The Corticiaceae of North Europe

By

Kurt Hjortstam, Karl-Henrik Larsson and Leif Ryvarden

with drawings by

John Eriksson

Volume 1

Introduction and keys

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PREFACE & ACKNOWLEDGEMENTS

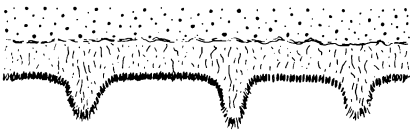
This flora was originally intended as an illustrated manual to be used by students in Gothenburg and Oslo. While planning the project it became evident that our ambition had to be raised considerably if a reliable flora should be presented. Already from the start there was a great deal of taxonomical and nomenclatural problems to cope with and we found existing literature to be either antiquated, incomplete or unreliable. We concluded that careful illustrations and descriptions of all species were essential. On the way towards our goal a great deal of the herbarium material in Gothenburg and in other Nordic herbaria as well was revised. Extensive collecting was carried out by our co-workers and students. Altogether some 50–70000 specimens have been studied.

We found it most practical to publish the genera in an alphabetical order as no "settled" taxonomical arrangement existed (and still does not exist!). We also decided to use the family name Corticiaceae in a broad and not very well defined sense. The exclusion of species belonging in Coniophoraceae and Lachnocladiaceae was mainly practical as these groups were the subject of a study by N. Hallenberg (Hallenberg 1985).

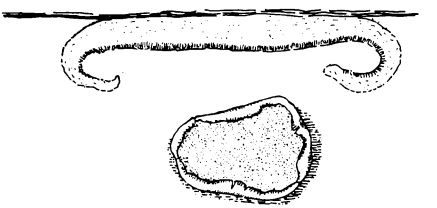
The flora is now completed in eight volumes, 16 years after it was initiated. During these years a wealth of new information concerning the Corticiaceae has been gathered. Some information has been published, but still many new taxa remain unpublished. The Corticiaceae of North Europe should be regarded as provisional and we hope to publish a revision in the near future.

The flora has received support and assistance from many friends, colleagues, herbaria and institutions and we want to extend our sincere thanks to all of them for their generous help. Financial support has been received above all from the Swedish Natural Science Research Council. It enabled us to connect first Thomas Hallingbäck and later Kurt Hjortstam to the project. The experimental part of the project was also supported by NFR when Nils Hallenberg became research assistent. The experimental work has now grown to an independent research branch. The Norwegian Natural Science Research Council supported printing of the first volumes of the flora. Anna och Gunnar Vidfelts fund for biological research gave us comprehensive support to collecting trips, herbarium research and for equipment. Iggesunds Paper Factory donated herbarium sheets and drawing paper for which we are grateful.

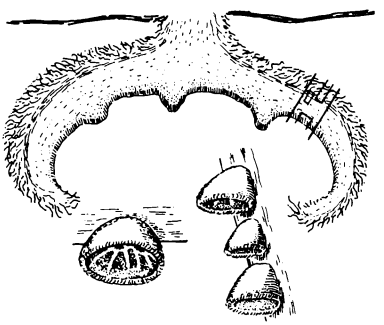
Oslo in August 1987 — Leif Ryvarden (editor)



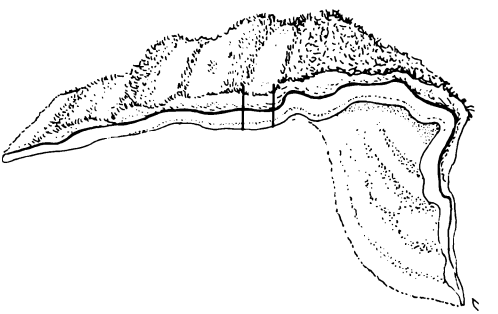
resupinate



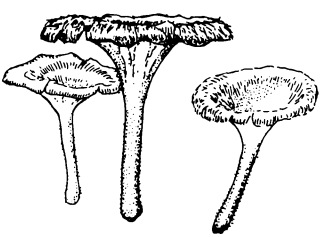
discoid



cupulate



effused-reflexed



stipitate

fanshaped-spathulate

Fig. 1. Types of fruitbodies.

WHAT IS CORTICIACEAE ?

Corticiaceae is a family within the Homobasidiomycetes. It is not a natural taxon but an assemblage of species with similar habit. Corticicaeae is here taken in a very wide sense in order to cover all species likely to be collected with the methods described here. Even some resupinate, lignicolous heterobasidiomycetes will be mentioned.
Corticiaceous fungi are characterized by simple fruitbodies. They are more or less effused and have an even, merulioid, poroid or warted to denticulate surface. Many species have very delicate fruitbodies, barely visible for the untrained eye. The colour is usually some shade of white, grey or yellow, sometimes more brightly coloured in red, green or blue. However inconspicuous, the colour is nevertheless an essential distinguishing feature. The fruitbody is usually soft to tough, seldom hard.
Most "corticiums" are wood-destroying organisms gaining their energy-yield from the decomposing of wood-substrate such as cellulose or lignin. A smaller group are constituents of the soil-microflora only using the wood as a support for their fruitbodies. Some species are even suspected of being mycorrhizal.
Some fungi belonging to rather distinct families, even if their representatives may look like a member of the Corticiaceae, are excluded from this flora. The reader is referred to Hallenberg, N. Lachnocladiaceae and Coniophoraceae of North Europe, Fungiflora, Oslo. Thelephoraceae where all species have brown warted to spiny spores and which includes the resupinate genus *Tomentella*, is also excluded from this flora.

MACROMORPHOLOGY

To use the key properly a fertile fruitbody (basidiocarp) with basidia and spores is necessary. In only a few cases are imperfect stages described and illustrated, but these are not keyed out. With experience, a fairly large number of species can be recognized in the sterile condition if the fruitbody is otherwise well developed.

1. The fruitbody Fig. 1
The fruitbody may vary considerably from one species to another and it is often difficult in a few words to cover the variation properly. The following are the most commonly used terms.

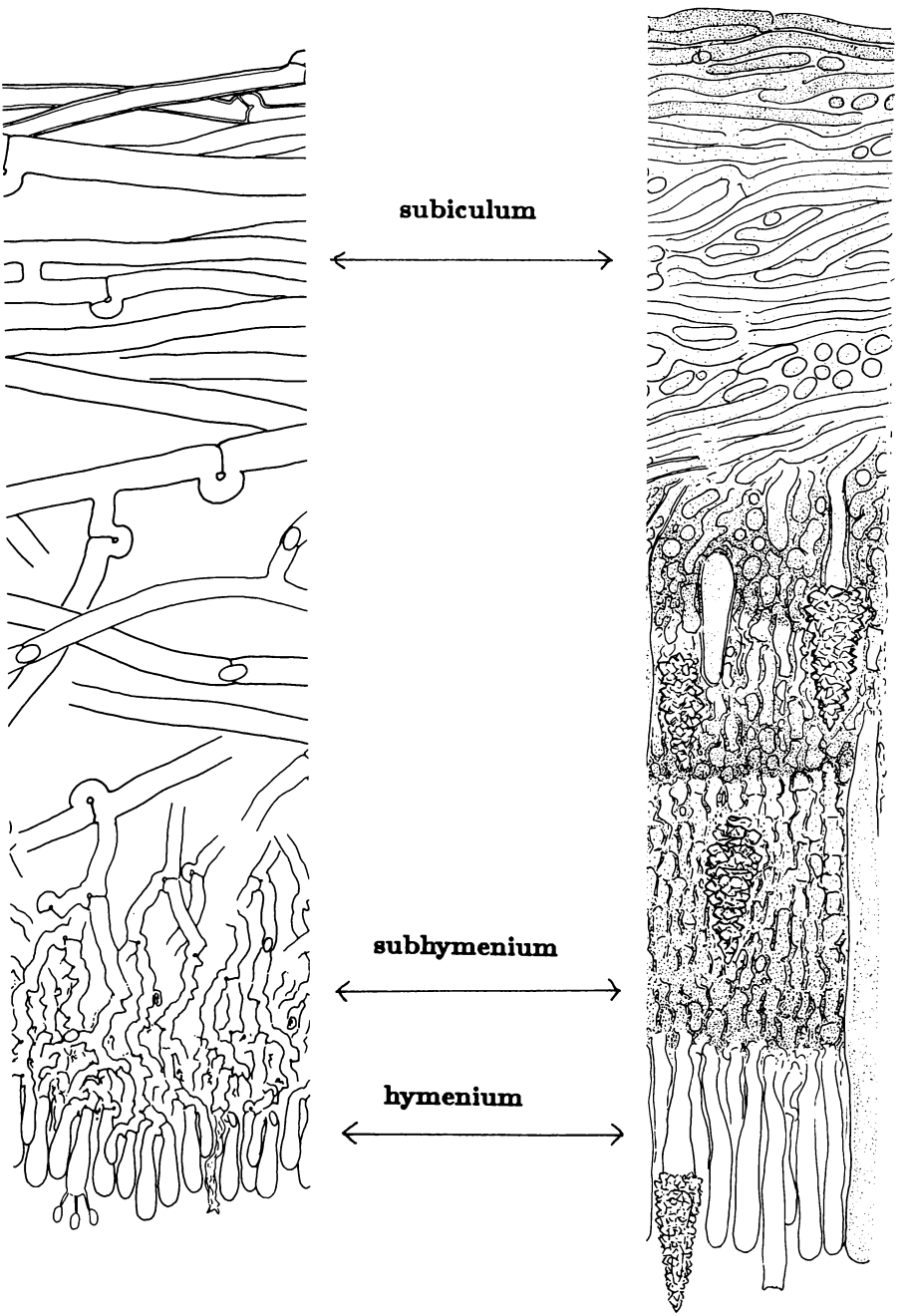


Fig. 2. Construction of a resupinate fruitbody.

Resupinate
The resupinate basidiocarp is characterized by the absence of any sterile parts, except for a margin. This is the general fruitbody type among the Corticiaceae.

Effused-reflexed
In some species a pileus will develop with age along the upper edge of the basidiocarp. Such basidiocarp is called effused-reflexed. Other species develop a pileate basidiocarp directly without any effused-resupinate part and there are transitions between the two types.

Cupulate-discoid
A few species have rounded fruitbodies with a more or less raised margin so that it becomes discoid or even cupulate. This condition should not be confused with raised margins appearing upon drying which is common in species with thick, membranaceous fruitbodies.

Dimidiate-fanshaped-stipitate
From the reflexed-pileate basidiocarp there are transitions to a more fanshaped or dimidiate basidiocarp with a contracted or tapering base. The next short step is to a laterally stipitate basidiocarp where the lower side of the base is sterile and further to a more centrally stipitate one like those seen in *Podoscypha* and other stereoid genera.

2. Construction of the fruitbody
The fruitbody in the Corticiaceae is rather simple but may, in the most complicated type, consist of the following layers (Fig. 2 & 3):
1. The hymenium which consists of the basidia eventually mixed with sterile organs such as cystidia etc.
2. The subhymenium which is a layer of hyphae below the basidia usually growing vertically and strongly branched. It is sometimes very compact and then the individual hyphae may be difficult to observe. In some species with very thin fruitbodies a subhymenium may be lacking.
3. The trama is a layer of hyphae supporting the hymenium and subhymenium and the term is only used when the hymenophore is poroid, hydnoid etc. not for smooth species. The hyphae of the trama are often wider and of a looser consistency than those of the subhymenium.
4. The subiculum is the layer of hyphae next to the substrate. As in the trama, its hyphae are often wider and looser than in the rest of the fruitbody and mostly grows parallel to the substratum.

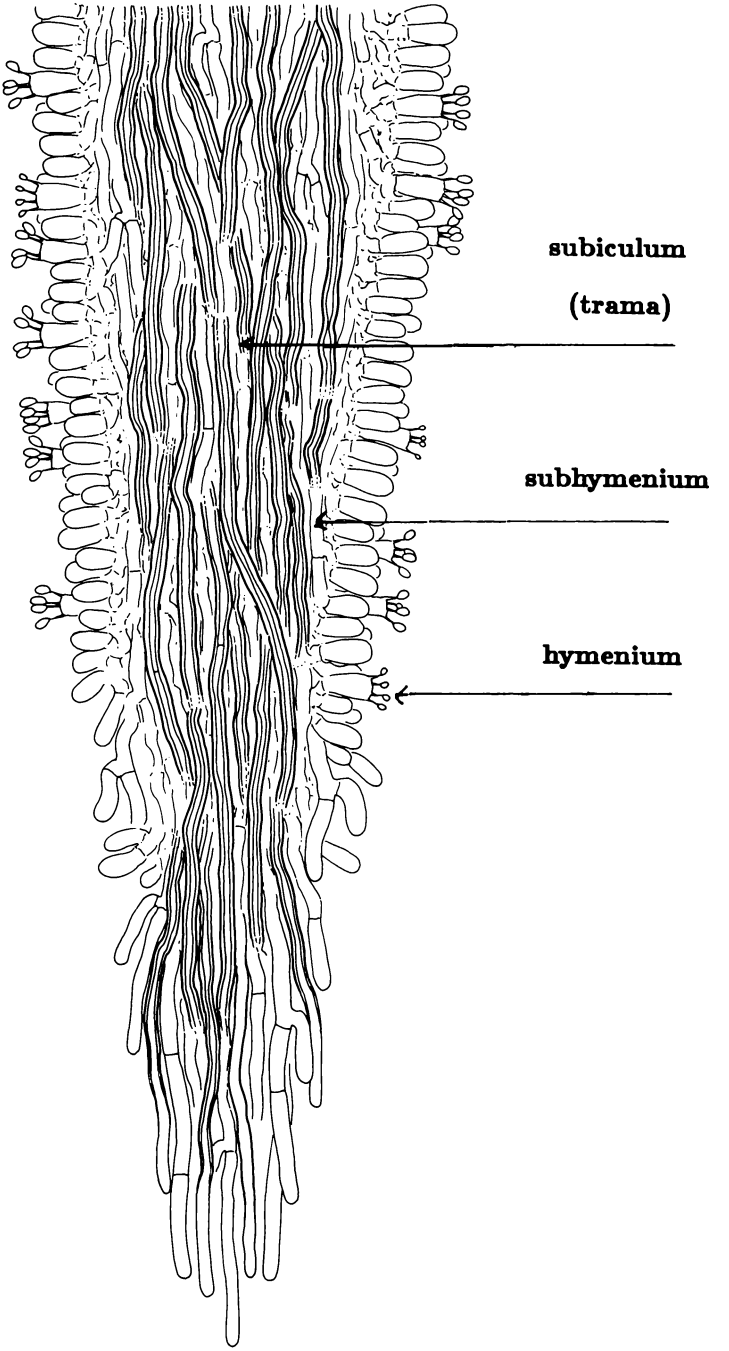


Fig. 3. Construction of a spine from a hydnoid fruitbody.

3. Hymenophore Fig. 4–7.
Strictly speaking, the hymenophore consists of the subiculum, trama and subhymenium, if all of them are present, i.e. they are the part of the fruitbody on which the hymenium is placed. The hymenophore can have a very variable configuration and the following terms are used to describe the variation:
Poroid with pores
Irpicoid with irregular and flattened teeth
Reticulate with netlike ridges
Merulioid with radial or more or less netlike folds
Grandinoid with small granules
Odontioid with teeth or small spines
Hydnoid with prominent spines
Tuberculate with (usually) sparse and irregular warts
Colliculose with low, rounded swellings and blisters
Epitheloid With scattered, sterile pegs

4. Consistency
According to structure, the fruitbody can vary from very loose to almost horny hard when dry. The following terms have been used to describe this variation:
Byssoid has a cotton-like or floccose, usually discontinuous surface.
Farinaceous has a mealy, minutely granulose, more or less discontinuous surface.
Athelioid has a thin, usually pliable membrane over a loose subiculum. Also called pellicular.
Membranaceous like athelioid but thicker.
Ceraceous with a waxy, closely adnate appearance.
Phlebioid very dense and hard. Watery as fresh, horny when dry.

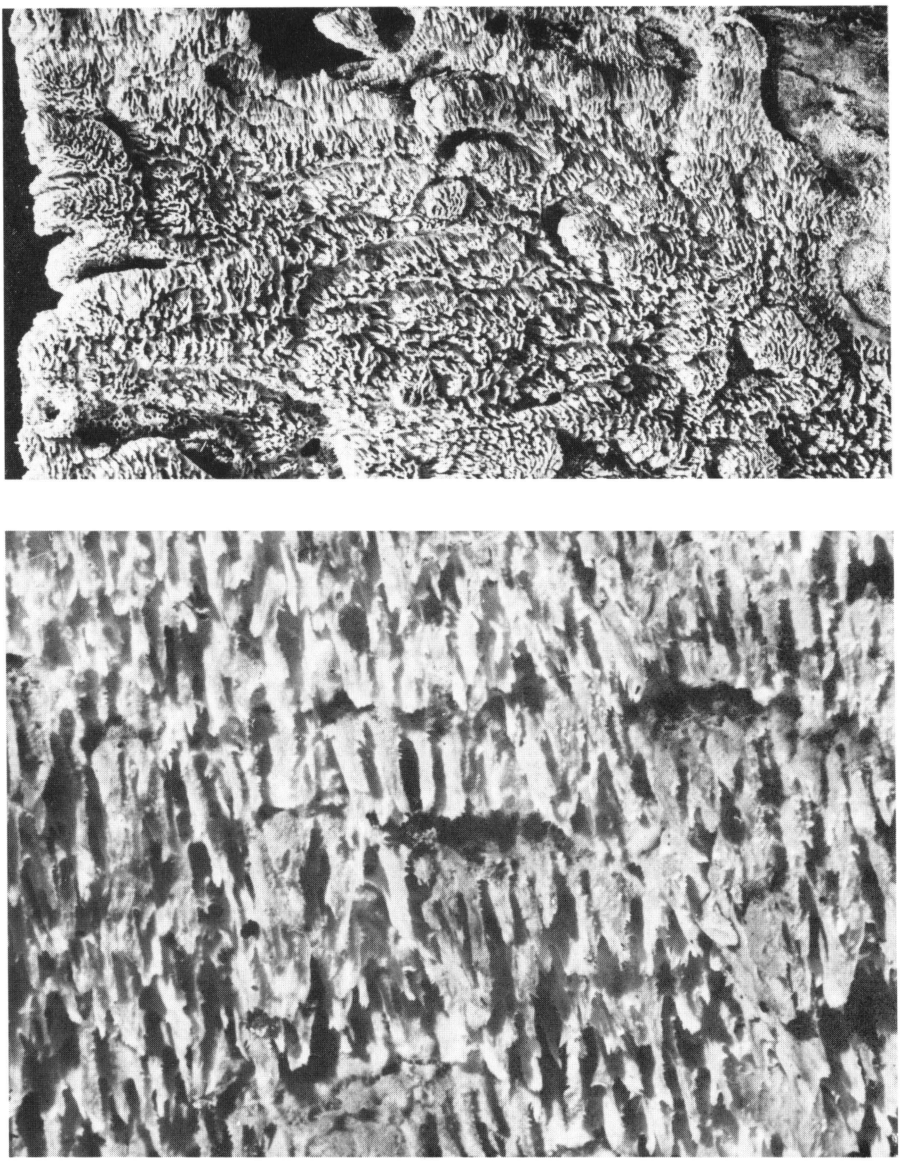


Fig. 4. Types of hymenophore: Poroid (above) and irpicoid (below).

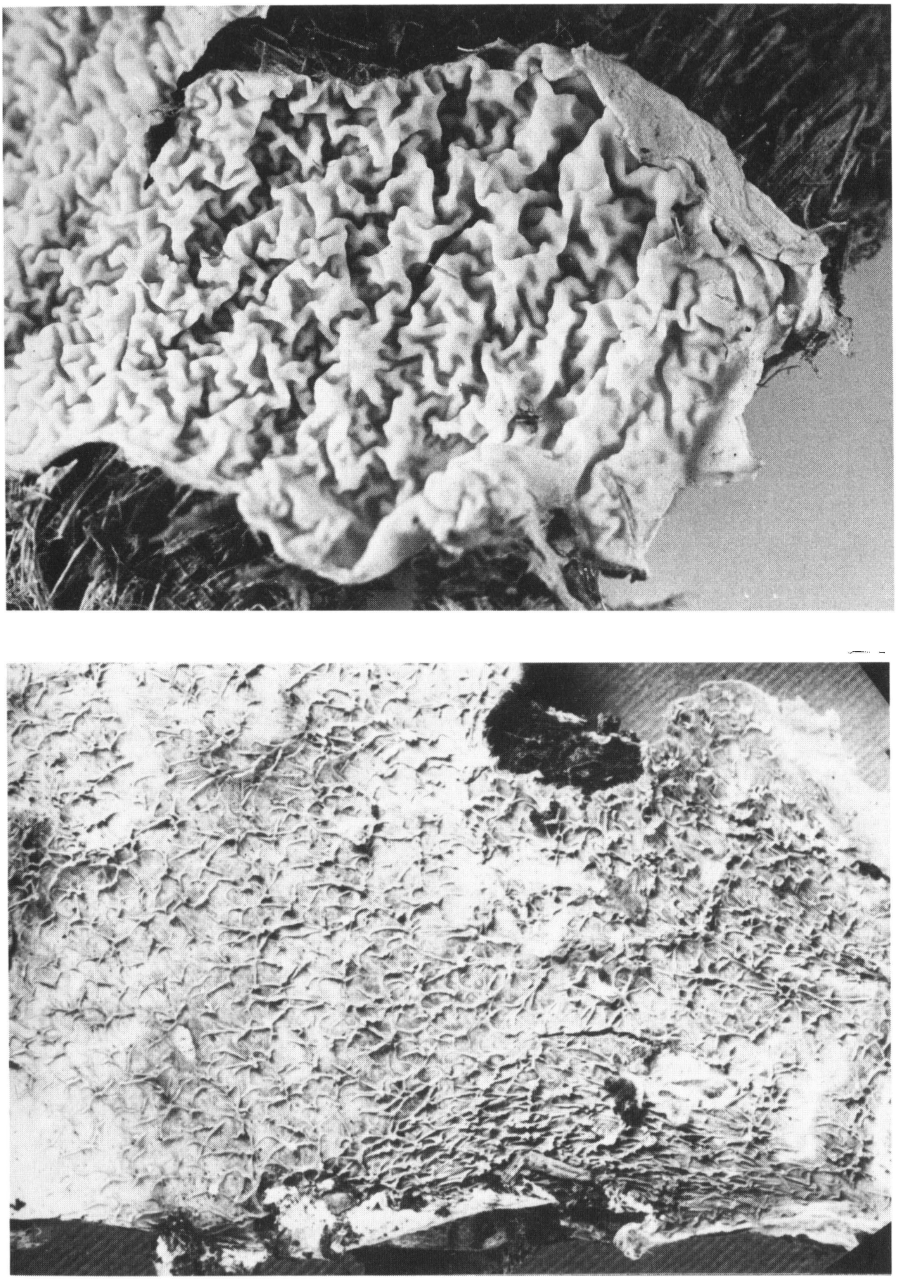


Fig. 5. Types of hymenophore: Merulioid fresh (above) and dried reticulate (below).

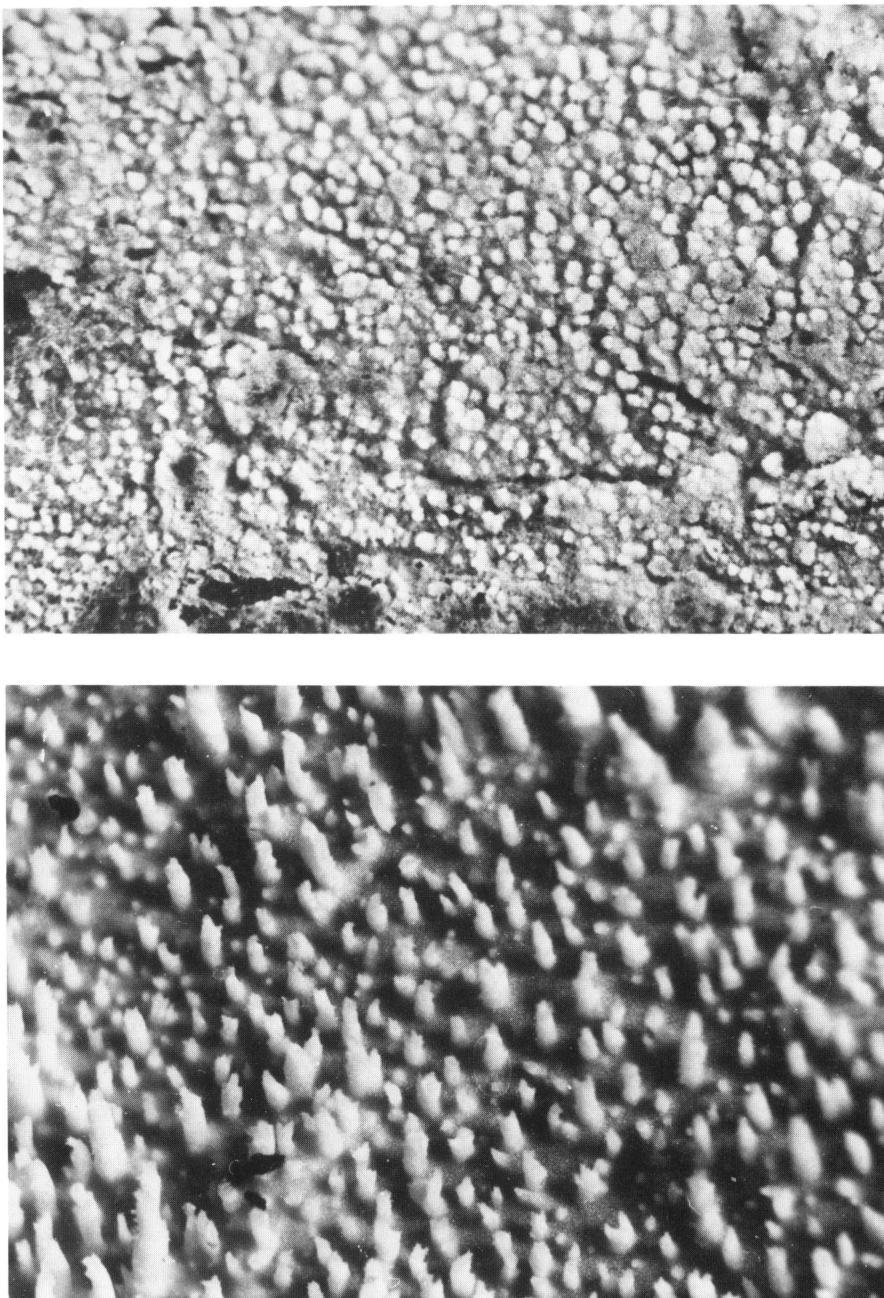


Fig. 6. Types of hymenophore: Grandinoid (above) and odontioid (below).

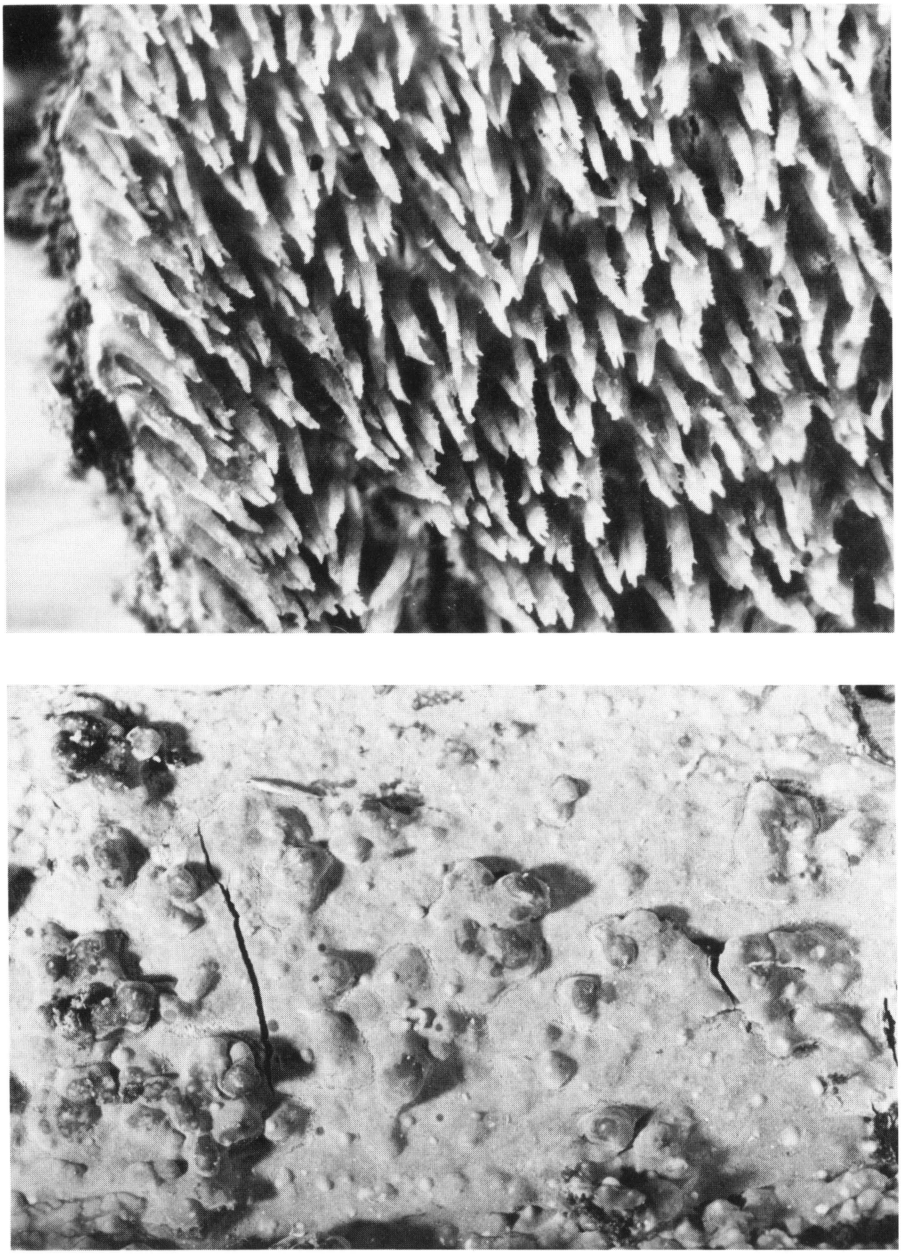


Fig. 7. Types of hymenophore: Hydnoid (above) and tuberculate (below).

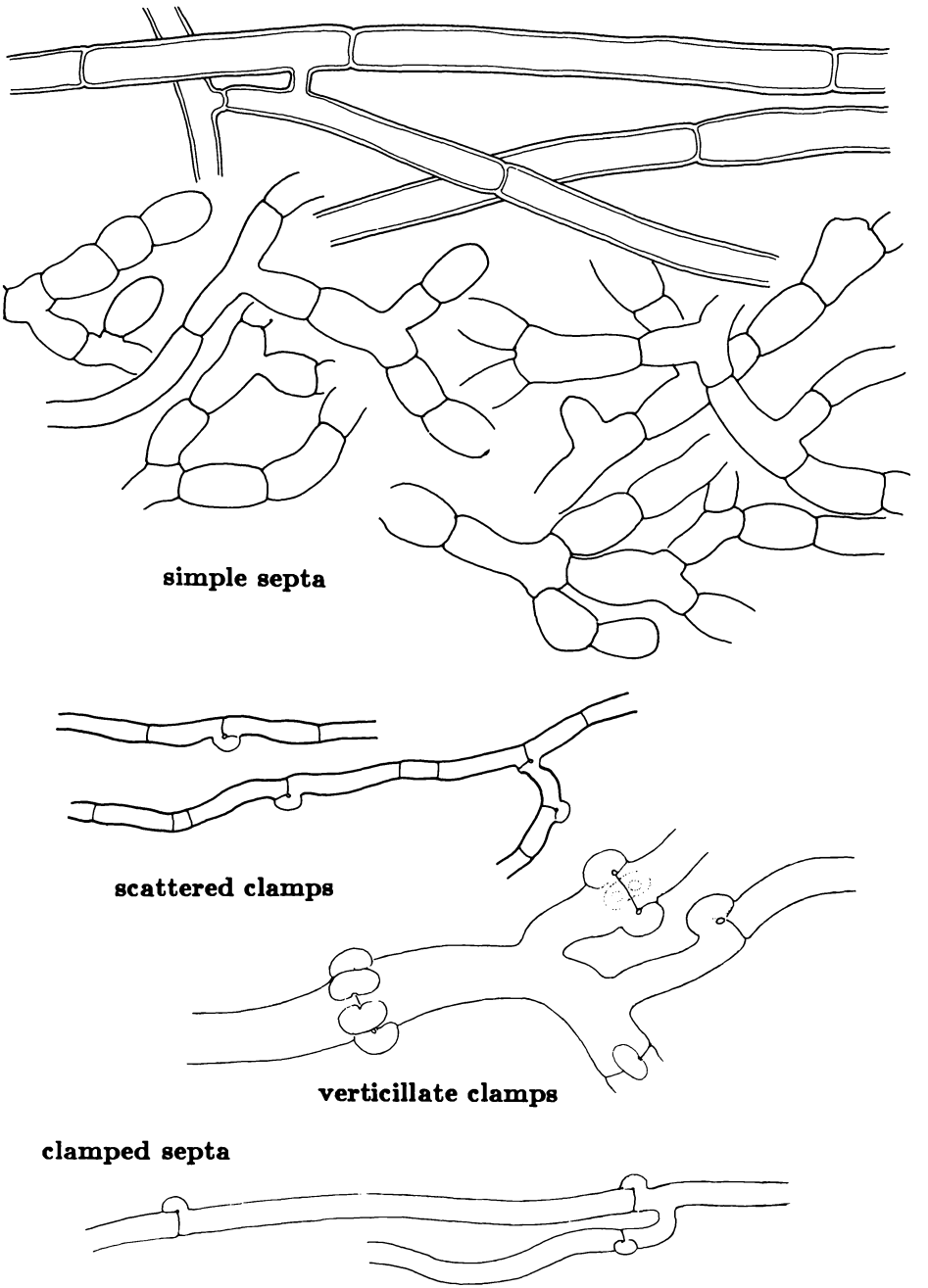


Fig. 8. Generative hyphae, types of septation.

MICROMORPHOLOGY

1. Hyphae

The fruitbody consists of hyphae and there are two general types.

Generative hyphae

These hyphae are the basic units of any fruitbody since they are always present, if exclusively so, the fruitbody is called monomitic. They will always be septate, but will otherwise vary from one species to another and even within the same fruitbody as to width, wall thickness, type of septa, content, branching and colour. Fig. 8–10 illustrates the most common types of terms used in connection with generative hyphae.

Vegetative hyphae

The vegetative hyphae develop from the generative hyphae and are never septate, and have distinctly thicker walls than the generative hyphae. Vegetative hyphae are comparatively rare in Corticiaceae compared with for example Polyporaceae. There are two types of vegetative hyphae 1) Skeletal hyphae and 2) Binding hyphae, see Fig. 10.

Skeletal hyphae are long and straight, unbranched hyphae. Some adventitious septa may occur when the protoplasm contracts, but such septa have normally considerably less wall thickness than the hyphal wall and should not be confused with true septa. In the Corticiaceae the skeletal hyphae, if present, normally only occur in the subiculum.

The binding hyphae are much branched, solid to very thick-walled and of limited growth with tapering hyphal ends. They are very rare in the Corticiaceae. In a few cases there are transitions between binding hyphae and skeletal hyphae.

2. Septation

The type of septation on the generative hyphae is very important and must always be checked to reach a reliable identification. Simple septa occur as a crosswall over the hyphae with the same wall thickness as the hyphae proper.

Clamps occur as a very distinct and peculiar swelling on the hyphae at the septum and may be either simple or occur in whorls with several clamps at each septum. The latter is rather rare in the Corticiaceae.

The whole of the fruitbody must be checked for septation as often the basidium and the subhymenium may have a different septation than the rest of the fruitbody. For example in *Phanerochaete* and *Athelia* there are scattered clamps on some hyphae in the subiculum while the hyphae in the rest of the fruitbody are simple septate.

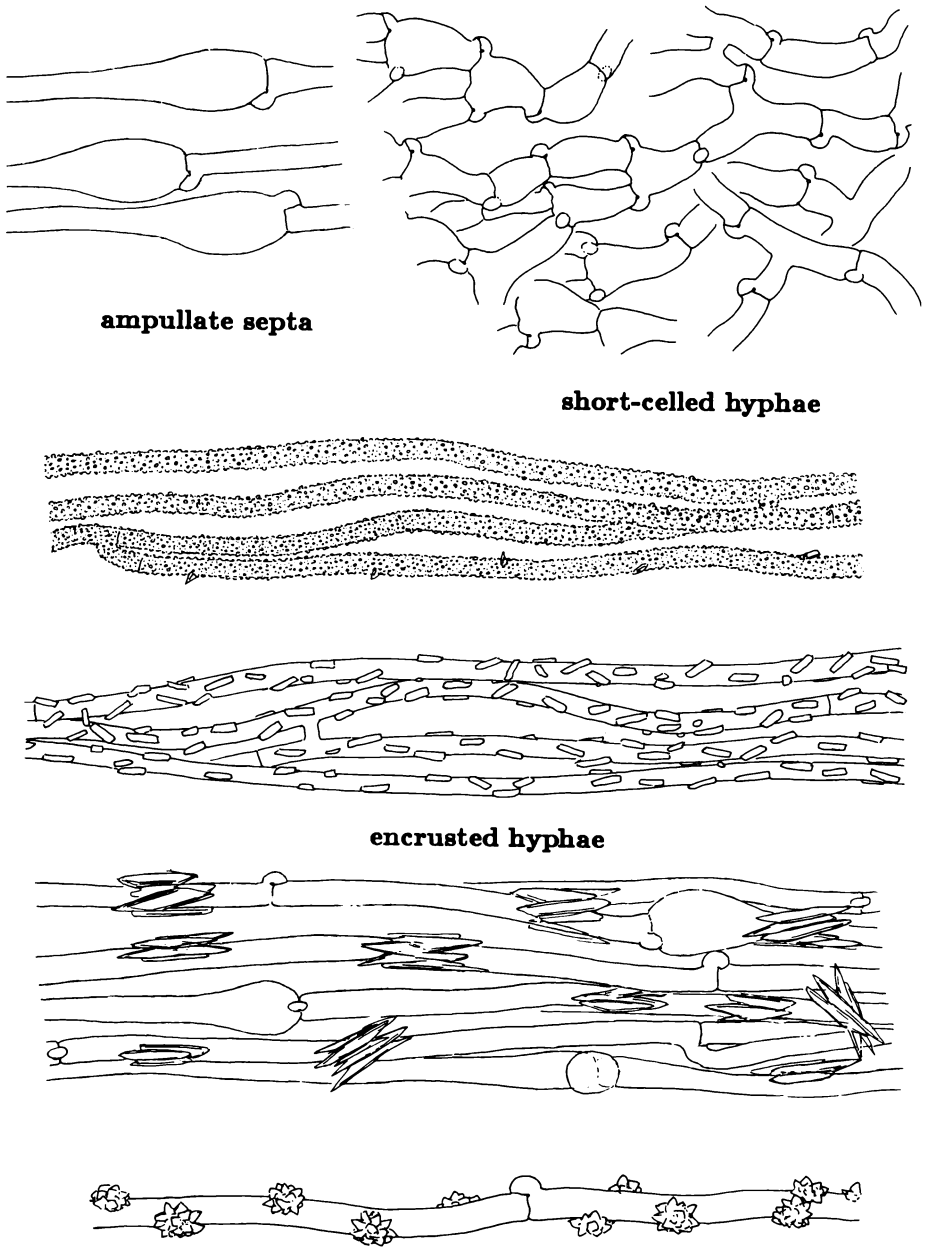
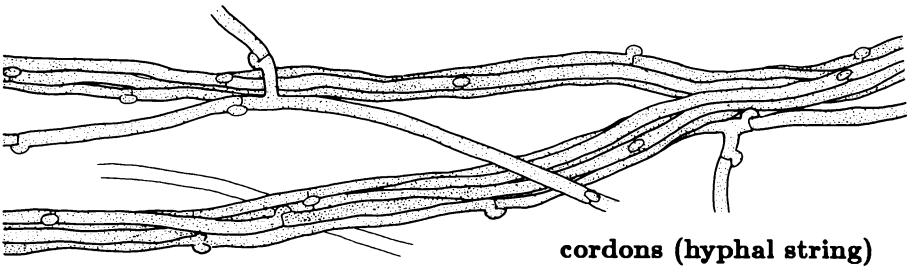
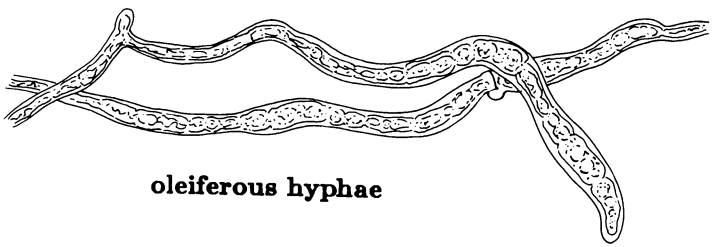


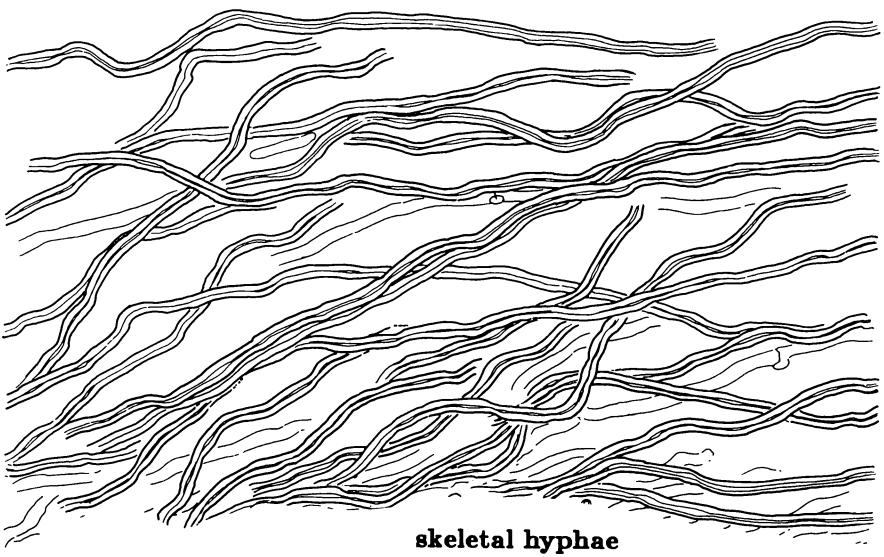
Fig. 9. Generative hyphae, ampullate septa, shortcelled hyphae and different types of encrustation.



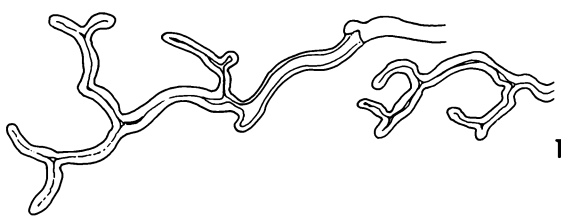
cordons (hyphal string)



oleiferous hyphae



skeletal hyphae



binding hyphae

Fig. 10. Cordon (hyphal string), oleiferous hyphae, skeletal hyphae and binding hyphae.

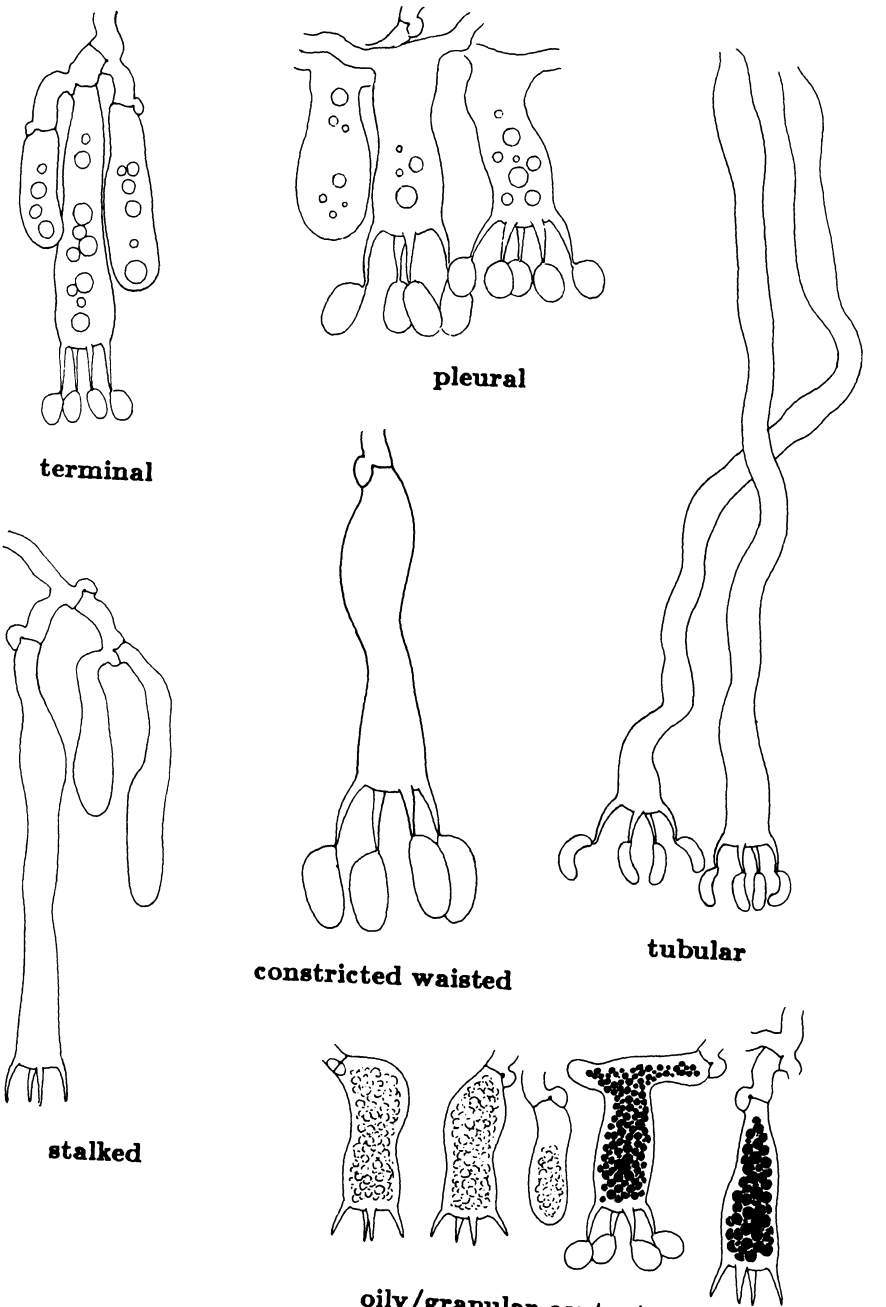


Fig. 11. Types of basidia.

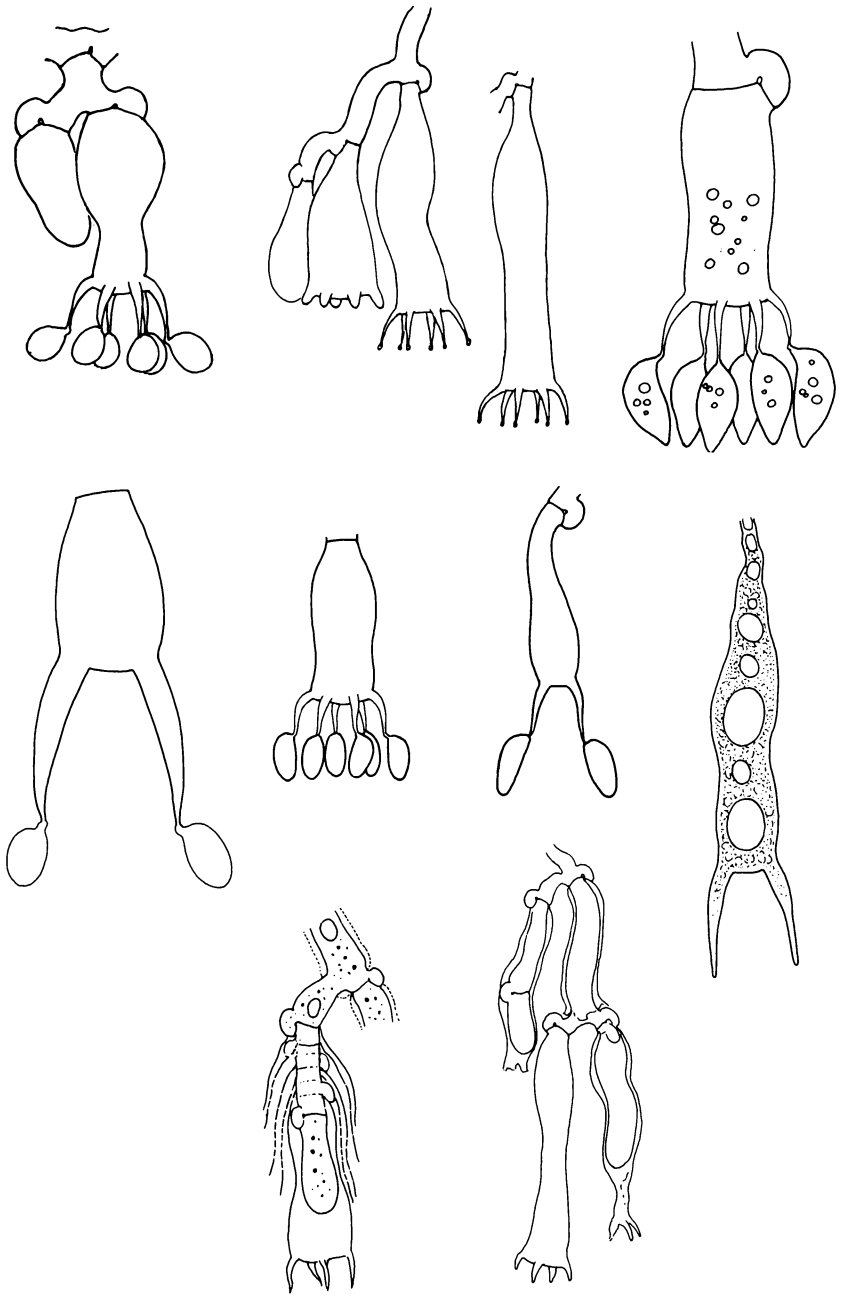
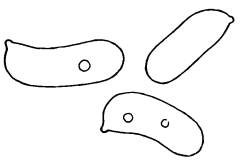
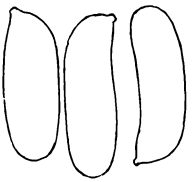


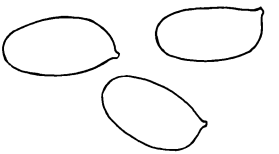
Fig. 12. 2– and 6/8–spored and repetetive basidia.



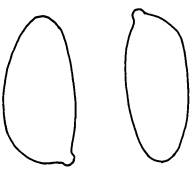
allantoid



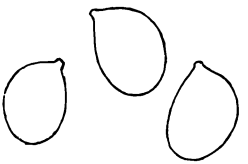
cylindrical



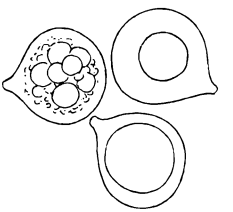
ellipsoid



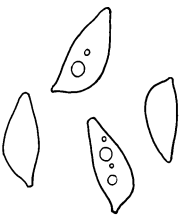
ovoid



subglobose

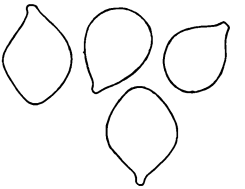


globose

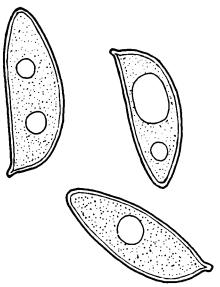


navicular

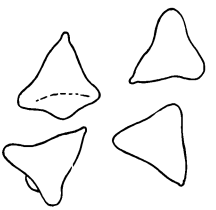
pip-shaped



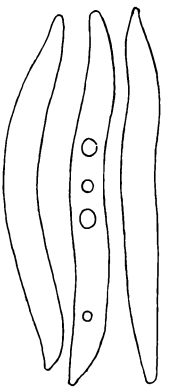
subangular



fusiform



tetrahedral



sigmoid

Fig. 13. Types of basidiospores.

3. Basidia

Reproductive organs are generally considered evolutionarly conservative and hence taxonomically very important. This is true also for fungi. In Corticiaceae the basidia show a remarkable variation supporting the idea that this family is of polyphyletic origin.

The basidia of Corticiaceae are holobasidia, i.e. they are one-celled and not divided by crosswalls as in the Heterobasidiomycetes. The shape of the basidium is very important and fig. 11–12 shows the most common types seen in the Corticiaceae.

The basidia will be normally developed terminally in the Corticiaceae, but in some genera with thin fruitbodies, they may also be developed laterally, and are then called pleurobasidia (fig. 11).

Internal repetition of basidia (fig.12) is a rare character, but is diagnostic in at least four genera, *Repetobasidium, Repetobasidiellum, Galzinia* and a few species of *Gloeocystidiellum* (recently separated in the genus *Conferticium.*

The number of sterigmata is normally four, but may vary from two to eight. The number is normally constant for a species and is in several cases diagnostic for genera. More than four sterigmata occur in all species of *Paullicorticium, Botryobasidium, Sistotremastrum* and *Sistotremella* and in most species of *Sistotrema.*

4. Spores

Spore size, form and ornamentation are very important characters in the Corticiaceae and, fig. 13–14 shows the most common terms used for shape and ornamentation.

The wall thickness is also a distinctive characteristic for a number of genera like *Hypochnicium, Leucogyrophana, Hypochniciellum, Bullbillomyces* and a few others.

Spores sometimes germinate. Then a hypha-like extension from the spore is seen. This event must not be mistaken for a spore-repetition. Spore-repetition means that a second spore is produced from a structure functioning as a sterigmata which grows out from the primary spore. This feature is generally associated with Heterobasidiomycetes, but also occurs in a few genera with holobasidia e.g. *Ceratobasidium, Uthatobasidium* and *Thanatephorus.* Colour of the spore-wall is not as important in Corticiaceae as in other groups of fungi. Slightly coloured spores occur in genera such as *Peniophora* and *Leucogyrophana* and a few other genera. In general the colour is difficult to observe unless a sporeprint is made.

Conidia and chlamydospores are rare in Corticiaceae and a few types are shown on fig. 15.

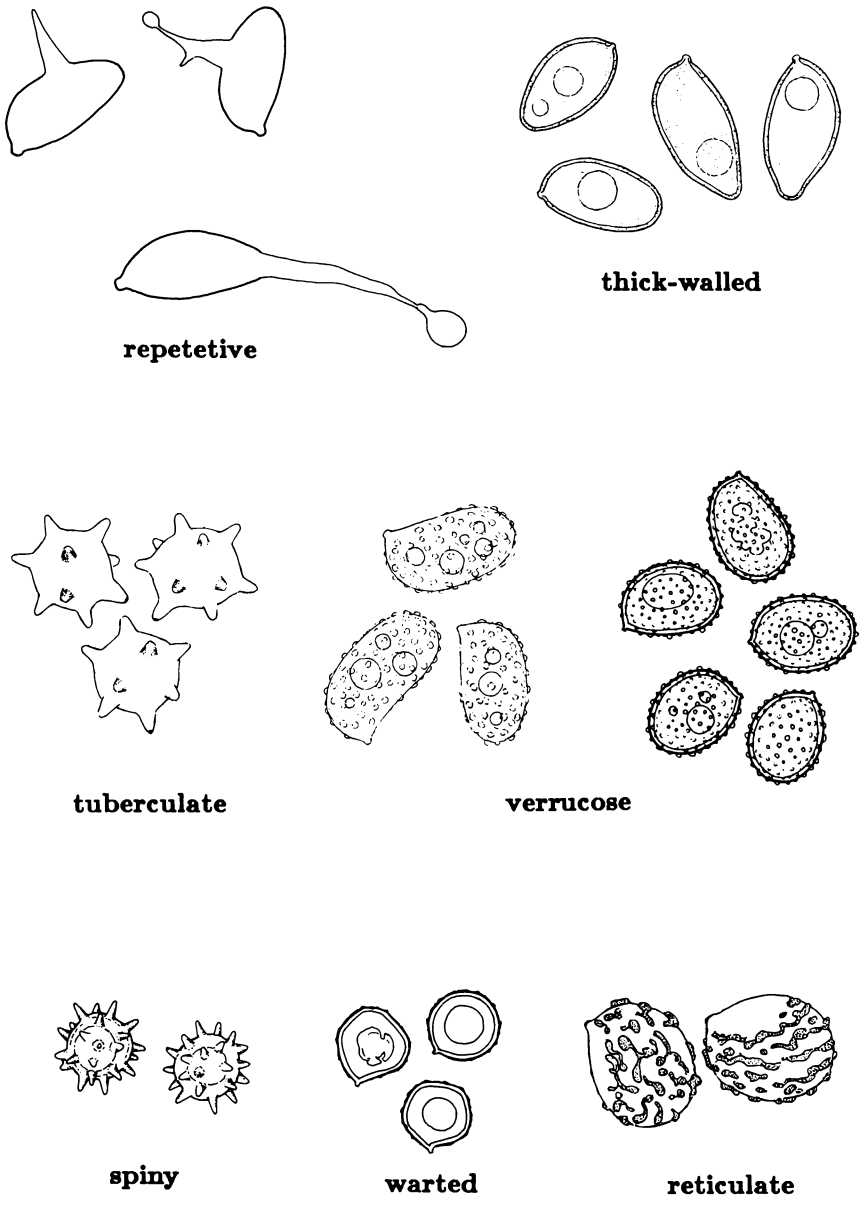


Fig. 14. Types of basidiospores.

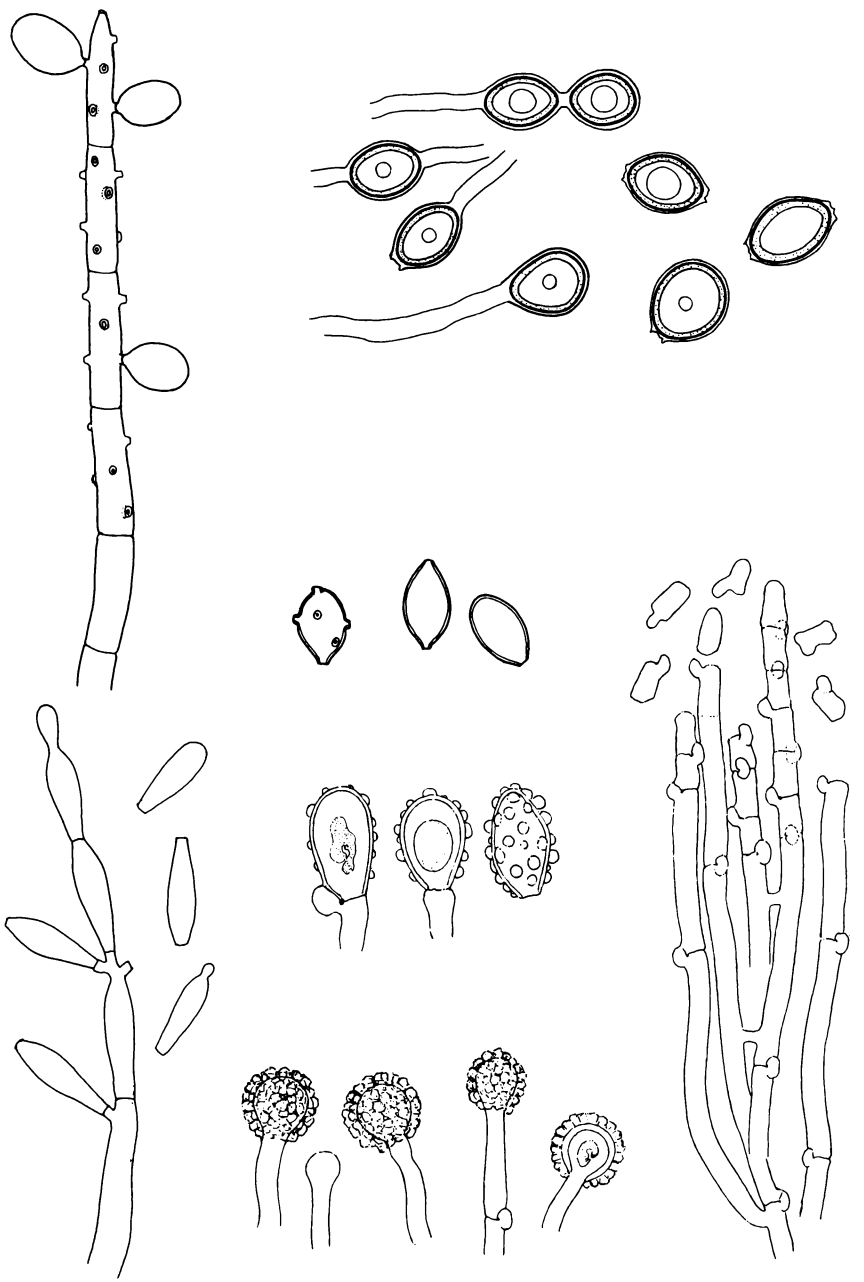
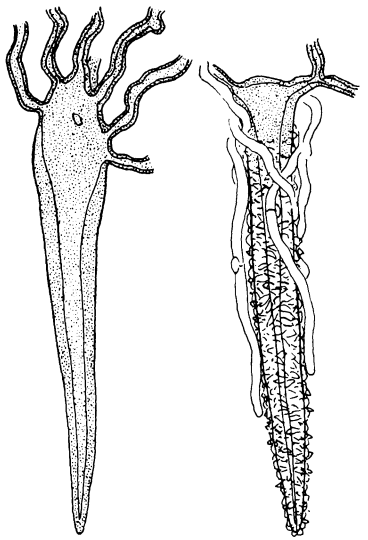
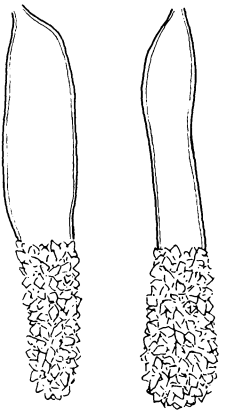


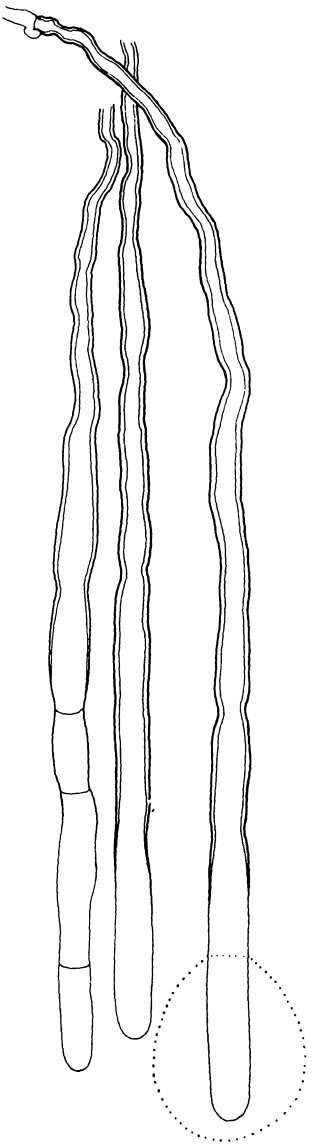
Fig. 15. Types of conidiophores, conidia and chlamydospores.



multi-rooted cystidia

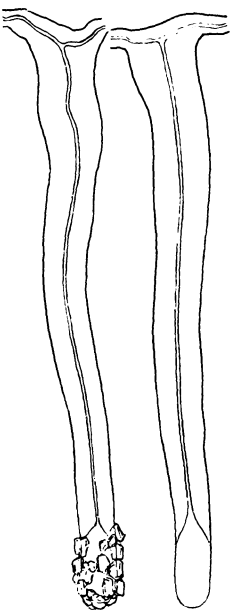


pseudocystidia

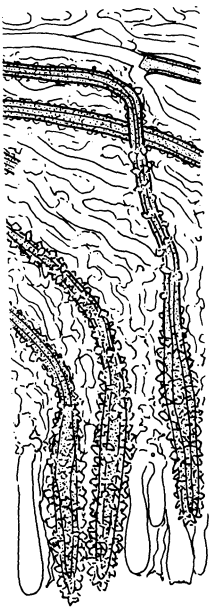


tubular cystidia

with excreted drop



lyocystidia

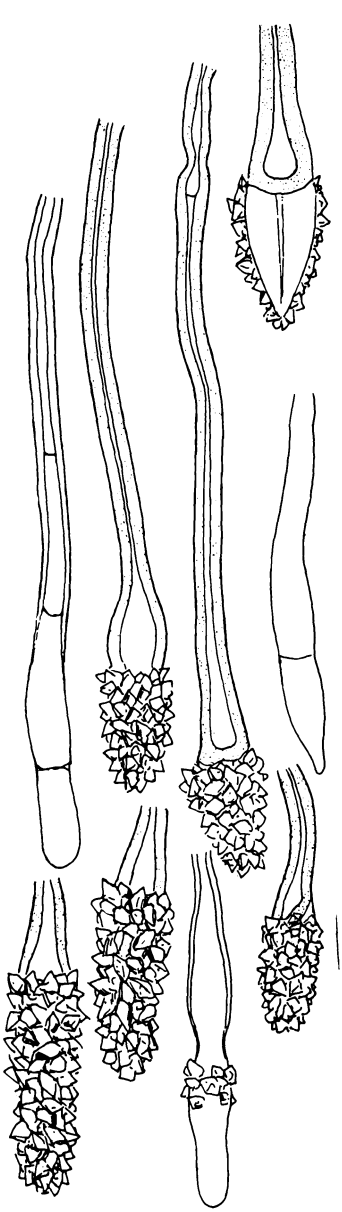


encrusted cystidia

Fig. 16. Types of cystidia.

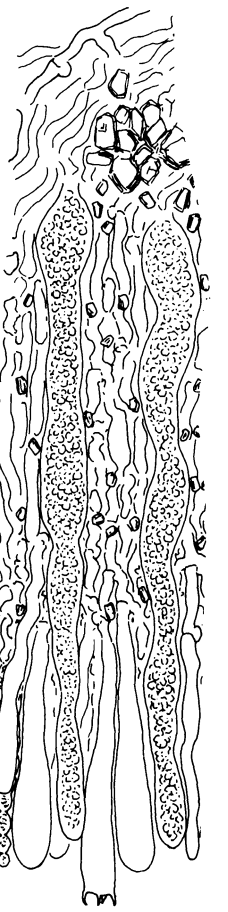
5. Cystidia and other sterile organs.
In many corticioid species cystidia and other sterile organs are distinctive features of the fruitbody and very important for classification and determination. They are termed partly by their origin partly by contents and partly by shape. The terminology adopted in this flora has not always been consistent througout all the volumes. Figs. 16–18 shows the most common types of cystidia.

5a. Cystidia
Cystidia may be divided into two groups according to where they arise. Hymenial cystidia arise in the hymenium or subhymenium, whilst pseudocystidia arise in the trama or subiculum and project into or even beyond the hymenium. Hyphocystidium is a term used for hypha-like cystidia originating in the subhymenium and projecting beyond the hymenium. This type of very simple sterile organs are often called paraphyses or paraphysoid hyphae but the use of that term should be restricted to Ascomycetes.
Leptocystidia. Thin to moderately thick-walled, of various form, often more or less cylindrical to fusoid or conical. Encrustations are common. Most hymenial cystidia are leptocystidia and often the term cystidium refers only to this type.
Lyocystidia. A highly specialized cystidium characterizing a small group of natural genera viz. *Tubulicrinis, Litschauerella,* and *Tubulicium*. They have very thick, refractive walls leaving only a small capillary lumen. This lumen widens rather abruptly near apex which is thin-walled. Lyocystidia are two- or multi-rooted. The wall dissolves more or less completely in KOH.
Metuloids (lamprocystidia pro parte) typically have two distinct parts, a basal one which has thin walls but a rather wide lumen and no encrustation and an apical part which is conical, has thick walls, only a capillary lumen and is covered with crystals. Metuloids are not always clearly separated from encrusted, thick- walled leptocystidia. Metuloids occur in several different genera. A special type with a coloured basal part occur in *Peniophora*.
Gloeocystidia are hymenial cystidia or pseudocystidia. They are thin-walled and more or less tubular or vesicular in shape, often sinuous or with constrictions. The content is oily and often refractive and somewhat yellowish. When they stain bluish-black with sulpho-vanilline (aldehyde-reaction) they are termed true gloeocystidia or **sulphocystidia**.
Lagenocystidia occur in *Hyphodontia*. They have a broader basal part and a needle-like apical part which is encrusted.

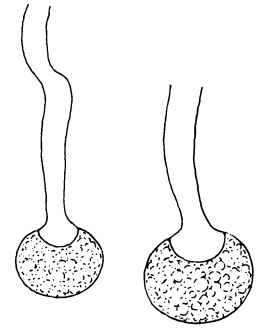


metuloids in different stages

constricted cystidium



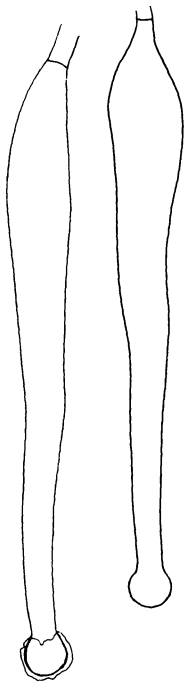
Gloeocystidia



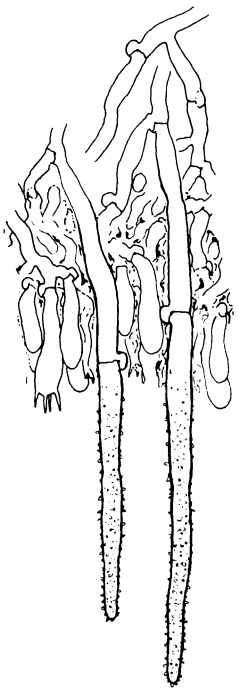
halocystidia

lagenocystidium

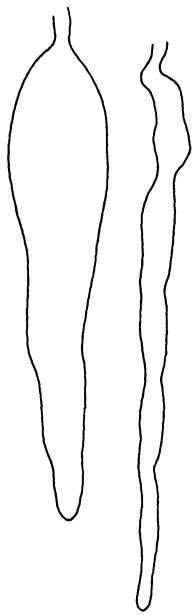
Fig. 17. Types of cystidia.



capitate cystidia

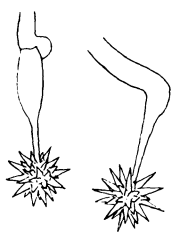


hyphoid cystidia

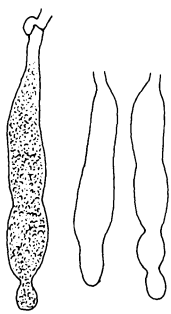


smooth thin-walled cystidia

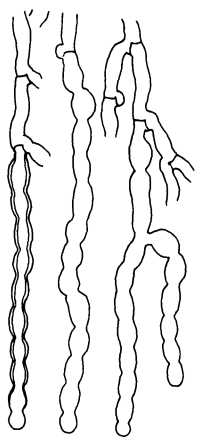
septate cystidium



asterocystidia

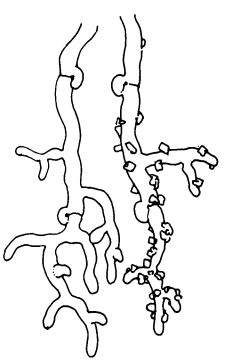


schizopapillate cystidia

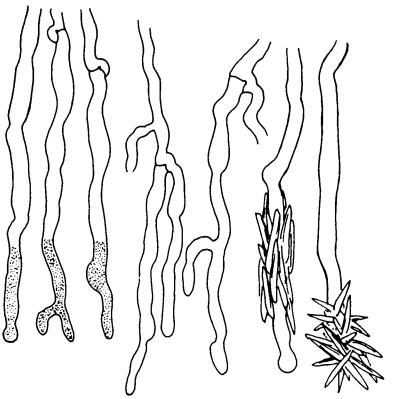


moniliform cystidia

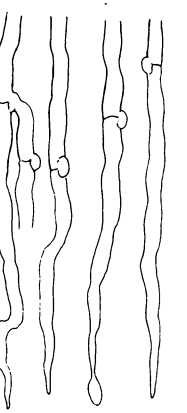
Fig. 18. Types of cystidia.



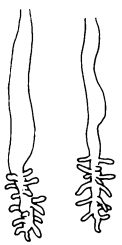
dendrohyphidia



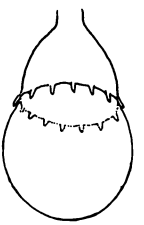
paraphysoid hyphae



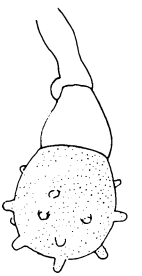
subulate hyphae



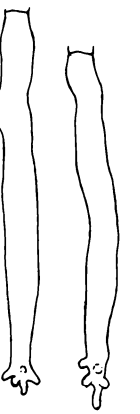
acanthophyses



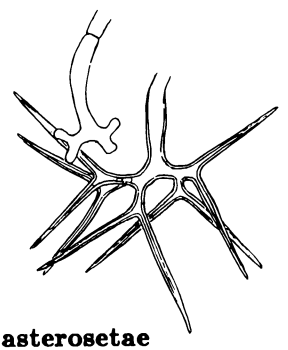
stephano- cyste



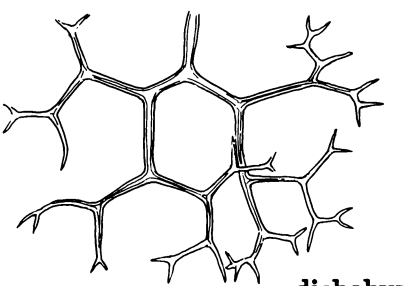
echinocyst



acanthocystidia



asterosetae



dichohyphidia

Fig. 19. Types of different sterile hymenial organs.

Moniliform cystidia refers to regularly constricted leptocystidia or gloeocystidia.
Schizopapillae is an apical constriction on a cystidium.
Basidiole is an immature and eventually sterile basidium.
Cystidiole is a small basidia-like leptocystidium which contrary to the basidiole protrudes beyond the basidia.

5b. Hyphidia
Hyphidia is a term used for more or less modified terminal hyphae in the hymenium. When they occur in the trama, the word hyphae with corresponding prefix is used. Following types of hyphidia are distinguished and shown on fig. 19.
Dendrohyphidia irregularly and strongly branched
Dichohyphidia dichotomously branched
Asterohyphidia with stellate branching (asterosetae)
Acantohyphidia with a bottle-brush appearance. This type shows transitions to cystidia.

DECAY CHARACTERISTICS

Wood-inhabiting fungi, and the majority of the Corticiaceae belong here, can generally be separated into two groups with regards to which type of rot they develop in the attacked wood. The so-called white-rot fungi attack both the cellulose and the lignin and bleach the wood to white or light colours. The brown-rot fungi attack almost exclusively the cellulose and gives the wood a brown colour.
During the attack the structure and consistency of the wood will change, and the rot is also described on the basis of this property such as fibre rot, pocket rot, cubical rot, etc.
The vast majority of the Corticiaceae are white-rot fungi, only a few genera and species are brown-rot fungi, and of these almost all attack or live on coniferous wood.
Brown-rotting genera treated in this flora include: *Leucogyrophana* (which many regard as a member of the Coniophoraceae), *Columnocystis, Crustoderma, Dacryobolus* and *Pseudomerulius* (see Gilbertson 1981).
However, many species have not been examined for their type of rot, and in the future, the list may be extended, but probably only to a restricted degree. It may be tempting to speculate on the evolutionary significance of this strongly unequal distribution, but this will be outside the scope of this flora. However, it may indicate that the brown rot is phylogenetically primitive (which is logical as it leaves half of

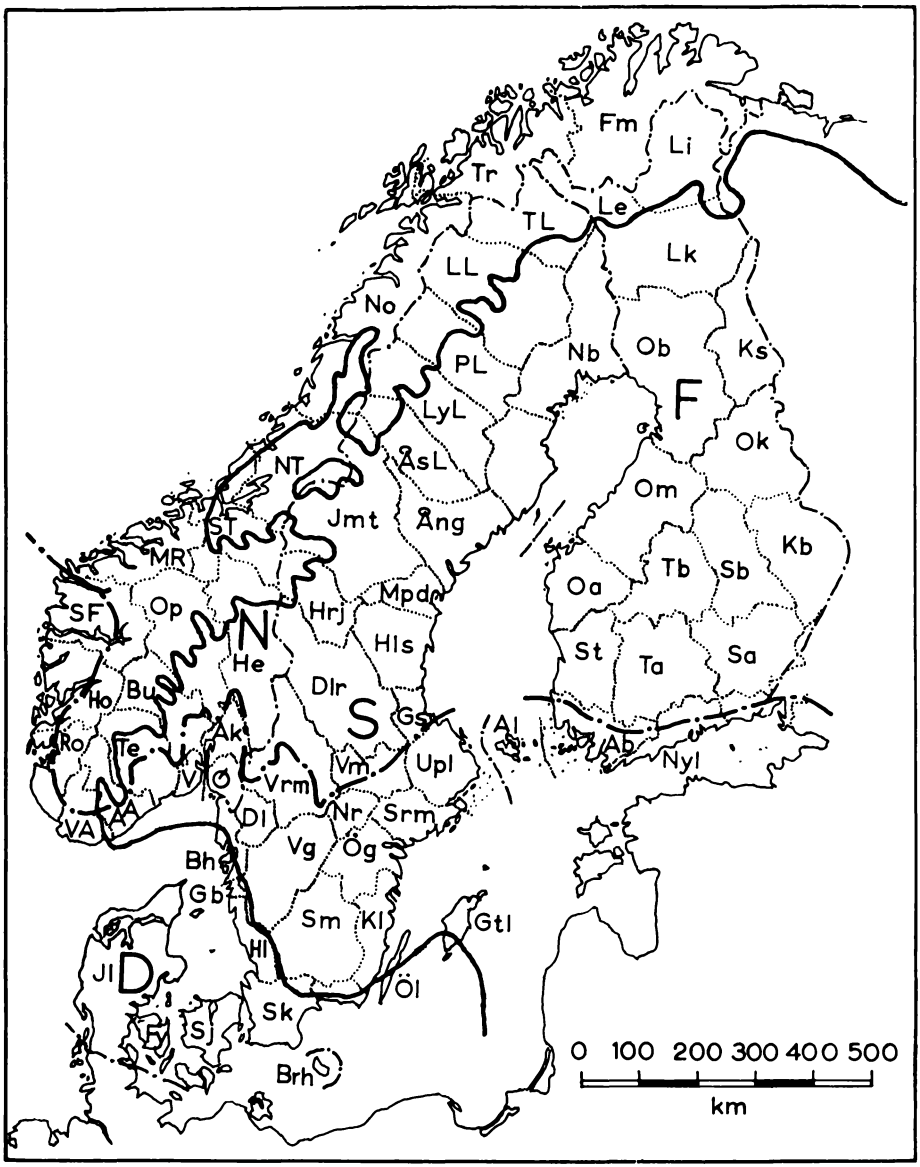


Fig. 20. Floristic provinces of Fennoscandia (counties in Norway) and the northern limit for spruce *Picea abies* (even line) and oak (*Quercus* sp.) (dotted line). From Hylander, N. 1953 Nordisk Kärlväxtflora 1, supplemented with data on distribution.

Key to the abbreviations on the map

Norway (counties)

AA – Aust-Agder
Ak – Akershus
Bu – Buskerud
Fm – Finnmark
He – Hedmark
Ho – Hordaland
MR – Møre and Romsdal
No – Nordland
NT – Nord-Trøndelag
Op – Oppland
Ro – Rogaland
SF – Sogn and Fjordane
ST – Sør-Trøndelag
Te – Telemark
Tr – Troms
V – Vestfold
VA – Vest-Agder
Ø – Østfold

Denmark

Brh – Bornholm
Fy – Fyn
Jl – Jylland
Sj – Sjælland

Sweden

Bh – Bohuslän
Bl – Blekinge
Dlr – Dalarna
Dls – Dalsland
Gbg – Göteborg
Gs – Gästrikland
Gtl – Gotland
Hl – Halland
Hls – Hälsingland
Hrj – Härjedalen
Jmt – Jämtland
Kl – Kalmar

(*Sweden* cont.)

LL – Lule Lappmark
Lyl – Lycksele Lappmark
Mpd – Medelpad
Nb – Norrbotten
Nr – Närke
PL – Pite Lappmark
Sk – Skåne
Sm – Småland
Srm – Södermanland
TL – Torne Lappmark
Upl – Uppland
Vb – Västerbotten
Vg – Västergötland
Vrm – Värmland
Vm – Västmanland
Ång – Ångermanland
Åsl – Åsele Lappmark
Ög – Östergötland
Öl – Öland

Finland

Ab – Åbo-area
Al – Åland
Kb – Pohjois Karjala
Ks – Kuusamo
Le – Enontekiön Lappi
Li – Inarin Lappi
Lk – Kemin Lappi
Nyl – Uusimaa
Oa – Etelä-Pohjanmaa
Ok – Kainuu
Ob – Pohjois-Pohjanmaa
Om – Keski-Pohjanmaa
Sa – Etelä-Savo
Sb – Pohjois-Savo
St – Satakunta
Ta – Etelä-Häme
Tb – Pohjois-Häme

the tree unaffected) and this is supported by their strong preference for gymnosperms, an ancient group of plants compared with the angiosperms.

ECOLOGY

Most species described in this flora will be found on dead wood lying on the ground. They grow on wood of every size from trunks down to the tiniest twigs or even needles. Fruitbodies develop on the underside of substrata with the hymenium facing downwards. Thus, the main task on the excursion will be to turn logs.
Newly fallen wood is seldom interesting but some specialized species always grow on newly fallen trunks. As the deterioration proceeds more species will appear on the trunk. A clear succession of species can be observed. This means that you always have to search wood in different stages of decay. Be well aware of the tree and bush composition on the collecting locality. Wood from different species should always be searched. The fungal flora differs considerably, above all between deciduous and coniferous trees but to a certain degree also between different tree species. However, few wood-destroying fungi grow only on one host and a large group seems to be ubiquitous.
In N. Europe coniferous wood seems to be the richest in species and *Picea* houses more species than *Pinus*. Among the decidous trees oak and elm are known to have several species of their own. Also *Salix* and *Populus*seem to have a somewhat more specialized flora.

Specialized substrata or ecological niches.
Dead, but still attached branches are an interesting place to look, because the open position of the substratum allows the establishment of species which are able to survive drought. The genera *Peniophora*, *Laeticorticium* and *Vuilleminia* are frequently found in such places.
Old ferns are often a profitable place to look as there seemingly is a number of species restricted to this substrate. Little is known of the flora as no systematic collecting has been done, and the fruitbodies are small, delicate and evanescent.
Stems and leaves of herbaceous origin often have the same type of fruitbodies as on dead ferns, but seemingly the flora is different. Dead material of *Lactuca, Aconitum, Equisetum, Epilobium, Rubus* and *Urtica* often have corticiaceous fungi late in the autumn.
Bark of living trees is normally less promising, but the genus *Dendrothele* is found exclusively in this habitat as are some species of *Aleurodiscus.*

Construction material of different kinds are often favourable habitats to pick up unusual species. The few investigations done on this type of substratum have revealed a number of specialized species which apparently are adapted to fruit on such exposed surfaces. Even the tiniest fruitbodies may be fully fertile on wooden fences, railings, old wooden bridges. The flora is rather similar to that found on decorticated trunks in open and sunny localities where the substrate dries up rather quickly after rain.
Riverbeds, shores and bogs are places where wood-debris is often present and periodically drowned. Such places will often give a fine harvest of very specialized species. Old timberwalls along rivers where timber-floating has been performed are a favourable place to collect.

PRACTICAL ADVICE FOR COLLECTING

What you need for collecting is: A good knife, paperbags or pieces of newspaper, a pencil or felt-tipped pen, hand lens and a basket or some sort of bag to carry your specimens. Extra equipment will be a map if you are in an area unknown to you, a compass and a small axe or a folded saw if you collect in an area with many hard and sun-exposed trunks.
Always carry two knives because sometimes you may break the blade but more likely you will loose one of them.
Logs should be turned. A most helpful tool is then a special hook with a handle which you will probably have to order from a smith. This tool is our prolonged hand when collecting. Try to cut clean, nice pieces of wood, not to small, not too big. They should enable you in the herbarium to get a picture of the outer appearance of the fruitbody, meaning that margins and eventual variation in colour should be covered in the collections. However, too large pieces will be difficult to handle in the herbarium. When cut you wrap your pieces one by one in paper or in a paperbag. Plain newspaper slots should be the best.
We recommend that each package should be numbered and the numbers listed in a note-book already in the field. Along with the numbers you make the following notes.
Exact place of collecting.
Type of vegetation e.g. *Alnus* stand.
Ecological conditions e.g. lake-shore.
Substratum e.g. *Alnus*.
Size of substratum e.g. stem.
Type of rot e.g. brown rot.
Stage of decay e.g. very rotten.

Eventual smell, exudates or other notable features that will disappear upon drying.

A lens could be used in the field. It will, for example, enable you to discover larger cystidia and thus better distinguish between species.

When a log has been turned it should be scrupulously searched. In the beginning much will look the same but if you are attentive you will find small differences in colour and texture of the fruitbodies. Often different species grow close together, even intermingled. Then there is usually a distinct interference-zone. Some species are very delicate and hard to see. Shimmering parts of the wood could be a clue. Other species have very small fruitbodies only appearing as spots on the wood and then may be easy to confuse with a discomycete or a cyphellaceous fungus.

A good collecting-place has a wide range of decaying wood. Logs, stems and branches in different stages of decay should be at hand. The more undisturbed conditions, the better. Collecting should always be made very carefully on the site. It is no use to wander over vast areas turning one log here and another there. It is better to do some walking before you start collecting and then find a place you feel is suitable. Then stay there and act as a vacuum-cleaner. If it is a good collecting place you will find new specimens for at least half the day amounting to some 50–100 samples. It is convenient to collect in only one or two places every day because it enables you to remember the individual collections which in turn makes it possible to return for material of a certain fruitbody. In order to be sure that you have really found everything on your collection site we estimate you have to collect 500–1000 samples. Their gathering should be spread over the whole season (inclusive of some winter, spring and summer finds!) and cover at least three years. Even then you will probably not have found everything, but what is left should be of less importance and mainly due to your lack of experience with these fungi.

Drying should start within 10–20 hours after collecting. Even this restricted time could be too much in certain cases. The fungi you have collected and put in papercover will immediately start to adapt themselves to the new conditions. They start to grow in order to put their hymenium in a horizontal position. Later, you will see this in your preparations as slender hyphae growing above and over the hymenium making the whole fungus look very strange.

If you have not numbered the specimens in the field, this should be done immediately after drying and before packing so that the pertinent number could be put on the envelope. The numbering can be consecutive, which is the most common way, or could start from 1 ev-

ery year with a number indicating the year. A proper label, either the field one or a new one, should be put inside the envelope with as much information as possible and at least locality, substrate and collector with added comments as to ecology, rot etc.
If the substrate was impossible to determine in the field and it is important to establish, we would recommend Mork, E. *Vedanatomi* sec. ed. 1963 available from Landbruksbokhandelen, 1432 Ås, Norway, Price 40 NOK (1986). There is an English summary and it keys out almost all woody plants in Scandinavia.

DETERMINATION.

First of all you need a good binocular compound microscope with at least two lenses, one 40× and one 100×. The eyepieces could be either 10× or 12.5×. The most suitable microscope is one with phase-contrast objectives as these will enable you to mount your specimens in KOH which is very efficient to disperse even rather thick sections.
Sections should be made with a sharp knife or preferably with a razor-edge of industrial quality, i.e. with only one sharp edge, the other one thicker and thus easier to hold. If possible, the sectioning should be made under a stereo-microscope or with aid of a strong lens of some kind.
You will need the following four reagents:
KOH — 3–5 % in water.
Melzer's solution — 0.5 g Iodine, 1.5 g KI, 22 g Chloral hydrate and 20 g water.
Cotton blue — 0.1 % cotton blue in 60 % lactic acid.
Sulphovanilline — 25 g vanillin, 2 ml conc. sulphuric acid and 2 ml water.
All these reagents can easily be stored with exception of the last one which normally should be discarded after two weeks.
Cotton blue gives a cyanophilous reaction, if positive, in walls of spores, basidia, cystidia or hyphae. The reaction is often difficult to observe as the protoplasm also absorbs the reagent to a certain degree.
Melzer's reagent, if positive, will either be amyloid or dextrinoid. If amyloid, spores, hyphae, etc. will be coloured grey to bluish with violet shades. In spores, the colour is most easily observed in empty spores, often glued to the hymenium. The dextrinoid reaction gives a reddish to brown colour in the affected parts.
Sulphovaniline is used to colour the contents of gloeocystidia and will, if positive, give a black colour.

Most specimens will dry properly in normal room-temperature, or you could also use a drier. Make sure your specimens are totally dried before you store them in your herbarium. We want to give a little warning for too efficient drying. One may sometimes see collections with the hymenial details totally collapsed. We suspect that this phenomena could be the result of too hot conditions during drying.
After drying, collections have to be protected against insects. We have found it most convenient to put the samples some 3–4 days in a commercial deep-freeze. Afterwards they should be sheltered in small self-sealing plastic bags. These are afterwards put in envelopes of the common kind used in herbaria and labelled.
To make a proper section of your specimen, first place a drop of KOH or your staining reagent on a slide. Dip the edge of your cutting-tool in the fluid and scrape or cut a small piece of the hymenium. The fluid will moisten your sample so normally this will not be difficult. Transfer the loose part with your cutting-tool to the drop where it will normally release itself.
If your specimen is thick and hard, it is often advantageous to make a vertical section. Cut a clean vertical surface and try to make as thin sections as possible, which should not be moistened in advance. Try to make a total section of the whole fruitbody, not only the hymenium.
Now place a cover slip on your preparation and gently tap the slip with a pencil or similar until you have squeezed the tissue for examination. Eventually remove excess KOH with a blotting-paper.
Sections in cotton-blue should be warmed before squeezing the tissue. Otherwise you have to wait for at least half an hour before the lactic acid has made the protoplasm swell. Use a spirit-lamp.
Your determination starts already in the field. Substratum and ecology gives valuable information. With the naked eye you observe colour and texture of the fruitbody. Under the lens you make further observations on texture, occurrence of rhizomorphs, configuration of the hymenophore and presence of cystidia. All these observations should give you a clue to the real nature of your sample. However only the microscope could give you reliable results.
We recommend the following steps in your examination of the preparation. When you get more experienced you could work in a more free manner.
— Search for occurrence of clamps. Make sure that they occur also on the basidia-bases. Note that sometimes clamps are found only on the hyphae nearest to the substratum (basal hyphae).
— Count the number of sterigmata on the basidia. There are normally four, but there could be anything between two and eight. When devi-

ating from four you should look at several basidia so that you know it was not just an aberration.
— Look for the spores and measure them. Try to figure out if they have any ornamentation. Sometimes ornamentation is visible only in Melzer's solution. Measure length and breadth of several spores and make sure that you have correctly identified the apiculus so that you can take the correct measurement. Keep in mind that extraneous spores often occur in a sample. Try to observe spores still attached to the sterigmata. Your specimens may also be in a condition that has prevented development of spores. Such samples are mostly without scientific interest.
— Look for sterile organs such as cystidia.
— Observe variation in hyphal construction.
— Make a new preparation in Melzer's solution. This will reveal amyloidity and dextrinoidity. Both staining reactions depend on presence of certain starch-compounds. Staining reactions should be observed in normal light (not phase).
— Turn to the key on the next page. Good luck!

KEY TO GENERA AND SPECIES

CONDENSED KEY

1. Spores amyloid ..... **Group A, page 43**
1. Spores inamyloid **2**
2. Basidia with a basal clamp ..... **3 Group B, page 45**
2. Basidia without a basal clamp ..... **26 Group C, page 58**

CONDENSED KEY TO GROUP B

3. Spores ornamented **2–13**
3. Spores smooth **4**
4. With cystidial elements **5**
4. Without cystidial elements **18**
5. With lyocystidia **16–17**
5. With other kinds of cystidia **6**
6. Basidia with less or more than 4 sterigmata **18–19**
6. Basidia with 4 sterigmata **7**
7. Basidia and spores 80–100 and 20 μm long respectively **20**
7. Basidia and spores smaller **8**
8. Species with dendrohyphidia **20–23**
8. Species without dendrohyphidia **9**
9. Hyphal system dimitic **25–40**
9. Hyphal system monomitic **10**
10. Fruitbodies plicate, poroid, grandinioid, odontioid or hydnoid **46–71**
10. Fruitbodies more or less smooth **11**
11. Spores thick-walled **76–79**
11. Spores thin-walled **12**
12. Basidia repetitive **81**
12. Basidia not repetitive **13**
13. Cystidia encrusted with crystalline matter **83–97**
13. Cystidia smooth or with resinous exudation **14**
14. Fruitbodies pileate, with a distinct tomentum **100**
14. Fruitbodies otherwise shaped **15**
15. Spores allantoid or cylindrical, up to 2.5 μm wide **102–11**
15. Spores differently shaped or broader than 2.5 μm **16**
16. Cystidia septate **116–119**
16. Cystidia not septate **17**
17. Basidia pleural **120**
17. Basidia terminal **121–124**

18. Spores thick-walled **146–155**
18. Spores thin-walled **19**
19. Basidia with more than 4 sterigmata **161–165**
19. Basidia with 2 or 4 sterigmata **20**
20. Basidia with 2 sterigmata **167–168**
20. Basidia with 4 sterigmata **21**
21. Species with dendrohyphidia **170–173**
21. Species without dendrohyphidia **22**
22. Spores large, 12–20 μm long **174–175**
22. Spores smaller **23**
23. Dimitic species **181–182**
23. Monomitic species **24**
24. Spores repetitive **183**
24. Spores not repetitive **25**
25. Fruitbodies grandinioid, odontioid, hydnoid or raduloid .. **185–193**
25. Fruitbodies poroid, folded or smooth **194–235**

CONDENSED KEY TO GROUP C

26. Spores ornamented **1**
26. Spores smooth **27**
27. With cystidia **3–21**
27. Without cystidia **28**
28. Spores repetitive **23–25**
28. Spores not repetitive **30–51**

GROUP A

1. Spores smooth **2**
1. Spores ornamented **19**
2. Clamps lacking **3**
2. Clamps present **8**
3. Cystidial elements lacking ..... **Hypochnella**
3. Cystidial elements present **4**
4. With dendrohyphidia, spores with thickened walls ..... **Dendrothele alliacea**
4. Without dendrohyphidia, spores thin-walled **5**
5. Fruitbodies of small dimensions, about 0.5 mm thick, spores large, 12–15 × 6–8 μm ..... **Aleurodiscus fennicus**
5. Fruitbodies normally larger and thicker, spores 5–10(–12) × 3–5 μm **6**

6. With thin-walled pseudocystidia, other cystidial elements lacking ..... **Gloeocystidiellum**
6. With thick-walled pseudocystidia, acuto- or/and acanthocystidia present **7**
7. Fruitbodies tessellate, producing a white pocket rot ... **Xylobolus**
7. Fruitbodies not or indistinctly tessellate, without a white pocket rot ..... **Stereum**
8. Cystidial elements present **9**
8. Cystidial elements lacking **13**
9. Acanthocystidia present ..... **Aleurodiscus**
9. Acanthocystidia lacking **10**
10. Spores thick-walled, cystidia sparse ..... **Leucogyrophana mollis**
10. Spores thin-walled, cystidia mostly numerous **11**
11. Cystidia strongly encrusted, of metuloid appearance ..... **Amylostereum**
11. Cystidia differently shaped **12**
12. Cystidia well differentiated, sulphoaldehyde reaction positive ..... **Gloeocystidiellum**
12. Cystidia less differentiated, sulphoaldehyde reaction negative ..... **Amylocorticium**
13. Fruitbodies smooth **14**
13. Fruitbodies hydnoid, folded or with gill-like ridges, often pileate or cupulate **17**
14. Spores thick-walled, usually with weak amyloid reaction (greyish) ..... **Leucogyrophana**
14. Spores thin-walled, amyloid reaction stronger **15**
15. Spores bean- or kidney-shaped ..... **Melzericium**
15. Spores differently shaped **16**
16. Basidia pedunculate, fruitbodies pellicular, loosely adnate, see also *Athelopsis lacerata* ..... **Amylocorticium cebennense**
16. Basidia pleural, fruitbodies gelatinous firmly attached to the substratum ..... **Phlebiella**
17. Spores 2–2.5 μm wide, strongly amyloid, fruitbodies pileate, dimidiate, sub-stipitate, on Pinus ..... **Irpicodon**
17. Spores 0.75–1.25 μm wide, usually weakly amyloid, on deciduous trees **18**
18. Hymenophore with gill-like ridges ..... **Plicaturopsis**
18. Hymenophore irregularly plicate ..... **Plicatura**
19. Clamps lacking **20**
19. Clamps present **21**
20. Spores large, 20–25 × 13–20 μm ..... **Aleurodiscus**
20. Spores smaller ..... **Gloeocystidiellum**

21. Dimitic (or trimitic) species **22**
21. Monomitic species **23**
22. Fruitbodies thick, stratified, cystidia conical and strongly encrusted ..... **Laurilia**
22. Fruitbodies thin, pellicular, cystidia not metuloid .... **Scytinostromella**
23. Spores 8–17 × 5–12 μm **24**
23. Spores 4.5–7 × 2.5–3.5 μm **26**
24. Basidia with two sterigmata ..... **Aleurodiscus norvegicus**
24. Basidia with four sterigmata **25**
25. Spores 15–17 × 10–12 μm ..... **Aleurodiscus disciformis**
25. Spores 8–10 × 7–8 μm ..... **Pseudoxenasma**
26. Fruitbodies resupinate to reflexed, tramal hyphae light brown, cystidia without sulphoaldehyde reaction ..... **Laxitextum**
26. Fruitbodies resupinate, trama lacking, subicular hyphae hyaline, cystidia with sulphoaldehyde reaction ..... **Gloeocystidiellum**

GROUP B

1. Spores ornamented, lobed or tetrahedral **2**
1. Spores smooth **15**
2. Cystidial elements present **3**
2. Cystidial elements lacking **5**
3. With lyocystidia, two- to many-rooted ..... **Litschauerella**
3. With other kinds of cystidia **4**
4. Spores rough or with striate ornamentation in Melzer, appearing smooth in KOH, basidia pleural, tissue dense ..... **Xenasma**
4. Spores and basidia without these characteristics, tissue loose .... **Hypochnicium**
5. Clamps scattered or lacking on the basal hyphae, basidia with cyanophilous granulation ..... **Lindtneria**
5. Clamps present throughout, basidia without cyanophilous granulation **6**
6. Fruitbodies poroid ..... **Trechispora mollusca**
6. Fruitbodies not poroid **7**
7. Basidia with 2 (4) sterigmata, spores 5–8 μm long, tetrahedral ... . **Xenosperma**
7. Basidia with more than 2 sterigmata **8**
8. Basidia with 6–8 sterigmata, spores 4.5–5 μm across, tetrahedral . ..... **Sistotrema subtrignospermum**
8. Basidia with 4 sterigmata, spores not tetrahedral **9**

9. Spores globose, finely warted ..... **Hypochnicium vellereum**
9. Spores subfusiform to ellipsoid **10**
10. Spore-walls or warts strongly cyanophilous **11**
10. Spore-walls or warts not cyanophilous **12**
11. Fruitbodies hydnoid ..... **Kavinia alboviridis**
11. Fruitbodies smooth ..... **Ramaricium**
12. Basidia pleural, tissue dense or at least hyphae more or less agglutinated ..... **Phlebiella**
12. Basidia terminal, tissue loose, hyphae not agglutinated **13**
13. Fruitbodies fairly tough, spores irregularly lobed or with few outgrowths, hyphae without ampullaceous swellings ..... **Tylospora**
13. Fruitbodies ordinarily brittle, spores echinulate or warted, hyphae with ampullaceous swellings ..... **Trechispora**
15. Cystidial elements present **16**
15. Cystidial elements lacking **144**
16. With lyocystidia, two- or many- rooted **17**
16. With other kinds of cystidia **18**
17. Spores vermicular, cystidia many-rooted ..... **Tubulicium**
17. Spores differently shaped, cystidia ordinarily 2-rooted **Tubulicrinis**
18. Basidia with two sterigmata ..... **Clavulicium macounii**
18. Basidia with 4–8 sterigmata **19**
19. Basidia with more than 4 sterigmata ..... **Sistotrema**
19. Basidia normally with 4 sterigmata **20**
20. Basidia and spores very long, normally 80–100 and 20 μm respectively, common on still attached branches of deciduous trees ..... **Vuilleminia**
20. Basidia and spores smaller **21**
21. Dendrohyphidia present **22**
21. Dendrohyphidia lacking **24**
22. Fruitbodies odontoid, spores small, 3.5–4.5 × 2–2.5 μm ..... **Cystostereum subabruptus**
22. Fruitbodies smooth or irregularly tuberculate, spores larger **23**
23. Cystidia protruding, often more than 30 μm above the basidia, without sulphoaldehyde reaction ..... **Laeticorticium**
23. Cystidia not or very slightly protruding, with sulphoaldehyde reaction ..... **Peniophora**
24. Hyphal system dimitic **25**
24. Hyphal system monomitic **45**
25. Fruitbodies odontioid, hydnoid or subporoid **26**
25. Fruitbodies smooth or tuberculate **35**
26. With strongly encrusted pseudocystidia ..... **Steccherinum**
26. With other kinds of cystidial elements **27**

27. Fruitbodies irpicoid to subporoid ..... **Schizopora**
27. Fruitbodies odontioid to hydnoid **28**
28. Gloeocystidia numerous, fruitbodies with small 0.5 mm long aculei ..... **Cystostereum subabruptum**
28. With other kinds of cystidia or only with hyphoids **29**
29. Hard species, cystidia well differentiated with a resinous globule . ..... **Mycoaciella**
29. Soft and tough species, cystidia lacking but protruding hyphoids in the aculeal parts ..... **Fibrodontia**
35. With brown pseudocystidia **36**
35. Without such cystidia **37**
36. Pseudocystidia strongly encrusted, spores 6–8 × 3–5 μm, rare species on deciduous wood ..... **Lopharia**
36. Pseudocystidia not metuloid-like, spores 9–13 × 4–5 μm, common species on spruce ..... **Columnocystis**
37. Spores allantoid ..... **Dacryobolus karstenii**
37. Spores differently shaped **38**
38. Spores fusiform, cystidia ventricose ..... **Merulicium**
38. Spores and cystidia differently shaped **39**
39. Skeletal hyphae strongly cyanophilous, cystidia lacking, but with sparse hyphoids between the basidia ..... **Fibriciellum**
39. Skeletal hyphae not cyanophilous, cystidia well differentiated .. **40**
40. Fruitbodies distinctly stratified, cystidia vesiculose, mostly embedded ..... **Cystostereum murraii**
40. Fruitbodies not stratified, cystidia conically obtuse, protruding ... . **Fibricium**
45. Fruitbodies reticulately plicate, poroid, grandinoid, odontoid or hydnoid **46**
45. Fruitbodies smooth but some species pilose by protruding cystidia or fruitbodies colliculose **75**
46. Fruitbodies meruloid or poroid **47**
46. Fruitbodies grandinoid, odontioid or hydnoid **49**
47. Cystidia strongly encrusted ..... **Phlebia lindtneri**
47. Cystidial elements differently shaped **48**
48. Spores 4–4.5 × 1–1.5 μm, with hymenial cystidial elements .... **Merulius**
48. Spores 4–6.5 × 1.5–2.5 μm, cystidia as a rule not hymenial, either embedded or marginal ..... **Phlebia**
49. Spores allantoid, not wider than 2 μm **50**
49. Spores differently shaped, if allantoid, then wider than 2.5–3 μm **52**

50. Aculei with excreted drop of viscid liquid, basidia conspicuously constricted below the sterigmata ..... **Dacryobolus sudans**
50. Aculei and basidia not with these characteristics **51**
51. Spores strongly curved, 4–5 μm long ..... **Chaetoporellus curvisporus**
51. Spores allantoid, 6–8 μm long ..... **Hyphodontia**
52. Fruitbodies irpicoid to subporoid ..... **Schizopora**
52. Fruitbodies differently shaped **53**
53. Only with thick-walled aculeal cystidia, or penetrating hyphae, if cystidia septate see 55 ..... **54**
53. Cystidial elements differently shaped **55**
54. Aculeal hyphae 2.5–3.5 μm wide, dimitic (subdimitic) species ..... **Fibrodontia**
54. Aculeal hyphae or cystidia 5–8 μm wide, monomitic species ..... **Hyphodontia**
55. Cystidia septate, with a clamp at each septum ..... **Hyphoderma setigerum**
55. Cystidia not septate **56**
56. Cystidia of two kinds **57**
56. Cystidia of one kind **62**
57. Spores large, 9–15 μm long **58**
57. Spores smaller **59**
58. Thin-walled cystidia and echinocysts present ..... **Hyphoderma echinocystis**
58. Metuloids and sulphocystidia present ..... **Peniophora laeta**
59. Fruitbodies grandinioid, strongly encrusted cystidia and small fusiform sulphocystidia present ..... **Metulodontia**
59. Fruitbodies odontioid, sulphocystidia lacking **60**
60. Spores 3–4 × 2–2.5 μm, with bladder- like gloeocystidia and tapering cystidia ..... **Physodontia**
60. Spores larger, cystidia of other kinds **61**
61. Spores 4.5–6 × 3.5–4 μm, with lagenocystidia and capitate cystidia ..... **Hyphodontia arguta**
61. Spores 5,5–8 × 2,5–3,5 μm, with numerous asterocystidia and capitate halocystidia ..... **Resinicum bicolor**
62. Spores small, 3.5–4.5 × 2–2.5 μm, gloeocystidia numerous ..... **Cystostereum subabruptum**
62. Not with this combination of characteristics **63**
63. Spores 9–15 μm long, ellipsoid to allantoid **64**
63. Spores shorter, of various appearance **66**

64. Fruitbodies odontioid with sparse aculei, fairly soft species ..... **Hyphoderma echinocystis**
64. Fruitbodies tuberculate to raduloid, firm species **65**
65. Spores subcylindrical, cystidia with sulphoaldehyde reaction ..... **Peniophora laeta**
65. Spores allantoid, cystidia without sulphoaldehyde reaction ..... **Hyphoderma radula**
66. Cystidia capitate **67**
66. Cystidia differently shaped **68**
67. Cystidia with an halo ..... **Resinicium pinicola**
67. Cystidia without an halo, but often encrusted apically ..... **Hyphodontia**
68. Cystidia strongly encrusted, ... **Phlebia queletii**
68. Cystidia differently shaped **69**
69. Spores globose, with thickened walls ..... **Radulodon**
69. Spores differently shaped **70**
70. Fruitbodies grandinoid, basidia with internal repetition ..... **Hyphodontia crustosa**
70. Fruitbodies odontoid or hydnoid, basidia without internal repetition **71**
71. Fruitbodies hard and brittle, aculei smooth or slightly fimbriate .. **Mycoacia**
71. Fruitbodies fibrous and fairly tough, aculei variable, but usually fimbriate ..... **Hyphodontia quercina**
75. Spores thick-walled **76**
75. Spores thin-walled **80**
76. Spores dextrinoid ..... **Jaapia**
76. Spores indextrinoid **77**
77. Spores greyish in Melzer's reagent ..... **Leucogyrophana mollis**
77. Spores not greyish in Melzer's reagent **78**
78. Cystidia septate, with a clamp at each septum ..... **Hypochnicium polonense**
78. Cystidia not septate **79**
79. Cystidia strongly encrusted, fruitbody often together with its conidial state Aegerita candida ..... **Bulbillomyces**
79. Cystidia not strongly encrusted ..... **Hypochnicium**
80. With basidial repetition **81**
80. Without basidial repetition **82**
81. Basidia subcylindrical, waisted, repetition inconspicuous ..... **Galizinia incrustans**
81. Basidia subglobose to pyriform, repetition conspicuous ..... **Repetobasidium**

82. Cystidia encrusted 83
82. Cystidia smooth or encrusted with resinuous exudation 100
83. Spores crescent-shaped, 12–16 × 4–6 μm ..... **Chaetoderma**
83. Spores differently shaped 84
84. With brown pseudocystidia, apically encrusted ..... **Lopharia**
84. Cystidia differently shaped 85
85. Lagenocystidia present, other kind of cystidia smooth ..... **Hyphodontia**
85. Lagenocystidia lacking 86
86. Cystidia septate, with a clamp at each septum 87
86. Cystidia not septate 88
87. Spores 7–13 μm long ..... **Hyphoderma setigerum**
87. Spores 4–5 μm long ..... **Amphinema**
88. Spores subglobose to ellipsoid, up to 6–7 μm long 89
88. Spores allantoid, sigmoid, sub- cylindrical, longer than 7 μm ... 92
89. Cystidia mostly capitate, fruitbodies pure white ..... **Hyphoderma sambuci**
89. Cystidia metuloid or with obtuse apex, fruitbodies not pure white 90
90. Tissue dense, hyphae agglutinated ..... **Phlebia**
90. Tissue loose, hyphae as a rule not agglutinated 91
91. With both encrusted cystidia and small sulphocystidia ..... **Metulodontia**
91. With only encrusted cystidia ..... **Ceraceomyces**
92. Cystidia spirally encrusted, spores fusiform to sigmoid ..... **Subulicystidium**
92. Cystidia and spores differently shaped 93
93. Basidia pleural, fruitbodies thin and inconspicuous . **Lepidomyces**
93. Basidia terminal, fruitbodies as a rule thick and conspicuous .. 94
94. Cystidia of one kind 95
94. Cystidia of two kinds 96
95. Hymenophore pilose by protruding cystidia, spores with many oil-drops ..... **Hyphoderma**
95. Hymenophore smooth or indistinctly pilose, cystidia not or slightly protruding, oily contents in the spores not conspicuous **Peniophora**
96. Cystidia with sulphoaldehyde reaction ..... **Peniophora**
96. Cystidia without sulphoaldehyde reaction 97
97. Metuloid cystidia numerous, tissue fairly dense ..... **Peniophora**
97. Metuloid cystidia rare or lacking, tissue fairly loose . **Hyphoderma**

100. Fruitbodies pileate, stratified and with a distinct tomentum, cystidia fusoid, vesicular hyphae abundant next to the subhymenial tissue ..... **Chondrostereum**
100. Not with this combination of characteristics **101**
101. Spores allantoid or cylindrical, up to 2,5 μm wide **102**
101. Spores differently shaped or/and more than 2,5 μm wide **115**
102. Cystidia thick-walled **103**
102. Cystidia thin-walled **105**
103. Cystidia subulate ..... **Phlebia segregata**
103. Cystidia obtuse **104**
104. Cystidia (pseudocystidia) with walls strongly swelling in KOH, dimitic species ..... **Dacryobolus karstenii**
104. Cystidia not swelling in KOH, monomitic species ... **Hyphodontia**
105. Cystidia subulate **106**
105. Cystidia obtuse **108**
106. Hymenophore dotted by reddish exudation from cystidia ..... **Hyphoderma pallidum**
106. Hymenophore without reddish dots **107**
107. Fruitbodies as a rule pure white, cystidia of two kinds, subulate and embedded moniliform ..... **Hyphodontia hastata**
107. Fruitbodies pale buff to ochraceous or reddish, cystidia of one kind ..... **Phlebia**
108. True cystidia lacking, but with protruding hyphal ends, basidia with internal repetition ..... **Galzinia incrustans**
108. Cystidia well differentiated, basidia without repetition **109**
109. Hymenophore dotted by brownish exudation from cystidia ..... **Hyphoderma macedonicum**
109. Hymenophore without brownish dots **110**
110. Cystidia of two kinds, capitate and moniliform ..... **Hyphodontia halonata**
110. Cystidia of one kind **111**
111. Basidia urniform, cystidia with grainy or oily contents ..... **Sistotrema sernanderi**
111. Basidia clavate, cystidia without oily contents ..... **Phlebia**
115. Cystidia septate, with a clamp at each septum **116**
115. Cystidia differently shaped **120**
116. Spores fusiform, 13–17 μm long ..... **Suillosporium**
116. Spores differently shaped **117**
117. Spores large, 6–9 μm long ..... **Atheloderma**
117. Spores smaller, 3–4.5 μm long **118**

118. Cystidia very sparse, fruitbodies pellicular, brittle ..... **Ceraceomyces sublaevis**
118. Cystidia numerous or easily observed **119**
119. Fruitbodies fairly tough and pliable, velvety by protruding cystidia ..... **Amphinema**
119. Fruitbodies not pliable or velvety ..... **Hyphodontia**
120. Basidia pleural, smooth in KOH, but rough or striate in Melzer's reagent ..... **Xenasma**
120. Basidia terminal, spores smooth in both Melzer's reagent and KOH **121**
121. Cystidia distinctly thick-walled, except in the upper part ..... **Hyphodontia alienata**
121. Cystidia thin-walled or with slight wall thickening **122**
122. Spores pip-shaped, glued together in groups of 2–4, hyphal protoplasm conspicuously oilrich ..... **Cylindrobasidium**
122. Not with this combination of characteristics **123**
123. Spores subfusiform or amygdaliform, cystidia fusiform, often with schizopapillae ..... **Coronicum gemmiferum**
123. Spores and cystidia differently shaped **124**
124. Protruding cystidia capitate **125**
124. Cystidia differently shaped **128**
125. With halocystidia, fruitbodies cracking ..... **Resinicium furfuraceum**
125. Cystidia and fruitbodies differently shaped **126**
126. Fruitbodies very thin, basidia small, 7–10 × 5–6 μm ..... **Sphaerobasidium**
126. Fruitbodies and basidia differently shaped **127**
127. Spores 4,5–7 μm long, fruitbodies pure white ..... **Hyphoderma sambuci**
127. Spores 8–11 μm long, fruitbodies greyish, creamcoloured or ochraceous ..... **Hyphoderma**
128. Cystidia cylindrical, apically widened or strongly constricted . **129**
128. Cystidia differently shaped, mostly tapering towards the apex **135**
129. Cystidia with grainy or oily contents, basidia urniform ..... **Sistotrema sernanderi**
129. Cystidia and basidia differently shaped **130**
130. With few dendrohyphidia ..... **Laeticorticium expallens**
130. Without dendrohyphidia **131**
131. Hyphal tissue and spores yellowish in KOH, fruitbodies ochraceous to saffron coloured ..... **Crustoderma**
131. Not with this combination of characteristics **132**

132. Spores subfusiform, 6–9 × 2.5–3 μm, tapering towards the basal end ..... **Phlebia griseoflavescens**
132. Spores differently shaped **133**
133. Fruitbodies hard and horny, tissue dense ..... **Phlebia**
133. Fruitbodies soft, tissue loose **134**
134. Cystidia with sulphoaldehyde reaction ..... **Peniophora laeta**
134. Cystidia without sulphoaldehyde reaction ..... **Hyphoderma**
135. Cystidia strongly encrusted with resinuous exudation, fruitbodies orange red ..... **Phlebia femsioeensis**
135. Not with this combination of characteristics **136**
136. Vesicular gloeocystidia numerous, fruitbodies tuberculate ..... **Cystostereum murraii**
136. Not with this combination of characteristics **137**
137. Spores 12–15 × 7–9 μm, cystidia with sulphoaldehyde reaction ..... **Peniophora lilacea**
137. Spores smaller, cystidia without sulphoaldehyde reaction **138**
138. Hymenophore dotted by reddish or brownish exudation from the cystidia ..... **Hyphoderma**
138. Hymenophore without reddish or brown dots **139**
139. Cystidia numerous, 2–3 μm wide, flexuous and tapering towards the apex ..... **Hyphodontia juniperi**
139. Cystidia 5–12 μm wide, if narrower then not distinctly flexuous ..... **Phlebia**
144. Clamps open, ansiform ..... **Paullicorticium ansatum**
144. Clamps of normal appearance **145**
145. Spores thick-walled **146**
145. Spores thin-walled **160**
146. Basidia with more than 4 sterigmata, usually 6–8, sporewalls cyanophilous ..... **Sistotremella perpusilla**
146. Basidia with (2–) 4 sterigmata **147**
147. Fruitbodies merulioid (or sometimes smooth), spores yellowish in KOH, cyanophilous ..... **Leucogyrophana pseudomollusca**
147. Not with this combination of characteristics **148**
148. Spores fusiform, 20–30 μm long, fruitbodies provided with sterile aculei ..... **Epithele typhae**
148. Spores smaller, fruitbodies smooth, if ornamented then with fertile aculei **149**
149. Basidia with 2 (–4) sterigmata, on bark of living deciduous trees ..... **Dendrothele commixta**
149. Not with this combination of characteristics **150**

150. Fruitbodies strongly hydnoid with 5–20 mm long aculei, spores acyanophilous ..... **Sarcodontia**
150. Fruitbodies not strongly hydnoid, spores distinctly cyanophilous **151**
151. Basidia with cyanophilous granulation ..... **Cristinia**
151. Basidia without cyanophilous granulation **152**
152. Fruitbodies bluish-green or yellowish, soft, byssoid, clamps lacking or scattered on the basal hyphae ..... **Byssocorticium**
152. Not with this combination of characteristics **153**
153. Basidia 10–15 μm long, fruitbodies thin, byssoid to pellicular with a very thin subiculum ..... **Leptosporomyces ovoideus**
153. Basidia and fruitbodies differently shaped **154**
154. Tissue dense, basidia pedunculate ..... **Intextomyces**
154. Tissue loose, basidia not pedunculate **155**
155. Spores greyish in Melzer's reagent ..... **Leucogyrophana**
155. Spores not greyish in Melzer's reagent ..... **Hypochnicium**
160. Basidia with more than 4 sterigmata **161**
160. Basidia with 2–4 sterigmata **166**
161. Fruitbodies stipitate, sub-lamellate or irpicoid, on the ground .... **Sistotrema confluens**
161. Fruitbodies resupinate, usually on wood **162**
162. Basidia urniform, mostly up to 7 μm wide, with 6–8 sterigmata, hyphae with oily contents ..... **Sistotrema**
162. Basidia not distinctly urniform, normally with 6 sterigmata, if suburniform then broader than 7 μm, hyphae without oily contents **163**
163. Fruitbodies conspicuous, postmature basidia with shrunken sterigmata bent inwards ..... **Sistotremastrum**
163. Not with this combination of characteristics **164**
164. Fruitbodies very thin and inconspicuous, basidia obconical .... **Paullicorticium**
164. Fruitbodies thicker or cobwebby, basidia as a rule stout, sub- cylindrical or suburniform **165**
165. Basal hyphae brownish pigmented ..... **Sistotrema heteronemum**
165. Basal hyphae hyaline ..... **Botryobasidium**
166. Basidia normally with 2 sterigmata **167**
166. Basidia normally with 4 sterigmata **169**
167. Spores allantoid, 7–12 μm long, fruitbodies not pliable .... **Cerinomyces**
167. Spores and fruitbodies differently shaped **168**

168. Basidia suburniform, spores ellipsoid to subfusiform, 10–18 μm long ..... **Sistotrema autumnale**
168. Basidia clavate, spores narrowly ellipsoid to cylindrical, 10–13 μm long ..... **Athelia sibirica**
169. Dendrohyphidia present **170**
169. Dendrohyphidia lacking **174**
170. With basidial repetition ..... **Repetobasidiellum**
170. Without basidial repetition **171**
171. Fruitbodies blue ..... **Pulcherricium**
171. Fruitbodies differently coloured **172**
172. Subicular hyphae brown or brownish, dendrohyphidia at first hyaline, then yellowish brown ..... **Punctularia**
172. Subicular hyphae and dendrohyphidia hyaline, if pale yellowish, then the fruitbodies bright red **173**
173. Fruitbodies discomycete-like, orange red to dark red, spores allantoid, 12–18 × 4–5 μm ..... **Cytidia**
173. Fruitbodies differently shaped, spores smaller, usually ellipsoid ... . **Laeticorticium**
174. Fruitbodies capitate ..... **Auriculariopsis**
174. Fruitbodies resupinate, if pileate or subpileate, then with gill-like ridges or folded **175**
175. Spores large, 12–20 μm long, allantoid, on attached branches of deciduous trees ..... **Vuilleminia**
175. Spores smaller **180**
180. Dimitic species **181**
180. Monomitic species **183**
181. Fruitbodies more or less smooth, skeletal hyphae strongly cyanophilous ..... **Fibriciellum**
181. Fruitbodies odontioid or hydnoid, skeletal hyphae cyanophilous **182**
182. Fruitbodies soft, usually white species ..... **Fibrodontia**
182. Fruitbodies hard, usually pale yellowish or ochraceous .... **Mycoaciella**
183. Spores repetitive ..... **Hydrabasidium**
183. Spores not repetitive **184**
184. Fruitbodies grandinioid, odontioid, hydnoid or raduloid **185**
184. Fruitbodies poroid, reticulately folded or smooth **194**
185. Spores 8–12 × 4–5 μm, subcylindrical, hyphae with dense and cyanophilous warts ..... **Kavinia himantia**
185. Spores less than 8 μm long or globose to ellipsoid, hyphae without cyanophilous warts **186**
186. Hyphae with sterile pegs, on ferns ..... **Epithele galzinii**
186. Fruitbodies differently shaped, usually on wood **187**

187. Fruitbodies grandinioid, subhymenial hyphae isodiametric ..... **Brevicellicium olivascens**
187. Not with this combination of characteristics **188**
188. Spores allantoid to narrowly ellipsoid, up to 2.5 μm wide **189**
188. Spores subglobose to ellipsoid, broader than 3.5 μm **192**
189. Fruitbodies hard, tissue dense **190**
189. Fruitbodies soft or brittle, tissue loose **191**
190. With halocystidia, mainly on coniferous trees ..... **Resinicium pinicola**
190. Without halocystidia, mainly on deciduous trees ..... **Mycoacia**
191. Spores 3–4 μm long, short-allantoid or subglobose, fairly brittle to brittle species ..... **Trechispora**
191. Spores 4.5–6 × 2–2.5 μm, cylindrical, fairly soft and tough species ..... **Hyphodontia nespori**
192. Fruitbodies raduloid, spores 8–11 × 6–8 μm ..... **Radulomyces molaris**
192. Fruitbodies hydnoid, spores smaller, 5–8 × 3.5–6 μm **193**
193. Spores 5–6 × 3.5–4 μm, aculei generally 5–15 mm long ..... **Sarcodontia**
193. Spores 6–8 × 5–6 μm, aculei 1–3 mm long ..... **Radulodon**
194. Fruitbodies poroid, tissue loose, basidia urniform ..... **Sistotrema alboluteum**
194. Fruitbodies differently shaped **195**
195. Fruitbodies reticulately folded or poroid **196**
195. Fruitbodies smooth **205**
196. Fruitbodies pileate, with gill- like ridges ..... **Plicaturopsis**
196. Fruitbodies differently shaped **197**
197. Fruitbodies reticulately folded to poroid, with a well developed tomentum ..... **Merulius**
197. Fruitbodies differently shaped **198**
198. Spores ellipsoid to subcylindrical, 2–3,5 μm wide, if allantoid then wider than 2 μm **199**
198. Spores allantoid to fusiform, up to 2 μm wide **200**
199. Fruitbodies about 0,5 mm thick, yellowish to reddish or greenish, first smooth then meruloid, spores 4–5.5 × 2–2.5 μm ..... **Ceraceomerulius serpens**
199. Fruitbodies thicker, tuberculate to wrinkled, spores 4.5–9 × 2.5–3.5 μm ..... **Phlebia**
200. Spores fusiform, 6–8 × 1.5–2 μm ..... **Ceraceomyces borealis**
200. Spores differently shaped **201**

201. Spores very small, often with weak amyloid reaction, hymenophore irregularly plicate to almost smooth, white to pale beigebrown ... . **Plicatura**
201. Spores broader and hymenophore differently shaped and coloured **202**
202. Spores reddish brown in Melzer's reagent, basidia 15–20 μm long ..... **Pseudomerulius**
202. Spores negative in Melzer's reagent, basidia 25–40 μm long .... **Phlebia**
205. Basidia pleural ..... **Phlebiella**
205. Basidia terminal **206**
206. With basidial repetition, spores sublunate to subfusiform .... **Repetobasidiellum**
206. Basidia not repetitive, if some basidia with internal repetition, then spores allantoid **207**
207. Spores suballantoid to allantoid or with sigmoid appearance .. **208**
207. Spores subglobose, ellipsoid, cylindrical or fusiform **209**
208. Basidia constricted to urniform ..... **Galzinia**
208. Basidia clavate, tapering towards the base ..... **Phlebia**
209. Clamps lacking or scattered on the basal hyphae, spores short-fusiform with obtuse apex, 5,5–6.5 × 3–3.5 μm .. **Hyphodontiella**
209. Clamps normally present at all septa **210**
210. Spores 2.5–5 μm long, if longer then narrower than 3 μm **211**
210. Spores normally longer than 6 μm, broader than 3 μm **225**
211. Spores cylindrical, 9–10 × 2–2.5 μm ..... **Athelopsis glaucina**
211. Spores differently shaped **212**
212. Spores with fusiform appearance see also *Ceraceomyces borealis* .. .. **Fibulomyces**
212. Spores subglobose, ellipsoid or cylindrical **213**
213. Basidia 20–35 μm long **214**
213. Basidia shorter, 8–15 μm long **215**
214. Spores 6–8 μm long or tissue dense ..... **Phlebia**
214. Spores 3–3.5 μm long, tissue loose ..... **Ceraceomyces sublaevis**
215. With brownish or rosy filaments, especially at the margin **216**
215. Filaments white or lacking **217**
216. Basal hyphae yellowish brown in KOH ..... **Confertobasidium**
216. Basal hyphae hyaline ..... **Leptosporomyces roseus**
217. Subhymenial hyphae short-celled, isodiametric .... **Brevicellicium**
217. Subhymenial hyphae differently shaped **218**
218. Fruitbodies fragile or cottony, hyphae often with ampullaceous septa ..... Trechispora cohaerens
218. Not with this combination of characteristics **219**

219. Fruitbodies pellicular to membranaceous, basal hyphae up to 10 μm wide, with thin filaments ..... **Fibulomyces mutabilis**
219. Fruitbodies very thin, often with a greenish tint, basal hyphae narrow, filaments present or lacking ..... **Leptosporomyces**
225. Spores subglobose, 9–15 μm in diam ..... **Globulicium**
225. Spores differently shaped **226**
226. Basidia narrowly urniform, spores amygdaliform, 8–11 μm long .. .. **Sistotrema intermedium**
226. Basidia and spores differently shaped **227**
227. Fruitbodies brown **228**
227. Fruitbodies differently coloured **229**
228. Spores fusiform to navicular, 7–9 μm long, fruitbodies closely adnate .... **Luellia recondita**
228. Spores ellipsoid, 6–7.5 μm long, fruitbodies orbicular with revolved margin ..... **Cytidiella**
229. Fruitbodies pellicular to membranaceous, pliable **230**
229. Fruitbodies differently shaped **232**
230. Fruitbodies fairly thick, spores 5–8 × 3–4,5 μm .... **Ceraceomyces**
230. Fruitbodies thin, pellicular (athelioid), basidia generally shorter, if longer than 20 μm then spores 7–16 μm long **231**
231. Basidia pedunculate ..... **Athelopsis subinconspicua**
231. Basidia not distinctly pedunculate ..... **Athelia**
232. Hyphal protoplasm oil-rich, spores pip-shaped . **Cylindrobasidium**
232. Not with this combination of characteristics **233**
233. Subhymenial hyphae distinctly isodiametric .... **Hyphoderma albocremeum**
233. Subhymenial hyphae differently shaped **234**
234. Basidia in a dense palisade, tissue dense ..... **Phlebia**
234. Basidial and hyphal tissue loose **235**
235. Spores with thickened walls, hymenophore yellowish in KOH .... **Radulomyces confluens**
235. Spores thin-walled, hymenophore not yellowish in KOH .... **Hyphoderma**

GROUP C

1. Spores ornamented, yellowish brown ..... **Botryohypochnus**
1. Spores smooth, as a rule hyaline **2**
2. Cystidial elements present **3**
2. Cystidial elements lacking **22**
3. Spores repetitive ..... **Oliveonia**
3. Spores not repetitive **4**

4. Dimitic species ..... **Steccherinum**
4. Monomitic species **5**
5. Fruitbodies pileate **6**
5. Fruitbodies resupinate **7**
6. Cystidia capitate ..... **Cyphellostereum**
6. Cystidia apically obtuse but not distinctly capitate ..... **Cotylidia**
7. Cystidia capitate, spores subglobose, 8–13 × 7–9 μm ..... **Hyphoderma capitatum**
7. Not with this combination of characteristics **8**
8. Hymenophore grandinioid, odontioid or hydnoid **9**
8. Hymenophore smooth or merulioid **14**
9. Cystidia strongly encrusted, of metuloid appearance, spores small, 3.5–4.5 (–5) × 1.8–2.2(–2.5) μm ..... **Scopuloides**
9. Not with this combination of characteristics **10**
10. Basidia with 2 sterigmata ..... **Hyphodontia efibulata**
10. Basidia with 4 sterigmata **11**
11. Cystidia septate **12**
11. Cystidia not septate **13**
12. Spores ellipsoid, 4.5–7 × 2–4 μm ..... **Candelabrochaete**
12. Spores allantoid, 4–5 × 1.5–2 μm .. **Phanerochaete septocystidia**
13. Cystidia and basal hyphae thin- walled ..... **Phlebia deflectens**
13. Cystidia, and hyphae thick-walled ..... **Phanerochaete**
14. Basidia as a rule with 2 sterigmata ..... **Clavulicium spurium**
14. Basidia with 4–6 sterigmata **15**
15. Basidia with 6 sterigmata, spores thick-walled ..... **Sistotremella hauerslevii**
15. Basidia with four sterigmata, spores thin- or thick-walled **16**
16. Cystidia of two kinds, metuloids and sulphocystidia .. **Peniophora**
16. Cystidia of one kind, without sulphoaldehyde reaction **17**
17. Hymenophore folded, orange to reddish, spores allantoid, 4–6 × 1.5 μm ..... **Ceraceomerulius albostramineus**
17. Not with this combination of characteristics **18**
18. Cystidia with an apical papilla, spores navicular ..... **Coronicium alboglaucum**
18. Cystidia and spores differently shaped **19**
19. Cystidia subulate, spores globose to subglobose, fruitbodies thin . ..... **Subulicium**
19. Not with this combination of characteristics **20**

20. Fruitbodies hard and parchment-like with distinct or indistinct subicular tissue, subhymenial tissue dense, cystidia metuloid ..... **Phlebiopsis**
20. Not with this combination of characteristics **21**
21. Tissue dense and the lack of clamps difficult to discern, cystidia not or slighly encrusted, few, thin-walled, up to 120 μm, if cystidia strongly encrusted towards the base see *Lepidomyces subcalceus* .. .. **Phlebia deflectens**
21. Tissue more loose, if dense then the cystidia strongly encrusted but not of typically metuloid appearance ..... **Phanerochaete**
22. Spores repetitive **23**
22. Spores not repetitive **30**
23. Basal hyphae 5–7 μm wide, basidia 12–16 μm long, fruitbodies usually adnate ..... **Ceratobasidium**
23. Basal hyphae about 10–15 μm wide, basidia generally longer, fruitbodies loosely attached **24**
24. Basidia with 2 sterigmata ..... **Ypsilonidium**
24. Basidia with 4 sterigmata **25**
25. Spores citriform, rarely subglobose, preferably on wood, not with *Rhizoctonia* state ..... **Uthatobasidium**
25. Spores subglobose to ellipsoid, parasitic on *Solanum* and other kinds of herbaceous plants, with *Rhizoctonia* state ..... **Thanatephorus**
30. Basidia with 2 sterigmata **31**
30. Basidia with 4–8 sterigmata **34**
31. Spores ellipsoid, 20–30 μm long, fruitbodies reddish, on twigs of *Quercus* , still attached to the trees ... **Laeticorticium quercinum**
31. Spores smaller, fruitbodies of other colour **32**
32. Spores navicular, fruitbodies fairly dense, brown ..... **Luellia furcata**
32. Spores differently shaped, fruitbodies normally not brown **33**
33. Basidia 50–80 × 7–11 μm, spores subglobose, fruitbodies greenish ..... **Clavulicium**
33. Basidia 20–30 × 5–7 μm, spores narrowly ellipsoid, fruitbodies whitish ..... **Athelia arachnoidea**
34. Basidia with more than 4 sterigmata **35**
34. Basidia with 4 sterigmata **37**
35. Basidia obconical, fairly small, 10–18 × 4–6 μm, with 6 sterigmata ..... **Paullicorticium**
35. Basidia differently shaped **36**

36. Basidia urniform ..... **Sistotrema**
36. Basidia rounded, obovate to subcylindrical, not distinctly urniform ..... **Botryobasidium**
37. Fruitbodies pileate, spathulate- flabellate, spores 3–4 × 2.2–2.5 μm ..... **Stereopsis**
37. Fruitbodies resupinate, if subpileate then spores 5–6 × 2.5–3 μm **38**
38. Fruitbodies poroid ..... **Byssocorticium terrestre**
38. Fruitbodies differently shaped **39**
39. Fruitbodies meruloid or odontioid **40**
39. Fruitbodies smooth **42**
40. Fruitbodies meruloid, at first resupinate, then with reflexed margin ..... **Byssomerulius**
40. Fruitbodies odontioid **41**
41. Spores allantoid, 4–5 × 1.2–1.5 μm ..... **Odonticium**
41. Spores ellipsoid, 7–10 × 4–6 μm ..... **Hyphodermella**
42. Basidia stout, 20–30 × 8–10 μm with the sterigmata up to 20 μm long, spores 12–17 × 6–7 μm ..... **Cejpomyces**
42. Not with this combination of characteristics **43**
43. Spores with thickened walls, in some species dextrinoid **44**
43. Spores thin-walled, not dextrinoid **45**
44. Spores small, 3–6 × 2–4,5 μm, with slight dextrinoid reaction .... **Piloderma**
44. Spores larger, 9–15 μm long, not with dextrinoid reaction .... **Erythricium**
45. Clamps scattered on the basal hyphae ..... **Athelia**
45. Clamps lacking totally or very few on the basal hyphae **46**
46. Basidia 35–50 × 8–12 μm, spores 9–15 × 4.5–7 μm .. **Erythricium**
46. Basidia and spores differently shaped **47**
47. Basidia typically constricted, spores oblong to subfusiform, 8–10 μm long, fruitbodies yellowish to orange ..... **Athelidium**
47. Basidia not distinctly constricted, spores and fruitbodies differently shaped **48**
48. Spores subcylindrical ..... **Phanerochaete jose-ferreirae**
48. Spores subglobose, ellipsoid or pyriform **49**
49. Spores pyriform ..... **Athelia**
49. Spores differently shaped **50**
50. Fruitbodies thin, distinctly pellicular ..... **Athelia decipiens**
50. Fruitbodies thick, mostly membranaceous **51**
51. Tissue dense and lack of clamps difficult to discern .... **Phlebia deflectens**
51. Tissue loose, lack of clamps easily observed ..... **Phanerochaete**

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