Stereum and Allied Genera of Fungi in the Upper Mississippi Valley

by Paul L. Lentz

Agriculture Monograph No. 24
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Modern research methods are utilized in this study to unite approximately 400 names in 26 accepted species of *Stereum* and allied genera of fungi. Recent investigations have shown that a considerable number of these fungi are of economic importance in causing disease of living trees and in rotting timber and all kinds of timber products. Proper classification of these fungi is basic to development of control methods. In that respect, this monograph should serve as a tool for future investigators in their efforts to prevent destruction of timber and wood products.

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Stereum and Allied Genera of Fungi in the Upper Mississippi Valley[1]

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Introduction

Stereum is a genus of Homobasidiomycetes included by Burt (1914) [2] in the Thelephoraceae. This family of fungi is essentially equivalent to the order Thelephorei of Fries (1874). In the classification system of Patouillard (1900) *Stereum* was placed in the series of Stereums of the subtribe Odontinae, tribe Porohydneae, family Aphyllophoraceae. Pilát (1930b) has included it in the family Stereaceae, a position similar to that which it occupies in the subdivision Stereines of Bourdot and Galzin (1928). Several hundred species of the genus have been described, but there are probably not more than about 100 good species. Of this number, 26 species of *Stereum* or *Stereum*-like fungi are recognized in the Upper Mississippi Valley. *Stereum* has affinities with the genera *Peniophora* and *Aleurodiscus*, but differs from both by its more complex structure. In addition, it diverges from *Peniophora* by its reflexed to stipitate habit and from *Aleurodiscus* by its smaller spores and basidia.

As the present study of the various species has progressed, certain ones have been found to differ from the basic concept of the genus. These have, accordingly, been placed in one of three other genera included in this monograph. All the stipitate species of the Upper Mississippi Valley were included in *Cotilydia* Karst. *Cryptochaete* Karst. seemed an appropriate place for the fungus commonly known as *Stereum rufum* (Fr.) Fr. For three other species, it has seemed desirable to recognize a new genus. The various genera are characterized at the appropriate places in this monograph. All the species of the four genera are included in a single key.

Economic Significance

Nearly all the species of *Stereum* discussed are active in decomposing dead timber. In addition, several species attack living trees, and some may be serious pathogens. Among the most important of the pathogens are *S. purpureum*, *S. sanguinolentum*, *S. gausapatum*, and *S. subpileatum*.

[1] Submitted for publication, April 18, 1955.

[2] References to Literature Cited (p. 60) are herein indicated by the name of the author (or authors) followed by the year of publication.

Others, in some cases probably of less importance, include *S. frustulatum*, *S. hirsutum*, *S. complicatum*, *S. sulcatum*, and *S. murraii*. Recognition of the importance of Stereums as pathogens has been facilitated recently by the use of refined isolation and inoculation techniques. The following examples of diseases and deterioration are only a random sample, and many more instances could be added from a thorough review of the literature.

Probably the best known disease caused by a species of *Stereum* is silver leaf. This disease has been studied thoroughly by Brooks and his associates (1911, 1913, 1919, 1923, 1926, 1929, 1931a, 1931b), and there is no doubt that it is caused by *S. purpureum*. Silver leaf disease is especially prevalent among woody Rosaceae, particularly plums and apples. The fungus enters the host through wounds, causes a silverlike appearance of the leaves, kills the branches in the immediately vicinity of its entry, and ultimately causes the death of the tree. Although the pathogen may be obtained in culture from the tissues of the host at any time after it has become established, production of basidiocarps does not occur until at least some tissues of the host have been killed, the basidiocarps developing only from dead wood. Many reports have been made of this disease on plums, apples, peaches, and cherries, and it has also been reported on raspberry canes (Brien and Atkinson, 1942), on apricots (Coombe, 1952), on cherry-laurel [*Prunus laurocerasus* L.] (Beaumont, 1935), and on *Cotoneaster melanocarpa* Lodd., *Crataegus sanguinea* Pall., and *Sorbus hybrida* L. (Jørstad, 1948). Reports of the pathogenicity of *S. purpureum* on hosts in families other than the Rosaceae have also been made. Beaumont (1935), for example, reported silver leaf disease of black and red currant and gooseberry, all in the Grossulariaceae. The disease has rarely been found in the United States, except in the Pacific Northwest. Sprague and Hord (1950) found it to be very common in parts of Washington following injury to apple trees during the severe winters of 1948–49 and 1949–50. Berkeley (1930) reported the disease on apples in Canada, and Wehmeyer (1950) has cited reports in the Canadian Plant Disease Survey both from apple and cherry.

Another serious disease of trees is the red heart rot which *S. sanguinolentum* causes in various conifers. As early as 1911 Eddelbüttel reported that this fungus grows in wounds of living spruce. Overholts (1939) stated that it causes a serious decay of hemlock. Recent isolation studies by Bier, Salisbury, and Waldie (1948) have shown *S. sanguinolentum* to be responsible for 46.8 percent of the total volume of decay in *Abies lasiocarpa* (Hook.) Nutt. and *A. amabilis* (Dougl.) Forb. left from a logged-over area in British Columbia, and they state that this fungus has previously been reported to cause serious losses in balsam fir [*A. balsamea* (L.) Mill.]. Bier (1949) reported that red heart rot is common in fir, pine, and spruce in British Columbia. He also says that recent studies have shown that *S. sanguinolentum* may occur as a root-rotting organism which kills trees in coniferous plantations. Mielke and Davidson (1947) also have called attention to the importance of *S. sanguinolentum* as a cause of disease of spruce and fir. They found that it was decaying living trees of *Picea engelmannii* Parry and *Abies lasiocarpa* (Hook.) Nutt. in Colorado. In Norway, Jørstad and Juul (1939, pp. 444–472, 480–481) found that *S. sanguinolentum* causes a brown

and rather structureless heart rot in living spruce [*Picea abies* (L.) Karst.]. Entrance of the fungus was through wounds of the top caused by snow, or through wounds of the trunk, or less often through wounds of the roots. Peace (1938) has isolated *S. sanguinolentum* from European larch in Great Britain and found that it was the cause of staining as well as of a soft brown or streaked rot.

Among the numerous species of *Stereum* commonly associated with oaks, several are known to cause rots in living trees. Culture studies by Davidson (1934) have shown that *S. gausapatum* is a common cause of heart rot in living trees. Genaux and Kuenzel (1939), in southeastern Iowa, found that *S. gausapatum* was responsible for most of the basal decay of oak. Later, Davidson, Campbell, and Vaughn (1942) showed that in the eastern United States *S. gausapatum* was the most important species causing butt rot in young sprout oak stands where parent stumps were the main source of infection, and was also important as a top-inhabiting species in mature- or old-growth stands. According to Wakefield and Dennis (1950, p. 258), this fungus enters the host through branch stubs and then attacks the heartwood, causing long pipes of rot that spread up and down the trunk. Overholts (1939) also has called attention to the extensive and destructive heart rot of living oak trees caused by *S. gausapatum*.

S. subpileatum also causes a heart rot of oak trees. Long (1917), working in Arkansas, found that this fungus is among the most important of the organisms that cause heart rots of living oaks and then continue to grow in the infected wood after the trees are felled. Butler (1918, p. 97) relates that the fungus gains entrance to the host tissues through wounds and insect burrows. According to Boyce (1923), the destruction of host tissues starts with the appearance of water-soaked areas; this is followed by delignification and the appearance of honeycomb-like pits and finally by destruction of the cellulose lining of the pits. Freeman (1905, pp. 242–243) has stated that *S. frustulatum* is also able to attack living trees. The two species are closely related, and the progress of the disease is very much the same in both instances.

An estimate of the importance of *S. hirsutum* as a pathogen is difficult to make because the fungus is so poorly known. Since *S. hirsutum* first was described by Willdenow (1787, p. 397), almost every conceivable *Stereum*-like fungus has at some time or other been misdetermined as belonging to this species. Some of the most often misdetermined are specimens belonging in *S. ostrea*, *S. complicatum*, and particularly *S. gausapatum*. However, enough reports of the pathogenicity of *S. hirsutum* have been made to justify the belief that this species is indeed a frequent cause of disease in trees. Butler (1918, p. 97), Bresadola and Cavara (1901), and Cooke (1906, p. 210) have reported that this fungus grows on living trees, as well as on dead stumps, branches, and logs. According to Bijl (1922), *S. hirsutum* is a wound parasite of fruit and other trees.

A study (Campbell and Davidson, 1940) of fungi associated with top wounds of glaze-damaged black cherry [*Prunus serotina* Ehrh.] in Pennsylvania has shown that *S. complicatum* [as *rameale*] is able to infect such trees and can cause a white rot of the heartwood. *S. complicatum* was isolated 27 times and constituted 17 percent of the total isolations made from

the decay. The authors believe that the wound parasites, such as *S. complicatum,* will eventually die as the wounds heal, although they may cause so much damage that the affected tree may be unmerchantable. Davidson, Campbell, and Vaughn (1942) have reported that *S. complicatum* is usually associated with sapwood rot in oaks, but that it may penetrate a short distance into the heartwood in some instances.

S. sulcatum usually grows on coniferous logs, but at least two reports have been made of its occurrence on living trees. Burt (1931) reported that this species was collected from the trunk of a living, aged *Chamaecyparis formosensis* Matsum. Mielke and Davidson (1947) have isolated *S. sulcatum* from a yellow stringy rot in the base of a large living *Picea engelmannii,* and considered the fungus to be the cause of the rot.

Davidson, Campbell, and Lorenz (1941) found *S. murraii* to be a common cause of heart rot in living trees of *Betula lutea* Michx. They also isolated it from heart rot in *Acer saccharum* Marsh. In addition, cultures of this fungus were isolated from cankers on living trees of *A. saccharum* and *B. lutea,* and sporocarps were found associated with cankers on living trees of *A. pensylvanicum* L., *Fagus grandifolia* Ehrh., and *Ostrya virginiana* (Mill.) K. Koch.

All the *Stereum* species previously discussed continue to grow on dead wood and help to bring about its disintegration. Most species are commonly found on rotting twigs, branches, stumps, and logs of forest trees, but sometimes they may cause serious damage to wood products. *S. abietinum* produces an intensive and often harmful dirty-whitish rot of wood structures, such as bridges and buildings in mountainous regions (Pilát, 1930b). In addition, it has been found on decaying coniferous fencing material (Lundell and Nannfeldt, 1937, p. 22) and on mine timbers (Pilát, 1930b). *S. hirsutum* also has frequently been reported to cause serious damage to mine timbers (Gillot, 1882; Roumeguère, 1886; Bourdot and Galzin, 1928, p. 370; Doidge, 1950, p. 490). Other species that have been found on mine timbers include *S. complicatum* and *S. gausapatum* (Maize, Scheffer, and Greenwald, 1941) and *S. sanguinolentum* (Harz, 1888; Pilát, 1930b; Möller, 1945, p. 119).

Many other reports have been made concerning the damage to wood products caused by various species of *Stereum. S. frustulatum* has rotted oak crossties of a cog railway (Pilát, 1930b), oak wood of the hull, deck, and framing timbers in boats (Davidson, Lombard, and Hirt, 1947), and was also found to rot empty oak kegs in a wine cellar (Pilát, 1930b). *S. hirsutum* has been reported on wood flooring of a bridge in the Philippines (Reinking, 1920) and on timber in storage (Doidge, 1950, p. 490). *S. purpureum* was very abundant on corded wood at a paper mill in Ohio (Hard, 1908, p. 457). *S. radiatum* has been obtained from rotten wood of a greenhouse in Russia (Burt, 1920, p. 182) and also from hemlock frames of cellar doors in New York (Fairman, 1892). It is moderately common on coniferous structural timbers (Overholts, 1939).

In the forests, various species of *Stereum* are very prominent in decomposing dead timber. In general, the fungi of this genus occupy wood while it is still in a reasonably sound condition and are among the earlier links in

the chain of humus-producing organisms. Long (1917) found that the four fungi most commonly found rotting white oak slash in Arkansas were species of *Stereum*, including *S. ostrea* [as *fasciatum*], *S. complicatum*, *S. versiforme*, and the species hitherto known as *S. umbrinum*. Zeller (1929) has reported that *S. erumpens* is the most common thelephore on pomaceous fruit trees in the Pacific Northwest, but he does not indicate whether he considers it a pathogen. Long (1917), in Arkansas, reported that *S. ochraceoflavum* was the principal fungus found rotting fire-killed oak bushes with branches not more than 2 inches in diameter, and Overholts (1939) also has mentioned that this species is common on shrubs in fire-swept areas. *S. ostrea*, *S. gausapatum*, *S. complicatum*, and *S. frustulatum* are common in the woodlands of the Upper Mississippi Valley and must account for a very large proportion of the decomposition of dead trees in that region. Throughout the world, species of *Stereum* are among the most ubiquitous of wood-inhabiting fungi and certainly must account for a significant amount of the deterioration of timber caused by fungi.

The foregoing survey of the economic significance of *Stereum*, as known at the present time, is only a small part of the story. Poorly understood is the fact that the relatively small size of the *Stereum* basidiocarp has no relation to its activity within the host. When so many of the most familiar species are shown to cause disease of living trees, there is reason to believe that study of the more unfamiliar species will reveal equally active pathogens. It is significant that the limited number of isolation studies made up to the present time have so often evoked from the investigators expressions of surprise that species of *Stereum*, instead of more conspicuous fungi, have proved to be the cause of serious rots of living trees. *Stereum* is still a moderately difficult genus taxonomically, few mycologists attempting to recognize more than a few of the more common species. Isolation studies from rots of living trees are very few indeed; correlation of the characteristics of cultures obtained from wood-rot isolations with those of cultures obtained from named basidiocarps is a very promising but relatively unworked field; serious study of rots caused by tropical Stereums is practically nonexistent. The work of assessing the true economic significance of *Stereum* has only begun.

Method of Study

Methods used in this study were essentially those described by Burt (1914, p. 195) and since used by many other students of the Thelephoraceae. Terminology for designating the various categories of typification was based on articles Nos. 18 to 21 of the International Code of Botanical Nomenclature edited by Lanjouw and others (1952) and also on the method outlined by Patterson and Diehl (1921, pp. 2–3). From the latter article, the term "type collection" has been borrowed to designate a collection made at the same time and locality and under the same collection number as the holotype and considered to be conspecific with it. An additional useful term is "authentic specimen," i. e., one determined by the author of a species as belonging to that species. Originally the term "extype" was used to designate a part, a piece, of the holotype. This has been discarded, because it has not been

possible always to determine whether a piece or the entire specimen was being examined.

The lists of synonymy preceding each specific description in this monograph are slightly more involved than in many reports, and perhaps require some explanation. An attempt has been made to indicate exactly the basis for and the significance of each binomial, as well as of all varieties and forms, in each list. Every specific epithet should be based on a type specimen. Whatever change of name may occur as the result of the work of various authors, the type of the epithet always must remain the particular specimen (or specimens) upon which the epithet was originally based. After a fungus has been placed in several different genera by various mycologists, it has several different binomial names. All these names are based on the precise type that was first used as the basis for the original binomial. All these binomials, therefore, are obligate synonyms of one another. In some instances, several different epithets may be based on a certain type specimen, and these also are obligate synonyms of one another. Often, however, there may be a number of different epithets based on several different types but all, according to the interpretation of the investigator, belonging in a single species. These epithets are facultative synonyms of one another. There may be some doubt about the actual conspecificity of facultative synonyms, since their synonymy is a matter of evaluation, but there can be no doubt about the conspecificity of obligate synonyms.

In this monograph, the accepted binomial heads the list of synonymy. Immediately following the accepted binomial, and indented from the margin, are the obligate synonyms of that binomial.[3] Following these synonyms, and at the margin of the page, is the first facultative synonym, and this is followed by its obligate synonyms. Thus, each binomial at the margin is a facultative synonym of every other marginal binomial and of every obligate synonym included under the various facultative synonyms. Each binomial in an indented group, on the other hand, is an obligate synonym of every other binomial in that group and of the marginal binomial heading that group. Furthermore, in all instances in which I have examined the type specimen (or specimens), the data pertaining to that specimen are included in the list of synonymy in immediate juxtaposition to the original binomial based on the particular type cited. The method of indicating obligate and facultative synonyms that I have adopted was devised by E. W. Mason (1942). That, together with the citation of types in the lists of synonymy, should give the most precise characterization of every binomial included in each list. When it has not been possible to examine a type or authentic specimen, it has been necessary to accept the interpretation of some other mycologist, and this is noted at the proper places in the lists of synonymy.

Type and authentic specimens cited in the lists of synonymy are not included in the formal lists of specimens examined. In the list of specimens examined, the name of the institution from which the specimen was obtained, the place of collection, the name of the collector and his collection number if known, and the name on the specimen if different from that considered the correct name are given.

[3] No attempt has been made to note obligate and facultative synonyms in the synonymy of the genera.

Specimens have been obtained from many institutions, which are indicated as follows: BPI=National Fungus Collections in the Plant Disease Epidemics and Identification Section (formerly Division of Mycology and Disease Survey), Horticultural Crops Research Branch, Agricultural Research Service, U. S. Department of Agriculture; DAOM=Mycological Herbarium, Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Ontario, Canada; DLK=Dominion Laboratory of Plant Pathology, Kentville, Nova Scotia, Canada; FH=Farlow Herbarium; FI=Herbarium Universitatis Florentinae, Istituto Botanico; H=University of Helsinki Botanical Museum; ILL=University of Illinois Department of Botany; IMI=Commonwealth Mycological Institute, Kew; L=Rijksherbarium, Leiden, Netherlands; LPS=Instituto de Botanica C. Spegazzini, Universidad Nacional de La Plata; MO=Missouri Botanical Garden; NY=New York Botanical Garden; NYS=New York State Museum; PAC=Pennsylvania State College Department of Botany and Plant Pathology; PC=Museum National d'Histoire Naturelle, Laboratoire de Cryptogamie, Paris; PH=Philadelphia Academy of Natural Sciences; PR=Botanical Department of the National Museum, Prague, Czechoslovakia; S=Naturhistoriska Riksmuseet, Botaniska Avdelningen, Stockholm; STR=Institut de Botanique, Universite de Strasbourg; SUI=State University of Iowa Department of Botany; TRT=University of Toronto Department of Botany; UPS=Botaniska Museet, Uppsala Universitet.

The Upper Mississippi Valley, as defined for the present purpose, includes the area of Missouri, Iowa, Illinois, Wisconsin, and Minnesota. While many of the specimens examined were collected in that region, I have not limited myself to studying only specimens from that area. Once it had been ascertained that a particular species occurs in that region, I have studied specimens of that species from whatever source they might be available. Although this monograph concerns the species that occur in the Upper Mississippi Valley, in practice it may be used for the identification of most of the species throughout the northern United States. In the southern United States various species occur that are not mentioned in this monograph.

In the specific descriptions, the quoted colors are from Color Standards and Color Nomenclature by Ridgway (1912) and common colors such as whitish, grayish, or tan have been used when no exact color seemed applicable. Measurements of sectioned material do not include the tomentum of the upper surface of the pileus; in some instances the tomentum may be thicker than the section itself.

Key to the Species of Stereum and Allied Genera

This key includes all the species of *Stereum* known to occur in the Upper Mississippi Valley and, in addition, those species of other genera which are likely to be sought in *Stereum*. The genus *Stereum* is abbreviated as *S.*, *Cotilydia* as *C.*, and *Laxitextum* as *L.*

1. Basidiocarp terrestrial, stipitate---- 2
1. Basidiocarp typically lignicolous, resupinate, effused-reflexed, or laterally sessile---- 4
2. Basidiocarp merismatoid; hymenium with gloeocystidia---- *1. C. aculeata*
2. Basidiocarp flabelliform to infundibuliform; hymenium with cystidia---- 3
3. Basidiocarp pallid, 1.5 to 4.5 cm. tall; cystidia at least 69μ by 9.5μ--- *2. C. diaphana*
3. Basidiocarp brownish, up to 1.5 (rarely to 2.5) cm. tall; cystidia not more than 60μ by 9.5μ---- *3. C. undulata*
4. On gymnosperms; hymenial surface glaucous from a covering of microscopic threadlike crystals; hymenium stratose; with brown setalike cystidia---- *12. S. abietinum*
4. On gymnosperms or angiosperms; hymenial surface lacking a glaucous covering of crystals; hymenium simple or stratose; cystidia, if present, not setalike---- 5
5. On gymnosperms; hymenium rust-colored or sometimes wholly or partly charcoal-black, usually radiately corrugated; with brownish cystidioles 1.5μ to 4μ in diameter and protruding up to 30μ beyond the hymenial surface---- *11. S. radiatum*
5. On gymnosperms or angiosperms; hymenium not rust-colored or black, not radiately corrugated; lacking brownish cystidioles---- 6
6. With incrusted cystidia or acanthophyses, or both; lacking gloeocystidia-- 7
6. Lacking incrusted cystidia and acanthophyses, or with gloeocystidia in addition to inconspicuous cystidia---- 15
7. Practically limited to *Quercus;* hymenium stratose; usually with acanthophyses; spores 3.5μ to 5μ by 2.5μ to 3μ---- 8
7. On various gymnosperms or angiosperms; hymenium simple or stratose; lacking acanthophyses; spores longer than 5μ or broader than 3μ, or larger than 5μ by 3μ---- 9
8. Basidiocarps in the form of hemispherical or angular tubercles usually not larger than 18 mm. in diameter, gregarious in colonial patches; cystidia lacking; with acanthophyses---- *14. S. frustulatum*
8. Basidiocarps effused-reflexed sheets, not colonial tubercles; hymenium usually with both cystidia and acanthophyses, sometimes lacking one or the other---- *15. S. subpileatum*
9. On gymnosperms; hymenium having a chalky texture, whitish with a ruddy tinge, stratose; cystidia incrusted and 8μ to 13μ in diameter; spores subglobose, often minutely echinulate---- *16. S. sulcatum*
9. On gymnosperms or angiosperms; hymenium not of chalky texture, darker than above, not stratose, or if stratose then with brownish cystidia 3.5μ to 6μ in diameter; spores ovoid to cylindrical, even---- 10
10. On gymnosperms; hymenium simple or stratose; cystidia brown, incrusted, 3.5μ to 6μ in diameter---- *13. S. chailletii*
10. Usually on angiosperms; hymenium not stratose; cystidia brown or hyaline, 5.5μ or more in diameter---- 11
11. Hymenium "light buff" to "wood brown"; cystidia hyaline to yellowish, 68.5μ to 175μ by 12.5μ to 34μ; basidia 50μ to 56μ by 9μ to 11.5μ; spores 8μ to 15μ by 5.5μ to 10μ---- *19. S. cinerascens*
11. Hymenium some shade of brown, drab, or gray, or occasionally "vinaceous-buff" to "wood brown"; cystidia brownish and up to 125μ by 13.5μ, or hyaline to pale-yellowish-brown and up to 80μ by 23μ; basidia up to 35μ by 6μ or slightly larger; spores generally smaller than *S. cinerascens*---- 12
12. Cystidia brownish, 75μ to 125μ long; hymenium lacking dendrophyses and differentiated brown hyphal tips---- *6. L. crassum*
12. Cystidia hyaline to yellowish-brown, up to 80μ long; hymenium with dendrophyses or differentiated brown hyphal tips---- 13
13. Hymenium "vinaceous-buff" to "army brown," or "light cinnamon-drab," margin usually white or pale-colored except in old specimens; spores 7.5μ to 10μ by 2.5μ to 4μ---- *8. S. albobadium*

13. Hymenium some shade of brown, buff, drab, or gray, with the margin not contrasting as conspicuously as in *S. albobadium;* spores 5μ to 7μ by 1.5μ to 2.5μ ---------- 14
    14. Hymenium "Mars brown" to "Prout's brown," fading to "cinnamon-drab"; with brown dendrophyses reaching or slightly surpassing the hymenial surface ---------- *9. S. versiforme*
    14. Hymenium "vinaceous-buff" to "wood brown," "light drab," or "pale mouse gray"; with dendrophysoid or simple dark-brown hyphal tips forming a stratum a short distance beneath the hymenial surface. *10. S. erumpens*
15. Practically limited to *Populus;* basidiocarp tuberculiform; hymenium red and waxy; with gloeocystidia; with small incrusted cystidia so inconspicuous that they are nearly always overlooked; spores 6μ to 8.5μ long. *4. Cryptochaete rufa*
15. On various gymnosperms or angiosperms; basidiocarp not tuberculiform; hymenium not red and usually not waxy (except *S. purpureum*); lacking incrusted cystidia and gloeocystidia, or the spores shorter than 6μ if gloeocystidia are present ---------- 16
    16. Basidiocarp spongy-fragile; the upper surface and most of the context brown, with the context consisting of loosely interwoven brown hyphae with clamp connections; hymenium pale to whitish; with hyaline, refractile gloeocystidia 70μ to 110μ by 4.5μ to 8.5μ ---- *5. L. bicolor*
    16. Basidiocarp usually leathery or corky; context hyphae hyaline to subhyaline, parallel or interwoven, with or without clamp connections; hymenium lacking gloeocystidia, or with yellowish gloeocystidia shorter than 70μ ---------- 17
17. Basidiocarp almost entirely of elliptical to subglobose vesicles; hymenium with inconspicuous yellowish gloeocystidia ---------- *17. S. murraii*
17. Basidiocarp soft to leathery; vesicles, if present, scattered in a single fairly narrow layer in the context near the subhymenium and sometimes in the subhymenium; hymenium lacking gloeocystidia ---------- 18
    18. Hymenium "fawn color" to "benzo brown," pruinulose-waxy; subhymenium and adjoining context with scattered pyriform to globose vesicles ---------- *18. S. purpureum*
    18. Hymenium colored differently than in *S. purpureum,* usually not waxy; subhymenium and context lacking vesicles ---------- 19
19. Hymenium "Rood's brown," "army brown," or "deep vinaceous-lavender," fading to "cinnamon-buff," "cinnamon," "Mikado brown," or "fawn color," tessellately cracked when dry; numerous branched pseudodendrophysoid hyphae with prominent clamp connections present in the hymenium ---------- *7. L. roseo-carneum*
19. Hymenium usually dull-orange, buff, or gray; lacking pseudodendrophyses --- 20
    20. Practically limited to *Carpinus;* the upper surface sericeous, pale gray-buff; basidiocarp 200μ to 375μ thick; cuticular layer inconspicuous or sometimes lacking ---------- *20. S. striatum*
    20. On various gymnosperms or angiosperms; the upper surface not uniformly sericeous, variously colored; basidiocarp usually thicker than *S. striatum;* cuticular layer usually at least moderately distinct --- 21
21. Basidiocarp usually about 5 mm. in diameter, more or less cup-shaped or conical and attached by the umbo or by one side and the umbo; the upper surface with long, soft, whitish hairs; hymenial surface yellowish or "cream-buff"; cuticular layer often not very distinct; hymenium with umbonate-tipped pseudocystidia ---------- *21. S. ochraceo-flavum*
21. Basidiocarp usually broader than 5 mm., rarely cup-shaped or conical; the upper surface usually tomentose or strigose, lacking soft whitish hairs; hymenial surface dull-orange or variously buff or brown to gray; cuticular layer usually conspicuous; pseudocystidia, if present, rarely umbonate-tipped ---------- 22

22. On gymnosperms; context, subhymenium, and hymenium with numerous dark-brown vascular hyphae that exude a reddish liquid when the fresh hymenial surface is cut; hymenium usually with aculeate-tipped basidioles ..... *22. S. sanguinolentum*

22. Occasionally on gymnosperms, but usually on angiosperms; with or without brown vascular hyphae, but these not likely to exude a red liquid (although the fresh hymenium of *S. gausapatum* may darken when cut); hymenium with or without aculeate-tipped basidioles 23

23. Basidiocarp effused-reflexed to dimidiate, usually loosely radially plicate, often cespitose-imbricate; with a moderate proportion of vascular hyphae often having brown contents; hymenium lacking aculeate-tipped basidioles .. 24

23. Basidiocarp effused-reflexed to laterally sessile, usually not radially plicate, usually not cespitose-imbricate; few or no vascular hyphae having colored contents; hymenium with aculeate-tipped basidioles ..... *26. S. ostrea*

24. Basidiocarp usually small, with the reflexed portions mostly 2 to 15 mm. long and broad, usually not more than 500μ thick; hymenial surface orange when fresh, fading to dull-orange or "cinnamon-buff." *23. S. complicatum*

24. Basidiocarp, usually larger and thicker than in *S. complicatum;* hymenium some dull shade of buff, brown, or gray 25

25. Usually on *Quercus;* often densely cespitose-imbricate; the upper surface usually a rich brown color near "ochraceous-tawny" or "buckthorn brown," sometimes near dull "clay color"; basidiocarp 500μ to 1,000μ thick ..... *24. S. gausapatum*

25. On various hosts, mostly angiosperms; usually not cespitose-imbricate; the upper surface whitish or a lighter and brighter shade of brown than *S. gausapatum*, or occasionally grayish; basidiocarp usually not more than 700μ thick ..... *25. S. hirsutum*

Cotilydia

Cotilydia Karst., Rev. Mycol. 3 (9) : 22. 1881.

Thelephora Ehrh. ex Fr., Syst. Myc. 1 : 428. 1821 (pro parte, sed non typica).

Stereum Hill ex S. F. Gray, British Plants 652. 1821 (pro parte, sed non typica).

Podoscypha Pat., Essai Tax. 70–71. 1900.

Bresadolina Brinkm., Ann. Mycol. 7 : 289. 1909.

Macroscopic

Basidiocarp terrestrial or lignicolous, bibulous to coriaceous, stipitate, with the stipe simple or compound, pileus flabelliform to infundibuliform; upper surface glabrous to villose or lanate, often zonate; hymenial surface inferior, even or with low undulated ridges.

Microscopic

In section consisting of two layers, the context appearing as a homogeneous layer of hyphae extending in a direction parallel with the pileus surface, the hymenium consisting of elements arranged vertically; pileocystidia often present and arising from the upper surface as simple, nonincrusted, hairlike structures; cystidia, cystidioles, or gloeocystidia often present in the hymenium; basidia 2- or 4-sterigmate; spores hyaline, simple, ellipsoidal to subglobose, smooth.

Discussion

The type species is *Cotilydia undulata* (Fr.) Karst., Rev. Mycol. 3 (9) : 22. 1881; *Cantharellus undulatus* Fr., Syst. Myc. 1: 321. 1821, excl. syn. Schaeff., Sow., Bull., Pers. *Cotilydia* differs from *Stereum* in the absence of a cuticular layer at the upper surface and by its generally delicate structure throughout, so that the context usually appears more homogeneous than that of most species of *Stereum*. Arthur Welden, at James Millikan University, has recently suggested that the homogeneous appearance may be related to the fact that the species which I have included in *Cotilydia* all seem to be of monomitic structure. *Cotilydia* differs from most species of *Stereum* by its stipitate habit, but some true Stereums are stipitate.

1. Cotilydia aculeata

(Pls. 1, *A*; 8, *A*; 13, *A*)

Cotilydia aculeata (Berk. & Curt.) comb. nov.; *Thelephora aculeata* Berk. & Curt., Grevillea 1: 149. 1873 [type, South Carolina (Curtis *2009*), in IMI]; *Stereum aculeatum* (Berk. & Curt.) Burt, Mo. Bot. Gard. Ann 13: 325. 1926 (non *S. aculeatum* Velenov., Ceske Houby 763. 1922).

Macroscopic

Basidiocarp terrestrial, centrally stipitate, cespitose-confluent, with several individuals coalescing more or less intimately to form a compound fructification 4.5 to 5 cm. tall and 1.5 by 5 cm. in its lateral dimensions, the apices of individual pilei rosette-formed, thin, with margins fimbriate to incised; upper surface intermediate between "tawny" and "russet," having a translucent resinoid appearance; hymenial surface intermediate between "light buff" and "warm buff," even except for low, sinuous, vertical ridges or veins.

Microscopic

In section 545μ thick, thinner near the apices and much thicker through the stipe; context approximately 400μ thick, hyphae hyaline, mostly moderately thick-walled with few clamp connections, but in the subhymenial region thin-walled, with numerous clamp connections, 3.5μ in diameter; hymenial region with gloeocystidia and numerous embedded spores; gloeocystidia hyaline, waxy-appearing, slender, flexuous, tapering toward the apex, with homogeneous contents, 98μ to 175μ by 8μ to 12.5μ; basidia 4-sterigmate, 43.5μ by 5.5μ; spores hyaline to pale-buff, subglobose, smooth, with the wall slightly thickened, 4.5μ to 6.5μ by 3.5μ to 5μ, very numerous and apparently embedded throughout the hymenial region as well as attached to the sterigmata. Plate 13, *A*, shows a gloeocystidium, basidium, and spores.

Habitat

On the ground.

Distribution

Reported only from South Carolina and Missouri.

Miscellaneous Specimens Examined

MO and BPI: Missouri—no locality (Emig *MO 58744* and *Weir 18820*, two parts of same specimen, as *Stereum aculeatum*).

2. Cotilydia diaphana

(Pls. 1, *B*; 8, *B*; 12, *A*)

Cotilydia diaphana (Schw.) comb. nov.; *Thelephora diaphana* Schw. in Berk. & Curt., Acad. Nat. Sci. Phila. Jour. (ser. 2) 2: 278. 1854 [type, Gnadenhutten, Ohio, in BPI (Michener Herb.)]; *Stereum diaphanum* (Schw.) Cke. in Sacc., Syll. Fung. 6: 558. 1888.

Thelephora sullivantii Mont., Syll. Crypt. 176. 1856 [type, Columbus, Ohio (Sullivant), in BPI].

Thelephora willeyi G. W. Clint. in Pk., N. Y. State Mus. Ann. Rpt. 26: 71. 1874 [syn. *Stereum diaphanum* sec. Burt, Mo. Bot. Gard. Ann. 7: 97–98. 1920]; *S. willeyi* (G. W. Clint.) Burt ex House, N. Y. State Mus. Bul. 219–220: 237. 1920.

Macroscopic

Basidiocarp terrestrial, stipitate, infundibuliform, with the pileus entire or split into spathulate processes, the margin even or laciniate, fructification 1.5 to 4.5 cm. tall including the stipe, 0.5 to 3 cm. broad at the apex, with the stipe 0.75 to 3.5 mm. in diameter; upper surface "pinkish buff" or somewhat darker, having a translucent resinoid appearance, faintly to distinctly striate, somewhat zonate; hymenial surface concolorous with the upper surface or often paler, pruinulose, even or minutely ridged; stipe covered by a delicate white tomentum which envelops a small ball of substratum at the stipe base.

Microscopic

In section 175μ to 350μ thick; context hyphae hyaline, densely massed, longitudinally arranged but with numerous perpendicular branches, septate, apparently lacking clamp connections, 2.5μ to 4.5μ in diameter; cystidia hyaline, nonincrusted, hairlike, 69μ to 102μ by 9.5μ to 13μ, protruding up to 65μ beyond the hymenial surface; basidia 4-sterigmate, approximately 20μ to 25μ by 5μ to 6μ; spores hyaline, ellipsoidal to oval, smooth, 4μ to 6μ (rarely to 7μ) by 2.5μ to 4μ. Plate 12, *A*, shows a cystidium, a basidium, and spores.

Habitat

On the ground.

Distribution

Canada, United States, Argentina, South Africa, China. Specimens from Iowa, and Burt (1920, p. 99) reports it from Missouri.

Miscellaneous Specimens Examined

BPI: New York—Alcove (Shear), Six Mile Creek (Thom), Taughannock (Thom); Washington—Spokane (Flowers), Sumner (Harper *1191*); West Virginia—Fayette County (Nuttall); all as *Stereum diaphanum*. MO: New York—Jamesville (House *MO 55498*, as *S. willeyi*). SUI: Iowa—Bluffton (Martin *1852*), North Liberty (Brasfield), State Quarry (Martin *1848*); all as *S. diaphanum*.

Illustrations

Burt (1920, text fig. 3; pl. 2, figs. 8 and 9); House (1920, fig. 3); Lloyd (1913, fig. 534); Overholts (1939, pl. 15, fig. 13); Talbot (1954, fig. 4).

3. Cotilydia undulata

(Pls. 1, *C* and *D*; 12, *B*; and 13, *D*)

Cotilydia undulata (Fr.) Karst., Rev. Mycol. 3 (9) : 22. 1881; *Cantharellus undulatus* Fr., Syst. Myc. 1: 321. 1821, excl. syn. Schaeff., Sow., Bull., Pers.; *Thelephora undulata* (Fr.) Fr., Elench. 1: 164. 1828; *Hymenochaete undulata* (Fr.) Lév., Ann. des Sci. Nat. (ser. 3) Bot. 5: 150. 1846; *Craterella undulata* (Fr.) Karst., Soc. pro Fauna et Flora Fenn. Meddel. 6: 10. 1881, lacking Fr. publication data; *Stereum undulatum* (Fr.) Mass., British Fung. Fl. 1: 130. 1892; *Podoscypha undulata* (Fr.) Maire, Ann. Mycol. 7: 429. 1909.

Cantharellus fimbriatus Weinm., Syll. Pl. Nov. Soc. Regia Bot. Ratisbon. Edita 2: 99. 1828 [syn. *Thelephora undulata* sec. Fr., Elench. 1: 164. 1828].

Stereum tenerrimum Berk. & Rav., Grevillea 1: 162. 1873 [syntype, North Carolina (Curtis *5029*), in IMI; syntype, North Carolina (ex herb. Bresadola), in BPI; syntype, South Carolina (Ravenel *1437*), in IMI; syntype, South Carolina (Ravenel), in NYS].

Thelephora exigua Pk., N. Y. State Mus. Bul. 54: 953. 1902 [type, Westport, N. Y. (Peck) in NYS]; *Stereum exiguum* (Pk.) Burt, Mo. Bot. Gard. Ann. 7: 99. 1920.

Macroscopic

Basidiocarp terrestrial, gregarious, stipitate, coriaceous, flabelliform to infundibuliform, sometimes lobed and split, with the margin subfimbriate to lacerate, fructification 5 to 14 mm. tall including the stipe which is 2 to 10 mm. long, pileus 1 to 9 mm. broad, stipe 0.15 to 0.6 mm. thick. European specimens sometimes considerably exceeding these measurements; upper surface "clay color," "buffy brown" to "olive-brown," or "Sayal brown" to "bister," delicately fibrillose-striate, often minutely setulose; hymenial surface concolorous with the upper surface, even; stipe slender, solid, often minutely setulose above, covered by a delicate whitish or pale-buff puberulence toward the base, with the base flattened or enveloping a minute ball of substratum.

Microscopic

In section 135μ to 250μ thick; context hyphae hyaline, sparsely branched, moderately thin-walled, septate, lacking clamp connections, 2.5μ (rarely 1μ to 3.5μ) in diameter; pileocystidia originating as slightly inflated free apices of context hyphae curving out from the upper surface of the pileus, hyaline, nonincrusted, filiform, up to 50μ by 5μ to 8.5μ, protruding up to 25μ beyond the upper surface; cystidia hyaline, nonincrusted, filiform, 35μ to 60μ by 5μ to 9.5μ, protruding up to 40μ beyond the hymenial surface; basidia 4-sterigmate, 11μ to 18μ by 3μ to 4.5μ; spores hyaline, ellipsoidal to oval, smooth, 3.5μ to 5μ by 2μ to 3μ. Plate 12, *B*, shows pileocystidia, part of the hymenium with cystidia and basidioles, a basidium, and spores. Plate 13, *D*, shows cystidia, a basidium, and a spore.

Discussion

The description of *Cotilydia undulata* presented here is based on specimens from the United States that would be placed by Burt (1920) in the species *Stereum exiguum* and *S. tenerrimum*, and also on a specimen of *Podoscypha undulata* from Sweden. It was with some hesitancy that I referred *S. tenerrimum* to *C. undulata*, but I was unable to convince myself that it could be maintained as a distinct species or even as a variety. The infundibuliform basidiocarps have previously been referred to *S. exiguum* or *P. undulata*, while the flabelliform ones have been called *S. tenerrimum*. However, there is considerable variation of form in individual collections of this group, and there is no microscopic distinction worthy of consideration.

According to Maire (1909), the breadth at the apex of the pileus of *P. undulata* ranges from 5 to 25 mm. This is so much larger than measurements of American specimens (1 to 7 mm.) as to cause uncertainty concerning the identity of American specimens. Nevertheless, Maire's measurements of microscopic anatomical structures and his illustrations of these agree perfectly with those obtained from American specimens. Further, Maire presented a photograph of some specimens from the Fries Herbarium in which the pileus apex diameters range from 3 to 9 mm., based on the scale accompanying the specimens. His photograph of a French collection shows the apex diameters to range from 7 to 17 mm. if the photograph is natural size. Specimens from Lundell and Nannfeldt's Fungi Exs. Suecici *1022* (in BPI) range from 2.5 to 9 mm. at the apex when dry. Peck (1902, p. 953) described the pileus of *Thelephora exigua* as 1.5 to 3 lines broad, or approximately 3.25 to 6.5 mm. In his description of *T. undulata* in the Elenchus, Fries (1828, p. 164) described the apex as measuring ⅓ to 1 inch, or approximately 8 to 25 mm. It is evidently from this description that Maire obtained his figure for the maximum diameter of the pileus. Now it appears from Maire's photograph that Fries actually had some specimens with an apex diameter as small as 3 mm., so the seeming discrepancy in size of European and American specimens becomes of little importance, and the striking identity of microscopic features leads to the conviction that all belong to the same species. This is all the more likely since the Lundell and Nannfeldt specimen is from Sweden, and their fungus should have been recognized as something else were it not truly Fries' species.

Habitat

On the ground, usually among mosses.

Distribution

Europe (from France and Great Britain to Sweden and Russia), United States (South Carolina, North Carolina, New York, Iowa, Wisconsin, Minnesota), Cuba. Rarely collected.

Miscellaneous Specimens Examined

SUI: Iowa—Iowa City (Martin, as *Stereum tenerrimum*); Minnesota—Crosslake (Newbro, as *S. exiguum*). NYS: New York—Croghan in Lewis County (Peck, as *S. tenerrimum*), Highland in Ulster County (Peck, as *S. tenerrimum*), Indian Lake in Hamilton County (Peck, as *S. tenerrimum*).

Exsiccati Examined

Lundell and Nannfeldt, Fungi Exs. Suecici *1022*, as *Podoscypha undulata.*

Illustrations

Burt (1920, pl. 2, figs. 10 and 11); Lloyd (1913, fig. 535); Maire (1909, figs. 1–3).

Cryptochaete

Cryptochaete Karst., Bidr. till Finlands Nat. och Folk 48: 407. 1889.

Aleurodiscus Rab. ex Cke. subgen. *Cryptochaete* (Karst.) Pilát, Ann. Mycol. 24: 208. 1926.

Macroscopic

Basidiocarp cartilaginous or coriaceous, erumpent, at first tuberculiform and remaining so in at least one species.

Microscopic

In section lacking a cuticular layer at the upper surface; context of glassy-appearing hyphae radiating from the point of attachment toward the basidiocarp margin and hymenium; gloeocystidia yellowish or hyaline, refractile, subglobose to elongate; cystidia present or lacking; basidia 4-sterigmate; spores hyaline, simple, curved-cylindrical to allantoid, smooth.

Discussion

The lectotype species is here designated as *Cryptochaete rufa* (Fr.) Karst., Bidr. till Finlands Nat. och Folk 48: 408. 1889; *Thelephora rufa* Fr., Elench. 1: 187. 1828. The original description by Fries very adequately typifies this species, but he seems to have been mistaken in citing Persoon's (1822, p. 124) *T. rufo-marginata* and Sowerby's (1803, pl. 388, fig. 3) *Auricularia cinerea.* Persoon's description of *T. rufo-marginata* is not very well applied to *T. rufa,* and Sowerby's figure does not resemble it. According to Bourdot and Galzin (1928, p. 329), *T. rufo-marginata* is a *Peniophora,* and they say that Romell considers *T. rufa* of Fries as certainly distinct from Persoon's species. Burt (1920, pp. 120–121) did not include Persoon's and Sowerby's species in synonymy.

Pilát (1930b, p. 15) says that *C. rufa* is anatomically unrelated to all species of *Stereum* and forms a transition to the Cyphellaceae, particularly to *Cytidia.* Burt and others have evidently considered it to belong in *Stereum* because the margin of the basidiocarp is free. As a matter of fact, the hymenium often curves around the margin until it is practically in contact with the substratum. Bourdot and Galzin (1928, p. 384) placed this species in their Section II. Sterea Spuria. B. Ambigua. It has no cuticular layer at the upper surface, the hyphae of the context show no indication of a horizontally parallel arrangement, and the texture and appearance of the basidiocarp are generally unlike other species more properly referred to *Stereum.*

Karsten (1889, p. 407) proposed the genus *Crytochaete* for this species and for *T. polygonia* Pers. ex Fr., Syst. Myc. 1: 444. 1821. The two apparently belong in the same genus, but whether or not *T. polygonia* is more

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properly placed in *Corticium* or *Peniophora* does not alter the facts that *C. rufa* is not a *Stereum* and is not apparently referable to any other known genus; therefore, Karsten's genus remains the only apparent alternative to devising another genus to include it.

While differing in gross appearance, *C. rufa* and *C. polygonia* have a number of characteristics in common. In each the sporocarp originates by erupting from the substratum more or less in the form of a tubercle. The margin of this tubercle then "spills" outward from the original point of attachment. In *C. polygonia*, the sporocarp spreads broadly and is generally adherent to the substratum so that it has a corticioid form. The margin is often free, however, and in any event there is a similarity in the growth pattern of these two species that is not entirely veiled by the fact that the basidiocarp of *C. rufa* remains tuberculiform while that of *C. polygonia* spreads and coalesces with adjacent basidiocarps. The appearance of the context in section is very similar in these two species. Both have fairly thick-walled, glassy-appearing context hyphae bearing clamp connections. Both have gloeocystidia, although the form of these differs between the two species. Both have more or less suballantoid spores and, curiously, both species occur principally on *Populus*.

Pilát (1926) has placed *C. polygonia* in a subgenus of *Aleurodiscus*, but the small spores and basidia prohibit its presence in that group as *Aleurodiscus* is generally understood. The other feature characterizing that genus, unusual hyphal-end modifications, has been abundantly demonstrated by the various species of *Stereum* and also occurs in other genera, families, and orders. I have considered leaving *C. rufa* in *Corticium*, where Schrenk (1894) placed it, but the development and structure of this species differ from that generally found in *Corticium*.

Bourdot and Galzin (1928, p. 320) and Eriksson (1950) have included *C. polygonia* in *Peniophora* Cke. sect. *Coloratae* Bourd. & Galz. Although it lacks cystidia, Eriksson regards that of slight importance and finds that the morphology of this species agrees with that of other *Coloratae* in several respects. At present, I prefer to follow Karsten's treatment.

4. Cryptochaete rufa

(Pls. 1, *E*; 8, *C*; 11, *A*)

Cryptochaete rufa (Fr.) Karst., Bidr. till Finlands Nat. och Folk 48: 408. 1889; *Thelephora rufa* Fr., Elench. 1: 187. 1828; *Stereum rufum* (Fr.) Fr., Epicr. 553. 1838 (non sensu Velenov., Ceske Houby 762. 1922); *Xerocarpus rufus* (Fr.) Karst., Bidr. till Finlands Nat. och Folk 37: 135. 1882, lacking Fr. publication data.

Tubercularia pezizoidea Schw., Am. Phil. Soc. Trans. (n. s.) 4: 301. 1832 [type, New York (Torrey), in PH]; *Corticium pezizoideum* (Schw.) Schrenk, Torrey Bot. Club Bul. 21: 388. 1894 (non *C. pezizoideum* Ell. & Ev., Jour. Mycol. 4: 74. 1888).

Hypocrea richardsoni Berk. & Mont., Grevillea 4: 14. 1875 [syntype, New England (Russell *5870*), in IMI].

Macroscopic

Basidiocarp lignicolous, waxy-cartilaginous, erumpent, tuberculiform, scattered or gregarious, rarely laterally coalescent, up to 9 mm. in diameter; hymenial surface various shades of "Corinthian red" to "vinaceous-brown," often with a grayish pruinose bloom, plane or convex, rugose.

Microscopic

In section up to 2,000μ thick; context pale "cream color" in mass, consisting of somewhat interwoven hyphae radiating from the point of attachment of the basidiocarp and having thick, gelatinous-refractile walls; gloeocystidia numerous and conspicuous in the subhymenium and hymenium, apex rounded, acute, acuminate, or retuse, wall thickened by a gelatinous sheath, contents granular, 52μ to 190μ by 7.5μ to 27.5μ, but only 5μ to 19μ in diameter excluding the gelatinous sheath, usually not protruding beyond the hymenial surface; cystidia in the hymenium exceedingly inconspicuous, usually recognizable only by the incrusted apices, observable length up to 36.5μ, diameter measured over the incrustation 4.5μ to 7.5μ, exserted very little; basidia 4-sterigmate, 30μ to 47.5μ by 3.5μ to 5.5μ; spores hyaline, curved-cylindrical or suballantoid, smooth, 6μ to 8.5μ by 2μ (rarely 1.5μ to 3μ). Plate 11, *A*, shows a hypha, gloeocystidia, a basidium, and spores.

Discussion

Thelephora rufa of Fries, Elench. 1: 187. 1828, is supposed by Fries to be the same as Persoon's (1822, p. 124) *T. rufo-marginata,* which Fries mistakenly lists as *T. rufa.* The host (*Tilia*) given by Fries is for Persoon's fungus. Persoon's *T. rufo-marginata* is not the same fungus as *T. rufa* of Fries; therefore, this and numerous other reports of *Tilia* as a host for *T. rufa* are erroneous. Fries says "etiam in Suecia," so Sweden is probably to be regarded as the type locality.

In describing *Hypocrea richardsoni,* Berkeley (1875) has listed a specimen from the mountains of New York, *4506,* which he stated to be a small variety. I have examined this specimen and find that it is truly a *Hypocrea.* Since *H. richardsoni,* as exemplified by specimen *5870,* is actually *C. rufa,* it and specimen *4506* are entirely different fungi.

There seems to be no previous report of cystidia in the present species. This is understandable, since they are so exceedingly inconspicuous and appear to be only some crystalline masses at and near the hymenial surface. I have examined these structures by oil immersion, and have no doubt that they are cystidia.

Habitat

Branches and twigs of *Populus,* especially *P. tremuloides* Michx. Possibly very rarely on other woody angiosperms.

Distribution

Europe, Asia, North America. Specimens from Iowa and Minnesota, and Burt (1920, p. 122) reports it from Wisconsin. Rea (1922, p. 667) says Miss Wakefield regards British records as actually *Eichleriella spinulosa* (Berk. & Curt.) Burt.

Miscellaneous Specimens Examined

BPI: Mexico (Smith *E & PQ 70416*). SUI: Iowa—Cedar Quarry (Wolf), Homestead (Davidson), Iowa City (Macbride; Martin *6516, 6517, 6518*), West Okoboji

(Martin *1358*); Minnesota—Cook (Martin), Hackensack (Newbro *SUI 1733*), Itasca State Park (Neely and Gardner); New Mexico—Cloudcroft (Shimek); Wyoming—Yellowstone Natl. Park (Conard *653*). All specimens listed were originally determined as *Stereum rufum*.

Illustrations

Burt (1920, text fig. 11; pl. 4, fig. 27); Emmons (1927, pl. 2, fig. 7); Overholts (1929, text fig. 17; 1939, pl. 17, fig. 21); Pilát (1930a, t. 17, fig. 10); Schrenk (1894, pl. 218).

Laxitextum

Laxitextum gen. nov.

Stereum Hill ex S. F. Gray subgen. *Malachodermum* Fr., Acta Soc. Sci. Upsala (ser. 3) 1: 111. 1851 (sensu Pat., Essai Tax. 72–73. 1900).

Generic Characterization

Basidiocarpi typice effuso-reflexi; nullo strato definito marginali in superficie superiori; contextu laxe intertexto, hyalino vel brunneo, non xanthochroico; hymenio inferiori, plano; cystidiis, gloeocystidiis et hyphalibus apicibus sterilibus praesentibus vel carentibus; basidiis sporisque ut in *Stereo* et *Peniophora*.

Macroscopic

Basidiocarp occasionally resupinate, but usually effused-reflexed, spongy-fragile to spongy-coriaceous, hymenial surface even.

Microscopic

In section lacking a cuticular layer at the upper surface; context of loosely interwoven hyphae that tend to form a network and only rarely assume a somewhat parallel arrangement; hymenium of vertically oriented elements that form a continuous stratum; sterile hyphal elements such as cystidia, gloeocystidia, or dendritically branched hyphae may be present; basidia and spores approximate those of *Stereum* and *Peniophora*.

Discussion

This genus differs from *Corticium* and *Peniophora* by having a more complex organization of the basidiocarp than is found in most species of those genera and by always having some individuals that are not totally resupinate. It differs from *Stereum* by lacking a cuticular layer, by not having a horizontally parallel arrangement of the context hyphae, and thus by having a much more loosely arranged context than is found in *Stereum*.

The type species is designated as *Thelephora bicolor* Pers. ex Fr., Syst. Myc. 1: 438. 1821. The species included in this genus are among those which Patouillard (1900, pp. 72–73) and Bourdot and Galzin (1928, p. 382) placed in *Stereum* subgen. *Malachodermum* Fr. Upon examining Fries's (1851, pp. 111–112) original discussion of this group, I found that his *S.* (*Malachod.*) *tenuissimum* Berk. is now known to be *Hymenochaete rheicolor* (Mont.) Lév. (see Petch and Bisby, 1950, p. 44), and his *S.* (*Malachod.*) *roseo-carneum* Schw. var. *ramealis* Fr. has *Corticium leveilleanum* Berk. listed as probably synonymous, while his type species, *S. vitile* Fr. (Fries, 1848, p. 143), has not been recognized since the original collection and probably no specimens now exist (see Doidge, 1950, p. 494). It has seemed advisable

to establish a new genus instead of attempting to elevate this subgenus, since *Malachodermum* Fr. may now be considered to be a nomen dubium.

5. Laxitextum bicolor

(Pls. 2, *A*; 8, *D*; 15, *A*)

Laxitextum bicolor (Pers. ex Fr.) comb. nov.; *Thelephora bicolor* Pers. ex Fr., Syst. Myc. 1: 438. 1821; Pers., Syn. 568. 1801; *T. fusca* Schrad. ex Gmel. in L., Syst. Nat. (ser. 13) 2: 1441. 1791 (non *T.* (*Himantia*) *fusca* Fr., Syst. Myc. 1: 451. 1821; nec *T. fusca* Fr., Elench. 1: 201. 1828); *Stereum bicolor* (Pers. ex Fr.) Fr., Epicr. 549. 1838; *S. fuscum* Karst., Icon. Select. Hym. Fenniae Nondum Del., Fasc. 1: 6. 1883; *Lloydella bicolor* (Pers. ex Fr.) Bres. in Lloyd, Mycol. Writ. 1, Mycol. Notes 6: 51. 1901; *L. fusca* (Karst.) Bres., Hedwigia 56: 300. 1915.

Stereum coffeatum Berk. & Curt., Grevillea 1: 164. 1873 [syntype, South Carolina (Curtis *2923*), in IMI; syntype, South Carolina (Ravenel *910* [sic]), in IMI].

Stereum pannosum Cke., Grevillea 8: 56. 1879 [syn. sec. Talbot, Bothalia 6: 308. 1954].

Stereum laxum Lloyd, Mycol. Writ. 4, Let. 60: 10. 1915 [syn. sec. Talbot, Bothalia 6: 308. 1954].

Macroscopic

Basidiocarp lignicolous, spongy, pliant, becoming somewhat fragile when dry, effused-reflexed and extending up to 15 by 7 cm., or conchate and often imbricate; upper surface "snuff brown" to "Prout's brown," wrinkled-membranaceous to indistinctly appressed-strigose, with a tendency to be concentrically sulcate; hymenial surface white when fresh, drying "light buff," "pale pinkish buff" to "clay color," or more rarely "avellaneous" to "wood brown," glabrous to pruinulose, even.

Microscopic

In section 800μ to 1,400μ thick; context hyphae brown, loosely interwoven, with prominent clamp connections, 2μ to 3.5μ (rarely 1μ to 4.5μ) in diameter; subhymenial hyphae hyaline, densely interwoven, profusely branched; gloeocystidia originating at the base of the subhymenium, colorless, refractile, slender, tapering toward the apex, 70μ to 110μ by 4.5μ to 8.5μ, protruding up to 10μ beyond the hymenial surface; basidia 4-sterigmate, 16.5μ to 24μ by 3.5μ to 4.5μ; spores hyaline, ellipsoidal to oval, smooth, 3.5μ to 4.5μ (rarely to 6μ) by 2μ to 3μ. Plate 15, *A*, shows a gloeocystidium, basidia, and spores.

Discussion

The contrast between the pale hymenium and the coffee-colored upper surface of *Laxitextum bicolor* is highly distinctive. This, together with the brown nodose-septate hyphae of the spongy context and the numerous gloeocystidia, makes the recognition of this species relatively easy.

Habitat

On rotting wood usually of angiosperms, rarely gymnosperms.

Distribution

Cosmopolitan but not common. Specimens from Iowa and Wisconsin, and Burt (1920, p. 120) reports it from Missouri.

Miscellaneous Specimens Examined

BPI: Florida—Camp O'Lena State Park (Dybas, as *Stereum bicolor*); Indiana—Scottsburg (Weir *6257*, as *S. fuscum*); Maine—Canton (Parlin *17371*, as *S. fuscum*); Maryland—Takoma Park (Shear *954*, as *S. fuscum;* Hedgcock *2101*, as *S. bicolor*); Virginia—Clarendon (*BPI 61082*, as *S. fuscum*); Washington—Metaline Falls (Weir *1771*, as *S. fuscum*); Wisconsin—Phillips (Humphrey *6805*, as *S. fuscum*); India—Askat (Koelz *21450*, as *S. bicolor*). SUI: Iowa—Iowa City (Martin *6530*, *6531*, *6532*, as *S. bicolor*).

Exsiccati Examined

Ellis and Everhart, Fungi Columbiani *1019;* Ravenel, Fungi Caroliniani, Fasc. 2, *33;* Ravenel, Fungi Americani *9;* Rick, Fungi Austro-Americani *183;* Thuemen, Myc. Univers. *1704.* All specimens as *Stereum bicolor.*

Illustrations

Banerjee (1935, text fig. 11; pl. 3, figs. 18–23; pl. 9, fig. 49); Bresadola (1932, t. 1067, fig. 1); Burt (1920, text fig. 10; pl. 4, fig. 26); Coker (1921, pl. 21, center); Karsten (1883, t. 2, fig. 9); Overholts (1939, pl. 14, fig. 5); Pilát (1930a, t. 17, fig. 12); Talbot (1951, pl. 26; 1954, fig. 21).

6. Laxitextum crassum

(Pls. 2, *B;* 8, *E;* 11, *C*)

Laxitextum crassum (Lév.) comb. nov.; *Thelephora crassa* Lév., Ann. des Sci. Nat. (ser. 3) Bot. 2: 209. 1844 [type, circa Tourane, Cochinchina (ex. herb. Bresadola), in BPI], (non *Stereum crassum* Fr., Acta Soc. Sci. Upsala (ser. 3) 1: 111. 1851; nec *Peniophora crassa* Burt ex Pk., N. Y. State Mus. Ann. Rpt. 54: 155. 1901); *Hymenochaete crassa* (Lév.) Berk. ex Cke., Grevillea 8: 148. 1880.

Corticium vinosum Berk., Hook. London Jour. Bot. 4: 60. 1845 [type, Swan River, Australia (Drummond *160*), in IMI]; *Hymenochaete* (*Veluticeps*) *vinosa* (Berk.) Cke., Grevillea 8: 149. 1880; *Peniophora vinosa* (Berk.) Mass., Linn. Soc. London, Jour., Bot. 25: 145. 1889; *Thelephora vinosa* (Berk.) Mass., Linn. Soc. London, Jour., Bot. 25: 145. 1889 (ut syn.), comb. attrib. to Berk.; *Lloydella vinosa* (Berk.) Bres., Ann. Mycol. 14: 233. 1916, lacking Berk. publication data.

Stereum umbrinum Berk. & Curt., Grevillea 1: 164. 1873 [type, South Carolina (Ravenel), in IMI], (non *S. umbrinum* Fr. in Lehm., Pl. Preiss. 2: 137. 1847); *Hymenochaete umbrina* (Berk. & Curt.) Berk. & Curt. ex Cke., Grevillea 8: 148. 1880.

Hymenochaete multispinulosa Pk., Bot. Gaz. 7: 54. 1882 [type, Camp Lowell, Ariz. (Pringle), in NYS].

Hymenochaete scabriseta Cke., Grevillea 11: 106–107. 1883 [type coll., Darien, Ga. (Ravenel, Fungi Americani *717*), in BPI]; *Lloydella scabriseta* (Cke.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 115 (1): 1580. 1906, lacking Cke. publication data.

Hymenochaete purpurea Cke. & Morg., Grevillea 11: 106. 1883 [type, Ohio (Morgan *11*), in IMI]; *Kneiffia purpurea* (Cke. & Morg.) Bres., Ann. Mycol. 1: 101. 1903; *Peniophora purpurea* (Cke. & Morg.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 781. 1907, lacking Cke. & Morg. publication data; *Stereum crassum* (Lév.) Bres. var. *purpurea* (Cke. & Morg.) Pat. & Demange, Soc. Mycol. de France, Bul. Trimest. 26: 45. 1910.

Peniophora intermedia Mass., Linn. Soc. London, Jour., Bot. 25: 143. 1889 [type coll., Florida (Ravenel, Fungi Americani *118*, as *Stereum papyrinum*), in BPI].

Hymenochaete kalchbrenneri Mass., Linn. Soc. London, Jour., Bot. 27: 116. 1890 [type coll., (Thuemen, Myc. Univers. *1504*, as *Corticium murinum*), in BPI]; *Peniophora kalchbrenneri* (Mass.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 115 (1): 1583. 1906; *Lloydella kalchbrenneri* (Mass.) Torrend, Brotéria 9: 89. 1910, comb. attrib. to Bres.

Hymenochaete kwangensis P. Henn., Mus. du Congo Belge Ann. Bot. (ser. 5) 2: 96–97. 1907 [type, Kisantu, Belgian Congo (ex herb. Bresadola), in BPI].

Macroscopic

Basidiocarp lignicolous spongy-coriaceous, resupinate, with the margin often narrowly reflexed, up to 3 cm. in diameter, often coalescent with adjoining basidiocarps and then up to 15 cm. in diameter; hymenial surface "Sayal brown" to "benzo brown," with the margin often "pale grayish vinaceous," pruinulose to puberulent, often minutely cracked when dry.

Microscopic

In section 300μ to 525μ thick (up to 1,000μ according to Burt, 1920, p. 192); context brownish, of loosely interwoven hyaline to pale-yellowish hyphae; cystidia originating at various levels of the context as the terminations of thick-walled septate hyphae, appearing most prominently in the hymenium, pale-yellowish-brown, incrusted with hyaline granular matter toward the apex, the apex rounded or tapering to a point, 75μ to 125μ by 7.5μ to 13.5μ, protruding up to 60μ beyond the hymenial surface; basidia borne in candelabra-like clusters, 4-sterigmate, 18.5μ to 22.5μ by 4μ to 6μ; spores hyaline, cylindrical, smooth, 7μ to 7.5μ (rarely 5.5μ to 8.5μ) by 3μ to 3.5μ. Plate 11, *C*, shows a cystidium, basidia, and spores.

Discussion

Laxitextum crassum is occasionally mistaken for an *Hymenochaete*, but it has incrusted cystidia instead of setae and also lacks the xanthochroic basidiocarp of *Hymenochaete*. The cystidia and the loosely interwoven context are distinctive for this species. According to Talbot (1951, p. 43), the cystidia are to be considered as apical modifications of skeletal hyphae.

Habitat

On dead trunks and branches of woody angiosperms.

Distribution

Cosmopolitan, or nearly so. Specimens from Iowa, and Burt (1920, p. 195) reports it from Illinois and Missouri.

Miscellaneous Specimens Examined

BPI: Florida—Camp Wewa in Orange County (Schallert), Kelly Park in Orange County (Schallert); Kansas—Manhattan (Rogerson and Shaffer *R 3495, R 3501*); Maryland—Herald Harbor (Stevenson), Shadyside (Diehl); North Carolina—Statesville (Shear); Liberia—Belefanai (Baldwin *12214*); all as *Stereum umbrinum;* Timor (Ferreira, as *Lloydella vinosa*). SUI: Iowa—Iowa City (Martin *2000, 3960, 3975, 6510, 6511, June 24 in 1943, SUI 915. Aug. 7 in 1936;* McGuire *SUI 1731;* Brasfield *SUI 1729, SUI 1730, SUI 1732, Sept. 28 in 1936, July 16 in 1937*), North Liberty (Gilbert *Nov. 16 in 1931*); all as *S. umbrinum.*

Exsiccati Examined

Ellis, N. Am. Fungi *606b*, as *Stereum papyrinum, 1108*, as *Hymenochaete scabriseta;* Ellis and Everhart, N. Am. Fungi *2315*, as *H. purpurea;* Ravenel, Fungi Caroliniani, Fasc. 2, *36*, as *S. papyrinum.*

Illustrations

Banerjee (1935, text fig. 12); Burt (1920, text fig. 31; pl. 6, fig. 59); Emmons (1927, pl. 2, fig. 6); Massee (1890, pl. 5, fig. 7); Overholts (1929, pl. 1, fig. 1; 1939, pl. 14, fig. 7); Talbot (1951, pl. 28; 1954, fig. 19).

7. Laxitextum roseo-carneum

(Pls. 2, *C* and *D*; 8, *F*; 11, *B*)

Laxitextum roseo-carneum (Schw.) comb. nov.; *Thelephora roseo-carnea* Schw., Naturf. Gesell. in Leipzig Schrift. 1: 107. 1822; Fr., Elench. 1: 226. 1828 (ut syn. *T. sterilis* Fr. nom. dubium); *Stereum* (*Malachodermum*) *roseo-carneum* (Schw.) Fr., Acta Soc. Sci. Upsala (ser. 3) 1: 112. 1851.

Corticium lilacino-fuscum Berk. & Curt., Grevillea 1: 180. 1873 [type, Connecticut (Wright *5610*), in IMI]; *Stereum lilacino-fuscum* (Berk. & Curt.) Lloyd, Mycol. Writ. 5, Let. 68: 8. 1919, lacking Berk. & Curt. publication data.

Corticium subrepandum Berk. & Cke., Grevillea 6: 81. 1878 [type, Newfield, N. J. (Ellis, Fungi New Jersey *2487*), in IMI].

Stereum sendaiense Lloyd, Mycol. Writ. 5, Mycol. Notes 48: 680. 1917 [type, Sendai, Japan (Yasuda), in BPI (Lloyd Herb.)].

Macroscopic

Basidiocarp lignicolous, soft-coriaceous, at first orbicular, 1 to 5 mm. or more in diameter, becoming confluent and effused, up to 9 by 3 cm. or more, the margin adherent or free but usually not broadly reflexed; hymenial surface "Rood's brown," "army brown," or "deep vinaceous-lavender," later fading to "cinnamon-buff," "cinnamon," "Mikado brown," or "fawn color," with the context showing through the cracked hymenium as "light buff" to whitish, even, the margin often minutely fibrillose and "avellaneous" in young sporocarps or "light buff" to whitish in older specimens.

Microscopic

In section 240μ to 460μ thick; context of irregularly interwoven, hyaline, branching, septate hyphae with numerous clamp connections, 2.5μ to 3μ (rarely 1.5μ to 3.5μ) in diameter, with the outer surface of the hyphal wall often bearing numerous delicate granular particles, the granules particularly abundant near the subhymenium; pseudodendrophyses in the hymenium hyaline to pale-yellowish-brown, irregularly branched, moderately thin walled, septate, with clamp connections, 1.5μ to 3μ in diameter, often somewhat obscured by granular matter; basidia 4-sterigmate, approximately 49μ by 8.5μ; spores hyaline, oval and flattened on one side, or approaching ellipsoidal, smooth, 8.5μ to 11μ (rarely 7μ) by 4.5μ to 6μ. Plate 11, *B*, shows a hypha, pseudodendrophyses, a basidium, and spores.

Discussion

The branched, dendrophysis-like hymenial hyphae afford the most distinctive feature, other than color, for recognition of *Laxitextum roseo-carneum*. These resemble ordinary context hyphae that have grown through the basidial layer and put forth numerous stunted branches. Clamp connections appear throughout these branched structures. They are not true dendrophyses of the type found in *Stereum versiforme* and *S. albobadium*. They also differ from those of *Eichleriella leveilleana* (Berk. & Curt.) Burt, which Bresadola (1896, p. 288) cited as being a synonym of *L. roseo-carneum*. The two species are clearly distinct from each other, and Bresadola's description of his fungus resembles neither species.

Thelephora sterilis Fr. (Fries 1821, p. 454; 1828, p. 226) and *T. anthochroa* Pers. ex Fr. (Fries 1828, p. 207) have been considered by some authors, starting with Fries, as synonymous with *T. roseo-carnea* Schw. Although I have not studied authentic specimens of these species, it seems unlikely that either belongs with the present species. *T. roseo-carnea* is not reported from Europe by Pilát (1930b), and there does not seem to be reference to it by other European authors except those based on American specimens or errors such as Killermann's (1943, p. 275) questioning referral of it to *Aleurodiscus roseus*.

Thelephora roseo-carnea is apparently restricted to woody angiosperms, while *T. sterilis* was described from *Abies*. In his Hymenomycetes Europaei, Fries (1874, p. 645) placed *T. sterilis* in quotation marks and included it among imperfect or sterile species. It does not seem to have been known to later authors. According to Burt (1920, p. 229), *T. anthochroa* of Schweinitz, but not of European authors, is a synonym of *T. roseo-carnea*. By this, he apparently means that Schweinitz (1832, p. 168) mistakenly referred his *T. roseo-carnea* to *T. anthochroa* Fr. According to Burt, *T. anthochroa* of European authors, evidently including Persoon, Albertini and Schweinitz, and Fries, is distinct from *T. roseo-carnea*, and I have accepted his judgment.

Habitat

On dead branches of woody angiosperms.

Distribution

Reported from Canada, United States, Brazil, Japan, and China. In the United States from New England to North Carolina and west to Iowa (Emmons, 1927) and Wisconsin (Burt, 1920, p. 232), but uncommon.

Miscellaneous Specimens Examined

BPI: District of Columbia—Washington (Pergande, as *Corticium lilacino-fuscum*); Maryland—Bowie (Lentz *31*, as *Stereum roseo-carneum*), Patuxent Wild Life Refuge (Lentz *45, 47*, as *S. roseo-carneum*); New Hampshire—Chocorua (Farlow, as *C. lilacino-fuscum*); New York—Alcove (Shear *1001, 1004, Oct. 1893*, as *S. roseo-carneum*), Woodstock (Shear *788*, as *C. lilacino-fuscum*); Nova Scotia—Colchester County (Wehmeyer *1587?*, as *S. roseo-carneum*), Kings County (*DLK 137; DAOM–F 5461;* both as *S. roseo-carneum*).

Exsiccati Examined

Ellis, N. Am. Fungi *20*, as *Corticium incarnatum*, *515*, as *C. lilacino-fuscum*.

Illustrations

Burt (1920, text fig. 48; pl. 6, fig. 77); Lloyd (1917a, text fig. 1015); Overholts (1939, pl. 15, fig. 10).

Stereum

Stereum Hill ex S. F. Gray, Brit. Plants 1: 652. 1821; Hill, Gen. Nat. Hist. vol. 2, Hist. of Plants 34. 1751.

Thelephora Fr., Syst. Myc. 1: 428. 1821 (pro parte, sed non typica).

Lopharia Kalchb. & MacOwan, Grevillea 10: 58. 1881.

Xylobolus Karst., Soc. pro Fauna et Flora Fenn. Meddel. 6: 11. 1881.

Sterellum Karst., Bidr. till Finlands Nat. och Folk 48: 405. 1889.

Chaetocarpus Karst., Bidr. till Finlands Nat. och Folk 48: 406. 1889.

Stereophyllum Karst., Hedwigia 28: 190. 1889.

Lloydella Bres. in Lloyd, Mycol. Writ. 1, Mycol. Notes 6: 51. 1901.

Stereofomes Rick, Egatea 15: 395. 1930.

Stereum Hill ex S. F. Gray subgen. *Crystallocystidium* Rick, Brotéria (ser. 3) 9: 43. 1940.

Stereum Hill ex S. F. Gray subgen. *Stereogloeocystidium* Rick, Brotéria (ser. 3) 9: 43. 1940.

Stereogloeocystidium (Rick) Rick, Brotéria (ser. 3) 9: 79. 1940.

Crystallocystidium (Rick) Rick, Brotéria (ser. 3) 9: 139. 1940.

Macroscopic

Basidiocarp usually on wood but also occurring on soil, soft-leathery to corky or nearly woody, occasionally almost entirely resupinate, but usually effused-reflexed, dimidiate, or laterally sessile; upper surface often covered by a brownish or grayish tomentum of usually thick-walled hyphae; hymenial surface usually yellowish or orange to brown, purple, or gray, usually glabrous or pruinulose, even or occasionally rough, but not spiny, poroid, or lamellate.

Microscopic

In section consisting of three definite layers in addition to the tomentum of the upper surface; the cuticular layer, or differentiated upper surface layer, having a golden-yellow to brown or nearly black color, consisting of densely massed to coalescent hyphae oriented parallel with the surface; the context, or intermediate layer, hyaline to yellowish or sometimes brownish in mass, consisting usually of both thin-walled and moderately thick walled hyphae oriented more or less parallel with the surface but not massed so compactly as in the cuticular layer and tending to be somewhat sinuous; hymenial layer, comprising the inferior surface, usually a single layer but sometimes of two or more strata composed of vertically oriented basidia and sterile hyphal ends variously modified as cystidia, pseudocystidia, cystidioles, gloeocystidia, dendrophyses, acanthophyses, or similar elements; basidia usually clavate, 2- or usually 4-sterigmate; spores hyaline or rarely slightly colored in mass, simple, subglobose to cylindrical and sometimes slightly curved, smooth, usually within the dimensions 3μ to 20μ by 1.5μ to 15μ.

Discussion

The type species is *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray, Brit. Plants 1: 653. 1821; *Thelephora hirsuta* Willd. ex Fr., Syst. Myc. 1: 439. 1821; Willd., Fl. Berolinensis Prodr. 397. 1787. The species of *Stereum*, excluding species that are segregated in other genera discussed in this monograph, constitute a reasonably homogeneous group characterized by their tough basidiocarp, their nonresupinate habit, and especially by their distinctive differentiation of the upper surface, context, and hymenium. Species resembling *S. hirsutum*, such as *S. ostrea* and *S. gausapatum*, form a closely related group. Superficial observation might lead one to believe that the stratose species such as *S. subpileatum* and *S. sulcatum* are definitely set apart from nonstratose species. Actually there is no difference in the basidiocarp of the two forms beyond the construction of additional hymenial layers in the stratose species. Even in *S. frustulatum* the same arrangement of the cuticular layer, context, and hymenial elements may be observed. Furthermore, basidiocarps of *S. ostrea* and other supposedly nonstratose species may be found to have at least one extra hymenial layer. A few species, such as *S. albobadium*, *S. erumpens*, and *S. versiforme*, do not entirely conform to the usual morphology of the genus, but they approach it so closely that it seems best not to remove them. These three species have some of the characteristics of *Peniophora* Cke. sect. *Coloratae* Bourd. & Galz., and perhaps eventually will be included in that group. In such case, *Peniophora* must be redefined to include species that are not completely resupinate.

Höhnel and Litschauer (1907) and Pilát (1926), especially, have directed considerable attention to the various modified sterile hyphal ends in the hymenia of various thelephores, particularly with respect to the kind found in species of *Aleurodiscus*. These structures are considered to be the most distinctive feature of *Aleurodiscus*, along with the large size of the spores and basidia. A careful study of the various species of *Stereum* shows that there is no fundamental difference between *Stereum* and *Aleurodiscus* with respect to modified hyphal ends. Acanthophyses are found in *S. frustulatum* and *S.*

subpileatum. Such common species as *S. ostrea* and *S. sanguinolentum* may have aculeate-tipped basidioles. Others, such as *S. ochraceo-flavum* and *S. striatum*, have umbonate-tipped pseudocystidia. *S. albobadium*, *S. versiforme*, and *S. erumpens* have dendrophyses. In addition, there are cystidia, gloeocystidia, vesicles, various kinds of cystidioles, and basidioles. Some species, such as *S. sanguinolentum* and *S. gausapatum*, have moderately thick walled hyphae with colored contents. These hyphae often end among the hymenial elements and, although not very conspicuous, the hymenial ends of these hyphae may be called pseudocystidia. Usually they do not protrude from the hymenium as do the pseudocystidia of *S. ochraceo-flavum* and *S. striatum*. Other species, including *S. complicatum*, *S. hirsutum*, and *S. ostrea*, also may have these hyphae, but in these species usually fewer of the hyphae have colored contents.

8. Stereum albobadium

(Pls. 2, *E*; 14, *D*)

Stereum albobadium (Schw. ex Fr.) Fr., Epicr. 551. 1838; *Thelephora albobadia* Schw. ex Fr., Elench. 1: 189. 1828; Schw., Naturf. Gesell. in Leipzig Schrift. 1: 108. 1822 [type, Salem, N. C., in BPI (Michener Herb.)]; *Lloydella albobadia* (Schw. ex Fr.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 772. 1907, lacking Schw. and Fr. publication data.

Thelephora albo-marginata Schw. in Berk., Hook. London Jour. Bot. 6: 324. 1847 [type, Cincinnati, Ohio, in IMI]; *Peniophora albo-marginata* (Schw. in Berk.) Mass., Linn. Soc. London, Jour., Bot. 25: 144. 1889.

Stereum coffearum Berk. & Curt., Linn. Soc. London, Jour., Bot. 10: 332. 1869 [type, Cuba (Wright *247*), in BPI]; *Lloydella coffearum* (Berk. & Curt.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 753. 1907.

Hymenochaete paupercula Berk. & Curt., Linn. Soc. London, Jour., Bot. 10: 334. 1869 [type, Cuba (Wright *542*), in IMI]; *Peniophora paupercula* (Berk. & Curt.) Cke., Grevillea 8: 150. 1880.

Stereum bizonatum Berk. & Curt., Grevillea 1: 163. 1873 [type, South Carolina, in IMI].

Macroscopic

Basidiocarp lignicolous, thin, coriaceous, resupinate, with the margin sometimes reflexed, approximately 1 to 10 mm. in diameter, enlarging to 2 to 25 by 1 to 4 cm. by confluence with adjoining basidiocarps; upper surface of reflexed basidiocarps "wood brown" to "snuff brown," silky to somewhat strigose, more or less zonate; hymenial surface "vinaceous-buff" to "army brown," becoming "light cinnamon-drab" to "drab" in old specimens, pruinulose, the margin white or pale-colored in younger specimens, later concolorous with the hymenium, velutinate.

Microscopic

In section 200μ to 550μ thick; cuticular region brownish, thin, often poorly defined or lacking; context hyphae subhyaline, loosely interwoven to more

or less horizontally parallel, with clamp connections, 2μ to 2.5μ (rarely 1.5μ to 3.5μ) in diameter; dendrophyses very numerous in the hymenium, subhyaline or pale-brown; cystidia hyaline, incrusted, conical, 24μ to 51μ by 9.5μ to 14μ, some completely submerged, others protruding up to 25μ beyond the hymenial surface; basidia 4-sterigmate, approximately 26.5μ to 27.5μ by 5μ; spores hyaline, cylindrical, smooth, 7.5μ to 10.5μ by 2.5μ to 4μ. Plate 14, *D*, shows dendrophyses, a cystidium, and spores.

Discussion

Stereum albobadium is distinguished from *Peniophora* by the narrowly reflexed margin or by the dark cuticular region when this is sufficiently developed. The antler-branched dendrophyses are very distinctive. Young specimens of *S. albobadium* usually have a bright hymenial surface, the brown hymenium contrasting strikingly with the white margin. With age, the hymenium becomes uniformly "drab" and the fungus is then much less conspicuous. *S. erumpens* and *S. versiforme* may be distinguished from *S. albobadium* by differences in size of cystidia and spores.

Habitat

On dead wood and fallen branches of many woody angiosperms.

Distribution

Eastern half of the United States and south to the Caribbean region. Specimens from Iowa, and Burt (1920, p. 219) reports it from Missouri. Talbot (1951, p. 45) says that Kalchbrenner's (1881) report from South Africa is erroneous.

Miscellaneous Specimens Examined

BPI: Alabama—Auburn (Underwood); District of Columbia—Washington (Shear); Florida—Winter Park (Shear); Kansas—Manhattan (Rogerson and Shaffer *R 3482, R 3487, R 3490, R 3493, R 3494*); Maryland— Bowie (Lentz *6*), Great Falls (Stevenson), Patuxent Wild Life Refuge (Lentz *36, 46*); Pennsylvania—Holland (McConnell); Virginia—Blacksburg (Shear), East Falls Church (Weir and Diehl). SUI: Iowa—Iowa City (Martin *5133, 5142, 6512, 6513, 6515*), Michael (Shimek), Montrose (Shimek).

Exsiccati Examined

Bartholomew, Fungi Columbiani *3688;* Ellis, N. Am. Fungi *15;* Ravenel, Fungi Caroliniani, Fasc. 1, *29*.

Illustrations

Burt (1920, text fig. 42; pl. 6, fig. 71); Coker (1921, pl. 31, figs. 14 and 15); Overholts (1939, pl. 14, fig. 6).

9. Stereum versiforme

(Pls. 2, *F*; 8, *G*; 14, *A*)

Stereum versiforme Berk. & Curt., Grevillea 1: 164. 1873 [type, Pennsylvania (Michener, comm. Curtis *4265*), in IMI; authentic specimens?, New Garden in Chester County, Pa. (Michener *1868, 1915*, det. Curtis?), in BPI (Michener Herb.)]; *Peniophora versiformis* (Berk. & Curt.) Bourd. & Galz., Hym. de France 327. 1928, lacking Berk. & Curt. publication data.

Corticium carbonicolum Pat., Rev. Mycol. 7: 152. 1885 [syn. *Peniophora versiformis* sec. John Eriks., Symb. Bot. Upsal. 10 (5): 69. 1950]; *P. carbonicola* (Pat.) Mass., Linn. Soc. London, Jour., Bot. 25: 146. 1889.

Peniophora ellisii Mass., Linn. Soc. London, Jour., Bot. 25: 144. 1889 [type coll., Newfield, N. J. (Ellis, Fungi of New Jersey *3460*=N. Am. Fungi *606*, as *Stereum papyrinum* Mont.), in NY].

Peniophora obscura (Pers.) Bres. sensu Bres., Accad. delle Sci. Let. ed Art. Rovereto Atti (ser. 3) 3: 113. 1897 [definitive specimen, Prencov, Hungary (Kmet), in S (Bresadola Herb.)], (non *P. obscura* sensu Bourd. & Galz., Hym. de France 327. 1928; nec *Thelephora obscura* Pers., Myc. Eur. 1: 146. 1822).

Macroscopic

Basidiocarp lignicolous, coriaceous, resupinate or narrowly reflexed, orbicular, 1 to 14 mm. in diameter, spreading by growth and confluence up to 10 by 2.5 cm.; upper surface at first "Mars brown" to "Prout's brown," puberulent, finally "bone brown" to dull-black, glabrous; hymenial surface "Mars brown" to "Prout's brown" or occasionally "cinnamon-drab," velutinous, even, often cracked in dried specimens, the narrow margin often "russet," or "fawn color" to "cinnamon-drab."

Microscopic

In section 100μ to 250μ (rarely to 350μ) thick; cuticular region a blackish organization of dark-brown densely massed branching hyphae which project abundantly into the context to give it a brown color; dendrophyses numerous in the hymenium, brown, profusely branched; cystidia originating in all parts of the basidiocarp but most conspicuous in the hymenium, pale-yellowish-brown toward the base, with a hyaline incrustation toward the apex, 36μ to 80μ by (rarely 9.5μ) 15μ to 23μ, protruding up to 10μ or 15μ (rarely to 25μ) beyond the hymenial surface; basidia 4-sterigmate; spores hyaline, curved-cylindrical, smooth, 5μ to 7μ by 1.5μ to 2μ. Plate 14, *A*, shows dendrophyses, a cystidium, and a spore.

Discussion

The general aspect of *Stereum versiforme* is somewhat like that of *S. albobadium*, from which it is distinguishable by its generally darker color, larger cystidia, and smaller spores. Surely Eriksson (1950) must be incorrect in his assertion that *S. versiforme* is totally resupinate. There may be some question as to whether the species belongs in *Stereum*, but certainly a large proportion of basidiocarps that I have seen are at least narrowly reflexed.

Habitat

On dead branches and twigs of woody angiosperms.

Distribution

Europe, China, Canada, the eastern half of the United States south to South Carolina and Alabama. A specimen from Illinois, and Burt (1920, p. 224) reports it from Iowa and Missouri.

Miscellaneous Specimens Examined

BPI: Illinois—Metropolis (Humphrey *9621*); Indiana—Turkey Run State Park (Bechtel); Maryland—Glen Sligo (Shear *1050*), Takoma Park (Shear *1020*; Shear); New York—Ithaca (Thom), McLean Bog near Ithaca (Stevenson), Pleasantville

(Hedgcock); Pennsylvania—Bear Meadows in Center County (Overholts *5430*); Virginia—Shenandoah Natl. Park (Stevenson); West Virginia—Fayette County (Nuttall *1347*); China—Hangchow (Ou *3357*). FH: France—St. Sernin (Galzin, det. Bourdot *4012* (*2*), as *Peniophora carbonicola*).

Exsiccati Examined

Ellis and Everhart, N. Am. Fungi *3209*, as *Peniophora ellisii;* Ellis and Everhart, Fungi Columbiani *611*, as *P. ellisii;* Thuemen, Myc. Univers. *307*.

Illustrations

Burt (1920, text fig. 44; pl. 6, fig. 73); Eriksson (1950, text fig. 23); Overholts (1939, pl. 16, fig. 18).

10. Stereum erumpens

(Pls. 3, *A*; 9, *A*; 14, *B*)

Stereum erumpens Burt, Mo. Bot. Gard. Ann. 7: 209. 1920 [type, Takoma Park, Md. (Shear *1043*), in BPI]; *S. versiforme* Berk. & Curt. forma *erumpens* (Burt) Killerm., Ann. Mycol. 41: 273. 1943.

Macroscopic

Basidiocarp lignicolous, erumpent from the substratum to form a small pezizaeform or plane frustule with the margin adnate and delicately fimbriate or free and entire, or often attached to the substratum by an umbo and adherent along one side with the other side reflexed, the individual basidiocarp 1 to 8 by 0.5 to 4 mm., sometimes confluent with adjoining basidiocarps to extend for several centimeters; upper surface "bister" or "mummy brown," crustose, sometimes with delicately puberulent zones, obscurely concentrically sulcate; hymenial surface "pale mouse gray," "light drab," or "vinaceous-buff" to "wood brown" when dry, becoming "wood brown," "bone brown," or "seal brown" when moistened, pruinulose, even or with inconspicuous rounded tubercles.

Microscopic

In section 175μ to 400μ thick, 500μ to 800μ thick through the umbo; cuticular region of densely massed blackish hyphae; context of intermixed brown and hyaline hyphae which are pale brown in mass, often with one or two darker strata and a final dark stratum at or near the subhymenium marking the terminations of brown hyphae; cystidia originating at various levels of the context and subhymenium, hyaline, or yellowish toward the base, incrusted, 25μ to 69μ by 5.5μ to 23μ, remaining submerged or exserted up to 25μ; basidia 4-sterigmate, 19μ to 20μ by 4.5μ to 5μ; spores hyaline, cylindrical or slightly curved-cylindrical, smooth, 6μ to 7μ by 1.5μ to 2.5μ. Plate 14, *B*, shows dendrophyses, cystidia, a basidium, and spores.

Discussion

Stereum erumpens resembles *S. versiforme* rather closely, but seems to differ in habit of growth and also in color. The brown hyphal tips, which Burt (1920, p. 210) considers to be of considerable diagnostic importance, are variable in form and to some extent also in position. In some specimens, as in the type, these structures are antler-like dendrophyses similar to those of *S. versiforme*. In other specimens the form appears to be simple, with a

complete absence of branching. The "glöozystiden" noted by Killermann (1943, p. 274) must be the crystal-incrusted cystidia that occur both in *S. versiforme* and *S. erumpens*.

Habitat

On woody angiosperms.

Distribution

Canada, the United States from New England to Alabama and west to Washington. Zeller (1929) reports that it is the most common thelephoraceous species on pomaceous fruit trees in the Pacific Northwest. Burt (1920, p. 211) reports it from Illinois, and Gardner (1947) includes it in her Iowa list.

Miscellaneous Specimens Examined

BPI: District of Columbia—Washington (Shear *959*); Indiana—Scottsburg (Weir *5836*); Montana—Missoula (Weir *1761*); Oregon—Grants Pass (Weir *8701*); North Dakota—Custer (Weir *9629*); Washington—Bellingham (Weir *1759*).

Exsiccati Examined

Bartholomew, Fungi Columbiani *5090*.

Illustrations

Burt (1920, text fig. 38; pl. 6, fig. 67).

11. Stereum radiatum

(Pls. 3, *B*; 9, *B*; 12, *E*)

Stereum radiatum Pk., Buffalo Soc. Nat. Hist. Bul. 1: 62. 1873 [type, Catskill Mts., N. Y., in NYS].

?Thelephora corrugata Lév., Ann. des Sci. Nat. (ser. 3) Bot. 5: 150. 1846 [? syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 181. 1920], (non *T. corrugata* Fr., Elench. 1: 224. 1828; nec *Hymenochaete corrugata* Berk., Outl. British Fung. 272. 1860); ? *Stereum corrugatum* (Lév.) Sacc., Syll. Fung. 6: 581. 1888, comb. attrib. to Lév., (non *S. corrugatum* (Fr.) Quél., Fl. Myc. France 15. 1888).

Stereum radiatum Pk. var. *reflexum* Pk., N. Y. State Mus. Ann. Rpt. 49: 31. 1896 [type, Franklin County, N. Y., in NYS].

Macroscopic

Basidiocarp lignicolous, coriaceous, suborbicular, resupinate, with the margin usually narrowly reflexed, 2.5 to 12.5 by 2 to 8 cm., or rarely forming an imbricate cluster of small, broadly reflexed pilei; upper surface "bone brown" to dull-black, tomentulose, with the tomentum becoming appressed, inconspicuously concentrically sulcate; hymenial surface "amber brown" or "Sudan brown," or sometimes charcoal black over much of the surface, minutely velutinous, radiately corrugate.

Microscopic

In section 300μ to 800μ thick; tomentum 300μ to 800μ thick, the tomental hyphae grayish-brown to grayish-black, entangled, sparingly branched, thick-walled, often with verruculose protuberances covering the surface of the wall, (rarely 2.5μ) 3.5μ to 4.5μ in diameter; cuticular layer black; context hyphae hyaline or subhyaline, with occasional brown hyphae interspersed, loosely

arranged in the subhymenium and adjoining context, 2μ to 3.5μ in diameter; cystidioles inconspicuously incrusted, filiform, occasionally branched, apex more or less pointed, lumen usually dark-brown, 1.5μ to 4μ in diameter, protruding up to 30μ or more beyond the hymenial surface; basidia 4-sterigmate, 5μ to 6μ in diameter (30μ to 35μ by 6μ to 7μ sec. Bourdot and Galzin 1928, p. 373); spores hyaline or rarely pale-brown, cylindrical, smooth, 7.5μ to 9.5μ by 2.5μ to 3.5μ. Plate 12, *E*, shows nodulose hyphae, cystidioles, basidioles, a basidium, and spores.

Discussion

Stereum radiatum has somewhat the appearance of an *Hymenochaete*, but the basidiocarp is not xanthochroic and lacks setae. The rusty-brown hymenium, blackish upper surface, and slender, protruding cystidioles are distinctive.

Habitat

On logs, boards, and charred wood of gymnosperms.

Distribution

In mountainous and northern areas of Europe, Asia, and North America. In the United States from New England to Montana and south to the Smoky Mountains. A specimen from Wisconsin, and C. E. Bessey (1884, p. 148) reports it from Iowa.

Miscellaneous Specimens Examined

BPI: Michigan—Brutus (Gehman); Montana—Darby (Weir *1697*); New York—Albany (Peck), Ithaca (Thom), North Greenbush (Peck); Pennsylvania—State College (Overholts *2653*); Virginia—Shenandoah Natl. Park (Stevenson); Wisconsin—Ladysmith (Humphrey *6832*).

Exsiccati Examined

Ellis, N. Am. Fungi *407*.

Illustrations

Burt (1920, text fig. 26; pl. 5, fig. 53); Overholts (1939, pl. 18, fig. 28); Pilát (1930b, t. 2, bottom).

12. Stereum abietinum

(Pls. 3, *C*; 13, *E*)

Stereum abietinum (Pers. ex Fr.) Fr., Epicr. 553. 1838; *Thelephora abietina* Pers. ex Fr., Syst. Myc. 1: 442. 1821; Pers., Syn. 573. 1801 [type, Harz Mts., Germany, in L]; *Xerocarpus abietinus* (Pers. ex Fr.) Karst., Bidr. till Finlands Nat. och Folk 37: 136. 1882, lacking Pers. and Fr. publication data; *Chaetocarpus abietinus* (Pers. ex Fr.) Karst., Bidr. till Finlands Nat. och Folk 48: 406. 1889; *Hymenochaete abietina* (Pers. ex Fr.) Mass., Linn. Soc. London, Jour., Bot. 27: 115. 1890.

Thelephora crispa Pers. ex Fr., Syst. Myc. 1: 437. 1821; Pers., Syn. 568–569. 1801 [type, Harz Mts., Germany, in L].

Thelephora conchata Fr., Syst. Myc. 1: 438. 1821; *Stereum conchatum* (Fr.) Fr., Epicr. 549. 1838 [syn. sec. Pilát, Hedwigia 70: 75–76. 1930].

Thelephora striata Schrad. ex Gmel. in L., Syst. Nat. (ser. 13) 2: 1441. 1791 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 186. 1920] (non *T. striata* Fr.,

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Elench. 1: 179. 1828); *Stereum striatum* Fr., Epicr. 551. 1838 (non *S. striatum* (Fr.) Fr., Epicr. 548. 1838); *Lloydella striata* (Fr.) Bres. in Lloyd, Mycol. Writ. 1, Mycol. Notes 6: 51. 1901, lacking Fr. citation.

Stereum glaucescens Fr., Hym. Eur. 644. 1874 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 186. 1920]; *Xerocarpus glaucescens* (Fr.) Karst., Bidr. till Finlands Nat. och Folk 37: 135–136. 1882, lacking Fr. publication data; *Chaetocarpus glaucescens* (Fr.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 115 (1): 1578. 1906, comb. attrib. to Karst.

Hymenochaete fimbriata Ell. & Ev., Jour. Mycol. 1: 149. 1885 [type, Yellowstone Natl. Park, Mont., in NY].

Hymenochaete abnormis Pk., N. Y. State Mus. Ann. Rpt. 42: 124. 1889 [type, Cascadeville, N. Y., in NYS].

Stereum pinicolum Velenov., Ceske Houby 764. 1922 [syn. sec. Pilát, Hedwigia 70: 75–76. 1930.]

Macroscopic

Basidiocarp lignicolous, coriaceous-spongy, resupinate with a thin, even margin, or effused-reflexed with the free margin often thickened and sulcate; upper surface "chestnut-brown" or "Mars brown," matted-tomentose, sometimes inconspicuously sulcate with the bare sulcate areas "fuscous"; hymenial surface "vinaceous-buff" to "wood brown," or more often "pale vinaceous-drab," "light drab," or "pale mouse gray," often covered by a pruinose white bloom, even.

Microscopic

In section 435μ to 2,175μ thick; tomental hyphae "tawny-olive," thick-walled, nonseptate or with few septa, 3μ to 4.5μ in diameter; cuticular layer blackish, well-defined; context brown in mass, with hyphae of two kinds—one kind hyaline, branching, thin-walled, septate, with clamp connections, 2μ to 3μ in diameter, the other kind brownish, unbranched or sparingly branched, thick-walled, mostly nonseptate, lacking clamp connections, 3μ to 6.5μ in diameter, often broadened toward the apices to form embedded pseudocystidia up to 300μ by 5μ to 9.5μ, these structures together with true cystidia forming several more or less distinct strata in the region underlying the active hymenium; cystidia pale when young and moderately thin walled, darkening with increasing thickness of the wall and eventually becoming very dark brown, not incrusted, wall finally 1.5μ to 6μ thick, with a basal clamp connection, 75μ to 260μ by 8μ to 17μ, protruding up to 80μ beyond the hymenial surface; basidia 4-sterigmate, with a basal clamp connection, 72μ to 100μ by 6μ to 7μ; spores hyaline, smooth, 8.5μ to 11.5μ by 4.5μ to 5μ. Plate 13, *E*, shows cystidia, a basidium, and a spore.

Discussion

The brown hyphae of *Stereum abietinum* often originate from branched, hyaline hyphae. There is a clamp connection at the juncture between the two forms, but there are no further clamp connections in the brown part. Occasionally a clamp connection may be seen at the base of a hymenial

cystidium, and it appears that a clamp connection is often or always present wherever the hyaline part of a hypha gives rise to a thicker walled brown part.

The cobwebby pruinosity over the hymenium is seen under magnification to consist of colorless, extremely long and slender threadlike crystals. These may be 15μ to 220μ long, or perhaps even longer, and 0.5μ to 1.5μ (rarely to 6μ) in diameter. An additional distinctive character of this species is the unusual length of the basidia. Burt (1920, p. 187) says that the cystidia may be incrusted, but I have not seen them thus. Overholts (1939) and Bourdot and Galzin (1928, p. 377) describe the walls as sometimes rugose, but not incrusted. Patouillard's (1900, p. 72, fig. 48) illustration shows crystalline matter in the context and on the cystidia.

Habitat

On stumps and logs of gymnosperms.

Distribution

In mountainous and northern areas of Europe and North America. Burt (1920, p. 188) cites a specimen from Wisconsin.

Miscellaneous Specimens Examined

BPI: Alaska—Ketchikan (Baxter), Lower Russian Lake (Baxter), Sheep's Creek (Baxter); Canada—Burnt Island (Baxter), Fort Smith (Baxter); Austria—Bad Ratzes (?) (Bresadola), Vienna (Höhnel); France—Strasbourg (Maire), Vosges (Maire); Italy—Castelfondo (Bresadola), Rumo (?) (Bresadola); Sweden—Stockholm (Romell *6, 2913*), Uppsala (Lloyd *08521*).

Exsiccati Examined

Lundell and Nannfeldt, Fungi Exs. Suecici *458;* Petrak, Fl. Bohemiae et Moraviae, Ser. 2 (Abt. 1), *1856,* as *Lloydella striata, 2089;* Thuemen, Myc. Univers. *1107.*

Illustrations

Bier (1949, pl. 21, figs. 1–6): Burt (1920, text fig. 28; pl. 5, fig. 56); Killermann (1928, text fig. 99, C); Massee (1890, pl. 5, fig. 8); Patouillard (1900, fig. 48); Peck (1889, pl. 1, figs. 13–16); Pilát (1930a, t. 16, fig. 7).

13. Stereum chailletii

(Pls. 3, *D*; 9, *C*; 12, *C*)

Stereum chailletii (Pers. ex Fr.) Fr., Epicr. 551. 1838; *Thelephora chailletii* Pers. ex Fr., Elench. 1: 188. 1828; Pers., Myc. Eur. 1: 125–126. 1822 [type, Neuchatel, Switzerland, in L]; *Lloydella chailletii* (Pers. ex Fr.) Bres. in Lloyd, Mycol. Writ. 1, Mycol. Notes 6: 51. 1901, lacking Pers. and Fr. publication data.

Xerocarpus ambiguus Karst., Soc. pro Fauna et Flora Fenn. Acta 2 (1): 38. 1881 [type, Merimasku in Dept. of Abo, Finland (Karsten), in H]; *Trichocarpus ambiguus* (Karst.) Karst., Bidr. till Finlands Nat. och Folk 48: 407. 1889; *Hymenochaete ambigua* (Karst.) Karst., Hedwigia 28: 26. 1889, lacking Karst. publication data.

Peniophora atkinsoni Ell. & Ev., Acad. Nat. Sci. Phila. Proc. 1894: 324. 1894 [type, Syracuse, N. Y., in NY].

Macroscopic

Basidiocarp lignicolous, coriaceous, resupinate, with the margin often narrowly reflexed, covering areas up to 13 by 6 cm.; upper surface "drab" to "hair brown," subtomentose, obscurely concentrically sulcate; hymenial surface "avellaneous" to "wood brown" or intermediate between "cinnamon" and "Sayal brown," subvelutinate, even or somewhat uneven.

Microscopic

In section 300μ to 1,000μ thick; tomental hyphae brown; cuticular layer dark-brown, thin; context of intermixed hyaline and pale-brown hyphae 2μ to 4μ in diameter, the brown hyphae usually of greater diameter than the hyaline; hymenial region simple or occasionally stratose; cystidia originating as brown hyphal elements of the context, incrusted, with a basal clamp connection, 50μ to 125μ (rarely to 207μ) by 4.5μ to 5μ (rarely 3.5μ to 6μ), protruding up to 22.5μ beyond the hymenial surface; basidia 4-sterigmate, approximately 26μ by 4.5μ; spores hyaline, ellipsoidal-cylindrical to cylindrical, smooth, 6μ to 8.5μ by 2.5μ to 3μ. Plate 12, *C*, shows cystidia, a basidium, and spores.

Discussion

Stereum chailletii has brown cystidia instead of setae and does not darken in potassium hydroxide solution as does *Hymenochaete*. It may be distinguished from *Peniophora* by the margin that is often at least narrowly reflexed and, in sectional preparations, usually by the well-differentiated cuticular region characteristic of *Stereum*.

Habitat

On gymnosperm logs, only rarely on *Pinus*.

Distribution

In mountainous and northern areas of Europe, China, and North America. A specimen from Iowa, and Burt (1920, p. 202) reports it from Wisconsin.

Miscellaneous Specimens Examined

BPI: Idaho—Coolin (Weir *11527*), Priest River (Weir *1752*); Iowa—Kendallville (Shimek *SUI 1748*); Washington—Bellingham (Weir *7559*), Lake Crescent (Alex. Smith *14061*), Stanwood (Humphrey *7358*); British Columbia—Salerno (Weir *1754*); Bohemia—Trebon (Bubak, as *Lloydella chailletti*); Sweden—Stockholm (Romell *7*, as *Stereum abietinum*).

Exsiccati Examined

Ellis and Everhart, N. Am. Fungi *2904*, as *Hymenochaete simulans* nom. nud., [type].

Illustrations

Burt (1920, text fig. 34; pl. 6, fig. 62); Pilát (1930a, t. 16, fig. 6; 1933, p. 322).

14. Stereum frustulatum

(Pls. 4, *A*; 13, *C*)

Stereum frustulatum (Pers. ex Fr.) Fckl., Jahrb. des Nassau. Verein f. Naturk. 15: 102. 1861, comb. attrib. to Fr.; *Thelephora frustulata* Pers. ex Fr., Syst. Myc. 1: 445. 1821; Pers., Syn. 577. 1801 [syntype, Stockholm, Sweden (Swartz), in L]; *S. frustulosum* Fr., Epicr. 552.

1838; *Xylobolus frustulosus* (Fr.) Karst., Soc. pro Fauna et Flora Fenn. Acta 2 (1): 40. 1881, lacking Fr. publication data; *Xerocarpus frustulosus* (Fr.) Karst., Bidr. till Finlands Nat. och Folk 37: 134. 1882.

Thelephora sinuans Pers., Myc. Eur. 1: 128. 1822 [type coll., France (Mougeot and Nestler, Stirpes Crypt. Vogeso-Rhen. *680a*), in BPI]; *T. frustulata* Pers. ex Fr. β var. *crassa* Fr., Elench. 1: 191. 1828.

Thelephora perdix Hartig, Zersetzungerscheinungen des Holzes 103–108. 1878 [cit. et syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 227. 1920].

Stereum nummularium Velenov., Ceske Houby 764. 1922 [topotype, Mnichovice, Czechoslovakia (Pilát), in PR].

Macroscopic

Basidiocarp lignicolous, ligneous, tuberculiform, with the margin adherent or narrowly reflexed, often gregarious as polygonal frustules each attached to the substratum by a narrowed base, 2 to 18 mm. in diameter, forming colonial aggregations up to 10 by 4 cm. or sometimes larger; upper surface of reflexed basidiocarps "warm sepia," "bister," or black, glabrous, concentrically sulcate; hymenial surface "light buff," slightly paler than "tawny olive," or "tilleul buff" to "avellaneous," pruinulose, even or somewhat rugulose.

Microscopic

In section up to 3,000μ thick; cuticular layer brown; context often very narrow, soon giving rise to a multistratose, very thick hymenial region that usually includes much crystalline matter; acanthophyses hyaline when young, darker in the deeper strata, with numerous aculeate protuberances, 28μ to 55μ by 3.5μ to 6.5μ; basidia 4-sterigmate, 22.5μ to 31.5μ by 3.5μ to 5μ; spores hyaline, ovoid, smooth, 3.5μ to 5μ by 2.5μ to 3μ. Plate 13, *C*, shows an acanthophysis, a basidium, and spores.

Discussion

Stereum frustulatum is closely related to *S. subpileatum*, but it is much different macroscopically and also lacks the cystidia that commonly appear in *S. subpileatum*.

Habitat

On stumps and logs of *Quercus* and less commonly on *Castanea*.

Distribution

Europe, China, the Philippine Islands, North America from Canada to Mexico and west to North Dakota and Texas. A report from Oregon (Burt, 1920, p. 229) evidently refers to a specimen that Weir (1919) found on an oak timber sent from Ohio. Common in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: Kansas—Manhattan (Rogerson *R 3486*); Maryland—Beltsville Forest Service (Lentz *2, 11*). SUI: Iowa—Cou Falls (Macbride and Puckett), Iowa City (Martin *3492, 6520, Apr. 25 in 1935;* McGuire *SUI 1737;* Emmons *SUI 1085;* Newbro), Milford (Lohman *SUI 1254*), North Liberty (Martin *1050*), Pine Hollow (Martin *6519*), Sedan (Shimek), Turkey Creek (Martin *Sept. 28 in 1935;* Wolf *Oct. 29 in 1927*).

Exsiccati Examined

Bartholomew, Fungi Columbiani *1881*, *4587*, both as *Stereum frustulosum;* Ellis, N. Am. Fungi *106*, as *S. frustulosum;* Lundell and Nannfeldt, Fungi Exs. Suecici *79;* Ravenel, Fungi Caroliniani, Fasc. 2, *34*, as *S. frustulosum;* Thuemen, Myc. Univers. *308*, as *S. frustulosum.*

Illustrations

Burt (1920, text fig. 47; pl. 6, fig. 76); Coker (1921, pl. 18, left; pl. 35, figs. 9 and 10); Cooke (1906, pl. 20, fig. 20); Emmons (1927, pl. 2, fig. 9); Freeman (1905, text fig. 118); Lloyd (1917b, text fig. 1041; 1925, pl. 322, fig. 3087); Overholts (1939, pl. 18, fig. 27); Pilát (1930a, t. 17, fig. 16; 1930b, t. 2, top) Tubeuf and Smith (1897, text figs. 260 and 261); Velenovsky (1922, text pl. 136, fig. 5).

15. Stereum subpileatum

(Pls. 4, *B*; 15, *B*)

Stereum subpileatum Berk. & Curt. in Hook., Jour. Bot. and Kew Gard. Misc. 1: 238. 1849 [syntype, Ohio (Lea *233*), in IMI; paratype, South Carolina (Ravenel *787*), in IMI]; *Lloydella subpileata* (Berk. & Curt.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 757. 1907, lacking Berk. & Curt. publication data.

Stereum insigne Bres., Nuovo Gior. Bot. Ital. 23: 158. 1891 [authentic specimen, Hungary (Kmet, det. Bresadola), in BPI (Lloyd Herb.)]; *Lloydella insignis* (Bres.) Höhn. & Litsch., Wiesner Festschrift 60. 1908 (ut syn.), comb. attrib. to Bres., lacking Bres. publication data.

Hymenochaete tjibodensis P. Henn. in Warburg, Monsunia 1: 140. 1899 [syn. *Lloydella subpileata* sec. Höhn. and Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 757. 1907.

Stereum sepium Burt, Mo. Bot. Gard. Ann. 7: 215. 1920 [type, Vienna, Ga. (Humphrey *5229*), in FH].

Macroscopic

Basidiocarp lignicolous, rigid, ellipsoidal and with the central part of the upper surface attached to the substratum by an umbo or several umbos, pileus usually broadly reflexed around part or all of its circumference, very loosely radiately plicate; upper surface entirely "ochraceous-tawny" to "cinnamon-brown," tomentose, or often "cinnamon-brown," "Mars brown," or "Sayal brown" to "snuff brown" toward the center when the tomentum in that region is matted to form a tough-punky rind, the tomentum interrupted at intervals by distinct "bone brown" to dull-black concentric glabrous sulcations; hymenial surface near "light buff" when dry, "ochraceous-buff" when moistened, even or somewhat uneven.

Microscopic

In section 500μ to 1,800μ thick; tomentum up to 400μ thick, the tomental hyphae hyaline, yellowish-brown, or pale-brownish, free or entangled, unbranched, with thick and refractile walls, nonseptate or with few septa, (rarely 3.5μ) 4.5μ to 7μ in diameter; cuticular layer very dense, orange to "ochraceous-tawny," 100μ to 240μ thick; context 250μ to 400μ thick, hyaline to pale-yellowish-brown, with the hyphae hyaline to pale-yellowish, 3μ to 5μ

in diameter, with walls somewhat thickened; hymenial region of usually 3 to 9 strata, bearing incrusted cystidia or acanthophyses or both; acanthophyses and aculeate-tipped basidioles hyaline, thin-walled, 2.5μ to 4μ in diameter; cystidia hyaline to pale-yellowish-brown, incrusted, thick-walled, with the wall under the incrustation either smooth or beset with aculeate protuberances, 32μ to 51μ by 6μ to 9.5μ; basidia 4-sterigmate, 20.5μ to 26μ by 3.5μ to 5μ; spores hyaline, smooth, 4μ to 4.5μ by 2.5μ to 3μ. Plate 15, *B*, shows acanthophyses, cystidia, basidia, and a spore.

Discussion

Stereum subpileatum, as interpreted by Burt (1920, pp. 213–214), includes those forms with incrusted cystidia and with few or no aculeate basidioles or acanthophyses. Those specimens with incrusted cystidia and numerous acanthophyses are named *S. sepium* Burt, while those with many acanthophyses and no cystidia are called *S. insigne* Bres. Coker (1921) has followed Burt's concept. Imazeki (1939) treats *S. subpileatum* and *S. sepium* in the same way as Burt, but has given the new species name *S. hiugense* Imazeki to a fungus having acanthophyses and lacking cystidia. From his description, this species may be close to or the same as *S. insigne* Bres. Höhnel and Litschauer (1907) consider *S. insigne* to be synonymous with *S. subpileatum*, with which view Bourdot and Galzin (1928, p. 375) and Pilát (1930b) concur. The latter also lists *S. sepium* as synonymous with *S. subpileatum*, as does Overholts (1939). Macroscopically the various forms are nearly if not completely indistinguishable from one another. Some specimens apparently have only incrusted cystidia, but sometimes the cystidial walls under the incrustation are found to have aculeate protuberances. The best solution seems to consist of considering all as belonging to a single species showing some variability with regard to sterile hyphal ends in the hymenium. Several tropical species, such as *S. princeps*, also appear to be very close to this species, and most or all of these fungi are usually on *Quercus*.

Habitat

On logs and stumps of *Quercus*, perhaps rarely on *Castanea*, *Fagus*, *Liquidambar*, and *Ulmus*.

Distribution

Europe, India, the Netherlands Indies, China, Japan, South and Central America, and the United States, particularly the southern part. Specimens from Illinois, Iowa, and Missouri.

Miscellaneous Specimens Examined

BPI: Louisiana—St. Martinville (Humphrey *3520*); Maryland—Patuxent Wild Life Refuge (Lentz *35*); Missouri—Wicks (Overholts *3161*); North Carolina—Duke Forest (Wolf *510*); Ohio—Cincinnati (Morgan), no locality (Morgan *140*); India (Koelz *20514, 21703, 22123*, as *Stereum insigne*). ILL: Illinois—Canton (Wolf *ILL 22244*, as *S. rugosum*; *ILL 27637*), Urbana (*ILL 27968*). SUI: Iowa—Dubuque County (Shimek); Louisiana—Lake Charles (Shimek).

Exsiccati Examined

Ravenel, Fungi Caroliniani, Fasc. 1, *30*; Ravenel, Fungi Americani *219*.

Illustrations

Burt (1920, text figs. 40, 41, and 45; pl. 6, figs. 69, 70, and 74); Coker (1921, pl. 21, top; pl. 35, fig. 3); Long (1915, pl. 41, figs. 1–10); Overholts (1939, pl. 15, fig. 12); Pilát (1930a, t. 16, fig. 8; 1930b, t. 1, figs. 1 and 2).

16. Stereum sulcatum

(Pls. 4, *C*; 9, *E*; 11, *D*)

Stereum sulcatum Burt in Pk., N. Y. State Mus. Ann. Rpt. 54: 154. 1901 [syntype, Floodwood in Franklin County, N. Y. (Peck), in NYS; syntype?, Adirondack Mts., N. Y. (Peck), in NYS]; *Lloydella sulcata* (Burt) Killerm. in Engl. & Prantl, Die Natürl. Pflanzenfam., Ed. 2., 6: 146. 1928, lacking Burt publication data.

Macroscopic

Basidiocarp lignicolous, hard and rigid when dry, corky when moistened, resupinate or narrowly reflexed, up to 15 by 10 cm.; upper surface of reflexed basidiocarps "cinnamon-buff," consisting of a bibulous mat of densely massed tomental hyphae usually less appressed toward the margin, or "ochraceous-tawny," "Sayal brown" to "bister," or "drab," and consisting of a glabrous rind, often distinctly sulcate particularly in the thickened reflexed margin, with the sulcations usually dull-black; hymenial surface "pale ochraceous-salmon," "pale ochraceous-buff" to "light ochraceous-buff," or "light buff" when dry, when moistened becoming "light ochraceous-buff," "apricot buff," or "pinkish cinnamon," even toward the margin, often somewhat uneven toward the center and sometimes cracked, the margin often bordered by a thin dark line of "argus brown" to blackish which, in turn, is often bordered by the tomentum of the upper surface extending beyond the hymenial margin for a short distance.

Microscopic

In section 675μ to 2,800μ thick; tomentum up to 1,000μ thick, yellowish-brown to brown in mass, the tomental hyphae yellowish to pale-brownish, branching, thick-walled, septate, with clamp connections, 2.5μ to 4μ in diameter; cuticular layer reddish-brown; context with two kinds of hyphae—one kind hyaline to pale-yellowish, branching, thick-walled, sparingly septate, with occasional clamp connections, 2μ to 4μ in diameter, the other kind hyaline, branching, thin-walled, septate, with clamp connections, 1.5μ to 2.5μ in diameter; hymenial region stratose, bearing numerous incrusted cystidia; cystidia apparently formed as the broadened ends of thick-walled context hyphae, hyaline to yellowish, heavily incrusted with hyaline or pale-yellowish crystalline masses, 38μ to 69μ by 8μ to 13μ, protruding up to 22μ beyond the hymenial surface; basidia 2- or 4-sterigmate, 23μ to 33μ by 4.5μ to 6μ; spores hyaline, subglobose, smooth or delicately echinulate, with the wall slightly thickened, 4.5μ to 6μ by 4.5μ. Plate 11, *D*, shows a cystidium, basidia, and spores.

Discussion

Stereum sulcatum is characterized by a bright hymenial surface having the aspect of delicately salmon-tinted chalk, by its incrusted cystidia borne

in a stratose hymenium, and by the spores. The minute asperity of the latter is highly distinctive for a species of *Stereum*, but is not always apparent.

Habitat

On gymnosperm logs.

Distribution

In Austria (Litschauer, 1930), Siberia, Alaska, Canada, the United States, Formosa, Japan, and China. Burt (1920, p. 212) reports it from Wisconsin.

Miscellaneous Specimens Examined

BPI: Colorado—Cottonwood Lake (Davidson *591*); Idaho—Bovill (Shattuck), Grangeville (Rhoads), Priest River (Weir *1728, 9206*); Montana—Evaro (Weir *1722*), Hamilton (Weir *1725*); New Hampshire—North Conway (Overholts *5033*); Washington—Chelan Lake (Weir *11107*); Alaska—Mt. McKinley Natl. Park (Baxter).

Exsiccati Examined

Bartholomew, Fungi Columbiani *5093*.

Illustrations

Burt (1920, text fig. 39; pl. 6, fig. 68); Litschauer (1930, text fig. 1; t. 19, figs. 2–4); Lloyd (1916, text fig. 878); Overholts (1929, text fig. 8; 1939, pl. 17, fig. 25); Pilát (1933, pl. 24, fig. 6).

17. Stereum murraii

(Pls. 4, *D*; 9, *D* and *F*; 14, *C*)

Stereum murraii (Berk. & Curt.) Burt, Mo. Bot. Gard. Ann. 7: 131. 1920, ut "*murrayi*"; *Thelephora murraii* Berk. & Curt., Linn. Soc. London, Jour., Bot. 10: 329. 1869 [type, Cuba (Wright *269*), in IMI]; *Corticium murraii* (Berk. & Curt.) Pat. in Duss, Enum. Meth. Champ. Guadeloupe et Martinique 18. 1903, ut "*murrayi*."

Stereum tuberculosum Fr., Hym. Eur. 644. 1874 (pro parte) [type, Norway (Blytt), in UPS], (non *S. tuberculosum* Velenov., Ceske Houby 762. 1922); *S. murraii* (Berk. & Curt.) Burt var. *tuberculosum* (Fr.) Pilát, Hedwigia 70: 91. 1930; *S. murraii* (Berk. & Curt.) Burt forma *tuberculosum* (Fr.) Pilát, Ceskoslov. Akad. Zemedel. Sborn. 5: 399. 1930.

Stereum pulverulentum Pk., Torrey Bot. Club Bul. 27: 20. 1900 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 131. 1920], (non *S. pulverulentum* (Lév.) Mont., Ann. des Sci. Nat. (ser. 3) Bot. 7: 174. 1847).

Corticium effusum Overh., Mycologia 22: 238. 1930 [type, Ferdinand, Vt. (Spaulding *FP 43963*), in PAC].

Macroscopic

Basidiocarp lignicolous, corky when fresh, drying hard and brittle, resupinate, with the margin usually narrowly reflexed, up to 10 cm. in diameter; upper surface "Verona brown" to "fuscous," glabrous, often concentrically sulcate; hymenial surface dull "cartridge buff," even, or tuberculate and then often deeply and intricately cracked.

Microscopic

In section 1,000μ to 2,300μ thick; cuticular layer very dark brown and thick in some sections but almost completely lacking in others; context of horizontally parallel hyphae near the upper surface in some sections, but with this region almost completely lacking in other sections, most of the context filled with vesicles that tend to be arranged in numerous obscure strata; vesicles numerous and conspicuous, hyaline, ellipsoidal to subglobose, 13μ to 37μ by 8.5μ to 20.5μ; gloeocystidia in the hymenium yellowish, refractile, usually rather inconspicuous, 20.5μ to 44.5μ by 5μ to 10.5μ, sometimes protruding slightly beyond the hymenial surface; basidia 4-sterigmate, approximately 17μ to 19μ by 4.5μ to 5μ; spores hyaline, ovoid-ellipsoidal, smooth, 4μ to 5μ by 2μ to 2.5μ. Plate 14, *C*, shows gloeocystidia, vesicles, a basidium, and spores.

Discussion

The vesicles of *Stereum murraii* may be partly filled with a homogeneous material, but usually appear nearly or entirely empty. The type specimen of *Corticium effusum* clearly shows the origin of the vesicles as enlargements of hyphal tips. In the hymenial region these enlarged hyphal tips may elongate somewhat, often contain a refractile yellowish substance, and are then gloeocystidia.

The European form of *S. murraii* (forma *tuberculosum*) supposedly differs from the American form by having a tuberculose hymenium and by growing usually on gymnosperms instead of woody angiosperms. However, the specimen in Sydow, Mycotheca Germanica *2062* was reputedly collected from *Fagus sylvatica* L. in Bavaria, and Sumstine (1941) has reported the collection of a specimen from pine logs in Pennsylvania. Overholts (1939) found that specimens in Pennsylvania may have a very rugose hymenium even though growing on woody angiosperms. I have seen many North American specimens with a rugose hymenium. The type of *S. tuberculosum* was found to consist of 3 small pieces of *S. chailletii* and 1 large piece of the tuberculose form of *S. murraii*. I have not included this in the synonymy of *S. chailletii*, since the 3 pieces may have been added subsequent to the original description and since the original description more nearly characterizes *S. murraii*.

Habitat

Usually on woody angiosperms in America, and on gymnosperms in Europe.

Distribution

In Europe, particularly in subalpine regions, in Canada, the United States, Cuba, Jamaica, Puerto Rico, and South Africa. Specimens from Illinois and Iowa, and Burt (1920, p. 134) reports it from Wisconsin. The report from South Africa by Doidge (1950, p. 491) apparently is the result of confusing the synonym *Stereum pulverulentum* Pk. with *S. pulverulentum* (Lév.) Mont., for she listed the latter as synonymous with *S. murraii*. I have examined Léveillé's (1846, p. 149) type of *Thelephora pulverulenta*, Cape of Good Hope (Drège *9442*), in PC, and have determined it to be *Hymenochaete luteobadia* (Fr.) Höhn. & Litsch. I have not seen Bijl's specimen *708* which Doidge cites from Zululand, but Talbot (1954) says that this specimen is *S. murraii* and he also cites another specimen from South Africa.

Miscellaneous Specimens Examined

BPI: New York—Saranac Inn (Spaulding *971*); Rhode Island—Providence (Spaulding and Collins); Vermont—Newfane (Anne Hibbard, as *Stereum tuberculosum*, in Lloyd Herb. *23746*); Virginia—Shenandoah Natl. Parf (Stevenson *70918, Oct. 27 in 1938*); Ontario—Huntsville (Cain *TRT 3606*); Czechoslovakia—Trebushany (Pilát *Aug. 1937*, as *S. murrayi* var. *tuberculosum*). SUI: Illinois—Jo Daviess County (Martin *1291*); Iowa—Postville (Shimek *SUI 1747*); Maine—Lake Millinocket (Martin *5067*); New York—Inlet (Rogers and Alpha Mae Rogers *3003*).

Exsiccati Examined

Ellis and Everhart, N. Am. Fungi *2903*, as *Corticium colliculosum* Berk. & Curt.; Ellis and Everhart, Fungi Columbiani *704*, as *Stereum rugosum* (Pers. ex Fr.) Fr.; Lundell and Nannfeldt, Fungi Exs. Suecici *1030*; Sydow, Myc. Germanica *2062*, as *S. tuberculosum*.

Illustrations

Burt (1920, text fig. 15; pl. 4, figs. 31 and 32); Lloyd (1920, pl. 148, fig. 1690); Overholts (1929, pl. 3, fig. 2; 1930, pl. 28, fig. 2; 1939, pl. 14, fig. 2 and pl. 16, fig. 17); Pilát (1930a, t. 17, fig. 15); Talbot (1954, fig. 16).

18. Stereum purpureum

(Pls. 5, *A* and *B*; 9, *G*; 15, *C*)

Stereum purpureum (Pers. ex Fr.) Fr., Epicr. 548. 1838; Pers., Disp. Meth. Fung. 30. 1797 [type, Europe, in L]; *Thelephora purpurea* Pers. ex Fr., Syst. Myc. 1: 440. 1821; Pers., Syn. 571. 1801.

Thelephora purpurea Pers. ex Fr. *β betulina* Fr., Syst. Myc. 1: 440. 1821 [syn. sec. Oud., Enum. Syst. Fung. 2: 526. 1920].

Thelephora purpurea Pers. ex Fr. *γ pinea* Fr., Syst. Myc. 1: 440. 1821; *Elvela lilacina* Batsch, Elenchi Fung. Cont. 1: 187. 1786 [syn. sec. Pilát, Hedwigia 70: 87. 1930]; *Stereum lilacinum* Pers., Obs. Myc. 2: 91. 1799; *T. lilacina* Pers., Syn. 572. 1801; *S. purpureum* (Pers. ex Fr.) Fr. **S. lilacinum* Fr., Epicr. 548. 1838; *S. lilacinum* (Fr.) Pass., Nuovo Gior. Bot. Ital. 4 (3): 159. 1872.

Thelephora purpurea Pers. ex Fr. *δ epiphega* Fr., Syst. Myc. 1: 440. 1821 [syn. sec. Oud., Enum. Syst. Fung. 2: 634. 1920].

Thelephora purpurea Pers. ex Fr. var. *disciformis* Desm., Pl. Crypt. du Nord France, Fasc. 9, *414*. 1829 [type, France, in BPI].

Stereum vorticosum Fr., Epicr. 548–549. 1838; *Thelephora vorticosa* Fr., Obs. Myc. 2: 275. 1818 [type, Femsjo, Sweden, in UPS].

Stereum rugosiusculum Berk. & Curt., Grevillea 1: 162. 1872 [type, New England (Sprague, comm. Curtis *5412*), in IMI].

Corticium nyssae Berk. & Curt., Grevillea 1: 166. 1873 [type, Pennsylvania (Michener *3486*), in IMI].

Corticium siparium Berk. & Curt., Grevillea 1: 177. 1873 [type, Alabama (Peters *5239*), in IMI].

Stereum purpureum (Pers. ex Fr.) Fr. var. *violaceum* Thuem., Fungi Austriaci *820*. 1874 [type, Teplitz, Bohemia, in BPI].

Stereum micheneri Berk. & Curt., Grevillea 1: 162. 1873, emend. Mass., Linn. Soc. London, Jour., Bot. 27: 183. 1890 [type, New England (Sprague *5413*), in IMI; paratype, New England (Sprague *5806*), in IMI].

Stereum purpureum (Pers. ex Fr.) Fr. var. *atromarginatum* W. G. Sm., Syn. British Basid. 405. 1908; *S. purpureum* (Pers. ex Fr.) Fr. forma *atromarginatum* (W. G. Sm.) Pilát, Hedwigia 70: 90. 1930.

Macroscopic

Basidiocarp lignicolous, coriaceous, resupinate to effused-reflexed, up to 6 cm. in diameter, the reflexed pilei sometimes imbricate; upper surface "light ochraceous-buff" to "cinnamon-buff," tomentose, but with the tomental hyphae becoming appressed to form a glabrous wrinkled surface; hymenial surface "fawn color" to "benzo brown," waxy-pruinulose, even.

Microscopic

In section 450μ to 750μ thick; tomental hyphae hyaline, unbranched, with moderately thin to thick refractile walls, sparingly septate; cuticular layer yellowish-brown; context of hyaline hyphae, some ending as vesicular enlargements in the subhymenial region and adjoining context; vesicles hyaline to pale-yellowish, pyriform to globose, 13μ to 26μ by 12μ to 22μ; cystidioles sometimes present in the hymenium, hyaline, not incrusted, hairlike, 3.5μ to 7.5μ in diameter, protruding up to 35μ beyond the hymenial surface; basidia 4-sterigmate, 4μ to 6μ in diameter; spores hyaline, broadly cylindrical, smooth, 5μ to 6.5μ by 2μ to 3μ. Plate 15, *C*, shows a vesicle and part of the hymenium with cystidioles, basidioles, and a basidium.

Discussion

Stereum purpureum is characterized by its purplish, waxy hymenium and by having vesicles in the subhymenium and adjacent context. Cystidioles sometimes develop in the hymenium. These have been the basis for referring specimens to *S. rugosiusculum*, although Berkeley (1873) did not mention these structures in his type description. Burt (1920, pp. 128–129), Rea (1922, pp. 664–665), and Overholts (1939) all distinguished *S. rugosiusculum* from *S. purpureum* primarily on the basis of the cystidioles, whereas Patouillard (1883, p. 65), Brooks (1923), Exell (1925), Bourdot and Galzin (1921; 1928, p. 381), Pilát (1930b), and Robak (1942, p. 19) made no such distinction. I have examined 1 specimen which Overholts determined as *S. purpureum* and 7 specimens determined or verified by Burt as *S. purpureum*. The Overholts specimen and 3 of the Burt specimens had cystidioles and 1 or 2 others may have had disintegrating cystidioles. This, together with evidence presented by Brooks, Bourdot and Galzin, and Robak, in particular, indicates the impossibility of maintaining *S. purpureum* and *S. rugosiusculum* as separate species. Ward (1898) has published an article on the biology of a fungus that he thought was *S. hirsutum* . His illustrations, particularly figs. 6 and 9, leave no doubt that the fungus with which he worked was *S. purpureum*. This fact should be kept in mind when reading H. P. Brown's (1915) comparison of the wood rot of *Hymenochaete rubiginosa* with that of "*S. hirsutum*," since he used Ward's description as a basis for comparison.

Habitat

Usually on woody angiosperms, but sometimes on gymnosperms.

Distribution

Cosmopolitan, reasonably common in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: Idaho—Priest River (Weir *8970*); Maryland—Bowie (Lentz *26*), Patuxent Wild Life Refuge (Stevenson), Takoma Park (Hedgcock *2102*); Montana—Helena (Weir *10907*); New York—Alcove (Shear *1122*); Virginia—Fairfax (Davidson *FP 52055*); Washington—Easton (Humphrey *FP 6085*); Argentina—Province of Tucuman (Singer *T 535*); Germany—East Prussia (Gramberg, as *Stereum purpureum* forma *resupinata* Bres.); India—Raytal (Koelz *22109*), Rungling Pass (Koelz *21329*). MO: Indiana—Lafayette (Orton *MO 44082*); Minnesota—Park Rapids (Jensen *MO 11100*); Wisconsin—Madison (Trelease *MO 5043*); Canada—Vancouver Island (Macoun *MO 5737*), Winnipeg (Buller *MO 58975*). SUI: Iowa—Homestead (*SUI 1856*, as *S. rugosiusculum*).

Exsiccati Examined

Bartholomew, Fungi Columbiani *3489*; Desmazières, Pl. Crypt. du Nord France, Fasc. 3, *117*, as *Thelephora purpurea;* Ellis and Everhart, N. Am. Fungi *323*, *2018;* Lundell and Nannfeldt, Fungi Exs. Suecici *460*; Rabenhorst, Fungi Europaei *1407*, as *Stereum rufum;* Shear, N. Y. Fungi *311*. Note: Holl, Schmidt, and Kunze, Deutschlands Schwaemme *46*, was cited by Fries, Syst. Myc. 1: 440. 1821, as an example of *T. purpurea*. This number in the BPI set is *Auricularia mesenterica* (Fr.) Fr., Epicr. 555. 1838.

Illustrations

Many illustrations are cited by Saccardo (1911, pp. 891–892). Others include Batsch (1786, t. 25, fig. 131); Brooks (1913, pls. 12 and 13); Burt (1920, text figs. 13 and 14; pl. 4, figs. 29 and 30); Cleland (1935, text fig. 57); Exell (1925, text figs. 6–7); Graham (1944, pl. 5, fig. 11); Overholts (1929, text fig. 25 and pl. 3, fig. 3; 1939, pl. 17, fig. 20); Patouillard (1883, fig. 150); Pilát (1930a, t. 17, fig. 17); Talbot (1954, fig. 17); Wakefield and Dennis (1950, pl. 106, fig. 2); Ward (1898, figs. 1–19).

19. Stereum cinerascens

(Pls. 5, *C*; 10, *A*; 13, *B*)

Stereum cinerascens (Schw.) Mass., Linn. Soc. London, Jour., Bot. 27: 179. 1890; *Thelephora cinerascens* Schw., Amer. Phil. Soc. Trans. (n. s.) 4: 167. 1832 [type, Bethlehem, Pa., in BPI (Michener Herb.)]; *Hymenochaete cinerascens* (Schw.) Lév., Ann. des Sci. Nat. (ser. 3) Bot. 5: 152. 1846; *Peniophora cinerascens* (Schw.) Sacc., Syll. Fung. 6: 646. 1888; *P. schweinitzii* Mass., Linn. Soc. London, Jour., Bot. 25: 145. 1889 (non *P. schweinitzii* Sacc. & Syd. in Sacc., Syll. Fung. 14: 224. 1899); *Lloydella cinerascens* (Schw.) Bres. in Lloyd, Mycol. Writ. 1, Mycol. Notes 6: 51. 1901, lacking Schw. publication data.

Corticium aschistum Berk. & Curt., Amer. Acad. Arts and Sci. Proc. 4: 123. 1860 [type coll., Nicaragua (Wright *109*), in BPI], (non *C. aschistum* Berk., Grevillea 2: 3. 1873); *Peniophora berkeleyi* Cke., Grevillea 8: 20. 1879.

Stereum moricola Berk., Grevillea 1: 162: 1873 [type, South Carolina (Curtis *5997*), in IMI]; *Peniophora moricola* (Berk.) Mass., Linn. Soc. London, Jour., Bot. 25: 141. 1889.

Stereum dissitum Berk., Grevillea 1: 164. 1873 [type coll., Texas (Wright), in BPI]; *Peniophora dissita* (Berk.) Cke., Grevillea 8: 150. 1880; *Lloydella dissita* (Berk.) Rick, Brotéria (ser. 3) 9: 87. 1940, lacking Berk. publication data.

Corticium ephebium Berk. & Curt., Grevillea 1: 178. 1873 (pro parte ?), [syntype, Alabama (Peters *6050*), (Peters *6088* and *6089* in poor condition and identity uncertain), in IMI]; *Peniophora ephebia* (Berk. & Curt.) Mass., Linn. Soc. London, Jour., Bot. 25: 151. 1889.

Radulum mirabile Berk. & Br., Linn. Soc. London, Jour., Bot. 14: 61. 1875 [syn. sec. Talbot, Bothalia 6: 309. 1954]; *Thwaitesiella mirabilis* (Berk. & Br.) Mass., Grevillea 21: 3. 1892; *Lopharia mirabilis* (Berk. & Br.) Pat., Soc. Mycol. de France, Bul. Trimest. 11: 14. 1895.

Stereum neglectum Pk., N. Y. State Mus. Ann. Rpt. 33: 22. 1880 [type, Verona, N. Y., in NYS]; *Peniophora neglecta* (Pk.) Pk., N. Y. State Mus. Ann. Rpt. 40: 76. 1887.

Lopharia lirellosa Kalchb. & MacOwan, Grevillea 10: 58. 1881 [syn. sec. Talbot, Bothalia 6: 309. 1954].

Peniophora occidentalis Ell. & Ev., Torrey Bot. Club Bul. 24: 277. 1897 [type coll., Montana (Ellis and Everhart, N. Am. Fungi *2314*), in BPI]; *Lloydella occidentalis* (Ell. & Ev.) Höhn. & Litsch., Akad. der Wiss. Wien, Math.-Nat. Kl. Sitzber. 116 (1): 791. 1907.

Stereum purpurascens Lloyd, Mycol. Writ. 4, Let. 53: 15. 1914 [type, West Roxbury, Mass. (Anne Hibbard), in BPI (Lloyd Herb.)].

Stereum caperatum Lloyd, Mycol. Writ. 4, Mycol. Notes 40: 549. 1916 [syn. sec. Talbot, Bothalia 6: 309. 1954], (non *S. caperatum* (Berk. & Mont.) Mass., Linn. Soc. London, Jour., Bot. 27: 161. 1890); *S. turgidum* Lloyd, Mycol. Writ. 5, Let. 63: 15. 1916.

Licentia yao-chanica Pilát, Ann. Mycol. 38: 66. 1940 [syn. sec. Talbot, Bothalia 6: 340, 343. 1954].

Macroscopic

Basidiocarp lignicolous, coriaceous, resupinate to effused-reflexed, up to 16.5 by 6 cm., the reflexed margin up to 1.7 cm. broad; upper surface "cinnamon-buff" to "cinnamon" or "avellaneous," sometimes gray except near the margin, strigose-hirsute, usually zonate; hymenial surface "light buff" to "wood brown," minutely pruinose-setulose, even, often delicately cracked.

Microscopic

In section 400μ to 800μ thick; tomental hyphae hyaline to pale-yellowish-brown, usually abundant, long, flexuous; cuticular layer yellowish-brown to brown; context hyaline to pale-yellowish-brown in mass, with some hyphae relatively unbranched, thick-walled, approximately 3μ in diameter, other hyphae moderately branching and somewhat thick-walled or much-branched and thin-walled, (rarely 1.5μ) 3μ in diameter; cystidia hyaline and incrusted

toward the apex, yellowish and smooth toward the base, conical, 68.5μ to 175μ by 12.5μ to 34μ, some entirely embedded in the hymenium, others protruding up to 100μ beyond the hymenial surface; basidia 4-sterigmate, 50μ to 56μ by 9μ to 11.5μ; spores hyaline, ovoid to broadly cylindrical, smooth, 8μ to 15.5μ by 5.5μ to 10μ. Plate 13, *B*, shows a cystidium, basidium, and spores.

Discussion

The large, conical cystidia and large spores are distinctive characters of *Stereum cinerascens*. This species has often been mistaken for a *Peniophora*, but it differs from that genus by its reflexed margin and by the characteristic *Stereum*-like appearance in section. Bresadola (1926) has listed *Hymenochaete bonaerensis* Speg. as a synonym of *Lloydella cinerascens* (Schw.) Bres. The type of *H. bonaerensis* [Palermo, Argentina (Spegazzini *24629*), in LPS] is a resupinate *Hymenochaete* with true setae. It has no relationship with *S. cinerascens*.

Habitat

On dead trees and fallen branches of woody angiosperms, especially *Morus* and *Ulmus*.

Distribution

In Europe, South Africa, Asia, the Philippine Islands, North America, and South America. It is fairly common in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: California—Berkeley (Parks *2752*); District of Columbia—Washington (Hedgcock *622, 815*); Massachusetts—Boston (Weir); Texas—Waco (Shoemaker). SUI: Iowa—Cou Falls (Emmons *SUI 1264, SUI 1279;* Himmel and Martin *SUI 1253*), Hills (Martin *432*), Iowa City (Martin *1920, 1921, 6504, 6505, 6506, 6507, 6508, 6509, Oct. 11 in 1946, Oct. 21 in 1947;* Brasfield *SUI 1726, SUI 1727*), Lyon County (*SUI 1728*), Midriver (Martin *1093*), Milford (Martin *1265;* Lohman), no locality (*in 1896 on box elder*).

Exsiccati Examined

Shear, N. Y. Fungi *313*, as *Stereum neglectum* (authentic specimen); Torrend, Mycotheca Lusitanica *51*.

Illustrations

Burt (1920, text fig. 36; pl. 6, fig. 64); Cooke (1879, pl. 122, fig. 4); Emmons (1927, pl. 2, fig. 10); Overholts (1939, pl. 18, fig. 31); Talbot (1951, pl. 27; 1954, fig. 18).

20. Stereum striatum

(Pls. 6, *A*; 10, *B*; 12, *D*)

Stereum striatum (Fr.) Fr., Epicr. 548. 1838 (non *S. striatum* Fr., Epicr. 551. 1838; nec *S. striatum* Fr., Hym. Eur. 641. 1874); *Thelephora sericea* Schw., Naturf. Gesell. in Leipzig Schrift. 1: 106. 1822; Fr., Elench. 1: 179. 1828 (ut syn.), (non *T. ochroleuca* Fr. subsp. *T. sericea* Schrad. ex Fr., Syst. Myc. 1: 440. 1821; nec *T. sericea* Pers., Myc. Eur. 1: 117. 1822); *T. striata* Fr., Elench. 1: 179. 1828 (non *T. crispa* Fr. subsp. *T. striata* Schrad. ex Fr., Syst. Myc. 1: 437. 1821; nec *T. striata* Jungh., Praemissa Fl. Crypt. Javae Insulae, Fasc. 1. 40. [preprint] 1838); *S. sericeum* (Schw.) Sacc., Syll. Fung. 6: 579. 1888.

Macroscopic

Basidiocarp lignicolous, coriaceous, thin, plane, orbicular and attached by a central umbo, or effused-reflexed or sometimes dimidiate, margin very thin and usually subfimbriate, up to 1.5 cm. in diameter or confluent with adjoining basidiocarps to extend up to 10 cm. or more along the substratum; upper surface "smoke gray" toward the base, or entirely "cartridge buff" or "light buff" to "tilleul buff," sericeous, with closely adnate radiating fibrils, delicately zonate; hymenial surface "light buff" to "pale ochraceous-buff," or occasionally "wood brown," even.

Microscopic

In section 200μ to 375μ thick; cuticular layer often not well-defined; context hyaline or pale-yellowish in mass, hyphae with walls slightly thickened, 2.5μ to 4.5μ in diameter; pseudocystidia visible in the subhymenial region and hymenium, inconspicuous, hyaline, some with umbonate tips, nonexserted; basidia 4-sterigmate, 4.5μ to 7.5μ in diameter; spores hyaline, cylindrical, smooth, 6μ to 8.5μ by 2μ to 3.5μ. Plate 12, *D*, shows part of the hymenium with pseudocystidia and basidioles, basidia, and spores.

Discussion

Stereum striatum is distinguished from *S. complicatum* by its plane, rather than plicate, usually thinner basidiocarp, by the more sericeous upper surface with the fibrils more closely adnate, by the hymenium that usually lacks the ruddy hue of *S. complicatum*, and by the usually indistinct cuticular layer.

A developmental series was observed in one of the exsiccati examined (Shear, N. Y. Fungi *312*). The basidiocarps erupted from the bark of the host at first as minute, semiglobose, grayish-white, plumulose masses of sterile fibrils. These masses enlarged to a diameter of approximately 1 mm. before forming a hymenial pocket by the unfolding of the plumulose mass at the apex. Further development resulted in the formation of a cup, with the hymenium lining the inside and an abundance of fibrils causing the exterior to have a distinct hirsuteness. Finally, the cup flattened out to form an orbicular-reflexed or effused-reflexed basidiocarp. As growth continued, the hirsuteness remained confined to the base, so there were no free fibrils over the greater area of the upper surface.

Habitat

On twigs and branches of *Carpinus*, rarely reported on other woody angiosperms.

Distribution

Eastern Canada, the United States, and Mexico. Specimens from Iowa, and Burt (1920) reports it from Missouri.

Miscellaneous Specimens Examined

BPI: District of Columbia—Rock Creek Park (Lentz *253*); Maryland—Bowie (Lentz *27*), Patuxent Wild Life Refuge (Lentz *37*); New York—Alcove (Shear *1209*); Ontario—Toronto (Jackson *TRT 3944*). SUI: Iowa—Canoe Creek (Shimek *SUI 1741*), Clayton County (Shimek *SUI 1742*), Hesper (Shimek *SUI 1738*), Pine Hollow (Shimek *SUI 1739*), Postville (Shimek *SUI 1740*); New Jersey—Whitesbog (Martin *1846*). All specimens as *Stereum sericeum*.

Exsiccati Examined

Ellis, N. Am. Fungi *19*; Shear, N. Y. Fungi *312*, as *Stereum sericeum*.

Illustrations

Burt (1920, text fig. 25; pl. 5, fig. 49); Coker (1921, pl. 35, fig. 7); Henry (1949, pl. 1, fig. 4); Overholts (1939, pl. 15, fig. 11; pl. 17, fig. 26).

21. Stereum ochraceo-flavum

(Pls. 6, *B*; 10, *C*; 16, *F*)

Stereum ochraceo-flavum (Schw.) Ell.,[4] N. Am. Fungi *17*. 1878; *Thelephora ochraceo-flava* Schw., Am. Phil. Soc. Trans. (n. s.) 4: 167. 1832 [type or paratype ?, Bethlehem, Pa., or Florida, in BPI (Michener Herb.)].

Macroscopic

Basidiocarp lignicolous, coriaceous, cup-shaped to conical and attached by an umbo or adherent along one side also, up to 12 mm. in diameter and 7 mm. deep, or sometimes effused-reflexed and often laterally coalescent along small twigs; upper surface conspicuously villose or silky-hirsute with long whitish fibrils, indistinctly zonate; hymenial surface "pale orange-yellow" to "cream-buff," even.

Microscopic

In section 160μ to 365μ thick; tomental hyphae hyaline, long, slender, unbranched, with walls up to 1.75μ (rarely 2μ) in diameter, infrequently septate, lacking clamp connections, 3μ to 5μ in diameter; cuticular layer yellowish-brown, approximately 25μ thick; context with two kinds of hyphae—one kind branching, thin-walled or with the wall only slightly thickened, septate, (rarely 1.5μ) 2μ to 4μ in diameter, especially thin and much-branched in the subhymenium, the other kind unbranched, with the wall 1.5μ (rarely 2μ) thick, with very few septa, 4μ to 7μ in diameter, often protruding somewhat beyond the hymenial surface as pseudocystidia; pseudocystidia obtuse or umbonate at the tips, with homogeneous to granular and sometimes yellowish and refractile contents, 4.5μ to 7μ in diameter, protruding up to 15μ beyond the hymenial surface; basidia 4-sterigmate, approximately 27μ by 4.5μ to 5μ; spores hyaline, cylindrical, smooth, 5.5μ to 7μ by 1.5μ to 2μ. Plate 16, *F*, shows a hypha with double clamp connections, the pseudocystidial apices of vascular hyphae, basidia, and a spore.

Discussion

Stereum ochraceo-flavum is characterized by the bright yellowish hymenium and abundant whitish, silky tomentum. Clamp connections were not observed on hyphae of dissected basidiocarps, but hyphae from the context of specimen *R 3480* developed single or double clamp connections at many septa when cultured on malt agar.

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[4] *S. ochraceo-flavum* (Schw.) Rav., Fungi Caroliniani, Fasc. 2, *31*. 1853, lacks Schweinitz publication data and apparently was not intended to be a new combination by Ravenel. The same is true of Pk., N. Y. State Cabinet Nat. Hist. Rpt. 22: 40, 86. 1869, and of Fr. in Thuem., Myc. Univers. *10*. 1875.

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Habitat

On twigs and small branches of woody angiosperms.

Distribution

Southern Canada to Mexico. Burt (1920, pp. 185–186) reports it from Wisconsin, Iowa, and Missouri, but its usual habitat is more southern. One specimen examined from Iowa. Doidge (1950, p. 491) reports this species from South Africa.

Miscellaneous Specimens Examined

BPI: Arkansas—Fordyce (Humphrey *FP 5617*); Florida—Gainesville (Nuttall), Jacksonville (Rhoads), Kelly Park (Schallert), Narcoossee (Schallert *1638*), New Smyrna (Weir *21079*); Iowa—Decorah (Holway); Kansas—Manhattan (Rogerson *R 3480*); Maryland—Takoma Park (Shear *1240*); Massachusetts—Nantucket County (Seeler); Mississippi—Ocean Springs (Earle); Virginia—Bull Run Mts. (Allard).

Illustrations

Burt (1920, text fig. 27; pl. 5, fig. 55); Coker (1921, pl. 35, fig. 8); Graham (1944, pl. 5, fig. 14); Overholts (1939, pl. 17, fig. 24).

22. Stereum sanguinolentum

(Pls. 6, *C*; 10, *D*; 16, *C*)

Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr., Epicr. 549. 1838; *Thelephora sanguinolenta* Alb. & Schw. ex Fr., Syst. Myc. 1: 440–441. 1821; Alb. & Schw., Consp. Fung. 274–275. 1805; *T. sericea* Schrad. ex Pers. *β sanguinolenta* Pers., Myc. Eur. 1: 117. 1822.

Thelephora hirsuta Willd. ex Fr. *β* Pers. ex Fr., Elench. 1: 178. 1828 (ut syn.); *T. hirsuta* Willd. *β T. alnea* Pers., Syn. 570. 1801 [syn. *T. sanguinolenta* sec. Fries, Elench. 1: 178. 1828].

Stereum balsameum Pk., N. Y. State Mus. Ann. Rpt. 27: 99. 1875 [type, Adirondack Mts., N. Y., in NYS].

Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr., **S. rigens* Karst., Bidr. till Finlands Nat. och Folk 37: 243 [125]. 1882 [type, Mustiala, Finland (Karsten), in H]; *S. rigens* (Karst.) Mass., Linn. Soc. London, Jour., Bot. 27: 189. 1890 (ut syn.), attrib. to Karst.; *S. sanguinolentum* (Alb. & Schw. ex Fr.) Fr. var. *rigens* (Karst.) Pilát, Soc. Mycol. de France, Bul. Trimest. 42: 109. 1926; *S. sanguinolentum* (Alb. & Schw. ex Fr.) Fr. forma *rigens* (Karst.) Pilát, Hedwigia 70: 62. 1930.

Stereum balsameum Pk. forma *reflexum* Pk., N. Y. State Mus. Ann. Rpt. 47: 26. 1894 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 144–145. 1920].

Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr. forma *alpina* Pilát, Soc. Mycol. de France, Bul. Trimest. 42: 110. 1926.

Macroscopic

Basidiocarp lignicolous, coriaceous, often orbicular and resupinate with the margin narrowly reflexed and curled inward toward the hymenium, often coalescing with adjoining basidiocarps and extending up to 10.5 by 1.5 cm. along tree branches or up to 9 by 5 cm. on broad substrata, some basidiocarps broadly reflexed and occasionally imbricate; upper surface "pinkish buff" to dull "cinnamon-buff," pubescent toward the margin to tomentose, hirsute,

and often strigose toward the base, indistinctly zonate; hymenial surface near "wood brown" when dry, becoming "hazel" or "Verona brown" when moistened, even, often radiately cracked when dry.

Microscopic

In section (rarely 150μ) 200μ to 585μ thick; tomental hyphae usually hyaline, unbranched, often with refractile walls, with infrequent delicate septa, 3μ to 5.5μ in diameter, some with dark-brown granular contents and 4.5μ to 6.5μ in diameter; cuticular layer yellowish-brown, 15μ to 25μ thick; context with two kinds of hyphae—one kind hyaline to pale-yellowish, branching, thin-walled, septate, 3μ to 3.5μ in diameter in the context and 2μ to 3μ in diameter in the subhymenial region, the other kind often somewhat thicker walled, with infrequent septa (rarely 3μ), 3.5μ to 6μ in diameter in the context, some with brownish contents often enlarging to 6.5μ to 11μ in diameter in the subhymenial and hymenial regions and differentiated as pseudocystidia; pseudocystidia usually with brown, granular contents that exude as a reddish-brown discoloration when the hymenium is injured; basidioles originating in the basidial fascicles, with the tips fimbriate or having several aculeate protuberances, thin-walled, 20μ to 27μ by 2μ to 3.5μ, nonexserted; basidia 2- or 4-sterigmate, large-spored basidia 31.5μ to 43μ by 6μ to 8.5μ, small-spored basidia shorter and approximately 5μ in diameter; spores hyaline, cylindrical, smooth, the large spores (rarely 7μ) 8μ to 14μ by 3μ to 5μ, the small spores 5μ to 7μ (rarely 8.5μ) by 2μ to 3.5μ. The small-spored specimens are more common than those with large spores. Plate 16, *C* shows the pseudocystidial apex of a sanguinolentous vascular hypha, basidioles, basidia, and spores.

Discussion

Hyphae of *Stereum sanguinolentum* specimens with large spores and basidia separated from one another much more satisfactorily in crushed mounts than did those in specimens with smaller spores and basidia. Most of the larger spored basidiocarps were obtained from *Tsuga,* particularly *T. canadensis,* although this was not absolutely consistent. Probably some host relationship is involved, but additional study is required before it can be understood. *S. sanguinolentum* is one of the "bleeding" species.

Habitat

On gymnosperms.

Distribution

Europe, Asia, and North America. It is also reported from South Africa by Doidge (1950, p. 493), and by Talbot (1954). Specimens examined from Wisconsin.

Miscellaneous Specimens Examined

BPI: Idaho—Coeur d'Alene (Rust *1023*), Grangeville (Rhoads), Priest River (Weir *1707;* Weir and Rhoads), Sandpoint (Hubert); Maine—Oxford County (Parlin *15423*), Sugar Island (Spaulding *FP 43936*); Massachusetts—Petersham (Spaulding *FP 43985*); Montana—Elkhorn (Weir *9749*), Evaro (Weir *1713*), Kalispell (Hubert), Libby (Hubert); New York—Knowlesville (Shear); Oregon—Crater Lake (Weir *1706*); Vermont—Bethel (Spaulding *2706*), Ripton (Burt); Virginia—Hawksbill Mt. (Allard); Washington—Hoquiam (Humphrey), Seattle (Shear), Tacoma; Wisconsin—Hayward (Humphrey *9760*), Rothschild (Richards *39251*); Alaska—Juneau (Baxter); British

Columbia—Agassiz (Weir *1709*). NYS: New York—Newcomb (Peck), North Elba (Peck); Ontario—Ottawa (Macoun *359*).

Exsiccati Examined

Lundell and Nannfeldt, Fungi Exs. Suecici *462;* Sydow, Myc. Germanica *2061.*

Illustrations

Many illustrations are cited by Saccardo (1911, pp. 892–893). Others include Bier (1949, pl. 14, figs. 1–4); Bier, Salisbury, and Waldie (1948, pl. 3; pl. 5, fig. 2); Burt (1920, text fig. 20; pl. 5, fig. 40); Coker (1921, pl. 35, fig. 2); Exell (1925, text fig. 9); Jørstad and Juul (1939, figs. 33–38); Möller (1945, text fig. 45, B); Overholts (1929), pl. 2, fig. 6; 1939, pl. 16, fig. 15, and pl. 16, fig. 19); Pilát (1930a, t. 16, figs. 2 and 3); Talbot (1951, pl. 25; 1954, fig. 15); Wakefield and Dennis (1950, pl. 106, fig. 5).

23. Stereum complicatum

(Pls. 6, *D* and *E*; 16, *D*)

Stereum complicatum (Fr.) Fr., Epicr. 548. 1838; *Thelephora complicata* Fr., Elench. 1: 179. 1828 [authentic specimen, Mexico (Liebmann), in UPS].

Thelephora ramealis Schw., Naturf. Gesell. in Leipzig Schrift. 1: 106. 1822; *T. hirsuta* Willd. ex Fr. *β ramealis* (Schw.) Schw., Am. Phil. Soc. Trans. (n. s.) 4: 167. 1832, subsp. rank attrib. to Fr., Elench. 1: 178. 1828; *Stereum rameale* (Schw.) Burt., Mo. Bot. Gard. Ann. 7: 169. 1920 (non *S. rameale* (Berk.) Mass., Linn. Soc. London, Jour., Bot. 27: 187. 1890).

Thelephora lobata Bertoloni, Accad. Sci. Ist. Bologna Mem. 7: 360. 1856 [type coll.?, Alabama (Gates), as *T. gatesii* Schw. nom. nud., in BPI (Michener Herb.)], (non *T. lobata* Kunze in Weigelt, Exs. 1827; nec *T. lobata* Fr., Linnaea 5: 527. 1830; *Stereum bertolonii* Sacc., Syll. Fung. 11: 120. 1895.

Macroscopic

Basidiocarp lignicolous, thin, coriaceous, flabelliform or dimidiate, or more often effused-reflexed and often coalescing with adjoining basidiocarps to extend up to 10 by 2.5 cm., the reflexed margins usually radiately plicate, often imbricate, up to 1.5 cm. broad; upper surface "cinnamon-buff" to "hazel," often paler near the margin, or the entire surface sometimes grayish, strigose at the base to appressed silky-strigose near the margin, zonate; hymenial surface dull "cream-buff" to "cinnamon-buff," or more nearly "orange" when fresh and moist, even, often slightly ridged at the lines of coalescence of adjoining basidiocarps.

Microscopic

In section 400μ to 500μ (rarely 300μ to 850μ) thick; tomental hyphae hyaline to subhyaline, with thick refractile walls; cuticular layer yellowish-brown; context with two kinds of hyphae—one kind thin-walled, septate, with infrequent clamp connections, the other kind thick-walled, nonseptate or with few septa, usually with hyaline contents but some having yellowish-brown granular contents and sometimes ending in the hymenial region as inconspicuous nonexserted pseudocystidia; basidia 4-sterigmate, 24.5μ to

31.5μ by 3.5μ to 5μ; spores hyaline, cylindrical to curved-cylindrical, smooth, 5μ to 6.5μ by 2μ to 2.5μ. Plate 16, *D*, shows a hypha with a clamp connection, the pseudocystidial apex of a vascular hypha, basidioles, basidia, and spores.

Discussion

Stereum complicatum is distinctive in having delicate, thin, often radiately plicate basidiocarps which are smaller than those of most other species that might be confused with it. This species is distinguished from *S. ostrea* and its varieties by its smaller size, its plicate and often intricately lobed margin, its more abundant thick-walled hyphae with colored contents (sanguinolentous hyphae), and by lack of aculeate-tipped basidioles. The basidiocarps of *S. complicatum* are thinner and smaller than those of *S. hirsutum* and do not have the richly hirsute upper surface characteristic of the latter. The ruddy coloration and plicate margin of *S. complicatum* distinguishes it from *S. striatum*, and it is not restricted to *Carpinus* as is *S. striatum*.

Habitat

On dead trunks and branches of woody angiosperms, especially *Quercus*. Coker (1921) reported a form on cedar (*Juniperus* sp.) poles.

Distribution

Canada to Mexico, Jamaica, Puerto Rico, the Philippine Islands (H. Sydow and P. Sydow, 1917, p. 170; Teodoro, 1937, p. 284), China (Teng, 1939, p. 326), Siberia (Killermann, 1943, p. 277). It is very common in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: Alabama—Mobile Bay (Dybas); District of Columbia—Fort Dupont (Stevenson); Indiana—Crawfordsville (Bechtel), Turkey Run State Park (Bechtel); Louisiana—Bogalusa (Hedgcock *812*); Maryland—Bowie (Lentz *32*), Takoma Park (Shear); North Carolina—Creedmoor (Stevens); Virginia—Little Stony Man Mt. (Lentz); Peru—Province of Paucartambo (Vargas *6806*). SUI: Iowa—Cou Falls (Himmel *SUI 196*), Hills (*447*), Iowa City (Brasfield *SUI 1746;* Martin *1284, June 10 in 1924, Aug. 10 in 1934;* Emmons *SUI 1285, Sept. 24 in 1942, Jan. 7 in 1939*), North Liberty (Brasfield), Tiffin (Nicholson and Gilmore), Turkey Creek (*1956*), West Union (Shimek); Louisiana—Vinton (Shimek); Michigan—Sister Lake at Dexter (Lasser). All specimens as *Stereum rameale*.

Exsiccati Examined

Bartholomew, Fungi Columbiani *2881, 4985, 5089;* Ellis, N. Am. Fungi *324;* Ellis and Everhart, Fungi Columbiani *307;* Ravenel, Fungi Caroliniani, Fasc. 2, *30;* Ravenel, Fungi Americani *117;* Thuemen, Myc. Univers. *1404*.

Illustrations

Bertoloni (1856, t. 19, fig. 2, E–G); Burt (1920, text fig. 24; pl. 5, fig. 48); Campbell and Davidson (1940, fig. 2, D); Coker (1921, pl. 21, bottom; pl. 23; pl. 35, figs. 5 and 6); Graham (1944, pl. 5, fig. 12); Henry (1949, pl. 1, fig. 3); Lloyd (1925, pl. 323, fig. 3094); Overholts (1939, pl. 14, fig. 8; pl. 17, fig. 22; pl. 18, figs. 30 and 32).

24. Stereum gausapatum

(Pls. 7, *A*; 10, *E*; 15, *D*)

Stereum gausapatum (Fr.) Fr., Hym. Eur. 638. 1874; *Thelephora gausapata* Fr., Elench. 1: 171. 1828; *Cladoderris gausapata* (Fr.) Fr., Acta Acad. Sci. Holm. 142. 1848.

Thelephora spadicea Fr., Elench. 1: 176. 1828 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 136. 1920], (non *T. spadicea* Pers., Syn. 568. 1801; nec *T. spadicea* Pers. ex Fr., Syst. Myc. 1: 438. 1821; nec *T. spadicea* Bres. in lit. in Höhn., Akad. der Wiss. Wien, Math.-Nat. Kl. Denkschr. 83: 9. 1907); *Stereum spadiceum* (Fr.) Fr., Epicr. 549. 1838 (non *S. spadiceum* (Pers. ex Fr.) Quél. sensu Bres., Accad. delle Sci. Let. ed Arti Rovereto Atti (ser. 3) 3: 106. 1897).

Stereum spadiceum (Fr.) Fr. *β lacerum* Kickx, Flore Crypt. Flandres 2: 262. 1867 [syn. *Thelephora spadicea* Fr., Elench., sec. Oud., Enum. Syst. Fung. 2: 711. 1920].

Stereum cristulatum Quél., Champ. Jura et Vosges 3: 15–16. 1875 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 136. 1920]; *S. hirsutum* (Willd. ex Fr.) S. F. Gray var. *cristulatum* (Quél.) Sacc., Syll. Fung. 6: 564. 1888.

Stereum rugosum (Pers. ex Fr.) Fr. var. *aurantiacum* Karst., Bidr. till Finlands Nat. och Folk 37: 243, [128]. 1882 [type, Tammela, Finland (Karsten), in H]; *S. aurantiacum* (Karst.) Britz., Bot. Centbl. 68: 144. 1896, lacking Karst. publication data, (non *S. aurantiacum* (Berk.) Fr., Summa Veg. Scandinaviae 333. 1849; nec *S. aurantiacum* (Pers. in Gaud.) Lloyd, Mycol. Writ. 4, Stip. Stereums 22. 1913).

Stereum spadiceum (Fr.) Fr. var. *plicatum* Pk., N. Y. State Mus. Ann. Rpt. 50: 132. 1897 [type, Menands, N. Y., in NYS]; *S. plicatum* (Pk.) Lloyd, Mycol. Notes [Writ.] 7, Mycol. Notes 67: 1157. 1922, ut *plicatulum*, lacking Pk. publication data.

Stereum quercinum M. C. Potter, English Arboricult. Soc. Trans. 5: 112. 1902 [syn. *S. spadiceum* (Fr.) Fr., sec. Rea, British Basid. 663. 1922].

Stereum occidentale Lloyd, Mycol. Writ. 5, Let. 69: 12. 1919 [type, Sunset Peak, San Antonio Mts., Calif. (Johnston), in BPI (Lloyd Herb.)].

Stereum lacunosum Velenov., Ceske Houby 763. 1922 [syn. sec. Pilát, Hedwigia 70: 63. 1930].

Stereum gausapatum (Fr.) Fr. forma *resupinata* Pilát, Hedwigia 70: 65. 1930.

Macroscopic

Basidiocarp lignicolous, coriaceous, effused-reflexed, dimidiate, or laterally sessile and hemiorbicular, with the margin sometimes loosely radiately plicate, cespitose-imbricate, the resupinate areas of effused-reflexed forms up to 10 cm. in diameter, the free pilei up to 5 cm. long and 6 cm. broad, often laterally coalescent and then up to 9 cm. or more broad; upper surface "buckthorn brown," "ochraceous-tawny," or "cinnamon-buff" to "clay color," densely pubescent to hirsute or sometimes strigose, zonate; hymenial surface "wood brown," "Sayal brown," or "pinkish buff" to "clay color," discoloring to "bister," "fawn color," or "bone brown" when wounded, even.

Microscopic

In section 500μ to 1,000μ thick; cuticular layer yellowish-brown; context with two kinds of hyphae—one kind hyaline, branching, septate, apparently lacking clamp connections, the other kind most prominent in the hymenial

side of the context and in the subhymenium, nonbranching, thick-walled vascular hyphae, many with brown contents, 5μ to 8.5μ in diameter, often extending into the hymenium as nonexserted pseudocystidia; basidioles obtuse at the apex, lacking aculeate protuberances; basidia 4-sterigmate, approximately 5μ in diameter; spores hyaline, cylindrical, smooth, 5μ to 7.5μ (rarely 8.5μ) by 2μ to 3μ. Plate 15, *D*, shows the pseudocystidial apex of a sanguinolentous vascular hypha, a basidium, and spores.

Discussion

Stereum gausapatum is one of the "bleeding" Stereums, since the sanguinolentous hyphae of fresh basidiocarps exude a deep-red liquid substance when injured. Sanguinolentous hyphae occur in a number of species of *Stereum*, but in only a few, such as *S. sanguinolentum*, *S. rugosum*, and *S. gausapatum*, is the hymenium discolored by the contents of these hyphae. The reddish liquid may be visible as it oozes from the cut hymenial surface of *S. sanguinolentum* basidiocarps, but as a rule the discoloration of the hymenium is the only gross evidence of the presence of this substance in specimens of *S. gausapatum*.

Habitat

On stumps and logs of *Quercus*, rarely on other woody angiosperms.

Distribution

Europe, Asia, Australia, North America from Canada to Mexico. It is common in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: Illinois—Bogota (Schallert *1883*); Maryland—Beltsville Forest Service (Lentz *4*), Cabin John Run (Stevenson), Great Falls (Stevenson), Herald Harbor (Stevenson), Suitland Bog (Diehl), Takoma Park (Shear *1273*); New York—Albany County (House), Alcove (Shear *1201*); Texas—Boerne (Hedgcock *808*); Virginia—Arlington (Stevenson and Diehl), Clarendon (Weir), Hawksbill Mt. (Stevenson), Shenandoah Natl. Park (Stevenson and Charles); Washington—Sumner (Harper *1158*). ILL: Illinois—Urbana (Gibbs, as *Stereum applanatum;* Gibbs and Clinton ILL *27967*, as *S. versicolor*). SUI: Iowa—Homestead (*Oct. 17 in 1926*), Iowa City (Martin *3955, June 28 in 1939, summer of 1947*), Johnson County (*1907; Aug. 21 in 1943*), Turkey Creek (Martin *1933*).

Exsiccati Examined

Bartholomew, Fungi Columbiani *2589, 2883, 4292, 4987, 5092*, all as *Stereum spadiceum;* Ellis, N. Am. Fungi *325*, as *S. spadiceum;* Lundell and Nannfeldt, Fungi Exs. Suecici *1337;* Ravenel, Fungi Caroliniani, Fasc. 2, *32*, as *S. spadiceum;* Ravenel, Fungi Americani *447;* Romell, Fungi Exs. Praes. Scandinavici *122*, as *S. cristulatum;* Thuemen, Fungi Austriaci *921*, as *S. spadiceum*.

Illustrations

Burt (1920, text fig. 18; pl. 4, fig. 36); Coker (1921, pl. 20; pl. 35, fig. 1); Henry (1949, pl. 1, fig. 2); Overholts (1929, text fig. 19; 1939, pl. 14, fig. 4); Pilát (1930a, t. 16, fig. 5; t. 18, figs. 1 and 2); Quélet (1875, pl. 1, fig. 15); Wakefield and Dennis (1950, pl. 106, fig. 3).

25. Stereum hirsutum

(Pls. 7, *B*; 16, *A*)

Stereum hirsutum (Willd. ex Fr.) S. F. Gray, British Plants 1: 653. 1821; *Thelephora hirsuta* Willd. ex Fr., Syst. Myc. 1: 439. 1821, excl. formae b. *alnea*, d. *dryina*, e. *ramealis;* Willd., Fl. Berolinensis Prodr. 397. 1787.

Thelephora hirsuta Willd. ex Fr. forma c. *faginea* Fr., Syst. Myc. 1: 439. 1821; *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray var. *fagineum* (Fr.) Thuem., Fungi Austriaci Exs. *332*. 1872, var. attrib. to Fr., lacking Fr. publication data.

Thelephora concentrica Alb. & Schw. ex Fr., Syst. Myc. 1: 446. 1821; Alb. & Schw., Consp. Fung. 279–280. 1805 [syn. sec. Seymour, Host Index 46. 1929]; *T. ochracea* Fr. *β crassior* Fr., Elench. 1: 217. 1828.

Thelephora hirsuta Willd. ex Fr. var. *β Cellularia cyathiformis* Pers., Myc. Eur. 1: 116–117. 1822; *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray *β cyathiforme* (Pers.) Kickx, Fl. Crypt. Flandres 2: 261. 1867, attrib. to Pers.

Thelephora hirsuta Willd. ex Fr. *γ decipiens* Fr. ex Pers., Myc. Eur. 1: 116. 1822; Fr., Obs. Myc. 1: 153. 1815; *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray *δ decipiens* (Fr. ex Pers.) Kickx, Fl. Crypt. Flandres 2: 261. 1867.

Thelephora ochracea Schw., Naturf. Gesell. in Leipzig Schrift. 1: 106. 1822 [syn. sec. Burt, Mo. Bot. Gard. Ann. 7: 150. 1920], (non *T. ochracea* Fr., Syst. Myc. 1: 446. 1821); *T. subzonata* Fr., Elench. 1: 181. 1828; *Corticium subzonatum* (Fr.) Fr., Epicr. 557. 1838.

Thelephora hirsuta Willd. ex Fr. forma *discoidea* Wallr., Fl. Crypt. Germaniae 2: 573. 1833 (nom. nud.) [type, in STR]; *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray *γ discoideum* Kickx, Fl. Crypt. Flandres 2: 261. 1867.

Thelephora hirsuta Willd. ex Fr. *β pulchella* Weinm., Hym. et Gasteromyc. in Imp. Rossico Obs. 384–385. 1836; *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray var. *pulchellum* (Weinm.) Karst., Bidr. till Finlands Nat. och Folk 37: 124. 1882, lacking Weinm. publication data.

Thelephora rhicnopilus Lév., Ann. des Sci. Nat. (ser. 3) Bot. 5: 148. 1846 [type, Chile (Gay), in PC]; *Stereum rhicnopilum* (Lév.) Mont., Fl. Chilena Plantes Cellulaires in Gay, Hist. Fisica y Polit. de Chile, Bot. 7: 377. 1850, ut "*rhicnopilus*," comb. attrib. to Lév.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray var. *pilosiusculum* Thuem., Fungi Austriaci Exs. *821*. 1873 [type, Teplitz, Bohemia, in BPI]; *S. hirsutum* (Willd. ex Fr.) S. F. Gray forma *pilosiusculum* (Thuem.) Pilát, Hedwigia 70: 53. 1930.

Stereum amoenum Kalchb. & MacOwan, Grevillea 10: 58. 1881 [syn. sec. Talbot, Bothalia 6: 316. 1954], (non *S. amoenum* (Lév.) Sacc., Syll. Fung. 6: 580. 1888); *S. kalchbrenneri* Sacc., Syll. Fung. 6: 568. 1888.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *ramosa* Gillot, Rev. Mycol. 4: 183. 1882.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *foliacea* Gillot, Rev. Mycol. 4: 183. 1882.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *striato-foliaceum* Roum., Rev. Mycol. 8: 203. 1886.

Stereum persoonianum Britz., Bot. Centbl. 71: 91. 1897 [syn. sec. Pilát, Hedwigia 70: 130. 1930].

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *alba* Britz., Bot. Centbl. 71: 91. 1897.

Stereum variicolor Lloyd, Mycol. Writ. 4, Let. 53: 10. 1914 [type, Corvallis, Oreg. (C. E. Owens), in BPI (Lloyd Herb.)].

Stereum reflexum Sacc., Fl. Italica Crypt. Part I: Fungi—Hymeniales 2: 1148. 1916; *Auricularia reflexa* Bull. var. *1* Bull., Herb. de la France, Hist. Champ. 1: 281. 1791 [syn. sec. Burt., Mo. Bot. Gard. Ann. 7: 150. 1920]; *Thelephora reflexa* Sacc., Fl. Italica Crypt. Part I: Fungi—Hymeniales 2: 1148. 1916 (ut syn.), comb. attrib. to Bull.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray var. *amplexicaule* Bacc., Ann. di Bot. [Torino] 14 (3): 122. 1917 [syntypes, Eritrea (A. Pappi *2353, 2786, 5317, 5517*), in FI].

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *crassa* Bourd. & Galz., Soc. Mycol. de France, Bul. Trimest. 37: 107. 1921 [type, Sazeret, Allier, France (Bourdot), in PC].

Stereum azonum Velenov., Ceske Houby 761. 1922 [syn. sec. Pilát, Hedwigia 70: 48–50. 1930].

Corticium reisneri Velenov., Ceske Houby 758. 1922 [syn. *Stereum hirsutum* forma *resupinata* sec. Pilát, Hedwigia 70: 52. 1930].

Stereum neuwirthi Velenov., Ceske Houby 760. 1922 [type, Jindřichův, Czechoslovakia (Neuwirth), in PR]; *S. hirsutum* (Willd. ex. Fr.) S. F. Gray forma *neuwirthi* (Velenov.) Pilát, Hedwigia 70: 52. 1930.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray var. *luteocitrinum* Sacc. ex Rea, British Basid. 664. 1922; *S. hirsutum* (Willd. ex Fr.) S. F. Gray forma *luteocitrinum* (Sacc. ex Rea) Pilát, Hedwigia 70: 55. 1930.

Stereum ochraceum Lloyd, Mycol. Notes [Writ.] 7, Mycol. Notes 69: 1207. 1923 [type, Caulfield, Australia (J. T. Paul), in BPI (Lloyd Herb.)]; *S. hirsutum* (Willd. ex Fr.) S. F. Gray var. *S. ochraceum* (Lloyd) Rick, Brotéria (ser. 3) 9: 46. 1940.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *resupinata* Pilát, Hedwigia 70: 52. 1930, forma attrib. to Mass., Linn. Soc. London, Jour., Bot. 25: pl. 45, fig. 1. 1889.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *faginea* Pilát, Hedwigia 70: 53. 1930.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *badium* Pilát, Hedwigia 70: 54. 1930.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *ciliatum* Pilát, Hedwigia 70: 54. 1930.

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *setosum* Pilát, Hedwigia 70: 54. 1930 [authentic specimen, District of Tara, Siberia (Krawtzew), in PR].

Stereum hirsutum (Willd. ex. Fr.) S. F. Gray forma *obscurum* Pilát, Soc. Mycol. de France, Bul. Trimest. 51: 410. 1936 [type, District of Narym, Siberia (Krawtzew *3038*), in PR].

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *areolata* Killerm., Ann. Mycol. 41: 271. 1943.

Macroscopic

Basidiocarp lignicolous, coriaceous, dimidiate, effused-reflexed, or sometimes resupinate with the margin usually loosely radiately plicate; upper surface whitish or "cinnamon-buff" to "wood brown," sometimes grayish toward the base or over the entire surface, hirsute or strigose-hirsute, zonate; hymenial surface yellowish, "cinnamon-buff" to "wood brown," or grayish, even.

Microscopic

In section 500μ to 700μ thick; tomental hyphae unbranched, with moderately thick to thick refractile walls, infrequently septate, 4.5μ to 8μ in diameter; cuticular layer yellowish-brown; context with two kinds of hyphae—one kind branching and septate, the other kind unbranched, thick-walled, with few or no septa, appearing most prominently in the subhymenial region, often with yellowish-brown granular contents, ending in the hymenium often as nonexserted pseudocystidia; basidioles with the tips obtuse or pointed but lacking aculeate protuberances, 2μ to 3μ in diameter; basidia 4-sterigmate, approximately 4.5μ in diameter, spores hyaline, cylindrical, smooth, 5μ to 8μ by 2μ to 3.5μ. Plate 16, *A*, shows the pseudocystidial apices of vascular hyphae, basidioles, and spores.

Discussion

Stereum hirsutum appears to be related very closely to both *S. ostrea* and *S. complicatum*. It is a variable species and has been divided into numerous varieties and forms. I have not made a critical study of these various subdivisions of the species, but have included all such names as synonyms. I do know that in some instances, as in Pilát's form *resupinata*, nothing more fundamental than its position on the substrate is responsible for the particular appearance of the basidiocarp. The few so-called varieties and forms that I have studied did not seem worthy of being distinguished by a subspecific epithet. The type specimen of *Thelephora rhicnopilus* Lév. is in very poor condition, but appears to be *S. hirsutum*.

Habitat

On dead woody angiosperms, less commonly on gymnosperms.

Distribution

Apparently the most universally distributed species of *Stereum*. It is very common in Europe where *S. ostrea* is uncommon, but much less common than *S. ostrea* in the United States east of the Rocky Mountains. It apparently occurs in the Upper Mississippi Valley, but I am somewhat uncertain whether the resupinate specimens from Iowa that I have examined are this species. Burt (1920, p. 153) reports it from Wisconsin, Minnesota, and Missouri.

Miscellaneous Specimens Examined

BPI: Canada—Fort Wrigley (Baxter); Ethiopia—50 k. west of Addis Ababa (Archer); Fiji Islands—Viti Levu (A. C. Smith *4353*); India—Kaudia (Koelz *21739*),

Martali (Koelz *20279, 20281*), Rungling Pass (Koelz *21342*). SUI: Iowa—Cou Falls (Himmel and Martin *1262*), Tiffin (Martin *1260, 1283*), West Okoboji (Martin *1176*).

Exsiccati Examined

Cooke, Fungi Britannici *307*; Ellis, N. Am. Fungi *1204*; Lundell and Nannfeldt, Fungi Exs. Suecici *937, 1335*; Saccardo, Mycotheca Veneta *32*.

Illustrations

Many illustrations are cited by Saccardo (1911, pp. 890–891). Others include Banerjee (1935, text fig. 21; pl. 8, figs. 41–44); Bijl (1922, text fig. 5); Bresadola (1932, t. 1067, fig. 2); Burt (1920, text fig. 22; pl. 5, fig. 42); Clements and Shear (1931, pl. 42, fig. 8); Cooke (1906, pl. 20, fig. 19); Gillet (1878, pl. 125); Maheu (1906, text fig. 18 bis, no. 1 and 2); Massee (1889, pl. 45, figs. 1–4); Overholts (1929, pl. 4, fig. 4; 1939, pl. 16, fig. 16 and pl. 17, fig. 23); Pilát (1930a, t. 16, fig. 9); Roumeguère (1886, t. 60, fig. 4); Talbot (1954, fig. 11); Velenovsky (1922, text pl. 136, fig. 4); Wakefield and Dennis (1950, pl. 106, fig. 1).

26. Stereum ostrea

(Pls. 7, *C* and *D*; 10, *F*; 16, *B* and *E*)

Stereum ostrea (Blume & Nees ex Fr.) Fr., Epicr. 547. 1838; *Thelephora ostrea* Blume & Nees ex Fr., Elench. 1: 175. 1828; Blume & Nees, Nova Acta Acad. Caes. Leop. Car. 13: 13. 1826 [type, Java (Blume), in BPI].

Thelephora fasciata Schw., Naturf. Gesell. in Leipzig Schrift. 1: 106. 1822 [type coll. ?, Salem, N. C. (Schweinitz) in BPI (Michener Herb.)]; *T. versicolor* Sw. ex Fr. *β T. fasciata* (Schw.) Fr., Elench. 1: 175. 1828; *Stereum fasciatum* (Schw.) Fr., Epicr. 546. 1838; *S. lobatum* (Kunze ex Fr.) Fr. var. *S. fasciatum* (Schw.) Rick, Brotéria (ser. 3) 9: 43. 1940.

Thelephora lobata Kunze ex Fr., Syst. Myc. 3 (Index): 188. 1832; Fr., Linnaea 5: 527. 1830; Kunze in Weigelt, Exs. 1827 [type, Surinam (Weigelt), in UPS]; *Stereum lobatum* (Kunze ex Fr.) Fr., Epicr. 547. 1838.

Thelephora boryana Fr. ex Fr., Syst. Myc. 3 (Index): 185. 1832; Fr., Linnaea 5: 528–529. 1830; *Stereum boryanum* (Fr. ex Fr.) Fr., Epicr. 547. 1838 [syn. *S. lobatum* sec. Berk. in Hook., Fl. Nov. Zelandiae, Part 2. 183. 1855].

Thelephora versicolor Sw. ex Fr. var. *caucasica* Weinm., Hym. et Gasteromyc. in Imp. Rossico Obs. 383–384. 1836 [syn. *Stereum fasciatum* sec. Fr., Epicr. 546. 1838].

Thelephora concolor Jungh., Praemissa Fl. Crypt. Javae Insulae, Fasc. 1. 38. [preprint] 1838 [type, Java, in L]; *Stereum concolor* (Jungh.) Mont., Ann. des Sci. Nat. (ser. 2) Bot. 16: 312. 1841 (non *S. concolor* Berk. in Hook., Fl. Tasmaniae 2: 259. 1860); *S. ostrea* (Blume & Nees ex Fr.) Fr. forma *concolor* (Jungh.) Bres., Ann. Mycol. 9: 550. 1911; *S. ostrea* (Blume & Nees ex Fr.) Fr. var. *concolor* (Jungh.) Bres. ex Syd. & P. Syd., Ann. Mycol. 15: 170. 1917, lacking Jungh. publication data.

Stereum perlatum Berk., Jour. Bot. London 1: 153. 1842 [type, Philippine Islands (Cuming), in BPI].

Thelephora mollis Lév., Ann. des Sci. Nat. (ser. 3) Bot. 5: 147–148. 1846 [type ?, Menands, N. Y., in PC]; *Stereum molle* (Lév.) Berk., Grevillea 1: 163. 1873.

Stereum galeottii Berk., Hooker's Jour. Bot. and Kew Gard. Misc. 3: 15–16. 1851 [type, Cordillera, Mexico (Galeotti *6853*), in IMI]; *S. lobatum* (Kunze) Fr. forma *crassior* Killerm. in Eng. & Prantl, Die Natürl. Pflanzenfam., Ed. 2, 6: 143. 1928, nom. nud.

Stereum sprucei Berk., Linn. Soc. London, Jour., Bot. 10: 331. 1869 [type, Cuba (Wright *522*), in BPI; paratype, Brazil (Salle), in BPI].

Stereum versicolor Sw. ex Fr. var. *S. illyricum* G. Beck in G. Beck and Zahlbr., K. K. Naturhist. Hofmuseums Ann. 13: 446–447. 1898 [type coll. ?, Zepce, Yugoslavia (Beck, Mus. Palat. Vind. Crypt. *319*)].

Stereum hirsutum (Willd. ex Fr.) S. F. Gray forma *rotundum* Pilát, Hedwigia 70: 54. 1930 [type, Mnisek, Czechoslovakia (Pilát *159409*), in PR].

Macroscopic

Basidiocarp lignicolous, coriaceous, petaliform, flabelliform, or hemiorbicular, laterally sessile or dimidiate, or effused-reflexed and with the resupinate part spreading along the lower surface of the substratum, or more rarely pseudoinfundibuliform and on the upper surface of the substratum, individual free pilei 1 to 6.5 cm. long and 0.5 to 7 cm. broad, often laterally coalescent with adjoining pilei, sometimes imbricate; upper surface "light buff" to "cinnamon-buff," or "drab" to "pale mouse gray," sometimes grayish toward the base and brownish toward the margin, tomentose, often with the bare "vinaceous-russet" or "hazel" upper surface showing through the tomentum in narrow to broad transverse zonations; hymenial surface "drab," "avellaneous," "light ochraceous-buff," or "pinkish-buff" to "Verona brown," even.

Microscopic

In section 500μ to 700μ (rarely 400μ to 800μ) thick; tomental hyphae hyaline to subhyaline, long, flexuous, unbranched, moderately thick walled, with very thin septa; cuticular layer yellowish-brown; context with two kinds of hyphae—one kind branching, septate, the other kind nonbranching, thick-walled, nonseptate, with hyaline or sometimes pale-brown contents, appearing in the hymenium as nonexserted pseudocystidia; basidioles numerous but inconspicuous in the hymenium, with their tips pointed or often with minute aculeate projections; basidia 4-sterigmate, 22.5μ to 26.5μ by 4.5μ to 5.5μ; spores hyaline, cylindrical, smooth, 5μ to 7.5μ by 2μ to 3μ. Plate 16, *B*, shows a basidiole, a basidium, and spores; 16, *E*, shows the pseudocystidial apex of a vascular hypha, basidioles, a basidium, and spores.

Discussion

Stereum ostrea presents a very difficult taxonomic problem. Burt (1920), Pilát (1930b), Banerjee (1935), and Hendrickx (1948, p. 83) have considered it to be a synonym of *S. fasciatum*. Massee (1890), Cooke (1892), Höhnel and Litschauer (1907), Reinking (1920), and Boedijn (1940) have considered it to be synonymous with *S. lobatum*. In the National Fungus Collections is a broad representation of specimens classified under *S. ostrea*,

S. lobatum, *S. fasciatum*, *S. concolor*, and other related groupings. Upon examination of these specimens, it becomes apparent that they represent all intergradations of a single highly variable species. Since the earliest valid name for these is *S. ostrea*, it is necessary to adopt that name for this complex. In North America, *S. fasciatum* is a well-recognized entity differing in minor respects from the type of *S. ostrea*. In the tropics, especially, *S. lobatum* is well-recognized and in its typical expression has a slightly different appearance than the type of *S. ostrea*. In North America, however, *S. fasciatum* and *S. lobatum* intergrade. At present, it is very difficult to reach a satisfactory judgment concerning varieties and forms. For that reason, no attempt is made to recognize subspecific entities. Plate 7, *C*, shows the habit of the *S. fasciatum* expression of *S. ostrea*. Plate 7, *D*, shows the habit of the temperate *S. lobatum* expression of *S. ostrea*.

Stereum ostrea is distinguished from *S. complicatum* by being larger, usually thicker, and not radiately plicate, by the hymenium usually not being so ruddy as that of *S. complicatum*, and by the thick-walled vascular hyphae not having their contents colored so often as in *S. complicatum*. Aculeate-tipped basidioles are reasonably common among the basidia of *S. ostrea*, but are lacking in *S. complicatum*. *S. hirsutum*, another species often confused with *S. ostrea*, is often somewhat radially plicate, has a more hirsute tomentum, usually has more colored vascular hyphae in the context and hymenium, and apparently lacks the laterally sessile forms so common in *S. ostrea* but is almost always effused-reflexed.

Habitat

On dead woody angiosperms.

Distribution

Cosmopolitan. It rivals *Stereum complicatum* in abundance in the Upper Mississippi Valley.

Miscellaneous Specimens Examined

BPI: California—Klamath Natl. Forest (Hedgcock *1694*); Indiana—Crawfordsville (Bechtel); Kansas—Manhattan (Rogerson and Shaffer *R 3483*); Louisiana—Bogalusa (Hedgcock *802, 804, 810*); Maryland—Beltsville (Davidson and Lentz *12*), Bowie (Lentz *3, 9, 10*), Takoma Park (Hedgcock *1704*); Michigan—Cross Village (Stevenson); Mississippi—Sandy Hook (Hedgcock *801*); New Mexico—Coronado Natl. Forest (Hedgcock *803*), Sandia Mts. (Hedgcock *800*); Texas—Boerne (Hedgcock *805*); Mexico—San Luis Potosi (*E & PQ 65024*); all as *Stereum fasciatum;* Kansas—Manhattan (Rogerson *R 3479*); Louisiana—Bogalusa (Hedgcock *811, 813*); Maryland—Bowie (Lentz *5, 30*); Mississippi—Sandy Hook (Hedgcock *806*); Texas—Little Thicket Nature Sanctuary (Mrs. Miner); Argentina—Quebrada del Diablo (Killip *39623*); Fiji Islands—Viti Levu (A. C. Smith *4013, 4349, 4394, 4705, 5547, 5821*); India—Bona (Koelz *20900*); all as *S. lobatum;* Philippine Islands—Mt. Maquiling (Patouillard *741*, as *S. boryanum*). ILL: Illinois—Bluff Lake (Seymour *ILL 2048*), Camp Point (Seymour *ILL 27633, ILL 27634*), Cobden (Cinton), Grafton (Seymour *ILL 6302*), Hudson (Seymour *ILL 27632*), Mahomet (Gibbs and Clokey *ILL 27965*), Minert (Clinton *ILL 27622;* Seymour *ILL 27625*), Monticello (Seymour and Waite *ILL 27630, ILL 27635*), Oregon (Waite *ILL 7551*), Twin Grove (Seymour *ILL 2762*), Villa Ridge (Seymour *ILL 4550*); all as *S. versicolor.* SUI: Iowa—Atalissa (Brasfield *SUI 1743*), Hills (Martin *1923*), Iowa City (McGuire *SUI 1745;* Martin *89, 3959, 5141, 6523, 6524, 6525, 6526, 6527;* Himmel *SUI 1091;* Baird *SUI 1289;* Emmons *SUI 1097, SUI 1259, 832, Aug. 22 in 1946*), North Liberty (Martin *1096*), Pine Hollow (Martin *6521*), Tiffin (Martin *1255*), Turkey Creek (Martin *1929*); Panama Canal Zone—Fort Sherman (Martin *6051*); Colombia—Hacienda

Cincinnati (Martin *3349*); all as *S. fasciatum;* Iowa—Cedar Valley (*SUI 1263*), Homestead (*SUI 1963*); China—Hainan (*SUI 2319*); Sumatra—Marbau (Toroes *369*); all as *S. lobatum.*

Exsiccati Examined

Bartholomew, Fungi Columbiani *2590, 2884,* both as *Stereum versicolor, 2985, 3985, 4291, 4986, 5091,* all as *S. fasciatum;* Ellis, Fungi Nova-Caesareenses *6,* as *S. purpureum;* Ellis, N. Am. Fungi *514a,* as *S. versicolor, 514d,* as *S. versicolor* var. *petaliforme;* Ellis and Everhart, N. Am. Fungi *1714,* as *S. purpureum;* Ellis and Everhart, Fungi Columbiani *306,* as *S. versicolor;* Lundell and Nannfeldt, Fungi Exs. Suecici *1336a, 1336b,* both as *S. fasciatum;* Rabenhorst-Pazschke, Fungi Europaei et Extraeuropaei *4348,* as *S. fasciatum;* Rabenhorst-Winter, Fungi Europaei *2934,* as *S. versicolor;* Ravenel, Fungi Americani *220,* as *S. versicolor, 721,* as *S. fasciatum.*

Illustrations

Blume and Nees von Esenbeck (1826, pl. 2, figs. 1 and 2); Burt (1920, text fig. 23; pl. 5, figs. 43–46); Coker (1921, pl. 22; pl 35, fig. 4); Emmons (1927, pl. 2, fig. 8); Graham (1944, pl. 5, fig. 13); Hennings (1897, text fig. 69, A and B); Henry (1949, pl. 1, fig. 1); Istvanffi (1896, pl. 158, fig. 3); Killermann (1928, text fig. 98, A and B); Lloyd (1925, pl. 323, fig. 3098); Overholts (1939, pl. 14, fig. 1; pl. 18, fig. 29); Pilát (1930a, t. 16, fig. 4); Talbot (1954, fig. 10).

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Glossary

Although an attempt has been made to utilize standard terms in this study, it has been desirable also to follow established usage of authors who have previously studied the Thelephoraceae. Thus, although most of the terms in the glossary are universally applicable, some others are used in a special sense differing from ordinary usage.

ACANTHOPHYSIS (Bottle-brush paraphysis).—A sterile hymenial hyphal end that has a number of tinelike diverticules protruding from the surface.

BASIDIOCARP.—The entire multicellular hyphal association, usually in the form of a prosenchymatous to pseudoparenchymatous body, that bears basidia and basidiospores.

BASIDIOLE.—A basidiumlike hymenial element that lacks sterigmata either because it is young or because it is permanently sterile.

CARTILAGINOUS.—Having a tough, gristly consistency.

CESPITOSE-IMBRICATE.—(Of basidiocarps). With the edges overlapping in the manner of shingles.

CLAVATE.—Club-shaped, with the diameter slightly but rather regularly increasing from base to apex.

CONTEXT.—The hyphal mass occupying the region between the superior surface and the subhymenium in basidiocarps lacking lamellae, pores, or spines, and also the similar mass in the cap but not in the lamellae, pores, or spines of basidiocarps having the latter structures.

CORIACEOUS.—Having a leathery consistency.

CUTICULAR LAYER.—A noticeably compacted region constituting the differentiated superior surface layer of some basidiocarps.

CYSTIDIOLE.—A simple hymenial cell of approximately the same diameter as the basidium but remaining sterile and protruding beyond the hymenial surface.

CYSTIDIUM.—An enlarged, conical, prismatic or cylindrical sterile end of a nonvascular hypha, characteristically hyaline or pale-colored but sometimes brown and distinguished then from a seta by origin, form, or failure to darken in potassium hydroxide solution, borne usually in the hymenium but sometimes remaining submerged or appearing at other surfaces of the basidiocarp.

DENDROPHYSIS.—A sterile hyphal end in the context or hymenium characterized by irregular treelike branching.

DIMIDIATE.—With a small part of the basidiocarp resupinate and the greater part bent away from the substratum.

EFFUSED-REFLEXED.—With part of the basidiocarp resupinate and a smaller part bent away from the substratum.

EXSERTED.—Protruding beyond the general level of the hymenial surface.

FLABELLIFORM.—Fan-shaped.

GLOEOCYSTIDIUM.—A sterile hyphal end considerably modified for either a short or a relatively long distance from the apex so that it is broader than the hypha from which it originates, thin-walled, characteristically nonseptate, usually of irregular form, often long and tortuous, with the base broader than the apex, usually bearing highly refractile hyaline or yellowish contents, originating in the context, trama, or subhymenium as a rule, and seldom protruding beyond the hymenial surface.

HYMENIUM.—A more or less continuous layer constituted by hyphal ends oriented vertically to the surface at which they occur and of which many or all may bear basidiospores.

IMBRICATE.—Overlying one another as a series of shelves.

INFUNDIBULIFORM.—Funnel-shaped.

LATERALLY SESSILE.—Attached directly by one edge and lacking a narrowed point of attachment, stipe, or any other intermediary structure.

LIGNEOUS.—Woody.

LIGNICOLOUS.—Living on wood.

LUMEN.—The central cavity of a hypha or of its cells.

MERISMATOID.—With the basidiocarp erect and with a much-branched apex, and thus having the appearance of a compound structure.

PETALIFORM.—Having the form of a petal. Similar to flabelliform but not as broad.

PILEOCYSTIDIUM.—A cystidium borne at the superior surface of the basidiocarp.

PLICATE.—Folded in pleats similar to those of a fan.

PSEUDOCYSTIDIUM.—The hymenial end of a vascular hypha.

PSEUDODENDROPHYSIS.—An ordinary unmodified hypha of the hymenium with greatly foreshortened branching and thus superficially resembling a dendrophysis.

REFLEXED.—Bent away from the substratum.

RESUPINATE.—With none of the morphologically superior surface of the basidiocarp free from the substratum, being entirely appressed, and thus with the hymenium facing away from the substratum.

SETA.—A brown, spinelike, sterile hyphal end appearing in various parts of xanthochroic basidiocarps. It never is very conspicuously incrusted, usually is thick-walled, and darkens conspicuously when moistened with potassium hydroxide solution.

STRATOSE.—With the thickened hymenial region having several definite layers, presumably representing (in addition to the present functioning basidial layer) previous hymenial surfaces each of which, in turn, has been overgrown by a more recent layer.

SULCATE.—Grooved or furrowed.

TERRESTRIAL.—Growing on the ground.

UMBO.—As the term is used among the thelephores, a little knob or nipple of mycelium that originates from the substratum, gives rise to the sporocarp, and thereafter remains the point of attachment of the upper surface of the sporocarp with the substratum. This method of attachment is known as being umbonate-affixed.

VASCULAR HYPHA.—A tubelike hypha that is nonseptate or sparingly septate and which also is conspicuous because of its large diameter or distinctive contents or both.

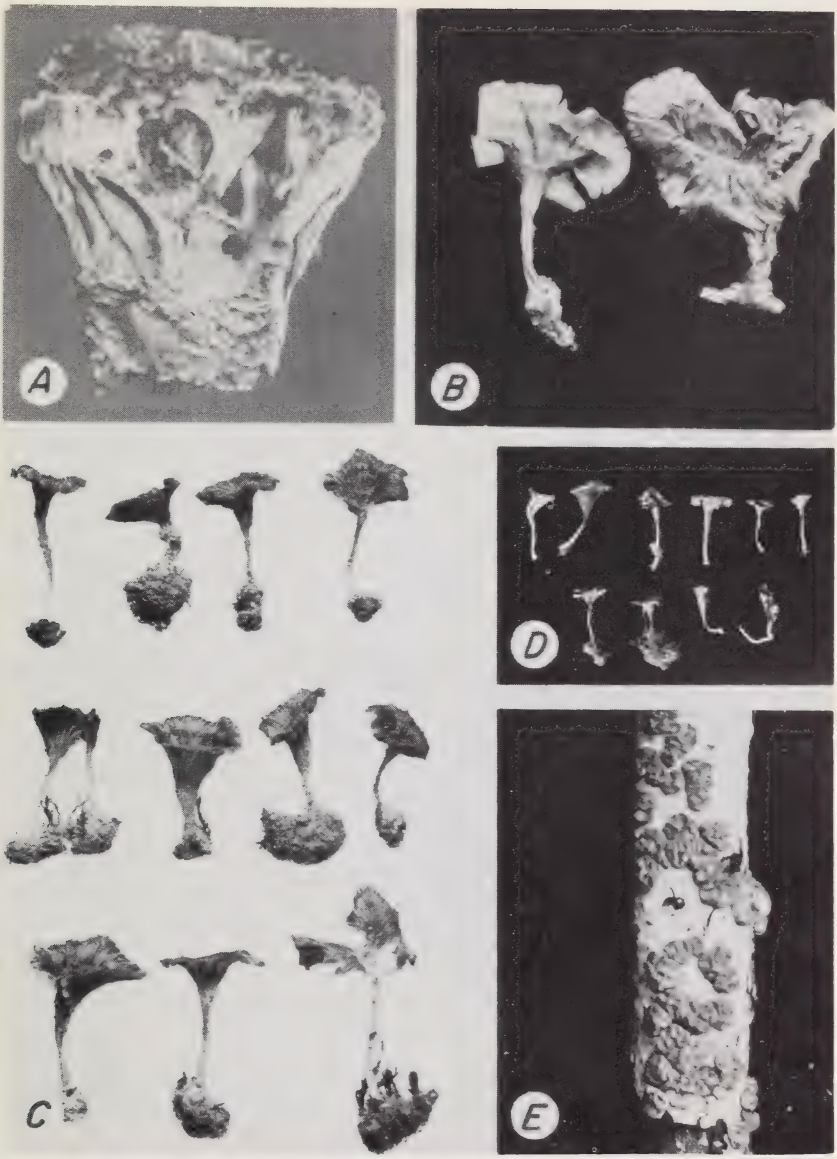
VESICLE.—An inflated, pyriform to subglobose, bladderlike sterile hyphal end that usually is situated in the context or trama, or more rarely in the hymenium. It may bear hyaline or yellowish and refractile contents, or may appear empty.

Index of Fungus Names

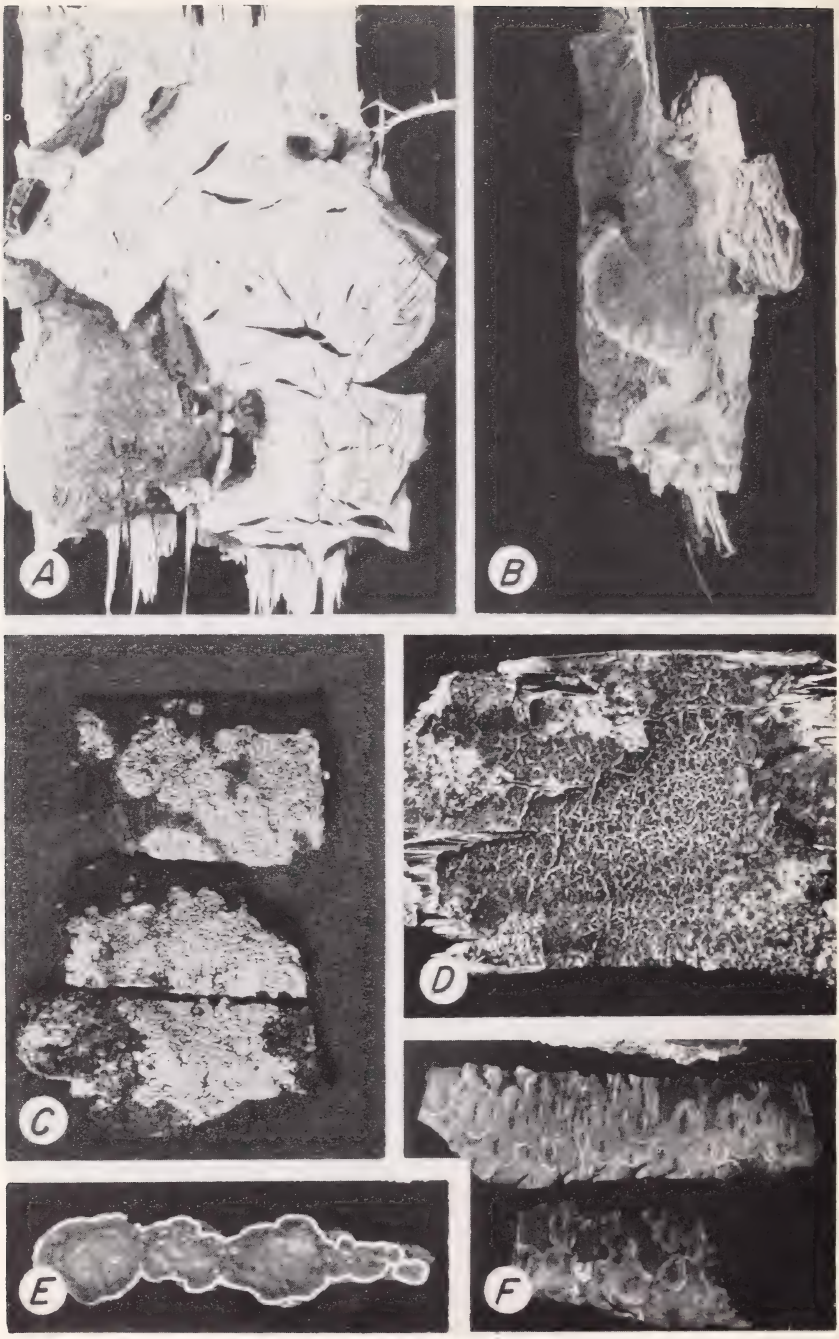
In the indexes to genera and species, the names of the principal recognized entities are printed in boldface. Those appearing in formal lists of synonymy are printed in italics. All others are printed in standard type. Page numbers referring to formal treatment of principal entities are in boldface. Those referring to names in formal lists of synonymy are in italics. All others are in standard type.

Index to Genera

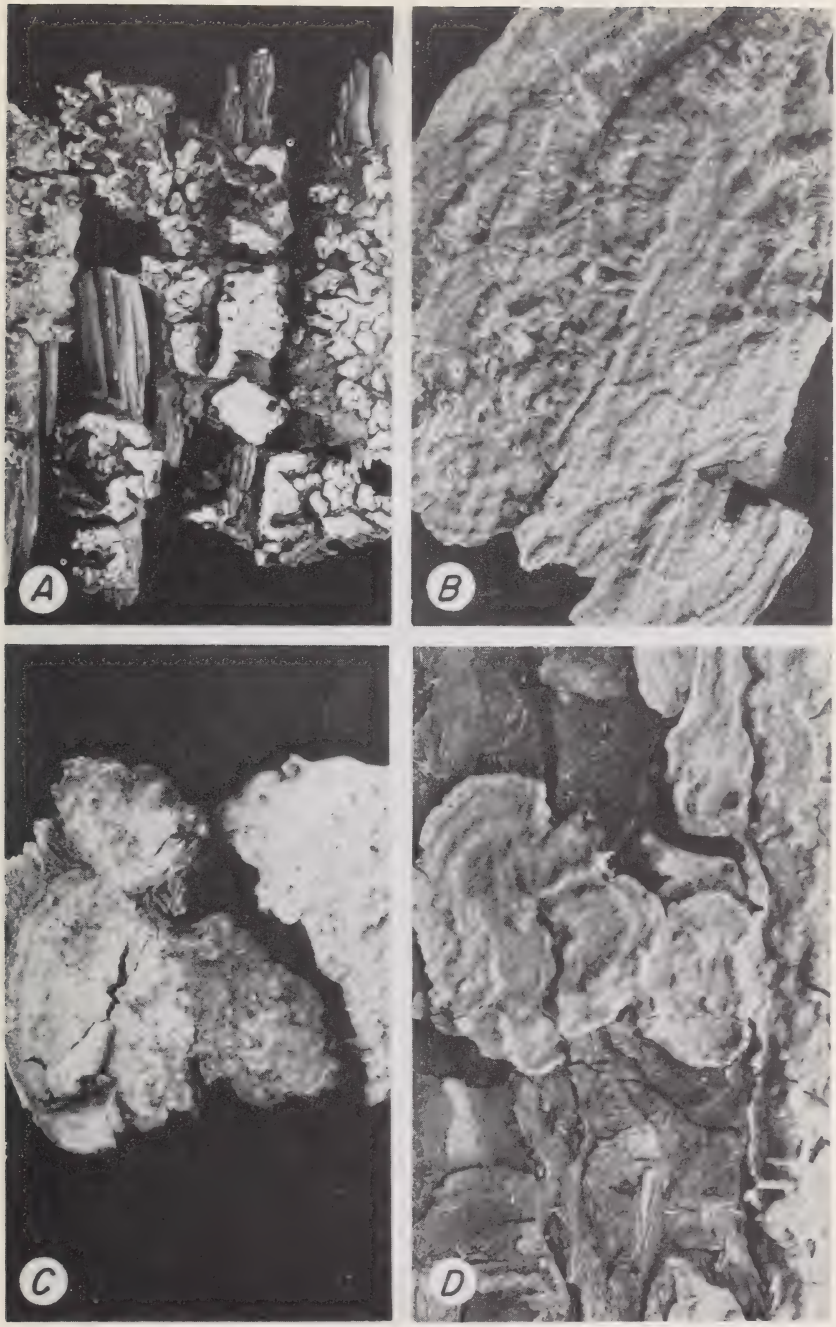
Index to Species



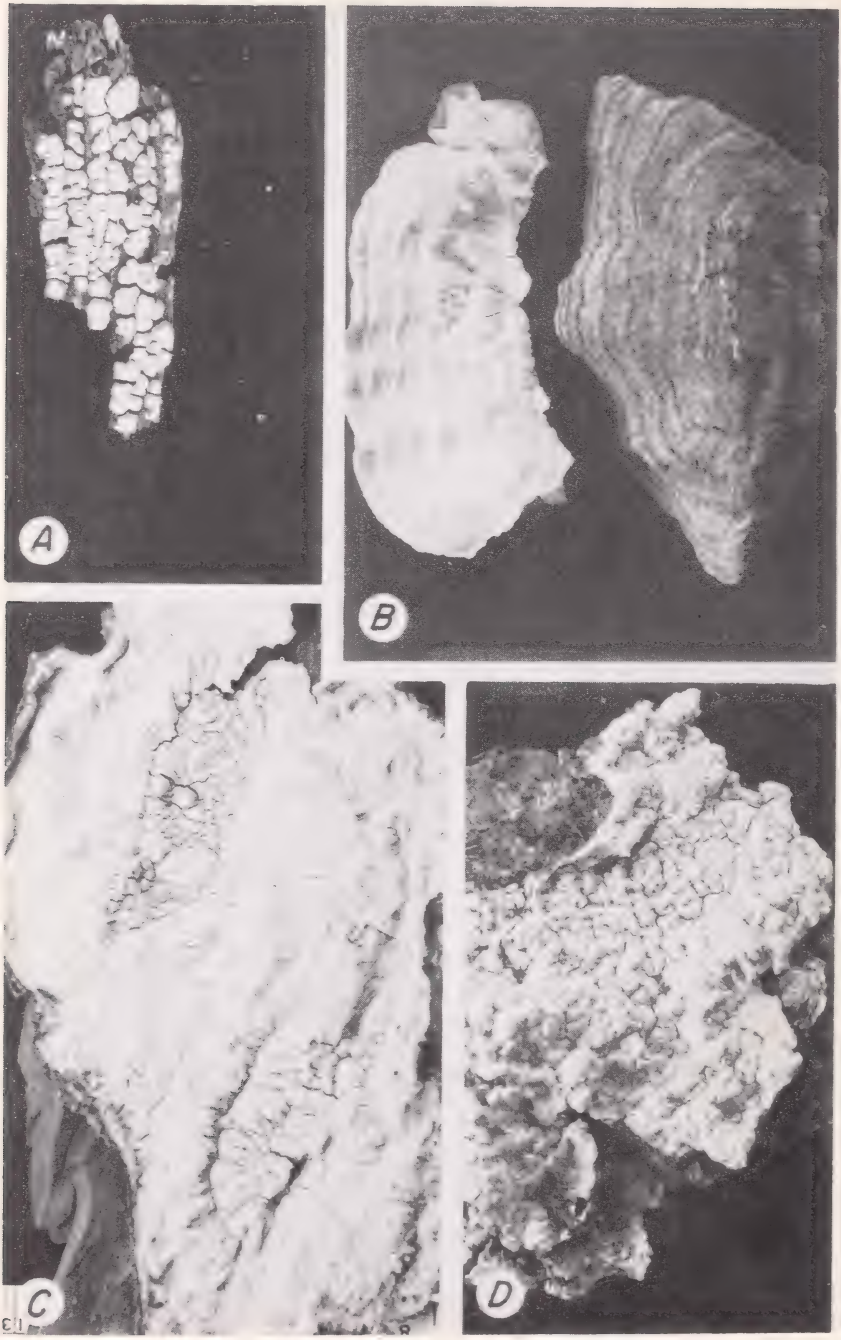
Habit: *A*, *Cotilydia aculeata*. × 1; *B*, *C. diaphana*. × 1; *C*, *C. undulata*. × 2.25; *D*, *C. undulata*. × 1; *E*, *Cryptochaete rufa*. × 1.



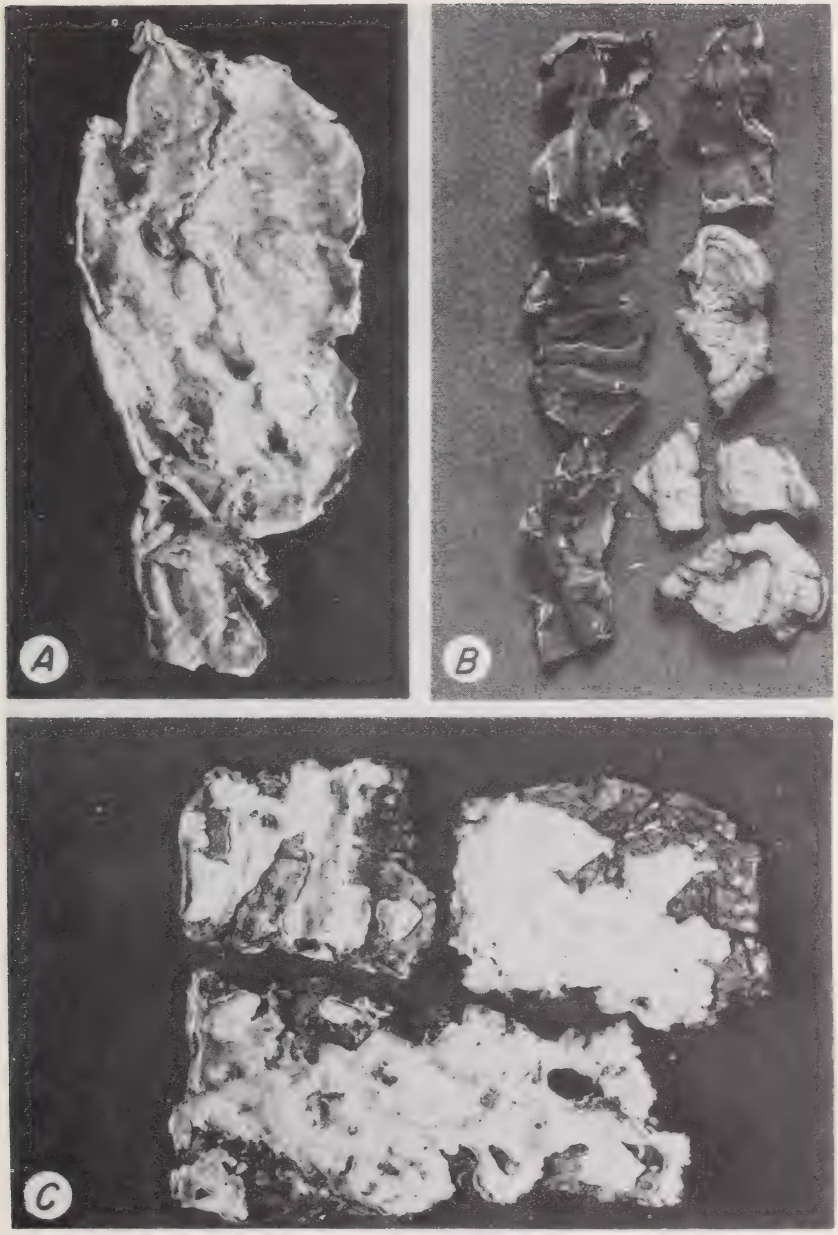
Habit: *A, Laxitextum bicolor; B, L. crassum; C* and *D, L. roseo-carneum; E, Stereum albobadium; F, S. versiforme.* All × 1.



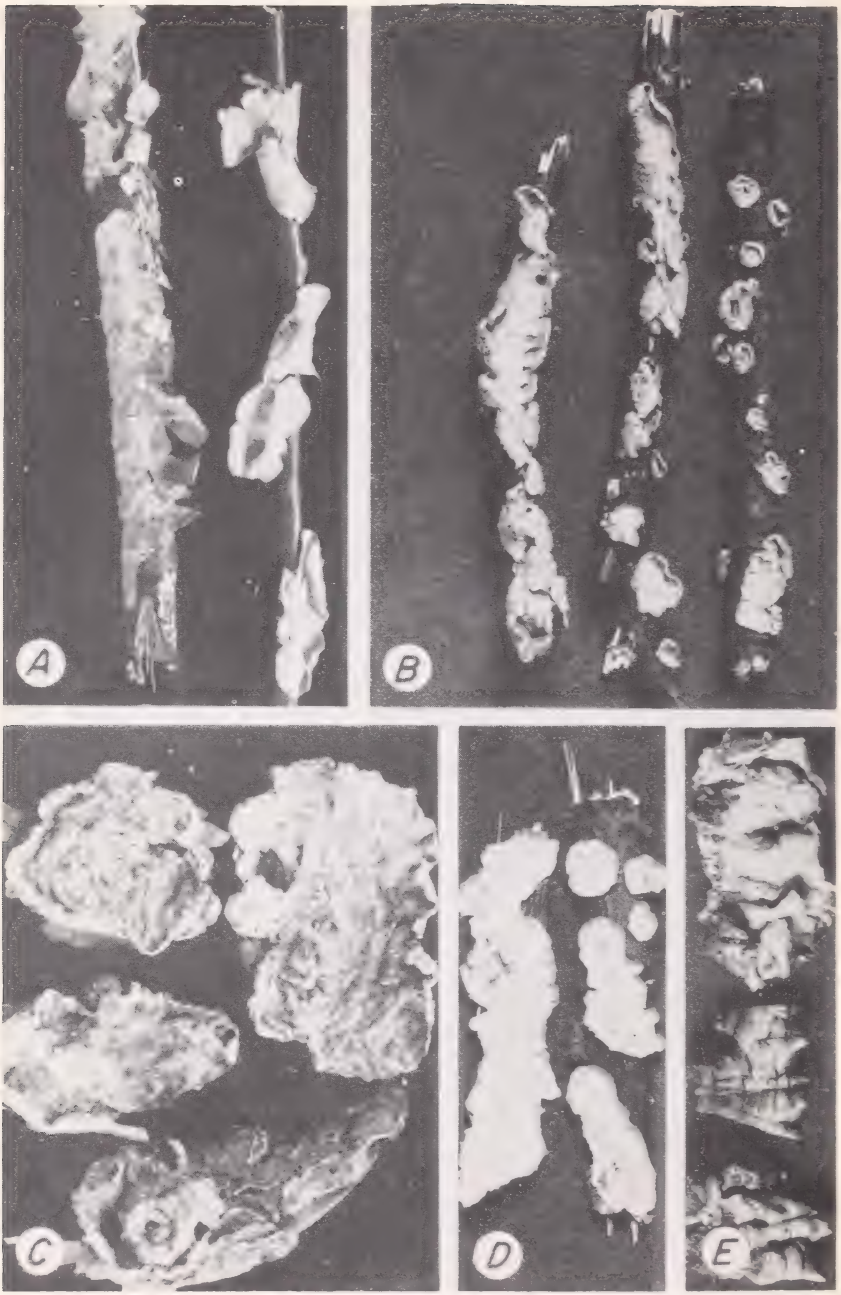
Habit: *A, Stereum erumpens; B, S. radiatum; C, S. abietinum; D, S. chailletii.* All × 1.



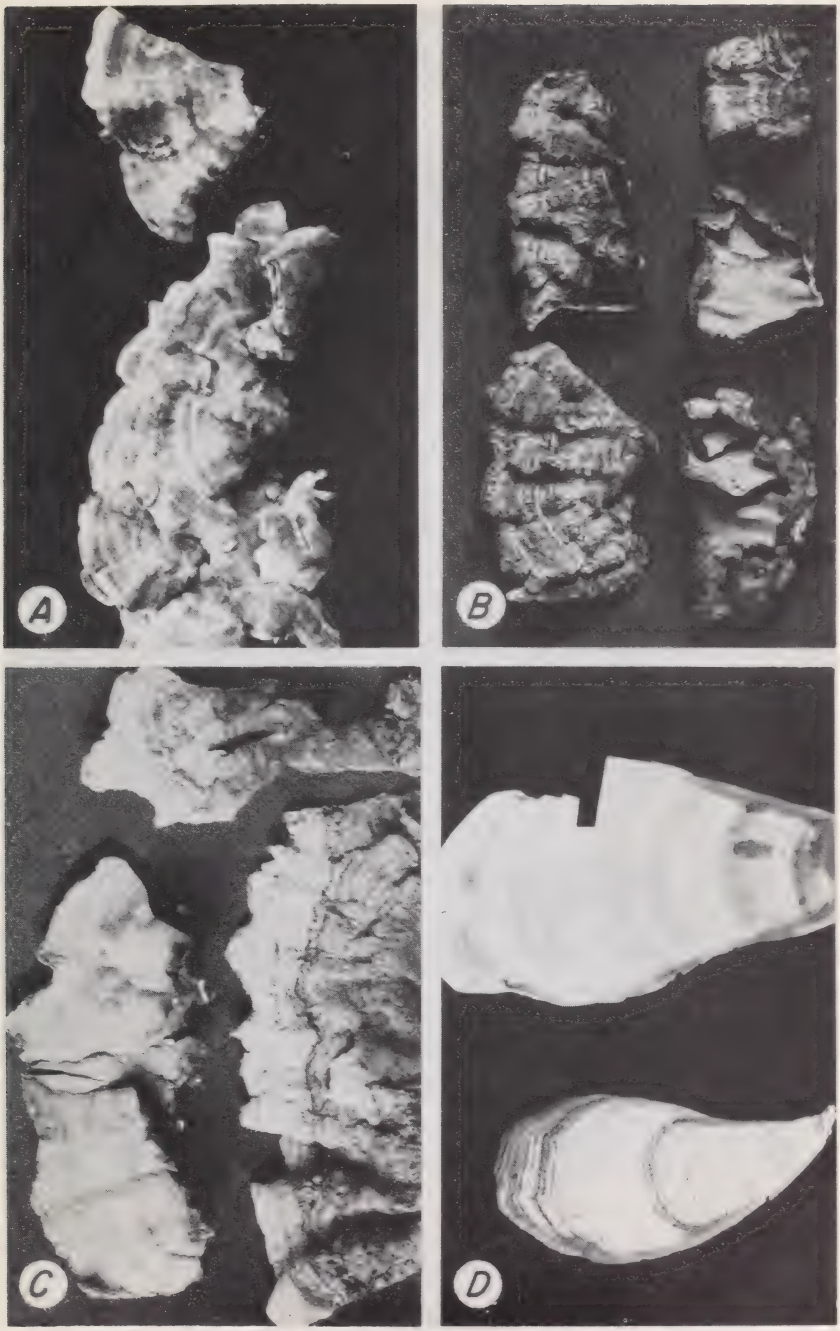
Habit: *A*, *Stereum frustulatum; B, S. subpileatum; C, S. sulcatum; D, S. murraii.* All × 1.



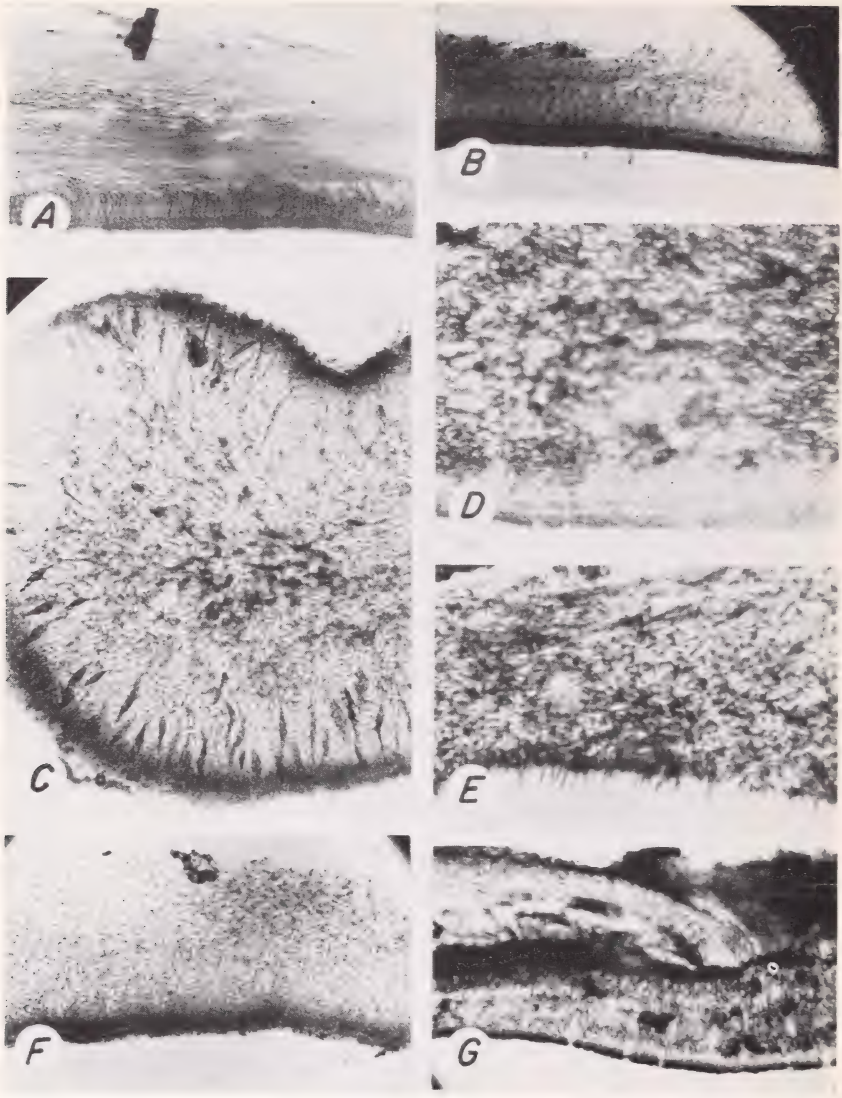
Habit: *A* and *B*, *Stereum purpureum; C*, *S. cinerascens.* All × 1.



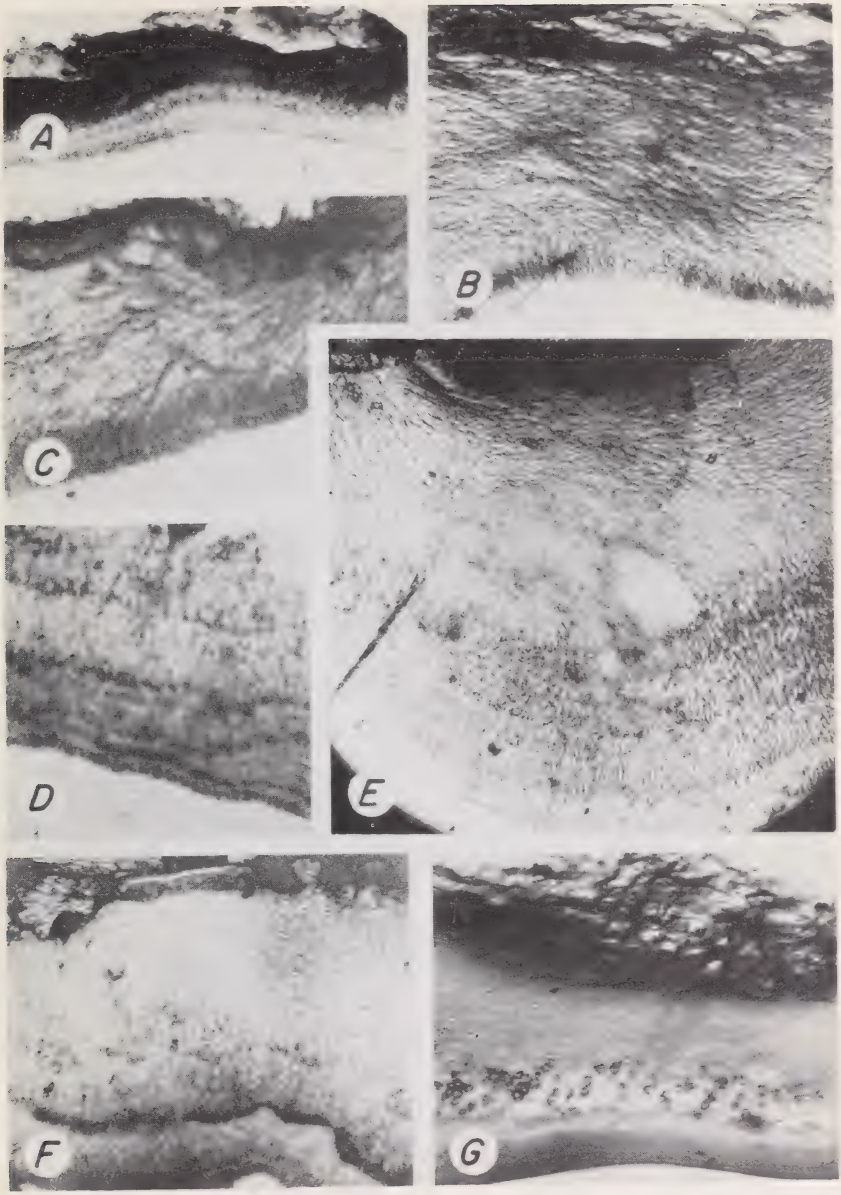
Habit: *A*, *Stereum striatum*; *B*, *S. ochraceo-flavum*; *C*, *S. sanguinolentum*; *D* and *E*, *S. complicatum*. All × 1.



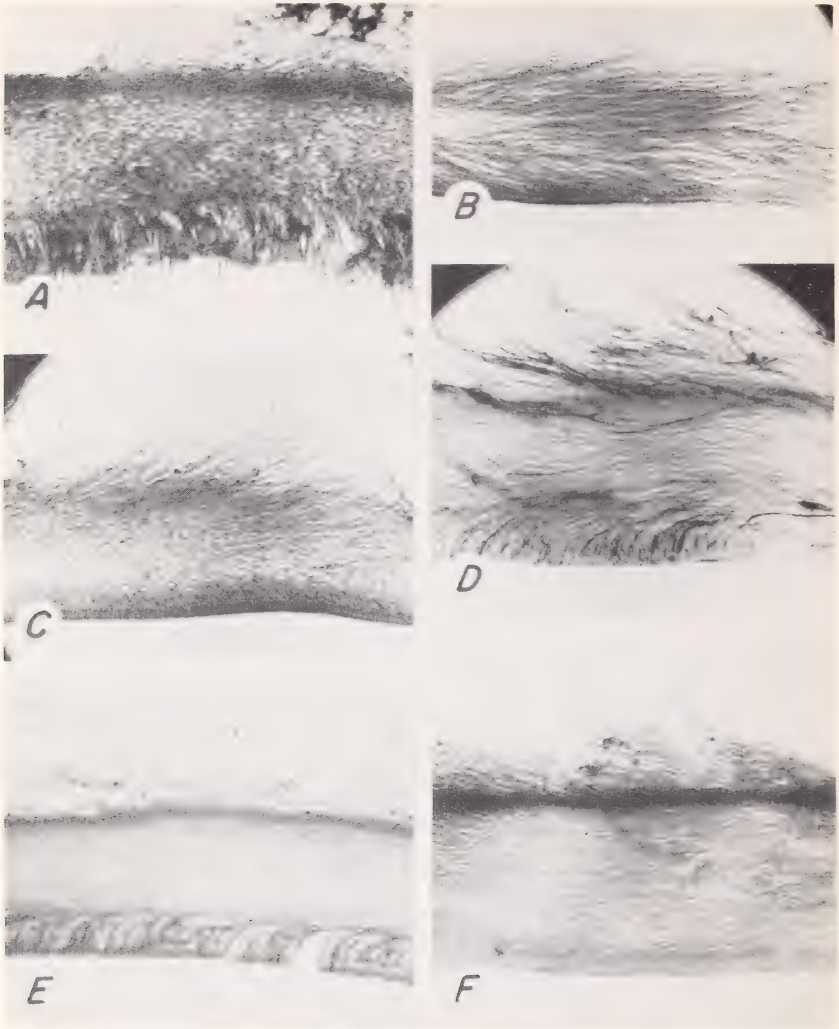
Habit: *A*, *Stereum gausapatum; B*, *S. hirsutum; C* and *D*, *S. ostrea.* All × 1.



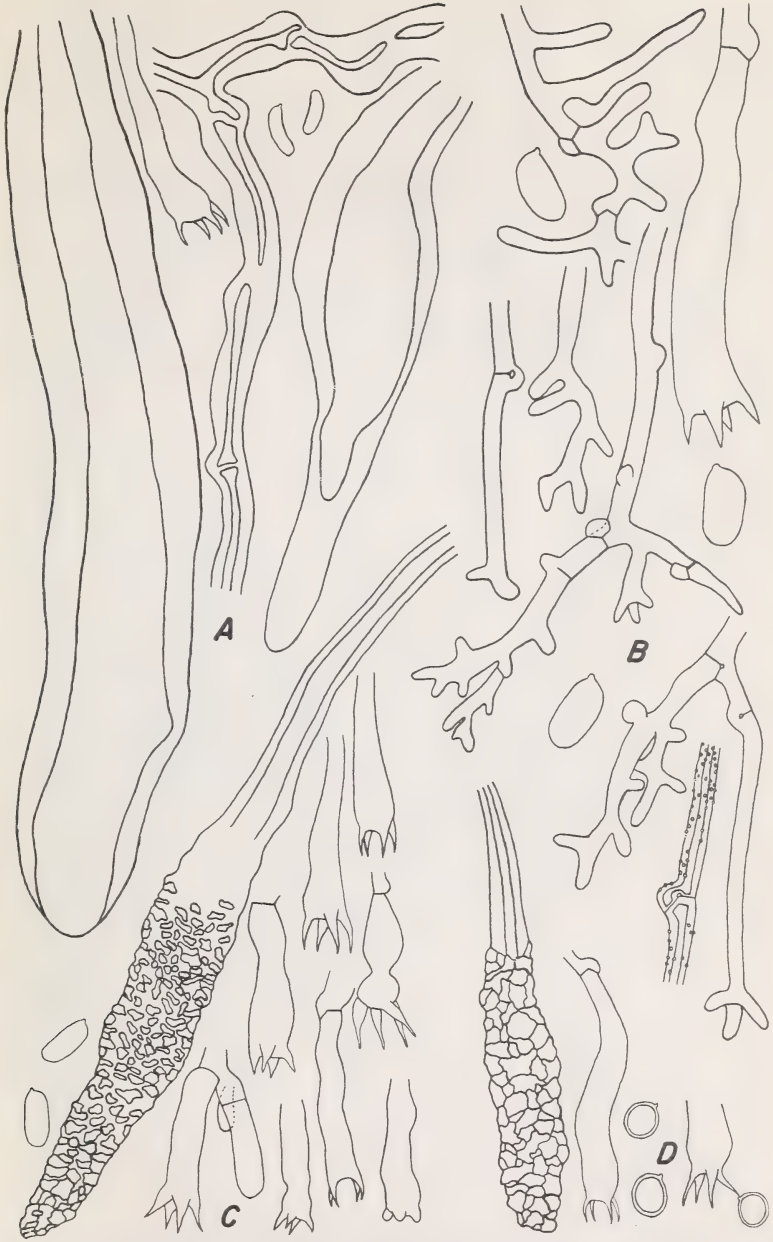
Vertical sections through basidiocarps: *A*, *Cotilydia aculeata*. × 90; *B*, *C. diaphana* × 90; *C*, *Cryptochaete rufa*. × 75; *D*, *Laxitextum bicolor*. × 68; *E*, *L. crassum* × 66; *F*, *L. roseo-carneum*. × 83; *G*, *Stereum versiforme*. × 90.



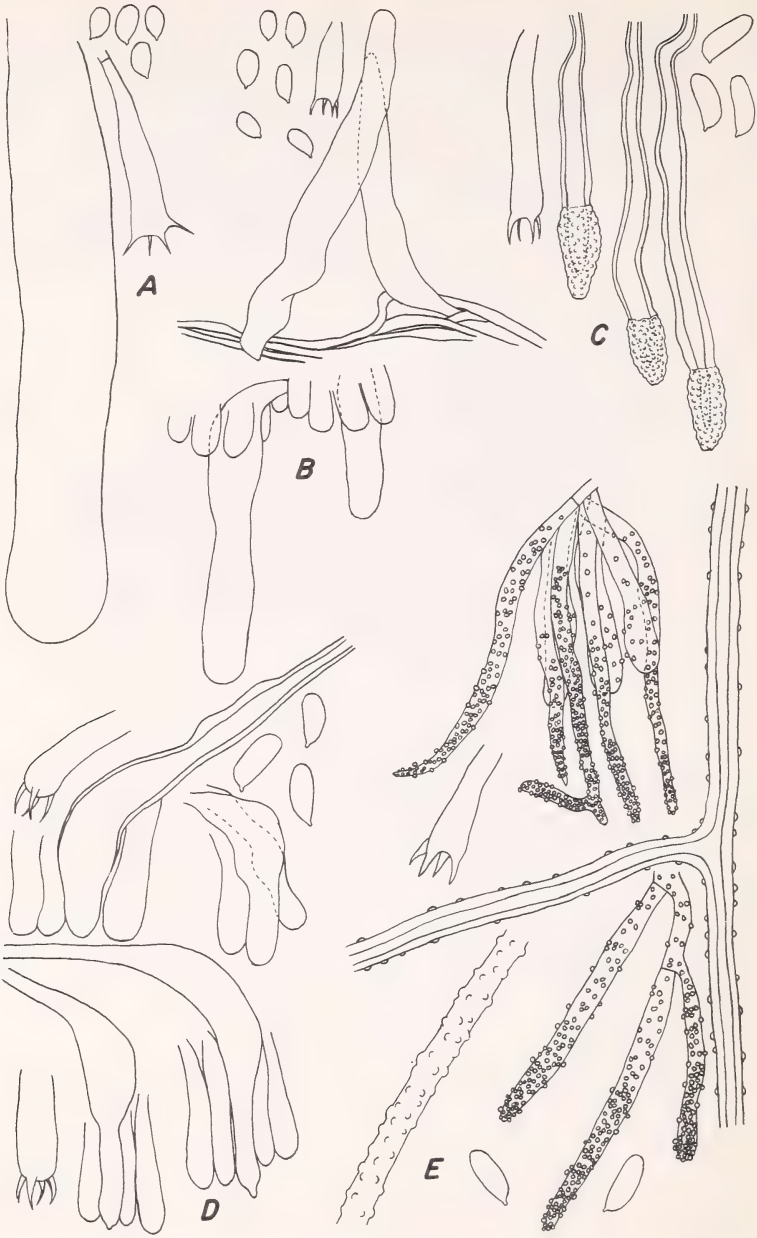
Vertical sections through basidiocarps: *A*, *Stereum erumpens*. × 83; *B*, *S. radiatum*. × 92; *C*, *S. chailletii*. × 65; *D*, *S. murraii*. × 67; *E*, *S. sulcatum*. × 65; *F*, *S. murraii*. × 65; *G*, *S. purpureum*. × 67.



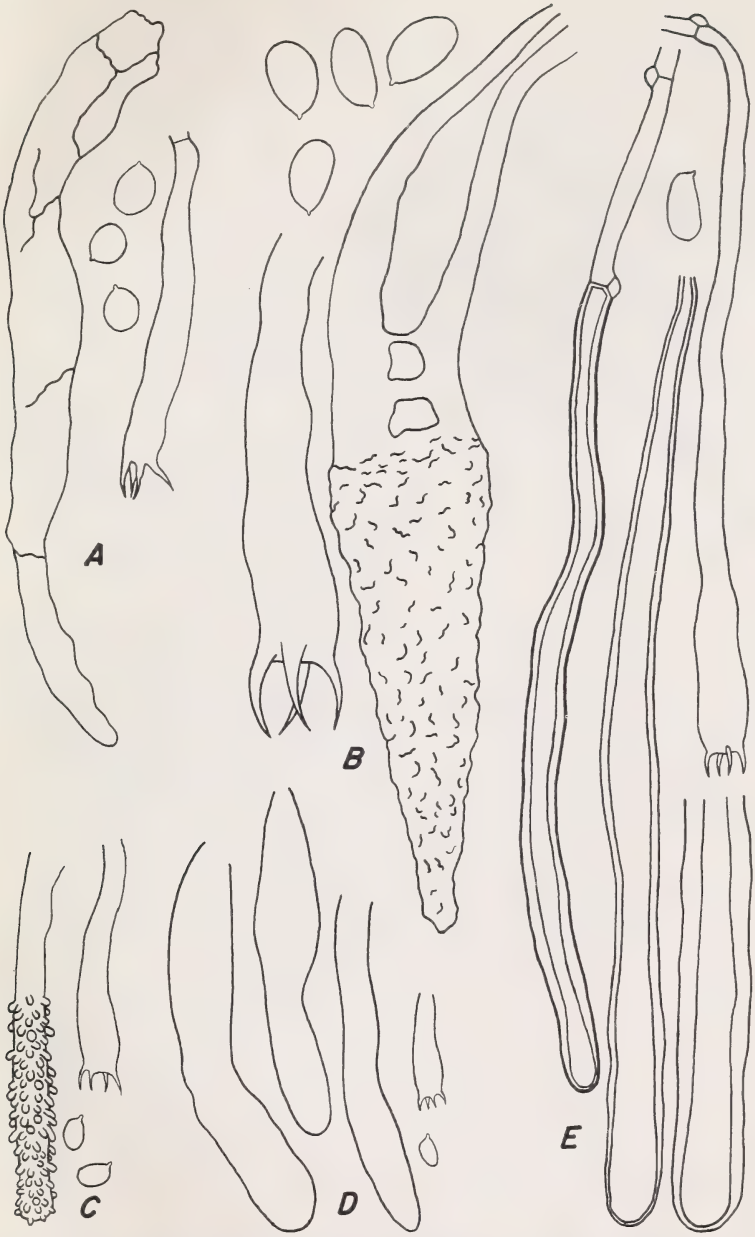
Vertical sections through basidiocarps: *A*, *Stereum cinerascens*. × 94; *B*, *S. striatum*. × 92; *C*, *S. ochraceo-flavum*. × 95; *D*, *S. sanguinolentum*. × 85; *E*, *S. gausapatum*. × 63; *F*, *S. ostrea*. × 75.



Camera lucida drawings: *A, Cryptochaete rufa; B, Laxitextum roseo-carneum; C, L. crassum; D, Stereum sulcatum.* All × 1,000.

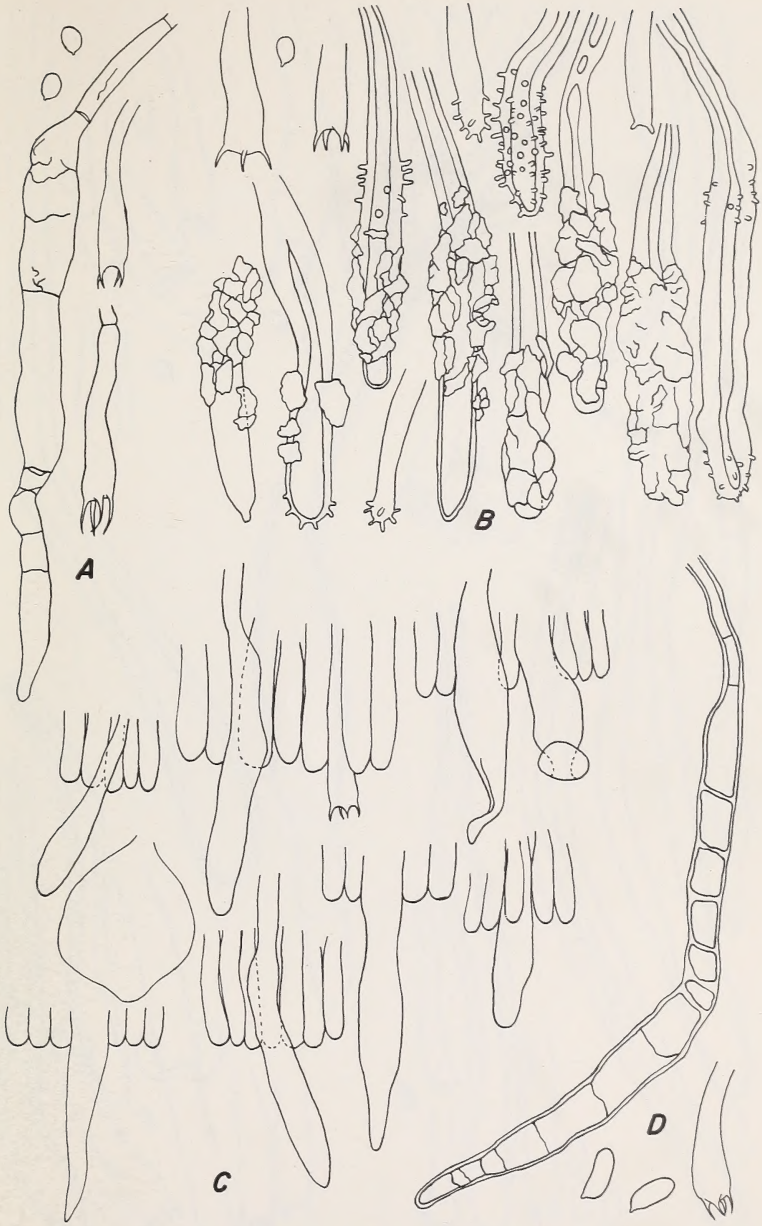


Camera lucida drawings: *A, Cotilydia diaphana; B, C. undulata; C, Stereum chailletii; D, S. striatum; E, S. radiatum.* All × 1,000.



Camera lucida drawings: *A, Cotilydia aculeata; B, Stereum cinerascens; C, S. frustulatum; D, C. undulata; E, S. abietinum.* All × 1,000.

Camera lucida drawings: *A, Stereum versiforme; B, S. erumpens; C, S. murraii; D, S. albobadium.* All × 1,000.



Camera lucida drawings: *A, Laxitextum bicolor; B, Stereum subpileatum; C, S. purpureum; D, S. gausapatum.* All × 1,000.

Camera lucida drawings: *A*, *Stereum hirsutum; B, S. ostrea; C, S. sanguinolentum; D, S. complicatum; E, S. ostrea; F, S. ochraceo-flavum.* All × 1,000.

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