Synopsis Fungorum 28

Stereoid fungi of America

by
Leif Ryvarden

FUNGIFLORA

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Nomenclaturial novelties proposed in this volume:

New species:
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New combinations
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Content

Introduction

The genus *Stereum* was originally used to include many types of basidiomycetes characterised by a pileate to effused-reflexed basidiocarp and a more or less smooth hymenial surface.
When microscopic and chemical characters were introduced as taxonomic tools *Stereum s.l* has been gradually split into numerous smaller and more precisely defined genera.
DNA sequencing has carried this development further, especially amongst genera with stipitate basidiocarps where many more species will have to be sequenced before we reach a stable system.
DNA sequencing has demonstrated that generic concepts based on basidiocarp morphology were misleading and that the stereoid basidiocarp has arisen many times in different groups with a different phylogenetic background.
However, if we want a system based entirely based on evolutionary and phylogenetic principles, there is a danger that we will end up with too many small, morphologically similar, genera which will make it difficult to determine specimens and construct user friendly keys. It may be that it will be necessary to have two parallel systems, a pragmatic one for naming specimens and another reflecting the evolution of the group under consideration.
For amateurs and students a practical key will be what will be required, leaving the phylogeny and evolutionary principles to more advanced students and professional mycologists. Essentially it comes down to an old philosophical question viz. do genera exist in nature or are they only a mental construction devised by mankind to facilitate recognition of the variation we observe in nature ?
Thus, when writing manuals for the determination of specimens, the author (s) may have to make a choice based on the considerations outlined above.
In this manual I have retained the currently wide generic concepts for groups with stipitate basidiocarps, such as *Podoscypha, Cotylidia* and *Stereopsis,* even if DNA sequencing of a selected number of species in these genera has shown them to be somewhat heterogeneous and polyphyletic.
Those interested in the evolution of these genera recognised today, and others included in this manual, are referred to (references in here to studies of phylogeny based on DNA).
This manual has a rather wide definition of the “stereoid” and thus, includes species of very different background and origin.

The purpose of the book is to provide a tool for both amateurs and students. Stereoid genera and species are rather easy to recognize in nature and are thus well adapted for starting a preliminary inventory of the mycota in restricted areas or for making small ecological studies. The provision of useable identification manuals is especially important in areas such as tropical America where there is an almost total lack of pertinent literature for almost any group of fungi!
To recruit new students to mycology and to stimulate interest for collecting and mapping of a mycota, it is necessary to develop tools to do so. This little manual is meant to be a contribution in achieving this.
In a manner this book is not 'scientific' (in a restricted sense) since it provides no new information and includes neither descriptions of new species (one exception) nor new data based on sequencing. It is almost entirely a compilation of available knowledge supplemented with observations made during many years of field work in tropical America.
The most important literature sources have been: Chamuris(1988), Reid (1965), and Welden (2010) and the numerous references to smaller studies given in these books.

Distribution.
The distribution indicated for each species is, in most cases, given in rather general terms.
The reason for this is that the areas that have been surveyed are often vast in area and it is impossible to survey them completely – some have not been investigated at all.
This is especially relevant for South and Central America where collecting has only ever been done in a disjunct manner, covering widely scattered sites. Thus, almost all distribution maps really only show where mycologists have been, and do not show the true distribution of the fungus species.
Based on experience in Europe, which has been rather well investigated mycologically, it will still be a great many years until any genuinely reliable information on fungal distribution is achieved for tropical America. The erratic occurrence of many species adds to the problem, since we are dependent on actually having to collect the basidiocarp to make a reliable determination.
Due to the physiology of fungi a good supply of water is necessary to produce a basidiocarp and, as all field mycologists know only too well, climatic conditions have to be just right for the production of basidiocarps, thus making it a necessity to return to the same area, often over a period of many years, in order to make reliable records.
In addition, many species are, in some manner, restricted in their ability to produce a basidiocarp e.g. they may require a certain type of substrate, or a

particular host species or may even be dependent on the stage of decay of the substrate – again, these are all reasons which may be problematic in finding specimens with which to compile good inventories.
Many areas (especially in South America) are very difficult to access and expensive expeditions have to be arranged in order to arrive in remotes places. This further accentuates the difficulties of making inventories of fungi in areas such as this. Further still, many species have a tendency to occur erratically even if (to the human sense) conditions seem optimal. It is a well established fact for most field mycologists that in a particular year a species may be common and abundant but will then not reappear for years.
The reasons for this are unknown! Possibly it is because ecological conditions are not right or it may be that it takes years for the fungus to accumulate sufficient resources to produce a basidiocarp. It may also be that the species has simply disappeared after having produced basidiocarps and consequently spores, and that a new supply of spores is then necessary to re-establish it. For all we know there may also be some kind of 'biological clock' at work. They are well known and documented for insects and vascular plants, so why not also for fungi?
All this make it difficult and, at times, frustrating to register / record fungi to make an inventory. However, on the other hand, it is always a stimulating exercise since you are never certain about what you will find during a field trip.

Determinations
The author is interested in receiving specimens of stereoid species for determination.

Specimens should preferably be duplicates, well dried and enclosed with a proper label showing the locality, substrate, date of collection, host (if possible), and collector. It should also be mentioned that a numbering system of some kind is necessary for making up a list of names to be returned the collector.
In Norway it is not necessary with any forms or papers to receive dried specimens for scientific studies, although this should be indicated on packet. Send to Professor L. Ryvarden, Biological Institute, Univ. of Oslo, P. O. Box 1066, Blindern, and N-0366 Oslo, Norway.

Acknowledgements.
Many persons have given information making this book possible. I am especially indebted to Karl-Henrik Larsson, James Ginns, Karen Nakasone and Scott Redhead who all answered questions and commented on lists of species or genera.

My field work in tropical America had not been possible with generous help and support from resident mycologists. Thus, my special gratitude goes to Dr. T. Iturriaga of Venezuela, Dr. Julietta Carranza of Costa Rica, Dr. T. Gibertoni of Brazil and Dr. Jean Lodge of Puerto Rico, USA.
The mycological staff of the Kew Herbarium, London and New York Botanical Garden have been very helpful by sending type specimens or provided logistic help during my visits to those institutions.
Nick Legon from England has been most helpful in reading most of the text in this book and suggested numerous linguistic improvements. Besides that, he has also pointed out errors and smaller inconsistencies. I am him most grateful for his generous support.

Illustrations

The illustrations are of two types, partly by the late professor John Eriksson and taken from Corticiaceae of North Europe and partly by the author. The difference in quality is striking and even if John Eriksson is acknowledged for each of his drawings, there should be no doubt that those without signatures have been done by the author.
Not all species are illustrated partly because of space restrictions, but also since many species in some genera like *Podoscypha* have more or less that same microstructure, being separated by presence or absence of cystidia and size and shape of spores which can as well be explained by words.

Main Key

1. Basidiocarp stipitate ..... **Key A**
1. Basidiocarp effused reflexed to sessile ..... **Key B**

Key A

1. Hyphal system monomitic 2
1. Hyphal system di- or trimitic 7

2. Cystidia present, projecting beyond the basidia ..... **Cotylidia**
2. Cystidia absent or immersed amongst the basidia 3

3. Hyphae in the context conspicuously inflated, up to 25 µm wide or with coralloid hyphae in the stipe, rare species 4
3. Hyphae straight, and of normal width 2-6 µm wide 4

4. Hyphae in the context conspicuously inflated and up to 25 µm wide, stipe ochraceous and glabrous ..... **Inflatostereum**
4. Hyphae in the context 2-4 µm wide, coralloid hyphae present in stipe which is striate to finally velutinate and blackish ..... **Coralloderma**

5. Basidiocarp white, obconical with widened, rounded apex ..... **Caripia**
5. Basidiocarps differently coloured, spatulate to centrally stipitate 6

6. Minute species, rarely more than 10 mm long and 3-8 mm wide, parasitic on mosses or on the ground among algae ..... **Cyphellostereum**
6. Larger species usually more than 2 cm high, laterally to centrally stipitate, on dead wood or roots ..... **Stereopsis**

7. Gloeocystidia absent 8
7. Gloeocystidia present 9

8. Basidiocarp dark brown, funnel shaped, up to 20 cm high, hyphal system trimitic, binding hypha non dextrinoid, basidiospores non-amyloid ..... **Aquaschypha**
8. Basidiocarp tan to ochraceous, rarely above 4 cm high, hyphal system dimitic, binding hyphae dextrinoid, basidiospores amyloid ..... **Dichopleuropus**

9 Basidiocarp large and robust, in most species with a dense cover of tomentum, hymenial surface with ribs or wart like tuberances, caulo- and pilocystidia absent ..... **Cymatoderma**
9. Basidiocarp small, rarely above 5 cm high, pileus often translucent when fresh, most species more or less glabrous, caulo- and / or pilocystidia present in most species ..... **Podoscypha**

Description of genera and species

ALEUROCYSTIDIELLUM Lemke,
Canad. J. Bot. 42:277, 1964.
Basidiocarps discomycete-like, corticioid or stereoid, margins variable, in some species distinctly delimited and ± reflexed, in others not differentiated, basidiospores amyloid, ornamented (warted or echinulate), large, i.e. longer than 15 µm, basidia medium to large, with four prominent sterigmata, sterile elements, such as cystidia or paraphysoid hyphae, usually present, cystidia thin-walled and ± apically moniliform, with protoplasm darkening in sulpho-vaniline (aldehyde-reaction), hyphal system dimitic, generative hyphae with clamp connections, skeletal hyphae present. Two species in America, causing a white rot.
Type species: *Stereum subcruentatum* Berk. & W. A. Curt.
Remarks: Similar to *Aleurodiscus*, but distinguished from this, by a dimitic hyphal system.

Key to species:
1. On *Quercus* spp. **A. disciformis**
1. On coniferous hosts **A. subcruentatum**

Aleurocystidiellum disciformis (Fr.) Boidin & Lanquetin, Fig. 1
Bull. Soc. Mycol. Fr. 84:63, 1968. - *Thelephora disciformis* Fr., Syst. mycol. 1:443, 1821.

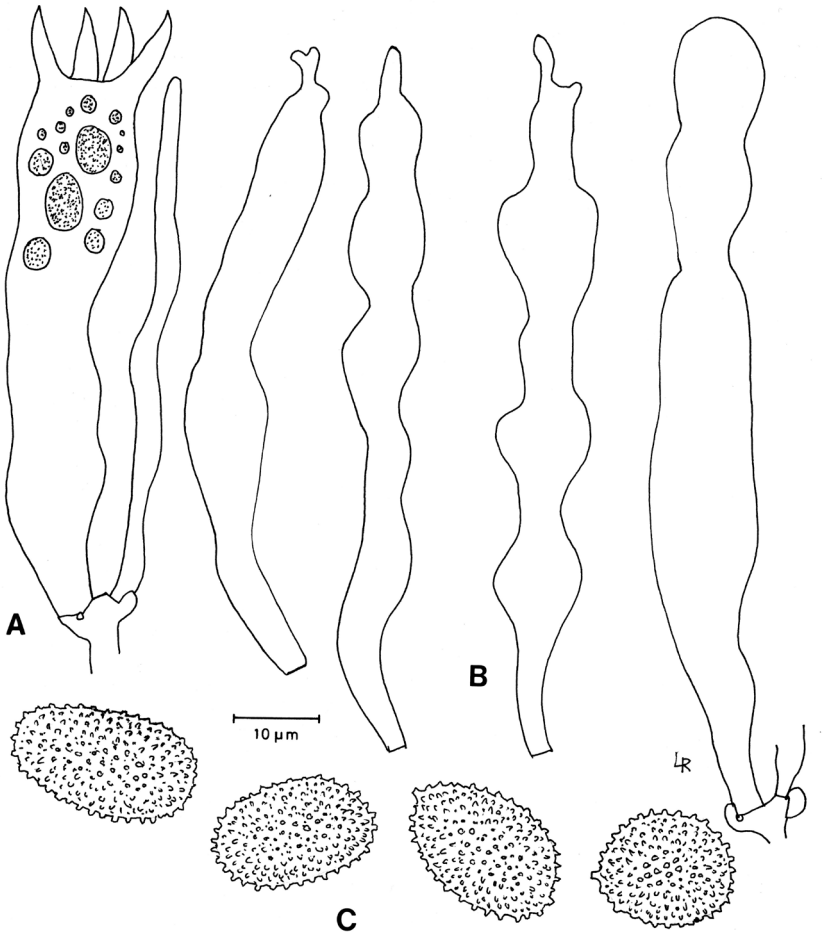


Fig. 1. *Aleurocystidiellum disciforme* A) Basidium, B) Gloeocystidia, C. Basidiospores. Norway, Telemark, Skultrevannsåsen , R. 24104 (O).

Basidiocarp *Stereum*-like, 1-1.5 cm thick, with margin slightly loosened from the substrate, normally a few centimetres wide, less often coalesced into larger basidiocarps. Hymenial surface more or less finely tuberculate, often cracked when dry, whitish to light grey, sometimes with yellow tinges, consistency dense and hard.
Hyphal system monomitic, 2.5-3.5 µm wide, generative hyphae with clamp connections, and thin- to thick-walled. In the basal clamp connections are often difficult to demonstrate. And the walls are thickened. These might be considered to be skeletal hyphae.
Cystidia similar in size to the basidia, paraphysoid with a moniliform apex, usually abundantly covered with crystals. No acanthophyses or dendrohyphidia present.
Basidia 75 x 10 µm, with four sterigmata.
Basidiospores 15-17 x 10-12 µm, subglobose to ellipsoid, covered with rounded irregular warts, amyloid.
Substrata. On old trunks of *Quercus* spp, often 1-5 m above the ground, in locally warm and sheltered localities.
Distribution. In North America known from Western United States. Also known in Europe and Asia on *Quercus* spp.
Remarks. Usually easy to recognize in the field because of the ecology and the greyish stereoid basidiocarps.

Aleurocystidiellum subcruentatum (Berk. & W. A. Curt.) Lemke, Fig. 2
Canad. J. Bot. 42:277, 1964. - *Stereum subcruentatum* Berk. & W. A. Curt. Proc. Am. Acad. Arts. Sci. 4:123, 1858.
Basidiocarp perennial, discoid to effused-reflexed on vertical substrata, attached by a central point, up to 10 mm wide, and up to 1.5 mm thick, coriaceous when fresh, stiff and hard when dry, margin narrow, involuted in dry specimens, hymenial surface smooth, cream to isabelline or slightly grey, abhymenial surface or partly reflexed upper margin smooth, greyish brown, often slightly zonate.
Hyphal system dimitic, generative hyphae 2-6 µm wide with clamp connections, scattered and often difficult to find; skeletal hyphae 3-6 µm wide, abundant, hyaline to slightly yellowish, thick-walled, non-amyloid.
Cystidia skeletocystidia, 5-10 µm wide, and up to 200 µm long, abundant, thick-walled to solid, arising deep in the subhymenium and filling up the hymenium, at first smooth, soon irregularly encrusted with small grainy crystals in the upper parts.
Gloeocystidia 5-10 µm wide, up to 120 µm long, few in number, smooth, tubular, often collapsed and difficult to find in dry specimens.

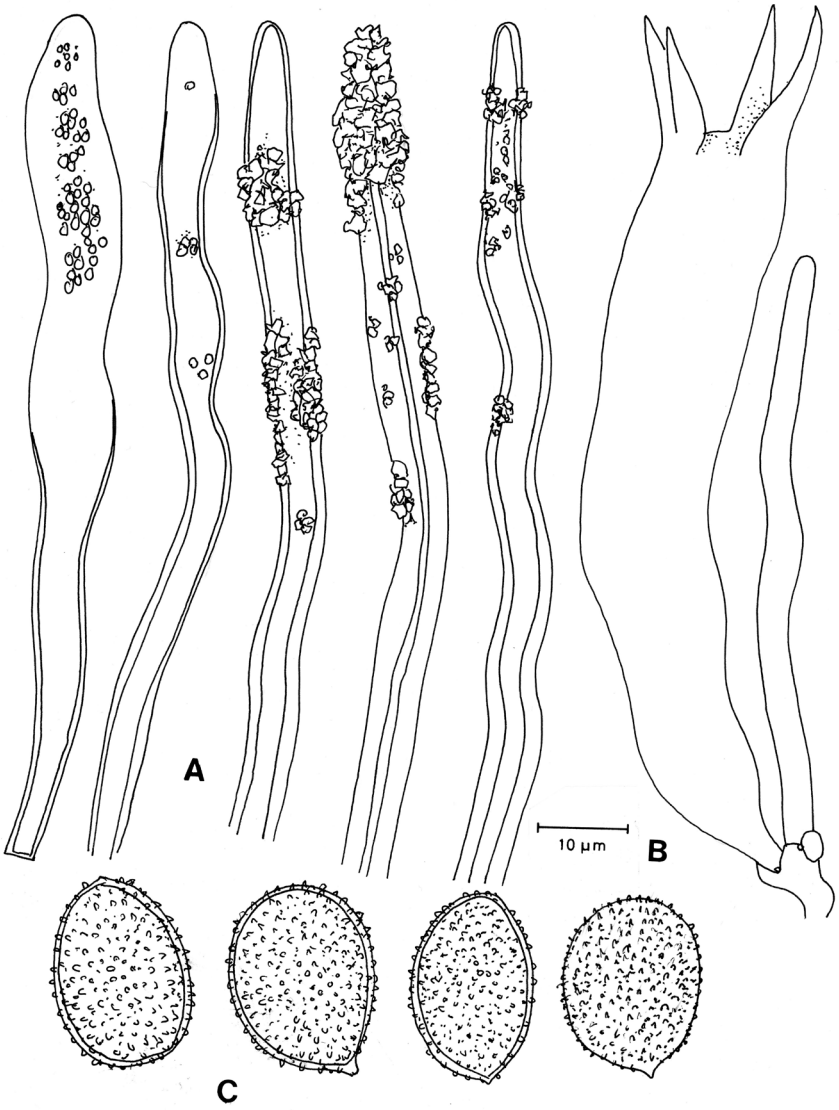


Fig. 2. *Aleurocystidiellum subcruentatum* A) Skeletocystidia, B) Basidium, C) Basidiospores. Japan, Wright nr. 106, holotype (K).

Basidia 55-100 x 8-12 µm, clavate, with 4 sterigmata,
Basidiospores 15-20(22) x 10-15 µm, ellipsoid to subglobose, thick-walled, appearing smooth in KOH, amyloid and finely verrucose in Melzer's reagent.
Substrate. On conifers such as *Abies*, *Picea* and *Pinus* spp.
Distribution. In Europe restricted to the Central European mountains from Austria and eastward. Circumpolar to North America.
Remarks. Easily recognized by the discomycete-like basidiocarps on the bark of living coniferous trees and the amyloid, ovoid, basidiospores.

ALEUROCYSTIS G. Cunn.,
Trans. Roy. Soc. New Zeal. 84:234, 1956.
Basidiocarp cupulate to resupinate, pale yellow to ochre, annual, gelatinous and tough when fresh, horny and dense when dry, hyphal system monomitic, generative hyphae with clamp connections, straight or branched, thick-walled in the subiculum, gelatinized in KOH, basidia clavate with 4 sterigmata, thick-walled metuloid cystidia present, these encrusted at least in the upper part, in age also in lower part and becoming more elongated, projecting to enclosed in old basidial layers, paraphysoid hyphae in some cases coming close to dendrohyphidia present in the hymenium, unbranched to slightly branched, basidiospores smooth, large, thin-walled and non-amyloid.
Two species on dead hardwoods, one pantropical, the other only in tropical America.
Type species: *Aleurodiscus capensis* Lloyd.
Remarks. Specimens are frequently collected and determined as belonging to the genus *Aleurodiscus* because of the discoid, scutellate basidiocarp with large basidiospores but the two genera are unrelated. The non-amyloid basidiospores and metuloid cystidia will however, immediately exclude it from *Aleurodiscus* in which such characters are unknown.

Key to species
1. Pantropical species, dendrohyphidia present, spores subglobose, 18-22 x 15-17 µm ..... **A. habgallae**
1. American species, dendrohyphidia absent, spores oblong ellipsoid, 20-25 x 12-14 µm ..... **A. magnispora**

Aleurocystis habgallae (Berk. & Broome) G. Cunn., Fig. 3.
Trans. Roy. Soc. New Zeal. 84:235, 1956. - *Corticium habgallae* Berk. & Broome, J. Linn. Soc. 14:72, 1873. - *Cytidia cornea* Lloyd, Lloyd Mycol. Notes. 47:656, 1917. - *Aleurodiscus capensis* Lloyd, Lloyd Mycol. Notes 62:930, 1920.

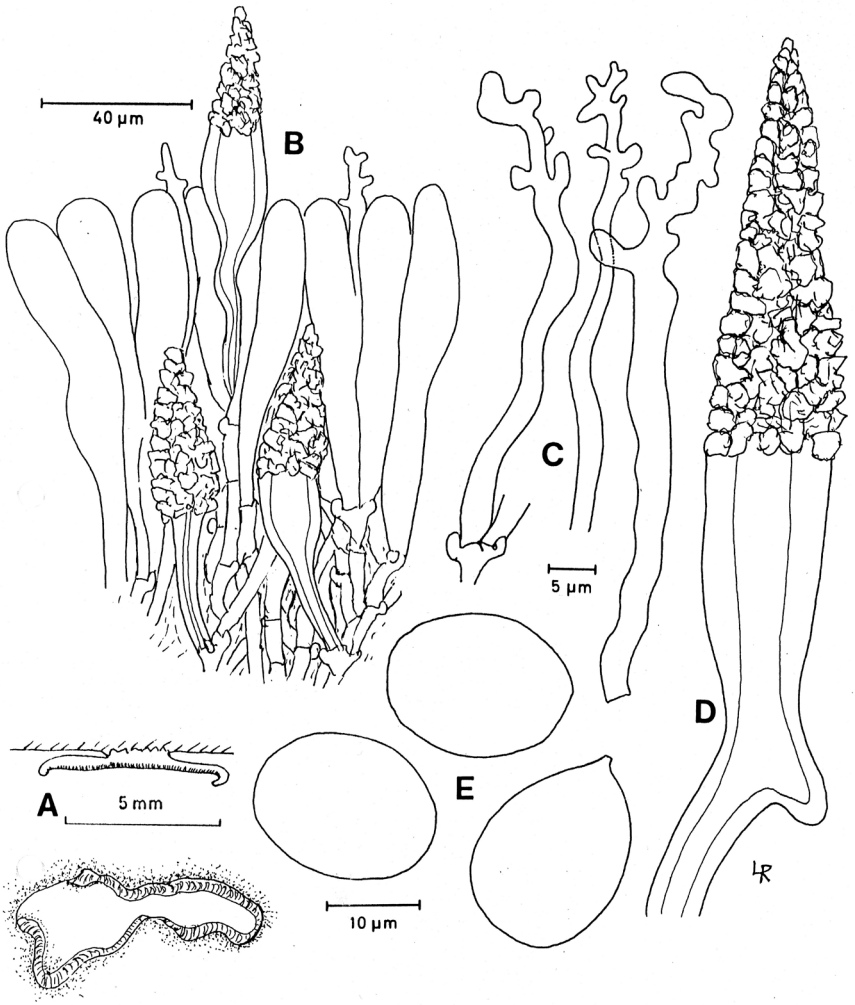


Fig. 3. *Aleurocystis habgallae* A) Basidiocarp in section and from above, B) Part of hymenium, C) Dendrohyphidia, D) Cystidium, E) Basidiospores. From the holotype of *Aleurodiscus capensis* (BPI).

Basidiocarps annual, cupulate to discoid, separable, gelatinous and waxy when fresh, cartilaginous and dense when dry, margin curled and involuted when dry, slightly raised up when fresh, abhymenial surface smooth or with a few scattered hyaline hairs. Hymenial surface pale yellow becoming whiter by age, smooth, hymenial layers deep and continuous, sterile subiculum thin and white.
Conidial stage 2-7 mm in diameter, cupulate to disciform, dorsally attached, lower surface smooth, pale buff to tan or slightly tuberculate, margin distinct and raised, outer surface cream to tan, finely tomentose, context dense, cream coloured with numerous groups of condia, these globose, 17-20 µm in diameter, thick-walled, smooth, non-amyloid, with walls up to 3 µm thick.
Hyphal system monomitic; generative hyphae 4-8 µm wide, with clamp connections. In the subhymenium, thin-walled, rapidly gelatinized in KOH and difficult to separate in sections. In the subiculum 3-10 µm wide, thick-walled and richly branched.
Cystidia 50-150 µm long, 10-14 µm wide in the middle, conical, usually tapering towards the base, coarsely encrusted at least in upper part, in the lower parts of the hymenial layers encrusted in longer sections. In the subhymenium, conical to club like, thick-walled, and projecting or embedded in many layers.
Dendrohyphidia up to 65 µm long, hyphoid and with few blunt and short side branches.
Basidia 60-90 x 14-20 µm, clavate, with 4 sterigmata, and a basal clamp.
Basidiospores 60-90 x 14-20 µm, subglobose, hyaline, smooth, non amyloid.
Substrata. On dead hardwoods.
Distribution. Pantropical, but uncommon. In South America known only from Brazil, Rio Grande do Sul. S. Leopoldo, 1930, leg. J. Rick (K).
Remarks. Reminiscent of a discoid *Aleurodiscus* or *Cytidia*, but separated easily from these genera by the combination of non-amyloid spores and metuloid cystidia. In the field it may be mistaken for a small 'jelly fungus' because of its gelatinous to waxy consistency.

Aleurocystis magnispora (Burt) Lemke, Fig. 4.
Can. J. Bot. 42: 760, 1964. - Stereum *magnisporum* Burt, Ann. Mo. Bot. Gard. 7:207, 1920. - *Cytidia magnispora* (Burt.) Welden, Mycologia 50:305, 1958.
Basidiocarps annual, cupulate to more widely effused with distinct raised margin especially when dry, resembling a thin *Stereum* basidiocarp, separable, gelatinous and waxy when fresh, cartilaginous and dense when dry, up to 800 µm thick, abhymenial surface smooth or minutely tomentose, hymenial surface smooth to slightly tuberculate or undulating, deep ochraceous to buff, subiculum thin and white.

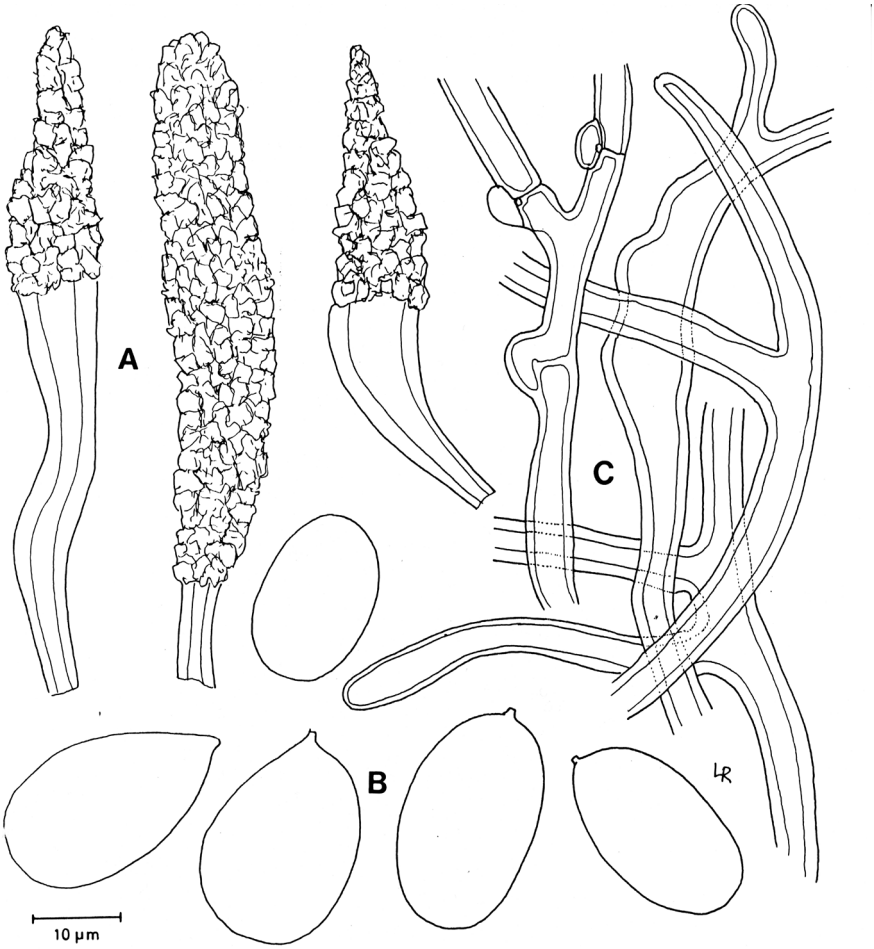


Fig. 4. *Aleurocystis magnispora* A) Cystidia, B) Basidiospores, C) Generative hyphae from the subiculum. Colombia, Santa Marta, Ryvarden 15573 (O).

Hyphal system monomitic; generative hyphae with clamp connections. In the subhymenium, 4-8 µm wide, thin-walled and richly branched, rapidly gelatinized in KOH and difficult to separate in sections. In the subiculum thick-walled and branched, often with apparent simple septa because the clamp connections are gelatinized, and, in swollen parts, up to 20 µm wide.
Cystidia 50-100 µm long, 15-20 µm wide in the middle, conical, usually tapering towards the base, coarsely encrusted, at least in upper part, in lower parts of the hymenial layers encrusted in longer sections, conical to club like in the subhymenium, thick-walled, and projecting or embedded in many layers,
Dendrohyphidia absent.
Basidia 60-90 x 14-20 µm, clavate, with 4 sterigmata and a basal clamp.
Basidiospores 13 -15 x 22-25 µm, ellipsoid, hyaline, smooth, non-amyloid
Substrata. On dead hardwoods.
Distribution. Rare. Neotropical. Known from Colombia and Jamaica.
Remarks. Close to *A. habgallae*, but is separated partly by geographical distribution, but above all by the far more ellipsoid spores and the lack of dendrohyphidia.

ALEURODISCUS J. Schröt. in Cohn,
Krypt. Fl. Schles. 3:429, 1888.
Basidiocarps variable in appearances, cupulate, corticioid or stereoid, margin in some species distinctly delimited and ± reflexed, in others not differentiated, basidiospores amyloid, smooth or ornamented, small to large, hyphal system monomitic in most species, subicular skeletal hyphae present in a few species, basidia medium to large, with four (rarely two) prominent sterigmata, sterile elements such as acanthophyses, dendrohyphidia, cystidia and paraphysoid hyphae usually present, cystidia (when present) thin-walled, clavate to moniliform or mammillate and may occur as skeletocystidia in a few species, basidiospores smooth or ornamented and amyloid.
On wood of hard wood trees and gymnosperms, such as dead, still-attached branches, living or dead trunks often in sunny and dry, exposed localities. All species so far reported cause a white rot. Cosmopolitan genus.
Type species: *Thelephora amorpha* Pers.: Fr.
Remarks: *Aleurodiscus* is a large genus. Included here are only a few American species with distinctly cupulate or effused reflexed basidiocarps which, by a lax definition, may be characterized as stereoid. There will be other species having transitional basidiocarps from cupulate to distinctly adnate, corticioid types which the reader may in vain try to find here. He or she are then referred to Nunez & Ryvarden (2000) for a full treatment of the genus.

Key to American species of *Aleurodiscus* with cupulate to effused-reflexed basidiocarps.

1. Growing on *Nothofagus* in southern areas of South America 2
1. Growing on other hosts.....3

2. Basidiospores ornamented, generative hyphae with clamp connections .....**A. vitellinus**
2. Basidiospores smooth, generative hyphae with simple septa ..... **A. fuegianus**

3. On coniferous wood 4
3. On hardwoods..... 6

4. Basidiospores ornamented 5
4. Basidiospores smooth .....**A. abietis**

5. Generative hyphae with simple septa ..... **A. amorphus**
5. Generative hyphae with clamp connections ..... **A. grantii**

6. Basidiospores smooth .....**A. fruticetorum**
6. Basidiospores ornamented 7

7. Generative hyphae with simple septa .....**A. oakesii**
7. Generative hyphae with clamp connections 8

8. Basidiocarps cream to ochraceous, basidiospores subglobose to globose .....**A. croceus**
8. Basidiocarps salmon to pink, basidiospores citriform to ellipsoid...**A. mirabilis**

Aleurodiscus abietis H.S. Jacks. & P.A. Lemke, Fig 5
Can. J. Bot. 42:225, 1964.
Basidiocarp pulvinate to stereoid, resupinate, to 1.0 cm wide, 0.5 mm thick in cross section, margin at first indeterminate, white and cobwebby, later determinate and distinct, adnate or slightly lifted, hymenium smooth, light cream or orange-buff, becoming paler on drying.
Hyphal system monomitic, generative hyphae to 5 µm wide, with simple septa, and with partially thickened walls.
Acanthophyses 40-60 x 4-12 µm, hyphoid to bottle-shaped with a swollen, smooth, thick-walled base, 4-7 µm wide and with protuberances in the upper

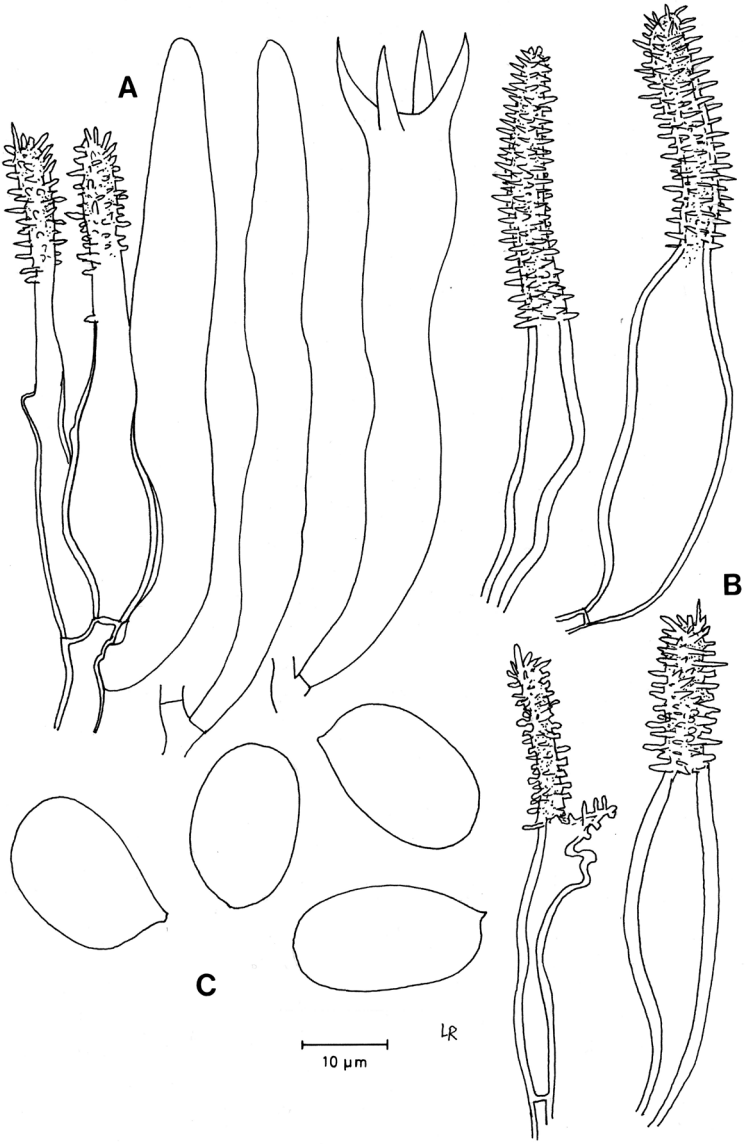


Fig. 5. *Aleurodiscus abietis*, A) Part of hymenium, B) acanthophyses, C) basidiospores. From the holotype.

part, 4-12 µm in the lower, smooth part, hyaline to slightly yellowish in KOH, faintly amyloid in Melzer's reagent.
Gloeocystidia 35-85 (100) x (8) 13-20 µm, mostly embedded subcylindrical to mammillate with an apical bulb,
Basidia 85-100 x 20-24 µm, clavate with 4 arcuate sterigmata and a basal simple septum.
Basidiospores (16)18-20 x (14)16-18 µm, smooth, subglobose, amyloid
Substrata. On wood, usually the undersides of small, dead branches of living *Abies* spp. and *Tsuga mertensiana.*
Distribution. Southern Canada and northern parts of the USA.
Remarks. Related to *A. farlowii* Burt, sharing cylindrical, thick-walled acanthophyses as well as smooth basidiospores, and also found on conifers.
v
Aleurodiscus amorphus (Pers.:Fr.) J. Schröt. Fig 6.
Krypt.-Fl. Schles. 3:429, 1888. - *Thelephora amorpha* Pers.: Fr., Elench. fung. 1:183, 1828. - *Peziza amorpha* Pers., Syn. meth. fung. 1:183, 1801.
Basidiocarp discomycete-like, then more confluent, 0.5-1 mm thick, 1-5 cm wide, margin narrow and distinctly determinate. Hymenium ochraceous, pinkish grey to orange red. Consistency of mature basidiocarps firm and subcoriaceous.
Hyphal system monomitic, generative hyphae 2-4 µm wide, simple-septate.
Acanthophyses absent.
Cystidia 110-160 x 5-10 µm, tube like and usually distinctly moniliform, with slightly thickened walls.
Paraphyses to 140 µm long, few and scattered, occasionally branched and then similar to dendrohyphidia,
Basidia 100 x 25 µm (or even larger !), with 4 sterigmata 15-25 µm long.
Basidiospores 24-28 x 18-22 µm, subglobose to broadly ellipsoid, densely covered with fine, cylindric to slightly conical and blunt spines, amyloid.
Substrata. Most frequent on dead, attached branches of *Abies*, but also rather common on *Picea abies*.
Usually found on nearly or recently dead, but still-attached, lower branches. Basidiocarps are annual, developing during humid periods and fertile specimens may be found throughout the winter.
Distribution. Throughout the northern boreal zone, common in areas with *Abies*, more scattered in other coniferous areas.
Remarks. The discomycete-like basidiocarp and large, echinulate basidiospores make *A. amorphu*s easily recognized. The heterobasidiomycetes *Tremella mycetophiloides* Kobayasi and *T. simplex* H.S. Jacks. & G.W. Martin are often found parasitizing basidiocarps, occurring as gelatinous folded outgrowths on the hymenium. (Bandoni & Ginns 1993).

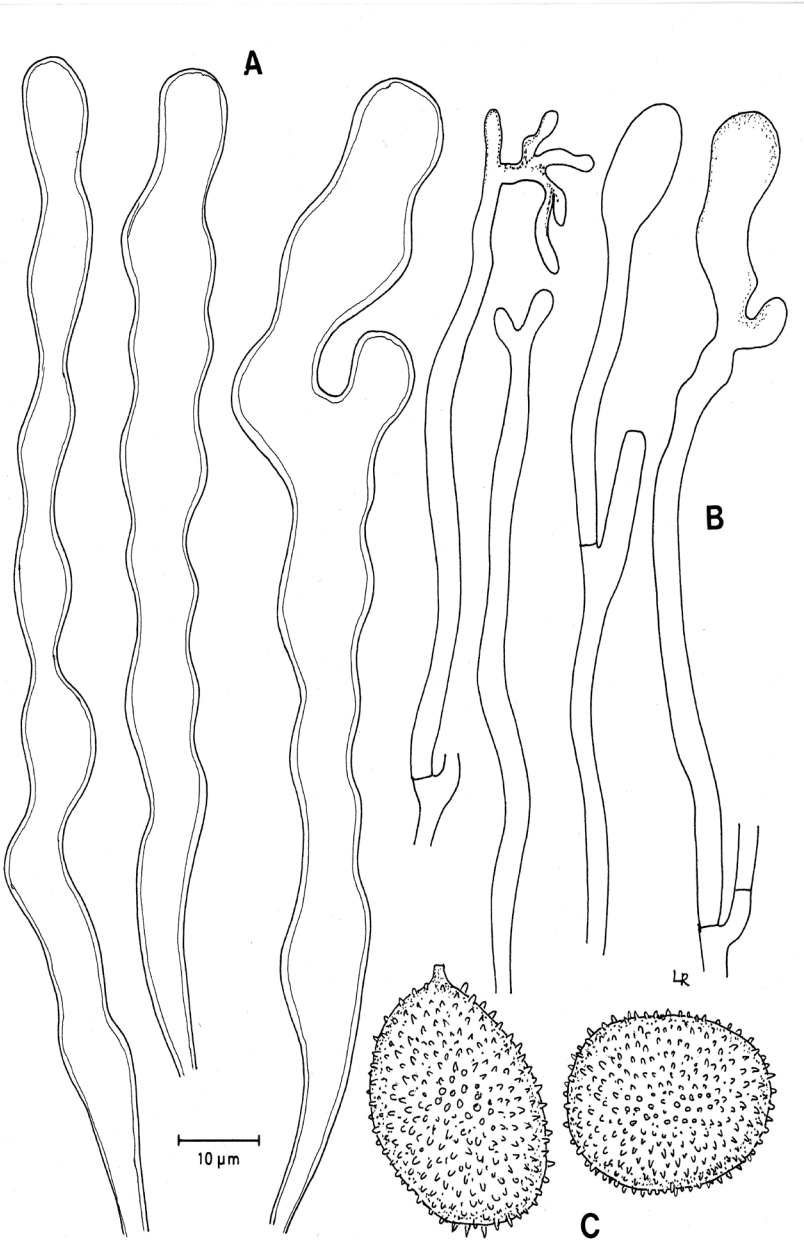


Fig. 6. *Aleurodiscus amorphus*, A) Cystidia, B) paraphyses, C) basidiospores. Ryvarden 27145 Norway.

Aleurodiscus croceus Pat., Fig 7
Bull. Soc. mycol. Fr. 9:133, 1893.
Basidiocarp disciform to cupulate, or in confluent patches separable, 1.0-3.0 mm wide, to 0.6 mm thick, margin slightly reflexed, brittle and farinose, hymenium white to pale ochraceous with some grey tints, abhymenial surface whitish, tomentose.
Hyphal system monomitic, generative hyphae 2-4 µm wide, with clamp connections, smooth in the subhymenium and subiculum, whilst those of the abhymenial surface are club-like and with abundant small protuberances.
Acanthophyses abundant, 6-12 µm wide, cylindric, thick-walled, with abundant protuberances in the upper part.
Gloeocystidia 60-160 x 7-10 µm, embedded, flexuous-cylindrical, often slightly pointed and widened in the apical part, yellow in KOH.
Basidia 100-180 x 12-20 µm, with 4 sterigmata, these up to 25 µm in length, and with some scattered protuberances at the base.
Basidiospores 20-25 x 17-22 µm, subglobose to globose, slightly thick-walled, variably asperulate, amyloid.
Substrata. The type collection was on *Melastoma puctularia* but has since been collected on abundant unidentified deciduous trees.
Distribution. Known from Ecuador, Costa Rica, Argentina and Colombia, but is probably widespread in South America; also recorded from the USA: Arizona.
Remarks. Related to *A. mirabilis*, which however has larger, navicular basidiospores and decidedly more hydnoid acanthophyses.

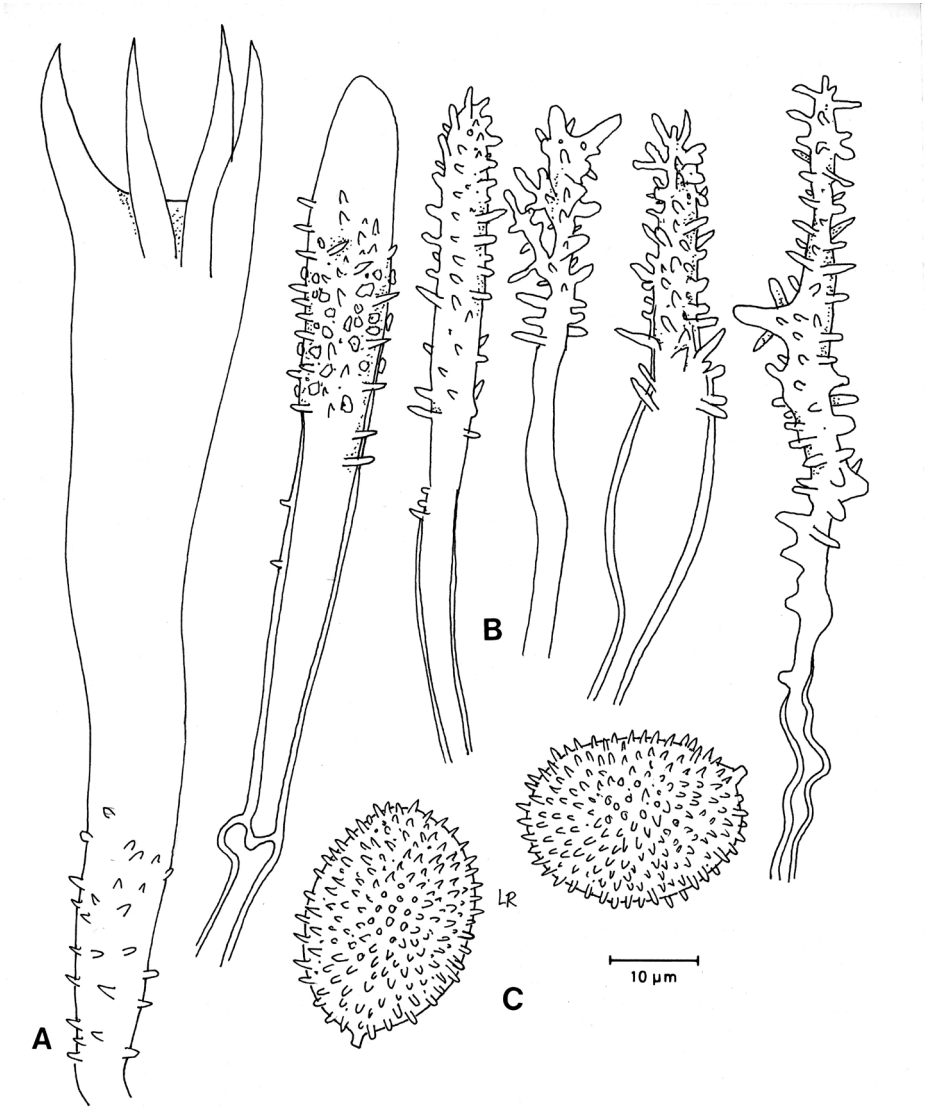


Fig. 7. *Aleurodiscus croceus* A) Ornamented basidium, B) acanthophyses, C) Basidiospores. From the lectotype, Ecuador.

Aleurodiscus fruticetorum W.B Cooke, Fig 8

Mycologia 35:281, 1943.
Basidiocarp sub-stereoid, effuse-reflexed, to 1.0 mm thick, without a cuticular layer, margin reflexed to 1.0 cm, deflexed on drying, texture sub-ceraceous, hymenium drying orange-buff, abhymenial surface pale greyish, conspicuously tomentose to cottony, continuing into similar margin.
Hyphal system dimitic, generative hyphae 2.5-3.5 µm wide, simple-septate and partially thick-walled; skeletal hyphae to 4 µm wide, only found in the subiculum, semi-solid, aseptate, unbranched, agglutinated on the abhymenial surface to form a trichoderm.
Acanthophyses 35-55 x 4-8 µm, clavate to subfusiform, thin-walled with small to minute protuberances in the apical part.
Gloeocystidia 70-80(120) x 7-10 µm, embedded, cylindrical to clavate, emergent, with yellow grainy content, apices often mammillate.
Basidia 60-70 x 7-9(11) µm, clavate with 4 sterigmata and small protuberances in the middle part.
Basidiospores 10-13 x 5.5-7 µm, ellipsoid, smooth, amyloid.
Substrata. Collected on *Arctostaphylos, Artemisia* and *Ceanothus* at 2000 m elevation.
Distribution. Known from the USA: California.
Remarks. The species is remarkable in having basidia with protuberances.

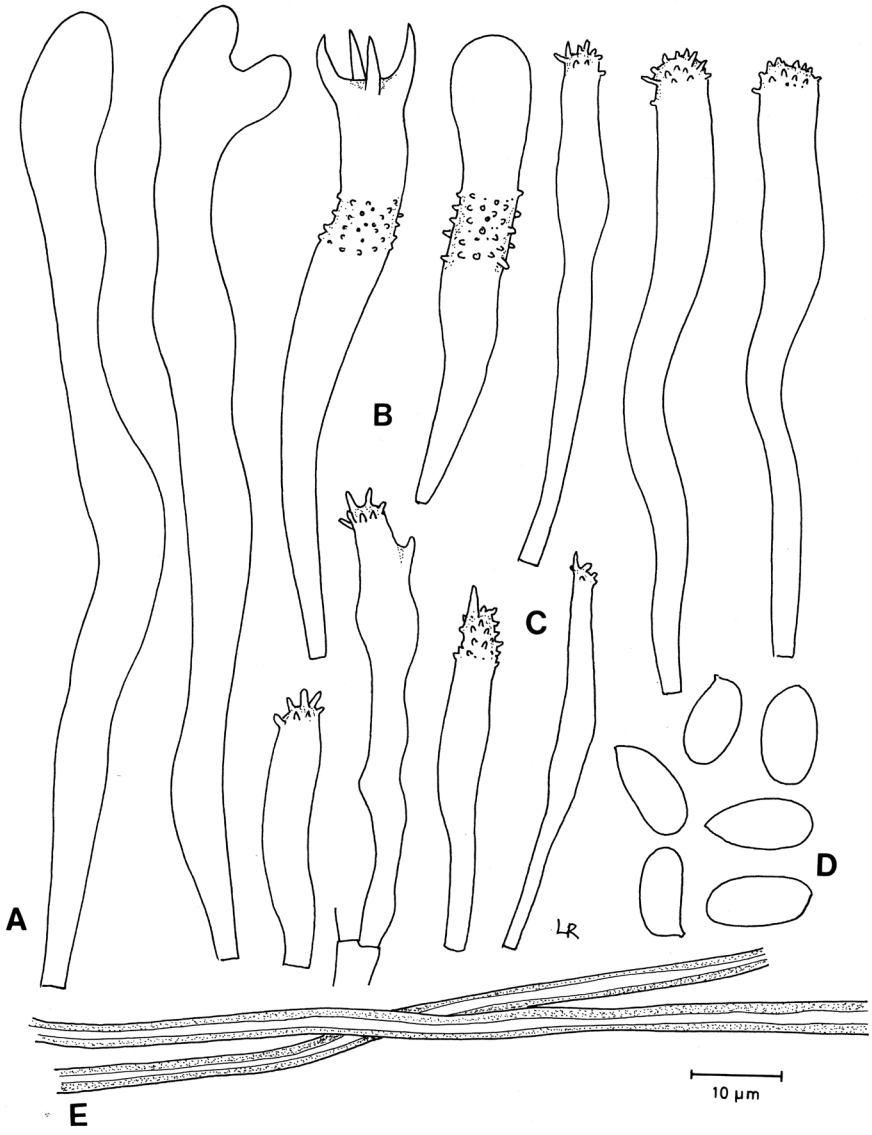


Fig. 8. *Aleurodiscus fruticetorum* A) Gloeocystidia, B) Ornamented basidium and basidiol, C) acanthophyses, D) basidiospores, E) Hyphae from the subiculum. From the lectotype, USA:

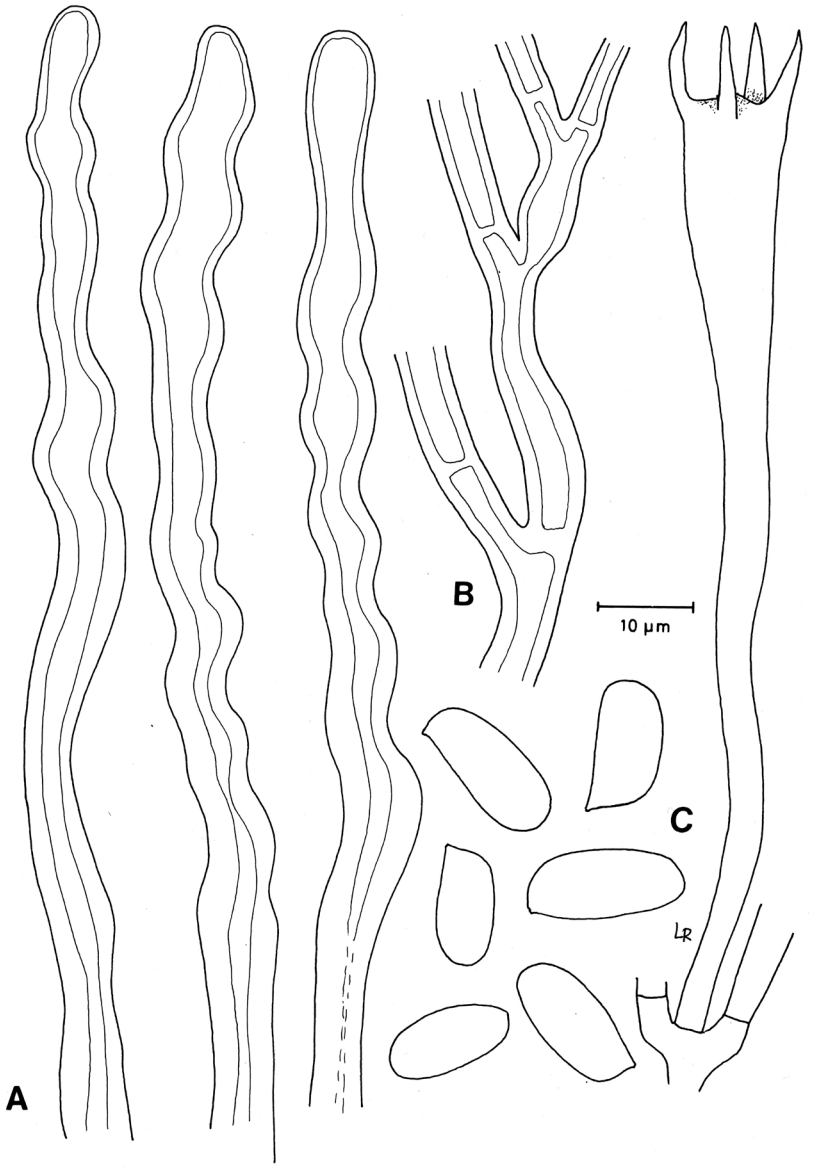


Fig. 9. *Aleurodiscus fuegianus* A (Skeletocystidia, B) hyphae from the subiculum, C) Basidium and basidiospores. From the holotype, Argentina.

Aleurodiscus fuegianus Nunez & Ryvarden, Fig. 9
Synopsis Fung. 12:81, 1997.
Basidiocarp stereoid, effused, undulating, separable, to 7.0 cm long, margin raised and distinct, fragile and slightly radially cracked with age, hymenium pale brown, smooth to slightly tuberculate, subiculum white and cottony, distinctly contrasted with the hymenium in section.
Hyphal system monomitic, generative hyphae 3-5 µm wide, with simple septa, thin-walled and difficult to observe in the subhymenium, thick-walled in the subiculum, 4-10 µm wide, angular crystals present obscuring the basal structure.
Acanthophyses and **dendrohyphidia** absent.
Gloeocystidia absent.
Skeletocystidia present, to 10 µm wide and 180 µm long,
as long hyphal ends originating in the subhymenium, thick-walled, slightly torulose or sinuous.
Basidia clavate 80-120 x 6 -14 µm, with 4 sterigmata.
Basidiospores 12-15(17) x 6-8 µm, oblong ellipsoid to subcylindrical, smooth, thin-walled.
Substrata. On wood of *Nothofagus*.
Distribution. Known only from Argentina; Tierra del Fuego, Monte Olivia, but is probably widespread in the *Nothofagus* zone in South America.
Remarks. Undoubtedly close to *A. parmuliformis* from New Zealand,
but separated from it by the narrower basidiospores (8-12 µm wide in *A. parmuliformis*) and the sinuous, thick-walled skeletocystidia.

Aleurodiscus grantii Lloyd, Fig. 10
Mycol. Writ. 6: 927, 1920.
Basidiocarp cupulate, 1.0-4.0 mm wide, to 1.0 mm thick, scattered to gregarious, sometimes confluent, margin determinate, ringed with shiny fascicles of white hairs to 0.2 mm long, hymenium finely granulose, pale orange-pink to pink, sometimes faded, abhymenial surface white, grey or pale brown, finely hirsute or matted.
Hyphal system monomitic, generative hyphae 3-7 µm wide and with clamp connections, thin- to thick-walled, in the context gelatinized, brownish yellow, hyphal hairs rarely branched, simple-septate, embedded crystals present.
Acanthophyses absent.
Gloeocystidia (or paraphyses) 4-6 µm wide, thin- to thick-walled, unbranched or with up to four short branches, cylindric or with a moniliform apex.
Basidia clavate, to 80-110 x 25-28 µm wide, tapering to a narrow (4 µm wide) base, 4 sterigmate, the sterigmata up to 21 µm long.

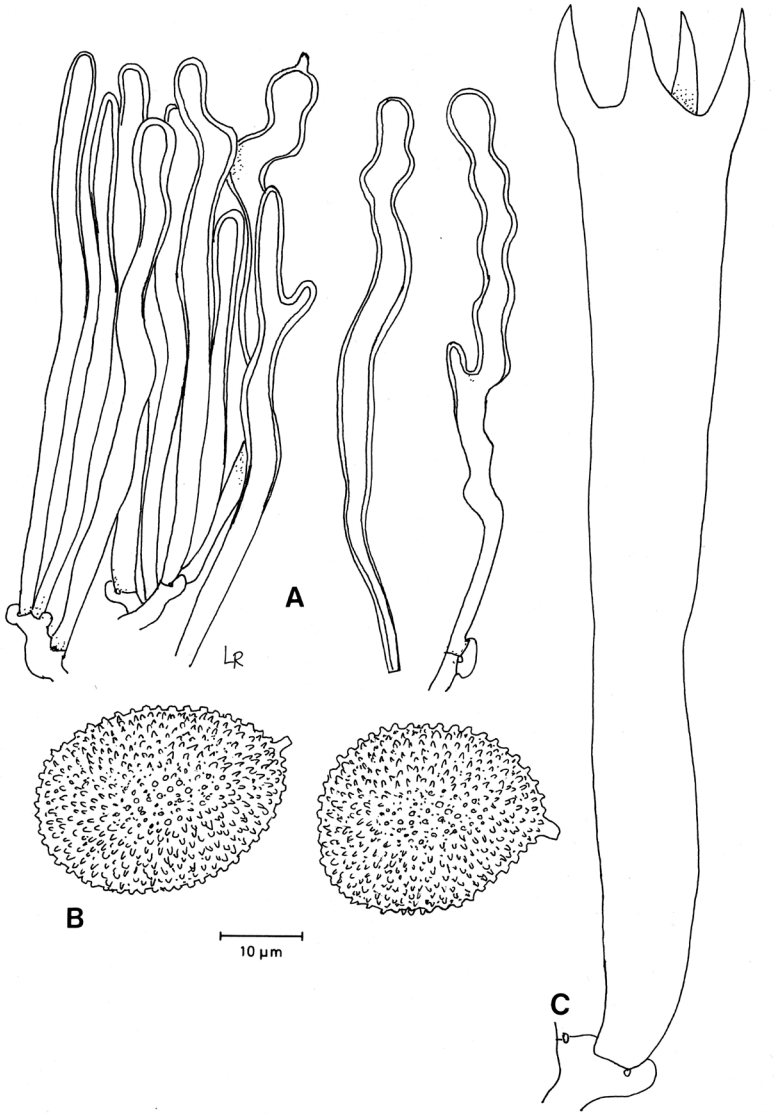


Fig. 10. *Aleurodiscus grantii* A) Paraphyses, B) Basidiospores, C) Basidium. From the holotype, Canada.

Basidiospores 22-32(39) x 18-24(28) µm, broadly ellipsoid to subglobose, thick-walled, with spines to 4 µm long and a broad (-3 µm), blunt apiculus.
Substrata. On wood, usually the lower surface of small dead branches of living or dead *Abies, Picea, Pinus, Pseudotsuga, Thuja* and *Tsuga*.
Distribution. Western parts of the USA and also known from Japan.
Remarks. *A. grantii* was considered a synonym of *A. amorphus* since they share the same discoid basidiocarps with large, spiny basidiospores and presence of cylindrical paraphysoid hyphae. The latter species, however, lacks clamp connections and has slightly smaller basidiospores which are obvious when measuring the largest ones in both species. In addition, the moniliform paraphysoid hyphae of *A. grantii* never reach the size of the cystidia in *A. amorphus*. The heterobasidiomycete parasite *Tremella mycetophiloides*, occurs on both species (Bandoni & Ginns 1993).

Aleurodiscus mirabilis (Berk. & M.A. Curtis) Höhnel, Fig. 11
K. Akad. Wiss. Wien Math.-Nat. Kl. Sitzungsb 118:818, 1909. *Psilopeziza mirabilis* Berk. & M.A. Curtis, J. Linn. Soc. Bot. 10:364, 1868. - *Corticium peradeniae* Berk. & Broome, [publication details ?]1873. - *Aleurodiscus usambarensis* Henn., Bot. Jahrb. 38:43, 1905. - *Aleurodiscus javanicus* Henn., Monsunia 1:139, 1905. - *Aleurodiscus spinulosus* Henn., Bot. Jahrb. 38:107, 1905. - *Aleurodiscus apiculatus* Burt, Ann. Mo. Bot. Gard. 5: 186, 1918. - *Aleurodiscus japonicus* Yasuda, Tokyo Bot. Mag. 33:33, 1919. - *Aleurodiscus alboroseus* Bres., Ann. Mycol. 18: 46, 1920. - *Aleurodiscus peteloti* Pat., Bull. Soc. mycol. Fr. 40: 31, 1924. - *Aleurodiscus salmoneus* Pat., Mem. Acad. Malgache 6:11, 1927. - *Aleurodiscus sinensis* Teng. & Ling, Contr. Biol. Lab. Sci. Soc. China 8:273, 1933. - *Aleurodiscus pallideroseus* Litsch., Symb. Sinica 2:41, 1937.
Basidiocarp initially disciform to cupulate, 1.0-3.0 mm wide, to 0.7 mm thick, readily confluent and then forming irregularly effused areas, margin determinate, reflexed, white on the abhymenial surface, hymenium smooth, salmon or pink when fresh, cream to ochraceous with age, smooth to reticulate-ridged in more compact specimens.
Hyphal system monomitic, generative hyphae 3-5 µm wide, thin- to thick-walled, with clamp connections, in the abhymenial surface partly unbranched and simulating skeletal hyphae, mixed with variably branching hyphae with transitions to strongly spiny acanthophyses.
Acanthophyses to 120 µm long and 8 µm wide, thick-walled, mostly cylindrical, with protuberances in the upper parts and partly covering the whole length, sometimes with forked protuberances, scattered in the abhymenial surface with transitions to binding hyphae.

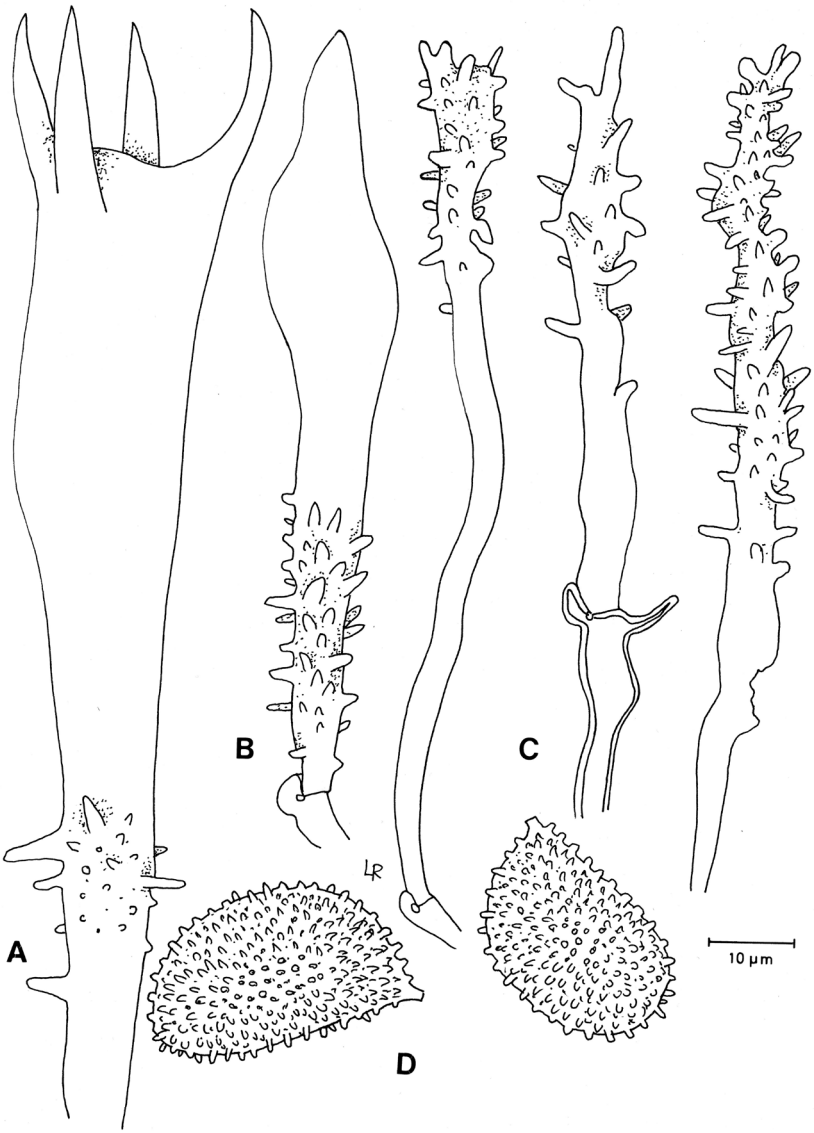


Fig. 11. *Aleurodiscus mirabilis* A) ornamented basidium, B) Ornamented gloeocystidium, C) Acanthophyses, D) Basidiospores, E) Acanthophyses with forked protuberances. Ryvarden 27420, Zimbabwe.

Gloeocystidia 70-150 x 8-12 µm, scattered to abundant, embedded, flexuous-cylindrical.
Basidia 80-160 x 16-24 µm, clavate, often with warts and protuberances on the basal part.
Basidiospores 24-28 x 14-17 µm, ellipsoid-citriform to semilunate, biapiculate, thick-walled, asperulate, amyloid.
Substrata. On wood, usually dead branches of hardwoods such as *Rhododendron*, *Betula, Larix, Cinnamomeum* and abundant tropical trees of unknown identity.
Distribution. Pantropical to subtropical, north to the USA and Japan. Not known from Europe.
Remarks. Easy to recognize in the field by its pinkish, stereoid basidiocarp. Microscopically, closely related to *A. ochraceoflavus*, sharing the same cylindrical, spinulate acanthophyses and spore ornamentation although the spores are elliptic in the latter species.
A. zealandicus shares the same type of basidiocarps with the last two species, but the acanthophyses are only apically brush-like.

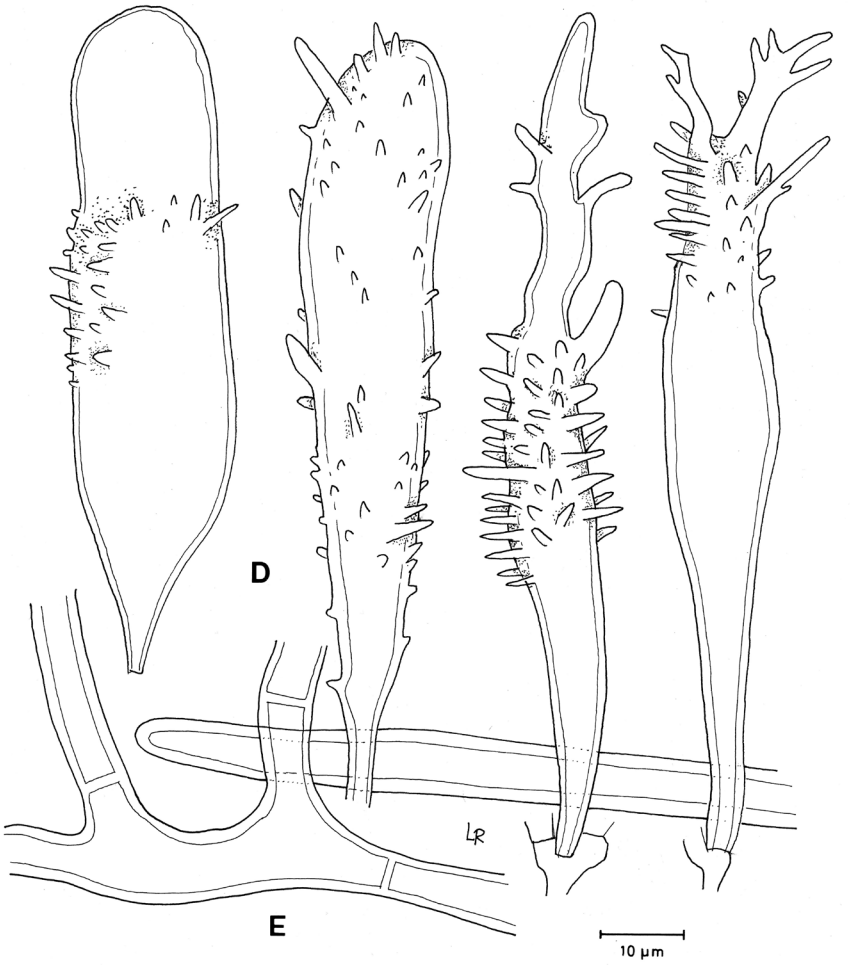
Aleurodiscus oakesii (Berk. & M.A. Curtis) Pat., Fig. 12.
Rev. Mycol. 12:133, 1890. - *Corticium oakesii* Berk. & M.A. Curtis, Grevillea 1:166, 1873.
Basidiocarp initially cupulate, 1.5-5.5 mm wide, to 0.6 mm thick, later more stereoid and effused, margin reflexed to deflexed on drying, farinose to subcoriaceous, hymenium smooth, pale cream, drying avellaneous to ochraceous, sometimes with pale grey tints, abhymenial surface floccose, white when fresh, drying pale ochraceous.
Hyphal system monomitic, generative hyphae 3-5 µm wide, simple-septate, in the hymenium and subhymenium thin-walled to slightly thick-walled with many septa and richly branched; in the subiculum and on the abhymenial surface 3-7 µm wide, sparingly and dichotomously branched, smooth, with few clamp connections, these only at the branching. These hyphae have sometimes been cited (Lemke) as skeletal hyphae.
Acanthophyses 40-80 x 4-6 µm, abundant, filiform to subclavate, slightly thick-walled, usually with apical antler-like protuberances, some also with lateral protuberances.
Gloeocystidia to 80 µm long and 10 µm wide, moniliform-cylindrical to mammillate, smooth, embedded, yellowish in KOH, sometimes with a few protuberances that can be observed close to the apex.
Basidia 75-120 x 12-15.5(20) µm, flexuous-subclavate, with 4 sterigmata.

Basidiospores 18-27 x 12-14(17) µm, ovoid-ellipsoid, finely warted**,** thick-walled at maturity.
Substrata. Normally on dead wood, or bark of living deciduous trees.
Distribution. Known from North America, eastern Asia, and the Pyrenees in Europe.
Remarks. Close to *A. wakefieldiae* from Europe which is separated by having clamped hyphae.

Aleurodiscus vitellinus (Lév.) Pat., Fig. 13
Essai. Tax. Hymen. p.54, 1900. - *Exidia vitellina* Lév., Ann. Sci. Nat. Bot. III, 2: 219, 1844.
Basidiocarp cyphelloid, pendant and strongly lobed or folded, attached by a contracted base, separable, 2.5 cm wide, to 2.0 mm thick, margin determinate, widely reflexed, deflexed on drying. Texture gelatinous when fresh, drying cartilaginous, hymenium concave, continuous, chrome to yellow when fresh, drying ochraceous to tan-buff, abhymenial surface veined to reticulate, concolorous, trama distinctly duplex with a lower dense layer and a subiculum of looser consistency.
Hyphal system monomitic, generative hyphae 3-6 µm wide, with clamp connections in the subhymenium. In the subiculum contorted, irregularly widened and very thick-walled (to 4 µm wide and total width to 22 µm), strongly agglutinated and difficult to tease apart.
Acanthophyses to 180 µm long and 4-15 µm wide, abundant, cylindrical to clavate, apically covered with dense protuberances to 8 µm long.
Dendrohyphidia 2-8 µm wide, generally cylindrical to slightly swollen, smooth, unbranched or with a few stout, apical side branches.
Basidia 150-200 x 22-30 µm, subclavate to clavate with
4 (or rarely 2) large sterigmata to 15 µm long.
Basidiospores 12-15(17) x 6-8 µm, ovoid, slightly adaxially flattened, asperulate, amyloid.
Substrata. Known only from dead branches of *Nothofagus* spp.
Distribution. South America. Known from southern Chile and Argentina, where it follows the genus *Nothofagus*.
Remarks. Recognized in the field by large, yellowish, pendant, gelatinous textured basidiocarps with a contracted central area of attachment and, additionally, by the host.

Dobbel side

Fig. 12. *Aleurodiscus oakesii* A) moniliform cystidia, B) Acanthophyses, C) Basidiospores, D) Ornamented gloeocystidia, E) Hyphae from the subiculum. Rogerson, New York, USA.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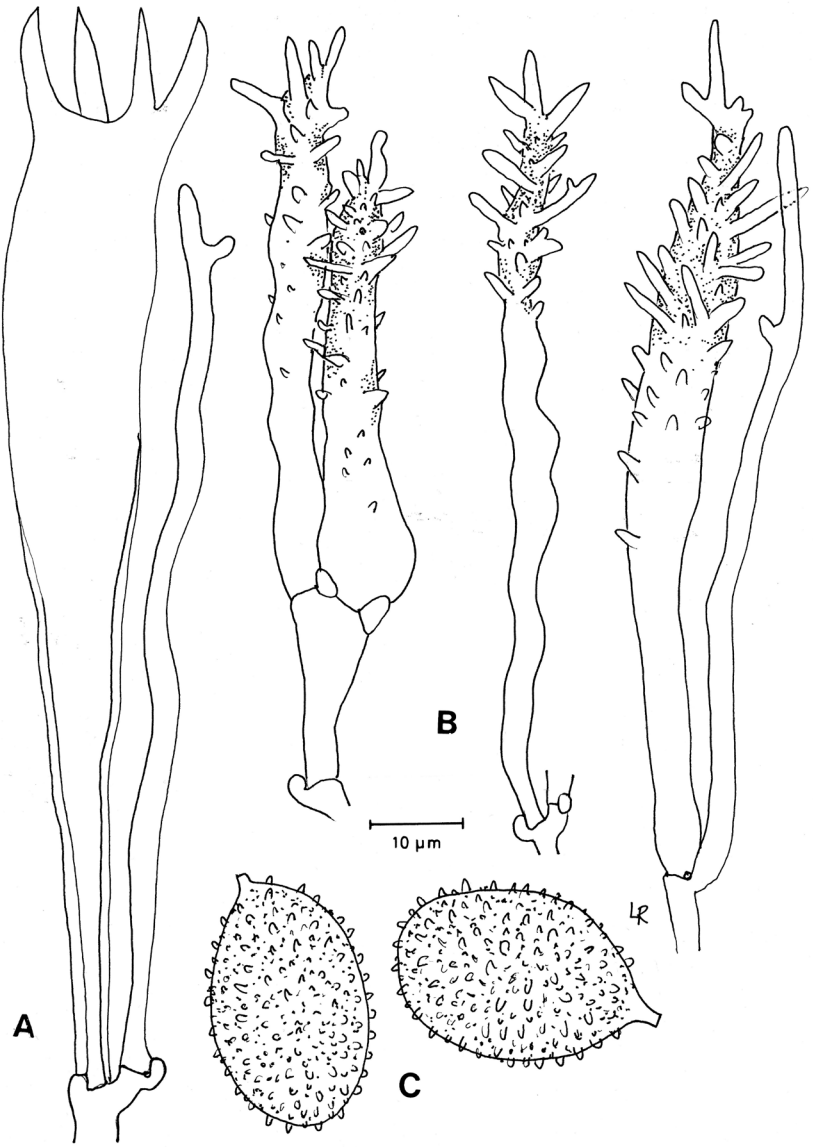


Fig. 13 *Aleurodiscus vitellinus* A) Basidium, B) Acanthophyses, C) Basidiospores. Ryvarden 19334, Argentina.

AMYLOSTEREUM Boidin,
Rev. Mycol. (Paris) 23:345, 1958.
Basidiocarps resupinate, effused-reflexed to pileate, hymenial surface and context brown with numerous light brown, first thin walled and hyaline, then thick-walled and apically encrusted yellowish brown cystidia, hyphae thin-walled and hyaline or thick-walled and brown, with clamp connections, basidiospores cylindrical or narrowly ellipsoid, smooth, thin-walled and distinctly amyloid. On gymnosperms and hardwoods, causing with a white rot.
Type species: *Thelephora chailletii* Pers.
Remarks. With its small, amyloid basidiospores, undoubtedly related to the genus *Stereum*, but easily separated from it by the numerous encrusted cystidia and the clamped generative hyphae. The four species known in the genus have all almost identical microscopical characters and is mainly separated on their hosts, and in part type of basidiocarp. This seems to indicate and old taxon also reflexed in their evolutionary old hosts.
Amylostereum spp. is transferred to new hosts by the actions of wood-wasps, (eg. *Sirex* spp.), thus making them potentially dangerous pathogens.

Key to species

1. Basidiocarp thick, perennial and with a black line below a thin tomentum. ..... **A. areolatum**
1. Basidiocarp annual, thin to moderately thick and without black line below the tomentum 2

2. American tropical species, on *Podocarpus* ..... **A. ferreum**
2. Temperate-boreal species, on different species of conifers 3

3. Basidiocarp resupinate, adnate, usually less than 1 mm thick, on *Juniperus, Taxus* or *Thuja* ..... **A. laevigatum**
3. Basidiocarp 1-3 mm thick often with a reflexed margin, on *Picea abies* and cultivated *Abies* spp. ..... **A. chailletii**

Amylostereum areolatum (Chaillet) Boidin, Fig. xx
Revue Mycol. (Paris) 23: 345, 1958. - *Thelephora areolata* Chaillet in Fr., Elench. fung. 1:190, 1828.
Basidiocarp on horizontal substrates more or less resupinate, on vertical ones reflexed, about 2-3 cm wide, 5-10 cm long, reflexed part usually 1-3 mm thick, central part often thicker, up to 1 cm or more, consistency firm and leathery when

fresh, hard and brittle when dry. Upper side zonate, in young parts ochraceous or olivaceous brown and finely velutinous, in older parts covered with an uneven black crust, hymenial surface dull purplish to greyish-violet when fresh and actively growing drying pale ochraceous brown and somewhat pruinose, irregularly tuberculate, when dried more or less cracked, in older basidiocarps and when water-soaked darkening to blue brown or dark violet blue, in section with a dark brown upper tomentum, separated by a dark line from the lighter brown trama.

Hyphal system dimitic, generative hyphae 2-3 µm wide, thin-walled, hyaline, richly branched and with clamp connections, skeletal hyphae 3-4 µm wide, thick-walled with a narrow lumen, yellow brown.

Cystidia 30-40 µm long, abundant, fusiform, acute, at first thin-walled, hyaline, then with thickening walls, yellow brown and encrusted with small, dense crystals, there is some variation in the shape of the cystidia, some may be obtuse, constricted, or have an extra lateral apex etc. In old basidiocarps, with a thickened hymenium, cystidia may be arranged in layers, corresponding to the annual growth.

Basidia 18-20 x 2.5-3.5 µm, clavate, with 4 slender sterigmata and with a basal clamp.

Basidiospores 6-8 x 2.5-3.5 µm, narrowly ellipsoid, thin-walled, smooth, amyloid.

Substrata. On coniferous wood.

Distribution. Not known with certainty from North America, but included here as it may be confused with *A. chailletii* which also grows on coniferous wood.

Remarks. Close to *A. chailletii* and difficult to separate when young and resupinate. Well developed specimens are effused-reflexed with a differentiated, velutinous upper side and with a clearly duplex-structure.

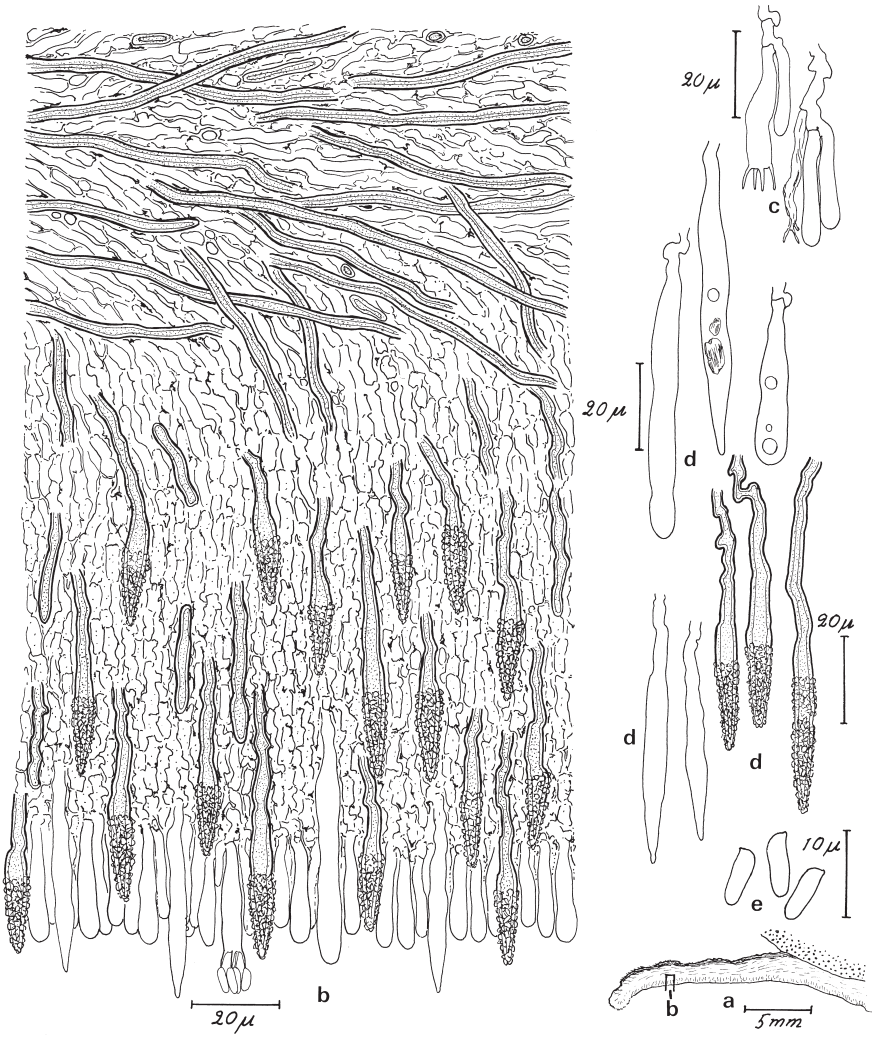


Fig. 14. *Amylostereum areolatum* a) section through the basidiocarp, b) section though the hymenium, c) generative and skeletal hyphae, d) young and mature cystidia, Fagerstrøm, Finland, del. J. Eriksson.

Amylostereum chailletii (Pers.) Boidin, Fig. 15.
Rev. Mycol. (Paris) 23:345, 1958. - *Thelephora chailletii* Pers., Mycol. Eur. 1:125, 1825.
Basidiocarp 1-3 mm thick, small or widely effused, resupinate or effused-reflexed, with a narrow, dark brown, irregular and finely tomentose pileus. Hymenial surface ochraceous to cinnamon or dark brown often greyish-brown when old, somewhat patchy, when dry usually finely rimose, margin somewhat thickened and finely tomentose (lens).
Hyphal system dimitic, generative hyphae 2-5 µm wide thin-walled and with numerous clamp connections, skeletal hyphae 3-4 µm wide, straight, thick-walled and pale brownish. The basidiocarp is differentiated in two distinct layers with different hyphal structures, viz. a subicular layer with hyphae more or less parallel to the substrate, and a subhymenial layer of vertical hyphae.
Cystidia 15-40 x 4-5 µm, first thin-walled, rounded to subulate, seemingly of gloeocystidial character, often containing oily drops or resinous grains, then becoming thick walled, pigmented and encrusted in the upper half part.
Basidia 20-25 x 4-5 µm, clavate, narrow, with four sterigmata and a basal clamp.
Basidiospores 6-7.5 x 2.5-3 µm, cylindrical or narrowly ellipsoid, smooth and amyloid.
Substrata. *A. chailletii* grows on *Picea* or cultivated species of *Abies*.
Distribution. It seems to follow the spruce in Europe.
Remarks. The warm, brown colours of this species combined with the encrusted brown cystidia and amyloid basidiospores make it distinctive. Never found with a duplex context as seen in *A. areolatum*.

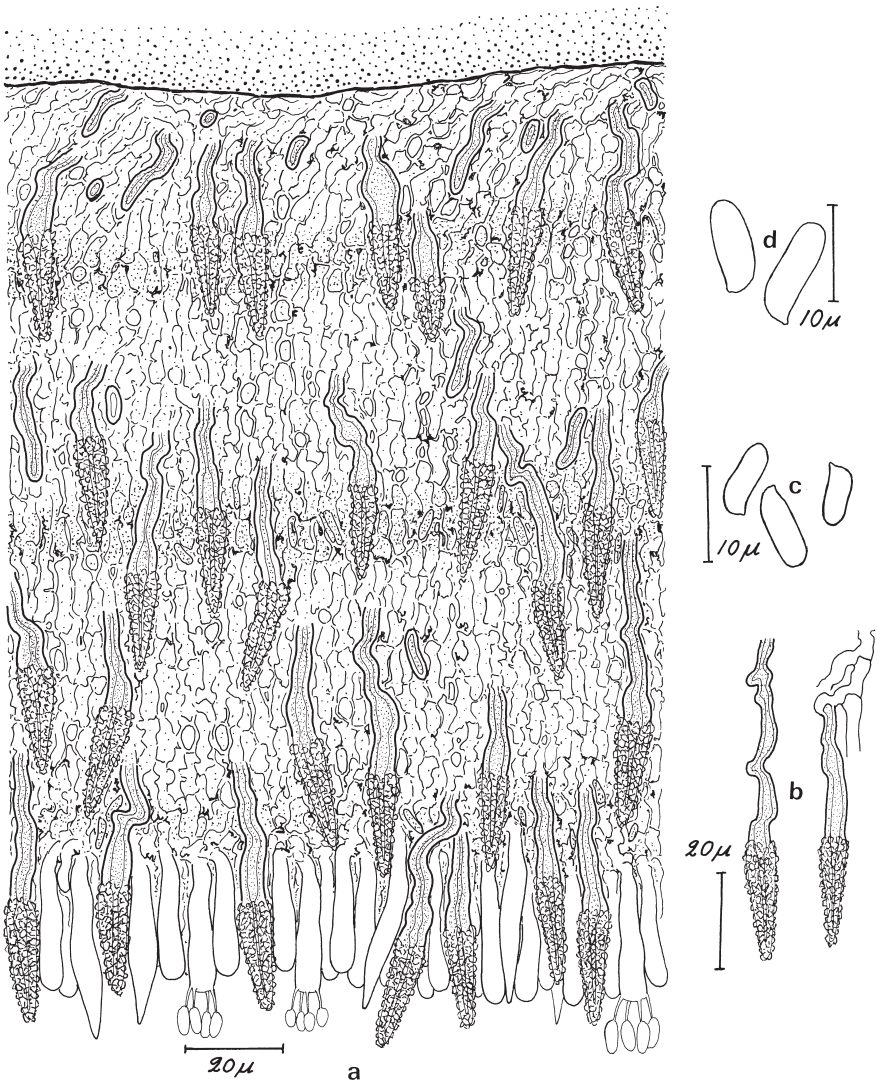


Fig. 15. *Amylostereum chailletii* a) section of basidiocarp b) section showing subiculum and hymenium, c) basidia, d) cystidia in different stages of development e) basidiospores . Eriksson 7. July 1966, Seden, del. John Eriksson.

Amylostereum ferreum (Berk. & W. A. Curtis) Boidin & Lanquetin, Bull. Mycol. Soc. Fr. 100:217, 1984. - *Stereum ferreum* Berk. & W. A. Curtis, J. Lin. Soc. Bot. 10:332, 1868.
Basidiocarp about 1-3 mm thick, small or widely effused, resupinate or rarely with an effused-reflexed, narrow, dark brown, finely tomentose and irregular pileus, hymenial surface ochraceous to brown,
Hyphal system dimitic, generative hyphae 2-4 µm thin-walled, with numerous clamp connections, skeletal hyphae up to 5 µm straight, thick-walled and light brownish.
Cystidia as in A. chailletii
Basidia 15-25 x 4-5 µm, clavate, narrow, with four sterigmata and a basal clamp.
Basidiospores 6-7.5 x 2.5-3 µm, cylindrical or narrowly ellipsoid, smooth and amyloid.
Substrata. On dead *Podocarpus* spp.
Distribution. Known from Cuba, Jamaica and Brazil.
Remarks. The host and the distribution will help to name this species. Sequencing is necessary to ascertain that it can be kept as a separate species and not as a form or variety of *A. chailletii*.

Amylostereum laevigatum (Fr.) Boidin, Fig. 16
Rev. Mycol. (Paris) 23(3): 345, 1958. - *Thelephora laevigata* Fr., Elench. fung. 1:224, 1828.
Basidiocarp resupinate and closely adnate (but the margin together with the outer layer of the bark may loosen from the substrate in old specimens), smooth, when dry often finely rimose, light brown, isabelline to ochraceous or even grey in older specimens.
Hyphal system monomitic, generative hyphae (2)3-4 µm wide, richly branched, thin- to thick-walled, with clamp connections.
Cystidia up to 130 x 5-10µm, abundant, brown or yellowish- brown, when young thin-walled and subulate, when mature thick-walled and apically encrusted (this part to 20-30 x 5-10 µm).
Basidia 25-30 x 4-6 µm, narrowly clavate, with 4 sterigmata and a basal clamp.
Basidiospores 7-12 x 3-4 µm, cylindrical or narrowly ellipsoid, smooth and amyloid.
Substrata. On dead branches of *Juniperus* spp. and rarely on *Thuja occidentalis*.
Distribution. Ontario in Canada and a few States in Northern United States, but has probably a much wider distribution.
Remarks. The hosts and pale isabelline to brown colours of the basidiocarps will usually be sufficient to recognize the species in the field. The species should be looked for wherever dead *Juniperus* spp. occur.

Fig. 16 *Amylostereum laevigatum,* a) section of basidiocarp, b) cystidia c) basidiospores. John Eriksson 147, Sweden, del. J. Eriksson.

AQUASCYPHA D. A. Reid,
Nova Hedwigia Beiheft 18:51, 1965.
Basidiocarps lignicolous, coriaceous, infundibuliform and mesopodal; adjacent basidiocarps frequently confluent. Upper surface of the pileus minutely tomentose or velutinate, usually bearing flattened, dendroid or antler-like, processes from a few mm to several cm in height. They may be densely tufted, scattered or even absent in old basidiocarps. Hymenium smooth, conspicuously pruinose. Hyphal structure trimitic; generative hyphae thin-walled, hyaline, with inconspicuous clamp-connexions; skeletal hyphae thick-walled, yellowish-brown; binding hyphae thick-walled, hyaline or pale brown, surface tomentum formed of skeletal hyphae. Cystidia and gloeocystidia absent, pseudoparaphyses abundant, thick-walled, cylindrical, often conspicuously echinulate, forming a distinct palisade layer. Neither basidia nor basidiospores have ever been seen.
Type species: *Aquascypha hydrophora* (Berk.) D. A. Reid
Remarks: Easy to recognize because of the large, tough and dark brown basidiocarps, often found filled with water.

Aquascypha hydrophora (Berk.) D. A. Reid, Op. cit. Fig. 17.
Stereum hydrophorum Berk. Ann. Mag. nat. Hist. 14:327, 1844. - *Podoscypha hydrophora* (Berk.) Boidin, Rev. Mycol 24:219, 1959. - *Hymenochaete crateriformis* P. Hennings Hedwigia 43:172, 1904.
Basidiocarps 4-12 cm high, 3.5-15 cm wide, dark brown to dark purple-brown, coriaceous, centrally stipitate, infundibuliform, pilei minutely tomentose or velutinate, concentrically zoned, normally with conspicuous, flattened, dendroid or antler-like outgrowths, these from a few mm to several cm long, hymenial surface smooth, often concentrically zonate, distinctly pruinose, ochraceous-buff to white, becoming purple brown in old specimens. Stipe 1. 5 - 3 cm high, 0. 3 - 0.5 cm wide, relatively short, minutely velutinate, dark brown to dark purple-brown, attached to the substrate with a disc of mycelium, context, creamy-white, dark brown towards the hymenium.
Hyphal system trimitic, generative hyphae, 2-3 µm wide, with conspicuous clamp connections; skeletal hyphae 3 - 7 µm wide, brown, thick-walled; binding hyphae, 2-3(-5)11 µm wide, thick-walled, pale brown or hyaline, are found in the antler-like processes and the context of the stipe. The hymenium is composed of a palisade of thick-walled hyphae, these up to 45 µm long and 2.5-4 µm wide which arise from the thin-walled generative hyphae.
Cystidia absent, but the hymenium contains cylindrical, pale brown, apically rounded hyphae, these distinctly but minutely echinulate.
Basidia not seen.

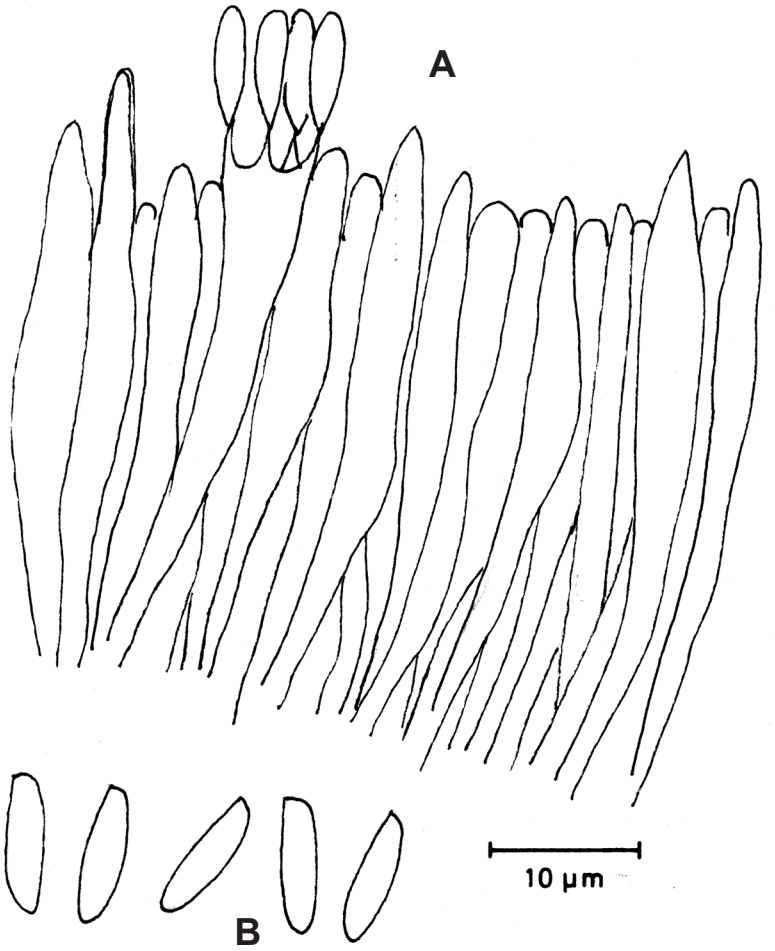


Fig. 17. *Aquascypha hydrophora* A) Section through the hymenium, b) basidiospores. Venezuela, Ryvarden

Basidiospores cylindrical
Substrata. On wood (stumps, fallen logs, etc.)
Distribution. Distinctly Amazonian. Known from Brazil, British Guiana, Colombia, Dutch Guiana, French Guiana, Panama and Venezuela.
Remarks. A unique species characterized by its large dark brown, infundibuliform basidiocarps and seemingly without any close relatives.

Auriculariopsis Maire,
Bull. Soc. mycol. France 18:102, 1902.
Basidiocarp pileate, cupulate (discomycete-like) and hanging from the substrate, or resupinate. Abhymenial side felted, hymenial surface radially folded, soft and gelatinous when wet, more or less folded when dry. Hyphal texture duplex, consisting of an upper layer of thick-walled, unbranched hyphae and a hymenial layer of gelatinous, densely united hyphae with clamp connections. Cystidia absent. Basidia subclavate, in a dense palisade, basidiospores allantoid, smooth, thin-walled, non-amyloid. Causing a brown rot.
Type species: *Cyphella ampla* Lév.
Remarks. Separated from *Cytidia* which has a catahymenium of dendrohyphidia and large basidia, while such organs are absent from *Auriculariopsis* where the hymenium being a dense palisade of basidia, resembling the genus *Phlebia*, which it may be related to. Sequencing has to be done to see whether this is a biological convergence or really reflects a true relationship.

Key to species

1. Basidiospores 11.5 -14 x 4-4.5 µm, allantoid ..... **A. patelliformis**
1. Basidiospores shorter 2

2 basidiospores allantoid, 7-10 µm long ..... **A. ampla**
2, Basidiospores ellipsoid, shorter than 7.5 µm 3

3. Basidiospores 3-3.5 µm wide ..... **A. albomellea**
3. Basidiospores 2-3 µm wide ..... **A. lanata**

Auriculariopsis albomellea (Bondartsev) Kotlaba, Fig. 18
Ceska Mykol. 42:239, 1988. - *Cytidia albomellea* Bondartsev, Morbi plant Leningrad 16: 96, 1927. - *Cytidiella melzeri* Pouzar. Ceska Mykol. 8:127, 1954.
Basidiocarps resupinate, at first orbicular, about 1-2 cm wide, then confluent and becoming larger, adnate and ceraceous, when fresh and wet, membranous and with margins revolute when dry, hymenial surface smooth or with low tubercles,

Fig. 18. *Auriculariopsis albomellea* a,b,c & d) basidiocarps in dry and fresh condition, e) section through basidiocarp, f) hymenium, g) section through upper side of basidiocarp, h) basidiospores i) basidium k) parts of gelatinized hyphae. P. Johansson, Sweden, del. J. Eriksson.

light brown when wet, dark brown when dry, abhymenial side of the revolute margin whitish, smooth, and (under a lens) densely felted.
Hyphal system monomitic, hyphae 3-6 µm wide, mostly thin-walled, especially in the subhymenium, somewhat thickened in the trama and becoming partially gelatinous and swollen in KOH, clamp connections present at all septa.
Cystidia absent.
Basidia 30-40 x 5-6 µm, subclavate, with 4 sterigmata and a basal clamp.
Basidiospores 6-7.5 x 3-3.5 µm, ellipsoid, smooth, thin-walled, non-amyloid.
Substrata. On wood (dead branches) of *Quercus robur* and *Pinus* spp.
Distribution. Rare in the United States. Known from Arizona and Wisconsin. Also rare in Europe and there known from the central mountains from France to Russia.
Remarks. Recognized by its resupinate, orbicular, dense and light brown basidiocarps, with a white lower surface when dry.

Auriculariopsis ampla (Lév.) Maire, Fig. 19-20
Bull. Soc. mycol. France 18:102, 1902. - *Cyphella ampla* Lév., Ann. sci. nat. III:9:126, 1848.
Basidiocarp pileate, cupulate or bell shaped, pendant, about 1 cm wide, with the abhymenial side white, and appearing as if felted, when fresh and wet with a pale ochraceous to light brown (cinnamon) hymenial surface, this folded in radial ridges, margin even, slightly revolute, finely fibrillose. When dry, becoming shrunken and more or less folded.
Hyphal system monomitic, generative hyphae 2-3 µm wide, with clamp connections. The hairs on the abhymenial layer composed of thick-walled, twisted, non-gelatinizing hyphae with practically no clamp connections or septa. In the lower, tramal layer, gelatinizing richly branched, but mainly parallel hyphae predominate, these somewhat wider than the hair hyphae, and which may swell to 7 or even 10 µm wide.
Hyphae of the abhymenial layer are formed by transformation of gelatinous hyphae from the tramal layer or from irregularly twisted and much branched intermediate hyphae.
Cystidia absent.
Basidia 25-30 x 4-4.5 µm, subclavate, with 4 sterigmata and a basal clamp.
Basidiospores 7.5-10 (-12) x 2.5 (-3) µm, allantoid, smooth, thin-walled, non-amyloid,
Substrata. On wood, usually dry, dead or dying, and often attached, branches of hardwoods such as *Alnus, Betula*, *Salix* and *Populus*.

Fig. 19 *Auriculariopsis ampla* a) section though the basidiocarp, b) basidiocarps, about natural size, c & d) positions of sections shown on fig 18, d) section through tomentum Pouzar, 8. August 1953, Czech Republic, del J. Eriksson.

Fig. 20. *Auriculariopsis ampla* a) section through part og basidiocarp, b) section through basidiocarp with the hymenium, c) trama hyphae, d) transition between hyphae of trama and the tomentum e) basidia, f) basidiospores. Pouzar, 8. August 1953, Czech Republic, del J. Eriksson.

Distribution. Known from the Mississippi valley and into central Canada. Widespread and much more frequent than *C. albomellea* in Europe, north to Denmark.
Remarks. Easily recognized by the cupulate to bell-shaped, pendant, basidiocarps.

Auriculariopsis lanata (W. B. Cooke) Ryvarden, comb. nov.
Basionym: *Cytidia lanata* W. B. Cooke**,** Mycologia 43:205, 1951.
Basidiocarp initially stereoid with a slightly lifted margin, hanging and cupulate with a central point of attachment, about 1-3 cm in diameter and 1-2 mm thick, probably coriaceous to subgelatinous consistency when fresh, becoming corneous, hard and brittle when dry, upper surface tomentose and ochraceous to pale brown, hymenial surface smooth, deep purplish, hymenium dense and up to 60 µm deep, in section with a pale brown context from which the tomentum hyphae arise in bundles.
Hyphal system monomitic, hyphae 5-8 µm wide, gelatinous in KOH, thick walled and with clamps at all septa, strongly agglutinated by gelatinous interhyphal substances, some few hyphae seemingly solid and without clamps and could be interpreted as skeletal hyphae.
Cystidia and **dendrohyphidia** absent.
Basidia 23-28 x 4-6 µm, clavate and with 4 sterigmata.
Basidiospores 6-7 x 2-3 µm, oblong ellipsoid, hyaline and smooth.
Substrata. On branches of *Betula* sp.
Distribution. Known only from the type, collected in Idaho.
Remarks. The description given here is taken from the original description and must be regarded as provisional and fresh specimens are desirable to verify the stated characters.

Auriculariopsis patelliformis (Burt) Ryvarden, comb. nov. Fig. 21
Basionym: *Stereum patelliforme* Burt, Ann. Missouri Bot. Garden 7:182, 1920.
Basidiocarp initially stereoid and resupinate with a slightly lifted margin, then more cupulate to oblong with a tendency to be effused reflexed, up about 1 cm wide and 3-5 mm wide, probably coriaceous to subgelatinous consistency when fresh, becoming corneous, hard and brittle when dry, hymenial surface smooth, pale brown when dry, pileus when it occurs, dark brown to almost black and covered with a fine white tomentum which over time presumably is being lost and exposing a dark surface, in section with a brown hymenium about 100 µm deep over a whitish context of same thickness being agglutinated on the surface; margin more or less revolute in dry specimens

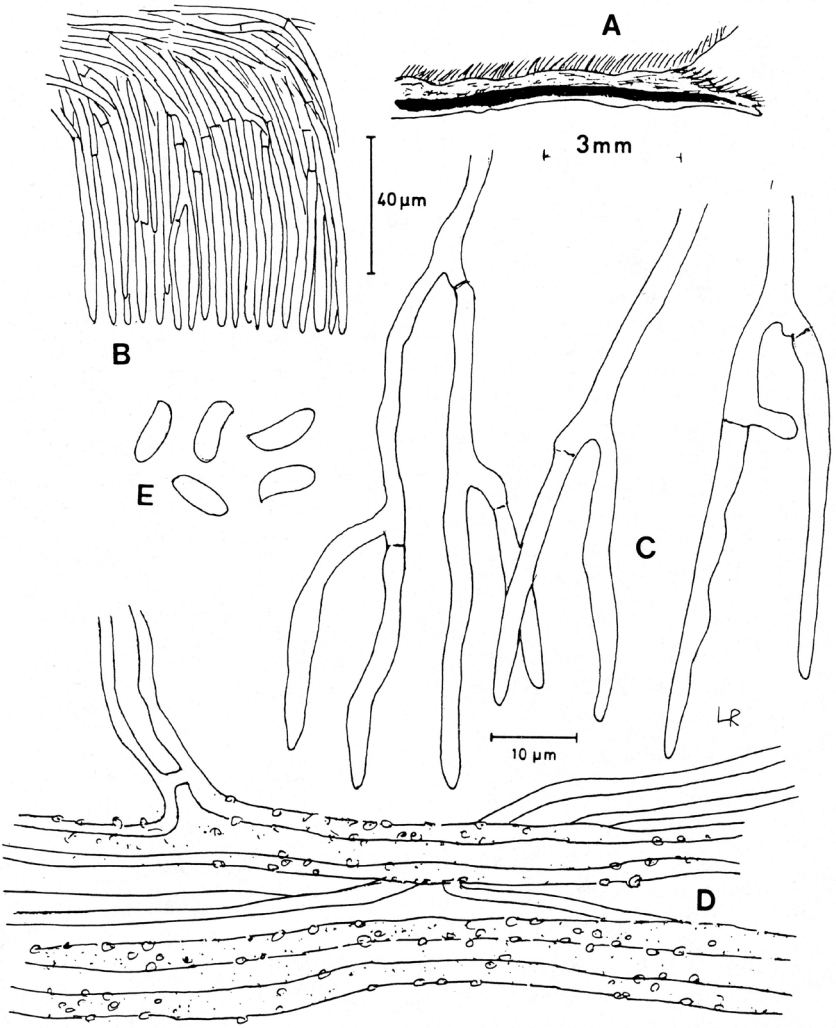
Fig. 21. *Auriculariopsis patelliformis* A) basidia, B) generative hyphae, C) basidiospores. USA, Bandoni 9403.

Hyphal system monomitic, hyphae 3-4 µm wide, with thickened walls and a darker lumen slightly sinuous to straight, with clamps at all septa, strongly agglutinated by gelatinous interhyphal substances, some few hyphae seemingly solid and without clamps and could be interpreted as skeletal hyphae but this has to be decided on fresh material.
Cystidia and **dendrohyphidia** absent.
Basidia up to 110 µm long and 5-8 µm wide in the upper part, tapering towards the base, clavate, slightly sinuous and with 4 large sterigmata.
Basidiospores 11.5 -14 x 4-4.5 µm, allantoid and smooth.
Substrata. On fallen branches of different hard wood trees.
Distribution. Widespread but rare in Central United States and adjacent Canadian States.
Remarks. The brown colours and the lack of dendrohyphidia separate this species from *C. salicina.*

BOREOSTEREUM Parmasto,
Consp. Syst. Cort. p. 186, 1968.
Basidiocarp usually resupinate to effused-reflexed, rarely distinctly pileate, loosely adnate, coriaceous and tough, distinctly stratified, pileus smooth to tomentose, dark brown, zonate. Hymenial surface smooth to radially plicate or folded, ochraceous to rusty brown. Hyphal system dimitic, generative hyphae thin- to thick-walled, with simple septa, and often with oily content, skeletal hyphae yellow to pale brown, thick-walled, usually with a brown encrustation, this becoming green in KOH. Hyphoid cystidia abundant in hymenium, these arising in the subhymenium, basidia subclavate with four sterigmata and a simple septum at the base, basidiospores up to 12 µm long, narrowly ellipsoid to cylindrical, thin-walled, non-amyloid.
On wood of conifers, rarely on hardwoods, causing a white rot. Boreal species with a circumpolar distribution. Monotypic genus.
Type species: *Boreostereum radiatum* (Peck) Parmasto.
Remarks. The type species is reminiscent of a *Hymenochaete*, but lacks true setae. *Lopharia* and *Porostereum* are separated by their metuloid cystidia and / or skeletocystidia.

Boreostereum radiatum (Peck) Parmasto, Fig. 22
Consp. Syst. Cort. p. 187, 1968. - *Stereum radiatum* Peck, Bull. Buffalo Soc. Nat. Hist. 1:62, 1873.
Basidiocarp resupinate, effused-reflexed, usually less than 1 cm wide, rarely distinctly pileate, easily peeled off the substrate, stiff when dry, up to 2 mm thick. Upper surface dark brown, finely tomentose, hymenial surface dark

ochraceous to rusty brown, smooth to radially folded or tuberculate, in section distinctly stratified with a rusty brown hymenium and subhymenium and a black subiculum with a transitions to a cottony dark brown tomentum, either close to the substrate or on the pileus.
Hyphal system dimitic, generative hyphae 3-5 µm wide, with simple septa, in the subhymenium hyaline to pale yellowish, thin-walled, freely branched; skeletal hyphae or thick-walled generative hyphae up to 7 µm wide, straight, abundant in tomentum and subiculum, rarely septate, often branched dichotomously, usually with a pale brown encrustation (occasionally smooth), this dark green in KOH,
Hyphoid cystidia 2-5 µm wide, and up to 45 µm long, abundant in the hymenium, embedded to slightly projecting, hyaline, thin-walled, and finely encrusted to smooth, often dichotomously branched from the base, with a basal simple septum.
Basidia 25-35 x 3-6 µm, clavate, with 4 sterigmata.
Basidiospores 7-11 x 2.5-3.5 µm, cylindrical and hyaline, non amyloid.
Substrata. On wood. Usually on gymnosperms, rarely on hardwoods such as *Salix* spp.
Distribution. Boreal areas of North America and Northern Asia. In Europe recorded only in the Carpathian Mountains, i.e. the Czech Republic and Poland.
Remarks. Easy to recognize in the field because of the slightly folded, rusty brown hymenial surface with a dark brown tomentum and a distinct black subiculum in section. Microscopically, the green reaction of the hyphal encrustation is very distinct. It is a matter of opinion whether the hyphoid cystidia should be regarded as cystidioles or just hyphal ends.



Fig, 22. *Boreostereum radiatum* A) section through the basidiocarp, B) part of hymenium, C) hyphoid cystidia from the hymenium, D) encrusted hyphae from context, E) basidiospores. Ellis N. Am. Fungi no 407, USA.

BYSSOMERULIUS Parmasto ,
Eesti N.S.V Tead. Akad. Toimet. Biol. 16 (4):383, 1967.
Basidiocarp resupinate to pileate, upper surface whitish and tomentose, hymenium initially cream coloured, then brown, dark purplish or almost black, margin remaining white, subhymenium thickening with age, hyphal system monomitic, hyphae thin-walled or slightly thick-walled, lacking clamps, basidia narrowly clavate, normally with four sterigmata, basidiospores ellipsoid to subcylindrical, smooth and non-amyloid.
Type species: *Merulius corium* Fr.
Remarks. The genus is characterized by a partly reflexed basidiocarp with a meruloid to semiporoid hymenial surface and simple septate hyphae.

Key to species

1. Hymenial surface purplish, to black, on coniferous wood, preferably *Pinus* ..... **B. ambigus**
1. Hymenial surface cream to pale brown, on hardwoods 2

2. Basidiospores 4.5-5 x 2.5-3 µm, ellipsoid, hymenial surface golden brown. ..... **B. sordidus**
2. Basidiospores 5.5-6 (7) x 2.5-3 µm, subcylindrical, hymenial surface pale yellow to pale orange .....**B. corium**

Byssomerulius ambigus (Berk.) Gilbn. & Buddington,
J. Ariz. Acad. Sci. 6:92. 1970. - *Merulius ambigus* Berk., Grevillea 1:69, 1872.
Basidiocarp 0.5-1 mm thick, initially resupinate, soon effused-reflexed, up to 3 cm wide and 4 cm long (rarely larger), when reflexed often in imbricate clusters. Pileus cream to slightly greyish in old specimens, tomentose and zonate, margin of effused parts, up to 2 mm wide, white to cream, or greyish, finely tomentose. Hymenial surface purplish to brown or almost black, shiny, with a waxy texture when fresh, covered with radiating folds, these sometimes anastomosing and forming shallow pits, 1-3 per mm.
Hyphal system monomitic, all hyphae with simple septa, in the context 3.5-6 µm wide, thick-walled, mostly horizontal, and rather loosely arranged, in the subhymenium up to 3 µm wide, thin-walled, and more closely packed.
Basidia 15-30 x 5-6 µm, narrowly clavate, with four sterigmata.
Cystidia absent.
Basidiospores 5-8 x 2.2-2.8 µm, ellipsoid to subcylindrical, smooth, thin-walled, non-amyloid.
Substrata. On dead branches of coniferous trees, usually on *Pinus* spp.

Distribution. Widespread in the United States and Canada. Known also from Europe. Its presence in Mexico and subtropical countries where *Pinus* spp. occur is unknown.
Remarks. Recognized by the dark coloured, purplish, merulioid hymenial surface and usual occurrence on *Pinus*. May occur on other conifer hosts.

Byssomerulius corium (Fr.) Parmasto, Fig. 23-24.
Eesti N.S.V Tead. Akad. Toimet. Biol. 16:383, 1967. - *Merulius corium* Fr., Elench. fung. p. 58, 1828. - *Thelephora corium* Pers., Syn. meth. Fung.: p. 574 1801.
Basidiocarp 0.5-1 mm thick, resupinate, then with reflexed margins or even pileate, hymenial surface initially white, then yellowish, finally more or less brownish, pilei usually remaining white, sometimes grey or even becoming greenish (due to growth of algae in the context), finely tomentose, context white and very soft.
Hyphal system monomitic, all hyphae lacking clamps, subhymenial hyphae 2.5-3.5 µm wide, thin-walled, densely intertwined, more or less covered with fine crystals, basal hyphae 3-5 µm wide, with thickened walls, forming a loose context.
Basidia 30-35 x 5-6 µm, narrowly clavate, with four sterigmata.
Cystidia absent.
Basidiospores 5.5-6 (7) x 2.5-3 µm, subcylindrical, smooth, thin-walled, non-amyloid.
Substrata. On dead branches of deciduous trees, usually in humid localities.
Distribution. Rather common throughout the area and a cosmopolitan species.
Remarks. A widespread and common species recognized by its narrow, white pileus and pale isabelline to yellowish, smooth to slightly merulioid surface.

Fig. 23. *Byssomerulius corium* a) section of basidiocarp, b) hyphaefrom lower trama, c) hyphaefrom upper trama, d) young hymenium, e) basidia, f) basidiospores. A-d) Degelius, Sweden, e-f) Sunhede 5709, both Sweden, del. John Eriksson.

Fig. 24. *Byssomerulius corium* section of basidiocarp, a) upper and lower trama. b) subhymenium, c) hymenium, Sunhede 5709, Sweden, del. John Eriksson.

Byssomerulius sordidus (Berk. & M. A. Curtis ex Cooke) Hjortstam, Mycotaxon 54:184, 1995. - *Merulius sordidus* Berk. & M. A. Curtis ex Cooke, Grevillea 19:108, 1891. - *Cladoderris platensis* Speg. Anal. Mus. Hist. nat. B. Aires 6: 179, 1898. - *Cladoderris rickii* Lloyd, Mycol. Writ. **7**:1196. 1923.
Basidiocarp 0.5-1 mm thick, 2-10 mm wide, initially resupinate, then reflexed-pileate, upper surface smooth, golden brown, hymenial surface slightly reticulate to semi-poroid, more or less golden brown, subiculum white and thin.
Hyphal system monomitic, all hyphae lacking clamps, subhymenial hyphae 3-4 µm wide, thin-walled, densely intertwined, usually covered with fine crystals, basal hyphae 3-5 µm wide, with thickened walls, hyaline to pale yellow, and forming a loose context.
Basidia 20-25 x 5-6 µm, narrowly clavate, with four sterigmata.
Cystidia absent.
Basidiospores 4.5-5 x 2.5-3 µm ellipsoid, smooth, thin-walled, negative in Melzer's reagent.
Substrata. On dead branches of deciduous trees.
Distribution. Known from Argentina to Venezuela, but nowhere common.
Remarks. Closely related to *B. corium*, but separated from it by the shorter ellipsoid (rather than subcylindrical) spores, with a sigmoid shape as is typical for *B. corium,* basidiocarps of this species are also usually pale yellow to pale orange and not brown

CARIPIA O. Kuntze,
Rev. Gen. Pl. 3:451, 1898.
Basidiocarp small, more or less centrally stipitate, obconical with apex expanded and discoid, pilei flat, with a slightly depressed central part, whitish, smooth, hyphal system monomitic, generative hyphae with clamp connections, cystidia present, smooth, basidiospores thin-walled, smooth and non-amyloid. On dead wood, causing a white rot. Monotypic, neotropical genus.
Type species: *Hypolyssus montagnei* Berk.
Remarks. The small whitish to ochraceous basidiocarps, rarely more than 2.0 cm high make this a distinct genus. *Cotylidia* is easily separated its thin, flabelliform to spatulate basidiocarps, contrasted with those of *Caripia* which are compact and obconical. DNA sequencing has shown *Caripia* to be a reduced agaric related to *Gymnopus*.

Caripia montagnei (Berk.) O. Kuntze, Fig. 25
Rev. Genera Pl. 2:451. 1898. - *Hypolysses montagnei* Berk., Hooker J. Botany 1:139, 1842. *Hypolyssus sprucei* Mass. Grevillea 20:251, 1891. - *Hypolyssus foetidus* Mass. Journ. Bot. 30:197, 1892.

Basidiocarp more or less centrally stipitate, up to 2.0 cm high and 3.0-7.0 mm wide, obconical, expanding toward a discoid more or less circular pileus with a weakly undulant margin, initially flat, often developing a central depression and an elevated margin, white, finely tomentose then glabrous and becoming ochraceous, hymenium white to ochraceous, smooth or longitudinally furrowed to semi-lamellate, stipe widened towards the pileus, usually shorter than the fertile part, initially white then ochraceous, becoming pale brown, attached to the substrate with a small mycelial disk, context white, dense and drying fairly hard.
Hyphal system monomitic, hyphae 7-10 (12 µm) wide with clamp connections, hyaline, irregularly thick walled with a narrow lumen, irregularly branched, interwoven and difficult to tease apart in microscopical preparations.
Cystidia 20-25 x 4-5 µm, smooth, thin walled, fusiform and all immersed in the hymenium.
Basidia 25-30 x 5-6 µm, clavate with 2 to 4 sterigmata.
Basidiospores 5-6 x 3-3.5 µm, ellipsoid to pip shaped, smooth, non-amyloid.
Substrata. On all types of dead hard wood, herbs and roots.
Distribution. Widespread and usually abundant where it occurs throughout the neotropical area from Northern Argentina to southern Mexico.
Remarks. Easily recognizable in the field, due to the small, white, compact and stereoid basidiocarps, which often occur in clusters.

CHONDROSTEREUM Pouzar,
Ceská Mykol. 13:7, 1959.
Basidiocarp normally pileate, soft and flexible when fresh, firm and brittle when dry composed of several distinct hyphal layers which are, when viewed in section, from above: a whitish tomentum of hyphae with somewhat thickened walls. a dark cartilaginous layer composed of dense parallel hyphae which, in dry condition, is as hard as horn and difficult to section, a white layer also composed of dense parallel hyphae, a vesicular layer composed of few hyphae and numerous vesicles, a subhymenial layer of densely interwoven vertical hyphae, and a hymenium of densely packed, narrow basidia and sparse cystidia. All hyphae have clamps at the septa. Cystidia and vesicles seem to be homologue structures. Basidia are long, narrow and compacted in a dense palisade. Basidiospores are cylindrical, thin-walled and non-amyloid.
Type species: *Thelephora purpurea* Fr.
Remarks. *Chondrostereum* was derived from *Stereum* but it is apparent that *C. purpureum* is not related to that genus but is more reminiscent of *Phlebia*.

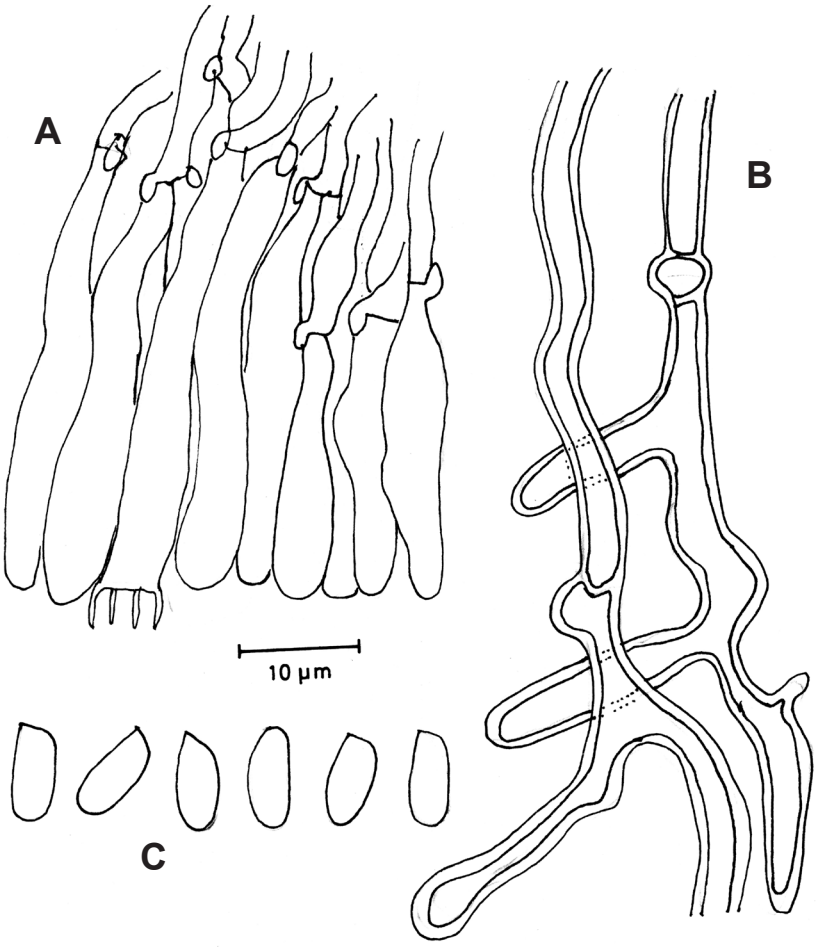


Fig. 25 *Caripia montagnei* A) part of hymenium, B) generative hyphae from the context, C) basidiospores. Venezuela, Ryvarden 40631.

Chondrostereum purpureum (Fr.) Pouzar Fig. 26
Ceská Mykol. 13:17, 1959. - *Thelephora purpurea* Fr. Syst. mycol. 1:440, 1821. - *Stereum purpureum* Pers., Neues Mag. Bot.1:110, 1794.
Basidiocarp pileate or resupinate, white and tomentose above, hymenium smooth, dark violaceous to purplish or brown-violaceous when fresh, paler after drying. The consistency of the fungus is tough when fresh, brittle when dry. In vertical section the white tomentum of the pileus is separated from the lower layers by a dark line visible to the naked eye. Dried basidiocarps are often hygroscopically rolled together.
Hyphal system monomitic 2.5-4 µm in diameter, with clamp connections, in the subhymenium thin-walled, more or less thick-walled in other parts of the basidiocarp.
Cystidia 60-80 x 6-8 µm, fusoid or obtuse, sparse, projecting 25-50 µm above the hymenium, thin-walled, smooth or with crystalline deposits.
Basidia 50 x 5 µm, long and narrow, with 4-sterigmata, arranged in the hymenium in a very dense palisade.
Basidiospores 5-8 x 2.5-3 µm, allantoid to subcylindrical, smooth, non-amyloid.
Substrata. Saprophytic or parasitic on stumps, branches or trunks of deciduous trees, rarely on conifers. Infected fruit-trees, develop a characteristic change to the appearance of the leaves due to a toxin produced by the fungus causing the upper epidermis of the leaf to separate from the layer beneath, causing the so-called "silver leaf" disease.
Distribution. Circumpolar in the Northern Hemisphere and seems to occur in woodland to its northern limit, such as 70^0 North in Norway.

CORALLODERMA D. A. Reid,
Beiheft Nova Hedwigia 18:332, 1965.
Basidiocarps spatulate, flabellate to infundibuliform, pileus glabrous, smooth to finely crested, hymenial surface smooth, stipe lateral to central, context black. Hyphal system monomitic, generative hyphae with either clamp connections or with simple septa, hyphae covered with purplish pigment. In old parts of the basidiocarp there is a dense structure of coralloid hyphae. Cystidia absent. Basidiospores ellipsoid, non-amyloid and smooth.
Terrestrial. One species in America.
Type species: *Thelephora acroleuca* Pat.
Remarks. Characterized by acystidiate, blackish basidiocarps with coralloid hyphae. Known only from a very few collections, more being needed to elucidate its position within the stereoid genera.

Fig. 26. *Chondrostereum purpureum* a) section through the basidiocarp, b) section through the tomentum, c) section through the hymenium, d) cystidia, e) basidium, f) basidiospores. J. Eriksson 7277 (Sweden). Del. J. Eriksson.

Coralloderma guzmanii Welden, Fig. 27
Mycotaxon 48:69, 1993.
Basidiocarps stipitate, up to 3 cm, high and 1.5 cm wide, solitary, narrowly reniform to spatulate, upper surface dirty whitish, drying orange yellow, smooth and glabrous to slightly rugulose, hymenial surface dirty yellowish becoming unevenly and patchily pale brownish, stipe round, slightly striate to finely velutinate, widened at the point of attachment, upper part as the hymenial surface becoming black from the base, context deep brown.
In the type, there is hymenium on both side of the basidiocarp, typical of a clavaroid species. Whether this is an aberrant feature or not remains to be seen.
Hyphal system monomitic, generative hyphae, 2-4 µm in wide, with simple septa, those in the stipe coralloid at the apex and covered with fine crystals of a dark purplish pigment.
Cystidia absent.
Basidia 45-54 x 5-7 µm, clavate, with 2 sterigmata.
Basidiospores 5-11 x 3.5-75 µm, ellipsoid to subglobose, smooth, hyaline, non-amyloid.
Substrata. Terrestrial.
Distribution. Known only from the type locality Oaxaca: Tuxtepec, in Mexico.
Remarks. The description above is entirely based on the original one of Welden. The type has not been examined by us. The black stipe, with coralloid hyphae is diagnostic.

COTYLIDIA P. Karst.,
Rev. Mycol. Toulouse 3: 22, 1881.
Basidiocarps terrestrial or on woody debris, coriaceous, spatulate, dimidiate, flabellate or infundibuliform to pseudo-infundibuliform, adjacent basidiocarps sometimes becoming confluent, upper surface usually white, yellowish or pale brown, becoming pale fawn, yellowish ochre or purplish brown, hymenial surface smooth, white, cream or bright yellow in fresh specimens, minutely setulose under a lens.
Hyphal system monomitic, generative hyphae lacking clamps, smooth, cystidia always present in the hymenium and, in some species on the pileus and stipe, basidia clavate, usually 4-spored basidiospores elliptic, thin-walled, hyaline, non-amyloid.
Cosmopolitan genus with four species in America.
Type species: C*otylidia undulata* (Fr.) Karst.
Remarks. The genus is characterized by a monomitic hyphal system with simple septate generative hyphae and smooth, thin walled, cylindrical cystidia.

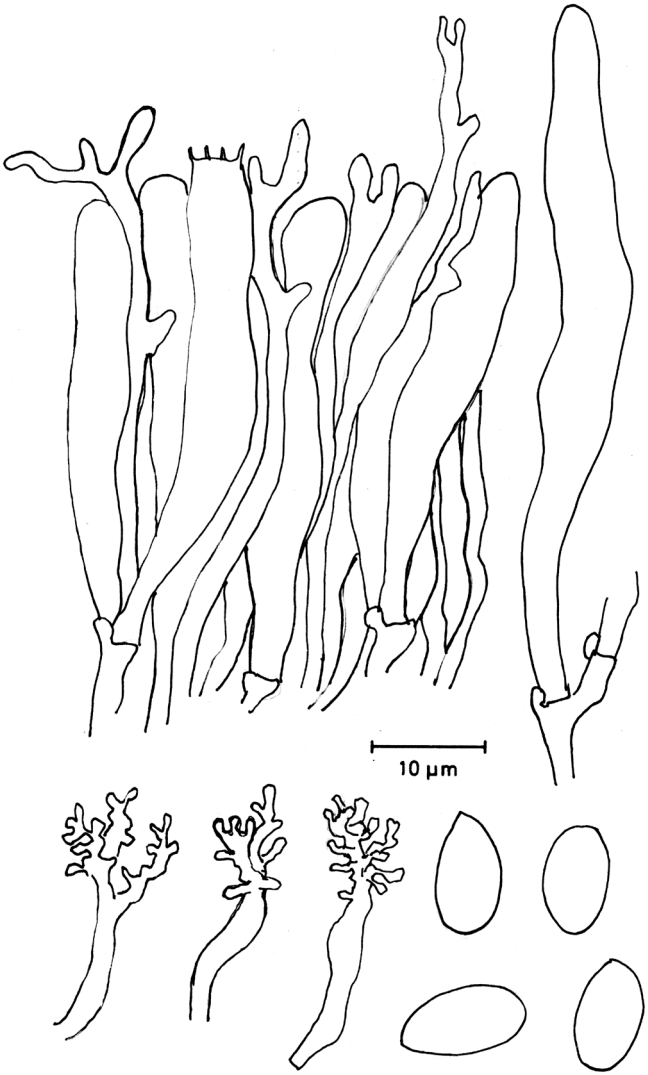


Fig. 27. *Coralloderma acroleucum* A) part of hymenium with branched hyphae, b) Gloeocystidium, C) coralloid hyphae from the stipe, D) basidiospores. Thailand, Schumacher 67/78.

Key to species

1. Basidiocarps whitish to bright yellow when fresh, becoming ochraceous, predominantly tropical ..... **C. aurantiaca**
1. Basidiocarps differently coloured, predominantly temperate to boreal. 2

2. Basidiocarps often rosette like, 3-5 cm high, pileus 1 mm thick or more, basidiospores 7-9 x 3.5-4 µm ..... **C. pannosa**
2. Basidiocarps infundibuliform to spatulate, 1-2 cm high, very thin, basidiospores 5-6 x 2-2.5 µm 3

3. Basidiocarps white to ochraceous, basidiospores 2.7-3.5 µm cystidia absent on the pileus and stipe .....**C. diaphana**
3. Basidiocarps, greyish to brown, basidiospores 1.5-2.5 µm wide and cystidia present also on pileus and stipe ..... **C. undulata**

Cotylidia aurantiaca (Pers.) Welden, Fig. 28
Lloydia 2, 40, 1958. - *Thelephora aurantiaca* Pers., Gaudichaud, Voyage sur I'Uranie Botany p. 176, 1827. - *Thelephora spectabilis* Lev., Ann. Sci. nat. Series Ill, 2:206, 1844. - *Thelephora decolorans* Berk. & M. A. Curt., J. Linn. Soc. (Bot.), 10:328, 1868. - *Thelephora sericella* Berk. & M. A. Curt., J. Linn. Soc. (Bot.) 10,328, 1868. - *Thelephora affinis* Berk. & M. A. Curt., J. Linn. Soc. (Bot.) 10: 328, 1868. - *Thelephora quisquiliaris* Berk. & M. A. Curt., J. Linn. Soc. (Bot.) 10, 239, 1868. - *Stereum alutaceum* Berk. & Cooke, J. Linn. Soc. (Bot.) 15:388,1876. - *Stereum xanthellum* Cooke, Grevillea 9:12, 1880. - *Stereum albostipatum* Lloyd, Lloyd Mycol. Writ. 4:22, 1913.
Basidiocarps 0.6-3.5 cm high, 0.2-4.5 cm wide, stipe up to 1.5 cm. long and 1.5 mm wide, solitary or gregarious, with a papery texture, commonly spatulate or reniform, less often pseudo-infundibuliform or truly infundibuliform, adjacent basidiocarps frequently confluent, pilei bright yellow when fresh, becoming ochraceous or ochraceous-straw coloured when dry, margin usually fimbriate or the pileus may split radially, when dry the upper surface has a distinct silky sheen with numerous radiating fibrils; hymenial surface bright yellow when fresh, yellow ochre or creamy ochre on drying, context very thin.
Hyphal system monomitic, generative hyphae, 3-8 µm in diameter, slightly thick-walled, hyaline or very pale yellowish with simple septa.
Cystidia 6-26 µm wide and up to 125 µm long, often projecting up to 65 µm beyond the basidia, cylindrical, clavate or slightly capitate to subglobose or pyriform, some with 1 to 3 transverse and often somewhat constricted septa, walls slightly thickened.

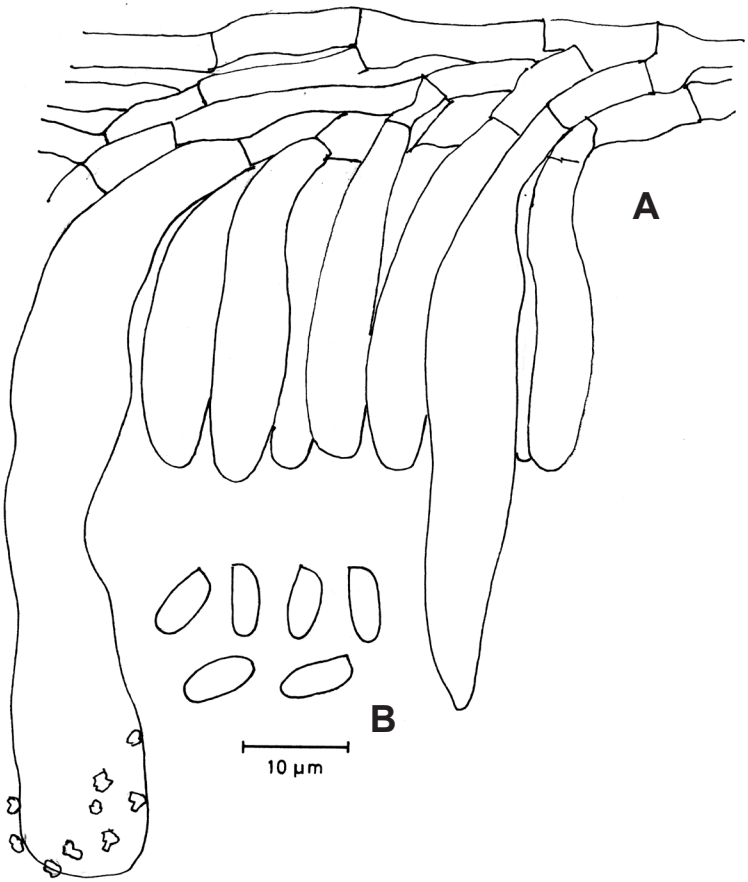


Fig. 28. *Cotylidia aurantiaca* A) hymenium with cystidia, B) basidiospores. Ecuador, Ryvarden 44727.

Basidia 26-39 x 3-5 µm, cylindrical or clavate, with 4 sterigmata.
Basidiospores (5.5-) 6-8.5 (-9) x 3-3.75 (-4) µm, elliptic, thin-walled, hyaline, basidiospores on dried material collapse readily and are difficult to revive.
Substrata. Most frequent on woody substrates but also sometimes terrestrial.
Distribution. Known only from tropical America, where it is very common.
Remarks. This is a small, soft, beautiful, and white to yellow species, which may be locally common, often occurring in large numbers on the forest floor.

Cotylidia diaphana (Schwein.) Lentz,
US Dept. Agric. Monograph 24:12, 1955. - *Thelephora diaphana* Schwein. in Berk. & W. A. Curtis, J. Acad. Nat. Sci. Philadelphia Ser II, vol. 2:278, 1854.
Basidiocarps 1.5-4 cm high, 0.8-3 cm wide, usually solitary, thin, coriaceous, frequently infundibuliform more rarely spatulate, sometimes with pilei split into lobes that then fuse together again, to form a complicated basidiocarp. Adjacent basidiocarps may also fuse to form compound basidiocarps. Pilei white to pale cream when fresh, becoming darker, to straw-coloured, occasionally with darker bands, smooth or with fine radiating fibrils which may be more fibrous to strigose towards the base, hymenial surface smooth to slightly wrinkled white to ochraceous-yellow when fresh, becoming pale reddish-brown in some specimens, usually decurrent on the stipe, stipe to 2.5 cm. long and 1-4 mm wide, white, and finely velutinate to tomentose towards the base.
Hyphal system monomitic, generative hyphae 3-7 µm in diameter, hyaline or very pale yellowish, with simple septa.
Cystidia up to 125 µm long and 8-15 µm wide, projecting up to 80 µm beyond the basidia,
cylindrical to clavate, with slightly thickened walls, some with 1 to 3 transverse, and often somewhat constricted septa.
Basidia 22-30 x 3-5 µm, cylindrical or clavate, with 4 sterigmata.
Basidiospores 4-6 (7) x 2.5-3.5 µm, ellipsoid, thin-walled and hyaline.
Substrata. On the ground or on wood of hardwood trees.
Distribution: North America. The presence of this species in South America is unverified due to previous confusion with *C. aurantiaca*. Also known from a single locality in East Siberia.
Remarks. This species may be looked upon as the temperate, boreal, counterpart of *C. aurantiaca*, separated from that species by shorter basidiospores.

Cotylidia pannosa (Sowerby:Fr.) D. A. Reid,
Nova Hedw. Beih. 18:81, 1965. - *Thelephora pannosa* Sowerby:Fr., Syst. mycol. 1:430, 1821. - *Helvella pannosa* Sowerby, Col. fig. Engl. fung. 2:pl.155, 1791.

Basidiocarp 3-5 cm, irregularly infundibuliform, then confluent and often becoming more or less like a rosette, at first white, later more yellowish, upper surface radiately fibrillose, hymenial surface setulose (lens), irregularly veined, initially white, then yellowish to ochre after drying, stipe short or inconspicuous, covered at the base by a whitish tomentum of hyphae.
Hyphal system monomitic, 3-4 µm wide, hyphae with thin or slightly thickened walls, lacking clamps, arranged parallel in the trama, irregularly interwoven in the subhymenium.
Cystidia (pseudocystidia) 100-150 x 10-12 µm, tubular-cylindrical, thin-walled apically rounded, strongly projecting, usually abundant.
Basidia 50 x 5-7 µm, subcylindrical, with 2-4 sterigmata, lacking a basal clamp.
Basidiospores 7-9 x 3.5-4 µm, ellipsoid with a prominent oblique apiculus, smooth, thin-walled, non-amyloid, with irregular oily inclusions when dry, which are probably oil drops in fresh material.
Substrata. On soil in fertile deciduous forests.
Distribution. A rare species, known from a few states in the northern United States. In Europe known from England, France, Sweden and Denmark.

Cotylidia undulata (Fr.) P. Karst., Fig. 29
Rév. Mycol. Toulouse 3(9):22, 1881. - *Thelephora undulata* Fr., Elench. fung. 1:164, 1828.
Basidiocarp 0.5-1.5 cm high, 0.5-1.5 cm wide, stipitate, infundibuliform, pileus thin, indistinctly zonate, greyish to greyish-brown, upper side smooth, fibrillose near the margin with radiating hyphae and pilocystidia (lens), hymenium smooth or slightly veined, greyish or pale ochraceous, setulose (lens) due to projecting cystidia, stipe about 0.5 cm high and 1 mm wide, greyish white, appearing finely hairy due to projecting hyphae and caulocystidia.
Hyphal system monomitic, hyphae up to 3 µm wide, simple septate, thin-walled, straight, parallel, sparsely branched and distinct in the trama, but densely branched, interwoven and indistinct in the subhymenium.
Cystidia (pseudocystidia), 50-70 x 5-10 µm, subcylindrical, apically rounded, with thin or slightly thickened walls, present in the hymenium. Originating in the trama, they penetrate the subhymenium and project above the hymenium. Numerous pilocystidia of similar shape are present on the upper side of the pileus. On the stipe, abundant, septate caulocystidia (100 µm or more in length) are present.
Basidia 15-20 x 4-5 µm, narrowly clavate, with 4-sterigmata, lacking a basal clamp and forming a dense palisade as seen in the genus *Phlebia*. The generative hyphae form a distinct, densely interwoven subhymenium.

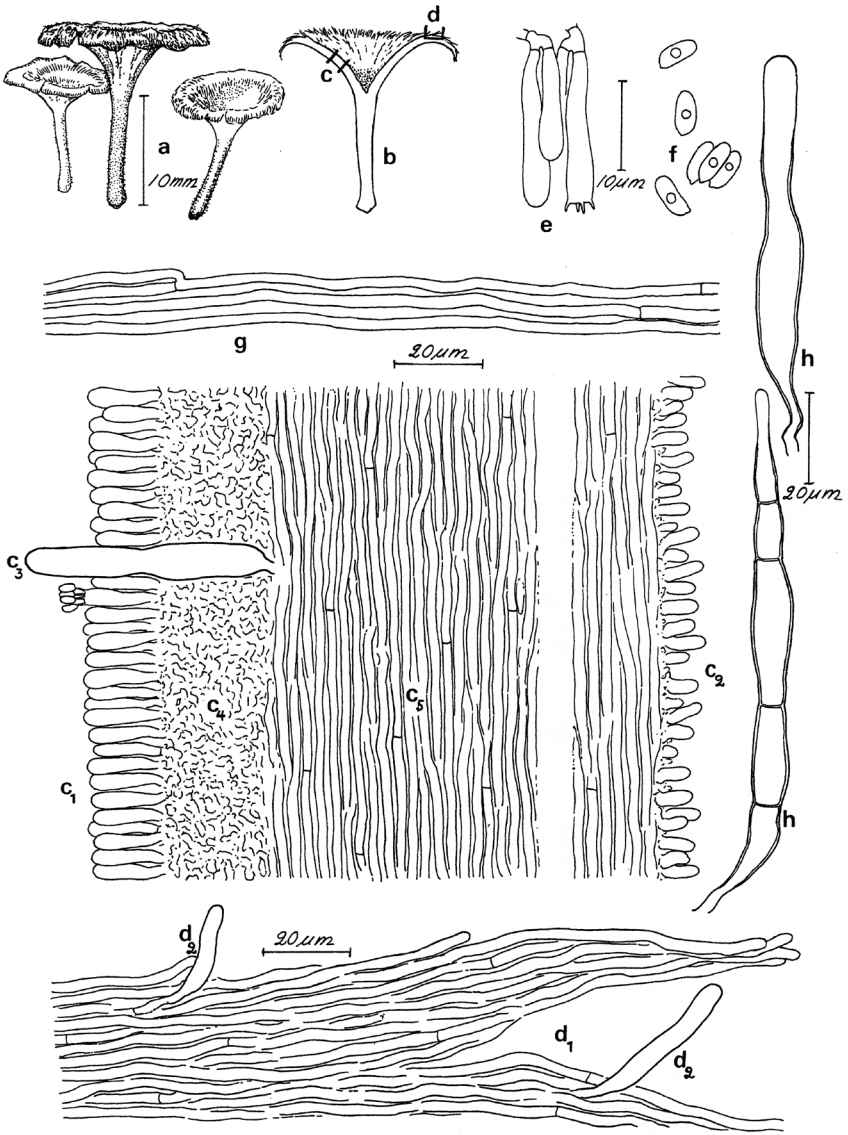


Fig. 29 *Cotylidia undulata* a) basidiocarps, b) section of basidiocarp, c) section through pileus showing its construction, d_1 agglutinated hyphae, d_2 pileocystidia, e) basidia, f) basidiospores, g) tramal hyphae, h) caulocystidia. S. Lundell, Sweden, del. J. Eriksson.

Basidiospores 4-5 x 2-2.5 µm, narrowly ellipsoid, thin-walled, smooth, with single oil drop in the protoplasm.
Substrata. On soil in dry biotopes, sometimes on old fire sites, often associated with species of the moss genus *Polytrichum* but also known with other mosses.
Distribution. Circumpolar in the temperate zone but apparently rather rare, but however, easily overlooked because of its cryptic colours and small size.

CYMATODERMA Jungh.,
Tijdschr. nat. Gesch. 7, 290, 1840. - *Cladoderris* Berk. in Lond. J. Bot. 1:152, 1842.
Actinostroma Klotzsch in Nova Acta Acad. Leop. Carol. 19 (Suppl.1) 23: 6, 1843. - *Beccariella* Ces., Atti Accad. Sci. fis. mat. Napoli 8: 95, 1879.
Basidiocarps lignicolous, coriaceous, dimidiate, flabellate, infundibuliform, with adjacent basidiocarps frequently becoming confluent, upper surface of the pileus covered with a very thick felty tomentum which may be much thicker than the context.
In some species the surface below the tomentum is covered with radiating, knife-like, sharp edged ridges but these may be almost completely obscured by the density of the tomentum, except towards the pileal margins, hymenial surface smooth, warty or spiny, and with folds, ridges, or undulations, stipe lateral or central.
Hyphal system di- or trimitic; generative hyphae frequently of two kinds 1. thin-walled, hyaline, branched, and with clamp connections or 2. very thick-walled with the lumen often obliterated; skeletal hyphae very thick-walled, subhyaline or pale brown; binding hyphae thick walled.
Encrusted cystidia present in some species, gloeocystidia present in all species, basidia clavate, usually 4-spored, basidiospores broadly elliptical to subglobose thin-walled, hyaline, non-amyloid.
On dead hardwoods, pantropical genus with a white rot.
Type species: *Cymatoderma elegans* Jungh.
Remarks. Species of the genus are usually easy to recognize in the field because of the large, fleshy basidiocarps with a tomentose to densely hairy pileus, and, in most species, ribs or folds on the lower side. *Podoscypha*, a genus similar to *Cymatoderma*, has species with much smaller basidiocarps, pilei which are smooth or only sparsely covered with simple cystidia and a smooth hymenial surface.

Key to species

1. Basidiospores 7.5-12 µm long ..... **C. caperatum**
1. Basidiospores much shorter 2

2. Basidiocarps arising on the ground from a sclerotium .....**C. sclerotioides**
2. Basidiocarps on dead wood, no sclerotium present 3

3. Hymenial surface more or less smooth ..... **C. venezuelae**
3. Hymenial surface with ridges, folds or protuberances 4

4. Hymenial surface with a complex pattern of ribs and folds without protuberances, context brown, gloeocystidia abundant, subhymenial hyphae more or less smooth .....**C. dendriticum**
4. Hymenial surface with occasional ribs but with numerous small protuberances, context greyish white to wood-coloured, gloeocystidia few, subhymenial hyphae strongly encrusted ..... **C. fuscum**

Cymatoderma caperatum (Berk. & Mont.) D. A. Reid, Fig. 30
Kew Bull. 10:635, 1955. - *Thelephora caperata* Berk. & Mont. Ann. Sci. Nat. Ser 3, 11:241, 1849. - *Stereum goliath* Speg. Ann. Soc Sci. Argent. 17:77, 1884. - *Stereum hylocrater* Speg. Ann. Soc Sci. Argent. 17:77, 1884.
Basidiocarp 4-19 cm high, 3-12 cm wide, thin, pliable, tough, usually infundibuliform, with a central stipe, often confluent. Pilei covered with a thick, straw coloured to golden or rusty brown tomentum under which the surface is radially covered in furrows and sharp ridges, hymenial surface creamy-white to flesh coloured, becoming rusty cream or ochraceous with a pinkish tinge. In dried specimens the surface is covered with obtuse, radiating folds these tending to branch toward the margin.
Stipe central, often very short or rudimentary, occasionally well developed, covered with a brownish tomentum and attached to the substrate by a small basal disc.
Hyphal system dimitic, generative hyphae 2-4 µm wide, with clamp connections, skeletal hyphae 3-5 µm wide, the tomentum is comprised of generative hyphae with clamps at intervals along the entire length.
Cystidia absent.
Gloeocystidia up to 11 µm wide, undulating, thin-walled, with swollen bases, narrowing toward the obtuse apices, frequently constricted at intervals and appearing irregularly moniliform.
Basidia 30-45 x 4-7 µm, clavate, with 4 sterigmata.

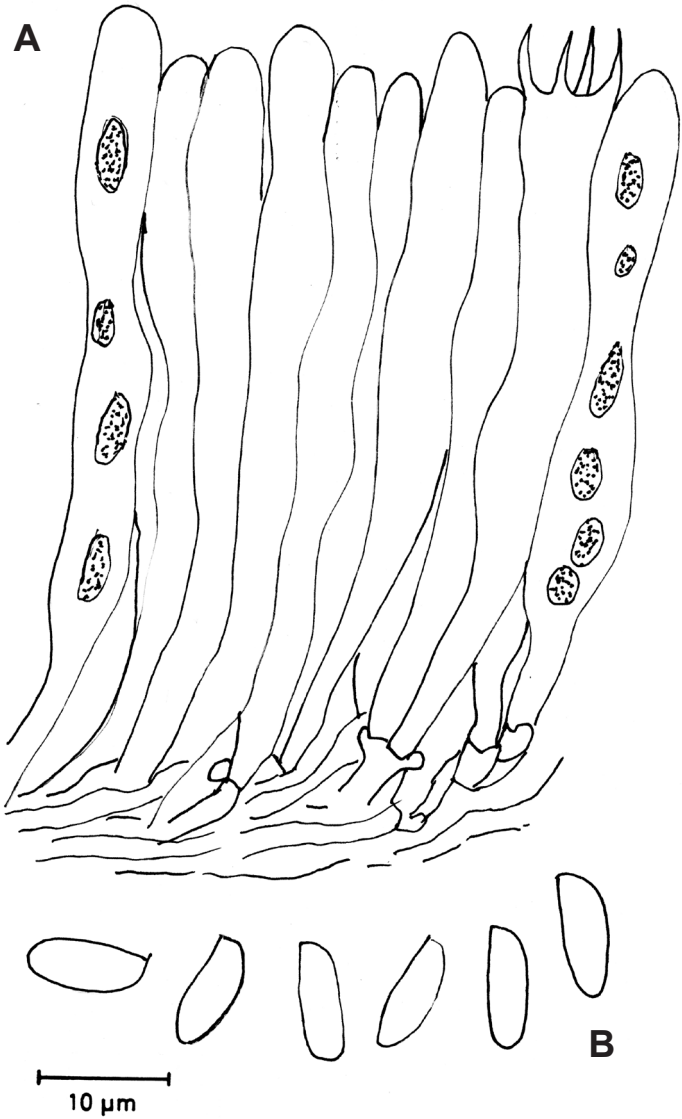


Fig. 30. *Cymatoderma caperatum* A) part of hymenium with gloeocystidia, B) basidiospores. Venezuela, Ryvarden 40501.

Basidiospores 7.5-12 x 2.5-4 (-4.5) µm, hyaline, subcylindrical to narrowly elliptic.
Substrata: on dead wood (dead stumps, trunks, fallen branches, roots etc.)
Distribution: Argentina, Bolivia, Brazil and Colombia. Costa Rica, Cuba, Paraguay, Peru, St. Domingo, USA, Venezuela.

Cymatoderma dendriticum (Pers.). D. A. Reid,
Kew Bull. 13, 523, 1958. - *Thelephora dendritica* Pers. in Gaudichaud, Voyage sur I'Uranie Botany 176, 1826. - *Actinostroma crassum* Klotzsch in Nova Acta Acad. Leop. Carol. 19, (Suppl. 1), 237, 1843. *Cladoderris candolleana* Lev. in Ann. Sci. nat., Series Ill, 5, 153 -4, 1846. - *Becariella trailii* Cooke Grevillea 20, 33, 1891. - *Cladoderris imbricata* Pat. in Bull. Soc. mycol. Fr. 38, 86-7, 1922. - *Stereum fenixii* Lloyd, Lloyd Mycol. Writ. 7: 1115, 1922.
Basidiocarps up to 10.5 cm from stalk to margin, and 20.5 cm wide, thin, pliable, coriaceous-membranous, dimidiate or flabellate, often deeply imbricately lobed (in some specimens almost down to the short lateral stipe). Pilei usually completely covered with a very well developed felt-like tomentum, this beige or pale fawn to dark ochraceous-brown, up to 8 mm thick near the base of the basidiocarp and obscuring the short and not very prominent, sharply edged ridges on the surface.
Hymenial surface cream to purplish or reddish-brown in older specimens, surface with a complex system of densely crowded, rather sharply edged, branched, radiating ribs.
Stipe lateral, usually short and stout or rudimentary, rarely well developed (but may reach 5 cm and 1 - 5 cm wide), covered by a dense reddish-brown tomentum, context thin, greyish white to wood coloured.
Hyphal system trimitic; generative hyphae 3-5 µm wide and smooth, skeletal hyphae 4-5(-8) µm, hyaline to pale brown, and binding hyphae 2-2.5 µm., the tomentum is comprised of thick-walled smooth hyphae (2.5)3–5 (-7) µm wide.
Gloeocystidia abundant, 40-80 x 4-8 µm, undulating, thin-walled, with swollen bases up to 15 µm in diam., often irregularly constricted and very rarely forked.
Basidia 25-25 x 4-6 µm, clavate, with four sterigmata.
Basidiospores (2.5-) 3-4 x (2-) 2.5-3 (-3.5) µm, often mono- guttulate, broadly elliptic to subglobose.
Substrata: on dead wood (stumps, trunks, fallen branches).
Distribution. Pantropical. Widespread in tropical America north to Cuba and Jamaica.
Remarks. Characterized by the complex system of ridges on the lower side of the basidiocarp.

Cymatoderma fuscum (Cooke) D. A. Reid,
Kew Bull. 13, 526, 1958. - *Cladoderris fusca* Cooke, Grevillea 10, 123, 1882. - *Cladoderris glaziovii* Henn., Bot. Jb. 15, Beiheft 34:15, 1892.
Basidiocarps 3-6 cm from stipe to margin and 4-10 cm wide, coriaceous, dimidiate or flabellate, pileus covered with a thick, brown, felt-like tomentum which obscures the short, radiating, inconspicuous ridges on the surface, except toward the margins, which are very dark brown or black, glabrous and shiny. Hymenial surface pinkish-beige with a purplish tinge, with several radiating folds and covered with very minute granular protuberances. Stipe rudimentary, context pale brown.
Hyphal system trimitic, generative hyphae with clamps thin – to thick walled 3-7 µm, skeletal hyphae 4-6 µm, distinctly brown in colour, with those in the subhymenium strongly encrusted, binding hyphae, 2-3µm, with numerous long tapering branches.
Cystidia absent.
Gloeocystidia up to 60 µm long, present, but few, often collapsed and wrinkled.
Basidia not seen.
Basidiospores 3.75 -4 x 2.5 -2.7 µm, hyaline, broadly elliptical.
Substrata. On dead hardwoods.
Distribution. Known only from Rio de Janeiro in Brazil (type locality), Grenada and Louisiana in the United States.
Remarks. Undoubtedly related to *C. dendriticum*, but separated from it by the hymenial surface covered with protuberances, a darker context and encrusted hyphae in the subhymenium. It may be that these characters are a result of environmental factors and that more collections will reveal it to be a form of *C.dendriticum*. Microscopical characters are more or less identical in the two species.

Cymatoderma sclerotioides (Lloyd) D. A. Reid,
Kew Bull. 13, 528, 1958. - *Stereum sclerotioides* Lloyd, Lloyd Mycological Writings 7:11, 1922.
Basidiocarps 7 -7.5 cm high, 2.5 cm wide, arising from a very hard, dark brown, strongly ribbed and wrinkled sclerotium up to 4 cm long and 2.5 cm wide, stipe is well developed and expands into a small coriaceous, infundibuliform pileus, 1.75 cm high and 2.5 cm in diam., with wavy margin, pileus surface only slightly radially ridged, covered by a thick, deep rich ochre-brown tomentum, hymenial surface pale creamy-ochre with numerous radial ridges, stipe up to 6 cm long and 1 cm wide covered at the base by a thick, spongy, deep ochre-brown tomentum.

Hyphal structure dimitic; generative hyphae 2 -4 µm wide and with clamps, skeletal hyphae, narrow, 2.5-3 (-4) µm, hyphae of the surface tomentum thick-walled, with a distinct lumen.
Cystidia absent.
Gloeocystidia 40-75 x 4-8 µm, abundant, undulating, thin-walled with swollen bases, narrowing above and appearing almost moniliform.
Basidia 25-30 x 5-6 µm, clavate and with four sterigmata.
Basidiospores (3.5)4-5.5 x 2-3 µm, narrowly elliptic to subcylindrical, often with one guttule.
Substrata. On the ground.
Distribution: Known from Brazil, Panama and Costa Rica.
Remarks. Characterized by the sclerotium, unknown in any of the other species of *Cymatoderma* described here.

Cymatoderma venezuelae D. A. Reid,
Beiheft Nova Hedwigia 18:132, 1965.
Basidiocarps 0.8-2-0 cm from point of attachment to the margin, 0.3 - 1. 5 cm wide, irregularly spatulate to flabellate with a very short, flattened, stipe like base, which is attached to the substrate by a thick, basal pad of ochraceous mycelium, occasionally more than one basidiocarp may arise from a single mycelial pad, pileus densely covered with a thick, matted, felty tomentum, this ochraceous- or tawny-brown, and which may thin out toward the margin, exposing the underlying surface at the extreme edge, as a narrow, glabrous, shining, translucent, chestnut-brown zone, hymenial surface quite smooth, dark purple-brown to orange brown, with narrow blackish zones, stipe very short, flattened and rudimentary.
Hyphal system dimitic, generative hyphae, 2-5 µm wide, hyaline, branched, and with clamp connections; skeletal hyphae, up to 7.5(-8) µm in diam., thick-walled to almost solid, hyaline and unbranched. In the tomentum, composed of densely compacted, thin-walled, generative hyphae there are widened sections resembling cysts or pseudocystidia, these rather short but up to 40 µm long.
Cystidia gloeocystidia, up to 80 µm long and 14 µm wide abundant, thin-walled, undulating, arising at different depths in the hymenium and projecting slightly above it.
Basidia 24-30 x 4-6 µm, clavate, with four sterigmata.
Basidiospores 3.5-4 x 2-3 µm narrowly elliptic to ovate.
Substrata. Unknown, but probably on dead hardwood.
Distribution: Known only from type specimen from Venezuela.

Remarks. Recognised by the smooth hymenium and the cysts or pseudocystidia formed in the hairs on the pileus. More collections are desirable in order to ascertain its morphological variation.

CYPHELLOSTEREUM D. A**.** Reid,
Beih. Nova Hedw. 18: 336, 1965.
Basidiocarps terrestrial, or on mosses, pileate, dimidiate or flabelliform, with or without a short stipe, hymenium smooth, hyphal system monomitic, hyphae thin-walled, lacking clamps, hymenium thickening, cystidia present, basidia small, clavate or subcylindrical, basidiospores small, negative in Melzer's reagent, thin-walled, subglobose or elliptic.
Type species: *Cantharellus laevis* Fr.
Remarks. A unique genus in the Stereales as its type is parasitic on mosses. In this sense it resembles the genus *Leptoglossum*, which in most literature is placed in the Agaricales. The small whitish basidiocarps are reminiscent of *Cotylidia*, but the type is, as stated, parasitic, a characteristic completely unknown in that genus, whilst the other species treated here lack the cystidia, characteristic of *Cotylidia*.

Key to species

1. Parasitic on dead or living mosses 2
1. On open soil .....**C. pusiolum**

2. Thin-walled cystidia present, basidiospores 4-4.5 x 2-2.5 µm .....**C. laeve**
2. Cystidia absent, basidiospores 7-8 x 3.5-4.5 µm .....**C. brasilensis**

Cyphellostereum brasiliensis Ryvarden nov. sp. Fig. 31
Ad. *Cyphellostereum laeve*, sed sporae 7-8 x 3.5-4.5 µm (4-4.5 x 2-2.5 µm in C. laeve).
Holotype: Brazil, Sao Paulo State, Vale de Pariba, Campos do Jordao, Parque Est. de Camp Jordao 27. January 1987, on dead mosses, Ryvarden 24386 (O).
Basidiocarp pileate, up to 8 mm in diam. rounded to slightly spatulate and with a 1-4 mm long lateral stipe, upper side flat when fresh, bent to curled when dry, white, glabrous smooth when fresh becoming slightly wrinkled when dry, hymenial side smooth and pale cream to ochraceous, stipe white with acute hyphal pegs in parts so dense that it can be said to be almost hirsute.
Hyphal system monomitic, all hyphae without clamps, those of subhymenium 2-5 µm wide, in the context variable, in parts very wide and up to 20 µm in

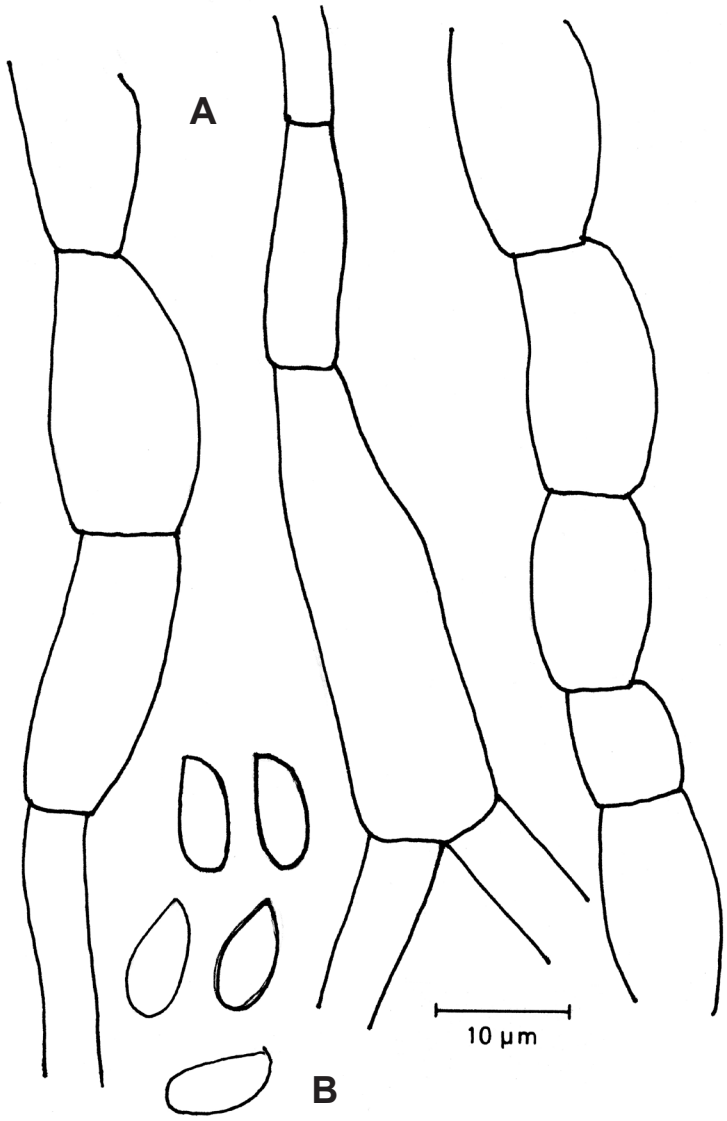


Fig. 31. *Cyphellostereum brasiliensis* A) Hyphae from the context, B) basidiospores. Brazil. Ryvarden 24386, holotype.

diameter in an open texture, in parts short celled with a slight constriction at the septa, hyaline and non amyloid and non dextrinoid. **Cystidia** absent.
Basidia 18 -25 x 5-6 µm, clavate, with 4 sterigmata and with a basal simple septum.
Basidiospores 7-8 x 3.5-4.5 µm, oblong ellipsoid, thin-walled, smooth and without reaction in Melzer's reagent.
Substrata. On dead mosses.
Distribution. Known only from the type locality, but very easily overlooked due to the small size and the unusual habitat.
Remarks. Superficially easily taken for *C. laeve* since they are similar in colour and the substrate, i.e. dead or living mosses. However, the large cells of the context, the large spores and the white stipe with distinct hyphal pegs make this a characteristic species.

Cyphellostereum laeve (Fr.) D. A. Reid, Fig. 32
Beih. Nova Hedw. 18 p. 336, 1965. - *Cantharellus laevis* Fr., Syst. mycol. 1:324, 1821.
Basidiocarp pileate, small (about 0.5-1 cm in diam.), rounded or spatulate, usually tapering to a short, often indistinct stipe, upper side flat or somewhat convex, white, with a soft texture, composed of interwoven hyphae, lacking a differentiated surface layer, hymenial side concave, white or cream-coloured, smooth or almost so, continuous, margin somewhat deflexed.
Hyphal system monomitic, hyphae about 2.5 µm wide (2-3 µm), hyaline, slightly cyanophilous, narrow, even, sparsely branched, lacking clamps, with a distinct subhymenium formed by densely interwoven hyphae.
Cystidia 35-55 x 6-7 µm, numerous, projecting, thin-walled, not encrusted, narrowly fusiform, widest near the base, apically rounded to an insignificantly widened head.
Basidia 15-18 x 4.5-6 µm, clavate, with 4 sterigmata, with small drops in the protoplasm, lacking a basal clamp.
Basidiospores 4-4.5 x 2-2.5 µm, subglobose or sub-ellipsoid, tapering towards the apiculus, thin-walled, somewhat cyanophilous, with an oil drop.
Substrata. On living mosses, especially *Polytrichum* spp.
Distribution. Cosmopolitan. Apparently rare everywhere, but easily overlooked because of its size.
Remarks. Easily recognized by its ecology and substrate.

Fig. 32. *Cyphellostereum laeve* a) basidiocarp, b) section through the basidiocarp, c) hymenium, d) hyphae from the context, e) cystidium, f) basidium, g) basidiospores. Canada, John Eriksson 8377.

Cyphellostereum pusiolum (Berk. & M. A. Curtis) D. A. Reid,
Beiheft Nova Hedwigia 18:342, 1965. - *Stereum pusiolum* Berk. & M. A. Curtis, J. Linn. Soc. (Bot.) 10:330, 1869.
Basidiocarp pileate, small (up to 2 cm long and wide), spatulate to flabelliform, usually tapering to a short, often indistinct or rudimentary stipe, upper side white to cream coloured, adpressed cottony and radially fibrillose to wrinkled, in old specimens often fimbriate along the margin, hymenial side extending almost to the base of the stipe, white or cream-coloured, smooth or almost so, stipe concolorous with the hymenial side.
Hyphal system monomitic, hyphae about 2- 5 µm wide, hyaline, narrow, sparsely branched, lacking clamps, forming a distinct subhymenium composed of densely interwoven hyphae.
Cystidia absent.
Basidia 10-25 x 4.5-6 µm, clavate with 4 sterigmata, lacking a basal clamp.
Basidiospores 5-8 x 3-4µm, ellipsoid to almost subglobose, or pip shaped, thin-walled, often collapsed in dry specimens and difficult to revive, and then difficult to measure or to ascertain their shape.
Substrata. On open soil, roadsides, river banks and similar places, often present in large numbers.
Distribution. Pantropical. Apparently rare everywhere, but easily overlooked because of its size.
Remarks. Easily recognized in the field due to the white colour, small basidiocarps and occurrence on open ground. The lack of cystidia and larger spores make it microscopically distinct from *C. laeve*. The lack of cystidia also precludes its transfer to *Cotylidia*.

CYSTOSTEREUM Pouzar,
Ceska Mykol. 13:18, 1959.
Basidiocarps perennial, usually resupinate or occasionally pileate, hymenium odontioid or tuberculate, light-coloured, at least when young. Hyphal system dimitic composed of thin-walled generative hyphae with clamp connections, and thick-walled skeletal hyphae. Basidiocarps consist of two layers, a subiculum of mainly horizontal hyphae and a subhymenial trama of vertical hyphae. Gloeocystidia like vesicles present in the hymenium and the subhymenium, but rare in the subiculum. Basidia narrowly clavate, with 4-sterigmata, basidiospores narrowly ellipsoid or subcylindrical, about 5 x 2.5 µm, thin-walled, smooth, cyanophilous and non-amyloid. Cosmopolitan genus out of which two species occur in America.
Type species: *Thelephora murraii* Berk. & M. A. Curtis

Remarks. The whitish tuberculate, perennial basidiocarps make this a distinct genus in which especially the type species is easily recognized in the field. Microscopically, the dimitic hyphal system and the gloeocystidia form a unique combination.

Key to species

1. Basidiospores cylindrical, pointed hyphidia absent ..... **C. murraii**
1. Basidiospores ellipsoid, pointed hyphidia present ..... **C. australe**

Cystostereum australe Nakasone,
Mycotaxon 17:270, 1983.
Basidiocarp perennial, effused, resupinate or narrowly reflexed with a narrow pileus, up to12 cm long, 5 cm wide and 2.5 mm thick, woody hard, cracking when drying and with a black zone between the subiculum and the substrate. Upper side black and hard, hymenium smooth to tuberculate, light coloured, cream to ivory yellow, discolouring brown, and black with 2% KOH. Subiculum light brown and dense, margin abrupt often raised from the substrate when dry.
Hyphal system dimitic, consisting of thin-walled, richly ramified hyphae, 2-3.5 µm wide, provided with clamp connections, and sparse, thick-walled skeletal hyphae, 0.5 -1.5 µm wide, these mostly in the subicular layer, generative hyphae are densely agglutinated and separable only in very young basidiocarps. In the trama, generative hyphae are predominant, arranged vertically, and mixed with cystidia.
Gloeocystidia 25-40 x 9-15 µm, ventricose to clavate, hyaline numerous, rarely projecting and mostly embedded, slightly thick walled, and in the subhymenium with a yellowish content.
Hyphidia 15-35 x 1.5-5 µm, present in the hymenium, slender, more or less cylindrical, smooth, hyaline and tapering towards the apex.
Basidia 25-40 x 5 -7 µm, clavate, with 4 sterigmata and a basal clamp.
Basidiospores 5.5-6 x 3.5-4 µm, ellipsoid and often flattened adaxially, smooth, thin-walled, non-amyloid.
Substrata. On hardwoods.
Distribution. A rare species, known only from Florida and Georgia in the United States and Costa Rica.
Remarks. The species is most easily separated by its basidiospores. The few specimens recorded of *C. australe* may indicate that it has a more tropical distribution than *C. murraii*.

Cystostereum murraii (Berk. & M. A. Curtis) Pouzar, Fig. 33
loc. cit. *Thelephora murraii* Berk. & M. A. Curtis, Journ. Linn. Soc. London 10:329, 1869.
Basidiocarp perennial, effused, resupinate or reflexed, to partly pileate, variable in size but often very large (several dm) and may extend to 1 metre or more in length, about 1 mm thick, tough to ligneous, brittle when dry, abhymenial side black and hard (carbonaceous), uneven, often with concentric ridges, hymenium tuberculate, light coloured, mostly greyish white when young, darkening with age, smell characteristic, pleasantly aromatic, especially when fresh.
Hyphal system dimitic, consisting of thin-walled, richly ramifying hyphae, 2-3.5 μm wide, with clamp connections, and sparse, thick-walled skeletal hyphae, 1.5-3 μm wide, these mostly in the subicular layer. Generative hyphae are densely agglutinated and separable only in very young basidiocarps.
Hyphae are mostly arranged horizontally in the subiculum and vertically in the subhymenium. In old basidiocarps the context may be invaded by new hyphae, growing from the wood into the basidiocarp and thus changing the original structure.
Gloeocystidia 7-15 μm wide (rarely more) and 30-40 μm long, variable in shape but usually ovate to ellipsoid, common in the hymenium and very numerous in the subhymenial trama and subiculum, often somewhat longer and narrower in the subiculum.
In the very young basidiocarp they originate from the subiculum and extend into the hymenium, with new gloeocystidia developing in the hymenium as long as it increases in thickness. In thin sections they appear empty but are normally filled with oil droplets. In many specimens some of the gloeocystidia, especially, those in the hymenium, are filled with a homogeneous, yellow substance (dotted in the figure).
Basidia 25-30 x 5 μm, narrowly clavate with 4 sterigmata and a basal clamp.
Basidiospores 4.5-5.5 x 2.5-3 μm, narrowly ellipsoid to subcylindrical, smooth, thin-walled, non-amyloid, stained by cotton-blue (red in phase contrast).
Substrata. In America found on both hardwoods and conifers. In Europe almost exclusively on fallen trunks, stumps etc. of *Picea abies*.
Distribution. Widespread in Canada and United States and known also from Cuba from where it was described. In Europe a boreal-montane species known from the Central European mountains and Fennoscandia.
Remarks. The white colour, the tuberculate hymenial surface and the pleasant smell are usually sufficient for a field determination.

Fig. 33. *Cystostereum murraii* a) section through the basidiocarp, b) section through upper part of the basidiocarp, c) section through the hymenium, d) empty gloeocystidia, e) basidia, f) basidiospores, g) skeletal hyphae, h) generative hyphae. Eriksson & Strid 10477 (Sweden), Del. J. Eriksson.

CYTIDIA Quél.,
Fl. myc. France: 25, 1888.
Basidiocarps initially tuberculate and resupinate, then loosening at the margins becoming cupuliform, when fresh and hydrated the texture is coriaceous to somewhat gelatinous and pliable, when dry becoming hard and brittle, hymenium smooth, dark red to violaceous, upper side farinose and whitish. Hyphae 2-3 µm wide, violaceous blue in sulpho-vanillin, agglutinated by gelatinous interhyphal substances to a dense texture, all hyphae with clamps, ramifications mainly from the clamps. No cystidia. Dendrohyphidia present, densely interwoven and forming the surface of the hymenium, these light brown in KOH, violaceous blue in sulpho-vanillin. Basidia large, with 4 stout, curved sterigmata. Basidiospores large, allantoid, smooth, non-amyloid, non-cyanophilous.
Type species*: Thelephora salicina* Fr.
Remarks. The genus occupies an isolated position among the corticoid fungi. With regard to the basidia and basidiospores it resembles *Vuilleminia* but the cupulate basidiocarps make it distinct. It seems natural to restrict the genus to species with dendrohyphidia and thus, some species previously placed in the genus is here transferred to *Auriculariopsis*.

Key to species

1. Basidiocarp red to orange ..... **C. salicina**
1. Basidiocarps differently coloured 2
2. Basidiospores 8-10 x 6-6.5 µm ..... **C. pezizoidea**
2. Basidiospores 18-22 x 7-8 µm ..... **C. stereoides**

Cytidia pezizoidea (Pat.)Pat., Fig. 34
Essai Taxonomique p. 54, 1900. – *Corticium pezizoideum* Pat., Jour. de Bot. (Paris) 5:314, 1891.
Basidiocarp cupulate and centrally attached, 1-5 mm in diameter, upper surface pale brown, smooth or with a thin tomentum, where confluent basidiocarps may look meruloid, hymenial surface smooth.
Hyphal system monomitic, hyphae 3-4 µm wide, with clamps at all septa
Cystidia absent.
Dendrohyphidia present.
Basidia 40-80 x 4-10 µm undulating, hyaline and with 4 sterigmata.
Basidiospores 8-10 x 6-6.5 µm, ellipsoid, hyaline to faintly coloured and smooth.
Substrata. On different hard wood trees.
Distribution. Louisiana in United States and Panama.
Remarks. The small basidiospores make his to a distinct species in the genus.

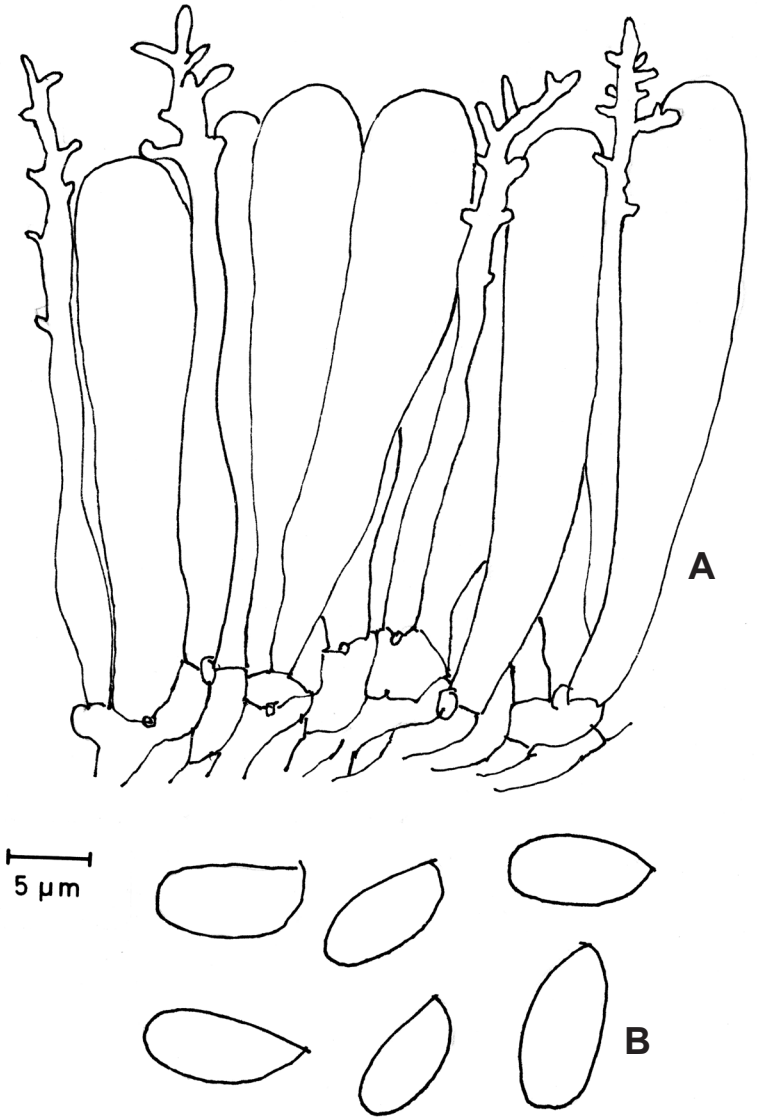


Fig. 34. *Cytidia pezizoidea* A) hymenium with dendrohyphidia, B) basidiospores. USA, Welden, NY Bot. Gard. 0046 1432.

Cytidia salicina (Fr.) Burt, Fig. 35
Ann. Miss. Bot. Gard. 11:10, 1924. - *Thelephora salicina* Fr., Syst. mycol. 1:442, 1821.
Basidiocarp initially stereoid and resupinate, then loosening along the margin and becoming cupulate with a central point of attachment (and then resembling a discomycete), about 1 cm wide but often confluent, forming larger, irregular basidiocarps, with a soft and pliable, coriaceous to subgelatinous consistency when fresh, becoming corneous, hard and brittle when dry, hymenium smooth, or somewhat tuberculate, orange red when young, becoming dark red to violaceous red, at first glabrous, then pruinose when fertile, from projecting basidia and basidiospores, outer side covered by microscopic crystals, whitish, farinose or finely floccose; margin more or less revolute.
Hyphal system monomitic, hyphae 2-3 μm wide, with thin to slightly thickened walls, mostly straight, with clamps at all septa, strongly agglutinated by gelatinous interhyphal substances, making the basidiocarp semitranslucent. All hyphae, but especially those in the hymenium and close to the upper side, are conspicuously stained blue or violaceous blue in sulpho-vaniline. Hyphal structure dense and interwoven, the hyphae mainly parallel to the substrate except for those in the subhymenium, which bend into the hymenium.
Cystidia none.
Dendrohyphidia numerous, richly branched, forming a dense layer on the hymenial surface, best seen in young basidiocarps, which remain sterile for a long while, and in which the hymenial surface consists only of dendrohyphidia which microscopically are light yellowish brown but are certainly the main cause of the red colour of the basidiocarp.
Separate dendrohyphidia are not easily observed. Normal hyphae then swell conspicuously, while dendrohyphidia remain unchanged.
Basidia up to 50 μm long, clavate, slightly sinuous and with 4 large sterigmata.
Basidiospores 12-18 x 4-5 μm, large, allantoid and smooth.
Substrata. *C. salicina* has a preference for *Salix* and *Populus* ssp. on which it grows almost exclusively on dry, attached twigs and branches. It is however, occasionally found on other hosts such as *Alnus* and *Betula*.
Distribution. Widespread throughout Canada and northern part of United States. Circumglobal in the northern hemisphere.
Remarks. The orange red colour when fresh slightly darkened when dry and old besides the hosts will be sufficient for a field determination.

Fig. 35. *Cytidia salicina* a) section through the basidiocarp, b) section through the hymenium, c) section through upper part of basidiocarp, d) basidium, e) basidiospores. S. Eriksson, Sweden. Del. John Eriksson.

Cystidia stereoides W. B. Cooke,
Mycologia 43:2006, 1951.
Basidiocarp resupinate to cupulate with a slightly lifted 1-3 mm wide margin, 0.2-1 cm in diameter, often confluent to seemingly more compound structures, individual basidiocarps up to 0.5 mm thick, coriaceous to subgelatinous consistency when fresh, becoming corneous, hard and brittle when dry, upper surface covered with a fine whitish tomentum consisting of thick-walled hyphae in bundles, hymenial surface smooth, pink to rose when fresh becoming darker when dry, in section with a brown hymenium about 100 µm deep over a whitish context of same thickness being agglutinated .
Hyphal system monomitic, hyphae 3-4.5 µm wide with clamps at all septa, arranged more or less vertical above the hymenium, thick walled, strongly agglutinated by gelatinous interhyphal substances.
Cystidia absent.
Dendrohyphidia 40-150 x 5-11 µm, hyaline and branched from the clamped septa.
Basidia 40-55 x 7 - 15 µm, clavate with 4 large sterigmata.
Basidiospores 18-22 x 7-8 µm, allantoid, hyaline and smooth.
Substrata. On fallen branches of different hard wood trees.
Distribution. Known only from Mount Shasta in California from where it was described.
Remarks. The pink colour, the dendrohyphidia and the large allantoid basidiospores characterize this species.

DENDROPHORA (Parm.) Chamuris,
Mycotaxon 28:543, 1987. - *Peniophora* Cooke subgen. *Dendrophora* Parm. Consp. syst. Cort. p. 131, 1968.
Basidiocarp resupinate, rarely effused-reflexed, tough, adnate but loosening along the margin with age, hymenophore tuberculate (or less often smooth), grey to dark brown. Hyphal system dimitic; generative hyphae with clamps, skeleto-ligative hyphae thick-walled, yellow to pale brown, indextrinoid, dominating in the subiculum and branching to form skeleto-dendrohyphidia in the subhymenium. Metuloid cystidia usually numerous, hyaline or basally pale brown. Gloeocystidia present or absent, positive in sulpho-vaniline. Basidia with four sterigmata and a basal clamp. Basidiospores cylindrical to allantoid, inamyloid, indextrinoid and acyanophilous. Spore print pink (at least in the type).
Type species: *Stereum versiforme* Berk. & A. W. Curtis.
Remarks. Superficially reminiscent of *Porostereum*, but easily recognized microscopically by the numerous skeleto-dendrohyphidia and gloeocystidia with a positive reaction in sulpho-vaniline.

Key to species

1. Basidiospores 7-11 x 3-4 µm ..... **D. albobadia**
1. Basidiospores 5-8 x 1.5-2 um ..... **D. versiforme**

Dendrophora albobadia (Schw.:Fr.) Chamuris,
Mycotaxon 28:544, 1987. - *Stereum albobadium* (Schw.:Fr.) Fr. Epicris. Syst Mycol. P. 551, 1838.
Basidiocarps annual, resupinate to effused-reflexed, young specimens often slightly umbonate with a distinct central point from where the basidiocarp starts to develop, separable from the substrate, coriaceous when fresh, brittle when dry, reflexed part (when present) up to 5 mm wide, elongated along the substrate, undulate to applanate and curling when dry; upper surface adpressed velutinate to finely tomentose and light to dark brown, margin narrow, adnate, white to cream, hymenial surface smooth to even, or slightly tuberculate, finely pruinose with projecting cystidia, often with differently coloured zones, the innermost greyish brown, becoming darker with age whilst the outer zones are paler than the innermost ones, subiculum thin and pale brown. In old specimens there may be two to three distinct layers of old hymenium.
Hyphal system monomitic; generative hyphae 2-5 µm wide, with clamp connections, hyaline to brown, thin- to thick-walled, branched, in the subiculum resembling skeletal hyphae, but scattered clamp connections are present, in the hymenium vertically arranged, often distinctly zonate and agglutinated in a layer, which may be up to 600 µm thick.
Cystidia 30-50 x 8-15 um, partly in the hymenium and then initially smooth and thin-walled, with age becoming thick-walled, heavily encrusted to distinctly metuloid, and projecting up to 30 um above the hymenium. In old areas of hymenium completely embedded, hyaline to slightly tinted, very thick-walled and strongly encrusted.
Dendrohyphidia very abundant, markedly arboriform, thick-walled and dark brown or slightly paler towards the base. Embedded dendrohyphidia absent.
Basidia 30-40 x 4-6 um, clavate, with 4-sterigmata, and a basal clamp.
Basidiospores 7-11 x 3-4 µm, allantoid, hyaline, smooth, non-amyloid.
Habitat. On dead hardwoods, often on dead, still attached, branches.
Distribution. Widespread in Eastern and central North America. Known also from Japan.
Remarks. May easily be taken for an old basidiome of *Stereum* in the field due to the dark brown colour, but microscopically, the coloured, thick-walled dendrohyphidia and metuloid cystidia should be sufficient for a diagnosis.

Dendrophora versiformis (Berk. & A. W. Curtis) Chamuris,
Mycotaxon 28:544, 1987. - *Stereum versiforme* Berk. & Curt. Grevillea 1:164, 1873. – *Stereum erumpens* Burt, Ann. Missouri Bot. Garden 7:209, 1920.
Basidiocarps annual, resupinate to effused-reflexed, young specimens often slightly umbonate with a distinct central point from where the basidiocarp starts to develop, separable from the substrate, coriaceous when fresh. brittle when dry, the reflexed part (when present) up to 5 mm wide, elongated along the substrate, undulate to applanate; upper surface adpressed velutinate to finely tomentose and dark brown, margin narrow, adnate, cream to pale brown, rarely white. Hymenial surface smooth to even or slightly tuberculate, often cracking when old and dry in mature specimens, thickly matted by projecting cystidia, dark brown becoming more grey in old and dead specimens, subiculum thin and pale brown.
Hyphal system monomitic; generative hyphae 2-6(8) um wide, with clamp connections, hyaline to brown, thin- to thick-walled, branched, in the subiculum resembling skeletal hyphae, but scattered clamp connections are present, in the hymenium vertically arranged, often distinctly zonate and agglutinated in a layer, up to 600 um thick.
Cystidia 30-50 x 8-15 um, partly in the hymenium and then initially smooth and thin-walled, with age becoming thick-walled and heavily encrusted to distinctly metuloid, projecting up to 30 um above the hymenium. In old areas of hymenium completely embedded, hyaline to slightly tinted, very thick-walled and strongly encrusted,
Dendrohyphidia very abundant, markedly arboriform, thick-walled and dark brown or slightly paler towards the base. Old embedded dendrohyphidia usually present and, with their dark brown tips, clearly indicate seasonal growth zones in the old hymenial layers.
Basidia 30-40 x 4-6 um, clavate, with 4-sterigmata, and a basal clamp.
Basidiospores 5-8 x 1.5-2 um, allantoid, hyaline, smooth, non-amyloid.
Habitat. On dead hardwoods, often on dead, still attached, branches.
Distribution. Widespread in North America. Known also from Japan.
Remarks. Separated from *D. albobadia* by the smaller and more narrow basidiospores.

DICHOPLEUROPUS D. A. Reid,
Beiheft Nova Hedwigia 18:329, 1965
Basidiocarps, terrestrial, coriaceous, spatulate to flabelliform, upper surface glabrous to rugulose. Hymenial surface smooth. Stipe lateral, widened towards the pileus. Hyphal system dimitic, generative hyphae hyaline to pale yellow, with simple septate; binding hyphae present, these dichotomously branched, thick-

walled and yellowish brown, densely agglutinated on the pileus. Gloeocystidia present. Basidiospores smooth, hyaline, ellipsoid to subglobose and amyloid.
Type species: *Dichopleuropus spathulatus*. D. A. Reid.
Remarks. The genus is characterized by the dichotomously branched binding hyphae present both in the hymenium and on the pileus.

Dichopleuropus spathulatus D. A. Reid,
Beiheft Nova Hedwigia 1:330, 1965.
Basidiocarps stipitate, 3 -15 cm, high and 2-7 cm wide, solitary, pleuropodal, narrowly spatulate or flabelliform, upper surface glabrous, radiately rugulose, pale dirty yellow to ochraceous with a distinct blunt white margin, hymenial surface smooth, white, becoming cream on drying, often decurrent, stipe to 3 cm long and 3 mm in diameter, whitish to ochraceous, gradually expanding towards the pileus, slightly tomentose towards the base and point of attachment, context 2-3 mm thick at base, ochraceous and zoned with narrow dark lines.
Hyphal system dimitic, generative hyphae 2-5 µm wide, with simple septa; binding hyphae yellowish brown, with apical parts initially hyaline, thick-walled, dichotomously branched and dextrinoid, both in the hymenium and on the pileus. Some hyphae appear to be irregularly developed as one of the side branches becomes stunted and shorter than the other.
Cystidia gloeocystidia, to 250 µm x 6-10 µm, only slightly projecting above the basidia, undulating and with a rounded to pointed apex, filled with yellowish, irregular, and often rod-shaped bodies, often with a slightly thickened wall in the basal parts.
Basidia 54-78 x 7-11 µm, clavate, with 4 sterigmata.
Basidiospores 6-9 x 6.5-7.5µm, globose to subglobose, smooth, hyaline and amyloid (although only faintly so in the known collections).
Substrata. Terrestrial.
Distribution. Known from South America (Brazil) and the southern United States (Florida).
Remarks. Easily recognised due to the combination of coloured, dextrinoid and dichotomously branched binding hyphae and subglobose, amyloid basidiospores.

HJORTSTAMIA Boidin & Gilles,
Bull. Soc. Mycol. Fr. 118:99, 2002.
Basidiocarps resupinate, effused-reflexed to distinctly pileate, broadly attached to dimidiate or fanshaped, upper surface tomentose to felty, often zonate, greyish to deep brown; hymenium smooth to tuberculate, smooth to cracked with age, ochraceous, greyish to pinkish or dark brown; hyphal system di- or trimitic, generative hyphae with simple septa; skeletal hyphae (when present) pale to

dark brown; pseudocystidia present or absent, pale brown, encrusted or smooth, hymenial cystidia mostly metuloid, hyaline to brown; basidia narrowly clavate with 4 sterigmata; spores cylindrical to ellipsoid, smooth, hyaline, acyanophilous and non-amyloid.
Tropical to warm temperate zones. Causing a white rot in hardwoods,
Type species: *Thelephora friesii* Lév.
Remarks. Reminiscent of *Porostereum* but separated from it by simple septate generative hyphae.

Key to species

1. Basidiome distinctly pileate, sessile to fanshaped, hymenium beige to pinkish brown, hymenial cystidia ventricose, pseudocystidia absent ..... **H. papyrina**
1. Basidiome effused-reflexed, hymenium dark gray to dark vinaceous brown, or lilaceous to purplish, hymenial cystidia subulate, skeletocystidia usually abundant 2

2. Hymenium lilaceous, metuloid cystidia brown to dark brown ... **H amethystea**
2. Hymenium brown or dark violet, metuloid cystidia almost hyaline to pale brown 3

3. Brown dendroid binding hyphae present ..... **H. mexicana**
3. Brown dendroid binding hyphae absent 4

4. Basidiocarp resupinate, skeletal hyphae absent, known only on bamboo .....**H. novo-granata**
4. Basidiocarps effused-reflexed, skeletal hyphae present, widespread species .....**H. crassa**

Hjortstamia amethystea (Hjortstam & Ryvarden) Boidin & Gilles, Fig. 36
Bull. Soc. Mycol. Fr. 118:99, 2002. - *Porostereum amethysteum* Hjortstam & Ryvarden. Synopsis Fung. 4: 27,1989.
Basidiome resupinate, more rarely with the margin reflexed, membranous, flexible, 0.5-1.0 mm thick. Hymenium smooth to slightly undulating, violet to purplish brown, somewhat cracked and then exposing a brown subiculum.
Hyphal system dimitic, generative hyphae 3-4 µm wide, thin-walled, hyaline to subhyaline and with simple septa; skeletal hyphae present but few, mostly as skeletocystidia, about 4 µm wide, pale yellow brown.
Cystidia 50-70 x 8-10 µm, abundant, a mixture of metuloid cystidia, these brown, thick-walled, and projecting up to 40 µm above the hymenium, and skeletocystidia these fusoid to cuspidate and apically encrusted.

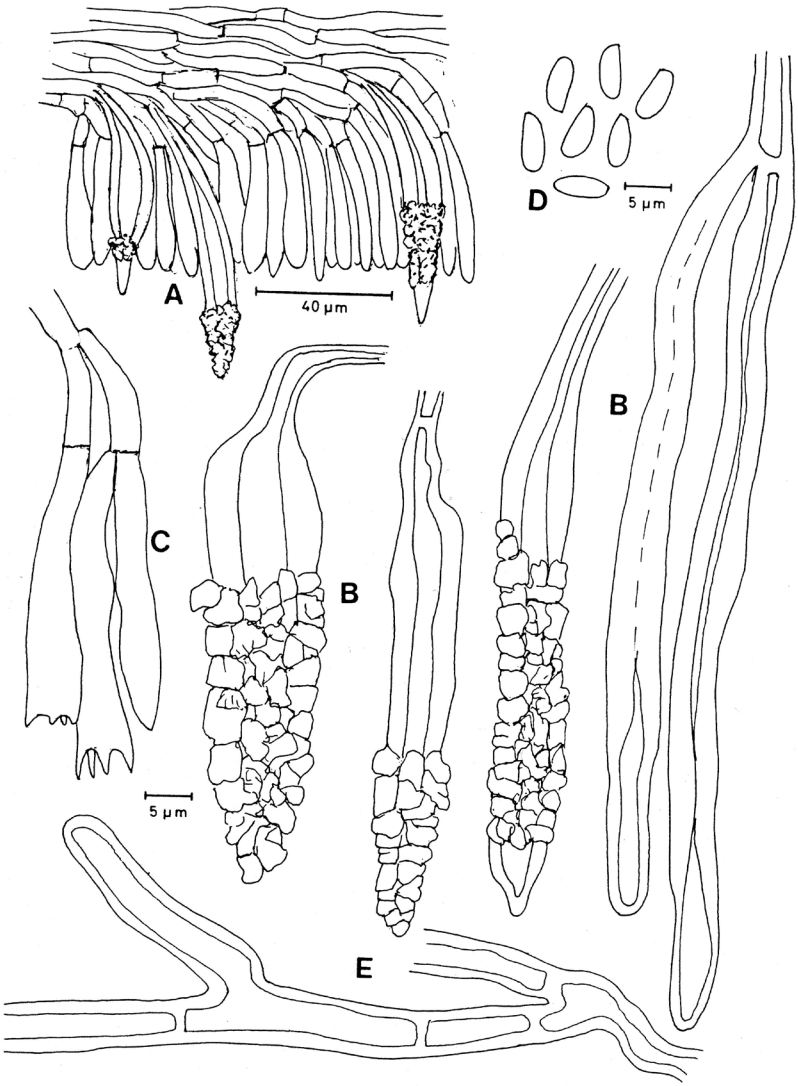


Fig. 36. *Hjortstamia amethystea*, A) part of hymenium, B) encrusted and smooth cystidia, C) basidia, D) basidiospores, E) generative hyphae, brazil, Ryvarden 24433.

Basidia 30-35 x 5-6 µm, clavate, in a relatively dense palisade, with 4 sterigmata and a simple septate base.
Spores 5-6 x 3-3.5 µm, hyaline, ellipsoid, smooth and thin-walled.
Substrate. On dead hardwood.
Distribution. South America. Known only from locations in Brazil (Sao Paulo, Campinas, Mogi Guacu, and the type locality, Fazenda Campininha).
Remarks. Closely related to *H. crassa*, but with darker metuloid cystidia and a distinctly purplish hymenium.

Hjortstamia crassa (Lév.) Boidin & Gilles, Fig. 36
Bull. Soc. Mycol. Fr. 118:99, 2002. - *Thelephora crassa* Lév. Ann. Sci. nat. Bot. Ser. 3 2:209, 1844. -
Porostereum crassum (Lev.) Hjortstam & Ryvarden Synopsis Fung. 4:29, 1989.
Basidiocarp annual, effused-reflexed with a narrow upper portion, rarely about 1 cm wide, 1 mm thick at the base, coriaceous and flexible, upper surface ochraceous, grey or pale brown, felty to adpressed tomentose but without a dark zone in section, slightly zonate, smooth to sulcate in narrow bands, hymenium smooth to undulating, pale brown, pinkish brown, bright purple to almost dark violet, with age becoming cracked and exposing a paler (beige) context. Context thin and loosely interwoven, intergrading with the upper tomentum.
Hyphal system dimitic; generative hyphae 3-7 µm wide, hyaline**,** thin to distinctly thick-walled, with simple septa, freely branched in the subhymenium, slightly less branched in context; skeletal hyphae 4-10 µm wide, thick-walled to solid, pale yellow, rare in the context and tomentum.
Cystidia 30-60 x 4-8 µm, mostly metuloid, almost hyaline to pale brown, weakly developed in young material, abundant in mature specimens, acute with a tapering apex, when young more or less smooth, when mature, encrusted at least in the upper part, and, in mature specimens, the horizontal base may also be encrusted. Smooth or encrusted cystidia 50-120 x 8-20 µm, may also be found embedded in the context.
Basidia 25-35 x 4-6 µm, clavate, with 4 sterigmata, and a simple septum at the base.
Basidiospores 5.5 -7.5 x 3-4 µm, ellipsoid to subcylindrical and hyaline.
Substrate. On dead hardwoods.
Distribution. Pantropical and seemingly rather common. Known from eastern Australia, south-east Asia north to Japan, tropical Africa and both North and South America.
Remarks. Recognized by the pale brown cystidia making the hymenium pinkish-brown to dark brown and the oblong subcylindrical spores. The colour of the hymenium is very variable and young specimens even if fertile, have a

Fig. 37. *Hjortstamia crassa* A) part of hymenium, B) skeletocystidia, C) basidia, D) basidiospores, E) generative hyphae. Argentina, Ryvarden 15653.

beige colour with weakly developed cystidia. Skeletal hyphae in such specimens often penetrate into the hymenium, but are hyaline, as the brown colour and encrustation apparently develop later. Basidiocarps have a tendency to be effused-reflexed and not sessile fanshaped as is often seen in the closely related *H. papyrina*, which has cystidia ventricose, and shorter, more ellipsoid spores.

Hjortstamia mexicana (A. L. Welden) Boidin & Gilles, Fig. 38
Bull. Soc. Mycol. Fr. 118:99, 2002. - *Lopharia mexicana* A. L. Welden, Tulane Stud. Zool. & Bot. 17:19, 1971. - *Porostereum mexicanum* (A. L. Welden) Hjortstam. & Ryvarden, Synopsis Fung. 4: 39, 1989.
Basidiome effused-reflexed, spongy, separable from the substrate, up to 6 cm in diameter in the type, upper surface dark brown, adpressed tomentose to cottony, sulcate. Hymenium smooth to slightly tuberculate, dark snuff brown along the margin, dark reddish brown in fertile areas, finely cracked when dry. Margin rounded and obtuse, context dark brown and cottony, up to 1 mm thick.
Hyphal system dimitic, generative hyphae 4-10 µm wide, hyaline to slightly tinted, freely branched often at wide angles, simple septate, thin-walled in the subhymenium, distinctly thick-walled in the context, and with transitions from one type to another; binding hyphae arboriform to dendroid, brown, dichotomously branched from a long unbranched lower section, thick-walled to solid, up to 10 µm wide in KOH, narrower in Melzer's reagent.
Cystidia absent. However, pointed ends of the binding hyphae may protrude into the subhymenium and thus simulate cystidia.
Basidia 30-35 x5-7 µm, clavate, with 4 sterigmata, and a simple septum at the base.
Spores 6.5-8.5 x 3.5 - 5 µm (teste Welden) (The type is sterile).
ellipsoid, thin-walled, hyaline.
Substrate. Presumably deciduous wood.
Distribution. Known only from higher elevations in Mexico.
Remarks. Unique in the genus with its brown dendroid binding hyphae. The lower segments of these are often long and unbranched and may, as broken segments, easily be taken as skeletal hyphae. They are similar to those observed in many *Ganoderma* or *Amauroderma* spp. where they are called arboriform skeletal hyphae.

Fig. 38 *Hjortstamia mexicana* A) part of hymenium, B) generative hyphae, C) skeletal hyphae, Mexico, Liebman, lectotype.

Hjortstamia novae-granata (Welden) Hjortstam & Ryvarden, Fig. 39
Synopsis Fung. 25:19, 2008. - *Lopharia nova-granata* Welden Mycologia 67:540, 1975. - *Porostereum nova-granatum* (Welden) Hjortstam & Ryvarden, Synopsis Fung. 4:41, 1989.
Basidiome rather small, effused, resupinate, orbicular in parts, with a raised margin, separable from the substrate. Hymenium in the type almost smooth along the margin and probably smooth when young and fresh but cracked in the central part when mature, first dark beige, becoming brown and finally blackish (and then strongly cracked). Margin distinct, rounded and curled in the type, floccose and ochraceous to dirty brown. Subhymenium and context ochraceous and often exposed in cracks, floccose to cottony and up to 1 mm thick,
Hyphal system monomitic; generative hyphae 3-8 µm wide, hyaline, with simple septa, thin-walled and branched at wide angles in the subhymenium, thick-walled and sparingly branched in the context, sometimes very thick-walled and then simulating skeletal hyphae, but branching and septation clearly show them to be thickened generative hyphae.
Cystidia present, as scarce, hymenial cystidia up to 50 µm long, and skeletocystidia up to 120 µm long, 5-12 µm wide, pale brown, acute to obtuse, smooth, solid to thick-walled at the base, deeply embedded, mainly in the sub-hymenium and old hymenium, and with transitions between the two types as is so common in many species of *Hjortstamia*.
Basidia 22-25 x 5-7 µm, clavate, with 4 sterigmata, and a simple septum at the base.
Spores 5.5-7 x 3-4 µm, subcylindrical, smooth, hyaline, thin-walled.
Substrate. Known only from bamboo.
Distribution. Known only from the type locality in Colombia.
Remarks. Welden, op. cit. cited the cystidia as skeletal hyphae while we prefer to call them hymenial and skeletocystidia respectively. The latter are rather short and rarely bend horizontally into the context and are elongated into what may be interpreted as skeletal hyphae.
The species is clearly related to *H. crassa* which differs in having true skeletal hyphae in the context and projecting, encrusted and normally more numerous skeletocystidia. The floccose and light context in the type of *H. nova-granata*, so conspicuously exposed in old and cracked parts of the hymenium, is normally not as prominent in *H. crassa* although in the latter species some cracking does occur with age and drying. More collections are needed before the status of this taxon can be fully evaluated

Fig 39., *Hjortstamia nova-granata* A) part of hymenium, B) basidia, C) cystidia, D) generative hyphae, E) basidiospores. Colombia, holotype, leg. A. Welden.

Hjortstamia papyrina (Mont.) Boidin & Gilles, Fig. 40
Bull. Soc. Mycol. Fr. 118:99, 2002. - *Stereum papyrinum* Mont. in de la Sagra (ed.) Hist. Cuba Pl. Cellul. p. 374, 1845. - *Porostereum papyrinum* (Mont.) Hjortstam. & Ryvarden, Synopsis Fung. 4:45, 1989.
Basidiome effused-reflexed to pileate, umbonate, fanshaped to dimidiate or broadly sessile, flexible and pliable, flat to undulating and wavy, margin entire to lobed or incised, often adjacent basidiomes become fused to form more compound structures, upper surface of pileus felty tomentose to scrupose, sulcately zoned, pale to dark brown, becoming more greyish in weathered specimens. Hymenium concentrically zoned, radially tuberculate to slightly folded, beige in fertile specimens, more brown in dry and sterile ones, margin pale brown in sterile parts, context snuff to umber brown and without a cuticle towards the upper tomentum.
Hyphal system dimitic, generative hyphae 2-5 µm wide, hyaline to very pale yellow, thin to thick-walled and sparingly branched, with simple septa; skeletal hyphae 4-8 µm wide, up to 350 µm, hyaline to yellowish, solid to thick-walled, lacking septa, unbranched, running parallel to the substrate, some with small swellings apically and partly incalary.
Cystidia 30-80 x 6-15 µm, metuloid, apically encrusted and thick-walled, ventricose to clavate, pale brown, arising from generative hyphae, present in the hymenium.
Basidia 20-35 x 4-6 µm, thin-walled, clavate, with 4 sterigmata.
Spores 5-6 x 3.5-4 µm, ellipsoid, thin-walled, hyaline.
Substrate. Hardwoods of different kinds.
Distribution. Tropical America from Florida to southern Brazil, seemingly rather common.
Remarks. The distribution, the beige colour of the hymenium and the felty to tomentose brown zoned pileus characterize this species. It is common to find sterile specimens. Microscopically the pale brown metuloids and the skeletal hyphae are distinctive. *H. crassa* has much slender cystidia, longer spores and usually a darker brown colour.

Fig. 40. *Hjortstamia papyrina* A) section of basidiocarp, B) part of hymenium C) cystidia, D) basidiospores, e) generative hyphae, F) skeletal hyphae. Peru, leg. Hormia (NY).

INFLATOSTEREUM D. A. Reid,.
Beiheft Nova Hedwigia 18:143, 1965.
Basidiocarps stipitate, flabellate to spatulate, upper surface glabrous, usually rugulose to slightly radially folded, hymenial surface smooth, hyphal structure dimitic, generative hyphae with clamp connections, thin to slightly thick-walled, skeletal hyphae thick-walled, narrow to wide, cystidia and gloeocystidia absent, basidia 4-spored, hyaline, clavate, basidiospores smooth, hyaline, thin-walled, non-amyloid, elliptical. Tropical genus with only one species in America.
Type species: *Thelephora glabra* Lev.
Remarks. The genus is characterized by the strongly inflated generative hyphae. Close to *Stereopsis*, but separated from it by the peculiar hyphae and a dimitic hyphal system.

Inflatostereum glabrum (Lev.) D. A. Reid,
Beiheft Nova Hedwigia 18:144, 1965. - *Thelephora glabra* Lev., Ann. Sci. Nat. Ser. 3, 5:147, 1846. - *Stereum fissum* Berk., Hooker J. Bot. 8:273: 1856. - *Stereum partitum* Berk. & Broome, J. Linn. Soc. (Bot.) 14:65, 1873. - *Guepinia flabellata* Cooke, Grevillea 13:3, 1884. - *Stereum huberianum* P. Henn., Hedwigia 41:15, 1902.
Basidiocarps up to 7 cm long, and 5.5 cm. wide, discrete, coriaceous, spathulate or flabelliform, pileus often split radially, glabrous, tawny or rarely pale brown, often conspicuously radially wrinkled, but sometimes dark chestnut-brown and translucent. Hymenial surface smooth and ochraceous, stipe lateral, very short or rudimentary, attached to the substrate by a thin, closely adpressed, creamy-ochre coloured mycelial disc.
Hyphal system monomitic throughout most of the basidiocarp but dimitic in the basal region, including the stipe, generative hyphae 2-5 µm wide, with clamp connections, and thin or slightly thickened walls, some with conspicuously inflated segments, to 28 um wide and with walls to 3 µm thick, these present throughout the context but most abundant immediately above the hymenium, and occasionally filled with yellowish-brown contents, skeletal hyphae 2-4 µm wide, present in stipe and basal parts.
Cystidia and **Gloeocystidia** absent.
Basidia 35-44 x 4-7 µm, clavate, with 4 sterigmata, often with a single oil globule or a number of smaller drops.
Basidiospores (5-) 6.5-8 x (3 -) 4 - 4.5 µm, elliptic, smooth, hyaline, non-amyloid, and with a distinct oil drop.
Substrata. Usually on twigs and small branches, but sometimes on stumps.
Distribution. South America. Known from Brazil, Guiana and Costa Rica.

Remarks. The inflated hyphae are diagnostic. Whether this is sufficient to warrant a specific genus, separated from *Stereopsis,* has to be solved with DNA sequencing.

LAURILIA Pouzar,
Ceská mykol. 13 p. 14, 1959.
Basidiocarps perennial, leathery or ligneous, resupinate, effused and confluent, or partly pileate, especially on vertical substrate, upper side of young specimens consists of a brown tinder-like layer, in old specimens almost black and hard. The trama consists of two layers, an upper tinder-like layer, and the true trama which corresponds to a subiculum. The two layers are separated by a thin, hard, resinous, layer, visible as a dark line in section. Hymenium light-coloured, more or less tuberculate, not hydnoid; texture dense and hard. Hyphal system trimitic, comprised of skeletal and binding hyphae with thick walls and few clamp connections, and thin-walled, generative hyphae, with clamp connections; tinder-layer mainly dimitic, composed largely of horizontal, brown, thick-walled skeletal hyphae; subiculum trimitic, composed of horizontal, light-coloured skeletal hyphae, numerous binding hyphae and some generative hyphae; subhymenium stratified and much thickened, trimitic, hard and tough as are all other parts of the basidiocarp; metuloid cystidia numerous, thick-walled, encrusted; basidia clavate, with 4 sterigmata and a basal clamp; spores globose, somewhat thick-walled, echinulate, amyloid.
Type species: *Stereum sulcatum* Burt.
Remarks. The type species differs from other stereoid species with a smooth hymenium in having a trimitic hyphal system, thus referred to the family Echinodontiaceae with which it has several characters in common.

Laurilia sulcata (Burt) Pouzar, Fig 41-42
Ceská mycol. 13 p. 14, 1959. - *Stereum sulcatum* Burt in Peck, N.Y. St. Mus. Ann. Rep. 54 p. 154, 1901.
Basidiocarps resupinate or partly pileate, perennial, leathery or when old, partly ligneous, first orbiculate, then confluent with age, and often reaching several dm²; upper side, especially in young specimens, often covered with a brown tomentum, 1-5 mm thick. In old specimens this is mostly dark brown to blackish, often with concentric furrows and ridges, resulting from the peripheral growth of the fungus, basidiocarp stratified in section, with an upper tinder-layer, then a thin, hard, resinous layer visible as a dark line, then a subicular trama which is light-coloured like the subicular layer. In old basidiocarps the 'tinder' may be worn off or filled with resinous substances into a single hard stratum, hymenium in young specimens smooth, then tuberculate or concentrically sulcate, light yellowish with a tint of

salmon-pink, when old (especially in herbarium material) pale ochraceous. 5% KOH on the hymenium gives an orange colour and the fresh trama turns reddish when bruised, margins of young basidiocarps white, finely fibrillose, then more glabrous, smooth or somewhat thickened, in old specimens formed of parallel ridges, this the result of a receding hymenium leaving a new, annual, sterile zone, in a similar manner as seen in some polypores (such as *Fomitopsis rosea* and *Phellinus nigrolimitatus*).

Hyphal system trimitic, consisting of straight, thick-walled skeletal hyphae, 2.5-4 um wide, with sparse septa, richly branched, thick-walled binding hyphae, 2-3 um wide, and thin-walled, richly branched generative hyphae 2-3 um wide, with clamp connections and some adventitious septa.

The upper tomentum consists mainly of brown skeletal hyphae, the subiculum of hyaline or pale yellowish, thick-walled, horizontal skeletal hyphae with numerous binding hyphae between them, as well as (at least in young specimens) a few generative hyphae; subhymenium comprised of vertical skeletal, irregular binding, and generative hyphae, cystidia and old, shrunken basidia.

Cystidia 40-65 x 8-10 um, abundant, thick-walled, apically conical, with an encrusted area 20-30 um long, yellowish or pale ochraceous in the proximal part, somewhat pigmented in the basal part, tapering to the bearing hyphae.

Basidia 25-35 x 4-5 um, clavate, with 4 sterigmata and a basal clamp.

Basidiospores 5.5-6.5 x 5 um, globose or subglobose, echinulate, amyloid, with somewhat thickened walls.

Substrata. On fallen wood of conifers.

Distribution. Canada and Central and Eastern United States. Described from Cuba. Widespread in the boreal coniferous zone, but in Europe with a more restricted distribution and there known only from *Picea abies*.

Remarks. *Laurilia sulcata* is one of the most characteristic stereoid fungi and cannot be mistaken for any other species.

Fig. 41. *Laurilia sulcata* a) schematic section through basidiocarp, b) section of basidiocarp next to substrate, c) section through resinous layer in the basidiocarp, d) basidia, e) basidiospores. J. Eriksson 9373, Sweden, del. J. Eriksson.

Fig. 42 *Laurilia sulcata*, a) section through basidiocarp, b) binding hyphae, c) skeletal hyphae, J. Eriksson 9373, Sweden, del. J. Eriksson.

Laxitextum Lentz.
U.S. Dept. Agric., Monogr. 24, p. 18, 1955.
Basidiocarps resupinate or subpileate, rather soft and pliable, pileus brown, tomentose or when older with adpressed hyphal hairs, sometimes slightly zonate; hymenium white in fresh specimens; margin finely fibrillose in the resupinate state, smooth or somewhat tomentose in pileate ones; hyphal system monomitic; hyphae thin-walled, smooth cystidia; basidia clavate with 4 sterigmata and a basal clamp; spores globose - subglobose, echinulate, amyloid.
Type species: *Laxitextum bicolor* (Fr.) Lentz.
Remarks. A well characterized genus with stereoid basidiocarps, brown trama and white or light-colored subhymenial layer, amyloid and echinulate spores and enclosed gloeocystidia and projecting cystidia.

Key to species

1. Basidiocarp pileate with brown pileus subicular hyphae smooth ..... **L. bicolor**
1. Basidiocarp resupinate, subicular hyphae encrusted ..... **L. incrustans**

Laxitextum bicolor (Fr.) Lentz, Fig 43
loc. cit. - *Thelephora bicolor* Pers. : Fr., Syst. mycol. I: 438, 1821. - *Thelephora bicolor* Pers., Syn. meth. fung. p. 568, 1801; Myc. Eur. I: 122, 1822.
Basidiocarp resupinate to reflexed, pileus brown, in young specimens finely tomentose, in old specimens with more adpressed hyphal hairs, often subzonate and radially striate; hymenium in young fresh basidiocarps pure white, darkening slightly to cream and with age to pale brownish, smooth and glabrous, when dried more or less cracked, in section about 1 mm thick, the upper part of the trama (i.e. the subiculum of resupinate specimens) brown, with the subhymenial part whitish; margin white and finely fibrillose in young specimens.
Hyphal system monomitic; tramal hyphae 2.5-4 µm wide, with thin or somewhat thickened walls, light brown; subhymenial hyphae thin-walled, partly collapsed in old basidiocarps to form a hyphal net with irregular meshes, this penetrated by very thin-walled, plasma filled generative hyphae, 1-3 µm wide.
Gloeocystidia 40-100 x 5-10 µm, when young fusiform to subulate, often with a moniliform apical appendix, more or less projecting; in old specimens tubiform, mostly obtuse. All cystidia filled with a yellowish oily substance, in dried material this generally coalesced and filling the cystidium evenly, dissolving in Melzer's reagent.
Basidia 20-30 x 3.5-5 µm, narrowly clavate, with 4 sterigmata and a basal clamp.
Basidiospores 4.5-5 x 2.5 µm, oblong-ellipsoid, thin-walled, finely echinulate and amyloid.

Hel side
Fig. 43. *Laxitextum bicolor* a (schematic section through basidiocarp, b) part of subiculum with brown hyphae, c) section through hymenium d) basidiospores, e) basidia, f) gloeocystidia with moniliform apex, g) obtuse gloeocystidium. Hallingbäck & Eriksson 9318, Sweden, del. J. Eriksson.

Substrata. On hardwoods of all kinds.
Distribution. Widespread in North America and circumglobal in the temperate boreal zone
Remarks. Easily recognized macroscopically, due to the brown and white colour and soft consistency.

Laxitextum incrustans Hjortstam & Ryvarden, Fig. 44
Mycotaxon 13:35, 1981.
Basidiocarp resupinate and effused, loosely attached and loosening along he margin when dry, hymenial surface smooth cream coloured to pale ochraceous and cracked when dry, margin white and finely fibrillose in young specimens.
Hyphal system monomitic; tramal hyphae with clamps, loosely interwoven, 3-6 µm wide, golden yellow, thick-walled and with scattered small irregular crystals, subhymenial hyphae thin-walled, hyaline to pale yellow, oleiferous hyphae present throughout the basidiocarp, 3-7µm wide with granular content, in parts amyloid.
Gloeocystidia 50-80 x 5-8µm, sometimes even longer, first fusiform to subulate, often with a moniliform apical appendix, more or less projecting; later tubular and obtuse, filled with a yellowish oily substance, which in dried material this generally coalesced and unevenly distributed in the cystidia.
Basidia 15-25 x 4-5 µm, narrowly clavate, with 4 sterigmata and a basal clamp.
Basidiospores 4.5-5 x 3-3.5 µm, ellipsoid, thin-walled, finely echinulate and amyloid.
Substrata. On hardwoods of all kinds.
Distribution. Louisiana in United States, Colombia and several places in Africa.
Remarks. Easily recognized macroscopically because of the resupinate easily detachable basidiocarp and the unevenly encrusted hyphae.

Hel side
Fig. 44. *Laxitextum incrustans* A) part of hymenium, B) basidium, C) gloeocystidia, D) subicular hyphae, E) basidiospores. R. Holotype.

LICROSTROMA Lemke
Canad. J. Bot. 42:762, 1964.
Basidiocarp resupinate to effused-reflexed, pale yellow to ochre, hyphal system dimitic, generative hyphae simple septate, *Bovista*-like branched binding hyphae present especially in the context. Smooth, thin to thick walled cystidia present, up to 250 µm long, basidia clavate with 4 sterigmata up to 100 µm long, basidiospores globose to subglobose, smooth, large, thick-walled and non-amyloid. Monotypic genus causing a white rot in hardwoods.
Type species: *Corticium subgiganteum* Berk.
Remarks. The combination of simple septate hyphae, dimitic hyphal system with *Bovista* like binding hyphae and the large, smooth, subglobose, non amyloid basidiospores make this genus unique.

Licrostroma subgiganteum (Berk.) Lemke,
Canad. J. Bot. 42:763, 1964. - *Corticium subgiganteum* Berk., Grevillea 2:3, 1873.
Basidiocarps resupinate to effused-reflexed, to 15.0 cm long, 1.0-4,0 cm wide along the substrate and up to 1.0 cm thick, pileus, when present, glabrous, cream to ochraceous. Hymenium concolorous, margin determinate, usually lifted and incurved in dry condition, subiculum cream coloured and dense.
Hyphal system dimitic, generative hyphae 2.5-4 µm wide and simple septate in the subhymenium, 2-4 µm wide in the context and subiculum, with *Bovista*-like binding hyphae, hyaline, thick walled to solid, branched at right angles, mostly with tapering ends, and all hyphae non-amyloid.
Cystidia 100-250 x 12-20 µm, clavate to sinuous and apically round to pointed, thin- to thick-walled and frequently with secondary septa, contents becoming dark in sulpho vanillin.
Dendrohyphidia or paraphysoid hyphae up to 100 µm long and 3-5 µm wide, present among the basidia, slightly branched to unbranched and with some simple septa.
Basidia 70-100 x 13-18 µm, cylindrical, simple septate at the base, with 4 sterigmata, these to 10µm long.
Basidiospores 16-19 x 14-16 µm, subglobose, smooth, hyaline, thick walled and non amyloid.
Substrata. On dead hardwoods.
Distribution. Known from East United States and Japan.
Remarks. Superficially reminiscent of a discoid *Aleurodiscus* or *Cytidia*, but easily separated from these by the combination of non-amyloid spores, long cylindrical cystidia, simple septate generative hyphae and *Bovista*-like binding hyphae.

LOPHARIA Kalch. & McOwan,
Grevillea 10:58,1881.
Basidiome effused-reflexed to resupinate, detachable, upper surface, if present, velvety to tomentose, hymenophore smooth to tuberculate or odontoid or semiporoid with shallow depressions, beige to ochraceous; context duplex with black zone between the lower part and the tomentum or subiculum.
Hyphal system dimitic, generative hyphae with clamps, skeletal hyphae hyaline, abundant in context and tomentum; cystidia (metuloids) or skeletocystidia with metuloid appearance large, thick-walled and heavily encrusted, projecting visibly above the hymenium; basidia clavate, longer than 50 um, with four sterigmata and a basal clamp; spores cylindric to oblong ellipsoid,longer than 10 um, with a grainy content, smooth, hyaline, inamyloid, indextrinoid and acyanophilous. On dead hardwoods, tropical to subtropical genus with 2 species out of which one occur in America.
Type species: *Lopharia lirellosa* Kalch. & MacOwan = *Radulum mirabile* (Berk. & Br.) Pat.
Synonyms: *Twaitesiella* Mass., Grevillea 21:3, 1892.Type species: *Radulum mirabile* Berk. & Br.
Lloydella Bres., Lloyd Mycol. Writ. 1:51,1901. Type species: *Thelephora cinerascens* Schw.
Licentia Pilat., Ann. Mycol. 38:66, 1940. Type species: *Licentia yao-chanica* Pil.
Remarks. The genus is here treated in a more restricted sense than that of Boidin (1959) and Welden (1975) both of whom included a number of species which today is included in *Porostereum* and *Hjortstamia.*
Lopharia is characterized by a true dimitic hyphal system, medium to large-sized spores that are 8-14 um long, and with a grainy content, and heavily encrusted, hyaline and projecting cystidia. Basidiomes of *Lopharia* species are greyish white to pale brown. Species of *Porostereum* and *Hjortstamia* have generally shorter spores without a grainy content and most species have skeletocystidia which bend into the hymenium with a smooth or encrusted apical part. Their basidiomes are brown, occasionally greyish white or dark pinkish brown.

Lopharia cinerascens (Schw.) G.H. Cunn., Fig. 45
Trans. Roy. Soc. N. Z. 83:622, 1956. - *Thelephora cinerascens* Schw., Trans. Am. Philos. Soc. N.S. 4:167, 1822.
Basidiome resupinate to effused reflexed, rather easy to remove from the substratum, tough when fresh, hard and brittle when dry, pileus when present up to 1.5 cm wide, 1-2 mm thick, upper surface tomentose to velvety, usually zoned, gray to pale ochraceous and with a distinct black zone below the persistent

tomentum, hymenophore even, beige to light corky brown, in section with a distinct hymenium and subhymenium, with embedded cystidia, context whitish to ochraceous, less than 1 mm thick.
Hyphal system dimitic, generative hyphae with clamps, hyaline, 2-4 µm wide, clamps rather scattered and often difficult to find; skeletal hyphae 3-6 µm wide, thick-walled, hyaline, unbranched, straight to sinuous, mixed with generative hyphae in the subhymenium and context, the pileus tomentum consisting almost exclusively of skeletal hyphae.
Cystidia large, thick-walled, acute, coarsely encrusted when mature, embedded to slightly projecting, 55-160 x 12-25 (30) µm, hyaline to pale yellowish brown with age, arising from subhymenial hyphae or from skeletal hyphae and then apparently bending into the vertical subhymenium and hymenium, young cystidia sharply pointed and smooth.
Basidia clavate with a tapering base and 4 sterigmata, 40-55 x 8-10 µm, with a basal clamp.
Basidiospores cylindrical, often slightly bent, smooth, thin-walled, IKI-, 10-16 x 6-7.5 µm.
Substrate. On hardwoods.
Distribution. North and South America. Also known from tropical Africa and Portugal in Europe.
Remarks. The genus is characterized by its large encrusted cystidia, the dimitic hyphal system and the large basidiospores.

Lopharia rugulosa (Berk. & M. A. Curtis) Hjortstam,
Mycotaxon 54:188, 1995. - *Merulius rugulosus* Berk. & M. A. Curtis, J. Linn. Soc. Bot. 10:323, 1868. Type came from Cuba.
The type is described in detail by Ginns (1971) and has a monomitic hyphal system and lacking cystidia. Thus, it falls wide outside the concept given by the type species as described above. Hjortstam has probably been mislead by a misidentified or wrongly named specimen during his work in Kew, which lead him to transfer the species to *Lopharia*. The species seems to belong in *Phlebia* s. lato.

MINOSTROSCYTA Hjortstam & Ryvarden,
Mycotaxon 79: 194, 2001.
Basidiocarps disciform, hymenium smooth to slightly tuberculate, hyphal system dimitic with skeletal hyphae and generative hyphae with clamp connections; long, tubular, cystidia present, basidia with 4 sterigmata, basidiospores 15-18 µm long, subfusiform, smooth, thin-walled and non-dextrinoid and non amyloid. Monotypic genus.

Fig. 45. *Lopharia cinerascens* A) section of basidiocarp, B) part of hymenium, C) basidium, D) basidiospores, E) generative hyphae, F, skeletal hyphae, USA, Chapman, compared with the lectotype, FH.

Type species: *Minostroscyta discoidalis* Hjortstam & Ryvarden.
Remarks. The cupulate basidiocarps, very long cystidia and large fusiform basidiospores make this a distinct and easily recognizable genus.

Minostroscyta discoidalis Hjortstam & Ryvarden, Op. cit. Fig. 46
Basidiocarp annual, cupulate, up to1.0 cm in diameter and 2 mm thick, soft textured, outer surface cottony and whitish, hymenium cream-coloured, smooth to slightly tuberculate.
Hyphal system dimitic, generative hyphae 3-5 µm wide, thin-walled, intermixed with hyphae 2-3.5 µm wide, these also thin-walled but richly ramifying and branched, each type with clamp connections; skeletal hyphae 1.5-2 µm wide, thick-walled, present only sparsely, and most frequent in the subicular layer.
C**ystidia** 50-120 x 8-10 µm, smooth, thinwalled, tubular, slightly sinuous, and with an oleiferous content, abundant, arising in the subhymenial layer and, with the basidia, forming a dense palisade in the hymenium.
Basidia 40 75 µm x 4-6 µm, clavate, tapered towards the base, with 4 sterigmata and a basal clamp.
Basidiospores 15-18 x 4-6 µm, fusiform to subfusiform often with a slight depression near the apiculus, smooth, thin-walled, non-amyloid,
Substrata. On bark of an unknown hardwood tree.
Distribution. Known only from the type locality in Columbia, Sierra Nevada, Magdalena. **Remarks**. The combination of the softly textured, cupulate, cream to white basidiocarps, with long tubular cystidia and large fusiform basidiospores is unique. Probably overlooked due to small size and unusual habitat.

Fig. 46 *Minostroscyta discoidalis* A) part of hymenium, B) cystidium, C) basidiospores. Colombia, Ryvarden Holotype.

MYCOBONIA Pat.,
Bull. Soc. Mycol. Fr. 10:76, 1894
Basidiocarps pileate, annual, dimidiate to reniform, upper surface yellowish, glabrous. Lower surface yellowish, often becoming darker when dried, covered with minute sterile spines. Context thin and dense. Hyphal system dimitic, generative hyphae hyaline, with clamp connections, vegetative hyphae arboriform of the *Bovista* type, mostly dichotomously branched, solid to thick-walled and hyaline, not reacting in Melzer's reagent, basidia clavate with 4 sterigmata, cystidia absent, basidiospores hyaline, thin-walled and cylindrical to ellipsoid and non-amyloid.
Tropical genus, with two species in America, both causing a white rot in dead wood of hardwoods.
Type species: *Peziza flava* Sw.:Fr.
Remarks. Included in this manual because species have a stereoid appearance, although the basidiocarps are covered with tiny hyaline spines. Related to *Polyporus* s. str., and having the same microstructure, but easily separated from it by the densely spiny underside of the basidiocarp.

Key to species

1. Basidiospores cylindrical to navicular .....**M. flava**
1. Basidiospores ellipsoid ..... **M. brunneoleuca**

Mycobonia flava (Sw.:Fr.) Pat.,
Bull. Soc. mycol. Fr. 10: 77, 1894. - *Peziza flava* Swartz Nov. Gen. Sp. Plant. Prodromus p. 150, 1788. - *Peziza flava* Sw.:Fr. Syst. Mycol. 2:161, 1822. [
Basidiocarp annual, pileate, dimidiate to reniform or flabellate, up to 8 cm wide and 4 cm across, rarely more than 4 mm thick, when fresh flexible and tough, when dry dense and hard. Stipe short, expanding evenly into the pileus, yellow to ochre when fresh, pale purplish to rusty isabelline in some specimens when dry, lower surface pale ochre to yellow when dry, rarely more darkly coloured, covered with numerous, tiny, conical, sterile spines of the same colour, these up to 0.5 mm long, context whitish to ochre, with a dense texture.
Hyphal system dimitic, generative hyphae 2-4 µm wide, thin-walled and hyaline, difficult to observe in dry specimens; arboriform binding hyphae throughout most of the basidiocarp, hyaline, thick-walled to solid, richly branched, and with tapering apices, 2-5 mm wide.
Cystidia absent.
Basidia 30-50 x 9-12 µm, clavate, with 4 sterigmata.
Basidiospores 15-22 x 5-7.5 µm, thin-walled, smooth, hyaline, cylindrical to slightly navicular. **Substrata.** On dead wood of deciduous trees.

Distribution Widespread, but nowhere common, throughout Central and South America, from the Yucatan Peninsula to northern Argentina
Remarks. Easily recognized in the field due to the delicate yellow basidiocarps with numerous tiny spines on the lower side (when viewed with a lens !). To the naked eye, however, the lower surface of young specimens can easily be taken to be glabrous.

Mycobonia brunneoleuca (Berk. & M. A. Curtis) Pat.,
Essai Taxon. P. 75, 1900. - *Hydnum brunneoleucum* Berk. & M. A. Curtis, Trans. Linn. Soc. Lond. 22:129, 1857.
Basidiocarps, hyphal system and **basidia** as in *M. flava*.
Basidiospores 17-22 x 9-11 µm, ellipsoid, smooth and thin-walled.
Substrate. On dead wood of deciduous trees.
Distribution. Insufficiently known, due to confusion with *M. flava* - only microscopic examination can separate the two species.
Remarks. Known from Cuba, Mexico and Venezuela (with verified material in Kew) but the distribution is almost certainly wider.

PHLEBIA Fr.
Syst. Mycol. 1: 426, 1821.
Basidiocarps normally completely resupinate, rarely semipileate; hymenium smooth, tuberculate, phlebioid, odontioid, merulioid or poroid; consistency of living basidiocarps (especially the hymenial part) ceraceous - subgelatinous; when dry, becoming firm, membranous to corneous; subhymenium thickening with age; hyphae with clamp connections, thin- or slightly thickened walls, usually embedded in a gelatinous matrix; cystidia absent or, if present, thin- or thick-walled, not encrusted or sometimes strongly encrusted with crystalline or resinous material, basidia normally narrowly clavate, arranged in a dense palisade; spores smooth, allantoid to ellipsoid, thin-walled, non-amyloid and non-cyanophilous.
Cosmopolitan genus. All species associated with a white rot.
This manual includes only two distinctly pileate species
Type species: *Phlebia radiata* Fr.
Remarks. The genus was originally described only for species with a radially folded (phlebioid) hymenium. However, in recent years it has grown to accommodate numerous other species, with a smooth or tuberculate hymenium, a waxy-gelatinous consistency, and narrow basidia in a dense palisade. It is, no doubt, an artificial assemblage, and will certainly be split when the species currently included are all genetically sequenced.

Key to pileate American species

1. Basidiocarp reddish ..... P**. incarnata**
1. Basidiocarp white above, pale yellowish below ..... **P. tremellosa**

Phlebia incarnata (Schw.) Nakasone,
Mycotaxon 21:245, 1984. - *Merulius incarnatus* Schw., Schr. Naturf. Gesellschaft Leipzig 1:92, 1822.
Basidiocarp annual, dimidiate to reflexed, often imbricate, up to 11 x 7 cm and 5 mm thick, spongy when young and fresh, dense and cartilaginous when old, pilei pink to pale orange, drying tan with a pink tint, slightly tomentose, margin up to 2 mm wide, tan to reddish orange, hymenium pale pink, drying orange to dark red, distinctly folded, with folds up to 0.4 mm wide and up to 1.5 mm deep, radiating to the margins, with side branches in parts anastomosing and developing into small pits up to 2 mm wide. Context duplex, with the lower part dense and concolorous with the hymenium, and the upper one loose and spongy in texture.
Hyphal system monomitic, 2-6 µm wide, thin to thick-walled, with clamp connections, mixed with a yellowish amorphous matter. Those in the hymenial layer 4-5 µm wide, gelatinized, dense in texture and mixed with large coloured granules
Cystidia absent.
Basidia 18-35 x 4-5 µm, narrowly clavate**,** arranged in a very dense palisade, with 4 sterigmata and a basal clamp connection.
Basidiospores 4-6 x 2-2.5 µm, cylindrical, often slightly bent near the apiculus, smooth, thin walled, non-amyloid.
Substrate. On dead wood (decayed stumps and fallen trunks or logs), associated with a white rot, of deciduous trees, especially *Acer* and *Quercus*.
Distribution. An American species known from central parts of the United States and north-eastern and central Mexico.
Remarks: Distinctive due to the overall pinkish colours which becomes stronger on drying, and the radially folded hymenium.

Phlebia tremellosa (Schrad.: Fr) Burds. & Nakasone, Fig 47
Mycotaxon 21:245, 1984. -. *Merulius tremellosa* Schrad. Spicily. Fl. Germ. 1: 139, 1794. - *Merulius tremellosus* Schrad.:Fr., Syst. mycol. 1 p. 426 1821.
Basidiocarp resupinate, orbicular and confluent, widely effused and may reach a size of several dm, or dimidiate-pileate with pilei 1-5 cm broad, arranged in a radial direction, often elongated lengthwise, occasionally imbricate. When fresh and hydrated carnose-tremellose, but shrunken with the hymenium becoming horn-like in texture when dry, upper side white, tomentose-strigose, often

somewhat zonate. When young, fresh and hydrated the hymenium is a watery greyish, yellowish-ochraceous to pinkish-ochraceous, or even reddish when mature. In dried material, becoming dark ochraceous to pale orange or even red. Hymenium reticulate-plicate (merulioid) with irregular alveoli, radial ridges often dominant over the tangential dissepiments, in fully developed specimens more or less poroid, with the edges of the dissepiments fertile; margin radially fibrose in resupinate specimens, tomentose or hispid when pileate.

Hyphal system monomitic. Two kinds of hyphae are present, both with clamp connections.

a) in the upper and major part of the trama, which is white and cottony in section, hyphae 4-5 µm wide are present and distinct, these with thickened walls, and much branched in all directions, in sections forming a net-like tissue, penetrated by strands of parallel hyphae.

b) in the hymenophore hyphae 4-5 µm wide predominate, these thin-walled, ochraceous to reddish, forming a parallel layer in the pileal trama, becoming more irregularly intertwined in the dissepiments, forming a ceraceous context, which becomes hard and horn-like in dry specimens.

Subhymenium thickening with age, composed of hyphae 2-3 µm wide, these thin-walled, richly branched and forming an almost pseudoparenchymatic hymenophore.

Cystidia absent, but, in the hymenium and projecting 20-30 µm above it, there are frequently thin-walled hyphae, often covered with pieces of an excreted, resinous matter, sometimes to such a degree that they may look like true cystidia. However, in other respects they are not differentiated from the hyphae of the hymenophore.

Basidia 18-25 x 4-5 µm, narrowly clavate, arranged in a very dense palisade, with 4 sterigmata and a basal clamp connection, from which new basidia arise.

Basidiospores 4-4.5 x 1-1.5 µm, allantoid, smooth, thin-walled, often biguttulate, non amyloid.

Substrate. On dead wood (decayed stumps and fallen trunks or logs of hardwoods or conifers)

Distribution. Cosmopolitan and common in certain areas, but in general rare in tropical forests.

Remarks: Distinctive due to the yellowish, reticulate to merulioid hymenophore and white tomentose pileus.

Hel side
Fig. 47. *Phlebia tremellosa* a) schematic section through basidiocarp, b) section of subhymenium, c) section through hymenium, d) generative hyphae e) generative hyphae from context, f) encrusted projecting hyphae, g) basidiocarps. Hjortstam 14971, Sweden, del. J. Eriksson.

PLICATURA Peck,
Ann. Rep. New York St. Mus. 24:75, 1872.
Basidiocarp resupinate to dimidiate, white, loosely adnate, soft when fresh, fragile when dry; upper side not very differentiated, composed of intertwined hyphae similar to those in the subiculum; in older basidiocarps forming a thin pileipellis of collapsed hyphae; hymenial side at first smooth, then more or less wrinkled or irregularly plicate, not forming regular gills or pores; hyphae with clamp connections, conspicuous especially in the trama, hyphae of the subhymenium thin-walled and richly branched, those of the trama and the upper side with more or less thickened walls, more straight and sparsely branched; cystidia absent; basidia subclavate, arranged in a dense palisade; spores allantoid, smooth, thin-walled, amyloid, non cyanophilous.
Type species: *Plicatura alni* Peck = *Plicatura nivea* (Sommerf.:Fr.) P. Karsten.
Remarks. Easily recognized, with the soft, white basidiocarp with plicate hymenium sufficient for a diagnosis in the field. It has affinities with *Plicaturopsis*, but for the present time, best kept separate.

Plicatura nivea (Fr.) P.A. Karst., Fig. 48
Bidr. Känned. Finl. Nat. Folk 48:342, 1889. - *Merulius niveus* Sommerf.:Fr., Elench. Fung. 1:59, 1828. - *Merulius niveus* Sommerf., Suppl. Fl. Lapp. p. 268, 1826.
Basidiocarp resupinate to dimidiate, orbicular and sometimes confluent, a few cm wide, loosely attached to the substrate, soft and lax when living, fragile and very lightweight when dried; upper side smooth, finely velvety (when viewed with a lens) in very young specimens and the growing margin of older ones, initially white, becoming greyish or pale beige brown. Hymenium smooth in young basidiocarps, becoming distinctly and irregularly plicate (but not forming net-like pores) with age, white then yellowish when older, pale brown to slightly orange, when dried.
Hyphal system monomitic, hyphae with large clamp connections, these often with a conspicuous central space, or "eye", at least in the wider hyphae; subhymenial hyphae 2-3 µm wide, thin-walled, richly branched; subicular (tramal) hyphae 3-6 µm, widened over the clamp to 8-10 µm; most hyphae with somewhat thickened walls, straight, sparsely branched with few anastomoses.
Cystidia absent.
Basidia 12-18 x 3-4 µm, subcylindric to narrowly clavate, with 4 sterigmata and a basal clamp connection.
Basidiospores 4-4.5 x 1.0 µm, allantoid, smooth, thin-walled, amyloid, non-cyanophilous.

Fig. 48 *Plicatura nivea* a) hymenium and subhymenial layer, b) hyphae, c) basidia, d) hyphae, e) basidiospores, Sweden, Eriksson 9689, del. John Eriksson.

S**ubstrate.** On wood, usually dead hanging, or fallen, branches of standing or fallen trunks. Frequently on *Alnus* ssp., rarely on other deciduous trees.
Distribution. Widespread in the northern part of the United States and Canada. Circumglobal in the northern conifer zone.
Remarks. Easily recognized by the white basidiocarps, with irregularly wrinkled hymenium and hyaline, amyloid spores.

Plicaturopsis D. A. Reid,
Persoonia 3:150, 1964.
Basidiocarps pileate, cupulate to sub-resupinate, single, aggregated or imbricately expanded, when fresh soft and pliable, contracted and brittle when dried, upper side subzonate and velutinous or tomentose, margin more or less involute. Hymenium plicate with low, bifurcate, radially arranged gill-like ridges; hyphae with conspicuous clamp connections, mostly thin-walled but, in the upper part of the subiculum (trama), with thickening walls and horizontally layered whilst those of the subhymenium are much intertwined; cystidia absent; basidia subclavate, arranged in a dense palisade, with 4 sterigmata; spores allantoid, thin-walled, amyloid, but in some specimens the reaction is weak whilst in others much stronger and obvious.
Type species: *Cantharellus crispus* Pers.:Fr.
Remarks. The genus agrees in many respects with *Plicatura* and they must be regarded as closely related. Microscopic characteristics are the same, except for the denser texture of *Plicaturopsis*, with thick-walled hyphae on the upper side of the basidiocarp. The genus is monotypic.

Plicaturopsis crispa (Fr.) D. A. Reid, l.c. Fig. 49
Cantharellus crispus Pers.: Fr., Syst. mycol 1:323, 1821. - *Merulius crispus* Pers. Icon descr. Fungi.: pl.32 ,1800.
Basidiocarp usually dimidiate, flabelliform or cupulate, mostly crowded to imbricate, 1.0-2.0 cm wide, seldom more, lacking a stipe or (dependent on the situation of the basidiocarp) pseudostipitate with the basidiocarp narrowed at the point of attachment, into a short, stipe-like part; on the undersides of horizontal substrate, often sub-resupinate and more or less lobed, and on vertical substrate, laterally fixed; initially white when young, the upper side soon pale brown to tobacco-brown, finely velutinous, and often subzonate, hymenium white to glaucous white, darkening when older and in herbarium material, folded into dichotomously branched, gill-like ridges with an uneven to crispate edge; consistency soft and pliable when young, firmer when mature and brittle when dried.

Hyphal system monomitic; hyphae 3-5(-7) µm wide, with large clamp connections, these often with a conspicuous central space, or "eye"; subhymenial hyphae 3-5 µm, mainly parallel, hyphae on the upper side of the basidiocarp 5-7 µm wide, coarse, thick-walled and somewhat swollen in KOH and Melzer's reagent, thus best studied in cotton-blue ! The ends of such hyphae form the tomentum on the upper side, becoming more or less agglutinated in old basidiocarps, forming tufts of agglutinated hyphae.
Cystidia absent.
Basidia 15-22 x 3.5-4.5 µm, subclavate to subcylindrical, with 4 sterigmata and a basal clamp connection, arranged in a dense palisade.
Basidiospores 3-4.5 x 0.75-1.25 µm (exceptionally somewhat larger !), allantoid, thin-walled, smooth, amyloid, with oily contents. The amyloid reaction may be strong and obvious in some specimens or weak and difficult to observe in others. The number of spores is often few, and their very thin width may add to difficulties in observing their amyloid nature. In addition, the oily contents often impart a greenish tint that can also hide the reaction.
Substrate. On dead wood, usually on corticated trunks and branches of both hardwoods and conifers
Distribution. Widespread in Canada. Rarer in the central parts of the United States. Circumglobal in the conifer zone.
Remarks. Close to *Plicatura nivea* but distinguished from it by the radially folded hymenium and the pale brown pileus.

Fig. 49. *Plicaturopsis crispa* a) schematic section through the basidiocarp, b) section through the basidiocarp, c) hyphae from the trama, d) part of hymenium and subhymenium, e) hyphae from the pileus, f) basidia, g) basidiospores. Sweden, Jacobsen 79224, del. John Eriksson.

PODOSCYPHA Pat.,
Essai tax. p. 70-71, 1900. - *Stereogloeocystidium* Rick, Broteria 9:79, 1940.
Basidiocarps lignicolous or terrestrial and then often growing from buried wood, thin, coriaceous, spatulate, flabellate, infundibuliform; adjacent basidiocarps frequently confluent forming complicated rosette-like structures, upper surface glabrous or covered with a distinct tomentum or bearing branched antler-like processes, pale to dark brown or occasionally ochraceous-fawn, pinkish-fawn or pallid fawn to white, in old dried specimens dark chestnut to blackish-brown often concentrically zonate, hymenium smooth, usually pallid or cream coloured, but in some species dark bay, bright ochraceous or orange, stipe usually well developed, often attached to the substrate by a conspicuous mycelial disc and covered by a felt-like tomentum or minutely hispid due to the presence of numerous well defined caulocystidia, context often very thin, hyphal system dimitic or (rarely) rudimentarily trimitic, generative hyphae thin walled, hyaline, with clamp connections in all species, thin to thick-walled, skeletal hyphae thick-walled to almost solid, hyaline metuloid cystidia present in few species, gloeocystidia always present, caulocystidia and pileocystidia absent or present, basidia clavate, 2 to 4-spored, of small to medium size, basidiospores smooth, thin-walled, hyaline, non-amyloid, subcylindrical to broadly ellipsoid to subglobose. All species cause a white rot. Pantropical, with few species in the temperate zone.
Type species: *Stereum surinamense* Lév.
Remarks The most difficult genus of all stipitate stereoid fungi !
Distinctions between some species are vague, especially since some of them known only from the type specimen probably do not probably reveal the whole range of variation. Further collecting is necessary to ascertain the validity of some of the species concepts accepted here.

Key to neotropical species of *Podoscypha*

1. Pilei tomentose to hispid or with antler-like outgrowths 2
1. Pilei glabrous, although pileocystidia may be present, but visible only with a lens 5

2. Pilei with antler-like outgrowths.....**P. cristata**
2. Pilei finely tomentose 3

3. Basidiocarps effused-reflexed and dorsally attached .....**P. semiresupinata**
3. Basidiocarps spatulate to flabelliform with tapering stipe 4

4. Tomentum ochraceous with greenish tints, basidiospores 3-3.7 x 2-2.5 µm ..... **P. viridans**
4. Tomentum whitish to beige, basidiospores 4-4.5 x 3-3.5 µm ..... **P. caespitosa**

5. Thick walled, smooth, metuloid cystidia or chlamydospores present 6
5. Thick-walled metuloid cystidia or chlamydospores absent 7

6. Thick walled smooth cystidia present, chlamydospores absent ..... **P. mellisii**
6. Thick walled smooth cystidia absent, chlamydospores present ..... **P. bolleana**

7. Basidiospores 5-8 µm long 8
7. Basidiospores in general shorter than 5 µm 11

8. Basidiospores subglobose, pileocystidia present 9
8. Basidiospores ellipsoid, pileocystidia absent 10

9. Pilei radially wrinkled, dark chestnut to almost black when dry....**P. ovalispora**
9. Pilei smooth, cream to greyish when dry.....**P. aculeata**

10. Basidiospores 6-8 (10) x 4-6 µm, on dead grasses .....**P. thozetii**
10. Basidiospores 5-7 x 3.5-4 µm, on dead wood ..... **P. brasiliensis**

11. Pileocystidia or undifferentiated hairs on pilei 12
11. Pileocystidia absent 17

12. Basidiocarp with radiating ribs, up to 1.5 mm thick, basidiospores 3-3.5 µm long ..... **P. replicata**
12. Basidiocarps without radiating ribs, basidiospores 3.5-5 µm long 13

13. Basidiospores subcylindrical to oblong-ellipsoid 4-5 x 2-2.5 µm, stipe usually well developed .....**P. tomentipes**
13. Basidiospores broadly ellipsoid, wider than 2.5 µm, stipe mostly present as tapering contracted base 14

14. Basidiospores 4-5 (6) x 2.2-3 µm, pileocystidia rare..... **P. macrorhiza**
14. Basidiospores usually wider, pileocystidia common 15

15. Pilei radially wrinkled when dry, hymenium sharply delimited towards the short stipe .....**P. glabrescens**
15. Pilei becoming smooth, hymenium not sharply delimited towards the stipe.16

16. Basidiocarps whitish when fresh, becoming darker when dry, pilei thin and papery, growing on wood and attached with a distinct mycelial disc at the attachment ..... **P. venustula**
16. Basidiocarps light brown to pinkish brown when fresh, becoming dark when dry, growing on the ground ..... **P. petaloides**

17. Basidiocarps more or less spatulate with only a contracted base 18
17. Basidiocarps more or less erect with a distinct stipe 19

18. Basidiospores 3-4 µm long, pilei azonate, pale brown ..... **P. corbiformis**
18. Basidiospores 2-3.2 µm long, pilei zonate, blackish brown ..... **P. mølleri**

19. Basidiospores 2-4 x 1.5-2.2 µm, basidiocarp funnel shaped ... **P. fulvo-nitens**
19. Basidiospores larger, pilei more or less spatulate to flabelliform 20

20. Basidiospores (3.8) 4-6 x 3-4 µm, stipe glabrous ..... **P. nitidula**
20 Basidiospores 4-5 x 2-3 µm, stipe with hairs or thick-walled caulocystidia...21

21. Caulocystidia absent. Stipe covered with undifferentiated hairs mixed with gloeocystidia, on the ground .....**P. ravenelii**
21. Thick-walled caulocystidia present, stipe with fine hairs, lignicolous ..... **P. bubalina**

Podoscypha aculeata (Berk & M.A. Curtis) Boidin,
Rev. Mycol. 24: 210, 1959. - *Thelephora aculeata* Berk. & M. A. Curtis, Grevillea 1:149, 1873.
Basidiocarps to 10.0 cm wide and 10.0 cm high, consisting of numerous stipitate, flabelliform pilei, fused at the base of the stipe to form a rosette-like structure, upper surface finely ridged or crested, white to cream when fresh, darkening to dark reddish brown when dry, margin finely incised to dentate, hymenium smooth, white to cream when fresh, darkening to light to dark grey when dry. Stipe in effect absent, and the tapering part of the basidiocarp is concolorous with the pilei and hymenium respectively.
Pileocystidia and **caulocystidia** absent.
Gloeocystidia 30-50 x 2.5-3.5µm, hyaline, thin-walled.
Hyphal system dimitic, generative hyphae 2.5-6.0 µm wide, hyaline, thin-walled, with clamp connections; skeletal hyphae 2.5-5.0 µm, hyaline, thick-walled.
Basidia not seen.

Basidiospores 5.0-6.0 (7.0) x 4.0-5.0 µm, subglobose to globose, smooth, hyaline, thin-walled, guttulate and apiculate.
Substrate. Terrestrial.
Distribution. Brazil and United States.
Remarks. Macroscopically similar to *P. multizonata*, but that species has pileocystidia and is known only from Europe and Asia.

Podoscypha bolleana (Mont.) Boidin.
Bull. Jard. Bot. Bruxelles 30:323, 1960. - *Stereum bolleana* Mont., Syll. Crypt. p. 177, 1856.
Basidiocarps to 2.0-5,0 cm high and 0.3-2 cm wide in solitary basidiocarps, but often several fused to form more compound structures, spatulate, often lobed or split, flabellate to pseudo-infundibuliform, more rarely truly infundibuliform, upper surface glabrous, silky, shining and with radiating wrinkles imparting a lineate appearance, ochraceus beige to pale brown when fresh, darkening to chestnut brown or yellowish brown, often concentrically zonate, and with a whitish or pale margin, hymenium smooth, ochraceous to ash grey in dried specimens. Stipe attached to the substratum by a conspicuous disc of ochraceous mycelium up to 6.0 mm wide usually short but may attain 4.0 cm long and 0.5-3.0 mm wide covered with a fine ochraceous to brown coloured tomentum, consisting of stiff caulocystidia and skeletal hyphae.
Hyphal system dimitic, generative hyphae 2.5-5 µm wide, hyaline, thin-walled, branched, with clamp connections; skeletal hyphae, to 3-4.5 µm wide, thick-walled to almost solid, unbranched.
Chlamydospores 8-16 x 6-9 µm, present in both the context and stipe, yellow to pale brown, smooth, globose to oblong, very thick walled, either developed singly or more rarely in double structures, as intercalary swellings.
Pileocystidia 25-70 x10-15 µm, abundant, smooth, cylindrical to clavate, yellow to pale brown, thick-walled except at the apex.
Caulocystidia to 120 µm long and 8-13 µm wide, cylindrical or clavate, arising deep in the tissue of the stipe and growing out at right angles through the longitudinally orientated hyphae forming this tissue, hyphal walls thickened, brown, usually darker than the pileocystidia.
Gloeocystidia to 80 µm long and 15 µm wide, elongate, thin-walled, undulant with a slightly swollen base and gradually narrowing to an obtuse apex.
Basidia 20-30 x 5-6 µm with 4 sterigmata.
Basidiospores 4-6 x (2.2 -) 2.7-3.5 µm, ellipsoid to broadly ellipsoid, hyaline, thin-walled, often mono-guttulate.
Substrate. On dead wood.

Distribution. Rare, in tropical America. Specimens seen from Brazil, Colombia, Trinidad and Venezuela
Remarks. Microscopically, the usually abundant chlamydospores make *P. bolleana* easy to recognize. Macroscopically it is similar to the common *P. nitidula*.

Podoscypha brasiliensis D. A. Reid, Fig. 50
Beiheft Nova Hedwigia 18:169, 1965.
Basidiocarps to 1.5-3.1 cm high and 0.6-2 cm wide, gregarious, truly infundibuliform, occasionally split almost to the stipe on one side and then appearing flabellate, whitish when fresh, yellowish or ochraceous-brown with slightly darker indistinct zones through reddish- or orange-brown to dark chestnut when dried, some with a smooth surface others minutely radially wrinkled, although quite glabrous. Hymenium smooth, cream ochre or grey-brown to almost black, usually with an ash-grey pruina, stipe 3.0–8.0 mm long, 0.5-1.0 mm wide, very minutely tomentose, ranging from pale ochre to dark brown and attached to the substrate by a pale ochraceous disc of mycelium up to 5.0 mm wide.
Hyphal system dimitic, generative hyphae 2.5-4.5 µm wide hyaline, thin-walled, branched, with clamp connections and appearing twisted and ribbon-like in microscope preparations; skeletal hyphae, to 5.0 µm wide, hyaline, very thick-walled, unbranched or (very rarely) with short lateral branches of limited growth.
Pileocystidia and **caulocystidia** absent.
Gloeocystidia 30-55 x 6-12 µm, long, narrow, undulant, thin-walled with a swollen base.
Basidia up to 40 x 5 µm, clavate, mostly 4-spored.
Basidiospores 5-7.3 x 3.0-4.2 µm, ellipsoid to broadly ellipsoid, hyaline, thin-walled.
Substrate. On dead wood.
Distribution. Known from the type locality in Brazil and in Venezuela.
Remarks. Might be confused with *P. fulvo-nitens*, but easily distinguished from it by the larger basidiospores.

Fig. 50. *Podoscypha brasiliensis* A) part of hymenium with gloeocystidia, B) basidiospores, Ecuador, Ryvarden 44552.

Podoscypha bubalina D. A. Reid, Fig. 51
Beiheft Nova Hedwigia 18:171, 1965.
Basidiocarps to1.0-2.0 cm high and 0.3-1.2 cm wide, truly infundibuliform, pilei glabrous, pale buff when fresh becoming orange-brown or reddish-chestnut in herbarium material, sometimes ornamented with rather indistinct, darker, concentric zones. Hymenium smooth, varying from ochraceous to almost black in dried specimens. Stipe 0.5-0.8 cm long and 0.5-0.7 mm wide, rusty-brown, appearing minutely hispid under a lens due to the presence of caulocystidia, attached to the substratum by a conspicuous disc of ochraceous mycelium up to 6.0 mm wide
Hyphal system dimitic, generative hyphae 2.5-4 µm wide hyaline, thin-walled, branched, with clamp connections; skeletal hyphae 3.5-4.5 µm wide, thick-walled to almost solid, unbranched.
Pileocystidia absent.
Caulocystidia present, to 80 µm long, and 8-13 µm wide, cylindrical or clavate, often in tufts, hyphal walls thickened, first hyaline then pale brown, arising deep in the context of the stipe and bend to out at right angles from the longitudinally orientated hyphae in the stipe.
Gloeocystidia 30-60 x 5-7 µm, elongate, thin-walled, undulant with a slightly swollen base, gradually narrowed toward an obtuse apex.
Basidia, mature basidia not seen.
Basidiospores 3.7-4.7 x 2.5-3.2 µm, ellipsoid to broadly ellipsoid, hyaline, thin-walled, often mono-guttulate.
Substrate. On dead wood.
Distribution. Known only from the type locality, Lago cerrado, Rio Jurua in Brazil. **Remarks:** The caulocystidia and its lignicolous habitat characterize this species. More collections are desirable to verify its macro morphological variation.

Fig. 51. *Podoscypha bubalina*, A) basidiocarps, b) part of hymenium with gloeocystidia, C) caulocystidium, D) basidiospores, Brazil, Gibertoni 264.

Podoscypha caespitosa (Burt) Boidin,
Rev. Mycol., Paris, 24, 212, 1959. - *Stereum caespitosum* Burt, Ann. Mo. Bot. Gdn 7: 116-117, 1920.
Basidiocarps coriaceous, thin, caespitose, effused-reflexed or laterally stipitate with a small resupinate part, often forming as a cluster of up to 10 imbricate, reflexed, pileate lobes, to 5.0-10.0 mm wide pilei whitish ochraceous, drying pale brown and minutely adpressed tomentose, but margin remaining glabrous, hymenium whitish to light buff.
Hyphal system dimitic, generative hyphae 2-5 µm wide, hyaline thin-walled with clamp connections; skeletal hyphae to 3.5 µm wide, hyaline thick-walled.
Pileocystidia present but scattered, to 70 µm long and 6-8 µm wide.
Caulocystidia absent.
Gloeocystidia abundant, to 85 x 7-10 µm, slender, flexuous with a slightly swollen base, gradually tapering toward the obtuse apex.
Basidia not seen.
Basidiospores 4-4.5 x 3-3.5 µm, subglobose and hyaline and thin walled**.**
Substrate. On dead wood.
Distribution. Known from Jamaica and Venezuela.
Remarks. Typically found growing in small clusters, a characteristic which, together with the small subglobose spores, is diagnostic for this species.

Podoscypha corbiformis (Fr.) D. A. Reid,
Beiheft Nova Hedwigia 18:277, 1965. - *Thelephora corbiformis* Fr., Act. R. Soc. Sci. Uppsala, Series Ill, 1, 108, 1851.
Basidiocarps to 10 cm wide, formed of tufted, sessile, pileate lobes arising from a common base, often imperfectly fused to form sessile, cup-shaped structures, from the inner surface of which innumerable small pileate lobes arise by proliferation, pilei pallid grey-brown, possibly golden brown when fresh and with darker concentric zones, hymenium smooth and dingy grey-brown.
Hyphal structure dimitic, generative hyphae 2-4 µm wide, hyaline, thin walled, with clamp connections; skeletal hyphae, 2-5-5 µm wide, thick-walled to almost solid, unbranched.
Pileocystidia and **caulocystidia** absent.
Gloeocystidia present, but mostly collapsed.
Basidia not seen.
Basidiospores 3-4.2 x 2-2.7 µm, broadly ovate to ellipsoid and smooth.
Substrate. Terrestrial.
Distribution. South America: Known from Brazil, Argentina, Venezuela and Costa Rica.

Remarks. The lack of cystidia on the surface of the basidiocarp is typical for this species.

Podoscypha cristata (Berk. & M. A. Curtis) D. A. Reid,
Beiheft Nova Hedwigia 18:174, 1965. - *Stereum cristatum* Berk. & M. A. Curtis , Grevillea 1:163, 1873. - *Stereum rufo-nitens* Speg., Bol. Acad. Cienc. Cordoba 11:81, 1889.
Basidiocarps to 0.6-1.5 cm high, and 0.6-1.2 cm wide, truly infundibuliform or flabelliform, covered on the inner side with a tangled mass of branched, antler-like processes especially toward the base, fulvous or reddish with a silky sheen (but probably straw-coloured when fresh), with somewhat darker, concentric zones and a slightly paler margin, hymenium smooth, pale creamy-ochre to pinkish ochre.
Stipe short, 1.0-5.0 mm high and 1.0-2.0 mm wide, pale reddish to dark brown.
Hyphal system dimitic, generative hyphae 2-4 µm wide, hyaline, branched, with clamp connections; skeletal hyphae 3-5 µm wide, hyaline, thick-walled to almost solid. The antler-like pileal processes are comprised mainly of skeletal hyphae with only a few generative hyphae intermixed.
Gloeocystidia 30-60 x 4-8 µm, initially globular or obpyriform but soon long, undulant and thin-walled.
Pileocystidia and **caulocystidia** absent.
Basidia not seen.
Basidiospores 4-4.5 x 1.75-2 µm, narrowly ellipsoid or subcylindrical, hyaline, thin walled.
Substrate. On dead wood or vines.
Distribution. Known from North America; South Carolina, and South America; Brazil and Venezuela.
Remarks. The tangled mass of hairs on the pileus makes this a characteristic species. Welden (1960) placed this species in *Cymatoderma* because of the dense pileus cover, a characteristic for this genus. D. A. Reid (op cit) placed more emphasis on the hyphal structure and preferred *Podoscypha* as the proper genus and his solution is accepted here.

Podoscypha fulvo-nitens (Berk.) D. A. Reid
Beiheft Nova Hedwigia 18:176, 1965. - *Stereum fulvo-nitens* Berk., Ann. Mag. nat. Hist., Series 11, 9:198, 1852.
Basidiocarps to 0.6-5.5 cm high and 0.4-3 cm wide, nearly always truly infundibuliform, although sometimes irregular with uneven sidewalls, and then appearing almost flabellate, upper surface glabrous, very minutely radially wrinkled, with a distinct waxy sheen, golden-orange, to reddish-brown to rich

chestnut to deep purplish brown when old, concentrically zonate, with narrow zones.
Hymenium smooth, deep ochraceous-cream or ochre to pale orange brown, darkening grey-brown, purplish-grey to orange-brown when older.
Stipe up to 1.0 cm long, dark brown, glabrous, attached to the substrate by a conspicuous, pale brown basal disc of mycelium.
Hyphal system dimitic, generative hyphae 2.5-4 µm wide, hyaline, thin-walled, branched, with clamp connections; skeletal hyphae 3.5-7 µm wide, thick-walled.
Pileocystidia and **Caulocystidia** absent.
Gloeocystidia present, but often rather scanty, subglobose, oval or club-shaped.
Basidia clavate, with 4 sterigmata.
Basidiospores 3-4 x 2-2.5 µm, ellipsoid to broadly ellipsoid, hyaline and thin walled.
Substrate. On dead wood.
Distribution. Central and South America. Bolivia, Brazil, Ecuador, Panama, Dominican republic¸ Trinidad and Tobago and Venezuela.
Remarks. Probably the most common representative of the genus, easily recognized by the glabrous basidiocarp with beautiful shiny brown colours.

Podoscypha glabrescens (Berk. & M. A. Curtis) Boidin, Fig. 52
Rev. Mycol. 24: 210-211, 1959. - *Stereum glabrescens* Berk. & M. A. Curtis, J. Linn. Soc. 10: 330, 1869.
Basidiocarps to 1.7-2.5 cm long and 1.2-3.2 cm wide, spatulate to flabellate, upper surface dark chestnut-brown with darker and paler zones, glabrous and matt although finely pubescent towards the stipe hymenium smooth, pale ochraceous cream, becoming brownish and finally grey towards the stipe, on the lower side of the stipe but sharply delimited from the sterile portion by a distinct ridge, stipe very short and flattened to almost rudimentary.
Hyphal system dimitic, generative hyphae 2-4 µm wide, hyaline, thin walled**,** freely branched, with clamp connections; skeletal hyphae 3-5 µm wide, hyaline, thick-walled to almost solid, unbranched.
Pileocystidia up to 91 µm long and 10 µm wide, cylindrical or clavate, with broadly rounded apices, pale brown walls, and often with brown contents.
Caulocystidia to 120 µm long, similar to the pileocystidia.
Gloeocystidia abundant, thin-walled, undulant, gradually tapering toward an obtuse or pointed apex.
Basidia not seen.
Basidiospores 3.7-4.x 2.5-3.5 µm, ellipsoid to ovate, hyaline, thin-walled.
Substrate. On dead wood.
Distribution. Known with certainty only from Cuba.

Fig. 52. *Podoscyphae glabrescens* A) part of hymenium with gloeocystidia, B) skeletal hypha, C) basidiospores. Cuba, Wright coll. 1870, lectotype.

Podoscypha macrorhiza (Lev.) Pat.,
Essai taxonomique, p. 71, 1900. - *Thelephora macrorhiza* Lév. Ann. Sci. nat. Series Ill, 5:146, 1846.
Basidiocarps more or less infundibuliform, compound, consisting of several fused individuals arising from a common base, upper surface dark chestnut (stated to be reddish when fresh), glabrous but with radiating wrinkles, hymenium pale when fresh, grey-black when dry. Stipe 1.0-2.0 mm long, minutely tomentose due to the presence of numerous caulocystidia.
Hyphal system dimitic, generative hyphae 2-4 µm wide, hyaline, thin-walled, with clamp connections; skeletal hyphae, 3-5 µm wide, hyaline**,** thick-walled to almost solid, unbranched.
Pileocystidia 30-80 x 5-10 µm, rare, clavate or subcylindrical, with distinctly thickened walls.
Caulocystidia to 45 µm long and 7.5-12 µm wide, short cylindrical or clavate, with distinctly thick, brown walls.
Gloeocystidia 30-60 x 4-7 µm, subcylindrical, thin-walled.
Basidia not seen.
Basidiospores 4-5(-6) x 2.2-3 µm, ellipsoid, hyaline, thin-walled.
Substrate. Terrestrial but probably arising from buried wood.
Distribution. Known from South America: French Guiana, Guadeloupe and Martinique.
Remarks. The presence of both caulocystidia and pileocystidia and the dark surface make this a distinct species.

Podoscypha mellisii (Sacc.) Pat., Fig. 53
Mem. Acad. Malagache 6:11, 1928. - *Stereum mellisii* Sacc. Syll. Fung. 6:553, 1888.
Basidiocarps to 1.6 cm high and 0.6-4 cm wide, pliable and flexible when fresh, hard and curled with deflexed and bent margin when dried, usually single, rarely confluent and forming more compound structures, flabellate or spatulate to funnel-shaped, bay to brown with even darker chestnut coloured zones, occasionally with some paler zones, surface smooth and glabrous, hymenium smooth, ochre or grey-brown to almost black. Stipe to 3 cm long, dark brown to almost black, minutely tomentose (lens) to velutinate, attached to the substrate by a brown to ochraceous disc of mycelium, up to 5.0 mm wide
Hyphal system dimitic, generative hyphae 2.5-3 µm wide hyaline, thin-walled, branched, with clamp connections; skeletal hyphae, to 5 µm wide, hyaline, thick-walled, usually unbranched but rarely with short lateral branches of limited growth.
Pileocystidia absent.

Fig. 53. *Podoscypha mellisii* A) part of hymenium, B) metuloid cystidia c) basidiospores. Costa Rica, Ryvarden 29655.

Caulocystidia to 120 µm long, smooth, brown, thick-walled, straight or bent to sinuous, covering the whole stipe, originating deep in the context, and projecting up to 60 µm.
Metuloid cystidia to 60 µm long, usually abundant, smooth, hyaline, lanceolate and acute or cylindrical with rounded apices. Those deeply buried in the subhymenium and context are usually very thick-walled, whilst those in the hymenium often exhibit a thick-walled base thinning towards the apex.
Gloeocystidia to 90 µm long and to 12 µm wide, narrow, undulant, thin-walled with a swollen base, not as frequent as the metuloid cystidia.
Basidia 12-18 x 4-6 µm with 4 sterigmata.
Basidiospores 3-4 x 2.5-3 µm, ellipsoid, hyaline, thin-walled.
Substrate. On decayed hardwoods.
Distribution. Pantropical, but rare in America. Specimens have only been examined from Jamaica, Venezuela, Brazil and Costa Rica.
Remarks. The only stipitate American stereoid fungus with metuloid cystidia ! Macroscopically the hard basidiocarps (when dried) with dark shiny colours and very dark, finely tomentose stipe should make it possible to recognize in the field.

Podoscypha møllerii (Bres. & Henn.) D. A. Reid,
Beiheft Nova Hedwigia 18:202, 1965. - *Stereum mølleri* Bres. & Henn., Hedwigia 35:288, 1896.
Basidiocarps 1.0-2.0 cm wide, flabelliform, upper surface silky, dark blackish brown, with numerous, narrow, concentric zones and a whitish margin. Hymenium smooth and pallid. Stipe 5.0-7.0 mm long and 2.0 mm wide, flattened, dark blackish-brown and similarly zoned like the pilei, and often appearing as little more than a basal prolongation of the cap.
Hyphal system dimitic, generative hyphae 2-3 µm wide, hyaline, thin-walled, with clamp connections; skeletal hyphae, 3-5 µm wide, hyaline, thick-walled, unbranched.
Pileocystidia absent.
Caulocystidia projecting up to 90 µm, 5-8 µm wide, with thick brown walls, often constricted.
Gloeocystidia present, 5-7 µm wide, elongate, thin walled, cylindrical.
Basidia not seen.
Basidiospores 2.2-3.2 x 2-2.2 µm, broadly ellipsoid, hyaline, thin-walled.
Substrate On dead wood.
Distribution Known only from Brazil: Blumenau, St. Catharina.
Remarks Most easily distinguished by its dark, distinctly zonate pilei.

Podoscypha nitidula (Berk.) Pat. in Duss., Fig. 54
Enumuration champ. Guadeloupe Martinique p. 21, 1903. - *Stereum nitidulum* Berk. in Hooker's Lond. J. Bot. 2, 638, 1843. - *Stereum surinamense* Lév., Ann. Sci. nat. Series Ill, 2:209, 1844.
Basidiocarps to 1.2-4.0 (-8.0) cm high and 0.7-1.5(-5.0) cm wide, usually truly infundibuliform with a folded basidiocarps, although occasionally proliferating from within the cup, but very rarely flabellate specimens are produced, single, but when crowded together some basidiocarps may fuse along their adjacent margins, pilei dirty white, drying dark chestnut-brown, frequently ornamented with concentric zones of a lighter or darker shade, upper surface glabrous and often has a waxy, semi-translucent appearance, hymenium smooth, pale creamy-ochre to grey-brown, but in some basidiocarps marked with dark slate grey or blackish zones especially toward the margin, which is itself often chestnut-brown, stipe rudimentary to well formed and then up to 2.5 cm long and 1-2 mm wide, brown and with a fine cover of undifferentiated hyphae mixed with gloeocystidia, finally becoming glabrous.
Hyphal system dimitic, generative hyphae 2-4 wide thin-walled, hyaline, branched with clamp-connexions at the septa, skeletal hyphae, 3-5 µm wide, thick-walled often almost solid, hyaline and unbranched.
Pileocystidia absent.
Caulocystidia absent.
Gloeocystidia present, undulant, and may arise in the context, curve into the hymenium and many continue to grow as the hymenium thickens and may reach a length of 150 µm.
Basidia not seen.
Basidiospores 3.75-5.75 x 3-4 (-4.2) µm, broadly ellipsoid to subglobose.
Substrate. Usually terrestrial, but also found on dead wood.
Distribution. Known only from South America: Bolivia, Brazil, Guyana, Cuba, Dominican republic**,** Surinam and Trinidad.
Remarks. The lack of all types of cystidia on the surface of the basidiocarp and the oblong basidiospores characterize the speices.

Fig. 54. *Podoscypha nitidula* A) hymenium with gloeocystidia, B) basidiospores, Ecuador, Ryvarden44514.

Podoscypha ovalispora D. A. Reid,
Beiheft Nova Hedwigia 18:218, 1965.
Basidiocarp to 4.3 cm high, and 4.0 cm wide, flabellate with a very short stipe, margin deeply divided into numerous small lobes, upper surface yellowish, when fresh, uniformly very dark chestnut to almost black when dry, rather strongly radiately wrinkled and partly cracked in mature specimens, surface glabrous to the naked eye, although sparsely scurfy when viewed with a lens, due to the presence of scattered pileocystidia. Hymenium greyish rusty-brown, ornamented with radiating folds. Stipe to 8.0 mm. high and 1.5 mm. wide, densely tomentose to pubescent under a lens.
Hyphal system dimitic, generative hyphae 2.5-5 µm wide, hyaline, thin walled with clamp connections; skeletal hyphae, to 5 µm wide, thick-walled to almost solid.
Pileocystidia present, to 130 µm long and 8-17 µm wide, subcylindrical to clavate, very thick walled and almost solid.
Caulocystidia to 200 µm long, similar to the pileocystidia.
Gloeocystidia present, 30-50 x 4-8 µm**,** subcylindrical, elongate, thin-walled, with a slightly swollen base.
Basidia: not seen.
Basidiospores 5.5-7 x 4-4.7 µm, ovate, hyaline, thin-walled.
Substrate. On dead hardwoods
Distribution. Known only from Brazil.
Remarks. Readily distinguished amongst species of *Podoscypha* with pileo- and caulocystidia by the large oval basidiospores.

Podoscypha petalodes (Berk.) Pat. in Duss., Fig. 55
Enumeration champignons Guadeloupe et Martinique, p. 20-21, 1903. *Stereum petalodes* Berk., Ann. Mag. nat. Hist. Series 11, 9:198, 1852.
Basidiocarps to 2.0-8.0 cm high and 0.8-4.0 cm wide, spatulate or flabellate, usually clustered but discrete, although may form loose clusters in which adjacent basidiocarps become confluent, upper surface finely velutinate due to numerous pileocystidia or fine hair, especially towards the base, margins remaining glabrous, when fresh light brown to pinkish-brown becoming purplish-chestnut-brown, tawny-brown, golden-brown with a purplish tint or pale golden-brown, with darker concentric zones, hymenium ochraceous or greyish buff or concolorous with the pilei. Stipe short and rudimentary or well formed and elongate, minutely tomentose due to the presence of caulocystidia.

Hyphal system dimitic, generative hyphae 2.5-4.5 µm wide, hyaline, thin walled, with clamp connections; skeletal hyphae, 3.5-6.0 µm wide, thick-walled to almost solid, unbranched.
Pileocystidia 40-80 x 6-12 µm, subcylindrical or clavate with thickened walls.
Caulocystidia similar to the pileocystidia, thick-walled, protruding up to 130 µm.
Gloeocystidia abundant, elongate, thin-walled, with highly refractive contents.
Basidia clavate, with 4 sterigmata.
Basidiospores 3.7-5.0 x 2.5 -3.7 µm, ovate to ellipsoid, hyaline, thin-walled, often monoguttulate.
Substrate. On dead wood. Usually on logs, but occasionally terrestrial, then probably arising from buried wood.
Distribution. Bolivia, Costa Rica, Cuba, Dominican Republic**,** Trinidad, Uruguay, Brazil and Guadeloupe.
Remarks. The spatulate basidiocarp becoming purplish chestnut brown and with caulo- and pileocystidia should make it possible to identify this species.

Podoscypha ravenelii (Berk. & M. A. Curtis) Pat., Fig. 56
Essai tax. p. 71, 1900. - *Stereum ravenelii* Berk. & M. A. Curtis, Grevillea 1:162, 1873.
Stereum pergamenum Berk. & M. A. Curtis, Grevillea 1:161, 1873.
Basidiocarps to 2-10 cm high and 0-8-3.5 cm wide, infundibuliform, spatulate or flabellate, usually discrete but when growing in close proximity may become confluent , upper surface more or less smooth, minutely radiately wrinkled or lineate-striate with a distinct waxy lustre, whitish when young, drying pale orange, through reddish-brown, chestnut to dark purplish-chestnut brown, often with darker concentric zones. Hymenium smooth, creamy-ochre or grey-brown, with or without chestnut or blackish zones, to uniform dark purplish-slate-grey. Stipe to 1.5 cm long and 0.5-2.0 mm wide and may extend to the mycelial disk by which it is attached when growing on dead wood, minutely velvety, ochraceus to pale brown which.
Hyphal system dimitic, generative hyphae 2-5 µm wide, hyaline, thin-walled, branched, with clamp connections; skeletal hyphae 3-5 µm wide, hyaline, thick-walled to almost solid, unbranched.
Pileocystidia and c**aulocystidia** absent.
Gloeocystidia 30-50 x 5-6 µm, thin-walled, clavate to slightly sinuous.
Basidia not seen.
Basidiospores 3.7-5.2 x 2.5-3.5 µm, subglobose to ellipsoid, hyaline, thin walled.

Fig. 55. *Podoscypha petaloides* A) part of pileus with pileocystidia, B) basidiospores. Brazil, B. Lowy no 520.

Substrate. Usually terrestrial, but arising from buried wood. Occasionally occurring on dead wood above ground.
Distribution. Known from Brazil to southern part of United States.
Remarks. This species is very similar to *P. nitidula* and some authors have been inclined to treat them as one species. However, D. Reid (1965:247) concludes that the spores of the former are slightly smaller and narrower than those of the latter.

Podoscypha replicata (Lloyd) D. A. Reid.,
Beiheft Nova Hedw. 18:249, 1965. - *Stereum replicatum* Lloyd, Lloyd Mycological Writings 7:25, 1339.
Basidiocarps often in clusters from a common base, to 3.0 cm from the base of the stalk to the margin and to 6.0 cm. wide, individual pilei thick, reaching 1.5 mm near the stipe which expands on the substrate as a small, brown, tomentose disc, upper surface strongly ribbed and often with a number of thin lobes, brown and minutely tomentose especially toward the base. Hymenium grey, strongly radiately ribbed and extending along the underside of the stipe as far as the basal disc.
Hyphal system dimitic, generative hyphae 2-4 µm wide, hyaline, branched, with clamp connections; skeletal hyphae 4-6 µm wide, very thick-walled to almost solid.
Pileocystidia and c**aulocystidia** absent**.**
Gloeocystidia abundant, narrow, thin-walled, tapering gradually from a somewhat swollen base toward an obtuse or pointed apex.
Basidia 12-16 x 4-5 µm with 4 sterigmata.
Basidiospores 3-3.5 x 2-2.5 µm, ellipsoid, hyaline, thin-walled, with a single oil drop.
Substrate. On dead wood.
Distribution. Known only from Brazil.
Remarks. This species has the thickest basidiocarp of all the species of *Podoscypha*. It is closely related to *P. viridans* but differs in habit, especially with regard to the thickness of the basidiocarp, and in the type of tomentum covering the surface of the pilei.

Fig. 56. *Podoscypha ravenelii* A) hymenium with gloeocystidia B) basidiospores. Venezuela, Ryvarden 37691.

Podoscypha semiresupinata Welden,
Mycotaxon 48:78, 1993.
Basidiocarps to 4 cm wide, effused-reflexed, dorsally attached to the wood, semicircular to elongate, adjacent basidiocarp may fuse to more compound structures, pilei adpressed tomentose especially towards the substrate, white to ochraceous, smooth to slightly rugulose. Hymenium smooth, white to ochraceous,
Hyphal system dimitic, generative hyphae 2-4 µm wide, thin walled and with clamp connections, those of the tomentum on the pilei or lower side of the basidiocarp, up to 7 µm wide; skeletal hyphae 3-6 µm wide, hyaline, thick-walled.
Pileocystidia and **caulocystidia** absent.
Gloeocystidia present, to 85 µm long and 6-12 µm wide,
clavate to cylindrical.
Basidia 30-40 x 3.5-6 µm, clavate, with 4 sterigmata.
Basidiospores 4.5-7 x 3-4.5µm, ellipsoid, smooth, hyaline.
Substrate. On dead hardwoods.
Distribution. Known only from the type locality in Brazil, Rio de Janeiro
Remarks. Seems closely related to *P. caespitosa* and *P. glabrescens* both of which have shorter spores, and traces of a tomentum at the base which, in both species, also tapers to a rudimentary stipe.

Podoscypha thozetii (Berk.) Boidin, Fig. 57
Rev. Mycol., Paris 24:208, 1959. - *Stereum thozetii* Berk., J. Linn. Soc. 18:85, 1881. - *Stereum cyathoides* Henn., Hedwigia 37:284, 1898. - *Stereum warneckeana* Henn. Bot. Jahrb. 38:120, 1905.
Basidiocarps to 3.0 cm high and 2.0 cm wide, stipitate, infundibuliform to fanshaped, soft and semi-transparent when fresh, denser when dry, upper surface smooth, glabrous, pink to buff, becoming more brownish when dry and with indistinct concentric zones. Hymenium smooth, ochraceous to grey or isabelline. Stipe to 1.0 cm long and 3.0 mm wide, grey to pale brown, glabrous and slightly expanded towards the base.
Hyphal system dimitic, generative hyphae 2 - 4 µm wide, thin walled with clamp connections; skeletal hyphae 4-5.5 µm wide, hyaline, thick-walled to almost solid, unbranched,
Pileocystidia absent.
Caulocystidia absent.
Gloeocystidia present, 50-140 µm long and 8-15 µm wide, undulant, yellowish, thin-walled, tapering towards the apex.

Fig. 57. *Podoscypha thozetii* A) basidiocarp, B) part of hymenium with gloeocystidia c) part of skeletal hyphae d) basidiospores. Zimbabwe, Ryvarden 33926.

Basidia 30-45 x 4-8 µm, clavate with 4 sterigmata (occasionally 2 sterigmate), arranged in a dense palisade.
Basidiospores 6.5-7.5 x4.5-6 µm, broadly ellipsoid, hyaline, thin-walled, often monoguttulate.
Substrate. On culms or tufts of dead grasses.
Distribution. Southern United States, Mexico, South America: Venezuela, Panama. Widespread in the paleotropics and especially common in Africa.
Remarks The substrate, on dead grasses, should suffice for a field determination**.**

Podoscypha tomentipes (Overholts) D. A. Reid, Fig. 58
Beiheft Nova Hedwigia 18:255, 1965. - *Stereum tomentipes* Monogr. Univ. Puerto Rico, Biol. Sci. Series B. No. 2: 308, 1934.
Basidiocarps to 1.0-4.5 cm high and 0.3-2.0 cm wide, flabelliform, upper surface glabrous, pinkish-rusty-brown with indistinct concentric zones when fresh, orange-brown with conspicuous golden-brown zones or rich chestnut with silky sheen when dry, pilei very thin and often diaphanous when held to the light. Hymenium smooth, beige when fresh, becoming ochraceous-buff with a greyish bloom. Stipe up to 4 cm long, concolorous with the pilei, becoming dark brown with age, finely tomentose and covered with caulocystidia, arising from a basal disc of mycelium.
Hyphal system dimitic **[**generative hyphae 2-3 µm wide, thin walled **,** with clamp connections; skeletal hyphae, 4-5 µm wide, hyaline and thick walled**.**
Pileocystidia present, to 100 µm long and 5-8.5 µm wide, subcylindrical to clavate, those in older portions of the basidiocarp very thick-walled and often secondarily septate **Caulocystidia** present and abundant, to 120 µm long, and 9 µm wide, similar to the pileocystidia, with thick brown walls, in some cases appearing almost solid.
Gloeocystidia subcylindrical, elongate, thin-walled, with refractive hyaline contents, with a slightly swollen base.
Basidia 26-36.4 x 3-5 µm, clavate, hyaline, with 4 sterigmata.
Basidiospores 4-5 x 2-2.5 µm, narrowly ellipsoid to subcylindrical, hyaline, thin walled.
Substrate On dead hardwood**s.**
Distribution Known only from tropical South America: Bolivia, Brazil, Costa Rica, Venezuela, and from Cuba.
Remarks: Most closely related to *P. venustula* and *P. parvula* from which it may be distinguished by narrower and more elongate basidiospores.

Fig. 58. *Podoscypha tomentipes* A) part of hymenium with gloeocystidia, B) basidiospores, Costa Rica, Ryvarden 42701.

Podoscypha venustula (Speg.) D. A. Reid, Fig. 59
Beiheft Nova Hedw. 18:260, 1965. - *Thelephora venustula* Speg., An. Soc. cient. Argent. 19:36, 1885. - *Stereum flabellatum* Pat. Bull. Soc. mycol. Fr. 16:179, 1900. - *Stereogloeocystidium subflabellatum* Rick, Broteria 9:79, 1940.
Basidiocarps to 6 cm high, and 4.0 cm wide, gregarious, flabelliform, narrowing behind to a short but distinct stipe, often laterally fused to form compound structures, upper surface may be white or whitish, pale yellowish or pale cinnamon fawn when fresh, becoming pale to rusty-brown, purplish brown or chestnut to ochre-brown with lighter or darker zones when dried, glabrous but may be minutely radiately wrinkled, hymenium ochraceous-buff or ochraceous-fawn with a greyish to slate-grey or greyish-purple pruina. Stipe concolorous, finely tomentose, usually rather short, occasionally well developed.
Hyphal system dimitic, generative hyphae 2.5-5 (- 6) µm wide, hyaline, freely branched, with clamp connections; skeletal hyphae 3.5-6(-7) µm wide, hyaline**,** thick-walled to almost solid, unbranched.
Pileocystidia to 70 µm long and 13 µm wide, subcylindrical or clavate, with strongly thickened walls.
Caulocystidia similar to the pileocystidia but much longer, projecting up to 130 µm.
Gloeocystidia abundant, elongate, thin-walled with highly refractive contents.
Basidia not seen.
Basidiospores 3.2-4.7 x 2.2-3.5 µm, ovate to broadly ellipsoid, hyaline, thin-walled.
Substrate. On fallen branches and dead wood.
Distribution. South America: Brazil, Ecuador, Panama, Paraguay, Venezuela and Guadeloupe.
Remarks. The colour change from whitish to darker rusty brown, seems to be a distinct character for this species.

Fig. 59 *Podoscypha venustula* A) part of hymenium with gloeocystidia, B) caulocystidia, C) basidiospores, Puerto Rico, Ryvarden 40870.

Podoscypha viridans (Lloyd) D. A. Reid,
Beiheft Nova Hedwigia 18:274, 1965. - *Stereum viridans* Lloyd, Lloyd Mycol. Writings 7:1339, 1925. - *Stereogloeocystidium lobato-plicatum* Rick, Broteria 9:79, 1940.
Basidiocarps to 2.5 cm from point of attachment to the margin, and 0.5-2.2 cm wide, flabellate, narrowing behind into a more or less distinct, lateral stipe, sometimes becoming confluent, upper surface with a buff or slightly greenish, matted tomentum, at least toward the base, frequently becoming uniformly glabrous or zonately glabrous near the margin and then minutely radiately wrinkled with a distinct sheen, chestnut-brown to rich tawny-brown with darker concentric zones. The thickness of the tomentum varies considerably from a dense layer up to 0.3 mm thick, hymenium smooth, pale yellowish-brown to purplish-brown. Stipe to 1 cm long, and with a dark-brown or buff coloured tomentum.
Hyphal system dimitic, generative hyphae 2-4 µm wide, thin walled with clamp connections; skeletal hyphae, 4-5.5 µm wide, hyaline, thick-walled to almost solid, unbranched,
Pileocystidia present, but difficult to differentiate from surface hairs as they can reach 350 µm long, rarely forked towards the apex.
Caulocystidia to 120 µm long, present in the tomentum of the stipe.
Gloeocystidia to 130 µm long and 10 µm wide, undulant, hyaline, thin-walled, often constricted.
Basidia 12-20 x 4-6 µm**,** clavate, with 4 sterigmata.
Basidiospores 3-3.75 x 2-2-3 µm, broadly ellipsoid to ovate, hyaline, thin-walled, often monoguttulate.
Substrate. On dead wood.
Distribution. Known only from Brazil.
Remarks The species is well characterized by the ochraceous-buff or green tinted tomentum which, at least in part, covers the cap surface.

POROSTEREUM Pilat,
Bull. Soc. Mycol. Fr. 52:330, 1936.
Basidiome resupinate, effused-reflexed to distinctly pileate, broadly attached to dimidiate or fan shaped, upper surface tomentose to felty, often zonate, greyish to deep brown; hymenium smooth to tuberculate, becoming cracked with age, ochraceous, greyish to pinkish or dark brown; hyphal system di- or trimitic, generative hyphae with simple septa or clamp connections, skeletal hyphae pale to dark brown; pseudocystidia present or absent, pale brown, encrusted or smooth, cystidia mostly metuloid, hyaline to brown; basidia narrowly clavate

with 4 sterigmata; spores cylindrical to ellipsoid, smooth, hyaline, non amyloid, acyanophilous. Tropical to warm temperate zones.
Causing a white rot in hardwoods, rarely in conifers.
Type species: *Porostereum phellodendri* Pilat (= *Thelephora spadicea* Pers.:Fr.).
Remarks. Macroscopically similar to *Hjortstamia* and *Amylostereum*, but separated from the former by the simple septate generative hyphae, whilst the latter has amyloid spores. Related to *Lopharia* but has pale coloured basidiomes, hyaline metuloid cystidia and larger spores with grainy contents. See that genus for further comments.

Key to species

1. Hymenium ochraceous to beige, on wood of conifers, from higher elevations in Mexico .....**P. sharpianum**
1. Hymenium clay-coloured to dark brown or grey, on hardwoods, widespread species 2

2. Spores 13-15 um long, hyphal system monomitic .....**P. pilosiusculum**
2. Spores 5-8 um long, hyphal system dimitic..... 3

3. Hymenium lilaceous, spores ellipsoid, 6.5-7.5 µm long ..... **P.lilacinum**
3. Hymenium otherwise coloured, spores cylindrical 4.5-5 µm long .....**P. vibrans**

Porostereum lilacinum (Berk. & Br.) Hjortstam, Fig. 60
Kew Bull. 44:308, 1989. - *Corticium lilacinum* Berk. & Br., J. Linn. Soc. Bot. 14:70, 1873.
Basidiome resupinate, rarely with a reflexed margin, adnate and confluent; hymenium smooth, lilaceous to lilaceous-brown or partly pale brown.
Hyphal system dimitic, generative hyphae 3-6 µm wide, with clamp connections, hyaline to pale brown; skeletal hyphae 6-7 µm wide, brown, thick-walled with transitions to skeletocystidia, these abundant, 100-150 µm long, arising from generative hyphae and usually vertical, thick-walled, strongly apically encrusted, pale yellow in KOH.
Basidia 30-40 x 4-6 µm, subclavate, with 4 sterigmata and a basal clamp.
Spores 6.5-7.5 x 4.5-5 µm, ellipsoid, smooth, thin-walled, hyaline, non amyloid.
Substrate. On decayed hardwoods.
Distribution. Known from the type locality in Sri Lanka and also from South America: Brazil, Sao Paulo.
Remarks. Easily recognizable in the field due to the lilaceous colours.

Fig. 60 *Porostereum lilacinum* A) part of hymenium, B) skeletocystidium, C) basidia, D) basidiospores, E) generative hyphae, Sri Lanka, Broome 997 (lectotype K!).

Porostereum pilosiusculum Hjortstam & Ryvarden, Fig. 61
Synopsis Fung. 4:49, 1989.
Basidiome resupinate, rarely with a reflexed margin, 0.5-1 mm thick, hymenium more or less pilose with protruding cystidia, pale brown to hazel, strongly cracked to expose a brown, felty, stratified subiculum about 0.2-0.8 mm thick.
Hyphal system monomitic; subicular hyphae 5-7 µm wide, interwoven, brown, thick-walled; subhymenial hyphae 3-4 µm wide, hyaline to pale yellow. All hyphae with clamp connections.
Cystidia 100-150 x 10-15 µm wide (in the middle part), projecting up to 50 µm above the basidia, abundant, fusoid to ventricose, metuloid, yellowish-brown, and usually thick-walled.
Basidia 35-40 (60) x 6-8 µm, clavate, more or less sinuous, with 4 sterigmata and a basal clamp connection.
Spores 13-15 x 4-5 µm, ellipsoid to subcylindrical, often slightly sigmoid, smooth, hyaline, thin-walled, and with an oily content.
Substrate. On dead wood of an unknown deciduous tree.
Distribution. Known from the type locality in South America: Brazil, Sao Paulo, Parqe Estados das Fontes do Ipiranga.
Remarks. Deviating from others species in the genus (due to the projecting metuloid cystidia, not of skeletoid origin, large spores, monomitic hyphal system, and brown felty subiculum) but still *Porostereum* seems to be the best genus.

Porostereum sharpianum (Welden) Hjortstam & Ryvarden, Fig. 62
Synopsis Fung. 4.51, 1989. - *Lopharia sharpiana* Welden, Tulane Stud. Zool. Bot. 17:18, 1970.
Basidiome effused reflexed, single or fused into more compound basidiomes, up to 1.0 cm wide in reflexed portion and 1-5 mm thick in the basal part, coriaceous; upper surface initially finely tomentose, soon glabrous, sulcate, cinnamon brown when young, becoming dark brown to almost blackish when older, finely radially striate in the glabrous parts. Hymenium smooth to slightly tuberculate, ochraceous to beige, minutely cracked with age, distinctly stratose in section, young layers distinctly lighter than the older ones and separated by a thin black line, context dark brown towards the substrate and pileus, ochraceous in young parts.

Fig. 61. *Porostereum pilosiusculum*, A) part of hymenium, B) cystidia. C) basidiospores, D) generative hyphae , Brazil, Ryvarden 24340, Holotype O!

Fig. 62 *Porostereum sharpianum* A) section through basidiocarp, B) part of hymenium, C) basidia, D) basidiospores, E) skeletal hyphae, Mexico, A. Sharp, isotype,

Hyphal system dimitic, generative hyphae 2-3 (5) µm wide, hyaline, thin-walled and with clamp connections; skeletal hyphae 3-6 µm wide dominant in the basidiocarp, pale brown, thick-walled to almost solid, in the context more or less horizontal, bending into the subhymenium and hymenium as pointed skeletocystidia with a rounded to a more or less acute and sometimes widened apex.
Basidia 30-45 x 4-7 µm, clavate, slightly sinuous, with 4 sterigmata and a basal clamp,
Spores 6-7 x 2-3 µm, cylindrical to almost allantoid, hyaline, thin-walled, non amyloid.
Substrate. On dead wood of conifers. The type collection was on *Abies*. It may also occur on *Pinus*, but additional collections are needed to verify this.
Distribution. Known only from high elevations (3000-3200 m) in Mexico.
Remarks. Characterized by the reflexed, stratified, basidiome with a distinct black line separating the pileus and parts of the context, the skeletocystidia and the cylindrical spores.

Porostereum vibrans (Berk. & W. A. Curtis) Ryvarden, Fig. 63
Synopsis Fung. 18: 2003. - *Stereum vibrans* Berk. & W. A. Curtis, Journ. Linn. Soc. Bot. 10:332, 1868. - *Aquascypha vibrans* (Berk. & M. A. Curtis) Welden . J. Tenness. Acad. Sci. 42:81, 1967.
Basidiocarp effused-reflexed to distinctly pileate, tough when fresh, harder when dried, up to 2 mm thick; pilei to 5.0 cm wide, dimidiate to broadly attached and often laterally fused to adjacent basidiocarps or densely imbricate, often lobed and wavy, permanently tomentose – hirsute, densely zoned, dark brown, with a black cuticle present below the tomentum, hymenium smooth or (reflecting growth zones) wavy, pale brown to deep isabelline with a violet tinge, context dark brown.
Hyphal system trimitic, generative hyphae 2-5 µm wide, hyaline, with clamp connections; skeletal hyphae 3-6 µm wide, dominant in the basidiocarp, brown, thick walled to solid, with smooth ends, bending from the subhymenium into the hymenium, to form a catahymenium. Binding hyphae 2-4 µm wide, present but sparse, sparingly branched, pale brown and apparently solid.
Cystidia absent.
Basidia 15-20 x 5-7 µm, clavate, with 4 sterigmata and a basal clamp.
Basidiospores 4.5-5 x 1.5-2 µm, cylindrical, thin-walled smooth, non-amyloid,
Substrata. On dead hardwoods, causing a white rot.

Fig. 63. *Porostereum vibrans* a) part of hymenium …

Distribution. Tropical America. The type collection is from Cuba. Known also from Jamaica, Ecuador, Costa Rica, Trinidad, Guatemala, Brazil and Colombia (based on collections in herb. K and Oslo, with information in Welden (1967) and on the internet).
Remarks. In the field easily confused with *Xylobolus subpileatum*, which is macroscopically similar, but that has amyloid spores and acanthophyses, and is thus easily distinguished microscopically.

PUNCTULARIA Pat. & Lagerh.,
Bull. Herb. Boiss. 3 p. 57, 1895. – *Phaeophlebia* W.Br. Cooke, Mycologia 48: 401, 1956.
Basidiocarp resupinate, reflexed or dimidiate; hymenium subgelatinous, composed of hemispherical nodules or elongate, radial ridges; upper side of reflexed parts zonate; margin determined, narrow, finely fimbriate or velutinous; hyphal system monomitic, hymenial hyphae thin-walled, richly branched, tramal hyphae mainly parallel and horizontal, with more or less thickened walls, swelling in KOH, all hyphae with clamps; dendrohyphidia present, hyaline at first, then yellow or dark-coloured; conidia often present; basidia elongate, flexuous, with 4 sterigmata and basal clamp; spores ellipsoid, hyaline - yellow.
Type species: *Corticium tuberculosum* Pat.
Remarks. The genus is characterized by its dark basidiocarp and the numerous dendrohyphidia.

Punctularia strigozonata (Schw.) Talbot Fig. 64
Bothalia 7:1 p. 143, 1958. - *Merulius strigozonatus* Schw., Trans. Am. Phil. Soc. n.s. 4 p. 160, 1834.
Basidiocarps resupinate or often reflexed, orbicular and confluent to rather large size, upper side of refl4xed part zonate with black brown concentric furrows of totally conglutinate hyphae, and lighter brown ridges, velutinous by projecting hyphal-ends; oldest part often ash-grey; margin bright yellow brown to reddish-brown; hymenium dark brown - violaceous, gelatinous in the wet living state, drying hard, in the youngest state smooth, then with elongate, radial ridges or irregular tubercules, when fertile with a whitish pruina of spore deposits.

Fig. 64. *Punctularia strigosozonata* a) schematic section of basidiocarp, b) pileus, c) hymenium and subhymenium, d) basal hyphae, e) basidium and dendrohyphida f) hyphae, g) basidiospores h) sterile hyphae. Estonia, Parmasto 1423. Del. John Eriksson.

Hyphal system monomitic; all hyphae with clamps, those of the upper side and next to the substrate pigmented brown, about 5 µm wide, often encrusted with lumps of excreted resinous matter, and forming a layer, 30-50 µm thick or sometimes more; major part of the trama composed of mainly hyaline, more or less horizontal hyphae with thick walls, swelling in KOH and with sparse clamps and branches, this layer reaching a thickness of 500-1000 µm; from this trama layer the subhymenium is formed, thickens with age to about 100 µm, composed of vertical, densely interwoven hyphae with thinner walls producing the basidia; in older basidiocarps the hyphae producing the basidia; in older ones the hyphae producing the dendrohyphidia may become pigmented brown, other hyphae hyaline or slightly yellowish.
Cystidia none.
Dendrohyphidia numerous, richly branched, at first hyaline, then yellowish and in older hymenia grey-brown, in the furrows between the hymenial ridges the hymenial layer may be formed by dendrohyphidia alone, in such spots sometimes covered with a layer of crystals, visible to the eye as white patches.
Basidia in the immature state tube-like, flexuosa, when mature apically widened and projecting, 40-50(-80= x 4-5 µm, with 4 sterigmata; in hymenia with rich development of dendrohyphidia a catahymenium-like structure is formed.
Basidiospores 6.5-8.5 x 3.5-4.5 µm, ellipsoid to ovate, adaxial side straight or somewhat convex, rarely slightly concave, smooth, thin-walled, new spores hyaline or yellowish, old enclosed spores brown, non-amyloid, non-cyanophilous.
Substrate. On hardwoods.
Distribution. Widely distributed in warm-temperate and tropical areas all over the world.
Remarks. Easy to recognize because of its dark colour, red-brown margin and numerous dendrohyphidia.

STEREOPSIS D. A. Reid,
Beiheft Nova Hedw. 18:290, 1965.
Basidiocarps lignicolous or terrestrial (but then usually attached to buried wood), coriaceous, pleuropodal, spatulate, flabellate, pseudo-infundibuliform or (rarely) truly infundibuliform, discrete or confluent, sometimes in small rosettes, upper surface glabrous, in dried specimens often radiately rugulose, hymenium smooth or indistinctly radially rugulose, hyphal system monomitic, generative hyphae with or without clamp connections, cystidia absent, gloeocystidia present in some species, basidiospores smooth, hyaline, non-amyloid, broadly elliptical to subglobose, often with a prominent lateral apiculus.
Type species: *Stereum radicans* (Berk.) D. A. Reid

Remarks. Characterized by a monomitic hyphal system and fairly large basidiocarps lacking coralloid hyphal structures or large cylindrical cystidia.

Key to species

1. Gloeocystidia present in hymenium .....**S. radicans**
1. Gloeocystidia absent 2

2. Generative hyphae with simple septate .....**S.burtianum**
2. Generative hyphae with clamp connections 3

3. Basidiocarp black to dark brown, tropical South American species..**S. nigripes**
3. Basidiocarps differently coloured, widespread species 4

4. Boreal, on wood of conifers or on the ground in coniferous woodland, basidiospores longer than 6.5 µm ..... **S. humphreyi**
4. Tropical to warm temperate, in broad leaved forest, basidiospores shorter than 6.6 µm .....**S. hiscens**

Stereopsis burtianum (Peck) D. A. Reid,
Beiheft Nova Hedw. 18:292, 1965. - *Stereum burtianum* Peck, Rep. N.Y. St. Mus. No. 57:21, 1904.
Basidiocarps up to 3 cm high, and 2.5 cm wide, thin, submembranous, coriaceous, usually truly infundibuliform, rarely spatulate, adjacent basidiocarps frequently confluent.
Pilei somewhat shiny, pale, often with brown shades, becoming pale ochraceous-brown, more or less zonate in shades of grey-brown, surface, often with numerous, but rarely prominent, radiating, fibrillose strands of hyphae when viewed with a lens, these especially seen towards the base of the funnel, hymenial surface smooth or faintly radiately striate, pale buff to ochraceous-buff, drying pale creamy-ochraceous. Stipe 3-8 mm long and 1-1.5 mm thick, short, tough, solid, minutely tomentose or pruinose-tomentose, becoming concolorous with the pileus in herbarium material.
Hyphal system monomitic, generative hyphae 2.5-3.5 µm wide and with simple septa,.
Cystidia absent.
Gloeocystidia absent.
Basidia 15-20 x 5 µm, clavate and with 4 sterigmata.
Basidiospores 3.5-5 x 2.5-3.5 µm, smooth, hyaline, thin-walled, broadly elliptic to subglobose, with a minute lateral apiculus, non amyloid.
Substrata: Terrestrial,

Distribution: North and South America. Possibly also from Japan.
Remarks. The simple septate generative hyphae and the lack of gloeocystidia set this species apart from the other species in the genus.

Stereopsis hiscens Berk. & Rav.) D. A. Reid,
Beiheft Nova Hedw. 18:298, 1965. - *Thelephora hiscens* Berk. & Rav., Grevillea 1:148, 1873. - *Thelephora ravenelii* Berk., Grevillea 1:148, 1873. - *Thelephora pusilla* Currey, Trans. Linn. Soc. Lond. Series 11, 1:126, 1876. - *Thelephora circinella* Pat. & Gaill., Bull. Soc. mycol. Fr. 4: 38, 1888. - *Thelephora ninh-thaiensis* Pat., J. Bot., Paris 11: 34, 1897. - *Thelephora tentaculata* Pat., Bull. Soc. mycol. Fr. 15, 201, 1899. - *Thelephora pusiola* Pat. in Duss, Enum. Champ. Guadeloupe et Martinique 12, 1903. - *Stereum insolitum* Lloyd, Lloyd Mycol. Writings 5:665, 1917. - *Stereum incisum* Lloyd Lloyd Mycol. Writ. 6:988, 1920. - *Stereum cuneoforme* Lloyd, Lloyd Mycol. Writ. 6:988-989, 1920. - *Stereum multifidum* Lloyd Lloyd Mycol. Writ. 7:1311, 1924. - *Stereum divisum* Petch, Ann. R. Bot. Gdns, Peradeniya 9:270, 1925. - *Podoscypha intermedia* Pat. Mem. Acad. Malagache 6:11-12, 1928.
Basidiocarps erect, 1-3 (-6) cm high, either discrete or becoming confluent and then large, complicated, and rosette-like or clavaroid with flattened branches. Upper surface when fresh variable in colour, pale yellowish, pale ochraceous drab, or greyish white, becoming dingy purple or vinaceous in all parts on bruising; dried specimens light brown to greyish-brown with faint zonation, with the surface smooth or minutely adpressed silky-fibrillose.
Hymenium smooth, dark bluish-grey, greyish-purple, or vinaceous-umber, becoming dark purplish-grey or brownish-vinaceous when dried. Stipe to 3.0 cm long, simple or branched, white, pallid yellowish or greyish. Context to 0.35 cm thick near the base of the basidiocarp, coriaceous, firm, pale wood-coloured, or pallid ochraceous, with faint darker zones near the margin. Smell rather strong, polyporoid.
Hyphal system monomitic: generative hyphae 2.5-3.5 (- 5) µm wide, hyaline or very pale brown, with clamp connections.
Cystidia absent.
Gloeocystidia absent,
Basidia 12-24 x 5-7 µm, broadly clavate and with 4 sterigmata.
Basidiospores 4.5-6.5(- 8) x 3-5-5.5 (-7) um, smooth, hyaline, becoming faintly brownish when buried in the hymenial tissue, broadly ovate to subglobose, non amyloid, usually collapsed in dried material and then difficult to revive.
Substrata Terrestrial, but probably arising from buried wood or roots.
Distribution Occurs in most tropical or subtropical regions throughout the world.

Remarks The branching and splitting of basidiocarps, combined with the fusion of adjacent ones, make this probably the most variable in macroscopic appearance of all stipitate stereoid fungi.

Stereopsis humphreyi (Burt.) Redhead & D. A. Reid,
Can. J. Bot. 61:3088, 1983. - *Craterellus humphreyi* Burt, Ann. Mo. Bot. Gard. 1:344, 1914.
Basidiocarps stipitate, up to 3.0 cm, high and 3.0 cm wide, solitary, or rarely two to three pilei together, narrowly reniform or flabelliform becoming more or less circular with the two lobes almost overlapping and with undulating margin. Upper surface dull white, initially with a silky appearance, then more or less glabrous to slightly rugulose and somewhat more floccose or scaly towards the stipe. Hymenial surface well defined, often decurrent onto the stipe, cream coloured, smooth, stipe up to 3.0 cm long and 3.0 mm in diameter, tough and dense, initially white, becoming slightly cinnamon, velutinate to pubescent but becoming glabrous from the top, strigose at the point of attachment.
Hyphal system monomitic, generative hyphae, 2-4 µm wide, with clamp connections.
Cystidia absent.
Gloeocystidia absent.
Basidia 30-50 x 3.5-6 µm, clavate, with 4 sterigmata and with a basal clamp.
Basidiospores 6.5-9 x 3.5-5.5 µm, smooth, hyaline, ellipsoid to subglobose, non amyloid.
Substrata. Terrestrial in coniferous forest, or on wood of conifers such as *Picea* and *Tsuga*.
Distribution. Known from Canada and the north of the United States.
Remarks. Seemingly restricted to coniferous forests or coniferous wood, thus, easy to separate from the other *Stereopsis* spp. described here.

Stereopsis nigripes D. A. Reid,
Beiheft Nova Hedw. 18:312, 1965.
Basidiocarps to 5.5 cm high and 1-1.5 cm wide, solitary, spatulate, or narrowly flabelliform, usually simple but occasionally with 2-3 pilei. Pilei strongly inclined vertically, minutely pruinose-subvillose and appearing almost powdery when viewed with a lens, initially white, becoming more or less deep brown to dark greyish, retaining a white margin, darker and almost blackish when dry. Hymenial surface sharply delimited from the stipe, smooth, waxy, pale ochraceous-fawn becoming dark grey to brown or almost black. Stipe 2.0-3.0 cm long and 2.0-3.0 mm wide, uneven, erect, dull, black, matt, appearing relatively

long compared with the pileus. Context soft, fibrillose-subcoriaceous, brownish with darker zones. The whole basidiocarp becomes exceedingly brittle when dry.
Hyphal system monomitic, generative hyphae 2.5-3 µm wide hyaline to pale brown, with clamp connections.
Cystidia absent.
Gloeocystidia absent.
Basidia 14-22 x 4-8 µm**,** clavate, usually with 4 sterigmata, but the presence of occasional large spores on the hymenium is indicative that 2 spored basidia are also produced.
Basidiospores 5-8 (-9.5) x 3.5-5 µm, smooth, hyaline to subhyaline, with very pale brown granular contents, elongate-elliptic to ovate or even subglobose, non amyloid.
Substrata: Terrestrial in woodland and forests, but probably arising from dead roots.
Distribution: South America. Known from Peru and Ecuador.
Remarks A very distinctive fungus, with a long, narrow, black stipe bearing a rather small dark pileus, which could easily be mistaken for the conidial state of some *Xylaria* at a casual glance.

Stereopsis radicans (Berk.) D. A. Reid,
Beiheft Nova Hedwigia 18:314, 1965. - *Thelephora radicans* Berk., Hooker's Lond. J. Bot. 3, 190, 1844. - *Thelephora acanthacea* Lev., Ann. Sci. nat. Series Ill, 5:147, 1846. - *Thelephora xerantha* Berk. & M. A. Curtis, Proc. Amer. Acad. Arts Sci. 4:123, 1860. - *Cladoderris thwaitesii* Berk. & Br., J. Linn. Soc. (Bot.) 14:63, 1873. - *Stereum auriforme* Lloyd, Lloyd Mycol. Writ. 7:1246, 1924. - *Stereum lignosum* Lloyd, Lloyd Mycol. Writ. 7:1336, 1925.
Basidiocarps 1.3-9.0 cm high, 0.3-4.0(-9.0) cm wide, solitary, gregarious or subcaespitose, considerably variable in shape, from narrowly spatulate or flabellate to pseudo-infundibuliform, the variability often compounded by fusion of adjacent basidiocarps to form large amorphous masses extending for several centimetres (-12.0 cm). Upper surface minutely radially fibrillose when viewed with a lens, initially white then pale cream, pale tan or ochraceous, with faint darker zones, darker yellowish-tan in old specimens, hymenial surface smooth or thrown into undulating radial folds, waxy, pale tan-ochraceous or pale cinnamon-ochraceous becoming dingy vinaceous-drab from the base, stipe 0.5-4.5 cm long, 2.0-10.0 mm wide, white, subtomentose or nearly smooth, often with white mycelial fibrils at the base, becoming darker when dried. Context subcoriaceous, fibrillose, white or pallid, brittle when fresh, becoming tough when dried. When fresh, all parts of the basidiocarps rapidly become dull

purplish or dull vinaceous-brown where bruised or handled. Smell rather strong, fungoid.
Hyphal system monomitic, generative hyphae, 2-3.5 µm wide with clamp connections (which can be difficult to demonstrate). Frequently, some hyphae are found with long, unbranched, aseptate segments which may become thick-walled, and are easily then mistaken for skeletal hyphae unless traced along their length, when they will be seen to be normal thin-walled, clamped hyphae at either end.
Cystidia absent.
Gloeocystidia 4-8 µm wide**,** cylindrical, and often very abundant.
Basidia 40-70 x 5-8 um, narrowly clavate, bisporic with 2 large sterigmata, these up to 8-13 µm long and 1.5 µm wide at the base.
Basidiospores (5) 6-8 x 5-7.5 µm, hyaline, but often stained brown when buried in the thickening hymenium, ellipsoid to broadly ellipsoid to subglobose, with a distinct and often slightly oblique apiculus, rapidly collapsed and often appearing angular or irregular in herbarium material.
Substrata: Terrestrial, but arising from dead wood or roots. Often found growing amongst the roots of bamboo.
Distribution: Known from most tropical and subtropical regions of the world.
Remarks. The rapid colour change to purplish or dark brown when the basidiocarp is handled or bruised, is a very distinct character for this species and not easily forgotten once experienced. The basidiocarps are thicker than for the other species described here and this and the long unbranched segments of the generative hyphae may mislead the observer to think he has a *Podoscypha* species at hand.

STEREUM Pers. ,
Neues Mag. Bot. 1:110, 1794.
Basidiocarps annual or perennial, resupinate, orbicular, effused- reflexed to pileate, tough and pliable to hard, pileus (if present) initially tomentose, hispid or velutinous, tomentum white to rusty brown, in most species becoming glabrous in zones to expose a dark coloured cuticle; hymenium smooth to slightly tuberculate, yellow, clay-coloured, orange to beige, some species (in living condition) bleeding or discolouring bright yellow, red or purplish red where damaged; hymenium homogenous or stratose, context thin and dense, in most species separated from the tomentum by a thin brown zone this becoming the cuticle when exposed by loss of the tomentum; hyphal system dimitic, generative hyphae with simple septa, skeletal hyphae moderately thick-walled, hyaline to yellowish.
Cystidia present, of three types,

1. skeletocystidia, smooth, hyaline to yellow to light brown, filled with an oily to granular substance, thick-walled except in the apical part, where often constricted and with one, or occasionally two, schizopapillae, normally originating from horizontal skeletal hyphae in the trama which bend into the hymenium.
2. Acutocystidia, smooth and with a pointed apex.
3. Pseudoacanthocystidia with a few protuberances near the apex.
Basidia elongate to clavate, with 4 sterigmata; spores ellipsoid to narrowly ellipsoid to cylindrical, often slightly bent, thin-walled, smooth, hyaline and amyloid.
Cosmopolitan genus causing a white rot in wood of hardwoods and conifers.
Type species: *Stereum hirsutum* (Willd.) S.F. Gray.
Remarks. The genus is well defined by the dimitic hyphal system with simple-septate hyphae, oleiferous skeletocystidia (present in all species), acutocystidia and acanthocystidia (in some species), and smooth, amyloid spores.
However, as is often the case, if a genus is easy to identify, species within it are often difficult to separate! This is the situation in *Stereum* since clamp connections are always absent, and there are probably different strains with morphological characters that may seemingly warrant specific separation.
In some of the complexes described here, especially *S. versiforme*, many 'species' have been described, these based on rather subtle differentiating characters. Here, *S. versiforme* is regarded as a single species displaying rather wide variations in basidiocarp morphology and characteristics.

Key to *Stereum* in America

1. On coniferous wood ..... **S. sanguinolentum**
1. On hardwoods 2

2. Hymenium bleeding when damaged, in fresh condition 3
2. Hymenium not bleeding 6

3. Bleeding red when damaged 4
3. Bleeding yellowish or rarely slightly reddish 5

4. Hymenial surface pale orange, resupinate or with a narrow, black, glabrous pileus ..... **S. rugosum**
4. Hymenial surface greyish to pale brown, pileus hirsute, mostly on *Quercus* ..... **S. gausapatum**

5. Boreal-temperate, pseudo-acanthocystidia absent .....**S. atrorubrum**
5. Tropical to subtropical, pseudo-acanthocystidia present ..... S**. versicolor**

6. Acanthocystidia present, mostly tropical 7
6. Acanthocystidia absent, widespread, but predominantly warm temperate to boreal 8

7. Pileus adpressed tomentose to velutinate, whitish-grey to pale brown, tomentum often intermixed with brown glabrous zones, basidiospores 2-3 µm wide, very common ..... **S. versicolor**
7. Pileus tomentose to hirsute, pinkish brown to deep brown lacking glabrous zones, basidiospores 3-4 µm wide, rare ..... S**. illudens**

8. On *Nothofagus*, basidiospores 14-17 µm .....**S. antarcticum**
8. On other hosts, basidiospores shorter than 12 µm 9

9. Pileus initially velutinate, radially striate and shiny, with age glabrous, whitish, grey to pale orange, no cuticle between tomentum and context .....**S. striatum**
9. Pileus, velutinate, tomentose to hirsute in concentric zones, whitish grey, with age yellowish grey to dirty brown, dark line absent or present between tomentum and context 10

10. Basidiocarp to 6.0 cm wide, flabelliform to spatulate with contracted base, upper surface whitish grey, tomentum often eroded in zones to exposepartly of completely a reddish brown cuticle; bleeding bright to dull yellowish when fresh .....**S. atrorubrum**
10. Basidiocarps rarely bigger than 3.0 cm wide, resupinate, effused-reflexed to cupulate, broadly attached to the substrate, upper surface whitish grey to brownish, tomentum mostly persistent, rarely eroded with age to show a few indistinct zones; never bleeding when fresh 11

11. Basidiocarps usually distinctly pileate, to 4.0 cm wide and 2.0 mm thick, stiff when dry, hymenium orange yellow, tomentum hirsute to striate, dark line always present between tomentum and context .....**S. hirsutum**
11. Basidiocarps cupulate to effused reflexed, often attached by a central point, 0.5-0.8 mm thick, flexible (because of the thin basidiocarp), hymenium ochraceous yellow, tomentum thin and adpressed, soft and velutinous**,** dark line between tomentum and context absent in young basidiocarp, and only weakly developed in old specimens .....**S. ochraceo-flavum**

Stereum antarcticum (Speg.) Rajchenb., Fig. 65
Sydowia 40.248, 1987. - *Aleurodiscus antarcticus* (Speg.) Nunez & Ryvarden, Synopsis Fung. 12.43, 1997. - *Corticium antarcticum* Speg., Bol. Acad. Nacional Cienc. Cordoba 11:170, 1887. - *Stereum magellanicum* Hjortstam & Ryvarden, Trans. Br. Mycol. Soc. 89:114, 1987.
Basidiocarp annual to perennial, stereoid to cupulate, dorsally attached, to 2.0 x 1.5 cm, and 1.2 cm thick at point of attachment, margin incurved when dry, abhymenial surface covered with appressed brown hairs under which there is a thin cuticle. Hymenium pale yellow to beige, smooth, finely cracked when old, to 300 µm deep in undifferentiated zones, context to 800 µm thick, pale brown and with an upper thin, black cuticle.
Hyphal system dimitic, generative hyphae 3 -8 µm wide, with simple septa, thin- to very thick-walled, initially hyaline, then pale brown in the cuticle and on the abhymenial surface; skeletal hyphae 4-8 µm wide, abundant in the context, pale brown in the abhymenial hairs and bending into the hymenium as skeletocystidia (see below).
Cystidia present as skeletocystidia, 4-8 µm at the base, swelling to 12 µm near the apex, smooth to finely encrusted with small brown grains, thick-walled except for the rounded apex.
Basidia clavate, to 150 µm long, with 4 sterigmata.
Basidiospores 14-17 x 8-10 µm, ellipsoid, smooth, thin-walled, amyloid.
Substrata. Known only from dead *Nothofagus.*
Distribution. Known only from Tierra del Fuego in Argentina, but may have a wider distribution in the *Nothofagus* zone in South America.
Remarks. This species is easy to recognize, partly because of the host and its distribution, but also by the large basidiospores, much larger for any of the other species described here.

Fig. 65. *Stereum antarcticum* A) skeletocystidia, B) basidium, C) basidiospores, D) section through basidiocarp, Argentina, Ryvarden, holotype of *Stereum magellanicum*.

Stereum atrorubrum Ellis & Everh**.**, Fig. 66
Proc. Acad. nat. Sci. Philad., 1890 42: 219, 1890 (NY!). - *Stereum subtomentosum* Pouzar, Ceska Mykol. 18:147-148, 1964.
Basidiocarp annual, normally reflexed with a distinct pileus, commonly in dense imbricate clusters, occasionally singly, coriaceous and tough, pilei to 5.0 cm wide and, in fused basidiocarps, 3.0-7.0 cm long, fan shaped to spatulate with a distinctly tapering, short, stipe-like base, or may also be broadly attached, lobed and undulate, involute especially when dried, upper surface initially finely tomentose to velutinous, in narrow zones, yellowish grey to pale brown often more hirsute and grey in older specimens, sometimes with a greenish tint at the base due to algal growth in the tomentum, some of the zones may be separated by dark bands reflecting distinct stages in the development, margin thin and light-coloured, hymenial surface smooth, tuberculate or undulate, light beige to ochraceous, when fresh, immediately bright to dull yellowish damaged; context beige to ochraceous, separated from the tomentum by a distinct, dark brown zone of agglutinated hyphae.
Hyphal system dimitic, consisting of simple septate generative hyphae, 3-6 µm wide, in the hymenium thin-walled and abundantly branched; skeletal hyphae 3-10 µm wide, thick-walled and sparsely branched, present in the cortex and the tomentum, often with adventitious 'septa' of contracted protoplasm.
Cystidia present, of two kinds:
1) Skeletocystidia 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia and often with an apical appendix.
2) Acutocystidia 35-40 x 4-5 µm, abundant, projecting slightly above the basidia.
Basidia 25-40 x 4-6 µm, clavate, with 4 sterigmata.
Basidiospores 5.5-8 x 2-3 µm, cylindrical to narrowly ellipsoid, often slightly bent, thin-walled, smooth and amyloid.
Substrate. On dead wood of hard wood trees.
Distribution. Previously confused with *S. versicolor*, and not well known in America! Widespread in the boreal zone and circumglobal to England in Western Europe.
Remarks. Easily recognizable in the field due to large, often distinctly fan shaped to spatulate basidiocarps, soft velutinous tomentum and the yellowish bleeding reaction when fresh. The species has more or less the same type of basidiocarp as *S. versicolor* which however is a tropical species with pseudoacanthocystidia.

Fig. 66. *Stereum atrorubrum*, sections though hymenium, a) from *Alnus* Eriksson 10423, Uppland, Sweden, b) from *Tilia*, Eriksson 9233, Quebec, Canada, c) basidiospores, Eriksson 7321, N. West Territory, Canada, d) from *Alnus*, Øland, Sweden, Hjortstam 10414. Del. J. Eriksson. From specimens named *S. subtomentosum*.

Stereum gausapatum (Fr.) Fr., Fig. 67
Hymenomycetes Europ. p. 638, 1874. - *Thelephora gausapata* Fr., Elenchus fung. 1: 171, 1828.
Basidiocarps effused, resupinate to reflexed, orbicular and confluent, tough when fresh, rather hard when dried, to 1.0 mm thick; pilei dimidiate to broadly attached, lobed, often laterally fused, to 2.0 cm wide, tomentose or velutinous in narrow zones, grey to pale brown and almost rusty brown with age; tomentum present on the pileus, eventually eroded to expose a glabrous, dark brown cortex, margin paler than the rest of the surface.
Hymenium smooth to tuberculate, in larger specimens often partially folded in a radial pattern, wood-coloured to pale olivaceous or buff, darker with age, distinctly red or reddish when damaged, then discoloured to shades of reddish-brown or brown. Context pale ochraceous, to 0.5 mm thick, separated from the tomentum by a thick, dark-brown zone of compacted hyphae to 25-75 µm thick.
Hyphal system dimitic, generative hyphae simple-septate, 2-5 mm wide, skeletal hyphae thin- to thick-walled, with transitions to skeletocystidia. In the cortex and tomentum thick-walled, not or only sparsely branched, strongly pigmented and agglutinated by a resinous substance.
Cystidia present, of two kinds:
1. **Skeletocystidia** 5-10 µm wide and often more than 150 µm long, thick-walled except in the apical part, hyaline to yellowish, filled with grainy to oily contents.
2. **Acutocystidia** 20-30 x 2-4 µm, projecting slightly above the basidia and easily observed in thin sections.
Basidia 30-60 x 4-6(-8) µm, elongate clavate, with 4 sterigmata.
Basidiospores 6-9(-10) x 3.5-4.5 µm, ellipsoid to narrowly ellipsoid, thin-walled, smooth, amyloid.
Substrate. On dead wood. Most frequent on *Quercus* spp., often dead standing trunks with still attached branches, less commonly on fallen trunks or branches.
Distribution. Follows *Quercus* throughout its range, i.e. south to Colombia.
Remarks. Easily recognizable in the field by the bleeding reaction of the hymenium and by the host.

Fig. 67. *Stereum gausapatum* a) basidia b) acutocystidia, c) subhymenial hyphae, d) skeletocystidia, e) basidiospores. Eriksson, s. n. Sweden, del. John Eriksson.

Stereum hirsutum (Willd.:Fr.) S.F. Gray., Fig. 68-69
Nat. Arr. Br. Pl. 1: 653, 1821. - *Thelephora hirsuta* Willd.:Fr., Syst. mycol. I: 439, 1821. -
Thelephora hirsuta Willd., Fl. Berol. Prodr. p. 397, 1787.
Basidiocarps effused-reflexed to distinctly pileate, more rarely resupinate or orbicular, with a distinct margin, tough when fresh, harder when dried, to 2.0 mm thick, pilei to 3.0 cm wide, dimidiate to broadly attached, often laterally fused or densely imbricate, often lobed and wavy, upper surface tomentose, hirsute or hispid, generally zonate, initially white, becoming greyish to unevenly dirty brown; with age the tomentum erodes to expose a glabrous, brown cortex. Hymenium smooth to tuberculate, greyish to yellowish or pale orange, with a white margin in actively growing specimens, later more yellow to ochraceous, and, in dead and hibernating specimens, almost buff, context yellow to ochraceous, to 1.0 mm thick.
Hyphal system dimitic, generative hyphae simple-septate, 2-5 µm wide, skeletal hyphae thin- to slightly thick-walled and frequently branched; in the trama 4-6 µm wide, thick-walled, and infrequently branched and bending into the hymenium as skeletocystidia, in the cortex, yellowish brown and thick-walled, and in the tomentum 5-8 µm wide, thick-walled, with numerous adventitious septa.
Cystidia present, of two kinds:
1. **Skeletocystidia** 7-10 µm wide and often more than 100 µm long, abundant, thick-walled except for the apical part, sometimes with a schizopapillae, in the upper part filled with oily contents, not or rarely projecting above the basidia, arising from the trama and forming a fairly dense layer next to the hymenium.
2. **Acutocystidia** 20-30 x 2-4 µm, abundant, projecting slightly above the basidia and easily observed in a thin section.
Basidia 25-60 x 3-5 µm, elongated clavate, with 4 sterigmata.
Basidiospores 5-8 x 2-4(-3.5) µm, narrowly ellipsoid to cylindrical, thin-walled, smooth, amyloid.
Substrate. On dead wood, of almost any genus of hardwood trees.
Distribution. Cosmopolitan. Common in temperate areas, rarer in tropical ones.
Remarks. Easily recognized by the white to grey, woolly to hirsute tomentum and the yellow to orange hymenium.

Hel side
Fig. 68. *Stereum hirsutum* a) section through basidiocarp, b) section through basidioscarp, c) tomentum d) cotext, e) trama, f) skeletocystidiate layer, g) hymenium. Norway, Ryvarden 19061.

Fig. 69. *Stereum hirsutum*, a) section through basidiocarp, b) section through old and new hymenium, Sweden, J. Eriksson s. n.

Stereum illudens Berk., Fig. 70
London J. Bot. 4:59, 1845.
Basidiocarps annual, cupulate to effuse-reflexed often attached by a more or less central point and often imbricate. Pilei to 3.0
cm wide and long and 2.0-3.0 mm thick, flexible when fresh, stiff when dry, upper surface densely tomentose to strigose, slightly concentrically zonate, initially pinkish brown then deeper brown. Hymenium smooth, rarely slightly tuberculate, light brown, pinkish brown at the margin and often with a purplish tint towards the centre or point of attachment. Context thin and pale brown, separated toward the tomentum by a thin black line.
Hyphal system dimitic, generative hyphae 3-5 µm wide, simple septate, in the tomentum with coloured walls, in the cuticle to 7 µm wide, while those of the context are pale yellow and thick-walled; skeletal hyphae 3-8 µm wide, with thick walls and often with adventitious 'septa' of contracted protoplasm.
Skeletocystidia present, 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia, and often with an apical appendix.
Acanthocystidia present, to 30 µm long and 4-7 µm wide with numerous small tuberances in the apex.
Basidia 25-35 x 4-6 µm, clavate, with 4 sterigmata.
Basidiospores 6-8 x 3-4 µm, subcylindrical to narrowly ellipsoid, amyloid.
Substrate. On dead hard woods.
Distribution. Described from Australia. Rare in America and known from Colombia, Ecuador, Venezuela.
Remarks. The species is recognized by the dark brown tomentum with a distinct pinkish tint when fresh and the black line below the tomentum.

Fig. 70. *Stereum illudens* A) Section through hymenium with pseudoacanthocystidia, b) pseudoacanthocystidia, C) basidiospores. Costa Rica, Gomez 24238.

Stereum ochraceo-flavum (Schw.) Ellis,
North. Am. Fungi no 17, 1878. - *Thelephora ochraceo-flava* Schw. Trans Amer. Phil. Soc. New series 4:167, 1832. - *Stereum sulphuratum* Berk. & Ravenel, J. Linn. Soc. Bot. 10:331, 1868. - *Stereum rameale* (Pers.) Burt. Ann. Rep. Mis. Bot. Gard. 7: 169, 1920, (Basionym: *Thelephora hirsuta δ rameale* Pers., Syn. meth. Fung.: 570, 1801) nom. illegit, non *Stereum rameale* (Berk.) Massee, J. Linn. Soc. Bot. 27:187, 1889, (Basionym: *Hymenochaete ramealis* Berk., J. Linn. Soc., Bot. 14: 68, 1875).
Basidiocarps annual, cupulate to effused-reflexed, often attached by a more or less central point, often imbricate, individual basidiocarps spatulate to flabelliform, to 3.0 cm wide and long and 2.0-3.0 mm thick, flexible when fresh, stiff when dry upper surface initially finely tomentose to velutinous, yellowish grey to pale brown in narrow zones, with age often more hirsute and grey, often with a greenish tint due to growths of algae in the tomentum, hymenial surface smooth, rarely slightly tuberculate, light orange to greyish orange often with a slight pinkish tinge, becoming darker with age, context to 0.5 mm thick, concolorous with the hymenium, cuticle usually absent, but may be weakly developed in old specimens with distinct and persistent tomentum. In living material, not bleeding or discoloured when damaged.
Hyphal system dimitic, generative hyphae simple septate in the hymenium 3-5 µm wide, thin-walled and abundantly branched; skeletal hyphae 3-10 µm wide, present in the in the cortex and the tomentum, thick-walled, sparsely branched, and often with adventitious 'septa' of contracted protoplasm.
Skeletocystidia present, 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia and often with an apical appendix .
Acutocystidia absent.
Acanthocystidia absent.
Basidia 25-35 x 4-6 µm, clavate with 4 sterigmata.
Basidiospores 5-7 x 2-3 µm, cylindrical to narrowly ellipsoid, often slightly bent, thin-walled, smooth and amyloid.
Substrate. Seemingly on all types of hard woods.
Distribution. Widespread in the warm temperate zone and also in the tropical zone, where known from Brazil, Argentine, Jamaica and Costa Rica.
Remarks. Belongs to the *S. hirsutum* group or complex, but separated from it by the much smaller, thinner basidiocarps, the usual occurrence on small, or thin, sticks and branches, and lack of cuticle below the tomentum.

Stereum rugosum (Pers.:Fr.) Fr., Fig. 71
Epicr. p. 522, 1838. - *Thelephora rugosa* Pers.:Fr., Syst. mycol. 1: 439, 1821. - *Thelephora rugosa* Pers. Syn. meth. fung.: 569. 1801.
Basidiocarp perennial**,** resupinate to effused-reflexed, coriaceous to very hard, forming as rounded and orbicular patches with a loosening margin, or with a narrow reflexed pileus, often confluent or forming dense imbricate clusters; pilei narrow, undulate to lobate, occasionally lacking, often fused laterally, rarely more then 1.0 cm wide, initially greyish, with a finely depressed tomentum, soon becoming glabrous and dark brown, finally black in narrow and sharp zones and with a distinct cortex in section, margin rounded, white to pale ochraceous; hymenium smooth, tuberculate to undulating, pale ochraceous to buff, pale yellowish brown with age, often with black spots in older specimens, in living material bleeding red where damaged this becoming blackish brown after a while. In section distinctly stratose, each zone clearly defined by a thin dark line, in total to 2 mm thick, in young parts ochraceous, in older parts darker, often greyish to dirty brown, due to oxidization of the contents of the skeletocystidia.
Hyphal system dimitic, generative hyphae simple-septate, 3-4 µm wide, thin-walled, and frequently branched; skeletal hyphae 3-6 µm wide, thick-walled, horizontal; hyphae in the tomentum are of an intermediate type, hyaline to yellowish and sparingly branched, and in the cortex fairly thick-walled and pale brown.
Cystidia present, of two kinds:
1) **Skeletocystidia** 5-12 µm wide, usually more than 100 µm long, smooth, thick-walled except for the apical part, hyaline to yellowish, with oily contents, more or less constricted and slightly projecting.
2) **Acanthocystidia** 30-35 x 3-4 µm, projecting slightly above the basidia, and easily observed.
Basidia 30-50(-100) x 6-8 µm, elongated clavate, with 4 sterigmata.
Basidiospores 7-12 x 3-4.5 µm, narrowly ellipsoid to cylindrical slightly bent, thin-walled, smooth, amyloid.
Substrate On deciduous wood, often dead standing trunks, on which it may cover large areas. *Corylus, Betula*, and *Alnus* are seemingly the most common hosts, but also known from most other species of deciduous tree in the area.
Distribution. Widespread and common in Canada and the eastern United States. How south it is distributed on the continent is unknown to me.
Remarks. Easily recognized by the perennial and often extensive, hard, resupinate to effused reflexed basidiocarps, bleeding red when damaged. The pileus becomes rapidly glabrous with age, and the basidiocarp is much harder in texture than all of the other species dealt with here.

Fig. 71. *Stereum rugosum* a) skeletocystidium, b) basidiospores, c) basidium, d) acanthobasidium, e) pseudoacanthocystidia, f) acutocystidium, Sweden, J. Eriksson, s. n. Del John Eriksson.

Stereum sanguinolentum (Alb. & Schw.:Fr.) Fr., Fig. 72
Epicr. p. 549, 1838. - *Thelephora sanguinolenta* Alb. & Schw.:Fr., Syst. mycol. 1: 440, 1821.
- *Thelephora sanguinolenta* Alb. & Schw. Consp. fung. Lusat.: p. 274, 1805.
Basidiocarps annual to perennial, resupinate and orbicular with a slightly loosening margin, effused-reflexed to distinctly pileate, often covering large areas, especially on the lower sides of logs, to 1.0mm thick, tough when fresh, hard to coriaceous when dried; pileus present or absent, if present then narrow, mostly less than 10.0 mm wide, often laterally fused, undulate, lobed and incised, or as dense imbricate clusters, initially finely adpressed-tomentose to hirsute, greyish white to brownish, soon becoming glabrous in zones and exposing a brown cortex in narrow bands, these dark brown to almost black, with narrow and sharp zones, then almost completely glabrous when old.
Hymenium smooth, undulate or tuberculate, beige to buff when young, dark brown when older, bleeding strongly red where damaged, this darkening after a short while and becoming brown. Margin narrow, white to pale buff; context beige to ochraceous, often with small dark spots, separated from the tomentum by a thin dark brown zone, less than 50 µm thick.
Hyphal system dimitic, generative hyphae simple-septate hyphae, in the hymenium 2-6 µm wide**,** thin- to thick-walled, skeletal hyphae in the tomentum, cortex and trama 3-6 µm wide, thick-walled, hyaline to pale brown.
Cystidia present, of two kinds:
1. Skeletocystidia 3-6 µm wide and usually longer than 100 µm somewhat wider in the upper parts (to 4-10 µm), thick-walled except in the apical part, hyaline to yellowish in the basal parts, filled with a pale brown, oily to grainy contents, projecting very slightly above the basidia.
2. Acanthocystidia 30-40 x 3-5 µm, projecting above the basidia
Basidia 25-40 x 5-6 µm, elongate clavate, with 4 sterigmata.
Basidiospores (6)7-10 x (2.5)3-4.5 µm, narrowly ellipsoid to cylindrical, often slightly bent, thin-walled, smooth and amyloid.
Substrate. On dead wood of numerous conifer species.
Distribution. Very common in the coniferous forests throughout the temperate boreal conifer zone. Distribution in subtropical pine forests, such as on Cuba and in Belize is unknown.
Remarks. Easily recognized due to the bleeding reaction and occurrence on coniferous wood.

Fig. 72. *Stereum sanguinolentum* a (section through hymenium, b) basidium, c) pseudoacanthocystidia, d) basidiospores. Sweden, Hjortstam 12722.

Stereum striatum (Fr.) Fr.,
Epicr. Syst. Mycol. p. 548, 1838. - *Thelephora striata* Fr. Elench. Fung. 1:179, 1828.
Basidiocarps annual, effused-reflexed, often imbricate, individual basidiocarps dimidiate with a contracted base, or spatulate to flabelliform, to 2.0 cm wide and long and 2.0 mm thick, flexible when fresh, stiff when dry, upper surface initially velutinate, soon more or less glabrous, shiny, sericeous, radially striate, often zoned, grey to greyish white when young, becoming orange to pale brown with age. Hymenium smooth, rarely slightly tuberculate, pale orange to greyish orange, darker with age. Context to 0.2 mm thick, concolorous with the hymenium, cuticle absent, in living material not bleeding or discolouring when damaged.
Hyphal system dimitic, generative hyphae simple septate hyphae 3-5 µm wide, in the hymenium thin-walled and often branched; skeletal hyphae 3-10 µm wide, in the cortex and the tomentum thick-walled and sparsely branched, often with adventitious 'septa' of contracted protoplasm.
Skeletocystidia 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia, and often with an apical appendix
Acanthocystidia absent.
Acutocystidia 15-25 x 4-5 µm.
Basidia 25-35 x 4-6 µm, clavate, with 4 sterigmata.
Basidiospores 5-7 x 2-3 µm, cylindrical to narrowly ellipsoid, often slightly bent, thin-walled, smooth, and amyloid.
Substrate. On dead wood, apparently of any genus of hardwoods, but in the southern United States often on *Carpinus caroliniana*.
Distribution. Widespread in the eastern and southern United States and in South America, including Guatemala, Panama, Costa Rica, Colombia, Venezuela and Brazil. Also known from Jamaica.
Remarks. Recognized in the field by the small size, and shiny, finely striate, greyish, upper surface.

Stereum versicolor (Sw.) Fr**.**, Fig. 73
Epicr. syst. Mycol. p. 547, 1838. - *Helvella versicolor* Sw. Prod. Nov. pl. Spec. India Occ. p. 149, 1788. (K!). - *Stereum ostrea* (Blume & Nees: Fr.) Fr., Epicr. Syst. Mycol. p.547, 1838. - *Thelephora ostrea* Blume et Nees, Nova Acta Acad. Caes. Leopl. Carol. 13:13, 1826. ibid Fr. Elench. Fung. 1:175, 1828. – *Stereum fasciatum* (Schw.) Fr. Epicr. Syst. mycol. p. 546, 1838. – *Stereum lobatum* (Kunze:Fr.) Fr., Epicr. Syst. Mycol. P. 547. – *Stereum australe* Lloyd, Lloyd Mycol. Writ. 4, Letter 48:10, 1913.

Basidiocarps annual, normally reflexed with a distinct pileus, single or more commonly in dense imbricate clusters, coriaceous and tough, pileus to 6.0 cm wide and 3.0-7.0 cm long in fused basidiocarps, fan shaped to spatulate, broadly attached or with a distinctly tapering base, this resembling a short stipe, margin thin and light-coloured, involute (especially when dried), lobed and undulate, initially finely tomentose to velutinous, yellowish grey to pale brown in narrow zones, some of which may be separated by dark bands, these reflecting distinct stages in the development, often becoming more hirsute and greyish with age, and sometimes showing a greenish tint at the base due to the growth of algae in the tomentum, hymenium smooth, tuberculate or undulate, light beige to ochraceous; context beige to ochraceous, separated from the tomentum by a distinct, dark brown zone of agglutinated hyphae. In living specimens the hymenial surface has different reactions when damaged or cut, partly without any reaction, partly with a yellowish colouring and in some rare cases even becoming reddish, where the wound dries dark brown. The latter type is often called *S. australe* Lloyd,.
Hyphal system dimitic, generative hyphae simple septate hyphae, in the hymenium thin-walled, abundantly branched, 3-5 µm wide; skeletal hyphae 3-10 µm wide, in the cortex and the tomentum thick-walled and sparsely branched, often with adventitious 'septa' of contracted protoplasm.
Cystidia present, of two kinds:
1) **Skeletocystidia** 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia and often with an apical appendix.
2) **Pseudoacanthocystidia** 35-40 x 4-5 µm, numerous, projecting slightly above the basidia.
Basidia 25-40 x 4-6 µm, clavate, with 4 sterigmata.
Basidiospores 5.5-8 x 2-3 µm, cylindrical to narrowly ellipsoid, often slightly bent, thin-walled, smooth, amyloid.
Substrate. Seemingly on any species of hard woods.
Distribution. Pantropical and common. Replaced by *S. atrorubrum* in temperate zones, which could easily be interpreted as a form of *S. versicolor*, although the latter has pseudoacanthocystidia.
Remarks. Undoubtedly the most common and variable species of *Stereum* in the tropics. Easily recognized in the field due to the large, often distinctly fan shaped to spatulate basidiocarps, with a soft and concentrically zonate, velutinous tomentum in variable colours.
When fresh the yellowish bleeding reaction is distinctive, but this disappears as the basidiocarp dries out. The colour of the lower side is variable and may become dark ochraceous when old.

Fig. 73. *Stereum versicolor* a) part of hymenium, from the lectotype. Jamaica, Swartz (K), b) basidiospores, Costa Rica, Gomez 24249.

The occurrence of pseudoacanthocystidia is variable according to my opinion and this is also the experience to E. Parmasto (pers. com) who has examined a long series of specimens of this species, and came to the conclusion that the complex best is treated as one variable species, a conclusion to which I subscribe.

VELUTICEPS Pat. **,**
Bull. Soc. Mycol. Fr. 10:78, 1894.
Syn. *Columnocystis* Pouzar. Ceska Mykol 13:17, 1959.
Basidiocarp perennial, coriaceous, stratose, pileate or resupinate, upper surface with dark brown tomentum, hyphal system dimitic, rarely monomitic, skeletal hyphae fuscous and thick-walled, generative hyphae hyaline, thin-walled, with clamp connections; hymenium finely hydnoid to velutinate with numerous projecting cystidia, spores thin-walled (or somewhat thick-walled when old), smooth, hyaline, non-amyloid. Causing a brown rot, mostly in conifers.
Type species: *Veluticeps berkeleyi* Pat.
Remarks. *Veluticeps* include perennial species causing a brown rot in the substrate, a rather rare characteristic within the stereoid fungi.

Key to species

1. Hymenial surface covered with sterile odontioid fascicles ..... **V. berkeleyi**
1. Hymenial surface smooth, but in actively growing specimens covered with fine, acicular or needle-like projecting cystidia 2

2. Basidiospores 17-25 µm long .....**V. pimeriensis**
2. Basidiospores shorter 3

3. Generative hyphae with clamp connections, thin black cuticle present on the upper surface or below a thin tomentum ..... **V. abietina**
3. Generative hyphae with simple septa, no cuticle present in basidiocarp ..... **V. ambigua**

Veluticeps abietina (Fr.) Hjortstam & Telleria, Fig. 74
Mycotaxon 37:54, 1990. - *Thelephora abietina* Fr. Syst. myc. 1:442, 1821.
Columnocystis abietina (Fr.) Pouzar, Ceska Mykol 13:17, 1959.
Basidiocarp perennial, pileate or resupinate, stratose, 1.0-2.0mm thick, initially orbicular then coalescent, margin light brown, with more or less zonate tomentum, in resupinate basidiocarps a black smooth cutis is formed by agglutinated hyphae whilst in pileate specimens this cutis is found below the tomentum. Hymenium dark violaceous blue when wet, paler when dry. The

degree of paleness is dependent on the thickness of the basidial layer. A well developed hymenium is usually pale in the herbarium. In a section through a basidiocarp several layers can be seen with a lens or microscope - these are (from above),
1. A tomentum of hyphae 2.5-4.0 µm wide, thick walled and brown.
2. A cutis of thick-walled, brown, agglutinated hyphae.
3. an intermediate layer consisting of skeletal and generative hyphae the former bending down into the hymenium, usually ending in smaller enclosed, or larger projecting, cystidia.
4. A hymenium of basidia, cystidioles and cystidia.
Hyphal system dimitic, generative hyphae 2-3.5 µm wide, thin-walled, hyaline, with clamp connections at septa from where ramifications occur; skeletal hyphae 2.5-4 (5) µm wide, thick walled and dark brown.
Cystidia present, of two types.
1. Projecting, 150-200 x 8-12 µm, very thick-walled, usually only slightly pigmented (yellow to light brown in the microscope), arising deep in the intermediate layer, apically almost hyaline, externally with a generally thin and delicate crystalline crust which dissolves in Melzer's reagent and in lactic acid.
2. Enclosed, 50-100 x 3-6 µm, thick-walled and strongly pigmented, often with several simple adventitious septa, usually arising from the skeletal hyphae in the intermediate tramal layer. However, this type of cystidium may also develop from thin-walled, slightly encrusted basidia-like cystidioles in the hymenium.
Basidia 50-70 x 5-6 µm, narrowly clavate, initially thin-walled, then with slightly thickened walls, and 4-sterigmata.
Basidiospores 9-13 x 4-5 µm, narrowly ellipsoid to subcylindrical or even slightly allantoid, initially thin-walled but becoming slightly thickened with age, hyaline or yellowish, smooth and non-amyloid.
Substrate. On wood, usually logs and branches of different species of conifer. In Europe normally on *Picea abies* and also rarely on *Salix caprea.*
Distribution. Rather common in the northern part of the United States and southern Canada
Remarks. Similar to *Veluticeps ambigua* (Peck) but distinguished from it by lack of clamp connections at the septa.

Fig. 74. *Veluticeps abietina* a) section of basidiocarp (the original figs. 107-108 are not shown here), b) basidiospores c) young cystidia d) mature projecting cystidium, e) basidia indifferent stages of development f) skeletal hyphae, g) generative hyphae. Sweden, J. Eriksson 8127, del. J. Eriksson.

Veluticeps ambigua (Peck) Hjortstam & Telleria,
Mycotaxon 37, 54, 1990. - *Stereum ambigum* Peck, Ann. Rep. N.Y. State Mus. 47:145, 1894.
Columnocystis ambigua (Peck) Pouzar, Ceska Mykol. 13:17, 1959.
Basidiocarp perennial, resupinate to effused-reflexed, if reflexed extended laterally, shelf-like, to 5.0 mm wide, tough and coriaceous, upper surface dark brown, tomentose to matted velutinate, margin distinct, velvety, dark brown. Hymenium smooth to slightly tuberculate, light violaceous brown in young and actively growing specimens, dark brown and slightly cracked when old and dry, in section with distinct strata and lacking a black cuticle towards the substrate or upper surface of the pileus.
Hyphal system dimitic, generative hyphae 2-4 µm wide, with simple septa, thin- to thick-walled, the latter tinted yellow to pale brown; skeletal hyphae 2.5-5 µm wide, thick-walled and brown.
Cystidia present with two intergrading types,
1. cylindrical to subclavate, up to 100 µm long, 3-7 µm wide, thick-walled, smooth, dark brown, arising as skeletocystidia from the subhymenium, or directly from a simple septum in the generative hyphae.
2. skeletocystidia, 100-300 µm long, thick walled, brown, arising deep in the old hymenial strata, projecting up to100 µm above the hymenium (making the surface pilose), and apically encrusted with coarse, angular crystals.
Basidia 40-100 x 4-6 µm, cylindrical to subclavate with 4 sterigmata and a simple septum at the base.
Basidiospores 12-17 x 3.5.-5 µm, cylindrical to suballantoid smooth, thin-walled and non amyloid.
Habitat. On dead wood of conifers.
Distribution. Canada and northern parts of the United States. Rarer than *V. abietina.*
Remarks. Undoubtedly close to *V. abietina*, but separated from it by the lack of clamp connections on the generative hyphae, the cuticle in, or on the pileus, and larger spores.

Veluticeps berkeleyi Pat.**,**
Bull. Soc. mycol. Fr. 10:78, 1894.
Basidiocarp perennial, resupinate to effused-reflexed, if reflexed then extended laterally, shelf-like, to 3.0 mm wide, tough and coriaceous, upper surface dark brown, tomentose to matted velutinate, slightly sulcate, margin distinct, velvety, dark brown. Hymenium pale brown, finely hydnoid due to numerous sterile fascicles which extend deep into the surface (appearing as dark lines) and lacking a black cuticle towards the substrate or upper surface of the pileus.

Hyphal system dimitic, generative hyphae 2-7 µm wide, with simple septa, thin- to thick-walled, the latter tinted yellow to pale brown; skeletal hyphae 2.5-8 µm wide, thick-walled and brown.
Cystidia present, in the sterile hymenial fascicles, up to 100 µm long, 3-7 µm wide, cylindrical to subclavate, thick-walled, smooth, dark brown, arising as skeletocystidia from the subhymenium.
Basidia 40-100 x 7-8 µm, clavate, with 4 sterigmata and a simple septum at the base.
Basidiospores 10-14 x 4-5 µm, cylindrical to suballantoid, smooth, thin-walled and non amyloid.
Substrate. On dead wood of conifers, causing a brown rot.
Distribution. The western United States. Probably also in the zone of *Pinus* further south, but the distribution in those areas is unknown.
Remarks. Characterized by the finely hydnoid, brown hymenial surface.

Veluticeps pimeriensis (Gilbn.) Hjortstam & Telleria,
Mycotaxon 37:54, 1990. - *Columnocystis pimeriensis* Gilbn. Fungi that decay Ponderosa pine p. 87, 1974.
Basidiocarp annual, pilei to 10 cm wide, resupinate to effused- reflexed, if reflexed then extended laterally, shelf-like, to 1.0-2.0 mm wide, consistency tough and coriaceous. Upper surface dark brown, coarsely tomentose. Hymenium smooth, but covered with tiny, shiny, projecting cystidia, brown.
Hyphal system monomitic, generative hyphae 2-4 µm wide, with both simple septa and clamp connections, thin- to thick-walled, hyaline to pale brown; skeletal hyphae apparently absent.
Cystidia 30-80 x 3-6 µm, abundant, cylindrical to sinuous, with constrictions, mostly smooth but occasionally finely encrusted and with a few simple septa, arising deep in the subhymenium and projecting to 100 µm above the hymenium. Cystidioles present in the hymenium, partly cylindrical and partly with a swollen apex.
Basidia 40-110 x 7-12 µm, clavate, with 4 large sterigmata up to 20 µm long.
Basidiospores 17.5-25 x 7-10 µm, cylindrical to ellipsoid, smooth, thin-walled and non-amyloid**.**
Substrate. On dead wood (logs) of *Pinus ponderosa*.
Distribution. Known from Arizona and New Mexico in the western United States, but probably widespread within the range of the host.
Remarks. Characterized by the annual basidiocarp with large basidiospores and tiny, projecting needle like cylindrical cystidia.

XYLOBOLUS P. Karst.,
Medd. Soc. Fauna Fl. Fenn. 6:11, 1881.
Basidiocarps perennial, resupinate to pileate, hard and stiff, upper surface deep brown to black, glabrous to tomentose or hirsute, hymenium smooth to undulant, beige to pale brown, hyphal system dimitic, generative hyphae with simple septa, skeletal hyphae thick-walled to solid with vertically arranged, skeletocystidia and acanthophyses present, basidiospores ellipsoid smooth and amyloid, causes a white pocket rot.
Type species: *Thelephora frustulata* Pers.:Fr.
Remarks. Close to *Stereum* but separated from it by the ellipsoid spores, numerous acanthophyses and distinct pocket rot which is unknown in *Stereum*.

KEY

Xylobolus frustulatus (Pers.:Fr.) Boidin, Fig. 75
Rev. Mycol. (Paris) 23:341, 1958. - *Thelephora frustulata* Pers.:Fr., Syst. Mycol. 1:445, 1821. - *Thelephora frustulata* Pers., Syn. meth. Fung. p. 577, 1801.
Basidiocarp perennial, usually resupinate, rarely with a narrow black, zonate and glabrous pileus, woody textured, normally1-2 mm thick, but in old specimens may be considerably thicker, in section distinctly stratified into several layers, soon cracked into small, angular polygons. Hymenium smooth, young layers pale ochraceous, older ones dull to deep brown.
Hyphal system monomitic, hyphae 3.5-5 µm wide, short celled, hyaline to yellowish brown (in older layers more strongly pigmented), sparsely branched, vertically arranged with transitions to acanthocystidia; other hyphae (tramal hyphae) 3-5 µm wide, few in number or not always found, most easily observed in very thin sections, also vertically arranged, thin to moderately thick-walled, with transitions to pseudocystidia, greyish black in sulpho-vaniline. All hyphae lacking clamp connections.
Cystidia present, of two kinds;
Pseudocystidia, 18-25 x 4-6 µm, thin to moderately thick-walled, barely or not projecting above the basidia and the acanthocystidia.
Acanthocystidia 25-30 µm x 4-5 µm, abundant, especially so in sterile specimens.
Basidia 25-30 x 4-5 µm, elongate clavate, smooth or with a few basal protuberances (acanthobasidia), with 4 sterigmata.

Fig. 75. *Xylobolus frustulatus*, a) section of tomentum, b) acanthocystidia, c1) basidium with protuberances, c) basidia , d) basidiospores. Sweden, Sunhede 7505. Del. John Eriksson.

Basidiospores 4.5-5(-5.5) x 3-3.2(-3.5) µm, shortly ellipsoid, thin-walled or occasionally slightly thick-walled, smooth, amyloid.
Substrate. Most commonly on hard, decorticate wood, usually fallen branches or trunks of *Quercus*, but also known on other types of hard woods.
Distribution. Follows *Quercus* throughout its range but is rather rare, especially in the north.
Remarks. Easily recognizable in the field due to the strongly cracked, often polygonal basidiocarps, and microscopically, the numerous acanthocystidia.

Xylobolus subpileatus (Berk. & M. A. Curtis.) Boidin,
Rev. Mycol. 23:341, 1958. - *Stereum subpileatum* Berk. & W. A. Curtis, Hooker J. Botany 1:238, 1849.
Basidiocarp perennial, effused-reflexed to distinctly pileate and dimidiate to slightly pendant and often attached by a central point, to 7.0 cm wide and long, coriaceous when fresh, dense and hard when dry. Pilei velvety to tomentose, various shades of brown, sometimes with violet tints, often furrowed and sulcate, becoming glabrous in zones when older, exposing a black cuticle, Hymenium initially smooth then slightly tuberculate, sometimes concentrically ridged, grey to orange becoming light brown with age, fertile parts often stratified. Context pale ochraceous, with a black cuticle below the pileal tomentum
Hyphal system monomitic, hyphae 3.5-5 µm wide, short-celled, lacking clamp connections, vertically arranged and with transitions to acanthocystidia.
Cystidia present, of two kinds;
Skeletocystidia 20-50 x 4-8 µm, thin to moderately thick-walled, barely or not projecting above the basidia and acanthocystidia;
Acanthocystidia, 25-30 µm long and 4-5 µm wide, abundant, especially so in sterile specimens.
Basidia 25-30 x 4-5 µm, elongated clavate, with 4 sterigmata.
Basidiospores 4.5-5.0(-5.5) x 2.5-3.0(3.2) µm, shortly ellipsoid, thin-walled or occasionally slightly thick-walled, smooth, amyloid.
Substrate. Usually on decorticate wood of *Quercus* spp., but also known other hardwoods.
Distribution. Known within the oak zone in North America but unknown whether it follows the *Quercus*-hosts south to Colombia.
Remarks. Recognized by the pileate basidiocarps with an upper brown, often zoned tomentum. Microscopically, the numerous acanthocystidia will immediately separate it from similarly coloured species of *Stereum.*

Xylobolus spectabilis (Klotzsch) Boidin,
Revue Mycol 23: 341, 1958. -*Stereum spectabile* Klotzsch, Nova Acta Acad. Caesar. Leop. Carol. 19: 238, 1843.
I suspect that specimens named *X. frustulatus* from the Amazonian jungle should better be named as cited above. However, this has to be sorted out in a separate study taken into account all names given to species in this group. They have all more or less that same microscopical characters making the distinction between the species difficult.

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