NORTH AMERICAN SPECIES OF CREPIDOTUS

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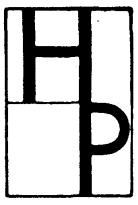

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PREFACE

During the years of our joint endeavors on the study of fleshy fungi one feature has stood out clearly from all others, and that is that all groups of fleshy fungi in North America have been in need of critical study. Though our published efforts to date have been mostly on *Hygrophorus* (1963) and *Lactarius* (1960a, 1960b, 1962), we have not neglected other groups in our collecting. We had no particular motive in signalling out *Crepidotus* for critical study other than that the literature on it seemed to be more inadequate than usual as far as being able to use it accurately to identify specimens. In our attempt to correct this situation we have pooled our resources and the result is a treatise which we hope will put the concept of the species in *Crepidotus* in a more meaningful light than it has been heretofore. The following treatment is organized along the lines of our other presentations, and on the basis of morphological and anatomical characters. The coverage for North America, though more complete than in any other previous treatment, is not to be considered adequate on any ultimate basis.

Any extensive taxonomic revision depends not only on the accumulation of much new material, but also a critical restudy of the type specimens of species already described, as well as studying much material as preserved in herbaria to fill out patterns of distribution. Without help from the numerous curators of collections containing specimens of *Crepidotus,* this work could not have been completed. We are indebted to Dr. G. Taylor, Director, Royal Botanic Gardens, Kew, England; Director Dr. Albert Pilát, The Botanical Department of the National Museum of Prague, Czechoslovakia; Curator C. Bas, The Rijksherbarium, Leiden; Curator Dr. Sten Ahlner, The Rijksmuseum, Stockholm; Dr. Clark T. Rogerson, Curator, Cryptogamic Herbarium, The New York Botanical Garden; Mr. Stanley J. Smith, The Herbarium of the New York State Museum, Albany; Dr. Richard P. Korf, Plant Pathology Herbarium, Cornell University; Dr. Howard E. Bigelow, The University of Massachusetts; Dr. C. R. Benjamin, The National Fungus Collections, Beltsville, Maryland; Dr. Erdman West, The University of Florida Agricultural Experiment Station Herbarium; Dr. Clifford C. Gregg, Director, The Chicago Natural History Museum; Dr. I. Mackenzie Lamb, The Farlow Herbarium of Cryptogamic Botany, Harvard University; and Dr. D. P. Rogers, The University of Illinois Herbarium.

For support of field expeditions and the herbarium studies we both are indebted to the National Science Foundation for assistance over a period of many years. The Faculty Research Fund of the University of Michigan financed much of Smith's work in the Western United States prior to the aid received from the National Science Foundation. The University of Michigan Biological Station, A. H. Stockard, Director, was the base of operations for work in the Upper Great Lakes region from 1946 to the present.

The junior author wishes particularly to acknowledge the aid received from the Huron Mountain Club's Wildlife Foundation for facilities furnished and the great privilege of collecting in the virgin forests on the south shore of Lake Superior. These are being maintained as a natural area under control of the Club.

The various herbaria in which cited specimens are deposited are indicated by the abbreviations recommended in Index Herbariorum except for those by Smith which are at Michigan and those by Hesler which are in the Herbarium of the University of Tennessee.

Color terms within quotation marks indicate that the color was found to match that of the color plate by that name in Ridgway, Color Standards and Color Nomenclature, Washington, D. C. 1912. Ridgway color names not in quotes indicate that the color was an approximation of the Ridgway plate of that name.

The photographs are reproduced natural size unless otherwise indicated.

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INTRODUCTION

HISTORY OF THE GENUS CREPIDOTUS

The earliest studies of *Crepidotus* of any consequence were made early in the nineteenth century and were concerned, as were studies of gill fungi generally at that period, with the macroscopic features of the basidiocarps. The starting point may be said to be Systema Mycologicum by Elias Fries in 1821, p. 272, where we find Tribus XXX *Crepidotus* proposed under the broadly conceived genus *Agaricus*. In this work we find *A. atrotomentosus, A. panuoides, A. vulpinus, A. depluens,* and *A. byssisedus,* species now excluded from *Crepidotus,* as well as *C. mollis, C. variabilis,* and *C. epibryus,* which are still retained in *Crepidotus*. In his later works Fries (1836–38) removed *A. atrotomentosus* and *A. panuoides* to *Paxillus* and in 1874 transferred *A. depluens, A. byssisedus,* and *A. variabilis* to *Claudopus,* a group characterized by a vinaceous colored spore deposit.

It has been shown by Donk (1949), through his diligent searchings of the older literature, that Staude (1857) was the first to ascribe generic rank to *Crepidotus*. Staude treated only one species under this name, *C. mollis,* which under our present rules of nomenclature means that it must be accepted as the type species of the genus.

Kummer (1871) in his descriptive key briefly described ten species as follows: *C. variabilis, C. violaceo-fulvus, C. pezizoides, C. byssisedus, C. depluens, C. proboscideus, C. haustellaris, C. applanatus, C. mollis,* and *C. alveolus.* As can be seen, the concept of the genus, as it was developing, was that of a group of sessile to laterally or eccentrically stipitate agarics with colored spores. The modern delimitation of species on this basis had not yet been reached, since *C. violaceo-fulvus,* for instance, actually has white spores.

Quélet (1872) also treated *Crepidotus* as a genus and transferred additional species to it, though he was either unaware of Staude's and Kummer's works, or simply disregarded them. Quélet (1886), under Series III (Phaeospori), recognized about a dozen species, but these were only briefly described. Only macroscopic features were used.

In North America, Peck (1886) was the first to provide keys and descriptions for our *Crepidotus* flora. In his "New York Species of *Pleurotus, Claudopus,* and *Crepidotus*" Peck described eleven species. His descriptions, following the pattern of European authors, used macroscopic features predominantly but included brief notations of spore color, shape, and size (in fractions of inches). With the exception of *C. tiliophilus,* the species he treated are still retained in the genus; although three (*C. haerens, C. fulvo-*

tomentosus, and *C. dorsalis*) are now placed in synonymy with other species. It is a point of historical interest that Peck placed *Crepidotus variabilis* in *Claudopus.*

Murrill (1917) was the next to treat the North American species, but the characters he used were about the same as those used by previous authors, with the result that his work is valuable chiefly as a compilation. Kauffman (1918) treated 15 species, including one which was new. None of these authors recognized infrageneric categories above the rank of species.

Pilát (1948) limited *Crepidotus* to those species with brown to yellow-brown spore deposits varying to ocher-flesh color. He recognized the following subgenera: 1) *Tapinella,* characterized by bilateral lamellar trama and represented by *C. panuoides,* a species he interprets as forming a transition to *Paxillus.* 2) *Paxillina,* similar to *Tapinella* but lacking bilateral gill trama. It was considered to unite *Tapinella* with *Paxillus.* 3) *Gelocutis,* characterized by a gelatinous cuticle on the pileus and represented by *C. mollis.* 4) Subgenus *Sphaerocrepidotus,* embracing taxa with globose, rough spores, represented by *C. applanatus.* 5) *Naucoriopsis,* in which the basidiocarp is truly stipitate even at maturity, and in which the spores are ellipsoid-reniform. 6) *Stipitina,* with basidiocarp stipitate, as in 5 above, but with oblong-ellipsoid spores. He assigned *C. phillipsii* here and considered both 5 and 6 to connect to *Naucoria.* 7) *Geophila,* embracing species growing on the soil or on debris, rarely on wood not in contact with soil. Examples of species placed here are *C. fragilis, C. caspari,* and *C. bresadolae.* 8) *Nebulosi,* carpophores small but solidly and firmly fleshy, and spores ellipsoid, fusiform or amygdaloid. *C. lundellii* and *C. subverrucisporus* are placed here. 9) *Dochmiopus,* small species with spores brown, tinted flesh color. Examples: *C. variabilis, C. cesatii,* and others. 10) *Muscicola,* small species growing among living mosses, approaching *Dochmiopus,* but with difficult to determine spore-color, such as *C. subepibryus* and others. 11) *Colorati,* with carpophores with reddish gill edges, as in *C. cinnabarinus.* 12) *Pearsonomyces,* with spores yellowish in H_2O but becoming dark rusty in KOH, and also the basidia and some hyphae with a similar KOH reaction. Pilát regarded this group, represented by *C. hibernicus,* as a transition between *Crepidotus* and *Pholiota* sensu Singer. Though very elaborate, this division of *Crepidotus* has not found favor in the eyes of other investigators and at least for the North American species seems to lack perspective. The names were not validly published.

Singer in his various publications (1947, 1951, 1962) used a more realistic approach when he recognized two sections for the genus: *Echinosporae,* those taxa with the spore wall punctate, and *Crepidotus* (Laevisporae), embracing species with the spore wall lacking ornamentation.

In the course of his studies of type specimens, Singer (1947) transferred a few species from other genera to *Crepidotus,* for example, *Tremellopsis antillarum.* Singer recognized a relatively large number of crepidotoid genera: *Melanotus, Phaeomarasmius, Pleuroflammula, Pyrrhoglossum, Naucoria, Pleurotellus.* In 1962, he took up the name *Simocybe* to replace *Naucoria* in the sense of his 1951 work. We accept a number of these genera and have included all their North American species in our keys. Under our heading, Excluded Species,

we include descriptions of them as an aid to the investigator collecting crepidotoid fungi.

Pilát (1950) also published studies of types, particularly those of extra-European species of *Crepidotus,* and presented a key based on a combination of Singer's and his own type studies. He described seven new species from various parts of the world, but none from North America. He also gave valuable notes on the exsiccati examined. Except for Pilát (1948) and Singer (1947, 1951, 1962), little has been proposed in the way of infrageneric categories for *Crepidotus*. A synopsis of infrageneric categories as we have developed them for the North American species follows. We consider this arrangement an approximation of natural relationships of the species.

SYNOPSIS OF THE GENUS CREPIDOTUS

Singer in 1947 gave the following synopsis of the infrageneric classification.

Section Echinosporae Pilát 1929
Type species: *C. carpaticus*
Subsec. Porpopharini Singer
Type species: *C. applanatus*
Subsec. Aporpini Sing.
Type species: *C. cinnabarinus*
Section Laevisporae Pilát 1929
Type species: *C. mollis*
Subsec. Fibulatini
Type species: *C. albidus*
Subsec. Defibulatini
Type species: *C. mollis*

These are validly published and are to be taken into account in any subdivision of *Crepidotus* into smaller taxa. Our proposed synopsis follows.

Genus *Crepidotus* (Fr.) Staude (1857)

I. Subgenus *Crepidotus*
Type species: *C. mollis* (Fr.) Staude
1. Section *Cinnabarini* Hes. & Sm.
Type species: *C. cinnabarinus* Pk.
2. Section *Tubariopsis* Hes. & Sm.
Type species: *C. pubescens* Bres.
3. Section *Stratosi* Hes. & Sm.
Type species: *C. stratosus* Hes. & Sm.
4. Section *Parvuli* Hes. & Sm.
Type species: *C. parvulus* Murr.
5. Section *Crepidotus*
6. Section *Versuti* Hes. & Sm.
Type species: *C. versutus* (Pk.) Sacc.

II. Subgenus *Sphaerula* Hes. & Sm.

Type species: *C. applanatus* (Pers.) Kummer

7. Section *Nyssicolae* (Sing.) Hes. & Sm.
   Type species: *C. nyssicola* (Murr.) Sing.
8. Section *Sphaerula*
   a. Subsection *Sphaerula*
   b. Subsection *Colorantes* Hes. & Sm.
      Type species: *C. confertus* Hes. & Sm.
   c. Subsection *Fulvofibrillosi* Hes. & Sm.
      Type species: *C. nephrodes* (B. & C.) Sacc.

III. Subgenus *Dochmiopus* (Pat.) Pilát
   Type species: *C. variabilis* (Pers. ex Fr.) Kummer

9. Section *Cystidiosi* Hes. & Sm.
   Type species: *C. albatus* Hes. & Sm.
10. Section *Fulvidi* Hes. & Sm.
   Type species: *C. kauffmanii* Hes. & Sm.
11. Section *Phaseoli* Hes. & Sm.
   Type species: *C. phaseoliformis* Hes. & Sm.
12. Section *Fusisporae* Hes. & Sm.
   Type species: *C. fusisporus* Hes. & Sm.
13. Section *Betulae* Hes. & Sm.
   Type species: *C. betulae* Murr.
14. Section *Dochmiopus* (Pat.) Pilát
15. Section *Crepidotellae* Hes. & Sm.
   Type species: *C. submollis* Murr.

GENERAL CONSIDERATIONS

THE BASIDIOCARP

The basidiocarp of *Crepidotus* species, and those in closely related genera, is reduced to the extent that the stipe varies from underdeveloped to absent. In this respect, the group of genera around and including *Crepidotus* is similar to the pleurotoid members of the *Tricholomataceae*. A survey of the structural features of the basidiocarp is presented in the following paragraphs in accordance with currently accepted procedure in agaric taxonomy. This survey is divided into two parts, one dealing with macroscopic characters and the other with microscopic details. The importance we attach to individual features is expressed by the emphasis given them in the formal descriptions, but a summary of our data pertaining to the various characters should aid the reader in developing perspective.

MACROSCOPIC CHARACTERS

The Pileus. The size, shape, color, and ornamentation of the pileus are among the classical features of the genus and are still important in the delimitation of species in the so-called modern approach. The pileus is rela-

tively small, ranging in breadth from 2 mm to about 8 cm, but with most species falling in a range of 10–30 mm. In the majority of species the pileus is attached laterally to the substratum, with or without a lateral basal extension. This habit of growth results in the shape of the pileus being fan-shaped, semi-orbicular, reniform, or spathulate, depending to some extent on how much the cap is tapered to the point of attachment. The basidiocarps, of course, grow on stumps, logs, fallen branches, twigs—in fact, on woody debris generally, and occasionally on mosses or on herbaceous debris. They rarely occur on the soil. If the basidiocarp is growing on the under side of a log, it may be resupinate at first, but by maturity an upper pileus surface is usually evident at least along the margin. Although the habit is usually scattered to gregarious, there are a few species in which the basidiocarps are produced in an imbricate fashion. It must be kept clearly in mind that the subiculum, or hyphae on the substratum around the basidiocarp, are to be regarded as part of the mycelium, and for this reason may be (and do in some species) reveal differences not shown by hyphal elements arising directly from the pileus.

Pileus color. Our observations lead us to conclude that color is basic in the delimitation of species. There are several aspects of pileus color, such as whether the pigment is dissolved in the cell sap, or whether it is incrusted on the hyphal walls or actually in the walls. In addition to these possibilities, the position of the pigmented hyphae in the fruiting body is important. Pigment changes from youth to old age are also important. In many species the pileus and gills are white and become colored only as the spores mature. This change in color is more than just a reflection of the brown spores through a moist cap. As in *Agaricus,* it is due in part at least to accessory pigments which develop as the pigment becomes evident in the spores. Thus, white species may become buff to tan as the spores mature and, when dried, the pileus may be dingy buff to alutaceous or darker brown. From the color of the pileus even in well-dried exsiccati one can only guess at the pileus color in the fresh state; hence notes on the color when the specimens were fresh are essential to correct identification.

The pileus may be white or whitish, but the surface fibrils or hairs may be colored. In such species the pigment in the colored hyphae is often encrusted on the hyphal walls of the cuticle hyphae or those of the epicutis. Such colors are most pronounced on the young caps and become more dilute in age as the pigmented hyphae become separated. The pigments associated with spore maturation may influence the ground color of these species at maturity just as they do in the others already discussed.

In other species the surface of the pileus may be colored (yellow, buff, gray, drab, reddish, or avellaneous), and white or colored surface hyphae may be present. The taxonomic characters of importance as regards pileus color are the combinations which one finds. For instance, the ground color of the pileus may be orange and that of the epicuticular hyphae dark brown; thus the combination is striking. Or, the pileus may be gray and the epicuticular elements white. In the following taxonomic treatment we have used these features in the delimitation of sections and subsections, and it

should be understood that these combinations are basic at the level of species.

The epicuticular hyphae, in addition to showing differences in color from species to species also show important differences in distribution, size, and arrangement. At one extreme they may appear to be absent (under a hand lens), and such pilei are termed glabrous. Actually, some (not all) apparently glabrous pilei may show scattered to dense epicuticular hyphae when viewed in sections of the cap under the microscope. The details of these hyphae are treated in the discussion of microscopic features.

The pileus may be moist and hygrophanous or dry and fibrillose. However, we have used the hygrophanous character sparingly because it is easy to misinterpret it, and, in particular, notes by inexperienced collectors may lead an investigator astray. The correlated feature of a translucent-striate pileus margin is also deceptive as far as most collectors are concerned, and notes on it are often unreliable, especially if the margin is indicated as not striate. Basically, however, these are valuable characters in the recognition of species. The hygrophanous nature of the pileus is essentially that of a water-soaked condition; and as moisture escapes, the color changes markedly, and the flesh which then becomes opaque does not allow the gills to show as lines (striations) through it. A pileus may be hygrophanous and have colored or hyaline (white) epicuticular hyphae, or, except for the mycelial tomentum at the point of attachment, such a pileus may be glabrous.

In a few species, a cuticular layer of gelatinous hyphae causes the surface to feel viscid to slippery. It is important to note this condition in fresh material, although in the study of herbarium specimens the presence of gelatinous hyphae can be readily ascertained. This character is often misinterpreted by professional and amateur mycologists alike, to the point that one soon finds himself falling into the habit of not giving credence to the collector's notes. This statement applies to all genera of gill fungi. The basic feature involved is a chemical difference between the hyphae producing the slippery feel and those beneath that layer, and it is this difference which is of taxonomic significance.

Context. The features of the context are not as contrasting as in many genera, but nevertheless some are important. The taste of the raw flesh in some species is bitter to disagreeable and, as in other genera, this is important at the species level. The odor in most *Crepidoti* is mild or bland and hence of little taxonomic account. Likewise, little assistance can be obtained from the slight differences in color of the flesh which are shown by most species.

Lamellae. The characters involved here are the usual ones: color when young and when mature, spacing, breadth, and whether the edges are crenulate, fimbriate, or even. The color of the young gills, in species in which they are something other than merely white to grayish, is caused by pigment dissolved in the cell sap of the basidioles or the tramal hyphae. This pigmentation is independent of the color changes and pigment development associated with spore maturation. At maturity, obviously, the gill color reflects that of the spores, but one must not assume they are identical; the color of the spore deposit should be obtained not only as a check but for its own inherent taxonomic value.

The spacing of the gills is comparatively constant for a species and hence is of some value at the species level. Spacing varies with the species from crowded, close, subdistant to distant, as for other agaric genera. A comparison of the species illustrated will give one an idea of the degree of difference involved between each category. We found that counting the number of gills which reach the base and the number of tiers of lamellulae does not give an accurate index for these differences, because the size of the fruiting body varies so greatly. We have not tried to arrive at a mathematical basis for distinguishing between crowded, close, etc., although this could probably be done. The width of the gills is a feature of some importance, but is easily misinterpreted if one lacks a knowledge of the way *Crepidoti* develop. Large numbers of fruiting bodies often occur on a log in a single fruiting and are likely to be all in the same stage of development. The gills in many species are narrow at first and develop their typical width only after expansion of the cap is complete. If one finds a log with mature basidiocarps of species A, the gills may be broad (3–4 mm), whereas on the next log younger basidiocarps may bear narrow gills (2–2.5 μ broad), and one might think he was dealing with two species. Since spores soon develop (before the cap is fully expanded), this feature cannot be used as an index to basidiocarp maturity. However, in regard to the use of both gill width and spacing, we believe they must be correlated with other characters to have much taxonomic value in species recognition.

Stipe. As previously mentioned, the stipe is not as a rule a conspicuous feature of *Crepidotus* species. In *C. haustellaris,* however, it is a well-formed, narrow structure persistent throughout the life of the basidiocarp and hence an important taxonomic feature. In *C. stipitatus,* the stipe is much like that of *C. haustellaris,* but is smaller in relation to the size of the cap and more like the pseudostipe of many species. The pseudostipe is merely a rudimentary stipe 2–3 mm long and about 1 mm wide which is found on the underside of the pileus near the point of attachment to the substratum. It usually disappears by the time the basidiocarp has matured. In species in which the pseudostipe is present, the pileus is laterally attached to the substratum at maturity. Although of minor importance as a taxonomic feature, the pseudostipe may have ontogenic significance which indicates a phylogenetic connection from normally stipitate ancestors. Usually when *Crepidotus* is truly stipitate, the pileus is marginate around the base (or, as explained in some books, the pileus is *marginate behind*). This is a distinctive feature.

MICROSCOPIC CHARACTERS

In the current study we at first gave equal attention to the morphology of the spores, basidia, cystidia, gill trama, pileus trama, cuticle, and the presence or absence of clamp connections. As experience was gained, however, it appeared that limited taxonomic use could be made of the characteristics of the basidia, and of the trama of the pileus and gills. In contrast, we found that great reliance could be placed on spore size, shape, and ornamentation, on the morphology of the cheilocystidia, and also the

pleurocystidia, if such were present, and on the presence or absence of clamp connections.

Clamp Connections. The presence or absence of clamp connections on the hyphae of the basidiocarp is now an empirically much used character in the taxonomy of Basidiomycetes generally, but it still needs to be evaluated. We have not been able to investigate this character in detail in *Crepidotus* but have used it empirically, as other investigators have, as an important feature mainly because it is a positive character; clamps are either present or absent. Before any ultimate value can be assigned to the character, we need to culture all the species of *Crepidotus* to see whether clamps are present on the mycelium when they are absent from the hyphae of the basidiocarp. Because of what is not yet known about this character we would not use it as an important generic character.

It is imperative, however, in using our infrageneric classification to determine at the outset whether clamps are present or absent on the hyphae of the basidiocarp. The technique we use is simple: tangential sections of the pileus are cut from near the outer edge and mounted in 2% KOH. Clamps are then searched for on the hyphae of the cuticle, context, gill trama, and base of the basidia. Clamps may be readily observed on epicuticular hyphae, at the base of pilocystidia, or on the repent hyphae themselves. This is due in most species to the fact that these hyphae or hyphal elements are not greatly inflated. Hence, there is no distortion of the clamp following cell division. The hyphae of the context frequently become quite inflated after cell division takes place, with the result that clamps, though originally present at the cross-walls, are nearly to completely obliterated by subsequent changes in the cell. Although clamps are typically present at the base of basidia in clamp-bearing species, the manner of hyphal branching which gives rise to the hymenium is such that it is often difficult to decide when one is dealing with a clamp or a young branch. In addition, observations on these hyphae and their branches are difficult because of the compact arrangement of the components of the region. Hence, the presence or absence of clamps in a *Crepidotus,* as used here, means that the character was determined from an examination of the cuticular hyphae. One misleading fact enters into the determination of this character state. The hyphae around the base of the fruiting body may, in age, extend over the surface of the basal area and become actually a part of the basidiocarp. Clamps may be present on such hyphae, but not on those making up the original basidiocarp. The extent to which this situation prevails needs further investigation. One should not understand from what has been said that when clamps occur on the cuticular hyphae they are found one at each septum. If abundant, most septa will show them, but there are species in which they are relatively scattered or very rare. The reasons for this pattern of occurrence need to be ascertained. The size of the clamp may be different from species to species, and some are of the type called medallion clamps, i.e., large and looping. *Crepidotus* appears to be a favorable genus for a study of clamp connections *per se.* Pending results from such an investigation, we have followed modern usage of this character in *Crepidotus.* We recognize

subgenus *Crepidotus* for those species lacking clamps, as indicated above, and divide the subgenus into six sections.

Spores. As in other genera of agarics, spore morphology in *Crepidotus* furnishes constant characters generally regarded as basic to an understanding of speciation. Our observations have verified those of previous authors in this respect. In *Crepidotus,* as might be expected, certain spore features that occur in other brown-spored genera are present, and some features have developed in a manner more or less characteristic of the genus. Spore shape and ornamentation are most important, and spore size, ranking third, is used mainly at the species level. Although important, the color of the spore deposit is not critically known for enough of the species, but this in no way reflects on its possible intrinsic value as a taxonomic feature. Using these features in our classification we find that the clamp-bearing species may be grouped as follows: (1) those with globose to subglobose spores grouped in *Sphaerula;* (2) those with ellipsoid, ovoid, or rarely lanceolate spores are placed in *Crepidotellus;* (3) the fusoid-spored species are placed in sections *Fusisporae* and *Tubariopsis.*

The ornamentation of the spore is a more basic feature than the presence or absence of clamps, but in *Crepidotus* it is often very indistinct. A study of the spore wall in *Crepidotus* under the electron microscope is needed to furnish a better understanding of this character in the genus. As we have used spore ornamentation, the surface is described as either smooth or ornamented as seen under a 1.3 NA oil immersion lens. Under the heading of ornamentation, all types of irregularities of the spore surface are included, as well as pores or plugs extending through the wall. It is a feature of a number of *Crepidoti* that there are minute canals extending through the spore wall which, where they reach the surface, produce a minute spot or opening which is seen as a discontinuity of the surface. Such spores are said to be punctate. If the canal is filled with a solid substance, this may project slightly beyond the surrounding spore surface as a short rod. Such spores are termed echinulate. This type of ornamentation is not common in *Crepidotus.* In a few species, the ornamentation is caused by a wrinkling of the outer wall. Such spores are described as rugulose, and if the outer wall remnants are gathered into discrete, approximately isodiametric particles or warts, the spore is said to be verrucose. The spores of *Crepidotus* lack a germ pore, although at times an indistinct thin spot (callus) may be present. Features of the spore ornamentation in *Crepidotus* are best observed with a 10x eye piece and a 1.3 NA oil immersion lens.

Spore-deposit color is in the yellow to earth-brown color range, with many species having deposits "clay color" to a duller yellow-brown. In some the deposit is yellowish to pinkish buff to pale ochre buff. In others, it is a dingy earth brown, and in some, near "Sayal brown," (a pale cinnamon). Borderline species for the genus may have somewhat flesh tinted spore deposits. Spore-deposit color, as far as our data indicate, is a very constant and important feature. A difficulty is, however, that a good spore deposit is not always readily obtained, since the fruiting bodies are small and often wither quickly. Thus, the problem of getting deposits of comparable density affects

the practical use of this character in identification work. It is essential, of course, to get some indication of the color in order to identify the genus.

Spore size is a routine feature in *Crepidotus,* as in other agarics, and our observations have shed no new light on the pattern of variation within species or its use in delimiting species. The range in spore size for the genus, about 4–10 μ in length, is one of the narrowest for any agaric genus. Because the ornamentation of *Crepidotus* spores is not prominent, as it is in many species of *Lactarius*, our measurements always include the ornamentation, if any is present. Spore shape, in our estimation, is a more important feature than spore size. It is a very reliable character at the species level and serves well as an aid in circumscribing infrageneric taxa. One must be sure to view the spores in profile view as seen on the sterigmata as well as in the front or back views. *Crepidotus* spores fall in the category of "thick walled." At least the wall is fairly rigid, but in most species it is scarcely thick enough to measure.

Basidia. From species to species, basidia vary some in size, but with the evidence at hand we feel that the differences are of little value taxonomically. The variation in a single cap is often very great. It is important to note the size in descriptions, however, since the information may be useful to some investigators, such as cytologists engaged in studies of the basidium *per se.* It is, of course, important to note whether basidia are two-spored or four-spored, and whether both kinds occur on one basidiocarp. This may affect spore size, as spores on two-spored basidia tend to be larger than on four-spored, even in the same species. Also, the feature of two-sporedness, at least in some agarics, is very constant and can be used as a convenient character for identification. Its taxonomic value, however, rests on whether or not it can be correlated with more basic features. We made a preliminary attempt to count chromosomes in a number of species, but the few figures available and the small size of the chromosomes were such that we decided to make this the subject of a later special study.

Cystidia. Scattered among the basidia on the sides, on the edges of the gills, or on the pileus, cystidia may be present. In Singer (1962: 660) the statement is made under *Crepidotus:* "cystidia none on the sides of the lamellae but always present on the edges (cheilocystidia)." Pilát (1948) also states that in *Crepidotus* cystidia are absent on the sides of the lamellae. Our studies contradict these statements. We have found cheilocystidia to be present in all species except *C. albidus* and *C. aquosus.* We have found pleurocystidia in a number of species and have used their presence to help define infrageneric taxa (see Figs. 44, 51, 54, 67, 70, 72, 112, 117, 121, 125, and others). We have known for over twenty years that this situation existed, but have never published on it. In *Crepidotus* these structures are not always as conspicuous as in many genera of agarics, nevertheless they are present. Our use of this feature is in line with present day treatments in other genera. In *Crepidotus,* as in *Tricholomopsis,* the morphological differences between the cystidia of the various species is not great and hence not of major taxonomic significance.

Cheilocystidia. These structures are more diverse in form than the pleurocystidia, as the illustrations (see drawings) readily show. They furnish a number of the characters on which species are distinguished. One of the fea-

tures well shown in *Crepidotus* and not common in other genera is the crooked to contorted condition, which at first glance one might suspect of being an abnormality (see especially Figs. 109, 120, 153, 154, 165, 184, 196). The development of secondary septa in the cheilocystidia of a few species has been noted by us in the recognition of a number of varieties (Figs. 80, 81, 95). It is interesting that secondary septa may also develop in other genera, such as *Rhodophyllus.* This is not a surprising feature in Hymenomycetes; actually the formation of such septa in basidia is known in some groups, as the *Clavariaceae.* Some cheilocystidia, which are nothing more than prolongations of tramal hyphae, of course, would be expected to be septate—or only the end cell is described as a cystidium.

Gill Trama. We found little that was helpful here in recognition of infrageneric taxa. In most of the species we have examined, the hyphae are hyaline, smooth walled, and in subparallel arrangement extending roughly from the pileus context toward the gill edge. In some species, however, the hyphae are intricately interwoven (extend in all directions), and rarely have we found them truly parallel. Also, the compactness or looseness is a difficult feature to evaluate or use, because generally the hyphae are compactly arranged at first and more loosely arranged in age. Typically, the hyphal cells themselves are not inflated at first, but may become somewhat inflated in age. In a few instances considerable enlargement may take place, but the difficulties of using these features were considered to outweigh any practical taxonomic value they might have.

Pileus Trama. In a majority of the species, it can be seen in a tangential section of the pileus that the context hyphae are interwoven. In a lesser number there is a tendency toward a radial, and more or less parallel, arrangement. In the latter type of structure, the trama in tangential section appears cellular because one is viewing the cut ends of hyphae. In such species a section cut radially will show the filamentous structure of the context. From our observations the pileus trama is composed of a single hyphal system in most species; a few also show a system of laticiferous hyphae. In a small number of species, layering is evident in the trama, and it is on this feature that section *Stratosi* is based. In it the inner half or less is composed of densely interwoven hyphae, whereas the layer exterior to this is composed of loose tangled hyphae. Except for this feature there is not much of taxonomic value in the organization of the pileus context. On the other hand, the organization of the pileus cuticle was found to show differences of great value in the delimitation and grouping of species.

The Cuticle. The characters of the dermal layers of the basidiocarp have come into prominence in the so-called modern approach to agaric taxonomy. This is well illustrated in Singer's *Agaricales in Modern Taxonomy.* Our review of these features for *Crepidotus* species has confirmed their value in taxonomy, but it should be pointed out that the diversity of features found in some genera is not present in *Crepidotus.* In fact, in some *Crepidoti* the dermal region is scarcely distinct in structure from that of the context. In the following discussion we proceed from this simple condition to the more complex types.

THE HOMOGENOUS PILEUS: In certain species the surface zone consists of hyphae interwoven as in the context (or radially arranged) and not differentiated from context hyphae, except perhaps for their slightly more compact arrangement. We do not believe that this condition indicates a primitive condition from an evolutionary point of view. It could just as easily come about by reduction from a more complex type. In order to determine the truly primitive as contrasted to highly evolved species, all features of a species need to be considered.

THE SIMPLE CUTIS: In species with a glabrous pileus there is usually some differentiation between the hyphae of the context and the hyphae forming the cutis. A tangential section of the pileus reveals that the cuticular hyphae are more compactly arranged than in the context, often more regular in arrangement, and that the hyphae forming the layer are narrower than the context hyphae and have a tendency to greater encrustation of pigment on the walls and/or intracellular pigment. The thickness of the layer and the degree of differentiation vary with the species. In such a layer one may find a few undifferentiated hyphal ends either erect or somewhat decumbent. If many of these are present, the surface of the cap appears pruinose when fresh and moist.

THE TRICHODERMIUM: This type of covering is a further development of the hyphae which cause the pruina. If they elongate and become septate as well as densely arranged, we have a type of covering termed a trichodermium. The hyphae composing it are basically upright, but if they elongate much, they become matted into a loose tangled mass. To observe the true nature of such a layer, the younger caps should be sectioned and observed. The elements of the trichodermium may themselves show features of taxonomic value. These elements may become coiled or contorted (Figs. 175, 192, 194, 205) in a characteristic manner, or only the terminal cell of an element may show distinctive features. If the elements projecting from the pileus surface are single cells and they show some differentiation, by inflation at the apex or midportion, or the apex narrowing to a point, they are termed pilocystidia. In a given species, pilocystidia often resemble the cheilocystidia but vary through a wider range in most characters. Pilocystidia are often best observed near the margin of the cap. In a number of species, fascicles of hyphae extend out from the pileus or from appressed fibrils which are continuous at first but become broken up as the pileus expands. These hyphae may show pigment incrustations arranged in various patterns over the exterior. This pattern of pigmentation in correlation with other features is valuable in species circumscription.

THE GELATINOUS CUTICLE: This type is distinctive, and is based on a slight chemical difference in the hyphal walls in the cuticle as compared to those of the context. If a section is made of the pileus of a species in the *C. mollis* complex, or of some species in section *Betulae,* and mounted in 2% KOH, a clear translucent (or "glassy") zone about 50–350 μ thick can readily be seen under the low power. The hyphal walls in this zone are mucilaginous, at least over the exterior layer, and this zone (it is seldom clearly defined) expands greatly when mounted in water or KOH. Thus, the moist pileus surface having such a layer has a viscid, slippery, or slimy feel, and if

the layer is thick, the cap is rubbery in texture. In a species with a gelatinous cuticle, the surface, as it dries out, usually takes on a shiny appearance, as if it had been varnished. However, sections mounted in KOH will clearly show the gelatinous nature of the hyphae from such a cap. In *C. uber,* gelatinous hyphae are present not only in the cuticle but in the pileus context as well, with the result that in *C. uber* the gelatinous cuticle lacks a clear boundary. With reference to surface hyphae resting on a gelatinous zone and not themselves being gelatinous, one of several conditions prevails, depending on the species: (1) the surface may bear erect, colorless hyphae arranged in more or less of a turf, and with the terminal cells cystidioid, as in *C. alabamensis;* (2) the hyphae are colorless as above, but the terminal cell is not differentiated from the other hyphal cells, as in *C. maximus* and *C. betulae;* (3) the surface bears conspicuously brown hyphae, at least some (not necessarily all) of which are incrusted (Fig. 50). At times, the terminal element may be cystidioid, and often these brown hyphae are in tufts or clusters (scales), as in the *C. mollis* complex and others; (4) the surface hyphae are brown but are not incrusted, and may be intermixed with colorless hyphae, as in *C. fraxinicola.* In some pilei, the surface may seem to be glabrous, but a section of the cap examined under the microscope will reveal scattered to clustered, brown, incrusted hyphae. Hence, the pileus should be examined under a hand lens before deciding whether or not it is glabrous.

Pilocystidia (Examples: Figs. 69, 75, 83, 94, 108, 116). These structures may be defined as single cells projecting from the pileus surface and in some way differentiated from a simple hyphal tip. Commonly they are clavate, fusoid-ventricose, or capitate, and, in other genera of agarics, other shapes are known. They may originate as outgrowths from the cuticular hyphae, but at times can be traced to connective hyphae in the context. Not infrequently the pilocystidia of a species resemble the cheilocystidia. In a few species the pilocystidia are relatively short, are of uniform height, stand erect, and are close enough together to form a palisade. It is questionable whether the differentiated end-cell of a trichodermial hypha can be properly called a pilocystidium. In summary, it may be stated that the characters of the pileus cutis along with the epicuticular elements do indeed furnish important characters for the recognition and grouping of species in *Crepidotus.*

CHEMICAL CHARACTERS

Up to this time no extensive systematic work has been published to determine what chemically caused color changes or other reactions may be significant for *Crepidotus* species. During the summer of 1963, Smith made tests with KOH and $FeSO_4$ on the species available, with encouraging results. Future studies should emphasize this approach. It is only in this manner that an evaluation of chemical characters in the taxonomy of the genus can be made.

MATERIALS STUDIED

In so far as possible during the course of this study, we examined the specimens collected in the fresh state and also studied them microscopically.

They were then dried and later restudied. For the latter study, a wedge-shaped piece was cut from a pileus, dipped in alcohol (70–95%) to drive out the air, softened for a few minutes in water, then placed between two pieces of pith, and sectioned so as to give cross sections of the gills that are tangential to the pileus. These sections were then mounted in 2% KOH. At one's discretion, one may add to the mount a drop of basic phloxine, or better still, Congo red.

Dried specimens, as these have accumulated in herbaria, represent a motley arrangement of materials without adequate notes and only someone's guess as to what the species might be. As a result of the present study, we are more aware of this situation than other workers have been. In view of this state of affairs, some recommendations to future investigators are pertinent. Since basidiocarps of *Crepidotus* are typically small and in texture rather thin, the drying technique using Silica Gel, published by Hoseney (1963), is strongly recommended. Also, notes on odor, taste, colors of all parts, and color changes from handling, as well as any changes resulting from the application of chemicals, should be taken before the specimens are dried. There is no longer any excuse for placing collections in an herbarium and using up valuable storage space when the features of the specimens are not properly recorded. This does not mean that all the previously collected material should be discarded, but it is time to bring up to date our requirements for an acceptable herbarium specimen in the fleshy fungi.

In all, we have examined and recorded observations on about one thousand collections, including sixty-three type collections. We have had about one hundred ten collections from the Southern Appalachians, and some seven hundred from the Middle West, the Rocky Mountains, and the Pacific Coast states. Some collections from Massachusetts and Maine, from Florida, and from the Southwest have also been available to us. We have cited the collections by number. All of Smith's collections are on deposit in the Herbarium at the University of Michigan, Ann Arbor, and all of Hesler's are in the Herbarium of the University of Tennessee at Knoxville. The location for each type studied is given under its respective species. For other collections, as previously stated, the herbaria are indicated by the abbreviations recommended in Index Herbariorum Part I, 1959.

HABIT, HABITAT, AND DISTRIBUTION

Basidiocarps of most species occur on wood or very close to logs and stumps, and are particularly abundant on slash, especially the smaller branches and debris. Though much more abundant on the wood of hardwoods than on conifer wood, certain species may almost cover the decaying tops of fallen conifers, down to branches not more than 5 mm thick. Few species are truly clustered, although at times on large pieces of wood they may fruit in imbricate masses. In some there is considerable amount of mycelium around the base of the basidiocarp, but the amount of humidity appears to influence the degree of its development. There is not much specificity as to substratum in this genus, though aspen (*Populus*), basswood

(*Tilia*), and maple (species of *Acer*), in our experience, are the most favorable substrata.

The study of the geographical distribution of *Crepidoti* is still in its early stages. We hope that the species concepts presented here will serve to advance this phase of our knowledge of the genus. It is eminently clear that the North American species will probably outnumber the European species by a ratio of two to one. This paucity of species in the European flora could very well be caused in part by the European habit of picking up from the forest floor branches for firewood, thus "cleaning up" the forest and removing the most favorable habitats for *Crepidotus.*

PHYLOGENY

That an extreme reduction in the *Crepidotus* basidiocarp has resulted in species lacking lamellae, and with basidiocarps more or less cup-shaped, now seems to be generally admitted. Singer (1963: 656) keys some of these genera out in his family *Crepidotaceae.* The implications of this view in regard to the ancestors of *Crepidotus* are obvious. The ancestors must be sought among the true gill fungi.

As yet we do not accept the *Crepidotaceae* of Singer nor his ideas of phylogeny. However, we do not care to propose any counter system with suggested finality. To us the significant features of evolution in the group have not been brought into clear focus. Hence in the following account, we content ourselves with pointing out trends and possibilities.

First, it is obvious that a number of white-spored agarics have gone over to the "Pleurotoid habit" as have, to some extent, almost all species of fungi inhabiting dead wood. Even if we limit ourselves to the fleshy fungi, it is obvious that colored spores have originated "de novo" in a number of Pleurotoid groups; so there is no reason to think that yellow, yellow-brown to earth-brown or cinnamon spores necessarily originated from stipitate agarics of the same spore color. True, this could possibly happen, and in a few instances most assuredly has happened. But yellow to yellow-brown spored species could have arisen as easily from white spored species as have those with lilac spores (*Pleurotus ostreatus*) or pink spores (*Phyllotopsis*). One must also keep clearly in mind that it has been shown in culture that white spores (colorless) can originate (have originated) as a mutant from a purple-brown spored species. Thus, species of *Crepidotus* could just as easily give rise to species of *Pleurotus* (*sensu lato*). We have found evidence of such a change occurring in nature in the genus *Inocybe* (unpublished data of A. H. Smith). We do not believe that *Pleurotellus* as a genus distinct from *Crepidotus* will stand the test of close scrutiny, and regard these pale-spored species as a connecting pathway to the small species of *Pleurotus,* many of which have globose spores. In effect, differences in the color of the spore deposit in these reduced forms may not mean as much as they do in some other groups. We regard it as more comparable to the situation as found in *Russula* where the color of the spore deposit varies from white to orange.

The second point we would make is that the punctate-ornamented

spore of *Crepidotus* is indicative of an evolutionary line within the genus. Hence resemblances to scattered species in other groups with somewhat similar spores may simply be more cases of parallel development. This point needs to be studied in great detail, particularly with the aid of electron microscopy. The smooth spored species could have easily come, at least in part, from *Ramicola* (*Naucoria centuncula* group), as *C. haustellaris* almost certainly did.

A third point is that a critical study of *Crepidotus* and *Pleurotus* should be made to circumscribe stirpes, some of which will almost surely be intermediate between the two genera. When this is done, the pattern of differentiation of these groups will give us a better basis for organizing larger phylogenetic groups in what is assuredly, in our estimation, a polyphyletic aggregation of species. As a genus, however, *Crepidotus* does and probably will continue to serve a useful place in agaric classification. We consider it most unlikely that any supposed connections to gastromycetes or to boletes have the slightest validity here.

As for connections to *Rhodophyllus,* all possibilities need to be considered. *Rhodophyllus,* in our estimation, can be just as logically derived from *Collybia* as any other group, especially the lignicolous species with pinkish spore deposits. Pleurotoid *Rhodophylli,* then, can logically be regarded as reduced forms. This idea fits well into the general pattern of reduction as applied to *Crepidotus.* But one can still separate the angular, red-spored Pleurotoid species from true *Crepidoti* with reddish spores by spore outline. In other words, a reddish tint to the spore deposit in species we have recognized here as *Crepidotus* does not necessarily have any phylogenetic significance in connecting these *Crepidoti* to *Rhodophyllus.* It is just as logically regarded as a pigment trend within *Crepidotus,* just as we have a red trend in spore deposit color in *Coprinus, Psathyrella,* and *Hebeloma.*

CLASSIFICATION

CREPIDOTUS (Fries) Staude

Die Schwämme Mitteldeutschlands, p. 71. 1857

Agaricus Tribus *Crepidotus* Fr., Syst. Mycol. 1: 272. 1821.
Dochmiopus Pat., Hymen. Eur., p. 113. 1887.
Derminus Schroter, *apud* Cohn, Krypt.-Fl. Schlesien, Pilze 1: 578. 1889.
Tremellopsis Pat. *apud* Duss, Fl. Krypt. Ant. Fr., p. 223. 1904.
Conchomyces Van Overeem, Bull. Jard. Bot. Buitenzorg 9: 19. 1927.

Type species: C. *mollis* (Fr.) Staude.

Characters

Carpophores usually lignicolous, rarely on soil; white or colored, fibrillose, villose, or glabrous; lamellae usually radiating from a lateral attachment point; spores in deposit brown, "clay color," or yellowish, more rarely pale ocher buff, or with a pinkish tint; spore wall single and thin, or double and thick, smooth, or rough, the roughness consisting of either: (1) very short rods extending from the endosporium through the exosporium and in surface view appearing punctate, or echinulate when the rods are longer, or (2) wrinkling of the exosporium, often appearing as minute warts, globose, subglobose, ellipsoid, fusoid, or ovoid, without a germ-pore, at times with an indistinct callus; cheilocystidia (with rare exceptions) present, and often versiform, pleurocystidia and pilocystidia present in some species; basidia usual, 2–4-spored; gill trama subparallel, or at times interwoven; pileus trama interwoven; cuticle variable (but constant for the species): slightly or not at all differentiated, or more often sharply differentiated and then of repent hyphae, without erect, epicuticular hyphae in strictly glabrous species, or more often bearing scattered to numerous, somewhat erect hyphae giving to the surface a condition which, according to the quality of the ornamentation, is called villose, pubescent, fibrillose, tomentose, or scaly, these hyphae colorless (in most instances), or colored (in some species) and in a lesser number of species the hyphae with ring-like incrustation; clamp connections absent, or more often present on the hyphae of the cuticle or epicutis (also, at times observed on the hyphae of the gill trama, the pileus trama, or at the base of basidia); stipe short and lateral or eccentric, or entirely lacking, or present only as a pseudostipe (a small, often inconspicuous structure, visible on the lower side) which is present in youth, disappearing on carpophore maturation; veil none.

Key to Subgenera

1. Clamp connections absent on the epicuticular hyphae of the basidiocarp (the hyphae of the gill trama, and including the base of the basidium)* ---------- Subg. CREPIDOTUS, p. 20
1. Clamp connections present on the hyphae of the pileus cuticle, the gill trama hyphae, or at the base of the basidium ---------- 2
   2. Spores globose to subglobose ---------- Subg. SPHAERULA, p. 38
   2. Spores typically longer than broad (ellipsoid, fusoid, ovoid, phaseoliform) ---------- Subg. DOCHMIOPUS, p. 80

SUBGENUS CREPIDOTUS

Clamp connections none on the hyphae of basidiocarp. The vegetative mycelium has not been studied.

TYPE SPECIES: *Crepidotus mollis* (Fr.) Staude

Key to Sections

1. Pileus with red dissolved pigment in the hyphae of the cutis and hypoderm; spores distinctly ornamented ---------- Section *Cinnabarini,* p. 20
1. Not as above ---------- 2
   2. Spores fusoid to subfusoid in face view, thin-walled, usually "pinkish buff" in deposit ---------- Section *Tubariopsis,* p. 21
   2. Spores not as above ---------- 3
3. Pileus structure duplex, a compactly interwoven basal layer usually less than half the diameter of the pileus trama and a loosely floccose upper zone ---------- Section *Stratosi,* p. 22
3. Not as above ---------- 4
   4. Spores globose and ornamented ---------- Section *Parvuli,* p. 24
   4. Spores typically longer than broad ---------- 5
5. Cuticular hyphae and at times also pileus trama hyphae gelatinized often forming a gelatinous surface stratum ---- Section *Crepidotus,* p. 25
5. Cuticular hyphae and those of pileus trama not gelatinous ---------- Section *Versuti,* p. 35

Section Cinnabarini sec. nov.

Sporae manifeste ornatae; pileus in cuticulae et hypodermis hyphis materiam cinnabarirubri coloris gerens, materia coloris in KOH flavida deinde sine colore facta.

Spores distinctly ornamented; pileus with cinnabar-red pigment in the hyphae of the cuticle and hypoderm, the pigment in KOH becoming yellowish then colorless.

TYPE SPECIES: *Crepidotus cinnabarinus* Pk.

Only one species known.

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* Clamp connections may be present on the hyphae of the basal tomentum of this group.

1. Crepidotus cinnabarinus Pk. Bull. Torrey Club 22: 489. 1895.
Illustration: Fig. 34.

Pileus 5–15 mm broad, scarlet to cinnabar-red, conchate to reflexed-dimidiate or reniform, becoming more or less plane, surface dry, fibrillose, somewhat glabrescent, margin even.

Lamellae rather broad, subdistant, sinuate to base of pileus, brownish when dried, scarlet on the flocculose or fimbriate edges.

Stipe slight, lateral, and minutely reddish-tomentose, or lacking entirely.

Spores (6)7–9(10) × 5–6 μ, oval and pointed at apiculate end as seen in face view, subellipsoid, punctate, thin-walled, many remaining collapsed in KOH. Basidia 20–32 × 7–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 30–63 × 5–11 μ, fusoid-ventricose, clavate, cylindric, or bottle-shaped, apices subacute thin-walled, hyaline in KOH, at times extending up the sides 100 μ. Gill trama of hyaline subparallel to interwoven, thin-walled hyphae. Pileus trama of two regions: a lower half of compactly interwoven, hyaline hyphae, 4–8 μ broad and an upper loosely arranged turf, with long hyphae having pinkish, yellowish, or fuscous content when revived in KOH, 150–350 × 3–8 μ, the terminal elements often as clavate-cylindric end cells or pilocystidia; no incrustations observed. Clamp connections absent.

HABIT, HABITAT, AND DISTRIBUTION: On basswood and poplar (*Tilia* and *Populus*), Michigan, Ohio, and Alabama, summer; also Denmark, on beech.

MATERIAL STUDIED: MICHIGAN: Peck's type (NYS), collected by L. N. Johnson, Ann Arbor, September 24, 1894; Univ. of Mich. Herb. 1847, iso-type.

OBSERVATIONS: This species is rare. It was originally found in Michigan, has rarely been reported from Ohio and Alabama, and is even more rare in Europe, having been reported from Denmark (Møller, 1946). The red color of this species is distinctive.

Section Tubariopsis sec. nov.

Sporae fusoidea demum subfusoidea in fronte, tenuiseptae, similes Tubariae *sporis.*

Spores fusoid to subfusoid in face view, thin-walled, reminding one of spores of *Tubaria.*

TYPE SPECIES: *Crepidotus pubescens* Bres.

Only one species known.

2. Crepidotus pubescens Bres. *sensu* Kühner & Romagnesi Icon. Myc. t. 790/2. 1930.
Illustration: Fig. 35.

Pileus 3–12 mm broad, conchate, dimidiate, to orbicular, the margin at times pleated or wavy, surface dry, pure white, white-felted base with a

slight pubescence, extreme margin faintly pubescent-fimbriate. Context thin soft and white, without odor or taste.

Lamellae close, 2–3 tiers of lamellulae, narrow, white but soon "pinkish buff" or bright cinnamon buff to orange-buff, edges even or minutely fimbriate under a lens, attached at base of pileus or to a slight pseudostipe.

Spore deposit "pinkish buff" or "orange-buff." Spores (6)7–9 × 2.5–3(3.3) μ, often clinging in two's, three's, or four's, subfusoid or pip-shaped in front view, slightly allantoid in profile, smooth, thin-walled, pale to nearly colorless in 2% KOH. Basidia 17–27 × 4–6 μ, 4-spored. Gill trama interwoven. Pleurocystidia none; cheilocystidia 35–75 × 3–10 μ, filamentous, usually crooked, at times branched, the basal portion sometimes clavate-enlarged and the apex surmounted by a long, crooked (more rarely coiled) neck. Pileus trama interwoven. Cuticle repent, with a broad (250–400 μ), colorless zone of loosely interwoven, more or less crooked hyphae forming a turf—the hyphae at first appearing gelatinous but there is no swelling in 2% KOH. Clamp connections none on the hyphae of the carpophore (found only on the hyphae of the pubescence at the point of attachment).

HABIT, HABITAT, AND DISTRIBUTION: On fallen twigs and leaves of deciduous and coniferous trees, Idaho, Oregon, and Michigan, October–November; also Europe.

MATERIAL STUDIED: IDAHO: Smith 54060; MICHIGAN: Smith 66272; OREGON: Smith 55365, 55561; NETHERLANDS: Bas 983.

OBSERVATIONS: The fusoid spores and the shape of the cheilocystidia distinguish this from *C. herbarum*. Pilát (1948) proposes for it a new name, *C. bresadolae*, for the reason that the name *Agaricus pubescens* was used for a different species in Flora Danica in 1792. Pilát (1948) and Lange (1939) list Britzelmayer's *terricola* as a synonym.

Section Stratosi sec. nov.

Trama pilei duplex, in huius inferiore parte ex densis intertextis hyphis, in superiore parte ex laxis intertextis hyphis composita.

Pileus trama duplex, lower portion of densely interwoven hyphae, upper portion of loosely interwoven hyphae.

TYPE SPECIES: *Crepidotus stratosus* sp. nov.

Key to Species

1. Spores ellipsoid to ovoid ---------- 3. *C. stratosus*
1. Spores globose or subglobose ---------- 4. *C. unicus*

3. Crepidotus stratosus sp. nov.

Illustration: Fig. 36.

Pileus 8–15 mm latus, albus, siccus, fibrillosus, margine pubescens, involutus. Lamellae primum albae, cinnamomeae siccatae, confertae, latae, marginibus plus

minusve fimbriatae. Sporae 7–12 × 4–6 μ, ovoideae demum ellipsoideae in fronte, in imagine obliqua inaequilaterales, minimum punctatae, parietibus tenues. Basidia (20)25–34(41) × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 35–70(104) × 3–8 μ. Pilei trama duplex: interior triens e densis intertextis hyphis compositus, pars exterior laxe intertexta, superficies gerens caespitem ex erectis hyphis compositus. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Priest Lake, Idaho, Oct. 17, 1956, A. H. Smith 54909.

Pileus 8–15 mm broad, white, dry, resupinate, at times more or less laterally attached, fibrillose, margin inrolled, pubescent. Context white; odor and taste none.

Lamellae radiating from a lateral point, white at first, drying cinnamon, close or crowded, broad, edges more or less fimbriate.

Spores 7–12 × 4–6 μ, ovoid to ellipsoid in face view, inequilateral in profile, minutely punctate, thin-walled, pale ochraceous tawny in KOH. Basidia (20)25–34(41) × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 35–70(104) × 3–8 μ, filamentous, cylindric, subclavate, at times subventricose, often flexuous, more rarely forked, branched, or coiled. Gill trama somewhat interwoven, hyphae 4–10 μ broad. Pileus trama duplex: the inner (lower) third of densely interwoven hyphae, the outer (upper) portion loosely interwoven, the surface bearing a turf (at times more or less a palisade) of colorless, erect hyphae, 2.5–4(6) μ broad. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and coniferous wood and soil, Michigan, Idaho, and California, October and December.

MATERIAL STUDIED: CALIFORNIA: Smith 56900; IDAHO: Smith 53796, 53817, 53818, 54909 (type, from Priest Lake, Oct. 17, 1956), 55247, 55248, 55249; MICHIGAN: Smith 50783.

OBSERVATIONS: The duplex character of the pileus trama, the long cheilocystidia, and rather large spores distinguish this species. Two Idaho collections were on soil.

4. Crepidotus unicus sp. nov.
Illustration: Fig. 37.

Pileus 7–12 mm latus, cuneatus demum semi-orbicularis, cineraceus, fibrillosus, lubricus, margine planus. Lamellae bruneae, angustae demum medio-latae, confertae vel subdistantes. Sporae 4.5–5.5 μ, globosae, perraro subovoideae, brunneae, palam punctato-echinulatae. Pleurocystidia desunt; cheilocystidia 17–40 × 7–10 μ. Pilei trama duplex: pars interior decima usque quarta ex intertextis hyphis, pars exterior e laxe implicatis hyphis composita. Fibulatae desunt. Specimen typicum in Herb. Univ. Tenn.; lectum in Great Smoky Mts. National Park, Tenn., Aug. 9, 1952, L. R. Hesler 20503.

Pileus 7–12 mm broad, cuneate to semi-orbicular, grayish-white, appearing somewhat fibrillose under lens, lubricous when wet, margin even.

Lamellae radiating from a lateral point, brown, narrow or medium broad, close or nearly subdistant.

Stipe none; pileus attached laterally, at times by a prolongation of one side.

Spores 4.5–5.5 μ, globose, more rarely subovoid, conspicuously punctate-echinulate, brown. Pleurocystidia none; cheilocystidia 17–40 × 7–10 μ, clavate, ventricose, often capitate or forked or knobbed and contorted. Gill trama subparallel, hyphae 5–8 μ broad. Pileus trama duplex: the inner one-tenth to one-fourth composed of non-gelatinous, closely interwoven hyphae, the outer three-fourths to nine-tenths of very loosely tangled hyphae. Cuticle of repent hyphae. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On conifer bridge timber, Tennessee, August.

MATERIAL STUDIED: TENNESSEE: Hesler 20503, type, Alum Cave Parking Area, Great Smoky Mts. National Park, August 9, 1952.

OBSERVATIONS: This is a unique species because of the combination of globose spores, stratose pileus trama, and lack of clamp connections.

Section Parvuli sec. nov.

Sporae globosae vel subglobosae.
Spores globose or subglobose.
TYPE SPECIES: *Crepidotus parvulus* Murr.

Key to Species

1. Lamellae distant; pileus 1–4 mm broad ---------- 5. *C. parvulus*
1. Lamellae close or crowded; pileus 1–5 cm broad ------ 6. *C. putrigenus*

5. Crepidotus parvulus Murr. Mycologia 5: 27. 1913.
Illustration: Fig. 38.

Pileus 1–4 mm broad, resupinate, at first orbicular-reniform, becoming conchiform and convex, pure-white, dry, densely floccose-pulverulent, margin even. Context thin, soft.

Lamellae radiating from an eccentric point, rounded behind, white to yellowish-ochraceous, broad, distant, thin.

Spores 4–5.3 μ in diameter, globose, conspicuously punctate or echinulate, pale yellow to pallid in KOH. Basidia 16–20 × 4–6 μ, 4-spored. Pleurocystidia rare, similar to cheilocystidia; cheilocystidia 24–27 × 4–7 μ, cylindric-clavate with irregular knob-like processes over the surface. Gill trama subparallel to slightly interwoven, hyphae 2.5–5 μ broad. Pileus trama homogeneous, interwoven. Cuticle a trichodermial turf, the hyphae thick-walled, colorless, branched, loosely arranged, 3–6 μ broad. Clamp connections none on the epicuticular hyphae, rarely at the base of the basidium.

HABIT, HABITAT, AND DISTRIBUTION: On dead orange branches, Jamaica, October–November.

MATERIAL STUDIED: JAMAICA: Earle 334, the type (NY), from Hope Gardens, Oct. 20–Nov. 24, 1902.

OBSERVATIONS: Material of the type is meager. Although this species has been regarded as the same as *C. quitensis* (Singer, 1947), the latter differs from *C. parvulus* in the presence of clamp connections and slightly larger spores.

The description of macroscopic characters above is taken from Murrill (1913), and that of microscopic characters is based on a study of the type.

6. Crepidotus putrigenus (Berk. & Curt.) Sacc. Syll. Fung. 5: 883. 1887.

Agaricus putrigenus B. & C., Ann. Mag. Nat. Hist. III: 4: 292. 1859.
Crepidotus malachius var. *plicatilis* Pk., New York State Mus. Nat. Hist. Rept. 39: 71. 1886.
Illustration: Fig. 39.

Pileus 1–5 cm broad, sessile, subreniform, densely imbricate, dingy-white, tomentose or finally more or less glabrescent, moist, margin slightly striate.

Lamellae nearly close to crowded, broad, dingy-white then rusty brown to dull cinnamon.

Stipe none.

Spores (4)4.5–7 μ in diameter, globose or subglobose, many more or less ovoid, punctate, brownish, wall medium thick. Pleurocystidia none; cheilocystidia 25–46(71) $\times$ 6–10(15) μ, clavate, cylindrical, at times ventricose or constricted, apices obtuse, at times capitate, often repent on the gill edges (in dried material). Gill trama subparallel, hyphae 3–6 μ or more broad. Pileus trama interwoven. Cuticle repent, with scattered, more or less erect hyphae, at times with pilocystidia resembling the cheilocystidia. Lactifers present in the pileus trama. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On decaying hardwood, New York, Michigan, South Carolina, summer.

MATERIAL STUDIED: MICHIGAN: Smith 25512, 37186, 63439, 63521, 63529, 63530, 63602; NEW YORK: Peck, type (NYS) of *C. malachius* var. *plicatilis;* SOUTH CAROLINA: Curtis No. 2566, (K) type, collected by Ravenel and sent to Berkeley.

OBSERVATIONS: The type at Kew was not found in satisfactory condition for critical observations; cheilocystidia were difficult to find, but clearly there is a lack of clamp connections. The species shows some variation in the ornamentation of the pileus (it may be fibrillose or more or less glabrous), and the gills vary somewhat in width and spacing. It differs from *malachius* and *nephrodes,* with which it has been confused, in its lack of clamp connections. We believe that Peck's *C. malachius* var. *plicatilis* is *C. putrigenus.*

Section Crepidotus

Cuticle and, at times, the pileus trama gelatinous.

TYPE SPECIES: *Crepidotus mollis* (Fr.) Staude.

Key to Species

1. Pileus epicuticular hyphae, colorless ---------- 2
1. Pileus epicuticular hyphae or at least some of them brownish, often forming scales ---------- 5
   2. Spores 8–10 × 5.5–7 μ; pileus at first ochraceous to Isabella color or snuff brown ---------- 7. *C. ochraceus*
   2. Spores 6–8 μ long; pileus at first whitish or pallid, often becoming ochraceous when dried ---------- 3
3. Cuticle a gelatinous stratum differentiated from the non-gelatinous pileus trama ---------- 8. *C. alabamensis*
3. Cuticle gelatinization also extending into the pileus trama ---------- 4
   4. Pleurocystidia absent ---------- 9. *C. uber* var. *uber*
   4. Pleurocystidia present ---------- 10. *C. uber* var. *cystidiosus*
5. Epicuticular brown hyphae not incrusted ---------- 11. *C. fraxinicola*
5. Epicuticular brown hyphae, or at least some of them, incrusted ---------- 6
   6. Pleurocystidia absent ---------- 7
   6. Pleurocystidia present ---------- 8
7. Cuticular gelatinization confined to a well-defined stratum; occurring in the temperate zone ---------- 13. *C. mollis* var. *mollis*
7. Cuticular gelatinization also extending into the pileus trama ---------- 12. *C. sububer*
   8. Pleurocystidia cylindric-fusoid ---------- 14. *C. mollis* var. *cystidiosus*
   8. Pleurocystidia clavate, spathulate, or flask-shaped with a neck which may be forked ---------- 15. *C. mollis* var. *beachii*

7. Crepidotus ochraceus sp. nov.

Illustration: Fig. 40.

Pileus 3 cm latus, sessilis, flabelliformis, subluteo-brunneus vel ochraceus ("Isabella color" vel "snuff brown"), glaber, gelatinosus, margine striatus. Lamellae subdistantes demum confertae, latae, marginibus gelatinosae. Sporae 8–10 × 5.5–7 μ, ellipsoideae, planae. Basidia 24–30 × 6–8 μ, di- vel tetraspora. Pleurocystidia desunt; cheilocystidia 23–45 × 3–6 μ. Cuticula gelatinosa. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum in Mt. Hood National Forest, Oregon, Nov. 4, 1947, A. H. Smith 28494.

Pileus 3 cm broad, sessile, flabelliform, ochraceous, dull yellow brown or olivaceous ("Isabella color" or "snuff brown"), gelatinous, glabrous, margin striate.

Lamellae broad, subdistant, nearly close, edges gelatinous.

Spores 8–10 × 5.5–7 μ, ellipsoid, smooth, wall thick, brown, with a "plug," slightly inequilateral in profile view. Basidia 24–30 × 6–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 23–45 × 3–6 μ, filamentous, clavate or somewhat bottle-shaped with a neck, occasionally septate, at times brownish. Gill trama of narrow (2.5–5 μ), loosely interwoven, irregularly branched hyphae. Subhymenium a narrow zone of parallel, slender (2–4 μ) hyphae. Pileus trama of branched, interwoven, very loosely arranged

hyphae. Cuticle of loosely interwoven, slender (2.5–4 μ), gelatinous hyphae forming a gelatinous zone 250–375 μ thick. No epicuticular hyphae surmounting this zone. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On *Alnus,* Oregon, November.

MATERIAL STUDIED: OREGON: Smith 28494, type, from Still Creek, Mt. Hood National Forest, Nov. 4, 1947.

OBSERVATIONS: The ochraceous, glabrous pileus, distinct gelatinous cuticular zone, and the lack of any specialized epicuticular hyphae distinguish this species. It is near *C. alabamensis,* which has smaller spores and a turf of colorless epicuticular hyphae.

8. Crepidotus alabamensis Murr. North Amer. Flora 10: 150. 1917. Illustration: Figs. 1, 41.

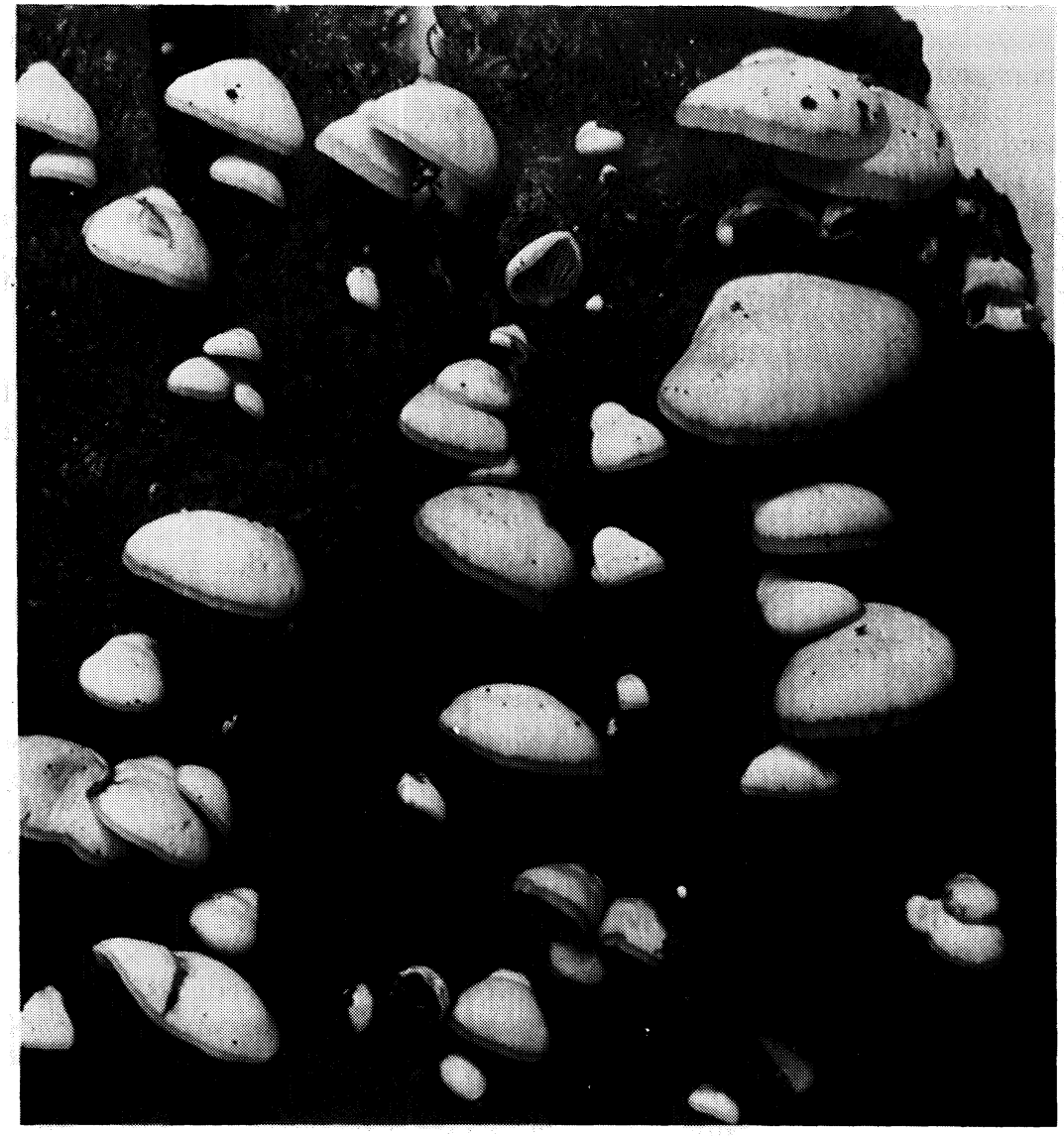

FIG. 1. *C. alabamensis*

Pileus 1–2(4.5) cm broad, sessile, reniform, flabelliform, or semiorbicular, convex, whitish, viscid, glabrous or obscurely pruinose, more rarely white-fibrillose, white-tomentose behind, margin even or faintly short-striate when wet. Context white, somewhat tough, more or less rubbery, not readily decaying.

Lamellae radiating, thin, narrow to moderately broad, close or crowded, white then pale-isabelline, finally darker, edges gelatinous, concolorous.

Spores in deposit: "Dresden brown." Spores (5.5)6–8.5 × 4–5 μ, ellipsoid, inequilateral in profile, smooth, brown in 2% KOH. Basidia 22–28 × 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia often gelatinous, 37–60 × 6–10 μ, clavate, fusoid, ventricose, or bottle-shaped, at times irregularly shaped or constricted. Gill trama subparallel, hyphae 6–12 μ broad. Pileus trama interwoven. Cuticle a thick (75–300 μ or more) gelatinous zone of loosely interwoven hyphae, bearing on the surface more or less erect, colorless hyphae, the terminal elements as pilocystidia, which may be forked, branched, sharp-pointed or capitate, forming more or less of a turf. Clamp connections none. No brownish hyphae present on the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On deciduous stumps, logs, trunks, and limbs, Southeastern United States, May–October.

MATERIAL STUDIED: ALABAMA: Earle, the type (NY) from Palmetto Swamp, near Auburn, on persimmon, Sept. 1, 1899; FLORIDA: Hesler 19624 (collected by Murrill); MISSOURI: Hesler 13241 (collected by J. B. Routien, No. 1049); NORTH CAROLINA: Hesler 24893; TENNESSEE: Hesler 5388, 8966, 9208, 12227, 19654, 21871, 22996, 24963, 25817.

OBSERVATIONS: This differs from *mollis* in its lack of brown, incrusted hyphae, and exhibits a turf of colorless hyphae and pilocystidia.

9. Crepidotus uber (B. & C.) Sacc. var. **uber** Syll. Fung. 5: 878. 1887.

Agaricus (Crepidotus) uber, B. & C., Amer. Acad. Arts Sci. Proc. 4: 117. 1868.

Crepidotus sulcatus Murr., Mycologia 5: 29. 1913.

Illustrations: Fig. 42 (type of *C. sulcatus*). Fig. 49.

Pileus 1.5 cm broad, white to yellowish-fuscous, flabelliform to orbiculate-reniform, laterally sessile, delicately membranous-fleshy, surface glabrous, viscid, margin not involute.

Lamellae moderately close, broad, argillaceous-fuscous to ferruginous.

Spores 6–8 × 4.5–5.5 μ, mostly 7 μ or less in length, ellipsoid, at times slightly inequilateral in profile, smooth, double-walled, thick. Basidia 28–34 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 26–35 × 4–6 μ, clavate or obclavate, few, mostly collapsed against the gill edge. Gill trama subparallel, hyphae 3–5 μ broad. Pileus trama radially interwoven, appearing more or less as cells in tangential sections. Cuticular zone and pileus trama more or less uniformly gelatinous, no distinct gelatinous stratum on the surface, as in *C. mollis.*

HABIT, HABITAT, AND DISTRIBUTION: In shady woods, Bonin Islands and Cuba; Singer (1947) reports it from Florida.

MATERIAL STUDIED: BONIN ISLANDS: the type, no. 46 (K) collected by Charles Wright, Expedition of 1853–56; CUBA: Underwood and Earle No. 761, type of *C. sulcatus* (NY) collected at the base of El Yunque Mt., Baracoa, March, 1903.

OBSERVATIONS: This species was compared with Murrill's type of *C. sulcatus,* and they agree in all essential microscopic characters. The sulcate-striate margin of the pileus in *C. sulcatus* is not mentioned in the original description of *C. uber,* but this is hardly regarded as a specific difference. This species differs from *mollis* in its lack of both brown incrusted hyphae and a gelatinous, cuticular stratum. Singer (1947) holds that *uber* is the southern form of *C. mollis,* and that *C. citri* Pat. is a synonym of *C. uber.* We found the type of *C. citri* inadequate for microscopic study of the pileus.

10. Crepidotus uber var. **cystidiosus** var. nov.
Illustrations: Figs. 43, 44.

Pileus 8–15 mm latus, reniformis, albidus, siccatus ochraceus, glabrosus, margine planus. Lamellae angustae vel medio-latae, confertae vel medio-confertae, albae deinde ochraceo-brunneae. Sporae 6–8 × 4–5 μ, ellipsoideae, planae. Pleurocystidia 26–35 × 6–8 μ; cheilocystidia hymenialia: 33–50 × 4–10 μ, tramalia: 57–75 × 7–8 μ. Pilei trama et cuticula aequaliter gelatinosae. Piloĉystidia aliquantulum clavata, 22–50 × 3–7 μ. Fibulatae desunt. Specimen typicum in Herb. Univ. Tenn.; lectum prope La Follette, Tenn., July 11, 1934. L. R. Hesler 4101.

Pileus 8–15 mm broad, sessile, fan-shaped, reniform, whitish, drying ochraceous, glabrous, margin even. Context with a soft or slightly rubbery texture.

Lamellae narrow or medium broad, close or moderately so, white, finally ochraceous-brown.

Spores 6–8 × 4–5 μ, ellipsoid, slightly or not at all inequilateral in profile, smooth. Basidia 22–28 × 6–7 μ, 2–4-spored. Pleurocystidia 26–35 × 6–8 μ, clavate or flask-shaped, appendiculate; cheilocystidia of two types: (1) hymenial, 33–50 × 4–10 μ, cylindric-ventricose, fusoid, flask-shaped, often with a neck, at times with a brownish pigment; (2) tramal, gelatinous, 57–75 × 7–8 μ, filamentous with a clavate apex, at times appendiculate. Gill trama subparallel, hyphae branched, 4–10 μ broad. Pileus trama loosely interwoven, the hyphae branched, somewhat gelatinous, the gelatinization homogeneous throughout the pileus trama and cuticle, or the cuticle only slightly more gelatinized and then showing an indistinct band at the surface. Cuticle not differentiated, the surface bearing scattered to numerous erect, colorless hyphae, and pilocystidia which are more or less clavate, 22–50 × 3–7 μ. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood log, Tennessee, July.

MATERIAL STUDIED: TENNESSEE: Hesler 4101, type, from LaFollette, July 11, 1934; 10783.

OBSERVATIONS: This variety differs from *C. uber* var. *uber* in having pleurocystidia; and from *C. alabamensis* in its peculiar gelatinization of the pileus and cuticle.

11. Crepidotus fraxinicola Murr. North Amer. Flora 10: 150. 1917. Illustrations: Figs. 45, 46.

Pileus 1–2 cm broad, convex to subexpanded, not at first resupinate, reniform, gelatinous or viscid, dingy-white, or finally pale honey color, shining when dry, at first fibrillose, becoming glabrous, the base strigose-tomentose. Context moderately thin.

Lamellae white to isabelline, rather narrow, close or crowded, lamellulae numerous, edges subentire, whitish, often gelatinous.

Stipe none.

Spores (6)7–8(10) × (4)4.5–5.5(6) μ, ellipsoid, slightly inequilateral in profile, smooth. Basidia 24–32 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 30–76 × 3.5–6 μ, slender, clavate-cylindric, to bottle-shaped, clustered; or long (75 μ more or less) when gill-edge is gelatinous and their origin tramal. Gill trama subparallel to slightly interwoven, hyphae 4–6 μ broad. Gill edges often gelatinous. Pileus trama interwoven. Cuticle a gelatinous zone, the zone 100–220 μ thick. The surface of the cuticle bearing hyphae some of which are brownish and not incrusted, at times forming scales; most surface hyphae colorless. Hypodermium distinct. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On deciduous wood, Michigan, New York, and Washington, June–August.

MATERIAL STUDIED: MICHIGAN: Smith 66633; NEW YORK: Earle 1507 (NY) the type, on ash, from West Park, July 24, 1903; WASHINGTON (Mt. Rainier National Park): Smith 29301, 30201.

OBSERVATIONS: The description of microscopic characters is based on a study of the type. This species differs from *C. mollis* chiefly in its lack of incrustations on the brown hyphae of the pileus surface.

12. Crepidotus sububer sp. nov.

Pileus 3–5 mm latus, sessilis, superficie brunneo fibrillosus vel tomentosus, margine villosus, incurvatus. Lamellae angustae demum medio-latae, paene subdistantes, pallidae, marginibus gelatinosae. Sporae (6)7–9.5 × 4.5–6(7) μ, ellipsoideae, planae. Pleurocystidia absunt; cheilocystidia 36–86 × 5–8 μ, gelatinosa. Pilei trama intertexta, pars exterior gelatinosa, superficies gerens densum caespitem e brunneis incrustatis hyphis compositum. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Priest Lake, Idaho, Oct. 22, 1956, A. H. Smith 55309.

Pileus 3–5 mm broad, sessile, densely brown-fibrillose or tomentose, margin villose, incurved.

Lamellae narrow to medium broad, nearly subdistant, pallid, edges gelatinous.

Spores (6)7–9.5 × 4.5–6(7) μ, ellipsoid, smooth. Basidia 27–33 × 6–7(9) μ, 2–4-spored. Pleurocystidia none; cheilocystidia tramal, 36–86 × 5–8 μ, gelatinous, filamentous, often enlarged below or near middle, and then slender bottle-shaped or ventricose. Gill trama of slender (3–5 μ), subparallel hyphae of long cells. Pileus trama interwoven, the outer zone more or less gelatinous, but not differentiated into a distinct cuticular zone as in *C. mollis,* the surface bearing a dense turf of brown, incrusted hyphae, 7–15 μ broad. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On *Populus,* Idaho, October.

MATERIAL STUDIED: IDAHO: Smith 55309, type, from Priest Lake, Oct. 22, 1956.

OBSERVATIONS: As in *C. uber,* a gelatinous surface is not differentiated. The very densely fibrillose or tomentose surface of the pileus, however, distinguishes it from *C. uber.*

13. Crepidotus mollis (Fr.) Staude var. **mollis** Die Schwämme Mitteldeutschlands, p. 71. 1857.

Agaricus mollis Fr., Syst. Myc. 1: 274. 1821.
Agaricus (Crepidotus) fulvotomentosus Pk., N.Y. State Mus. Nat. Hist. 26: 57. 1874.
Agaricus haerens Pk., N.Y. State Mus. Ann. Rept. 35: 132. 1884.
Crepidotus calolepidoides Murr., Mycologia 5: 30. 1913.
Crepidotus mollis var. *calolepis* (Fr.) Pilát, Acta Musei Nat. Pragae 2B: 74. 1940.
Illustrations: Figs. 2, 47, 48, 50.

Pileus 1–5(8) cm broad, sessile, reniform to obovate, soon plane, with a gelatinous cuticle, flaccid, brownish fibrillose or scaly to apparently glabrous, hygrophanous, olive brown (moist), becoming shining and ochra-

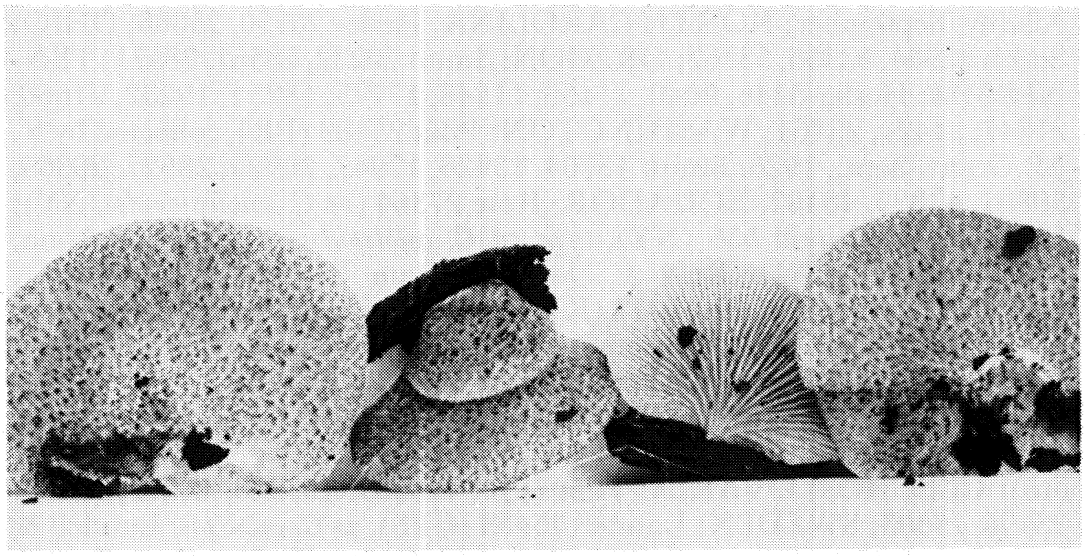

FIG. 2. *C. mollis* var. *mollis*

ceous-whitish (dry), margin faintly striatulate. Context thin, white, odor mild, taste mild or more rarely bitter.

Lamellae decurrent, radiating, whitish, becoming cinnamon, broad or moderately broad or moderately narrow, crowded to close, the edges at times gelatinous and fimbriate.

Stipe none, or rudimentary and obsolete.

Spores 7–9(10) × 4.5–5.5(6) μ, ellipsoid in face view, slightly inequilateral in profile, smooth, brownish in 2% KOH, wall double. Basidia 23–34 × 5–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia of two types: (1) hymenial, 30–60 × 6–8 μ, flask-shaped to irregularly cylindric; (2) tramal, 70–105 × 4–6 μ, filamentous, the apices often more or less enlarged, gelatinous, in *Sm-42732* the tips may be contorted. Gill trama subparallel, at times the hyphae irregularly branched, 4–9 μ broad. Subhymenium of parallel, narrow hyphae. Pileus trama interwoven, hyphae 5–12 μ broad. Cuticle a distinct gelatinous zone, 130–500 μ thick, the hyphae interwoven and narrow (1.5–2 μ), the surface bearing repent to erect tufts of fuscous or colorless hyphae, some of the former incrusted. Hypodermium distinct. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On bark of deciduous, more rarely coniferous, trees, in the temperate zones of North America, South America, The British Isles, Europe; spring, summer, and autumn.

MATERIAL STUDIED: IDAHO: Smith 53835, 55309, 55311; MAINE: Bigelow 10569; MASSACHUSETTS: Bigelow 8251; MICHIGAN: Iltis (TENN-18251); Johnson 1649 (MICH.); Smith 11129, 18949, 21735, 25468, 33691, 42732, 49596, 49597, 49601, 49637, 49758, 49759, 49760, 49761, 49762, 50997, 51942, 57068, 57087a, 57691, 57707, 63499, 63506, 63581, 63585, 63588, 66277, 66306, 66332, 66340, 66349, 66363, 66382, 66389, 66390, 66392, 66653, 66672, 66701, 67456; NEW HAMPSHIRE: Bigelow 11754 (MASS); NEW MEXICO: Barrows 249, 1288 (MICH); NEW YORK: Peck, type (NYS) of *Agaricus (Crepidotus) fulvotomentosus,* from Savannah, August; Peck, type (NYS) of *Agaricus (Crepidotus) haerens,* from Albany, September; NORTH CAROLINA: Hesler 20950, 25686; OHIO: Smith 32984, 33356, 33762; OREGON: Smith 20232, 28561, 28571; TENNESSEE: Hesler 5446, 9040, 11450, 11548, 17475, 18251, 19232, 21666, 21847, 24421, 25764; WASHINGTON: Pilát 23489 (PR), collected by Y. M. Grant, Sept., 1926; Smith 13704, 13928, 17947, 28925, 28927, 29369, 39861, 47825, 48482; ECUADOR: Rose 27364 (as *C. calolepidoides,* NY); JAMAICA: Murrill 556 (NY), type of *C. calolepidoides,* from Cinchona, 1908–9; ENGLAND: Reid & Donk, Burham Beeches, 6–10–57 (K); H.R.D. Ilston Valley, 19–10–14 (K); Dennis, Norbury Park, Surrey, Nov. 4, 1945 (K); Kew-3644, Haslemere, Oct. 1913 (as *C. mollis* var. *calolepis*); SCOTLAND: D. Boths (K), Fort William, Aug. 28, 1956; Reid (K), Killiecrankie, Aug. 26, 1953; FRANCE: Smith 66264, leg.-det. Josserand; NETHERLANDS: Hesler 26101 (leg. C. Bas), 26102 (leg. Maas Geesteranus): CZECHOSLOVAKIA: Pilát (PR) 149083, 193926, 20565, 23487, 23496, 23503; SWEDEN: Lundell 23453 (UPS), as *C. calolepis;* Lundell & Nannfeldt 907 (UPS), Goteborg; Pilát 14465, Stockholm; Romell 1891 (NY).

OBSERVATIONS: The material examined, both European and American, shows wide variation in the abundance and density of the brownish fibrils and scales. In a given collection, one pileus may be very densely fibrillose, and another very lightly so, and in the latter instance appearing to the unaided eye as glabrous. Thus, it is understandable that *C. mollis* has at times been described as glabrous. In *C. haerens,* Peck originally described the pileus as glabrous, but the type clearly shows some brownish, erect, incrusted, epicuticular hyphae. In Peck's *C. fulvotomentosus,* the pileus is densely fibrillose, and these fibrils are brown, incrusted hyphae, as in *mollis.* Again, the pileus of *C. calolepidoides* was originally described by Murrill as beset with small conic elevations (scales); but, in the type, these scales were found to be composed of brownish, incrusted hyphae, as in *mollis.* The pileus of *C. calolepis* is described as fibrillose scaly. In European materal we have seen the pileus bears brownish incrusted hyphae, again as in *mollis.* In view of the variation in *C. mollis,* the density of these brown incrusted hyphae does not offer a stable basis for the separation of *haerens, fulvotomentosus,* and *calolepidoides* from *mollis.* The material of *calolepis* we have seen is not different from *mollis.*

The structure of the gelatinized cuticle, and the morphological characters of the spores and cheilocystidia, are valid characters; but likewise, none of these characters provides a basis for separating the Peck and Murrill entities, listed in synonymy, from *mollis.*

In most of our collections, the spores are 7–9(10) × 4.5–5.5(6) μ. In a few collections (Shaffer-674; and Smith-63506 and 66264), the spores are about 1 μ shorter than in most collections; and in Smith-25468 and 31963, the range is from 6–9 × 4.5–6 μ. Otherwise, these collections exhibit the distinguishing characters as found in all other collections of *C. mollis.*

14. Crepidotus mollis var. **cystidiosus** var. nov.
Illustrations: Figs. 51, 52, 53.

Pileus (1)3–7 cm latus, sessilis, "tawny" fibrilloso-squamulosus, paene melleus, viscidus, striatulatus. Lamellae "tilleul buff" juvenes deinde "wood brown," latae, confertae. Sporae 8–10 × 5–6.5(7) μ, ellipsoideae demum ovoideae, planae. Basidia 26–35 × 6–9(10) μ, tetraspora. Pleurocystidia 47–52 × 5–6 μ; cheilocystidia hymenialia: 34–41 × 2–8 μ, tramalia: 52–72 × 6–10 μ. Cuticula gelatinosa, gerens brunnearum incrustatarum hypharum fasciculos. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Lake Quinault, Washington, May 17, 1939, A. H. Smith 13455.

Pileus (1.0)3–7 cm broad, sessile, conchate, becoming dimidiate, margin at first inrolled but finally spreading, the surface covered by small "tawny" fibrillose squamules, at maturity the context showing toward the margin between the squamules near "honey yellow," in age dingy and nearly glabrous, at first not viscid, at maturity distinctly viscid, pellicle adnate, margin finally striatulate. Context "olive buff" when moist, 2.5 mm or more thick, rubbery; odor and taste none.

Lamellae "tilleul buff" when young, becoming "wood brown," broad (5–7 mm), close to crowded, radiating from a lateral point, 3–5 tiers of lamellae, soft and collapsing against one another.

Stipe none; area of attachment broad and faintly tawny-pubescent.

Spores 8–10 × 5–6.5(7) μ, ellipsoid to ovoid in face-view, slightly inequilateral in profile, smooth, wall thickened somewhat, dull tawny in KOH. Basidia 26–35 × 6–9(10) μ, 4-spored. Pleurocystidia at times found chiefly on the lower half of the gill, 47–52 × 5–6 μ, subcylindric or subfusoid, at times with a slight neck; cheilocystidia of two general types: (a) regular, hymenial type, cylindric to flask-shaped, 34–41 × 2–8 μ; (b) tramal type, 52–72 × 6–10 μ, clavate, cylindric, at times forked, or branched at the apex. Gill trama irregularly subparallel, hyphae 6–12 μ broad. Subhymenium of narrow, parallel hyphae. Pileus trama interwoven. Cuticle a thick (200–350 μ) gelatinous zone of narrow interwoven hyphae, surmounted by bundles of brown, septate, incrusted hyphae forming scales. Hypodermium rather distinct. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On *Alnus,* Washington, May.

MATERIAL STUDIED: WASHINGTON: Smith 13455, type, from Lake Quinault, May 17, 1939.

OBSERVATIONS: This differs from *C. mollis* var. *mollis* in the presence of pleurocystidia, and the "tilleul buff" gills when young.

15. Crepidotus mollis var. **beachii** var. nov.
Illustrations: Figs. 54, 55.

Pileus 10–16 mm latus, sessilis, flabelliformis, pallidus, dense brunneo-fibrillosus vel tomentosus. Lamellae latae, confertae. Sporae 7–9 × 5–6 μ, ellipsoideae, planae. Basidia 20–28 × 5–6 μ, tetraspora. Pleurocystidia 20–53 × 4–12 μ; cheilocystidia 27–35 × 6–8 μ. Cuticula gelatinosa, hyphas incrustatas brunneas sine colore gerens. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Douglas Lake, Michigan, Beach 24.

Pileus 10–16 mm broad, sessile, flabelliform, pallid, densely brownish fibrillose or tomentose. Context thin.

Lamellae broad, close, brownish at maturity.

Spores 7–9 × 5–6 μ, ellipsoid, inequilateral in profile, smooth, thick-walled, brown. Basidia 20–28 × 5–6 μ, 4-spored. Pleurocystidia 20–53 × 4–12 μ, clavate to sub-spathulate, or flask-shaped with a neck which may be forked; cheilocystidia 27–35 × 6–8 μ, not abundant, flask-shaped, usually with a neck which may be sub-capitate. Gill trama subparallel, hyphae 2–5 μ broad. Pileus trama interwoven. Cuticle a gelatinous zone 40–60 μ thick, of colorless, loosely interwoven hyphae—the zone surmounted by epicuticular hyphae of two types: (a) brown, incrusted hyphae, dense or tufted, 5–8 μ broad; (b) colorless, non-incrusted, 1.5–3(4) μ broad, the apices tapering to a rounded point. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On deciduous wood, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Beach 24 (MICH) type, from near University of Michigan Biological Station, Douglas Lake, collected by H. Beach, Aug. 6, 1955.

OBSERVATIONS: This differs from *C. mollis* var. *cystidiosus* in its entirely different cheilocystidia.

Section Versuti sec. nov.

Cuticula sicca, plerumque fibrillosa vel perraro glabrosa; sporae ellipsoideae vel raro lanceolatae demum graniformes.

Cuticle dry, usually fibrillose, or more rarely glabrous; spores ellipsoid or rarely lanceolate to pip-shaped.

TYPE SPECIES: *Crepidotus versutus* (Pk.) Sacc.

Key to Species

1. Stipe present ---------- 2
1. Stipe absent ---------- 3
   2. Spores verruculose-asperulate; pileus fuscous ---------- Ex. 1. *Pyrrhoglossum hepatizon**
   2. Spores smooth; pileus watery-brown when wet, dingy buff when dry ---------- Ex. 2. *Simocybe tiliophilia**
3. Spores 7–11 × 4.5–6 μ ---------- 16. *C. versutus*
3. Spores smaller (8 μ or less in length) ---------- 4
   4. Spores pip-shaped, lanceolate, or subovoid, 2.8–3.6 μ broad ---------- 17. *C. herbarum*
   4. Spores ellipsoid, or short-ovoid, 4.3–6 μ broad ---------- 5
5. Pileus colored at maturity ---------- 6
5. Pileus white ---------- 7
   6. Pileus brick reddish, glabrous or subglabrous ---------- 18. *C. bicolor*
   6. Pileus finally pinkish buff, or more rarely gray-buff, granulose-pubescent ---------- 19. *C. coloradensis*
7. Spores short-ellipsoid, or more often globose to subglobose, punctate (see also Sec. Parvulae) ---------- 6. *C. putrigenus*
7. Spores ellipsoid, smooth ---------- 19. *C. coloradensis*

16. Crepidotus versutus (Pk.) Sacc. Syll. Fung. 5: 888. 1887.
Agaricus versutus Pk., N.Y. State Mus. Ann. Rept. 30: 70. 1878.
Illustrations: Figs. 56, 57.

Pileus 5–14 mm broad, at first resupinate, then reflexed, attached dorsally or laterally, flabelliform or dimidiate, dry, white, villose to tomentose, margin even, incurved. Context thin, soft, white; odor and taste mild.

Lamellae radiating from an eccentric or lateral point, medium broad, ventricose, sub-distant, white at first, finally tinged rusty or "sayal brown," many short, edges fimbriate.

Stipe none, at times a short tubercle.

Spores 7–11 × 4.5–6 μ, ellipsoid, very minutely punctate, yellowish to yellowish-brown (under microscope). Basidia 27–32 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–63 × 3–12 μ, cylindric, subventri-

*See Excluded Species, p. 140

cose, or bottle-shaped. Gill trama interwoven or at times subparallel, hyphae (2)4–7 μ broad. Subhymenium parallel. Cuticle of interwoven hyphae, bearing a tuft of colorless, long, slender (2.5–5 μ broad) hyphae. Clamp connections none on the epicuticular hyphae, but found on the hyphae of the tomentum at the base of the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On bark of deciduous wood, New Hampshire, New York, Michigan, and Tennessee, August–October.

MATERIAL STUDIED: MICHIGAN: Bailey 89 (MICH); NEW HAMPSHIRE: Bigelow 12333 (MASS); NEW YORK: Peck, type (NYS), from Forestburgh, September; TENNESSEE: Hesler 21030.

OBSERVATIONS: The rather large, punctate, ellipsoid spores, and the white, tomentose to villose pileus, are important characters of this species. It seems to have been collected rather infrequently in North America.

The following notes are drawn from a study of the type: "Spores 7.5–10(11) × 4.5–5.5 μ, ellipsoid, faintly punctate (seen best in Melzer's; easily overlooked in water or 2% KOH mounts), yellowish-brown under microscope. Basidia 27–32 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 34–54 × 4–7 μ, hyphoid, cylindric, subventricose, or bottle-shaped, numerous when found (absent in some sections). Gill trama of undulating-subparallel, narrow (2–5 μ) hyphae. Pileus trama of interwoven hyphae. Cuticle of interwoven hyphae bearing a turf of long, colorless, slender hyphae 2.5–5 μ broad. Clamp connections present on the hyphae forming the tomentum at the point of attachment, but none on the epicuticular hyphae."

17. Crepidotus herbarum (Pk.) Sacc. Syll. Fung. 5: 888. 1887.
Agaricus herbarum Pk., Buffalo Soc. Nat. Sci. Bull. 1: 53. 1873.
Pleurotellus herbarum (Pk.) Sing. Lilloa 13: 84. 1947.
Illustrations: Figs. 58, 59.

Pileus 8–22 mm broad, white, villose or tomentose, glabrescent, sessile, reniform, suborbicular, or dimidiate, margin incurved. Context medium thin, white.

Lamellae radiating from a lateral or eccentric point, subdistant, medium broad, white when young, finally pale ochraceous.

Stipe none; pileus strongly villose at point of attachment.

Spores 6–8 × 2.8–3.6 μ, pip-shaped, sublanceolate to somewhat ellipsoid to subovoid, smooth, colorless to pale yellow in 2% KOH. Pleurocystidia none; cheilocystidia 22–51 × 4–7 μ, clavate, cylindric, or ventricose, more rarely forked, clustered and conspicuous. Gill trama undulating subparallel, or at times slightly interwoven. Pileus trama interwoven, hyphae 3–4 μ broad. Cuticle a trichodermium, the epicuticular hyphae loosely tangled, colorless, more or less erect, slender (2–4 μ broad). Clamp connections none (except on the hyphae at the point of attachment of pileus).

HABIT, HABITAT, AND DISTRIBUTION: On deciduous logs and twigs, and herbaceous stems, general in temperate North America, June–November.

MATERIAL STUDIED: MASSACHUSETTS: Bigelow 6265; MICHIGAN: Smith 57414; NEW YORK: Peck, type (NYS) from North Green-

bush, on herbaceous stems; OHIO: Cooke 33952 (MICH); OREGON: Smith 20222, 55544; TENNESSEE: Hesler and Rice 3656.

OBSERVATIONS: The spores of *C. herbarum* are unique in the genus. They are pip-shaped to lanceolate, and pale brownish yellow in mass. Because of its pale spores, Singer (1947, 1962) places *C. herbarum* in the genus *Pleurotellus,* and lists it, and some others, as synonyms of *P. hypnophilus.*

In the collections examined, all characters seemed constant except that in one of the Oregon collections (MICH 20222) the cheilocystidia are filamentous, 2–4 μ broad.

18. Crepidotus bicolor Murr. Mycologia 5: 28. 1913.
Illustration: Fig. 60.

Pileus 5–8 mm broad, sessile, dimidiate or flabelliform, usually narrowed behind, convex or applanate, testaceous to latericious (brick red), dry, glabrous or subglabrous, margin undulate and somewhat sulcate with age or on drying. Context thin, rather firm.

Lamellae radiating, ochraceous-ferruginous, broad, distant, ventricose.

Spores 7–8 × 5–6 μ, broadly ellipsoid, smooth, conspicuously thick-walled, reddish-brown to rusty-brown in 2% KOH. Basidia 19–30 × 5–7 μ, 2–4-spored, mostly 4-spored. Pleurocystidia none; cheilocystidia 23–46 × 3.5–6 μ, clustered, cylindric to slender-clavate, often irregular to slightly constricted. Gill trama of undulating subparallel hyphae 3–6 μ broad. Pileus trama interwoven. Cuticle of repent hyphae forming a narrow, conspicuous zone which is rusty-brown. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On dead wood, British Honduras.

MATERIAL STUDIED: BRITISH HONDURAS: Morton E. Peck, the type (NY), 1906.

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. This species seems to be unique in its pileus colors, its smooth, broadly ellipsoid spores, and in the structure of the pileus cuticle.

19. Crepidotus coloradensis sp. nov.
Illustration: Fig. 61.

Pileus 5–25 mm latus, sessilis, flabelliformis demum reniformis, albus deinde "pinkish buff," vel cinereo-coriaceus, villosus demum fibrillosus, siccus. Lamellae albae demum coriaceae vel brunneae, latae, subdistantes. Sporae 6–7.5(8) × 4–5 μ, ellipsoideae, planae. Basidia 20–30 × 5–7(8) μ, tetraspora. Pleurocystidia desunt; cheilocystidia (20)45–67 × (2)6–9 μ. Cuticula ex hyphis repentibus composita, gerens caespitem ex hyphis sine colore compositum. Fibulatae desunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Ophir, Colorado, Aug. 26, 1956, A. H. Smith 52889.

Pileus 0.5–2.5 cm broad, sessile, white, finally becoming pinkish buff, or more rarely grayish buff, villose to fibrillose, dry, flabelliform to reniform. Context whitish; odor and taste none or slight.

Lamellae white, becoming buff, or near wood brown, broad, subdistant or nearly so, edge white fimbriate.

Spores 6–7.5(8) × 4–5 μ, ellipsoid in face view, inequilateral in profile, smooth, pale ochraceous tawny in KOH. Basidia 20–30 × 5–7(8) μ, 4-spored. Pleurocystidia none; cheilocystidia (20)45–67 × (2)6–9 μ, usually more or less subulate or flask-shaped with a neck, at times filamentous to clavate, flexuous, the neck occasionally branched. Gill trama interwoven, hyphae 4–12 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae 1.5–2.5(5) μ broad. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On aspen, Michigan, Colorado, and New Mexico, June–October.

MATERIAL STUDIED: COLORADO: Smith 51637, 51803, 52191, 52460, 52461, 52666, 52889 (type, from Ophir, Aug. 26, 1956); MICHIGAN: Smith 32300, 49598, 50628; NEW MEXICO: Barrows 438A (MICH).

OBSERVATIONS: The pileus is white but may become some shade of buff. The smooth, medium-small spores, and more or less subulate to flask-shaped cheilocystidia are distinctive. The spores separate it from both *C. herbarum* and *C. versutus*.

Subgenus Sphaerula subg. nov.

Sporae globosae vel subglobosae; fibulatae adsunt.

Spores globose to subglobose; clamp connections present on the hyphae of the pileus cuticle or the gill trama, or at the base of the basidium.

Type species: *Crepidotus applanatus* (Pers.) Kummer var. *applanatus* sensu Josserand.

Key to Sections

1. Fruiting body stipitate ---------- Section *Nyssicolae,* p.
1. Fruiting body sessile or with a pseudostipe ---------- Section *Sphaerula,* p.

Section Nyssicolae (Singer) stat. nov.

Characters given in the key.

Type species: *Crepidotus nyssicola* (Murr.) Sing.

Key to Species

1. Pileus deeply depressed, white to cremeous ---------- 20. *C. nyssicola*
1. Pileus convex ---------- 2
   2. Pileus white to watery white ---------- 21. *C. stipitatus*
   2. Pileus isabelline or pinkish cinnamon ---------- Ex 3. *Melanotus eccentricus**

*See Excluded Species, p. 141

20. Crepidotus nyssicola (Murr.) Singer Lilloa 13: 89. 1947.
Pleuropus nyssicola Murr., Lloydia 5: 145. 1942.
Illustrations: Figs. 62, 63.

Pileus 3–6 cm broad, deeply depressed with an arched margin, becoming plano-depressed or vase-shaped, finely hispid or subglabrous, white to cremeous or pale purplish with dark purple lines, margin faintly striatulate when moist. Context thin, pallid; odor mild or resembling that of *Calvatia gigantea.*

Lamellae decurrent, close, narrow, white becoming "clay color" to "sayal brown," edges flocculose.

Stipe 1–3 cm × 4–8 mm, central or eccentric, fleshy-tough, white or pallid, pubescent or sub-scaly. Veil none.

Spores 5–7(7.8) × 5–6 μ, globose to subglobose, frequently ovoid, echinulate, wall medium thick. Basidia (21–32 × 6–7(8) μ, 4-spored. Pleurocystidia none; cheilocystidia 24–61 × 6–10 μ, cylindric-capitate, clavate, at times more or less constricted. Gill trama subparallel, hyphae 5–10 μ broad. Pileus trama: (a) in tangential sections more or less pseudoparenchymatous; (b) in radial sections, the hyphae radial and more or less subparallel or slightly interwoven. Cuticle of repent hyphae, with occasional uplifted ends. Clamp connections present on the cuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer logs, Florida and Michigan, April, August, and October.

MATERIAL STUDIED: FLORIDA: Murrill F 19730, type, on *Nyssa biflora,* Gainesville, April 20, 1939; MICHIGAN: Smith 33169, 61289.

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. Smith's Michigan collections are in essential agreement with the type, with some variation in the size of the cheilocystidia, and the extent of pilocystidia.

21. Crepidotus stipitatus Kauffman Agar. Mich. 1: 524. 1918.
Illustration: Fig. 64.

Pileus 1–3 cm broad, convex, suborbicular to reniform, hygrophanous, watery-white to white, glabrous, margin faintly striatulate when moist, silky when dry, margin decurved. Context white, firm, rather thick near base, thin in front; odor and taste not distinctive.

Lamellae somewhat close, rather broad, broadest near point of attachment, narrow in front, white then pale ochraceous-brown, edges entire.

Stipe 2–4 mm long, 1–1.5 mm thick, distinct, eccentric to nearly lateral, white, pruinose, villose at base, somewhat prolonged to the gills.

Spores 4.5–6.5 μ, globose, often ovoid or subovoid, minutely punctate, pale ochraceous brown in KOH. Basidia 14–20 × 4–5 μ, 4-spored. Pleurocystidia none; cheilocystidia 33–48 × 6–7 μ, clavate, subcylindric, or bottle-shaped. Gill trama subparallel, hyphae 6–10 μ broad. Pileus trama loosely interwoven. Cuticle of 6–8 layers of repent hyphae, a few free hyphal ends

more or less erect as pilocystidia, 20–30 × 5–7 μ, clavate to ventricose. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On rotten wood, Michigan, September.

MATERIAL STUDIED: MICHIGAN: Smith 66268; type, collected by L. H. Pennington, south of Ann Arbor, Sept. 11, 1907.

OBSERVATIONS: The description of macroscopic characters is from Kauffman (1918); microscopic characters are from the type.

Section Sphaerula Sec. nov.

Pileus sessilis vel pseudo-stipitem gerens.

Spores globose or subglobose; clamp connections present; pileus sessile or with a pseudostipe.

Type species: *Crepidotus applanatus* (Fr.) Kummer

Key to Subsections

1. Pileus at first white, but may become darker (grayish or brownish) in age or when wet, glabrous or white-fibrillose --- Subsection *Sphaeruli*, p. 40
1. Pileus or its fibrils colored ---------- 2
   2. Pileus at first colored, glabrous or white to buff fibrillose ---------- Subsection *Colorantes*, p. 59
   2. Pileus surface white or colored at first, bearing brown fibrils ---------- Subsection *Fulvifibrillosi*, p. 71

Subsection Sphaeruli

Characters given in the key.

Type species: *Crepidotus applanatus* (Fr.) Kummer

Key to Species

1. Pleurocystidia present ---------- 2
1. Pleurocystidia absent ---------- 4
   2. Spores 4–5.5 μ in diameter ---------- 22. *C. subapplanatus*
   2. Spores 5–7 μ in diameter ---------- 3
3. Pileus developing black spots in age ---------- 23. *C. maculans*
3. Pileus not as above ---------- 24. *C. cystidiosus*
   4. Spores 4–5.5 μ in diameter ---------- 5
   4. Spores 5–7(8) μ in diameter ---------- 10
5. Lamellae broad or medium broad ---------- 6
5. Lamellae narrow or moderately so ---------- 7
   6. Pileus 4–8(10) mm broad, conchate ---------- 25. *C. conchatus*
   6. Pileus 8–25 mm broad, reniform to fan-shaped ---------- 26. *C. tahquamenonensis*
7. Pileus tomentose, cuticle bearing a tangled turf; pilocystidia none ---------- 27. *C. harperi*

7. Pileus glabrous to villose or pruinose ---------- 8
   8. Cheilocystidia 20–40(50) μ long, non-septate, cylindric, clavate, or ventricose, pilocystidia often present, 25–65 μ long ------- 28. *C. applanatus* var. *applanatus*
   8. Cheilocystidia not as above ---------- 9
9. Cheilocystidia septate, at times forked; pilocystidia up to 60–120 μ long ---------- 29. *C. applanatus* var. *phragmocystidiosus*
9. Cheilocystidia non-septate, often forked or contorted; pilocystidia often contorted, forked or branched ---------- 30. *C. applanatus* var. *diversus*
   10. Lamellae narrow, close or crowded ---------- 31. *C. applanatus* var. *globigera*
   10. Lamellae broad or very broad ---------- 11
11. Pileus hygrophanous, conspicuously darkening on drying -------- 12
11. Pileus not as above ---------- 13
   12. Pileus becoming fulvous or tawny on drying, glabrous ---------- 32. *C. hygrophanus*
   12. Pileus becoming "Prout's brown" on drying, pubescent to fibrillose ---------- 33. *C. brunnescens*
13. Pileus typically very small (6 mm or less) ---------- 14
13. Pileus typically broader ---------- 16
   14. Lamellae unusually broad and distant to subdistant ---------- 15
   14. Lamellae narrow and close ---------- 34. *C. quitensis*
15. Cheilocystidia cylindric, often capitate ---------- 35. *C. latifolius*
15. Cheilocystidia obclavate, or flask-shaped, or at times fusoid ---------- 36. *C. praelatifolius*
   16. Pileus 4–12 mm broad, white-frosted villose ---------- 37. *C. avellaneus*
   16. Pileus 10–50(70) mm broad ---------- 17
17. Pileus glabrous, with few or no erect hyphae; no pilocystidia ---------- 38. *C. malachius* var. *malachius*
17. Pileus villose or pruinose; either pilocystidia or a hyphal-turf present ---------- 18
   18. Pilocystidia present; cheilocystidia non-septate ---------- 39. *C. malachius* var. *trichiferus*
   18. Pilocystidia none, a turf present; cheilocystidia at times septate ---------- 40. *C. malachius* var. *phragmocystidiosus*

22. Crepidotus subapplanatus sp. nov.
Illustrations: Figs. 65, 66, 67, 68, 69.

Pileus 8–25 mm latus, sessilis, flabelliformis demum subcuneatus, glabrosus, albus. Lamellae angustae, confertae, albae demum pallido-cinnamomeae. Sporae 4–5.5 μ, globosae, punctatae. Basidia 20–24 × 5–6 μ, di- et tetraspora. Pleurocystidia 24–36 × 5–6 μ; cheilocystidia 17–35 × 4–11 μ. Cuticula ex hyphis repentibus composita,

cum pilocystidiis, 30–67 × 4–8 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Michigan, July 15, 1959, A. H. Smith 61101.

Pileus 8–25 mm broad, flabelliform to subcuneate, glabrous, at times villose toward the base, white, sessile, laterally attached, the pileus at times prolongated into a pseudostipe.

Lamellae radiating from the base or lateral pseudostipe, narrow, close, white then pale cinnamon, edges fimbriate.

Spores 4–5.5 μ, globose, punctate. Basidia 20–24 × 5–6 μ, 2–4-spored. Pleurocystidia 24–36 × 5–6 μ, more or less cylindric to slender-ventricose, with a slender neck (appendiculate); cheilocystidia 17–35 × 4–11 μ, versiform: clavate and more or less capitate, ventricose, more rarely crooked or forked. Gill trama subparallel, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, with scattered pilocystidia, cylindric, clavate, or ventricose to bottle-shaped, 30–67 × 4–8 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan and New Hampshire, July.

MATERIAL STUDIED: MICHIGAN: Smith 61101, type, from Tahquamenon Falls State Park, July 15, 1959; NEW HAMPSHIRE: Bigelow 12017 (MASS); NORTH CAROLINA: Hesler 23088, Blue Ridge Parkway, Tanbark Tunnel, July 30, 1958.

OBSERVATIONS: Except for pleurocystidia, this is close to *C. applanatus.*

23. Crepidotus maculans sp. nov.
Illustrations: Figs. 3, 70, 71.

Pileus 2–6 cm latus, sessilis, flabelliformis, hygrophanus, colore lacteus demum niveus, denique atras maculas exponens. Lamellae latae, confertae vel subdistantes, albae demum "Sayal brown." Sporae 5.5–7 μ, globosae, punctatae. Basidia 25–33 × 7–10 μ, tetraspora. Pleurocystidia 27–40 × 6–8 μ; cheilocystidia 26–42 × 5–10 μ. Cuticula ex hyphis repentibus composita. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Michigan, Aug. 12, 1963, A. H. Smith 67118.

Pileus 2–6 cm broad, sessile, fan-shaped, glabrous, moist, hygrophanous, milk-white when young, fading to snow-white, in age developing blackish spots, margin translucent striate at maturity (moist). Context thin, only moderately fragile; odor and taste not distinctive.

Lamellae broad, subdistant varying to close, attached to a white basal point, white becoming dull cinnamon ("Sayal brown") thin, edges even.

Spores 5.5–7 μ, globose, punctate. Basidia 25–33 × 7–10 μ, 4-spored. Pleurocystidia 27–40 × 6–8 μ, more or less ventricose, at times with a tapering neck, not projecting far, scattered, not conspicuous; cheilocystidia 26–42 × 5–10 μ, clavate-basidioid, ventricose, or more rarely slightly contorted. Gill trama more or less interwoven, hyphae 3–6 μ broad. Pileus trama interwoven. Cuticle of repent hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, August.

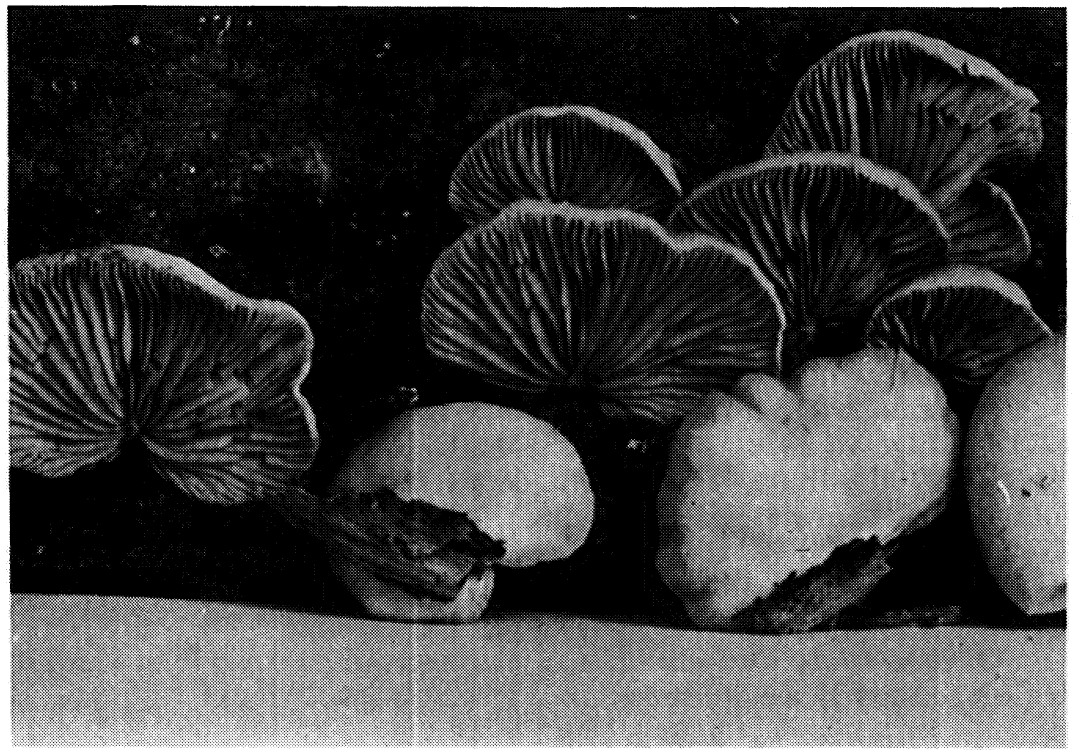

FIG. 3. *C. maculans*

MATERIAL STUDIED: MICHIGAN: Smith 67118 (type, from Emerson, Aug. 12, 1963), 67121, 67122, 67123, 67124, 67125, 67126, 67129, 67130, 67131.

OBSERVATIONS: The pilei average larger than in most species of *Crepidotus*. The milk-white pileus, which develops blackish spots in age, its pleurocystidia, and very broad gills distinguish it.

24. Crepidotus cystidiosus sp. nov.
Illustrations: Figs. 4, 72, 73.

Pileus 1.5–6 cm latus, sessilis, albus demum pallidus, hygrophanus, deinde alutaceus vel coriaceus, glabrosus vel tomentosus. Odore mitis, gustu mox amarus vel stypticus. Lamellae confertae, medio-latae demum latae, albae, deinde obscuro-"clay color." Sporae 5–7.5 μ, globosae, punctatae. Basidia 24–36 × (6)7–9(12) μ, di- et tetraspora. Pleurocystidia (24)35–62 × 5–12 μ; cheilocystidia 24–48(55) × 5–11 μ. Cuticula ex hyphis repentibus composita. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Colonial Point Hardwoods, Michigan, July 22, 1963, A. H. Smith 66854.

Pileus 1.5–6 cm broad, sessile, white or pallid, hygrophanous, becoming alutaceous to buff in age, spathulate, dimidiate, or reniform, glabrous, or slightly tomentose, margin striate when moist. Context thin, white, soft; odor mild, taste fungoid or mild, soon becoming somewhat bitter-astringent.

Lamellae close, medium broad to broad, white, becoming dull clay color, edges fimbriate.

Spores 5–7.5 μ in diameter, globose, punctate, "Sayal brown" to cinnamon brown in deposit. Basidia 24–36 × (6)7–9(12) μ, 2–4-spored (rarely 1-spored. Pleurocystidia (24)35–62 × 5–12 μ, versiform: clavate, at times mucronate or appendiculate, or ventricose, more rarely capitate; cheilocystidia 24–48(55) × 5–11 μ, clavate to ventricose. Gill trama subparallel to interwoven, hyphae 5–9(17) μ broad. Pileus trama loosely interwoven. Cuticle of repent hyphae, at times poorly differentiated, with or without pilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On logs of hardwood. Maine, Massachusetts, Michigan, New York, North Carolina, and Tennessee, June–October.

MATERIAL STUDIED: MAINE: Bigelow 10570 (MASS); MASSACHUSETTS: Bigelow 6824, 6825 (MASS); MICHIGAN: Beach 32 (MICH); Smith 33–1003, 41605, 61026, 66278, 66851, 66853, 66854 (type, from Colonial Point Hardwoods, July 22, 1963), 66856, 67073; Thiers 2668, 2785, 3362 (MICH); NEW YORK: Deegan 81 (MICH); NORTH CAROLINA: Hesler 4331, 5116, 19157, 25528; TENNESSEE: Hesler 24946, 25811.

OBSERVATIONS: This resembles *C. malachius* var. *malachius* from which it is distinguished by the pleurocystidia.

FIG. 4. *C. cystidiosus*

25. Crepidotus conchatus sp. nov.
Illustrations: Figs. 74, 75.

Pileus 4–10 mm latus, sessilis, albus, conchatus, villosus vel fibrillosus, glabrescens. Lamellae albae deinde pallido-cinnamomeae, latae demum medio-latae, confertae. Sporae 4.5–5.5 μ, globosae, punctatae. Basidia 20–28 × 5–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 26–62 × 5–10 μ. Cuticula ex hyphis repentibus composita, plerumque hyphas erectas gerens; pilocystidia cheilocystidiis similia. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Bois Blanc Island, Michigan, July 21, 1961, A. H. Smith 63600.

Pileus 4–10 mm broad, sessile, white, more or less dingy in age, conchate, somewhat villose or fibrillose, glabrescent. Context whitish.

Lamellae white then pale cinnamon, broad or medium broad, close or moderately close, thin.

Spores 4.5–5.5 μ in diameter, globose, punctate. Basidia 20–28 × 5–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 26–62 × 5–10 μ, versiform: cylindric, clavate, ventricose, rarely septate. Gill trama subparallel or slightly interwoven, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, usually bearing erect hyphae and, at times, pilocystidia resembling the cheilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood log, Michigan, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 63600 (type from Bois Blanc Island, July 21, 1961), 66265.

OBSERVATIONS: This species is distinguished by its white, conchate pileus, broad gills, and small spores. Its broad gills exclude it from *C. applanatus,* and its small spores separate it from *C. malachius.*

26. Crepidotus tahquamenonensis sp. nov.
Illustration: Fig. 76.

Pileus 8–25 mm latus, sessilis, flabelliformis demum reniformis, albus deinde obscurus, glabrosus. Lamellae latae, confertae, albae deinde sub-brunneae. Sporae 4.5–5.5 μ, globosae, punctatae. Basidia 16–20 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 28–42 × 5–13 μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 9, 1956, Thiers 3907.

Pileus 8–25 mm broad, sessile, flabelliform to reniform, white, becoming dingy in age, glabrous, at times tomentose on the disk or at the base. Context white; odor and taste mild.

Lamellae broad, close, thin, white becoming brownish.

Spores 4.5–5.5 μ in diameter, globose, punctate. Basidia 16–20 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 28–42 × 5–13 μ, clavate and often capitate or forked, or ventricose. Gill trama subparallel to slightly interwoven, hyphae 5–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered, erect hyphae, at times as cylindric pilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood log, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Thiers 3907 (MICH), type, from Tahquamenon Falls State Park, Aug. 9, 1956.

OBSERVATIONS: This is distinguished from *C. conchatus* by its much larger, flabelliform to reniform pileus, and different cheilocystidia.

27. Crepidotus harperi Sing. Mycologia 51: 586. 1959.
Illustrations: Singer, Mycologia 51, figs. 1–2, and 17. Fig. 77.

Pileus 7–19 mm broad, convex then repand, white, tomentose, broadly attached behind on vertical surfaces, pendulous-applicate on the lower side on horizontal surfaces. Context white, thin.

Lamellae rounded-concurrent behind, whitish then brown, narrow to medium broad (rarely more than 0.1 of pileus diameter in breadth), close.

Stipe rudimentary, extremely small and disappearing at maturity, functionless, with a white, tomentose base.

Spores 4.3–5.3 × 4–5 μ, globose to subglobose, echinulate, brown, wall moderately thick. Basidia 17–20 × 5–5.5 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 18–35 × 4–8 μ, versiform: cylindric-subcapitate, clavate, apices obtuse or more rarely appendiculate, occasionally irregularly ventricose-capitate, at times slightly nodulose. Gill trama undulating-subparallel, hyphae 3–7 μ broad. Pileus trama of slightly interwoven hyphae. Cuticle of repent hyphae bearing a dense trichodermial zone of loosely tangled, colorless hyphae, 3–5 μ broad. Clamps present.

HABIT, HABITAT, AND DISTRIBUTION: On wood, densely gregarious, Virginia, May.

MATERIAL STUDIED: VIRGINIA: Harper 1177, type (F), May, 1919.

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. The tomentose pileus and the small spores characterize this species.

28. Crepidotus applanatus (Pers.) Kummer Der Führer in Pilzk., p. 74. 1871 var. **applanatus** *sensu* Josserand.
Agaricus applanatus Pers., Myc. Eur. 3: 30. 1828.
Illustrations: Figs. 5, 6, 78, 79.

Pileus 1–4 cm broad, sessile, flabelliform, petaloid, spathulate, reniform or semi-orbicular, glabrous, at times more or less pubescent, villose or fibrillose at the base, white becoming brownish or somewhat vinaceous to buff or dull cinnamon as the spores mature, hygrophanous, margin striatulate when wet. Context thin, white; odor and taste mild.

Lamellae narrowly adnate-decurrent, white at first, then brownish, close or crowded, narrow, lamellulae numerous, edges fimbriate to even.

Spores in deposit: "Sayal brown" to "cinnamon brown," 4–5(5.5) μ, globose, punctate. Basidia 22–27 × 6–7 μ, 4-spored. Pleurocystidia none;

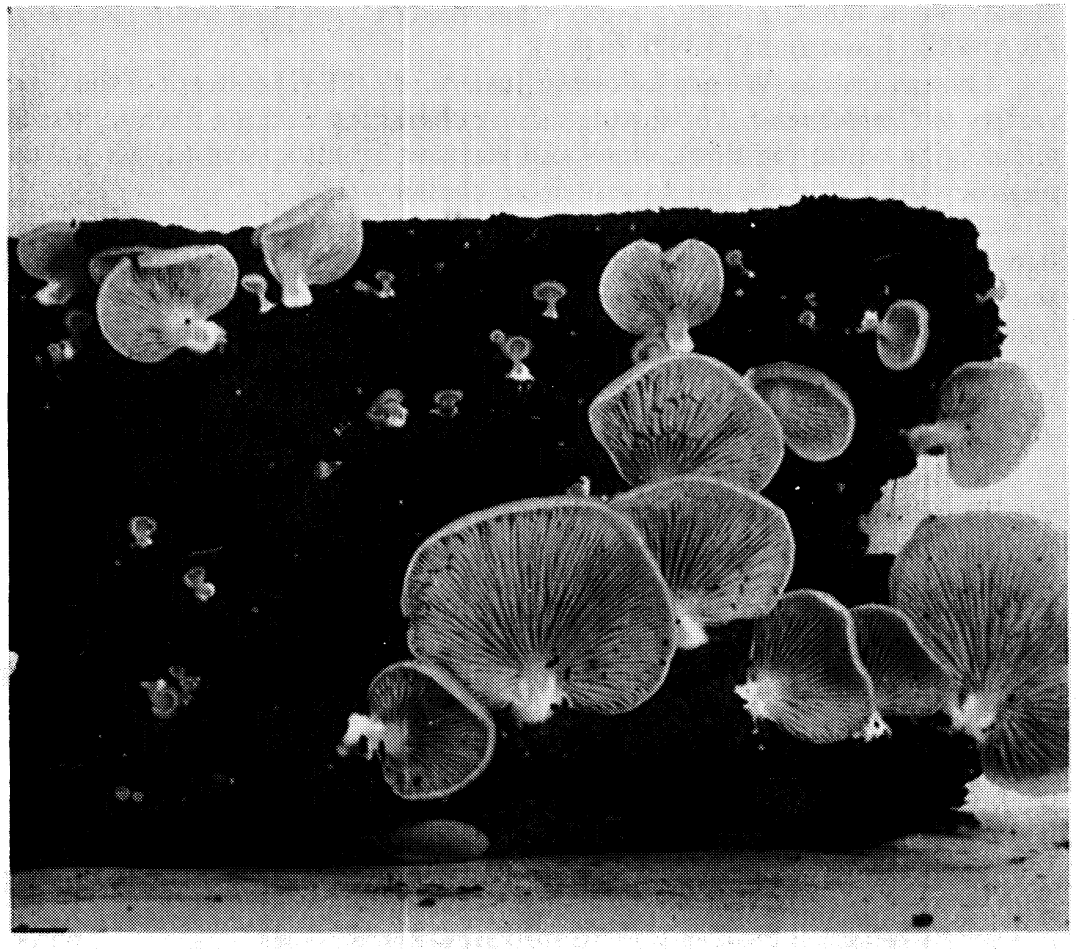

FIG. 5. *C. applanatus* var. *applanatus*

cheilocystidia 20–40(50) × 5–10(12) μ, clavate to ventricose, at times capitate. Gill trama subparallel, hyphae 5–9 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, at times with scattered, erect hyphae and pilocystidia, 25–65 × 5–10(12) μ, clavate or ventricose. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, more rarely on conifers, temperate North America and the world, summer.

MATERIAL STUDIED: IDAHO: Smith 53413; MAINE: Bigelow 4113 (MASS), 10572, 10625, 11314, 11328; MASSACHUSETTS: Bigelow 6269 (MASS), 6828, 6829, 6835, 7076, 7077, 9467, 7928; Smith 67283; MICHIGAN: Imshaug 4797 (MICH); Miller 1062 (MICH); Smith 1374, 1500, 16172, 23427, 33225, 33679, 33825, 39518, 41652, 41800, 41811, 57771, 57941, 61199, 63833, 66857, 66858, 66870, 67005, 67074, 67110, 67144, 67146, 67147, 67148, 67149, 67150, 67235; Thiers 3001 (MICH), 3118, 3172, 3475; NEW HAMPSHIRE: Bigelow 12072, 12085, 12168, 12169; NEW YORK: Hesler 9034; Shaffer 513 (MICH); NORTH CAROLINA: Hesler 5115, 21902, 22080, 23089; OHIO: Cooke 32165; TENNESSEE:

Hesler 3673, 8099, 21400, 24852; VERMONT: Bigelow 9907 (MASS); FRANCE: Josserand (TENN 25188).

OBSERVATIONS: We are following Josserand's (1937) concept of the type variety of *C. applanatus*. The distinguishing characters include a white, sessile pileus, gills white (at first), close and narrow, small spores (4–5.5 μ), no pleurocystidia, and clavate to ventricose cheilocystidia.

The species embraces a complex of forms, some of which are being assigned to proposed new varieties. For those individuals with the above characters but with septate cheilocystidia, we propose the name var. *phragmocystidiosus*; for those with non-septate, forked or contorted cheilocystidia and pilocystidia, we propose var. *diversus*. For individuals which have all the characters of var. *applanatus* except for larger spores (5.5–7.5 μ), we assign the name var. *globigera* (Berk.) Sacc.

Within the type-variety one finds the usual, or normal, variations. In one Tennessee collection for example (TENN 24852), the fresh pilei had a slightly pungent odor and astringent taste; in a Michigan collection (MICH 57771) a pseudostipe is present, and the cheilocystidia are somewhat longer (up to 67 μ) than usual, as are the pilocystidia. An inconspicuous temporary stipe is reported by several authors.

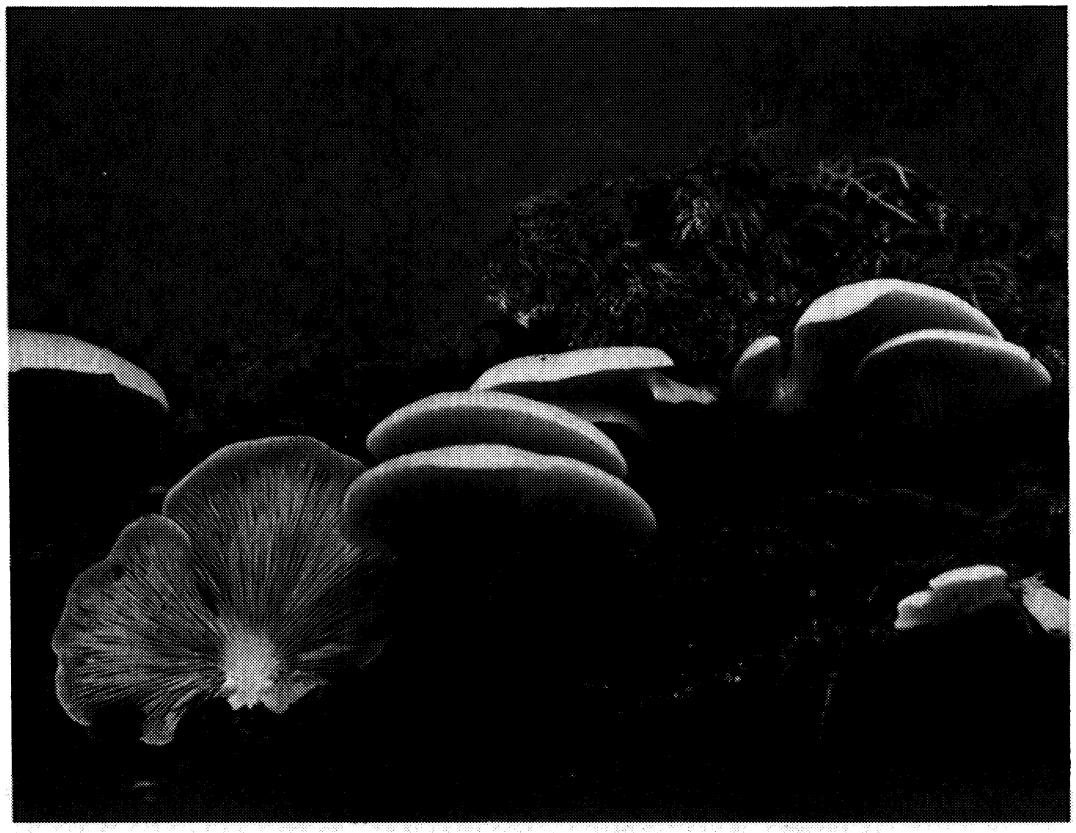

FIG. 6. *C. applanatus* var. *applanatus*

29. Crepidotus applanatus var. **phragmocystidiosus** var. nov.
Illustrations: Figs. 80, 81.

Pileus 8–14 mm latus, sessilis, semi-orbicularis demum flabelliformis, albidae deinde "cinnamon buff," subglabrosus. Lamellae albae deinde "Sayal brown," angustae, confertae. Sporae 4–5(5.5) μ, globosae, punctatae. Basidia 21–25 × 4–6 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 30–65 × 6–14 μ, septata. Cuticula ex hyphis repentibus composita, pilocystidia gerens, 20–60(120) × 4–6 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum in Manitou Island, Mich., Aug. 3, 1957, A. H. Smith 57473.

Pileus 8–14 mm broad, semiorbicular to flabelliform, hygrophanous, whitish when dry, cinnamon buff when wet, glabrous or nearly so, tomentose at base.

Lamellae white, finally "Sayal brown," crowded or close, narrow to moderately so.

Spores 4–5(5.5) μ in diameter, globose, punctate. Basidia 21–25 × 4–6 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 30–65 × 6–14 μ, clavate, ventricose, flask-shaped, bottle-shaped, subcylindric, at times capitate, more rarely slightly forked, frequently 1–3-septate. Gill trama subparallel, hyphae 5–15 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered to numerous (and then more or less a turf), erect pilocystidia, cylindric to subventricose, 20–60(120) × 4–6 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 57472, 57473 (type, from Manitou Island, August 3, 1957).

OBSERVATIONS: In some pilei the gills are quite narrow, as in the typical *applanatus*; in others they are only moderately narrow. The septate cheilocystidia distinguish it from other varieties.

30. Crepidotus applanatus var. **diversus** var. nov.
Illustrations: Figs. 82, 83.

Pileus 1–3 cm latus, flabelliformis demum spatulatus, sessilis, albus, glabrosus vel villosus, margine striatus. Lamellae angustae, perdensae, albae deinde brunneae. Sporae 4–4.8(5.2) μ, globosae, punctatae. Basidia (21)26–30(35) × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 25–52 × 5–9(15) μ. Cuticula ex hyphis repentibus composita, pilocystidia bifurcata gerens, 24–130 × 6–10 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Petawawa Forest, Ontario, Canada, Sept. 5, 1947, A. H. Smith 26573.

Pileus 1–3 cm broad, narrowly flabelliform to spathulate, sessile, white, glabrous to more or less villose, margin striate. Context thin, soft, pallid or watery white; odor and taste none or mild.

Lamellae adnate to decurrent, radiate, white then dull cinnamon to pale Mikado brown, narrow, very crowded, edges even or crenate.

Stipe none, base of pileus narrowed.

Spores in deposit "cinnamon brown." Spores 4–4.8(5.2) μ, globose,

punctate. Basidia (21)26–30(35) × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–52 × 5–9(15) μ, clavate, cylindric, at times capitate, ventricose, apices truncate or obtuse, often broadened by forking or branching. Gill trama subparallel to interwoven, hyphae 4–7(11) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing erect, colorless, scattered or gregarious pilocystidia, filamentous, cylindric, clavate, or subventricose, the apices obtuse or often forked or branched, 24–130 × 6–10 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Maine, Michigan, Quebec, and Ontario, July–September.

MATERIAL STUDIED: MAINE: Bigelow 10595 (MASS); MICHIGAN: Smith 61486, 67055; ONTARIO: Smith 26479, 26573 (type, from Petawawa Forest, September 5, 1947); QUEBEC: Smith 61703.

OBSERVATIONS: This variety is distinguished chiefly by its different cheilocystidia and pilocystidia, which are forked, branched, or knobbed.

31. Crepidotus applanatus var. **globigera** (Berk.) Sacc. Syll. Fung. 5: 879. 1887.

Agaricus (Crepidotus) globigera Berk., Jour. Linn. Soc. 13: 158. 1873.
Illustrations: Figs. 7, 84.

Pileus 1–4 cm broad, flabelliform, hygrophanous, white, in age or when wet becoming dull to dingy or more or less avellaneous, glabrous, at times fibrillose at the base, striatulate when wet. Context thin, white when faded, watery when fresh; odor and taste mild or none.

Lamellae narrow, or at times intermixed with some slightly broader, close or crowded, white, dull cinnamon in age.

Pseudostipe at times present.

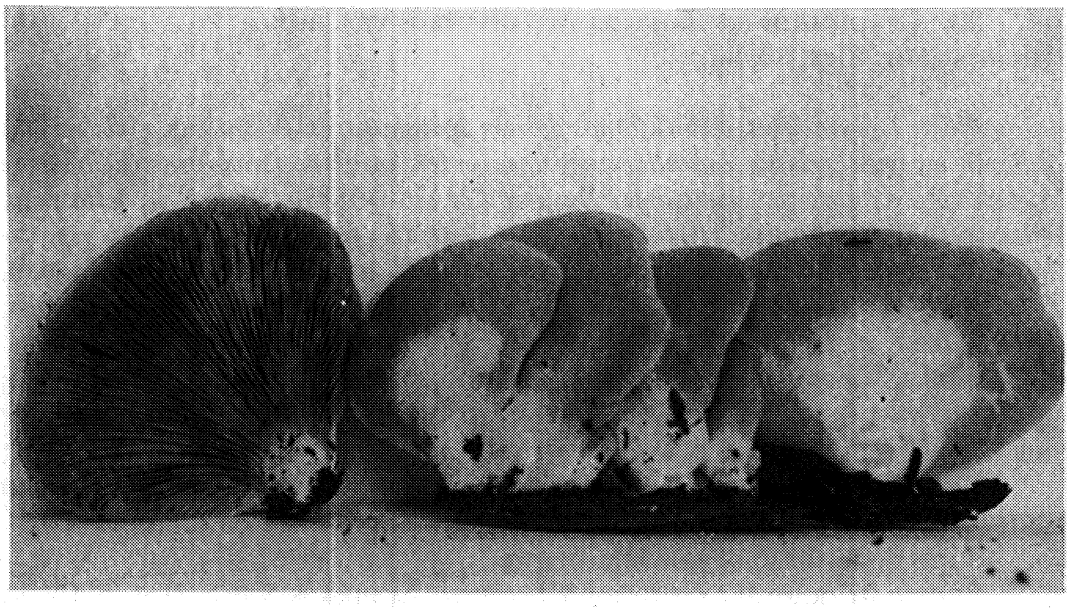

FIG. 7. *C. applanatus* var. *globigera*

Spores in deposit: "ochraceous tawny," 4.5–7.5(8) μ in diameter, globose or subglobose to slightly ovoid, punctate. Basidia 22–27 × 4–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–50 × 5–9(12) μ, clavate, subventricose, or more rarely pyriform-vesiculose. Gill trama subparallel, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, at times with scattered to gregarious pilocystidia 35–90 × 3–10 μ, which are subfilamentous, often subcapitate, sometimes resembling the cheilocystidia, more rarely the apices forked. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood (more rarely conifer) logs, Maine, Massachusetts, Michigan, New Hampshire, North Carolina, Tennessee, and California, July–September and December.

MATERIAL STUDIED: CALIFORNIA: Smith 56281; MAINE: Bigelow 11541 (MASS); MASSACHUSETTS: Bigelow 6951, 7078, 8954, 9089 (MASS); MICHIGAN: Smith 37290, 51282, 61202, 66947, 67108, 67140, 67141, 67142; Thiers 3987 (MICH); NEW HAMPSHIRE: Bigelow 11777 (MASS); NORTH CAROLINA: Hesler 24907; TENNESSEE: Hesler 24852.

OBSERVATIONS: We have not been able to study the type. Pilát (1948) reports this variety from New York, Vermont, and Australia. The distinctly larger spores separate it from var. *applanatus*. In the original publication, this species-name was spelled *globigera;* in some subsequent publications it is spelled *globiger*.

32. Crepidotus hygrophanus Murr. North Amer. Flora 10: 150. 1917. Illustration: Fig. 85.

Pileus 1–2 cm broad, sessile, dimidiate, convex-plane, hygrophanous, whitish, becoming nearly fulvous on drying, glabrous, minutely striate over the lamellae, more conspicuously striate when dried. Context soft, fleshy; taste mild.

Lamellae broad, close, thin, entire.

Stipe none, pileus attached by a white tuft of mycelium.

Spores 5–6(7) μ, globose, more rarely slightly subglobose, punctate. Basidia 24–28 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 28–48 × 5–10 μ, clavate, at times somewhat ventricose and capitate, more rarely slightly constricted. Gill trama subparallel, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle repent, often of several layers of hyphae, at times with some erect hyphae. Clamp connections on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, New Hampshire, New York, and Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 61031; NEW HAMPSHIRE: Bigelow 11853 (MASS); NEW YORK: Murrill 236, type, from Lake Placid, July 17–29, 1912 (NY).

OBSERVATIONS: As in many *Crepidotus* collections, the pileus appears glabrous, but sections examined microscopically show scattered, erect hyphae. In this species these hyphae and those of the cuticle are colorless. On drying it becomes fulvous, a character not shown by *C. malachius*.

The description above is based on a study of the type.

FIG. 8. *C. brunnescens* × 1⅓

33. Crepidotus brunnescens sp. nov.
Illustrations: Figs. 8, 86.

Pileus 8–15 mm latus, sessilis, flabelliformis demum conchatus, pallido-cineraceus, siccatus "Prout's brown," fibrillosus. Lamellae confertae, latae vel medio-latae, nonnullae quidem lamellulae angustae. Sporae 4.5–6.5 μ, globosae demum ovoideae, punctatae. Basidia 18–24 × 4–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 30–51 × 5–8 μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens, 30–68 × 2.5–6 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Lewiston, Michigan, July 30, 1963, A. H. Smith 66957.

Pileus 8–15 mm broad, sessile, conchate to fan shaped, surface, hygrophanous and translucent, striate to near base, watery pallid moist, pallid

grayish faded (but usually dusted cinnamon from the spores), drying "Prout's brown," surface thinly fibrillose to fibrillose-pubescent, with a white strigose base. Context thin, fragile, taste none, odor none.

Lamellae close, broad to moderately broad, interspersed with narrow ones, attached to strigose base, edges even.

Spores 4.5–6.5 μ, globose to more or less ovoid, often obscurely angular, punctate, yellowish-brown in 2% KOH, wall thickened. Basidia 18–24 × 4–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 30–51 × 5–8 μ, cylindric-constricted, clavate, often subcapitate, ventricose, or bottle-shaped. Gill trama slightly interwoven, usually undulating, hyphae 3–5 μ broad. Pileus trama interwoven. Cuticle of repent hyphae bearing scattered hyphae, and filamentous to clavate-subcapitate pilocystidia 30–68 × 2.5–6 μ. Clamp connections rare.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs and stumps, Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 66949 (type, on hardwood, from Lewiston, July 30, 1963) 66957, 66966.

OBSERVATIONS: This differs from *C. hygrophanus* in its more conchate pileus, the distinctive dark brown color when dried, and the presence of pilocystidia.

34. Crepidotus quitensis Pat. Bull. Soc. Myc. France 9: 128. 1893. Illustration: Fig. 87.

Pileus 1–6 mm broad, sessile, resupinate to reflexed, semiorbicular, reniform, to conchate, at first white, then brown, margin fuscous, floccose, puberulent, villose at the point of attachment. Context thin.

Lamellae narrow, close, radiating, fuscous-brown.

Spores 5–6(7) μ in diameter, globose or slightly subglobose, conspicuously punctate, usually appearing verruculose. Basidia 16–20 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 26–36 × 6–10 μ, irregularly clavate or ventricose, at times subcapitate or with a slight neck. Cuticle of repent hyphae, bearing a turf of colorless, thick-walled, branched hyphae, 3–7 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: Ecuador, February.

MATERIALS STUDIED: ECUADOR: Patouillard, type (FH), collected by Lagerheim, near Quito, Feb., 1892.

OBSERVATIONS: The notes on microscopic characters above are drawn from a study of the type. We have found no report of it from North America, but since it might occur in southern Florida or in the West Indies, we include it here. Its larger spores and distant gills separate it from *applanatus*. Its gill-spacing and floccose-puberulent pileus distinguish it from *malachius*.

35. Crepidotus latifolius Pk. Bull. Torrey Club 26: 66. 1899. Illustration: Fig. 88.

Pileus 2–6 mm broad, sessile, dimidiate, suborbicular, submembranous,

resupinate, attached by a tubercle, often dorsally attached, white and slightly pubescent when dry, hygrophanous, striatulate when moist, even when dry. Context white, thin.

Lamellae pallid, becoming pale ferruginous or dull cinnamon, incompletely converging, radiating, very broad, distinctly ventricose, subdistant, extending beyond the margin of the pileus, edges fimbriate.

Spores 4.5–6(7) μ in diameter, globose, more rarely subovoid, finely punctate, brownish in 2% KOH. Basidia 28–32 $\times$ 7–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 31–43 $\times$ 6–10(12) μ, cylindric at times, or ventricose. Gill trama undulating, subparallel, hyphae narrow, 3–7 μ broad. Pileus trama interwoven. Cuticle a cutis, often bearing tangled to loosely arranged, narrow (2–8 μ), colorless hyphae, often forming a trichodermial turf, the terminal elements more or less cystidioid. Clamp connections on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Ohio, Michigan, and Tennessee, June–July.

MATERIAL STUDIED: MICHIGAN: Smith 66263, 66727; OHIO: Lloyd 49964 (BPI), lectotype, from near Cincinnati, 1902; Walters 5 (MICH); TENNESSEE: Hesler 12270.

OBSERVATIONS: As Singer (1947) found, the box labelled *Crepidotus latifolius* Pk., at Albany, contains notes but no specimens. However, in the Lloyd Herbarium, National Fungus Collections, at Beltsville, Md., there is a collection by C. G. Lloyd, his No. 49964. Since the type has been lost, it is proposed that this Lloyd collection be designated as the lectotype. The cheilocystidia differ from those of *C. praelatifolius.*

In Smith's No. 66727, the odor, when collected, was musty, the taste slightly bitter.

36. Crepidotus praelatifolius Murr. Bull. Torrey Club 67: 230. 1940. Illustration: Fig. 89.

Pileus 1–2 mm broad, sessile, dimidiate or conchate to resupinate, imbricate, often laterally confluent, white, unchanging, with long white delicate hairs, margin even. Context white, membranous. Becoming inconspicuous at maturity.

Lamellae very few, very broad, pallid to fulvous, becoming folded and irregular with age.

Spores 4.5–6 μ, globose or ovoid, punctate, brownish in 2% KOH. Basidia 16–22 $\times$ 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 32–48 $\times$ 4–9 μ, cylindric, or more often obclavate to flask-shaped, rarely fusiform. Gill trama of subparallel hyphae, 3–6 μ broad. Cuticle of repent hyphae, often bearing more or less erect, long, loosely tangled hyphae (2–3 μ broad), forming a turf. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On magnolia log, Florida, September.

MATERIAL STUDIED: FLORIDA: Murrill F18107, the type (FLAS), collected by A. S. Rhoads, on magnolia log, Gainesville, Sept. 8, 1938.

OBSERVATIONS: The description of microscopic characters above is

based on a study of the type. As Murrill (1940) points out, the tiny caps are little more than tufts of hairs holding the few large gills in position. It differs from *C. latifolius* chiefly in its cheilocystidia.

37. Crepidotus avellaneus sp. nov.
Illustrations: Figs. 9, 10, 90.

Pileus 4–12(15) mm latus, sessilis, ungulatus, orbicularis, albus demum "pinkish buff," vel avellaneus, glabrosus vel albo-villosus. Lamellae albae deinde cinnamomeae, confertae vel paene subdistantes, latae demum medio-latae. Sporae 4.5–7(7.5) μ, globosae, punctatae. Basidia 18–25 × 5–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 37–60(70) × 5–10 μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum prope Lewiston, Mich., July 30, 1963, A. H. Smith 66950.

Pileus 4–12(15) mm broad, gregarious, sessile, ungulate, orbicular, often convex, white or whitish becoming pinkish buff, dull cinnamon, or avellaneous, glabrous or frosted with white-villose areas, striatulate when moist. Context watery brownish; odor and taste mild.

Lamellae white, then cinnamon, close or nearly subdistant, broad to medium broad, edges even or becoming white-fimbriate.

Spores 4.5–7(7.5) μ in diameter, globose, punctate. Basidia 18–25 × 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 37–60(70) × 5–10 μ,

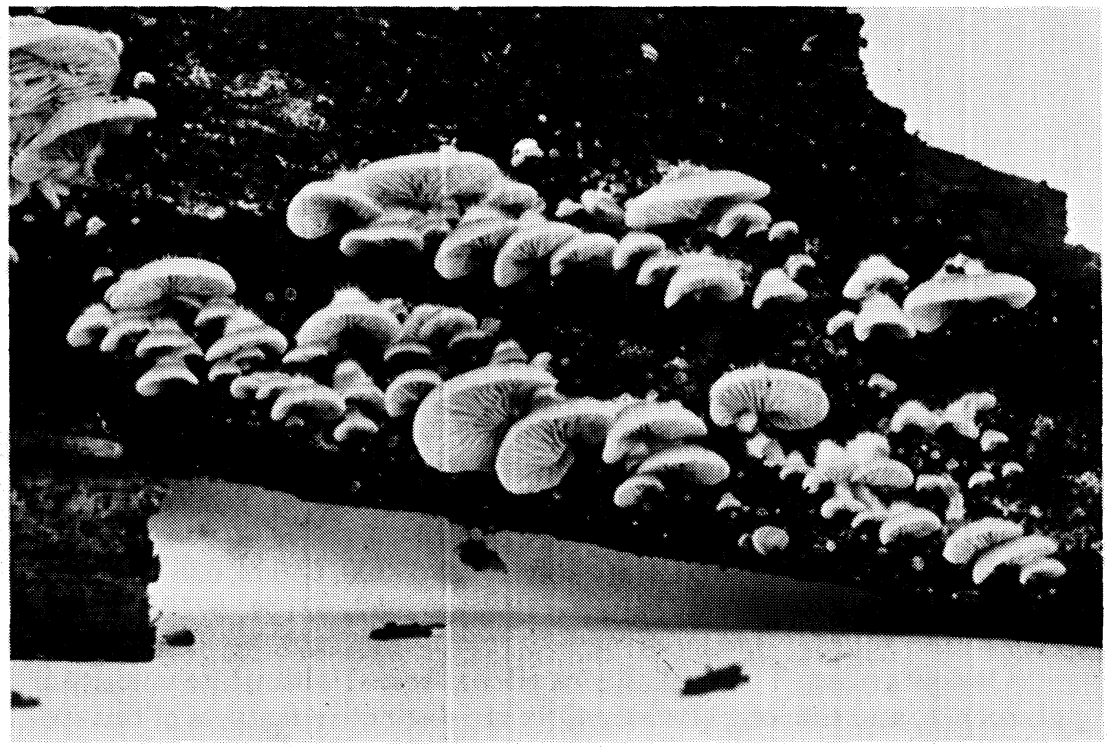

FIG. 9. *C. avellaneus*

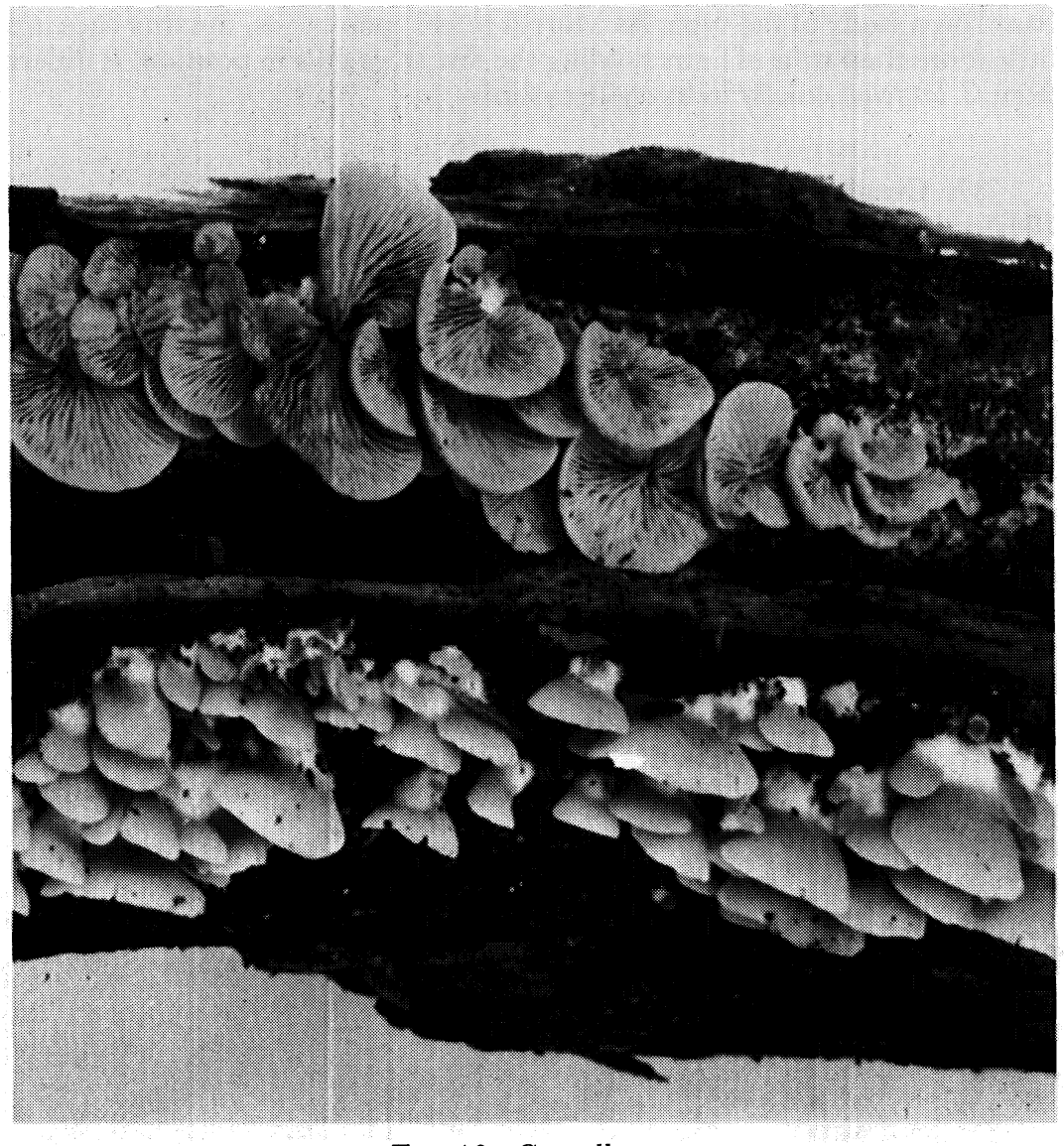

FIG. 10. *C. avellaneus*

irregularly cylindric, often slightly bottle-shaped, at times capitate. Gill trama subparallel, hyphae 5–8 μ broad. Pileus trama interwoven, often loosely so. Cuticle of repent hyphae, often bearing scattered, erect, slender hyphae, and, at scattered intervals over the surface, pilocystidia, in dense clusters on the pileus margin. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 37308, 63669, 63672, 63675, 66950 (type, from Lewiston, July 30, 1963), 66952, 67134, 67135, 67136, 67137.

OBSERVATIONS: The avellaneous pileus, frosted with white villosity or pubescence, and the long cheilocystidia are distinctive features of this species.

38. Crepidotus malachius (B. & C.) Sacc. var. **malachius** Syll. Fung. 5: 883. 1887.

Agaricus malachius B. & C., Ann. & Mag. Nat. Hist. Ser. III, 4: 291. 1859. Illustrations: Figs. 91, 92.

Pileus 1–6.5 cm broad, sessile, convex then nearly plane, reniform, semiorbicular, flabelliform, somewhat depressed at base, solitary, gregarious, or imbricate, glabrous, the base often slightly villose or tomentose, hygrophanous, white, watery-white, or grayish-white when wet, pale buff when dried, striatulate when wet. Context white; odor mild, taste fungoid, at times becoming bitterish.

Lamellae rounded at inner extremity, radiating from a basal, lateral point, white, becoming rusty or brownish-ferruginous, crowded or close, broad.

Stipe none; a pseudostipe at times present.

Spores in deposit: "snuff brown" or "Dresden brown," 5–7.5(8.5) μ, globose, at times subovoid, punctate, brown in 2% KOH. Basidia 25–32 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 24–52 × 5–10(12) μ, clavate, ventricose, bottle-shaped, ten-pin-shaped, scattered over the edges and thus absent in many sections. Gill trama subparallel, hyphae 4–9(10) μ (more rarely 15 μ) broad. Pileus trama interwoven. Cuticle of repent hyphae, rarely with few and scattered erect hyphae. Pilocystidia none. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs and stumps, eastern United States, April–September.

MATERIAL STUDIED: MAINE: Bigelow 11145 (MASS); MASSACHUSETTS: Bigelow 7258, 7265 (MASS); MICHIGAN: Shaffer 2591 (MICH); Smith 6237, 33–1003, 37249, 37288, 57246, 57418, 60976, 60978, 66852, 66855, 66874, 67075; THIERS 2703, 2737, 2948, 3196, 3441 (MICH); NEW ENGLAND: Sprague, type (K), August 1856; NEW HAMPSHIRE: Bigelow 11810, 12193; NEW YORK: Deegan 51 (MICH); Murrill (CUP 2658); NORTH CAROLINA: Hesler 8066, 19201; SOUTH CAROLINA: Hesler 24752; TENNESSEE: Hesler 10390, 11438, 12160, 16400, 25759, 25805.

OBSERVATIONS: The description of microscopic characters above is based chiefly on a study of the type.

The pileus is glabrous, except at times for a villose to tomentose base; sections, therefore, characteristically reveal no pilocystidia and only rarely any erect hyphae. Those collections in which erect, long pilocystidia, 25–45(83) μ, are present are placed in *C. malachius* var. *trichiferus*. Those collections in which a turf is present on the pileus, and the cheilocystidia septate and forked, belong to our *C. malachius* var. *phragmocystidiosus*.

Two other variations are mentioned here: in one Smith collection (MICH 16400), some of the pilei are white, others are faintly tinged yellowish; in MICH 67075, the white pileus, on being held over night, became black-spotted, much as in *C. maculans*. This latter species, however, has pleurocystidia. We hardly regard these as new varieties on the basis of material at hand.

39. Crepidotus malachius var. **trichiferus** var. nov.
Illustrations: Figs. 93, 94.

Pileus 1–5 cm latus, sessilis, dimidiatus, spatulatus, demum flabelliformis, pallidus vel cineraceus, obscuro-brunnaceus demum avellaneus maturus, minimum pubescens. Lamellae pallidae deinde "clay color" vel obscuro-cinnamomeae, latae vel medio-latae, confertae. Sporae 5–7 μ, globosae demum subovoideae, punctatae. Basidia 22–27 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 39–90 × 5–8 μ. Cuticula ex hyphis repentibus composita, pilocystidia cheilocystidiis similia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Mt. Rainier National Park, Wash., Oct. 17, 1952, A. H. Smith 41123.

Pileus 1–5 cm broad, sessile, dimidiate, spathulate to flabelliform, hygrophanous, pallid to grayish, becoming dull brownish to avellaneous or dull cinnamon as spores mature, more or less minutely pubescent. Context thin; odor and taste mild.

Lamellae broad or medium broad, close, pallid, becoming clay color or dull cinnamon at maturity, edges even or eroded.

Spores 5–7 μ, globose to subovoid, punctate or subechinulate. Basidia 22–27 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 39–50(90) × 5–8 μ, cylindric, some subcapitate, usually more or less constricted, flexuous. Gill trama subparallel, hyphae 5–11 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered to numerous, erect pilocystidia similar to cheilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer (pine and hemlock) logs, Michigan, Idaho, Washington, Oregon, Tennessee, Mexico, and Netherlands, March and June–October.

MATERIAL STUDIED: IDAHO: Smith 54010, 54513, 54544, 54732, 54737, 54911, 54990, 54225, 66279; MICHIGAN: Potter 3406 (MICH); Smith 1250, 9552, 32891, 57864, 60975, 63536, 63669, 66270; Thiers 3509, 3544 (MICH); NEW YORK: Clark (CUP 5522); OREGON: Smith 20244, 26753; TENNESSEE: Hesler 5009, 16336; WASHINGTON: Smith 41123 (type, from Mt. Rainier Nat'l. Park, Oct. 17, 1952); MEXICO (Veracruz): Sharp (TENN 17552); NETHERLANDS: Bas, Sept. 20, 1962 (TENN 26096).

OBSERVATIONS: The prominent pilocystidia and the cheilocystidia characterize this variety.

40. Crepidotus malachius var. **phragmocystidiosus** var. nov.
Illustration: Fig. 95.

Pileus 3–7 cm latus, sessilis, flabelliformis demum semiorbicularis, albus, glabrosus vel villosus, striatus. Lamellae confertae, latae, brunneae. Sporae 5–7.5 μ, globosae, punctatae. Basidia 30–37 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 37–62 × 6–12 μ, interdum septata. Cuticula ex hyphis repentibus perraro erectis composita. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Mich., Aug. 18, 1959, A. H. Smith 61452.

Pileus 3–7 cm broad, sessile, flabelliform to semiorbicular, white, glabrous, or at times somewhat villose, margin striate.

Lamellae close, broad, finally wood brown.

Spores 5–7.5 μ, globose, punctate, earth brown. Basidia 30–37 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia abundant, 37–62 × 6–12 μ, clavate, more or less cylindric and often slightly capitate, at times ventricose, occasionally septate. Gill trama subparallel, hyphae (3)7–17 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, only rarely with more or less erect hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 61105, 61452 (type, from Emerson, Aug. 18, 1959), 61474.

OBSERVATIONS: Some of the cheilocystidia are septate—a character which distinguishes this variety. In Smith's No. 61105 the pilei are much smaller than is typical for this variety, but it is included here because of its microscopic structure.

Subsection Colorantes subsec. nov.

Pileus maturus coloratus, glabrosus vel fibrillas albas aut coriaceas gerens.

Pileus colored at maturity, glabrous, or with white or buff fibrils.

Type species: *Crepidotus confertus.*

Key to Species

1. Spores 4–5(5.5) μ in diameter ---------- 2
1. Spores 5–7(8) μ in diameter ---------- 9
   2. Lamellae narrow or moderately so ---------- 3
   2. Lamellae broad to medium broad ---------- 5
3. Pleurocystidia present; pileus buff ---------- 41. *C. angustifolius*
3. Pleurocystidia absent; pileus color not as above ---------- 4
   4. Cheilocystidia clavate or ventricose ---------- 42. *C. confertus*
   4. Cheilocystidia filamentous to cylindric, flexuous ---------- 43. *C. flexuosus*
5. Pileus yellowish or becoming so ---------- 6
5. Pileus brownish or tawny at first ---------- 7
   6. Pileus at first gray, then yellow, finally brownish ---------- 44. *C. obfuscens*
   6. Pileus yellowish, unchanging ---------- 45. *C. constans*
7. Pleurocystidia present ---------- 46. *C. sublatifolius*
7. Pleurocystidia absent ---------- 8
   8. Pileus pale tawny, dull cinnamon or brown ---------- 47. *C. pallidobrunneus*
   8. Pileus gray, then yellow, then brown ---------- 44. *C. obfuscens*
9. Pileus deeply sulcate ---------- 48. *C. aquosus*
9. Pileus not sulcate ---------- 10

10. Pileus cuticle of 3–6(8) layers of repent hyphae ---------- 49. *C. cuneiformis*
10. Pileus cuticle not as above ---------- 11
11. Cheilocystidia irregularly shaped, flexuous or contorted ---------- 12
11. Cheilocystidia regularly shaped, not contorted ---------- 13
12. Cheilocystidia 2–8 μ broad, at least some flexuous or sinuous; gills orange buff ---------- 50. *C. sinuosus*
12. Cheilocystidia 7–13 μ broad, strongly contorted (forked, knobbed, branched); gills white or grayish yellow, becoming brownish ---------- 51. *C. contortus*
13. Lamellae narrow or moderately so; pleurocystidia present ---------- 14
13. Lamellae broad or medium broad, at least in age, pleurocystidia absent ---------- 15
14. Pileus pink, at least when mature ---------- 52. *C. roseus*
14. Pileus tawny ---------- 53. *C. montanus*
15. Pileus varicolored: white with pallid spots and buff tints, margin drab to cinnamon brown ---------- 54. *C. varicolor*
15. Pileus not as above ---------- 16
16. Pileus yellowish; cheilocystidia 25–72 μ long; pilocystidia present, cylindric, clavate, at times crooked or coiled ----------55. *C. campylus*
16. Pileus ochraceous; cheilocystidia 26–36 μ long; pilocystidia none ---------- Ex. 4. *Melanotus psychotriae**

41. Crepidotus angustifolius sp. nov.
Illustrations: Figs. 96, 97.

Pileus 5–10 mm latus, sessilis, flabelliformis demum suborbicularis, pallido-coriaceus, glabrosus. Lamellae angustae, confertae, colore ut flos lactis demum fuscus. Sporae 4.2–5.5 μ, globosae, punctatae. Basidia 22–30 × 5–6 μ, tetraspora. Pleurocystidia 23–38 × 5–8 μ; cheilocystidia 33–56 × 7–12 μ. Cuticula ex hyphis repentibus, pilocystidia adsunt, aut sparsa adsunt, 33–45 × 4–10 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 6, 1951, A. H. Smith 37504.

Pileus 5–10 mm broad, sessile, flabelliform or suborbicular, pale buff, glabrous, dry. Context thin.

Lamellae narrow, close, creamy then tawny.

Spores 4.2–5.5 μ, globose, punctate. Basidia 22–30 × 5–6 μ, 4-spored. Pleurocystidia 23–38 × 5–8 μ, clavate, cylindric, or ventricose, at times capitate, scattered, inconspicuous; cheilocystidia 33–56 × 7–12 μ, clavate or ventricose, at times capitate. Gill trama subparallel, of short cells, 5–9 μ broad. Pileus trama radially disposed, appearing as pseudoparenchyma in tangential sections. Cuticle of repent hyphae; pilocystidia none, or present

*See Excluded Species, p. 142

and then scattered, cylindric, clavate, or bottle-shaped, 33–45 × 4–10 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 37504, type, Tahquamenon Falls State Park, Aug. 6, 1951.

OBSERVATIONS: This differs from *C. subcuneiformis* and *subapplanatus* in its color and the structure of the pileus trama.

42. Crepidotus confertus sp. nov.
Illustration: Fig. 98.

Pileus 2–6 mm latus, sessilis, cuneatus vel spatulatus, fuscus, alutaceus vel obscuro-cinnamomeus, glabrosus, margine planus. Lamellae angustae, confertae vel densae, albae deinde brunnaceae. Sporae 4–5.5 μ, globosae demum subovoideae, punctatae. Basidia 19–28 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 22–48 × 4–11 μ. Cuticula ex hyphis repentibus composita, pilocystidia 30–74 × 6–12 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston, Mich., Aug. 6, 1953, A. H. Smith 61350.

Pileus 2–6 mm broad, sessile, cuneate or spathulate, tawny, alutaceous, or dull cinnamon, glabrous, base sometimes pale tawny or whitish strigose, margin even, incurved then spreading. Context white or pallid; odor and taste mild.

Lamellae narrow, crowded or close, white or whitish then brownish.

Spores 4–5.5 μ in diameter, globose to subovoid, punctate. Basidia 19–28 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–48 × 4–11 μ, clavate, ventricose, at times capitate. Gill trama subparallel or slightly interwoven, hyphae 4–9 μ broad. Pileus trama interwoven, at times loosely so. Cuticle of repent hyphae, 4–8 layers thick, bearing scattered pilocystidia, which are colorless, clavate, or ventricose, 30–74 × 6–12 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, New Hampshire, and Maine, July–August.

MATERIAL STUDIED: MAINE: Bigelow 10571; MICHIGAN: Shaffer 2054 (MICH); Smith 61350 (type, from Carp Creek, near Pellston, Aug. 6, 1953), 66262; NEW HAMPSHIRE: Bigelow 11958 (MASS).

OBSERVATIONS: This is related to *C. cuneiformis* which has broad gills and larger spores.

43. Crepidotus flexuosus sp. nov.
Illustration: Fig. 99.

Pileus 5–10 mm latus, sessilis, dimidiatus, "pinkish buff," in base "orange buff," siccus. Lamellae confertae, angustae demum medio-latae. Sporae 4.5–5.5 μ, globosae, perparum punctatae. Basidia (27)33–47 × 5–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 38–76 × 3–6 μ. Cuticula ex hyphis repentibus composita, ex hyphis caespitem gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum

prope Douglas Lake, Mich., Dick Homola, July 22, 1963, A. H. Smith 66846.

Pileus 5–10 mm broad, sessile, dimidiate, "pinkish buff," around the base orange-buff, opaque, unpolished, dry.

Lamellae close, narrow to medium broad.

Spores 4.5–5.5 μ, globose, minutely punctate, yellowish-ochraceous in KOH. Basidia (27)33–47 × 5–7μ, 4-spored. Pleurocystidia none; cheilocystidia 38–76 × 3–6 μ, filiform or cylindric, often flexuous or cork screw-shaped, basal portion slightly broader than above, conspicuous. Gill trama subparallel, hyphae 4.5–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of septate hyphae, the terminal element more or less aciculate, the penultimate cell usually broad (up to 10–12 μ), not incrusted. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On aspen, Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 66846, type, on aspen, Rees' Bog, Univ. Mich. Biological Station, Douglas Lake, leg. Dick Homola, July 22, 1963.

OBSERVATIONS: The exceptionally long basidia and the flexuous cheilocystidia characterize this species.

44. Crepidotus obfuscens sp. nov.
Illustration: Fig. 100.

Pileus 4–10 mm latus, sessilis, ungulatus, cinereus deinde pallido-flavidus denique brunnaceus, minimum pubescens. Lamellae pallidae, deinde brunnaceae, latae, paene confertae. Sporae 4–5.5 μ, globosae, punctatae. Basidia 24–28 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 22–53 × 6–11 μ. Cuticula ex hyphis repentibus composita, pilocystidia sparsa gerentibus, 25–64 × 4–7 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Colonial Point Hardwoods, Mich., Aug. 17, 1959, A. H. Smith 61427.

Pileus 4–10 mm broad, sessile, ungulate, at first gray, then pale yellowish, finally brownish, minutely pubescent, basal portion white-fibrillose, striate (dried). Context thin, pallid.

Lamellae pallid, then brownish, broad, nearly close, edges fimbriate.

Spores 4–5.5 μ, globose, punctate. Basidia 24–28 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–53 × 6–11 μ, more or less cylindric or ventricose, often enlarged at or near the base, at times somewhat strangulate. Gill trama subparallel, hyphae 4–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, with scattered pilocystidia, 25–64 × 4–7 μ, cylindric, clavate, or ventricose; the pileus margin beset with numerous pilocystidia similar to the cheilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 61427, type, from Colonial Point Hardwoods, Aug. 17, 1959.

OBSERVATIONS: The distinguishing characters of this species are its colors (color changes), its broad gills, and rather large cheilocystidia.

45. Crepidotus constans sp. nov.
Illustration: Fig. 101.

Pileus 3–15 mm latus, sesilis, ungulatus demum convexus vel paene planus aut flabelliformis, flavus vel pallido-melleus, pubescens, striatus, incurvatus. Lamellae albae demum subflavae denique obscuro-brunnaceae, latae vel medio-latae, subdistantes vel paene confertae. Sporae 4–5.5 μ, globosae, nonnullae ovoideae, punctatae. Basidia 20–28 × 5–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 33–71 × (3)5–11 μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens, 37–120 × (2)5–9 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Harbor Springs Hills, Mich., July 25, 1961, A. H. Smith 63670.

Pileus 3–15 mm broad, sessile, ungulate to convex or nearly plane, or flabelliform, yellow or pale honey yellow, pubescent, base byssoid, the fibrils whitish or buff, margin incurved, striate when fresh. Context thin, white to buff; taste none.

Lamellae whitish to pale yellowish, then dull brownish, broad or medium broad, subdistant or nearly close, edges fimbriate or denticulate.

Spores 4–5.5 μ in diameter, globose, some ovoid and then distinctly pointed one end, punctate. Basidia 20–28 × 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 33–71 × (3)5–11 μ, cylindric, often capitate, at times irregular. Gill trama subparallel, hyphae 4–14 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing erect, colorless hyphae, the terminal elements as pilocystidia, 37–120 × (2)5–9 μ; those on the margin similar to the cheilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 41547, 61485, 63513, 63571, 63670 (type, from Harbor Springs Hills, July 25, 1961).

OBSERVATIONS: The yellowish color of the pileus is unchanged, from youth to maturity; otherwise, the species is similar to *C. obfuscens*.

46. Crepidotus sublatifolius sp. nov.
Illustrations: Figs. 11, 102, 103.

Pileus (1.5)8–15 mm latus, sessilis, ungulatus vel conchatus demum flabelliformis, "pinkish buff," demum cinnamomo-coriaceus vel pallido-melleus ut mel, albus pubescens, striatus. Lamellae albae deinde obscuro-flavidae, denique paene "buckthorn brown," confertae demum paene subdistantes, medioangustae demum latae. Sporae 4.5–6 μ, globosae demum ovoideae, punctatae. Basidia 20–28 × 4–6(7) μ, di- et tetraspora. Pleurocystidia 20–34 × 5–8 μ; cheilocystidia 27–64(80) × 5–9(12) μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Mich., Aug. 12, 1963, A. H. Smith 67117.

Pileus (1.5)8–15 mm broad, sessile, ungulate, or conchate to flabelliform, "pinkish buff" to "cinnamon buff," or pale honey-yellow, white pubescent or villose, hygrophanous, margin striate when fresh. Context fragile, thin; odor and taste mild or none.

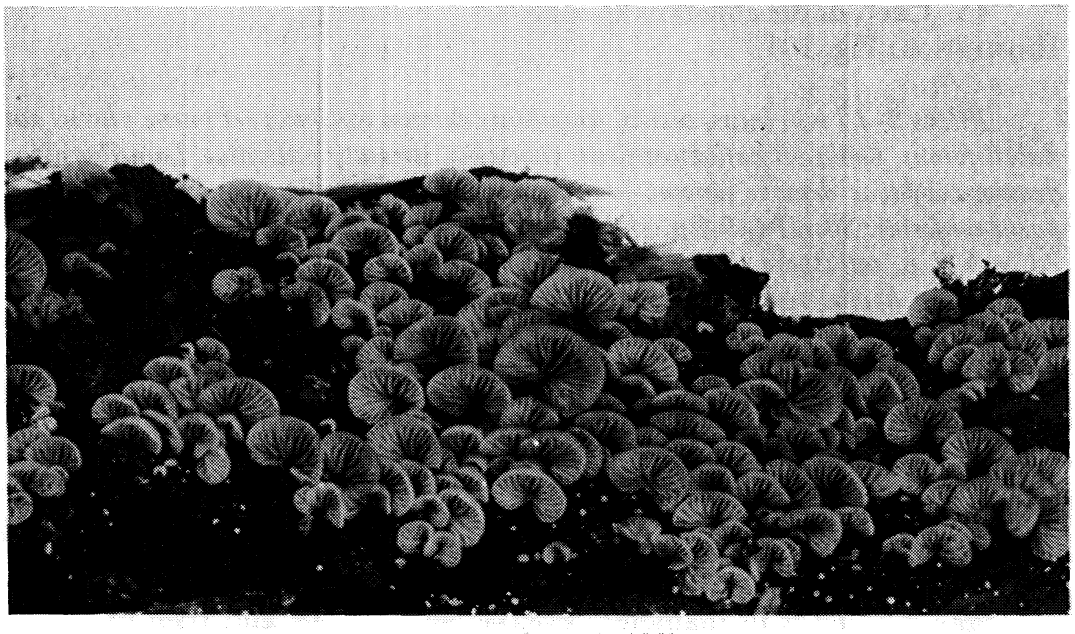

FIG. 11. *C. sublatifolius*

Lamellae at first whitish to dull yellowish, near "buckthorn brown" at maturity, close to nearly subdistant, medium narrow to broad, edges even or crenulate.

Spores 4.5–6 μ in diameter, globose or more or less ovoid, punctate, at times obscurely so, yellowish-brown in KOH. Basidia 20–28 × 4–6(7) μ, 2–4-spored. Pleurocystidia 20–34 × 5–8 μ, clavate or bottle-shaped with a neck, or ninepin-shaped; cheilocystidia 27–64(80) × 5–9(12) μ, cylindric, ventricose, at times flexuose, capitate. Gill trama subparallel or more or less interwoven, hyphae 4–11 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of erect hyphae, the terminal elements often as pilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs and slashings, Michigan, July–October.

MATERIALS STUDIED: MICHIGAN: Lange 1182 (MICH); Smith 32396, 32599, 67117 (type, from Emerson, Aug. 12, 1963), 67132.

OBSERVATIONS: The pileus colors, white pubescence, and the pleurocystidia are distinctive characters.

47. Crepidotus pallidobrunneus sp. nov.
Illustrations: Figs. 12, 104, 105.

Pileus (4)8–30 mm latus, sessilis, conchatus, convexus demum spatulatus, pallido-fuscus demum obscuro-cinnamomeus vel pallido-"Sayal brown," glabrosus vel pubescens, striatulatus. Lamellae confertae, latae, pallidae demum "Sayal brown" vel obscuro-cinnamomeae. Sporae 4.5–6 μ, globosae vel subglobosae, minimum punctatae. Bisidia 20–28 × 5–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 30–66 × 4–8(13) μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens.

Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Mich., Aug. 12, 1963, A. H. Smith 67120.

Pileus (4)8–30 mm broad, sessile, conchate, convex to spathulate, pale tawny to dull cinnamon or pale "Sayal brown," glabrous to more or less downy-pubescent, striatulate when fresh. Context thin, fragile; odor and taste mild.

Lamellae close, broad, pallid at first, finally "Sayal brown" or dull cinnamom, edges fimbriate.

Spores in deposit dull cinnamon, 4.5–6 μ in diameter, globose or subglobose, minutely punctate. Basidia 20–28 $\times$ 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 30–66 $\times$ 4–8(13) μ, cylindric, ventricose, to obclavate. Gill trama subparallel, hyphae 4–9 μ broad. Pileus trama interwoven, at times loosely so. Cuticle of repent hyphae, bearing erect hyphae with terminal elements as pilocystidia at times with a brownish content. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks and logs, Michigan, July–August.

MATERIALS STUDIED: IDAHO: Smith 54330; MICHIGAN: Smith 63674, 67120 (type, on twigs, Emerson, Aug. 12, 1963), 67133, 67138, 67139.

OBSERVATIONS: This is near *C. sublatifolius,* from which it is distinguished chiefly by its lack of pleurocystidia.

48. Crepidotus aquosus Murr. Mycologia 5: 30. 1913.

Pileus 1–2.5 cm broad, sessile, watery-brown, resupinate, reniform, expanded at maturity, glabrous or subglabrous, margin deeply sulcate. Context thin, soft, and watery.

FIG. 12. *C. pallidobrunneus*

Lamellae subcrowded, rather broad, dark-ochraceous or subfulvous.

Spores 4.5–7 μ in diameter, globose, faintly punctate, brown in 2% KOH. Pleurocystidia none; cheilocystidia none. Pileus trama interwoven. Cuticle of repent hyphae with a few more or less erect, scattered, short, colorless hyphae. Clamp connections present on the epicuticular hyphae and on the tomentum at the base of the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On log, Jamaica, October.

MATERIAL STUDIED: JAMAICA: Earle, type (NY), from Rose Hill, Oct. 30, 1902.

OBSERVATIONS: This differs from *cuneiformis* in the organization of the cuticle, in its lack of cheilocystidia, and in its deeply sulcate margin. The basidia were unsuitable for study.

49. Crepidotus cuneiformis Pat. Bull. Soc. Myc. Fr. 18: 173. 1902.
Illustration: Fig. 106.

Pileus 5–15 mm broad, sessile, reniform to flabelliform, base cuneate, pale brown, glabrous, dry, margin striatulate when wet. Context soft, watery; taste mild.

Lamellae radiating, broad, close, at first pallid, then brownish, edges serrulate.

Spores 5.4–7 μ in diameter, globose or subglobose, finely punctate, brown in 2% KOH. Basidia 20–24 × 7–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 28–40 × 7–13 μ, clavate, few, collapsed against the edges, inconspicuous. Gill trama subparallel, hyphae 5–7 μ broad. Pileus trama interwoven. Cuticle composed of a zone of three to five layers of repent hyphae, 5–7 μ broad, with occasional erect colorless hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Guadeloupe, Michigan, and Texas, June–July.

MATERIAL STUDIED: GUADELOUPE: Patouillard, No. 31 (405), type (FH); MICHIGAN: Smith 41548, 49609, 49625, 49641, 63673, 66386; TEXAS: Thiers 1885 (MICH).

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. The Michigan and Texas collections showed areas of erect hyphae which formed a turf, the terminal elements of which were pilocystidia. The multi-layered cuticle is characteristic, along with spore size and the shape of the cheilocystidia.

50. Crepidotus sinuosus sp. nov.
Illustrations: Figs. 107, 108.

Pileus 1–1.5 cm latus, sessilis, flabelliformis vel semiorbicularis, "orange buff" to "warm buff" vel pallido-croceus, margine involutus. Lamellae primum "orange buff" deinde luteae, confertae, latae. Sporae 5–7.5(8) μ, globosae, punctatae. Basidia 24–33 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 26–80 × 2–8 μ. Cuticula ex hyphis repentibus composita, hyphas erectas et pilocystidia gerens. Fibulatae adsunt.

Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston Hills, Mich., Aug. 2, 1963, Dick Homola, A. H. Smith 67003.

Pileus 1–1.5 cm broad, sessile, flabelliform or semiorbicular, orange buff to warm buff or pale croceus, becoming more ochraceous buff as the spores mature, opaque, fibrillose to pubescent, margin inrolled. Context thin, pallid buff; odor and taste none.

Lamellae at first orange buff, becoming clay color, close, broad, lax, thin, edges fimbriate.

Spores 5–7.5(8) μ in diameter, globose, punctate. Basidia 24–33 $\times$ 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 26–80 $\times$ 2–8 μ, cylindric-flexuous, crooked, somewhat strangulate, more rarely aciculate or subulate, occasionally slightly branched. Gill trama slightly interwoven to subparallel, hyphae 4–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of erect hyphae which are septate, more or less irregularly shaped, at times branched, the terminal element cystidioid and somewhat aciculate-flexuous. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 67003 (type, collected by Dick Homola, from Pellston Hills, Aug. 2, 1963); Thiers 4404 (MICH).

OBSERVATIONS: This species is distinguished by its orange colors, large spores, and sinuous cheilocystidia and pilocystidia.

51. Crepidotus contortus sp. nov.
Illustrations: Figs. 13, 109.

Pileus 4–9 cm latus, conchatus demum dimidiatus, "pale olive buff," fibrillosus. Lamellae primum subflavo-cinereae, deinde "wood brown," confertae vel densae, medio-

FIG. 13. *C. contortus*

angustae. Sporae 4.5–6 μ, globosae vel subglobosae, perraro ellipsoideae (5.5 × 4.3 μ), vel ovoideae, punctatae. Basidia 17–22 × 5–7(8) μ, tetraspora. Pleurocystidia desunt; cheilocystidia 20–40 × 7–13 μ, ramosa, contorta. Cuticula ex hyphis repentibus composita, hyphas erectas in superficie gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Baker Lake, Washington, Sept. 14, 1941, A. H. Smith 16956.

Pileus 4–9(30) mm broad, attached by a broad base, conchate with an inrolled margin, expanding to dimidiate, at times flattened against the substratum but not truly resupinate, "pale olive buff," base near avellaneous at maturity, surface fibrillose, dry, margin at first fringed with fibrils. Context thin.

Lamellae extending to an area around the base, at first yellowish-gray, becoming wood brown, close or crowded, moderately narrow, edges minutely white-fimbriate.

Stipe none, or rudimentary and more or less 0.2 mm thick, on lower side of pileus.

Spores 4.5–6 μ, globose or subglobose, more rarely short-ellipsoid, about 5.5–4.3 μ, occasionally ovoid, punctate, dingy yellow-brown in 2% KOH, wall slightly thickened, many spores collapsing in KOH and in chloral hydrate. Basidia 17–22 × 5–7(8) μ, 4-spored. Pleurocystidia none; cheilocystidia 20–40 × 7–13 μ, irregular, forked or branched, often greatly contorted by knob-like outgrowths. Gill trama subparallel, hyphae 3–5 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing erect, colorless hyphae 3–6 μ broad. Clamp connections present on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On twigs of vine maple (*Acer circinatum* Pursh) and *Populus,* Washington, May and September.

MATERIAL STUDIED: WASHINGTON: Smith 16956 (type, from Baker Lake, Sept. 14, 1941, 13558.

OBSERVATIONS: The strikingly contorted cheilocystidia, the small, "pale olive buff" pileus, and yellowish-gray gills characterize it.

52. Crepidotus roseus Singer Lilloa 13: 87. 1947.
Illustrations: Figs. 110, 111.

Pileus 4–6 mm broad, sessile, dimidiate, convex to applanate, at first white then rosy, finally "congo pink" to "light congo pink," pubescent, subsilky to subglabrous, margin incurved. Context thin; odor none.

Lamellae radiating from an eccentric point, attenuated or rounded at inner extremity, subcrowded to subdistant, narrow (1–1.5 mm broad), "coral pink" to "Japan rose," then "testaceous" to "pecan brown."

Spores 5.8–7(8) × 5–5.7 μ, globose, subglobose, or ovoid to subellipsoid, echinulate, brown. Basidia (15)22–27 × 6–7 μ, 2–4-spored. Pleurocystidia none, or a few near the gill-edges (60–100 μ above), 27–30 × 8–14 μ, clavate-irregular or fusoid; cheilocystidia 22–44 × 7–11 μ, versiform: cylindric, clavate, obclavate, ventricose, ampullaceous, at times constricted. Gill trama subparallel, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of

repent hyphae, often with numerous epicuticular hyphae forming a turf, the repent hyphae at times somewhat incrusted. Clamp connections present on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On wood, Florida, October.

MATERIAL STUDIED: FLORIDA: Singer, the type (FH), on wood of *Ficus* sp., in tropical thicket, near Miami, October 30, 1942.

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. The pink colors are distinctive.

53. Crepidotus montanus sp. nov.
Illustrations: Figs. 112, 113.

Pileus 5–10 mm latus, sessilis, flabelliformis, fuscus, glabrosus, striatulatus. Lamellae confertae, medio-angustae, albae deinde brunneae. Sporae 5–7.5 μ, globosae vel ovoideae, punctatae. Basidia 23–27 × 5–6 μ, tetraspora. Pleurocystidia 27–38 × 5–7 μ; cheilocystidia 28–45 × 5–10 μ. Cuticula ex hyphis repentibus composita, adsunt pilocystidia, 30–72 × 4–10 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Tenn.; lectum in Great Smoky Mts. National Park, Tenn., July 26, 1936, L. R. Hesler 8934.

Pileus 5–10 mm broad, sessile, flabelliform, tawny, glabrous or appearing so, margin striatulate when wet.

Lamellae close, moderately narrow, white, finally brown, edges serrulate.

Spores 5–7.5 μ in diameter, globose or ovoid, punctate. Basidia 23–27 × 5–6 μ, 4-spored. Pleurocystidia 27–38 × 5–7 μ, clavate, appendiculate; cheilocystidia 28–45 × 5–10 μ, clavate, ventricose, or somewhat flask-shaped. Gill trama undulating-subparallel to slightly interwoven, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, with scattered to numerous pilocystidia which are clavate, ventricose or fusoid, or at times subcapitate and measure 30–72 × 4–10 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On log, Tennessee, July.

MATERIAL STUDIED: TENNESSEE: Hesler 8934, type, along trail from Indian Gap to Chimneys, Great Smoky Mountains National Park, July 26, 1936.

OBSERVATIONS: This is rather close to *C. roseus,* differing chiefly in color, and also in the form of the pleurocystidia.

54. Crepidotus varicolor sp. nov.
Illustration: Fig. 114.

Pileus 2–5 cm latus, sessilis, suborbicularis, reniformis vel dimidiatus, glabrosus, albus pallido colore maculatus, "warm-buff" posteriore, margine "light drab," demum pallido-coriaceus vel cinnamomo-brunneus, striatulatus. Lamellae primum cinereae, deinde cinnamomeae vel cinnamomo-coriaceae, confertae, medio-latae demum latae. Sporae 5.4–7(8) μ, globosae, punctatae. Basidia 28–32 × 6–7.5 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 32–38 × 6.5–7 μ. Cuticula ex hyphis repentibus com-

posita. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 4, 1955, Beach 29.

Pileus 2–5 cm broad, sessile, suborbicular, reniform, or dimidiate, hygrophanous, glabrous, white with pallid spots, and, at the point of attachment, with warm buff tints, marginal portion light drab to pale buff or cinnamon brown, finely striatulate.

Lamellae at first gray, finally becoming cinnamon to cinnamon buff, close, medium broad to broad.

Spores 5.4–7(8) μ in diameter, globose, punctate. Basidia 28–32 × 6–7.5 μ, 4-spored. Pleurocystidia none; cheilocystidia 27–38 × 4–8 μ, clavate. Gill trama parallel to slightly interwoven. Pileus trama interwoven. Cuticle of repent, radially-disposed hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On wood, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Beach 29 (MICH), type, from Tahquamenon Falls State Park, August 4, 1955.

OBSERVATIONS: This differs from *C. malachius* var. *malachius* in its peculiarly colored pileus, gray gills, and smaller cheilocystidia.

55. Crepidotus campylus sp. nov.
Illustrations: Figs. 115, 116.

Pileus 5–12 mm latus, flabelliformis, subflavus, leviter squamulosus demum glabrosus, planus. Lamellae albidae deinde brunneae, confertae, medio-latae. Sporae 5–7 μ, globosae vel ovoideae, punctatae. Basidia 26–32 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 25–72 × 5–10 μ, saepe flexuosa, furcata vel nodosa. Cuticula sine discrimine, superficies hyphas erectas et pilocystidia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Harbor Springs Hills, Mich., July 27, 1961, A. H. Smith 63701.

Pileus 5–12 mm broad, fan-shaped, yellowish, faintly appressed-fibrillose-squamulose to glabrous, margin even, faintly pubescent, base scarcely mycelioid. Context medium thin; taste mild.

Lamellae whitish, then brown from spores, close, medium broad, edges white-fimbriate.

Spores 5–7 μ, globose, at times 6–7 × 5–6 μ and ovoid, punctate. Basidia 26–32 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 25–72 × 5–10 μ, mostly cylindric-capitate, often flexuous, at times clavate, more rarely forked or knobbed. Gill trama subparallel, hyphae 3–7 μ broad. Pileus trama densely interwoven. Cuticle not sharply differentiated, the surface bearing a moderately thin turf of erect hyphae, and pilocystidia which may be clavate, cylindric, capitate-appendiculate, some crooked, or nearly coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood log, Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 63701, type, from Harbor Springs Hills, July 27, 1961.

OBSERVATIONS: The yellow pileus, crooked to curved or semi-coiled pilocystidia, and the length attained by the cheilocystidia distinguish this species.

Subsection Fulvifibrillosi subsec. nov.

Pileus coloratus vel albus, hyphas brunneas fortasse incrustatas gerens.

Pileus colored or white, bearing brown, incrusted, or non-incrusted hyphae.

Type species: *Crepidotus nephrodes* (B. & C.) Sacc.

Key to Species

1. Pleurocystidia present ---------- 2
1. Pleurocystidia absent ---------- 7
   2. Spores smooth; pileus bright orange-tawny ---------- 56. *C. subnidulans*
   2. Spores punctate ---------- 3
3. Cheilocystidia irregularly branched, forked, or contorted ---------- 57. *C. distortus*
3. Cheilocystidia regular in form ---------- 4
   4. Lamellae at first white ---------- 58. *C. appalachianensis*
   4. Lamellae at first colored ---------- 5
5. Lamellae at first pallid-avellaneous ---------- 59. *C. subfibrillosus*
5. Lamellae yellowish or orange at first ---------- 6
   6. Pleurocystidia 9–15 μ broad, spathulate, clavate, or ventricose ---------- 60. *C. subaureifolius*
   6. Pleurocystidia 4–9 μ broad, often with a long, slender neck ---------- 61. *C. aureifolius*
7. Lamellae at first yellow or orange ---------- 62. *C. crocophyllus*
7. Lamellae at first whitish, pallid or grayish ---------- 63. *C. nephrodes*

56. Crepidotus subnidulans (Overh.) comb. nov.

Claudopus subnidulans Overh., Ann. Mo. Bot. Garden 3: 195. 1916.
Phyllotopsis subnidulans (Overh.) Sing., Agaricales (Lilloa 22: 264). 1951.
Illustrations: Figs. 117, 118.

Pileus 0.5–2 cm broad, sessile, reniform or dimidiate, convex, dry, fibrillose-tomentose, bright orange-tawny, margin inrolled, even or slightly striate. Context thin, white; odor and taste none.

Lamellae radiating from the point of attachment, subdistant, rather broad (3–5 mm), salmon-colored or dull orange.

Stipe none, pileus attached by a white, tomentose base.

Spores 5.5–7.5 × 5–7 μ, globose to slightly subglobose, smooth, pale brown in 2% KOH. Basidia 35–41 × 10–13 μ, 2–4-spored, basidia clavate, the lower two-thirds slender. Pleurocystidia 43–53 × 3.5–6 μ, cylindric to subclavate, rare; cheilocystidia 38–50 × 8–13 μ, pale fuscous, clavate or bottle-shaped, apparently of tramal origin, rare. Gill trama undulating subparallel. Pileus trama radial, appearing as pseudoparenchyma in tangential sections. Cuticle of repent hyphae, bearing rather numerous, more or less erect, fuscous, septate, rarely branched hyphae, the terminal elements cys-

tidioid (pilocystidia). Clamp connections moderately common in the epicuticular hyphae. Lactifers none.

HABIT, HABITAT, AND DISTRIBUTION: On rotten log, Missouri, October.

MATERIAL STUDIED: MISSOURI: Overholts 13045, the type (BPI), from Jefferson Barracks, near St. Louis, Oct. 25, 1913.

OBSERVATIONS: Singer (1951) doubtfully assigns this to the genus *Phyllotopsis*. That genus, however, has cylindric-allantoid spores. Under modern systems, *Claudopus* has pink, angular spores, and is usually placed in *Rhodophyllus*. The difficulty in placing *subnidulans* in *Crepidotus* is its salmon-pink spores (in deposits). They are, however, pale brownish in 2% KOH, under the microscope. Pending additional collections and observations, we are placing it in *Crepidotus*.

The description of microscopic characters above is based on a study of the type.

57. Crepidotus distortus sp. nov.
Illustrations: Figs. 119, 120.

Pileus 10–35 mm latus, sessilis, pallidus, multis brunnaceis squamis. Lamellae primum subflavae, deinde brunnaceae, confertae, latae. Sporae 5–7 μ, globosae, punctatae. Basidia 22–27 × 4–6 μ, tetraspora. Pleurocystidia 20–63 × 5–11 μ; cheilocystidia 30–60 × 6–9 μ. Cuticula ex hyphis repentibus composita, hyphas brunneas incrustatas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Mich., Aug. 12, 1963, A. H. Smith 67160.

Pileus 10–35 mm broad, sessile, pallid with scattered to numerous or dense brownish fibrillose scales.

Lamellae at first yellowish, finally brownish, close, broad.

Spores 5–7 μ in diameter, globose, punctate. Basidia 22–27 × 4–6 μ, 4-spored. Pleurocystidia 20–63 × 5–11 μ, subcylindric and slightly constricted, bottle-shaped with a neck, obclavate, subfusoid, more rarely forked or branched; cheilocystidia 30–60 × 6–9 μ, often more or less distorted, clavate, bottle-shaped with a neck, subcylindric-constricted, at times forked or branched. Gill trama subparallel, hyphae 4–6 μ broad, at times up to 11 or 15 μ broad. Pileus trama loosely interwoven. Cuticle of repent hyphae, bearing a turf or clusters of brown, incrusted hyphae, 4–10 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan and New Hampshire, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 36650, 67160, type, Emerson, August 12, 1963; NEW HAMPSHIRE: Bigelow 12014 (MASS).

OBSERVATIONS: The distorted cheilocystidia and yellow gills distinguish this species.

58. Crepidotus appalachianensis sp. nov.
Illustrations: Figs. 14, 121, 122.

Pileus 10–47 mm latus, sessilis, pallidus demum "chamois," brunnaceus squamulosus vel fibrillosus. Lamellae confertae, latae vel medio-latae, albidae deinde "pinkish buff," denique brunnaceae. Sporae 4.5–6(7) μ, globosae vel subglobosae, punctatae. Basidia 26–34 × 5–7 μ, tetraspora. Pleurocystidia 23–50(60) × (3)7–10 μ; cheilocystidia 28–48 × 4–10 μ. Cuticula ex hyphis repentibus composita, hyphas incrustatas brunneas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Tenn.; lectum in Cades Cove, Tenn., July 2, 1962, L. R. Hesler 24851.

Pileus 10–47 mm broad, sessile, semiorbicular to flabelliform, convex to subconchate, hygrophanous, pallid to "chamois," brownish-fibrillose or squamulose, margin even. Context thin, whitish; odor mild, taste mild or bitterish.

Lamellae radiating, close, broad or medium broad, whitish then pinkish-buff, finally brownish, edges obscurely fimbriate.

Spores 4.5–6(7) μ in diameter, globose, at times subglobose, punctate. Basidia 26–34 × 5–7μ, 4-spored. Pleurocystidia 25–30(60) × (3)7–10 μ, obclavate, ventricose, flask-shaped, cylindric, clavate, often tapering above, projecting only slightly; cheilocystidia 28–48 × 4–10 μ, subcylindric, clavate, flask-shaped with a neck. Gill trama subparallel to slightly interwoven, hyphae 5–12 μ broad. Pileus trama interwoven, at times loosely so. Cuticle of repent hyphae, bearing both brown, incrusted hyphae, often in clusters forming scales, and colorless, erect, septate hyphae, the terminal elements at times as pilocystidia. Lactifers present in the trama of the pileus and gills. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Florida, North Carolina, Tennessee, Kentucky, Ohio, Michigan, May–October.

MATERIAL STUDIED: FLORIDA: Hesler 21441; KENTUCKY: Stevenson (TENN 17492); MICHIGAN: Smith 66275; NORTH CAROLINA: Hesler 18679; OHIO: Cooke (MICH 33763); TENNESSEE:

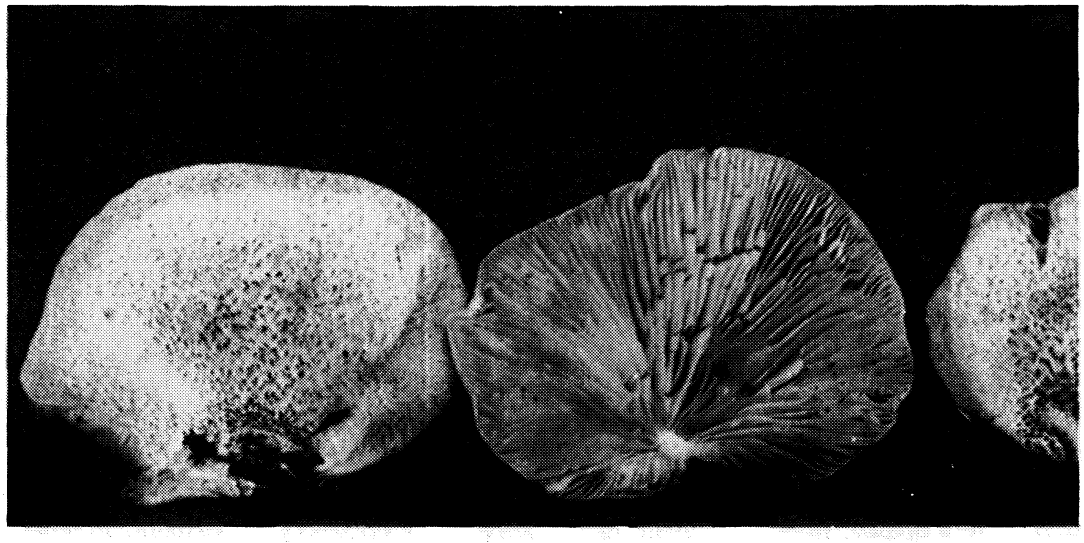

FIG. 14. *C. appalachianensis*

Hesler 12264, 12383, 24851 (type, Cades Cove, Great Smoky Mts. National Park, July 2, 1962).

OBSERVATIONS: This species superficially resembles *C. nephrodes,* but is chiefly distinguished from it by the presence of pleurocystidia.

59. Crepidotus subfibrillosus sp. nov.
Illustrations: Figs. 123, 124.

Pileus 3–10(15) mm latus, sessilis, flabelliformis, primum subfibrillosus, deinde glabrosus, "cinnamon buff" vel "pinkish buff," denique atro-brunneus, striatus. Lamellae primum pallide avellaneae, deinde "clay color," confertae, latae. Sporae 5–6(7) μ, globosae vel subovoideae, punctatae vel subechinulatae. Basidia 17.5–22 × 5–6.5 μ, di- et tetraspora. Pleurocystidia 30–43 × 5–7 μ; cheilocystidia 30–55 × 5–8 μ. Cuticula ex hyphis repentibus composita, hyphas non-incrustatas brunneas et sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., June 29, 1949, A. H. Smith 32367.

Pileus 3–10(15) mm broad, sessile, flabelliform, at first pale-rusty-subfibrillose, soon glabrous over the marginal area or entirely, surface faintly "cinnamon buff" or "pinkish buff," in age dark brown, margin translucent-striate.

Lamellae more or less adnate on the pseudostipe, at first pallid avellaneous, finally pale clay color, close, broad, edges even.

Spores 5–6(7) μ in diameter, globose or subovoid, punctate or subechinulate, wall double, brown. Basidia 17.5–22 × 5–6.5 μ, 2–4-spored. Pleurocystidia 30–43 × 5–7 μ, clavate-mucronate or ventricose with a rounded apex; cheilocystidia 30–55 × 5–8 μ, clavate, ventricose, at times more or less constricted. Subhymenium of more or less globose cells. Gill trama parallel to subparallel, cells short or long, hyphae 5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing both non-incrusted brown and colorless hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On log of *Fraxinus,* Michigan, June.

MATERIAL STUDIED: MICHIGAN: Smith 32367, type, from Wolf Bog, Cheboygan County, June 29, 1949.

OBSERVATIONS: This is characterized chiefly by the pileus colors, the pale avellaneous gills, the pleurocystidia, and the brown, non-incrusted, epicuticular hyphae.

60. Crepidotus subaureifolius sp. nov.
Illustrations: Figs. 125, 126.

Pileus 1–6 cm latus, sessilis, suborbicularis, reniformis vel dimidiatus, brunnaceo-fibrillosus, subflavo-ochreus demum fulvo-ochraceus, striatus. Lamellae primum aurantiae deinde ochraceo-coriaceae, confertae, latae vel medio-latae. Sporae 4.5–6.5(7) μ, globosae, punctatae. Basidia (20)24–34 × (6)7–9 μ, tetraspora. Pleurocystidia 20–40 × (7)9–15 μ; cheilocystidia 23–48 × 4–10 μ. Cuticula ex hyphis repentibus composita, hyphas incrustatas brunneas et sine colore gerens. Fibulatae

adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 11, 1955, Beach 28.

Pileus 1–6 cm broad, sessile, suborbicular, reniform, or dimidiate, finally more or less expanded, hygrophanous, densely brownish-fibrillose at base, thinly so toward the margin, yellowish ocher to ochraceous tawny fading to ochraceous-buff, margin striate. Context firm, white to pallid; odor and taste mild or none.

Lamellae at first orange, finally ochraceous-buff, close, broad or medium broad.

Spores "snuff brown" in deposits, 4.5–6.5(7) μ in diameter, globose, punctate, wall medium thick. Basidia (20)24–34 $\times$ (6)7–9 μ, 4-spored. Pleurocystidia 20–40 $\times$ (7)9–15 μ, clavate, spathulate, subpyriform, napiform, or flask-shaped with a neck; cheilocystidia 23–48 $\times$ 4–10 μ, clavate, more or less constricted, at times subcylindric. Gill trama subparallel, hyphae 5–9 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing both brown, incrusted, and colorless hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On wood, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Beach 28 (MICH), type, from Tahquamenon Falls State Park, August 11, 1955; Smith 66273.

OBSERVATIONS: The presence of broad pleurocystidia excludes it from *C. crocophyllus* and *aureifolius*.

61. Crepidotus aureifolius sp. nov.
Illustrations: Figs. 15, 127, 128.

Pileus 1–3.5 cm latus, sessilis, semiorbicularis demum flabelliformis, pallido-flavus, fibrillis et squamis rubido-brunneus. Lamellae primum aurantiae denique

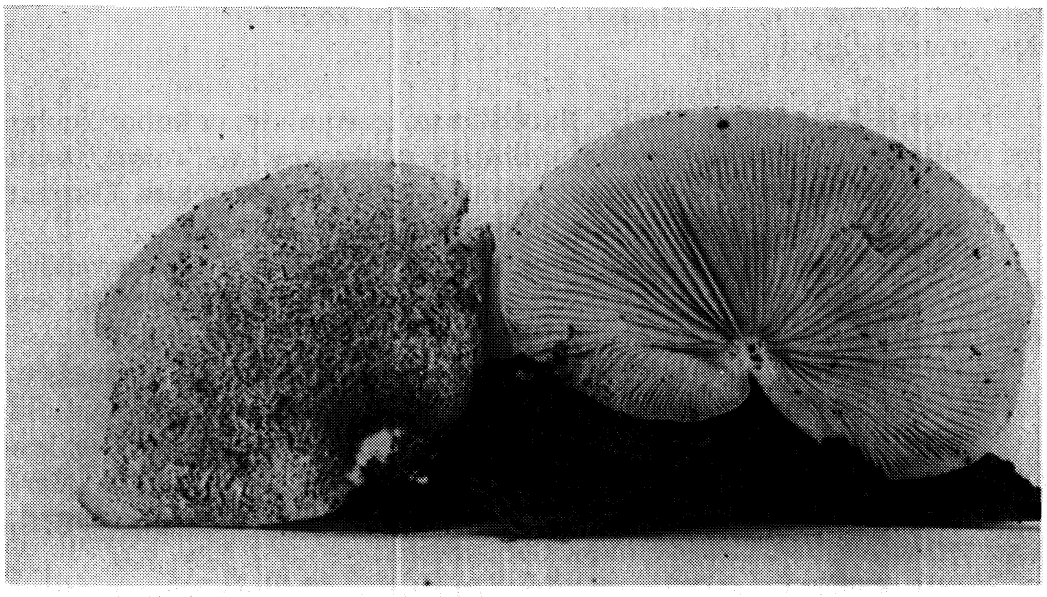

FIG. 15. *C. aureifolius*

brunnaceo-aurantiae, confertae, medio-latae. Sporae 5–7.5 μ, globosae, punctatae. Basidia 23–28 × 6–7 μ, di- et tetraspora. Pleurocystidia 25–50 × 6–8(11) μ; cheilocystidia 24–45 × 4–8 μ. Cuticula ex hyphis repentibus composita, hyphas incrustatas brunneas et sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Haven Hill, Mich., Sept. 1, 1963, A. H. Smith 67333.

Pileus 1–3.5 cm broad, sessile, semiorbicular to flabelliform, pale yellow, with reddish-brown fibrils or fibrillose scales. Context moderately thin; taste mild.

Lamellae at first orange, finally brownish-orange, close, medium broad.

Spores 5–7.5 μ in diameter, globose, punctate. Basidia 23–28 × 6–7 μ, 2–4-spored. Pleurocystidia 25–50 × 6–8(11) μ, cylindric-clavate or ventricose, with a short or long neck (appendiculate); cheilocystidia 24–45 × 4–8 μ, clavate, cylindric, or ventricose, at times slightly constricted. Gill trama subparallel to slightly interwoven, hyphae 3–8 μ broad. Pileus trama interwoven, often loosely so. Cuticle of repent hyphae, bearing a turf of both brown, incrusted, and colorless hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan and Tennessee, July–September.

MATERIAL STUDIED: MICHIGAN: Beach 28, 31 (MICH); Smith 36934, 49471, 67096, 67333 (type, Haven Hill, September 1, 1963); TENNESSEE: Hesler 24912, 25732.

OBSERVATIONS: The bright orange gills, and the pleurocystidia are characteristic of this species. It is close to *C. crocophyllus,* which lacks pleurocystidia. In the Tennessee collections, the color of the gills was more yellowish and less brilliant than in the type.

62. Crepidotus crocophyllus (Berk.) Sacc. Syll. Fung. 5: 886. 1887.
Agaricus crocophyllus Berk., London Jour. Bot. 6: 313. 1847.
Agaricus dorsalis Pk., N.Y. State Mus. Ann. Rept. 24: 69. 1872.
Crepidotus dorsalis (Pk.) Sacc., Syll. Fung. 5: 883. 1887.
Illustrations: Figs. 16, 129.

Pileus 1–3 cm broad, sessile, flabelliform, spathulate, or suborbicular then reniform to dimidiate, pallid, yellowish, or "tawny" to "russet," with "chestnut," "cinnamon," or "orange cinnamon" fibrils or scales. Context thin, white, soft; odor mild, taste mild or often slowly bitterish.

Lamellae close, broad or medium, more rarely narrow, at first yellow, orange, "capucine orange," or "ochraceous orange," fading to more or less avellaneous, finally brownish, edges fimbriate.

Spores 4.5–7 μ, globose, at times ovoid, often some flat-sided, punctate. Basidia (20)30–40 × 5–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 32–53 × 5–10(12) μ, clavate, cylindric-ventricose, at times more or less capitate. Gill trama subparallel, hyphae 6–12 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of both brown, incrusted, and colorless hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks, stumps, fallen

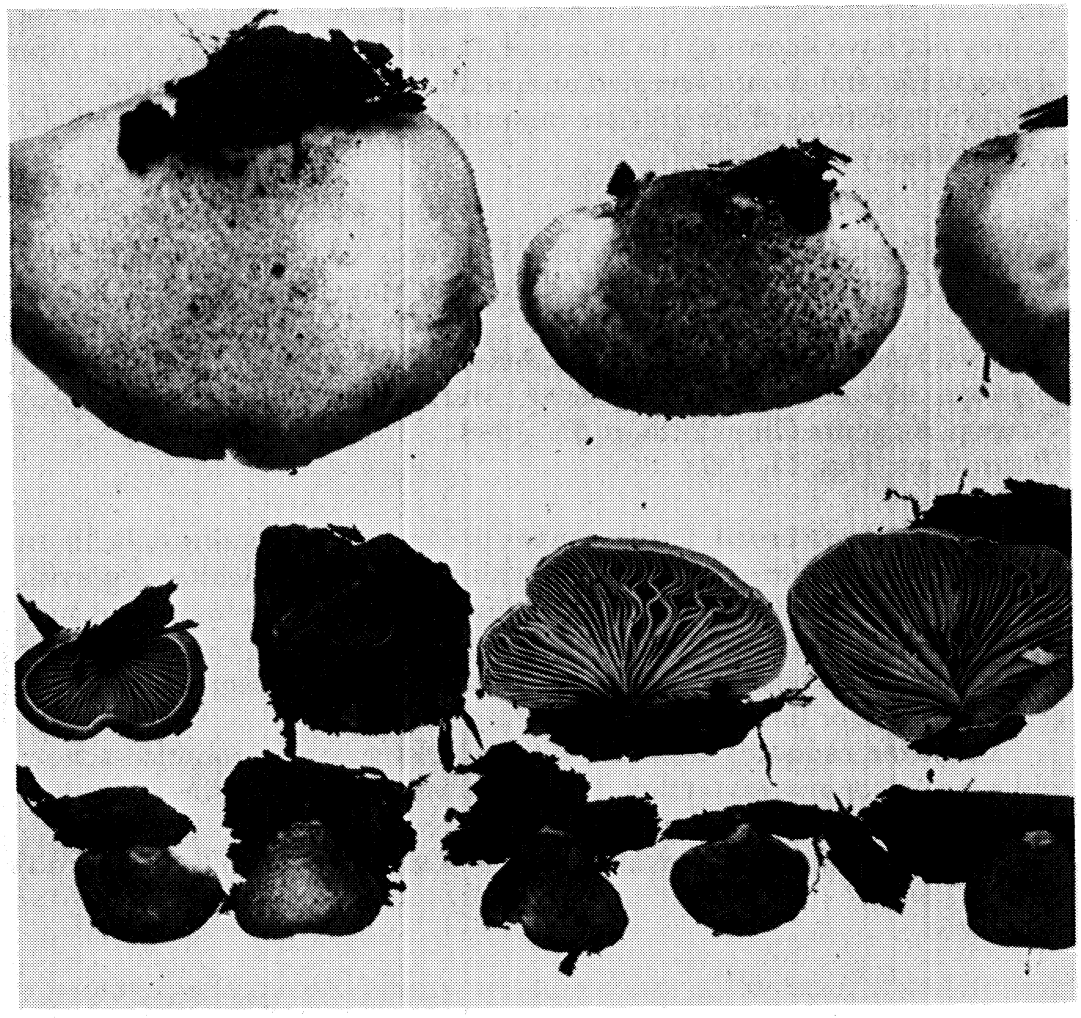

FIG. 16. *C. crocophyllus*

branches, and logs, more rarely on conifer wood, Maine, New York, Ohio, Tennessee, Louisiana, Michigan, Idaho, and Oregon, June–October.

MATERIAL STUDIED: IDAHO: Smith 66274; LOUISIANA: Lowy 1721 (TENN 22465); MAINE: Bigelow 10639, 10774 (MASS); MICHIGAN: Brooks 1249 (MICH); Deegan H-86 (MICH); Miller 195 (MICH); Potter 3396, 3420 (MICH); Shaffer 817 (MICH); Smith 7266, 9554, 18316, 20549, 21572, 33–1002, 49648, 49867, 51275, 57860, 63535, 63573, 63576b, 66850, 66877, 66902, 66906, 66909; Thiers 2667, 2722, 2735, 3052, 3951; NEW HAMPSHIRE: Bigelow 11816, 12168 (MASS); NEW YORK: Peck, type of *Agaricus dorsalis,* from Grieg, Sept., 1869(?); OHIO: Lea, type (NYS) of *Agaricus crocophyllus,* Waynesville, Sept. 4, 1844; OREGON: Smith 23940; TENNESSEE: Hesler 8077, 10795, 12539, 14236.

OBSERVATIONS: Apparently the color of the fresh pileus actually varies; and, moreover, authors in describing pileus colors, may have been influenced by the fibrils which ornament the surface. Comparably, the lamellae also vary in color from yellow to orange. Thus, it is understandable that Peck

described *dorsalis,* apparently assuming it was different from *crocophyllus*; or, he may not have known of the binomial, *C. crocophyllus*. A study of the types of *crocophyllus* and *dorsalis* revealed no specific differences in structure.

When sections of the gills are mounted in 2% KOH, they usually become orange-yellow in color.

63. Crepidotus nephrodes (B. & C.) Sacc. Syll. Fung. 5: 882. 1887.
Agaricus (Crepidotus) nephrodes B. & C., Ann. & Mag. Nat. Hist. II: 12: 422. 1853.
Crepidotus fulvifibrillosus Murr., North Amer. Flora 10: 153. 1917.
Crepidotus applanatus var. *fulvifibrillosus* (Murr.) Pilát, Monogr. des especès europ. du genre Crepidotus, p. 35. 1948.
Illustrations: Figs. 17, 130.

Pileus 2–9 cm broad, sessile, convex to conchate, becoming flabelliform to subreniform, white or whitish, yellowish-white, grayish-white, or grayish-olive buff, brownish-fibrillose to squamulose, at times villose-tomentose, margin at first incurved, in age obscurely striatulate when wet. Context whitish, moderately thick; odor and taste mild, or taste at times disagreeable (astringent, nauseous, or bitter).

Lamellae radiating from the villose basal tubercle, rounded-adnate, white, pallid, or grayish, at first, finally brownish, close, narrow to medium broad, edges entire.

Spores in deposit: "Sayal brown," "Dresden brown," "Saccardo's

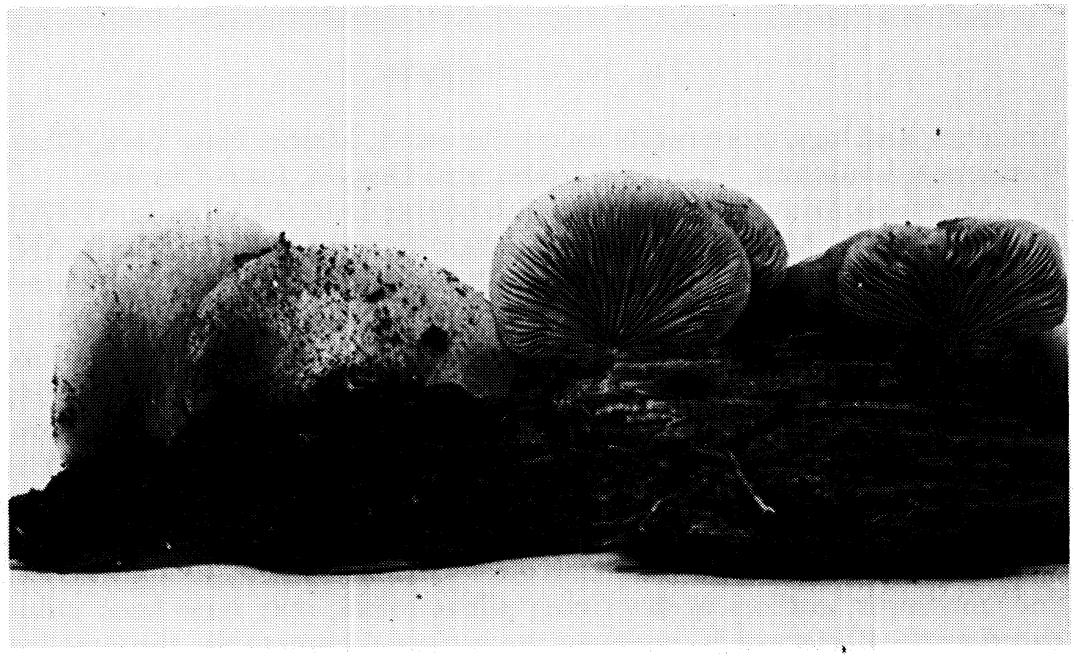

FIG. 17. *C. nephrodes*

umber," or "buffy brown," (4.5)5–7(7.5) μ in diameter, globose to subovoid, punctate, pale cinnamon in 2% KOH. Basidia (20)30–36 × 5.5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 28–53 × 5–9(12) μ, clavate or ventricose, at times with a neck, or subcapitate. Gill trama subparallel, hyphae 6–15 μ broad. Pileus trama loosely interwoven. Cuticle of repent hyphae, bearing scattered to dense fuscous or brownish fibrils, at times aggregated to form squamules, some hyphae incrusted. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwoods, logs, stumps, and fallen branches, eastern United States, June–Sept.

MATERIAL STUDIED: MAINE: Bigelow 10766 (MASS); MASSACHUSETTS: Bigelow 7259, 8326 (MASS); MICHIGAN: Imshaug 3653 (MICH): Potter 3087, 3105, 3408 (MICH); Shaffer 681, 2828 (MICH); Smith 9553, 57183, 57861, 66266, 66385, 66863; Thiers 694, 3952, 3967; NEW HAMPSHIRE: Bigelow 11785, 11786 (MASS); Miller 569 (MICH); NEW YORK: Deegan 45, H84 (MICH); C. V. Smith (CUP 5528); NORTH CAROLINA: Hesler 5118; Smith 10842; SOUTH CAROLINA: Ravenel, type (K); TENNESSEE: Hesler 25059, 25675; VIRGINIA: Murrill 104, type (NY) of *C. fulvifibrillosus,* from Falls Church, July 2–6, 1904; WISCONSIN: Shaffer 681 (MICH).

OBSERVATIONS: Berkeley and Curtis (1853) originally described *Agaricus (Crepidotus) nephrodes,* on material sent to them from South Carolina by Ravenel. Subsequently, Murrill (1917) described a Virginia collection as *C. fulvifibrillosis.* Although Murrill knew of *C. nephrodes,* he distinguished his Virginia collection from it, chiefly on the macroscopic character of the fibrils on the pileus surface. Neither Murrill nor Berkeley and Curtis studied critically the microscopic features of these fibrils nor of other structures. In 1947, Singer recognized the two as distinct species, separating them on gill-width and pileus fibril-ornamentation, and adding that *C. nephrodes* is not really different from what is commonly called *C. malachius* in North America. Pilát (1948), in his studies of European *Crepidotus,* including some North American species, obviously looks upon *C. applanatus* as a very broadly-conceived species, for he places a number of species-names in synonymy. For example, he places *C. nephrodes* as a synonym under *C. applanatus* and proposes that Murrill's *C. fulvifibrillosus* be attached to *applanatus* as a variety. He bases his proposal on the squamulose-tomentose character of the pileus of Murrill's species. Singer (1947) says that *C. fulvifibrillosus* is identical with *C. applanatus,* except for the scales on the former; and further, that the specific value of these scales must be established. Finally, Singer (1962) recognizes as valid distinct species, *applanatus, fulvifibrillosus,* and *nephrodes,* listing several synonyms of *nephrodes,* including *malachius, hygrophanus, leucochrysos*, and possibly *putrigenus* and others (see Singer, 1962: 662). Our studies of the types of *C. nephrodes* and *C. leucochrysos* indicate some relationship, but the latter species is without brown, incrusted hyphae on the pileus and lacks clamp connections.

We have studied numerous North American collections, and also the available types, and are now convinced that *fulvifibrillosus* is the same as

nephrodes; that *malachius, hygrophanus, putrigenus,* and *applanatus* are distinct species (see our proposed keys and descriptions herein).

The types of *C. nephrodes* and *C. fulvifibrillosus* show some variations but no difference in their fundamental structure. The lamellae vary, in collections studied, from moderately narrow to moderately broad; and, in spacing, from crowded to close or moderately close. The color of the young gills seems to vary from whitish to pallid or grayish. The pileus in both types (and in other collections) bears brown, incrusted hyphae. These hyphae, however, vary in distribution and density, and thus may be either scattered or dense, or they may stand more or less separately, or aggregated to form fibrillose-scales.

In our effort to separate *nephrodes* and *fulvifibrillosus,* we have found no character, nor a combination of characters, which we regard as valid for such a separation.

Subgenus Dochmiopus (Pat.) Pilát

In Kavina, Atlas des champ. de l'Europe 4: 12. 1948.

Spores longer than broad (ellipsoid, fusoid, phaseoliform); clamp connections present.

TYPE SPECIES: *Crepidotus variabilis* (Fr.) Kummer.

Key to Sections

1. Pleurocystidia present ---------- Section *Cystiodiosi,* p. 80
1. Pleurocystidia absent ---------- 2
   2. Pileus surface colored, or with colored fibrils, at least when young (for yellowish species, see next choice) -------- Section *Fulvidi,* p. 87
   2. Pileus white to pallid or finally yellowish or ochraceous ---------- 3
3. Spores phaseoliform in profile ---------- Section *Phaseoli,* p. 92
3. Spores of different shape ---------- 4
   4. Spores fusoid in face view, inequilateral in side view ---------- Section *Fusisporae,* p. 92
5. Spores smooth under oil-immersion lens -------- Section *Betulae,* p. 99
5. Spores ornamented under oil-immersion lens ---------- 6
   6. Spores typically 6 μ or less in length ----- Section *Dochmiopus,* p. 107
   6. Spores 6.5 μ or more in length --------- Section *Crepidotellae,* p. 110

Section Cystidiosi sec. nov.

Pleurocystidia et cheilocystidia adsunt.

Both pleurocystidia and cheilocystidia present.

TYPE SPECIES: *Crepidotus albatus.*

Key to Species

1. Stipe present, conspicuous ---------- 2
1. Stipe absent; or, if present, inconspicuous and soon disappearing ---- 4
   2. Pileus orange or orange-brown; lamellae pale orange-yellow ---------- 64. *C. pseudoflammeus*
   2. Pileus and lamellae of other colors ---------- 3
3. Pileus pinkish-buff to grayish-clay, with brown, incrusted erect hyphae ---------- 65. *C. haustellaris*
3. Pileus brown, with colorless or pale fuscous, non-incrusted hyphae ---- ---------- Ex 5. *Pleuroflammula puberula**
   4. Pileus white, at least when dry ---------- 5
   4. Pileus colored ---------- 6
5. Spores 6–8 × 4–5.5 μ, punctate ---------- 66. *C. albatus*
5. Spores 7–9(10) × 4.5–6 μ, smooth ---------- 67. *C. fragilis*
   6. Spores 5–7 μ long, ovoid; pileus "picric yellow" or "antimony yellow" ---------- 68. *C. luteicolor*
   6. Spores 7–9(10) μ long ---------- 7
7. Pileus "cinnamon buff"; spores drop-shaped or pyriform, punctate ---------- 69. *C. rainierensis*
7. Pileus white when dry, grayish to brownish when wet; spores ellipsoid to ovoid, smooth ---------- 67. *C. fragilis*

64. Crepidotus pseudoflammeus sp. nov.
Illustrations: Figs. 131, 132.

Pileus 8–12 mm latus, conchatus demum dimidiatus, fibrillosus, brunneus, fibrillis "xanthine orange," margine fimbriatus; odoris nihil, gustu amarus. Lamellae "pale orange yellow" demum brunneae, confertae, medio-latae. Stipes 2–3 mm longus, "pale orange yellow," fibrillosus. Sporae 7–9(10) × 5–6.5(7) μ, ellipsoideae, planae. Basidia 24–30 × 6–7 μ, tetraspora. Pleurocystidia 23–35 × 5–10 μ; cheilocystidia 35–53 × 5–10 μ. Cuticula ex hyphis repentibus subflavis demum brunnaceis composita, hyphas erectas incrustatas brunneas gerens. Fibulatae adsunt. Specimen typicum in *Herb. Univ. Mich.; lectum in Mt. Baker Forest, Wash., Sept. 6, 1941, A. H. Smith 16682.*

Pileus 8–12 mm broad, conchate, becoming dimidiate, dry, appressed-fibrillose, fibrils at base "xanthine orange," but "orange" near the pale yellow, incurved, fringed margin, color finally dingy brown. Context thin, pliant, pale yellowish; odor none, taste slightly bitter.

Lamellae bluntly adnate, "pale orange yellow," soon rusty-brown from the spores, moderately close to nearly subdistant and moderately broad, edges crenulate.

Stipe 2–3 mm long, more or less 1 mm thick, curved, "pale orange yellow," densely woolly-fibrillose.

*See Excluded Species, p. 142

Spores 7–9(10) × 5–6.5(7) μ, ellipsoid, wall thickened, smooth, no germ-pore, dark tawny-reddish in 2% KOH. Basidia 24–30 × 6–7 μ, 4-spored. Pleurocystidia 23–35 × 5–10 μ, ventricose, apices rounded; cheilocystidia 35–53 × 5–10 μ, cylindric-capitate, often flexuous. Gill trama subparallel, hyphae 3–6 μ broad. Pileus trama interwoven, hyphae 2–3 μ broad. Cuticle of repent, yellowish to fuscous hyphae, some incrusted; at surface bearing a turf of brownish hyphae, 2–4 μ broad, often in bundles. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On *Alnus* fallen twigs, Washington, September.

MATERIAL STUDIED: WASHINGTON: Smith 16682, type, from Marble Creek, Mt. Baker National Forest, Sept. 6, 1941.

OBSERVATIONS: This is suggestive of *Pleuroflammula flammea,* which has a veil and lacks pleurocystidia.

65. Crepidotus haustellaris (Fr.) Kummer Der Führer in die Pilzk., p. 74. 1871.

Agaricus haustellaris Fr., Syst. Myc., p. 274. 1821.

Illustrations: Figs. 133, 134.

Pileus 4–10(15) mm broad, convex, becoming broadly so, marginate behind, dry, matted-fibrillose, "pinkish buff" to grayish-clay color, margin incurved. Context pale buff, pliant; odor none, taste slightly bitterish.

Lamellae bluntly adnate, pale buff becoming cinnamon brown, broad, subdistant, two tiers of lamellulae, edges crenulate or white-flocculose.

Stipe (1)3–8 mm long, 0.5–1.0 mm thick, eccentric to nearly lateral, appressed-fibrillose, concolorous with the pileus, pliant, solid, inserted.

Spores 7–9.5 × 5–6(7) μ, ellipsoid to subovoid, inequilateral in profile, smooth, no germ-pore. Basidia 23–34 × 7–8 μ, 2–4-spored. Pleurocystidia 31–38 × 5–8 μ, scattered, cylindric or fusoid; cheilocystidia 36–61 × 4–12 μ, cylindric or slender-clavate, often capitate, at times slightly flexuous. Gill trama interwoven, hyphae 5–11 μ broad. Pileus trama loosely interwoven, hyphae 5–9 μ broad. Cuticle of repent hyphae, bearing tufts of brown, incrusted hyphae, 5–10 μ broad, and scattered, colorless, erect, relatively short hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan, July–August.

MATERIAL STUDIED: MICHIGAN: Lange 1001 (MICH); Smith 22261, 25518, 25748, 25998, 32230, 37137, 67018; CZECHOSLOVAKIA: Pilát 149016 (PR); GERMANY: Pilát 149015 (PR); ITALY: Pilát 149022 (PR).

OBSERVATIONS: The description above is based chiefly on Smith's No. 22261, which agrees well with other collections, including Pilát's from Europe. The incrustation of the brown hyphae on the pileus is at times obscure.

The colored pileus and its colored hyphae relate it closely to section *Fulvidi.*

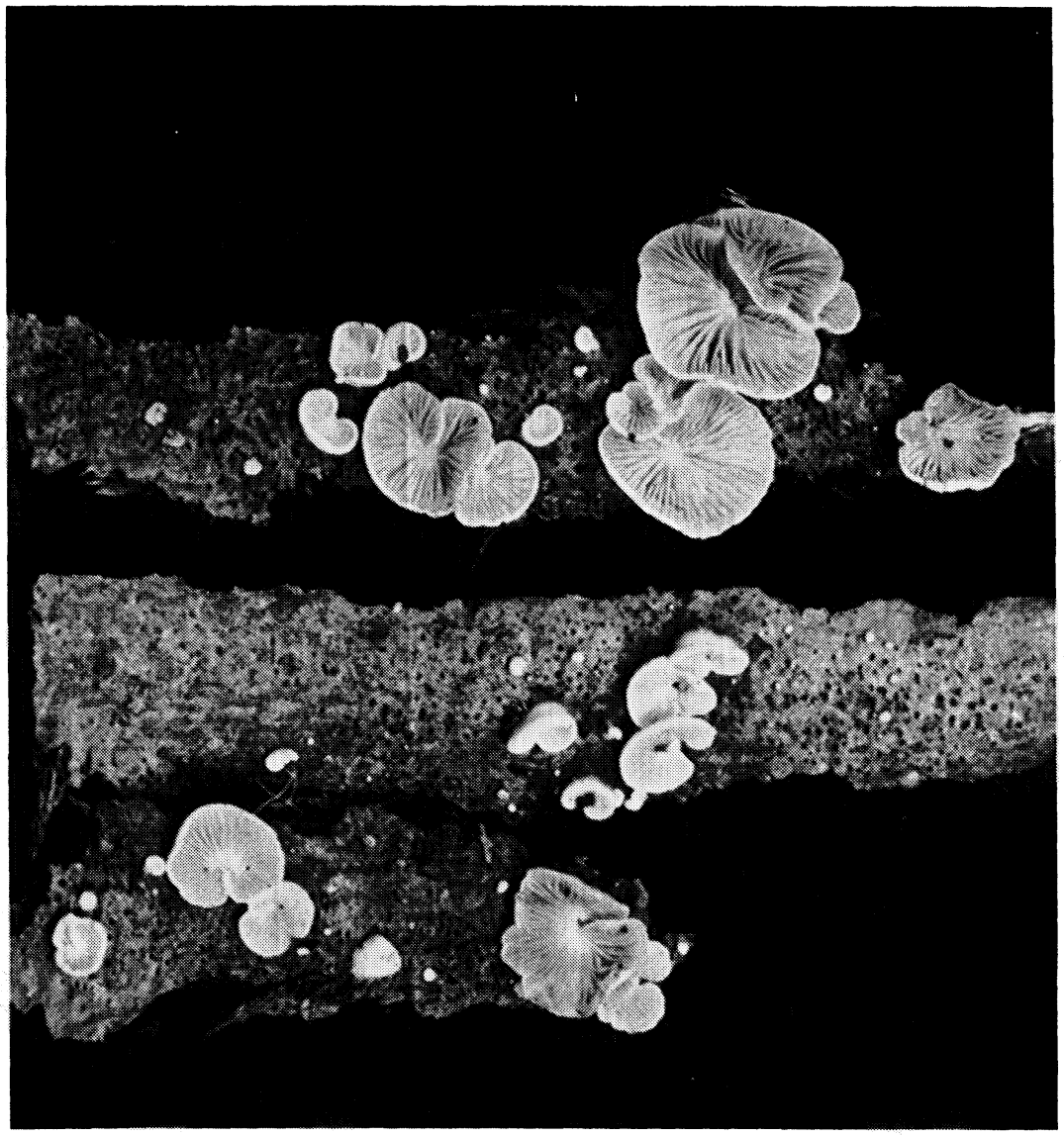

FIG. 18. *C. albatus* × 1⅓

66. Crepidotus albatus sp. nov.
Illustrations: Figs. 18, 135, 136.

Pileus (3)6–20 mm latus, sessilis, ungulatus deinde flabelliformis demum semiorbicularis, albus, albo-fibrillosus. Lamellae albae deinde "pinkish cinnamon," confertae, angustae demum medio-latae. Sporae 6–8(9) × 4–5.5 μ, ellipsoideae, punctatae. Basidia (18)25–30 × 6–8 μ, tetraspora. Pleurocystidia 24–26 × 5–8 μ; cheilocystidia 31–70 × 6–12 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2–3(5) μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Mio, Mich., Aug. 14, 1963, A. H. Smith 67203.

Pileus (3)6–20 mm broad, sessile, ungulate, soon becoming flabelliform or semiorbicular, dry, white, white-villose or pubescent to fibrillose, base

white-strigose, matted-fibrillose toward the margin, extreme margin inrolled and frosted, basal hyphae quickly yellow in 2% KOH. Context white or pallid, thin, firm; odor and taste none.

Lamellae narrowly adnate, white then pinkish-cinnamon, finally cinnamon, close, narrow to medium broad, edges even or fimbriate.

Spores 6–8(9) × 4–5.5 μ, ellipsoid, only slightly inequilateral in profile, punctate. Basidia (18)25–30 × 6–8 μ, 4-spored. Pleurocystidia 24–46 × 5–8 μ, flask-shaped, tapering above or with a neck; cheilocystidia 31–70 × 6–12 μ, flask-shaped, with a neck, often flexuous. Gill trama interwoven, hyphae 5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae bearing a turf of tangled, colorless hyphae, 2–3(5) μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs, Michigan and Tennessee, June–August.

MATERIAL STUDIED: MICHIGAN: Smith 49909, 67203, type, on *Tilia,* Mio, Aug. 14, 1963; TENNESSEE: Hesler 3658.

OBSERVATIONS: The white villose-pubescent pileus, and the large, conspicuous, flask-shaped or cucurbitiform pleurocystidia and cheilocystidia, and ellipsoid, punctate spores are distinctive characters of this species. This is related to *C. fragilis* Joss., in which the pileus is larger, the spores somewhat longer, amygdaliform, and smooth.

67. Crepidotus fragilis Joss. Bull. Soc. Myc. France 53: 218. 1937. Illustrations: Figs. 137, 138.

Pileus 2–7 cm broad, sessile, of variable form: either flattened and pleuropodic, or convex, slightly hygrophanous, gray, clay, or even fuliginous when wet, snow white when dry, grooved fibrillose giving the effect of rimosity which gives the pileus snow white and clayish-gray streaks, margin sinuous, scalloped, or lobed. Context very thin on the margin, thick near base, fragile, white when dry, dark-gray when wet, not gelatinous; odor and taste fungoid.

Lamellae rather narrow, thin, rounded at point of attachment, almost white, then very pale clay color, finally deep clay to dark earthy color.

Spores in deposit: deep clay color, earthy (olive tinged). Spores 7–9(10) × 4.5–5.8 μ, amygdaliform (tonsil shaped), smooth. Basidia 25–33 × 7–8 μ, 4-spored. Pleurocystidia 28–40 × 5–8 μ, clavate-appendiculate, at times numerous; cheilocystidia 25–40 × 6–10 μ, more or less cylindric, slightly sinuous, obtuse, not capitate. Gill trama with a broad mediostrate composed of filamentous hyphae, 4–10(20) μ broad, undulating-parallel. Subhymenium subcellular. Pileus trama interwoven, hyphae 6–20 μ broad. Cuticle of repent hyphae bearing a turf of colorless hyphae, 3–10 μ broad. No gelatinous zone. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On soil or decaying wood, France, September.

MATERIAL STUDIED: FRANCE: from Doubs, collected and determined by C. Bas, Oct. 3, 1956 (L).

OBSERVATIONS: The description of macroscopic characters above is based on Josserand's account (1937); that of the microscopic characters is based largely on a collection from France, by Bas, Leiden, Netherlands, and deposited as Tenn-26099. Although Josserand does not mention pleurocystidia, they were found in Bas' material.

Pilát (1948) reports this species from Czechoslovakia and Germany. It has not been reported from North America but is included here for comparison, and on the possibility that it might be discovered here.

68. Crepidotus luteicolor sp. nov.
Illustrations: Figs. 19, 139, 140.

Pileus 2–4 cm latus, sessilis, flabelliformis, "picric yellow" demum "antimony yellow," anteriore glabrosus, posteriore albo-pubescens. Lamellae primum pallido-"picric yellow" demum "warm buff," deinde brunnaceae, confertae, angustae. Sporae 5–7 × 4–5.5 μ, ovoideae vel ellipsoideae, punctatae. Basidia 28–36 × 7–8 μ, di- et tetraspora. Pleurocystidia 28–42 × 8–10 μ; cheilocystidia 26–50 × 4–17 μ. Cuticula sine magno discrimine, superficies hyphas sine colore erectas et pilocystidia gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Emerson, Mich., Aug. 12, 1963, Dick Homola, Smith-67119.

Pileus 2–4 cm broad, fan-shaped, the margin long remaining inrolled, surface "picric yellow" to "antimony yellow," outer half glabrous, basal half with a dense white-pubescent covering, moist and at maturity the extreme edge striatulate in one. Context whitish, firm-brittle; odor and taste mild.

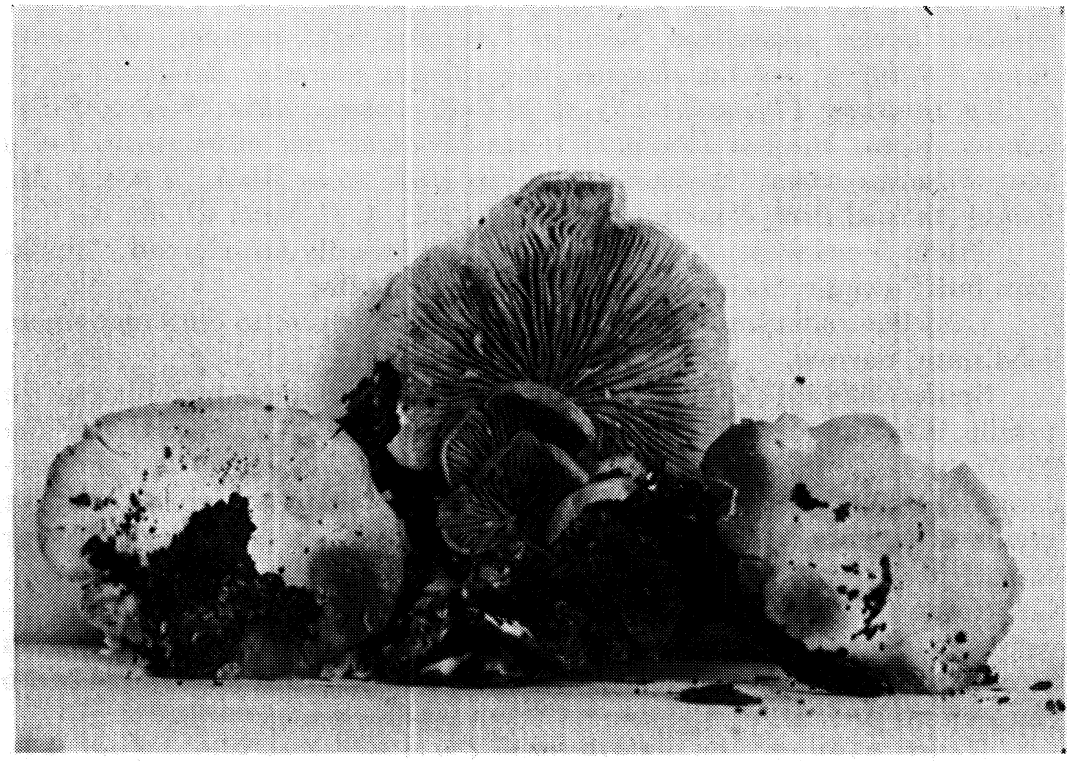

FIG. 19. *C. luteicolor*

Lamellae at first pale "picric yellow" to "warm buff," becoming near "Sudan brown," or dingy-orange-brown, close, narrow, attached at a basal point, often broken transversely.

Stipe none, caps broadly attached by a basal mycelial mat which is whitish and finally discolors to tawny.

Spores 5–7 × 4–5.5 μ, ovoid, more rarely ellipsoid, punctate. Basidia 28–36 × 7–8 μ, 2-4-spored. Pleurocystidia 28–42 × 8–10 μ, clavate, scattered; cheilocystidia 26–50 × 4–17 μ, mostly clavate, more or less capitate, with a tapering neck (more or less aciculate). Gill trama interwoven, hyphae 5–10 μ broad. Pileus trama loosely interwoven. Cuticle not distinctly differentiated, the surface bearing scattered or numerous, erect, colorless hyphae, the terminal elements scarcely cystidioid, hyphae 2.5–5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION. On hardwood logs, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 67119, type, from Emerson, collected by Dick Homola, Aug. 12, 1963.

OBSERVATIONS: The yellow pileus and gills and small, ovoid spores, together with pleurocystidia, distinguish it. Its colors, narrow gills, and pleurocystidia separate it from *C. croceitinctus*.

69. Crepidotus rainierensis sp. nov.
Illustrations: Figs. 141, 142.

Pileus 5 cm latus, 2–3 cm longus, sessilis, flabelliformis, "cinnamon buff," fibrillosus demum squamulosus. Lamellae "cinnamon buff" angustae, subdistantes. Sporae 7–9(10) × 3–4.5 μ, elongatae, subpyriformes, punctatae. Basidia 23–26 × 6–7.5 μ, tetraspora. Pleurocystidia 25–35 × 6–10 μ; cheilocystidia 33–47 × 5–7 μ. Cuticula hyphas brunneas incrustatas et non-incrustatas sine colore gerens, 4–6 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Mt. Rainier National Park, Washington, Sept. 24, 1952, A. H. Smith 40178.

Pileus 5 cm wide, 2–3 cm long, sessile, broadly fan-shaped, "cinnamon buff," evenly fibrillose to appressed squamulose.

Lamellae radiating, dingy cinnamon, drying russet to dark cinnamon, subdistant, narrow.

Spores 7–9(10) × 3–4.5 μ, elongated drop-shaped, inequilateral in profile, obscurely roughened-punctate, ochraceous in 2% KOH. Basidia 23–26 × 6–7.5 μ, 4-spored. Pleurocystidia 25–35 × 6–10 μ, cylindric-capitate, clavate, or obclavate, inconspicuous, with a highly refractive granulose content in 2% KOH; cheilocystidia 33–47 × 5–7 μ, cylindric, or clavate-fusoid, at times appendiculate, with a granulose refractive content. Gill trama subparallel, hyphae 5–8 μ broad. Pileus trama more or less interwoven. Cuticle bearing a dense turf of brown, incrusted hyphae, 9–12 μ broad, and some colorless, non-incrusted hyphae, 4–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On conifer log, Washington, September.

MATERIAL STUDIED: WASHINGTON: Smith 40178, type, from Mt. Rainier National Park, St. Andrews Creek, Sept. 24, 1952.

OBSERVATIONS: This species is distinguished from its near relatives by its pileus colors, elongated drop-shaped or long-pyriform spores, incrusted cuticular hyphae, and the presence of pleurocystidia.

Section Fulvidi sec. nov.

Pileus coloratus, vel fibrillas brunneas gerens.

Pileus colored, or with colored fibrils (for yellowish or ochraceous species, see next choice); clamp connections present.

Type species: *Crepidotus kauffmanii* sp. nov.

Key to Species

1. Spores 10–14 μ long ---------- 2
1. Spores shorter ---------- 3
   2. Pileus tawny; lamellae very distant; stipe present, eccentric ---------- Ex 6. *Phaeomarasmius distans**
   2. Pileus dark brick-red; lamellae distant; stipe none ---------- Ex 7. *Phaeomarasmius rufolateritius**
3. Pileus glabrous, or appearing so ---------- 4
3. Pileus fibrillose ---------- 5
   4. Spores 4–5.5 × 3–4.5 μ, distinctly warty ---------- Ex 8. *Pyrrhoglossum pyrrhus**
   4. Spores (5.5)6.5–8.5 × 4.5–5.5(6) μ ---------- 70. *C. payettensis*
5. Pileus reddish-orange, zinc orange, ochraceous-tawny ---------- 6
5. Pileus of other colors ---------- 7
   6. Spores 5–7 × 2.3–3 μ, cylindric-allantoid, pink in deposits ---------- Ex 14. *Phyllotopsis nidulans**
   6. Spores 6.5–8(9) × 4.5–6(7) μ, broadly ellipsoid or subovoid, brown in deposits ---------- Ex 9. *Pleuroflammula flammea**
7. Spores (5)5.5–7(8) μ long ---------- 8
7. Spores 7.5–9(10–11) μ long ---------- 10
   8. Pileus fawn, tawny-olive, to light buff, with dense avellaneous to light vinaceous cinnamon, incrusted fibrils ---------- 71. *C. kauffmanii*
   8. Pileus otherwise colored, bearing white, non-incrusted fibrils ---------- 9
9. Stipe present; spores 5.3–6 × 4–5 μ, smooth ---------- Ex 3. *Melanotus eccentricus**
9. Stipe absent; spores 6–8 × 4–5 μ, punctate ---------- 72. *C. roseibrunneus*
   10. Spores subreniform; pileus

*See Excluded Species, p. 141, 143, 144, 145, 148

25–75 mm broad ---------- 73. *C. paxilloides*
10. Spores not as above; pileus smaller ---------- 11
11. Spores elongated drop-shaped; pileus "cinnamon buff" ---------- 69. *C. rainierensis*
11. Spores ellipsoid ---------- 12
12. Spores smooth; stipe present ---------- 65. *C. haustellaris*
12. Spores punctate; stipe absent ---------- 74. *C. hamulatus*

70. Crepidotus payettensis sp. nov.
Illustration: Fig. 143.

Pileus 5–12 mm latus, sessilis, dimidiatus, glabrosus, paene "buckthorn brown" deinde fusco-ochraceus. Lamellae confertae, latae, obscuro-fulvae. Sporae (5.5)6.5–8.5 × 4.5–5.5(6) μ, ellipsoideae, punctatae. Basidia 23–30 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 26–44 × 5–10 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Payette National Forest, Idaho, July 14, 1958, A. H. Smith 58531.

Pileus 5–12 mm broad, sessile, dimidiate, glabrous and smooth to the place of insertion on substratum, near "buckthorn brown," moist, (dingy yellow brown), fading to dingy ochraceous, margin even and naked, surface becoming somewhat rivulose. Context thin, pliant, dingy pallid; odor and taste none.

Lamellae close, broad, attached to a basal point, at maturity dingy fulvous, between "ochraceous tawny" and "buckthorn brown," edges even or uneven.

Spores (5.5)6.5–8.5 × 4.5–5.5(6) μ, ellipsoid, minutely punctate, wall double, brown in 2% KOH. Basidia 23–30 × 6–8 μ, 4-spored. Pleurocystidia none cheilocystidia 26–44 × 5–10 μ, clavate, or cylindrical, at times somewhat ventricose, at times capitate, sometimes constricted. Gill trama interwoven, hyphae 4–8 μ broad. Pileus trama densely interwoven. Cuticle of repent hyphae, bearing scattered, more or less erect, colorless hyphae. Clamp connections present but rare.

HABIT, HABITAT, AND DISTRIBUTION: On decorticated lodgepole pine log, Idaho, July.

MATERIAL STUDIED: IDAHO: Smith 58531, type, from South Fork, Lake Fork Creek, Payette National Forest, July 14, 1958.

OBSERVATIONS: This species is related to *C. kauffmanii,* but is distinguished by its glabrous, differently-colored pileus and lack of brown, incrusted, epicuticular hyphae.

71. Crepidotus kauffmanii sp. nov.
Crepidotus calolepis (Fr.) Karst. *sensu* Kauffman, Agar. Mich. 1: 522. 1918.
Illustrations: Figs. 20, 144.

Pileus (6)10–30 mm latus, sessilis, convexus, flabelliformis, "light buff," "fawn"

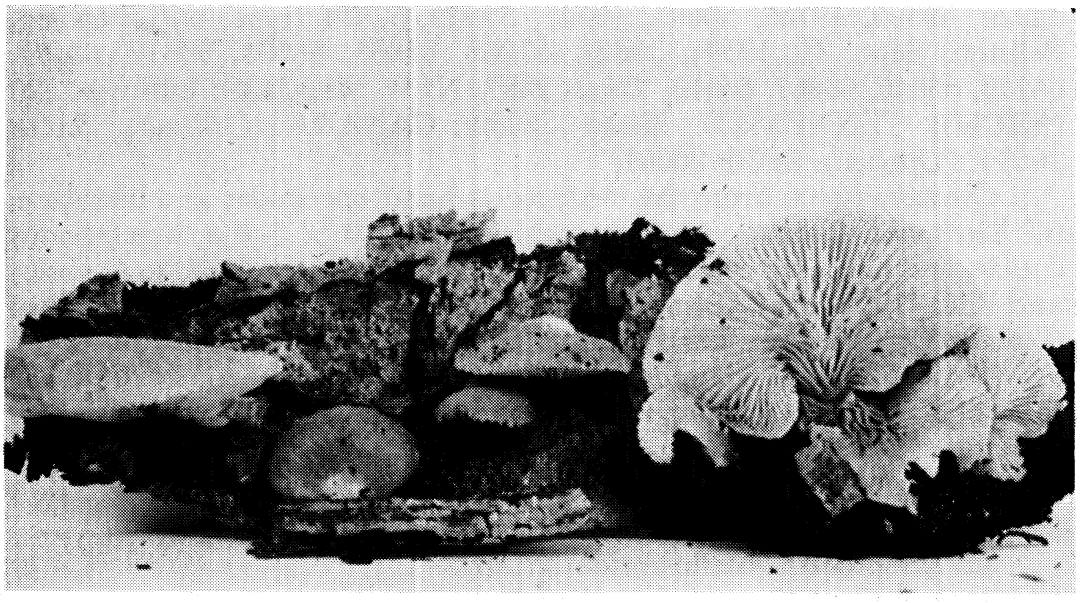

FIG. 20. *C. kauffmanii*

vel "tawny olive," fibrillis vel squamis "avellaneous" demum "light vinaceous cinnamon" densis. Lamellae confertae vel densae, latae, primum albae deinde "pale cinnamon buff" vel "avellaneous." Sporae (5)5.5–7(8) × 4–5(5.5) μ, ellipsoideae vel subovoideae, punctatae. Basidia (20)25–33 × 6–7(8) μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 30–50(80) × 5–11 μ. Cuticula ex hyphis repentibus composita, hyphas brunneas incrustatas et non-incrustatas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston, Mich.; Sept. 21, 1957, A. H. Smith 57814.

Pileus (6)10–30 mm broad, sessile, convex, flabelliform, dry, light buff, fawn, or "tawny olive," with dense, "avellaneous," or "wood brown" to "light vinaceous cinnamon" fibrils which may fade to pallid in age, fibrils appressed or felted, at times aggregated to form scales, basal portion white to buff tomentose. Context thin, light-drab to whitish; odor and taste not distinctive.

Lamellae rounded behind, broad, close or crowded, with 4–5 tiers of lamellulae, white at first, then pale cinnamon buff or avellaneous.

Spores "Sayal brown" in deposits, (5)5.5–7(8) × 4–5(5.5) μ, ellipsoid or subovoid, obscurely inequilateral in profile, punctate. Basidia (20)25–33 × 6–7(8) μ, 2-4-spored. Pleurocystidia none; cheilocystidia 30–50(80) × 5–11 μ, clavate or ventricose, at times cylindric or filamentous, the apices rounded or more rarely forked. Gill trama interwoven to subparallel, hyphae 5–8(12) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a tangled turf of brown, incrusted hyphae, 5–9 μ broad, and colorless hyphae, 3–5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs and fallen limbs, Canada, Michigan, Tennessee, and New Mexico, June–October.

MATERIALS STUDIED: MICHIGAN: Potter 3671 (MICH); Shaffer 2593 (MICH); Smith 9550, 21704, 25508, 25814, 32303, 32304, 33866, 36668,

42029, 49595, 49766, 50893, 50941, 57089, 57814 (type, on aspen log, Pellston, Sept. 21, 1957), 57821, 57862, 57863, 58061, 63512, 63584, 66259, 66848, 66867, 66910; Thiers 2897; NEW MEXICO: Barrows 1290 (MICH); TENNESSEE: Hesler 26080; CANADA (Ontario): Smith 26534; (Quebec): Smith 26601.

OBSERVATIONS: From the evidence at hand, specimens and literature, the European *C. calolepis* has smooth spores 7–10 × 5–6 μ, a gelatinous cuticle, and no clamp connections. It is therefore closely related to *C. mollis*; and Pilát (1948) and Kühner & Romagnesi (1953) treat it as a variety of *C. mollis*. On the other hand, Kauffman's *C. calolepis* has punctate spores, 5.5–7 × 4–5 μ, a non-gelatinous cuticle, and clamp connections. From our study of Kauffman's and other collections, it is apparent that, until now, this is an undescribed species.

72. Crepidotus roseibrunneus sp. nov.
Illustration: Fig. 145.

Pileus 4–8 mm latus, sessilis, ungulatus, se extendens, avellaneus, albo-fibrillosus, margine villosus, incurvatus. Lamellae confertae, latae, pallidae deinde fuscae. Sporae 6–8 × 4–5 μ, ellipsoideae, punctatae. Basidia 23–28 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 34–55 × 4–9 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., July 9, 1951, A. H. Smith 36814.

Pileus 4–8 mm broad, sessile, ungulate, expanding, white-fibrillose, avellaneous, margin villose, incurved.

Lamellae close, broad, pallid then tawny, edges fimbriate.

Stipe none, or only a pseudostipe.

Spores 6–8 × 4–5 μ, ellipsoid, inequilateral in profile, punctate. Basidia 23–2 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 34–55 × 4–9 μ, clavate, subcylindric, more or less bottle-shaped, apices obtuse, more rarely appendiculate. Gill trama subparallel, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing numerous, more or less erect hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 36814, type, from Tahquamenon Falls State Park, July 9, 1951.

OBSERVATIONS: This is somewhat related to *C. payettensis,* which is glabrous, and has slightly broader spores. It differs from *C. kauffmanii,* which has brown, incrusted hyphae on the pileus.

73. Crepidotus paxilloides Sing. Lilloa 22: 594. 1951.
Paxillus reniformis Berk. & Rav. *apud* Berk. & Curt., Ann. & Mag. Nat. Hist. II: 12: 424. 1853.

Crepidotus reniformis (B. & Rav. *apud* B. & C.) Singer, Farlowia 2: 544. 1946. (*Non C. reniformis* Velenovsky, Ceské houby, p. 556. 1921.)
Illustration: Fig. 146.

Pileus 2.5–7.5 cm broad, pale brown, reniform, densely tomentose to fibrillose-scaly, subimbricated.

Lamellae whitish, at length subferruginous by the spores, very broad, thin, close.

Spores 7.5–9(10) × 5–6 μ, ellipsoid or ovoid in face view, slightly inequilateral and subreniform in profile, distinctly punctate, pale brown in 2% KOH. Pleurocystidia none; cheilocystidia 32–36 × 5–6 μ, ventricose to slender bottle-shaped. Pileus trama interwoven. Cuticle of repent hyphae, bearing more or less erect, brownish hyphae, singly or in clusters, and more or less clavate pilocystidia, 40–80 × 6–10 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On oak rail, North Carolina.

MATERIAL STUDIED: NORTH CAROLINA: Berkeley 1538, type (K), from Sulphur Spring, collected by H. W. Ravenel.

OBSERVATIONS: The description of microscopic characters is based on a study of the type. The subreniform spores are distinctive. Except for its brown fibrils on the pileus, it is close to *C. phaseoliformis.*

74. Crepidotus hamulatus sp. nov.
Illustration: Fig. 147.

Pileus 3–6 mm latus, flabelliformis demum semiorbicularis, pallido-avellaneus, villosus. Lamellae pallidae deinde brunnaceae, subdistantes demum paene confertae, latae vel medio-latae. Sporae 7.5–11 × 4.5–6(7) μ, ellipsoidae, punctatae. Basidia 24–31 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 32–50 × 5–7 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, illas marginibus sinuosas et in spiram volutas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., Aug. 14, 1957, A. H. Smith 66271.

Pileus 3–6 mm broad, flabelliform to semiorbicular, pallid avellaneous, minutely villose under a lens, especially on the margin.

Lamellae pallid then brownish, broad or medium broad, subdistant to nearly close, edges fimbriate.

Spores 7.5–11 × 4.5–6(7) μ, ellipsoid, inequilateral in profile, punctate. Basidia 24–31 × 6–7 μ, 2–4-spored. Pleurocystidia none; chelocystidia 32–50 × 3–7 μ, filamentous, slender-ventricose, clavate, apices often tapering upward. Gill trama slightly interwoven, hyphae 3–7 μ broad. Pileus trama densely interwoven, appearing more or less cellular in tangential sections. Cuticle of repent hyphae, the surface bearing scattered, colorless, straight, erect hyphae, 15–30 × 2–3 μ; the margin with dense, crooked and coiled hyphae, 3–4 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On *Acer,* Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 66271, type, from Mud Lake Bog, Cheboygan County, Aug. 14, 1957.

OBSERVATIONS: This species is close to *C. kauffmanii,* which has colored, incrusted fibrils on the pileus and distinctly smaller spores.

Section Phaseoli sec. nov.

Sporae phaseoliformes vel subphaseoliformes in obliquam.
Spores phaseoliform to sub-phaseoliform in profile.
Type species: *Crepidotus phaseoliformis.*
Only one species known to date.

75. Crepidotus phaseoliformis sp. nov.
Illustration: Fig. 148.

Pileus 1–3 cm latus, sessilis, convexo-dimidiatus, albidus, fibrillosus. Lamellae "pale tawny," confertae demum subdistantes, latae. Sporae (5.5)6–8 × 4–4.5 μ, ellipsoideae vel ovoideae ad frontem conspectae, oblique phaseoliformes, planae. Basidia 23–28 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 44–60(76) × 4–7 μ. Cuticula gelatinosa, hyphas erectas sine colore gerens, 3–6 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Perry Sound District, Ontario, Canada, Sept. 1919, Kelly 158.

Pileus 1–3 cm broad, sessile, convex-dimidiate with an incurved margin, dull white and unchanging, appressed fibrillose, or when young the fibrils more or less erect. Context white, firm.

Lamellae near pale ochraceous tawny when dried, close to subdistant, broad, edges serrulate.

Spores (5.5)6–8 × 4–4.5 μ, ellipsoid or more rarely ovoid in face view, phaseoliform or subphaseoliform in profile, smooth, wall moderately thick. Basidia 23–28 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 44–60(76) × 4–7 μ, filamentous to cylindric, apices at times slightly enlarged to subcapitate, often appearing slightly gelatinous. Gill trama with a distinct mediostrate, the hyphae 3–5 μ broad and slightly interwoven; on either side of the mediostrate the hyphae distinctly gelatinous—the trama appearing bilateral. Pileus trama interwoven and often vesiculose. Cuticle a distinct gelatinous zone, 110–200 μ thick, bearing on its surface a turf of colorless, non-incrusted hyphae, 3–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On birch, Canada, September.

MATERIAL STUDIED: CANADA: Kelly 158, type (MICH), from Perry Sound District, Ontario, Sept. 1919.

OBSERVATIONS: This species is characterized by its phaseoliform, smooth spores, and its gelatinous cuticular zone on the pileus surface.

Section Fusisporae sec. nov.

Sporae fusoideae.
Spores fusoid.
Type species: *Crepidotus fusisporus.*

Key to Varieties

1. Epicuticular hyphae straight ---------- 2
1. Epicuticular hyphae crooked or coiled ---------- 5
   2. Spores (7)8.5–12 μ long; on *Abies* ---------- 76. *C. fusisporus* var. *abietinus*
   2. Spores (6)7–9(10) μ long; on hardwood ---------- 3
3. Cheilocystidia 29–60 × 3–16 μ ---------- 77. *C. fusisporus* var. *longicystis*
3. Cheilocystidia 19–45 μ long ---------- 4
   4. Cheilocystidia contorted (crooked, forked, or knobbed) ---------- 78. *C. fusisporus* var. *anomalus* var. nov.
   4. Cheilocystidia not contorted (straight) ---------- 79. *C. fusisporus* var. *fusisporus*
5. Cheilocystidia contorted ---------- 80. *C. fusisporus* var. *rameus*
5. Cheilocystidia not contorted ---------- 81. *C. fusisporus* var. *simplex*

76. Crepidotus fusisporus sp. nov. var. **abietinus** var. nov.
Illustration: Fig. 149.

Pileus 8–15 mm latus, sessilis, flabelliformis demum cucullatus, peralbus, planus. Lamellae pallido-brunneae, confertae, medio-latae. Sporae (7)8.5–12 × (3)3.5–4.5(5) μ, fusoideae, punctatae. Basidia 22–27 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 22–45 × 5–11 μ. Cuticula ex hyphis repentibus composita, hyphas sine colore gerens, 2–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum prope Wagner's Falls, Mich., Sept. 7, 1933, A. H. Smith 33–902.

Pileus 8–15 mm broad, sessile, fan-shaped or cucullate, pure white, cottony and dull, slightly tomentose near the base, margin not at all striate.

Lamellae attached to a substipitate point on the lower side, very pale brown, thin, close, moderately broad.

Spores (7)8.5–12 × (3)3.5–4.5(5) μ, fusoid, pointed at both ends, punctate, clinging in 2's, 3's, or 4's, smooth or nearly so. Basidia 22–27 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–45 × 5–11 μ, clavate to ventricose, at times capitate. Gill trama interwoven, hyphae 5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless, straight hyphae, 2–3 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead twigs of *Abies,* Michigan, September.

MATERIAL STUDIED: MICHIGAN: Smith 33–902, type, from Wagner's Falls, Sept. 7, 1933.

OBSERVATIONS: The spores of this variety range longer than in any of the other varieties of *C. fusisporus.*

77. Crepidotus fusisporus var. **longicystis** var. nov.
Illustration: Fig. 150.

Pileus 10–22 mm latus, sessilis, albus, fibrillosus. Lamellae confertae, mediolatae. Sporae 7–10 × 3.5–5 μ, fusoideae vel subfusoideae, punctatae. Basidia 24–30 × 5–6(7) μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 29–60 × 3–16 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2–3.5 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., July 7, 1949, A. H. Smith 32464.

Pileus 10–22 mm broad, sessile, whitish, "light buff" when dried, fibrillose or villose, white-tomentose at base.

Lamellae close, medium broad, edges fimbriate.

Spores 7–10 × 3.5–5 μ, fusoid or subfusoid, inequilateral in profile, obscurely punctate. Basidia 24–30 × 5–6(7) μ, 2–4-spored. Pleurocystidia none; cheilocystidia 29–60 × 3–16 μ, filamentous, or cylindric and at times capitate, ventricose, or irregularly flexuous-clavate. Gill trama slightly interwoven, hyphae 4–6 μ broad. Pileus trama interwoven, often loosely so. Cuticle of repent hyphae, bearing a turf of colorless, straight hyphae 2–3.5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood log, Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 32464, type, from North Fish Tail Bay, Univ. Mich. Biological Station, July 7, 1949.

OBSERVATIONS: The exceptionally long cheilocystidia distinguish this variety from all others. The surface of the dried pileus is "light buff."

78. Crepidotus fusisporus var. **anomalus** var. nov.
Illustrations: Figs. 21, 151.

Pileus 5–15 mm latus, flabelliformis vel ungulatus, fibrillosus, obscuro-albus demum pallido-coriaceus. Lamellae confertae, medio-latae, albae deinde "pinkish cinnamon," denique "clay color." Sporae (6)8–10 × 4–5 μ, fusoideae, punctatae. Basidia 24–28 × 5–7 μ, tetrasporae. Pleurocystidia desunt; cheilocystidia 25–34 × 7–11 μ, furcata, nodosa vel capitata. Cuticula sine magno discrimine, superficies hyphas erectas sine colore gerens, 2–5 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 7, 1963, Alma Homola, Smith 67042.

Pileus 5–15 mm broad, flabelliform or ungulate, surface dry and thinly matted-fibrillose, dull white to very pale dingy buff, base only slightly strigose. Context very thin and pliant, whitish, taste mild.

Lamellae moderately close, medium broad, attached to a pseudostipe, white, becoming pinkish cinnamon, finally pale clay, edges even.

Spores (6)8–10 × 4–5 μ, fusoid, obscurely punctate, yellowish in 2% KOH, often clustered in 2's, 3's, or 4's. Basidia 24–28 × 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–34 × 7–11 μ, clavate, ventricose, apices often forked, knobbed, or capitate. Gill trama interwoven, hyphae 3–7 μ broad. Pileus trama interwoven. Cuticle not sharply differentiated, the surface bearing a turf of colorless hyphae, 2–5 μ broad. Clamp connections present.

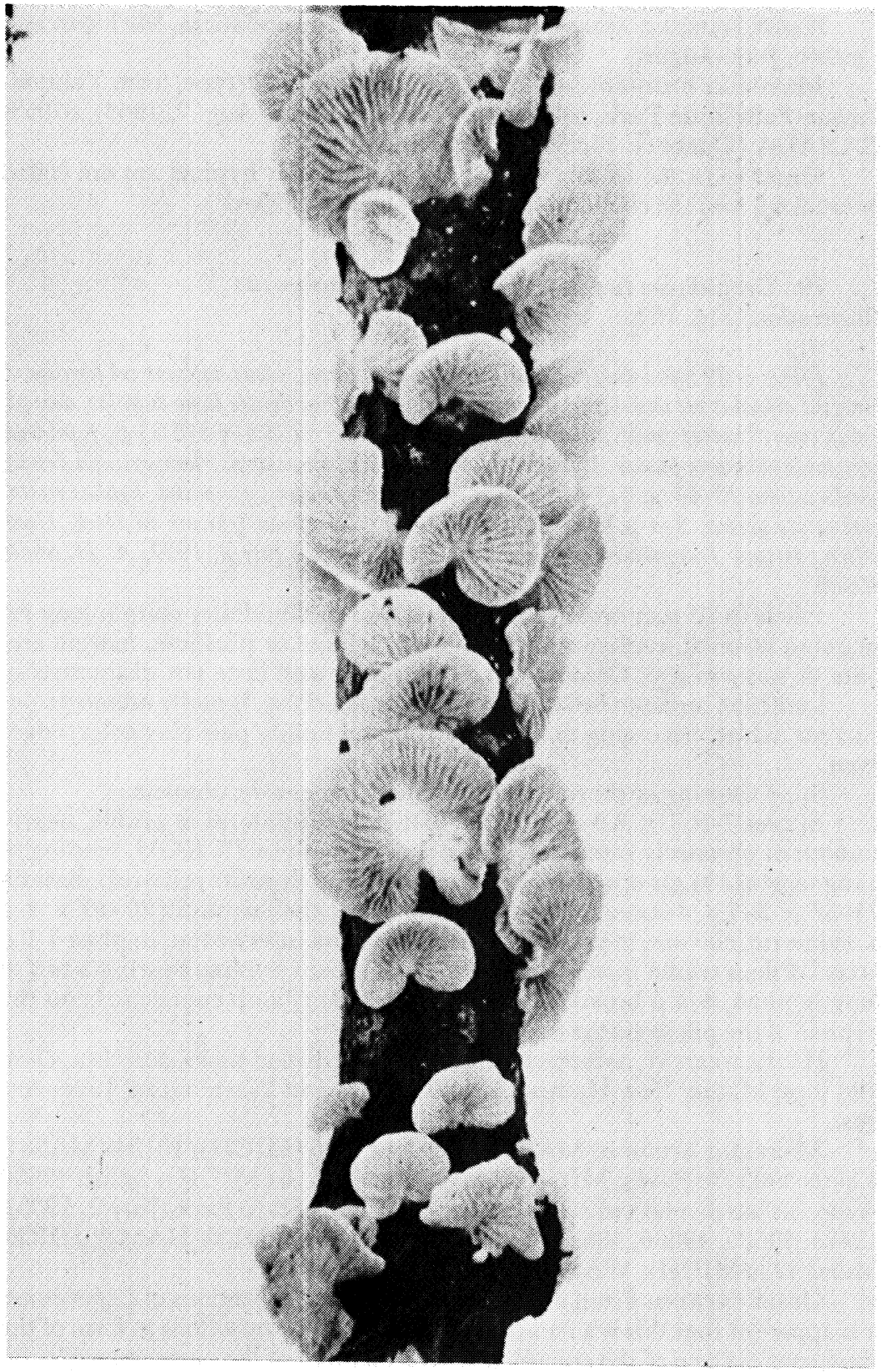

FIG. 21. *C. fusisporus* var. *anomalus* × 2

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks, Michigan and Quebec, July–August.

MATERIAL STUDIED: MICHIGAN: Smith 67042 (type, from Tahquamenon Falls State Park, collected by Alma Homola, Aug. 7, 1963), 67053; CANADA (Quebec): Bigelow 5575 (MASS).

OBSERVATIONS: In this variety, the epicuticular hyphae are not coiled or crooked, and the cheilocystidia are knobbed or forked.

79. Crepidotus fusisporus sp. nov. var. **fusiporus**
Illustration: Fig. 152.

Pileus 6–20 mm latus, conchatus demum dimidiatus, albus, villosus vel fibrillosus, margine crenatus vel undulatus, involutus. Lamellae albae deinde fusco-luteolae, denique "clay color," medio-latae, subdistantes. Sporae 7–9.5 × 3.5–4.5(5.3) μ, fusoideae, punctatae vel paene planae. Basidia 24–32 × 5–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 20–40 × 4–5 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 3–4 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum Tahquamenon Falls State Park, Mich., July 2, 1955, A. H. Smith 49680.

Pileus 6–20 mm broad, sessile, conchate to dimidiate, margin long remaining inrolled, surface snow white, dry, villose or fibrillose, margin crenate to wavy in age. Context soft, white; odor and taste not distinctive.

Lamellae medium broad, subdistant or nearly so, broadly adnate to decurrent, white, becoming dingy yellowish and finally pale clay color, edges even.

Stipe wanting or short, white and finely tomentose, obsolete.

Spores 7–9.5 × 3.5–4.5(5.3) μ, fusoid, inequilateral in profile, nearly smooth or obscurely punctate, very pale yellowish in 2% KOH, tending to hang together in groups of 2, 3, or 4, color in thin deposit: yellowish. Basidia 24–32 × 5–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 20–40 × 4–5 μ, cylindric, clavate, to subventricose. Gill trama interwoven, hyphae 5–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae bearing a turf of long hyphae, 3–4 μ broad, colorless, branched. Clamp connections on the hyphae of the pileus trama and the epicutis.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks, dead branches, and logs, Maine, New Hampshire, Michigan, and Washington, June–August.

MATERIAL STUDIED: MAINE: Bigelow 1956 (MICH), 10194 (MASS); Thiers 3903 (MICH); MICHIGAN: Beach 4, 5, 6 (MICH); Smith 49680 (type, on hardwood twigs, Tahquamenon Falls State Park, July 2, 1955), 49684, 49685, 49686, 49687; Thiers 2849 (MICH); NEW HAMPSHIRE: Miller 423 (MICH); WASHINGTON: Smith 29213.

OBSERVATIONS: From our study of some forty collections of *C. fusisporus,* it is apparent that this is a complex of varieties. The variations in form of the cheilocystidia and of the epicuticular hyphae were at the outset puzzling. So far as our studies now have gone, these variations, from collection to collection, are sufficiently stable to assign populations to varietal status. These va-

rieties are united through their fusoid spores. The spores also vary somewhat in their surface character: they may be distinctly punctate to obscurely so, or smooth to nearly so. A microscopic mount showing apparently smooth spores will also show some spores which are obscurely punctate. Thus, this character, in our experience, seems hardly reliable for distinguishing the varieties.

80. Crepidotus fusisporus var. **rameus** var. nov.
Illustrations: Figs. 22, 153, 154.

Pileus (3)10–30 mm latus, flabelliformis, ungulatus vel conchatus, albus, pubescens, margine incurvatus, lobatus. Lamellae albae deinde "pinkish buff," denique "clay color," confertae medio-latae. Sporae 7–9(10) × (3)4–5(5.5) μ, fusoideae, asperae vel paene planae. Pleurocystidia desunt; cheilocystidia 21–43(72) × 5–15 μ, contortae. Cuticula hyphas erectas, rectas vel sinuosas demum in spiram volutas gerens. Fibulatae

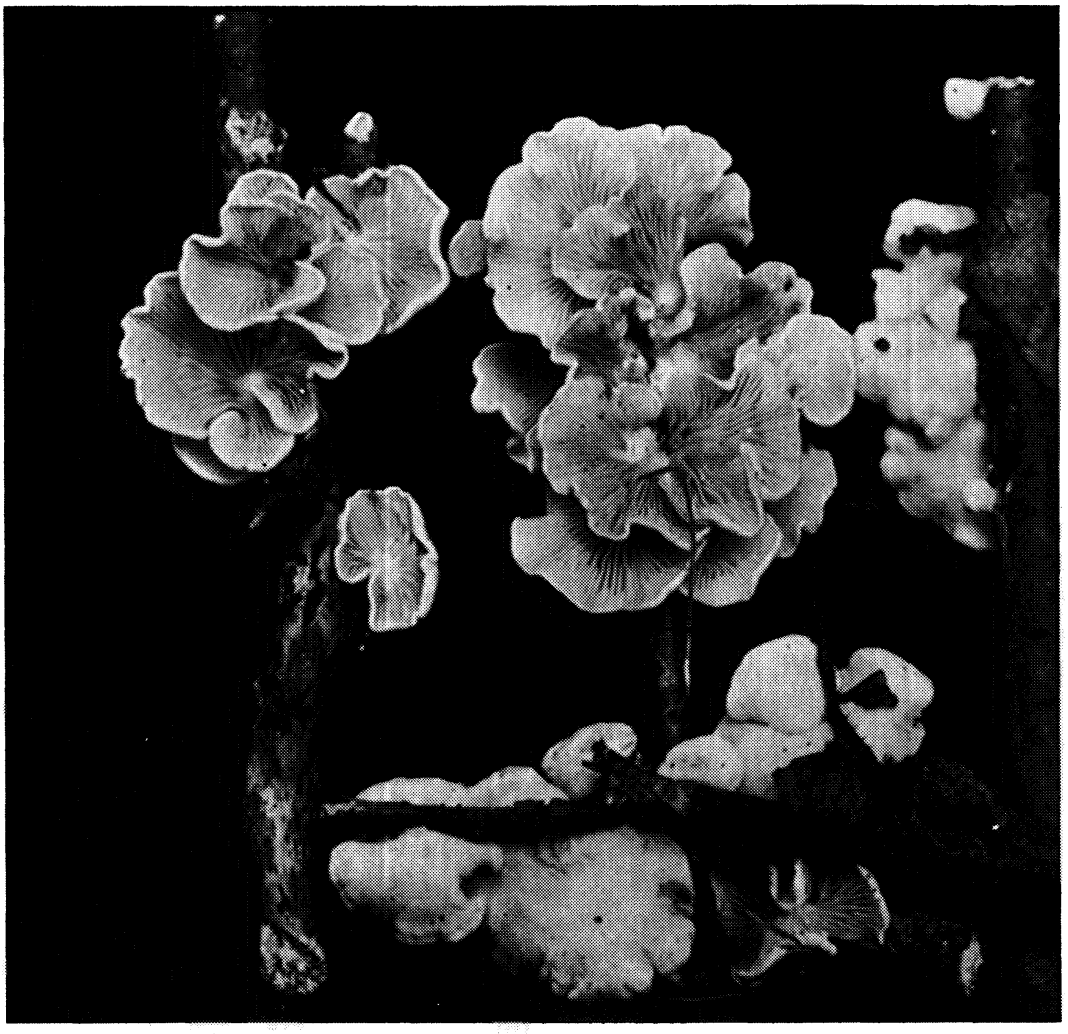

FIG. 22. *C. fusisporus* var. *rameus*

adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 7, 1963, A. H. Smith 67058.

Pileus (3)10–30 mm broad, flabelliform, ungulate or conchate, surface snow white, cottony pubescent, becoming dingy yellowish in KOH, $FeSO_4$ –0, margin often creased to lobed, incurved at first. Context thin and pliant, white, odor and taste mild.

Lamellae close to near subdistant, moderately broad, white becoming pinkish buff, finally clay color, edges even, attached around the base of the pseudostipe.

Stipe a white pseudostipe, or more rarely a true, eccentric stipe, 1 × 0.2–0.3 mm.

Spore deposit pinkish cinnamon-buff. Spores 7–9(10) × (3)4–5(5.5) μ, fusoid, nearly smooth or obscurely rough, often in clumps of 2, 3, or 4. Pleurocystidia none; cheilocystidia 21–43(72) × 5–15 μ, ventricose, subfusoid, occasionally with a neck, at times forked, contorted or asymmetrical, knobbed. Gill trama interwoven, hyphae 2–3 μ, or 5–8 μ broad. Epicuticular hyphae straight or, especially on the margin, crooked or coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On fallen twigs of *Betula, Alnus,* and other hardwoods, Maine and Michigan, June–August.

MATERIAL STUDIED: MAINE: Bigelow 3040, 3085, 3168, 4035 (MASS); MICHIGAN: Smith 32601, 49866, 50036, 66645, 67057, 67058 (type, from Tahquamenon Falls State Park, Aug. 7, 1963), 67059, 67223; Thiers 3155 (MICH).

OBSERVATIONS: This variety differs from others in its crooked to coiled, epicuticular hyphae and its contorted cheilocystidia.

81. **Crepidotus fusisporus** var. **simplex** var. nov.

Pileus 4–20 mm latus, sessilis, conchatus demum flabelliformis, albus, pubescens, margine involutus. Lamellae medio-latae, confertae vel paene subdistantes. Sporae 7–9.5 × 3.7–4.6(5) μ, fusoideae vel subfusoideae, punctatae, saepe subleves. Basidia 26–30 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 25–36 × 5–8 μ. Cuticula ex hyphis repentibus composita, hyphas erectas saepe sinuosas vel in spiram volutas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Tahquamenon Falls State Park, Mich., Aug. 9, 1963, A. H. Smith 67100.

Pileus 4–20 mm broad, sessile, conchate to flabelliform, white, pubescent or villose, opaque, margin inrolled.

Lamellae medium broad, moderately close or at times nearly subdistant.

Stipe absent, or present and small, inconspicuous, and disappearing.

Spores 7–9.5 × 3.7–4.6(5) μ, fusoid or subfusoid, obscurely punctate, often nearly smooth, pale yellowish, clinging together in 2's, 3's, or 4's. Basidia 26–30 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–36 × 5–8 μ, clavate to slightly bottle-shaped. Gill trama interwoven, hyphae 5–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf

of long, narrow (3–5 μ), colorless hyphae, often crooked or coiled, especially on the margin. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On sticks, New Hampshire, Michigan, and Oregon, July–August, and November.

MATERIAL STUDIED: MICHIGAN: Smith 37780, 49683, 67100 (type, from Tahquamenon Falls State Park, Aug. 9, 1963); Thiers 3119 (MICH); NEW HAMPSHIRE: Miller 280 (MICH); OREGON: Zeller 7829 (MICH).

OBSERVATIONS: This variety is characterized by its regularly-shaped cheilocystidia and crooked or coiled epicuticular hyphae.

Section Betulae sec. nov.

Sporae planae.
Spores smooth.
Type species: *Crepidotus betulae* Murr.

Key to Species

1. Taste very bitter at once ---------- 82. *C. amarus*
1. Taste mild or not distinctive ---------- 2
   2. Spores with a germ-pore ---------- 3
   2. Spores lacking a germ-pore ---------- 8
3. Veil present; pileus chrome-yellow ------ Ex 10. *Pleuroflammula dussii**
3. Veil lacking ---------- 4
   4. Cuticle a gelatinous zone ---------- Ex 4. *Melanotus psychotriae**
   4. Cuticle not gelatinous: gills purplish-violaceous ---------- 5
5. Pileus avellaneous to isabelline or pinkish cinnamon ---------- 6
5. Pileus white, whitish, or with ochraceous tints ---------- 7
   6. Spores 7–9 × 5–6 μ ---------- Ex 11. *Melanotus subcuneiformis**
   6. Spores 5–6 × 4–5 μ ---------- Ex 3. *Melanotus eccentricus**
7. Pileus lightly appressed-fibrillose to subglabrous; cheilocystidia 6–11 μ broad ---------- Ex 12. *Melanotus flavolivens**
7. Pileus glabrous or slightly pruinose; cheilocystidia 3–4 μ broad ---------- Ex 13. *Melanotus fumosifolius**
   8. Cuticle a gelatinous zone ---------- 9
   8. Cuticle non-gelatinous ---------- 10
9. Pileus 4–13 cm broad; gills purplish-brown when bruised ---------- 83. *C. maximus*
9. Pileus (2)10–24 mm broad; gills unchanging when bruised ---------- 84. *C. betulae*
   10. Spores 7–9.5(10.5) μ long ---------- 11
   10. Spores 4.5–7(8) μ long ---------- 13

*See Excluded Species, p. 141, 142, 145, 146, 147

11. Pileus pure white and remaining so when dried ---------- 85. *C. occidentalis*
11. Pileus darkening on being dried ---------- 12
    12. Lamellae crowded; cuticle well-developed; basidia 26–38 × 6–8 μ ---------- 86. *C. antillarum*
    12. Lamellae subdistant or distant; cuticle not differentiated; basidia 16–24 × 5–6 μ ---------- 87. *C. lundellii*
13. Stipe present and persisting ---------- 82. *C. amarus*
13. Stipe absent, or, if present, soon disappearing ---------- 14
    14. Pileus ochraceous, margin strongly crenate-sulcate ---------- 88. *C. pecten*
    14. Pileus white or whitish, margin not as above ---------- 15
15. Spores 6–8.5 × 4.5–5.5 μ ---------- 87. *C. lundellii*
15. Spores 4.5–5.5(7) × 3.5–4.5 μ ---------- 16
    16. Pileus glabrous; cheilocystidia 20–35 μ long ---------- 17
    16. Pileus silky-fibrillose; cheilocystidia 30–83 μ long ---------- 91. *C. albissimus*
17. Pileus attached to a rhizomorphic strand; pilocystidia present ---------- 89. *C. rhizomorphus*
17. Pileus lacking a rhizomorphic strand; pilocystidia none ---------- 90. *C. albidus*

82. Crepidotus amarus Murr. Mycologia 35: 430. 1943.
Illustration: Fig. 155.

Pileus 5–8 mm broad, convex, not resupinate at first, reniform or subcircular, uniformly white, unchanging, pulverulent, margin at times slightly striate. Context thin, white; taste very bitter at once.

Lamellae adnexed, broad at the base, distant, inserted, whitish, becoming fulvous, edges beaded, fimbriate.

Stipe always present, eccentric, short, slender, curved, white.

Spores 6–8.5 × 5–6 μ, ellipsoid to ovoid, equilateral, wall thick, smooth. Basidia 18–24 × 4–5 μ, 4-spored. Pleurocystidia none; cheilocystidia 33–48 × 3–7 μ, clavate to cylindric, more or less subcapitate, base at times enlarged, often crooked. Gill trama slightly interwoven, hyphae 3–4 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered to numerous (rarely a turf) pilocystidia, 35–55 × 2.5–4 μ, filamentous, often somewhat flexuous, apices at times forked. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead grape-vine, Florida, June.

MATERIAL STUDIED: Florida: Murrill F 17226, type, from Gainesville, June 28, 1938.

OBSERVATIONS: The presence of a permanent stipe and a very bitter taste should facilitate the recognition of this species.

83. Crepidotus maximus sp. nov.
Crepidotus mollis sensu Sm. & Hes., Elisha Mitchell Sci. Soc. Jour. 56: 310. 1940. [*Non C. mollis* (Fr.) Staude]

Illustrations: Figs. 23, 156.

Pileus 4–13 cm latus, sessilis, imbricatus, dimidiatus, cuneatus vel flabelliformis, convexus deinde planus, albus vel albidus, denique "light ochraceous buff," rivuloso-reticulatus, fibrillosus, viscidus demum glutinosus, necnon incurvatus. Lamellae albae deinde "snuff brown," purpureo-brunneae contusae, confertae, angustae. Sporae (6)7–8(9) × 4–4.5(5) μ, ellipsoideae, planae. Basidia 23–30 × 5–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 48–96 × 5–10 μ. Cuticula gelatinosa, hyphas erectas sine colore gerens, 3–5 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Tenn.; lectum prope Knoxville, Tenn., L. R. Hesler 9718.

Pileus 4–13 cm broad, sessile, somewhat imbricate, dimidiate, cuneate or broadly flabelliform, convex, then more or less plane, or the margin wavy and the midportion more or less depressed, white or whitish, becoming tinted "light ochraceous-buff," coarsely rivulose-reticulated, innately fibrillose, distinctly viscid or almost glutinous when wet, soon dry, not hygrophanous, margin incurved and even. Context thick, tough, rather turgid, pallid.

Lamellae radiating, white at first, becoming "snuff brown," "argus

FIG. 23. *C. maximus*

brown," or "Brussel's brown," with a purple-brown tint where bruised, close, linear, relatively narrow (up to 5 mm), narrowed at the ends, edges white-fimbriate, at times gelatinous.

Stipe none, pileus tapering into a stipe-like base, which is usually white villose-strigose.

Spores (6)7–8(9) × 4–4.5(5) μ, ellipsoid in front view, shorter spores slightly inequilateral in profile, some spores suboblong, 7.5–8.5 × 4 μ, smooth, "Prout's brown" in deposits, brown in 2% KOH. Basidia 23–30 × 5–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 48–96 × 5–10 μ, long clavate-cylindric, at times short-clavate, occasionally subcapitate, sometimes pale fuscous, many of tramal origin. Gill trama with a broad mediostrate of parallel to subparallel, dark hyphae, the hyphae on either side colorless and loosely interwoven. Subhymenium of narrow, more or less interwoven hyphae. Pileus trama interwoven, hyphae 5–12 μ broad. Cuticle a broad (350–500 μ or more) zone of gelatinous, interwoven, narrow (2–3 μ) hyphae, the surface usually bearing numerous colorless, narrow (3–5 μ) hyphae forming a trichodermium. Hypodermium usually quite distinct. Clamp connections present on the hyphae of the epicutis, pileus trama, and the gill trama.

HABIT, HABITAT, AND DISTRIBUTION: On dead, standing hickory trunk, Tennessee, November.

MATERIAL STUDIED: TENNESSEE: Hesler 9718, type, from near Knoxville, in Knox County, Nov. 7, 1936.

OBSERVATIONS: This was erroneously identified by us as *C. mollis* (Smith & Hesler, 1940), but it differs from the latter in the presence of clamp connections, more narrow spores, color-change of gills when bruised, and the lack of brown, incrusted hyphae.

84. Crepidotus betulae Murr. North Amer. Flora 10: 151. 1917. Illustration: Fig. 157.

Pileus (2)10–24 mm broad, sessile, pure white, suborbicular or reniform, dimidiate, villose with felted hairs, glabrous toward the margin with age, margin entire. Context rather thick, fleshy.

Lamellae rounded behind, pure white, at length colored by the spores, crowded, medium broad to broad, plane, edges at times gelatinous.

Spores 6–8.5 × 4–5 μ, ellipsoid, slightly inequilateral in profile, smooth. Basidia 20–27 × 5–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 33–65(125) × 4–10 μ, cylindric, clavate, flask-shaped to ventricose, often tramal in origin. Gill trama subparallel, often with a brownish mediostrate and a gelatinous subhymenium, hyphae 3–7 μ broad. Pileus trama interwoven. Cuticle a gelatinous zone, 100–180 μ thick, of loosely interwoven, slender hyphae, bearing scattered, slender, colorless, erect hyphae, the innermost zone a distinct hypodermium. Clamp connections on the epicuticular hyphae and on the tomentum at the base of the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On dead wood of birch, alder, beech, and other deciduous trees, New Hampshire, New York, Virginia, Tennessee, and Michigan, June–September.

MATERIAL STUDIED: MICHIGAN: Smith 66940, 67413; NEW HAMPSHIRE: Miller 408; NEW YORK: Earle 241, type (NY), June 16, 1902; TENNESSEE: Hesler 7874.

OBSERVATIONS: Although Murrill (1917) described the pileus as dry, there is a distinct gelatinous, cuticular zone.

85. Crepidotus occidentalis sp. nov.
Illustration: Fig. 158.

Pileus 10–30 mm latus, albus, immutabilis, flabelliformis, pubescens, margine incurvatus. Lamellae confertae, latae vel medio-latae. Sporae 7–10 × 5–6(7) μ, ellipsoideae vel subovoideae, planae. Basidia 26–34 × 7–9 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 33–55 × 4–7 μ. Cuticula ex hyphis repentibus composita, hyphas erectas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Lake Crescent, Wash., June 4, 1939, A. H. Smith 14051.

Pileus 10–30 mm broad, pure white and remaining so when dried, flabelliform, dry, minutely pubescent, margin incurved. Context white; odor and taste not recorded.

Lamellae adnate to the apex of a pseudostipe if present, or converging to a point, close, broad to moderately broad, edges fimbriate.

Pseudostipe at times present.

Spores 7–10 × 5–6(7) μ, ellipsoid to subovoid, slightly inequilateral in profile, smooth, brown (dark clay color). Basidia 26–34 × 7–9 μ, 4-spored. Pleurocystidia none; cheilocystidia 33–55 × 4–7 μ, filamentous, cylindric, subventricose, or subclavate. Gill trama subparallel, hyphae 4–9 μ broad. Pileus trama interwoven, with large interspaces. Cuticle of repent hyphae, bearing a turf of straight, long, slender hyphae. Clamp connection present on the trichodermial hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On *Alnus,* Washington, June.

MATERIAL STUDIED: WASHINGTON: Smith 14051 (type, from Lake Crescent, June 4, 1939), 14558.

OBSERVATIONS: This differs from *C. betulae* in its larger spores and lack of a gelatinous cuticle. It is related to *C. lundellii* and *C. antillarum,* neither of which remains pure white at maturity or on drying.

86. Crepidotus antillarum (Pat. apud Duss) Singer Lilloa 13: 62. 1947.
Crepidotus cinchonensis Murr., Mycologia 5: 30. 1913.
Tremellopsis antillarum Pat. apud Duss, Enum. Champ. Gaudel, p. 13. 1903.
Illustration: Fig. 160.

Pileus reaching 2 cm broad, convex to plane, reniform to orbicular, dull watery-white, drying cinnamon buff, pulverulent to nearly glabrous, base sometimes strigose, attached by a lateral or eccentric point, or by the vertex and appearing resupinate when growing on the lower side of a log or trunk, dry, margin striate. Context thin, soft.

Lamellae radiating from a lateral or eccentric point, dull watery white, becoming subfulvous, thin, crowded, ventricose, broad in the middle.

Stipe none.

Spores 7.5–10.5 × 5–7 μ, mostly 8–9 × 5–5.5 μ, ellipsoid, smooth, dark clay color. Basidia 20–38 × 6–8(9) μ, 2–4-spored. Pleurocystidia none; cheilocystidia 25–50 × 5–9 μ, somewhat variable: ventricose, clavate, often more or less constricted, and at times subcapitate, many collapsed against the gill edge. Gill trama subparallel, hyphae 4–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, with or without erect, scattered, colorless, straight, septate hyphae. Clamp connections present on the epicuticular hyphae and the tomentum at the base of the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Jamaica and Guadeloupe; also South Florida (Singer 1947).

MATERIALS STUDIED: JAMAICA: Murrill 610, type (NY) of *C. cinchonensis*, from Cinchona, Dec. 25–Jan. 8, 1908–9; GUADELOUPE: No. 224, type (FH) of *C. antillarum*.

OBSERVATIONS: Our observations on *C. antillarum* were limited by the paucity of material of the type. The spores and general features support Singer's contention that it agrees with the type of *C. cinchonensis*. Singer (1947) interpreted the pileus trama as being subgelatinous.

87. **Crepidotus lundellii** Pilát

Apud Lundell & Nannfeldt, Fungi Exsicc. Suecici praesertim Upsalienses No. 220. 1935.

Illustration: Fig. 159.

Pileus 6–17 mm broad, white, drying pale buff or ochre, sessile, dry, at first ungulate or conchate, finally more or less expanded, villose, base strigose or tomentose, margin incurved.

Lamellae whitish, becoming pale brown, narrow to medium broad, nearly close to close.

Stipe none or, if present, inconspicuous and temporary.

Spores 6–8(8.5) × 4.2–5.2(5.5) μ, ellipsoid, inequilateral in profile, smooth, wall moderately thick, pale yellowish-brown in 2% KOH. Basidia 20–26 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–56 × 4–12 μ, cylindric and at times more or less capitate and constricted, ventricose, clavate. Gill trama subparallel, hyphae 6–9 μ broad. Pileus trama interwoven. Cuticle not differentiated, the surface bearing a turf of colorless hyphae, some narrow (2–4 μ broad), others broad (4–10 μ), the hyphal cells often more or less inflated at the septa, and the terminal elements often as clavate pilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan and New York, June–September; also Europe.

MATERIAL STUDIED: MICHIGAN: Shaffer 1300 (MICH); Smith 57885; NEW YORK: Bigelow 5057; NETHERLANDS: Bas 10778 (L); SWEDEN: Pilát 149039, type (PR), on decaying *Ulmus* branches, collected by Seth Lundell, Sept. 15, 1935.

OBSERVATIONS: The spore measurements above are based on Smith's collection No. 57885. In Pilát's type, the spores are 6.5–8.5(9) × 4.5–5(5.3) μ; and in Bas' collection from the Netherlands, 6–8.5 × 4.5–5.5 μ. In Pilát's description (1948), he gives the spores 7–10.5 × 5.8–7.5 μ, mostly 8 × 6 μ. But in a study of his type, we found no spores longer than 9 μ.

Pilát (1948) discusses variability of the spores, and in some collections he found the spores to be shorter (6.5–7.5 × 4.5–5.5 μ). For these short-spored forms, he has described (1940) *C. lundellii* var. *subglobisporus,* based on material from Czechoslovakia and Sweden. *C. lundellii* var. *lundellii* is distinguished from *C. albissimus* by its larger spores. The relationship of *C. lundellii* var. *subglobisporus* to *C. albissimus* is as yet not entirely clear.

88. Crepidotus pecten (B. & C.) Sacc. Syll. Fung. 5: 885. 1887.
Agaricus (Crepidotus) pecten B. & C., Ann. Mag. Nat. Hist. III: 4: 291. 1859.
Illustration: Fig. 161.

Pileus 4 mm broad, sessile, resupinate to reflexed, flabelliform, ochraceous, tomentose, white-downy around point of attachment, margin crenate-sulcate. Context white.

Lamellae medium broad, moderately close to subdistant, umbrinous at maturity, edges white fimbriate.

Spores 6.8–8 × 5.3–6 μ, more or less ovoid or more rarely ellipsoid in front view, very slightly inequilateral in profile, smooth, no germ-pore, thick (double)-walled, brown in 2% KOH. Basidia 18–22 × 4.5–6 μ. Pleurocystidia none; cheilocystidia 27–63 × 5–8 μ, clavate, often subcapitate, in conspicuous clusters. Gill trama subparallel. Pileus trama interwoven. Cuticle of repent hyphae, with more or less erect, colorless, short hyphae. Clamp connections present on the epicuticular hyphae, and at the base of some of the cheilocystidia.

HABIT, HABITAT, AND DISTRIBUTION: On dead branches, North Carolina.

MATERIAL STUDIED: NORTH CAROLINA: Curtis 4991, type (K).

OBSERVATIONS: The umbrinous gills suggest an atypical *Crepidotus,* but the spores and other structural features of the pileus and hymenium indicate a *Crepidotus.* Pilát (1950) says that it approaches *C. lundellii* var. *subglobisporus.*

89. Crepidotus rhizomorphus Burt Ann. Missouri Bot. Garden 10: 181. 1923.

Pileus 5–7 mm broad (dried), sessile, "pinkish buff" (dried), glabrous, membranous, margin even, entire.

Lamellae radiating from a central point, ventricose, snuff brown.

Rhizomorphic strand, about 1 mm broad, bone brown, extends along the grass culm.

Spores 5–7 × 3.5–5 μ, ellipsoid, smooth, brown. Basidia 17–20 × 4–5 μ. Pleurocystidia none; cheilocystidia 20–30 × 5–6 μ, versiform (fusoid, bot-

tle-shaped, irregularly clavate). Gill trama slightly interwoven, hyphae 3–5 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing at intervals small clusters of colorless, erect pilocystidia, cylindric-capitate, clavate, at times with a septum cutting off a rounded terminal cell. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On culm of grass, Hawaiian Islands, July.

MATERIAL STUDIED: HAWAII: F. L. Stevens 940, type, Hawaii, July 23, 1921 (Ill-30029).

OBSERVATIONS: This species is closely related to *C. albidus,* from which it is distinguished by its brown rhizomorph and its pilocystidia.

89. Crepidotus albidus E. & E. Philadelphia Acad. Nat. Sci. Proc. 1894: 322. 1895.

Illustration: Fig. 162.

Pileus 5–7.5 mm broad, sessile, resupinate, nearly white, glabrous, margin incurved when dry.

Lamellae radiating from a lateral point, pallid, becoming yellowish-brown, broad, not crowded, thin.

Spores 5–7 × 4–5 μ, ellipsoid, smooth. Basidia 27–31 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–35 × 2–5 μ, more or less filamentous to cylindric, somewhat flexuous. Pileus trama interwoven. Cuticle of repent hyphae, bearing more or less erect, slender, short hyphae. Clamp connections small and rare.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan and Colorado, April-May.

MATERIAL STUDIED: COLORADO: Bethel, collected at Palmer Lake, March 1911, marked "Type" (NY); MICHIGAN: Kauffman 95, on dead trees, Ann Arbor, collected by A. J. Pieters, May 23, 1894, and marked "Co-Type" by Kauffman; a portion of the type collection, presumably sent from Ann Arbor to Ellis by Pieters, is on deposit at N. Y. Botanical Garden, and another portion is at University of Michigan.

OBSERVATIONS: The material of both the Michigan and Colorado collections is sparse and not satisfactory for critical study. The description of the spores given above is based on the iso-type from Michigan. The description of gill and pileus structure above is based on the Bethel collection from Colorado, which is not the type, even though it is so marked.

Although our study of this species is unsatisfactory, we include an account of it for the record and in the hope it may be found again. It is characterized by its small whitish, glabrous pileus, its short, smooth spores, and the presence of clamp connections.

91. Crepidotus albissimus Murr. Mycologia 35: 530. 1943.

Illustration: Fig. 163.

Pileus 8–12 × 6–8 mm, convex, reniform, dry, silky-fibrillose, very white, unchanging, margin even, incurved. Context white, unchanging.

Lamellae adnate, white, whitish when dry, rather broad behind, medium distant, inserted, edges fimbriate.

Spores 5.3–7 × 3.5–4.5 μ, ellipsoid or subovoid, smooth, pale brown. Basidia 22–28 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 30–83 × 4–7 μ, cylindric, slender-clavate, at times subventricose, apices rounded, or capitate, frequently blunt. Gill trama subparallel, hyphae 3–5 μ broad. Pileus trama distinctive: the inner three-fourths more densely interwoven, the outer one-fourth more loosely organized and pale. Cuticle of several layers of repent hyphae, bearing a turf of slender (2.5–5 μ), colorless hyphae, the terminal elements, in some instances, as more or less clavate pilocystidia. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead hardwood branch, Florida, June.

MATERIAL STUDIED: FLORIDA: Murrill F 17281, type, from near Gainesville, June 28, 1938.

OBSERVATIONS: This is a smooth-spored, white species, related to *C. albidus,* but the pileus is very white and silky-fibrillose, and the cheilocystidia are long (up to 83 μ). Although the pileus surface is dry to the touch, the outer fourth of the pileus trama (sections in KOH), appear slightly gelatinous. It is distinguished from *C. lundellii* by its smaller spores.

Section Dochmiopus

Spores 6(6.5) μ or less in length.

Type species: *Crepidotus variabilis* (Fr.) Kummer var. *variabilis.*

Key to Species

1. Pileus white, pubescent, villose, or fibrillose ---------- 2
1. Pileus colored ---------- 4
   2. Spores 2.5–3.5(4) μ broad ---------- 3
   2. Spores 4–5.5 μ broad ---------- 106. *C. subsphaerosporus*
3. Cheilocystidia 5–8 μ or more in diameter, clavate, ventricose ---------- 92. *C. variabilis* var. *variabilis*
3. Cheilocystidia 1.5–3(5) μ broad, filamentous, often flexuous or branched ---------- 93. *C. variabilis* var. *trichocystis*
   4. Pileus pale cinnamon ---------- 94. *C. cinnamomeus*
   4. Pileus and gills yellowish ---------- 5
5. Pileus lemon yellow; cuticle of 9–12 hyphae deep, bearing a turf of long (up to 1000 μ) hyphae and some pilocystidia ---------- 125. *C. subcroceitinctus*
5. Pileus orange-buff or warm-buff, margin tawny or yellow ocher; cuticle of one or two layers, turf of short hyphae ---------- 124. *C. croceitinctus*

92. Crepidotus variabilis (Fr.) Kummer Der Führer in die Pilzk., p. 74. 1871. var. **variabilis.**

Agaricus variabilis Fr., Syst. Myc. 1: 275. 1821.

Agaricus (Crepidotus) cheimonophyllus B. & Br. *apud* Berk. Outlines, p. 164. 1860.

Claudopus variabilis (Fr.) Gill., Champ. Fr., p. 426. 1876.

Dochmiopus variabilis (Fr.) Pat., Hymen. Europe, p. 113. 1887.

Crepidotus cheimonophyllus (B. & Br.) Sacc., *sensu* Sydow, Syll. Fung. 5: 882. 1887.

Illustration: Fig. 164.

Pileus 4–20 mm broad, resupinate to reflexed, attached laterally or dorsally, flabelliform, dimidiate or reniform, white, villose or tomentose, dry. Context moderately thin.

Lamellae radiating from a lateral point, white then ocher-flesh to pinkish-cinnamon, close or subdistant, medium broad, edges fimbriate.

Stipe none, or present when young and then very short, eccentric, and temporary.

Spores 4.5–6 × 2.5–3.5(4) μ, oblong-ellipsoid, at times subovoid, punctate, pale brownish. Basidia 20–28 × 5–6 μ, 2–4-spored. Pleurocystidia none; cheilocystidia (18)20–50 × 5–16 μ, clavate, ventricose, at times capitate, occasionally forked or branched, more rarely subcuneate. Gill trama interwoven, hyphae 3–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of hyphae 3–4 μ broad, colorless, densely tangled, those on the margin at times flexuous. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan; England and Netherlands, July-October.

MATERIAL STUDIED: MICHIGAN: Smith 66824; ENGLAND: Smith 63231 (MICH); Wakefield 8–10–36 (K); 4–11–45 (K); Dennis 30–9–51 (K); Reid (TENN 24024); NETHERLANDS: Bas (TENN 26105).

OBSERVATIONS: The collections we have studied seem to exhibit some variations in spore-width, and in the form of the cheilocystidia. Those which have spores up to 2.5–4 μ broad, and regularly shaped cheilocystidia, we interpret as *C. variabilis* var. *variabilis;* those with relatively broader spores (4–5 μ), we refer to *variabilis* var. *subsphaerosporus;* and, finally, those with typical spores (2.5–4 μ broad), but with filamentous, often flexuous and branched cheilocystidia, we refer to *variabilis* var. *trichocystis.*

93. Crepidotus variabilis var. **trichocystis** var. nov.

Illustration: Fig. 165.

Pileus 4–12 mm latus, sessilis, ungulatus, albus, fibrillosus. Lamellae albae demum roseae, denique brunnaceae, confertae vel paene subdistantes, latae. Sporae 4.5–6 × 2.8–4 μ, ellipsoideae, punctatae. Basidia 18–25 × 5–6 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 30–55(82) × 2–5(6) μ, gracilia. Cuticula ex

hyphis repentibus composita, hyphas erectas sine colore gerens, 1.5–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Burt Lake, Mich., July 18, 1963, A. H. Smith 66819.

Pileus 4–12 mm broad, sessile, ungulate, pure white, villose or fibrillose, base cottony-tomentose.

Lamellae white, then pinkish to brownish, close or at times nearly subdistant, broad.

Spores 4.5–6 × 2.8–4.0 μ, ellipsoid, slightly to scarcely inequilateral in profile, obscurely punctate. Basidia 18–25 × 5–6 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 30–55(82) × 2–5(6) μ, cylindric or filamentous, flexuous, often knobbed, forked, or branched, at times contorted, more rarely coiled. Gill trama subparallel, hyphae 3–5(9) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered to gregarious, erect hyphae, 1.5–3 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer twigs, branches, and debris, Michigan, Colorado, and Idaho, July-August.

MATERIAL STUDIED: COLORADO: Smith 51448, 51690, 51727, 52376; IDAHO: Smith 58753, 65857; MICHIGAN: Smith 66819, type, on birch twigs, Burt Lake, Maple Bay, July 18, 1963.

OBSERVATIONS: This variety is characterized chiefly by its filamentous to slender cylindric, flexuous or more or less contorted cheilocystidia.

94. Crepidotus cinnamomeus sp. nov.
Illustration: Fig. 166.

Pileus 8–20 mm latus, sessilis, dimidiatus vel inaequalis, obscuro-albus deinde cinnamomeus, fibrillosus. Lamellae confertae vel densae, angustae demum mediolatae, pallidae deinde cinnamomeae vel rubido-brunneae. Sporae 5–6.2 × 3.3–4(4.2) μ, ellipsoideae, punctatae. Basidia 22–28 × 4–6 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 32–42 × 5–8 μ. Cuticula sine magno discrimine, hyphas erectas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Priest Lake, Idaho, Oct. 1, 1956, A. H. Smith 53816.

Pileus 8–20 mm broad, sessile, dimidiate to irregular, margin often lobed, surface dull white becoming flushed cinnamon, tomentose near and over basal area, somewhat appressed fibrillose toward the margin. Context white, thin and pliant; odor and taste none.

Lamellae close to crowded, narrow to moderately broad, adnate to the pseudostipe, pallid when young becoming cinnamon to darker reddish brown when mature, edges even.

Stipe lacking or present only as a rudimentary pseudostipe.

Spores 5–6.2 × 3.3–4(4.2) μ, ellipsoid in face view, subinequilateral in profile, punctate, double-walled, brown in 2% KOH. Basidia 22–28 × 4–6 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 32–42 × 5–8 μ, cylindric-subcapitate, ventricose or clavate with a slender protruding neck, at times constricted and irregular in shape. Gill trama interwoven, hyphae 4–7 μ. Pileus trama interwoven. Cuticle not greatly differentiated from the trama,

the surface bearing a tangled trichodermium, the hyphae colorless, apices not coiled. Clamp connections found on hyphae of the epicutis and of the gill trama, and at the base of the basidia.

HABIT, HABITAT, AND DISTRIBUTION: On birch branches, Idaho, October.

MATERIAL STUDIED: IDAHO: Smith 53816, type, from Priest Lake, Oct. 1, 1956.

OBSERVATIONS: This species is related to *C. variabilis,* differing in its colors and its cheilocystidia.

Section Crepidotellae sec. nov.

Pileus albus vel pallide coloratus (cinereus, flavidus vel coriaceus); sporae ellipsoideae demum ovoideae, asperae, plerumque 6.5 μ vel etiam longiores.

Pileus white, or pale colored (grayish, yellowish, or buff). Spores ellipsoid to ovoid, rough, typically 6.5 μ or more in length.

Type species: *Crepidotus submollis* Murr.

Key to Species

1. Pileus at first white, at times becoming colored in age ---------- 2
1. Pileus at first colored (yellow, buff, pale clay) ---------- 23
2. Epicuticular hyphae of the pileus, or some of them, crooked and coiled ---------- 3
2. Epicuticular hyphae, if any, straight ---------- 11
3. Spores 5.5–8 μ long ---------- 4
3. Spores (7.5)8–12 μ long ---------- 7
4. Cheilocystidia conspicuously contorted, forked or branched -- 5
4. Cheilocystidia regular in form, or at most, slightly knobbed or flexuous (clavate, cylindric, ventricose) ---------- 6
5. Spores ellipsoid, or subovoid, (4)4.5–5.5 μ broad ---------- 95. *C. ellipsoideus*
5. Spores short, broadly ellipsoid or subglobose, (5.5)6–7 μ broad ---------- 96. *C. sphaerosporus*
6. Cheilocystidia lageniform, large, 48–64 × 7–13 μ ---------- 97. *C. lagenicystis*
6. Cheilocystidia cylindric, clavate, ventricose, not lageniform ---------- 98. *C. regularis*
7. Cheilocystidia contorted ---------- 99. *C. furcatus*
7. Cheilocystidia regular in shape, or somewhat flexuous ---------- 8
8. Pileus pure white, unchanging in age or when dried; spores 7–11(12) × 4–4.5 μ ---------- 100. *C. eburneus*
8. Pileus darkening in age or when dried ---------- 9
9. Spores 8–12(12.5) × 6–7 μ ---------- 101. *C. montanensis*
9. Spores 7–9.5 × 4.5–5.5 μ ---------- 10
10. Lamellae becoming pinkish ---------- 102. *C. epibryus*
10. Lamellae yellow-ocher ---------- 103. *C. subluteus*

11. Spores 5.5–7(8) μ long ---------- 12
11. Spores (7.5)8–13 μ long ---------- 15
    12. Cheilocystidia conspicuously contorted ---------- 13
    12. Cheilocystidia regular in shape ---------- 14
13. Pileus surface long-woolly ---------- 104. *C. lanuginosus*
13. Pileus villose, not woolly ---------- 105. *C. villosus*
    14. Spores short, relatively broad-ellipsoid; lamellae white then pinkish ---------- 106. *C. subsphaerosporus*
    14. Spores normally ellipsoid; lamellae white then brownish ---------- 107. *C. vulgaris*
15. Cuticle a conspicuous gelatinous zone ---------- 108. *C. alnicola*
15. Cuticle not gelatinous ---------- 16
    16. Cheilocystidia contorted ---------- 17
    16. Cheilocystidia regular in shape ---------- 18
17. Spores 4.5–5.5 μ broad; pileus margin typical sulcate-plicate ---------- 109. *C. submollis*
17. Spores 5.5–7(7.5) μ broad; pileus at times bilobed at the base ---------- 110. *C. cesatii*
    18. Spores punctate ---------- 111. *C. amygdalosporus*
    18. Spores wrinkled-verrucose ---------- 19
19. Lamellae at first grayish; pileus pale watery grayish, glabrous ---------- 112. *C. cinereipallens*
19. Lamellae at first white; pileus not gray ---------- 20
    20. Lamellae becoming brownish ---------- 21
    20. Lamellae assuming distinct pink tints ---------- 22
21. Cheilocystidia 24–38 × 4–8 μ and clavate, cylindric, ventricose; or napiform, spherical, to broadly clavate, 33–55 × 10–28 μ ---------- 113. *C. obscurus*
21. Cheilocystidia long, slender ventricose with a neck or slender bottle-shaped, 35–70 × 5–8 μ ---------- 114. *C. subverrucisporus* var. *subverrucisporus*
    22. Spores 7–9(10) × 4–6(7) μ ---------- 115. *C. subverrucisporus* var. *roseifolius*
    22. Spores (7.5)8–13 × 4.5–5.5 μ ---------- 116. *C. subverrucisporus* var. *megalosporus*
23. Epicuticular hyphae crooked and coiled ---------- 24
23. Epicuticular hyphae straight ---------- 25
    24. Spores 6–8 μ long ---------- 117. *C. circinatus*
    24. Spores 7.5–10 μ long ---------- 118. *C. helicus*
25. Spores 7–9(10) μ long ---------- 119. *C. milleri*
25. Spores (5.5)6–8 μ long ---------- 26
    26. Cheilocystidia contorted ---------- 120. *C. ramosus*
    26. Cheilocystidia regular in form ---------- 27
27. Gill-edges and cheilocystidia gelatinous ---------- 121. *C. mucidifolius*
27. Gill-edges and cheilocystidia not gelatinous ---------- 28
    28. Pileus margin incurved, fimbriate ---------- 122. *C. fimbriatus*
    28. Pileus margin not fimbriate ---------- 29
29. Spores ellipsoid, 6–8 μ long ---------- 123. *C. pallidoluteus*

29. Spores ovoid, 5.5–7(7.5) μ long ---------- 30
    30. Cuticle of one or two layers of repent hyphae, bearing a turf of short hyphae; pileus buff ---------- 124. *C. croceitinctus*
    30. Cuticle 9–12 hyphae deep, bearing a turf of very long hyphae; pileus lemon yellow ---- 125. *C. subcroceitinctus*

95. Crepidotus ellipsoideus sp. nov.
Illustration: Fig. 167.

Pileus (6)10–25 mm latus, sessilis, conchatus, reniformis, flabelliformis, albus deinde ochraceus demum coriaceus, fibrillosus. Lamellae confertae vel paene subdistantes, medio-latae, albae deinde alutaceae. Sporae (5.5)6–8 × (4)4.5–5.5 μ, ellipsoideae demum ovoideae, punctatae. Basidia 24–35 × 6–8 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 26–45(66) × 5–12(17) μ, contorta. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas et in spiram volutas, 3–6 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum prope Pellston Hills, Mich., July 16, 1961, O. Miller 1051.

Pileus (6)10–25 mm broad, sessile, dry, conchate, reniform, flabelliform, white or whitish, at times ochraceous or watery buff in age, pubescent to fibrillose, margin pruinose, inrolled. Context thin, white; odor and taste not distinctive.

Lamellae close or nearly subdistant, medium broad, white then alutaceous, edges even.

Spores (5.5)6–8 × (4)4.5–5.5 μ, ellipsoid or somewhat ovoid, inequilateral in profile, punctate, pale tawny in 2% KOH. Basidia 24–35 × 6–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 26–45(66) × 5–12(17) μ, ventricose, clavate, crooked, contorted, at times forked. Gill trama interwoven to subparallel, hyphae 5–9 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of crooked and coiled hyphae, 3–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, rarely on coniferous wood, Canada, Michigan, Colorado, Idaho, Indiana, Tennessee, June-September.

MATERIAL STUDIED: COLORADO: Smith 52722; IDAHO: Smith 65600; INDIANA: Cooke 32846; MICHIGAN: Miller 1049, 1050, 1051, type (MICH), from Pellston Hills, collected by O. Miller, July 16, 1961; Smith 49806, 57075, 57086, 57087b, 57090, 57091, 57092, 57093, 57887, 63577, 63582, 63586, 63671, 66820, 66845; TENNESSEE: Hesler 8083, 12778; ONTARIO: Kelly 936 (MICH).

OBSERVATIONS: This species is characterized by its white pileus, moderately small, punctate spores, contorted cheilocystidia, and crooked to coiled hyphae on the surface of the pileus. It appears to be near *C. sphaerosporus,* which has distinctly broader spores.

96. Crepidotus sphaerosporus (Pat.) Lange Dansk Bot. Arkiv. 9: 52. 1938.

Agaricus variabilis var. *sphaerosporus* Pat., Tab. an. fasc., p. 101, No. 226. 1884.
Crepidotus variabilis var. *sphaerosporus* (Pat.) Quél., Ench. Fung., p. 108. 1886.
Claudopus sphaerosporus (Pat.) Sacc., Syll. Fung. 5: 734. 1887.
Dochmiopus sphaerosporus (Pat.) Pat., Hymen. Europe, p. 113. 1887.
Illustration: Fig. 168.

Pileus 8–20 mm broad, sessile, white, silky or villose, reniform or conchate, expanding to semiorbicular, margin at times lobed, pubescent, and somewhat incurved. Context thin and white; odor and taste mild.

Lamellae white then ocher-brownish with a flush of pinkish-brown, medium broad, subdistant, lamellulae variable in number.

Spores (6)6.5–8 × 5.5–7.5 μ, short- and broadly-ellipsoid to subglobose, more rarely globose, spinulose-punctate to echinulate. Basidia 25–32 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 27–62 × 5–10 μ, cylindric, clavate, obclavate, ventricose, apices rounded, or often forked, branched or knobbed. Gill trama interwoven, hyphae 3–5 μ broad. Cuticle not sharply differentiated, the surface bearing a turf of colorless, narrow (2–4 μ), often crooked or coiled hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Europe.

MATERIAL STUDIED: FRANCE: Josserand (MICH 66267).

OBSERVATIONS: This species name is often placed in synonymy with *C. cesatii;* but on the basis of material we have seen, *C. sphaerosporus* differs from *C. cesatii,* which has longer, ellipsoid spores and straight (not coiled) epicuticular hyphae. At this point we refer to the paper by Favre (1935) in which he reports the spores of *C. sphaerosporus* to be 6–10 × 4.5–8 μ. Further critical studies of authentic material should provide additional evidence of their differences, if any. For the present, we are recognizing both *C. cesatii* and *C. sphaerosporus* as distinct species.

Thus far we have seen no North American material which we would refer to either *C. cesatii* or *C. sphaerosporus,* but we have included them for comparison, and on the possibility that one or both may still be found here.

97. Crepidotus lagenicystis sp. nov.
Illustration: Fig. 169.

Pileus 6–9 mm latus, sessilis, conchatus demum dimidiatus, cinereo-albus, fibrillosus, margine incurvatus. Lamellae medio-latae, paene subdistantes, marginibus albo-fimbriatae. Sporae 6–8 × 4.5–5.5 μ, ellipsoideae vel ovoideae, punctatae. Basidia 24–32 × 6–8 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 48–65 × 7–13 μ, lageniformia demum obclavata. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore, sinuosas et in spiram volutas gerens, 1.5–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Mt. Rainier National Park, Washington, July 12, 1948, Imshaug 255.

Pileus 6–9 mm broad, sessile, conchate to dimidiate, ashy-white, densely villose to tomentose throughout, including the incurved margin.

Lamellae medium broad, nearly subdistant, edges white-fimbriate.

Spores 6–8 × 4.5–5.5 μ, ellipsoid to ovoid, inequilateral in profile, obscurely punctate. Basidia 24–32 × 6–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 48–65 × 7–13 μ, lageniform to obclavate with a long neck. Gill trama subparallel, hyphae 5–8 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of slender (1.5–3 μ), colorless hyphae which often are crooked or coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On wood, California and Washington, July.

MATERIAL STUDIED: CALIFORNIA: Cooke 34192; WASHINGTON: Imshaug 255 (MICH), type, from Mt. Rainier National Park, July 12, 1948.

OBSERVATIONS: The large, conspicuous, lageniform cheilocystidia, together with the white silky pileus, and crooked or coiled epicuticular hyphae are distinguishing characters. *Crepidotus submollis* has straight epicuticular hyphae and different cheilocystidia.

98. Crepidotus regularis sp. nov.
Illustrations: Figs. 171, 205.

Pileus (5)10–25 mm latus, sessilis, conchatus deinde flabelliformis, albus, fibrillosus, margine involutus. Lamellae confertae vel subdistantes, latae, albae deinde "cinnamon buff." Sporae 6–8 × 4–5(5.5) μ, ellipsoideae demum ovoideae, punctatae demum echinulatae. Basidia 25–33 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia (20)25–52 × 4–9(12) μ. Cuticula ex hyphis repentibus composita, apicibus sinuosas vel in spiram volutas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich., lectum prope Milford, Mich., Aug. 10, 1937, A. H. Smith 6967.

Pileus (5)10–25 mm broad, sessile, conchate, expanding to flabelliform, opaque, white, white-pubescent or fibrillose, byssoid around the point of attachment, the margin inrolled and often fimbriate. Context thin, white; odor and taste not distinctive (in Smith 51806, taste raphanoid).

Lamellae radiating from a lateral point, or attached to a pseudostipe, close or subdistant, broad, white, becoming cinnamon buff, edges even.

Stipe none, or merely a pseudostipe which soon disappears.

Spores 6–8 × 4–5(5.5) μ, ellipsoid to ovoid, inequilateral in profile, minutely punctate to echinulate, yellowish-brown in 2% KOH. Basidia 25–33 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia (20)25–52 × 4–9(12) μ, cylindric, clavate, ventricose, at times more or less forked. Gill trama slightly interwoven, hyphae 3–8(11) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 2–6 μ broad, the tips or upper portions crooked or coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, rarely on conifer wood, Maine, North Carolina, Michigan, Missouri, Colorado, Idaho, Washington, Oregon, May-October.

MATERIAL STUDIED: COLORADO: Smith 51806, 52939; IDAHO: Smith 65021, Granite Twin Lakes; MAINE: Bigelow 3028 (MICH);

MICHIGAN: Beach 11, 25, 26 (MICH); Thiers 2879, 2901, 3069 (MICH); Potter 3465 (MICH); Smith 6967 (type, on hardwood twigs, Milford, Aug. 10, 1937), 21573, 49599, 49681, 49765, 69769, 49770, 49771, 49772, 49773, 49774, 49775, 49803, 49804, 49806, 49807, 49812, 49813, 50999, 57818, 63574, 63578, 66866, 66964, 66990, 67012, 67014, 67206, 67458; MISSOURI: Routien (TENN 13243); NORTH CAROLINA: Hesler 25731; OREGON: Smith 62457; WASHINGTON: Imshaug 1293 (MICH); Smith 13933, 28928.

OBSERVATIONS: In this species, there is an apparent scarcity of striking characters. The pileus is white, the surface hyphae crooked or coiled, the spores medium small, the cheilocystidia regular in form.

It is near *C. subepibryus,* which has straight or only slightly curved, but not coiled, epicuticular hyphae, less variable cheilocystidia, and more conspicuously punctate spores.

It is distinguished from *C. ellipsoideus* and *C. lagenicystis* by its more regularly shaped cheilocystidia. Although variable, the cheilocystidia are neither contorted nor lageniform. In one collection (MICH 51806), the flesh had a slightly raphanoid taste.

99. Crepidotus furcatus sp. nov.
Illustration: Fig. 170.

Pileus (4)10–30 mm latus, sessilis, ungulatus demum applanatus, fibrillosus, glabrescens, albus deinde "pinkish buff" demum "cinnamon buff," margine involutus. Lamellae albae, deinde "clay color" demum obscuro-ochreae, confertae, angustae deinde ventricosae. Sporae 7–10 × 4.5–5.5(6) μ, ellipsoideae demum ovoideae, punctatae. Basidia 28–35 × 6–8 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 30–50 × 4–10 μ, contorta vel furcata. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas vel in spiram volutas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., Oct. 9, 1955, A. H. Smith 50938.

Pileus (4)10–30 mm broad, sessile, ungulate to applanate, white, pubescent to villose, in age becoming more or less glabrescent and pinkish buff to cinnamon buff, margin inrolled. Context thin, white; odor and taste none.

Lamellae white becoming clay color to ocher tawny, close, narrow, becoming ventricose and medium broad, edges fimbriate.

Spores 7–10 × 4.5–5.5(6) μ, ellipsoid to ovoid, obscurely inequilateral in profile, minutely punctate, yellowish-brown in 2% KOH. Basidia 28–35 × 6–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 30–50 × 4–10 μ, cylindric, clavate, crooked, contorted, more rarely forked or knobbed. Gill trama interwoven, hyphae 5–8(12) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 3–7 μ broad, the upper portions crooked or coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, sticks and bark, Michigan, June-October.

MATERIAL STUDIED: MICHIGAN: Potter 3355, 3675 (MICH); Smith 50938 (type, on aspen, Mud Lake bog, Cheboygan County, Oct. 9, 1955), 50939, 50940, 57088, 57886, 57888.

OBSERVATIONS: The moderately large spores and flexuous or contorted cheilocystidia, together with its crooked and coiled epicuticular hyphae, characterize this species.

100. Crepidotus eburneus sp. nov.
Illustrations: Figs. 24, 172, 194.

Pileus 5–22 mm latus, sessilis, ungulatus deinde applanatus, albus, immutabilis, fibrillosus, margine incurvatus. Lamellae albae deinde obscuro-luteae, confertae, latae, vel medio-latae, ventricosae. Sporae 7–11 × 4–4.6 μ, ellipsoideae, extremis decrescentes, punctatae. Basidia 22–27 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia (18)27–43 × 5–10 μ. Cuticula ex hyphis repentibus composita, hyphas sinuosas vel in spiram volutas sine colore gerens, 3–5 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Ogemow Reserve, Mich., Sept. 4, 1963, A. H. Smith 67371.

Pileus 5–22 mm broad, sessile, ungulate then expanding, pure white and remaining so when dried, densely white-silky-fibrillose, margin more or less wavy, incurved. Context thin, white.

Lamellae white then dingy clay color, close or moderately so, ventricose, broad to medium broad, edges fimbriate.

FIG. 24. *C. eburneus*

Spores 7–11 × 4–4.6 μ, slender-ellipsoid, ends more or less pointed, inequilateral in profile, punctate. Basidia 22–27 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia (18)27–43 × 5–10 μ, clavate, obclavate, slightly pyriform, ventricose, cylindric, slightly flexuous. Gill trama subparallel, hyphae 4–6 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless, crooked or coiled hyphae, 3–5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, September.

MATERIAL STUDIED: MICHIGAN: Smith 67371, type, from Ogemaw Reserve, Sept. 4, 1963.

OBSERVATIONS: The snow white pileus remains so after being dried. The yellowish brown, slender spores, and the crooked or coiled, epicuticular hyphae also distinguish it.

101. Crepidotus montanensis sp. nov.
Illustration: Fig. 173.

Pileus 5–15 mm latus, albus, villosus, senescens resupinatus, ungulatus, deinde flabelliformis. Lamellae albae deinde ochraceae, medio-latae, subdistantes. Sporae 8–12(12.5) × 5.5–7 μ, ellipsoideae vel subovoideae, rugosae vel subverrucosae. Basidia 26–32 × 7–8 μ, (di-)tetraspora. Pleurocystidia desunt; cheilocystidia 34–45 × 3–6 μ. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas et in spiram volutas sine colore gerens, 3–6 μ vel 12–14 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Echo Lake, Flathead National Forest, Mont., July 6, 1928, C. H. Kauffman.

Pileus 5–15 mm broad, white, villose, sessile, not resupinate at first but becoming so in age, ungulate then flabelliform, margin faintly plicate, base white strigose.

Lamellae medium broad, subdistant or nearly so, at first white then ochraceous, edges fimbriate.

Spores 8–12(12.5) × 5.5–7 μ, ellipsoid, more rarely subovoid, slightly inequilateral in profile, wrinkled-rough to subverrucose. Basidia 26–32 × 7–8 μ, (2-)4-spored. Pleurocystidia none; cheilocystidia 34–45 × 3–6 μ, filamentous, cylindric, clavate, ventricose, at times slightly constricted, more rarely capitate. Gill trama interwoven, hyphae 5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless, crooked and coiled hyphae, 3–6 μ broad, or at times some cells inflated and then 12–14 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On mossy, living bark of birch, Montana, July.

MATERIAL STUDIED: MONTANA: Kauffman (MICH), type, from Echo Lake, Flathead National Forest, July 6, 1928.

OBSERVATIONS: The large wrinkled-subverrucose spores and the crooked and coiled hyphae on the pileus characterize it. It is closely related to *C. epibryus,* which has smaller spores. Kauffman, in his notes, designated

it doubtfully as *Crepidotus subversutus* n. sp. But this binomial had been used by Peck for a fungus which is a *Clitopilus,* and was never validly published.

102. Crepidotus epibryus (Fr.) Quél. sensu Pilát
Agaricus epibryus Fr., Syst. Myc., p. 275. 1821.
Crepidotus epibryus (Fr.) Quél., Flore Myc. Fr., p. 107. 1888.
Dochmiopus epibryus (Fr.) Romagn., Rev. Mycol. 2: 137. 1937.

Illustrations: Pilát Monogr. des espèces europ. du genre Crepidotus Fr., Tab. 24. Figs. 174, 175, 176.

Pileus 3–10 mm broad, sessile, semiorbicular, ungulate, finally more or less applanate, white, villose or silky, margin even, incurved. Context whitish, thin; odor and taste mild.

Lamellae radiating from a lateral point, white, then pale pinkish-brown, close or nearly subdistant, broad or moderately so, edges paler, fimbriate.

Spores 7.5–10(11) × 4.5–6 μ, ellipsoid to subovoid, base more or less pointed, slightly inequilateral in profile, surface wrinkled-verruculose. Basidia 28–35 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–58(70) × 4–9 μ, filamentous, clavate, flask-shaped or ventricose with a slender neck. Gill trama subparallel to slightly interwoven, hyphae 3–7 μ broad. Pileus trama interwoven. Cuticle not always sharply differentiated, the surface bearing a turf of colorless hyphae, 3–7 μ broad, the apical portions at times crooked or coiled. Clamp connections present.

HABIT HABITAT, AND DISTRIBUTION: On hardwood, Colorado, Michigan, and Tennessee, June–August; also in Europe.

MATERIAL STUDIED: COLORADO: Smith 51538, 51577, 51581, 51643, 51644, 51645, 51950; MICHIGAN: Smith 63607, 63645; Thiers 3119 (MICH); TENNESSEE: Hesler 17709, 22579; EUROPE (Czechoslovakia and Southeast Europe): Pilát 23401, 23404, 23405, 23472, 149031, 147345, 197708, 489525, 489568, 489588, 489592, 490535 (PR). (Also a collection by C. G. Lloyd, made in USA, locality not stated, and sent to Pilát, the latter's No. 149032.)

OBSERVATIONS: This species grows on hardwood and, in Europe at least, is often associated with mosses. The wrinkled-verruculose spores which are usually more or less pointed at the basal end, the long lecythiform cheilocystidia, and the crooked to coiled epicuticular hyphae are distinctive features of this species.

We have followed Pilát's concept in our studies of *C. epibryus.* Whether his concept is the same as that of Fries is uncertain.

103. Crepidotus subluteus sp. nov.
Illustration: Fig. 177.

Pileus 8–15 mm latus, sessilis, flabelliformis, albus, pubescens, margine incurvatus. Lamellae albidae deinde "yellow ocher," angustae demum medio-latae, confertae vel paene subdistantes. Sporae 7–9 × 4.5–5.5 μ, ellipsoideae, punctatae, cumulatae "yellow ocher." Basidia 26–30 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 22–34 × 6–21 μ. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas vel in spiram volutas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston Hills, Mich.; July 17, 1961, O. K. Miller 1047.

Pileus 8–15 mm broad, sessile, flabelliform, pure white, pubescent under a lens, margin incurved.

Lamellae whitish becoming "yellow ocher," narrow to moderately broad, close or nearly subdistant, edges even or slightly rough.

Spores 7–9 × 4.5–5.5 μ, ellipsoid, inequilateral in profile, obscurely punctate, color in deposit: near "yellow ocher." Basidia 26–30 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–34 × 6–21 μ, clavate, ventricose, at times with a neck, or subvesciculose to spathulate. Gill trama interwoven, hyphae 6–12(20) μ broad, often short-celled. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of crooked or coiled, colorless, non-incrusted hyphae, 2–5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead *Ulmus,* Michigan, July.

MATERIAL STUDIED: MICHIGAN: Miller (MICH) 1047, type, from Pellston Hills, leg. O. Miller, July 17, 1961.

OBSERVATIONS: This species is characterized by its pure white pileus, its yellow ocher gills and spores, and broad cheilocystidia. It is near *C. epibryus* and *C. eburneus,* the former with pinkish gills, and the latter with clay-brownish gills.

104. Crepidotus lanuginosus sp. nov.
Illustration: Fig. 178.

Pileus 10–20 mm latus, primum resupinatus deinde reniformis demum flabelliformis, albidus deinde brunnaceus, longo-fibrillosus vel lanatus, margine incurvatus. Lamellae albae deinde obscuro-fuscae, ochraceae vel obscuro-luteobrunneae, subdistantes vel paene confertae, latae vel medio-latae. Sporae 5..5–7(8) × 4.5–5.5 μ, ellipsoideae, punctatae. Basidia 24–30(35) × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 27–65 × 3–8 μ, saepe contorta. Cuticula ex hyphis repentibus, brunnaceis, non-incrustatis composita, hyphas erectas, longas, sine colore gerens, 2–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Brundage Mt., Idaho, July 6, 1954, A. H. Smith 44687.

Pileus 10–20 mm broad, resupinate at first, becoming reniform to flabelliform and curving away from the substratum, whitish, becoming brownish as the spores mature, dry, long, fibrillose or woolly, margin incurved, at times fringed.

Lamellae radiating from a lateral point, white, becoming dull tawny to ochraceous or darker yellowish-brown, subdistant or nearly close, broad or medium broad.

Spores 5.5–7(8) × 4.5–5.5 μ, ellipsoid, slightly inequilateral in profile, minutely punctate, often obscurely so. Basidia 24–30(35) × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 27–65 × 3–8 μ, cylindric or filamentous, ventricose, often crooked or contorted, at times forked or branched above. Gill trama undulating or regularly parallel to subparallel, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent, brownish, non-incrusted hyphae, bearing a turf of long, straight, colorless hyphae, 2–3 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On conifer sticks and limbs, Idaho and California, July.

MATERIAL STUDIED: CALIFORNIA: Cooke 15646, 18448 (MICH); IDAHO: Smith 44687 (type, Brundage Mt., Valley County, July 6, 1954).

OBSERVATIONS: The woolly, fibrillose pileus, with its incurved, often fringed margin are distinctive macroscopic features. The minutely punctate, relatively small spores, together with contorted cheilocystidia, and the brownish hyphae in the cuticular zone, distinguish it.

105. Crepidotus villosus sp. nov.
Illustration: Fig. 179.

Pileus (4)10–30 mm latus, sessilis, albus, villosus, primum resupinatus deinde conchatus demum flabelliformis. Lamellae albae deinde "light pinkish cinnamon" demum "vinaceous," medio-latae, confertae vel paene subdistantes. Sporae 5.5–7.5(8) × 4–5(5.5) μ, ellipsoideae, punctatae. Basidia (21)27–33 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 30–56(70) × 4–12 μ, contorta. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2–5(7) μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston Hills, Mich., Oct. 5, 1955, A. H. Smith 50880.

Pileus (4)10–30 mm broad, sessile, white, villose, resupinate at first, then conchate to flabelliform, dry, unpolished, base white-mycelioid. Context soft; odor and taste mild.

Lamellae white, then light pinkish cinnamon to vinaceous, close or nearly subdistant, medium broad.

Spores 5.5–7.5(8) × 4–5(5.5) μ, ellipsoid, slightly inequilateral, punctate or at times somewhat echinulate. Basidia (21)27–33 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 30–56(70) × 4–12 μ, cylindric-flexuous, clavate, often knobbed or forked (contorted). Gill trama subparallel to slightly interwoven, hyphae 3–6 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 2–5(7) μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer wood, Michigan, Wyoming, Idaho, California, and Washington, July-December.

MATERIAL STUDIED: CALIFORNIA: Smith 56630; IDAHO: Smith 54015, 54762, 54826, 54988; MICHIGAN: Thiers 3409 (MICH); Smith 50880 (type, from Pellston Hills, Oct. 7, 1955), 50944; WASHINGTON: Smith 47698; WYOMING: Smith 35821.

OBSERVATIONS: This is a white, villose species, with straight (not coiled) hyphae on the pileus, with relatively small punctate to echinulate spores and somewhat contorted cheilocystidia.

106. Crepidotus subsphaerosporus (Lange) Kühner & Romagn. Fl. Anal. Champ. Superieurs, p. 76. 1953.

Crepidotus variabilis var. *subsphaerosporus* Lange, Dansk Botanisk Archiv. 9: 52. 1938.

Illustration: Fig. 180.

Pileus 4–12 mm broad, white, dry, fibrillose or villose, flabelliform to suborbicular.

Lamellae close or nearly subdistant, medium broad, white then vinaceous or pinkish cinnamon to clay brown, edges even or slightly fimbriate.

Stipe none, or inconspicuous and temporary.

Spores 5–7(8) × 4–5.5(6) μ, ellipsoid or subsphaerical, more rarely ovoid, slightly inequilateral in profile, punctate-echinulate. Basidia (20)26–32 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 23–50 × 5–9(11) μ, clavate to cylindric, ventricose, occasionally more or less forked, often subcapitate. Gill trama subparallel to slightly interwoven, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent, dingy hyphae with scattered or gregarious, erect hyphae, 4–8 μ broad, forming more or less of a turf. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer wood, New York, Michigan, Colorado, Idaho, California, and Washington, June-December; also Europe.

MATERIAL STUDIED: CALIFORNIA: Smith 56652, 56709, 56770; COLORADO: Smith 52227; IDAHO: Smith 54061, 54338; MICHIGAN: Beach 9a (MICH); Smith 63589, 63590, 66826, 66862, 66864, 66865a, 66868, 66871, 66875, 66876, 66916; NEW YORK: Deegan A2 (MICH); WASHINGTON: Smith 14612.

OBSERVATIONS: This species is related to *C. variabilis,* as Lange concluded, and he gave it varietal status. The spores, however, are sufficiently distinct from those of *C. variabilis* so that we agree with Kühner and Romagnesi (1953) in giving it the status of an autonomous species.

107. Crepidotus vulgaris sp. nov.

Illustrations: Figs. 25, 181.

Pileus 6–20(40) mm latus, sessilis, conchatus deinde dimidiatus, albus deinde albidus vel brunnaceus, pubescens. Lamellae albae deinde brunnaceae, latae vel mediolatae, confertae vel paene subdistantes. Sporae (5)6–8 × 4–5.5 μ, ellipsoideae, punctatae. Basidia 22–33 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 28–50 × 5–9(16) μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2.5–4 μ latas. Fibulatae adsunt. Specimen typicum in Herb.

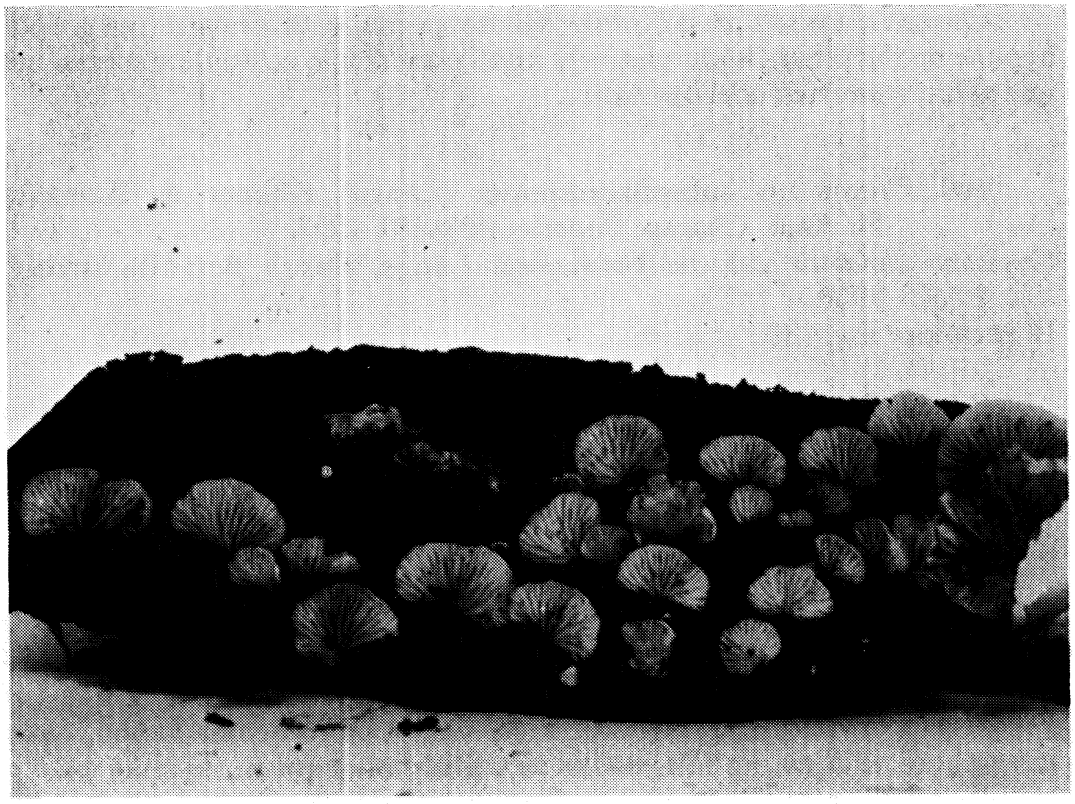

FIG. 25. *C. vulgaris*

Univ. Mich.; lectum prope Pellston Hills, Mich., July 21, 1961, A. H. Smith 63570 b.

Pileus 6–20(40) mm broad, sessile, or with a pseudostipe, conchate then dimidiate, white, at times remaining so when dried, or becoming brownish, villose or pubescent, base often strigose. Context thin, soft, white; odor and taste mild.

Lamellae radiating from a lateral point, white then brownish, broad or medium broad, close or nearly subdistant.

Spores (5)6–8 × 4–5.5 μ, ellipsoid, inequilateral in profile, punctate. Basidia 22–33 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 28–50 × 5–9(16) μ, clavate, ventricose, at times constricted, or flask-shaped. Gill trama subparallel or slightly interwoven, hyphae (3)5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 2.5–4 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer wood, Massachusetts, New Hampshire, North Carolina, Tennessee, Michigan, and Washington, June-September.

MATERIAL STUDIED: MASSACHUSETTS: Bigelow 8576 (MASS); Smith 67284; MICHIGAN: Thiers 2881, 3350 (MICH); Smith 49768, 63531, 63557, 63570b (type, from Pellston Hills, July 21, 1961), 66951, 67054; NEW HAMPSHIRE: Bigelow 11778; NORTH CAROLINA: Hesler 14198, 17638; TENNESSEE: Hesler 14173; WASHINGTON: Smith 39873.

OBSERVATIONS: The distinguishing characteristics of *C. vulgaris* are its punctate spores, white then brown gills, regular cheilocystidia, and straight hyphae on the pileus. In *C. subsphaerosporus* the spores are punctate-echinulate, more broadly ellipsoid, and the lamellae are white then pinkish.

108. Crepidotus alnicola sp. nov.
Illustrations: Figs. 26, 182.

Pileus 1–2 cm latus, sessilis, ungulatus demum dimidiatus, albus, fibrillosus, margine incurvatus. Lamellae albae deinde "pinkish cinnamon" vel colore obscuriore, latae, confertae vel subdistantes. Sporae (6)7–9 × (3.5)4–5.5 μ, ellipsoideae, punctatae. Basidia 34–48 × (5)6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 38–75(200) × 3–9 μ, saepe gelatinosa et tramalia. Cuticula gelatinosa, hyphas erectas sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Burt Lake, Mich., July 24, 1963, A. H. Smith 66901.

FIG. 26. *C. alnicola* × 1⅓

Pileus 1–2 cm broad, sessile, ungulate to dimidiate, snow white, appressed- to matted-fibrillose, margin incurved, slightly fimbriate. Context thick, rubbery-cartilaginous, white or watery-white; odor and taste none.

Lamellae pure white becoming pinkish cinnamon or darker, broad, close or subdistant, edges white fimbriate.

Spores (6)7–9 × (3.5)4–5.5 μ, ellipsoid, slightly inequilateral in profile, obscurely punctate, near "cinnamon" in deposit, ochraceous in 2% KOH. Basidia 34–48 × (5)6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 38–75(200) × 3–9 μ, filamentous to cylindric, at times capitate, occasionally forked, the longer ones tramal and somewhat gelatinous. Subhymenium gelatinous. Gill trama subparallel, hyphae 5–9 μ broad. Pileus trama interwoven. Cuticle a gelatinous zone, 175–350 μ thick, bearing a turf of slender (3–7 μ), colorless, more or less flexuous, septate hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On *Alnus incana,* Michigan, July.

MATERIAL STUDIED: MICHIGAN: Smith 66901 (type, from Burt Lake, July 24, 1963), 66979.

OBSERVATIONS: This species resembles *C. betulae,* but that has smooth spores. The punctate spores and gelatinous cuticle are distinctive features of *C. alnicola.*

109. Crepidotus submollis Murr. Mycologia 4: 245. 1912.
Illustrations: Figs. 27, 183.

Pileus 1–3 cm broad, sessile, conchate, dimidiate to subreniform, becoming applanate, white, dry, pruinose-pubescent to fibrillose, in age glabrescent and becoming somewhat cinnamon buff, margin sulcate or plicate, remaining inrolled for some time. Context thin, white; odor and taste none.

Lamellae radiating from the lateral point of attachment, white, becoming ferruginous, then clay color to ochraceous tawny, close, narrow, becoming ventricose and broad in age, edges even or crenulate.

Spores 7–9.5 × 4.5–5.5 μ, ellipsoid to slightly ovoid in face view, somewhat inequilateral in profile, minutely punctate. Basidia (22)28–34(39) × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 24–50 × 4–10 μ, crooked and contorted, ventricose, clavate, subcylindric, often forked or knobbed. Gill trama subparallel to slightly interwoven, hyphae 5–9(15) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, or not always sharply differentiated, the surface bearing a turf of colorless, straight hyphae, 3–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On fallen twigs and limbs of hardwoods, Michigan, Washington, Oregon, and California, July, October-November, and February.

MATERIAL STUDIED: CALIFORNIA: Harper 27 (NY): MICHIGAN: Smith 36812, 49808, 50938, 63587, 66982; OREGON: Smith 19444; WASHINGTON: Murrill 572, type (NY), from Seattle, Oct. 20-Nov. 1, 1911, and 603.

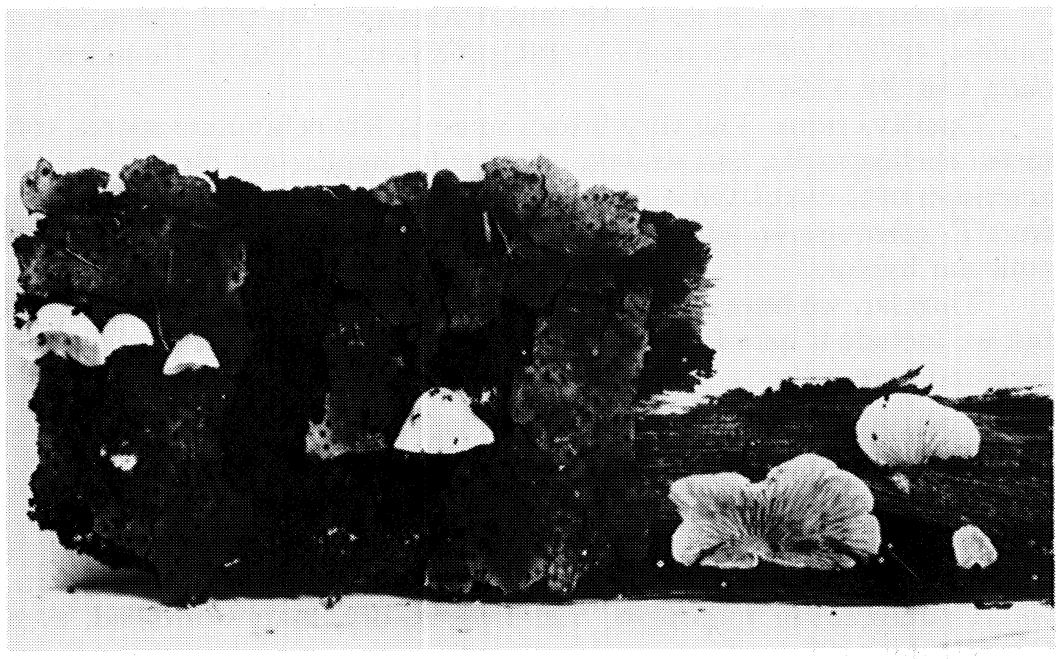

FIG. 27. *C. submollis*

OBSERVATIONS: The moderately large, obscurely punctate spores, the crooked or contorted cheilocystidia, and straight hyphae on the pileus are characteristic of *C. submollis*. The pileus margin apparently is not always sulcate-plicate.

110. Crepidotus cesatii (Rab.) Sacc. Michelia 1: 2. 1877.
Agaricus cesatii Rab., Fl. Ratish., p. 564. 1851.
Illustration: Fig. 184.

Pileus 5–20 mm broad, pure white, sessile or nearly so, cupulate, then conchoid and reflexed, base often bilobed, villose, fibrillose behind, margin involute, villose. Context thin at the margin, thicker at the center, soft, white; odor and taste mild or none.

Lamellae radiating from a lateral or eccentric point, white, then pale flesh-color, finally rusty-flesh color to rusty, with numerous lamellulae, medium broad, moderately close.

Spores (6.5)7–9(10) × 5.5–7(7.5) μ, broadly ellipsoid, punctate-echinulate, pale yellowish-brown in 2% KOH. Basidia (18)25–32 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 28–50 × 6–7(10) μ, contorted, forked, knobbed, subcylindric, ventricose. Gill trama subparallel, hyphae 6–12 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, or at times not sharply differentiated, the surface bearing a turf of colorless hyphae, 3–4.5(6) μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifer wood, Europe, summer and autumn.

MATERIAL STUDIED: CZECHOSLOVAKIA: Pilát 23173, 23456, 23457, 149096, 487852, 487965, 488570 (PR); NETHERLANDS: Reijnders, on *Salix,* Oct. 31, 1954 (L).

OBSERVATIONS: The very broad, more or less echinulate spores, contorted cheilocystidia, and straight epicuticular hyphae are distinctive characteristics of *C. cesatii.* On a basis of material we have seen, *C. cesatii* differs from *C. sphaerosporus,* which has shorter spores and crooked or coiled epicuticular hyphae.

Thus far, we have seen no material of *C. cesatii* from North America, but we include it here for comparison, and in the hope that it might later be found here.

111. **Crepidotus amygdalosporus** Kühner

Illustrations: Figs. 28, 185.

Pileus 5–15(30) mm broad, sessile, ungulate, conchoid, to flabelliform, white, pubescent or tomentose, base byssoid, dry, margin inrolled, even. Context thin; taste mild.

Lamellae white, becoming brown, close or nearly subdistant, narrow to medium broad.

Spores in deposit: dull cinnamon; spores 7–9.5(11) × (4)4.5–5.5 μ, ellipsoid, inequilateral in profile, punctate. Basidia 20–27 × 5–7 μ, 4-spored.

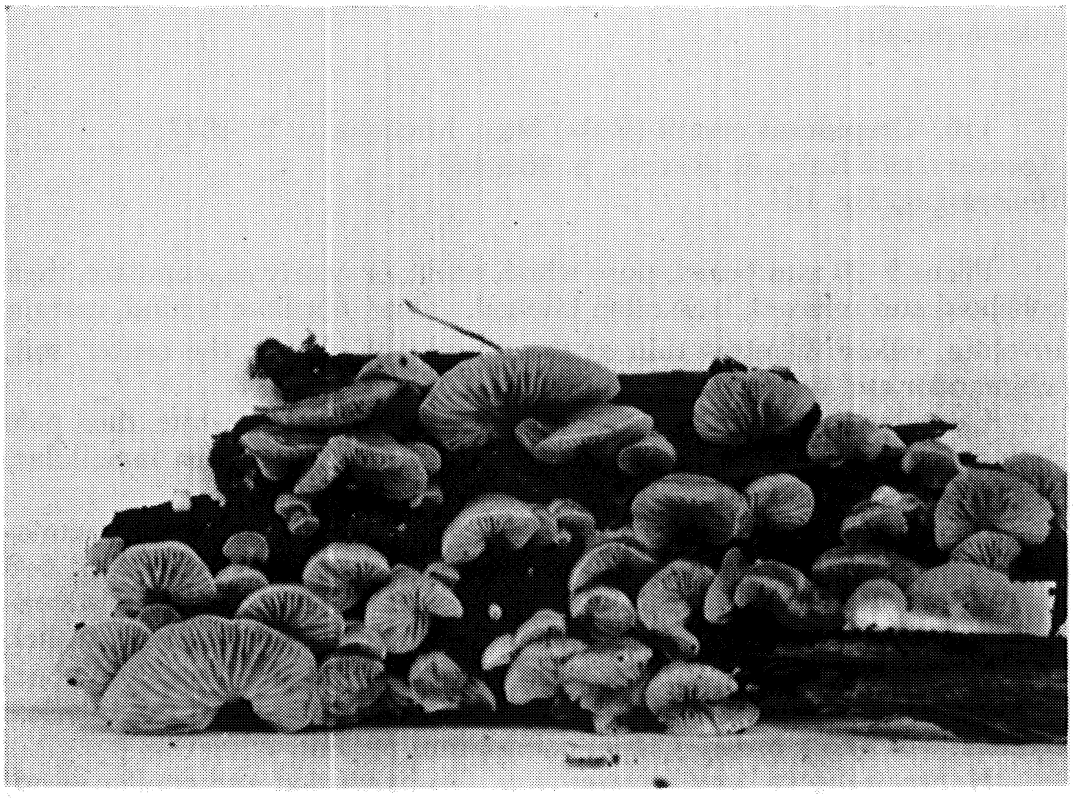

FIG. 28. *C. amygdalosporus*

Pleurocystidia none; cheilocystidia (23)28–52(90) × 5–10 μ, clavate, ventricose, flask-shaped, more rarely subfusoid or knobbed. Gill trama subparallel to slightly interwoven, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, or at times not sharply differentiated, the surface bearing a turf of colorless hyphae, 2.5–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, rarely on conifer, Maine, Massachusetts, Michigan, North Carolina, Washington, June-December; also Europe.

MATERIAL STUDIED: MAINE: Bigelow (MASS) 10156, 10337; MASSACHUSETTS: Bigelow (MASS) 8232; MICHIGAN: Bigelow (MICH) 200; Bas (MICH) 527; Smith 20398, 49805, 50942, 63640, 66629, 66905, 67202, 67374; Thiers 3092 (MICH); NORTH CAROLINA: Hesler 25540; WASHINGTON: Smith 14558, 17848, 29546; NETHERLANDS: Bas (L), from near Amsterdam, leg. & det. E. L. v. Waveren, Dec. 8, 1960.

OBSERVATIONS: The distinctive characteristics of *C. amygdalosporus* include a white pileus with straight hyphae on its surface, relatively long, punctate spores, regularly shaped cheilocystidia, and lamellae which are white then brownish.

112. Crepidotus cinereipallens sp. nov.
Illustrations: Fig. 186.

Pileus 5–15 mm latus, sessilis, flabelliformis demum suborbicularis, pallido-aqueo-cinereus deinde pallidus, glabrosus. Lamellae cinereo-pallidae deinde "avellaneous," confertae, angustae demum medio-latae. Sporae 7–9 × 4.5–5.5(6) μ, ellipsoideae, rugosae, "tawny olive" cumulatae. Basidia 20–28 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 22–40 × 4–15(27) μ. Cuticula ex hyphis repentibus composita, hyphas erectas paucas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., Oct. 9, 1955, A. H. Smith 50945.

Pileus 5–15 mm broad, sessile, flabelliform to nearly circular in outline, when moist pale watery gray, pallid when faded, glabrous, translucent striate, non-byssoid at the base. Context very thin and very soft; odor and taste mild.

Lamellae grayish-pallid becoming buffy avellaneous, close, narrow to medium broad, with more or less three tiers of lamellulae, edges even.

Spores "tawny olive" in deposit. Spores 7–9 × 4.5–5.5(6) μ, ellipsoid to ovoid in face view, slightly inequilateral in profile, wrinkled. Basidia 20–28 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–40 × 4–15(27) μ, clavate, fusoid-ventricose, more rarely broadly napiform. Gill trama interwoven, hyphae 6–14 μ broad, cells at times inflated; hyphae of the subhymenium subparallel, narrow. Pileus trama interwoven, cells inflated especially toward the surface.. Cuticle of repent hyphae, only a few erect. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On basswood bark, Michigan, October.

MATERIAL STUDIED: MICHIGAN: Smith 50945, type, from Mud Lake Bog, Cheboygan County, Oct. 9, 1955.

OBSERVATIONS: The distinctive features of *C. cinereipallens* include the grayish pileus and gills, the absence of epicuticular hyphae on the pileus, and the broad cheilocystidia.

113. Crepidotus obscurus sp. nov.
Illustrations: Figs. 187a, b.

Pileus 5–30 mm latus, albus deinde brunnaceus, fibrillosus, margine lobatus. Lamellae latae, confertae, albae deinde brunneae. Pseudostipes 2–3 mm × 0.5–0.7 mm, albus, centro aberrans. Sporae 7–9 × 4.5–5.5 μ, ellipsoideae, rugoso-verrucosae. Basidia 22–26 × 7–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 24–38 × 4–8 μ, clavata, cylindrica, ventricosa, vel 33–55 × 10–28 μ, clavata, napiformia vel sphaeropedunculata. Cuticula ex hyphis repentibus composita, hyphas erectas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Ann Arbor, Mich., Sept. 15, 1938, A. H. Smith 10963.

Pileus 5–30 mm broad, at first pure white and white-fibrillose or pubescent throughout, finally subglabrescent near the margin, at maturity sordid brownish, applanate, large pileus variously wavy or lobed, at times almost orbicular. Context thin, soft, whitish; odor and taste mild.

Lamellae broad, close, adnate-to or free from the stipe, white then sordid brown.

Stipe a pseudostipe, 2–3 mm long, 0.5–0.7 mm thick, white, appearing eccentric, not attached to substratum.

Spores 7–9 × 4.5–5.5 μ, ellipsoid, obscurely wrinkled-verrucose, thick-walled. Basidia 22–26 × 7–8 μ, 4-spored. Pleurocystidia none; cheilocystidia of two general types: (a) clavate, ventricose, cylindric, 24–38 × 4–8 μ; (b) broadly clavate, napiform to sphaeropedunculate, 33–55 × 10–28 μ. Gill trama slightly interwoven to subparallel, hyphae 7–10(14) μ broad, of relatively short cells. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered or gregarious, erect hyphae, which may be branched. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On basswood, Michigan, September.

MATERIAL STUDIED: MICHIGAN: Smith 10963, type, from Ann Arbor, Sept. 15, 1938.

OBSERVATIONS: The cheilocystidia are strikingly different in shape from those of *C. subverrucisporus,* and the spores less conspicuously wrinkled-verrucose.

114. Crepidotus subverrucisporus Pilát var. **subverrucisporus**
Illustrations: Figs. 29, 189.

Pileus 4–20(30) mm broad, conchate, then flabelliform to reniform or

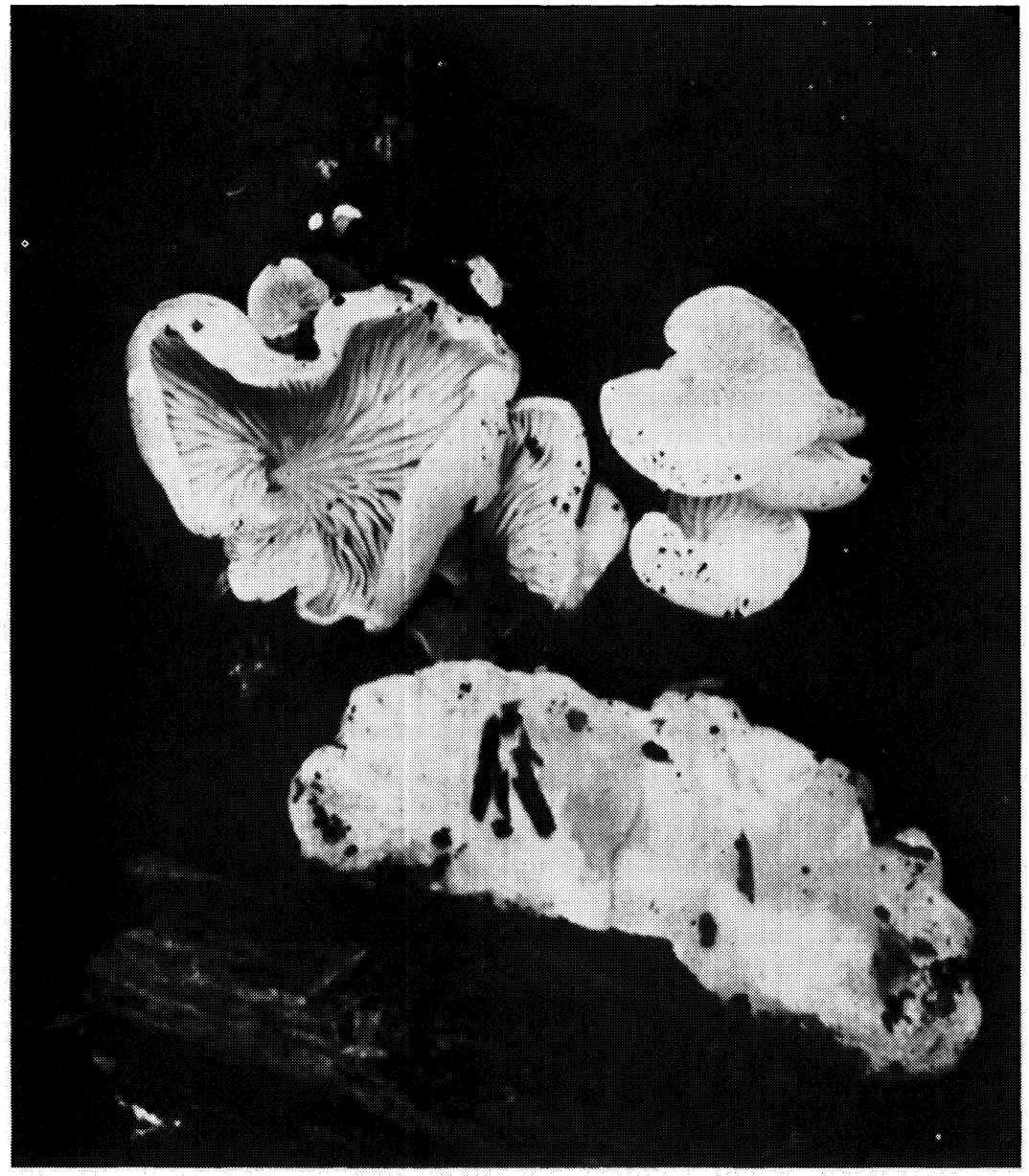

FIG. 29. *C. subverrucisporus* var. *subverrucisporus* × 2

suborbicular, dry, white, pubescent, margin incurved. Context thin; odor and taste mild.

Lamellae broad to medium broad, close to nearly subdistant, white becoming clay color, edges white-crenulate.

Stipe none or a temporary pseudostipe present.

Spores 7–9(10) × 4.5–5.5(6) μ, ellipsoid, inequilateral in profile, wrinkled-verrucose. Basidia 24–33 × 6–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 37–70 × 5–8 μ, cylindric, slender bottle-shaped with a neck, or ventricose. Gill trama subparallel to slightly interwoven, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing

a turf of colorless hyphae, 2–5 μ broad, at times the hyphal cells inflated and then 6–9(14) μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, Colorado, and Oregon, June-October; also Europe.

MATERIAL STUDIED: COLORADO: Smith 52903; MICHIGAN: Smith 57889, 66383; OREGON: Smith 19443; CZECHOSLOVAKIA: Pilát 149034 (type, PR, from Chrustenica, Bohemia, July 20, 1946), 189766, 189768 (PR).

OBSERVATIONS: The type is characterized by white pileus, white then clay-color gills (no pink tints), spores 7–9(10) × 4.5–5.5(6) μ, wrinkled-verrucose, and rather long, slender, often slender-ventricose cheilocystidia. We have encountered a form with pinkish gills, similar spores, and usually shorter cheilocystidia. This we have described as var. *roseifolius;* and another form with notably larger spores we have named var. *megalosporus.*

Favre (1960) says the spores in deposit are cinnamon brown—mars brown of Ridgway, and that the spore wall is not echinulate but distinctly verrucose, the warts low. Since he found the spores to measure 8–11(13) × 5–6.5 μ, he assumes his collection may be a macrosporic form, and refers to Pilát (1950: 164).

115. Crepidotus subverrucisporus var. **roseifolius** var. nov.
Illustrations: Figs. 30, 188.

Pileus 5–45 mm latus, ungulatus demum dimidiatus, primum albus deinde obscurus, pubescens demum albo-fibrillosus. Lamellae albae deinde roseae denique cinnamomeae, angustae, subdistantes. Sporae 7–9(10) × 4.5–5.5(6) μ, ellipsoideae, rugoso-verrucosae, "sayal brown." Basidia 27–33 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 25–45(60) × 3–8 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2–3(4–9) μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Pellston Hills, Mich., Oct. 7, 1955, A. H. Smith 50875.

Pileus 5–45 mm broad, ungulate to dimidiate, white or whitish at first, becoming somewhat dingy in age, pubescent to white cottony fibrillose, margin at times crenate. Context thin, white; odor and taste not distinctive.

Lamellae white becoming pinkish, finally cinnamon, narrow, becoming medium broad especially near point of attachment, subdistant, attached to a pseudostipe, or merely arising from a basal point.

Stipe none, or only as a temporary pseudostipe.

Spores 7–9(10) × 4.5–5.5(6) μ, ellipsoid to ovoid in face view, slightly inequilateral in profile, wrinkled-verrucose, "sayal brown" in deposit. Basidia 27–33 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–45(60) × 3–8 μ, filamentous, clavate, cylindric, or ventricose. Gill trama subparallel to slightly interwoven, hyphae 4–7(10) μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae 2–3 μ, or some broader (up to 4–9 μ). Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks and branches, Michigan, Colorado, Utah, and Oregon, June-November.

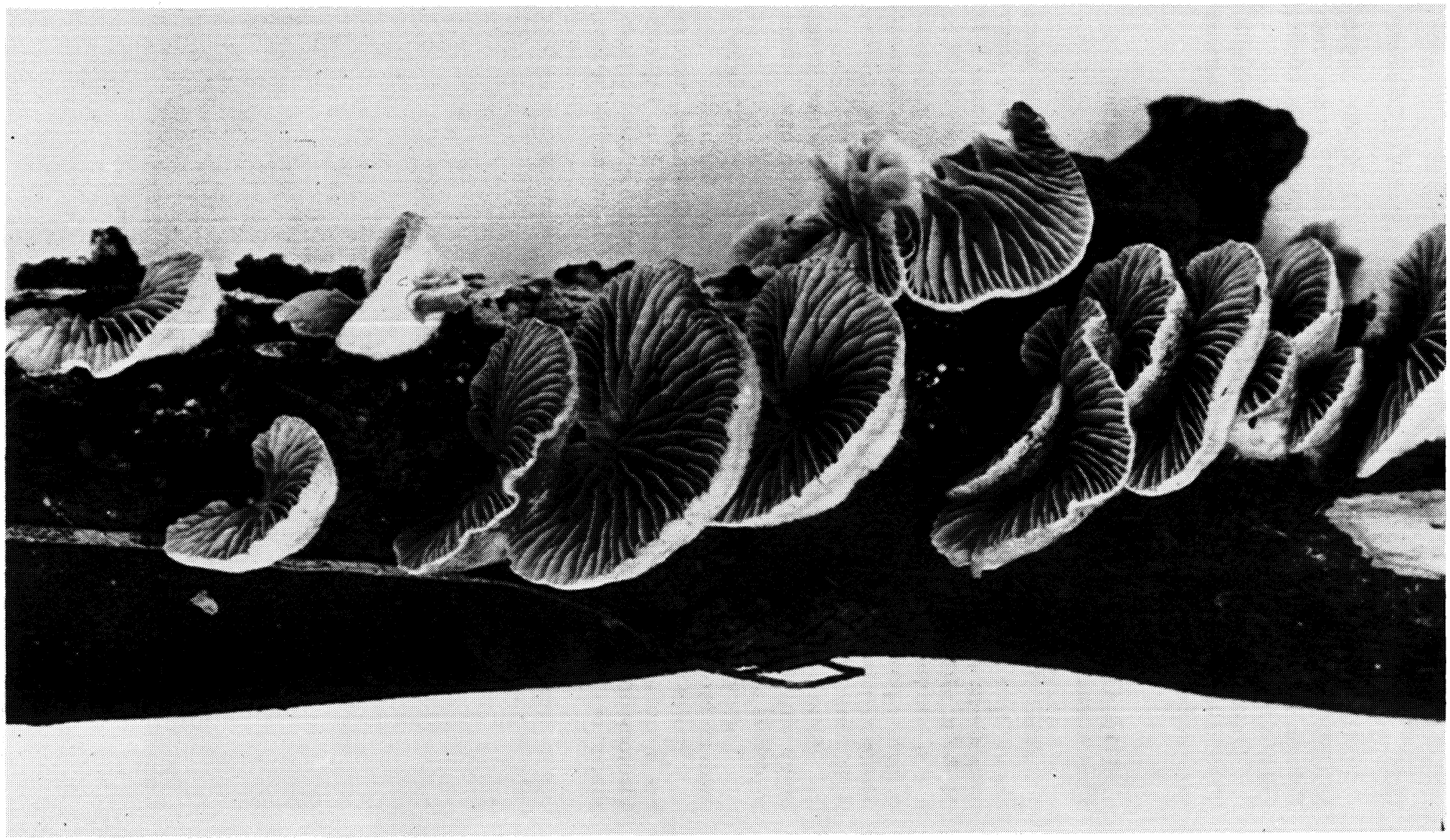

FIG. 30. *C. subverrucisporus* var. *roseifolius* × 1½

MATERIAL STUDIED: COLORADO: Smith 52852, 52860, 52910; MICHIGAN: Thiers 2950 (MICH); Smith 36848, 50875 (type, from Pellston Hills, Oct. 7, 1955), 50885, 60919, 61027, 63568, 63570a, 66984; OREGON: Smith 28588; UTAH: McKnight F106 (MICH).

OBSERVATIONS: The distinctive character of this variety is its pink gills. The cheilocystidia are usually shorter than in the type variety; otherwise var. *roseifolius* is similar to var. *subverrucisporus.*

116. Crepidotus subverrucisporus var. **megalosporus** var. nov. Illustrations: Figs. 31, 190.

Pileus 5–15(20) mm latus, sessilis, ungulatus, dimidiatus, albus deinde obscuro "vinaceous buff," albo-fibrillosus, margine involutus. Lamellae albae deinde roseae denique brunnaceae, medio-latae, confertae vel paene subdistantes. Sporae 8–13 × 5–7 μ, ellipsoideae demum ovoideae vel graniformes, rugosae. Basidia 28–34 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 38–76 × 4–10 μ. Cuticula ex hyphis repentibus composita, hyphas erectas gerens, 3–6 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Ophir, Colo., Aug. 1, 1956, A. H. Smith 51582.

Pileus 5–15(20) mm broad, sessile, ungulate, dimidiate, white, in age dingy vinaceous buff, white fibrillose, cottony toward the base, white-mycelioid at the point of attachment, margin inrolled.

Lamellae at first white, then becoming pinkish, finally rusty brown, medium broad, close or nearly subdistant, edges at times fimbriate.

Spores 8–13 × 5–7 μ, ellipsoid to ovoid, at times pip-shaped, more or less inequilateral in profile, wrinkled. Basidia 28–34 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 35–76 × 4–10 μ, cylindric, clavate, flask-shaped or obclavate, often with a strangulate neck. Gill trama interwoven,

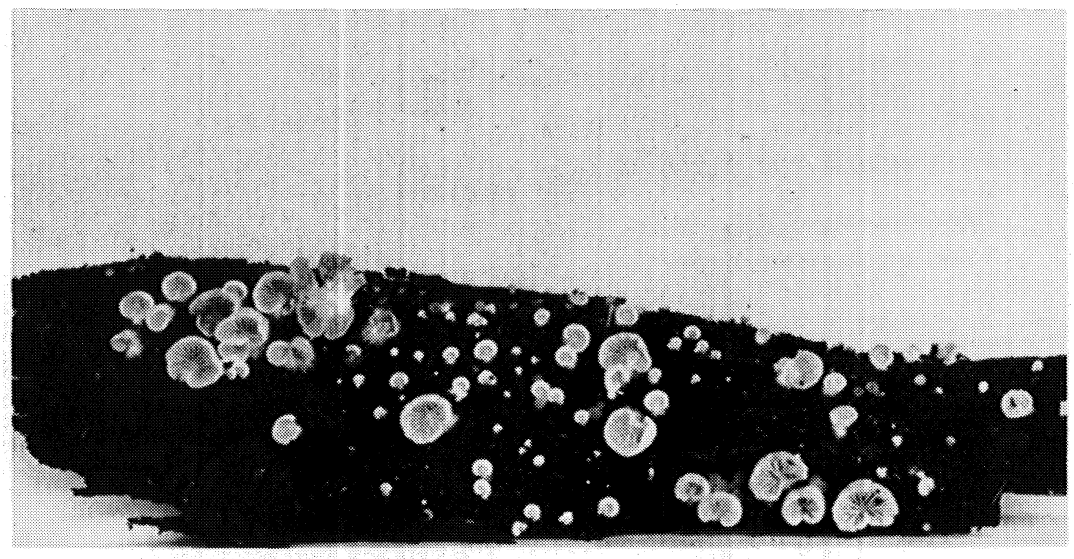

FIG. 31. *C. subverrucisporus* var. *megalosporus*

hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of hyphae which are often arranged in palisade, 3–6 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood (*Alnus* and *Populus*), Colorado, July-August.

MATERIAL STUDIED: COLORADO: Smith 51540, 51582 (type, from Ophir, Aug. 1, 1956), 51947, 52229, 52375, 52852.

OBSERVATIONS: This differs from the type species in its pinkish gills, palisade-like turf on the cuticle, and larger spores. The cheilocystidia are quite similar to those of the type variety. The pinkish gills suggest a relationship to *C. epibryus,* which, however, has smaller spores and different cheilocystidia.

117. Crepidotus circinatus sp. nov.
Illustrations: Figs. 191, 192.

Pileus 5–15 mm latus, sessilis, flavido-coriaceus, villosus. Lamellae medio-latae, medio-confertae. Sporae 6–8 × 4.5–6 μ, ellipsoideae, punctatae. Basidia 27–34 × 6–7 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 32–56 × 5–11 μ. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas et in spiram volutas gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Baker Lake, Wash., Sept. 2, 1941, A. H. Smith 16572.

Pileus 5–15 mm broad, sessile, yellowish buff, villose.

Lamellae medium broad, medium close.

Spores 6–8 × 4.5–6 μ, ellipsoid, inequilateral in profile, punctate. Basidia 27–34 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 32–56 × 5–11 μ, fusoid, clavate, bottle-shaped, apices at times forked or branched. Gill trama interwoven, hyphae 5–9 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of hyphae 5–9 μ broad, random cells with a golden yellow or brownish pigment in 2% KOH, the upper portion of some of the turf hyphae crooked and coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood twigs, Washington, September.

MATERIAL STUDIED: WASHINGTON: Smith 16572, type, from Baker Lake, Sept. 2, 1941.

OBSERVATIONS: Except for colors, this appears to be closely related to *C. regularis.* It is characterized chiefly by its buff yellow pileus, moderately small spores, and crooked to coiled epicuticular hyphae.

118. Crepidotus helicus sp. nov.
Illustration: Fig. 193.

Pileus 3–7 mm latus, convexus deinde flabelliformis, fibrillosus, flavidus deinde obscuro "pinkish buff." Lamellae latae, confertae demum subdistantes, marginibus

crenulatae. Sporae 7.5–10 × 4.5–5.5 μ, ovoideae vel ellipsoideae, punctatae. Basidia 22–27 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 31–63 × 4–9 μ. Cuticula ex hyphis repentibus composita, hyphas erectas, sinuosas et in spiram volutas, sine colore gerens. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., Aug. 7, 1946, A. H. Smith 22054.

Pileus 3–7 mm broad, convex, becoming flabelliform, or, when on the lower side of the substratum, reniform, fibrillose, yellowish, drying dull pinkish buff.

Lamellae radiating, broad, close to subdistant, cinnamon buff when dried, edges crenulate.

Stipe none, or present as a pseudostipe.

Spores 7.5–10 × 4.5–5.5 μ, ovoid to ellipsoid, inequilateral in profile, punctate, near cinnamon buff in 2% KOH. Basidia 22–27 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 31–63 × 4–9 μ, cylindric, ventricose, at times clavate, with or without a neck. Gill trama subparallel, hyphae 4–6 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, the apical portion more or less crooked and coiled. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood sticks, Michigan, August.

MATERIAL STUDIED: MICHIGAN: Smith 22054, type, from Wolf's Bog, Cheboygan County, Aug. 7, 1946.

OBSERVATIONS: This species is related to *C. circinatus,* but is distinguished by its larger spores.

119. Crepidotus milleri sp. nov.
Illustration: Fig. 195.

Pileus 10–22 mm latus, sessilis, colore cremeus, villosus, flabelliformis, margine incurvatus. Lamellae confertae, medio-latae, albae deinde obscurae. Sporae 7–9(10) × 4–5(5.5) μ, ellipsoideae demum ovoideae, punctatae. Basidia 23–27 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 26–58 × 4–13 μ. Cuticula sine magno discrimine, superficies hyphas erectas sine colore gerens, 3–5 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Fox Forest, New Hampshire, O. K. Miller 546.

Pileus 10–22 mm broad, sessile, cream color, villose, hirsute behind, flabelliform, margin incurved.

Lamellae close, medium broad, white then tawny, edges more or less fimbriate.

Spores 7–9(10) × 4–5(5.5) μ, ellipsoid to ovoid, inequilateral in profile, punctate, walls at times collapsed or ruptured in 2% KOH. Basidia 23–27 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 26–58 × 4–13 μ, cylindric, clavate, ventricose, apices rounded, at times capitate, more rarely forked. Gill trama tortuous-subparallel to interwoven, hyphae 4–9 μ broad. Pileus trama loosely interwoven. Cuticle not sharply differentiated, the surface bearing more or less of a turf, the hyphae colorless, 3–5 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, New Hampshire, September.

MATERIAL STUDIED: NEW HAMPSHIRE: Miller (MICH) 546, type, from Fox Forest, leg. O. K. Miller, Sept. 1, 1959.

OBSERVATIONS: This species is distinguished from its nearest relatives by its moderately large spores, cream colored pileus, and rather large cheilocystidia.

120. Crepidotus ramosus sp. nov.
Illustration: Fig. 196.

Pileus 8–15 mm latus, sessilis, glabrosus vel subglabrosus, disco coriaceus, margine albus. Lamellae luteo-brunneae, confertae, latae, marginibus pallidae, denticulatae. Sporae 6.5–8 × 5.5–6 μ, ellipsoideae vel subovoideae, punctatae, echinulatae. Basidia 26–32 × 6–8 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 34–58 × 4–11 μ, contorta. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 20–50 × 2–3 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Trout Lake, Colo., Aug. 17, 1956, A. H. Smith 52374.

Pileus 8–15 mm broad, sessile, disc buff, margin white, glabrous or nearly so.

Lamellae clay brown, close, broad, edges paler, denticulate.

Spores 6.5–8 × 5.5–6 μ, ellipsoid, at times subovoid, inequilateral in profile, punctate-echinulate. Basidia 26–32 × 6–8 μ, 4-spored. Pleurocystidia none; cheilocystidia 34–58 × 4–11 μ (below apex), clavate, subcylindric, ventricose, irregularly branched, forked, knobbed, contorted. Gill trama interwoven, hyphae 5–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered, more or less erect, colorless hyphae, 20–50 × 2–3 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On spruce, Colorado, August.

MATERIAL STUDIED: COLORADO: Smith 52374, type, from Trout Lake, San Juan Mts., Aug. 17, 1956.

OBSERVATIONS: The conspicuous, contorted branching of the cheilocystidia is a distinctive character of this species.

121. Crepidotus mucidifolius sp. nov.
Illustrations: Figs. 197, 198.

Pileus 6–12 mm latus, flavus, albo-tomentosus, primum cupulatus deinde applanatus, margine incurvatus. Lamellae albae deinde flavae, denique brunnaceae, angustae demum medio-latae, subdistantes, marginibus gelatinosae. Sporae 6–7.5 × 4–5 μ, ellipsoideae, punctatae. Basidia 30–35 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia hymenialia, 25–48 × 4–6 μ, filamentosa; tramalia gelatinosa, 46–70 × 4–7 μ, filamentosa demum cylindrica. Cuticula ex hyphis repentibus composita, hyphas erectas sine colore gerens, 2.5–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum prope Mt. Shasta, Calif., June, 1954, W. B. Cooke 29548.

Pileus 6–12 mm broad, yellow, white-tomentose, at first cupulate, then expanding, margin incurved. Context medium thick; odor none.

Lamellae white, then yellow, finally pale brownish, subdistant, narrow to medium broad, edges more or less gelatinous.

Spores 6–7.5 × 4–5 μ, ellipsoid, inequilateral in profile, punctate. Basidia 30–35 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia of two types: (a) hymenial, 25–48 × 4–6 μ, filamentous, flexuous, at times clavate, apices rounded, or rarely forked; (b) tramal, gelatinous, 46–70 × 4–7 μ, filamentous, cylindric, or bottle-shaped, or more or less gelatinous. Gill trama slightly interwoven, hyphae 4–7 μ broad. Pileus trama interwoven. Lactifers abundant in the pileus trama. Cuticle a zone of repent hyphae, the zone 30–60 μ thick, bearing a turf of colorless hyphae, 2.5–3 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On bark of conifer logs, California and New Hampshire, June and September.

MATERIAL STUDIED: CALIFORNIA: Cooke 29548, type (MICH), from Mt. Shasta, leg. W. B. Cooke, June, 1954; NEW HAMPSHIRE: Miller 408 (MICH).

OBSERVATIONS: The characteristics of *C. mucidifolius* include its yellow pileus, white-tomentose surface, and its gelatinous gill-edges and tramal cheilocystidia.

122. Crepidotus fimbriatus sp. nov.
Illustrations: Figs. 32, 199.

Pileus 8–30 mm latus, conchatus demum dimidiatus, fibrillosus, obscuro-"clay color." Lamellae albae deinde obscuro-pallido-ochraceae demum flavido-brunneae, medio-confertae, latae vel medio-latae. Sporae (5)6–8 × 4.3–5.5 μ, ovoideae demum ellipsoideae, punctatae. Basidia 27–35 × 6.5–8 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia (17)27–54 × 5–9 μ. Cuticula sine magno discrimine, hyphas erectas gerens, 2–3 μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Payette National Forest, Idaho, June 29, 1958, R. Gilbertson, Smith 58396.

Pileus 8–30 mm broad, conchate to dimidiate, densely and loosely fibrillose, margin glabrescent and then exposing the dingy clay-colored ground color. Context pliant; odor none, taste mild.

Lamellae white at first, soon dingy pale ochraceous, then pale yellow-brown, medium close to subdistant, broad or medium broad.

Stipe none, or only a slight pseudostipe.

Spores (5)6–8 × 4.3–5.5 μ, ovoid to ellipsoid in face view, slightly inequilateral in profile, punctate, brownish in 2% KOH. Basidia 27–35 × 6.5–8 μ, 2–4-spored. Pleurocystidia none; cheilocystidia (17)27–54 × 5–9(12) μ, ventricose, cylindric-constricted, at times flexuous, rarely forked, apices rounded, or subcapitate, at times knobbed. Gill trama subparallel, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle slightly differentiated, bearing a turf of hyphae, 2–3 μ broad. Clamp connections present.

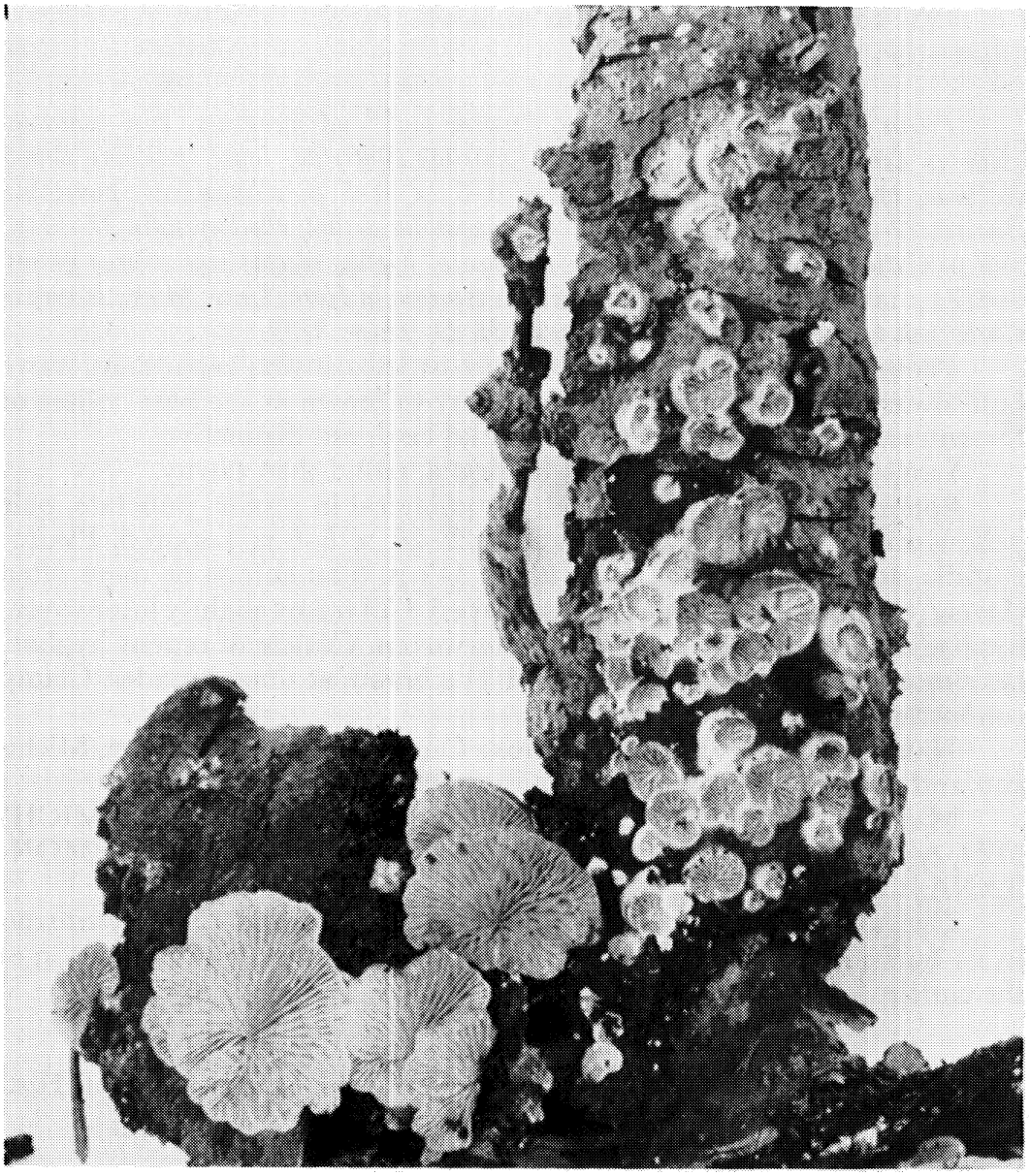

FIG. 32. *C. fimbriatus*

HABIT, HABITAT, AND DISTRIBUTION: On hardwood and conifers, Michigan, Colorado, and Idaho, June–July.

MATERIAL STUDIED: IDAHO: Smith 58396, type, from Payette National Forest, on fallen fir branch, in a snow bank, leg. R. Gilbertson, June 29, 1958; MICHIGAN: Smith 66384; WYOMING: Smith 34451, 34452.

OBSERVATIONS: This species is characterized by its yellowish-brown, or yellowish-clay pileus, which has an incurved, fimbriate margin. It differs from *C. pallidoluteus,* in which the pileus is more yellowish and nonfimbriate.

123. Crepidotus pallidoluteus sp. nov.
Illustration: Fig. 200.

Pileus 5–12 mm latus, sessilis, "warm buff" ad margines, basi ochraceo-obscurus demum brunneus, fibrillosus. Lamellae confertae, latae, pallidae deinde obscurae, marginibus fimbriatae. Sporae 6–8 × 4–5 μ, ellipsoideae, punctatae. Basidia 22–26 × 5–6 μ, tetraspora. Pleurocystidia desunt; cheilocystidia 27–40 × 3–9 μ. Cuticula ex hyphis repentibus composita, hyphas erectas sine colorae gerens, 2–4(7) μ latas. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Cheboygan County, Mich., July 11, 1956, H. D. Thiers 3123.

Pileus 5–12 mm broad, sessile, more or less convex, expanding, warm buff toward the margin, ochraceous tawny to brown at the base, villose or tomentose. Context thin, pallid; odor and taste not distinctive.

Lamellae close, broad, edges fimbriate, pallid then tawny.

Spores 6–8 × 4–5 μ, ellipsoid, inequilateral in profile, punctate, pale yellowish-brown in 2% KOH. Basidia 22–26 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 27–40 × 3–9 μ, filamentous or more often clavate, cylindric, ventricose or flask-shaped. Gill trama slightly interwoven, hyphae 4–7 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 2–4(7) μ broad, at times broader. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On logs, in hemlock forest, Michigan and Montana, July–August.

MATERIAL STUDIED: MICHIGAN: Beach (MICH) 20; Thiers (MICH) 3123, type, from Camp Creek, Cheboygan County, July 11, 1956; MONTANA: Cooke 32217.

OBSERVATIONS: This differs from *C. croceitinctus* and *C. subcroceitinctus* in its buff color, its ellipsoid spores, and its more simple organization of the cuticle.

124. Crepidotus croceitinctus Pk. New York State Mus. Nat. Hist. Rept. 39: 72. 1886.
Illustrations: Figs. 33, 201, 202, 203.

Pileus 1–4 cm broad, sessile, flabelliform, reniform to dimidiate, or suborbicular, pale yellow to "orange buff" to "warm buff" when young, becoming yellow ocher to tawny on the margin, hygrohanous, glabrous or appressed-fibrillose, but the base white-fibrillose, the margin with disappearing yellowish or grayish fibrils, margin even or only faintly striate. Context firm, watery yellowish or cinnamon-buff; odor and taste mild.

Lamellae pale yellow or "warm buff," becoming ochraceous tawny or orange-cinnamon, close or crowded, medium broad to broad, edges often uneven.

Spores in deposit: "Dresden brown"; spores (4.5)5–6.5(7) × 3.9–5.3 μ, ovoid to ellipsoid-ovoid, distinctly punctate, often echinulate-punctate, with a slight suprahilar depression. Basidia 20–30 × 5–6(7) μ, 4-spored.

FIG. 33. *C. croceitinctus*

Pleurocystidia none; cheilocystidia 22–58 × (3)6–9(16) μ, clavate, ventricose, often more or less capitate, at times irregularly shaped (forked, knobbed). Gill trama subparallel, especially in the middle, the sides more or less interwoven, hyphae 4–10 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing scattered to dense more or less erect hyphae, 3–6 μ broad, or at times pilocystidia which are cylindric, slender-clavate, capitate, forked or knobbed. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, New York, Michigan, and Tennessee, June–September.

MATERIAL STUDIED: MICHIGAN: Beach 1, 3 (MICH); Smith 1096, 32394, 33436, 39524, 50647, 61335, 61399, 61423, 61451, 63569, 63631, 66667, 66682; NEW YORK: Peck, type, from Adirondack Mts., Saratoga County, July; TENNESSEE: Hesler 9407, 14171.

OBSERVATIONS: The yellowish colors of the pileus and gills, together with the ovoid, distinctly ornamented spores, characterize *C. croceitinctus*. In some collections the cheilocystidia are more versiform than in the type.

125. Crepidotus subcroceitinctus sp. nov.
Illustration: Fig. 204.

Pileus 15–30 mm latus, sessilis, flabelliformis demum semiorbicularis, flavus. Lamellae confertae, latae, flavido-pallidae. Sporae 5.5–7(7.5) × 4.3–5 μ, ellipsoideae demum ovoideae, punctatae. Basidia 24–31 × 6–7 μ, di- et tetraspora. Pleurocystidia desunt; cheilocystidia 24–38 × 6–18 μ. Cuticula ex 9–12 ordinibus hypharum composita, hyphas erectas sine colore et pilocystidia gerens, 27–43 × 4–9

μ vel 37–58 × 5–12 μ. Fibulatae adsunt. Specimen typicum in Herb. Univ. Mich.; lectum in Warren Woods, prope New Buffalo, Mich., Sept. 4, 1955, A. H. Smith 51270.

Pileus 15–30 mm broad, sessile, flabelliform to semi-orbicular, lemon yellow, white-mycelioid behind. Context relatively thick, firm; taste mild.

Lamellae yellowish-pallid, close, broad.

Spores 5.5–7(7.5) × 4.3–5 μ, ellipsoid to ovoid, slightly inequilateral, punctate. Basidia 24–31 × 6–7 μ, 2–4-spored. Pleurocystidia none; cheilocystidia 24–38 × 6–18 μ, fusoid, clavate, vesiculose or napiform, or ellipsoid with a short stipe. Gill trama interwoven, hyphae 4–7(12) μ broad. Pileus trama loosely interwoven. Cuticle composed of 9–12 hyphae deep which extend radially, bearing, on the basal half, a turf of colorless hyphae 2–4 μ broad, and some pilocystidia 27–43 × 4–9 μ, and in front, only scattered erect hyphae and pilocystidia which are filamentous, clavate, ventricose, 37–58 × 5–12 μ. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood, Michigan, September.

MATERIAL STUDIED: MICHIGAN: Smith 51270, type, from Warren Woods, New Buffalo, Sept. 4, 1955.

OBSERVATIONS: The spores of this species resemble somewhat those of *C. croceitinctus,* but the lemon yellow pileus and different structure of the cuticle distinguish the two.

EXCLUDED SPECIES

Because of the similarity of growth habit, some pleurotoid agarics with colored spores have, in the past, been incorrectly assigned to the genus *Crepidotus*. But in recent studies, these species have appropriately been removed to other genera, including *Claudopus, Clitopilus, Melanotus, Paxillus, Phaeomarasmius, Pleuroflammula, Phyllotopsis, Pyrrhoglossum,* and *Simocybe.* For the convenience of the student, several of the more common of these species are included in our keys, even though they are clearly not members of the genus *Crepidotus*. And for further reference, we have, on the succeeding pages, also included descriptions and observations based on our studies of the types (in all except *Phyllotopsis nidulans*).

Ex 1. Pyrrhoglossum hepatizon (Berk.) Singer Sydowia 5: 474. 1951.
Agaricus (Crepidotus) hepatizon Berk., *apud* Hooker, London Jour. Bot. 6: 486. 1847.
Crepidotus hepatizon (Berk.) Sacc., Syll. Fung. 5: 879. 1887.

Pileus 1.5–2.5 cm broad, usually eccentric, moderately convex to subplano-umbilicate, fuscous, lobed-sinuous.

Lamellae brown (ferruginous), moderately close, narrow.

Stipe conspicuous, 1.5–2.5 cm long, 5 mm broad, cylindric central or eccentric, not rarely sublateral.

Spores 4.6–5.5 × 2.8–4 μ, ovoid, or more or less ellipsoid, slightly in-

equilateral in profile, verruculose-asperulate, dark brown, wall thick. Pleurocystidia and cheilocystidia not observed. Gill trama undulating-parallel, hyphae 3–6 μ broad. Pileus trama interwoven. Cuticle repent, apparently of several (5–6) hyphal layers. Clamp connections not found. Singer (1962) says clamps present on all hyphae in the genus *Pyrrhoglossum.*

HABIT, HABITAT, AND DISTRIBUTION: It is reported from California by McClatchie (see Murrill, 1917: 158).

MATERIAL STUDIED: CEYLON: type, No. 52, from Kew Herbarium.

OBSERVATIONS: The tissues of the type are collapsed and do not revive well. Pilát (1950) suggested that this species does not belong to *Crepidotus,* but is related to *Pholiota-Rozites.* Singer (1962) places it in the genus *Pyrrhoglossum,* as *P. hepatizon* (Berk.) Sing.

Ex 2. Simocybe tiliophila (Pk.) Sing. Agar., 2nd ed., p. 588. 1962.
Agaricus (Crepidotus) tiliophilus Pk., N. Y. State Mus. Ann. Rept. 35:133. 1884.
Crepidotus tiliophilus (Pk.) Pk., N. Y. State Mus. Ann. Rept. 39: 70. 1886.
Naucoria tiliophila (Pk.) Sing., Mycologia 35: 163. 1943.

Pileus 1–2.5 cm broad, convex, hygrophanous, watery-brown and striatulate when moist, dingy-buff when dry, minutely pulverulent. Context moderately thin.

Lamellae adnexed, rounded behind, concolorous, becoming ferruginous-cinnamon, rather broad, subdistant.

Stipe 4–8 mm × 2 mm, pruinose, white-pubescent at the base, often curved, solid.

Spores 5.5–7 × 4–4.5 μ, ellipsoid to subovoid, smooth, pale fuscous under microscope. Basidia 17–21 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 18–29 × 4–8 μ, clustered, clavate, colorless. Gill trama subparallel. Pileus trama interwoven. Cuticle not sharply differentiated; the surface hyphae give rise to erect, brownish, clavate cystitioid cells, scarcely in a palisade or a trichodermium. Clamp connections none.

HABIT, HABITAT, AND DISTRIBUTION: On dead trunks and branches of *Tilia americana,* New York, August.

MATERIAL STUDIED: NEW YORK: Peck, the type, collected by Peck, East Berne, August.

OBSERVATIONS: The description of microscopic characters above is based on a study of the type. Singer (1962), in describing the genus *Simocybe,* says that the hyphae are usually with clamp connections; in *S. tiliophila,* however, clamps are absent. Smooth spores and the presence of pilocystidia characterize the genus *Simocybe.*

Ex 3. Melanotus eccentricus (Murr.) Sing. Lilloa 13: 87. 1947.
Crepidotus eccentricus Murr., North Amer. Flora 10: 155. 1917.

Pileus 5 mm broad, convex, not umbonate, subcircular, isabelline, glabrous, margin entire, incurved.

Lamellae adnate, yellowish to isabelline, subcrowded, broad, ventricose, edges entire.

Stipe 2 mm or less long, 0.5 mm thick, eccentric, enlarged above and below, surface white fibrillose, base surrounded by a white mycelial mat.

Spores 5.3–6 × 4–5 μ, ellipsoid, smooth, with a germ-pore. Basidia 17–24 × 5–6 μ. Pleurocystidia none; cheilocystidia cylindric, few, 30–35 × 2–4 μ. Gill trama subparallel. Pileus trama interwoven. Cuticle a cutis, not greatly differentiated, with a few, scattered, colorless, more or less erect hyphae. Clamp connections on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On dead herbaceous stems, Jamaica, December.

MATERIAL STUDIED: JAMAICA: Murrill 21, the type, east of Hope Gardens, Dec. 12, 1908.

OBSERVATIONS: Because of the spore characters, Singer (1947) has transferred this species to the genus *Melanotus*. The description of microscopic characters is based on a study of the type.

Ex 4. Melanotus psychotriae (Pat.) Sing. Lloydia 9: 130. 1946.
Crepidotus psychotriae Pat., Bull. Soc. Myc. Fr. 18: 173. 1902.

Pileus 5–10 mm broad, sessile, convex, orbicular, indented or marginate behind, scattered or caespitose, pale-ochraceous, glabrous, smooth, margin entire. Context fleshy, firm.

Lamellae crowded or close, broad, brownish, inserted, edges serrate.

Spores 6.7–8 × 4.5–5.5 μ, ellipsoid to ovoid, smooth, often lentiform-compressed, with a germ-pore, brownish, tinged purplish. Basidia 12–16 × 3–5 μ. Pleurocystidia none; cheilocystidia 12–23 × 2–6 μ, flask-shaped, ventricose, or cylindric, small and inconspicuous. Gill trama interwoven, hyphae 2–4 μ broad. Pileus trama loosely interwoven. Cuticle a narrow gelatinous zone, 12–43 μ thick. Clamp connections on the hyphae of the pileus trama and the cuticle.

HABIT, HABITAT, AND DISTRIBUTION: On dying branches of *Psychotria glabrata,* Guadeloupe and Martinique.

MATERIAL STUDIED: GUADELOUPE: Patouillard, Nos. 33 and 403, type (FH).

OBSERVATIONS: The shape and color of the spores caused Singer (1946) to transfer it from *Crepidotus* to *Melanotus*. The cheilocystidia, in the type, are relatively small and inconspicuous.

Ex 5. Pleuroflammula puberula (Pk.) Sing. Lilloa 13: 85. 1947.
Crepidotus puberulus Pk., Bull. Torrey Bot. Club. 25: 324. 1898.

Pileus 6–10 mm broad, reniform or suborbicular, nearly plane, sometimes almost resupinate, brown, minutely pubescent. Context thin.

Lamellae ventricose, rather broad, rusty-brown when mature, edges whitish.

Stipe 2–4 mm long, lateral or eccentric, equal, curved, base white-mycelioid.

Spores 8–10 × 5–6 μ, ellipsoid, smooth, with a germ-pore, brown or slightly yellowish-brown. Basidia 13–22 × 4–6 μ, 1–2–4-spored. Pleurocystidia 26–31 × 6–7 μ (halfway up the gill), more or less fusoid to clavate-appendiculate, rare; cheilocystidia 26–48 × 6–7 μ, cylindric or subclavate to clavate-appendiculate, not abundant. Gill trama subparallel. Pileus trama interwoven. Cuticle of repent, brown hyphae, bearing erect, scattered cylindric to subnodulose colorless, rarely slightly fuscous hyphae —scarcely a turf. Clamp connections on the epicuticular and pileus trama hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On wood, California, March.

MATERIAL STUDIED: CALIFORNIA: Peck, type, collected by McClatchie, at Compton, March 18, 1897.

OBSERVATIONS: Singer (1947) transfers this to the genus *Pleuroflammula,* because of the presence of a veil. The description of microscopic characters above is based on a study of the type.

Ex 6. Phaeomarasmius distans (Pk.) Singer Lilloa 13: 83. 1947.
Crepidotus distans Pk., N. Y. State Museum Ann. Rept. 44: 132. 1892.

Pileus 4–8 mm broad, convex, tawny, minutely pubescent, margin distantly sulcate-striate.

Lamellae adnate, concolorous with the pileus, broad, very distant.

Stipe eccentric, reddish-brown, minute, about 2 mm long.

Spores 10–14 × 7–9 μ, ellipsoid, smooth, with a callus at the apex, rusty colored, with a thick double wall. Basidia 27–30 × 7–9 μ, 4-spored. Pleurocystidia none; cheilocystidia 50–64 × 5–12 μ, cylindric, hair-like bulbous, usually wavy-constricted. Gill trama interwoven. Cuticle bearing dense, brown, septate, at times branched hyphae 4–6 μ broad, with ridge-like incrustations, hyphae forming a trichodermium. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On bark of *Crataegus tomentosa,* New York, September.

MATERIAL STUDIED: NEW YORK: Peck, type of *Crepidotus distans,* collected by Peck, at Carrollton, September.

OBSERVATIONS: Singer (1947), after studying the type of *C. distans,* proposed the new combination *Phaeomarasmius distans* (Pk.) Sing. His move is justifiable on the grounds that this species has smooth spores with a callus but no germ-pore, and a trichodermial epicutis of brown pigmented, incrusted hyphae on the pileus surface.

Ex 7. Phaeomarasmius rufolateritius (Bres.) Sing. Lilloa 13: 85. 1947.
Crepidotus rufolateritius Bres., Hedgwigia 24: 186. 1885.

Pileus 2–4 mm broad, sessile, resupinate, rarely reflexed, cupulate, latericio-rufous, glabrous, margin lobed. Context membranous.

Lamellae radiating from an eccentric point, concolorous, distant, broad, edges white, rounded at the ends.

Spores 10.5–12.5 × (6.5)7–9 μ, ellipsoid, smooth, with a germ-pore. Basidia 33–37 × 9–10 μ, 4-spored. Pleurocystidia none; cheilocystidia 38–48 × 6–8 μ, clavate, clustered, colorless. Epicuticular hyphae brown, septate, incrusted, with clamp connections.

HABIT, HABITAT, AND DISTRIBUTION: On bark of *Crataegus,* Missouri, March.

MATERIAL STUDIED: MISSOURI: Rabenhorst-Winter Pazxchke, Fungi No. 3941, part of the type (NY), collected by C. H. Demetrio, Emma, March, 1892. The type is in the Bresadola Herbarium Museum, at Stockholm.

OBSERVATIONS: The description of microscopic characters above is based on a study of the material from the New York Botanical Garden. It is sparse, and no sections of the pileus were made. Singer (1947) states that it is a native of southern United States.

Ex 8. Pyrrhoglossum pyrrhus (B. & C.) Sing. Mycologia 36: 367. 1944.

Agaricus pyrrhus Berk. & Curt., Jour. Linn. Soc. 10: 291. 1868.
Crepidotus pyrrhus (B. & C.) Sacc., Syll. Fung. 5: 879. 1887.
Crepidotus laceratus Pat., Bull. Soc. Myc. France 18: 173. 1902.
Crepidotus substipitatus Murr., Mycologia 5: 31. 1913.

Pileus 1–3 cm broad, flabelliform, semiorbicular, to conchate, ochraceous to rufous, glabrous or subglabrous, margin even. Context thin, fragile.

Lamellae close or crowded, broad, ventricose, concolorous to pileus.

Stipe absent, or if present 4–8 mm × 1 mm, curved, eccentric, reddish-brown, glabrous.

Spores 4–5.5 × 3–4.5 μ, ellipsoid or ovoid, conspicuously warty, no germ-pore, dark rusty-brown in 2% KOH. Basidia 14–18 × 5–6 μ, 4-spored. Pleurocystidia none; cheilocystidia 25–42 × 4–8 μ, cylindric and often capitate, or flask-shaped with a neck. Gill trama undulating-subparallel, hyphae 2–5 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing occasional, erect, colorless hyphae. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead wood, Cuba and Guadeloupe.

MATERIALS STUDIED: CUBA: Berkeley and Curtis 38, type (K) of *Agaricus pyrrhus,* collected by C. Wright; Murrill 1236, type (NY) of *Crepidotus substipitatus,* collected by Underwood & Earle, Baracoa, March, 1903; GUADELOUPE: Patouillard, type (FH) of *Crepidotus laceratus,* 1886.

OBSERVATIONS: The warty spores place this species in the genus *Pyrrhoglossum,* as proposed by Singer (1944). The description of microscopic characters is based on a study of the type of *P. pyrrhus.* Pilát (1950) reports the spores of the type of *P. pyrrhus* to be larger (8–8.5 × 5.6–5.8 μ) than we observed.

Ex 9. Pleuroflammula flammea (Murr.) Singer *apud* Singer and Smith, Mycologia 38: 522. 1946.
Crepidotus flammeus Murr., North Amer. Flora 10: 153. 1917.

Pileus 8–20 mm broad, stipitate or sessile, convex, yellowish when young, in age becoming "ochraceous-tawny" to reddish-orange or rusty-orange, dry, tomentose-squamulose, margin at first appendiculate, even when dry, somewhat striate when wet. Context yellowish; odor mild, taste bitter.

Lamellae adnate, broad, subdistant, at first "colonial buff" then rusty-brown, edges whitish-crenulate.

Stipe when present 1.5–3 mm × 0.5–0.7 mm, minutely velvety, lateral, often almost none, or entirely absent. Veil present, at first fibrillose-powdery, finally as remnants on the stipe and pileus margin.

Spores in deposit: "cinnamon brown" to "Dresden brown"; spores 6.5–8(9) × 4.5–6(7) μ, broadly ellipsoid to sub-ovoid, thick-walled, smooth. Gill trama subparallel, 3–6(10) μ broad. Pleurocystidia none; cheilocystidia clustered, cylindric to clavate, usually more or less subcapitate, at times flexuous, 22–56 × 4–8 μ. Cuticle a distinct, thin zone of repent, narrow hyphae, bearing numerous scales composed of erect, narrow (2–5 μ) brown, septate hyphae, some of which are incrusted. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On hardwood logs and fallen, dead twigs, Virginia, North Carolina, and Tennessee, June-August.

MATERIAL STUDIED: NORTH CAROLINA: Hesler 5117, 9247, 12782; TENNESSEE: Hesler 3655, 4100, 18678; VIRGINIA: Murrill 221, type (NY), from Crabbottom, July 17–21, 1904.

OBSERVATIONS: This species, although resembling a *Crepidotus* and originally described under that genus, has been transferred to *Pleuroflammula,* primarily because of its veil.

Ex 10. Pleuroflammula dussii (Pat.) Sing. Mycologia 38: 521. 1946.
Crepidotus dussii Pat., Bull. Soc. Myc. Fr. 18: 173. 1902.

Pileus (2)4–10(17) mm broad, convex or reniform, "colonial buff" to "cream color" or "ochraceous buff" to "amber brown," more yellow near the margin, browner toward the disc, "antimony yellow" at the margin, "Sudan brown" on the disc in age, at first fibrillose, then glabrescent, non-viscid. Context yellowish, bitterish.

Lamellae at first almost "amber yellow," the edges more yellow than the olive or brownish sides, finally brown from the spores, comparatively broad (up to 2 mm at maturity), subclose to subdistant, adnexed or when young often emarginate-adnexed.

Stipe up to 2 × 1.5 mm, apex yellowish, below brownish, fibrillose from the veil, glabescent, at times indistinctly subannulate, curved, eccentric,

becoming sublateral. Veil at first covering the lamellae, at times forming a narrow, indistinct annulus.

Spore deposit: "Brussels brown." Spores 6–8(9) × 4.5–5.5(7) μ, ellipsoid, thick-walled, smooth, with an indistinct germ-pore. Basidia 23–27 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 22–52 × 5–10 μ, variable: clavate, subcylindric, ventricose, subfusoid, subcapitate to appendiculate, spathulate, ampullaceous. Gill trama interwoven. Cuticle a gelatinous zone, more or less 50 μ thick, the hyphae 3–5 μ broad and imbedded in a gelatinous matrix, resting on a hypodermium about 20 μ thick. Clamp connections few and inconspicuous on the epicuticular hyphae.

HABIT, HABITAT, AND DISTRIBUTION: On dead wood, Guadeloupe; also Florida, June-August.

MATERIAL STUDIED: GUADELOUPE: Patouillard, type (FH), Nos. 25 and 111, collected at Baines-Jaunes.

OBSERVATIONS: Singer (in: Singer and Smith, 1946) proposed the genus *Pleuroflammula,* and made *P. dussii* (Pat.) Singer the type species. It differs from *Crepidotus* chiefly in the presence of a veil. Although Singer (1962) characterizes the pileus of *Pleuroflammula* as non-viscid, a study of the type of *P. dussii* shows a gelatinous cuticular zone. In his description he does not mention the gelatinous cuticular zone, but does report incrusted cuticular hyphae.

The description of macroscopic characters above is based on that of Singer; and that of microscopic characters is based on the type.

Ex 11. Melanotus subcuneiformis (Pat.) Sing. Lilloa 13: 87. 1947. *Crepidotus subcuneiformis* Murr., Mycologia 5: 29. 1913.

Pileus reaching 10 mm broad and becoming somewhat longer, sessile, broadly wedge-shaped, approaching orbicular, plane above, tapering to a rather broad base, glabrous or pulverulent, moist, dull-isabelline to avellaneous-isabelline, margin even. Context thin, rather firm, fragile on drying.

Lamellae radiating, plane, subcrowded, dull-yellowish to umbrinous.

Spores 7–9 × 5–6 μ, ellipsoid to sublenticular, smooth, wall double, with a germ-pore. Basidia 24–28 × 6–7 μ, 4-spored. Pleurocystidia none; cheilocystidia 20–27 × 3–5 μ, cylindric-clavate, inconspicuous. Gill trama interwoven. Cuticle of repent hyphae, slightly darker than the context. Clamp connections present on the cuticular hyphae, and on the tomentum at the base of the pileus.

HABIT, HABITAT, AND DISTRIBUTION: On decaying cocoanut husks, Grenada, September.

MATERIAL STUDIED: GRENADA: Type collected by W. E. Broadway, September 1905 (NY).

OBSERVATIONS: The sublenticular spores with a germ-pore place this in the genus *Melanotus* (see Singer, 1947).

Ex 12. Melanotus flavolivens (B. & C.) Sing. Lloydia 9: 130. 1946.
Agaricus (Crepidotus) flavolivens B. & C., Proc. Amer. Acad. Arts & Sci. 4: 117. 1858.
Agaricus (Crepidotus) musaecola B. & C., Jour. Linn. Soc. (Bot.) 10: 291. 1868.
Crepidotus musaecola (B. & C.) Sacc., Syll. Fung. 5: 883. 1887.
Crepidotus flavolivens (B. & C.) Sacc., Syll. Fung. 5: 887. 1887.
*Melanotus musaecola** (B. & C.) Murr., Mycologia 10: 16. 1918.

Pileus 4–15 mm broad, spathulate-cuneate, or suborbicular to helmet-shaped, white or sublutescens, subtly appressed-tomentose or subglabrous.

Lamellae close, narrow, brownish, tinged purplish-violaceous.

Stipe eccentric or lateral, inconspicuous, 1.5 mm long, curved.

Spores 6–8 × 4.5–5.5 μ, ellipsoid to subovoid, smooth, truncate with a germ-pore, wall thick, double, purplish-brown in 2% KOH. Pleurocystidia none; cheilocystidia 28–45 × 6–11 μ, subclavate, ventricose, bottle-shaped, often with a neck. Cuticle of repent hyphae, bearing colorless hyphae on the surface. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On dead plantain leaves, Cuba and Bonin Islands.

MATERIAL STUDIED: BONIN ISLANDS: Type (K) of *A. (Crepidotus) flavolivens;* CUBA: Type (K) of *A. (Crepidotus) musaecola,* collected by Wright, No. 86.

OBSERVATIONS: From the information at hand, we agree with Pilát (1950: 221) that *M. flavolivens* and *M. musaecola* are the same.

Ex 13. Melanotus fumosifolius (Murr.) Murr. Mycologia 10: 16. 1918.
Crepidotus fumosifolius Murr., Mycologia 5: 31. 1913.

Pileus 2–3 cm broad, sessile, dimidiate or reniform, expanded at maturity, whitish or with ochraceous tints, glabrous or slightly pruninose, margin even.

Lamellae narrow, crowded, becoming very dark-fuscous or almost purplish.

Spores 5.5–7 × 4.5–5 μ, ellipsoid or sublenticular, smooth, with a germ-pore. Pleurocystidia none; cheilocystidia 36–42 × 3–4 μ, cylindric, collapsed against the gill edge (not conspicuous). Gill trama undulating subparallel, hyphae narrow. Pileus trama interwoven. Cuticle of repent hyphae. Clamp connections on the hyphae of the pileus trama.

HABIT, HABITAT, AND DISTRIBUTION: On log, Jamaica, October.

MATERIAL STUDIED: JAMAICA: Earle, No. 292, type (NY), from Rose Hill, Oct. 30, 1902.

OBSERVATIONS: This is close to *M. flavolivens (= M. musaecola),* which has broader cheilocystidia and a more fibrillose pileus.

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*Murrill spells it *musicola,* which Dr. A. H. Moser, Professor of Classics, University of Tennessee, approves.

Ex 14. Phyllotopsis nidulans (Fr.) Sing. Rev. Myc. 1: 76. 1936.
Agaricus nidulans Fr., Syst. Myc. 1: 189. 1821.
Pleurotus nidulans (Fr.) Kummer, Der Führer in die Pilzk., p. 105. 1871.
Crepidotus nidulans (Fr.) Quél., Champ. Jura Vosges, Pt. III: 114. 1875.
Panus nidulans (Fr.) Pilát, Mykologie 7: 90. 1930.

Pileus 2–8 cm broad, sessile, orbicular and cupulate when young, becoming flabelliform, often imbricated, base color "zinc orange" to "ochraceous salmon," fibrillose or tomentose, the hairs white, dry, margin even, inrolled. Context thick, pliant, yellowish; odor and sometimes the taste strong, disagreeable.

Lamellae adnate to a lateral point of attachment, "zinc orange" to "ochraceous orange," close, narrow to medium broad, edges even.

Spores 5–7 × 2.3–3 μ, elongated, somewhat curved (cylindric-allantoid), smooth, in mass: "light congo pink," "vinaceous buff," or "light vinaceous cinnamon," fading when stored. Basidia 20–27 × 4.5 μ, 4-spored. Pleurocystidia and cheilocystidia none. Gill trama parallel to subparallel, hyphae 2.5–3.5 μ broad. Pileus trama interwoven. Cuticle of repent hyphae, bearing a turf of colorless hyphae, 2–4 μ broad. Clamp connections present.

HABIT, HABITAT, AND DISTRIBUTION: On conifer and deciduous stumps, logs, dead trunks, throughout the temperate zone, summer and autumn, also winter and spring in southern areas.

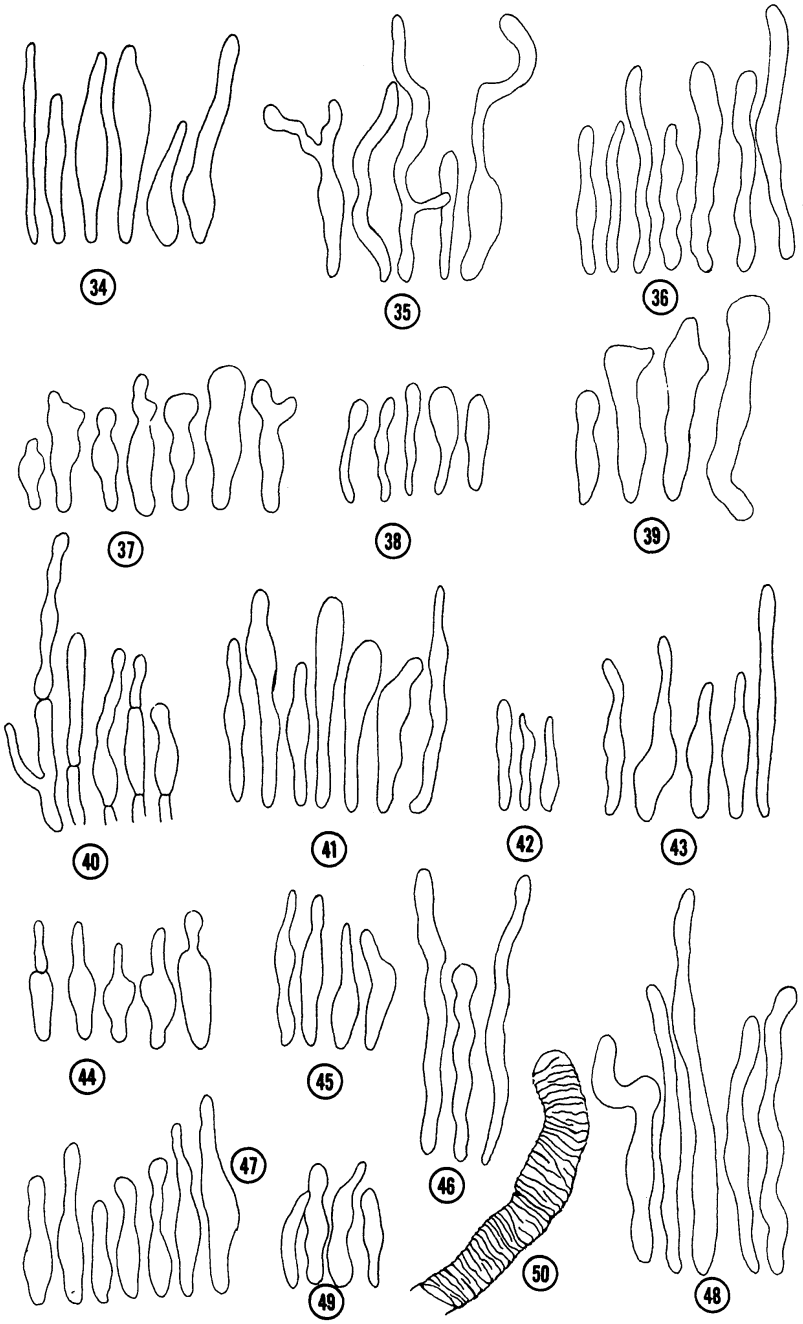
MATERIAL STUDIED: GEORGIA: J. F. Smith (TENN 16026); KENTUCKY: Bishop (TENN 10126); LOUISIANA: Hesler 22254; MICHIGAN: Smith 67234; TENNESSEE: Hesler 5229, 5230, 6540, 10121, 14055, 25806.

OBSERVATIONS: Although this species is shelving and of a Crepidotus-habit, it has cylindric-allantoid, pink spores, and lacks cystidia. Singer has made it the type-species of the genus *Phyllotopsis*.

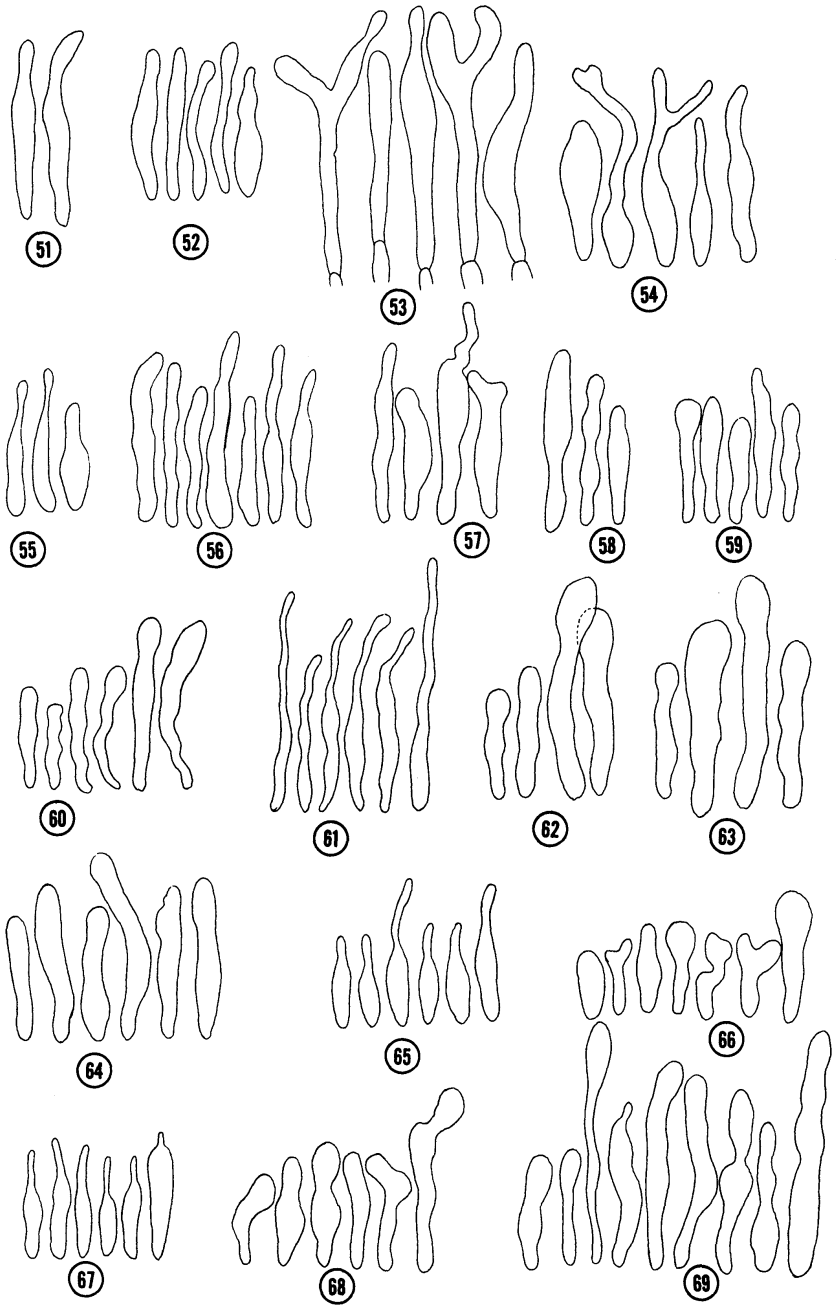
Extralimital Sections

Section Echinosporae. Type *C. carpaticus*.

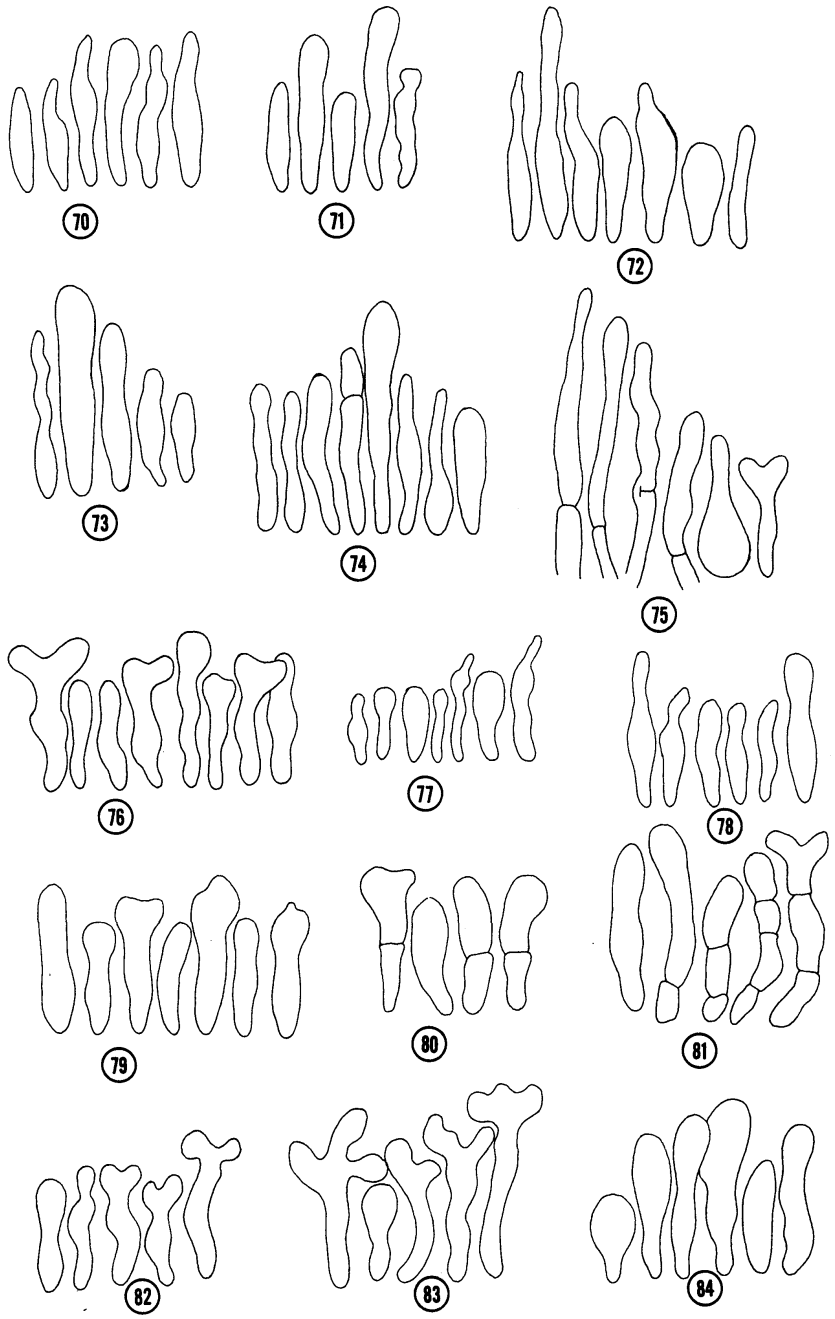
Spores subglobose; verrucose to echinulate; conidia born on epicutis of pileus.



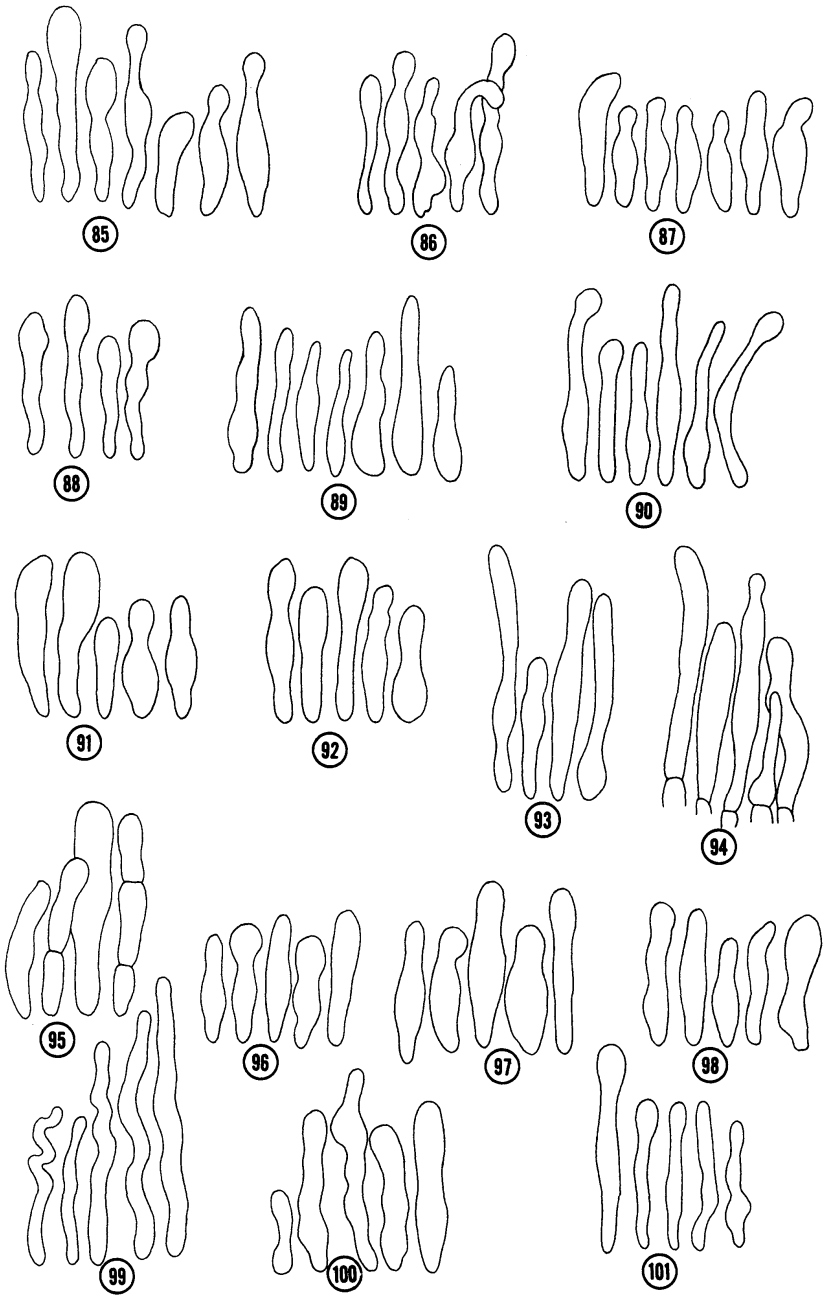
FIGS. 34–50. *Crepidotus*—CHEILOCYSTIDIA: 34, *cinnabarinus,* type; 35, *pubescens,* MICH-54060; 36, *stratosus,* type; 37, *unicus,* type; 38, *parvulus,* type; 39, *putrigenus,* MICH-37186; 40, *ochraceus,* type; 41, *alabamensis,* type; 42, *sulcatus,* type; 43, *uber* var. *cystidiosus,* type; PLEUROCYSTIDIA: 44, *uber* var. *cystidiosus,* type; CHEILOCYSTIDIA: 45, *fraxinicola* (hymenial), type; 46, *fraxinicola* (tramal), type; 47, *mollis* var. *mollis* (hymenial); 48, *mollis* var. *mollis* (tramal); 49, *uber* var. *uber,* type; INCRUSTED HYPHA: 50, *mollis* var. *mollis.*



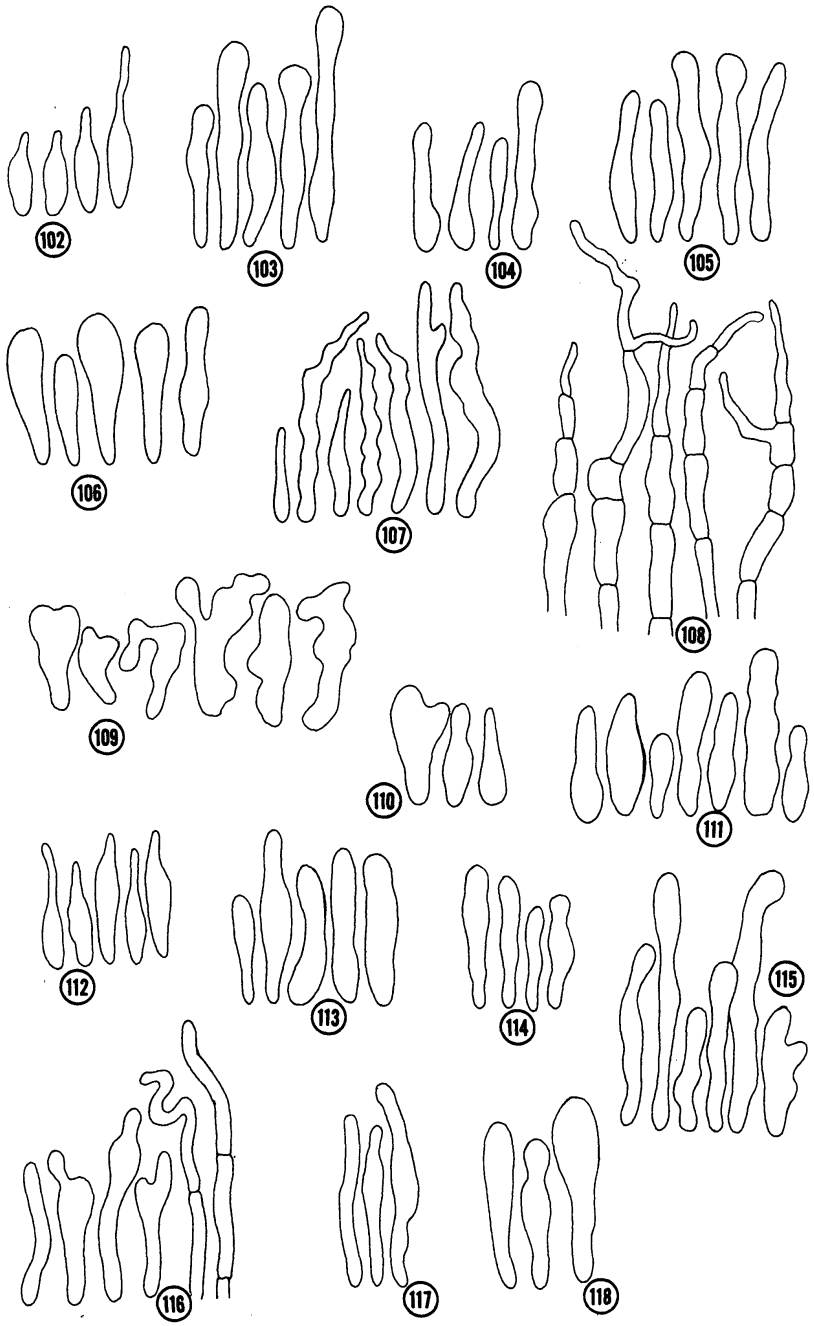
FIGS. 51–69. *Crepidotus*—PLEUROCYSTIDIA: 51, *mollis* var. *cystidiosus,* type; CHEILOCYSTIDIA: 52, *mollis* var. *cystidiosus* (hymenial), type; 53, *mollis* var. *cystidiosus* (tramal), type; PLEUROCYSTIDIA: 54, *mollis* var. *beachii,* type; CHEILOCYSTIDIA: 55, *mollis* var. *beachii,* type; 56, *versutus,* type; 57, *versutus,* MICH-89; 58, *herbarum,* type; 59, *herbarum,* TENN-3656; 60, *bicolor,* type; 61, *coloradensis,* type; 62, *nyssicola,* type; 63, *nyssicola,* MICH-33169; 64, *stipitatus,* type; PLEUROCYSTIDIA: 65, *subapplanatus,* type; CHEILOCYSTIDIA: 66, *subapplanatus*, type; PLEUROCYSTIDIA: 67, *subapplanatus,* TENN-23088; CHEILOCYSTIDIA: 68, *subapplanatus,* TENN-23088; PILOCYSTIDIA: 69, *subapplanatus,* TENN-23088.



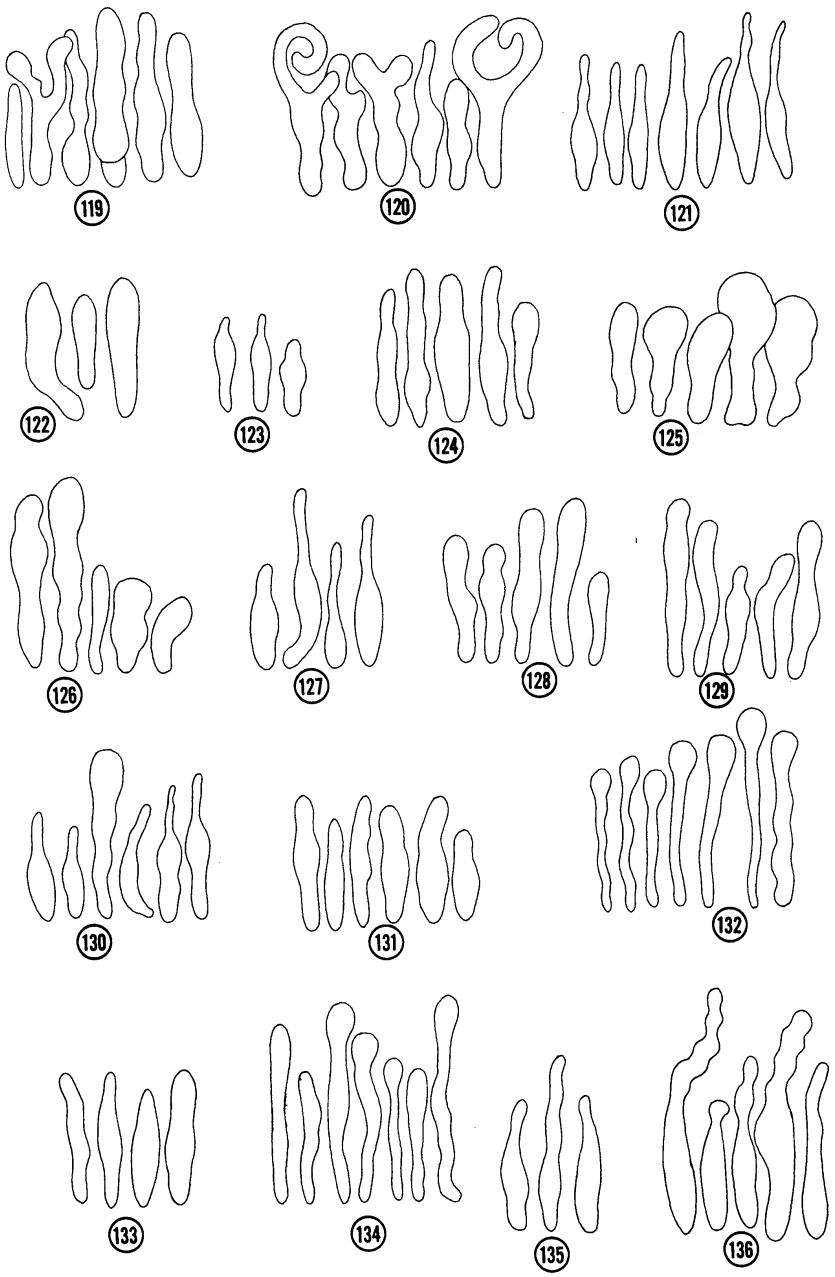
FIGS. 70–84. *Crepidotus*—PLEUROCYSTIDIA: 70, *maculans,* type; CHEILOCYSTIDIA: 71, *maculans,* type; PLEUROCYSTIDIA: 72, *cystidiosus,* type; CHEILOCYSTIDIA: 73, *cystidiosus,* type; 74, *conchatus,* type; PILOCYSTIDIA: 75, *conchatus,* type; CHEILOCYSTIDIA: 76, *tahquamenonensis,* type; 77, *harperi,* type; 78, *applanatus* var. *applanatus,* leg. Josserand; 79, *applanatus* var. *applanatus,* TENN-9034; 80, *applanatus* var. *phragmocystidiosus,* type; 81, *applanatus* var. *phragmocystidiosus,* MICH-57472; 82, *applanatus* var. *diversus,* MASS-10595; PILOCYSTIDIA: 83, *applanatus* var. *diversus,* MASS-10595; CHEILOCYSTIDIA: 84, *applanatus* var. *globigera,* MICH-37290.



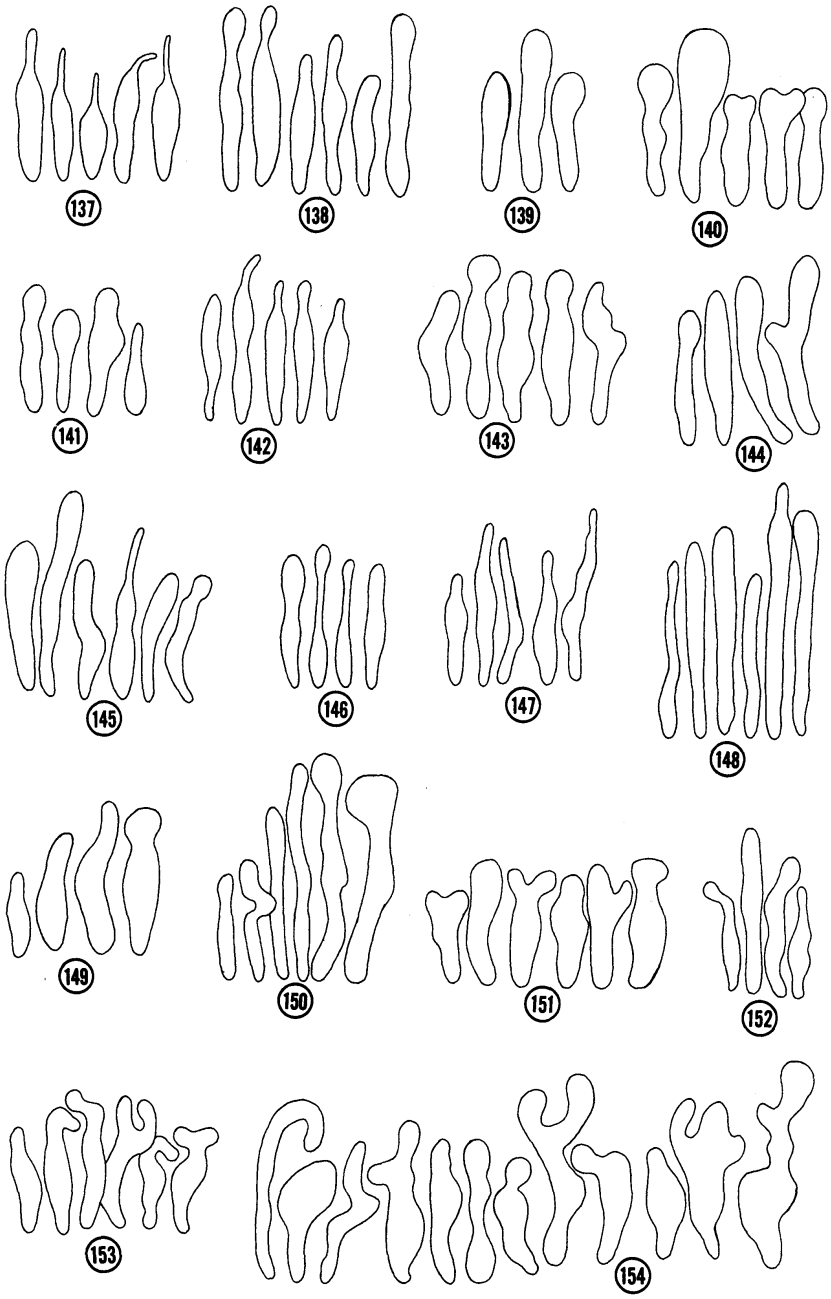
FIGS. 85–101. *Crepidotus*—CHEILOCYSTIDIA: 85, *hygrophanus,* type; 86, *brunnescens,* type; 87, *quitensis,* type; 88, *latifolius,* lecto-type (Lloyd-49964); 89, *praelatifolius,* type; 90, *avellaneus,* type; 91, *malachius* var. *malachius,* type; 92, *malachius* var. *malachius,* TENN-24752; 93, *malachius* var. *trichiferus,* type; PILOCYSTIDIA: 94, *malachius* var. *trichiferus,* type; CHEILOCYSTIDIA: 95, *malachius* var. *phragmocystidiosus,* type; PLEUROCYSTIDIA: 96, *angustifolius,* type; CHEILOCYSTIDIA: 97, *angustifolius,* type; 98, *confertus,* type; 99, *flexuosus,* type; 100, *obfuscens,* type; 101, *constans,* type.



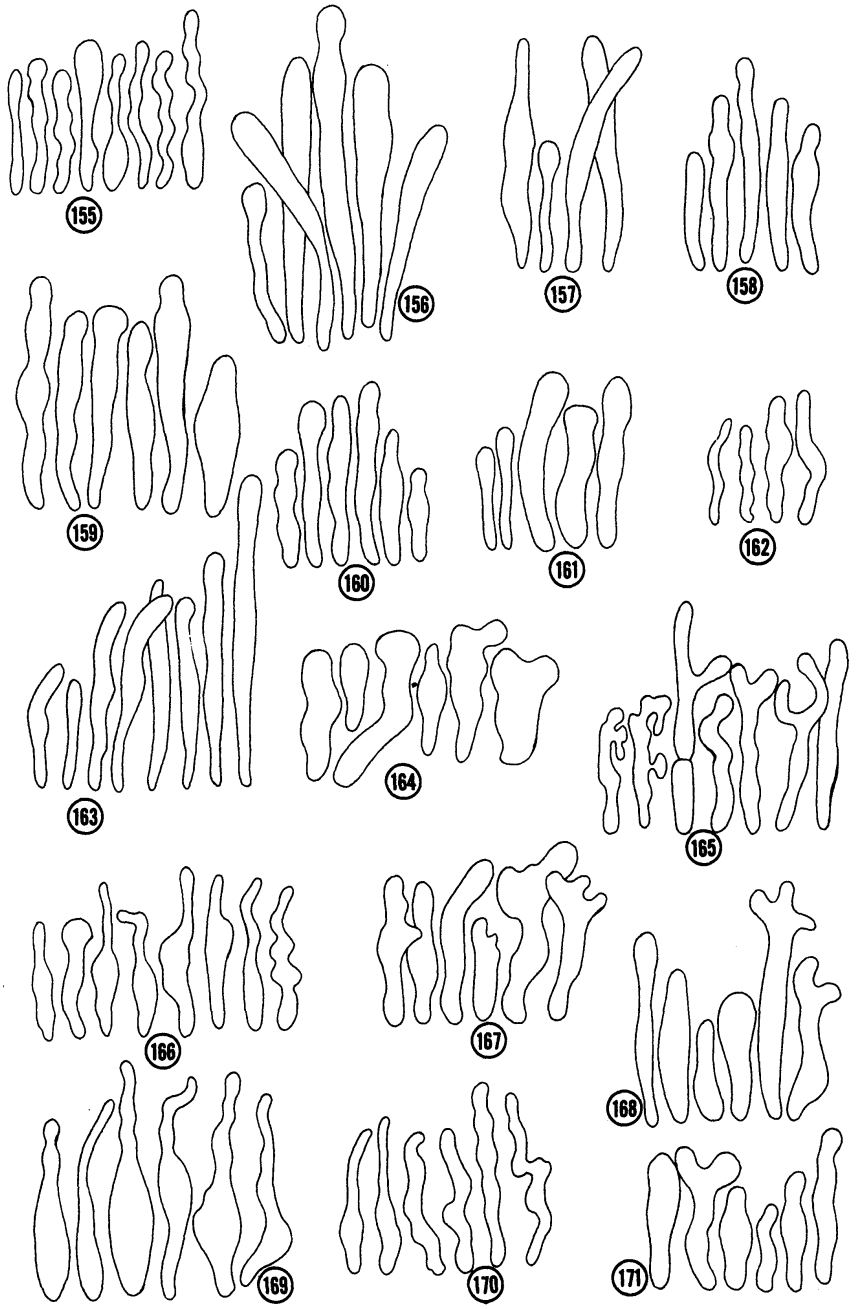
FIGS. 102–118. *Crepidotus*—PLEUROCYSTIDIA: 102, *sublatifolius,* type; CHEILOCYSTIDIA:103, *sublatifolius,* type; 104, *pallidobrunneus,* type; 105, *pallidobrunneus,* MICH-63674; 106, *cuneiformis,* type; 107, *sinuosus,* type; PILOCYSTIDIA: 108, *sinuosus,* type; CHEILOCYSTIDIA: 109, *contortus,* type; PLEUROCYSTIDIA: 110, *roseus,* type; CHEILOCYSTIDIA: 111, *roseus,* type; PLEUROCYSTIDIA: 112, *montanus,* type; CHEILOCYSTIDIA: 113, *montanus,* type; 114, *varicolor,* type; 115, *campylus,* type; PILOCYSTIDIA: 116, *campylus,* type; PLEUROCYSTIDIA: 117, *subnidulans,* type; CHEILOCYSTIDIA: 118, *subnidulans,* type.



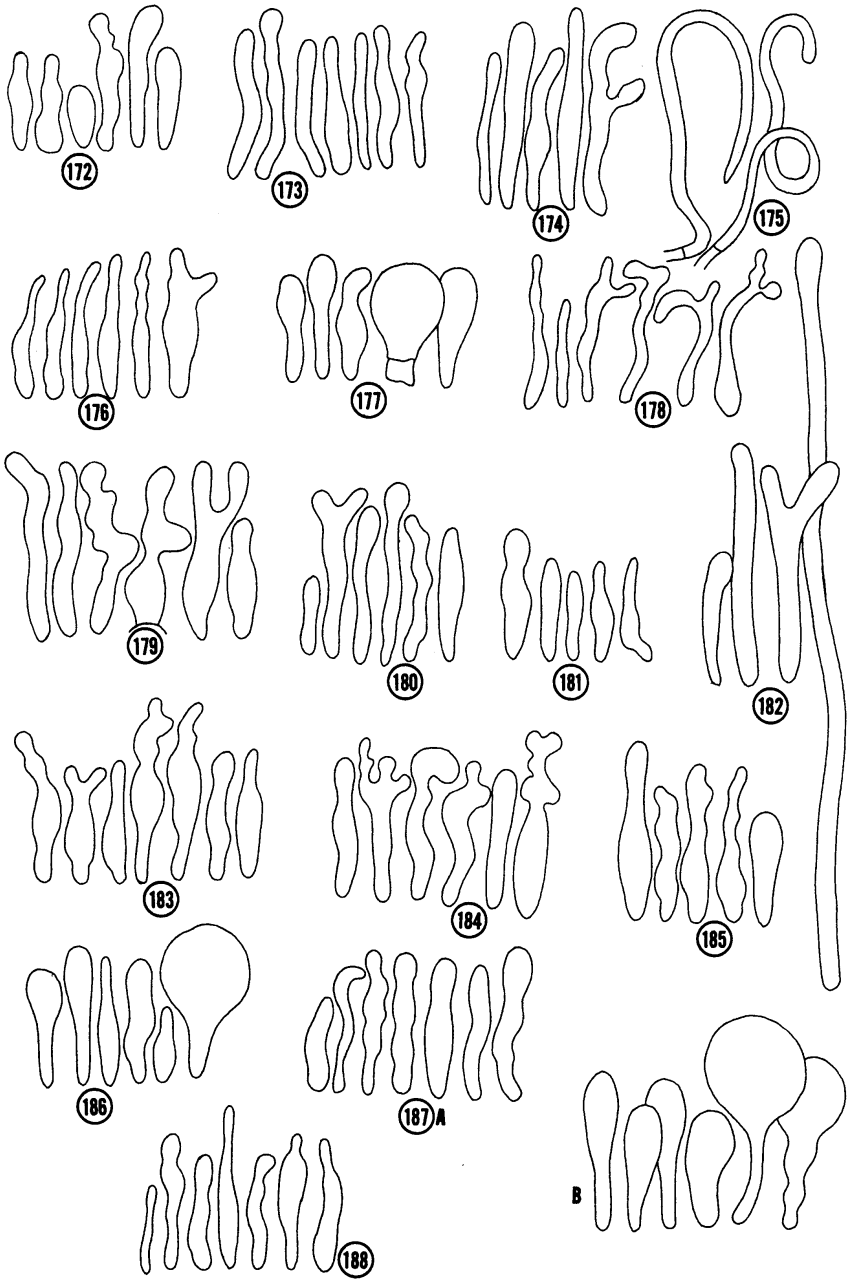
FIGS. 119–136. *Crepidotus*—PLEUROCYSTIDIA: 119, *distortus,* type; CHEILOCYSTIDIA: 120, *distortus,* type; PLEUROCYSTIDIA: 121, *appalachianensis,* type; CHEILOCYSTIDIA: 122, *appalachianensis,* type; PLEUROCYSTIDIA: 123, *subfibrillosus,* type; CHEILOCYSTIDIA: 124, *subfibrillosus,* type; PLEUROCYSTIDIA: 125, *subaureifolius,* type; CHEILOCYSTIDIA: 126, *subaureifolius,* type; PLEUROCYSTIDIA: 127, *aureifolius,* type; CHEILOCYSTIDIA: 128, *aureifolius,* type; 129, *crocophyllus,* type; 130, *nephrodes,* type; PLEUROCYSTIDIA: 131, *pseudoflammeus,* type; CHEILOCYSTIDIA: 132, *pseudoflammeus,* type; PLEUROCYSTIDIA: 133, *haustellaris,* MICH-22261; CHEILOCYSTIDIA: 134, *haustellaris,* MICH-22261; PLEUROCYSTIDIA: 135, *albatus,* type; CHEILOCYSTIDIA: 136, *albatus,* type.



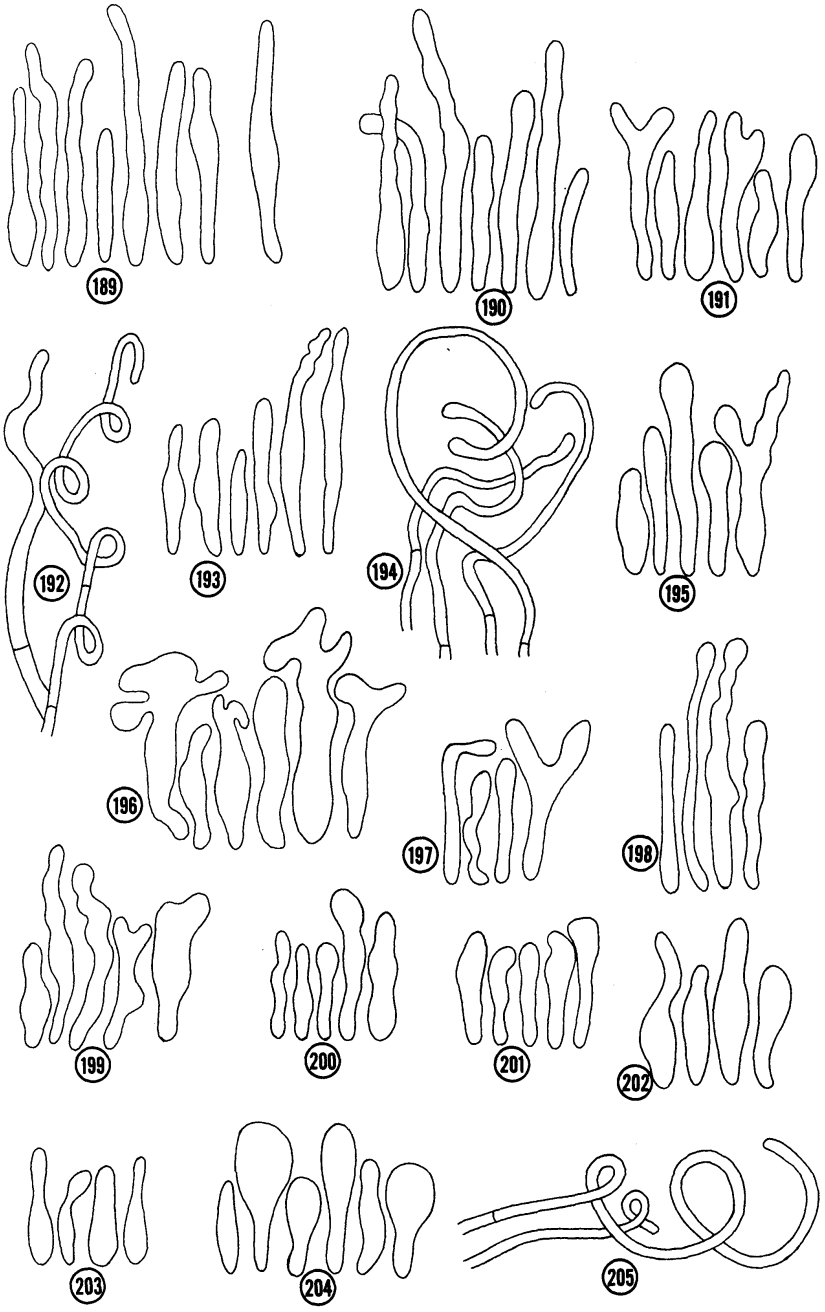
FIGS. 137–154. *Crepidotus*—PLEUROCYSTIDIA: 137, *fragilis,* Bas (Leiden) TENN-26099; CHEILOCYSTIDIA: 138, *fragilis,* Bas (Leiden) TENN-26099; PLEUROCYSTIDIA: 139, *luteicolor,* type; CHEILOCYSTIDIA: 140, *luteicolor,* type; PLEUROCYSTIDIA: 141, *rainierensis,* type; CHEILOCYSTIDIA: 142, *rainierensis,* type; 143, *payettensis,* type; 144, *kauffmanii,* type; 145, *roseibrunneus,* type; 146, *paxilloides,* type; 147, *hamulatus,* type; 148, *phaseoliformis*, type; 149, *fusisporus* var. *abietinus*, type; 150, *fusisporus* var. *longicystis,* type; 151, *fusisporus* var. *anomalus,* type; 152, *fusisporus* var. *fusisporus,* type; 153, *fusisporus* var. *rameus,* type; 154, *fusisporus* var. *rameus,* type.



FIGS. 155–171. *Crepidotus*—CHEILOCYSTIDIA: 155, *amarus,* type; 156, *maximus,* type; 157, *betulae,* type; 158, *occidentalis,* type; 159, *lundellii,* type; 160, *cinchonensis,* type; 161, *pecten,* type; 162, *albidus,* type(?); 163, *albissimus,* type; 164, *variabilis* var. *variabilis,* from Kew; 165, *variabilis* var. *trichocystis,* type; 166, *cinnamomeus,* type; 167, *ellipsoideus,* type; 168, *sphaerosporus,* from France, MICH-66267; 169, *lagenicystis,* type; 170, *furcatus,* type; 171, *regularis,* type.



FIGS. 172–188. *Crepidotus*—CHEILOCYSTIDIA: 172, *eburneus,* type; 173, *montanensis,* type; 174, *epibryus,* Pilát-197706; EPICUTICULAR HYPHAE: 175, *epibryus,* Pilát-197706; CHEILOCYSTIDIA: 176, *epibryus,* TENN-17709; 177, *subluteus,* type; 178, *lanuginosus,* type; 179, *villosus,* type; 180, *subsphaerosporus,* MICH-14612; 181, *vulgaris,* type; 182, *alnicola,* type; 183, *submollis,* type; 184, *cesatii,* Pilát-487965; 185, *amygdalosporus,* v. Waveren (Leiden); 186, *cinereipallens,* type; 187a, *obscurus,* type; 187b, *obscurus,* type; 188, *subverrucisporus* var. *roseifolius,* type.



FIGS. 189–205. *Crepidotus*—CHEILOCYSTIDIA: 189, *subverrucisporus* var. *subverrucisporus,* type; 190, *subverrucisporus* var. *megalosporus,* MICH-51947; 191, *circinatus,* type; COILED AND CROOKED EPICUTICULAR HYPHAE: 192, *circinatus*, type; CHEILOCYSTIDIA: 193, *helicus,* type; COILED AND CROOKED EPICUTICULAR HYPHAE: 194, *eburneus,* type; CHEILOCYSTIDIA: 195, *milleri*, type; 196, *ramosus*, type; 197, *mucidifolius* (hymenial) type; 198, *mucidifolius* (tramal); 199, *fimbriatus,* type; 200, *pallidoluteus,* type; 201, *croceitinctus,* type; 202, *croceitinctus,* TENN-14171; 203, *croceitinctus,* MICH-66682; 204, *subcroceitinctus,* type; COILED EPICUTICULAR HYPHAE: 205, *regularis,* MASS-3028.

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The illustrations in the text of the book are for identification only. For a more detailed reproduction we have added a duplicate set of these illustrations on glossy paper.

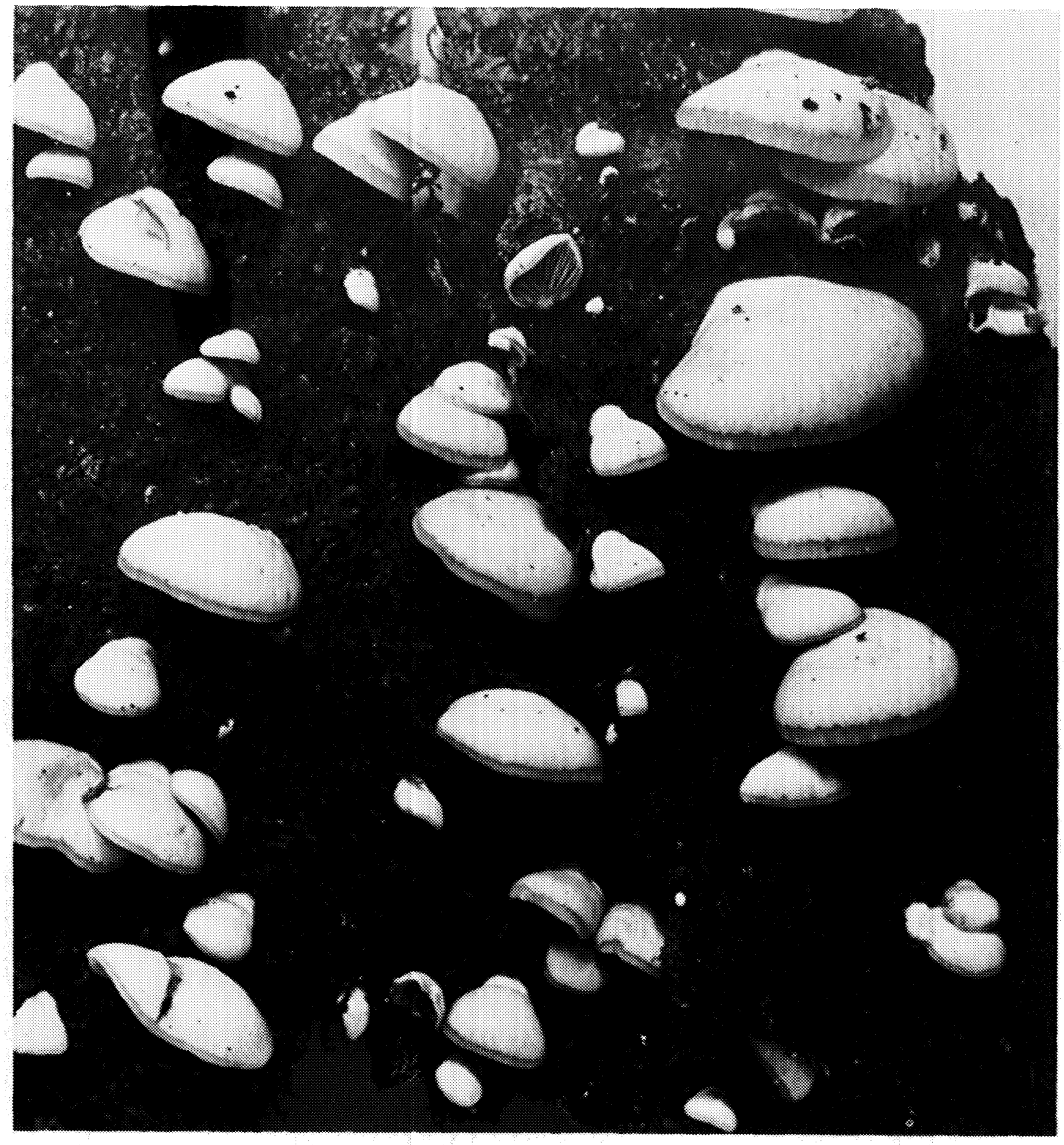

FIG. 1. *C. alabamensis*

FIG. 2. *C. mollis* var. *mollis*

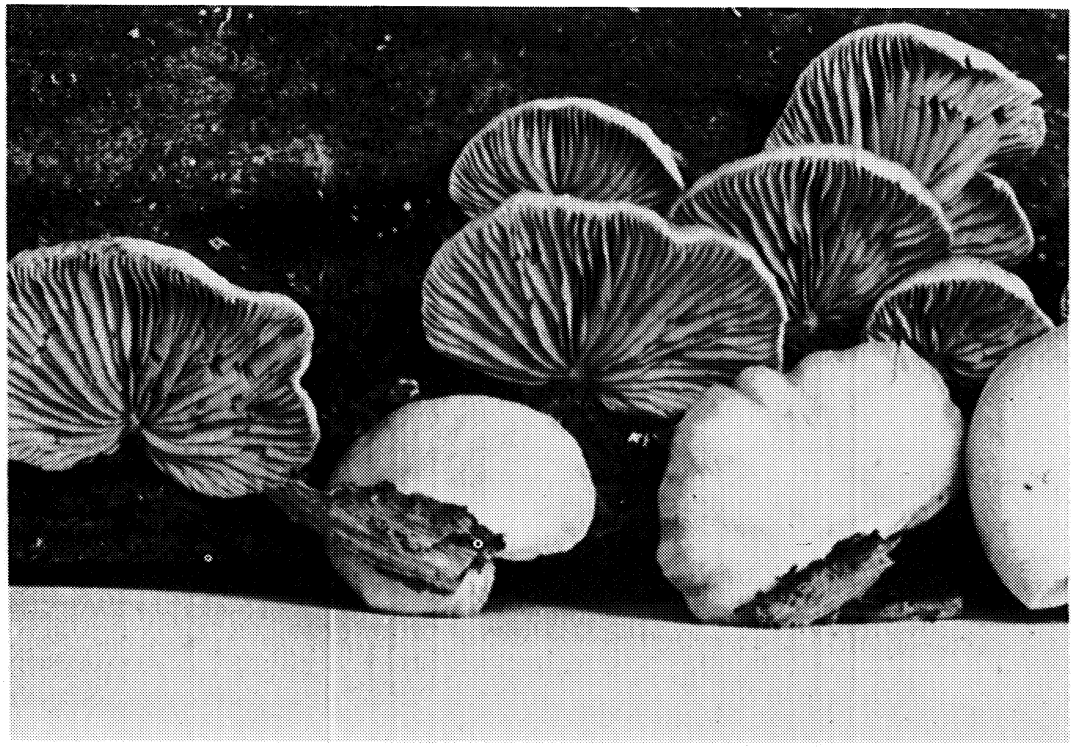

FIG. 3. *C. maculans*

FIG. 4. *C. cystidiosus*

FIG. 5. *C. applanatus* var. *applanatus*

FIG. 6. *C. applanatus* var. *applanatus*

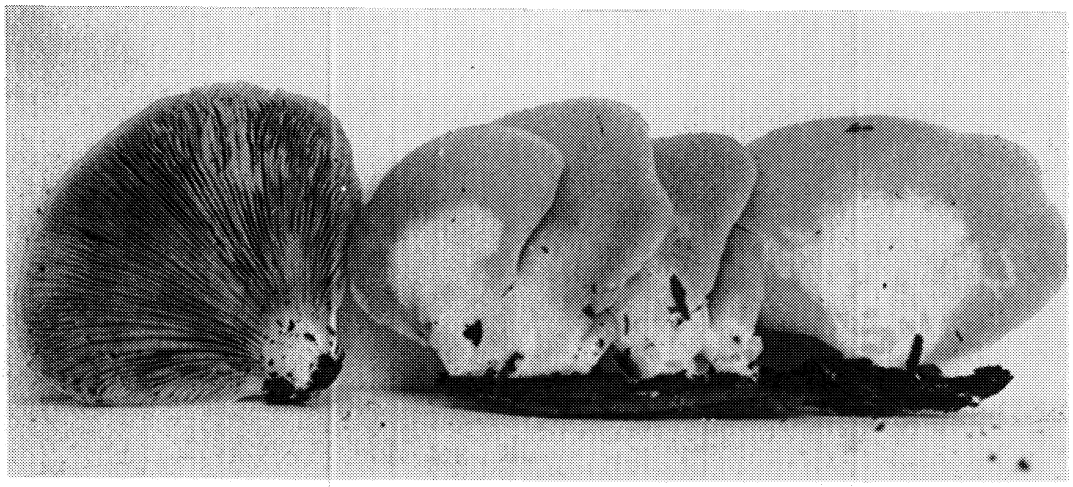

FIG. 7. *C. applanatus* var. *globigera*

FIG. 8. *C. brunnescens* × 1⅓

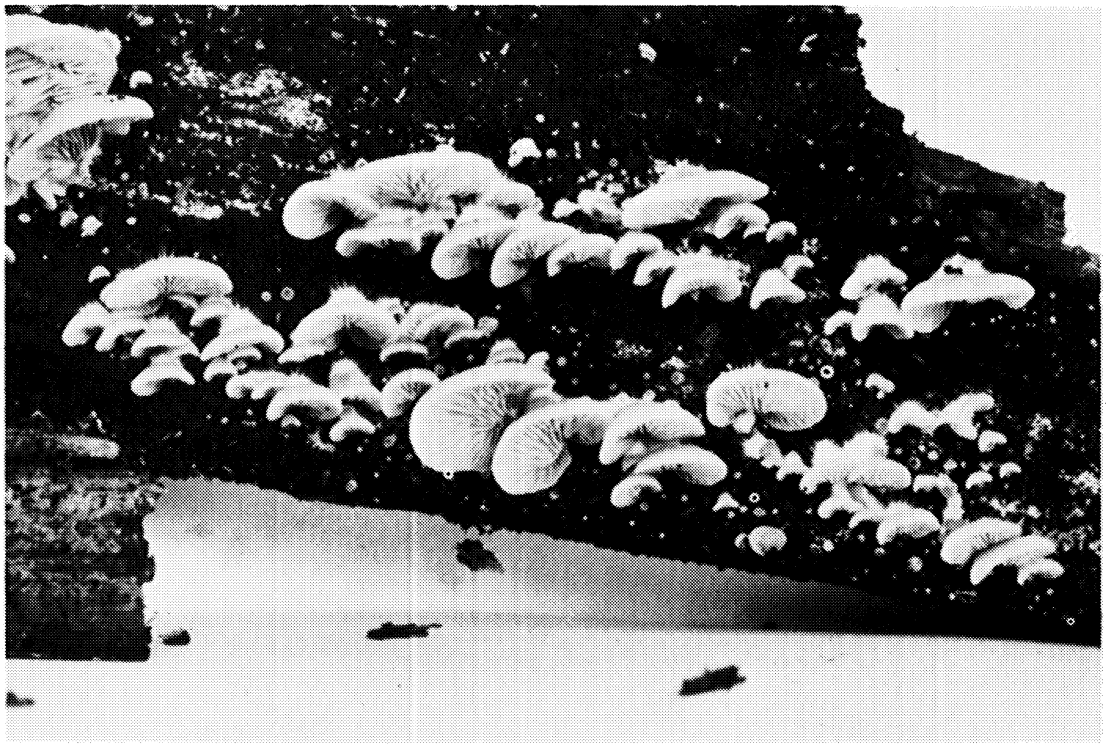

FIG. 9. *C. avellaneus*

FIG. 10. *C. avellaneus*

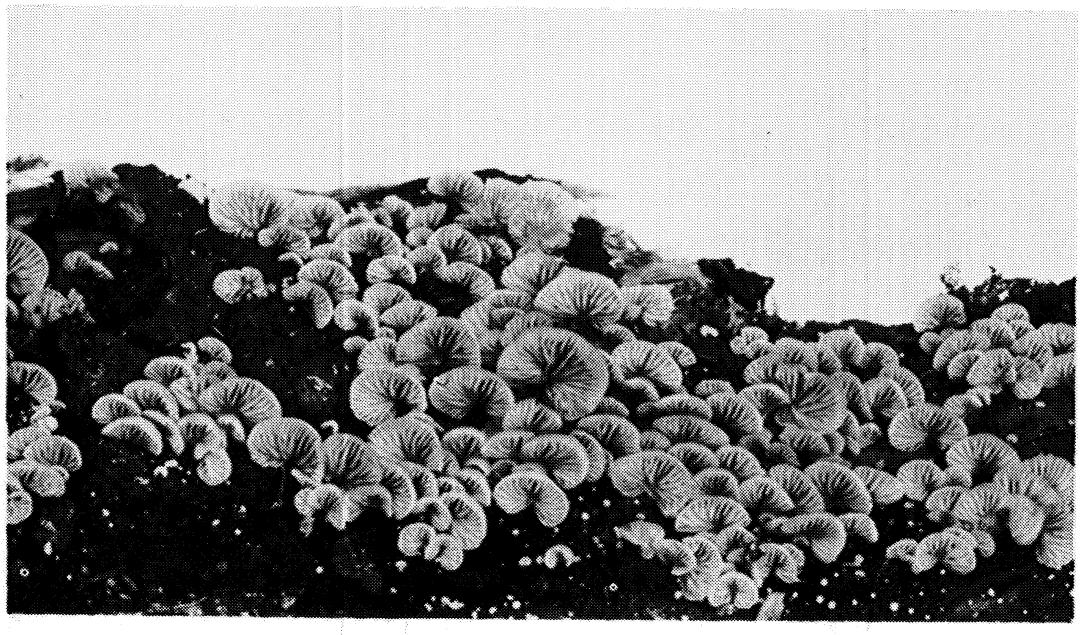

FIG. 11. *C. sublatifolius*

FIG. 12. *C. pallidobrunneus*

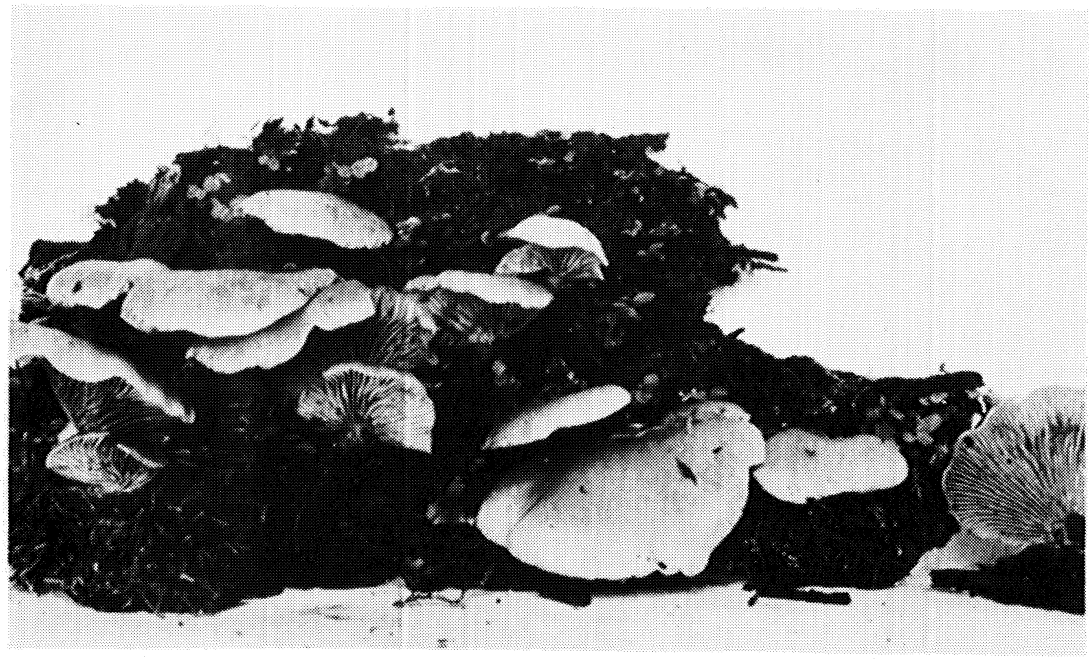

FIG. 13. *C. contortus*

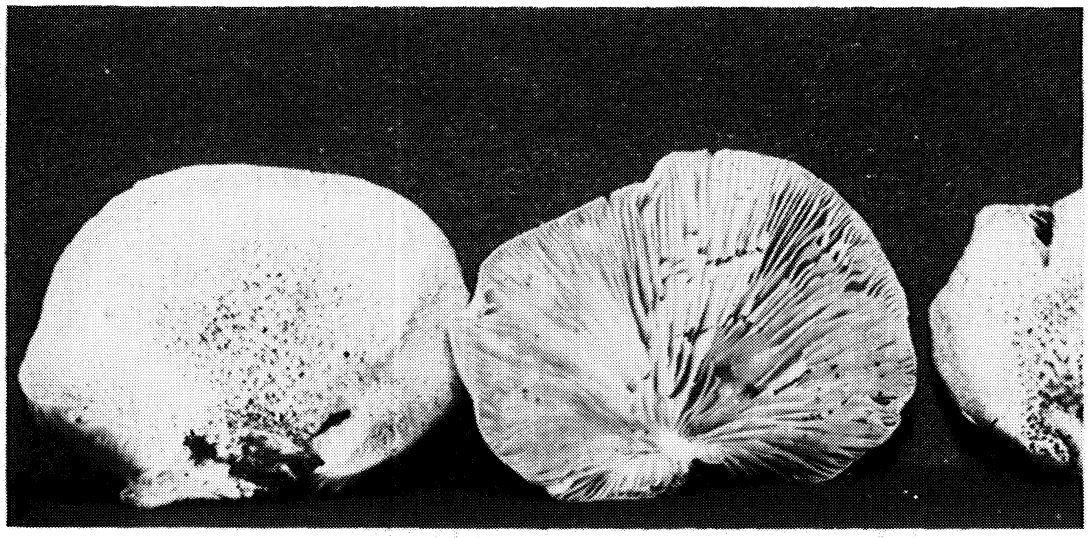

FIG. 14. *C. appalachianensis*

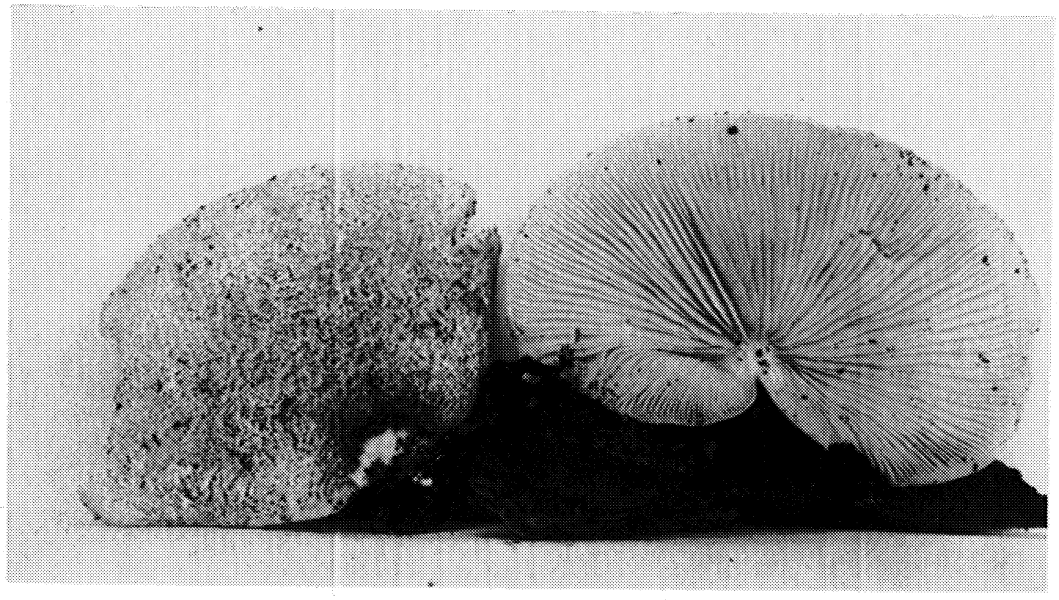

FIG. 15. *C. aureifolius*

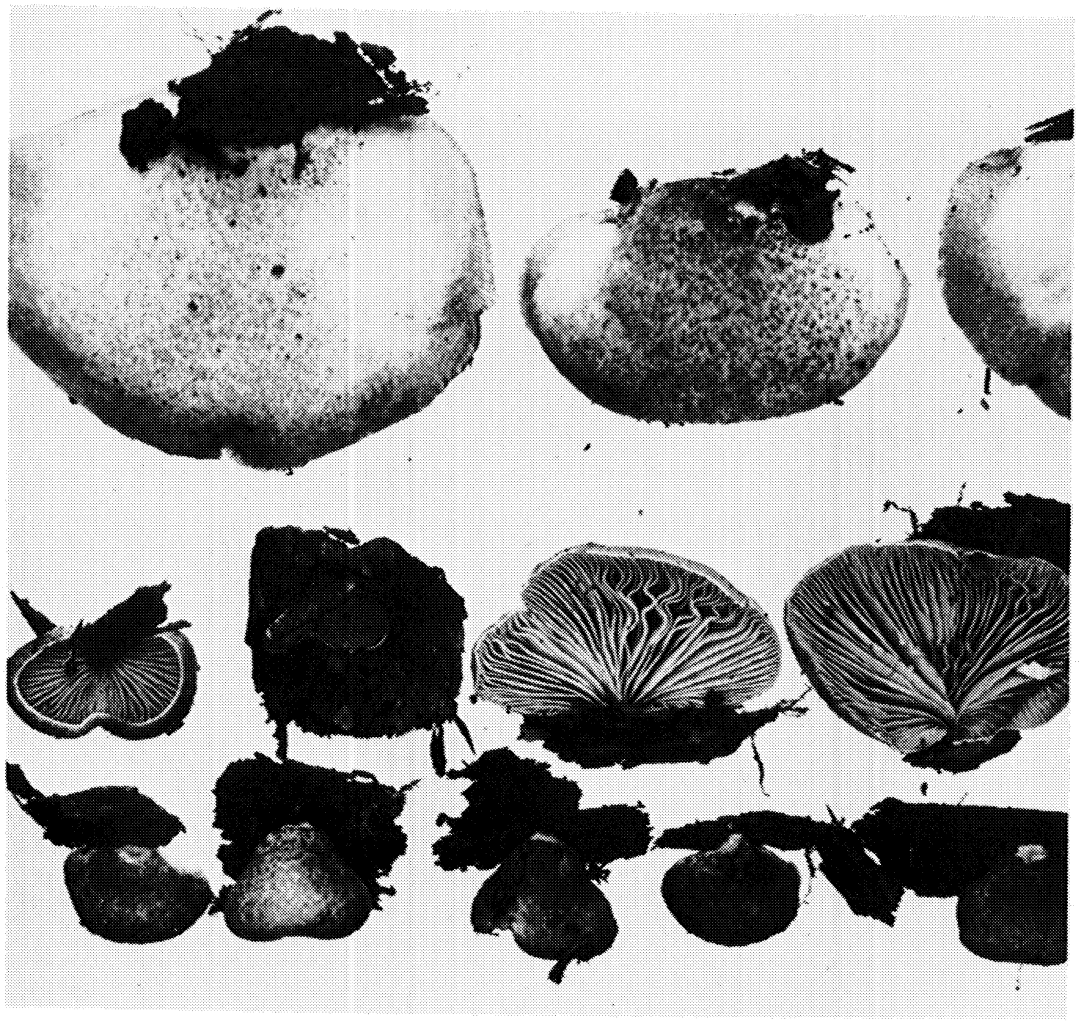

FIG. 16. *C. crocophyllus*

FIG. 17. *C. nephrodes*

FIG. 18. *C. albatus* × 1⅓

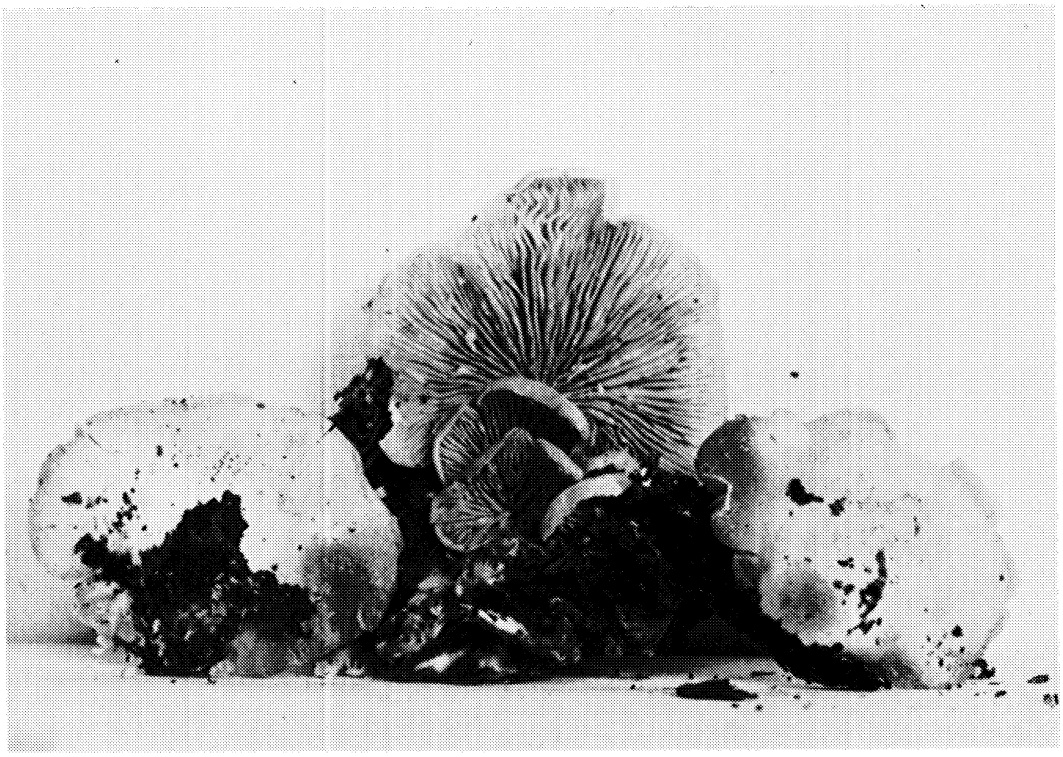

FIG. 19. *C. luteicolor*

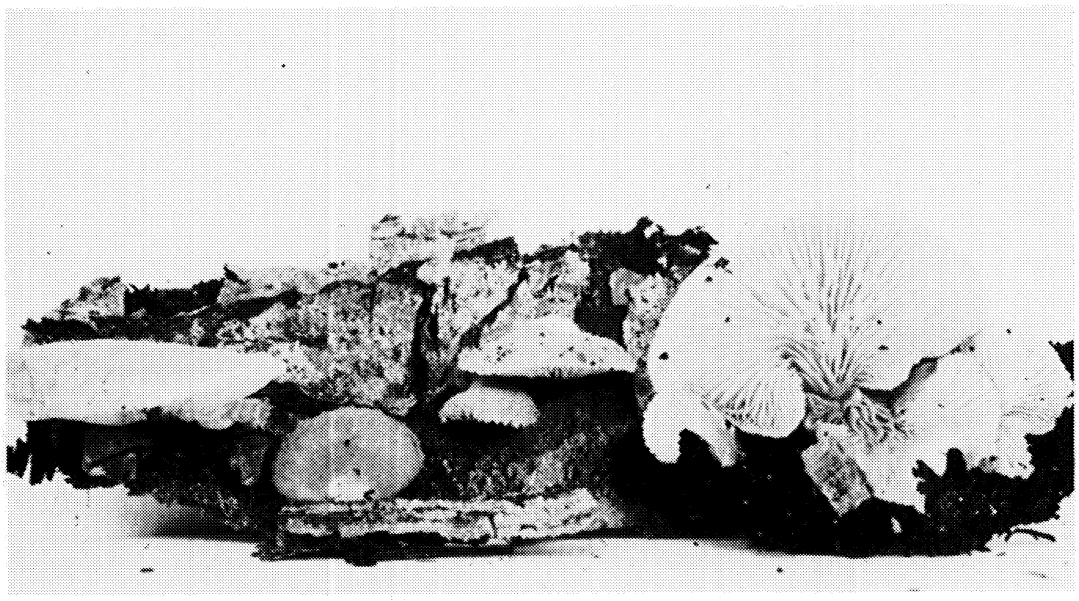

FIG. 20. *C. kauffmanii*

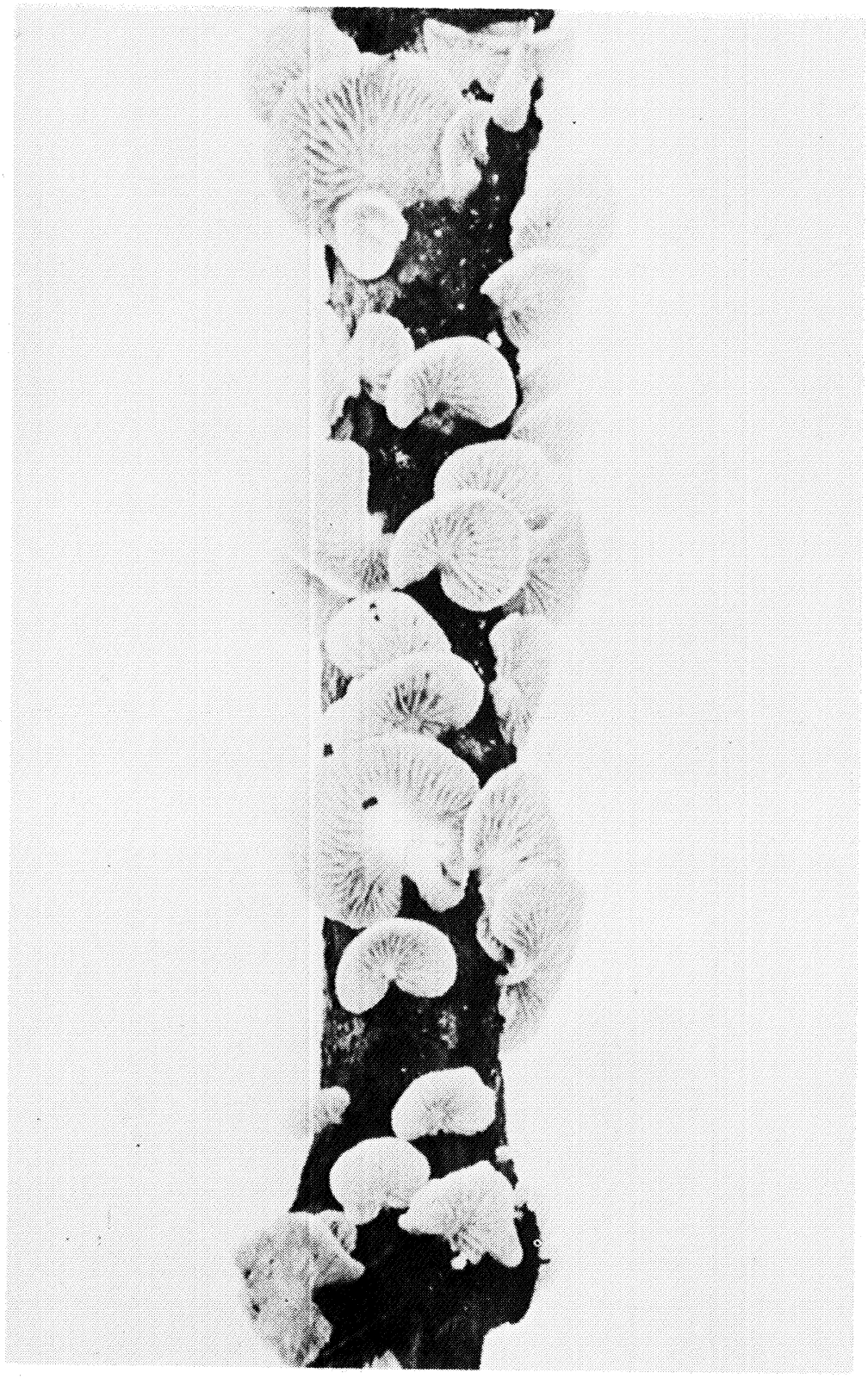

FIG. 21. *C. fusisporus* var. *anomalus* × 2

FIG. 22. *C. fusisporus* var. *rameus*

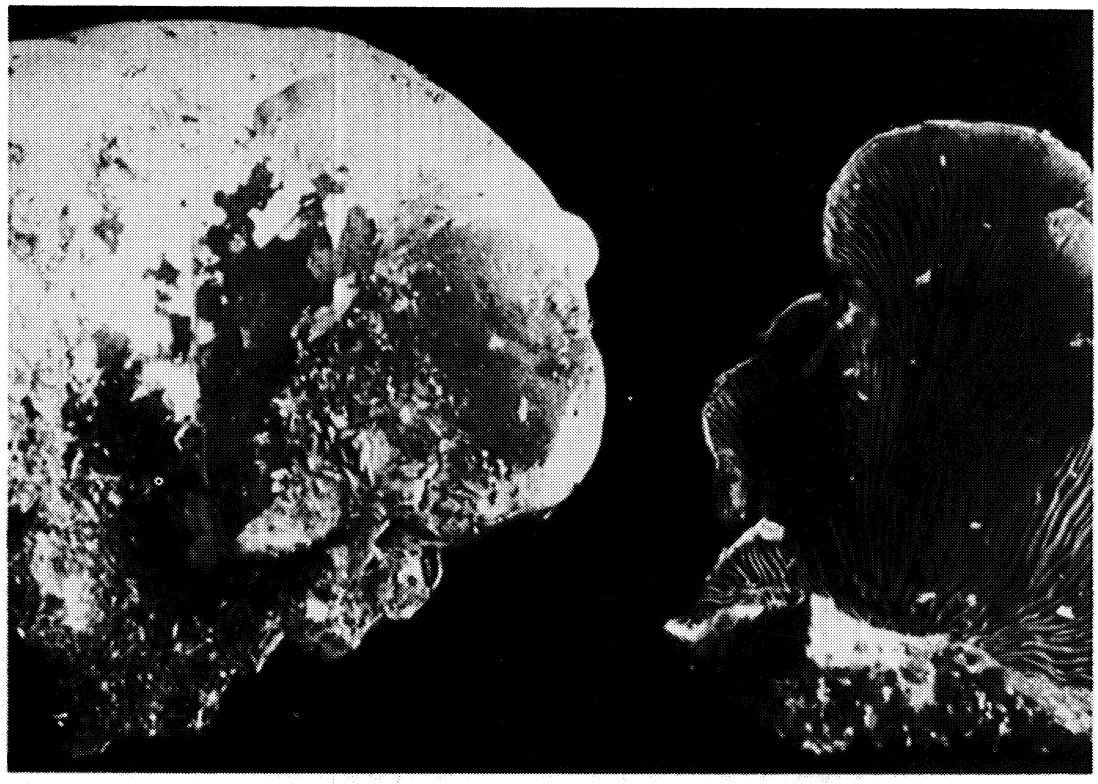

FIG. 23. *C. maximus*

FIG. 24. *C. eburneus*

FIG. 25. *C. vulgaris*

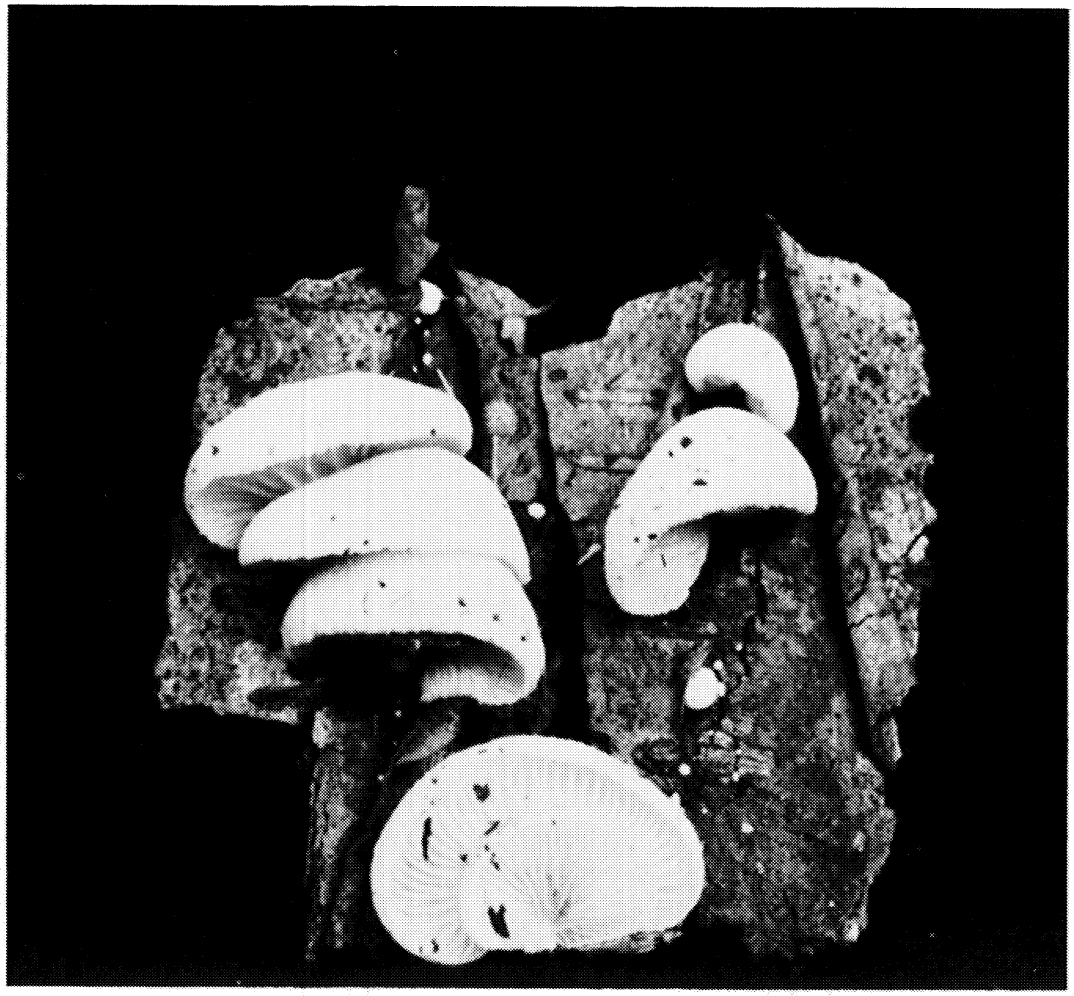

FIG. 26. *C. alnicola* × 1⅓

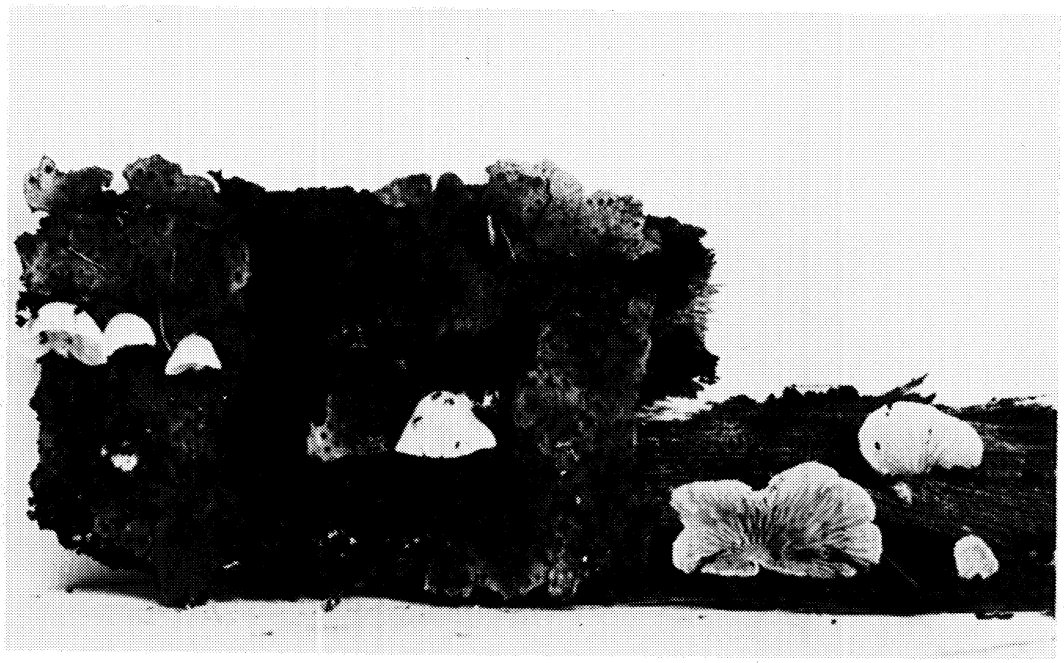

FIG. 27. *C. submollis*

FIG. 28. *C. amygdalosporus*

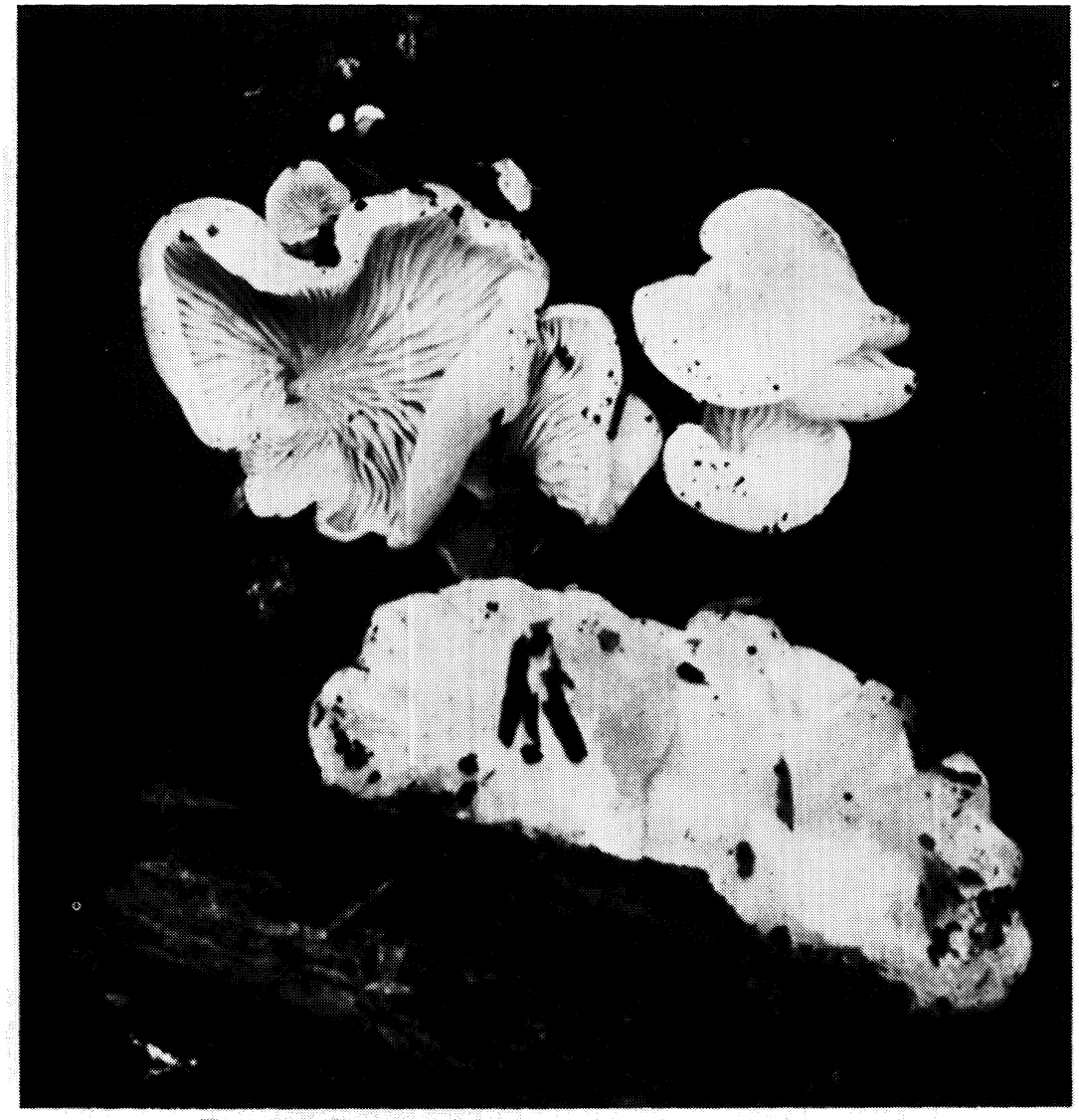

FIG. 29. *C. subverrucisporus* var. *subverrucisporus* × 2

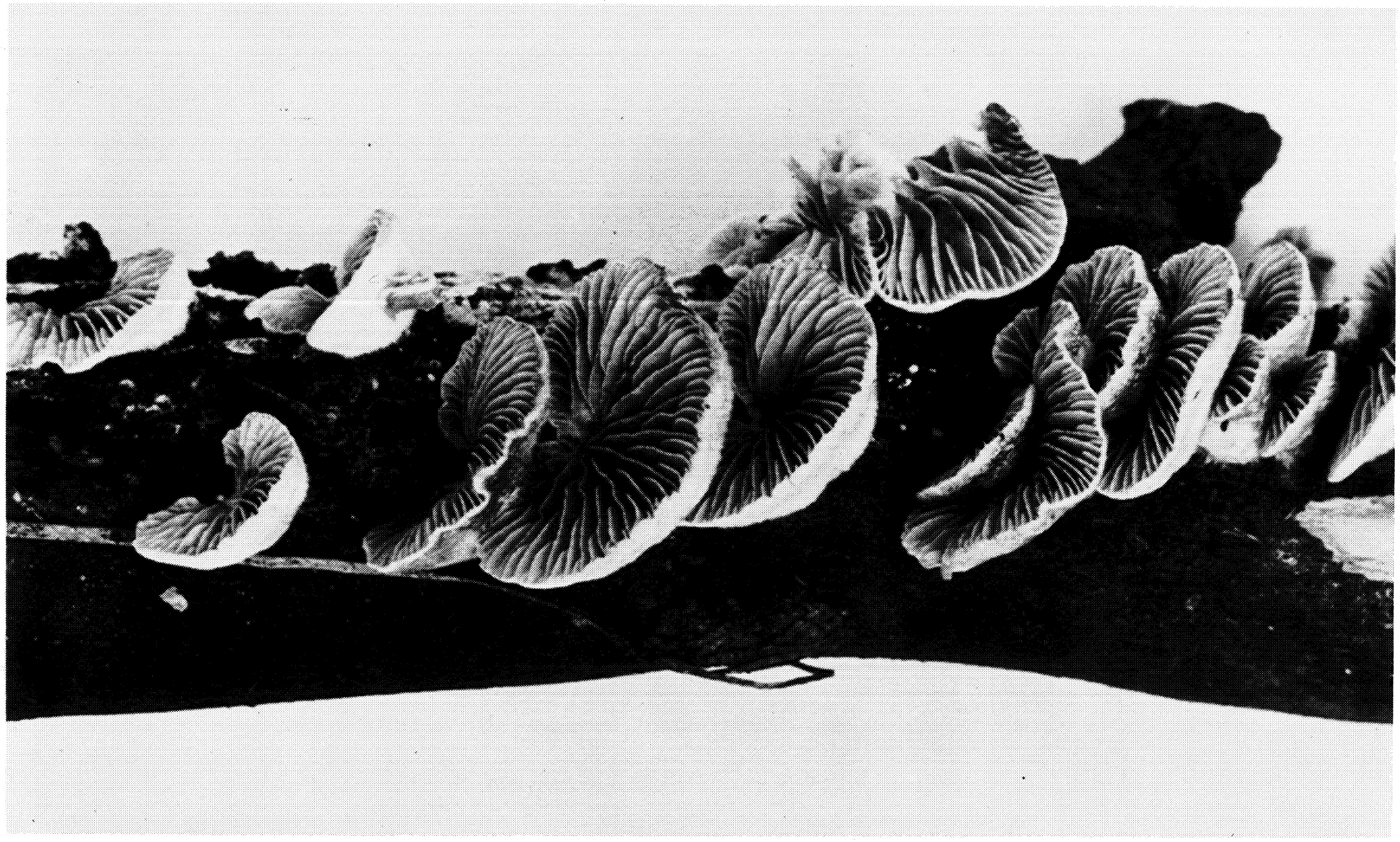

FIG. 30. *C. subverrucisporus* var. *roseifolius* × 1½

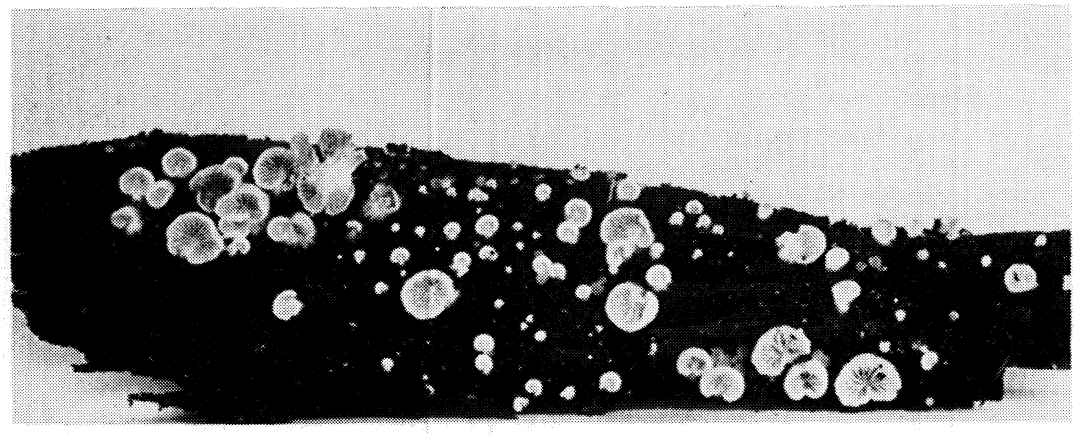

FIG. 31. *C. subverrucisporus* var. *megalosporus*

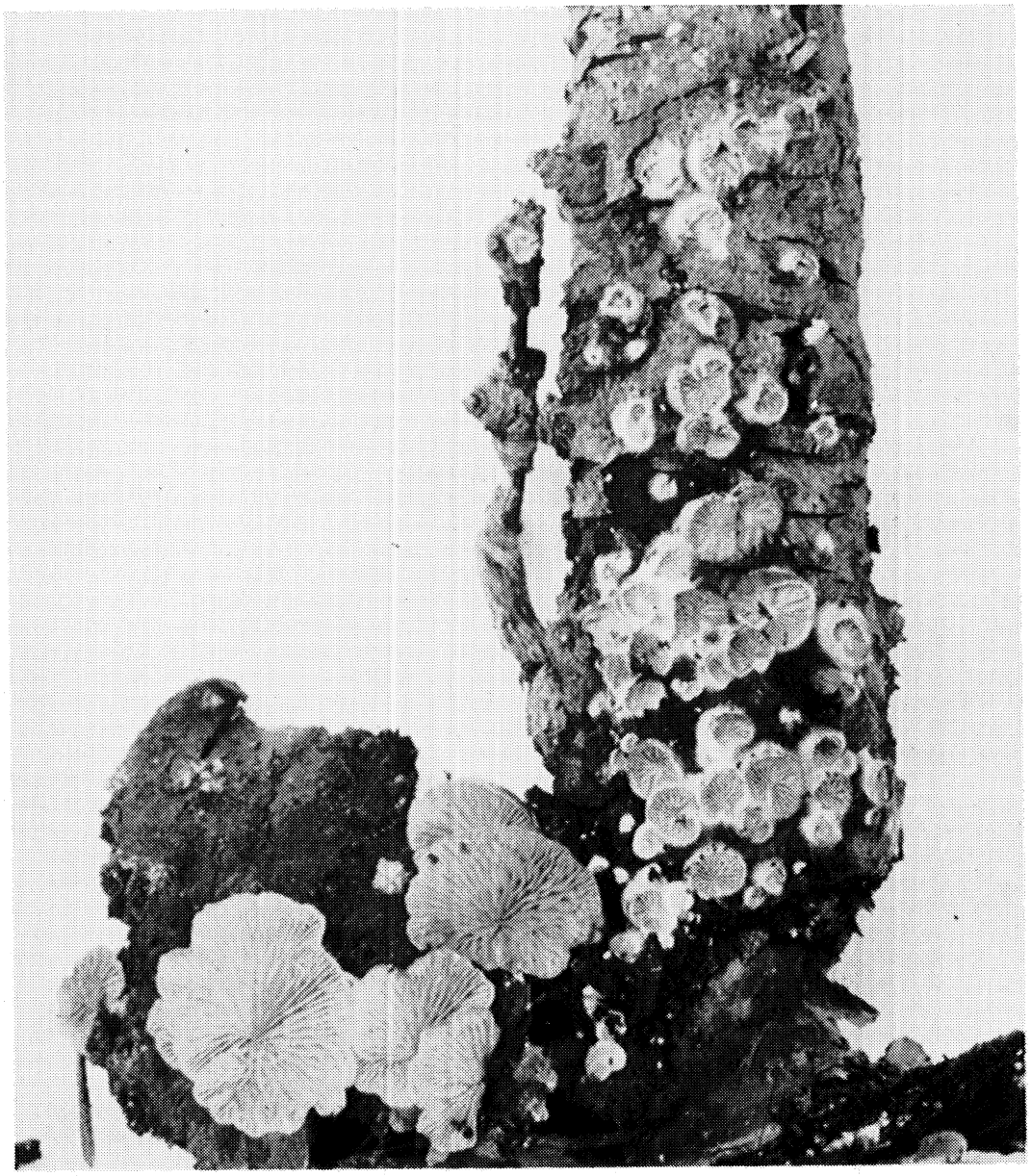

FIG. 32. *C. fimbriatus*

FIG. 33. *C. croceitinctus*