes Bakerii</i> |
| Fig. 25. | <i>Trametes malicola</i> | Fig. 37. | <i>Fomes conchatus</i> |
| Fig. 26. | <i>Lenzites betulina</i> | Fig. 38. | <i>Fomes fulvus</i> |
| Fig. 27. | <i>Lenzites vialis</i> | Fig. 39. | <i>Fomes applanatus</i> |
| Fig. 28. | <i>Lenzites saepiaria</i> | Fig. 40. | <i>Fomes Everhartii</i> |
| Fig. 29. | <i>Daedalea unicolor</i> | Fig. 41. | <i>Fomes lobatus</i> |
| Fig. 30. | <i>Daedalea confragosa</i> | | |

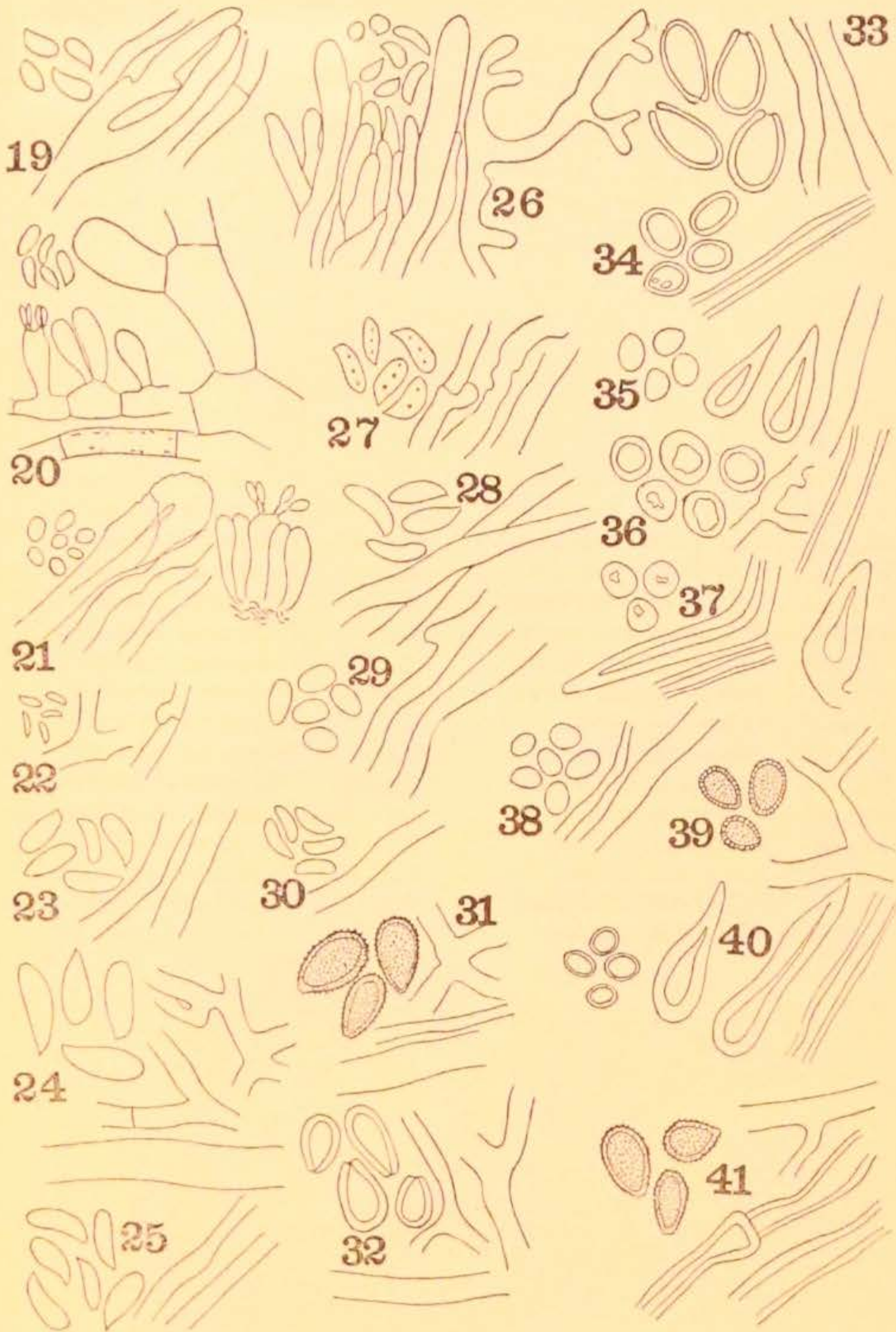


PLATE III

- | | | | |
|----------|-------------------------------|----------|--------------------------------|
| Fig. 42. | <i>Polystictus conchifer</i> | Fig. 58. | <i>Polyporus adustus</i> |
| Fig. 43. | <i>Polystictus versicolor</i> | Fig. 59. | <i>Polyporus resinosus</i> |
| Fig. 44. | <i>Polystictus pargamenus</i> | Fig. 60. | <i>Polyporus Spragueii</i> |
| Fig. 45. | <i>Polystictus zonatus</i> | Fig. 61. | <i>Polyporus tulipiferus</i> |
| Fig. 46. | <i>Polyporus umbellatus</i> | Fig. 62. | <i>Polyporus hirsutus</i> |
| Fig. 47. | <i>Polyporus sulphureus</i> | Fig. 63. | <i>Polyporus Berkeleyi</i> |
| Fig. 48. | <i>Polyporus frondosus</i> | Fig. 64. | <i>Polyporus rigidus</i> |
| Fig. 49. | <i>Polyporus giganteus</i> | Fig. 65. | <i>Polyporus albellus</i> |
| Fig. 50. | <i>Polyporus pocula</i> | Fig. 66. | <i>Polyporus iowensis</i> |
| Fig. 51. | <i>Polyporus varius</i> | Fig. 67. | <i>Polyporus obtusus</i> |
| Fig. 52. | <i>Polyporus squamosus</i> | Fig. 68. | <i>Polyporus delectans</i> |
| Fig. 53. | <i>Polyporus radicans</i> | Fig. 69. | <i>Polyporus cinnabarinus</i> |
| Fig. 54. | <i>Polyporus elegans</i> | Fig. 70. | <i>Polyporus nidulans</i> |
| Fig. 55. | <i>Polyporus picipes</i> | Fig. 71. | <i>Polystictus perennis</i> |
| Fig. 56. | <i>Polyporus arcularius</i> | Fig. 72. | <i>Polystictus cinnamomeus</i> |
| Fig. 57. | <i>Polyporus fumosus</i> | | |

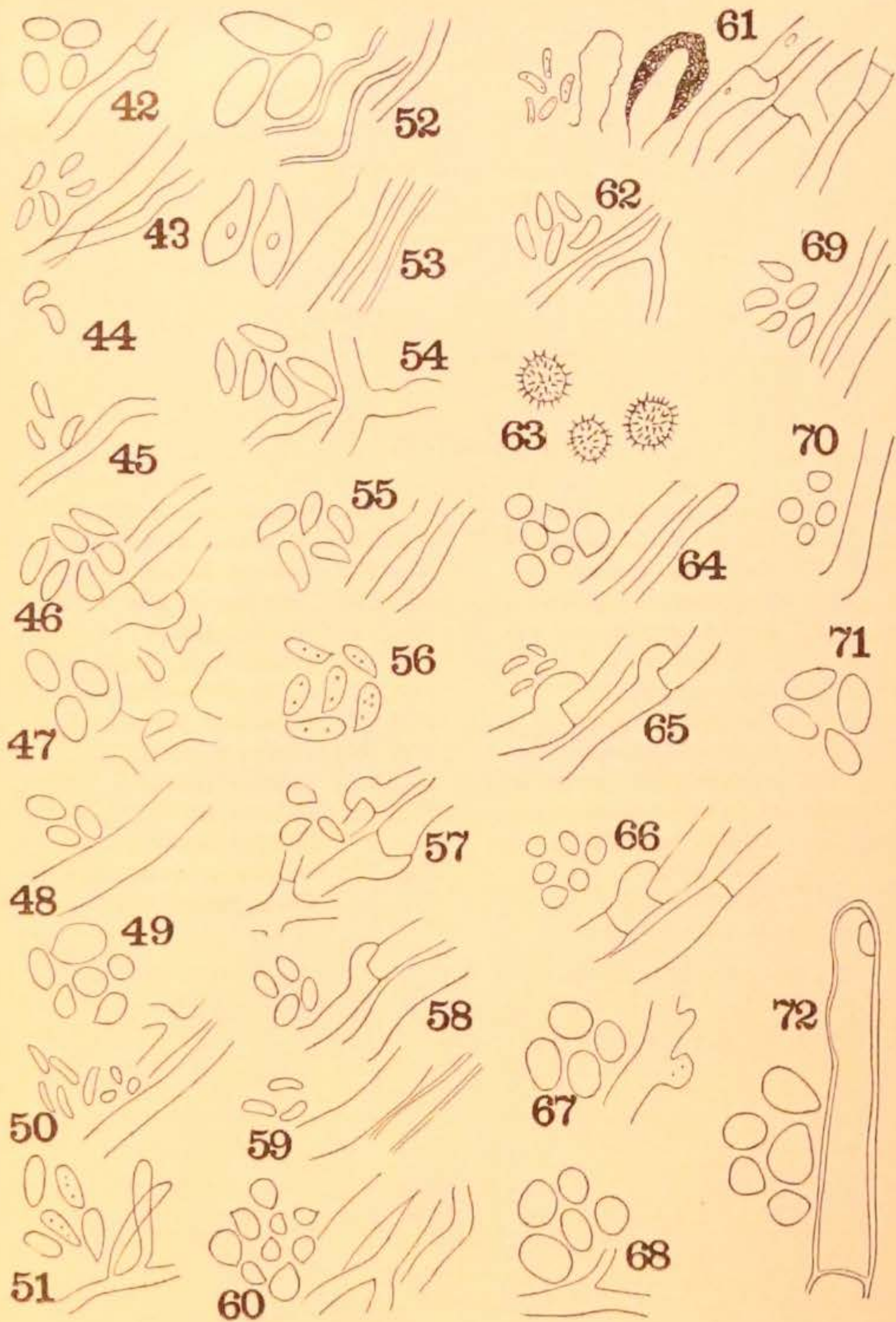
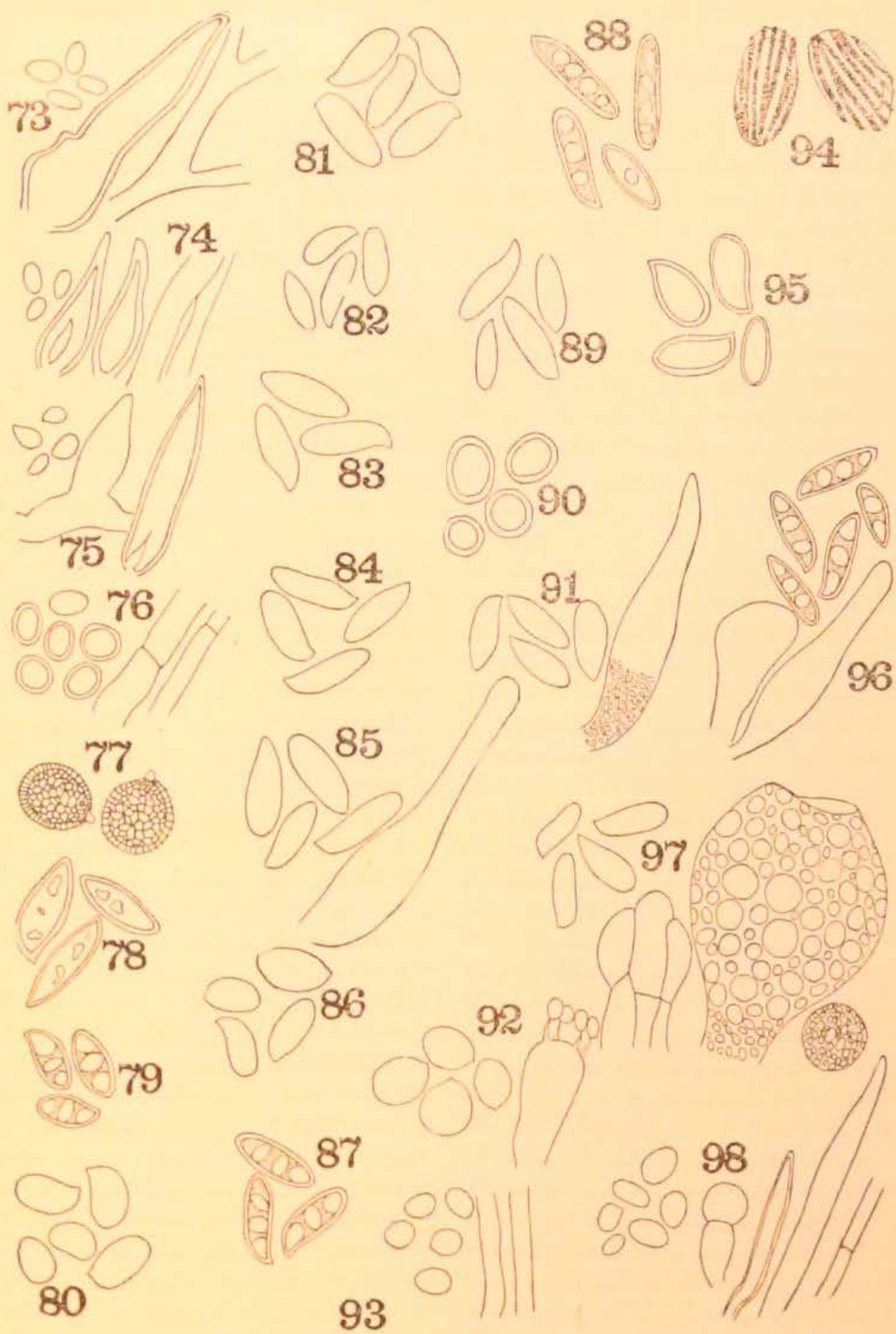


PLATE IV

- | | | | |
|----------|---|----------|------------------------------|
| Fig. 73. | <i>Polyporus circinatus</i> | Fig. 85. | <i>Boletus chrysenteron</i> |
| Fig. 74. | <i>Polyporus licnoides</i> | Fig. 86. | <i>Boletus fumosipes</i> |
| Fig. 75. | <i>Polyporus gilvus</i> | Fig. 87. | <i>Boletus indecisus</i> |
| Fig. 76. | <i>Polyporus Rheades</i> | Fig. 88. | <i>Boletus felleus</i> |
| Fig. 77. | <i>Strobilomyces</i>
<i>strobilaceus</i> | Fig. 89. | <i>Boletus edulis</i> |
| Fig. 78. | <i>Boletus scaber</i> | Fig. 90. | <i>Boletus sphaerosporus</i> |
| Fig. 79. | <i>Boletus nigrellus</i> | Fig. 91. | <i>Boletus Clintonianus</i> |
| Fig. 80. | <i>Boletus castaneus</i> | Fig. 92. | <i>Boletinus porosus</i> |
| Fig. 81. | <i>Boletus subtomentosus</i> | Fig. 93. | <i>Fomes rimosus</i> |
| Fig. 82. | <i>Boletus pallidus</i> | Fig. 94. | <i>Boletus Russellii</i> |
| Fig. 83. | <i>Boletus miniato-</i>
<i>olivaceus</i> | Fig. 95. | <i>Boletus luridus</i> |
| Fig. 84. | <i>Boletus bicolor</i> | Fig. 96. | <i>Boletus ornatipes</i> |
| | | Fig. 97. | <i>Boletus americanus</i> |
| | | Fig. 98. | <i>Poria setigera</i> |



Index to Genera and Species Described

	Page		Page
Boletinus -----	79	conchatus -----	38
porosus -----	79	connatus -----	36
Boletus -----	69	Everhartii -----	39
affinis -----	71	fomentarius -----	37
americanus -----	78	fraxineus -----	34
bicolor -----	79	fraxinophilus -----	37
castaneus -----	72	fulvus -----	39
Clintonianus -----	76	igniarius -----	37
chrysenteron -----	73	lobatus -----	40
edulis -----	75	ohiensis -----	35
felleus -----	74	pini -----	38
fumosipes -----	73	rimosus -----	40
indecisus -----	74	roseus -----	35
luridus -----	77	scutellatus -----	36
miniato-olivaceus -----	78	Ganoderma -----	31
nigrellus -----	71	Curtisii -----	32
ornatipes -----	77	sessile -----	32
pallidus -----	73	Gloeoporus -----	23
Russellii -----	76	conchoides -----	23
scaber -----	71	Lenzites -----	27
speciosus -----	77	betulina -----	27
sphaerosporus -----	75	saepiaria -----	28
subtomentosus -----	72	vialis -----	28
variipes -----	75	Merulius -----	5
Cyclomyces -----	26	ambiguus -----	7
Greenii -----	27	americanus -----	7
Daedalea -----	28	ceracellus -----	6
ambigua -----	29	confluens -----	9
confragosa -----	30	corium -----	9
quercina -----	30	incarnatus -----	8
unicolor -----	29	lacrymans -----	7
Favolus -----	30	tremellosus -----	8
canadensis -----	31	Polyporus -----	44
rhipidium -----	31	adustus -----	56
Fistulina -----	9	albellus -----	61
hepatica -----	10	arcularius -----	55
Fomes -----	33	Berkeleyi -----	50
annosus -----	36	betulinus -----	54
applanatus -----	40	borealis -----	59
Bakeri -----	38	brumalis -----	55

caesius	61	varius	52
chioneus	62	Polystictus	41
cinnabarinus	64	biformis	43
circinatus	65	cinnamomeus	42
crispus	56	conchifer	42
croceus	64	pargamenus	44
delectans	63	perennis	42
distortus	52	versicolor	43
elegans	53	zonatus	43
epileucus	62	Poria	11
frondosus	50	attenuata	18
fumosus	55	barbaeformis	20
galactinus	62	corticola	17
giganteus	51	ferruginosa	21
gilvus	67	griseoalba	15
glomeratus	66	medulla-panis	14
graveolens	65	mollusca	16
heteroclitus	50	mucida	16
hirsutus	58	nigra	20
hispidus	67	obliqua	21
iowensis	63	pinea	17
licnoides	66	punctata	20
nidulans	66	radiculosa	17
obtusus	60	rufa	22
occidentalis	60	salmonicolor	19
osseus	54	semitincta	15
picipes	54	sericeo-mollis	13
planellus	57	setigera	22
pocula	51	spissa	19
pubescens	59	subacida	14
radicatus	52	terrestris	13
resinosus	57	vaporaris	18
Rhodes	68	viticola	21
rigidus	58	vulgaria	16
sanguineus	64	Strobilomyces	68
Schweinitzii	65	strobilaceus	69
semipileatus	57	Trametes	23
Spraguei	60	hispidata	25
spumeus	63	malicola	26
squamosus	53	mollis	26
sulphureus	49	protracta	25
tephroleucus	61	sepium	25
tulipiferus	58	serialis	24
umbellatus	49	suaveolens	24

Index to Synonyms and Related Species

Ejerkandera		Ganoderma	
fumosa -----	56	subperforatum -----	32
Boletus		Gloeophyllum	
crassipes -----	72	hirsutum -----	28
glabellus -----	78	Grifola	
separans -----	75	Berkeleyi -----	50
Ceriumyces		ramosissima -----	49
communis -----	73	sumstinii -----	51
crassus -----	75	Gyroporus	
fumosipes -----	74	castaneus -----	72
retipes -----	78	Hapalopilus	
viscidus -----	71	rutilans -----	66
Coltricia		Hexagona	
perennis -----	42	alveolaris -----	31
tomentosus -----	65	Inonatus	
Coriolus		dryophilus -----	68
nigromarginatus -----	59	Irpex	
pargamenus -----	44	lacteus -----	58
prolificans -----	44	obliquus -----	16
Daedalea		sinuosus -----	16
corrugata -----	30	Irpiciporus	
obtusus -----	60	lacteus -----	58
Elfvigia		Ischnoderma	
megaloma -----	41	fuliginosum -----	57
Favolus		Laetiporus	
europaeus -----	31	speciosus -----	50
microporus -----	31	Lenzites	
ohiensis -----	31	Cookeii -----	30
striatulus -----	31	crataegi -----	30
Fomes		trabea -----	28
conglobatus -----	66	Piptoporus	
leucophaeus -----	41	suberosus -----	54
lucidus -----	32	Polyporus	
nigricans -----	38	abortivus -----	52
pomaceus -----	39	anax -----	51
populinus -----	36	caudicinus -----	53
robiniae -----	40	cinnatus -----	50
robustus -----	38	conglobatus -----	66
ulmarius -----	37	cupulaeformis -----	52
Funalia		dichrous -----	23
stuppea -----	25	dryophilus -----	68

dualis -----	65	obducens -----	15
endocrocinus -----	67	papyracea -----	18
fissus -----	53	pulchella -----	15
fragrans -----	56	radula -----	16
fuscus -----	57	sinuosus -----	16
immitus -----	62	superficialis -----	21
intybaceus -----	51	vinctus -----	18
isidioides -----	67	xantha -----	15
kansensis -----	52	xantholoma -----	15
lacteus -----	62	Porodisculus	
leucophaeus -----	41	pendulus -----	52
lobatus -----	40	Porodiscus	
lucidus -----	32	pendulus -----	52
morgani -----	52	Poronidulus	
nigra-purpurascens -----	23	conchifer -----	43
oblectans -----	42	Pyropolyporus	
pallido-cervinus -----	66	robiniae -----	40
pargamenus -----	44	Rostkovites	
parvulus -----	42	subaureus -----	78
perennis -----	42	Sphaeria	
pilotae -----	64	pocula -----	52
planus -----	57	Spongipellus	
polyporus -----	55	borealis -----	59
proliferus -----	42	delectans -----	64
pseudopargamenus -----	44	unicolor -----	60
rutilans -----	66	Trametes	
scruposus -----	67	abietinus -----	38
semisupinus -----	58	funalis -----	25
sordidus -----	60	ohiensis -----	35
subsericeus -----	42	pallida-fulva -----	28
Sullivantii -----	59	Peckii -----	25
tomentoso-quercinus -----	60	pini -----	38
tomentosus -----	65	serpens -----	26
zonalis -----	58	setosus -----	21
Polystictus		scutellata -----	36
hirtellus -----	59	tenuis -----	21
Poria		trogii -----	25
europa -----	18	Tryomyces	
flavescens -----	25	chioneus -----	62
haematodes -----	22	spraguei -----	60
laetifica -----	19	Tylopilus	
nitida -----	18	alboater -----	71

STATE LIBRARY OF IOWA



3 1723 02091 7241