NOTES ON THE LOWER BASIDIOMYCETES OF NORTH CAROLINA *

By W. C. Coker

Plates 23 and 30-~~66~~ 67

With the exception of some minute forms parasitic on insects, etc., the true fungi may be divided into three great classes, as follows:

A. Phycomycetes. Simple plants of webby or moldy growth, not forming large or complicated fruit bodies. In their reproduction they are distinguished by the presence, in most cases, of true eggs or gametes in addition to asexual spores. They include, among other forms, some of the molds, such as the black mold on bread, the downy mildews, which are destructive parasites on higher plants, as grapes, potatoes, etc., and the water molds, one of which causes a disease of fish. None of this group will be treated in this work. A separate book on the water molds of the United States will be published soon.

B. Basidiomycetes. To this group belong the vast majority of mushrooms and toadstools. With the exception of some of the lower groups, such as the rusts and smuts, which are diseases of higher plants and are not treated in this book, they form in nearly all cases a complicated fruit body that we usually speak of as the plant, but this body is the product of an extensive vegetative system of a webby or cottony character which ramifies through the earth or wood from which the mushroom arises. The most distinctive character is the production of the spores on the ends of club-shaped or pear-shaped microscopic branches or basidia which are formed on certain parts of the fruit body, and help to make up a distinct spore-producing surface or layer called the hymenium. In most species each basidium produces four spores on its end, each supported on a slender stalk.

C. Ascomycetes. A very extensive group of fungi of great economic importance because of the large number of destructive parasites it contains. They are quite varied in form and size, ranging from minute (as in many parasites, in yeast, etc.) to moderately large (as in the Morels). The spores are contained in sacs which

* Many of the drawings in this chapter were made by Miss Alma Holland, Assistant in Botany. Mr. J. N. Couch, Assistant in Botany, drew most of the figures of Gymnosporangium, Septobasidium and Sebacina. A good many figures were drawn by the author and inked in by Miss Holland. The colored plate was painted in part by Miss M. E. Eaton, of New York, and in part by Miss Cornelia S. Love, of Chapel Hill.

are usually elongated and which discharge by the rupture of the tip. There are usually eight spores in each sac, but this number is in some cases increased by the division of the original ones into several or many before they are discharged. Only a few of the larger forms will be treated in this series of papers, and the key to their families will be given later.

KEY TO THE FAMILIES OF BASIDIOMYCETES

1. HYMENOMYCETES: Hymenium (spore bearing surface) exposed before maturity and composed of gills, tubes or spines, or in some cases quite smooth. (In those mushrooms which are enclosed in a cup when young the cup is broken and the plant emerges before the spores are ripe.)
   - Basidia elongated and divided into four or fewer cells by cross walls; texture of plant toughly or softly gelatinous or waxy in the species here treated (of the very large group of rusts we are treating only a few species of Gymnosporangium, which are gelatinous at one stage).
     - Basidia arising from a specialized, thick-walled, constricted spore, which is two-celled in the species here treated (the other families of rusts are here omitted)..*Aecidiaceae* (p. 115)
     - Basidia not arising as above, but from hyphal threads, or in Saccoblastia from thin-walled, lateral, pendat sacs .....*Auriculariaceae* (p. 119)
   - Basidia divided across into several irregular cells; texture of plant fibrous and leathery ....*Septobasidium* (in *Auriculariaceae*) (p. 125)
   - Basidia ovate, pyriform or spherical, divided into two or four cells by longitudinal or oblique walls
     - Basidia arranged in rows of several; texture gelatinous .....*Sirobasidium* (p. 128)
     - Basidia single; texture in one group gelatinuous and forming erumpent, folded or convoluted masses; in another forming thin, resupinate, tough, leathery and coriaceous crusts; in one gelatinous genus with the form and teeth of a Hydnum...*Tremellaceae* (p. 129)
   - Basidia long, slender, terete, forked above into two long branches, not divided into cells; texture gelatinous or sub-cartilaginous.....*Dacrymycetaceae* (p. 160)
   - Basidia not divided into cells and not forked, mostly club-shaped
     - Hymenium smooth; form of plant various, but without sharp distinction between an expanded cap and a stem, sometimes completely spread out (resupinate) on the substratum.
       - Texture tough, leathery and fibrous; if branched, the branches not rounded (except in a few species)....*Thelephoraceae*
       - Texture softer, fleshy; plant cylindrical or club-shaped and un-

GYMNOSPORANGIUM JUNIPERI-VIRGINIANAE. No. 2307a.

branched or more often branched like a coral or bush or tree.....*Clavariaceae*
Texture fleshy; plant mushroom-shaped or trumpet-shaped; hymenium borne on the under side and often slightly wrinkled.....*Craterellus**

Hymenium borne on pendant teeth (if gelatinous see Tremellodon) .....*Hydnaceae*
Hymenium borne in pores, or if gill-like (Lentinus) then the plant is very tough, dry and corky.....*Polyporaceae*
Hymenium borne on gills; plant more or less soft and fleshy.....*Agaricaceae*

2. GASTEROMYCETES: Hymenium enclosed until maturity inside the plant body and not breaking out at all (as in the puff balls) or exposed at maturity by being elevated on a stalk (as in the phalloids); in one family forming a nest-like cup containing "eggs" at maturity.
Plant body more or less spherical or pear-shaped, sometimes stalked, opening at one or more places or wearing away to expose the spore mass .....*Lycoperdaceae*
Plant body breaking from an egg-like case at maturity and forming a delicate, more or less porous stem, which bears at its tip a smooth or folded or complicated or divided structure which supports the slimy and bad-smelling hymenium .....*Phallaceae*
Plant body small, forming a sessile or stalked cup which opens at maturity to expose a group of egg-like bodies within .....*Nidulariaceae*

AECIDIACEAE

In the most recent monograph of the true rusts or Uredinales by Arthur (N. Am. Flora 7:83. 1907) the order is divided into three families, the Coleosporiaceae, the Uredinaceae and the Aecidiaceae. Of these the last family is by far the most important economically and contains some of the most serious diseases of fruits and farm crops. The number of species is so large and the life history so complicated by a number of spore forms and an alternation of two generations, often on different hosts, that a study of the rusts is now almost a subject in itself. This complexity, together with their economic importance, has resulted in the production of a very large literature to which one may be guided by any of the recent text books on Plant Diseases, such as Duggar's *Fungus Diseases of Plants* and Stevens' *Fungi which Cause Plant Diseases.*

The destructive rusts of grains, grasses and clovers cause a loss of millions of dollars in the United States yearly. To them are closely

* Treated in the Agaricaceae. See this Journal **35**: 31. 1919.

related the rusts of apples, quinces, haws, etc., that cause much damage in the South Atlantic states and which infest the red cedar as their alternative host. We have chosen three species of these cedar rusts to represent the group of rusts in this paper. They belong to the genus Gymnosporangium in the family Aecidiaceae.

GYMNOSPORANGIUM

Producing on cedar in wet weather in the spring conspicuous masses of yellowish jelly either directly on the twigs, branches, or main trunks or on special large galls on the small twigs. This jelly contains a large number of two-celled spores, called teleutospores or teliospores, which sprout at once in the jelly to form elongated basidia, called promycelia, which are divided into four cells by cross walls, each cell sprouting to form a smaller curved spore called a sporidium. These last are then blown about and falling on leaves or fruits of apples or their relatives may infect them and produce in a few months discolored yellowish spots which produce on the underside tubular projections in which are borne in chains another kind of spore called the aecidiospore or aeciospore composed of one cell with a warted wall. These when blown back to the young cedar will infect the leaves and cause the development of the large galls again which are full grown and produce spores the second spring after the infection. The life history of these rusts thus requires two distinct hosts and each must be infected by spores borne on the other. On the upper side of the infected spots on the apple, etc., are borne in sunken flasks very small pycniospores which have no known function. Of the many species of the genus we select three that are found in Chapel Hill.

In addition to the treatment in North American Flora and in the texts mentioned, where references are given, one may refer to detailed work by Heald on the life history of the apple-cedar rust in the 22d Rep., Nebraska Agr. Exp. Station, p. 105, 1909; also a paper by Coons in the same series 25th Rep., p. 217, 1912.

KEY TO THE THREE SPECIES TREATED

All forming gelatinous excrescences on cedar (*J. virginiana*) in spring.

Forming globular, uneven balls which vary in size from a pea to a small apple, from which long gelatinous processes arise ..... *G. Juniperi-virginianae* (1)

Forming rough and usually thickened areas on twigs

GYMNOSPORANGIUM NIDUS-AVIS No. 2772*a* (right). Much reduced.
GYMNOSPORANGIUM GERMINALE (left). Reduced.

and branches, or less often on trunks, from scars on which arise globular or wedge-shaped, often confluent and irregularly-diffused masses of jelly

Jelly masses, only up to 7 mm. high, small and rounded; teliospores, 17-23μ thick.....*G. germinale* (2)

Jelly masses wedge-shaped, up to 25 mm. high; teliospores, 13-18.5μ thick.....*G. Nidus-avis* (3)

1. **Gymnosporangium Juniperi-virginianae** Schw.

G. macropus Link

PLATES 30 AND 52

This species is easily recognized on cedar by the large brown balls with shallow pits which form long, tentacle-like, gelatinous processes in wet weather in spring. After forming a crop of spores the balls die and turn blackish. The mycelium is not perennial but grows on the cedar through about twenty-one months from the infection of a leaf in July and August to spore formation a year from the following April. Infected apple leaves show thickened spots that are yellow or orange and on these spots below are several clusters of pale tubes which soon become lacerated and torn and more open. From these drop the brownish aeciospores which again infect the cedars. The elongated teliospores are 11-17 x 34-70μ and sprout from near the septum.

The abundance of the cedar in this section makes the infection of apples very easy and, with the exception of San Jose scale, which is much more easily controlled by spraying, this is the most serious apple disease in Chapel Hill. There is hardly a cedar tree in town without these rust balls on them and apple trees near them frequently lose nearly all their leaves in June and July and grow a new set by August. Different kinds of apples show great variation in resistance to the disease, the most immune apparently being the Staymans Winesap. Shockley and Bonum are very susceptible.

2307*a*. On *Juniperus virginiana*, May 7, 1915.

2. **Gymnosporangium germinale** (Schw.) Kern

G. clavipes Cooke and Pk.

PLATES 31 AND 52

Attacking cedar twigs about 3-8 mm. in thickness, producing a gradual fusiform enlargement about 5-12 mm. thick. The gelatinous

processes are in the form of low, small, rounded cushions crowded all around the infected area and are in large part fused into a continuous mass. Teliospores thicker than in our other species, 17-23 x 40-55μ, the upper cell with a single apical pore, the lower with a pore by the pedicel through which the germ-tube may emerge or it may emerge through the pedicel scar itself. The pedicel is stout, slightly swollen a little below the spore, 7-11μ thick at point of attachment.

The aecial stage is on the shad-bush (Amelanchier), affecting the fruits as much or more than the leaves. The infected fruits reach nearly full size and turn reddish where not attacked, but are distorted and imperfect. A tree in the garden at Glen Burnie is infected every year.

2786*a*. On twigs and small branches of cedar, April 9, 1918. Photo.

3. **Gymnosporangium Nidus-avis** Thaxter.

PLATES 31 AND 52

This is not uncommon in Chapel Hill, making rough and unsightly areas and scars on the branches and rarely even on the trunks of cedar. The gelatinous outgrowths are crowded in longitudinal rows often all around the branches for a distance at times of several feet. The branch is not much swollen, but the rough surface due to the ruptured bark makes such places larger. The individual scars are usually oval and about 2-4 x 4-7 mm., approximated by the scars of the preceding years. Gelatinous processes (telia) wedge-shaped, chestnut brown, 7-15 mm. high.

Teliospores (of No. 2772a) two-celled, 13-18.5 x 37-58μ, the two cells often partly separated before sprouting, the upper sprouting apically or at the septum or from both places, the lower from near the septum in one or two places, the slender pedicels not swollen.

This plant does not agree well with *Gymnosporangium Nidus-avis* as described in North Am. Flora (l.c. p. 196), which is said to have larger teliospores with stouter pedicels, the upper cell sprouting apically, the lower at the septum (called "apically" also). But Dr. Kern writes me that he would call our plant *G. Nidus-avis*. He says: "As regards the pores in the teliospores of Gymnosporangium the arrangement is quite variable. The generic description in the North American Flora states that they are usually 2 in each cell, but sometimes 1, 3, or 4, variously arranged, often near the septa, sometimes

apical in the upper, rarely near the pedicel in the lower. After further observations I believe that I have tried to be too definite regarding pore arrangement in the case of some of the species. In *G. Nidus-avis* it certainly is true that often only 1 pore is observed in each cell, apical in the upper, and near the septum in the lower (which is referred to as apical being as near the apex as possible) but frequently there are two pores in each cell, one apical and one near the septum in the upper, and both near the septum in the lower. The telia are often wedge-shaped instead of pulvinate. *G. Nidus-avis* is an unusually variable species and the description in the North American Flora does not provide for the variations as it should."

Our peculiar form of the species was collected by Arthur at Asheville, N. C., and cultures made on apple from his collection produced the typical aecia and pycnia. Infections made March 22nd gave pycnia by April 6th and aecia by April 27th (Mycologia 2:230. 1910).

186*a*. On branches of *J. virginiana* which were 3-4 mm. thick, March 31, 1914.

2772*a*. On branches of *J. virginiana* which were about 0.6-1-3 cm. thick, March 17, 1918.

AURICULARIACEAE

Basidia (in the more typical members of this family) elongated, divided into four or fewer cells by cross walls, each cell sprouting by a slender or a thickish sterigma to form a single spore; form of fruit body various, its texture varying from toughly or softly gelatinous to waxy. Resembling the rusts closely in the basidia and spores, but differing from them in the absence of a thick-walled, abstricted teliospore from which the basidia sprout, and in not being parasitic, but saprophytic on dead wood.

Nearest this family apparently, but doubtfully belonging to it, is the peculiar genus Septobasidium which is parasitic on scale insects and has a fibrous, leathery texture. The basidia are divided by cross walls but are variable in the form and number of the cells, and the number of the cells that produce spores is not known in all cases. We are including it here. See Brefeld l. c., p. 69.

KEY TO OUR GENERA

Texture gelatinous or waxy.

Toughly gelatinous; form more or less resembling an ear, which projects from the wood by a lateral attachment (*compare Exidia gelatinosa*); basidia not arising from a specialized sac ..... *Auricularia*

Texture waxy, form crustaceous and resupinate on the wood; basidia arising from a pear-shaped, hanging sac ..... *Saccoblastia*
Texture waxy; basidia not arising from a sac ..... *Platygloea*
Texture dry and leathery ..... *Septobasidium*

AURICULARIA

Plants sessile on dead wood by a narrow or broad base, crowded and often shelving, more or less cup-shaped; firmly gelatinous and tremelloid when wet, becoming hard when dry; spore-bearing surface rugosely channelled and pitted to resemble an ear. The basidia are long rods with cross partitions dividing them into cells, and from each cell arises a long sterigma bearing a single spore on its end. Spores white, smooth, sausage-shaped. We have but one species.

Auricularia auricula-judae (L.) Berk.

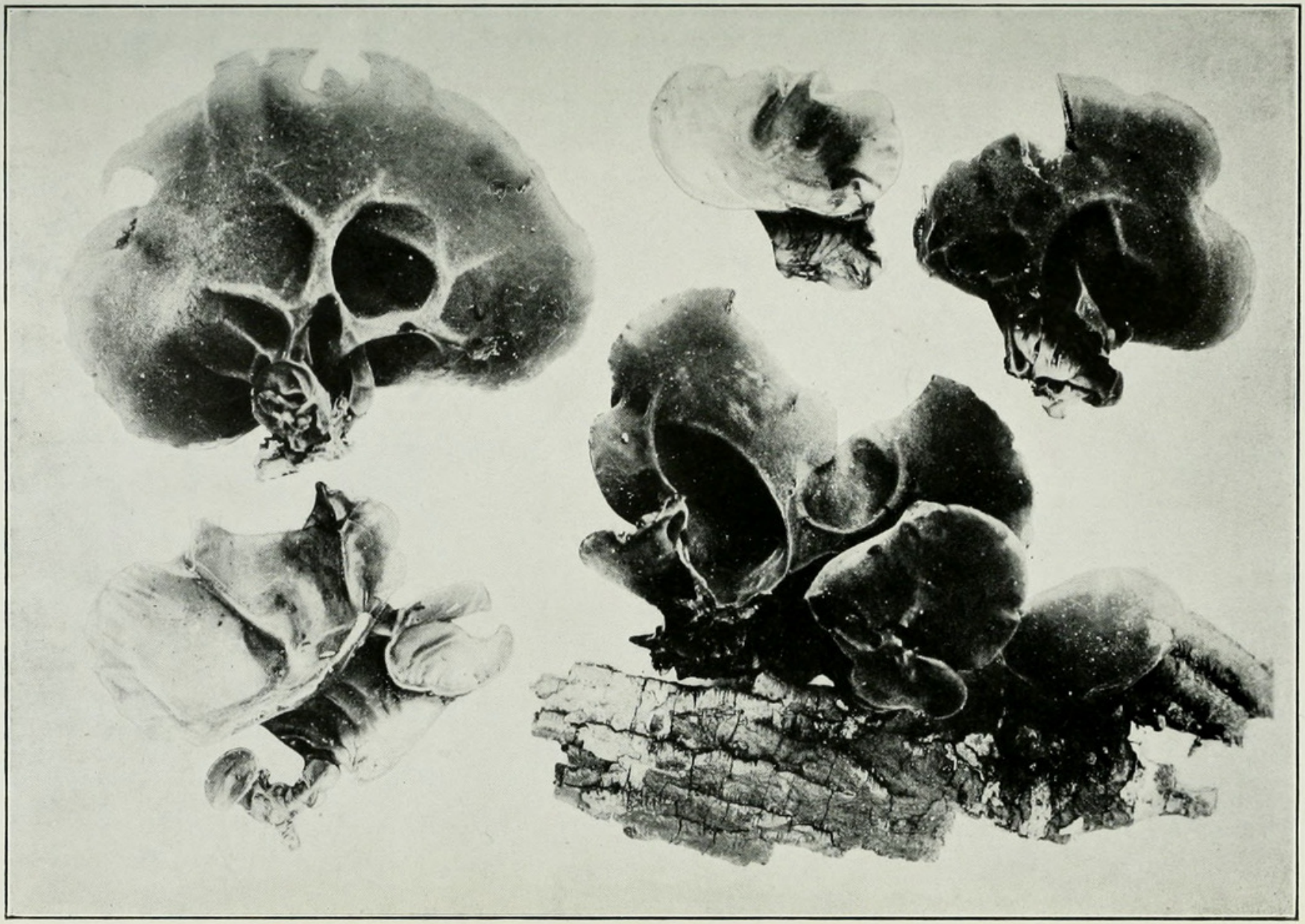
PLATES 32 AND 53

Plants sessile on dead wood by a narrow or broad base, up to 8 cm. in diameter, crowded and often shelving, more or less ear-shaped or cup-shaped, firmly gelatinous, tremelloid and translucent when damp and fresh, becoming hard when dry, a light yellowish-brown color much like that of rubber gloves. The under surface bearing the spores is more or less rugosely channelled and pitted like the inside of an ear, hence the name Jew's Ear. The dorsal surface is densely velvety tomentose with short, simple, crooked hairs.

Basidia long, slender, with cross partitions dividing them into four cells, each cell producing a long sterigma bearing a single spore on its end. Spores (of No. 3129) white, smooth, sausage-shaped, 4.3-5.4 x 10.8-14μ.

Not rare on fallen branches of deciduous trees. Edible. In China this or a closely related species is an important article of food. For illustration see Gilbert in Trans. Wis. Acad. **16**: Pl. 82, fig. 1, 1910.

1074. On a dead oak branch on ground close to Battle's Branch, May 7, 1912.
1075. On a dead oak twig east of Prof. H. H. Williams', October 18, 1911. These were small plants, not over 1.5 cm. broad.
2494. On fallen hickory by Morgan's Creek, 100 yards above Scott's Hole, May 8, 1917. Photo.
3129. On fallen oak tree southwest of athletic field, April 29, 1918.
3835. On fallen oak branch in woods east of cemetery, December 7, 1919. Spores pure white, smooth, bent, 4.8-6.3 x 11-13.7μ.



AURICULARIA AURICULA-JUDAE. No. 2494.

SACCOBLASTIA

Encrusting as a thin or thickish, uneven layer of a buttery, subgelatinous texture; basidia long, divided into four cells by cross walls and bearing four spores as in the rusts, connected below with a large, pear-shaped sac which furnishes the protoplasm for the basidium. Only a few species have been described, two from southern Brazil (Möller, l. c.) and one from Poland (Bresadola: Ann. Myc. 1:112. 1903). Our species is the first from North America. This genus reminds one strongly of the rusts, particularly the genus Gymnosporangium, where the teleutospore sprouts as soon as formed. If the relationship is as close as it seems the pear-shaped sac would be the homologue of the teleutospore. Note that this sac when long is constricted in the middle.

Saccoblastia ovispora Möller var. **caroliniana** n. var.

PLATES 33 AND 53

Forming an extensive, crumpled, convoluted cushion of irregular thickness (about 5-12 mm.), the surface quite uneven and nodulated by lumps and folds; color a dull, pallid straw to pallid white, with here and there darker stains absorbed from the rotten wood; upper surface rather dull, the lower more shining; texture about that of a soft wax, subgelatinous.

Basidia arising in a very peculiar way from the extension of a thread above a lateral, pear-shaped, hanging sac; the true basidium is very much like that of a rust and is divided into four cells by cross walls, each cell giving off a short sterigma at right angles, into which the contents is poured to form a kidney-shaped spore; between the basidium and the sac is a more slender stalk of varying length which is attached to the basidium at an angle or crimp. All or most of the contents of the sac and the stalk pass into the basidium and finally into the spores. Just below the attachment of the sac the whole apparatus is cut off by a wall from the hypha that bore it and below this wall is often formed one or more lateral branches which extend and soon produce another sac and basidium. Sacs 8.5-16 x 25-45μ, the longer ones often constricted; basidiospores subelliptic, flattened or a little concave on one side, smooth, white 7-7.7 x 15-17μ. These spores sprout soon in water to form smaller secondary spores or sporidia of the same shape which are usually about 4.8 x 12μ and borne on longer sterigmata up to 18μ long or more.

Of the two species described by Möller *S. ovispora* agrees best, but differs in the very thin context and the shorter spores and smaller sacs (basidiospores 7-8 x 13μ, sacs up to 8 x 30μ). The crimp or knee where the basidium joins the stalk is also not mentioned by Möller or shown in his figures.

Our plant also is not white but a pale, dull yellowish. These differences are hardly important enough to require the establishment of a new species and I am calling our plant a variety. Drying takes place quite slowly, resulting in a thin, dark membrane which looks like dried cartilage. When placed in water again it revives perfectly to the original form, even the sacs appearing quite normal under the microscope.

Our finding this South Brazilian genus here is remarkable and wholly unexpected. It was brought in by Mr. J. N. Couch, Instructor in Botany, and adds a genus to our North American flora.

4078. In hollow oak tree near Meeting of the Waters, February 4, 1920. The plant formed an almost continuous layer over several square feet of the hollow. Photo. Type.

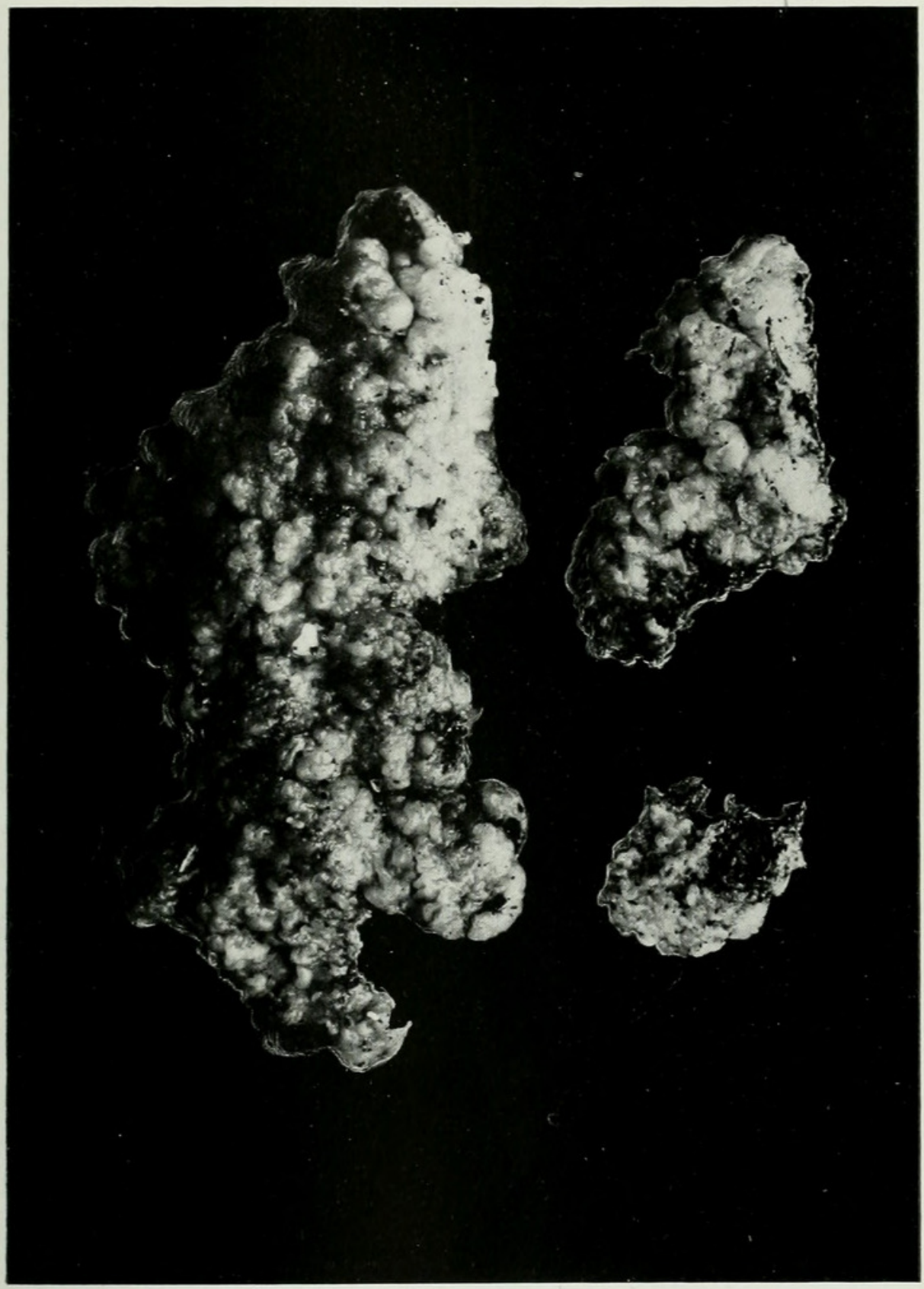
PLATYGLOEA

We take the following from the original definition of the genus by Schroeter (Krypt. Fora v. Schlesien (Cohn) 3:384. 1889): Fruit body waxy, flatly spread out or weakly swollen; hymenium waxy, smooth. Basidia crowded, divided by cross walls into mostly four cells. [In our Chapel Hill species into only 2-3 cells.] Spores single, colorless. Saccardo adds: spores, lunate, continuous, "producing no sporidia on sprouting (as it seems)." Nine species (none from North America) have been described, eight on wood, one on dung. All are quite small and easily overlooked. Our plants seems to be new. The genus Tachaphantium of Brefeld (l.c. p. 78) is not distinct from this.

Helicogloea of Patouillard (Bull. Soc. Myc. de France 8:121. 1892) is also not different from Platygloea.* One species *H. Lagerheimi* Pat. has been described. It is effused, hyaline, more or less tuberculose, cinereous, 4-5 cm. broad. Basidia 80-100μ long, 7-8μ thick, attentuated below, obtuse above, 3-4 spored. Spores hyaline

* Patouillard writes me: "The genus Helicogloea is not a good genus! It is a true Platygloea, which differs from the typical form in its texture of clay. At the most, it could be kept as a section of Platygloea."

PLATE 33



SACCOBLASTIA OVISPORA VAR. CAROLINIANA. No. 4078.

guttulate, 7-8 x 15μ, conidia ovoid, 7 x 12μ. On decaying wood in Equatoria. It may be our *P. Lagerstroemiae*, but there are discrepancies. For *P. effusa* see Trans. Brit. Myc. Soc. 6:138. 1918.

KEY TO THE SPECIES

Plants pulvinate, not fusing into crust-like masses, sterile threads (paraphyses) absent in the hymenium.....*P. caroliniana* (1)

Plants nodulose-crustose, sterile threads present in the hymenium .....*P. Lagerstroemiae* (2)

1. **Platygloea caroliniana** n. sp.*

PLATE 54

Gregarious but not crowded, forming pulvinate, flattened patches 0.5-2.5 mm. broad and 0.5-1.5 mm. high, dull smoky flesh-color until old, then more sordid and less pink. Surface dull, granular-looking, convex when fresh, even in small plants, convoluted in larger ones, in age becoming flattened by collapse. Texture firmly waxy throughout.

Spores (of No. 4199) sub-oval, smooth, not white, apparently yellowish or pinkish-yellow on a light spore print on a slide, 4-7 x 5-9μ, not divided. They sprout at or near one end to form smaller, secondary spores (sporidia) of more narrow and irregular shape, mostly pip-shaped, but soon becoming irregular or curved by sprouting. Basidia in dense groups of about 8-10, borne in a close corymb, 5.2-6.5 x 15-20μ, swollen, two-celled or some at least with a third, stalk-like cell, each cell sprouting by a rather long or a short sterigma parallel to the long axis of the basidium as in Auricularia.

Threads of the flesh not crowded, branching at open angles about 2-3.7μ thick, the cross walls usually about 55-100μ apart, but variable, no clamp connections, branching near the surface in a densely corymbose manner and terminating in the clusters of basidia. The plants have exactly the appearance of a small Dacrymyces, but the texture is waxy, not gelatinous. There is no discernible root entering the wood.

This cannot belong to the genus *Jola* of Möller, as that has basidia which do not arise in dense groups and which usually arise from a swollen stalk cell. The spores are very narrow, elongated, and curved (in *J. Hookeriana*, 6 x 28-36μ; in *J. javensis* 3-4 x 15-20μ). Moreover, of three species of Jola described all are parasitic on mosses.

* Just before going to press a letter comes from Patouillard, who says: "*P. caroliniana* is very different from *Helicogloea Lagerheimi* and is easily a good species."

We have decided to let this go for the present in the genus Platygloea, as it is certainly nearest that or Helicogloea Pat., which is very near or more probably the same, as Möller thinks. Our plant, however, has basidia with only two or three cells, and the absence of sterile cells mixed with the basidia is also a difference. It does not seem to agree with any described species of the genus or with *Helicogloea Lagerheimi*. *Platygloea blastomyces* Möller from South Brazil has basidia entirely too long and slender, spores 6 x 12μ. *Platygloea tiliae* (Bref.) Sacc. breaks through bark of Tilia; basidia four-celled, spores 12 x 35μ. *Platygloea Miedzyrzecensis* Bres. is pulvinate, 2-4 mm. in diameter, but the basidia are 3-5 septate, 4-6 x 75-200μ, the spores 7-9 x 10-13μ. (Ann. Myc. 1:113. 1903).

4044. On corticated and decorticated branches of crepe myrtle (Lagerstroemia), January 28, 1920. Spores 3.7-4.5 x 5-7.5μ.

4199. On corticated and decorticated branches of crepe myrtle, March 5, 1920. Type.

2. **Platygloea Lagerstroemiae** n. sp.

PLATES 41 AND 54

At first forming very small pustules up to 1.5 mm. broad with indefinite margins which are usually crowded and densely gregarious, often fusing later to form elongated, more or less nodulated, irregular patches which may extend for 1-2 cm., not convoluted, the surface dull and granular looking; color at first pallid dull white or straw, soon sordid or smoky brown; texture firmly waxy. Hymenium composed of an immense number of small threads, formed by the corymbose branching of the inner threads, among which are the much thicker and elongated, curved basidia which also arise in corymbose clusters of several.

Basidia 5-5.5μ thick, elongated, irregularly curved and bent, usually two-celled, often with a slender basal cell which collapses soon; sterigmata terminal on each cell, ascending, long or short. The basidium begins to collapse while the spores are being formed and its shape is very soon lost. Basidiospores oval or elliptic, usually curved, very soon becoming irregular and often cycle-shaped by sprouting, 4-7.4 x 7.4-12.3μ, the secondary spores of the same shape, the smaller sizes almost certainly secondary, the smaller secondary spores are 1.6-3.7 x 3-5.5μ.

This is quite distinct from the preceding species, differing in presence of sterile threads in the hymenium, in fused and crust-like form with indefinite margin, in color, in larger spores which are more curved and in larger basidia. The form and habit are more like those of a Sebacina than a Dacrymyces. This seems near Möller's *Platygloea blastomyces* from South Brazil, but differs in the thicker and shorter basidia. *Platygloea effusa* Schroeter is also near, but has basidia with four cells and the color is said to be bluish to yellowish white.

4062. On bark or dead limb of crepe myrtle (Lagerstroemia), February 3, 1920. Photo. Type.

SEPTOBASIDIUM

A curious and anomalous genus forming a resupinate crust on living twigs and branches that are usually and probably always infested with scale insects; supposed to be parasitic on these insects. The plants seem more nearly related to the rusts than the higher basidiomycetes, for the basidium arises from a previously formed, subspherical to pyriform cell, suggesting a one-celled teliospore, and is, when mature, elongated, curved and divided across into cells which give off the long, bent, white spores at right angles on short sterigmata. These structures have been imperfectly or incorrectly understood. Texture coriaceous and resembling a Corticium. Of the seventeen species recorded by Burt two are reported from North Carolina. See Burt in Ann. Mo. Bot. Gard. 3:319. 1916. Also Lloyd: Myc. Notes 51:720. 1917; and 61:887. 1919.

KEY TO THE SPECIES

Surface rugose-wrinkled like some lichens.....*S. retiforme* (2)
Surface even
  Paraphyses bent over and interwoven at the surface .....*S. pseudopedicellatum* (1)
  Paraphyses straight or nearly so.....*S. Schweinitzii* (3)

1. **Septobasidium pseudopedicellatum** Burt.

PLATES 34, 66, AND 67

Plant forming a felt-like, thickish crust usually about 2-5 cm. long and 1-2.5 cm. broad; surface smooth until broken up in age, whitish when young, then passing through pale brown to avellaneous or wood

brown and in age blackish brown; dull, not shining, the uneven margin somewhat fimbriated. Substance internally spongy and open, soon composed of delicate little fibrous pillars supporting the dense upper layer and springing below from a thin, superficial layer on the wood. Basidia-bearing cells (protobasidia) thick, single, terminal, surrounded by slender, bent, interwoven threads. Hyphae loosely packed, considerably branched, rarely septate, no clamp connections.

Basidia appearing in spring from the distal ends of the resting cells, irregularly cylindrical or club-shaped, the tip cell pointed at maturity; sterigmata lateral or, on the top cell, apical.

Spores (of No. 4293, print) white, smooth, long, curved, soon divided into about eight cells, 3.5-4.7 x 15.5-20μ, sprouting in water into small sporidia which are 1-1.8 x 3-6μ, or rarely sprouting without dividing into a single large secondary spore about 3 x 12μ. The length of the basidiospores is quite variable. In No. 4286 they were, from a print, 3.7-5 x 18-30μ.

This species attacks colonies of scale insects (*Chrysomphalus obscurus*)* on living bark and at first is a thin weft of pure white threads running over and among the scales; soon it becomes thicker, the insects become more obscured and are finally hidden completely. About this time there appear numerous free, upright, thread-like fascicles of woven hyphae about 1 mm. high, which gives the plant a peculiar hairy appearance at this stage. We have not followed the life history fully as yet, but it seems probable that these fascicles are to become the supporting columns to the upper layer and that they form this layer by later proliferation and fusion of their tips. The plant is parasitic on the insects only and does not injure the tree.

Burt remarks that in this species the spores are formed in May. In Chapel Hill we find in January and February apparently grown and fully thickened patches of the fungus that are still pure white; at the same time are found more mature brown patches, some of which are breaking up from age. Both the white and brown patches show fully formed resting cells near the surface, but younger, less mature white patches show none of these. In late April we find the basidia appearing and forming spores. If placed in a damp chamber after soaking basidia will appear and form spores in about two days. We have noticed that while the insects themselves were only dead shells under

* Determined by Mr. Harold Morrison of the Bureau of Entomology, Washington, D. C. Dr. Speare of the same Bureau finds associated with our specimen another parasite of scale insects, the fungus *Myriangium duriaei*.

PLATE 34

SEPTOBASIDIUM PSEUDOPEDICELLATUM. No. 3936.

the thick white crusts in January, their eggs were apparently in good condition, being plump and juicy. The species is common in Chapel Hill on willow oak, water oak and hornbeam, and we have found it on privet, apple, alder, white oak, pin oak, *Ilex decidua* and *Cornus amomum*.

3923. On live branches of privet by President's home and by Raleigh road, January 9, 1920.
3924. On a recently dead limb of ironwood (*Carpinus carolinianus*) in Arboretum, January, 9, 1920.
3936. On branches and trunk of *Quercus nigra* by Morgan's Creek, opposite Laurel Hill, January 11, 1920. Photo.
3943. On live limb of willow oak in Arboretum, January 15, 1920.
4015. On alder limbs by branch below Cobb's Terrace, January 24, 1920.
4112. On young, living ironwood near Battle's Branch, February 13, 1920.
4157. On apple bark (living) in Dr. Herty's yard, February 21, 1920.
4286. On live branches of *Q. Phellos*, Rocky Ridge Farm, April 25, 1920.

2. **Septobasidium retiforme** (B. & C.) Pat.

PLATES 65, 66, AND 67

Plants forming resupinate, firmly attached, rather hard and tough, thickish crusts with the surface rugose-veined very much like some foliaceous lichens; margin thinner, irregular and whitish; color deep drab brown and finally darker brown, the margin paler. Substance about 2.3-0.5 mm. thick, brown, the central part less dense and composed of upright fibers somewhat loosely packed, but appearing solid under a hand lens. In old crusts this central part collapses first, leaving the outer and inner layers.

In the S. C. collection, made in December, the basidia were just appearing as undeveloped thickenings. Burt found only one spore in his material, so that the spore characters remained uncertain until we found spores plentiful in our No. 4279. Resting cells when mature oval, sprouting in April to form apical basidia. Spores (of No. 4279, print) long, white, curved, 3.8-.5.5 x 17.3-27.5μ, if kept damp dividing soon into about six to eight cells and sprouting by minute sterigmata into oval sporidia, much as in *S. pseudopedicellatum*. Basidia 7-8 x 52-60μ, arising from the tip of the resting cells, 4-celled remarkable in that they fall from the resting cells as soon as fully formed, at least if formed in water; sprouting after falling off into the four spores from lateral sterigmata. In the distal cell the sterigma may be terminal or nearly so. The plant, like the preceding species, grows on plant lice, which are very obvious in

our material. It does not seem to have been reported from either of the Carolinas before, but has been found in the District of Columbia and as far south as Cuba. It is said to grow on apple, pear and peach, as well as other trees.

4279. On live branches of *Q. Phellos*, Rocky Ridge Farm, April 25, 1920.
4294. On the same tree as No. 4279, May 3, 1920.
Hartsville, S. C., on water oak (*Q. niger*), December 25, 1919. Coker.

3. **Septobasidium Schweinitzii** Burt

This is much like *S. pseudopedicellatum*, but is said to differ in the tips of the paraphyses being upright instead of bent and interwoven horizontally. It was originally described from North Carolina as *Thelephora pedicellata*. We have not found it.

North Carolina. Schweinitz.

SIROBASIDIACEAE

Plant gelatinous, soft, pulvinate, small; basidia arranged in chains, divided either into two cells by an oblique septum or into four cells by two longitudinal septa, each cell producing one spore. There is but one genus.

SIROBASIDIUM

As there is but one genus, it may be defined as having the characters of the family. We have found one species in Chapel Hill, and as the genus has heretofore been known only from South America, this adds a genus to the North American flora so far as reported, but Dr. Farlow has collected a minute species of this genus, practically invisible without a lens, on twigs of Viburnum (?) at Chocorua, N. H.

Sirobasidium Brefeldianum Möller

PLATE 55

Forming minute, little pustules about 0.4-1.3 mm. in diameter and 0.2-0.5 mm. high, gregarious but not crowded, smooth, softly gelatinous, not viscid, but slippery, watery-smoky to dusky white (with a tint of flesh in some).

Spores ovate, smooth, hyaline, varying in size, most about 7.5-8.1 x 13.3-13.7μ, sprouting soon to form small oval sporidia. Basidia 10.5-12.6 x 22-40μ, borne up to 6 (or more ?) in chains, pear-shaped, usually with a narrowed base, divided into two cells by an oblique cross wall, each cell sprouting near the apex to form a single spore.

The minute size and obscure color render the plant almost invisible in passing. The plant seems to agree well with *S. Brefeldianum* of South Brazil (see Möller) and adds a genus to the North American flora. Two other species, *S. albidum* Lag. & Pat. and *S. sanguineum* Lag. & Pat., have the basidia divided into four cells by longitudinal or slightly oblique septa. They are both from Ecquador (see Jour. Bot. 6:465. 1892).

4104. On decorticated rotting branch of *Albizzia julibrissin*, Episcopal churchyard, February 13, 1920.

TREMELLACEAE

Plants growing on wood, more or less gelatinous and translucent, toughish or soft, shrinking and becoming hard on drying, sometimes shelving and irregularly cup-shaped or ear-like, more often irregularly folded and lobed or brain-like or forming simple cushions; in another group thin, tough and leathery or coriaceous, and encrusting wood as in the Corticiums; in one genus (Tremellodon) with an eccentric cap and teeth like a Hydnum on the under surface. Hymenium covering all the exposed surface of the body (as in Tremella) or only the lower surface (as in Tremellodon). Basidia spherical or ovate or pear-shaped, divided into four cells by longitudinal or oblique walls. Basidiospores smooth, subglobose, pip-shaped, broadly elliptic, or elongated and curved; color various. Not yet reported from America are the genera *Protodontia* and *Protohydnum* (See Trans. Brit. Myc. Soc. 6:69. 1917).

See Tulasne: *Observations L'organisation des Tremellinees.* Ann. Sci. Nat. 3rd series, 19:193. 1853. Also Tulasne: *Les Fungi Tremellini et leurs Allies,* l.c. 5th series, 15:215. 1872. (Also the same in English in Proceedings Linnean Soc. 13:31. 1873). Brefeld: *Untersuchungen aus dem Gesamtgebiete der Mycologie.* Heft. 7:80. 1888. Gilbert: *Studies on the Tremellineae of Wisconsin.* Transactions, Wis. Acad. Sci. 16:1137. Pls. 82, 84. 1910. (This gives references to the literature). Morgan: *Myc. Flora Miami Valley.* Journ. Cin. Soc. Nat. Hist. 11:91. 1888.

KEY TO THE GENERA

Texture gelatinous; shrinking greatly on drying, and reviving again when moistened.
  Hymenium (spore-bearing surface) without spines.
    Spores white, elongated and a little curved like a sausage
    Plants without a central body of different tex-

ture ..... *Exidia*
Plants containing several small seed-like bodies, which become quite conspicuous on drying (in *N. atrata* Pk. the central body is said to be black) ..... *Naematelia nucleata*
Spores white or yellow to orange (*T. colorata* Pk. is said to have raisin-colored spores), spherical or broadly elliptic or pip-shaped, not curved..... *Tremella*
Plants containing a firm, white, central body or a folded white membrane; surface minutely rough.. *Naematelia*
Hymenium with spines ..... *Tremellodon*
Texture fibrous and leathery or toughly coriaceous or varying to waxy; not shrinking greatly on drying.
Plant growing from the ground, resembling a Thelephora, tough, firm, much branched from a fused base; tips white ..... *Tremellodendron*
Plant growing on wood, tough, leathery, resembling a Corticium or a little Stereum; hymenium pink in our one species..... *Eichleriella*
Plant resupinate on wood or encrusting the bases of plants or objects from the ground; white or buff or gray in our species..... *Sebacina*

EXIDIA

Plants pulvinate, convoluted, gelatinous, in some species with small surface papillae or dots, often compounded in lines or masses; arising from a small central point or elongated plate; all the exposed surface bearing the hymenium or only one surface in the more or less flabelliform *E. gelatinosa*. Basidia pyriform to subspherical, divided lengthwise into four cells, each cell with a long sterigma with a spore at its tip. Spores elongated, curved, white, mostly two-celled before sprouting.

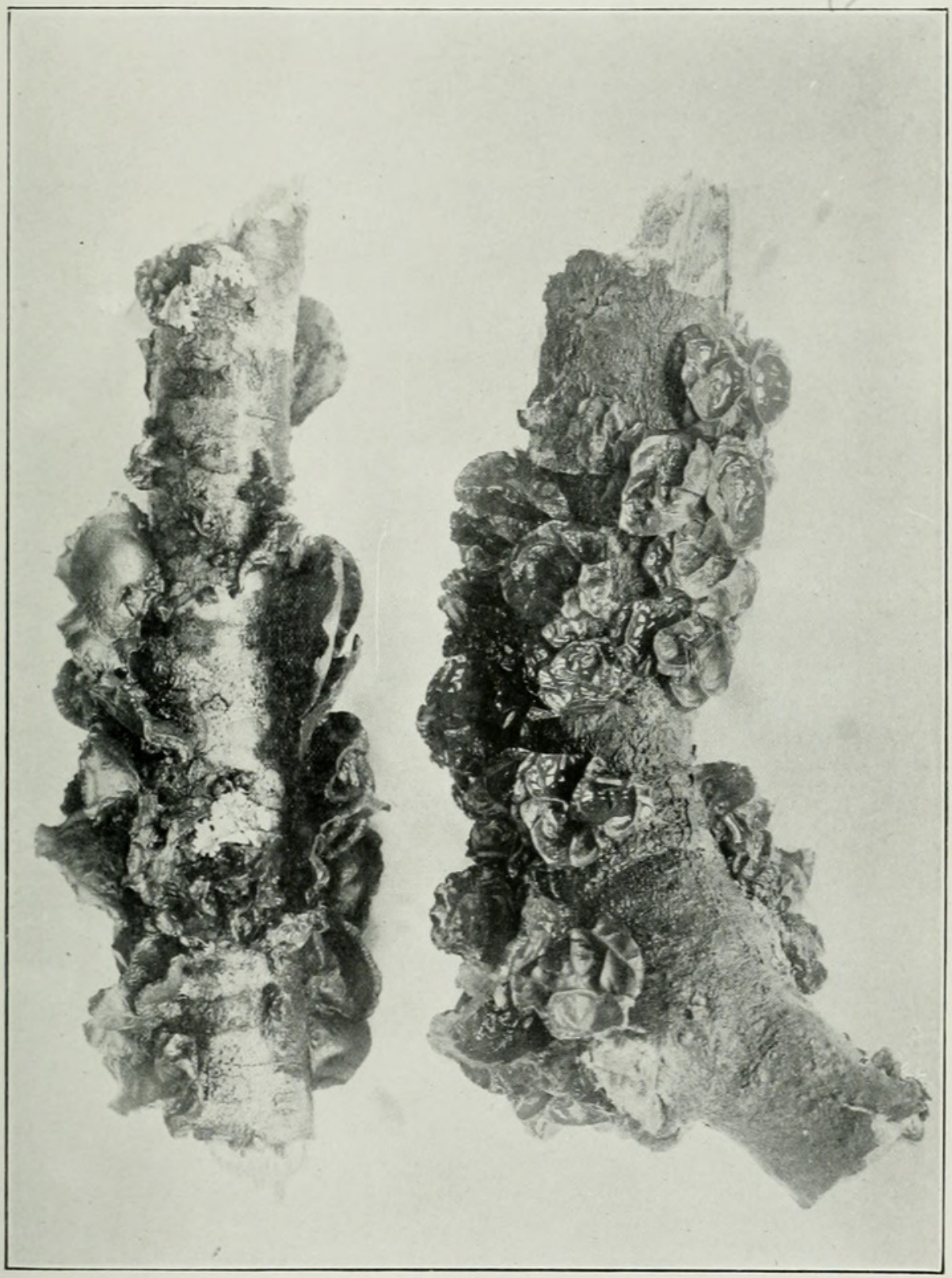
Brefeld has established a genus *Ulocolla* for plants like Exidia that form straight, rod-like sporidia in sprouting, the true Exidias sprouting to form groups of much curved, almost circular sporidia. He retains *E. gelatinosa* and *E. glandulosa* in Exidia, placing in Ulocolla *E. saccharina* Fr. and also *Tremella foliacea* Pers., which he thinks may not be distinct from the preceding. Brefeld erects still another genus, *Craterocolla* for dimorphic tremulose plants with spores like Exidia, and he transfers to that genus *Tremella Cerasi* Schum. (l.c. p. 98).

KEY TO THE SPECIES*

Plant raisin color, set with small darker specks on the sterile side ..... *E. gelatinosa* (1)
Plant dark, blackish-brown, usually with small scattered papillae on exposed surface ..... *E. glandulosa* (2)
Plant raisin color to sordid clay color without specks or papillae ..... *E. Beardsleei* (3)

* For notes on other species see pages 150, 151.

PLATE 35



EXIDIA GELATINOSA. No. 4091.

1. **Exidia gelatinosa** (Bull.) Schroet.

E. recisa (Dittm.) Fr.
Tremella corrugata Schw.
Tremella crenata Schw.

PLATES 35 AND 55

Plant if horizontal from the sides of branches forming flattened, shelving, bracket-like caps; if borne on top or beneath the branch they form crumpled, rather shapeless, more or less flattened masses which are attached by a point or by a more extensive area to the wood; dorsal surface sterile, wet-looking and when seen with a lens showing minute, dark dots; hymenial surface dryer and glaucous from the projecting sterigmata and spores, ridged irregularly like an ear as in Hirneola; there are no papillate projections as in *E. glandulosa.* Texture soft and gelatinous but holding its shape; not so firm as Hirneola, which it rather resembles in form and in the deep blackish wine color; black and shrunken and shapeless when dry. Internal hyphae of fruiting body 2μ in diameter; with cross walls but no clamp connections.

Basidia much as in Tremella, oval and divided into four cells by two longitudinal walls, each cell with a long sterigmata which projects considerably above the surface. Basidia short-oval, 9-10 x 11-11.3μ, situated at and near the surface to a depth of 45μ. Spores white, smooth, sausage-shaped, 3.8-4.5 x 11.2-13.4μ.

Under a microscope the black dots on the dorsal surface are seen to be crusty-looking patches partly embedded and partly free and with much the appearance of small, thickish flakes of bark. These furnish an unfailing means of determination. The absence of the papillae and the flattened form also distinguish this from *E. glandulosa,* while the sausage-shaped spores and smaller size separate it from *Tremella frondosa.*

Very common on fallen oak branches of various species and conspicuous in wet weather. Also on grape, *Prunus,* sweet gum, and elm. Gilbert's figs. 5 and 6 (l.c. Pl. 82) are good of our plant. Brefeld's figure also is good (l.c. Pl. 5, fig. 19). Bulliard's plate 460 (as *Peziza gelatinosa*) gives a poor impression of the habit. For the hymenium and spores see Tulasne l.c. Pl. 12, fig. 2. 1853. From an examination of a collection in the Schweinitz Herbarium I find that *Tremella corrugata* is this species. It has the same characteristic encrusting

particles on the dorsal surface, and there was nothing in the microscopic structure to contradict this. No spores were found. *Tremella crenata* is also the same, the crustaceous particles showing up plainly on wetting in a good specimen from the Schweinitz Herbarium (see page 151). Bresadola has found in the Trentino a plant much like *E. gelatinosa*, but growing on coniferous wood, to which he gives the name *E. umbrinella*. It has not been reported from America, but I find on examination of Peck's type that his *Tremella pinicola* is very like it if not the same (see note on page 150).

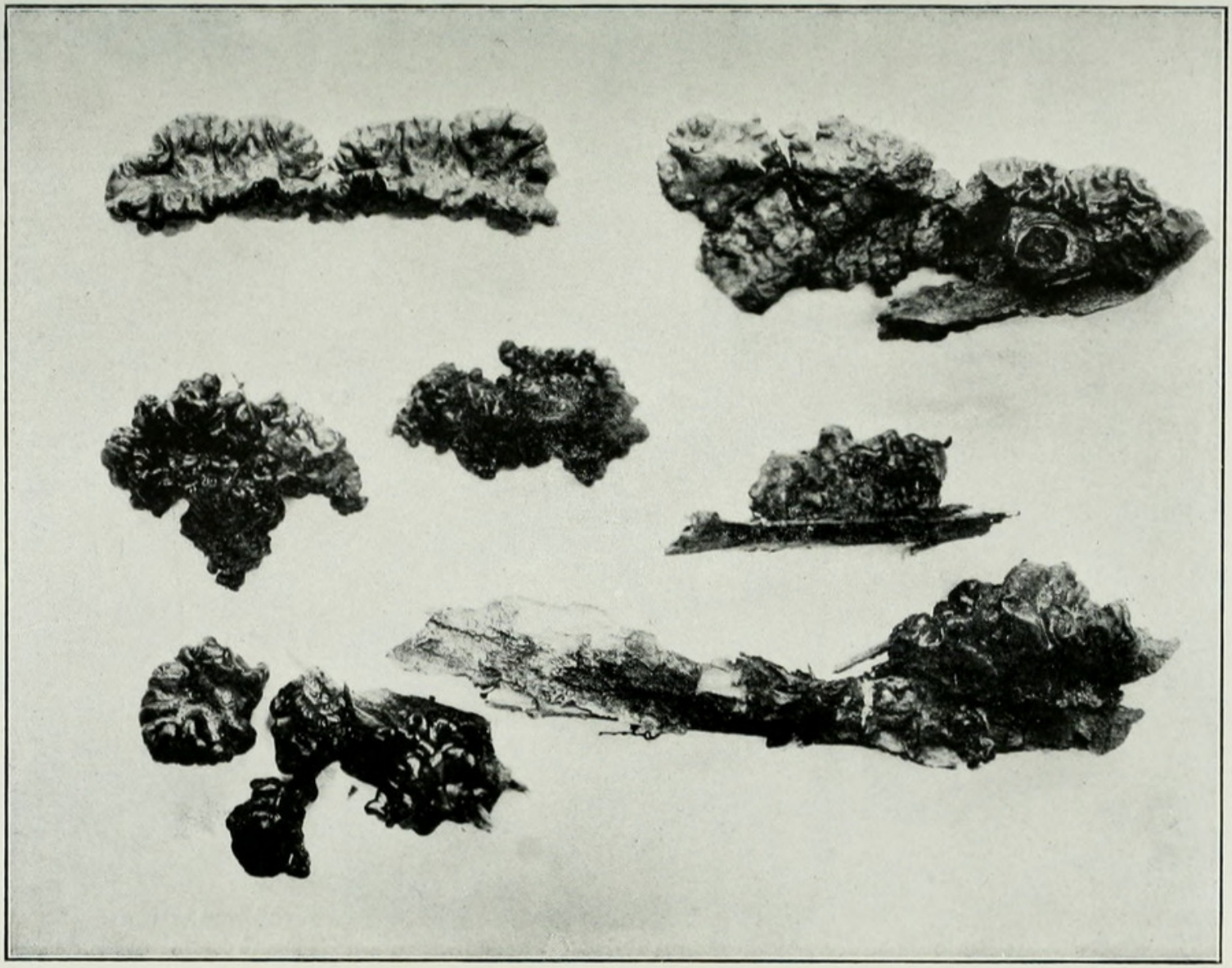
116*a*. On dead oak wood by Battle's Branch, December 2, 1913.
3854. Fallen oak limbs, east and southwest of old Graded School, December 9, 1919. Photo.
3900. On fallen branch of white oak, December 13, 1919.
3901. On fallen oak branch, December 13, 1919.
3938. On dead branch of *Prunus serotina* in Arboretum, January 13, 1920.
4089. On grape vine (*V. rotundifolia*), February 4 and 20, 1920. Basidia oval, four-celled, 9.3 x 11μ. Spores smooth, white, curved, 3.7-4.8 x 9.3-13.5μ.
4091. On oak branches back of Athletic Field, January 17, 1920.
4114. On oak limb by Battle's Branch, February 13, 1920. Photo.

2. **Exidia glandulosa** (Bull.) Fr.

PLATES 36 AND 55

Plant forming convoluted, gelatinous, thickish, pillow-like masses which may be single or fused into long rows along cracks in the bark; narrowly attached and spreading out laterally; upper (outer) surface bearing basidia and faintly glaucous under a lens, also more or less conspicuously dotted in a scattered way with small, black, protruding warts or points; color deep blackish-brown, like very dark wine jelly, the lower surface a little paler, watery-shining and not glaucous or warted; when protected from light, plants are apt to be much paler, approaching white (No. 4198); texture rather firmly gelatinous, deliquescing only when long wet, not viscid. On drying the plants flatten down and collapse into a thin black membrane.

Spores smooth, white, rod-shaped, curved, 3.7-4.1 x 9-12.5μ. In sprouting the contents usually moves to one end, the empty end being cut off by a wall, the protoplasmic end sprouting at the mucro. At times both cells contain protoplasm and both sprout; again no cross wall is formed and the entire spore sprouts at the mucro. Basidia pear-shaped, four-celled by two longitudinal divisions.



EXIDIA GLANDULOSA. No. 3878.

The smaller, single pustules are about 3 mm. wide and 2 mm. high, the longer, compound ones may reach a height of over a cm. and extend in more or less interrupted rows for a foot or more along the branches. This plant differs from *Exidia gelatinosa* in darker color, smaller size and pulvinate form which is quite unlike the thin, flattened, laterally attached caps of the latter. It also differs in the black papillae on the hymenial surface and the absence of the close-set, dark, inherent dots on the dorsal surface. Very common on many kinds of deciduous trees and shrubs, as on privet, osage orange, Baccharis and others, besides those mentioned below. Individual pustules are often without papillae, and such are probably *E. epapillata* Bref. and *Tremella intumescens* Sm. Brefeld gives the spores of the European *E. glandulosa* as 5 x 14μ which is a little larger than in ours. *Exidia plicata* Klotzsch seems to be another European form on alder with few papillae and slightly longer spores, up to 20μ.

3878. In fallen branch of willow (*Salix nigra*) in Arboretum, December 13, 1919. Photo.

3933. On dead stems of trumpet vine (*Tecoma radicans*), January 9, 1920. Spores as in No. 3878, 3.7-4.5 x 10-13μ.

3951. On *Vitis aestivalis*, January 17, 1920. Basidia 9.3-11 x 11-14μ.

3973. On white birch (*B. alba*) in Arboretum, January 18, 1920.

4188. On oak bark, Strowd's lowgrounds, February 25, 1920.

4198. On oak stick under leaves, March 2, 1920. Basidia oval, 10-11.8 x 14-15μ. Spores 3.7-4.5 x 8-14μ.

3. Exidia Beardsleei

PLATE 56

The following is by Mr. C. G. Lloyd:

"Sessile, cushion shape, gyrose, lobed. Color of a raisin. Flesh same color. Papillae none. Basidia globose, 8-10μ, very pale color. Spores hyaline, 5 x 10μ, slightly curved, unilateral, apiculate.

"Were we to determine this from books we should call it *Exidia saccharina*, but we know this in Europe and it is not that species. The color might be compared to brown sugar but better to a raisin. We do not find it in Ridgway, but pecan brown is not far away. While it has no papillae we put it in Exidia on the spores. As previously stated the line between Tremella and Exidia is hard to draw. In general appearance this is rather a Tremella. The color is somewhat like that of *Naematelia nucleata* when old. It dried away leaving hardly a trace on the bark. It grew on frondose wood. From W. C. Coker, North Carolina (No. 4021).

"We published this, Myc. Notes No. 61, p. 898, as *Exidia Uva Passa* (in duplicate) having used this name (54, 774) for a plant from Japan. We are not sure that our American plant is different from the Japanese, but it appears to us to have a more reddish color and smaller spores but it is practically the same."

In accordance with his well-known principles, Mr. Lloyd does not wish the above species name, here first used, to be followed by his name, and I have left it off at his specific request. We have found the plant three times in Chapel Hill, as is indicated by the collection numbers below. Our notes on No. 3930 are as follows (the figures on Plate 56 are ours):

Plant forming small, simple or more complicated pulvinate patches from 1-7 mm. broad and 1-2 mm. thick; surface, unless quite small, with folds like a brain; surface farinose with spores, not papillate, or with a few small, obscure warts, not viscid; color a dull sordid clay; texture firmly gelatinous.

Spores (of No. 3930) white, smooth, rod-elliptic, some a little bent, 4-4.8 x 7.7-11.4μ, a few up to 6.7 x 14.8μ. Basidia (of No. 4191) short-ovate, 9-10 x 11-11.8μ.

When dry the plant collapses down to a thin, scarcely visible, sordid brown membrane which is about the same color as the bark. This cannot be *E. sucina* Möller from Brazil which has similar basidia and spores (basidia 10-12μ, spores 4-5 x 10-12μ) for that is amber yellow in color (a "clear yellow," he says in another place), and is particularly characterized by numerous peculiar enlarged and elongated cells with yellow contents which run from the layer below the basidia up to but not beyond the surface. They are 66-80μ long and 6-8μ thick (Möller l.c. p. 95).

3930. On dead branch of *Robinia pseudacacia* with bark on, January 10, 1920.

4021. On *Robinia* branches on tree, January 24, 1920. Like No. 3930. In drying shrinking down to a nearly black membrane. No white nuclei. Spores white, elliptic, some curved, 3.7-5 x 7.4-11μ. Type.

4191. On decorticated oak wood, February 26, 1920. Color of plant dull reddish amber. Spores smooth, curved, 3.7-4.4 x 8-11.8μ.

NAEMATELIA

Resembling the cushion-shaped Tremellas in form, but differing in the presence of a firm, white or yellowish (said to be black in *N. atrata* Pk.) non-gelatinous central body or membrane which is surrounded by the gelatinous, translucent portion. In drying the gelatinous part shrinks to a membrane and leaves the unshrunken inner whitish part more conspicuous. The genus was established by Fries with *N. encephala* as the typical species (being the first mentioned). He also included *N. nucleata* (*T. nucleata* Schw.), a plant too different in its spores and in the presence of scattered white nuclei to be

cogeneric. It would be just as well probably to place this latter species in the genus Exidia, which differs only in the absence of white nuclei. We retain it here, however, for the present. For article on a supposed Naematelia see Trans. Brit. Myc. Soc. p. 143. 1899-1900.

KEY TO THE SPECIES

Growing on deciduous woods

Orange yellow; spores subspherical ..... *N. quercina* (1)

Dull ochraceous or smoky clay to wine color; spores elongated as in Exidia ..... *N. nucleata* (2)

Growing on pine; light flesh-color, then brownish ..... *N. encephala* (3)

1. **Naematelia quercina** n. sp.

PLATES 23 AND 58

Plant forming good sized masses of crumpled and flattened folds which are not hollow and which extend upward about 1.5-2 cm. and laterally about 2-3.5 cm., the surface not smooth but characteristically roughened all over under a lens like a cockscomb; color orange-yellow inside and out except for a thin white membrane about 0.7 mm. from the surface which follows all the convolutions and gives a marbled appearance to cut surface. Texture tough and firmly gelatinous, the surface opaque, only the internal part translucent and paler. The plant enters the bark by a flattened constricted brownish base.

Spores orange-yellow, spherical or short-oval, smooth, 7.4-11μ in diameter. Basidia spherical, divided into four cells by longitudinal walls, 15-20μ in diameter.

This is easily distinguished by the deep color, good size, firm texture, absence of hollows, and by the rough surface and white internal membrane. I have been able to find almost none of this plant in American herbaria, the only two specimens that I am sure of being the same are a plant from Ellis (Newfield, N. J.) in the Farlow Herbarium and one in the Curtis Herbarium from Society Hill, S. C. The former is labelled by Ellis *Naematelia* sp.? It has the same rough surface and white interior. The latter is labelled *T. aurantia* Schw. but is nothing like that species, which is a Dacrymyces. Its basidia are 15-19μ thick, four-parted; the spores 9-10μ thick, subspherical. *Naematelia encephala* Fr. on bark of Abies as represented in the Farlow Herbarium (Vermont, New Hampshire, etc.) has the same peculiar surface and white interior. A plant from Bresadola (New York Botanical Garden) on oak bark called by him *N. encephala* is like our *N. quercina* in surface characters and the basidia are nearly spherical, 14-17μ

thick, but the color is more of a fleshy tan (see also under *N. encephala*). This is probably what he later named *T. encephala* var. *Steidlerii* which agrees well with our plant except that he says the color of the plant is brown and the spores hyaline (Ann. Myc. 6:42. 1908). Lloyd thinks our plants are *T. mesenterica*, but I am satisfied that it cannot be that species, if indeed that is different from *T. lutescens*. The genus Naematelia may be taken as based on the species *N. encephala* and it seems to me that our plant is sufficiently like it to be placed in the same genus. *Tremella nucleata* Schw., placed in Naematelia by Fries is too different to be cogeneric with the other two, and would probably just as well be put in the genus Exidia.

3935. On oak wood in a wood pile, pushing through cracks in bark, January 18, 1920. Painting. Type.

4111. Deciduous twig by path north of Piney Prospect, February 13, 1920. Surface roughened, the white internal membrane barely showing, not hollow. Plant old and in part turned nearly white, other part watery orange.

2. **Naematelia nucleata** (Schw.) Fr.

PLATES 23, 41 AND 56

Small, pulvinate, nearly even or more often convoluted, flattish or convex or in larger plants pinched up in center; 1-6 mm. in diameter, often crowded into lines which may be up to 1-2 cm. long; gelatinous, translucent; color quite variable, a clear wine color or dull reddish-brown or faded to a pallid watery wine or dusky amber or nearly hyaline; not glaucous; the habit very like that of *Exidia glandulosa*. In the fresh state the whitish, seed-like nuclei may or may not be apparent even though they may show up on drying. Not a few plants of a good sized colony show no nuclei even when dry, and such if found alone would be referred to Exidia. The nuclei are irregularly scattered through the plant and are often so small as to be nearly invisible without a lens. They rarely reach a quarter mm. in diameter.

Spores (of No. 3959) white, curved-elliptic, 3.7-4.2 x 7.4-11μ. Basidia spherical, 10.5-11 x 11-11.5μ.

Schweinitz's description is misleading, but that this is his plant is not open to doubt. A collection from him in the Schweinitz Herbarium looks just like ours with scattered seed-like nuclei. Under the name of *Tremella abida* in the Curtis Herbarium are a variety of plants. One of these from England (Broome) is *N. nucleata*. Another from Massachusetts (Sprague) is a Dacrymyces.

3956. On corticated branch of *Salix nigra*, in Arboretum, January 17, 1920. In this collection the basidia are slightly more elongated than in other numbers, being 8.5-9.3 x 11μ, mostly divided lengthwise into four cells. Spores white, smooth, a little bent, 4-4.5 x 9.3-11μ, apparently one-celled when shed.

3957. On a quite rotten, decorticated branch of English walnut, January 17, 1920. Basidia oval, 9.3μ thick. Spores smooth, bent-elliptic, 3.4-4.2 x 7.4-11μ.

3958. On a decorticated branch of a frondose tree under a grape arbor, January 17, 1920. Plants like No. 3961 in every way except that these are smaller, the pustules being from less than 1 mm. to about 2 mm. broad. Basidia nearly spherical, divided into four cells. Spores curved-elliptic, white, 3.7-4.4 x 8-11.4μ.

3959. On vine of summer grape (*Vitis aestivalis*), January 17, 1920.

3960. On dead vine of scuppernong grape on an arbor, January 17, 1920.

3961. On a small branch of a deciduous tree on ground under grape arbor, January 17, 1920. Painting. Spores allantoid, pure white (print), 3.5-4 x 7.7-14.8μ. Basidia nearly spherical, 9 x 10μ. In the fresh state a few of the plants show small white nuclei.

4023. On bark of standing dead *Salix nigra* in Arboretum, January 24, 1920. Habit of *Exidia glandulosa*, not papillate, faintly glaucous, at times crowded in rows up to 3.5 cm. long from a common, plate-like root. Spores 4-4.4 x 9-12μ. Basidia oval, 8.5-9.5μ thick, divided lengthwise into four cells. Painting.

4046. On *Ampelopsis tricuspidata*, January 28, 1920. A great variety of color shown in this lot, some watery white, others pale lavender or amber or reddish wine, etc., the whitish nuclei showing up at least when dried as little subspherical eggs that vary in number and size.

4154. On deciduous wood, February 21, 1920. Spores smooth, white, bent, 3.8-4.2 x 7.5-11.4μ.

4169. On an oak branch with bark, February 25, 1920.

4189. On oak in Strowd's lowgrounds, February 25, 1920. A fine collection with white nuclei very conspicuous.

North Carolina. Schweinitz.
Common on fallen limbs. Curtis.

3. **Naematelia encephaliformis** (Willd.).

The following is Fries' description from Epicrisis, p. 591 (as *N. encephala*):

"Subsessile, pulvinate, plicate-rugose, pallid flesh-color, at length brownish. Nucleus large, firm, white. . . . . Frequent on pine branches in winter."

The spores are given by Brefeld as like those of *T. globulus*, which are 15-18μ thick, oval; basidia large, oval (l.c. p. 128). But Bresadola after his description of var. *Steidlerii* on oak says that the spores of the typical form on pine are globose 8 x 8-9μ and not as Brefeld gives them (Ann. Myc. 6:46. 1908).

A collection of this species from Fries on pine bark in the Curtis Herbarium is, in the dry state, about 3 mm. broad and 2 mm. high and the color of resin. Collections in the Farlow Herbarium from Vermont and New Hampshire on bark of Abies have a rough surface almost exactly like that of our *N. quercina*. This is also true of a collection in Schweinitz Herbarium on pine from Bethlehem. It is surprising to find that Bresadola has referred to this species a plant on oak bark. A specimen from him so labelled at the New York Botanical Garden is somewhat like my *N. quercina* but of a fleshy tan color. (See under *N. quercina*). Both Person and Fries use the specific name *encephala*, why, I do not know as Wildenow published it originally as *T. encephaliformis*.

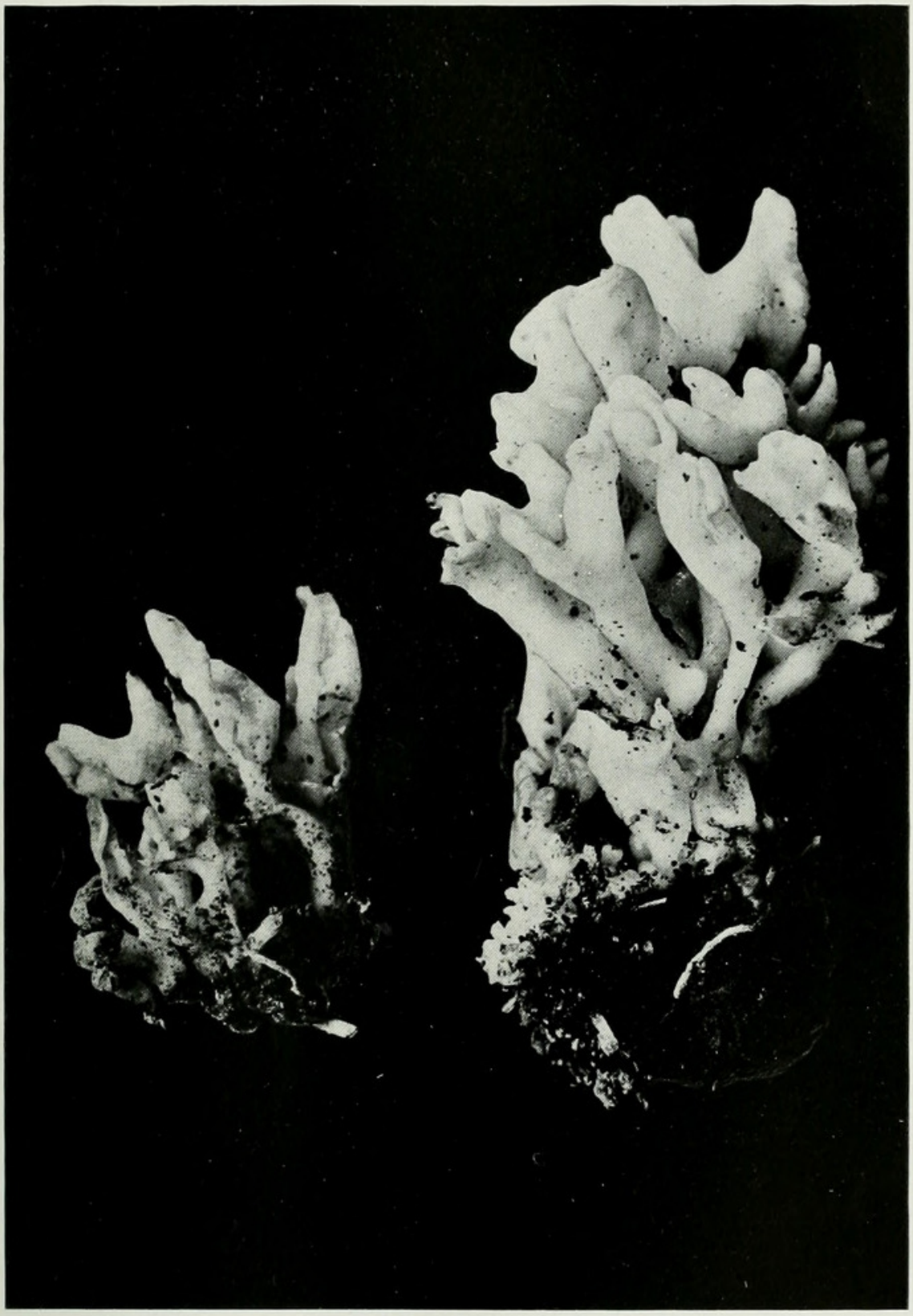
Middle and upper districts, on fallen limbs. Curtis.
North Carolina (Salem?). Schweinitz.

TREMELLA

Plants firmly gelatinous, folded, lobed or wrinkled, or in one case with thick upright branches; color white, yellow, orange, brownish, whitish or pinkish or purplish or raisin color; becoming tough and horny when dry and, in most species, shrinking greatly; basidia spherical to pyriform, longitudinally or obliquely divided into four equal or unequal cells, from each of which extends a long sterigma with a subglobose or pip-shaped, or broadly elliptic, white, yellowish, purplish or umbrinous spore on the end. The spores often sprout if put in water as soon as shed, forming a rather short promycelium or sterigma with a single round or broadly elliptic spore on the end, or they may form numerous small sporidia as buds from the surface. The species with spherical or plumply elliptic spores form a natural group and are typical Tremellas. *Tremella reticulata* with upright, hollow branches and pip-shaped spores should be placed in a separate genus. None is known to be harmful. For development of basidia see Wager in The Naturalist 695:364. 1914.

The plant growing parasitically on *Collybia driophila* and named by Peck *Tremella mycetophila*, was referred by Burt to Exobasidium

PLATE 37



TREMELLA RETICULATA. No. 2690.

(Bull. Torr. Bot. Club, 28:287. 1901), but he now considers it an abnormal excrescence of the mushroom itself (Ann. Mo. Bot. Gard. 2:656. 1915). We have found it here.

KEY TO THE SPECIES INCLUDED

Plants growing upright from the ground, with stout, hollow branches ..... *T. reticulata* (1)
Plants with thin, complicated, flattened, crowded, or open lobes; spores subspherical or jug-shaped, white.
  Color nearly pure translucent white ..... *T. fuciformis* (2)
  Color a translucent fleshy brown or raisin-clay or a deeper raisin color
    Spores subspherical, plant large
      Surface quite smooth; spores less than 8μ thick ..... *T. frondosa* (3)
      Surface roughish; spores more than 8μ thick.. *T. aspera* (4)
    Spores jug-shaped, plant small ..... *T. auricularia* (5)
Plants forming dense yellow or orange masses composed of folded and more or less flattened lobes; spores yellowish or orange.
  Growing on decidious wood..... *T. lutescens* (6)
  Growing on pine ..... *T. pinicola* (7)
Plants forming pulpy, diffused, amber-colored masses on dogwood or oak branches; spores pale, broadly elliptic ..... *T. virens* (8)
Plants forming small, irregular, convex, whitish or pinkish or creamy and usually much crowded cushions with brain-like folds; spores white..... *T. carneoalba* (9)
Plants in form like the above, but color pallid brown to wine-brown and when dry nearly black..... *T. subanomala* (10)
Plants in form something like the above, but purplish, almost black ..... *E. moriformis* (11)

1. **Tremella reticulata** (Berk.) Farlow.

? *Tremella vesicaria* Bull.
Sebacina tremellosa E. & E.

PLATES 37 AND 56

Plants 4.5-8.5 cm. high, 4-5.5 cm. broad in our collection, reaching at times a greater width, arising in a contorted and complicated way from the ground, and composed of more or less fused and anastomosing branches which end in blunt tips as in a coarse and dropsical Clavaria; color dull creamy white, not viscid, all parts hollow; semi-translucent, tough and elastic like a very firm jelly, not tremulose, almost tasteless and odorless.

Spores white, elliptic to pip-shaped, with a large mucro at one end, granular, smooth, 4.4-7 x 8-12.5μ. Basidia oval, 8.5-10.5 x 11-12.9μ.

This is the *T. fuciformis* of Atkinson's American Fungi, fig. 196, but I am following Farlow who seems to be right in determining it as *T. reticulata* (see Rhodora **10**:9. 1908). Lloyd thinks our plants are the same that pass in Europe as *T. vesicaria* (see Bulliard's Pl. 427), but that it is not the true species of Bulliard. See also a good photo by Lloyd in Myc. Notes, Old Sp. Series No. 1, fig. 224. 1908 (as *T. clavarioides*). His fig. 1562 in Myc. Notes **61**. 1919, as *T. sparassoidea*, is probably the same also. (See also Myc. Notes **62**: fig. 1646. 1920, and Mycologia **12**: 141, Pl. 10, fig. 3, 1920).

2690. Low damp woods by creek, upper Laurel Hill, July 17, 1917. Photo.

2. **Tremella fuciformis** Berk.

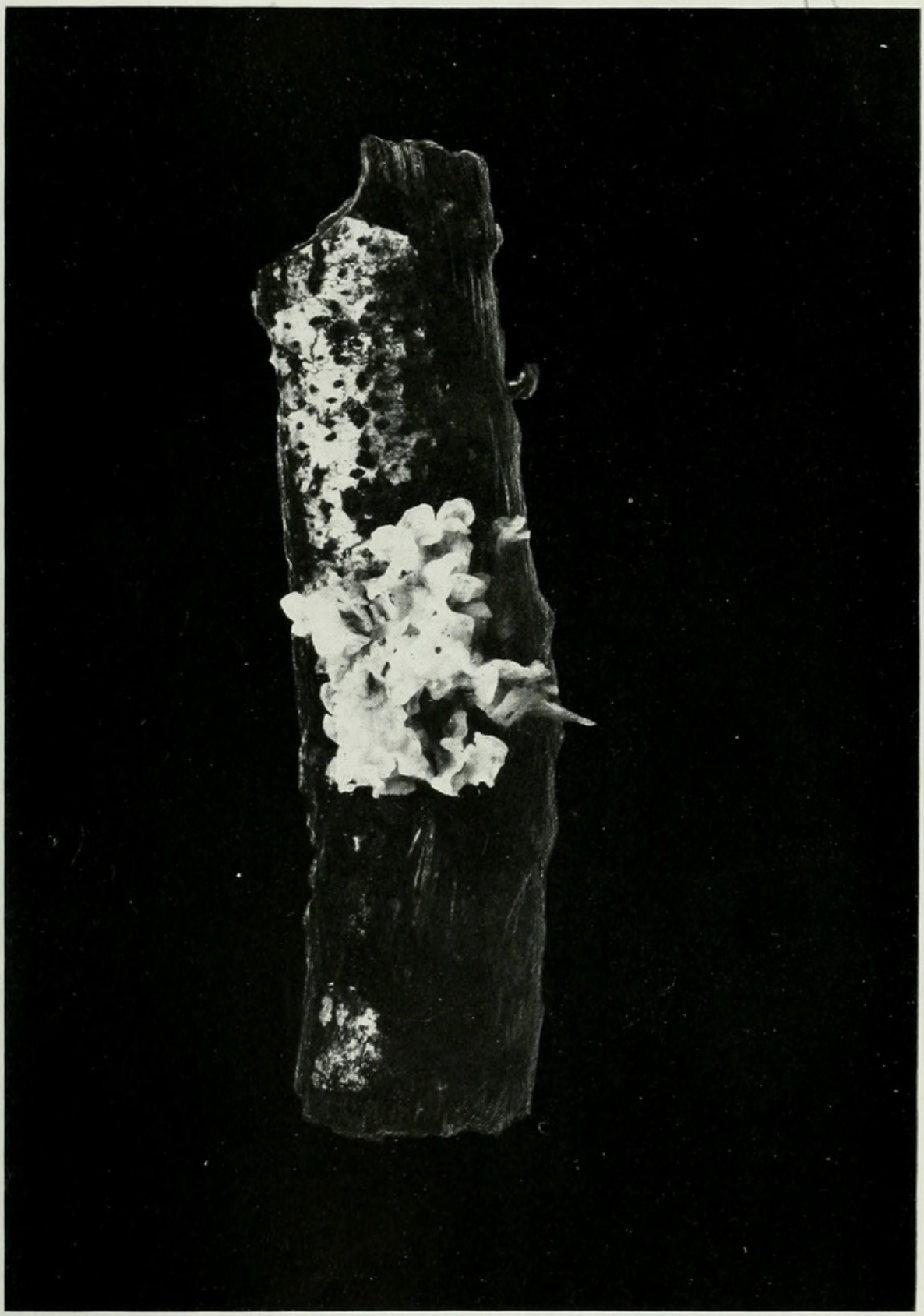
PLATES 38 AND 56

Plant forming a mass about 5 cm. long and 2 cm. high, composed of thin, flat, much crinkled and fluted lobes, texture tremulose, but quite tough; color a slightly soiled, translucent white.

Spores white, subglobose, smooth with a large oil drop, about 6.2μ in diameter. Basidia divided longitudinally into four cells, short and thick with long sterigmata.

According to Lloyd this is the true *T. fuciformis*, and is, he says, the third specimen known from the United States (but see notes under *T. lutescens*). The species was described from the Amazon and later recorded from Cuba and Jamaica and only reaches our southern states, the Orange County collections being the most northern record (see Farlow in Rhodora **10**:10. 1908). In a letter to me of September 3, 1918, Lloyd says that it has probably passed with southern "collectors as '*Tremella albida*,' our common, white northern species. But *Tremella albida* of America is an entirely different plant from *Tremella albida* of England." (See also Myc. Notes No. **55**:790, fig. 1188. 1918. Also *ibid.*, No. **40**:556. 1916). *Tremella albida* of Europe is now known by most authors as *Exidia albida* (Huds.) Bref. and differs sharply from our No. 1408 in the elongated, curved spores (4-6 x 12-14μ Karsten). The figure given by Möller of *T. fuciformis* (from Brazil) in his Protobasidiomyceten, Pl. 1, fig. 5 (1895), is like our plant in all essentials. See also the good photo by Lloyd mentioned above. The spores agree with Möller's measurements. For illustrations see Gilbert in Trans. Wis. Acad. **16**: Pl. 83, figs. 17-22. 1910. *Dacrymyces pellucidus* Schw. is probably the same thing. See page 173.

PLATE 38



TREMELLA FUCIFORMIS. No. 1408.

1408. On a fallen oak branch, Tenny's ravine, October 20, 1914. Photo.
3979. On decaying oak log, Strowd's lowgrounds, January 18, 1920.

3. **Tremella frondosa** Fr.

PLATES 39 AND 56

This is much the largest of our Tremellas, forming a mass up to 15 cm. in diameter, and up to 7-10 cm. high of flat, very thin, crumpled and contorted, petal-like lobes of a gelatinous but quite tough consistency like rubber; fused below into flattened and more or less extensive base which enters the wood. Surface quite smooth and, unless old, glaucous with the spores; color when fresh and not too old a rather light fleshy brown, in age becoming darker; drying to a raisin color if fresh, or to blackish if old. In drying there is much less shrinkage than in other species and the form is well retained.

Spores (of No. 4173) white, smooth, spherical to short oval. 5.5-7.7 x 6-10.5μ, a few 8.5μ wide. Basidia pear shaped, irregularly divided into four cells, 7.7-9.3 x 11-15μ, some up to 18μ.

Edible. Our nearest relative of this is *T. aspera* which may approximate it in size and color. For easily distinctive marks see under that species. Bulliard's Pl. 499, fig. 6T is good of the plant, so also is Lloyd's fig. 1195 in Myc. Notes **55**. 1918. Brefeld gives the spores of this species as spherical with a mucro, 10-12μ (l.c. p. 122). Under the name *T. foliacea* in the Curtis Herbarium are most of the large leafy Tremellas, some of which are certainly *T. frondosa*. The difference between these two species, if any, does not seem to be well established. See Gilbert's illustrations in Trans. Wis. Acad. **16**: Pl. 82, figs. 13, 14. 1910.

536. On a small oak log east of school house, October 9, 1912.
1006. On oak stump in Dr. Pratt's yard, October 4, 1908.
1372. Battle's Park, southeast of Dr. Battle's, October 17, 1914.
2456. On an oak log, swamp of Bowlin's creek, October 1, 1916.
4173. On oak wood, February 23, 1920.

4. **Tremella aspera** n. sp.

PLATES 40 AND 56

A good-sized plant, in our one collection about 3-5 cm. long, 2-3 cm. broad and 3-4 cm. thick, formed of flattened, much crumpled and contorted lobes which arise from more or less extensive and separated points of attachment; surface not smooth, but finely granular under a

lens; color of raisins, but much darker in age; gelatinous and rather tender.

Spores pure white, spherical with a distinctive mucro, 8.6-11.8μ. Basidia subpyriform, large, divided quite irregularly into four cells, 15.5-18.5 x 20.2-25.9μ.

There seems to be no agreement among European botanists as to what *T. foliacea* Pers. is (if indeed different from *T. frondosa*), and furthermore our plant does not agree with any of them. Bresadola's idea of *T. foliacea* is that it grows on Larix and Abies 4-8 cm. high and broad, from hyaline-saccharine to fleshy-isabelline tinted with umber-violet. Spores hyaline, globose, 7-10 x 7-9μ, basidia subglobose to ovate, 16-18 x 14-16μ. Subhymenial hyphae 2-2.5μ thick (Fung. Trident. p. 97, Pl. 209, fig. 1). This conception is evidently quite different from that of Brefeld (l.c. p. 98) who places *T. foliacea* in the genus *Ulocolla* and doubts its distinction from *U. saccharina* (previously *Exidia saccharina*) which, he says, has identical basidia, spores and sporidia, as well as color, and grows also on coniferae.

This species differs from *T. frondosa* in rougher surface that is not glaucous, larger spores and much larger basidia, more complicated, crumpling, thicker, less simple and less perfect lobes, more tender structure, and darker color. In drying *T. frondosa* shrinks very much less than *T. aspera* and does not become so black.

3950. On decaying oak stump back of Power Plant, January 17, 1920. Photo. Type.

5. **Tremella auricularia** Möller

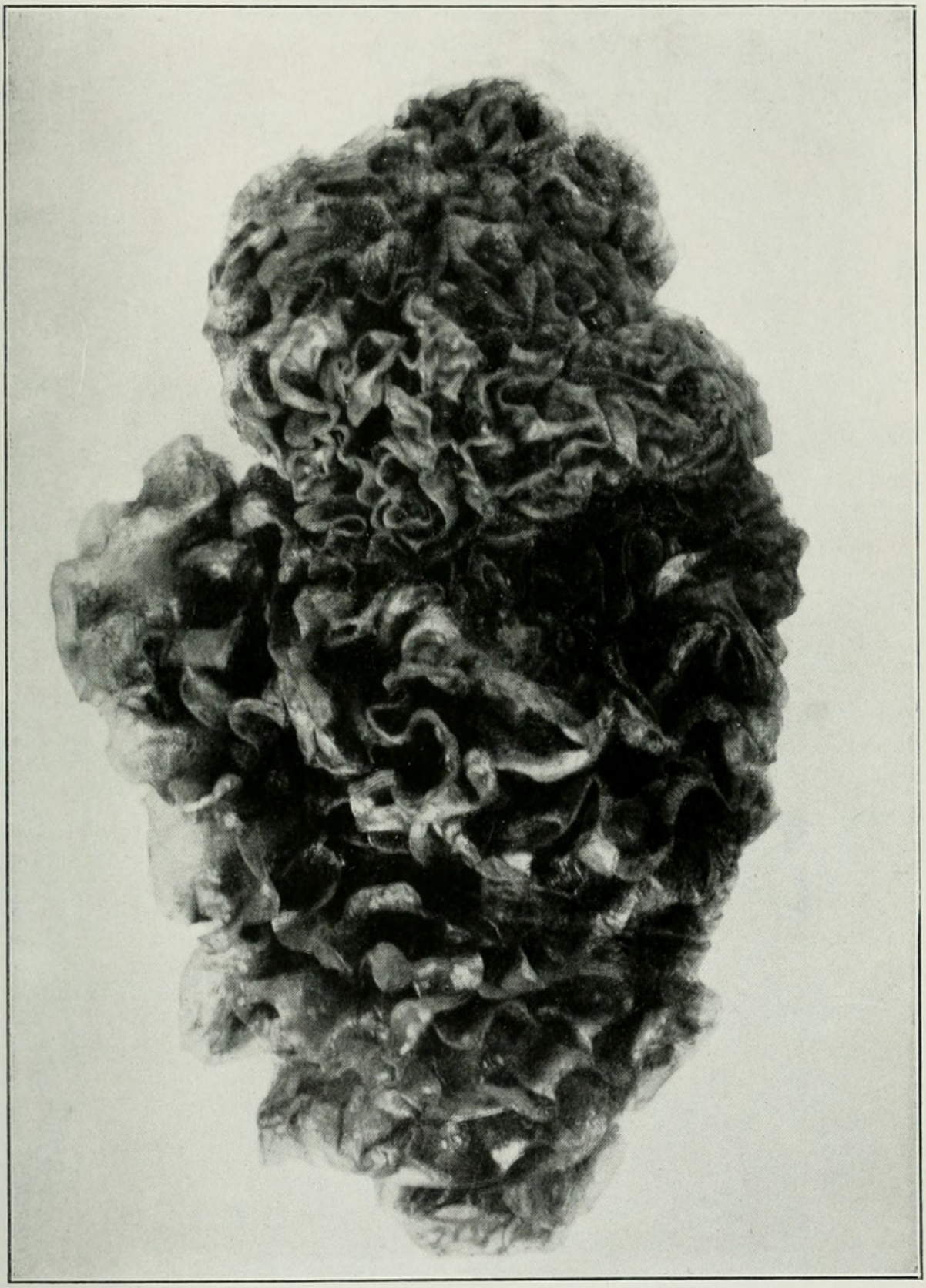
PLATE 62

Forming a flat, somewhat crumpled, folded, erect and branched plate about 1.5 cm. long and 7 mm. high and less than 1 mm. thick; color a dull reddish clay, almost intermediate between raisin color and clay color; surface smooth. Texture softly gelatinous and tender.

Spores white, elliptic or in one view approaching jug-shaped, 5.2-9.7 x 9.3-15μ, a few oval. In sprouting the spores form a good number of very small spherical sporidia about 3-5μ thick, which absorb all the contents and form a group in place of the collapsed and almost invisible spore. Basidia four-celled, 12.5-15μ thick.

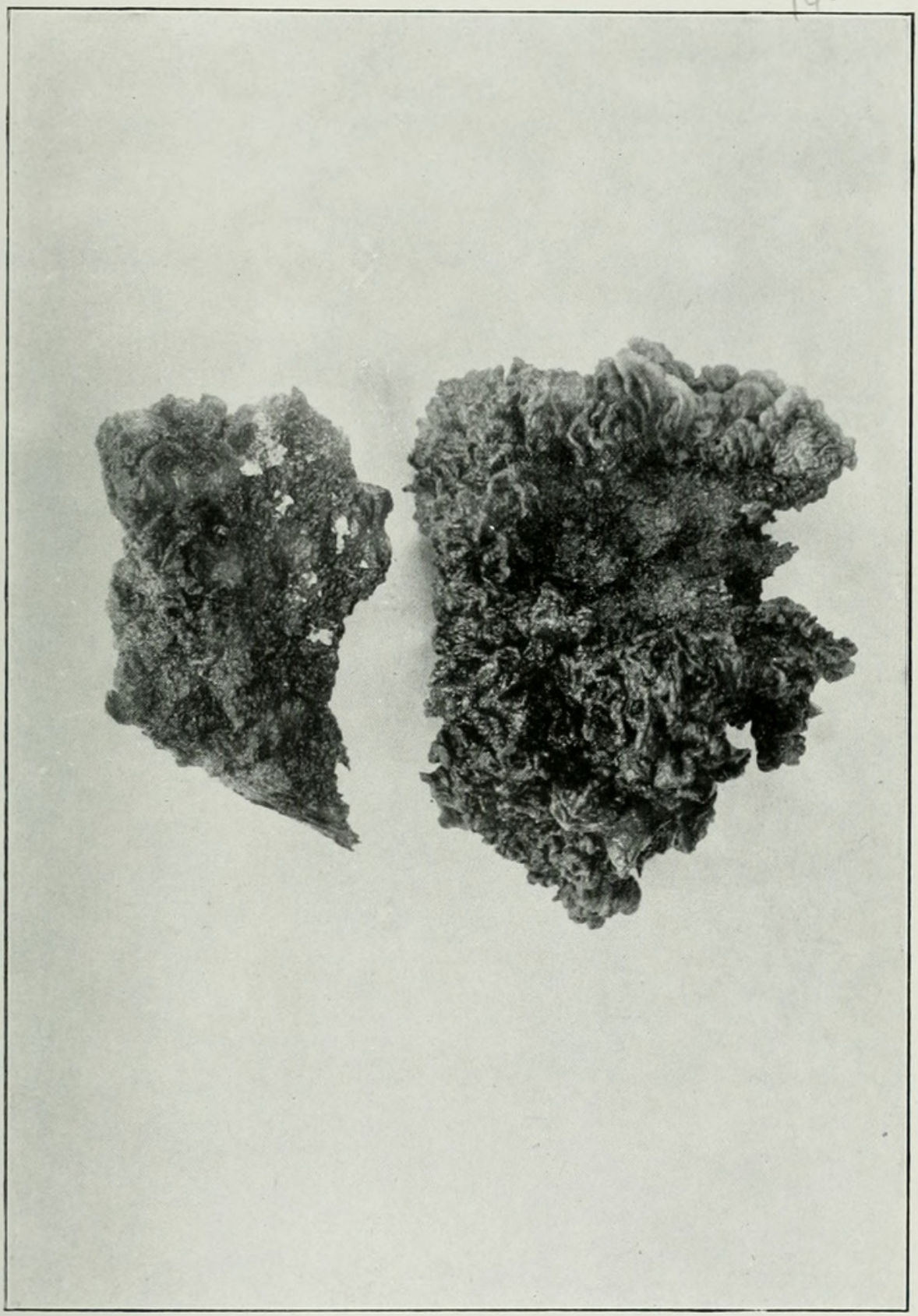
This is easily different from our other species in the white, jug-shaped spores, small size, delicate texture and dull color. That it is Möller's species seems certain. His description and figures agree,

PLATE 39



TREMELLA FRONDOSA. No. 536.

PLATE 40



TREMELLA ASPERA. No. 3950.

the spores having just the right shape and sprouting in the same quite peculiar way. The spores are said to be pear-shaped, 10-12μ thick; basidia 15μ thick (see Möller: Protobasidiomyceten, p. 170, Pl. 4, fig. 16. 1895).

4159. On privet (*L. sinense*), February 21, 1920. Drawings.

6. **Tremella lutescens** Pers.

PLATES 23, 41 AND 57

Plant forming an elevated, lobed mass with a surface of crumpled folds resembling somewhat a duodenum, many of the larger folds hollow, emerging from a small attachment and often bursting through the bark; surface not rough; breadth about 1-2.5 cm., height about 3-17 mm., surface dull, glaucous from the spores, color pale orange to clear orange, drying usually a rather darker orange and retaining much of its form. Texture firmly gelatinous, much less soft than *Exidia gelatinosa*.

Spores (of No. 3895) smooth, spherical to short-elliptic, 6.3-9 x 7-13μ, varying in size with the cells from which they spring. Basidia pear-shaped, divided into cells by longitudinal or slanting or quite irregular walls, the cells often quite unequal in size.

Easily recognized by its bright color, folded and hollow structure, medium size, glabrous surface, absence of a white membrane within and growth on deciduous wood. This seems very like *T. compacta* Möller from Brazil in form, size, color and hollow lobes, but that is said to have basidia 12-14μ thick and spores 6-7μ thick (Möller l.c. p. 107). See also Lloyd in Myc. Notes 58:825. 1919. In the Curtis Herbarium plants labelled *T. lutescens* are mostly T. *fuciformis*. Such are plants from Hillsboro, N. C., Santee Canal, S. C., and Alabama. One so labelled from the Schweinitz Herbarium (Bethlehem) is a Dacrymyces with large eight-celled spores, 7-7.8 x 20-23μ. It looks like Curtis' Society Hill Dacrymyces which he calls *T. aurantia*, but which is not that species.

This I have decided to call *T. lutescens* rather than *T. mesenterica* although I am far from convinced that these two species are properly understood either in Europe or America, if indeed they are distinct. There are no serious discrepancies between our plant and *T. lutescens* as understood by Brefeld. His plant, contrary to the usual statement, is orange when young, paler in age. The plant is usually re-

ferred to as paler than *T. mesenterica,* whitish in youth. Brefeld states the spores as being round with a point, colorless, 12-15μ thick. He received one plant from a correspondent that he took to be *T. mesenterica.* This was distinguished from *T. lutescens* by more irregular, distally enlarged, more or less nodulated sterigmata. Spores about the same as in *T. lutescens* (10-12μ thick) but sprouting with much fewer projections than in the latter. (See also Tulasne in Ann. Sc. Nat. 1853, Pls. 10 and 11).

This is almost certainly *T. mesenterica* as understood by Schweinitz. A specimen from him in the Curtis Herbarium is like my plants, basidia oval, 12-4-15 x 17-18μ, surface of the plant smooth. Curtis' own specimens labelled *T. mesenterica* (Society Hill, S. C., No. 1407, on deciduous bark) are a Dacrymyces with eight-celled spores about 15.5-21.7μ long.

3895. On dead stem of Ligustrum, Rosemary Street, December 14, 1919.

3916. On a decaying oak limb, bursting through the bark, Battle's Park, December 21, 1919. Basidiospores pale yellow to orange yellow, ovate or subspherical, 7.4-9 x 8-11μ. Basidia oval, 13.7-15.5 x 18-20μ, divided into four cells by longitudinal or slanting walls. Conidiospores orange yellow, oval, 2.8-3.7 x 3.4-5μ.

4032. Decaying maple wood on Strowd's hill, January 25, 1920.

4069. On a fallen branch of Spanish oak, February 4, 1920. Spores short-elliptic, 7.4-10 x 9.3-14.8μ. Basidia oval, 14.8-16.6x16-20μ.

4108. On oak bark by Battle's branch, February 13, 1920. Hollow in part, deep orange when young.

4204. On dead oak in Tenny's ravine, March 13, 1920. Lobes hollow. Spores short-oval, 7-8.5 x 9.3-12.5μ. Many secondary ones of various sizes. Basidia oval, young ones pear-shaped, irregularly divided, 11.2-15.5 x 14-20μ.

7. **Tremella pinicola** Britz.

PLATES 41 AND 58

Orange-yellow, composed of a few thin, flat, crumpled lobes or more folded and less plate-like, not hollow, making a clump 2.5 x 1.2 cm., and 7-10 mm. high, which is pinched at the base and attached by a line; not rooted; lobes when distinct about 1 mm. thick, surface nearly or quite glabrous. Texture firmly gelatinous; flesh translucent about color of surface.

Sporidia oval or elliptic, orange-yellow, 1-2.5 x 3-5μ. Basidia subspherical to oval, 16.5-18.5 x 20-23μ, irregularly divided into four cells. Basidiospores subspherical, 10-11 x 11-12.2μ.

PLATE 41

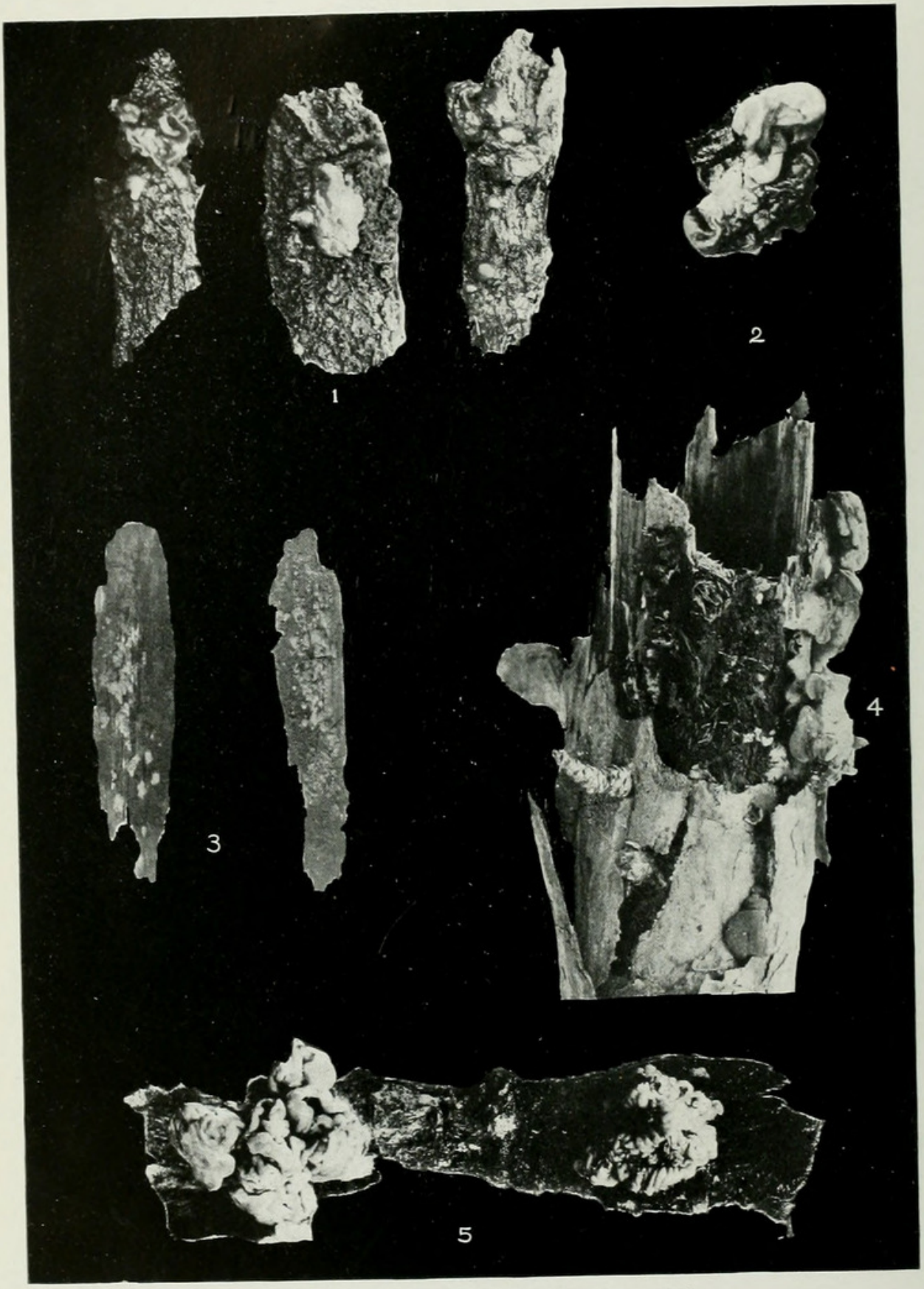


FIG. 1. NAEMATELIA NUCLEATA. No. 4046.
FIG. 2. TREMELLA PINICOLA. No. 4050.
FIG. 3. PLATYGLOEA LAGERSTROEMIA. No. 4062.
FIG. 4. DACRYMYCES PEDUNCULATUS. No. 4185.
FIG. 5. TREMELLA LUTESCENS. No. 3895.

We refer this to *T. pinicola* Britz. because it is about the same color and size, grows on pine and has similar spores. There is nothing else at all like these on pine and it seems best to interpret it in this way at present rather than to make a new species. Only microscopic comparison with the type, if any exists, can make the determination sure. Britzelmayr's description of his species is as follows (translation): "Gelatinous, externally orange, inside clearer, sessile or with a short stalk, surface with small undulations and pits, in other respects, including the spores, similar to *T. mesenterica;* on the bark of pine, fir and larch throughout the year." (Bot. Centralb. **54**:104. 1893). I have not seen his fig. 19 in his Tremellini fascicle as it is missing in the copy at the New York Botanical Garden. *Tremella pinicola* Pk. was published earlier and would take precedence, but it is not a Tremella. (See note on p. 150).

This cannot be *T. rufolutea* from Cuba. In the Curtis Herbarium is a specimen labelled *T. rufolutea* from Cuba (Wright, No. 217). It is a resin-colored mass of considerable size, apparently solid and amorphous. It is certainly not a Tremella. (See note by Lloyd under *T. compacta* in Myc. Notes **58**:825. 1919.) No basidia could be obtained from it. Massee's notes on *T. rufolutea* seem to refer to an entirely different plant (Jour. Myc. **6**:183. 1890). It resembles most *Naematelia quercina* (No. 3935) in form and color, basidia and spores, but differs in absence of the internal white membranes and different surface. *Tremella lutescens* (No. 3895) is also very similar in form and color, but differs in the smaller spores, smaller and more elongated basidia and hollow sacs. Both differ also in growing on deciduous wood. The lobes of the present species (No. 4050) are more like folded plates (as in *T. frondosa* but to a less degree) than in the other two. *Tremella spectabilis* Möller from Brazil is of somewhat similar form and color, but has basidia 13-15μ thick and spores 5-6 x 10μ, and probably grows on deciduous wood (kind not stated) (Möller, l.c. p. 122).

Hartsville, S. C. On bark of *Pinus taeda*, December 25, 1919, (No. 4050). Coker.

8. **Tremella virens** Schw.

PLATES 23 AND 57

Forming pulpy, much convoluted, irregular, flattened, compound masses which may extend along the branch-like *Exidia glandulosa* for

a distance of 15 cm.; individual plates are centrally attached and spread out flat on the bark, about 5-10 mm. broad and 1.5-2 mm. thick except where crumpled by pressure, then at times up to 6 cm. high, with much the habit of larger masses of Naematelia; at first firmly gelatinous then softer on exposure; color amber to pale amber, with a faint olive tint, later with brownish red tints in parts; not rooting; surface glabrous, not glaucous.

Spores (of No. 4070) elliptic, smooth, light greenish-yellow under microscope, 6-7.4 x 9.3-12.9μ. Basidia oval, 12.5-14 x 15-16μ, four-parted.

That this is *T. virens* seems certain. It is different from anything else we have, grows on dogwood and, in large groups, always shows a distinctly greenish tint. It is not confined to dogwood, but is also found on oak. *Tremella virescens* Schumacher (Enum. Plant. Sæll. 2:439. 1803) does not seem very different as understood by Brefeld. He was confused on the name of the last and treats it as "*T. virescens* n. sp. formerly *Naematelia virescens* Schm." (Brefeld l.c. p. 128, Pl. 8, figs. 25-28). *Naematelia virescens* (Schm.) Corda is supposed to be the same, but Corda speaks of the inside veined with white and figures the center pale (Icon. Fung. 3:35, Pl. 6, fig. 90. 1839). The spores of *T. virescens* are given by Lindau as ovate, 12-15μ long; basidia olive green, 15-20μ thick (Krypt. Fl. Mark Brand. 5*a*:920. 1914).

4070. On rotting dogwood branch with bark on, February 4, 1920. Photo.

4153. On dead dogwood limb, February 22, 1920. Basidia oval, about 13-14μ thick.

4161. On decaying oak limb, February 22, 1920. Spores elliptic, smooth, pale greenish-yellow under microscope, 5.5-7.4 x 9-13μ.

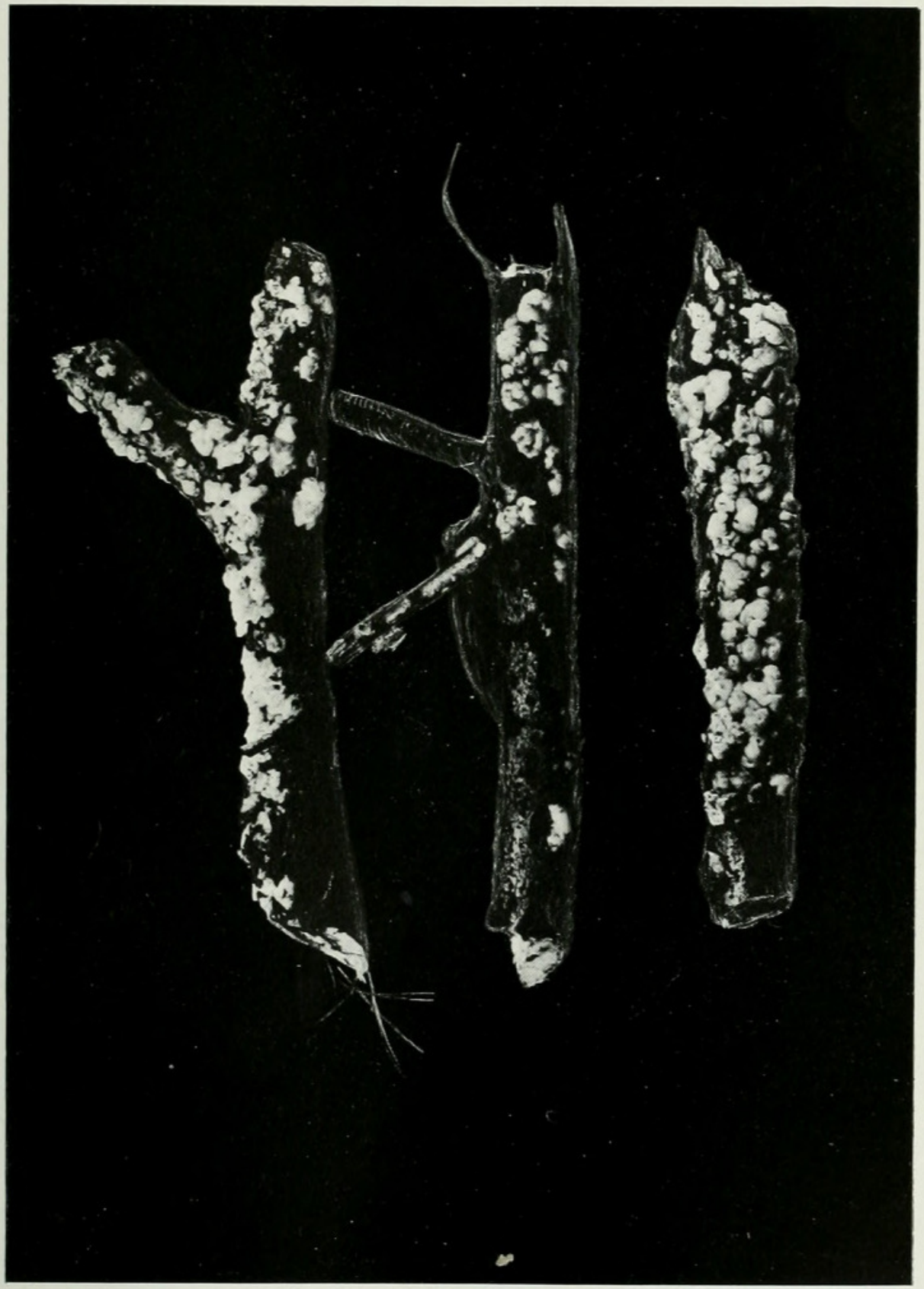
4172. On dead oak limbs, February 23, 1920. Plants pale greenish amber, extending 2.5 x 15 cm. Spores subspherical to elliptic, smooth, 5.5-7.4 x 7.5-12μ, pale greenish amber under microscope.

9. **Tremella carneoalba** n. sp.

PLATES 23, 42 AND 59

Plant forming small, convoluted, flattened pustules which touch and crowd each other over considerable areas or in part may be only gregarious. Individual pustules about 1-8 mm. broad and up to 4 mm. high, wet but not viscid; color pallid white to creamy yellow and often with a distinct flesh tint so as to be more flesh color than yellow; texture firmly gelatinous.

PLATE 42



TREMELLA CARNEOALBA. No. 3877.

Spores white, spherical, variable in size, 6.3-10.2μ in diameter, smooth, sprouting soon in water to a short promycelium with an apical spore of the same shape and a little smaller. Basidia spherical to very short-oval, 14-16μ in diameter, four-celled by longitudinal walls, which are median or eccentric and often oblique, the cells often of different sizes and producing spores in proportion. Sterigmata long to very long, irregular, pointed, collapsing as well as the basidial cells as soon as the basidiospore is formed.

Distinguished by the small size, pale color and pulvinate form. The plant dries down to very inconspicuous amber-colored crusts with a thin, superficial dusting of white fibers. It revives to the original form on wetting again.

This cannot be *T. viscosa*, for that has elongated, sausage-shaped spores according to Berkeley (Ann. & Mag. Nat. Hist. 13:Pl. 15, fig. 4) and Patouillard (Tab. Analyt. No. 475). Britzelmayr gives the spores of *T. viscosa* as 5-6 x 10-12μ, but Schroeter gives them as subglobose, 11-13 x 15-17μ (see Saccardo). This looks like a confusion of species. The illustration in Flora Danica showing habit (Pl. 1851, as *Thelephora viscosa*) is very much like our plant. *Tremella candida* var. *effusa* Alb. and Schw. can hardly be this, as it is said to be ½ inch thick. If it were not for its growth on wood this could hardly be distinguished from *Sebacina caesia* Tul. as illustrated by Patouillard (Tab. Analyt. No. 681). That is said to grow on the ground. The habit sketches are almost exactly like our plant and the subspherical spores (8 x 10-12μ) sprout to a single spore of similar shape. *Exidia albida*, as illustrated in Massee's British Fungi and Lichens, Pl. 30, fig. 1, is an exact representation of our plant, even the pinkish tint being shown, but all the published spore measurements of that species agree in giving them an elongated, sausage-shape (see also notes under *T. fuciformis*).

Exidia guttata Bref. is also very similar in form and color, but is a true Exidia with the curved spores 4 x 10μ. *Tremella globulus* Bref. is small, brownish and pulvinate, but could not be this as the spores are 15-18μ in diameter. The hymenium is brownish, the inner part colorless (?) ("Weiss") (Bref. l.c. p. 126).

3877. On fallen branch of Carpinus in Arboretum, December 12, 1919. Photo. Type.

4020. On twigs of privet on the bush in President's yard, January 24, 1920. Typical *Exidia glandulosa* was abundant on the same twig and crowded the Tremella in places.

4022. On Robinia twigs on tree, January 24, 1920. Color watery milk with a faint pink tint. Spores 7-9.7μ in diameter, spherical (spore print on slide), many budding and sending out promycelia to form a spore of the same shape on the end just as in No. 3877.

10. **Tremella subanomala** n. sp.

PLATE 58

Pulvinate, convoluted, forming an apparently compound tuft 4 x 6 mm. and about 1.5 mm. thick; color pallid brown to wine-brown; the surface appearing minutely granular under a lens; texture very firmly gelatinous, harder than any other species; bursting through the bark.

Spores subspherical, remarkable in being compressed a little at right angles to the mucro, 7.4-10μ in diameter, a few up to 11μ. Basidia subspherical, a few oval or pyriform, not collapsing when emptied, four-celled by longitudinal divisions, 13-17μ thick.

This is like a plant on alder labelled *T. bulgaroides* E. & E. from Canada (Macoun) at the New York Botanical Garden, but I cannot find that this name was ever published. It is nearest *Tremella carneo-alba* which differs in pinkish-white color, more gregarious growth, and basidia that collapse after forming spores. It is not unlike *T. anomala* Möller (l.c. p. 120) in size, form, and color (up to 0.5 x 1.5 cm.; color smoky-yellow), but that has basidia 10μ thick and spores 6μ thick.

4005. Dead Alnus twigs by Battle's branch, growing with Cyphella, January 22, 1920. Type.

11. **Tremella moriformis** Smith.

T. colorata Pk.

This has so far not been reported from North Carolina (except by Curtis as *D. moriformis*, probably from the S. C. collection by Ravenel), but it almost certainly occurs in the state and should be looked for. I have prepared the following description from the good type specimens of *T. colorata* Pk., from a collection of *T. moriformis* from Bresadola (on Robinia from the Trentino) and from a collection from South Carolina in the Curtis Herbarium (Ravenel). See Sowerby's English Botany 36:2446. 1812.

Plant forming irregular, more or less anastomosing, pulvinate patches extending more or less densely for several cms. on the wood,

individual patches tending to take an elliptic form like half of a football. Surface granular and irregular, not typically convoluted; the outer layer nearly black, quite tough and forming a kind of crust; the inner tissue more gelatinous and a lighter purple under the microscope; hyphal threads with numerous clamp connections, each thread distinctly purplish. Basidia near the surface, subspherical to oval, 12-14.5μ thick, colorless when young, purple when mature, divided often irregularly into four cells. Spores said by Peck to be color of hymenium when mature, globose, 12.7-17.7μ in diameter. His figures are evidently wrong, and he probably took the younger basidia for spores. We have not been able to be sure of the spores in any of the herbarium specimens examined. Spore-like material present was badly mixed and much collapsed.

If a true Tremella, this species is evidently an aberrant one. It is easily recognized by the blackish-purple color, practically black in herbarium specimens except under the microscope.

We include the following notes for the convenience of students:

Tremella tremelloides (Berk.) Mass. (*Sparassis tremelloides* Berk.). The following is adapted from Massee (Jour. Myc. 5:184, Pl.14, fig. 1. 1889). Tremelloid, lobes fasciculate, elongated, suberect, almost free to the base or variously united, compressed, springing from a small contracted base, surface scabrid, dull orange; spores elliptic-oblong with a minute oblique apiculus at the base, 11-12 x 5μ. On wood, Lower Carolina (Type in Herb. Berk., Kew). Forming large tremelloid tufts, always springing from a very small basal portion which penetrates the matrix; lobes suberect, 3-4 inches high in well grown specimens, sometimes smaller, in some specimens variously plicate and almost free to the base; in others the lobes are united laterally and form a gyrose tuft, always much compressed. The distinctly scabrid surface is very characteristic, and is due to thickly scattered papillae, which give a very harsh feel to dry specimens. Basidia large, sterigmata developed in succession. From Massee's figure of the spores this is probably an Exidia.

Tremella gigantea B. & Cooke, is, according to Massee, a gelatinous lichen (Jour. *Myc.* 6: 182. 1890).

Tremella rufolutea B. & C. See my note under *T. pinicola*, also see Massee (Jour. Myc. 6: 183. 1890).

Tremella enata B. & C. is represented in the Curtis Herbarium by No. 2456 on oak from Society Hill, S. C., a number mentioned in the original description. On examining it I found nothing to indicate that it is either a Tremella or a Dacrymyces. It is apparently not related to either. Massee, however, has studied the other number mentioned in the original description, No. 4307, at

Kew, and thinks it a Dacrymyces. We adapt the following from his description: (Jour. Myc. 6:182, Pl.7, figs. 14-17. 1890): Erumpent; dark amber, appressed, surface slightly rugulose, or almost smooth, bounded by the ruptured bark, up to 1 centimeter diameter; basidia cylindrical, bifurcate at the apex, 45-50 x 5μ; spores elliptic-oblong, colorless, with an oblique apiculus at the base, slightly curved, 10-11 x 3.5μ. Superficially resembling a small discolored form of *Tremella albida*, but a true Dacrymyces. From 3 millimetres to 1 centimetre across. On *Alnus serrulata* and oak, Lower Carolina.

Tremella myricae Berk. & Cooke. The following is adapted from Massee (Jour. Myc. 6: 182. 1890): Foliaceo-gyrose, gelatinoso-elastic, semi-pellucid, smoky gray, when dry blackish with a tinge of purple here and there, surface with minute, scattered points; spores broadly elliptic, with an oblique apiculus, 8-9 x 6-7μ, colorless. Forming thin, foliaceous expansions when dry, 1-4 centimeters across. The minutely scabrid surface when dry is characteristic. On bark of Myrica and Persea, Gainesville, Fla. (Rav.).

Tremella dependens B. & C. The following is from Massee (Jour. Myc. 6: 183. 1890): Pendulous, elongato-clavate, attached by a slender stem-like base, mucilaginous, pale dingy yellow, the central portion consisting of exceedingly thin hyphae immersed in mucilage; towards the even surface the hyphae become thicker and form a compact layer which produces basidia at every part of the surface; basidia spherical with four elongated sterigmata; spores elliptic-oblong, smooth, colorless, 7 x 3-3.5μ. Hanging down from underside of rotten poplar (Liriodendron) logs after rain, Alabama. Peters.

Tremella stippitata Pk. (Rep. 27; 100. 1875) is a Coryne. He also reports *T. enata* B. & C. (l. c. p. 100).

Phaeotremella pseudofoliacea Rea. (Trans. Brit. Myc. Soc. 3:377. 1912). This genus is based apparently only on the umbrinous spores (which are obovate, 12 x 9-12μ). The plant looks much like our *Naematelia quercina* in external form, and the spores are about the same.

Exidia scutellaeforme B. & C. In the Curtis Herbarium is a specimen of this from Alabama (Peters No. 1093: Curtis No. 6343. Type?) The dried plants are black and look like *E. glandulosa*. In Dr. Farlow's writing is the note: "Basidia are vertically 4-parted."

Exidia pinicola (Pk) (Rep. 39, p. 44. 1886 as Tremella). Peck's description is: "Pulvinate, gyrose-plicate, somewhat lobed and lacunose, raisin-colored when moist, blackish when dry, filaments slender, branched; spores oblong, curved, colorless, .0005 in. long, .0002 broad. Dead branches of pine, July."

We have examined the type and find the color as described; basidia oval or pear-shaped, 4-parted, 9.3-10.3μ thick; spores curved-elliptic, smooth, 3.7-4 x 9.5-11.1μ. This evidently throws the plant into the genus Exidia, and it seems nearest *E. gelatinosa*. The surface appearance is that of a crowded colony of very small individuals of *E. gelatinosa*, and is not at all cerebriform. It may be easily recognized by the raisin-color, small flat plates around sunken chambers and growth on pine. The texture is toughly gelatinous. It may well be that this is the same as *E.umbrinella* Bres. which grows on conifers, is said to be near *E. recisa*, and has spores 3-4 x 11-14μ, basidia 8-9 x 10-12μ (Fung. Trident. 2:98, Pl. 209, fig. 2. 1900).

The following are translations of Schweinitz's original descriptions of species of Exidia and Tremella with notes added by us:

Exidia lurida Schw. (No. 1100. Syn. Fung. Amer. Bor p: 185: 1832) "Effused gyrose-plicate, pale, circular; rather thick. Shrunken on drying. Dotted over with a few papillae. It occurs here and there on branches of *Celastrus*, Bethlehem." A plant in the Schweinitz Herbarium has the general aspect of *E. gelatinosa* but seems different in the absence of scurfy particles. A preparation showed basidia of the Exidia type.

Exidia spiculata Schw. (No. 1101. Syn. Fung. Amer. Bor. p. 185:) "Adpressed, effused, thick-lobed, rough, wrinkled, olivaceous-green, very slightly shrunken on drying, but black in color. Papillae frequent on the upper side; margin divided into small obtuse lobes. Rather rare on the cut surface of trunks of *Platanus*, Bethlehem." On examination the type showed no papillae when wet; dark, effused, crumpled, extensive. Not shrunken to a membrane. A slide revealed no facts of value.

Exidia applanata Schw. (No. 1102. Syn. Fung. Amer. Bor. p. 185.) "Applanate-expanded, closely adpressed, margin at length subfree, oblong in shape, moderately thick, 2-3 lines long; drying black and somewhat pulverulent-scurfy; marked on the surface with a few wrinkles or veins. Papillae scattered. On the inner bark of *Rhus glabra*, Bethlehem." This may be *E. glandulosa* but a slide from the type showed no characters of value.

Tremella crenata Schw. (No. 1141. Syn. Fung. Car. Sup. p. 89: 1822). "Rather large, thick, wavy-applanate, ribbed, fuscous brown; margin beautifully crenate. Occasional on branches." This is *E. gelatinosa.*

Tremella crassiloba Schw. (No. 1112. Syn. Fung. Amer. Bor. p. 185.) "Erumpent, firm, with thick, fleshy-tremellose, rounded white lobes forming a globose mass. In the wet state, surface apparently squamulose; when dry, black and pulverulent. Bursting forth from fallen branches, Bethlehem." A specimen in the Schweinitz Herbarium shows low, black, pulvinate, somewhat uneven warts about 1-1.5 mm. broad, coming through small holes in the bark of deciduous branches; when wet becoming murky clay-color and gelatinous, about consistency of *Exidia glandulosa* but does not seem to be that or *E. recisa.* There are no papillae and the surface is not obviously granulose. Basidia subspherical, 4-celled, 11-13μ in diameter.

Tremella corrugata Schw. (No. 1113. Syn. Fung. Amer. Bor. p. 185.) "Cespitose, corrugated, with rather thin, flabby lobes, margin elevated, veiny; blackish-purple in color. Sub-squamulose in the dry state. An inch in diameter. Rare on wood and branches, Bethlehem." This is *Exidia gelatinosa.*

Tremella palmata Schw. (No. 1117. Syn. Fung. Amer. Bor. p. 186.) "Rooted, penetrating the wood with a tomentose root. Stem compressed; palmately expanded, horny when dry, of elegant golden color, sub-diaphanous, apex capitulate, gyrose-plicate, compressed and dilated; the head confluent with the stem. In form and habit related to *Cantharellus spathularia*, n. 292, on dead wood, Bethlehem." This looks much like *Ditiola radicata* from the specimen in the Schweinitz Herbarium, but I could get very little from a preparation made from it.

TREMELLODON

Plants gelatinous, translucent, whitish to light or dark-brown, more or less stalked, the top expanded and bent over, with short teeth on the underside. Basidia longitudinally divided into four parts with four sterigmata. Spores smooth, white, spherical. We have but one species which when large would be taken at first sight for a Hydnum except for the gelatinous texture.

Tremellodon gelatinosum (Scop.) Pers.

PLATES 43 AND 59

Plants upright, petaloid and bent over at top to form a one-sided cap under which the small spines hang down; height from 2-7 cm., breadth at top up to 7 cm., at base about 1.5-2.5 cm.; color of cap surface usually from light to dark brown, in drying becoming darker and blackish in places; rarely the whole plant may be a pure soaked white, in age the upper part becoming a light pinkish buff; in darker plants the brown may be slightly tinted with blue or violet; surface, except spines, covered with minute papillae with some wrinkles on the posterior side near the base. Flesh gelatinous, watery and translucent, but firm and tough.

Spines gelatinous, white, confined to the underside of the cap, up to 2.5 mm. long, the spores being borne only on their proximal half or two-thirds. No spores are borne except on the spines.

Basidia short, pear-shaped, 10.3μ in diameter with four stout sterigmata. Spores white, spherical, about 6.5μ in diameter.

This is a remarkable and interesting plant, having the spines of a Hydnum and the texture and basidia of a Tremella. It is found on decaying pine and is rare. It is said by McIlvaine to be edible and delicious when slowly stewed. For illustrations in color, see Schaeffer, Pl. 144; Krombholz, Pl. 50, figs. 18-22; Richon & Roze, Pl. 65, figs. 12-17; Gillet, Pl. 661 (124). See note in Mycologia 12: 142. 1920.

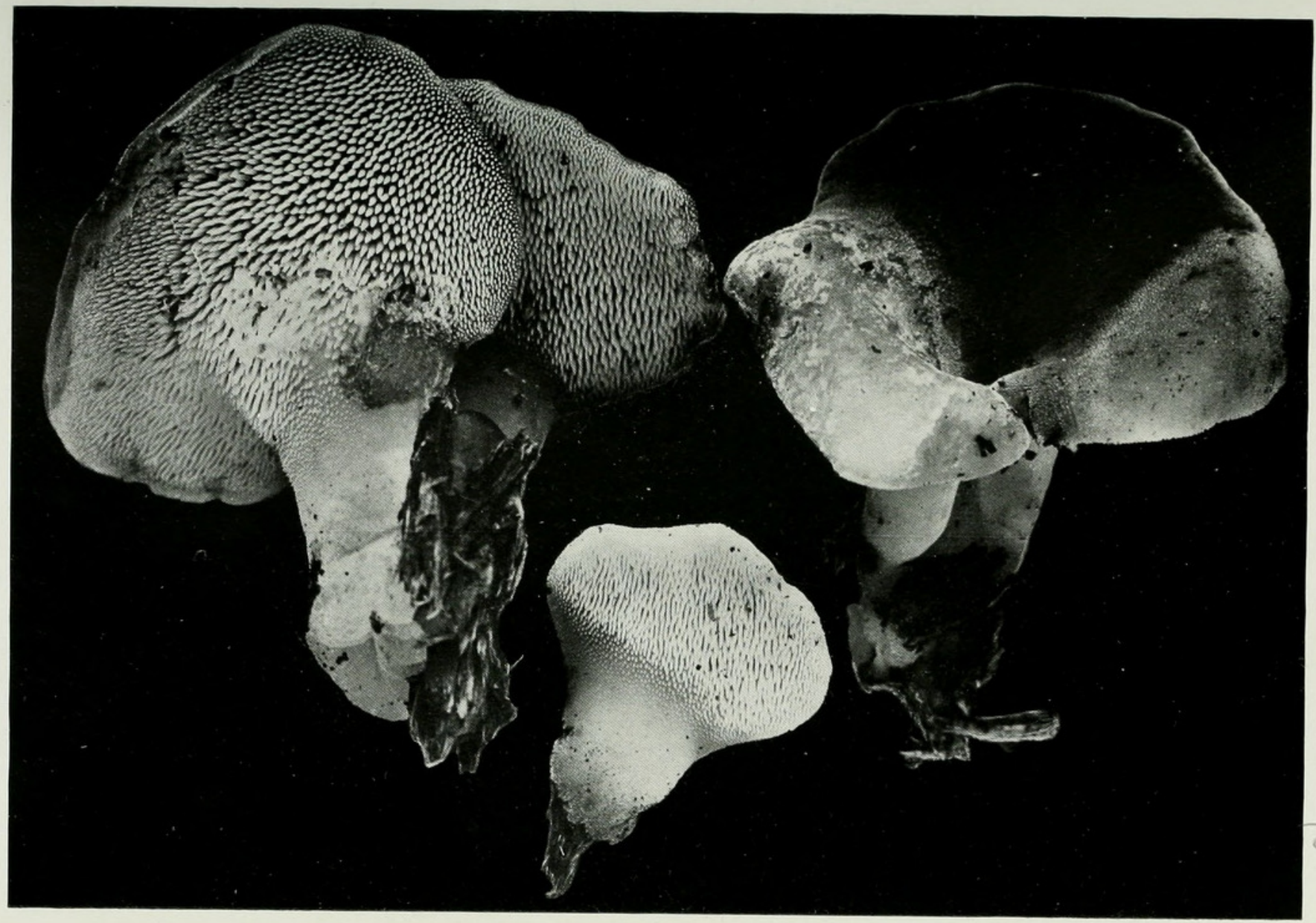
912. On a pine log, October 11, 1913. Photo and drawings.

2954. From inside decaying pine stump, woods south of athletic field, December 1, 1917. Photo.

2956. From side decaying pine stump, Strowd's pasture by Bowlin's Creek, December 3, 1917.

4034. On pine log on Strowd's hill, January 25, 1920.

4092. On pine log back of athletic field, February 8, 1920.



TREMELLODON GELATINOSUM. No. 2954.

TREMELLODENDRON

A remarkable genus, growing on the ground in woods and resembling stipitate species of Thelephora in habit, form and texture, but with the basidia divided into four parts by longitudinal septa, as in the Tremellaceae, and having the spores smooth, white and elongated. The genus was established by Atkinson (Journal Mycology 8:106. 1902), and the species have been treated by Burt (Ann. Mo. Bot. Gard. 2:731. 1915).

KEY TO THE SPECIES

Plant whitish, much branched, the stems or branches or both fusing where coming together.
- Stout and often large and heavy ..... *T. candidum* (1)
- Delicate, the branches slender and numerous ..... *T. merismatoides* (2)

Plant whitish, slender, little branched, the stems single and not fused with others ..... *T. Cladonia* (3)

Plant simple, orange colored ..... *T. aurantium* (4)

1. **Tremellodendron candidum** (Schw.) Atk.

PLATES 44 AND 59

Plant upright, centrally stalked, densely branched, the clumps reaching a diameter of 8 cm. and a height of 6 cm., but usually much smaller. The base is a fused mass which soon branches into more or less distinct, but often confluent upright stalks which subdivide into more or less flat and often laterally fused branches, these terminate in fibrous or decidedly fimbriated, bluntish tips, which are nearly or quite white, the remainder of the plant being a creamy or sordid white. The texture is very tough, almost woody below and is not at all brittle.

Basidia four-celled by longitudinal septa; spores (of No. 1385) white, elliptic, with mucro, smooth, with large or small oil drops, very oily as seen by the many oil drops in the water, 4.8-6.6 x 8.5-13μ.

A very abundant plant in woods and lawns and very variable in size and stoutness.

Burt recognizes *T. pallidum* as the larger, more solid forms I here include under *T. candidum*. I cannot see good grounds for recognizing more than two species here. We have many intermediate forms and sizes. I am also not sure that *T. merismatoides* is different, but am including it as a convenient name for the most delicate, Pterula-like form.