PERSOONIA
Published by the Rijksherbarium, Leiden
Volume 11, Part 2, pp. 121–151 (1981)

INTRODUCTION TO THE TAXONOMY OF THE GENUS ENTOLOMA SENSU LATO (AGARICALES)

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(With 9 Text-figures)

A survey is given of the infrageneric classification of the genus *Entoloma* sensu lato (Basidiomycetes, Agaricales), underlaying the author's recent revisions of *Entoloma* in the Netherlands and adjacent regions (Noordeloos, 1979, 1980, 1981). The taxonomic value of the characters currently used in this genus is discussed. Three new subgenera are described, viz. *Allocybe*, *Inocephalus*, and *Omphaliopsis*, and subgenus *Paraleptonia* Romagn. is validated; several new combinations are made.

CONTENTS

INTRODUCTION

The genus *Entoloma* is one of the larger genera of the Agaricales. In the last 40 years many important treatises have appeared. The more notable of these publications are — Europe: Kühner & Romagnesi, 1953. — Africa: Romagnesi, 1941, 1957; Romagnesi & Gilles, 1979. — North America: Hesler, 1967; Largent, 1977; Mazzer, 1976. — South America: Dennis, 1953; Horak, 1978. — Australasia: Horak, 1973, 1980. Alltogether some 1500 species have been described so far, but our knowledge is still far from complete (Horak, 1980: 14). It is clear that

in such a large genus in which the number of species is still increasing, problems concerning the infrageneric classification will arise.

In the following pages the characters are discussed which are used for classification in my revisions of *Entoloma* in the Netherlands and adjacent regions (Noordeloos, 1979, 1980, 1981). This discussion is followed by a synopsis of the classification accepted in these publications.

THE DELINEATION OF ENTOLOMA

Entoloma is the type-genus of the family Entolomataceae Kotlaba & Pouzar (syn. Rhodophyllaceae Sing.). This family is characterised by the following combination of characters: Spore-print pinkish-brownish, spores thin- to relatively thick-walled, hyaline or stramineous as seen under the lightmicroscope, angular in apical view or in all views or rough to verruculose in all views on account of the presence of ridges and warts caused by a special formation of the endospore (the epicorium of Clemençon, 1970: 117).

At present three agaricoid genera and one gasteroid genus are known, which can be distinguished as follows:

1a. Spores more or less rough or verruculose, not angular . . . . . *Rhodocybe* R. Maire
b. Spores angular, at least when seen in apical view 2
2a. Spores smooth except for longitudinal ridges or ribs or facets, thus appearing angular when seen in apical view only . . . . . *Clitopilus* (Fr.) Kumm.
b. Spores angular in all views, entirely covered with facets delineated by ridges 3
3a. Fruitbodies agaricoid . . . . . *Entoloma* (Fr.) Kumm.
b. Fruitbodies gasteroid . . . . . *Richoniella* Costantin & Dufour

Recently Horak (1978) demonstrated the resemblance of the spores of some species of *Rhodocybe* with weakly nodulose-warty spores with those of some species of *Entoloma* with weakly angular-nodulose spores. As a matter of fact with only the aid of the light microscope, it is not always easy to distinguish a species of *Rhodocybe* from a species of *Entoloma*. A very close observation of the spores, preferably with the aid of scanning electron microscopy, may well be necessary then.

Kühner (1979: 357) brought the families of Entolomataceae, Pluteaceae and Macrocystidiaceae together in a new order, the Pluteales. Although the last two families have entirely smooth, usually thin-walled spores, they show fundamentally the same ultrastructure of the spore wall as is found in the Entolomataceae, viz. a strongly developed endospore, made up in the same way as the epicorium, and a strongly reduced mixosporium, a structure which is unique among the Agaricales.

THE INFRAGENERIC CLASSIFICATION OF ENTOLOMA

Fries (1821, 1838) distinguished five tribes in the genus *Agaricus* to accomodate the species with a pink spore print and a pileus continuous with the stipe, viz.,

1. *Entoloma:* stipe fleshy and fibrous; lamellae sinuate; habit similar to that of species of *Tricholoma*.
2. *Clitopilus:* stipe fleshy and fibrous; lamellae decurrent; habit similar to that of species of *Clitocybe*.
3. *Leptonia:* stipe with cartilaginous cortex; pileal margin involute at first; lamellae secedent; habit similar to that of species of *Collybia*.
4. *Nolanea:* stipe cartilaginous; pileal margin straight; lamellae narrowly adnate to almost free; habit similar to that of species of *Mycena*.
5. *Eccilia:* stipe cartilaginous; lamellae decurrent; habit similar to that of species of *Omphalia*.

Later many authors accepted this classification, but often treated the Friesian taxa on other taxonomic levels, viz. as *subgenera* (Loudon, 1829; Rabenhorst, 1844) or as genera (Kummer, 1871; Quélet, 1872).

Quélet (1886) united again Kummer's entolomatoid genera into one large genus, which he called *Rhodophyllus*. This name was and is used by many European authors (Kühner & Romagnesi, 1953; Romagnesi, 1941, 1974a & b, 1978; Moser, 1967). Many others, however, preferred several small genera to distribute the same group of species. They maintained the Friesian taxa, raised to generic level by Kummer (1871), and added new ones, such as *Claudopus* Gill. for species with a crepidotoid habit, *Pouzaromyces*, originally monotypic, based upon the abberrant species *Nolanea fumosella* Wint. with strigose hairs on pileus and stipe, and *Alboleptonia* Largent & Benedict for a small group of white or pale coloured species with a collybioid habit, formerly placed in the genus *Leptonia* or *Entoloma*.

Romagnesi (1937) completely abandoned the Friesian classification and proposed a new one, mainly based on the structure of the base of the spores. He proposed a number of sections arranged into two groups: one with so-called symmetrical spores and one with so-called asymmetrical spores. This classification-scheme was extended by Romagnesi in 1941 to accommodate also tropical species. Romagnesi's system was also adopted by Singer (1943, 1951).

Later Romagnesi changed and emended the circumscription of many of his taxa on account of the evidence supplied by the many new, mainly tropical species with which he was confronted. This culminated in his most recent classification (Romagnesi, 1974b, 1978) in which many of the Friesian names were retained for restricted or emended taxa on subgeneric level.

Largent (1974) largerly emended the Friesian classification using macro- and microscopical characters besides chemical ones., such as the urea-content of the fruitbodies. He distinguished six genera, viz. *Entoloma*, *Leptonia (incl. Eccilia)*, *Nolanea*, *Claudopus*, *Alboleptonia* and *Pouzaromyces*.

In the present paper *Entoloma* is treated following the concept of Donk (1949: 158), which means including all agaricoid fungi with pink spores that are angular in all views (in other words: with a spore-wall consisting of angular facets) thus covering the same group of species as *Rhodophyllus* Quél. The latter name is rejected here for nomenclatural reasons. It is a superfluous later synonym of *Entoloma*, and was published illegitimately according to the rules of the International Code of Botanical Nomenclature.

Largent's classification of the entolomatoid fungi in several genera is not accepted here. In the author's experience there are no clear-cut taxa in *Entoloma* sensu lato that deserve generic rank.

It was difficult enough to delimitate such taxa when only the temperate species were relatively well-known. The new information supplied by the numerous recently found species from the tropics (Romagnesi, 1941, 1957; Romagnesi & Gilles, 1979; Horak, 1973, 1978, 1980) made this still harder.

It is not difficult to distinguish certain groups of taxa from each other, for example *Entoloma* versus *Nolanea* in my restricted sense, on a lower taxonomic level, but raising these units to the rank of genus would have as consequense that for a number of intermediate species a series of aberrant, often monotypical 'genera' would have to be added to those already known. I prefer to place such taxa in separate sections in a more or less isolated position in, or in new subgenera in between, the subgenera already accepted and not to create new genera for them.

It is obvious that in many cases there are links between the subgenera I have used. For example section *Fernandae* forms a distinct link between subgenus *Nolanea* and *Pouzaromyces* with respect to pigmentation, type of pileipellis, and lack of clamp-connections. A similar case is found in section *Griseorubida*, which is intermediate between subgenus *Nolanea* and *Leptonia*. Several other examples can be found.

In the present work the infrageneric classification of Romagnesi (1978) is largerly adopted with only slight alterations; some taxa are emended, some new ones are added. Unfortunately quite a few nomenclatoral changes are necessary as a consequence of the use of the name *Entoloma* instead of *Rhodophyllus*.

Of course the classification of *Entoloma* s.l. as proposed here is not a final one. First because of my knowledge of the genus is restricted to a small geographical area, second because so for I have studied only a part of the genus on monographic level (*Pouzaromyces*, 1979; *Nolanea*, 1980; *Entoloma*, *Allocybe* and *Trichopilus*, 1981) Moreover it is to be expected that many new species will be discovered in the future, especially in alpine, arctic and tropical regions, which undoubtely will necessitate the alteration of the concepts of some of the infrageneric taxa and the addition of new ones to the system.

NOTES ON THE CHARACTERS USED IN THE TAXONOMY OF ENTOLOMA

1. Macroscopical characters

1.1. *Habit of the carpophore.*

In general the habit of the carpophore is a useful character with which to recognize groups. In *Entoloma* the habit is very variable from fairly robust and tricholomatoid to very small and omphalioid or crepidotoid. However, in most cases in this genus, habit characters are subordinate to characters such as the structure of the pileipellis, the type of pigmentation and the presence or absence and topography of clamp-connections.

1.2. *Pileus.*

1.2.1. SIZE AND SHAPE.—In *Entoloma* size and shape of the pileus vary considerably and in addition change in the course of the development of the carpophore. In general two lines can be distinguished, viz. (1) conical when young, expanding via conico-campanulate to plano-convex, usually with umbo or papilla, as found in subgenera *Entoloma*, *Nolanea*, *Pouzaromyces*, and *Inocephalus*, and (2), pileus semiglobose to convex when young, with slight central depression or

(deep) umbilicus, hardly expanding with age, as is found in subgenera *Leptonia*, *Omphaliopsis*, *Alboleptonia* and *Claudopus*.

1.2.2. COLOUR.—The colour of the pileus is usually some shade of brown or grey with or without reddish and/or yellowish tinges; rarely the pileus is pigmentless, brilliantly white or brightly coloured.

1.2.3. HYGROPHANITY.—Hygrophanity plays an important role in the classification of *Entoloma*. Generally speaking most hygrophanous species are found in the subgenera *Entoloma* and *Nolanea*. There the pileus distinctly fades on drying, usually along radial streaks. In some cases the hygrophanity is weak, then the pileus usually is translucently striate when moist, becoming opaque but not changing colour very much on drying. This is found in some species of subgenera *Leptonia*, *Omphaliopsis* and others.

1.2.4. SURFACE.—The surface of the pileus varies from entirely smooth, sometimes with a slightly tomentose-fluffy centre, to strongly radially fibrillose-costate or squamulose. The aspect of the pileal surface is closely connected with the structure of the pileipellis and plays an important role in the delineation of infrageneric taxa.

1.3. *Lamellae*.

1.3.1. INSERTION.—The insertion of the lamellae is very variable and ranges from adnate decurrent to adnate emarginate or almost free, sometimes even within one species or section. Therefore it is of minor importance for the infrageneric taxonomy and was somewhat overestimated in the classical Friesian delimitation of subgenera.

1.3.2. COLOUR.—In most species of *Entoloma* the lamellae turn pink when mature, owing to the accumulation of ripe spores. Many species have in addition pigmented hyphae in the mediostratum which give the lamellea a brownish or greyish, rarely green or yellow tinge. This character plays a role in the specific delimitation more than in infrageneric classification.

Some species, particularly in the subgenus *Leptonia* have a coloured lamellar edge, which is caused by the presence of intracellular pigment in the cheilocystidia. This is considered a character of minor importance (see also under cheilocystidia below).

1.4. *Stipe*.

1.4.1. SHAPE AND SIZE.—In most species the stipe is central and more or less cylindrical, sometimes with a slightly broadened or attenuated base, sometimes flattened or twisted. Considering the variability within most species, this is a character of minor importance. Also the width of the stipe cannot be used to distinguish subgenera, as was done by Largent & Benedict (1971: 35) in the case of subgenus *Entoloma* versus subgenus *Nolanea*.

1.4.1. STRUCTURE AND SURFACE.—On account of the structure and surface of the stipe two types can be distinguished in the genus *Entoloma*. (1) Species with a fibrous stipe, easily spliting lengthwise. The surface of this type of stipe is fibrillosely striate lengthwise and usually slightly aeriferous with silvery fibrils alternating with white or colored ones. This type is found in many species of subgenera *Entoloma* and *Nolanea*. (2). Species with a more or less cartilaginous stipe, easily snapping accross and with a smooth surface, as if polished. This type of stipe is found in many species of subgenera *Leptonia*, *Omphaliopsis* and *Nolanea*. Intermediate stipe structures occur, however, in all subgenera mentioned.

1.5. *Smell and taste.*

Many species of *Entoloma* have a farinaceous smell and taste. In others a distinct smell and/or taste is completely lacking. A few individual species scattered throughout the genus can be recognized by their very typical smell. Smell and taste, however, must not be overestimated as a character, as it is shown to be rather variable in many species and also because the possibility of perception by observers varies considerably.

2. Microscopical characters

2.1. *Spores.*

The french mycologist Fayod (1889: 381) was the first to draw attention to the complex morphology of the spores in *Entoloma*: being angular from all sides, as the sporewall consists of many rectangular or polygonal facets. Kühner & Boursier (1929: 264–278) developed a series of geometric models of spores of *Entoloma*, devided into two main groups, based on the morphology of the base of the spore. The first type, called 'symmetrical', has a base in which the hilar appendix is attached to the edge of two facets (a dihedral base or 'diedre basal'). In the second type, called 'asymmetrical', the hilar appendix is attached to a basal facet ('face basal'). Romagnesi (1937), being much convinced of the importance of this character for the infrageneric classification of *Rhodophyllus*, based an entirely new system on the characters of the base of the spores. Probably because of the difficulty in many cases of interpreting the structure of the base of the spores with the light microscope, this system did not find much recognition.

Pegler & Young (1978) provided a thorough study of the geometric configuration of the spores of *Entoloma* based upon observations with the scanning electron microscope. They recognized altogether twelve types of spores arranged in two series which are largerly the same as those of Kühner & Boursier, viz. one group, comprising eight types, with the basal region of the spore formed by a single facet and another group, comprising of four types with the basal region of the spores made up of two facets, a dihedral base. One of the most important results from the work of Pergler & Young is that, contrary to Romagnesi, they did not find a strong correlation between their classification of spore-types and systematic groups based on other characters. It seems to early, however, to draw definite conclusions from their observations with regard to infrageneric taxonomy of *Entoloma*, as they studied only a fraction of all species of the genus known so far.

It is my experience that in many cases the structure of the base of the spore can be determined with the light microscope, but a great deal of practice is needed. Only after careful examination and comparison of thousands of spores does one get a good understanding of the structure of the base of the spores. Quite a few species however remain in which it is difficult to determine the structure of the base of the spores. In my revisions I have indicated the characteristics of the base of the spores in all cases in which they were visible by ordinary means, but I have avoided the use of this character in the keys as much as possible.

Another characteristic of the spores which I have consistently indicated is the length-width ratio (Q). Sometimes this character makes it possible to distinguish taxa of which the spores have approximately the same extreme values of length and width.

2.2. *Basidia.*

Most species of *Entoloma* have clavate, 4-spored basidia which measure about 25–50 × 7.5–15 μm. In subgenera *Pouzaromyces* and *Entoloma*, however, they are usually slightly to distinctly larger. It should be noted that in subgenus *Pouzaromyces* also the largest spores of the genus have been found. Two-spored basidia occur scattered throughout the genus.

In some sections, viz. *Pouzaromyces*, *Versatilia* and *Allocybe* basidia are found filled with a dark brown pigment. As I failed to find this in other sections, this character seems to be of taxonomic value.

Basidia with thickened, hyaline walls ('sklerobasidia') are sometimes found, but dot not seem to be constant in any species.

2.3. *Cystidia.*

2.3.1. CHEILOCYSTIDIA.—Many species of *Entoloma* have cheilocystidia. The presence and shape of cheilocystidia are important characters for distinguishing species, in some cases even for the delineation of sections or subgenera. The following types can be distinguished.

1. Cylindrico-clavate cystidia.—This is the most common type of cheilocystidia. They usually have about the same size and shape of the basidia, and are recognised by their entirely vacuolised contents.
2. Vesiculose cystidia.—These vary from broadly clavate to subglobose or obpyriform. Sometimes they bear an apical projection and are intermixed with this and the lageniform type. In subgenus *Pouzaromyces* the vesiculose cheilocystidia have encrusted walls.
3. Fusoid to lageniform cystidia.—This type of cystidia usually protrudes from the hymenium and is easy to localize. The apex can be acute or rounded, sometimes capitate.
4. Tibiiform cystidia.—This type of cystidia is characteristic for some groups, such as section *Trichopilus*, but occurs also scattered in other subgenera.

In some species the cheilocystidia, usually of the first type, are filled with a brightly coloured pigment (usually blue or brown). This character is often used in distinguishing species but in my experience at least in some species, it is a character of minor importance, as the pigmentation of the cystidia appears to be very variable and may be present, or only partly present or lacking in one collection of the species.

2.3.2. PLEUROCYSTIDIA.—Pleurocystidia occur rarely and then always together with cheilocystidia, usually of about the same size and shape as te latter.

2.3.3. CAULOCYSTIDIA.—Caulocystidia are rare in the genus *Entoloma*. If present, then they are more or less cylindrical or clavate, rarely capitate.

2.4. *Subhymenium.*

The subhymenium is usually poorly developed and filamentous, made up of thin-walled, narrow hyphae. Sometimes, particularly in subgenus *Entoloma*, the hyphal walls are slightly gelatinized. A subcellular subhymenium is found in subgenus *Pouzaromyces*.

2.5. *Hymenophoral trama.*

In *Entoloma* the hymenophoral trama is regular. Kühner (1977: 450) suggested that the size and shape of the elements of the trama in lamellae and pileus form a useful character for the

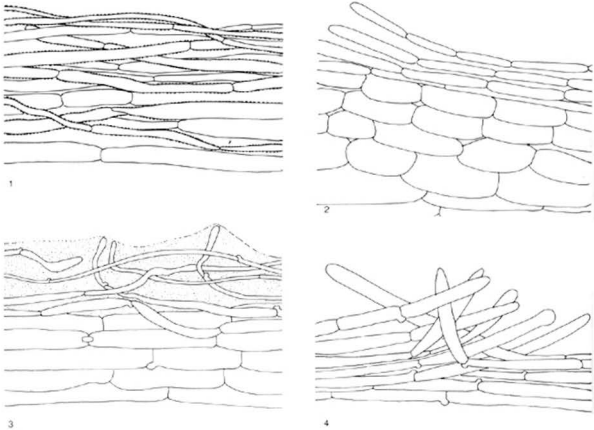
delineation of infrageneric taxa in *Entoloma*. I checked this for subgenera *Nolanea*, *Entoloma*, *Pouzaromyces*, *Allocybe* and *Trichopilus*, and the results indicate that this character has a great taxonomic value indeed.

In subgenus *Nolanea* the hymenophoral trama is made up of relatively long, cylindrical or fusoid cells (on the average 150–450 μm), whereas in subgenus *Entoloma* these cells are relatively short (mostly 50–150 μm) and usually slightly to distinctly inflated (like chains of sausages'. In subgenus *Pouzaromyces* the elements of the hymenophoral trama are generally narrowly cylindrical, not fusoid or inflated and general 100–300 μm long. In subgenera *Trichopilus* and *Allocybe* I found the elements of hymenophoral trama more or less 'nolaneoid', viz. relatively long and cylindrical to fusoid. Particularly with regard to the delimitation of subgenus *Entoloma* against subgenera *Nolanea* and *Trichopilus* is this character a useful criterion.

2.6. *Pileipellis*.

The structure of the pileipellis is one of the major characters in *Entoloma* for the delimitation of infrageneric taxa. Together with the nature and topography of the pigments it forms the base of the classification of Romagnesi (1974b, 1978) and the present one.

Watling and Largent (1977) published a thorough analysis of the cortical layers of some families of the Agaricales, including the Entolomataceae, which is a very important contribution



Figs. 1–4. Types of pileipellis in *Entoloma*. — 1. Cutis, *E. papillatum*. — 2. Cutis with well-developed subpellis, *E. conferendum*. — 3. Ixocutis, *E. aprile*. — 4. Trichoderm, *E. fuscomarginatum* (all figs. 670 ×).

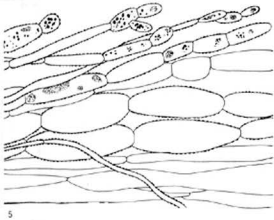
to the insight into the value of the structure of the pileipellis for taxonomy on infrageneric and generic level.

The most simple structure found in *Entoloma* is a dry cutis of radially arranged, narrowly cylindrical hyphae with a poorly developed subpellis, gradually passing into the pileitrama (Fig. 1). This simple type is found particularly in subgenus *Nolanea*. Differentiation occurs in several ways. First a distinct subpellis of inflated cells is developed (Fig. 2). In other species the situation at centre of the pileus is slightly different from that on the limb. There the terminal ends of the cuticular hyphae are ascending and form tufts. In section *Fernandae* the most complicated type of cutis is found within the subgenus *Nolanea*. There the suprapellis is made up of loosely arranged hyphae, which sometime form small semi-erect tufts with dark brown, coarsely encrusted walls and additional intracellular pigment clots (Fig. 5).

In subgenus *Entoloma*, particularly in section *Nolanidea*, the hyphal walls of the suprapellis desintegrate and form a gelatinuous layer (an ixocutis, Figs. 3 and 6).

A second type of pileipellis commonly found in the genus *Entoloma* is the trichodermium. This type of pileipellis probably originated from a cutis-like pileipellis of which the terminal elements have taken an ascending or erected position. This is the most common type of pileipellis found in subgenera *Trichopilus*, *Inocephalus* and section *Leptonia* (Fig. 4).

In *Pouzaromyces* the pileipellis is a cutis/trichoderm, made up of coarsely encrusted, thick-



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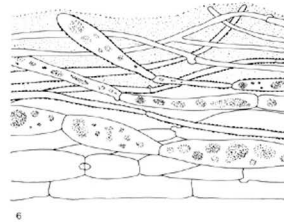

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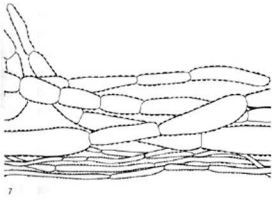

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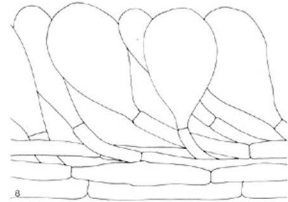

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Figs. 5–8. Types of pileipellis in *Entoloma*. — 5. Cutis with transitions to trichoderm, *E. fernandae*. — 6. Ixocutis, *E. myrmecophilum* var. *atrogaleatum*. — 7. Trichoderm, *E. dysthaloides*. — 8. Hymeniderm, *E. incanum* (all figs. 670 ×).

walled, multiseptate hairs (Fig. 7). In *E. strigosissimum* we find setiform hairs (Noordeloos, 1979: 213, fig. 6).

In subgenus *Leptonia* section *Paludocybe* and in some tropical species of subgenus *Entoloma* a hymeniform pileipellis is found, which is made up of (semi-)erect clavate or subglobose cells (Fig. 8). This type of pileipellis can be simple to fairly complicated (compare Watling & Largent, l.c.). Some tropical species of these subgenera have an epithelium of globose cells.

2.7. *Pigmentation.*

As I have pointed out above, the type and topography of the pigments is a very important character for the infrageneric classification of *Entoloma*.

Three basic types can be found:

1. Intracellular pigment.—Pigment present in plasma and/or vacuoles inside the hyphal elements. This pigment can be diffuse or present itself as smaller or larger granulae or clots, which sometimes agglutinate.
2. Membranal pigment.—Pigment present in the hyphal wall.
3. Encrusting.—Pigments present on the outer wall of the hyphal elements in the form of minute to rather large crust-like patches, which sometimes form distinct patterns (e.g. a 'zebra' pattern). This type of pigment is usually easy to recognise, even in dried specimens. In some cases the encrustations are very minute and inconspicious and should be looked for carefully, particularly on the narrowest hyphae of pileipellis and pileitrama, and near the septa.

Combinations of different types of pigment frequently occur, particularly (1) and (2), or (1) and (3).

2.8. *Pileitrama.*

The pileitrama in *Entoloma* is regular, at least in the limb of the pileus, and in general made up of the same type of elements as found in the hymenophoral trama. At centre of the pileus the tissue can be more irregular or even pseudoparenchymatical, particularly in thick-fleshed specimens.

2.9. *Stipitepellis.*

In most species of *Entoloma* the stipitepellis is a simple cutis of narrow cylindrical hyphae; in species with a cartilagenous stipe the hyphae are tightly packed together; in species with an aeriferous, fibrillosely striate stipe surface the hyphae are loosely arranged. A trichoderm-like stipitepellis is found in subgenus *Pouzaromyces* (Noordeloos, 1979). Some species of *Entoloma* have a pruinose stipe which is caused by the more or less recurving ends of the surface hyphae. These terminal cells can be simply cylindrical (e.g. in *E. lanuginosipes* or *E. cuneatum*) or have a capitate tip (e.g. in E. *cuspidiferum*). Real caulocystidia are rare in the whole genus.

2.10. *Clamp-connections.*

The presence or absence of clamp-connections is a very important character in *Entoloma*, particularly when their distribution in the fruit-body is also taken into account. Many sections are characterised by the absence of clamp-connections in all tissues, whereas for example many species of subgenus *Nolanea* have clamp-connections only in the hymenium, and many species of *Entoloma* are rich in clamp-connections in all tissues. To establish the presence or absence of

clamp-connections in a species it is often necessary to stain thoroughly (a 10% ammoniac 1% Congo-red solution is recommended) because clamp-connections are often scarce and small and easily overlooked. When searching for clamp-connections in the hymenium one should be aware of the possibility of proliferation of the clamp-connections as is described by Bas (1965: 355 and 1969: 319) for *Amanita* and Maas Geesteranus (1978: 130) for *Mycena*. Clamp-connections have to be looked for preferably at the base of young basidia, as in many species of *Entoloma* (particularly in subgenus *Nolanea*) mature basidia have lost almost every trace of clamp-connections at their base, except for a slight nick in the basal septum.

GEOGRAPHICAL DISTRIBUTION

Entoloma has a world-wide distribution, but our knowledge on the geographical distribution of subgenera and sections is still far from complete. However, some conclusions can already be drawn. Subgenus *Entoloma*, although it is found to occur in tropical areas (Romagnesi & Gilles, 1979; Horak 1980), seems to have its main distribution in the temperate and cold regions. On the other hand, subgenus *Inocephalus* is restricted to (sub-)tropical areas. The subgenera *Nolanea*, *Pouzaromyces*, *Leptonia*, *Omphaliopsis*, and *Claudopus* are widely distributed in tropical as well as temperate and cold areas. Less distributional information is available on the smaller subgenera *Allocybe*, *Alboleptonia* and *Paraleptonia*, but at least some temperate as well as tropical species are known of each of them.

On the sectional level the picture is obscured by the fact that the information on many of the species described is so incomplete that it is impossible to determine to which section they belong. However, large sections, such as sections *Entoloma*, *Rhodopolia*, *Cosmeoexonema*, *Endochromonema*, *Pouzaromyces*, *Versatilia*, and *Trichopilus* have a (world-)wide distribution. Romagnesi (1978) described three sections in subgenus *Omphaliopsis* and one in subgenus *Alboleptonia* that seem to be restricted to tropical Africa.

RELATIONSHIPS

A schematic view on the relationships between the subgenera and sections of *Entoloma* is given in Fig. 9. The assumed affinities of the taxa is based on degrees of similarity in certain characters, in particular the habit of the carpophores, degree of hygrophanity of the pileus, pigmentation, structure of the hymenophoral trama and the pileitrama, and occurrence and distribution of clamp-connections in the carpophore. The following hypothetical lines of development have also played their part in making the scheme:

1. Habit collybioid or mycenoid → tricholomatoid, omphalioid or pleurotoid.
2. Pileus hygrophanous → not hygrophanous.
3. Pileipellis a cutis or ixocutis → trichoderm → hymeniderm.
4. Clamp-connections abundant in all tissues → clamp-connections only locally present (hymenium) → clamp-connections absent.

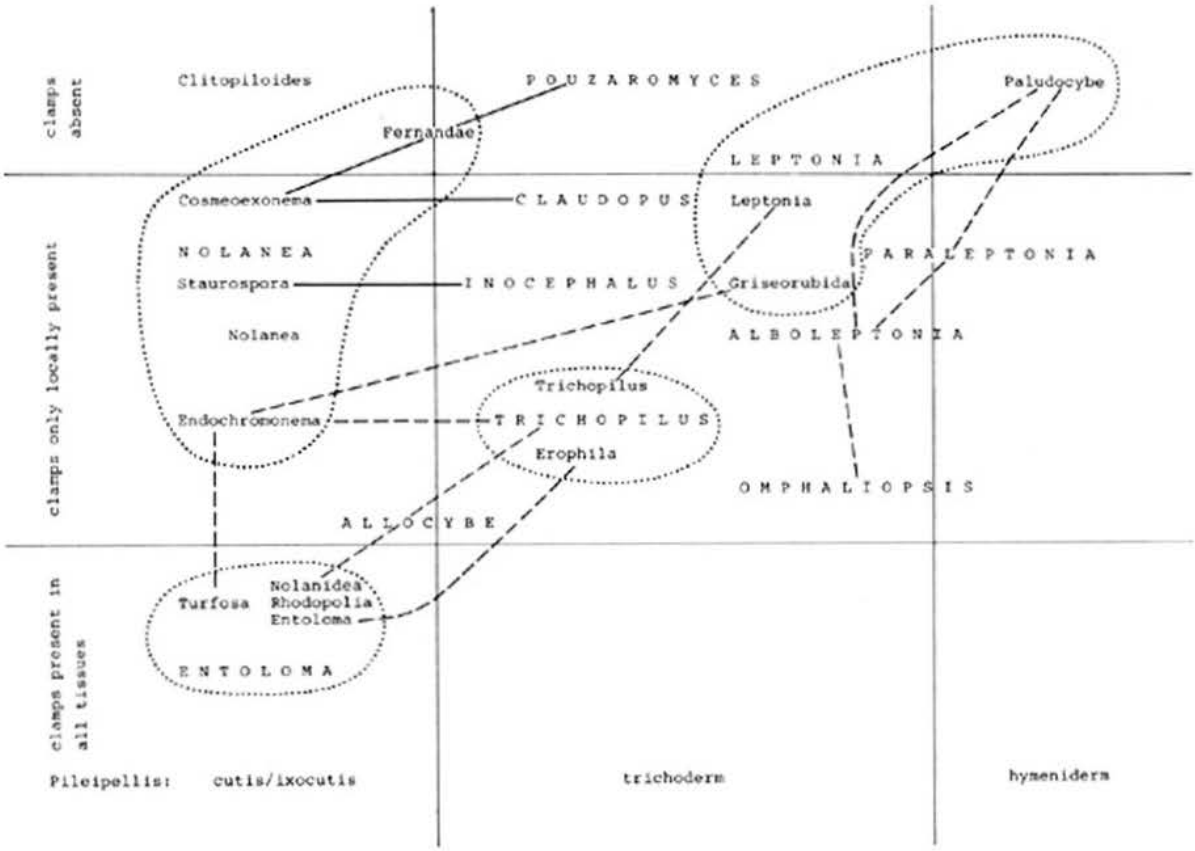

Fig. 9. Relationships between the subgenera and sections in *Entoloma*; continuous lines symbolize great affinities, broken lines indicate fairly great affinities. (Subgeneric names in capitals; sections of each of the larger subgenera surrounded by dotted lines).

Clear affinities are found between subgenus *Nolanea* and subgenus *Pouzaromyces* in the rather intermediate section *Fernandae* of subgenus *Nolanea* and between subgenus *Nolanea* and subgenus *Inocephalus* in section *Staurospora* of subgenus *Nolanea*.

Claudopus is considered a reduced series originating from nolaneoid species. *Omphaliopsis* and *Paraleptonia* seem to be sidelines of the *Leptonia*-complex which itself has similarities with subgenus *Nolanea*. The position of the subgenera *Allocybe* and *Trichopilus* is somewhat isolated: they bear some resemblances to subgenera *Entoloma* and *Nolanea* at one hand and to subgenus *Leptonia* at the other hand.

TAXONOMIC PART

ENTOLOMA (Fr.) Kumm. *emend.* Donk[1]

Agaricus trib. *Entoloma* Fr., Epicr.: 143. 1838. — *Agaricus* subgen. *Entoloma* (Fr.) Rabenh., Deutschl. KryptogFl. **1**: 508. 1844.—*Entoloma* (Fr.) Kumm, Führ. Pilzk.: 23. 1871.—Lectotype (Donk, 1962: 95): *Agaricus prunuloides* Fr.

Nolanea (Fr.) Kumm., Führ. Pilzk.: 24. 1871.—Lectotype (Largent, 1974: 1001): *Agaricus hirtipes* Schum. ex Fr.

Leptonia (Fr.) Kumm., Führ. Pilzk.: 24. 1871.—Lectotype (Clements & Shear, 1931: 349): *Agaricus euchrous* Pers. ex Fr.

Eccilia (Fr.) Kumm., Führ. Pilzk.: 23. 1871.—Lectotype (Donk, 1949: 158): *Agaricus politus* Pers. ex Fr.

Claudopus Gill., Hymen. Fr.: 426. 1876.—Lectotype (Konrad, 1934: 177): *Agaricus byssisedus* Pers. ex Fr.

Rhodophyllus Quél., Enchir.: 56. 1886.—Lectotype (Romagnesi, 1954: 36–37): *Agaricus prunuloides* Fr.

Latzinaea O. Kuntze, Rev. Gen. Pl. **2**: 857. 1891.—Lectotype (Donk, 1962: 157): *Agaricus pascuus* Pers. ex Fr.

Leptoniella Earle *in* Bull. N. Y. bot. Gdn. **5**: 424. 1909.—Lectotype (Donk, 1962: 171): *Agaricus euchrous* Pers. ex Fr.

Lanolea Nieuwl. *in* Amer. Midl. Nat. **4**: 381. 1916.—Lectotype (Donk, 1962: 157): *Agaricus pascuus* Pers. ex Fr.

Pouzaromyces Pilát *in* Acta Mus. Nat. Prag. (B) **9** (2): 60. 1953.—Holotype: *Nolanea fumosella* (Wint.) Lange sensu Pilát (= *Nolanea strigosissima* Rea).

Alboleptonia Largent & Benedict *in* Mycologia **62**: 439. 1970.—Holotype: *A. sericella* (Fr.) Largent & Benedict.

Pouzarella Mazzer *in* Bibltca mycol. **46**: 69. 1978.—Holotype: *Pouzarella nodospora* (Atk.) Mazzer.

Habit variable: tricholomatoid, mycenoid, collybioid, clitocyboid, omphalioid or pleurotoid; lamellae almost free, adnexed to adnate, adnate-emarginate or adnate-decurrent; veil none or rarely present in the shape of traces of cortina at margin of pileus; spores with angular outline when seen from all sides, thin- to relatively thick-walled; spore print pink or pinkish brown; basidia 4-, rarely 2-spored; cheilocystidia present or absent; pleurocystidia rare and only occurring in combination with cheilocystidia; hymenophoral trama regular; subhymenium usually thin, filamentous, in some cases (subgen. *Pouzaromyces*) well differentiated and subcellular, rarely somewhat gelatinized (subgenus *Entoloma*); pileipellis varying from a simple cutis and then sometimes with a well-differentiated, subcellular subpellis, to a trichoderm of cylindrical or inflated hyphal tips or a trichoderm of well differentiated, attenuate, encrusted

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[1] Singer & Smith (1948: 628–629) and Singer (1951: 25–26) added *Acurtis* Fr. to the synonyms of *Entoloma* because Singer said he had been able to prove the correctness of Burt's suggestion (1922: 68) that the genus *Acurtis* was based upon *Clavaria gigantea* which was considered identical with *Entoloma abortivum* (Berk. & Curt.) Donk.

Donk rejected this synonymy on the basis of Art. 59 of the Code of Botanical Nomenclature (1956-edition) and considered the name *Acurtis* as a nomen anamorphosum. Watling (1974: 449–469) studied the carpophoroid stages of *E. abortivum*, and discovered that these bodies are characterized by the presence of mycelium of *Armillaria mellea* and must therefore be considered a monstruosity. Furthermore he disputed the theory of Burt and Singer saying that *Clavaria gigantea* is a carpophoroid stage of *E. abortivum*, because *C. gigantea* is originally described as a large fungus of about the size of a man's head. This size is never reached by the carpophoroids of *E. abortivum*, but may easily be reached by parasitized fruit-bodies of *Tylopilus rubrobrunneus* Mazzer & Smith, a bolete described from the same geographical area as *C. gigantea*. Considering all this I agree in rejecting *Acurtis* as a valid generic name, and also as an older synonym of *Entoloma*.

hairs or hymeniform or epithelial; pigment encrusting and/or membranal and/or intracellular; pileitrama regular; vascular hyphae sometimes present; clamp-connections present or not; hyphae always inamyloid.

Development: usually gymnocarpous.

HABITAT & DISTRIBUTION. — Usually terrestrial, growing saprophytically in humus etc., rarely wood-inhabiting; some species mycorrhizal. Cosmopolitan as to the genus, but some groups seem to have definite geographic areas, e.g. subgenus *Inocephalus* occurs almost exclusively in tropical and subtropical areas, whereas subgenus *Entoloma* prefers temperate and cold areas.

KEY TO THE SUBGENERA AND SECTIONS IN EUROPE

1a. Pigment encrusting at least narrowest hyphae of pileipellis and/or underlaying pileitrama, often in addition intracellular pigment present 2
b. Pigment never encrusting, predominantly intracellular, sometimes membranal or simultaneously intracellular and membranal 9
2a. Clamp-connections absent from all tissues 3
b. Clamp-connections present, at least in hymenium 5
3a. Pigment exclusively encrusting; pileus not hygrophanous; pileipellis a trichoderm made up of multiseptate-attenuate, thick-walled and/or coarsely encrusted hairs.
Subgen. *Pouzaromyces* sect. *Pouzaromyces*.
b. Pigment of two types: encrusting and intracellular 4
4a. Cheilocystidia present, usually large and lageniform; pileus slightly hygrophanous or not; pileipellis a trichoderm of large, fusiform hyphal ends. . . . . Subgen. *Pouzaromyces* sect. *Versatilia*.
b. Cheilocystidia absent; pileus often distinctly hygrophanous; pileipellis a cutis of narrow, cylindrical hyphae or trichodermal, made up of chains of short, cylindrical or slightly inflated cells.
Subgen. *Nolanea* sect. *Fernandae*.
5a. Habit pleurotoid or omphalioid; pigment exclusively encrusting.
Subgen. *Claudopus* sect. *Claudopus*.
b. Habit mycenoid or tricholomatoid, if omphalioid then pigment encrusting in pileitrama only and, in addition intracellular in pileipellis 6
6a. Habit omphalioid; pigment predominantly intracellular; encrustations only found in upper pileitrama
Subgen. *Omphaliopsis* sect. *Omphaliopsis*.
b. Habit mycenoid or tricholomatoid, encrusting pigments always distinct and predominant, sometimes in addition intracellular 7
7a. Habit mycenoid or rarely tricholomatoid; hymenophoral trama and pileitrama made up of long, cylindrical or inflated-fusiform cells, on the average 150–450 μm long; clamp-connections, if present, frequent in hymenium only, rare or lacking in trama and covering layers. . Subgen. *Nolanea* p.p.
b. Habit tricholomatoid, rarely dwarfish and more collybioid; hymenophoral trama and pileitrama made up of chains of short, inflated or cylindrical hyphae (like rows of sausages); clamp-connections numerous in all tissues. . . . . Subgen. *Entoloma* sect. *Rhodopolia*, p.p.
8a. Cylindrical-subcapitate cheilocystidia present; pigment of two types, encrusting and, particularly in subpellis of pileus, intracellular; spores always heterodiametrical. Subgen. *Nolanea* sect. *Nolanea*.
b. Cheilocystidia absent, or if present, then pigment exclusively encrusting.
Subgen. *Nolanea* sect. *Cosmocoxonema*.
9a. Pileus smooth or slightly rugolose-fluffy at centre only and distinctly hygrophanous: on drying pallescent along radial streaks. 10
b. Pileus fibrillose-rugulose or subsquamulose, more rarely smooth, but then never hygrophanous. 16
10a. Habit mycenoid or collybioid, hymenophoral trama made up of long, cylindrical or inflated-fusoid cells, 150–450 μm long; clamp-connections, if present, frequent in hymenium but rare or absent in trama and covering layers 11

b. Habit tricholomatoid, collybioid or clitocyboid; hymenophoral trama and pileitrama made up of shortish, cylindrical or inflated cells, on the average 40–120 μm long; clamp-connections, if present abundant in all tissues 12

11a. Spores cuboid or cruciform-stellate . . . . . Subgen. *Nolanea* sect. *Staurospora*.

b. Spores different, usually heterodiametrical. . . . . Subgen. *Nolanea* sect. *Endochromonema*.

12a. Vernal species often associated with Rosaceae; pileipellis an ixocutis.
Subgen. *Entoloma* sect. *Nolanidea*, p.p.

b. Occurring in summer or autumn; pileipellis usually a cutis, but sometimes more like an ixocutis.13

13a. Spores small, 6–8 × 5–7 μm, rather thin-walled, subglobose and multi-angled in outline.
Subgen. *Entoloma* sect. *Turfosa*.

b. Spores usually distinctly larger and relatively thick-walled 14

14a. Clamp-connections absent; carpophores clitocyboid, pileus convex with depressed to subumbilicate centre, coarsely radially fibrillose; stipe short, striate . . . Subgen. *Entoloma* sect. *Clitopiloides*.

b. Clamp-connections present. 15

15a. Carpophores collybioid or even omphalioid; pileus often with depressed centre; stipe smooth, as if polished, never striate. . . . . Subgen. *Entoloma* sect. *Polita*.

b. Carpophores tricholomatoid, rarely collybioid; pileus usually distinctly convex-umbonate when mature, rarely with depressed centre; stipe always fibrillose-striate lengthwise.
Subgen. *Entoloma* sect. *Rhodopolia*, p.p.

16a. Habit tricholomatoid; pileus smooth, opaque, sometimes with micaceous patches. 17

b. With other characters; if habit tricholomatoid, then pileal surface always strongly radially fibrillose to subsquamulose and large capitate cheilocystidia present. 19

17a. Vernal species, often associated with Rosaceae or *Ulmus*; pileipellis always an ixocutis with distinctly gelatinized layer; cheilocystidia always absent. . . . . Subgen. *Entoloma* sect. *Nolanidea* p.p.

b. Fruiting in late summer or autumn; pileipellis a dry cutis or an ixocutis. 18

18a. Pileus white or pale leather brown, with membranal, rarely minutely encrusting pigment; intracellular pigment always absent; large lageniform cheilocystidia present . . . . . Subgen. *Allocybe*.

b. Pileus white or coloured and then always with intracellular pigment; cheilocystidia always absent
Subgen. *Entoloma* sect. *Entoloma*.

19a. Habit strongly reminiscent of that of a species of *Inocybe*; pileus conical, only slightly expanding, radially fibrillose to squamulose; pileipellis a trichoderm of long hyphal ends; clamp-connections usually present; spores often cuboid. . . . . Subgen. *Inocephalus*.

b. With another combination of characters 20

20a. Habit pleurotoid or omphalioid; clamp-connections present. 21

b. Habit tricholomatoid, mycenoid or collybioid, if omphalioid, then clamp-connections lacking 22

21a. Pileus white or yellowish, pale pink, or brown, and spores with basal facet. Subgen. *Paraleptonia*.

b. Pileus brown or grey-brown; spores with dihedral base. . . . . Subgen. *Omphaliopsis*, p.p.

22a. Habit tricholomatoid, rarely mycenoid; cheilocystidia present, lageniform, often (sub-)capitate; clamp-connections present, rarely absent. . . . . Subgen. *Trichopilus* sect. *Trichopilus*.

b. Differently characterized 23

23a. Clamp-connections absent from all tissues; habit collybioid or omphalioid; pileus with flattened, depressed or umbilicate centre, exceptionally with small papilla. Subgen. *Leptonia* sect. *Paludocybe*.

b. Clamp-connections present; habit tricholomatioid or collybioid, more rarely mycenoid. . . . 24

24a. Carpophores collybioid, pale, usually white, pinkish or with slight brown or grey tinge at centre of pileus,. . . . . Subgen. *Alboleptonia*.

b. Carpophores always distinctly coloured, usually brownish-greyish or purplish-bluish . . . 25

25a. Habit tricholomatoid; pileus minutely radially fibrillose, grey or grey-brown, never with blue tinges
Subgen. *Trichopilus* sect. *Erophila*.

b. Habit different or parts of carpophores with bluish-purplish tinge 26

26a. Pileus usually truncate-campanulate or conico-convex with depressed to umbilicate centre, brownish or greyish; cheilocystidia long, fusiform or subcylindrical, protruding from the hymenium.
Subgen. *Leptonia* sect *Griseorubida*.

b. Pileus usually conico-convex to convex with weak to pronounced umbo, rarely subdepressed at centre, but then entire carpophores violaceous blue; cheilocystidia, if present more or less clavate and their length not much exceeding that of basidia. . . . . Subgen. *Leptonia* sect. *Leptonia*.

SYNOPSIS OF THE SUBGENERA AND SECTIONS OF ENTOLOMA IN EUROPE

1. ENTOLOMA subgenus ENTOLOMA

Agaricus trib. *Entoloma* Fr., Epicr.: 143. 1838. — *Agaricus* subgen. *Entoloma* (Fr.) Rabenh., Deutschl. KryptogFl. **1**: 508. 1844. — *Entoloma* (Fr.) Kumm., Führ. Pilzk.: 23. 1871. — *Rhodophyllus* subgen. *Entoloma* (Fr.) Quél., Enchir.: 57. 1886. — *Hyporrhodius* subgen. *Entoloma* (Fr.) Schroet. *in* Cohn, KryptogFl. Schles. **3** (1): 616. 1889. — Lectotype (Donk, 1962: 95): *Agaricus prunuloides* Fr.

Agaricus trib. *Eccilia* Fr., Syst. mycol. **1**: 10. 1821. — *Agaricus* subgen. *Eccilia* (Fr.) Loud., Encycl. Pl.: 998. 1829. — *Eccilia* (Fr.) Kumm., Führ. Pilzk.: 23. 1871. — *Rhodophyllus* subgen. *Eccilia* (Fr.) Quél., Enchir.: 62. 1886. — *Hyporrhodius* subgen. *Eccilia* (Fr.) Schroet. *in* Cohn, KryptogFl. Schles. **3** (1): 613. 1889. — Lectotype (Donk, 1949: 158): *Agaricus politus* Pers. ex Fr.

Rhodophyllus subgen. *Romagnesia* Singer *in* Annls mycol. **41**: 13. 1943. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

Carpophores usually tricholomatoid, rarely collybioid or clitocyboid, mycenoid or omphalioid; pileus usually conico-convex then flattened with or without broad umbo, rarely entirely flattened, cup-shaped or with central depression, hygrophanous or not, smooth or radially fibrillose, never fibrillose-squamulose; lamellae usually deeply emarginate or adnate, rarely adnate-subdecurrent; stipe usually aeriferously-fibrillosely striate lengthwise, rarely smooth as if polished; spores often more or less isodiametrical, with basal facet or blunt dihedral base; pileipellis a cutis or ixocutis made up of cylindrical hyphae, sometimes with ascending, clavate terminal cells. Pigment usually intracellular, rarely membranal or encrusting. Hymenophoral trama and pileitrama regular, made up of chains of relatively short (on the average 40–150 μm long) cylindrical or inflated cells; clamp-connections usually abundant in all parts of the carpophore.

1.1. Section ENTOLOMA

Agaricus sect. *Genuini* Fr., Epicr.: 143. 1838. — *Entoloma* sect. *Genuini* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard ser. II, **5**: 116. 1872. — *Rhodophyllus* sect. *Genuini* (Fr.) Quél., Enchir.: 57. 1886. — Lectotype (Donk, 1962: 95): *Agaricus prunuloides* Fr.

Rhodophyllus sect. *Nitidi* Romagn. in Bull. Soc. mycol. Fr. **53**: 326. 1937 (nom. nud., no Latin diagn.). — Lectotype (Singer, 1951: 623): *R. nitidus* (Quél.) Quél.

Rhodophyllus sect. *Viscosi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 325. 1937 (nom. nud., no Latin diagn.). — Lectotype (design. mihi): *R. lividus* (Bull. ex St.-Am.) Quél.

Rhodophyllus sect. *Madidi* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *R. madidus* (Fr.) Quél.

Carpophores tricholomatoid, usually fairly robust; pileus not hygrophanous, not striate, whitish, greyish, brownish, blue or greenish; pileipellis a cutis passing into an ixocutis with or without intracellular pigment; fruiting in late summer and autumn.

SPECIES.—*Entoloma prunuloides* (Fr.) Quél.; *E. lividum* (Bull. ex St.-Am.) Quél.; *E. sinatum* (Bull. ex Fr.) Kumm.; *E. madidum* (Fr.) Quél.; *E. nitidum* (Quél.) Quél.; *E. viridans* (Fr.) P. Karst.; *E. inocybeforme* Bon

1.2. Section NOLANIDEA (Fr.) Quél.

Agaricus subtribus *Nolanidei* Fr., Epicr.: 146. 1838. — *Entoloma* sect. *Nolanides* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. **II, 5**: 118. 1872. — *Rhodophyllus* sect. *Nolanidei* (Fr.) Quél., Enchir.: 59. 1886. — Lectotype (Singer 1951: 622): *Agaricus clypeatus* L. ex Fr.

Rhodophyllus sect. *Clypeati* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 326. 1937. — Lectotype (Singer, 1951: 622): *R. clypeatus* (L. ex Fr.) Quél.

Rhodophyllus sect. *Apriles* Kühn. & Romagn., Fl. anal.: 196. 1953 (nom. nud.). — *Rhodophyllus* sect. *Apriles* Kühn. & Romagn. ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

Rhodophyllus subgen. *Romagnesia* Sing. *in* Annls mycol. **41**: 13. 1943. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

EXCLUDED NAMES.—*Rhodophyllus* sect. *Nolanidei* sensu Romagn. *in* Bull. mens Soc. linn. Lyon **43**: 332. 1974. — Lectotype (Romagn., 1974b: 332): *R. nidorosus* (Fr.) Quél. (= *Entoloma* sect. *Rhodopolia* sensu mihi).

Entoloma sect. *Nolanidei* sensu Largent *in* Mycologia **66**: 999. 1974. — Lectotype (Largent, 1974: 999): *E. rhodopolium* (Fr.) Kumm. (= *Entoloma* sect. *Rhodopolia* sensu mihi).

Habit tricholomatoid, fleshy; pileus white, pale greyish, yellowish or brownish to dark brown or sepiaceous with grey or olivaceous tinge, hygrophanous or not; lamellae adnate-emarginate, rarely with decurrent tooth; stipe usually firm and fleshy, white to grey or grey-brown; smell and taste farinaceous; pileipellis an ixocutis of narrow cylindrical hyphae with gelatinized walls and pigment intracellular when present; strictly vernal, often associated with Rosaceae or *Ulmus*.

SPECIES.—*Entoloma clypeatum* (L. ex Fr.) Kumm. and varieties; *E. aprile* (Britz.) Sacc.; *E. niphoides* (Romagn.) P. D. Orton; *E. saundersii* (Fr.) Sacc.; *E. sepium* (Noul. & Dass.) Richon & Roze.

In the present revision *E. clypeatum* is considered the lectotype of sect. *Nolanidea* following Singer (1951: 622). From Fries' publications it is obvious that he considered this species as very typical for the section. In 1849 (: 287) Fries called the concerning group 'stirps *A. clypeati*'. Therefore the choice of *Agaricus nidorosus* by Romagnesi (1974b: 332) and *A. rhodopolius*, chosen by Largent (1974: 999) are rejected as lectotypes. As a consequence of this 'section *Nolanidei*' sensu Romagnesi, Largent is to be now called section *Rhodopolia* (see below).

1.3. **Entoloma** section **Rhodopolia** (Fr.) Noordeloos, *comb. nov.*

Agaricus subtribus *Rhodopolii* Fr., Syst. mycol. **1**: 195. 1821 (basionym). — *Rhodophyllus* sect. *Rhodopolii* (Fr.) Romagn. *in* Bull. Soc. mycol. Fr. **63**: 120. 1947. — Lectotype (design. mihi): *Agaricus rhodopolius* Fr.

Rhodophyllus subsect. *Nidorosi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 327. 1937. — Lectotype (design. mihi): *R. nidorosus* (Fr.) Quél.

Rhodophyllus sect. *Specularii* Romagn., Rhodoph. Madag.: 42. 1941. — Lectotype (Singer, 1951: 622): *R. speculum* (Fr.) Quél.

Entoloma sect. *Typodochroa* Largent in Mycologia **66**: 999. 1974. — Holotype: *E. platyphylloides* (Romagn.) Largent.

MISAPPLIED NAMES.—*Rhodophyllus* sect. *Nolanidei* sensu Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332 1974. — Lectotype (Romagn. 1974b: 322): *R. nidorosus* (Fr.) Quél.

Entoloma sect. *Nolanidea* sensu Largent *in* Mycologia **66**: 999. 1974. — Lectotype (Largent, 1974: 999): *E. rhodopolium* (Fr.) Quél.

Habit tricholomatoid, sometimes slender and almost mycenoid; pileus white, yellow, brown or grey, usually strongly hygrophanous; stipe always fibrillose-striate lengthwise; pigment intracellular or encrusting or both; summer-autumn.

SPECIES.—*Entoloma rhodopolium* (Fr.) Kumm., *E. nidorosum* (Fr.) Quél.; *E. lividoalbum* (Kühn. & Romagn.) Kubička; *E. speculum* (Fr.) Quél.; *E. leucocarpum* Noordeloos; *E. subradiatum* (Kühn. & Romagn.) Moser; *E. sphagneti* Naveau; *E. alpicolum* (Favre) Noordeloos; *E. brassicolens* (Reid) Noordeloos; E. *gerriae* Noordeloos; *E. atrosericeum* (Kühn.) Noordeloos; *E. venosum* Gill.; *E. myrmecophilum* (Romagn.) Moser with var. *atrogaleatum* Noordeloos; *E. majaloides* P. D. Orton; *E. sericatum* (Britz.) Sacc. with f. *saliciphilum* Noordeloos; *E. sordidulum* (Kühn. & Romagn.) P. D. Orton.

1.4. **Entoloma** section **Polita** (Romagn.) ex Noordeloos, *sect. nov.*

Rhodophyllus subsect. *Politi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 327. 1937 (nom. nud., no Latin diagnosis). — *Rhodophyllus* sect. *Politi* (Romagn.) Sing. *in* Annls mycol. **41**: 13. 1943. — Lectotype (Singer, 1951: 617). — *R. politus* (Pers. ex Fr.) Quél.

Agaricus subtribus *Eccilia* Fr., Syst. mycol. **1**, 10. 1821 — *Agaricus* subgen. *Eccilia* (Fr.) Loud., Encyl. Pl.: 998. 1829. — *Rhodophyllus* subgen. *Eccilia* (Fr.) Quél. Enchir.: 62. 1886. — *Eccilia* (Fr.) Kumm., Führ. Pilzk. **23**: 1871. — Lectotype (Donk 1949: 158): *Agaricus politus* Pers. ex Fr.

Statura omphalioidea vel collybioidea; pileus depressus vel umbilicatus, raro papillatus; lamellae adnatae vel uncinatae vel decurrentes; stipes glaber, politus; pileus pigmentis intracellulosis praeditus, fibulae abundantes.—Typus: *Agaricus politus* Pers. ex Fr.

Habit omphalioid or collybioid; pileus with depressed or umbilicate rarely papillate centre; lamellae adnate or uncinate or decurrent; stipe smooth as if polished, pigments intracellular; clamp-connections abundant in all tissues.—Type: *Agaricus politus* Pers. ex Fr.

SPECIES.—*Entoloma politum* (Pers. ex Fr.) Donk with f. *pernitrosum* P. D. Orton; *E. caccabus* (Kühn.) Noordeloos; *E. bisporigerum* (P. D. Orton) Noordeloos; *E. anthracinum* (Favre) Noordeloos; *E. subflexipes* (Kühn.) Noordeloos.

Donk (1949: 158 and 1962: 92–93) argued the choice of *E. politum* as lectotype for *Agaricus* subtr. *Eccilia* so convincingly that his advice is followed here. As a consequence of this, *Eccilia* becomes a synonym of *Entoloma* sect. *Polita*, as the type species, *E. politum*, belongs to subgenus *Entoloma* according to Kühner & Romagnesi and myself. I could have given a new status, viz. that of section, to *Eccilia*, but I prefer the sectional name *Polita* for the following reason: *Eccilia* has been applied in the past for all species of *Entoloma* with a more or less omphalioid appearance viz. with a depressed to umbilicate pileus and decurrent lamellae, thus uniting species that, according to modern mycologists belong to several subgenera. Actually *Eccilia* served as a form genus. Therefore the use of the name *Eccilia* for the present section would create confusion.

1.5. **Entoloma** section **Clitopiloides** (Romagn.) Noordeloos, *comb. nov.*

Rhodophyllus sect. *Clitopiloides* Romagn. *in* Beih. Nova Hedwigia **59**: 55. 1978 (basionym). — Holotype: *R. cyathus* Romagn. & Gilles.

Habit clitocyboid; pileus depressed, dark brown; lamellae broadly adnate to subdecurrent; stipe fibrillosely striate lengthwise; spores subisodiametrical (or cuboid in extralimital taxa); pigment intracellular; clamp-connections absent.

SPECIES. — *Entoloma costatum* (Fr.) Kumm.

1.6. Section TURFOSA (Romagn.) Noordeloos

Rhodophyllus sect. *Turfosi* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — *Entoloma* sect. *Turfosa* (Romagn.) Noordeloos *in* Persoonia **10**: 529. 1979. — Holotype: *Entoloma turbidum* (Fr.) Quél.

Habit tricholomatoid or collybioid; pileus distinctly hygrophanous, smooth, grey-brown or yellowish brown; lamellae often with grey or brown tinge; spores small, 6–8(–9) µm long, rounded- and multi-angled in side-view, subisodiametrical to slightly oblong in outline, very thin-walled, slightly cyanophilous; pileipellis a cutis or ixocutis made up of narrow cylindrical hyphae with intracellular pigment; clamp-connections numerous in all tissues.

SPECIES. — *Entoloma turbidum* (Fr.) Quél. with var. *pachylamellatum* Noordeloos; *E. vinaceum* (Scop. ex Fr.) Arnolds & Noordeloos with var. *violeipes* Arnolds & Noordeloos and var. *fumosipes* Arnolds & Noordeloos; *E. pseudoturbidum* (Romagn.) Moser.

The small, multi-angled and thin-walled spores are unique in the genus *Entoloma*. The section is placed in subgenus *Entoloma* on account of the size and shape of the tramal hyphae, the structure of the pileipellis, the pigmentation, and the abundant clamp-connections in all tissues which are quite typical for the subgenus. *Entoloma vinaceoum* was formerly placed in subgenus *Nolanea* by several authors, on account of its slender habit, which however is more collybioid than mycenoid, but the characters mentioned above render *E. vinaceum* a typical member of subgenus *Entoloma*.

2. ENTOLOMA subgenus NOLANEA (Fr.) Noordeloos

Agaricus tribus *Nolanea* Fr., Syst. mycol. **1**: 10. 1821. — *Agaricus* subgen. *Nolanea* (Fr.) Loud., Encycl. Pl.: 998. 1829. — *Nolanea* (Fr.) Kumm., Führ. Pilzk.: 24. 1871. — *Rhodophyllus* subgen. *Nolanea* (Fr.) Quél., Enchir.: 62. 1886. — *Hyporrhodius* subgen. *Nolanea* (Fr.) Schroet. *in* Cohn. KryptogFl. Schles. **3** (1): 612. 1889. — *Entoloma* subgen. *Nolanea* (Fr.) Noordeloos *in* Persoonia **10**: 431. 1979. — Lectope (Largent, 1974: 1001): *Agaricus hirtipes* Schum. ex Fr.

Habit mycenoid, rarely slenderly tricholomatoid or omphalioid; pileus conical to conico-campanulate, then expanding, usually with papilla, rarely depressed at centre; hygrophanous;

mostly translucently striate when moist, smooth or slightly fluffy-rugulose at centre; lamellae almost free or narrowly adnate or emarginate, rarely with decurrent tooth; stipe slender, often more or less cartilagineous; spores variable in shape, (sub-)isodiametrical to heterodiametrical or cuboid or cruciform; cystidia present or not; pileipellis a cutis, often with a tendency to become a trichoderm at centre of pileus because of ascending hyphal endcells; pigment intracellular or membranal or encrusting or in combinations of two of these types; hymenophoral trama and pileitrama made up or relatively long, cylindrical to fusoid cells, mostly between 150–450 μm long; clamp-connections, if present, abundant in hymenium, but elsewhere rare or entirely lacking.

Agaricus pascuus Pers. ex Fr. has long been considered the type-species of *Nolanea* (see Donk, 1962: 201–202). I reject this lectotype, as the name *Agaricus pascuus* has been variously interpreted, and must be considered a collective name, comprising at least three different grass-inhabiting species of *Nolanea*, including *E. conferendum* (= *E. staurosporum*), *E. vernum* and *E. sericeum* which belong in my opinion to different sections of *Nolanea*. Agaricus pascuus has therefore been dealt with as a nomen dubium in a previous paper (Noordeloos, 1979: 527). As a consequence the lectotypification of *Nolanea* by Largent (1974, l.c.) with *Agaricus hirtipes* Schum. ex Fr. has been followed. This is a well-known, wide-spread species, which has been included by Fries in tribus *Nolanea* (Fries, 1821: 206).

2.1. Section NOLANEA

Rhodophyllus subsect. *Mammosi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 331. 1937. — *Rhodophyllus* sect. *Mommosi* (Romagn. ex) Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 331. 1974. — Holotype: *R. mammosus* (L. ex Fr.) Quél.

Pigment encrusting hyphae of pileipellis and pileitrama, in addition intracellular in subpellis; cheilocystidia present, subcylindrical, often subcapitate; spores heterodiametrical with basal facet; clamp-connections present in hymenium.

SPECIES.—*Entoloma hirtipes* (Schum. ex Fr.) Moser with var. *sericoides* (Kühn.) Noordeloos; *E. leptopus* Noordeloos.

2.2. Section STAUROSPORA (Largent & Thiers) Noordeloos

Nolanea sect. *Staurospori* Largent & Thiers *in* Northwest Sci. **46**: 37. 1972. — *Rhodophyllus* sect. *Staurospori* (Largent & Thiers) Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 330. 1974. — *Entoloma* sect. *Staurospora* (Largent & Thiers) Noordeloos *in* Persoonia **10**: 445. 1979. — Holotype: *Nolanea staurospora* Bres. (= *E. conferendum* (Britz.) Noordeloos).

Rhodophyllus subsect. *Staurospori* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 331. 1948 (nom. nud., no latin diagnosis). — Lectotype (design. mihi): *R. staurosporus* (Bres.) J. Lange.

Rhodophyllus subsect. *Solstitiales* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 333. 1937 (nom. nud., no latin diagnosis). — Lectotype (Singer 1951: 619): *R. solstitialis* sensu Ricken, Romagn. 1937 (= *E. rhombisporum* (Kühn. & Bours.) Horak).

Spores cuboid or prismatical (cruciform-stellate); pigment membranal, encrusting and/or intracellular.

SPECIES.—*Entoloma conferendum* (Britz.) Noordeloos (= *Nolanea staurospora* Bres.) and var. *pusillum* (Velen.) Noordeloos; *E. rhombisporum* (Kühn. & Bours.) Horak; *E. prismatospermum* (Romagn.) Noordeloos; *E. inodorum* (Velen.) Noordeloos.

2.3. **Entoloma** section **Cosmeoexonema** (Largent & Thiers) Noordeloos, *comb. nov.*[2]

Nolanea sect. *Cosmeoexonema* Largent & Thiers *in* Northwest Sci **46**: 35. 1972. — *Rhodophyllus* sect. *Cosmeoexonema* (Largent & Thiers) Romagnesi *in* Bull. mens. Soc. linn. Lyon **43**: 331. 1974. — Holotype: *E. sericeum* (Bull. ex Mérat) Quél.

Rhodophyllus sect. *Papillati* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 330. 1974. — *Entoloma* sect. *Papillata* (Romagn.) Noordeloos *in* Persoonia **10**: 246. 1979. — Holotype: *E. papillatum* (Bres.) Dennis.

Rhodophyllus sect. *Minuti* Romagn. in Bull. mens. Soc. linn. Lyon **43**: 330. 1974. — Holotype: *E. minutum* (P. A. Karst.) Noordeloos.

Nolanea subsect. *Fibulatae* Largent *in* Mycologia **66**: 1008. 1974. — Holotype: *Nolanea juncea* (Fr.) Quél.

Rhodophyllus sect. *Sphaerospori* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 331. 1937 (nom. nud., no Latin diagnosis). — Lectotype: (Singer, 1951: 621): *E. sericeum* (Bull. ex Mérat) Quél.

Pigment encrusting at least the narrowest hyphae of pileipellis and pileitrama, sometimes with intracellular pigment in addition, but this never dominant; clamp-connections present; spores iso- to heterodiametrical, never cuboid or prismatical; cystidia usually absent.

SPECIES.—*Entoloma papillatum* (Bres.) Dennis; *E. clandestinum* (Fr.) Noordeloos; *E. lucidum* (P. D. Orton) Moser; *E. sericeonitens* (P. D. Orton) Noordeloos; *E. ortonii* Arnolds & Noordeloos; *E. cuspidiferum* (Kühn. & Romagn.) Noordeloos; *E. juncinum* (Kühn. & Romagn.) Noordeloos; *E. nitens* (Velen.) Noordeloos; *E. minutum* (P. A. Karst.) Noordeloos with var. *polymorphum* (Romagn.) Noordeloos; *E. tenellum* (Favre) Noordeloos; *E. tibiicystidiatum* Arnolds & Noordeloos; *E. ameides* (Berk. & Br.) Sacc.; *E. sacchariolens* (Romagn.) Noordeloos; *E. vernum* Lundell; *E. sericeum* (Bull. ex Mérat) Quél. with var. *cinereo-opacum* Noordeloos and f. *nolaniforme* (Kühn. & Romagn.) Noordeloos; *E. sericeoides* (J. Lange) Noordeloos; *E. sphaerocystis* Noordeloos.

2.4. Section FERNANDAE Noordeloos

Entoloma sect. *Fernandae* Noordeloos *in* Persoonia **10**: 486. 1979. — Holotype: *E. fernandae (Romagn.) Noordeloos.*

Two types of pigment present: one encrusting the walls of most hyphae in pileipellis and upper pileitrama, another intracellular and forming, sometimes agglutinated, granules or clots; spores 5–6–7-angled, with distinct dihedral base; clamp-connections absent.

SPECIES.—*Entoloma fernandae* with *f. eccilioides*; *E. acidophilum* Arnolds & Noordeloos; *E. argenteostriatum* Arnolds & Noordeloos; *E. defibulatum* Arnolds & Noordeloos; *E.*

[2] The sectional name *Cosmeoexonema* is older than the sectional name *Papillata*, used by me earlier (1979: 246), and has therefore priority, see Noordeloos, 1981b: 257.

xanthocaulon Arnolds & Noordeloos; *E. cuniculorum* Arnolds & Noordeloos; *E. fractum* (Velen.) Noordeloos; *E. psilopus* Arnolds & Noordeloos; *E. pseudotelamonia* Noordeloos.

2.5. Section ENDOCHROMONEMA (Largent & Thiers) Noordeloos

Nolanea sect. *Endochromonema* Largent & Thiers *in* Northwest Sci **46**: 36. 1972. — *Rhodophyllus* sect. *Endochromonema* (Largent & Thiers) Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 331. 1974. — *Entoloma* sect. *Endochromonema* (Largent & Thiers) Noordeloos *in* Persoonia **10**: 246. 1979. — Holotype: *E. cetratum* (Fr.) Moser.

Pigment intracellular, sometimes membranal or both; spores heterodiametrical with dihedral base; cheilocystidia present or not; clamp-connections usually present.

SPECIES.—*Entoloma cetratum* (Fr.) Moser; *E. farinogustus* Arnolds & Noordeloos; *E. cuneatum* (Bres.) Moser; *E. lanuginosipes* Noordeloos; *E. occultopigmentatum* Arnolds & Noordeloos; *E. calthionis* Arnolds & Noordeloos; *E. ventricosum* Arnolds & Noordeloos; *E. infula* (Fr.) Noordeloos; *E. solstitiale* (Fr.) Noordeloos; *E. chlorinosum* Arnolds & Noordeloos; *E. verecundum* (Fr.) Noordeloos; *E. triste* (Velen.) Noordeloos; *E. undulatosporum* Arnolds & Noordeloos; *E. velenovskyi* Noordeloos with var. *longicystidiatum* Arnolds & Noordeloos; *E. cryptocystidiatum* Arnolds & Noordeloos; *E. inutile* (Britz.) Noordeloos; *E. globuliferum* Noordeloos; *E. icterinum* (Fr.) Moser; *E. chlorophyllum* Noordeloos; *E. ambrosium* (Quél.) Noordeloos; *E. pallescens* (P. A. Karst.) Noordeloos; *E. foetulentum* Noordeloos; *E. robiniae* (Velen.) Noordeloos.

3. ENTOLOMA subgenus POUZAROMYCES (Pilát) Moser ex Noordeloos [3]

Rhodophyllus 'subgenus' *Inopilus* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 329. 1974 (illegitimate name, no rank indicated, see also under subgen. *Inocephalus*, below). — Holotype: *R. versatilis* (Fr.) Quél.

Pouzaromyces Pilát in Acta Mus. nat. Prag. (**B**) **9** (2): 60. 1953. — *Entoloma* subgen. *Pouzaromyces* (Pilát) Moser *in* Gams, Kl. KryptogFl., 4. Aufl., **2** (b/2): 191. 1978. (not valid, no basionym cited); ex Noordeloos *in* Persoonia **10**: 209. 1979. — Holotype: *Nolanea fumosella* (Wint.) Lange sensu Pilát = *Entoloma strigosissimum* (Rea) Noordeloos.

Pouzarella Mazzer *in* Bibltca mycol. **46**: 69. 1976. — Holotype: *P. nodospora* (Atk.) Mazzer.

Habit mycenoid, or reminiscent of that of a species of *Inocybe;* pileus conical or campanulate, only slowly expanding, not hygrophanous, translucently striate at margin or not, with metallic sheen, strongly radially fibrillose, fibrillose-hairy of fibrillose-squamulose; lamellae adnate, emarginate or almost free, but then often with distinct decurrent tooth, usually very dark grey-brown; stipe filiform to cylindrical, concolorous with pileus or slightly paler, with fibrillose or arachnoid covering; spores angular or gibbose, often large, 9–20 μm long, ellipsoid to elongate in

[3] In my paper on *Pouzaromyces* (1979: 209) I overlooked that this combination, introduced by Moser, had not been validly published and I unintentionally validated it by citing its basionym and references.

outline, fairly thick-walled; basidia 4-spored, large, when dry frequently with dark brown intracellular pigment; cheilocystidia usually present [4]; hymenophoral trama regular with well-developed subcellular hymenopodium; pileipellis more or less trichodermal; pigment abundant, encrusting in trama and covering layers, sometimes intracellular in addition.

3.1. Section POUZAROMYCES

Rhodophyllus section *Luctuarii* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 330. 1974. — Holotype: *R. babingtonii* sensu Kühn. & Romagn. = *E. strigosissimum* (Rea) Noordeloos.
Pouzarella section *Pouzarella*.
Pouzarella section *Dysthales* Mazzer *in* Bibltca mycol. **46**: 92. 1976. — Holotype: *P. dysthales* (Pk.) Mazzer.

Pileus fibrillose-hairy to fibrillose-squamulose. Pileipellis a cutis with transitions to a trichoderm with long, septate, attenuate hairs; pigment encrusting; cheilocystidia if present subcylindrical, subglobular to clavate, usually brown-encrusted.

SPECIES.—*Entoloma strigosissimum* (Rea) Noordeloos, *E. dysthales* (Peck) Sacc. with *f. acystidiosum* Noordeloos; *E. dysthaloides* Noordeloos; *E. hirtum* (Velen.) Noordeloos; *E. romagnesii* Noordeloos; *E. pulvereum* Rea.

3.2. Section VERSATILIA (Romagn. ex Romagn.) Noordeloos

Rhodophyllus sect. *Versatiles* Romagn., Rhodoph. Madag.: 44. 1941 (nom. nud., no latin diagnosis). — *Rhodophyllus* section *Versatiles* Romagn. ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 329. 1974. — *Entoloma* sect. *Versatilia* (Romagn. ex Romagn.) Noordeloos *in* Persoonia **10:** 229. 1979.—Holotype: *R. versatilis* (Fr.) Quél.
Rhodophyllus 'subgen.' *Inopilus* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 329. 1974. — Holotype: *R. versatilis* (Fr.) Quél.

Pileus micaceous-fibrillose to fibrillose-hairy; cheilocystidia lageniform; pigment intracellular in pileipellis, encrusting in pileitrama.

SPECIES.—*Entoloma versatilis* (Fr.) Quél.; *E. areneosum* (Quél.) Moser with f. *fulvostrigosum* (Berk. & Br.) Noordeloos; *E. indutum* Boud.

4. **ENTOLOMA** subgenus **ALLOCYBE** Noordeloos, *subgen. nov.*

Rhodophyllus section *Excentrici* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *R. excentricus* (Bres.) Romagn.

Statura tricholomatoidea; pileus conicus vel planus, haud hygrophanus, albus vel alutaceous; pileipellis cutis, hyphae 8–20 μm latae, cylindraceae vel inflatae; pigmentum in hypharum tunica vel incrustans; sporae heterodiametricae structura nominatur 'basal facet'; trama elementis hypharum longis, cylindraceis vel fusoideis; fibulae basidiorum ad basin presentes. — Typus: *Entoloma excentricum* Bres.

[4] At least in the temperate species; in many tropical taxa cheilocystidia are lacking (Romagnesi, 1941; Horak, 1980).

Habit tricholomatoid; pileus conical or flattened, not hygrophanous, white or leather brown; pileipellis a cutis made up of 8–20 μm wide cylindrical or inflated hyphae; pigment membranal or encrusting; spores heterodiametrical with basal facet; elements of trama 90–320 μm long, cylindrical to fusoid; clamp-connections present at base of basidia. — Type: *Entoloma excentricum* Bres.

SPECIES.—*Entoloma excentricum* Bres.; *E. eximium* (Romagn.) Noordeloos; *E. chionoderma* (Pilat) Noordeloos.

Romagnesi (1978: 37) considered *E. excentricum* one of the most enigmatic species of *Entoloma* in Europe on account of its large spores with basal facet, large cheilocystidia and relatively simple pileipellis made up of radially arranged, narrow, cylindrical hyphae. He pointed at the resemblance to subgenus *Trichopilus*, but considered the structure of the pileipellis and the pigmentation of *E. excentricum* too different to allow inclusion of his section *Excentrici* in subgen. *Trichopilus*. Therefore he retained this section in subgen. *Entoloma* in an isolated position.

Additional characters studied by me (see Noordeloos, 1981: 251) such as size and shape of the tramal cells, structure of the pileipellis, and topography of the clamp-connections emphasized the differences between secion *Excentrici* and the rest of subgen. *Entoloma* to such en extent, that I decided to create a new subgenus to accommodate the species of section *Excentrici*. The new subgenus is placed in between subgen. *Entoloma*, from which it differs mainly in size and shape of tramal elements, topography of clamp-connections and in the presence of large cheilocystidia, and subgen. *Trichopilus*, from which it differs mainly in the structure and pigmentation of the pileipellis. Further information is found in Noordeloos, l.c.

5. ENTOLOMA subgenus TRICHOPILUS (Romagn.) Noordeloos, *emend.*

Rhodophyllus subgenus *Trichopilus* Romagn. *in* Beih. Nova Hedwigia **59**: 50. 1978. — *Entoloma* subgen. *Trichopilus* (Romagn.) Noordeloos *in* Persoonia **11**: 86. 1980. — Holotype: *E. jubatum* (Fr.) Quél.

Agaricus sect. *Leptonidei* Fr., Epicr.: 145. 1838. — *Rhodophyllus* sect. *Leptonidei* (Fr.) Quél., Enchir.: 58. 1886. — *Entoloma* sect. *Leptonidei* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér., II, **5**: 118. 1872. — Lectotype (design. mihi): *Agaricus resutus* Fr.

Rhodophyllus subgenus *Leptonidium* Kühn. *in* Bull. Soc. mycol. Fr. **93**: 446. 1977 (nom. nud., no Latin description, no type indicated).

Habit tricholomatoid; pileus often umbonate, rarely flattened, not hygrophanous, silky shining, densely radially fibrillose to fibrillose-squamulose; pileipellis a trichoderm made up of ascending bundles of cylindrical or fusoid terminal cells of the underlaying subpellis, up to 25 μm wide with intracellular pigment; hymenophoral trama regular, made up of long, fusoid, up to 450 μm long cells; clamp-connections usually abundant.

Subgenus *Trichopilus* is emended here by including sect. *Erophila*. The species of this section seem to be better on its place here than in subgen. *Inocephalus* because of their tricholomatoid habit and the structure of their pileipellis.

5.1. Section TRICHOPILUS

Characters as those of subgenus but (sub-)capitate lageniform cheilocystidia present.

SPECIES.—*Entoloma jubatum* (Fr.) P. A. Karst; *E. porphyrophaeum* (Fr.) P. A. Karst.; *E. helodes* (Fr.) Kumm.; *E. fuscotomentosum* Moell.; *E. fuscomarginatum* P. D. Orton; *E. scabiosum* (Fr.) Quél.

5.2. Section EROPHILA (Romagn.) Noordeloos

Rhodophyllus sect. *Erophili* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — *Entoloma* sect. *Erophila* (Romagn.) Noordeloos *in* Persoonia **11**: 86. 1980. — Holotype: *E. erophilum* (Fr.) P. A. Karst.

Cheilocystidia absent; pileus often flattened or with slightly depressed centre, fibrillose-rugulose to subsquamulose; often fruiting in spring.

SPECIES.—*E. erophilum* (Fr.) P. A. Karst.; *E. plebejum* Kalchbr.

6. **ENTOLOMA** subgenus **INOCEPHALUS** Noordeloos, *subgen. nov.*

Rhodophyllus subgenus *Inopilus* Romagn. sensu Romagn. *in* Beih. Nova Hedwigia **59:** 48. 1978. — Holotype: *R. inocephalus* Romagn.

Pileus plerumque conico-campanulate deinde expansus, obtusus vel mammosus, haud depressus neque hygrophanus, sed saepe translucido-striatus; cutis fibrillosa, adpresse squamulosa vel sericata, interdum velutina ac tenuiter rimulosa propter structuram hymeniformam; pigmentum intracellulosum; lamellae liberae vel adnexae, haud decurrentae; sporae structura nominatur 'dihedral base', saepe cuboidea. — Holotypus: *Entoloma inocephalum* (Romagn.) Dennis.

Habit mycenoid; pileus conico-campanulate then expanding, never depressed, usually papillate, with radially fibrillose or adpressedly squamulose, velutinous or slightly rimose surface; lamellae free or narrowly adnexed, never decurrent; spores with dihedral base; pileipellis a trichoderm or hymeniderm; pigment intracellular. — Holotype: *Entoloma inocephalum* (Romagn.) Dennis.

In discordance with the Rules of Botanical Nomenclature Romagnesi (1978, l.c.) changed the type of *Inopilus* from *E. versatilis* into *E. inocephalum*, because he thought the latter species to be more representative for the subgenus he had in mind. Noordeloos (1979: 209) transferred sect. *Inopilus*, with *E. versatilis* as type, to subgen. *Pouzaromyces*. Therefore a new subgenus had to be created for the remaining taxa of the former taxon *Inopilus*. I selected *E. inocephalum* as holotype for this new subgenus, following the suggestion of Romagnesi cited above. Subgen. *Inocephalus* has, as far as we know, no European representatives, but is widespread and rich in species in subtropical and tropical areas (Romagnesi & Gilles, 1979; Horak, 1973, 1978).

7. ENTOLOMA subgenus ALBOLEPTONIA (Largent & Benedict) Noordeloos

Alboleptonia Largent & Benedict *in* Mycologia **62**: 439. 1970. — *Entoloma* subgen. *Alboleptonia* (Largent & Benedict) Noordeloos *in* Persoonia **10**: 246. 1979. — Holotype: *E. sericellum* (Bull. ex Fr.) Kumm.

Habit collybioid or omphalioid, rarely with excentric stipe; pileus always pale, white, pinkish or with slight grey or brown tinges; pileipellis a trichoderm of interwoven hyphal tips, with pigment intracellular if present, clamp-connections usually present.

7.1. Section ALBOLEPTONIA

Rhodophyllus sect. *Candidi* Romagn. *in* Bull. Soc. mycol. Fr. 53: 333. 1937 (nom. nud., no Latin diagnosis). — Lectotype (Singer 1951: 617): *R. sericellus* (Bull. ex Fr.) Quél.

Characters as those of the subgenus, but clamp-connections always present.

SPECIES.—*Entoloma sericellum* (Bull. ex Fr.) Kumm.; *E. cephalotrichum* (P. D. Orton) Noordeloos, *E. olorinum* (Favre & Romagn.) Noordeloos. *E. roseum* (Longyear) Moser.

8. **ENTOLOMA** subgenus **LEPTONIA** (Fr.) Noordeloos, *comb. nov.*

Agaricus tribus *Leptonia* Fr., Syst. mycol. 1: 10. 1821. — *Agaricus* subgen. *Leptonia* (Fr.) Loud., Encyl. Pl.: 998. 1827. — *Rhodophyllus* subgen. *Leptonia* (Fr.) Quél., Enchir.: 59. 1886. — *Leptonia* (Fr.) Kumm., Führ. Pilzk.: 24. 1871. — Lectotype (Clements & Shear, 1931: 349): *Agaricus euchrous* Pers. ex Fr.

Leptonietta Earle *in* Bull. N.Y. bot. Gdn. 5: 424. 1909. — Lectotype (Donk, 1962: 171): *Agaricus euchrous* Pers. ex Fr.

Leptonia subgen. *Paludocybe* Largent *in* Mycologia 66: 1011. 1974. — Holotype: *L. lampropus* (Fr.) Quel. sensu P. D. Orton.

Habit collybioid, rarely omphalioid; pileus convex with depressed or umbilicate centre, rarely papillate, opaque or translucently striate when moist, not or only very slightly hygrophanous, with fibrillose to squamulose surface; pileipellis a trichoderm, hymeniform or a pallissadoderm; pigment intracellular.

8.1. Section LEPTONIA

Rhodophyllus sect. *Leptoniarii* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 332. 1937 (nom. nud., no latin diagnosis). — Lectotype (design. mihi): *R. euchrous* (Pers. ex Fr.) Quél.

Rhodophyllus 'groupe' *Lampropodes* Kühn. & Romagn., Fl. anal.: 208. 1953. — *Rhodophyllus* sect. *Lampropodes* (Kühn. & Romagn.) ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 328. 1974. — Holotype: *R. lampropus* sensu Kühn. & Romagn.

Habit collybioid, rarely more or less mycenoid or tricholomatoid; pileus rarely depressed, never umbilicate, frequently with bluish tinges; pileipellis a cutis or a trichoderm made up of bundles of repent or slightly ascending, cylindrical, multiseptate hyphae; clamp-connections present; cheilocystidia, if present, more or less clavate.

Species.—*Entoloma euchroum* (Pers. ex Fr.) Kumm.; *E. dichroum* (Pers. ex Fr.) Kumm.; *E. placidum* (Fr. ex Fr.) Noordeloos; *Rhodophyllus lampropus* sensu Kühn. & Romagn.

8.2. **Entoloma** section **Griseorubida** (Romagn.) Noordeloos, *comb. nov.*

Rhodophyllus sect. *Griseorubidi* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 328. 1974 (basionym). Holotype: *R. griseorubidus* Kühn.

Pileus truncate-campanulate with depressed centre and radially fibrillose surface, sometimes minutely squamulose at centre; with large fusiform or cylindrical cheilocystidia; clamp-connections present.

Species.—*Rhodophyllus griseorubidus* Kühn.; *Entoloma cocles* (Fr.) Noordeloos.

8.3. **Entoloma** section **Paludocybe** (Largent) Noordeloos, *comb.* & *stat. nov.*

Leptonia subgen. *Paludocybe* Largent *in* Mycologia **66**: 1011. 1974 (basionym). — Holotype: *L. lampropus* sensu P. D. Orton.

Habitat typically collybioid, rarely omphalioid; pileus convex to broadly convex with depressed to umbilicate, usually tomentose or squamulose centre, towards margin adpressed fibrillose or almost smooth; pileipellis usually a well-developed trichoderm, hymenoderm or pallissadoderm; clamp-connections absent; cheilocystidia, if present, never very much different from the basiodioles, sometimes with intracellular pigment.

Species.—The European taxa of this section are badly in need of a critical revision. Many species have been described in the past, and many have been misinterpreted afterwards. The species of sect. *Paludocybe* are often very difficult to distinguish, as there are not many microscopical characters to support the often slight macromorphological differences. The attempted subdivisions of *Paludocybe* into groups by Largent (1974, 1977) and Romagnesi (1974, 1978) are mainly based on the colour or pileus and stipe, sometimes also on other characters, such as a lamellar edge with coloured cheilocystidia (section *Rhamphocystotae* Largent), but the resulting subdivisions do not give the impression of being 'natural'. At present I am not able to give an account of the European taxa in this section.

9. **ENTOLOMA** subgenus **CLAUDOPUS** (Gill.) Noordeloos, *comb. nov.*

Claudopus Gill., Hymen. Fr.: 426. 1876 (basionym). — *Rhodophyllus* subgenus *Claudopus* (Gill.) Romagn. *in* Beih. Nova Hedwigia **59**: 41. 1978. — Lectotype (Konrad, 1934: 177): *Agaricus byssisedus* Pers. ex Fr.

Rhodophyllus section *Undati* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 329. 1937 (nom. nud., no Latin diagnosis). — *Rhodophyllus* sect. *Undati* Romagn. ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 327. 1974. — Holotype: *Rhodophyllus undatus* (Fr.) Quél.

Habit pleurotoid, omphalioid or clitocyboid; stipe central or excentrical, sometimes lacking; lamellae often decurrent; pigment exclusively encrusting.

SPECIES.—*Entoloma hyssisedum* (Pers. ex Fr.) Donk; *E. depluens* (Batsch ex Fr.) Hesler; *E. apiculatum* (Pers. ex Fr.) Noordeloos; *E. undatum* (Fr.) Moser (= *Eccilia sericeonitida* P. D. Orton); *E. rhodocylix* (Lasch) Moser; *E. rusticoides* (Gill.) Noordeloos; *E. nigrellum* (Quél.) Noordeloos; *E. lanicum* (Romagn.) Noordeloos.

Subgen. *Claudopus* is accepted here in the emended sense of Romagnesi (1974, l.c.). In this concept it covers not only the pleurotoid relatives of *E. hyssisedum* but also the omphalioid species with encrusting pigments, formerly placed in the form(sub)gen. *Eccilia*, such as *E. undatum* and related species. *Claudopus* sensu Horak (1973, 1980) is a form-genus, uniting all pleurotoid species in *Entoloma*, and covering an heterogenous group of species, some with encrusting pigment, others with intracellular pigment, here placed in subgen. *Paraleptonia*.

10. **ENTOLOMA** subgenus **OMPHALIOPSIS** Noordeloos, *subgen. nov.*

MISAPPLIED NAME.—*Rhodophyllus* subgen. *Eccilia* (Fr.) Quél. sensu Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 337. 1974. — Lectotype: (Clemens & Shear, 1931: 349): *R. parkensis* Fr. sensu Kühn.

Statura omphalioidea vel collybioidea, raro mycenoidea; pileus leviter hygrophanus, cutis tramaeque pigmento intracellularis, rarius leviter incrustante munitus; sporae structura nominatur 'dihedral base'; fibulae presentes vel absentes. — Typus: *Entoloma leptonipes* (Kühn. & Romagn.) Moser.

Habit omphalioid, collybioid or mycenoid; pileus sometimes slightly hygrophanous, usually not; pileipellis a cutis or trichoderm made up of wide, often inflated hyphae; pigment intracellular, sometimes in addition slightly encrusting pigment on the narrow hyphae of upper pileitrama; clamp-connections present (in extra-European taxa sometimes absent); spores with dihedral base. — Holotype: *Entoloma leptonipes* (Kühn. & Romagn.) Moser.

As I have pointed out above (see p. 138), *E. politum* must be considered the lectotype of '*Eccilia*' Fr., in accordance with the typification by Donk (1949: 158). In my concept of subgen. *Entoloma* the name *Eccilia* is then a synonym of subgen. *Entoloma*.

The consequence of this is that a new subgenus is needed to accommodate the taxa of *Rhodophyllus* subgen. *Eccilia* emend. Romagn. 1974. I have chosen *E. leptonipes* as the type of this new subgen. *Omphaliopsis* because that is a fairly well-known an widespread species, whereas the identity of *Rhodophyllus parkensis* sensu Kühn. seems rather doubtful.

Subgen. *Omphaliopsis* has its main distribution in the tropics (Romagn. & Gilles, 1979); only a few species, some of which are undescribed, occur in Europa.

10.1 Section OMPHALIOPSIS

Rhodophyllus sect. *Trichonophylli* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 327. 1974.—Holotype: *R. parkensis* sensu Kühn.

Pileus brown or grey-brown; stipe often with blue tinges; cheilocystidia, if present, simple, basidioliform; clamp-connections present.

SPECIES.—*Entoloma leptonipes* (Kühn. & Romagn.) Moser; *R. parkensis* sensu Kühn.

11. **ENTOLOMA** subgenus **PARALEPTONIA** Romagn. ex Noordeloos, *subgen. nov.*

Rhodophyllus subgen. *Paraleptonia* Romagn., Rhodoph. Madag.: 43. 1941 (nom. nud, no Latin diagn.).—Holotype: *R. cancrinus* (Fr.) Quél.

Statura pleurotoidea vel collyboidea; pileus pallidus vel brunneus; sporae structura nominatur 'basal facet'; fibulae presentes vel absentes.

Habit pleurotoid or collybioid; pileus pale or brown; spores with basal facet; clamp-connections present or absent.

11.1 Section PARALEPTONIA

Pileus white, yellowish or pale pinkish brown; stipe white or very pale.

SPECIES.—*Entoloma cancrinum* (Fr.) Noordeloos.

11.2 **Entoloma** section **Sarcita** (Romagn.) Noordeloos, *comb. nov.*

Rhodophyllus section *Sarciti* Romagn., Rhodoph. Madag.: 43. 1941 (nom. nud., no Latin diagn).—*Rhodophyllus* section *Sarciti* Romagn. ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 327. 1974 (basionym).—Holotype: *E. sarcitum* (Fr.) Noordeloos.

Pileus and stipe dark brown.

SPECIES.—*Entoloma sarcitum* (Fr.)Noordeloos.

NEW COMBINATIONS USED IN THE TEXT OF THIS PAPER

Entoloma apiculatum (Fr.) Noordeloos, *comb. nov.*—*Agaricus apiculatus* Fr., Epicr.: 159. 1838 (basionym).
Entoloma cancrinum (Fr.) Noordeloos, *comb. nov.*—*Agaricus cancrinus* Fr., Epicr.: 150. 1838 (basionym).
Entoloma cocles (Fr.) Noordeloos, *comb. nov.*—*Agaricus cocles* Fr., Epicr.: 158. 1838 (basionym).
Entoloma lanicum (Romagn.) Noordeloos, *comb. nov.*—*Rhodophyllus lanicus* Romagn. *in* Rev. Mycol. **1**: 159. 1936 (basionym).

Entoloma nigrellum (Quél.) Noordeloos, *comb. nov.*—*Rhodophyllus nigrellus* Quél. *in* C. R. Ass. franc. Av. Sci. (Rouen, 1883) **12**: 499. 1884 (basionym).

Entoloma placidum (Fr.) Noordeloos, *comb. nov.*—*Agaricus placidus* Fr., Syst mycol. 1: 202. 1821 (basionym).

Entoloma rusticoides (Gill.) Noordeloos, *comb. nov.*—*Eccilia rusticoides* Gill., Hymenom. Fr.: 425. 1876 (basionym).

Entoloma sarcitum (Fr.) Noordeloos, *comb. nov.*—*Agaricus sarcitus* Fr., Epicr.: 155. 1838 (basionym).

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PERSOONIA
Published by the Rijksherbarium, Leiden
Volume 11, Part 2, pp. 153–256 (1981)

ENTOLOMA SUBGENERA ENTOLOMA AND ALLOCYBE IN THE NETHERLANDS AND ADJACENT REGIONS WITH A RECONNAISSANCE OF THEIR REMAINING TAXA IN EUROPE

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(With 51 Text-figures)

Entoloma subgenera *Entoloma* and *Allocybe* are revised on account of personal observations and studies on collections from various herbaria. The types of European taxa, as far as they could be recovered, have been examined. Observations on extralimital taxa are included. The infrageneric classification of Noordeloos (1981) is followed. 51 taxa are recognized, eight of which are new, viz. *Entoloma clypeatum* f. *pallido-griseum*, *E. clypeatum* f. *xanthophyllum*, *E. clypeatum* var. *defibulatum*; *E. leucocarpum*, *E. myrmecophilum* var. *atrogaleatum*; *E. gerriae*, *E. sericatum* f. *saliciphilum*, *E. turbidum* var. *pachylamellatum*. Ten new combinations are made, viz. *E. clypeatum* f. *hybridum*, *E. politum* f. *pernitrosum*, *E. alnobetulae*, *E. alpicola*, *E. anthracinum*, *E. atrosericeum*, *E. brassicolens*, *E. chionoderma*, *E. eximium* and *E. subflexipes*. Keys, descriptions and plates are given for all species accepted. In an appendix insufficiently known taxa are enumerated and shortly discussed.

CONTENTS

INTRODUCTION

Fries (1838) erected tribus *Entoloma* to accomodate the pink-spored agarics with a tricholomatoid habit. The concept of this taxon was generally accepted by later mycologists, though on different taxonomic levels: as a subgenus of *Agaricus by* Rabenhorst (1844: 508), as a subgenus of *Rhodophyllus* by Quélet (1886: 57) and Romagnesi (1974a: 332, 1978: 66) or as a genus in its own right by Kummer (1871: 23) and many later mycologists.

In the present paper, *Entoloma* is considered a subgenus of the genus *Entoloma* emend. Donk (1948), in a narrow, emended concept (Noordeloos, 1981a: 136). This concept differs from that of Romagnesi (1974a & 1978, l.c.) in the exclusion of section *Excentrici*, which is accommodated in a subgenus of its own, viz. Subgenus *Allocybe*.

MATERIAL, METHODS AND PRESENTATION

Most species have been studied in fresh as well as in dried condition. Macroscopic descriptions are based on personal observations on fresh material, completed by notes provided by others, many of them are supplied by Dr. C. Bas, Dr. R. A. Maas Geesteranus, Dr. E. Kits v. Waveren and Mr. P. B. Jansen. Unless otherwise stated the colours of fresh specimens are compared with Munsell Soil Colour Charts, Baltimore.

Microscopical structures were observed and measured in water (fresh carpophores) or in a 10% ammonia solution or in ammoniac 1% Congo Red solution (dried specimens), usually under oilimmersion.

Spores, basidia and cystidia were observed and measured in squash preparations of minute parts of the lamellae. Hymenophoral trama has been examined in transversal sections as well as in squash preparations. The pileipellis has been studied on radial sections, using a standarised method, viz. one section from the middle of the pileal radius and one from the centre of the pileus. Pigments were studied on fresh material in radial sections of the pileus, mounted in a saturated saltsolution (NaCl) to obtain plasmolysis, and on dried material on sections after boiling in ammonia or KOH.

Drawings were made with the aid of a drawing prisma. The magnification of the figures are: carpophores, natural size; spores, × 1000; all other microscopical details, × 670.

Unless otherwise stated all material is kept at the Rijksherbarium, Leiden (L).

ACKNOWLEDGEMENTS

I am deeply indepted to Dr. C. Bas for his guidance and encouragement during my studies in *Entoloma*, which resulted in the present paper. Sincere thanks are due to Prof. H. Romagnesi, Paris, for generously making available his rich herbarium and notes, and for the instructive discussions we had during my stays in Paris. Prof. Dr. R. Kühner, Lyon; Prof. Dr. M. Moser, Innsbruck; Dr. E. Kits v. Waveren, Amsterdam; Dr. F. Tjallingii and Mrs. G. J. M. G. Tjallingii-Beukers, Wageningen, and Mr. P. B. Jansen, Breda, are gratefully thanked for making available important herbarium collections. Many members of the Netherlands' Mycological Society

(N.M.V.) supplied me with fresh and dried material, for which I am very much indebted. Without their help this revision would have been far less complete. Grateful acknowledgements are made to the directors of the following herbaria for the loan of material: Nationale Plantentuin van België, Meise (BR); Botanical Museum and Herbarium, Copenhagen (C); Royal Botanic Gardens, Edinburgh (E); Conservatoire et Jardin Botanique, Genève (G); Botanical Museum, Helsinki (H); Royal Botanic Gardens, Kew (K); Botanische Staatssammlung, München (M); Laboratoire de Cryptogamie, Museum d'Histoire Naturelle, Paris (PC); National Museum, Praque (PRM); Botanical Museum, Stockholm (S); Institute for Systematic Botany, Uppsala (UPS), and the Herbarium of the Biological Station Dr. W. Beyerinck, Wijster (WBS). I am indebted to the directors of the following institutions for providing working facilities: The Herbarium Royal Botanic Gardens, Kew; Botanical Institute, Copenhagen; Laboratoire de Cryptogamie, Paris; Botanische Staatssammlung, München; Botanical Museum, Oslo, and Botanical Museum, Stockholm. Special help was received from Prof. Dr. J. J. Barkman and Eef Arnolds, Wijster; Mr. H. Knudsen, Copenhagen; Prof. Dr. H. Hertel and Mr. A. Einhellinger, München; Dr. R. Watling, Edinburgh; Mme. Dr. J. Perreau, Paris; Dr. D. N. Pegler, Kew; Konservator A. E. Torkelsen and Konservator G. Gulden, Oslo; Dr. Z. Pouzar, Prague. I owe many thanks to Dr. R. A. Maas Geesteranus, Oegstgeest, for correcting the Latin diagnoses. Ruth van Crevel, Leiden is gratefully thanked for the artistic way she arranged the plates and prepared them for printing. Eva van Santen kindly corrected the English text, for which I am very grateful. Hanneke de Wolf and Zonaida Hoek are gratefully thanked for typing out the manuscript.

SYNOPTICAL KEY TO THE SPECIES OF SUBGENUS ENTOLOMA

(numbers refer to those in the Synopsis, table 1, p. 158; numbers in brackets means: character present or not).

Pileus
  colour
    when moist brilliantly white or very pale, greyish or yellowish: (6), (7), 11, (12), (13), (16), (17).
    with blue or blue-violaceous tinges: 3, 4.
    with greenish tinges: 48.
  surface
    not hygrophanous, not or hardly striate when moist: 1, 2, 3, (4), 5, 11, 12, 13, (41), 42, 43, (48).
  shape
    with depressed centre or umblicate: (14), (22), (27), (28), 29, 30, 31, (34), (35), (36), (37), (41).
Lamellae
  colour
    with distinct yellow tinge, at least when young: 2, 7.
    with slight green tinge: 48.
    distinctly brown or grey, sometimes with only slight pink tinge: (22), (29), 37, 39, 40, 46, 47.
    thickish: 33.
Stipe
  colour
    yellow: 7, 34.
    greenish: 48.
    violaceous: 36.
  surface
    smooth, as if polished, not striate: 27, 28, 29, 30, 47.
Smell
  aromatic, like toffee, cumarine: (33).
  fetid, like rotten cabbage or *Allium ursinum:* 41.
  nitrous, like chlorine: 14, (23), (24), (27), 28.
Basidia
  In majority 2-spored: 30.
    clampless: 9, 31.
Cheilocystidia
  present: 17.
Pigment
  encrusting at least the narrowest hyphae of pileipellis and pileitrama, often in addition intracellular pigment present: 20, 21, 22, 23, 24, 25, 26, 40, 47.
Fruiting period
  exclusively vernal: 5, 6, 7, 8, 9, 10, 11, 12, 13.

TAXONOMIC PART

ENTOLOMA (Fr.) Kumm. *emend.* Donk subgenus ENTOLOMA

Agaricus trib. *Entoloma* Fr., Epicr.: 143. 1838. — *Agaricus* subgenus *Entoloma* (Fr.) Rabenh., Deutschl. Kryptog Fl. **1**: 508. 1844. — *Entoloma* (Fr.) Kumm., Führ. Pilzk.: 23. 1871. — *Rhodophyllus* subgenus *Entoloma* (Fr.) Quél., Enchir.: 57. 1886. — *Hyporrhodius* subgenus *Entoloma* (Fr.) Schroet. *in* Cohn, KryptogFl. Schles. **3** (1): 616. 1889. — Lectotype (Donk, 1962: 95): *Agaricus prunuloides* Fr.

Agaricus trib. *Eccilia* Fr., Syst. mycol. **1**: 10. 1921. — *Agaricus* subgenus *Eccilia* (Fr.) Loud., Encyl. Pl.: 998. 1829. — *Eccilia* (Fr.) Kumm., Führ. Pilzk.: 23. 1871. — *Rhodophyllus* subgenus *Eccilia* (Fr.) Quél., Enchir.: 62. 1886. — *Hyporrhodius* subgenus *Eccilia* (Fr.) Schroet. *in* Cohn, KryptogFl. Schles. **3** (1): 613. 1889. — Lectotype (Donk, 1949: 158): *Agaricus politus* Pers. ex Fr.

Rhodophyllus subgenus *Romagnesia* Singer *in* Annls mycol. **41**: 13. 1943. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

Carpophores usually tricholomatoid, rarely collybioid or clitocyboid, mycenoid or omphalioid; pileus usually conico-convex with or without broad umbo, more rarely flattened, cup-shaped or with central depression, hygrophanous or not, smooth or radially fibrillose, never fibrillose-squamulose; lamellae usually deeply emarginate or adnate, rarely adnate-subdecurrent; stipe usually fibrillous-aeriferously striate lengthwise, rarely smooth and polished; spores often more or less isodiametrical, with basal facet or blunt dihedral base; pileipellis a cutis or ixocutis of cylindrical hyphae, sometimes with ascending, clavate terminal cells, frequently with gelatinised walls. Pigment usually intracellular, rarely membranal or encrusting. Hymenophoral trama and pileitrama regular, made up of chains of relatively short (on the average 40–150 μm long) cylindrical or inflated cells (cf. chains of sausages); clamp-connections usually present and numerous in all tissues.

KEY TO THE SECTIONS AND SUBSECTIONS OF SUBGENUS ENTOLOMA

1a. Pileus weakly to strongly hygrophanous, often translucently striate, at least at the margin . . 2
b. Pileus not hygrophanous; margin usually not striate 7
2a. Vernal species, often associated with rosaceous trees and shrubs; pileipellis an ixocutis, often very strongly gelatinised, with intracellular pigment. . . . . Section *Nolanidea*, p. 166
b. Not vernal; pileipellis a cutis, more rarely an ixocutis; pigment intracellular or encrusting . . 3
3a. Spores small, 6–8 × 5–7 μm, rather thin-walled, subglobular-multiangled in outline, slightly cyanophilous; pigment exclusively intracellular . . . . . Section *Turfosa*, p. 219
b. Spores usually distinctly larger and with more or less thickened, never cyanophilous walls . . 4
4a. Clamp-connections absent; carpophores clitocyboid; pileus convex with depressed to umbilicate centre, coarsely radially fibrillose; stipe short, striate. . . . . Section *Clitopiloides*, p. 217
b. Clamp-connections present; carpophores tricholomatoid, collybioid, omphalioid or mycenoid 5
5a. Carpophores omphalioid or more rarely collybioid, pileus often with depressed to umbilicate centre; stipe smooth, as if polished, not striate; pigment exclusively intracellular . Section *Polita*, p. 209
b. Carpophores usually tricholomatoid; pileus usually with broad umbo, rarely with depressed centre, but then stipe very distinctly striate lengthwise; pigment intracellular, membranal or encrusting, or often combinations of pigmentation types present 6
6a. Pigment predominantly intracellular, often pale and diffuse . . . Subsection *Rhodopolia*, p. 183
b. Pigment predominantly membranal-encrusting, often with additional intracellular pigment. Subsection *Typodochroa*, p. 194
7a. Vernal species, often associated with rosaceous plants; margin of pileus sometimes striate. Section *Nolanidea*, p. 166
b. Not vernal; margin of pileus never striate . . . . . Section *Entoloma*, p. 158

SYNOPTICAL KEY TO THE SPECIES OF SUBGENUS ENTOLOMA

(numbers refer to those in the Synopsis, table 1, p. 158; numbers in brackets means: character present or not).

Pileus
  colour
    when moist brilliantly white or very pale, greyish or yellowish: (6), (7), 11, (12), (13), (16), (17).
    with blue or blue-violaceous tinges: 3, 4.
    with greenish tinges: 48.
  surface
    not hygrophanous, not or hardly striate when moist: 1, 2, 3, (4), 5, 11, 12, 13, (41), 42, 43, (48).
  shape
    with depressed centre or umblicate: (14), (22), (27), (28), 29, 30, 31, (34), (35), (36), (37), (41).
Lamellae
  colour
    with distinct yellow tinge, at least when young: 2, 7.
    with slight green tinge: 48.
    distinctly brown or grey, sometimes with only slight pink tinge: (22), (29), 37, 39, 40, 46, 47.
    thickish: 33.
Stipe
  colour
    yellow: 7, 34.
    greenish: 48.
    violaceous: 36.
  surface
    smooth, as if polished, not striate: 27, 28, 29, 30, 47.
Smell
  aromatic, like toffee, cumarine: (33).
  fetid, like rotten cabbage or *Allium ursinum:* 41.
  nitrous, like chlorine: 14, (23), (24), (27), 28.
Basidia
  In majority 2-spored: 30.
    clampless: 9, 31.
Cheilocystidia
  present: 17.
Pigment
  encrusting at least the narrowest hyphae of pileipellis and pileitrama, often in addition intracellular pigment present: 20, 21, 22, 23, 24, 25, 26, 40, 47.
Fruiting period
  exclusively vernal: 5, 6, 7, 8, 9, 10, 11, 12, 13.

TABLE 1

Synopsis of the taxa of *Entoloma* subgenus *Entoloma* treated in the present work

ENTOLOMA SECT. ENTOLOMA

Agaricus tribus *Entoloma* sect. *Genuini* Fr., Epicr.: 143. 1838. — *Entoloma* sect. *Genuini* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, **5**: 116. 1872. — *Rhodophyllus* sect. *Genuini* (Fr.) Quél., Enchir.: 57. 1838. — Lectotype (Donk 1962: 95): *Agaricus prunuloides* Fr.

Rhodophyllus sect. *Nitidi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 326. 1937. — Lectotype (design. mihi): *Rhodophyllus nitidus* (Quél.) Quél.

Rhodophyllus sect. *Madidi* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *Rhodophyllus madidus* (Fr.) Quél.

CHARACTERISTICS.—Carpophores usually robust and tricholomatoid; pileus not hygrophanous, non-striate; spores (sub-) isodiametrical; pileipellis an ixocutis made up of cylindrical hyphae with distinctly gelatinized walls, with intracellular pigment; appearing in late summer and autumn.

KEY TO THE SPECIES OF SECTION ENTOLOMA

1a. Pileus and stipe with blue or green tinges 2
b. Pileus and stipe without blue and/or green tinges 4
2a. Pileus, stipe and lamellae with distinct green tinges, in woodlands (?) . . . . *E. viridans*, p. 235
b. Pileus and stipe with blue tinges 3
3a. Habit thick-set, typically tricholomatoid; length of stipe usually not exceeding diameter of pileus; in grasslands. . . . . *E. madidum*, p. 161
b. Habit more slenderly tricholomatoid, sometimes almost mycenoid, length of stipe usually 2–3 times diameter of pileus, in damp coniferous forests, rarely in frondose forests. . . . *E. nitidum*, p. 164
3a. Lamellae when young with yellow tinge, often still visible at the margin of the pileus of old specimens; spores subisodiametrical, 8–11.5 μm long, Q ≥ 1.2 on the average per collection; in frondose forests on rich soils. . . . . *E. lividum*, p. 159
b. Lamellae without yellow tinges 4
4a. Spores 8–11 × 6.5–8(–9) μm, Q ≥ 1.2 on the average per collection, in frondose forests in lowlands. *E. sinuatum*, p. 160
b. Spores 6–8(–8.5) × 6.5–8 μm, Q = 1.05–1.1 on the average per collection; in grasslands in mountanous and boreal habitats . . . . . *E. prunuloides*, p. 231

1. ENTOLOMA LIVIDUM (Bull. ex St.-Am.) Quél.
Figs. 1a–c

Agaricus lividus Bull., Herb. Fr., pl. 382. 1787. — *Agaricus lividus* Bull. ex St.-Am., Fl. agénaise: 580. 1821. — *Entoloma lividum* (Bull. ex St.-Am.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, **5**: 116. 1872. — *Rhodophyllus lividus* (Bull. ex St.-Am.) Schroet. *in* Cohn, KryptogFl. Schles. **3** (1): 617. 1889.

SELECTED ICONES AND DESCRIPTIONS.—Cetto, Funghi Vero **1**: 237. 1975. — Dähnke & Dähnke, 700 Pilze: 256. 1979. — Fries, Icon. sel. fung., pl. 90 fig. 3. 1867. — Gillet, Hymen. Fr.: 401, pl. 271. 1874. — Lange, J., Fl. agar. dan. **2**: pl. 74 C. 1936. — Marchand, Champ. Nord & Midi **1**: pl. 26. 1971. — Richon & Roze, Atlas Champ. Com. Vén.: 90, pl. 35. 1888. — Ricken, Blätterpilze: 284. 1913. — Romagnesi, Nouv. Atl. Champ. **1**: pl. 76. 1956.

CHARACTERISTICS.—Carpophores very robust; pileus up to 210 mm broad, ivory grey, leather brown or greyish brown; lamellae tinged yellow, particularly when young; stipe white in upper part, downwards (sub-)concolorous with pileus; spores 8.0–10.4(–11.5) × 6.8–9.3 μm, Q = 1.15–1.2 on the average per collection.

Pileus up to 210 mm broad, conico-convex or convex then expanding, often irregularly flattened with broad umbo, with lobed and undulating marginal zone, with involute margin, not hygrophanous, not striate, pale grey-brown, greyish-ochraceous or yellowish brown (2.5 Y 7/4, 10 YR 8/3, 7/3, 7/4, 6/3, 6/2), smooth and glabrous on limb, particularly at centre with micaceous patches alternating with arachnoid-fluffy spots, often becoming radially fibrillose or rimose, sometimes splitting up radially and showing pileal trama in-between, even appearing pseudo-squamulose in exposed pilei. Lamellae L = 70–100, l = 1–3, crowded, adnate or emarginate, segmentiform, rarely ventricose, yellowish when young then salmon pink to reddish brown, often retaining yellow colour near margin of pileus (2.5 Y 8/3, 10 YR 8/3, 7.5 YR 8/3, 8/6, 7/4), sometimes veined, with entire or coarsely serrulate, concolorous edge. Stipe 40–140 × 7–32 mm, cylindrical, often flexuose, tapering or broadening towards base, solid, rarely becoming fistulose with age, upper part (almost) white downwards concolorous with pileus, innately to, sometimes, coarsely fibrillose, at apex sometimes pruinose, downwards glabrous. Flesh white, rather firm, in pileus resisting the knife. Smell strong, often somewhat acidulous-nauseating, farinaceous or like

that of cucumber or raphanoid with faint component of burnt sugar (like that of *Hebeloma sacchariolens*). Taste nasty and rancid-raphanoid.

Spores 8.0–10.4(–11.5) × 6.8–9.3 μm, Q = (1.0–)1.05–1.2–1.3, L:D = (0–)0.6–1.5–2 μm, 6-angled in side-view. Basidia 35–58 × 10–16 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 45–170(–250) × 8–35 μm. Pileipellis a thin cutis or ixocutis or 2–5 μm wide cylindrical hyphae with strongly gelatinised walls, with pale brown intracellular pigment, subpellis weakly to distinctly developed, made up of inflated cells, 47–90(–120) × 12–32 μm with pale brown intracellular pigment. Pileitrama regular in limb, at centre of pileus more or less interwoven and very compact, pseudoparenchymatical, made up of short, inflated cells, up to 120 μm long, 8–35 μm wide. Vascular hyphae numerous in trama of certain specimens. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—In frondose forests, in the Netherlands on heavy, clayey soils along the great rivers, rare. Widespread (own observations and lit.) in entire Europe, northwards reaching southern Scandinavia. Sept.–Dec.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Gelderland: Doetinchem, Hallesche weg, Sept. 1935, *A. S. C. Schweers;* Buren, loam-pits, 1 Dec. 1968, *F. Tjallingii;* prov. Utrecht, Driebergen, Werkhoven, 12 Oct. 1978, *J. Schreurs.*

BELGIUM, prov. Namur, Ave-et-Auffe, Le Roptai, 9 Sept. 1975, *C. Bas 6618;* idem, 3 Oct. 1977, *M. E. Noordeloos 501.* — GERMAN FEDERAL REPUBLIC: Bentheim, Samelrot-forest, 25 Sept. 1977, *P. B. Jansen.* — FRANCE, Dept. Seine & Oise, Luzarches, 8 Sept. 1948, *H. Romagnesi 48.359* (herb. Romagn., PC); Forêt de Carnelle, 18 Sept. 1977, *M. E. Noordeloos 451;* Forêt de Marly, 18 Sept. 1977, *M. E. Noordeloos 453.*

Entoloma lividum is easily recognized by its robust habit, the non-hygrophanous pileus with micaceous spots and by the yellowish lamellae. *Entoloma clypeatum* forma *xanthophyllum* differs in its smooth, distinctly hygrophanous pileus without micaceous spots, the habitat and its strictly vernal occurrence.

Entoloma sinuatum has often been considered to be a synonym of *E. lividum*, particularly by the authors influenced by Quélet. Romagnesi (1978: 105–107) described, however, a find of an *Entoloma* which resembles very much our concept of *E. lividum*, but which differs in some important characters such as the colour of the pileus and lamellae and the smell. Dr. F. Tjallingii found one specimen of an *Entoloma* at Hemmen, Netherlands, that agrees very well with Romagnesi's concept of what he considers to be the true *E. sinuatum*. The Netherlands' find is described below.

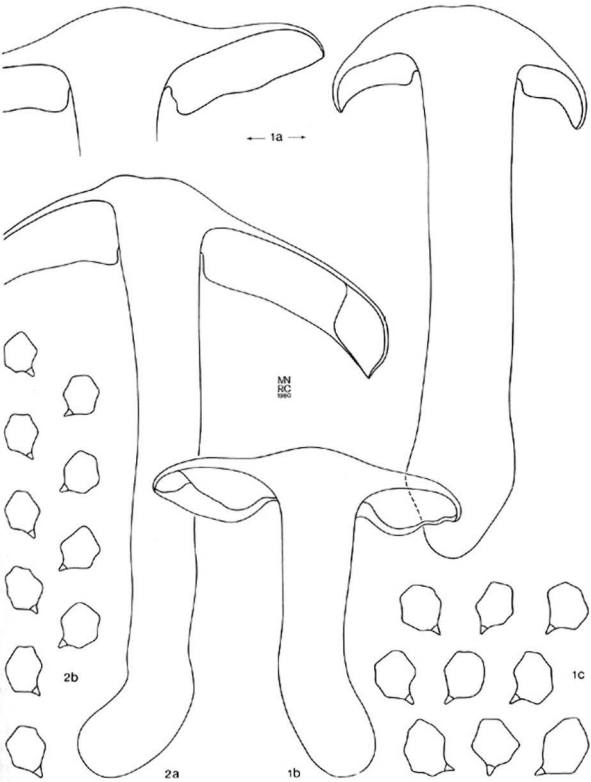
Entoloma prunuloides is also closely related to *E. lividum*. Its main differences are the slightly smaller dimensions of the carpophore, the lack of yellow in the lamellae, the habitat and the distinctly smaller, more isodiametrical spores. *Entoloma prunuloides* seems to occur mainly in mountainous and boreal habitats and has not been found yet in the Netherlands.

Pale-coloured taxa in section *Nolanidea*, viz. *E. clypeatum* f. *pallidogriseum*, *E. saundersii* and *E. sepium* differ from *E. lividum* among other things in the strictly vernal appearance and the habitat.

2. ENTOLOMA SINUATUM (Bull. ex Fr.) Kumm.—Figs. 2a–e

Agaricus sinuatus Bull., Herb. Fr., pl. 579 fig. 1. 1793. — *Agaricus sinuatus* Bull. ex Fr., Syst. mycol. **1**: 197. 1821. — *Entoloma sinuatum* (Bull. ex Fr.) Kumm., Führ. Pilzk.: 98. 1871. — *Rhodophyllus sinuatus* (Bull. ex Fr.) Quél., Fl. mycol. Fr.: 179. 1888.

SELECTED ICONES & DESCRIPTIONS.—Bull., Herb. Fr., pl. 547 fig. 1. 1791 (as *A. phonospermus*). — Cooke, Ill. Br. Fungi, pl. 316(310). 1884.—Romagnesi *in* Bull. Soc. mycol. Fr. **94**: 106–107, fig. 2. 1978.



Figs. 1a–c. *Entoloma lividum*. — Habit and spores (1a from *Jansen*, 25 Sept. 1977; 1b–c from *Schreurs*, 12 Oct. 1978).

Figs. 2a–b. *Entoloma sinuatum*. — Habit and spores (all figs. from *Tjallingii*, 20 Aug. 1966).

CHARACTERISTICS.—Carpophores robust; pileus up to 100 mm broad, pallid ochraceous or pallid grey; lamellae white then flesh pink; stipe 115 × 15 mm, whitish above, brownish below; smell farinaceous; spores (8.1–)8.7–10.4 × 7.6–8.1(–9.7) μm, Q = 1.2 on the average per collection; in frondose woods on clayey or loamy soil.

Pileus 100 mm broad, irregularly conico-convex with blunt umbo, with involute margin, non-hygrophanous, non-striate, pallid ochraceous with very pale grey spots, somewhat greasy/viscid when moist, minutely fibrillose-subfelted at margin. Lamellae rather crowded, somewhat thickish, adnexed-adnate, segmentiform up to 15 mm broad, flesh colour with slight brown tinge, with entire or serrulate concolorous edge. Stipe 115 × 15 mm, cylindrical, slightly tapering downwards, upper half white, more brownish towards base, with brownish cream fibrillose striation, with scattered short erect fibrils all over. Flesh creamy white, not really firm but with fibrous inner part, particularly in stipe (Romagnesi, l.c.: 'moelleux'). Smell somewhat alkaline-farinaceous. Taste not noted.

Spores (8.1–)8.7–10.4 × 7.6–8.1(–9.7) μm, Q = 1.05–1.2–1.3, L–D = 0.6–1.4–2.3 μm, 5–6-angled in side-view. Basidia 28–43 × 8–15 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 27–80 × 12–25 μm. Pileipellis a thin ixocutis of 2.5–5 μm wide hyphae with gelatinised walls, without any visible pigment. Pileitrama interwoven in centre of pileus, more regularly in limb, very compact, made up of cylindrical up to 17 μm wide hyphae, mixed up with inflated cells, 45–95(–110) × 14–28 μm, in upper layers some pale intracellular pigment observed. Vascular hyphae scarce. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—The Netherlands' collection was made in a frondose forest on clayey soil with dense undergrowth of *Symphoricarpus rivularis* (a garden-escape). The locality of the only French collection is unknown. Judging from Cooke's plate *E. sinuatum* occurs in Great Britain as well. June–Aug.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Gelderland, Hemmen, 20 Aug. 1966, *F. Tjallingii*.

FRANCE, loc. & coll. unknown (Paris-region?), 20 June 1977 (herb. Romagn., PC).

As is pointed out above in the discussion under *E. lividum*, *E. sinuatum* is very closely related to the former species, but seems to differ in the lack of yellow in the lamellae, the slightly paler pileus, the far less firm flesh of the stipe and, according to the notes on the French collection, also in the smell. As there are only two collections, (the Netherlands' collection consists of one old fruit-body) more information is needed for a more definite conclusion on the existence of a true *E. sinuatum*, different from *E. lividum*.

Entoloma prunuloides differs from *E. sinuatum* as described above in smaller, more isodiametrical spores, in the habit, and the habitat.

3. ENTOLOMA MADIDUM (Fr.) Gill.—Figs. 3a–c

Agaricus madidus Fr., Spicilegium: 6. 1836. — *Entoloma madidum* (Fr.) Gill., Hyménom. Fr.: 399. 1874. — *Rhodophyllus madidus* (Fr.) Quél., Enchir.: 58. 1886.

? Entoloma madidum f. *farinosum* Largent *in* Madroño **22**: 366. 1974.

Agaricus bloxami Berk. & Br. in Ann. Mag. nat. Hist., Sér. II, **8**: 399. 1854. — *Entoloma bloxami* (Berk. & Br.) Sacc., Sylloge **5**: 684. 1887. — *Entoloma madidum* var. *bloxami* (Berk. & Br.) Largent *in* Madroño **22**: 368. 1974.

SELECTED ICONES & DESCRIPTIONS.—Bres., Iconogr. mycol. **11**: pl. 548 fig. 1. 1929. — Cetto, Funghi Vero **1**: 249, pl. 96. 1975 (as *E. bloxami*). — Christiansen *in* Friesia **9**: 310–311, fig. 5. 1970. — Einhellinger *in* Ber. Bayer. bot. Ges. **41**: 106. 1969. — Fries, Icon. sel. Fung.: pl. 91 fig. 3. 1867. — Konr. & Maubl., Icon. sel. Fung. **2**: pl.

188. 1932. — Konrad *in* Bull. Soc. mycol. Fr. **39**: 34–35. 1923 (as *E. bloxami*). — Massee *in* Grevillea **22**: 79. 1892. — Largent *in* Madroño **22**: 366–368. 1974. — Lange, J. *in* Dansk bot. Ark. **2** (11): 29. 1921.

CHARACTERISTICS.—Habit tricholomatoid; pileus and stipe dark blue, fading with age, often turning brown, particularly at centre of pileus; length of stipe almost the same as the diameter of the pileus; spores (7.0–)7.5–8.7 × 6.5–8.1 μm; in grasslands.

Pileus 33–67 mm broad, convex with weak, broad umbo, with slightly involute margin when young, later straight, thickfleshed, non-hygrophanous, at first greyish blue (Meth. 22E3, 23E3) later more grey-violaceous (10E2, 9E3), becoming more brownish with age, particularly at centre of pileus, when fresh sometimes with whitish pruinose surface, dry or subviscid when old, sometimes rather coarsely radially fibrillose, particularly at margin. Lamellae L = about 140, l = 0–1(–3), crowded, free, narrowly ventricose, pale then salmon or flesh-coloured, with entire, concolorous edge. Stipe 40–65 × 19–21 (apex) × 6–13 (middle) mm, distinctly tapering downwards, steel-blue or greyish blue-violaceous, whitish or yellow at base, fibrillosely striate lengthwise. Flesh in pileus up to 13 mm thick, firm, greyish under surface, inner parts white. Smell and taste variable, indistinct to strongly farinaceous.

Spores (7.0–)7.5–8.7 × 6.5–8.1 μm, Q = 1.0–1.1–1.15(–1.2), L–D = 0–0.6–1.5 μm, subglobose-isodiametrical, 5–7(–8)-angled in side-view. Basidia 22–39 × 6.5–12 μm. Cystidia none. Hymenophoral trama regular, made up of cylindrical cells, 45–120(–150) × 4–18 μm. Pileipellis a thin ixocutis of 2.5–4 μm wide cylindrical hyphae with gelatinised walls with bluish intracellular pigment; subpellis well developed, about 100–120 μm thick, made up of short cylindrical cells, 25–60 × 12–25 μm. Pileitrama regular, made up of cylindrical to inflated cells. 70–120 × 6–18 μm, with bluish brown intracellular pigment in upper layers only. Vascular hyphae present. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In grasslands; in the Netherlands found in poorly manured grassland on clay along the river Rhine and in *Juniperus communis*-dominated heath. According to the literature widespread in entire North-Western Europe. Sept.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Rijssen-Markelo, 14 Nov. 1975, *B. de Vries 3208* (WBS); prov. Gelderland, Wageningen, Binnenveld, 22 Oct. 1955, *P. J. C. Kuiper*. GREAT BRITAIN, Warwickshire, Twycross, Nov. 1851, *A. Bloxam* (holotype of *Agaricus bloxami*, K). — FRANCE, dept. Doubs, Lougres, 13 Sept. 1955, *H. S. C. Huysman*.

Notes on the type of *Agaricus bloxami* Berk. & Br.:

The holotype consists of 4 longitudinal sections of one (or more) fruit-bodies and a drawing, glued on a piece of paper. The state of the material is too bad for a critical evaluation of the tissues. Only the spores could be measured: 6.5–8.5 × 6.5–8.0 μm, 5–8-angled in side-view, isodiametrical.

The description of Berkeley & Broome and the size and shape of the spores are sufficient evidence to reduce *Agaricus bloxami* to the synonymy of *A. madidus* Fr.

Largent (1974b: 366–368) distinguished *A. bloxami* as a variety of *E. madidum* on account of a supposed difference in spore-size, viz. 8–10 μm long in var. *bloxami* against 6.5–8 μm long in var. *madidum*. This is not supported by the type-study.

Fries (1836: 6) described *A. madidus* with a strong, pungent smell like that of *Russula foetida*. Later authors record various smells, such as weakly to distinctly farinaceous, spermatical (Einhellinger, l.c.) or faintly carbolic (Christiansen, l.c.). Only the latter smell comes near that mentioned in the original description of Fries. For this reason Largent (1974b, l.c.) described a new forma, viz. f. *farinaceum* to distinguish the current concept of *E. madidum* from the original of Fries. I hesitate to follow this proposal, as smell often is a precarious criterion to distinguish taxa, and furthermore because a form of E. *madidum* with fetid smell never has been recorded after Fries's.

4. ENTOLOMA NITIDUM Quél.—Figs. 4a–c

Entoloma nitidum Quél. *in* C. R. Ass. franc. Av. Sci. **11**: 391. 1882. — *Rhodophyllus nitidus* (Quél.) Quél., Enchir. 58. 1886.

Entoloma haastii Stevenson in Kew Bull. **16**: 224. 1962.

MISAPPLIED NAME. — *Agaricus ardosiacus* Bull. sensu Fr., Icon. sel.: pl. 94 fig. 4 1867, Cooke, non Fr. 1821 nec Ricken, Bres.

SELECTED ICONES AND DESCRIPTIONS.—Cetto, Funghi Vero **3**: 981. 1979. — Dähnke & Dähnke, 700 Pilze: 248. 1978. — Lange, J., Fl. agar. dan. **2**: pl. 74A. 1936. — Horak *in* Beih. Nova Hedwigia **43**: 26. 1973 (as *E. haastii*). — Horak *in* Sydowia **30**: 55. 1978 '1977' (as *E. haastii*). — Horak *in* Beih. Nova Hedwigia **65**: 276. 1980. — Ricken, Blätterpilze: 282. 1913. — Romagn. & Favre *in* Rev. Mycol. **3**: 73–75, f. 9, pl. 2 fig. 3, 4. 1938. — Schaeff. J. *in* Ber. Bayer. bot. Ges. **27**: 222. 1947.

CHARACTERISTICS.—Carpophores slenderly tricholomatoid to almost mycenoid; pileus conical at first then convex, always with broad, often conical umbo, dark blue-grey; stipe concolorous with pileus or slightly paler, cylindrical but always with attenuated, almost rooting, whitish or yellowish base, in forests.

Pileus (20–)26–40(–45) mm broad, conical then campanulate finally convex with broad, often conical umbo, with involute margin when young, non-hygrophanous, not translucently striate, dark greyish blue, often almost black at centre, only very slightly fading with age, (Meth. 22F(3–)2 to 23F1), strongly silky-shining, often fairly strongly radially fibrillose, smooth. Lamellae L = 28–32, l = 1–3(–7), almost free to narrowly adnate, ventricose, pale then pink, finally with slight brown tinge, with entire, concolorous edge. Stipe (30–)65–75(–85) × 2.5–5.0 mm, cylindrical with tapering, almost rooting base, concolorous with pileus or slightly paler, often whitish or yellowish at base, innately fibrillosely striate lengthwise, sometimes twisted. Flesh blue in cortex, inner parts white, more or less firm. Smell weak, slightly farinaceous or more raphanoid. Taste none.

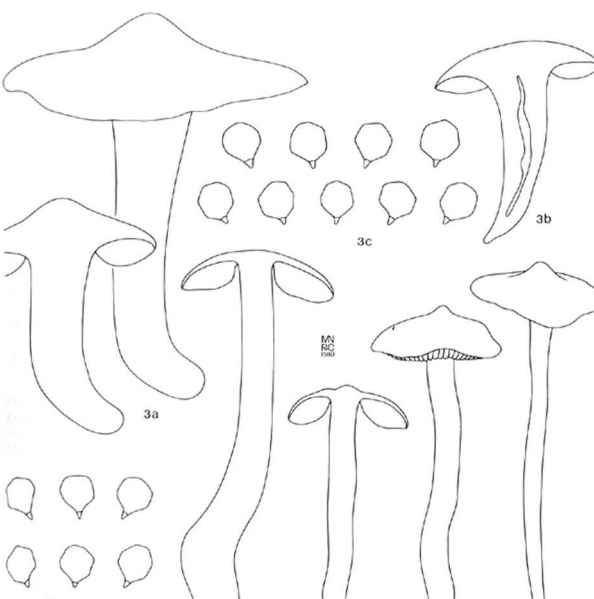
Spores (6.9–)6.5–8.7 × (5.8–)6.4–7.5(–8.1) µm, Q = 1.0–1.1–1.15, (–1.2), L–D = 0.0–0.6–1.2 µm, 6–8-angled in side-view, relatively thin-walled, subglobose with large, hyaline apiculus. Basidia 24–36(–43) × 7.5–12.5 µm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 36–95(–110) × 7–28 µm. Pileipellis a thin cutis of radially arranged, 2.5–6 µm wide, cylindrical hyphae with, abundant blue intracellular pigment; subpellis usually well differentiated, made up of swollen, inflated cells, 25–60(–78) × 20–35 µm, with blue intracellular pigment. Pileitrama regular, made up of inflated cells in chains, 60–125(–149) × 12–27 µm. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In moist coniferous forests, rarely also in frondose forests, probably with a preference to richer soils, not very common but widespread in Western and Northern Europe, S. America and S. E. Asia (Horak, 1973: 26; 1978: 55; 1980: 276). Sept.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Vorden, Eikelenkamp, 11 Oct. 1947, *H. S. C. Huysman*; prov. Utrecht, Baarn, 16 Oct. 1938, *H. J. v. d. Laan*; prov. Noord-Brabant, Eindhoven, Eckart, 5 Oct. 1970, *F. Benjaminsen* and 29 Sept. 1973, *F. Benjaminsen*; prov. Limburg, Linne, 2 Sept. 1969, *J. Verschueren*.

SWEDEN, Uppland, Femsjö, 8 Sept. 1973, *H. S. C. Huysman*. — GERMAN FEDERAL REPUBLIC: Teutoburgerwald, Beller Holz, 4 Oct. 1976, *M. E. Noordeloos 202*; Bayern Wertheim N. of Augsburg, 2 Oct. 1962, *C. Bas 2762*. — AUSTRIA, St. Georgen am Attersee, 28 sept. 1962, *C. Bas 2715*.

Entoloma nitidum is a beautiful species, easily recognised by its slender habit, conical or umbonate pileus, slender, stipe with tapering base and in particular by its deep steel blue to blackish blue colour. It can be distinguished from the closely related *E. madidum* by the slender habit and also the habitat: *E. nitidum* always grows in forests, whereas *E. madidum* prefers grasslands. The latter species also has a tendendy to become paler and more brownish with age.



Figs. 3a–c. *Entoloma madidum*. — Habit and spores (3a, c from *de Vries*, 14 Nov. 1975; 3b from *Kuyper*, 22 Oct. 1955).

Figs. 4a–c. *Entoloma nitidum*. — Habit and spores (4a, c from *Noordeloos* 202; 4b from *Noordeloos* 1036).

Entoloma nitidum can be distinguished from other dark blue coloured species of *Entoloma* by its small, isodiametrical spores, simple pileipellis, viz. a cutis, macroscopically reflected by the smooth pileal surface, and also by the 'barrel'-shaped tramal elements and abundant clamp-connections, which place this species in subgenus *Entoloma*. Most other blue-coloured species of *Entoloma* belong to the subgenus *Leptonia* and are among other things characterized by a complex pileipellis, usually a trichoderm or pallissade/hymeniderm, and by the lack of clamp-connections.

I agree with Horak (1980: 276) in placing *E. haastii* in the synonymy of *E. nitidum* as there is a perfect resemblance in macroscopical and microscopical characters.

I had the opportunity to study also some collections of *E. nitidum* from Chile. These turned out to be completely identical with the European collections studied by me.

ENTOLOMA section NOLANIDEA (Fr.) Quél.

Agaricus subtribus *Nolanidei* Fr., Epicr.: 146. 1838. — *Entoloma* section *Nolanidea* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, **5**: 118. 1872. — *Rhodophyllus* section *Nolanidei* (Fr.) Quél., Enchir.: 59. 1886. — Lectotype (Singer 1951: 622): *E. clypeatum* (L. ex Fr.) Kumm.

Rhodophyllus section *Clypeati* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 326. 1937. — Lectotype (design. mihi): *R. clypeatus* (L. ex Fr.) Quél.

Rhodophyllus section *Apriles* Kühn. & Romagn., Fl. anal.: 196. 1953. (nom. nud.). — *Rhodophyllus* section *Apriles* (Kühn. & Romagn.) ex Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

Rhodophyllus subgenus *Romagnesia* Sing. *in* Ann. mycol. **41**: 13. 1943. — Holotype: *R. clypeatus* (L. ex Fr.) Quél.

EXCLUDED NAMES. — *Rhodophyllus* section *Nolanidei* sensu Romagnesi *in* Bull. mens. Soc. linn. Lyon. **43**: 332. 1974. — Lectotype (Romagn. 1974a: 332): *R. nidorosus* (Fr.) Quél.

Entoloma section *Nolanidei* sensu Largent *in* Mycologia 66: 999. 1974. — Lectotype (Largent 1974b: 999): *E. rhodopolium* (Fr.) Kumm.

CHARACTERISTICS. — Carpophores medium-sized to large, usually fleshy and with tricholomatoid habit; pileus white, pale greyish, yellowish or brownish to dark brown or sepia with grey or olivaceous tinges, usually distinctly, but sometimes weakly or hardly hygrophanous; lamellae adnate-emarginate, rarely subdecurrent; stipe usually firm and fleshy, white to grey or grey-brown; smell and taste farinaceous; spores isodiametrical to slightly elongate in outline, (5–)6 to polyangled in side-view; pileipellis a well-developed ixocutis; hyphal walls often distinctly gelatinized; pigmentation intracellular in pileipellis; in the white taxa absent; clamp-connections mostly present, exceptionally absent from hymenium; strictly vernal, often associated with either rosaccous trees and shrubs or with *Ulmus* spp., in large groups, often in fairy-rings. (January-) February to June.

KEY TO THE SPECIES OF SECTION NOLANIDEA

1a. Pileus moderately to rather dark grey-brown or sepia, sometimes with yellowish or ochraceous tinges, strongly hygrophanous; stipe white to grey 2
b. Pileus pale: greyish, yellowish, brownish or white; hygrophanous or not; stipe white or yellowish, rarely tinged with grey 5
2a. Flesh in apex of stipe guaiac-positive; pileal surface glabrous, satiny radially when dry; stipe fistulose; flesh brittle 3
b. Flesh in apex of stipe guaiac-negative; pileal surface especially at centre becoming aeriferous, felted and rugulose especially when dry, easily breaking up into crust-like patches; flesh firm 4
3a. Stipe fistulose already when young; flesh in pileus and stipe fairly brittle; pileus striate up to $\frac{1}{2}$ or $\frac{1}{3}$ of radius; in woods under *Ulmus* . . . . . *E. aprile*, p. 174
b. Stipe narrowly fistulose and flesh more firm, especially in pileus; when moist outermost margin of pileus striate or not, under various Rosaceae . . . . . *E. clypeatum* f. *hybridum*, p. 173
4a. Stipe white or tinged with grey or grey-brown, especially in middle part, weakly to distinctly, rarely coarsely striate; basidia clamped . . . . . *E. clypeatum* f. *clypeatum*, p. 167
b. Stipe rather dark grey-brown and coarsely striate lengthwise; basidia clampless
E. clypeatum var. *defibulatum*, p. 173

5a. Pileus brilliantly white, marbled with pink only when watersoaked; flesh white, not changing colour when bruised by insects, at most slowly turning yellowish . . . . . *E. niphoides*, p. 176
b. Pileus white only when young, later always distinctly pigmented: pale greyish, yellowish, brownish or ochraceous 6

6a. Pileus not hygrophanous, at least when young covered with a fugaceous veil in mature specimens often forming a characteristic pattern of silverish arachnoid patches on a grey or greybrown, smooth and shining background; spores large and rounded, 10.4–12.7(–14) × 10–12 µm, Q = 1.0–1.1; appearing very early in spring under *Ulmus*. . . . . *E. saundersii*, p. 178
b. Pileus weakly but distinctly hygrophanous, without veil; spores narrower and more heterodiametrical; under rosaceous plants 7

7a. Flesh in apex of stipe guaiac-negative; flesh white, not changing colour when bruised or in insect-holes etc. Pileal margin often distinctly striate when moist, under *Malus*, *Crataegus* etc. 8
b. Flesh in apex of stipe guaiac-positive, flesh white changing to reddish yellow in insect-holes or when otherwise bruised, pileus pale, often with a reddish yellow shade, frequent in dense copses of *Prunus spinosa* but also in orchards, gardens etc. under *Malus*, *Pyrus* and *Prunus*, rarely met with *Crataegus* *E. sepium*, p. 181

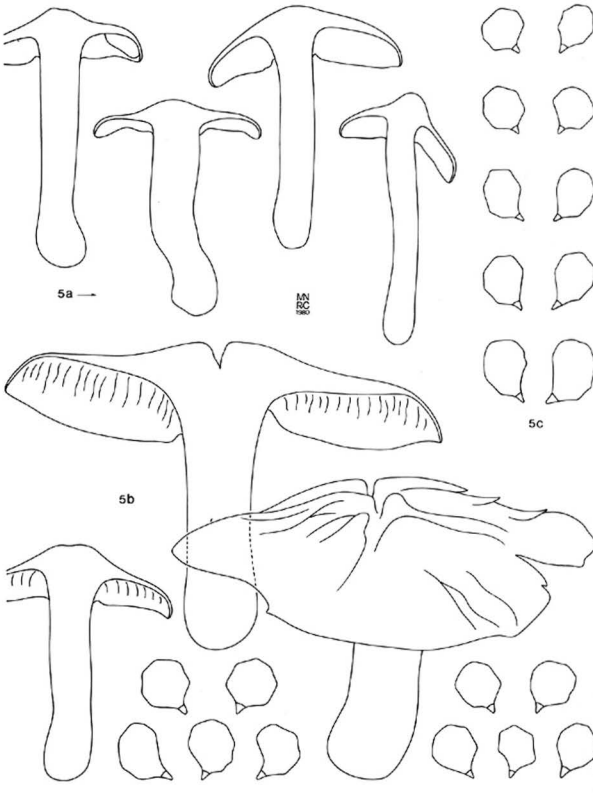
8a. Lamellae moderately crowded, thin, adnate-emarginate, pale grey or whitish then pink; stipe white to grey. . . . . *E. clypeatum* f. *pallidogriseum*, p. 171
b. Lamellae fairly distant, thickish, adnate-subdecurrent, yellow only late with pink shade; stipe white soon yellow as lamellae. . . . . *E. clypeatum* f. *xanthophyllum*, p. 172

5. ENTOLOMA CLYPEATUM (L. ex Fr.) Kumm.
f. CLYPEATUM—Figs. 5a–d

Agaricus clypeatus L., Syst. plant. **2**: 1174. 1753. — *Agaricus clypeatus* L. ex Fr., Epicr.: 146. 1838. — *Entoloma clypeatum* (L. ex Fr.) Kumm., Führ. Pilzk.: 98. 1871. — *Rhodophyllus clypeatus* (L. ex Fr.) Quél., Enchir.: 59. 1886. — *Hyporrhodius clypeatus* (L. ex Fr.) Schroet. *in* Cohn, KryptogFl.Schles.: 616. 1889.
Agaricus phonospermus Bull. ex Mérat, Nouvelle Flore Env. Paris, 2e Ed.: 76. 1821.
Agaricus fertilis Pers. ex Fr., Syst. mycol. **1**: 197. 1821. (pro parte).
SELECTED ICONES.—Romagnesi, H., Nouv. Atl. Champ. **1**: pl. 77b. 1956. — Cool, C. & v. d. Lek, H. A. A., Paddestbk., 3e Druk, **2**: 105 fig. 49. 1935. — Marchand, A., Champ. Nord & Midi **2**: pl. 119. 1973.

CHARACTERISTICS.—Carpophores in general robust with very firm flesh, dark-pigmented pileus and pale, white to grey, fibrillose striate, solid stipe. Gregarious often fasciculate under or near rosaceous trees and shrubs.

Pileus (20–)35–90(–120) mm broad, conical to conico-convex then expanding to plano-convex, rarely plano-concave with weak to pronounced conical umbo, with margin involute and expanding only in late stages, with marginal zone irregularly undulating and/or splitting with age, hygrophanous, when moist rather dark sepia, grey-brown sometimes with yellow of olivaceous tinge (10 YR 4/2, 4/3, 3/3 also 10 YR 5/2, 5/3) slightly paler towards margin, outermost margin obscurely translucently striate or not, dry or slightly greasy to touch, never viscid, (coarsely) innately radially fibrillose, sometimes rimulose, drying with radial streaks and/or irregular spots or more or less regularly centrifugal towards a pale grey-brown (10 YR 5/4, 6/4, 6/3, even 7/3, 8/3, Meth. 4B4, 3B3 or 4B3, Expo 61A, E or F, 81A (90A)), radially fibrillose satiny at centre often with aeriferous patches alternating with minute dents (poducing a pock-marked impression), becoming felted and rugulose, when exposed often rimose and/or pileipellis breaking in irregular flat scales and/or crust-like patches and flesh showing in between. Lamellae 40–70, l = (1–)3–5–7, adnate mostly emarginate segmentiform, also in large specimens more rarely ventricose and then up to 15 mm broad, pallid grey or grey-brown, then pink, sordid pink or brownish flesh colour (10 YR 7/2; 2.5 Y 7/2, 6/2 then 10 YR 6/2, 7/2, 7.5 YR 5/4, 6/4, 7/4 or 10 YR 6/3) in large specimens



Figs. 5a–c. *Entoloma clypeatum* var. *clypeatum*. — Habit and spores (5a, c from *Noordeloos* 306; 5b from *Karman*, 11 May 1966).

often slightly hygrophanous and/or transversely veined, with minutely to coarsely serrulate edge, concolorous with sides. Stipe 45–90(–150) × (5–)7–15(–18) mm, straight or irregularly flexuose, tapering downwards or cylindrical, sometimes subbulbose, in fasciculate specimens often forming a common bulbous base, solid, firm, white often with a grey or grey-brown tinge especially in the middle, weakly to distinctly striate lengthwise with greyish fibrils, sometimes fibrillosely grooved, glabrous. Flesh white or with grey tinge in cortical layers, rather firm, subcartilagineous near pileal surface (resisting a knife). Smell farinaceous. Taste farinaceous with rancid after taste. Spore print rather dark brownish pink (7.5 YR 6/4, rarely 5/4).

Spores (8.7–)9–11(–11.5) × (7.4–)7.8–9.0(–9.8) µm, Q = 1.1–1.2–1.3(–1.4), L–D = (0.5–)1–1.7–2.5(–3.0) µm, subisodiametrical to slightly oblong, (5–)6–7 angled in side-view, with very blunt

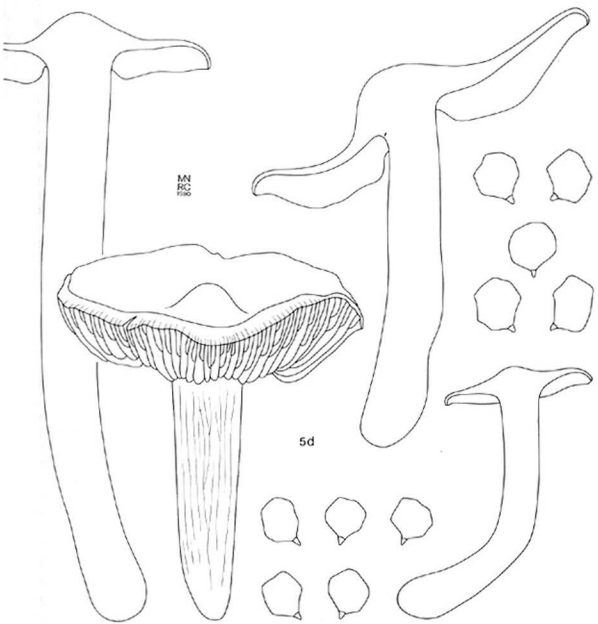


Fig. 5d. *Entoloma clypeatum* var. *clypeatum*. — Habit and spores (all figs. from *v. Brummelen*, 20 May 1979).

basal facet. Basidia (27–)35–54 × 11–17 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of (strongly) inflated cells, 27–85(–110) × 12–27 μm. Pileipellis an up to 350 μm thick ixocutis of more or less radially arranged, 2–7 μm wide cylindrical hyphae embedded in a gelatinous matter, sometimes with ascending, slightly widened terminal cells, with easily desintergrating walls, with brown intracellular pigment. Pileitrama regular, made up of inflated cells, 30–95(–120) × 7–26 μm, with intracellular pigment in upper layers. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—Gregarious, often in small bundles growing in large fairy rings, under or near rosaceous plants, in the Netherlands very common under *Crataegus monogyna* and cultivated *Malus, Pyrus, Prunus* etc. Widespread in entire Western Europe from the beginning of April up to June.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Friesland, Weststellingwerf, Steggerda, 19 May 1960, *C. Bas 1883;* prov. Drenthe: Roden, camping 'Dorado', 21–24 May 1976, *J. Schreurs;* Rolde, 6 May 1977, *J. Schreurs;* Assen, Asserbos, 13 June 1977, *J. Schreurs;* prov. Overijssel: Diepenveen, Keizers- en Stobbenwaarden, 28 May 1972, *G. & H. Piepenbrock;* Fortmond (Wijhe), 23 may 1976, *M. E. Noordeloos 154, 155, 156;* Boekelo, May 1977, *G. & H. Jonker;* Flevopolders: Roggebotszand, 8 May 1977, *G. Boezewinkel & H. Langevoort-Dul;* Drontenermeer, Strandbosjes, 22 May 1976, *G. Boezewinkel & H. Langevoort-Dul;* at the shore of Veluwemeer between Kampen and Elburg, along cycling-track, 14 May 1977, *M. E. Noordeloos 332, 333, 334, 335, 341;* prov. Gelderland: Voorst, 'De Poll', 24 May 1970, *G. & H. Piepenbrock;* Wageningen, 26 May 1963, *A. J. P. Oort;* prov. Utrecht: Zeist, 3 May 1955, *C. G. F. Schütz;* Amersfoort, 6 June 1969, *A F. M. Reijnders;* Bunnik, Fort Rijnauwen, 22 April 1972, *E. Arnolds 658;* Harmelen, 9 May 1977, *R. Elders;* prov. Noord-Holland: Velzen, 'Duin & Kruidberg', 14 May 1977, *A. G. Beckers;* Alkmaar, Alkmaarse Hout, 29 May 1976, *F. A. van den Bergh;* Castricum, dunes of Amsterdam Water Supply, 2 May 1977, *F. A. van den Bergh;* Castricum, Geversduin, 15 May 1955, *G. D. Swanenburg de Veye;* Ankeveen, Loodijk, 22 May 1968 and 19 May 1972, *J. Daams;* Kortenhoef, Vreelandse weg, 1 May 1972 and 11 May 1972, *J. Daams;* Vogelenzang, dunes, 12 May 1962, *J. van Brummelen 1453*, and 13 May 1958, *C. Bas 1430;* Heemskerk, dunes, 15 May 1958, *J. van Brummelen;* Overveen, dunes, 15 May 1963 and 20 May 1979, *J. van Brummelen*, 12 May 1962, *J. van Brummelen 1454*, 2 May 1965, *J. van Brummelen 1907*, 19 May 1969, *J. van Brummelen 2726;* De Zilk, 13 May 1968, *C. Bas 1429;* Den Helder, 28 May 1970, *J. Geesink;* prov. Zuid-Holland: Wassenaar, dune area 'Kijfhoek' and 'Bierlap', 6 June 1951, *R. A. Maas Geesteranus 7710*, 20 May 1951, *R. A. Maas Geesteranus 7714*, 8 May 1952, *R. A. Maas Geesteranus 8500*, 18 May 1966, *C. Bas 4630*, 2 June 1973, *C. Bas 6018*, 9 May 1973, *Miss R. van Crevel*, 8 May 1977, *M. E. Noordeloos 323, 324, 325, 326, 327, 328 and 329;* Leiden, Leidse Hout, 18 May 1955, *C. Bas 754*, 21 May 1955, *H. S. C. Huijsman;* Leiden Nieuweroord, 25 May 1955, *R. A. Maas Geesteranus 10370*, 26 March 1961, *R. A. Maas Geesteranus 13505*, 16 June 1961, *R. A. Maas Geesteranus* 13510; Voorne, Oostvoorne, dunes, 7 May 1964, *C. Bas 4048;* Voorne, Weeversduin, 11 May 1977, *J. J. Barkman & J. van Alphen;* 's-Gravenzande, Staelduin, 26 May 1977, *C. Bas 5232 and 5234;* Den Haag, Zuiderpark, 11 May 1966, 25 June 1967, spring 1971, *J. Karman;* Noordwijk, Leeuwenhorst, 21 May 1955, *R. A. Maas Geesteranus* 10364; prov. Zeeland, Wemeldinge, 15 May 1968, *J. A. C. Peters;* prov. Noord-Brabant: Leur, Oostpolder, 26 May 1958, *P. B. Jansen;* Gilze-Rijen, steenfabriek, 6 May 1977, *P. B. Jansen;* Eindhoven, garden, 3 June 1976, *M. E. Noordeloos 160;* prov. Limburg, St. Pietersberg, Maastricht, 20 May 1950, *R. A. Maas Geesteranus 6982* and *6983*.

FRANCE, Banlieue de Paris, 26 April 1977, *M. E. Noordeloos 303* and *304;* Forêt d'Achères, 26 April 1977, *M. E. Noordeloos 306;* Forêt Barbeau, 1 May 1977, *M. E. Noordeloos 329;* Forêt de Fontainebleau, 1 May 1977, *M. E. Noordeloos 321*.

The main characteristics of *E. clypeatum* f. *clypeatum* are the rather robust, firm-fleshed carpophores with dark pigmented pileus, which is often not completely smooth, but always distinctly hygrophanous. Besides, the flesh at apex of stipe does not turn greenish-bluish with Guaiac within 10 minutes (negative Guaiac-reaction). This is characteristic also for all other forms and varieties of *E. clypeatum* described here, except for forma *hybridum*. *Entoloma aprile* differs in its more slender, brittle carpophores, its positive guaiac reaction and the lack or scarcity of clamp-

connections, particularly in the covering layers. Other forms of *E. clypeatum* described below are a pale form (forma *pallidogriseum*) and a form with predominant yellowish tinges (forma *xanthophyllum*).

From field observations it is evident that there is some connection between *E. clypeatum* and its variants and rosaceous plants. Only exceptionally specimens have been observed growing under or near representatives of other families of higher plants, such a *Cercis siliquastrum* (Papilionaceae). In the Netherlands *E. clypeatum* very commonly grows under *Crataegus monogyna*, particularly in the coastal dunes, but also in planted hedges, parks etc. So far no records are available of *E. clypeatum* growing under *C. laevigata* (= *C. oxyacantha*), a shrub that is common in the eastern parts of the Netherlands.

The records in literature of *E. clypeatum* and related taxa found in summer and autumn probably are based upon misinterpretations of members of section *Rhodopolii*, such as *E. lividoalbum*. So far I have not come across reliable records of a second fruiting period of any of the vernal members of section *Nolanidea*.

6. ENTOLOMA CLYPEATUM (L. ex Fr.) Quél.
forma **pallidogriseum** Noordeloos, *forma nova*

A forma typica differt pileo pallide griseo vel pallide brunneo-griseo, in sicco albicante. — Holotypus: *M. E. Noordeloos 307*, 26-IV-1977, 'Forêt d'Achères, dept. Seine & Oise, France' (L).

CHARACTERISTICS. — Pileus very pale grey to very pale greybrown, turning white on drying; lamellae pale grey then greyish pink; stipe white; flesh firm, white, not becoming red with age or in insect-holes; smell farinaceous.

Pileus 31–40 mm broad, conico-convex when young, then expanding to plano-convex with weak, broad umbo, with margin slightly involute when young then straight, hygrophanous, very pale grey or grey-brown when moist (10 YR 7/3, 7/2), pallescent on drying to almost white (about 10 YR 8/2 or 8/3 or paler), translucently striate at margin and subviscid when moist, innately radially fibrillose on limb when dry, and at centre with a pattern of aeriferous subfelted-subrugulose patches. Lamellae L = 35–40, l = 1–3(–5), moderately crowded, broadly adnate to slightly emarginate, segmentiform or only slightly ventricose, pale when young, later greyish pink (7.5 YR 8/2–7/2 or more grey), with slightly crenulate, concolorous edge. Stipe 50–70 × 7–10 mm, cylindrical, often flexuose, white when fresh and young, later sordid white, minutely to fairly coarsely innately fibrillose-striate lengthwise, solid. Flesh white, very firm. Smell and taste weakly to distinctly farinaceous.

Microscopical characters as in the type-form, except for the considerable less abundant intracellular pigment in pileipellis.

HABITAT & DISTRIBUTION. — On clayey and sandy soils, river dunes, new polders, etc., always near *Crataegus monogyna* or *Prunus*. Apil–June.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Overijssel, Fortmond forest reserve between Olst and Wijhe along river IJssel, 11 June 1977, *G. Piepenbrock-Grooters and H. Piepenbrock*; IJsselmeerpolders, Oostelijk Flevoland, on sandy shore of Veluwemeer between Kampen and Elburg, 21 May 1977, *M. E. Noordeloos 336*.

FRANCE, dept. Seine & Oise, Forêt d'Achères, 21 April 1977, *M. E. Noordeloos 307* (holotype).

This pale form of *E. clypeatum* is very distinctive. I have seen it growing intermixed with typical *E. clypeatum*, but got the impression that the carpophores originated from different mycelia. However, the resemblance is very strong and I therefore consider the two conspecific.

Pale forms of *E. clypeatum* can be distinguished from other pale-coloured spring-*Entolomas* as follows: *E. sepium* differs in the non-hygrophanous, fibrillose to micaceous pileal surface and by the orange-red colour of the bruised flesh; *E. niphoides* differs in the brilliant white colour and *E. saundersii* in the non-hygrophanous, greyish pileus with silvery micaceous patches and larger spores.

7. ENTOLOMA CLYPEATUM (Fr.) Quél.
forma **xanthophyllum** Noordeloos, *forma nova*

A typo differt pileo lamellisque luteolo-tinctis. — Typus: *M. E. Noordeloos 908*, 7-VI-1979, 'coastal strip near de Abbert, Oostelijk Flevoland, IJsselmeerpolders, Netherlands' (L).

CHARACTERISTICS.—Carpophores robust, tricholomatoid, like in *E. clypeatum* f. *clypeatum*; pileus creamy to pale yellowish brown, lamellae distant, somewhat thickish, with distinct yellow tinge; stipe white, fibrillosely striate; subcaespitose under *Crataegus monogyna*.

Pileus 30–90 mm broad, conico-convex then expanding to plano-convex with very weak umbo, becoming very irregular with age with raised, undulating marginal zone, distinctly hygrophanous, when moist very pale yellowish brown (2.5 Y 6/4, 7/4, 8/4 to 10 YR 6/4 rarely 2.5 Y 5/4 or 10 YR 5/4), pallescent on drying to pale yellow or almost white (paler than 2.5 Y 8/2, also like Meth. 3A3–3A2), smooth and subviscid when moist, on drying becoming minutely radially fibrillose, at centre subrugulose to subfelted. Lamellae L = 40–50, l = 1–3–5, fairly distant, thickish, broadly adnate-emarginate, often with long decurrent tooth, segmentiform to ventricose, yellowish when young (2.5 Y 8/4–8/2), then with faint pink tinge with very irregularly serrulate concolorous edge. Stipe 60–100 × 5–25 mm, more or less cylindrical or flattened, mostly slightly broadened at base, white when fresh, yellowish-creamy with age (2.5 Y 8/2–8/4), fibrillosely striate to subcostate lengthwise, solid or with more or less spongy inner parts ('moelleux'). Flesh white, tough in pileus, very firm in stipe. Smell and taste strongly farinaceous-rancid.

Microscopical characters as in forma *clypeatum*, except for the intracellular pigmentation, which is very pale in the pileipellis and in the hymenophoral trama.

HABITAT & DISTRIBUTION.—On sandy, probably calcarous, soil under *Crataegus monogyna*; so far known only from the type locality where it was very abundant. June.

COLLECTIONS EXAMINED.—NETHERLANDS, IJsselmeerpolders, Oostelijk Flevoland, sandy shore of Veluwemeer between Kampen and Elburg, opposite recreation area 'de Abbert', 7 June 1979, *M. E. Noordeloos 908* (holotype) and *909*.

Forma *xanthophyllum* is very much alike forma *clypeatum* in habit, surface of the pileus and stipe and in the firm, white flesh. The striking yellowish colours of this collection and the distant, slightly thickened lamellae made me consider it a distinct form. Confusion with *E. lividum*, another member of genus *Entoloma* with yellowish lamellae is unlikely as this species grows in autumn in another habitat, viz. frondoze forest on rich, clayey soil and furthermore has a non-hygrophanous, differently coloured pileus (see p. 159).

8. ENTOLOMA CLYPEATUM (L. ex Fr.) Quél.
forma **hybridum** (Romagn.) Noordeloos, *comb. nov.*

Rhodophyllus aprilis f. *hybridus* Romagn. *in* Bull. Soc. mycol. Fr. **63**: 201. 1947 (basionym).

CHARACTERISTICS.—Carpophores more or less intermediate between *E. aprile* and *E. clypeatum*: more slender than typical *E. clypeatum*, stipe less firm, narrowly fistulose, and pileal surface shining and smooth; Guaiac-reaction on flesh at apex of stipe slowly blue-green within 10 minutes (positive).

Pileus 30–60 mm broad, convex with pronounced umbo to planoconvex with or without umbo, strongly to moderately hygrophanous, when moist dark brown, translucently striate at margin, subviscid, on drying pallescent in radial streaks to golden brown or grey-brown, shining, absolutely smooth. Lamellae moderately crowded, adnate-emarginate, pale brown then pink. Stipe 60–100 × 7–13 mm, cylindrical or flexuose, usually with equally thick, rounded base, grey-brown, paler at apex and base, strongly striate lengthwise, smooth. Flesh pale watery grey when moist, pallescent on drying. Smell faintly to distinctly farinaceous. Taste farinaceous-rancid.

Microscopical characters as in the typical form, except for the less abundant clamp-connections in trama and covering layers.

HABITAT & DISTRIBUTION.—Near rosaceous plants; the Netherlands' collection was made in coastal dunes under *Crataegus monogyna* and *Ulmus* spec. Also recorded from France. April–May.

COLLECTIONS EXAMINED. NETHERLANDS, prov. Zuid-Holland, Wassenaar, dune-area 'Meyendell', 8 May 1977, *M. E. Noordeloos 326*.
FRANCE, Paris, Exposition of Soc. mycol. Fr., 25 April 1977, *M. E. Noordeloos 302*.

The habit of *E. clypeatum* forma *hybridum* viz. slightly more slender than typical *E. clypeatum*, the less firm, narrowly fistulose stipe, shining pileal surface and slow positive Guaiac-reaction of the flesh of the stipe make this form somewhat intermediate between *E. clypeatum* and *E. aprile*. The Netherlands' collection was made in the same locality where typical *E. clypeatum* and *E. aprile* were growing.

9. ENTOLOMA CLYPEATUM (L. ex Fr.) Quél.
var. **defibulatum** Noordeloos, *var. nov.*

A varietate typica differt basidiis haud fibulatis, stipite griseo-brunneo, striato-costato. — Typus: *J. v. Brummelen 1279*, 22-IV-1961, 'Overveen, Noord-Holland, Netherlands' (L).

CHARACTERISTICS.—Differs from typical *E. clypeatum* in clampless basidia and coarsely striate, almost costate, brown-grey stipe.

Pileus 40–90 mm broad, conico-convex when young, soon expanding to plano-convex with broad, pronounced umbo often situated within a central depression, with margin involute when young but straight later on, finally with strongly lobed and undulating margin, hygrophanous, when moist grey-brown (10 YR 6/3–5/3, Expo 81E, sometimes more yellowish, 2.5 Y 5/4), translucently striate at outmost margin, pallescent on drying to pale yellowish brown with slight grey tinge (about 5 Y 7/3, Expo 72D), radially satiny, at centra with innate, silvery grey, aeriferous patches on brown-grey background, sometimes even felted-rugulose or subsquamulose in

exposedly growing specimens. Lamellae L = 40–60, l = 1–3, broadly adnate or emarginate, sometimes with slight decurrent tooth, pale cream when young (10 YR 8/3–7/3), becoming pinkish with age (between 10 YR 7/3 and 7.5 YR 7/3), with crenulate, concolorous edge. Stipe 50–80 × 7–15 mm, cylindrical or flattened (and then broadest side up to 18 mm wide), tapering downwards or subbulbose, often fasciculate and several specimens forming a common bulbous base, concolorous with pileus or paler, (2.5 Y 6/2 to 10 YR 7/3, sometimes 10 YR 6/3, 5/3), moderately to coarsely longitudinally striate-subcostate with silvery grey fibrils alternating with brown-grey streaks of background, often at darkest in middle part, rather firm, solid. Flesh sorded white in inner parts of pileus and stipe, in cortical layers concolorous with surface, very firm. Smell and taste strongly farinaceous; taste becoming very nasty cucumberish-rancid after mastication. Spores 9.3–11.5 × 7.0–8.1(–8.7) µm, Q = 1.15–1.3–1.4, L–D = 1.0–1.5–2.3 µm, multiangled, subisodiametrical in side-view, base difficult to interprete. Basidia 40–60 × 14–15 µm, 4(–2)-spored, clampless. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 45–120 × 9–20 µm. Pileipellis a well-developed 70–150 µm thick ixocutis of narrow, cylindrical, up to 15 µm wide hyphae with easily gelatinising walls, with brown intracellular pigment, at centre sometimes with more or less ascending, slightly swollen, clavate, terminal cells. Pileitrama regular, made up of inflated cells, up to 140 µm long and 12–27 µm wide. Clamp-connections absent from all tissues.

HABITAT & DISTRIBUTION.—On sandy, calcarous soils, often near *Prunus* spp. or *Crataegus monogyna*, only known from the Netherlands, viz. in the coastal dunes and in the Eastern Flevopolder, April–May.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Noord-Holland: Overveen, 22 April 1961, *J. van Brummelen 1279* (holotype); idem, 16 May 1969, *J. van Brummelen 2723* and 19 May 1969, *J. van Brummelen 2727*; prov. Zuid-Holland: Lisse, estate 'Keukenhof'; 8 May 1970, *C. Bas 2510*; Voorschoten, estate 'ter Horst', 14 May 1973, *C. Bas 6005*; IJsselmeerpolders, Oostelijk Flevoland, sandy shore of Veluwemeer between Kampen and Elburg, 14 May 1977, *M. E. Noordeloos 555*.

Entoloma clypeatum var. *defibulatum* is a very characteristic variety with its coarsely striate, almost costate, relatively intensely coloured brown-grey stipe, irregular pileal surface and clampless hyphae and basidia. It occurs in the same sort of habitat as the other varieties of *E. clypeatum*, but seems always to be associated with *Prunus* or *Crataegus*. *Entoloma aprile* differs in the smooth pileus, less coarsely striate stipe, clamped hyphae and its occurrence under *Ulmus*.

10. ENTOLOMA APRILE (Britz.) Sacc.–Figs. 6a–d

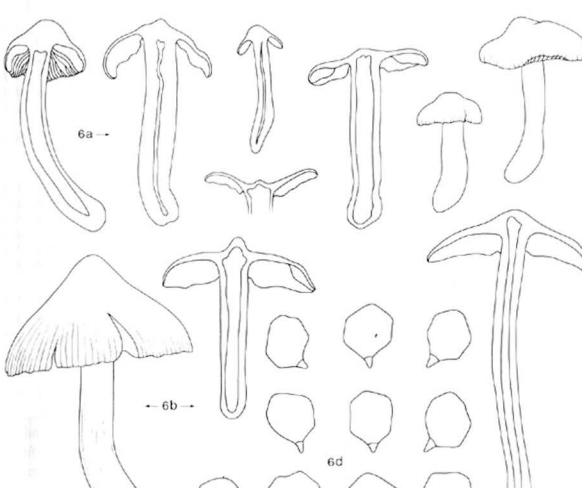
Agaricus aprilis Britz. *in* Ber. naturhist. Ver. Augsburg **28**: 149. 1885. — *Entoloma aprile* (Britz.) Sacc., Syll. Fung. 5: 696. 1887. — *Rhodophyllus aprilis* (Britz.) Romagn. *in* Bull. Soc. mycol. Fr. **63**: 199, 1947.

MISAPPLIED NAME.—*Rhodophyllus plebejus* sensu Romagn. *in* Rev. Mycol. **2**: 36. 1937.

SELECTED ICONES AND DESCRIPTIONS.—Marchand, Champ. Nord Midi **2**: pl. 118. 1973. — Romagnesi, Nouv. Atl. Champ. **1**: pl. 77a. 1956.

CHARACTERISTICS.—Carpophores slender, brittle; pileus conical and only slightly expanding, rather dark brown; lamellae sordid brown pink or greyish pink; stipe fistulose, tinged a brown-grey; smell farinaceous; clamp-connections rare.

Pileus 17–60(–75) mm broad, acutely conical to conical when young then campanulate, slowly expanding to plano-convex with pronounced, often conical umbo, with margin slightly involute when young, becoming straight only in late stages, with marginal zone usually regular but, in old expanded specimens sometimes irregular, undulating and splitting, strongly hygrophanous, when moist dark sepia, grey-brown or yellowish brown, not or only slightly paler towards margin (10



Figs. 6a–d. *Entoloma aprile*. — Habit and spores (6a, d, from *Noordeloos* 595; 6b from *Piepenbroek* 1173; 6c from *Jansen*, 7 May 1969).

YR 2/2, 3/2, 3/4, 4/3, 4/4, 5/4), translucently striate up to two-third of the radius, quickly and strongly pallescent on drying along radial streaks to pale yellowish brown (10 YR 5/3, 6/3, 6/4, 7/3, 7/4, rarely 8/4) sometimes with slight olivaceous tinge, with surface subviscid when moist, dry and absolutely smooth when dry, occasionally slightly rimose around umbo. Lamellae L = 30–60, l = 1–7, narrowly adnate to uncinate or deeply emarginate and then often with decurrent tooth, segmentiform to narrowly ventricose, rarely transversily veined, pale grey, then pink with brownish or greyish tinge, finally sordid brown-grey with pink shade (10 YR 8/2, 7/2, 6/3 then 7.5 YR 7/2, 7/4, 6/4, 6/2, 5/4) with minutely crenulate to coarsely serrulate, concolorous edge. Stipe 30–85 × 4–12 mm, cylindrical, often (slightly) broadened at base, rarely bulbose (– 16 mm thick), sometimes flattened, fistulose, brittle, easily splitting lengthwise, grey to grey-brown, rarely sordid white (10 YR 6/3, 5/3, 5/4, 4/3, 4/4 rarely 7/4), strongly fibrillosely striate lengthwise, sometimes almost costate, at base usually more or less smooth, pruinose at apex. Flesh relatively thin and brittle, white when very young, soon with grey tinge, particularly in cortical layers. Smell and taste strongly farinaceous-rancid.

Spores 9.11–11.3(–11.7) × 7.3–9.6(–10.9) μm, Q = 1.0–1.1–1.2(–1.25), L–D = 0.0–1.0–1.7 μm, multiangled (with very blunt angles) in side-view, almost isodiametrical. Basidia 40–68 × 13–16.5 μm, (2–)4-spored. Cystidia absent. Hymenophoral trama regular, made up of subcylindrical to inflated cells, 48–110(–160) × 6.5–16 μm, with pale brown intracellular pigment. Pileipellis an up to 240 μm thick ixocutis of repent, cylindrical 4–10 μm wide hyphae and brown intracellular pigment. Pileitrama regular, made up of subcylindrical to inflated cells, 35–85(–100) × 6.5–21 μm. Clamp-connections rare, except in the hymenium.

HABITAT & DISTRIBUTION. — In frondose forests, frequently on sandy soils, under or near *Ulmus*, rare but probably widespread in Western Europe. April–May(–June).

COLLECTIONS EXAMINED. — NETHERLANDS, prov. Gelderland, Gorssel, estate 't Joppe', 13 May 1979, *H. Piepenbroek & G. Piepenbroek-Grooters 1171, 1172, 1173*; prov. Zuid-Holland: Wassenaar, dune-reserve 'de Bierlap', 2 June 1973, *C. Bas 6016, 6017*, idem 8 May 1977, *M. E. Noordeloos 325*; Oegstgeest, in garden, 21 May 1969, *H. Sleumer*; prov. Noord-Brabant, Dorst, 7 May 1969, *P. B. Jansen*.

FRANCE: dept. Oise, bois Bonner, 24 April 1977, *M. E. Noordeloos 300*; dept. Seine & Oise, Fôret d'Achères, 26 April 1977, *M. E. Noordeloos 304* and 26 April 1978, *M. E. Noordeloos 595, 596, 597, 598*.

Entoloma aprile is taken here in the sense of H. Romagnesi, which in all probability is the same as that of Britzelmayer. I had the opportunity to study this species on collecting sites round Paris together with Prof. Romagnesi, which proved to be very instructive. The most important differences with *E. clypeatum* are the conical, thin-fleshed, strongly hygrophanous, smooth pileus, the dark coloured, fistulose and brittle stipe, the habitat, and, microscopically, the scarcity of clamp-connections in the hymenium. The association of *E. aprile* with *Ulmus* is manifest, at least on the collecting-sites in France and the Netherlands. In some places *E. aprile* grows together with *E. clypeatum*, e.g. in the coastal dunes near Wassenaar, prov. Zuid-Holland, the Netherlands, in mixed woods of *Crataegus monogyna* and *Ulmus* sp. In this habitat also some intermediate forms have been collected, described above as *E. clypeatum* forma *hybridum*. As no cultural experiments have been carried out, it is impossible to say whether this illustrates a case of hybridisation in Agaricales or that it is an indication that *E. aprile* should also be considered as an infraspecific taxon of *E. clypeatum*.

Sometimes *E. aprile* has a nolaneoid habit and may be confused with another spring-Entoloma, viz. *E. vernum*. Microscopically, however, the latter species is easily recognized by its encrusting pigments in the pileipellis and pileitrama and differently shaped spores.

11. ENTOLOMA NIPHOIDES (Romagn.) P. D. Orton.—Fig. 7

Rhodophyllus niphoides Romagn. *in* Bull. Soc. mycol. Fr. **63**: 198. 1947. — *Entoloma niphoides* (Romagn.) P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 64. 1960.
Rhodophyllus clypeatus var. *niveus* Quél. *in* C. R. Ass. franc. (Saint-Etienne, 1897) **26** (2): 448. 1898.
MISAPPLIED NAMES. — *Entoloma speculum* Fr. sensu Cooke, Ill. Br. Fungi **3**: pl. 342 (308). 1884–1886.
SELECTED ICONES. — Cooke, Ill. Br. Fungi **3**: pl. 342 (308). 1884–1886.

CHARACTERISTICS.—Carpophores brilliantly white; pileus smooth and shining; lamellae first pale, then vivid pink; stipe slightly striate lengthwise; flesh white, not changing colour when bruised; smell strongly farinaceous; under *Prunus spinosa*.

Pileus 20–145 mm broad, conical when young, then expanding to convex or plano-convex with large, rounded or truncate umbo, with margin involute when young but straight later on, with

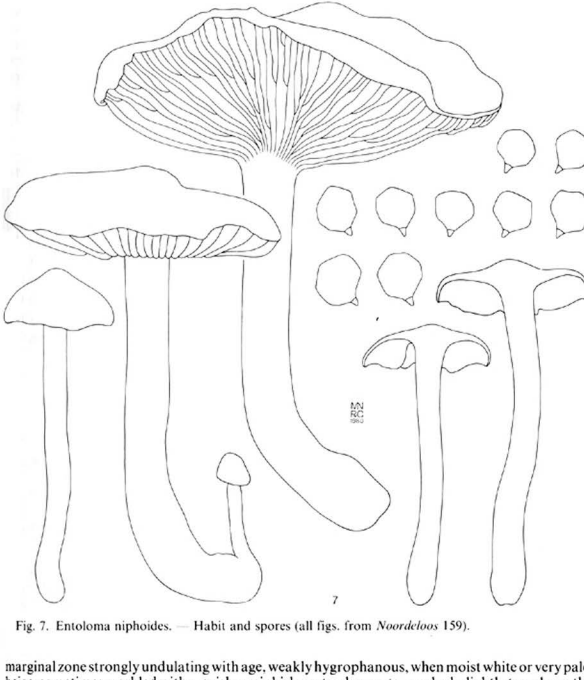


Fig. 7. Entoloma niphoides. — Habit and spores (all figs. from *Noordeloos* 159).

marginal zone strongly undulating with age, weakly hygrophanous, when moist white or very pale beige, sometimes marbled with greyish or pinkish spots when water-soaked, slightly translucently striate at margin, subviscid, pallescent on drying to brilliantly white, sometimes with slight ivory tinge at centre, strongly silky-shining, smooth. Lamellae L = about 40, l = 1–3, adnate to emarginate, segmentiform to ventricose, moderately broad, up to 10 mm, white when young, then vivid pink, without any grey or brown tinge, occasionally veined, with entire or serrulate, concolorous edge. Stipe 45–80 × 4–15 mm, cylindrical, sometimes twisted or flexuose and broadened towards base, white, only slightly striate lengthwise, solid, firm. Flesh white, not changing colour when bruised or rarely turning slightly yellowish, firm. Smell and taste strongly farinaceous.

Spores 8.0–10.0(–11.4) × 7.6–9.3(–10.8) μm, Q = (1.0–)1.1–1.2, L–D = (0–)0.6–1.4 μm, multiangled-subisodiametrical, in side-view with fairly blunt angles. Basidia 32–46 × 10–13 μm, 4-

spored, intermixed with scattered 'skelerobasidia'. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 45–132 × 14–27 μm. Pileipellis an ixocutis of narrow, 4–6 μm wide, cylindrical hyphae with strongly desintegrating walls, embedded in a gelatinuous matter, sometimes with more or less ascending, slightly swollen, up to 12 μm wide terminal cells; pigment not seen. Pileitrama regular, made up of chains of inflated cells, up to 140 μm long and 10–29 μm wide. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In hedges and dense thickets of *Prunus spinosa*, rarely under *Crataegus monogyna*, rare. June.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Beerse, camping-site 'de Roos', 2 June 1976, *M. E. Noordeloos 159*; prov. Zuid-Holland, Wassenaar, dune-reserve 'Bierlap', 1 June 1973, *R. v. Crevel* and 2 June 1973, *C. Bas 6015*.

DANMARK, Isl. Mön, near Busene-village, 10 June 1977, *M. E. Noordeloos 345*.

Entoloma niphoides is a beautiful species with brilliantly white carpophores. It seems to be closely related to *E. clypeatum*, from which it differs mainly in the lack of any pigmentation and the smooth pileal surface. It is frequently found, however, growing together with *E. clypeatum* and *E. sepium*, but always originating from different mycelia (fairy-rings!). *Entoloma sepium* differs in the distinctly pigmented pileus, which may be very pale, and in the characteristic colour-change of the flesh when being bruised. *Entoloma speculum*, another whitish species, is generally smaller, prefers a different habitat and fruits later in the year.

12. ENTOLOMA SAUNDERSII (Fr.) Sacc.—Figs. 8a–c

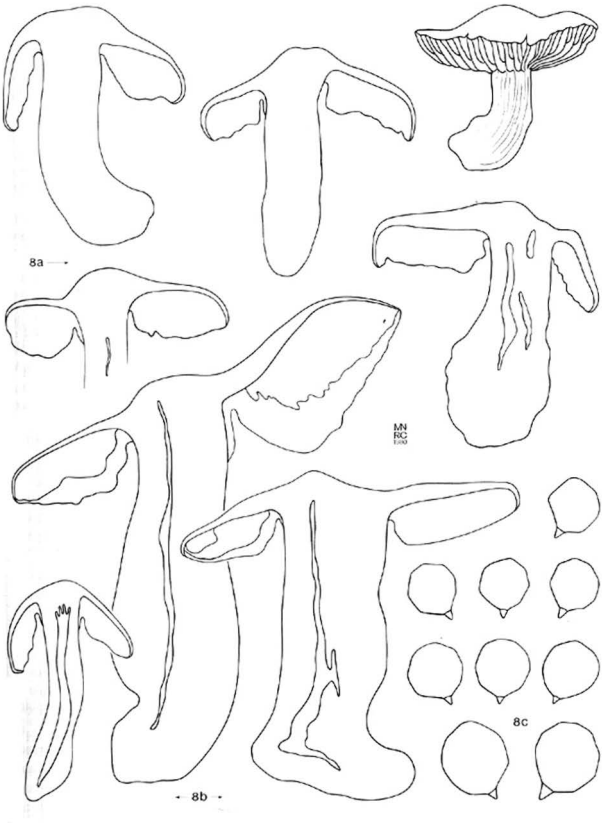
Agaricus saundersii Fr., Hymenom. eur.: 192. 1874. — *Entoloma saundersii* (Fr.) Sacc., Syll. Fung. **5**: 689. 1887. — *Rhodophyllus saundersii* (Fr.) Romagn. *in* Bull. Soc. mycol. Fr. **63**: 195. 1947.

MISAPPLIED NAMES.—*Agaricus majalis* Fr. sensu Saunders, Smith & Bennet, Mycol. Ill.: pl. 46. 1972.

SELECTED ICONES AND DESCRIPTIONS.—Boudier, Icon. mycol. **1**: pl. 93. 1905–1910. — Romagn. *in* Bull. Soc. mycol. Fr. **67**: pl. 97. 1951 (this is the same picture as in Nouv. Atl. Champ. **3**: pl. 234. 1961). — Marchand, Champ. Nord & Midi **2**: pl. 120. 1973.

CHARACTERISTICS.—Carpophores fairly robust, tricholomatoid; pileus pale greyish-brownish, not hygrophanous, often with a spotted surface of alternating smooth, shining and aeriferous, micaceous patches; lamellae with grey or gray-brown tinges; white then tinged grey, strongly striate-costate or even fissurate; spores large, 10.4–12.2(–12.7) × (9.3–)10.4–11.5(–12.1) μm, (sub-)isodiametrical.

Pileus 32–110 mm broad, conical or irregularly convex with large umbo, then expanding to plano-convex with pronounced umbo, finally very irregularly shaped with undulating marginal zone, with margin involute when young, but straight in later stages, not hygrophanous, not or only in fresh and young specimens translucently striate, when young (sordid) white, soon pale grey-brown (10 YR 7/1–7/2 rarely 7/3), sometimes with ochraceous tinges, with veil-like arachnoid patches at margin, in young specimens sometimes entirely covered with silvery-whitish arachnoid fibrils, in elder specimens with irregularly spotted surface of grey-brown, smooth, sometimes shining patches alternating with silvery whitish micaceous-aeriferous patches, in exposedly growing specimens pileipellis often strongly radially splitting and/or breaking in squamules. Lamellae L = about 50, l = 1–3–5, subdistant, deeply emarginate, often with decurrent tooth, thickish, broadly ventricose, up to 21 mm broad, pale cream at first then sordid pink, becoming grey tinged with age (7.5 YR 8/4–7/2), in large specimens often venose,



Figs. 8a–c. *Entoloma saundersii*. — Habit and spores (8a. from *Noordeloos* 283; 8b, c, from *Noordeloos* 284).

with irregularly serrate, concolorous edge. Stipe 35–100 × (5–)12–22 mm, rather irregular, usually more or less cylindrical but also frequently tapering downwards or with broadened to bulbous base, sometimes flattened and/or flexuose, white when young, then with grey, greyish brown or yellowish brown tinges, particularly near base, strongly fibrillose-costate lengthwise, sometimes fissurate, at apex minutely pruinose, downwards smooth, solid. Flesh white in stipe, pale grey-brown in cortex of pileus and above hymenium, firm. Smell and taste strong, farinaceous.

Spores 10.4–12.2(–12.7) × (9.3–)10.4–11.5(–12.1) μm, Q = 1.0–1.15(–1.2), L–D = 0.0–0.6–1.2 μm, subisodiametrical, multiangled with blunt angles in side-view. Basidia 45–58 × 15.0–18.5 μm, 4-spored. Hymenophoral trama regular, made up of inflated cells, (11.5–)25–100(–140) × 8–17(–19) μm. Pileipellis a thin ixocutis of cylindrical, 4.5–6(–7) μm wide, thin-walled hyphae with intracellular pigment. Pileitrama regular, made up of inflated cells (50–)80–130 × 8–18(–23) μm, with intracellular pigment in upper layers only. Clamp-connections present.

HABITAT & DISTRIBUTION. — On clayey soils, preferably under *Ulmus* (in the Netherlands). In France known from under fruittrees (prob. *Prunus*) in orchards and growing under *Rosa*, rare. Often appearing very early in the season; Febr.–May.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland, Geldermalsen, Deil, estate 'Noordenhoek', 13 May 1979, *M. E. Noordeloos 900;* prov. Zuid-Holland: Leiden, estate 'ter Wadding', March 1977, *C. Bas 7193;* Leiden, along 'Kanaalweg' 2 May 1973, *C. Bas 5995;* 1 & 2 April 1974, *C. Bas 6003, 6004, 6005;* 17 March 1977, *M. E. Noordeloos 277, 278, 279;* 21 March 1977, *M. E. Noordeloos 280, 281, 282, 283, 284;* 24 March 1977, *M. E. Noordeloos 286;* 4 April 1978, *M. E. Noordeloos 591:* 10 May 1979, *M. E. Noordeloos 899,* Delft, Heempark, Arboretum, 2 Febr. 1977, *P. J. Henneveld.*

Entoloma saundersii is a very characteristic species with its greyish colours and its pileal surface spotted with remnants of a sort of veil. The population from the Kanaalweg at Leiden has been studied during several subsequent years. It is a constant species, fruiting in every spring. The number of fruitbodies, however, is strongly affected by the weatherconditions. During the springs of 1974 and 1977 the fruiting was extremely rich, so that the variability of the species could be studied extensively. Usually *E. saundersii* has a characteristic way of growing. The pileus expands already underground; consequently its surface is often covered with lumps of clay. The carpophores are in general very irregular and compact, with very firm flesh and a strong farinaceous smell. So far *E. saundersii* has been found exclusively under *Ulmus* on heavy river-clay in the Netherlands. According to Romagnesi (l.c.) the species is found in France in orchards, but also in parks. *Entoloma saundersii* can easily be distinguished from all other vernal species of *Entoloma* by the large, almost round spores and by the pileal surface.

Rhodophyllus hiemalis Lazzari & Blanco in Bol. Gruppo micolog. G. Bres. **23**: 105. 1980 (nom. invalid., no type design.) is very likely a synonym. Their description and particularly the beautiful photographs agree perfectly with my observations on the Netherlands' collections cited above. Also the habitat under *Ulmus* and the early fruiting-period are similar. I do not follow the suggestion of Lazzari & Blanco to create a new taxon for this fungus on account of the differences with *R. saundersii* sensu Romagn. The arguments given, viz. different ecology, feeble Guaiac-reaction and early fruiting-period do not justify a new taxon, as the macro- and microscopic characters given by Romagnesi, in particular those of the surface of the pileus and the size and shape of the spores give no doubt on the identity of his material with ours and, judging from their description and illustrations, with that of Lazzari & Blanco.

13. ENTOLOMA SEPIUM (Noul. & Dass.) Richon & Roze.—Fig. 9

Agaricus saepius Noul. & Dass., Champ. com. susp. vén: 155. 1838. — *Entoloma clypeatum* var. *saepium* (Noul. & Dass.) Poirault & Roze *in* Bull. Soc. bot. Fr. **27**: 257–261. 1880. — *Entoloma sepium* (Noul. & Dass.) Richon & Roze, Fl. Champ. com. vén.: 92, pl. 36 figs. 15–18. 1880. — *Rhodophyllus sepius* (Noul. & Dass.) Romagn. *in* Bull. Soc. mycol. Fr. **63**: 196. 1947.

Rhodophyllus clypeatus var. *murinus* Quél., *in* C. R. Ass. franç. Av. Sci. (Saint Etienne 1897) **26** (2): 448. 1898.

Agaricus prunarii Schulz. in Verh. zool. bot. Ges. Wien **29**: 496. 1878. — *Agaricus clypeatus* var. *prunarii* (Schulz.) Schulz. *in* Verh. Mitt. Siebenburg. Ver. Naturw. **34**: 30. 1884.

MISAPPLIED NAMES.—*Rhodophyllus prunuloides* sensu Romagnesi *in* Rev. Mycol. **2**: 34. 1937 and sensu Konrad & Maublanc, Icon. sel. Fung. **2**: pl. 187. 1930 (pro parte).

Rhodophyllus acellinis (Britz.) Romagn. *sensu* Romagn. *in* Rev. Mycol. **2**: 34. 1937.

SELECTED ICONES AND DESCRIPTIONS.—Richon & Roze, l.c. 1888. — Marchand, Champ. Nord & Midi, 3e Ed., **1**: pl. 27. 1974. (In the third edition Marchand replaced the rather poor picture of the two foregoing editions by a much better one).

CHARACTERISTICS.—Carpophores firm and robust; pileus pale cream, whitish-ochraceous or very pale brown, never brilliantly white, not or only weakly hygrophanous with very regular innately fibrillose surface; lamellae pale, never with a brown or grey tinge; stipe firm, solid, white; flesh firm, white, turning reddish-ochraceous when bruised; growing under rosaceous plants, particularly *Prunus spinosa*.

Pileus 25–110 mm broad, conical to conico-convex then expanding to plano-convex or flattened with broad umbo, with margin involute when young, with marginal zone usually regular, only exceptionally irregularly undulating and/or splitting with age, not or weakly hygrophanous, greyish or yellowish creamy, greyish ochraceous or very pale brown, golden, rarely with reddish-ochraceous flush, particularly in exposedly growing pilei, not or only slightly pallescent on drying, rather regularly radially, innately fibrillose, in exposedly growing pilei sometimes rugulose-fluffy at centre and/or radially splitting, then often showing discoloured, reddish flesh in between the fibrils. Lamellae L = 50–60, l = 3–5–7, moderately crowded, deeply emarginate, segmentiform to ventricose, thin, creamy white then pink without any grey or brown (7.5 YR 7/4–6/4), with subentire to coarsely serrulate, concolorous edge. Stipe 30–110 × (5–)8–16(–24 at base) mm, cylindrical, straight to flexuose, usually distinctly broadened at base, very firm and solid, minutely to coarsely fibrillosely striate lengthwise, sometimes, particularly near base, with reddish yellow fibrils, apart from that smooth. Flesh firm, white, when bruised (insect holes) turning reddish-yellow, at apex of stipe quickly turning blue green (within 10 minutes) with Guaiac-reagens. Smell and taste farinaceous, not rancid.

Spores (7.3–)8.0–10.7(–11.0) × (6.5–)7.9–10.0(–10.8) µm, Q = (1.0–)1.05–1.15–1.2(–1.25), L–D = (0.0–)0.6–1.1–1.7 µm, isodiametrical to slightly elongate, with 5–7 angles in side view, with slightly thickened walls. Basidia 35–50 × 11–17 µm, 4-spored, in some specimens frequently with thickened, hyaline walls. Cystidia absent. Hymenophora trama regular, made up of cylindrical to slighty inflated cells (32–)40–120(–140) × 8–20 µm. Pileipellis an up to 330 µm thick ixocutis made up of 1.5–5(–7) µm wide, cylindrical hyphae with pale intracellular pigment. Pileitrama regular, made up of inflated cells, 32–120(–130) × 11–22 µm, with pale intracellular pigment in upper layers only. Clamp-connections frequent.

HABITAT & DISTRIBUTION.—Solitary or caespitose, often growing in large fairy-rings in dense thickets and hedges of *Prunus spinosa*, less frequent in orchards under fruit-trees (*Malus*, *Pyrus*, *Prunus*), widespread in Western Europe, locally common, April–June.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Beerze, camping 'De Roos' 22 May 1977, *M. E. Noordeloos 344;* Stegeren, 27 May 1969, *C. Bas 5132;* prov. Gelderland, Doorwerth, 15 May 1966 and 17 May 1967, *E. Nannenga-Bremekamp;* IJsselmeerpolders: Oostelijk Flevoland, sandy coast of Veluwemeer between Kampen and Elburg, 21 May 1975, *F. Tjallingii & G. Tjallingii-Beukers,*

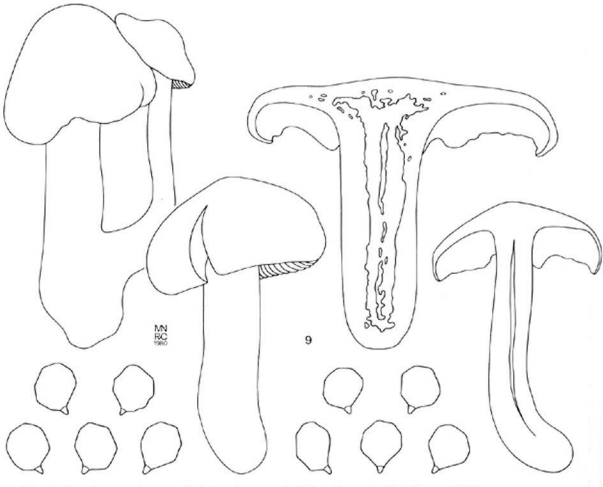


Fig. 9. *Entoloma sepium*. — Habit and spores (all figs. from *Kalff*, 17 June 1965).

14 May 1977, *M. E. Noordeloos 331, 332, 337, 338;* Oostelijk Flevoland, Roggebotszand, 8 May 1977, *G. Boezewinkel & H. Langevoort-Dul;* prov. Utrecht, Harmelen, in garden, 13 & 18 May 1979, *T. Boekhout;* prov. Noord-Holland, Ankeveen, Loodijk, 20 May 1979, *J. Daams;* prov. Limburg, Mook, 9 & 17 May 1965, 12 June 1966 and 21 May 1968, *J. Kalff*.

FRANCE: dept Oise, fôret de Montmorency, 24 April 1077, *M. E. Noordeloos 301;* fôret de Fontainebleau, 1 May 1977, *M. E. Noordeloos 320, 321*.

The pale colours, the non-hygrophanous, very smooth pileus and the reddish yellow discolouration of the flesh are distinctive for *E. sepium*. *Entoloma saundersii* differs by the spotted micaceous pileal surface, white flesh and larger spores; *E. niphoides* differs in its brilliantly white pileus. Pale forms of *E. clypeatum*, such as f. *pallidogriseum* can be distinguished by their slightly to distinctly hygrophanous pileus, pale flesh with does not change colour when bruised and often by a slight grey tinge in the lamellae. Furthermore they have a negative guaiac-reaction of the flesh at apex of stipe, viz. not turning blue-green within 10 minutes.

Entoloma sepium can be distinguished from pale-coloured taxa in section *Entoloma*, such as *E. prunuloides*, by its larger and more irregularly shaped spores, its vernal appearance and by its habitat.

ENTOLOMA section RHODOPOLIA (Fr.) Noordeloos

Agaricus subtribus *Rhodopolii* Fr., Syst. mycol. **1**: 195. 1821. — *Rhodophyllus* section *Rhodopolii* (Fr.) Romagn. *in* Bull. Soc. mycol. Fr. **63**: 120. 1947. — *Entoloma* section *Rhodopolia* (Fr.) Noordeloos *in* Persoonia **11**: 137. 1981. — Lectotype (Noordeloos, 1981a, l.c.): *A. rhodopolius* Fr.

Rhodophyllus subsection *Nidorosi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 327. 1937. — Lectotype (Noordeloos, 1981, l.c.): *E. nidorosus* (Fr.) Quél.

Rhodophyllus section *Specularii* Romagn., Rhodoph. Madag.: 42. 1941. — Lectotype (Singer, 1951: 633): *R. speculus* (Fr.) Quél.

Entoloma section *Typodochroa* Largent *in* Mycologia **66**: 999. 1974. — Holotype: *E. platyphylloides* (Romagn.) Largent.

MISAPPLIED NAMES. — *Rhodophyllus* section *Nolanidei* sensu Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 322. 1974. — Lectotype (Romagn., 1974, l.c.): *R. nidorosus* (Fr.) Quél.

Entoloma section *Nolanidea* sensu Largent *in* Mycologia **66**: 999. 1974. — Lectotype (Largent, 1974, l.c.): *E. rhodopolium* (Fr.) Quél.

CHARACTERISTICS. — Habit tricholomatoid; pileus white, brown, yellow or grey, usually strongly hygrophanous; stipe fibrillosely striate lengthwise; pigment intracellular or encrusting or both types of pigmentation present at the same time; fruiting in summer-autumn.

KEY TO THE SUBSECTIONS OF SECTION RHODOPOLIA

1a. Pigment exclusively intracellular. . . . . Subsection *Rhodopolia*, p. 183
b. Pigment encrusting at least the narrowest hyphae of pileipellis and pileitrama and particularly near the septa, sometimes in addition intracellular pigment present. . . . Subsection *Typodochroa*, p. 194

Entoloma subsection **Rhodopolia** Noordeloos, *subsect. nov.*

Rhodophyllus subsection Nidorosi Romagn., Rhodoph. Madag.: 46. 1941. (nom. nud., no Latin diagn.). — Lectotype: (design. nihi): *R. nidorosus* (Fr.) Quél.

Basidiomata characteribus sicut in sect. *Rhodopolia* sed pigmentis intracellulosis. — Typus: *Entoloma rhodopolium* (Fr.) Quél.

CHARACTERISTICS. — As for the section, except for the exclusively intracellular pigment. — Typus: *Entoloma rhodopolium* (Fr.) Quél.

KEY TO THE SPECIES OF SUBSECTION RHODOPOLIA

1a. Pileus brilliantly white or very pale greyish-yellowish; smell never nitrous 2
b. Pileus always distinctly pigmented, if very pale, then with distinct nitrous smell 3
2a. Cheilocystidia present. . . . . *E. leucocarpum*, p. 189
b. Cheilocystidia absent . . . . . *E. speculum*, p. 188
3a. Pileus and stipe very dark sepia, reddish brown or chocolate brown; lamellae reddish brown in mature specimens; smell none; in *Sphagnum* or on peat . . . . . *E. sphagneti*, p. 192
b. Pileus moderately dark greyish or reddish brown or paler; lamellae never dark reddish brown 4
4a. Carpophores usually rather robust and thick-fleshed, firm; pileus moderately dark yellowish brown, golden brown or sepiaceous; lamellae pale then pink; stipe white or pale greyish yellow, distinctly and brilliantly striate; smell farinaceous . . . . . *E. lividoalbum*, p. 186
b. Carpophores usually smaller and/or with brittle flesh and hollow stipe 5

5a. Carpophores dwarfish, pileus 14–35(–50) mm broad, moderately dark brown with reddish flush; stipe 27–50 × 1.5–4 mm, faintly striate; smell farinaceous . . . . . *E. subradiatum*, p. 191
b. Carpophores usually larger, pileus (10–)20–75 mm broad, pale yellowish brown; stipe 25–95(–130) × (3–)5–8(–13) mm, distinctly striate; smell nitrous . . . . . *E. nidorosum*, p. 184

14. ENTOLOMA NIDOROSUM (Fr.) Quél. — Figs. 10a–c

Agaricus nidorosus Fr., Epicr.: 118. 1838. — *Entoloma nidorosum* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, **5**: 119. 1872. — *Rhodophyllus nidorosus* (Fr.) Quél., Enchir. 59. 1886.

MISAPPLIED NAME. — *Rhodophyllus nidorosus* var. *speculus* Fr. sensu J. Lange *in* Dansk bot. Ark. **2** (11): 31. 1921.

SELECTED ICONES AND DESCRIPTIONS. — Cetto, Funghi Vero **1**: 243, pl. 97. 1975. — Kühn. & Romagn. *in* Rev. Mycol. **20**: 14–18, figs. 2d–e, 3. 1954. — Pilát *in* Acta Mus. nat., Prag. **9B2**: 35, fig. 27. 1951. — Romagnesi, Nouv. Atl. Champ. **1**: pl. 78a, 1956.

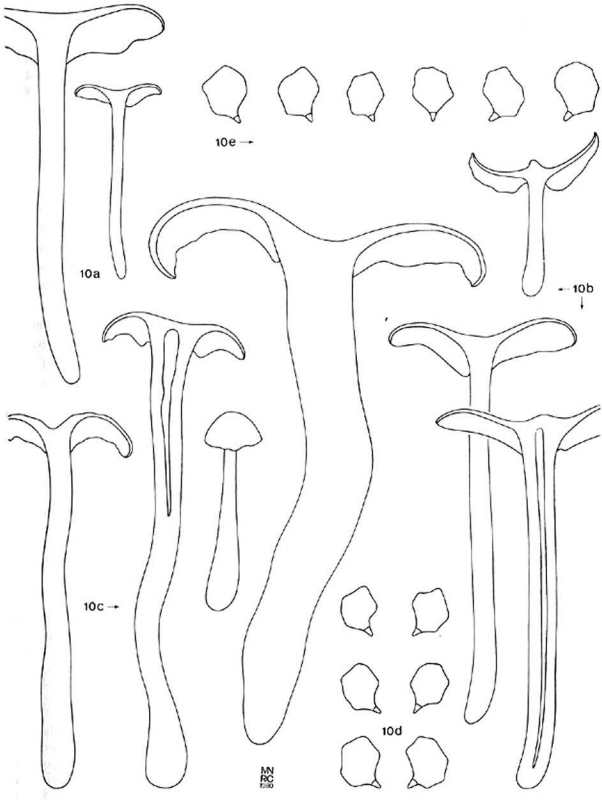
CHARACTERISTICS. — Carpophores relatively slender; pileus quickly expanding to plano-convex or plano-concave, usually with slight central depression, rarely weakly umbonate; lamellae pale then pink; stipe long and slender, pale, distinctly striate lengthwise; smell nitrous.

Pileus (10–)20–75 mm broad, conico-convex when young, soon expanding to plano-convex or plano-concave, usually with slight central depression, more rarely with faint to distinct umbo, with margin slightly involute when young, but straight later on, with marginal zone undulating with age, hygrophanous, when moist relatively pale yellowish brown, horn brown (10 YR 8/3, 7/3, 7/4, 7/6, 6/4; 2.5 Y 8/4), often darker at centre (10 YR 6/4, 5/4, 4/4, 4/3), slightly paler at margin (10 YR 8/3, 8/2), translucently striate at margin up to 1/3 of the radius, strongly pallescent on drying to greyish yellow or sordid white, smooth, sometimes, particularly when young and fresh, with small aeriferous-fibrillose, silvery white patches especially on limb. Lamellae L = 35–50, l = 1–3–5, broadly adnate, often with slight decurrent tooth or narrowly adnate-emarginate, uncinate then segmentiform rarely ventricose, pale then pink, rarely with greyish shade (10 YR 8/3, 8/2 then 7.5 YR 8/4, 7/6) with irregularly serrulate concolorous edge. Stipe (25–)40–95(130) × 3–8(–13) mm, usually cylindrical, with slightly broadened, rarely tapering base, early fistulose, brittle, pale yellowish-whitish, silvery fibrillosely striate lengthwise, at apex sometimes flocculose, downwards smooth. Flesh pale, brittle in stipe, in young and fresh pilei relatively firm, later, particularly when water-soaked, very brittle. Smell nitrous, particularly when fresh. Taste rancid-unpleasant.

Spores 7–9.3 × 6.0–7.8(–8.1) μm, Q = 1.0–1.5–1.25(–1.4), L–D = 0.0–1.0–2.3 μm, 5–6–7-angled in side-view, probably with dihedral base. Basidia 32–50 × 7.5–14 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 35–110(–125) × 12–29 μm. Pileipellis a cutis of narrow, 2.3–7(–9) μm wide cylindrical hyphae, sometimes with slightly gelatinising walls, with very pale intracellular pigment; subpellis sometimes well developed, made up of inflated cells, 25–74 × 12–32 μm, with intracellular pigment. Pileitrama regular, made up of inflated cells 45–120 × 13–31 μm. Vascular hyphae sometimes numerous in trama of pileus. Clamp-connections numerous.

HABITAT & DISTRIBUTION. — In moist, frondose forests, e.g. *Alneta*, *Betula*-woods or mixed stands of *Betula*, *Fraxinus*, *Quercus*, also in *Sphagnum*. Very common in entire north-western Europe. Aug.–Oct.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Gelderland: Winterwijk, Bek-en-Delle, 26 Sept. 1976, *J. Schreurs*; Putten, Schovenhorst, 26 Aug. 1978, *T. Boekhout*; prov. Utrecht: Harmelen, Vijverbos, 14 & 24 Oct. 1978, *T. Boekhout*; Breukelen, estate 'Guntersteyn', 20 Sept. 1978, *T. Boekhout*; prov. Noord-Holland, Isl. Texel, along Waal-en-Burgse dijk, 25 Oct. 1977, *M. E. Noordeloos 557*; prov. Zuid-Holland, Voorschoten, estate 'ter Horst', 13 Sept. 1978, *M. E. Noordeloos 713*; prov. Noord-



Figs. 10a–c. *Entoloma nidorosum*. — Habit and spores (10a, e from *Noordeloos* 1203; 10c from *Boekhout*, 14 Oct. 1978; 10b, d from *Noordeloos* 1218).

Brabant: Zevenbergen, Eendekooi, 31 Oct. 1978, *P. B. Jansen*; Strijbeek, Patersven, 30 Aug. 1961, *C. Bas 2389*; Budel, Visvijvers, 9 Oct. 1977, *M. E. Noordeloos 524*; prov. Limburg: Gronsveld, Savelsbos, 11 Sept. 1977, *T. Kuyper & J. Schreurs*; Bunde, Bunderbos, 10 Sept. 1977, *T. Kuyper & J. Schreurs*.

SWEDEN: Småland, Femsjö, Södra Färgen, 22 Aug. 1976, *M. Moser 76/152* (IB); Värnamo, near Elgarud, 14 Sept. 1959, *C. Bas 1770*. — DENMARK, Isl. Amager, S. E. of Copenhagen, estate 'Kongelund', 9 Sept. 1980, *M. E. Noordeloos 1203*, and 14 Sept. 1980, *M. E. Noordeloos 1218*. — BELGIUM: prov. Limburg, Bèvercé, along river Warsche, 26 Sept. 1976, *M. E. Noordeloos 193*; prov. Namur: Ave-et-Auffe, Fond d'Ave, 8 Sept. 1975, *M. E. Noordeloos 123*; Banalbois near Han-sur-Lesse, 22 Sept. 1974, *C. Bas 6370*.

Entoloma nidorosum is one of the most common and well-known species of *Entoloma*. It occurs in many different habitats, and the size and shape of the fruit-bodies is fairly variable. The most common habit is that of a slender species of *Entoloma*, with a convex or flattened, slightly depressed, moderately dark brown pileus; pale pink lamellae and a striate, whitish, slender stipe. In addition the nitrous smell is usually manifest. *Entoloma sericatum* is closely related and sometimes has also a faint nitrous smell, but can be distinguished by the minutely encrusted hyphae in the covering layers of the pileus. *Entoloma politum*, incl. var. *pernitrosum*, frequently occurs in the same habitat as *E. nidorosum*, but can easily be distinguished by the smooth, not striate, polished stipe and the different shape of the spores.

In literature *E. nidorosum* is often compared with *E. rhodopolium* which is said to differ by a more robust habit and lack of a distinct smell. *Entoloma rhodopholium* sensu J. Lange, as described by me below, differs by the slightly larger fruit-bodies with a more greyish tinge and the lack of smell, but still the identity of *E. rhodopolium* in its original sense is obscure to me (also see below).

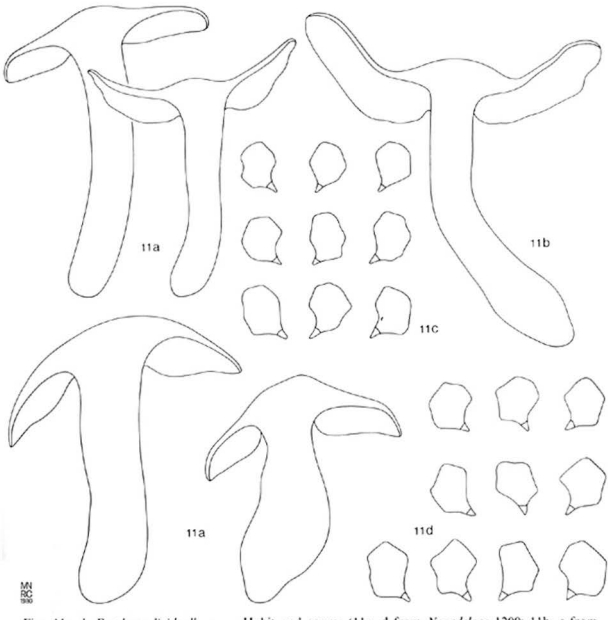
15. ENTOLOMA LIVIDOALBUM (Kühn. & Romagn.) Kubička — Figs. 11a–d

Rhodophyllus lividoalbus Kühn. & Romagn. *in* Rev. Mycol. **19**: 6. 1954 (Fl. anal.: 194. 1953, nom. nud.). — *Entoloma lividoalbum* (Kühn. & Romagn.) Kubička *in* Česka Mykol. **29**: 27. 1975.

SELECTED ICONES AND DESCRIPTIONS.—Cetto, Funghi Vero **2**: 243, pl. 530. 1976. — Kühn. & Romagn. *in* Rev. Mycol. **20**: 28, fig. 25. 1955.

CHARACTERISTICS.—Carpophores fairly robust with thick, firm flesh; pileus with beautiful yellow-brown or golden-sepiaceous colour; lamellae pale then pink, stipe whitish, thick-set, 30–70 × 8–20 mm, solid; flesh firm, white; smell farinaceous.

Pileus 35–90 mm broad, conical at first, expanding to broadly conico-convex or convex, finally irregularly flattened with or without weak umbo, with margin involute at first but straight later on, with marginal zone irregularly lobed or undulating with age, hygrophanous, when moist moderately dark yellowish brown, golden or more sepia, only slightly paler towards margin, more or less uniformely coloured, (10 YR 4/4, 5/4, rarely 3/4, on limb more like 10 YR 5/3, 5/4, 6/4, outermost margin 10 YR 6/4, 7/3, 7/4), translucently striate at margin only or not, pallescent on drying to greyish-ochraceous, pale sepia or ivory yellowish (2.5 Y 7/4, 8/4 or 10 YR 8/3, 7/3, 6/3), subviscid when moist, smooth when dry or minutely radially rimose-rugulose, particularly at centre. Lamellae L = 40–65, l = 3–7(–9), broadly adnate to emarginate, segmentiform to subventricose, pale then pink, (2.5 Y 8/2–7/2, then 7.5 YR 8/4, rarely 7/4), never with brown or grey tinges, with irregularly serrulate, concolorous edge. Stipe 30–70 × 8–20 mm, cylindrical or flattened, broadening or tapering at base, whitish to sordid yellowish, brilliantly fibrillose-striate lengthwise, at apex sometimes flocculose, downwards smooth, solid, narrowly fistulose only in very old stages. Flesh pale, very firm when fresh, hard in pileus. Smell and taste strongly farinaceous.



Figs. 11a–d. *Entoloma lividoalbum*. — Habit and spores (11a, d from *Noordeloos* 1200; 11b, c from *Noordeloos* 1277).

Spores 8.1–10.0(–11.0) × 7.8.2(–8.7) μm, Q = 1.05–1.2–1.3(–1.4), 5–7-angled in side-view. Basidia 34–49 × 9.5–14 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 45–95(–120) × (4–)7.5–26 μm. Pileipellis a cutis of 2.5–12 μm wide cylindrical hyphae, sometimes, particularly at centre, with ascending, clavate, terminal cells, 32–85(–110) × 5–15 μm, with brownish intracellular pigment. Pileitrama regular, made up of inflated cells, 50–120 × 14–34 μm. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—Terrestrial in humus-rich frondose forests, preferably on richer, loamy or clayey soils, widespread in north-western Europe, probably locally common. Aug.–Sept.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Noord-Holland, Bloemendaal, estate 'Vogelenzang', 13 Oct. 1979, *C. Bas*; prov. Zeeland, Isl. Walcheren, Domburg, park near Castle, 30 Oct. 1976, *M. E. Noordeloos 238*.

DENMARK. Isl. Amager, S. E. of Copenhagen, estate 'Kongelund', 9 Sept. 1980, *M. E. Noordeloos 1200*, and 14 Sept. 1980, *M. E. Noordeloos 1217*. — BELGIUM, prov. Namur, Ave-et-Auffe, Fond d'Ave, 27 Aug. 1979, *J. Schreurs*. — GERMAN FEDERAL REPUBLIC: Westphalen, Donoper teich near Hedessen in Teutoburgerwald, 6 Oct. 1976, *H. v. d. Aa*; Rheinland-Pfalz, Eifel, Gerolstein, Gees state-forest, 26 Sept. 1980, *M. E. Noordeloos 1277*.

The rather robust habit of *E. lividoalbum* and its firm, hard flesh remind of some vernal species of section *Nolanidea*, such as *E. clypeatum*. It is likely that some records in literature concerning the occurrence of *E. clypeatum* in autumn are misinterpretations of the present species. *Entoloma lividoalbum* differs, however, from *E. clypeatum* also in the preference for a completely different habitat, the type of pileipellis and also in the size and shape of spores. The habit of *E. lividoalbum* together with its strong farinaceous smell prevent confusion with members of the *E. nidorosum*-complex.

16. ENTOLOMA SPECULUM (Fr.) Quél.—Figs. 12a–d

Agaricus speculus Fr., Spicilegium: 4. 1886. — *Entoloma speculum* (Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 119. 1872. — *Rhodophyllus speculus* (Fr.) Quél., Enchir.: 59. 1886.

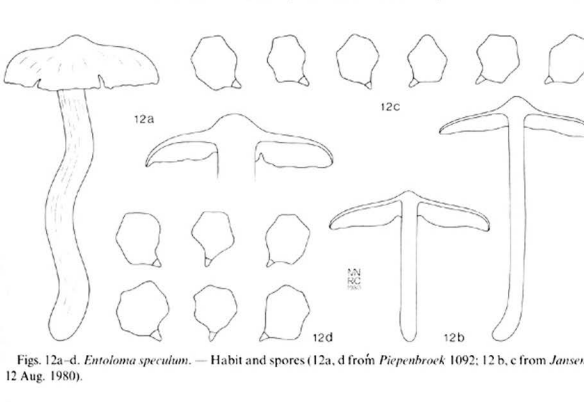
EXCLUDED. — *Entoloma speculum* sensu Cooke Ill. Br. Fungi 3: pl. 342 (308). 1884–1886 (= *E. niphoides* (Romagn.) P. D. Orton).

CHARACTERISTICS.—Carpophores small, almost white to brilliantly white; pileus 14–37 mm broad; stipe 20–65 × 2–5 mm; lamellae pale then pink, rarely with brown tinge when old; smell weakly to distinctly farinaceous; spores 9.0–12.7(–13) × (7.5–)8.0–12.0 μm, Q about 1.2 on the average per collection; cheilocystidia absent; in humus-rich places, in or near frondose forests; summer.

Pileus 14–37 mm broad, convex soon expanding to plano-convex or flattened, with or without small umbo, with margin slightly involute when young, but straight later on, with marginal zone slightly undulating with age, weakly hygrophanous, when moist brilliantly white or with pale grey or grey-yellow tinges or spots (10 YR 8/3–7/4, 2.5 Y 8/3, 7/3, 7/4), translucently striate at margin only or not, slightly pallescent on drying, smooth or slightly fluffy at centre. Lamellae L = 30–60, l = 1-3-5, moderately distant, narrowly ventricose, rarely intervenose or veined on sides, white then pink, sometimes with slight brown tinge (7.5 YR 7/6, 7/4, 6/4 towards 10 YR 6/3) with concolorous, subentire or serrulate edge. Stipe 20–65 × 2–5 mm, cylindrical, sometimes broadened at base, sometimes flexuose, brilliantly white or with grey or yellowish tinge, particularly when handled, at apex sometimes pruinose-flocculose, downwards smooth, silvery striate lengthwise. Flesh relatively firm, white or with slight grey tinge. Smell weakly to distinctly farinaceous, particularly when cut. Taste strongly farinaceous.

Spores 9.0–12.7(–13) × (7.5–)8.0–12.0 μm, Q = (1.0–)1.05–1.2–1.25(–1.3), L–D = (0.0–)0.6–2–2.5(–3.0) μm, rather irregularly (5–)6–7(–8)-angled in side-view. Basidia 35–45 × 9–15 μm, 4-(rarely 2-)spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 30–87(–117) × 10–33 μm. Pileipellis a cutis with transitions to an ixocutis, made up of radially arranged, 2–7.5 μm wide cylindrical hyphae, sometimes with ascending, clavate, terminal cells, with easily desintegrating, often distinctly gelatinised walls, with very pale intracellular pigment. Pileitrama regular, made up of inflated cells, 32–130 × 15–32(–42) μm, with pale intracellular pigment in upper layer only. Clamp-connections numerous.

HABITAT & DISTRIBUTION.—Terrestrial in or near humus-rich frondose forests, rare, summer (Aug.).



Figs. 12a–d. *Entoloma speculum*. — Habit and spores (12a, d from *Piepenbroek* 1092; 12 b, c from *Jansen*, 12 Aug. 1980).

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Zwolle, Windesheim, estate 'Windesheim', 20 Aug. 1978, *H. Piepenbroek & G. Piepenbroek-Grooters* 1092; prov. Gelderland, Neerijnen, estate 'Neerijnen', near Castle, 10 Aug. 1974, *C. Bas 6344*; prov. Noord-Brabant, Dorst, 18 Aug. 1980, *P. B. Jansen*.

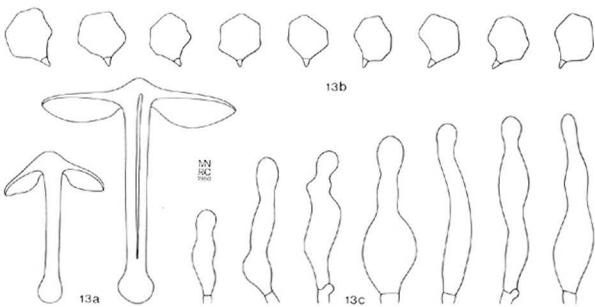
The small carpophores, pale colours, and the appearance in summer in humus-rich frondose forests are quite distinctive for *E. speculum*. *E. niphoides* has much larger carpophores, more isodiametrical and more weakly angled spores and grows in spring in *Prunus spinosa* thickets. *Entoloma leucocarpum* is very closely related to *E. speculum*, but differs in having large cheilocystidia (see below).

I am not convinced that Romagnesi's concept of *Rhodophyllus speculus* (1951: 214–215 and 1953: 197) represents the same taxon as mine; this might be a pale-coloured taxon close to *E. clypeatum*, such as forma *pallidogriseum* (see p. 171).

17. **Entoloma leucocarpum** Noordeloos, *spec. nov.*—Figs. 13a–c

Pileus et stipes albi vel albiduli; lamellae adnatae vel emarginatae, albae demum roseae; sporae (8.4–)9.0–10.8(–11.5) × (7.4–)7.9–8.5(–9.0) μm, Q = 1.1–1.2–1.3; cheilocystidia cylindracea vel flexuosa, subcapitatae vel moniliformes, 60–124 × 13.5–26(–40) μm; pileipellis cutis, hyphae 3.0–6.0 μm latae, pigmentis intracellulosis; fibulae adsunt; ab *E. speculo* cheilocystidiis differt. — Typus: *M. E. Noordeloos 701*, 24-VIII-1978, 'estate Mildenburg, Isl. Oostvoorne, prov. Zuid-Holland, Netherlands' (L).

CHARACTERISTICS.—Carpophores very pale, almost white, shining; pileus 18–32 mm broad, conico-convex then flattened with small, weak umbo; lamellae pale then pink; stipe white with



Figs. 13a–c. *Entoloma leucocarpum*.—Habit, spores and cheilocystidia (all figs. from holotype).

bulbous base; smell none; taste rancid; spores (8.4–)9.0–10.8(–11.5) × (7.4–)7.9–8.5(–9.0) μm; cheilocystidia numerous, versiform, often flexuose, with subcapitate or more or less moniliform neck; pileipellis a cutis of narrow cylindrical hyphae with very pale intracellular pigment; in humus-rich frondose forest.

Pileus 18–32 mm broad, conico-convex then plano-convex with weak umbo and straight margin, non-hygrophanous, very pale, whitish, at centre with grey-brown tinge (10 YR 7/3), strongly radially fibrillose-satiny, appearing subfelted under lens. Lamellae L = 30–36, l = 3–5, narrowly adnate to emarginate, ventricose, extending below the pileus, white then pink (7.5 YR 8/2, 8/4 finally 7/4) with entire, concolorous edge. Stipe 25–40 × 2.5–4 mm, rigid, cylindrical, abruptly bulbous at base, solid then fistulose, white, finally with very pale yellowish greyish tinge, shiningly fibrillose-striate lengthwise, pruinose at apex, smooth downwards. Flesh white, finally with greyish tinge under pileipellis, relatively firm. Smell none. Taste rancid.

Spores (8.4–)9.0–10.8(–11.5) × (7.4–)7.9–8.5(–9.0) μm, Q = 1.1–1.2–1.25(1.3), L–D = 1.0–1.5–2.3 μm, 5–7-angled in side-view (with blunt dihedral base?). Basidia 41–53 × 13–16 μm, 4-spored. Cheilocystidia 60–124 × 13.5–26(–40) μm, versiform, usually irregularly cylindrical, often flexuose, with subcapitate or more or less moniliform neck, numerous, scattered among the basidia. Hymenophoral trama regular, with inflated cells, 35–90(–100) × 14–30 μm. Pileipellis a thin cutis of 3–6(–7.5) μm wide, cylindrical hyphae almost without any pigment. Pileitrama regular, made up of inflated cells, 42–125 × 12–27 μm, with very pale intracellular pigment in upper layer only. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—Terrestrial on moist soil in *Urtica dioica* facies in humus-rich frondose forest dominated by *Quercus robur*, *Fraxinus excelsior* and *Alnus glutinosa*. So far only known from the type-locality.

COLLECTION EXAMINED.—NETHERLANDS, prov. Zuid-Holland, Oostvoorne, estate 'Mildenburg', 24 Aug. 1978, *M. E. Noordeloos 701* (holotype).

Enoloma leucocarpum is very similar to *E. speculum*, for which it was taken in the field. However, the numerous, large cheilocystidia and, in addition, some other macroscopical characters such as

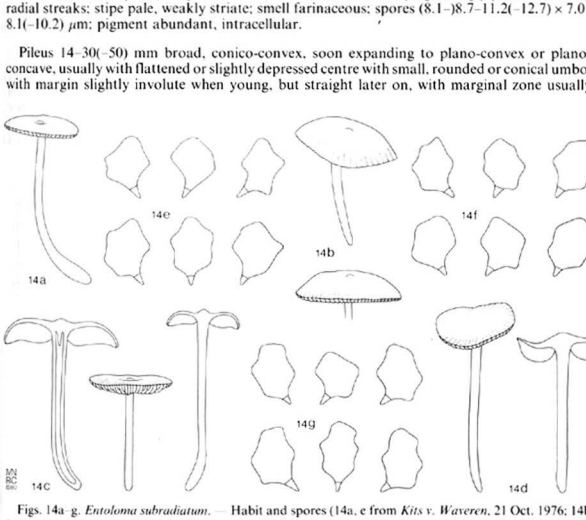
the subfelted pileus and the abruptly bulbous base of the stipe made me consider it as a species in its own right. *Entoloma cinerascens* Hesler from the U.S.A. seems to be related, but differs by the plane, almost depressed pileus, the non-bulbous stipe and the lack of clamp-connections. The cheilocystidia found in *E. leucocarpum* remind of those found in *E. jubatum* and allied species (subgenus *Trichopilus*). The simple pileipellis of *E. leucocarpum* and the short cells in the trama of lamellae and pileus, however, exclude a close affinity of this species with those of subgenus *Trichopilus*.

18. ENTOLOMA SUBRADIATUM (Kühn. & Romagn.) Moser—Figs. 14a–g

Rhodophyllus subradiatus Kühn. & Romagn. *in* Rev. Mycol. **19**: 10. 1954 (Fl. anal.: 197, nom. nud.). — *Entoloma subradiatum* (Kühn. & Romagn.) Moser *in* Gams, Kl. KryptogFl. 4. Aufl. **2** (b/2): 197. 1978.

CHARACTERISTICS.—Carpophores tiny; pileus 14–30(–50) mm broad, reddish brown or greyish brown, translucently striate up to 1/4 or 1/2 of the radius, on drying strongly pallescent along radial streaks; stipe pale, weakly striate; smell farinaceous; spores (8.1–)8.7–11.2(–12.7) × 7.0–8.1(–10.2) µm; pigment abundant, intracellular.

Pileus 14–30(–50) mm broad, conico-convex, soon expanding to plano-convex or plano-concave, usually with flattened or slightly depressed centre with small, rounded or conical umbo, with margin slightly involute when young, but straight later on, with marginal zone usually



Figs. 14a–g. *Entoloma subradiatum*. — Habit and spores (14a, e from *Kits v. Waveren*, 21 Oct. 1976; 14b from *Kits v. Waveren*, 8 July 1961; 14c from *Kits v. Waveren*, 2 Aug. 1968; 14d from *Kits v. Waveren*, 29 July 1961; 14g from *Noordeloos* 436).

undulating or lobed with age, strongly hygrophanous, when moist moderately dark brown with reddish or greyish flush, usually distinctly darker at centre to blackish brown, paler at margin (at centre 10 YR 2/2, 3/2, 4/2, 4/3 to 7.5 YR 3/2; at margin 10 YR 7/4, 8/3), translucently striate up to 1/4 or 1/2 of the radius, strongly pallescent on drying along radial streaks, smooth or slightly to distinctly rugulose at centre. Lamellae L = 20–40(–45), l = 3–5, broadly adnate to emarginate, often with slight decurrent tooth, segmentiform to ventricose, up to 4 mm broad, pale then pink, sometimes with brown tinge (7.5 YR 8/4 to 10 YR 7/4), with concolorous, serrulate edge. Stipe 27–50 × 1.5–4(–6) mm, cylindrical, often slightly broadened at base, rarely subbulbous or attenuate at base, pale, white or greyish-brownish (2.5 Y 8/2, 7/2 or 10 YR 7/2, 7/3), innately fibrillose to weakly silvery striate lengthwise, at apex pruinose or not, downwards smooth, solid then narrowly fistulose. Flesh thin, relatively firm in pileus, pale or watery brown-grey, particularly in cortex. Smell and taste weakly to strongly farinaceous.

Spores (8.1–)8.7–11.2(–12.7) × 7.0–8.1(–10.4) μm, Q = 1.1–1.2–1.3(–1.35), L–D = (0.6–)1.2–2.0–2.5 μm, 5–7-angled in side-view. Basidia 32–47 × 9–16 μm, (2–)4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 38–150 × 9–27 μm. Pileipellis a thin cutis of 2.4–7 μm wide, cylindrical hyphae, sometimes with ascending, clavate terminal cells, particularly at centre, with abundant intracellular pigment, sometimes with slightly gelatinised walls, subpellis usually well developed, made up of strongly inflated cells, 27–65(–80) × 8.5–32 μm, with intracellular pigment. Pileitrama regular, made up of inflated cells, 45–125(–140) × 7.5–29 μm. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—Terrestrial, solitary or subcaespitose, in humus-rich frondose forests, known from the Netherlands and France. July–Sept.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Denekamp, estate 'Singraven', 8 July 1961, *E. Kits v. Waveren*; prov. Gelderland: Winterswijk, Bek-en-Delle, 3 Sept. 1979, *J. Scheurs*; Nijmegen, grounds of Radboudt-hospital, 3 Aug. 1977, *M. E. Noordeloos 436*; Neerijnen, estate 'Neerijnen', 21 Aug. 1979, *J. Schreurs*; prov. Utrecht, Loenen, estate 'Over-Holland', 29 July 1961, *E. Kits v. Waveren*; prov. Noord-Holland: Heemstede, Leyduin, 2 Aug. 1968, *E. Kits v. Waveren*; Bloemendaal, estate 'Elswout', 21 Oct. 1966, *E. Kits v. Waveren*.

J. Lange's plate (1936, pl. 761) of *Rhodophyllus radiatus* J. Lange strongly reminds of *E. subradiatum* as described above. J. Lange's name probably is a synonym of *E. subradiatum*, but since the type-collection of Lange's species is lacking, this cannot be verified. At Copenhagen some spore-prints are left of specimens of *R. radiatus* collected by its author, but they consist of smaller spores than our *E. subradiatum* has. As it is impossible to check such important characters as pigmentation in authentic material, the status of *R. radiatus* J. Lange remains uncertain. Also see under the insufficiently known taxa below, p. 247.

Entoloma sordidulum is very similar to *E. subradiatum*, but differs by quite another type of pigmentation (see p. 207).

19. ENTOLOMA SPHAGNETI Naveau.—Fig. 15

Entoloma sphagneti Naveau *in* Natuurw. Tijdschr. **5**: 75. 1932. — *Rhodophyllus sphagneti* (Naveau) Kühn. & Romagn., Fl. anal.: 194. 1953.

SELECTED ICONES AND DESCRIPTIONS.—Arnolds & Noordeloos *in* Fung. rar. Icon. col. **12**: pl. 95a. 1981. — Imler *in* Bull. Soc. Nat. Oyonnax **14–15**: 147–149 (incl. col. pl.). 1960–1961. — Imler *in* Bull. Soc. Nat. Oyonnax **16–18**: 105–106. 1966.

CHARACTERS.—Carpophores usually rather robust and brittle; pileus very dark chocolate or sepia brown; lamellae pale then flesh-coloured brown; stipe almost concolorous with pileus,

Fig. 15. Entoloma *sphagneti*. — Habit and spores (all figs. from *Noordeloos* 1079).

striate; without smell; spores 9.3–12.7 × 6.5–8.7(–9.3) μm, Q = 1.3–1.4 on the average per collection, ellipsoid and multi-angled-gibbose in outline; pigment very abundant, intracellular; in dead or living *Sphagnum* and on peat.

Pileus (15–)20–80(–120) mm broad, conical to conico-campanulate, slowly expanding to conico-convex finally plano-convex with pronounced, often conical umbo, with margin involute when young, straightening only in late stages, with marginal zone undulating with age, strongly hygrophanous, when moist very dark chocolate brown, date brown, sepia or almost blackish brown, not or only very slightly paler at margin, obscurely translucently striate at margin (5 YR 2/1, 2/2, 3/1; 7.5 YR 3/2, 4/2 or 10 YR 2/2, 3/3), pallescent on drying along radial streaks to greyish brown or yellowish brown with slight red tinge (7.5 YR 4/4 to 10 YR 5/4), subviscid when moist, dry and shining when dry, in many collections with silvery white, aeriferous-fibrillose patches on limb and at margin. Lamellae L = 40–60, l = 3–5, free or deeply emarginate, triangular, then broadly ventricose, up to 11 mm broad often, extending below the pileus, pale beige when young, soon pink, finally flesh-coloured brown to reddish brown (10 YR 5/3; 7.5 YR 6/4, 5/4, 4/4, 4/2; 5 YR 7/3, 6/4) with slightly irregular, concolorous edge. Stipe 35–105 × 3–15 mm, cylindrical, more rarely tapering towards base, sometimes first broadening towards base and then abruptly tapering or rooting, fistulose, fragile, grey-brown to reddish brown, slightly paler than pileus (10 YR 6/3, 5/4, 4/3; 7.5 YR 4/2, 3/2; 5 YR 3/2), strongly longitudinally striate with paler fibrils, with white tomentose base. Flesh almost concolorous with surface or slightly paler in inner parts, brittle, in stipe very easily splitting lengthwise. Smell and taste indistinct.

Spores 9.3–12.7 × 6.5–8.7(–9.3) μm, Q = (1.2–)1.35–1.5(–1.8), L–D = (1.5–)2.3–3.5–4.5(–5.0) μm, multiangled-nodulose, ellipsoid. Basidia 27–48 × 8.5–16 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 35–110(–120) × 8–32 μm. Pileipellis a cutis or radially arranged, 2.5–9 μm wide, cylindrical hyphae with abundant intracellular pigment. Pileitrama regular, made up of inflated cells, 37–140 × 7.5–34 μm. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—In and on dead or living *Sphagnum* or on peat, nor uncommon in the holocene peat-bogs of the north-western European lowland. Known to occur in Netherlands, Belgium (Naveau, 1923, l.c.) and France (Kühner & Romagnesi, 1953: 194). Aug.—Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Drenthe: Roden, Mensingebos, Moltmakersstuk, 15 Sept. 1976, *M. E. Noordeloos 176*; Hoogeveen, Stuifzand, Boerenveenplassen, 15 Sept. 1973, *K. Booy*; prov. Overijssel, Delden, 18 Sept. 1964, *E. Kits v. Waveren*; prov. Gelderland: Winterswijk, Wooldse veen, 20 Sept. 1975, *M. E. Noordeloos 153* and 20 Sept. 1976, *M. E. Noordeloos 186*; idem, 30 Sept. 1976, *C. Bas 6168*; Overasselt, Haterse vennen, 9 Oct. 1963, *P. B. Jansen 63–177*, and 14 Oct. 1964, *E. Kits v. Waveren*; prov. Noord-Brabant: Eindhoven, Oudmeer between Son and Best, 25 Oct. & 2 Nov. 1959, *H. Drost*; Strijbeek, Goudbergven, 24 July 1960, 25 Aug. 1960, 21 Aug. 1961 and 20 Sept. 1967, *P. B. Jansen*; idem, 30 Aug. 1961, *C. Bas 2382*; Zundert, 'de Krochten', 5 Oct. 1973, *P. B. Jansen 73–193*; idem, 6 Oct. 1973, *A. Daleboudt 91*; idem, 9 Sept. 1976, *P. B. Jansen*.

Entoloma sphagneti is one of the darkest species in *Entoloma* subgenus *Entoloma* and reminds of '*Rhodophyllus*' *nigrocinnamomeus* sensu Favre (1948: 51–52), but that species differs in having considerably smaller, more isodiametrical spores. All other dark brown species of *Entoloma*, viz. *E. myrmecophilum*, *E. venosum*, *E. gerriae* and *E. platyphylloides* differ among many other things in the encrusting pigments in the pileipellis and differently shaped, more isodiametrical spores.

Entoloma subsection **Typodochroa** (Largent) Noordeloos, *comb. & stat. nov.*

Entoloma section *Typodochroa* Largent *in* Mycologia **66**: 999. 1974 (basionym). — Holotype: *Entoloma platyphylloides* (Romagn.) Largent.

CHARACTERISTICS.—Pigment encrusting the hyphae of pileipellis and pileitrama, at least the narrowest hyphae and particularly near the septa, but usually very abundant and forming 'zebralike' patterns or crust-like patches on the outer walls of the hyphae; in addition intracellular pigments often present.

KEY TO THE SPECIES OF SUBSECTION TYPODOCHROA

1a. Pileus dark grey-brown, sepia, umber of blackish-brown, more or less unicoloured, not or only slightly paler towards margin and usually only inconspicuously translucently striate; pigment coarsely encrusting 2
b. Pileus paler, grey-brown, yellowish brown or with reddish flush, or distinctly bicoloured, viz. with very dark brown umbo and strongly contrasting paler limb 6
2a. Pileus coarsely radially fibrillose and with micaceous sheen; particularly when dry, the pileus reminiscent of *Oudemansiella platyphylla*; in frondose forests. . . . . *E. platyphylloides*, p. 245
b. Pileus smooth or slightly villose at centre, never fibrillose-micaceous 3
3a Carpophores small to medium-sized, relatively thin-fleshed, pileus 10–35 mm broad, stipe 13–45 × 2–5(–10 at base) mm 4
b. Carpophores medium-sized to large, thick-fleshed, pileus 25–75(–100) mm broad, stipe 40–100 × 5–15 mm 5
4a. Pileus convex, soon flattened to concave with central depression or with faint umbo; spores 8.4–11.3(–12.4) × 7–9 µm, Q = 1.15–1.3–1.4; two types of pigment, viz. encrusting and intracellular, in pileipellis and pileitrama; in frondose lowland forests. . . . . *E. gerriae*, p. 199
b. Pileus conico-campanulate, then expanding, never depressed, usually umbonate; spores 8–10(–11) × 6.5–9 µm, Q = 1.1–1.2; pigments encrusting only, in (sub-)arctic and alpine grasslands and marshy places with shrub of *Salix* and/or *Dryas octopetala*. . . . . *E. atrosericeum*, p. 229
5a. Lamellae often dark grey-brown already when young; spores 8–10.4 × 6.5–8 µm, Q = 1.25–1.3 on the average per collection, in or near coniferous forests (*Picea*) in central Europe, probably only in mountainous habitats . . . . . *E. venosum*, p. 234
b. Lamellae often white when young, later on with grey tinge, spores 8–10.4 × 7–8 µm, Q = 1.15–1.2 on the average per collection, in lowlands of western and northern Europe, in frondose forests or *Salix*-thickets. . . . . *E. myrmecophilum* var. *myrmecophilum*, p. 196
6a. Pileus with blackish brown umbo strongly contrasting with leather-brown limb; in frondose forests, pigment coarsely encrusting . . . . . *E. myrmecophilum* var. *atrogaleatum*, p. 198
b. Pileus more uniformely coloured; pigment usually minutely encrusting the narrowest hyphae only. 7
7a. Pileus yellow to yellowish brown, without any trace of grey; smell absent; rather robust species in frondose forests. . . . . *E. majaloides*, p. 205
b. Pileus greyish brown to yellowish grey, sometimes with reddish flush; smell usually distinct, farinaceous or subnitrous 8
8a. In moist places, preferably in *Betula*-woods with *Sphagnum*, but also found in *Alnetа*; smell often distinctly but weakly nitrous when collected, later on often more farinaceous; rather robust and brittle *E. sericatum* f. *sericatum*, p. 201
b. In other habitats 9
9a. In frondose forests, particularly on clayey soils; carpophores usually small to medium-sized; pileus 10–45(–55) mm broad, sordid grey-brown, sometimes with reddish flush; stipe sordid grey or almost white, solid, firm; flesh white; smell farinaceous rancid . . . . . *E. sordidulum*, p. 207
b. Among and round *Salix repens* in coastal dunes; carpophores medium-sized to large; pileus 30–75(–110) mm broad, greyish brown to greyish yellow; stipe usually with grey tinge, soon fistulose; flesh brittle particularly in stipe, with grey tinge; smell usually slightly nitrous when collected, more farinaceous later on . . . . . *E. sericatum* f. *saliciphilum*, p. 203

20. ENTOLOMA MYRMECOPHILUM (Romagn.) Moser var. MYRMECOPHILUM.—Figs. 16a–d

Rhodophyllus myrmecophilus Romagn. *in* (Trav. mycol. déd. R. Kühner) Bull. mens. Soc. linn. Lyon **43** (No. spéc.): 386. 1974. — *Entoloma myrmecophilum* (Romagn.) Moser *in* Gams, Kl. KryptogFl. 4. Aufl., **2**(b/2): 197. 1978.

MISAPPLIED NAMES.—*Rhodophyllus platyphylloides* sensu Horak *in* Schweiz. Z. Pilzk. **49**: 116–117, fig. 4. 1971. — *Rhodophyllus nigrocinnamomeus* sensu Favre, Assoc. fong. Hauts marais: 51–52. 1948.

SELECTED ICONES & DESCRIPTION.—Romagnesi, l.c.: 378–379. 1974. — Einhellinger *in* Ber. Bayer. bot. Ges. **47**: 126–127, pl. 7 B. 1976. — Horak, l.c. (with col. pl., as *R. platyphylloides*).

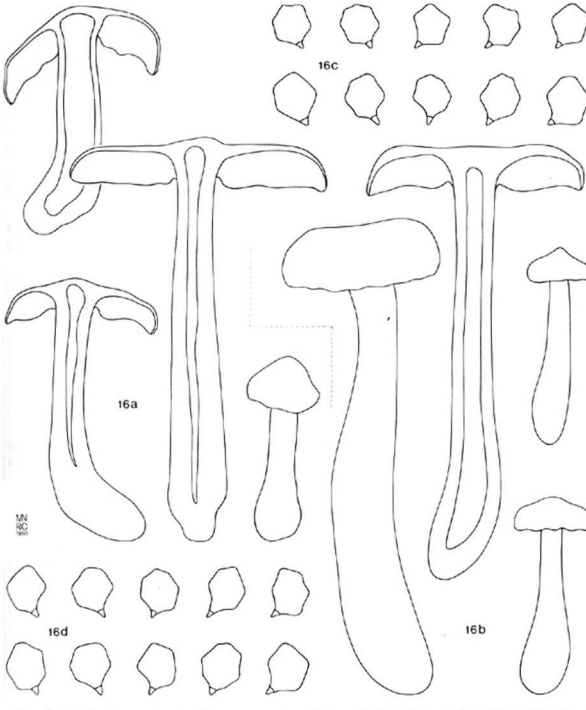
CHARACTERISTICS.—Pileus dark brown to blackish brown, not or only slightly paler at margin, not or only short translucently striate at margin; lamellae white or pale when young later on with grey or brown tinge; stipe usually paler than pileus, strongly silvery-white on grey-brown background; spores subisodiametrical, Q = 1.15–1.2 on the average per collection.

Pileus (15–)20–65 mm broad, conical or conico-campanulate when young, then expanding to (conico-)convex with broad umbo, finally flattened with or without umbo, sometimes slightly depressed at centre, with (slightly) involute margin when young, hygrophanous, when moist dark (blackish) brown (10 YR 3/1, 3/2, 3/3, 4/3) not or only very slightly paler at margin, mostly more or less unicoloured, on drying pallescent to brownish grey or yellowish brown (10 YR 5/4, 6/4), when moist with shining-polished surface or with minute arachnoid-fibrillose covering particularly when young, when dry subinnately fibrillose or with minute micaceous patches, often minutely velvety-rugulose at centre, in exposed growing pilei often craked ('craquelé'). Lamellae L = about 40, l = 3–5–7(–9), moderately crowded, variably inserted from broadly adnate with small decurrent tooth to deeply emarginate or almost free, arcuate then segmentiform, never really ventricose, white or pale when young, then with grey or brown tinge, finally pinkish brown (10 YR 7/3, 7/4, 6/3, 5/3; 7.5 YR 7/4, 6/4) with entire or subserrulate, concolorous edge. Stipe 40–92 × 5–15 mm, cylindrical often gradually broadening towards base, rarely subbulbous, solid, then fistulose, sordid white or cream to grey-brown (2.5 Y 8/4, 7/2; 10 YR 7/2, 7/3, 6/3) with dense, pallid striation, smooth or minutely pruinose-downy at apex, base white tomentose. Flesh (dark) grey-brown when moist, pallescent on drying, firm to rather brittle in pileus, firm in stipe of young specimens, later on becoming fibrillose-brittle. Smell spontaneously often weak, but distinctly farinaceous when cut. Taste rancid, nasty.

Spores 8–11 × (5.8–)6.5–8(–9) µm, Q = (1.0–)1.1–1.3, on the average per collection 1.15–1.2, L–D = (0–)0.6–1.5–2 µm, subisodiametrical, mostly 6–7-angled in side-view, probably with dihedral base. Basidia 23–40(–45) × 10–15 µm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 45–100(–120) × (3.5–)5–21(–30) µm with pale intracellular pigment. Pileipellis a thin, compact cutis of radially arranged 3–5–8(–10) µm wide cylindrical hyphae with slightly gelatinising walls, sometimes with clavate terminal cells particularly at centre of pileus, forming the villosity, with brown encrusted walls and in addition frequently also with intracellular pigment. Pileitrama regular, made up of inflated, rarely cylindrical cells, 45–110(–130) × 7–29 µm, with minutely to rather coarsely encrusted walls and dispersed intracellular pigment, particularly in upper layer. Lactiferous hyphae scattered, in some specimens fairly abundant. Clamp-connections abundant in all tissues studied.

HABITAT & DISTRIBUTION.—In mossy meadow on sandy soil; in *Salix*-bushes in coastal dunes and terrestrial in frondose forests, not rare, known to occur in lowlands in Sweden, Netherlands, France, German Federal Republic and Switzerland. Sept.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. of Drenthe, Wijster, in lawn behind Biological Station, 19 Oct. 1960, *J. J. Barkman 6875*, and 2 Sept. 1978, *P. B. Jansen*; prov. Gelderland: Korenburgerveen, 29 Sept. 1973, *C. Bas 6166*; Wageningen, Bennekomse Meent, 4 Nov. 1970, *H. S. C. Huysman 70.320*; Hoenderloo, Hoge Veluwe, 29 Oct. 1966, *E. Kits van Waveren*; prov. Noord-



Figs. 16a–d. *Entoloma myrmecophilum* var. *myrmecophilum*. — Habit and spores (16a, b from *Noordeloos 1077*; 16c from *Kits v. Waveren*, 29 Oct. 1966; 16d from holotype).

Holland, Callantsoog, nature-reserve 'Zwanewater', 21 Oct. 1979, *M. E. Noordeloos 1077*; prov. Zuid-Holland, Isl. of Voorne, Rockanje, Quackjeswater, 22 Oct. 1955, *C. Bas 936*.

FRANCE, dept. Aisne, Environ de Château-Thierry, 15 & 22 Nov. 1971, *M. Drapier* (holotype, Herb. Romagn. 71.326, PC). — SWEDEN, Uppland Djurö s.n., Runmarö, forest between Uppeby and Svartträsk, 2 Oct. 1949, *G. Haglund & R. Rudberg* (S).

Entoloma myrmecophilum is one of the darkest coloured *Entoloma* species in section *Rhodopolia*, very well characterized by its encrusting pigments and almost isodiametrical spores. When working at the *Entoloma* collections available I was serveral times confronted with material identified as '*Rhodophyllus platyphylloides*'. After some hesitation, however, I prefer for most of this material the epithet '*myrmecophilum*' for the following reason: In *R. platyphylloides* the pileal surface is said to be 'finement vergetulé-fibrilleux radialement', thus strongly resembling *Collybia* (or *Oudemansiella*) *platyphylla* but not only in surface structure, but also in colour. In *E. myrmecophilum* the pileus is darker and smooth. The Netherlands' collections agree in a satisfactory way with the discription given by Romagnesi (1974b, l.c.); the pileus is smooth, sometimes even brilliantly shining as if polished (*M. E. Noordeloos 1077*), only the centre of the pileus may become minutely velvety-rugulose, particularly when dried up.

Entoloma myrmecophilum resembles *E. venosum* very much in colour but the latter has more elongate spores, darker lamellae particularly when young, and a different habitat and geographical distribution (see under extralimital species, p. 234).

Entoloma gerriae is distinguished from *E. myrmecophilum* in its slender habit with (sub-) umbilicate pileus and the larger and more elongate spores.

21. ENTOLOMA MYRMECOPHILUM var. **atrogaleatum** Noordeloos *var. nov.*—Fig. 17

A var. myrmecophilo differt pileo manifeste bicolorato: umbone atrogaleato margineque manifeste pallidiore. Typus: *J. Schreurs*, 7-IX-1979, 'Korenburgerveen, Winterswijk, prov. Gelderland, Netherlands' (L).

CHARACTERISTICS.—Differs from the type-variety in the yellow-brown pileus with strongly contrasting blackish-brown umbo.

Pileus 30–92 mm broad, conical then expanding to plano-convex or flattened, with broad umbo, with slightly involute margin, strongly hygrophanous, when moist dark yellow-brown (10 YR 4/4, 5/4) with conspicuously darker and contrasting blackish brown umbo (10 YR 2/2, 3/2, 3/3), on drying pallescent to pale brown (10 YR 8/3, 8/4) with centre remaining darker, smooth on limb, micaceous-subpruinose at centre, particularly when dry, when young often with minute silvery-white arachnoid patches on limb. Lamellae L = 40–60, l = 3–5–7, broadly adnate, sometimes with slightly decurrent tooth or emarginate, segmentiform to weakly ventricose, pale then pink (10 YR 8/2; 7.5 YR 8/2, 8/3), with uneven, concolorous edge. Stipe 40–100 × 4–10 (–16 at base) cylindrical, often with broadly swollen base, pale brown (10 YR 7/3, 6/3), densely silvery-fibrillosely striate lengthwise, smooth, at apex sometimes minutely pruinose, at base white tomentose. Flesh pale, brittle. Smell spontaneously weak, distinctly farinaceous when cut. Taste farinaceous-rancid.

Spores 8.1–10.4 × 7–8.1 μm, Q = 1.05–1.3 (1.15–1.2 on the average per collection), L–D = 0.5–1.2–2.3 μm, subisodiametrical, 5–6-angled in side-view. Basidia 27–36 × 11.5–15 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 45–120 × 11–24 μm. Pileipellis a thin cutis of 2.7–12 μm wide cylindrical hyphae with encrusted walls and in addition scattered intracellular pigment, with numerous clavate, up to 15 μm wide terminal cells with encrusted walls, particularly at centre. Pileitrama regular, compact, somewhat irregular-interwoven at centre, made up of short, inflated cells, 45–80 (–120) × 12–32 μm, with brown

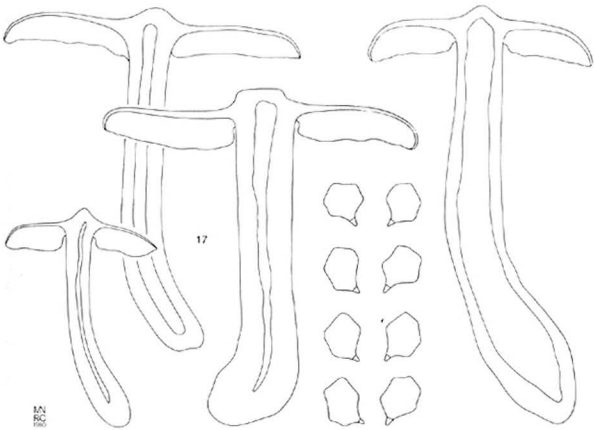


Fig. 17. *Entoloma myrmecophilum* var. *atrogaleatum*. — Habit and spores (all figs. from holotype).

encrusted walls and in addition, particularly in upper layers, intracellular pigment. Clamp-connections abundant in all tissues. Vascular hyphae may be present or not.

HABITAT & DISTRIBUTION.—In mixed forest of mainly *Betula* and *Salix* on peaty soil (type) and in *Betula*-forest, between *Rubus* spp. on sandy-loamy, probably acid soil. So far only known from two localities in the Netherlands. Sept.-Oct.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Gelderland, Winterswijk, Korenburgerveen, 7 Sept. 1979, *J. Schreurs* (holotype); prov. Limburg, Gronsveld, Savelsbos, 26 Oct. 1958, *C. Bas 1627*.

Entoloma myrmecophilum var. *atrogaleatum* is described here as a distinct variety on account of the characteristic bicoloured pileus. The fresh carpophores seemed to wear a blackish brown helmet.

22. **Entoloma gerriae** Noordeloos, *spec. nov.*—Figs. 18a–e

Statura pumila; pileus 10–35 mm latus, planus vel leviter depressus, atrobrunneus, hygrophanus; lamellae adnatae vel leviter emarginatae, sordido-salmoneae demum brunneo- vel griseo-tinctae; stipes 13–50 × 2–10 mm, frequenter versus basim attenuatus, cinereo-brunneus, striatus; odore saporeque farinaceis; spore 8.4–11.3(–12.4) × 7–9 μm, Q = 1.15–1.3–1.4; pigmentis incrustatis pariter intracellulosis in pileipelle

pileitramaeque; fibulae ubique abundantes. — Typus: *G. Piepenbroek-Grooters & H. Piepenbroek 1101*, 10 IX–1978, 'Wilp. prov. Gelderland, Netherlands' (L).

ETYMOLOGY: named in honour of Mrs. Gerrie Piepenbroek-Grooters, who collected, together with her husband Henk Piepenbroek many rare and interesting species for the Rijksherbarium.

CHARACTERISTICS.—Carpophores dwarfish; pileus 10–35 mm broad, convex or flattened, often slightly depressed, blackish brown, only slightly pallescent on drying; lamellae pale then brownish pink; stipe dull grey-brown, striate; spores 8.4–11.3(–12.4) × 7–9 μm, Q = 1.15–1.3–1.4; pigment intracellular and encrusting. Clamp-connections abundant in all tissues.

Pileus 10–35 mm broad, convex soon flattened or concave with or without central depression, more rarely faintly umbonate, with margin involute when young, weakly hygrophanous, when moist blackish brown, only slightly paler at margin (10 YR 2/1, 2/2, 3/2, towards margin 10 YR 3/2, 3/3, 4/4, outermost margin 10 YR 5/4, 6/4), not striate or only at outermost margin, only slightly pallescent on drying towards more greyish brown (10 YR 4/3, 3/4), dull, subfelted at centre (lens). Lamellae L = 20–40, l = (1–)3–5, broadly adnate with short decurrent tooth or slightly emarginate, sometimes veined on sides or interveined, sometimes thickish, pale brown or yellowish when young then pink finally brown-pink (10 YR 7/3; 7.5 YR 7/6, 7/4, 6/6), with slightly eroded, concolorous edge. Stipe 13–50 × 2–10 mm, cylindrical-flexuose or strongly

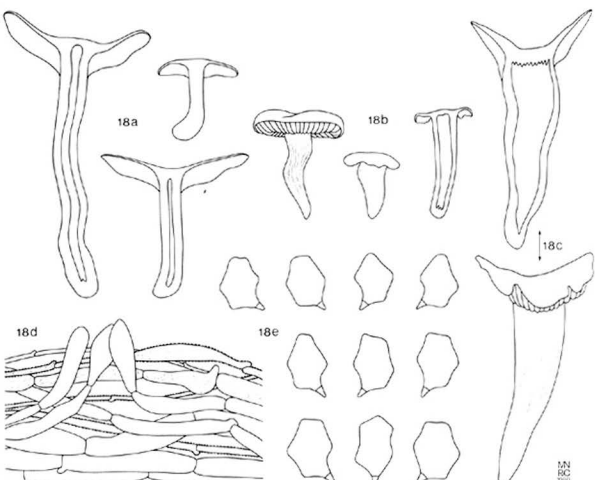


Fig. 18a–e. *Entoloma gerriae*. — Habit, spores and pileipellis (18a, d, e from holotype; 18b from *Wisman* 16 Oct. 1978; 18c from *Piepenbroek* 1039a).

tapering towards base, solid, pale at very apex, downwards dull grey-brown (10 YR 6/4, 5/4, 5/3, 5/2, 4/3) with silvery-white striation lengthwise, rarely smooth and somewhat polished, at apex slightly pruinose, at base white-tomentose. Flesh sordid, very firm. Smell and taste strongly farinaceous-rancid.

Spores 8.4–11.3(–12.4) × 7–9 μm, Q = 1.15–1.3–1.4, L–D = (1.2–)1.5–2–3.5 μm, mostly 6-angled in side-view with pronounced angles and with dihedral base. Basidia 24–45(–50) × 9.5–14 μm, 2- and 4-spored. Cystidia none. Hymenophoral trama regular, made up of cylindrical to inflated cells, 22–90(–130) × 5–18 μm. Pileipellis a cutis of radially arranged, 3–12 μm wide cylindrical or slightly inflated hyphae, sometimes with clavate terminal cells, particularly at centre, with coarsely encrusted walls and in addition brown intracellular pigment. Pileitrama compact, (sub-)regular, made up of cylindrical or inflated cells, 20–70(–95) × 8–15 μm, mixed up with 3–12 μm wide cylindrical hyphae with membranal and encrusting pigment and interspersed, brown intracellular pigment, particularly in upper layer and at centre of pileus. Vascular hyphae numerous in trama. Clamp-connections frequent in all tissues studied.

HABITAT & DISTRIBUTION.—Terrestrial on clayey soil in beech forest (*Fagus sylvatica*). So far known only from two different localities in the Netherlands. Aug.–Oct.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Friesland, Ysbrechtum, Epema state, 16 Oct. 1978, *J. Wisman 60D*; prov. Gelderland, Wilp, along road near estate 'de Poll', 28 Aug. 1977, *H. Piepenbroek & G. Piepenbroek-Grooters* 1039a: idem 10 Sept. 1978, *H. Piepenbroek & G. Piepenbroek-Grooters* 1101 (holotype).

This dwarfish *Entoloma* is characterized by its dark, hardly striate and weakly hygrophanous pileus, grey stipe, double pigmentation and elongate spores. Macroscopically it is quite similar to *E. atrosericeum* from subalpine and boreal dwarf-shrub heaths, but that species has more isodiametrical spores and lacks any intracellular pigment. Other dwarfish *Entoloma* species with a blackish-brown pileus such as *E. atropellitum* and *E. anthracinum* differ among other things in having exclusively intracellular pigment and a preference for the alpine zone. *Entoloma venosum* is much larger, has slightly different spores and occurs in coniferous foests.

The habit of *E. gerriae* is similar to that of *E. sericeum* and related taxa, but the double pigmentation and size and shape of tramal elements as well as the size and shape of the spores prevent confusion (see Noordeloos, 1979: 478–485).

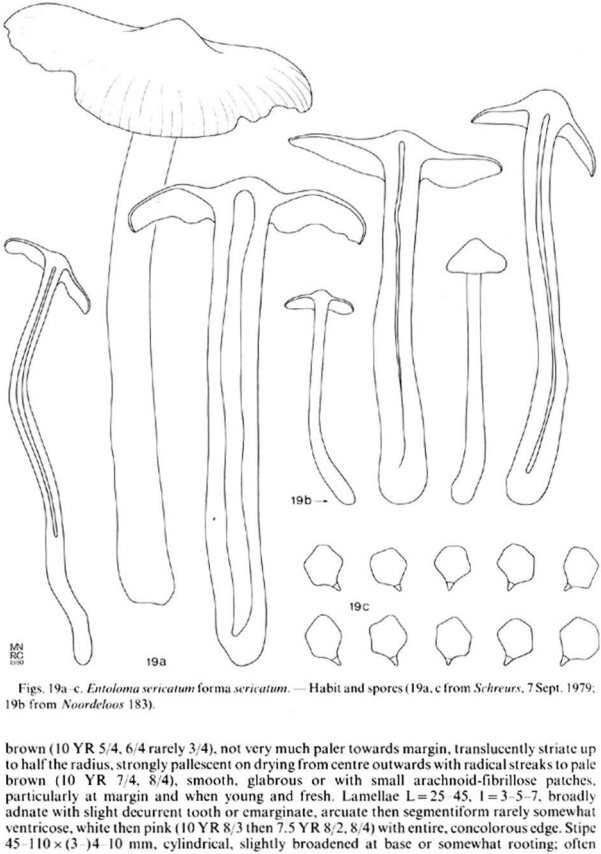
23. ENTOLOMA SERICATUM (Britz.) Sacc. forma SERICATUM.—Figs. 19a–c

Agaricus sericatus Britz. *in* Bot. Zbl. **15/17**: 8. 1893. — *Entoloma sericatum* (Britz.) Sacc., Syll. Fung. **11**: 45. 1895. — *Rhodophyllus sericatus* (Britz.) Favre. Ass. fong. Hauts-marais: 54. 1948.

SELECTED DESCRIPTION.—Favre *in* Bul. Soc. mycol. Fr. **53**: 273–277, fig. 2. 1937.

CHARACTERISTICS.—Carpophores medium-sized; pileus 15–70 mm broad, pale to moderately dark brown; lamellae pink, usually without any grey and/or brown tinge; stipe pale with dense silvery-white striation; smell farinaceous or subnitrous; pigment predominantly membranal, the narrowest hyphae of pileipellis and pileitrama encrusted, in addition sometimes intracellular pigment present; in marshy frondose forests, often growing in *Sphagnum*.

Pileus 15–70 mm broad, conical or semiglobose when young, soon expanding to plano-convex or flattened, rarely somewhat concave, usually with broad, flattened umbo, with slightly involute margin when young, strongly hygrophanous, when moist pale to moderately dark



Figs. 19a–c. *Entoloma sericatum* forma *sericatum*. — Habit and spores (19a, c from *Schreurs*, 7 Sept. 1979; 19b from *Noordeloos* 183).

brown (10 YR 5/4, 6/4 rarely 3/4), not very much paler towards margin, translucently striate up to half the radius, strongly pallescent on drying from centre outwards with radical streaks to pale brown (10 YR 7/4, 8/4), smooth, glabrous or with small arachnoid-fibrillose patches, particularly at margin and when young and fresh. Lamellae L = 25–45, l = 3–5–7, broadly adnate with slight decurrent tooth or emarginate, arcuate then segmentiform rarely somewhat ventricose, white then pink (10 YR 8/3 then 7.5 YR 8/2, 8/4) with entire, concolorous edge. Stipe 45–110 × (3–)4–10 mm, cylindrical, slightly broadened at base or somewhat rooting; often

flexuose, fistulose, (very) pale brown, densely covered with silvery white fibrils, at apex pruinose or not, at base white tomentose. Flesh whitish, very brittle, rarely more firm-subcartilagineous in stipe. Smell spontaneously often subnitrous-subalcaline, but later on more farinaceous. Taste very unpleasant rancid, like paraffin-oil.

Spores 8–10 × 6.4–8.1, Q = 1.05–1.2–1.25(–1.3), L–D = 0.6–1.2–2.5 μm, rather rounded 5–6-angled in side-view. Basidia 25–42 × 8.5–15 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 45–150 × 9–14 μm. Pileipellis a thin cutis made up of radially arranged cylindrical 2.5–8 μm wide hyphae with slightly gelatinised, pale coloured, sometimes minutely encrusted walls. Pileitrama regular in limb, in centre more interwoven-irregular, made up of irregularly shaped, inflated cells, 53–140 × 8–32 μm with pale membranal pigment and, particularly on the narrowest hyphae, minute encrustrations, spread with additional intracellular pigment particularly in upper layer. Clamp-connections in all tissues.

HABITAT & DISTRIBUTION.—In swamp-forests of *Alnus glutinosa*, *A. viride*, *Salix* spp. and/or *Betula pubescens* often growing in *Sphagnum*. Known to occur in France, Switzerland, German Federal Republic, Sweden and the Netherlands. Sept.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Drenthe, Roden, Mensingebos, 15 Sept. 1976, *M. E. Noordeloos 183*; prov. Gelderland, Winterswijk, Korenburgerveen, 7 Sept. 1979, *J. Schreurs* (3 collections).

FRANCE, dept. Doubs, Russey, Tourbière de la Chenalotte, 18 Sept. 1937, *J. Favre* (G). — SWEDEN, Småland, Värnamo near Elgarud, 14 Sept. 1959, *C. Bas 1769*.

24. ENTOLOMA SERICATUM forma **saliciphilum** Noordeloos, *forma nova*.—Figs. 20a–d

A forma typica differt stipite valde sericeo, albo, in dunis sabulosis inter *Salices repentes* crescit.—Typus: 'nature-reserve Zwanewater, Callantsoog, prov. Noord-Holland, Netherlands, *M. E. Noordeloos 1076*, 21-X-1979' (L).

CHARACTERISTICS.—Carpophores medium-sized; pileus 20–60(–70) mm broad, convex soon flattened with small umbo, pale (yellowish) brown or greyish-yellowish brown, pallescent on drying; lamellae pale then pink; stipe brilliantly white, shining; smell often subnitrous when collected, later none or more farinaceous; spores 7.6–10.4 × (7–)7.2–8.6(–9.3) μm, Q = (1.0–)1.05–1.15–1.25(–1.3); two types of pigment present, viz. intracellular and encrusting, in pileipellis and upper pileitrama; in *Salix repens* thickets in coastal sanddunes.

Pileus 20–60(–70) mm broad, (conico-)convex, then expanding with small umbo, with margin slightly involute, particularly when young but later often straight, marginal zone often irregularly lobed with age, hygrophanous, when moist more or less unicoloured, yellowish grey or yellowish brown (10 YR 5/4, 6/4, 7/4 rarely 4/3) sometimes darker at centre (10 YR 3/2, 4/3), not very much paler towards margin, translucently striate up to one third of radius, strongly pallescent on drying to pale greyish-yellowish or sordid white (10 YR 7/3, 8/4, 8/3, 8/2; 2.5 Y 7/2, 8/2) smooth, shining or, particularly when young with minute, silvery, fibrillose or micaceous patches at margin. Lamellae L = 25–40, l = 3–7, deeply emarginate to almost free, rarely adnate, arcuate then segmentiform rarely subventricose, white, then pink, without any grey and/or brown tinge (10 YR 7/4; 7.5 YR 8/4, 7/4), with subentire or crenulate concolorous edge. Stipe 20–80(–90) × 3–7 mm, cylindrical, sometimes slightly broadened at base, brilliantly white, innately striate lengthwise, shining, sometimes slightly pruinose at apex. Flesh (sordid) white, brittle in stipe, more firm in pileus. Smell spontaneously often reminiscent of that of *E. nidorosum*, later often faint or subfarinaceous. Taste very nasty-rancid, like that of parafin-oil.

Spores 7.6–10.4 × (7–)7.2–8.6(–9.3) μm, Q = (1.0)1.05–1.15–1.25(–1.3), L–D = (0–)0.6–1.5–2.0 μm, rather rounded 5–6-angled in side-view. Basidia 27–40 × 10–12.5 μm, 4-spored. Cystidia

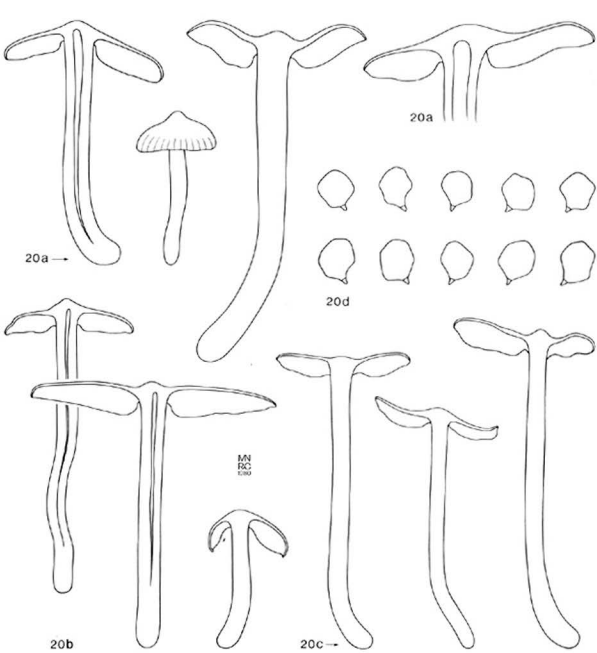


Fig. 20a–d. *Entoloma sericatum* forma *saliciphilum*. — Habit and spores (20a, d from *Noordeloos* 1079; 20b from holotype; 20c from *Noordeloos* 1080).

none. Hymenophoral trama regular, made up of cylindrical to inflated cells, 80–240 × 10–19 μm. Pileipellis a thin cutis of loosely arranged, narrow-cylindrical 2–6 μm wide hyphae with pale brown intracellular pigment and minutely encrusted walls (often at best visible near septa), with easily desintegrating-gelatinising walls making the pileipellis almost an ixocutis. Pileitrama regular in limb, in centre interwoven, almost pseudoparenchymatical, made up of short, inflated cells, 50–135(–200) × 12–32 μm, with intracellular pigment and minute encrustations in upper layer only. Vascular hyphae present or not. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION. — Terrestrial in *Salix repens* thickets in coastal dunes in the North of the Netherlands and German Federal Republic, particularly on the West-Friesian Islands. Oct.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Noord-Holland: Callantsoog, nature-reserve 'Zwanewater', 5 Nov. 1977, *C. Bas 7301*; idem, 21 Oct. 1979, *M. E. Noordeloos 1076* (holotype), *1079 & 1080*; Isl. of Texel, nature-reserve 'De Geul', 25 Oct. 1977, *M. E. Noordeloos 558*.

GERMAN FEDERAL REPUBLIC, Ost Friesland, Isl. of Borkum, 30 Oct. 1977, *C. Bas 7260, 7270, 7272, 7273*.

Entoloma sericatum as described above is taken in the sense of Favre (l.c.) and Kühn. & Romagn. (1953: 195) which is probably the same as the original concept of Britzelmayer. Favre and Kühner & Romagnesi do not mention the occurrence of encrusting pigments in the pileipellis and pileitrama, which place *E. sericatum* in subsection *Typodochroa*. I have found this character to be constant in all material studied, including Favre's collection. This character makes it easier to distinguish *E. sericatum* form *E. nidorosum*, occurring frequently in the same habitat. *Entoloma nidorosum* has exclusively intracellular pigment and a more pronounced nitrous smell.

Entoloma sericatum occurs in swamp forests of *Betula, Alnus* and *Salix* and grows preferably among *Sphagnum* (Favre, l.c. and 1948: 54; Einhellinger 1977: 119). A very constant and rather characteristical variant from *Salix repens* communities in the coastal dunes in the north of the Netherlands and Germany is described here as a distinct form because of the striking difference in habitat and some slight macroscopical differences such as the brilliantly white stipe.

Entoloma majaloides is very similar to *E. sericatum*. It is distinguished by the predominant yellow tinges in the pileus and the lack of a distinct smell. These differences are perhaps insufficient reasons for maintaining a distinction between the two taxa on specific level, but more material is needed before a more final decision on the status of *E. majaloides* can be made.

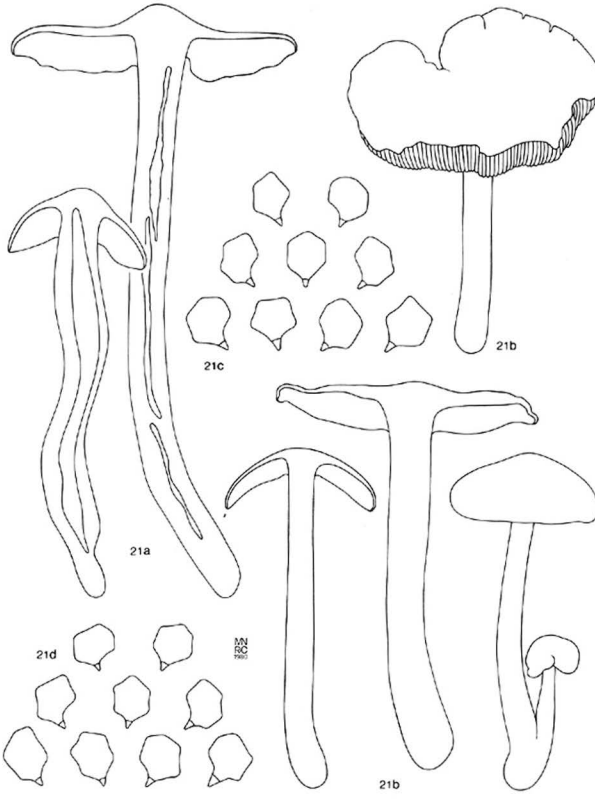
25. ENTOLOMA MAJALOIDES P. D. Orton. Fig. 21a–d

Entoloma majaloides P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 130. 1960.

CHARACTERISTICS.—Carpophores medium-sized to large, pileus 32–85 mm broad, yellow-brown; lamellae pale pink with slight grey tinge, stipe 70–120 × 8–12 mm; strongly and aeriferously silvery striate on yellow-brown background, smell none; pigments encrusting and intracellular.

Pileus 32–85 mm broad, conical or hemispherical when young, soon expanding, finally flattened with weak, broad umbo and margin more or less straight and undulating with age, strongly hygrophanous, when moist brown in young specimens (10 YR 3/3, 4/3), not translucently striate, when mature yellow-brown (10 YR 5/4, 6/4, 7/4, 6/6, 7/6), translucently striate up to 1/3 or 1/2 of the radius, strongly pallescent on drying, surface covered with minute silvery hairs when young, later glabrescent but remaining slightly pruinose-villose at centre (lens). Lamellae L = 28–40, l = 3–9, broadly adnate or emarginate, segmentiform to ventricose, pale greyish when young, later pale, sordid pinkish (2.5 Y 8/2, 10 YR 8/2 then between 10 YR 7/3 and 7.5 YR 8/4), with serrulate, concolorous edge. Stipe 70–120 × 8–12 mm, cylindrical or slightly broadened at base, sometimes more or less rooting, solid then fistulose, strongly silvery white aeriferously striate on yellow-brown background, at apex sometimes conspicuously pruinose, at base white-tomentose. Flesh pale grey in pileus and stipe, brittle. Smell none or very weakly farinaceous. Taste none or rancid.

Spores 8.1–10.4 × 7–8 μm, Q = (1.0–)1.05–1.15; L–D = 0–0.6–1.2 μm, isodiametrical, rounded 5–6–7-angled in side-view. Basidia 27–40 × 8.7–1.35 μm, 4-spored. Cystidia none.



Figs. 21a–d. *Entoloma majaloides*. — Habit and spores (21a from *Noordeloos* 231; 21b, c from *Kits v. Waveren*, 11 Oct. 1966; 21d from holotype).

Hymenophoral trama regular, made up of cylindrical to weakly inflated cells, 37–80(–110) × 5.5–19(–27) μm. Pileipellis a thin cutis made up of cylindrical, 2.5–6 μm wide, minutely encrusted hyphae. Pileitrama regular, made up of cylindrical to inflated cells, 42–120 × 7–30 μm, with minutely encrusted walls and some scattered intracellular pigment, particularly in upper layers. Vascular hyphae present. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In frondose forests, *Betula*, *Alnus*, *Populus*, *Salix*, etc. In Great-Britain also recorded from coniferous forest. Known to occur in the Netherlands and Great Britain. Rare (?).

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Twickel, 11 Oct. 1966, *E. Kits van Waveren*; prov. Zuid-Holland, Oostvoorne, 'vliegveld-vallei' in dunes, 27 Sept. 1976, *M. E. Noordeloos* 231.

GREAT-BRITAIN, Inverness-shire, Rothiemurchus, Loch-an-Eilan, 8 Sept. 1957, *P. D. Orton* (holotype, K).

The Netherlands' collections of *E. majaloides* agree very well with the description given by Orton (l.c.). Particularly an excellent photograph of the Kits van Waveren collection shows clearly the predominant yellow colour of the carpophores. This yellow colour and the lack of a distinct smell made me consider these collections as different from *E. sericatum* on specific level and apply the epithet '*majaloides*' to them. However, the differences are not very impressive. Particularly smell and taste are considered of relatively low diagnostic value by me. The Kits van Waveren collection was said to have no distinct taste, but my own collection, which macroscopically is perfectly similar to the former, had a distinct rancid taste, although the smell was very weak.

For the time being I maintain *E. sericatum* and *E. majaloides* as different taxa on specific level. However, the material available was too scanty to get a clear insight in their variability. More collections and further investigations are needed for a more definite conclusion.

26. ENTOLOMA SORDIDULUM (Kühn. & Romagn.) P. D. Orton – Figs. 22a–e

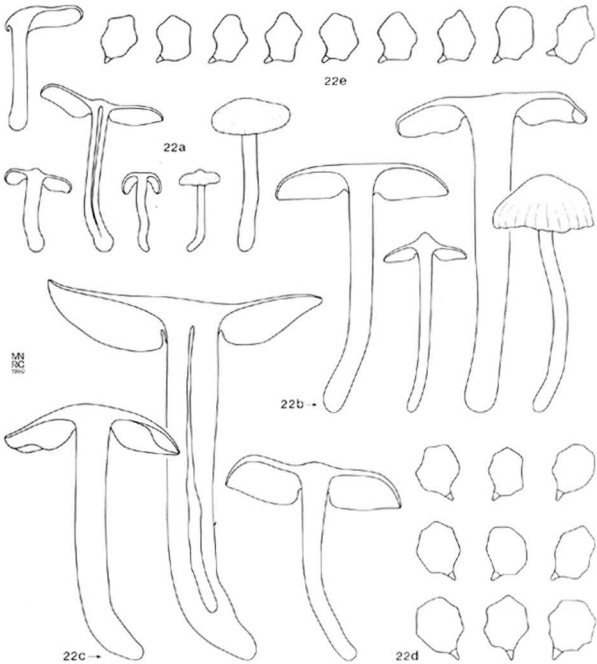
Rhodopyllus sordidulus Kühn. & Romagn. *in* Rev. Mycol. **19**: 10. 1954 (Fl. anal.: 194. 1953, nom. nud.).—*Entoloma sordidulum* (Kühn. & Romagn.) P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 175. 1960.

HOMONYM: *Entoloma sordidulum* Horak *in* Beih. Nova Hedwigia **43**: 12. 1973 (changed into *E. minutoalbum* Horak, Fl. Cript. Tierra del Fuego **13**: 96, 1979).

SELECTED ICON & DESCRIPTION.—Romagnesi apud Kühn. & Romagn. *in* Rev. Mycol. **20**: 208–210, fig. 16, pl. 3 fig. b, 1955.

CHARACTERISTICS.—Carpophores small to medium-sized; pileus 10–40(–50) mm broad, pale to moderately dark brown; lamellae usually with grey-brown tinge; stipe 20–50(70) × 2–4.5(–6) mm, sordid grey-brown with silvery-white striation; flesh firm, ± white; smell farinaceous; pigment minutely encrusting at least the narrow hyphae of pileipellis and pileitrama, in addition intracellular, particularly in subpellis and upper pileitrama; terrestrial in frondose forests, often on clayey soils.

Pileus (5.5–)10–40(–55) broad, conical to hemispherical at first usually soon expanding to plano-convex, finally flattened or even concave, usually with rounded umbo and this sometimes situated in a central depression, with margin slightly involute when young but straight later on, with marginal zone irregularly lobed and undulating with age, hygrophanous, when moist pale



Figs. 22a–e. *Entoloma sordidulum*. — Habit and spores (22a, c from *Noordeloos* 1176; 22b from *Noordeloos* 1178; 22e from *Bas & Gordijn*, 29 Sept. 1976; 22d from lectotype).

to moderately dark grey-brown, sometimes with reddish flush (7.5 YR 4/2, 6/4, 10 YR 5/3, 5/4, 6/3, 6/4, 7/2, 7/3, 7/4, 2.5 Y 6/3, 7/2), paler at margin (10 YR 7/3, 7/4), usually with conspicuously darker centre (7.5 YR 3/2, 4/2, 10 YR 2/2; 3/2, 3/3, 4/2, 4/3, 5/3), not translucently striate or at margin only, strongly pallescent on drying to grey-brown or yellowish grey (10 YR 7/3, 8/3, 8/6, 8/8), smooth or slightly rugulose-fluffy at centre, sometimes radially wrinkled on limb. Lamellae L = 20–40, l = 1–3–5, narrowly adnate to emarginate, more rarely broadly adnate with slight decurrent tooth, segmentiform or ventricose, rarely very broad and extending below the pileus

pale grey, rarely white when young, then tinged pink, finally often brown-pink (10 YR 8/3, 7/3, 7/4, 6/4, 7.5 YR 8/4, 7/4, 6/4), with entire or irregularly serrulate edge. Stipe 20–50(–60) × 2–4.5(–6) mm, central, rarely excentrical, cylindrical, sometimes broadened at base, sordid white to pale grey-brown (10 YR 8/3, 7/4, 7/3, 7/2, 6/4) with innate silvery white striation lengthwise, shining, often 'undulating' but not polished, at apex pruinose, downwards smooth. Flesh firm, (sordid) white, firm in stipe. Smell and taste strongly farinaceous-rancid, with nasty aftertaste.

Spores 8.1–11.5 × 7.0–8.7(–9.3) µm, Q = (1.0–)1.1–1.2–1.3(–1.4), L–D = (0.0–)0.6–1.7–2.5(–3.0) µm, irregularly 5–7-angled in side-view, subisodiametrical to shortly ellipsoid in outline. Basidia 30–45 × 10.4–14 µm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of cylindrical to inflated cells, 50–190(–200) × 8–32 µm, with hyaline, sometimes pale coloured, rarely minutely encrusted walls. Pileipellis a thin cutis of radially arranged, 1.8–7 µm wide, cylindrical hyphae with minutely encrusted walls, sometimes with ascending, clavate terminal cells, up to 17 µm wide, particularly at centre of pileus, sometimes with additional intracellular pigment; subpellis not clearly separated from trama, made up of short, broadly inflated cells, 27–65 × 10–32 µm, gradually passing into pileitrama. Pileitrama regular, made up of inflated cells, (45–)60–120(–200) × 11–34 µm with intracellular pigment in upper layer, intermixed with narrow, 4–11 µm wide, cylindrical hyphae with minutely encrusted walls. Vascular hyphae sometimes abundant in pileitrama. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—Terrestrial in frondose forests, often on clayey soils, common and widespread in western Europe, July–Dec.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Groningen, Leek, Nienoord, 14 Sept. 1976, *M. E. Noordeloos 170*; prov. Drenthe, Roden, 12 Oct. 1977, *J. Schreurs*; prov. Gelderland: Wilp, near estate 'de Lathmer', 28 Aug. 1977, *H. Piepenbroek & G. Piepenbroek-Grooters 1041*, Winterswijk, Bek-en-Delle, 20 Sept. 1976, *M. E. Noordeloos 188*; idem, 3 Sept. 1979, *J. Schreurs*; Oosterhout, estate 'Oosterhout', 23 Aug. 1980, *M. E. Noordeloos 1176, 1178*; Beesd, estate 'Mariënwaard', 10 Aug. 1977, *C. Bas 5867*; idem, 15 Oct. 1977, *J. Schreurs*; prov. Utrecht: Bunnik, estate 'Ameliseweerd', 25 Sept. 1978, *M. E. Noordeloos 740*; Neerijnen, estate 'Neerijnen', 6 Sept. 1980, *T. Kuyper & J. Schreurs*; Vleuten, Bijleveld, 11 Nov. 1976, *M. E. Noordeloos 258*; prov. Noord-Holland: Bergen, Komlaan, in garden, 13 Oct. 1976, *M. E. Noordeloos 223*; Amsterdam, Amsterdamse bos, 16 July 1959, *E. Kits v. Waveren*; Kortenhoef, near hotel 'de Zuwe', 14 Oct. 1957, *C. Bas 1284*; prov. Zuid-Holland: Oegstgeest, estate 'Poelgeest', 20 Aug. 1979 and 16 Oct. 1979, *M. Brand*; Leiden, Leidsche Hout, 4 Sept. 1977, *M. E. Noordeloos 438*; idem, 29 Sept. 1976, *C. Bas & T. Gordijn*; Leiden, Heempark, 4 Sept. 1977, *M. E. Noordeloos 437*; prov. Noord-Brabant, Dorst, 6 July 1959, *P. B. Jansen*; prov. Limburg, Schaelsberg, Savelsbos, 20 Aug. 1977, *P. B. Jansen*. GERMAN FEDERAL REPUBLIC: Westfalen, Detmold, Externsteine, 7 Oct. 1976, *C. Bas*; idem, Sandebeck forest, 5 Oct. 1976, *M. E. Noordeloos 210*. — FRANCE: dept. Seine, Bois de Vincennes, Sept. 1933, *H. Romagnesi s.n.* (Herb. Romagn., PC); idem, Oct. 1937, *H. Romagnesi 37.248* (lectotype, design. mihi, Herb. Romagn., PC); dept. Seine & Oise, Luzarches, 29 July 1942, *H. Romagnesi 42.249* (Herb. Romagn. PC); Coye-la-Forêt, 15 Sept. 1950, *H. Romagnesi 50.266* (Herb. Romagn., PC).

Entoloma sordidulum is one of the smaller species in subgenus *Entoloma*. It may also easily be recognized by the sordid brown colour of the pileus, relatively firm flesh, sordid tinges of the stipe, strong farinaceous smell, and also the habitat, as it prefers frondose forests on clayey soils. *Entoloma subradiatum* is very similar, and differs mainly in the abundant intracellular pigment in the pileipellis and the lack of any encrusting pigments.

ENTOLOMA section POLITA (Romagn.) ex Noordeloos

Rhodophyllus subsect. *Politi* Romagn. *in* Bull. Soc. mycol. Fr. **53**: 327. 1937 (nom. nud., no latin diagnosis). — *Rhodophyllus* section *Politi* (Romagn.) Singer *in* Annls mycol. **41**: 13. 1943. — *Entoloma*

section *Polita* (Romagn.) ex Noordeloos *in* Persoonia **11**: 138. 1981. — Lectotype (Singer, 1951: 617): *E. politum* (Pers. ex Fr.) Donk.

Agaricus subtr. *Eccilia* Fr., Syst. mycol. **1**: 10. 1821. — *Agaricus* subgenus *Eccilia* (Fr.) Loud., Encyl. Pl. 998. 1829. — *Rhodophyllus* subgenus *Eccilia* (Fr.) Quél., Enchir.: 62. 1886. — *Eccilia* (Fr.) Kumm., Führ. Pilzk.: 23. 1871. — Lectotype (Donk, 1949: 158): *E. politum* (Pers. ex Fr.) Donk.

Habit omphaloid or collybioid; pileus with depressed or umbilicate centre; lamellae adnate or uncinate or decurrent; stipe smooth as if polished; pigment intracellular; clamp-connections abundant in all tissues.

KEY TO THE SPECIES OF SECTION POLITA

1a. Basidia 2-spored. . . . . *E. bisporigerum*, p. 215
b. Basidia (at least in majority) 4-spored 2
2a. Spores (7.6–)8.1–9.7(–10.4) × (6.5–)7.0–8.1(–8.7) µm, Q = (1.0–)1.05–1.15–1.3; smell none or nitrous (like chlorine) 3
b. Spores 8.1–11.5(–12.0) × (6.5)7.0–8.7(–9.3) µm, Q = 1.1–1.25–1.4(–1.5); smell strong, farinaceous or rancid-farinaceous, sometimes nauseating-rancid with garlic-component (like that of *Micromphale perforans*). . . . . *E. caccabus*, p. 213
3a. Pileus very dark sepia or grey-brown. . . . . *E. politum* f. *politum*, p. 210
b. Pileus pale horn brown, yellowish brown or cream, sometimes almost white when dry
E. politum f. *pernitrosum*, p. 211

27. ENTOLOMA POLITUM (Pers. ex Fr.) Donk forma POLITUM.—Figs. 23a–b

Agaricus politus Pers., Syn.: 465. 1801. — *Agaricus politus* Pers. ex Fr., Syst. mycol. **1**: 209. 1821 — *Eccilia polita* (Pers. ex Fr.) Kumm., Führ. Pilzk.: 95. 1871. — *Rhodophyllus politus* (Pers. ex Fr.) Quél., Enchir.: 62. 1886. — *Entoloma politum* (Pers. ex Fr.) Donk *in* Bull. bot. Gdn Buitenz., ser. III, **18**: 158. 1949. — *Leptonia polita* (Pers. ex Fr.) P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 178. 1960.

Rhodophyllus nitriolens Kühn. *in* Bull. Soc. mycol. Fr. **93**: 453. 1977.

SELECTED ILLUSTRATIONS & DESCRIPTIONS.—Fries, Icon. select. fung. pl. 100 fig. 3. 1874. — Bon & Chevassut *in* Docum. mycol. **11**: 13. 1973. — Einhellinger *in* Ber. Bayer. bot. Ges. **41**: 107, fig. 22, 23. 1969. — Kühner *in* Bull. Soc. mycol. Fr. **93**: 463–468. 1977.

CHARACTERISTICS.—Pileus dark sepia or grey-brown, usually distinctly umbilicate; lamellae pale then pink; stipe usually paler than pileus, polished; spores subisodiametrical, Q = 1.1–1.15 on the average per collection; smell none or nitrous.

Pileus (7–)10–47 mm broad, hemispherical to convex, flattening with age, with slightly depressed or umbilicate centre and involute margin, hygrophanous, when moist dark sepia or grey-brown (10 YR 3/2, 3/4, 4/3, 5/3), slightly paler at margin, translucently striate at margin only or up to $\frac{1}{2}$–$\frac{3}{4}$ of the radius, pallescent on drying, with smooth limb, at centre often slightly rugulose or fluffy, shining when dry. Lamellae L = 20–30, l = 1–3(–5), distant, broadly adnate, uncinate or short decurrent, sometimes emarginate with decurrent tooth, triangular-arcuate when young, then segmentiform or slightly ventricose with broadest part near stipe, white, then pink, sometimes with slight brown tinge (10 YR 8/3, 8/4, 7/3, 7/4, then 7.5 YR 7/4) with entire, concolorous edge. Stipe 16–85 × 2–6 mm, cylindrical, but sometimes flattened and then up to 10 mm broad, often more or less flexuose, pale yellowish brown to greyish brown (2.5 Y 8/4; 10 YR

7/3, 5/6, 5/4, 4/4), smooth, polished, not really shining. Flesh concolorous or slightly paler than surface, cartilagineous in stipe. Smell sometimes absent, but usually weakly to strongly nitrous (like chlorine). Taste unpleasant, subraphanoid or more rancid but not farinaceous.

Spores (7.6–)8.1–9.7(–10.4) × (6.5–)7.0–8.1(–8.7), Q = (1.0–)1.05–1.15–1.25(–1.30), L–D = (0–)0.6–1.5–2.4 μm, 5–6-angled in side-view, with base difficult to interprete but probably with basal facet. Basidia 24–36 × 8–12.5 μm, 4-spored. Cystidia none. Hymenophoral trama regular, composed of inflated cells, 70–110 × 14–20 μm, mixed up with 6–14 μm wide cylindrical hyphae. Pileipellis an ixocutis; suprapellis a thin layer of 4.5–12 μm wide, cylindrical hyphae with easily desintegrating/gelatinizing walls, in centre with numerous terminal cells, up to 18 μm wide; suppellis composed of chains of inflated cells 28–60 × 17–25 μm, with intracellular pigment. Pileitrama regular, composed of cylindrical to inflated hyphae with cells up to 120 μm long and 7–21 μm wide. Clamp-connections rather abundant in all tissues studied.

HABITAT & DISTRIBUTION.—Terrestrial, in marshy forests of *Alnus glutinosa*, *Salix* spp. div. and/or *Fraxinus excelsior* in the lowlands of western Europe; in the mountanous part of northern and central Europe met with in copses of dwarf-willows (*Salix arbuscula*, *S. reticulata*). Not common but widespread. Known to occur in Scandinavia, Great Britain, Netherlands, German Federal Republic, Belgium, France and Switzerland. May–Nov.

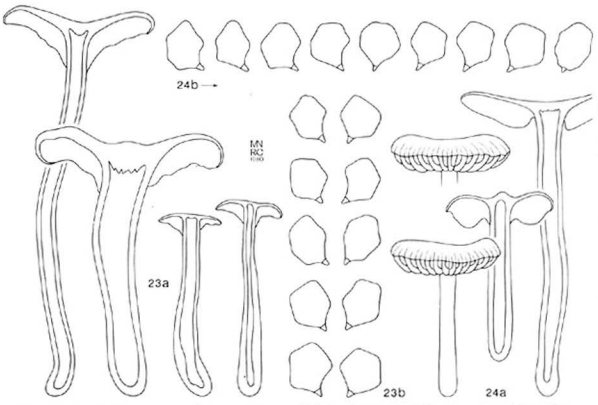
COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel, Delden, Carelshaven, 29 Sept. 1974, *E. Kits v. Waveren*; prov. Utrecht, Leusden, Stoutenburg, 22 Oct. 1978, *T. Boekhout*; prov. Noord-Holland, Kortenhoef, 14 Oct. 1957, *C. Bas 1287*; prov. Noord-Brabant: Breda, Liesbos, 13 Aug. 1965, *P. B. Jansen 65–172*; Strijbeek, Goudbergven, 31 May 1959, *P. B. Jansen*. BELGIUM, prov. Namur, Vencimont, N. of river Houille, 3 Oct. 1977, *M. E. Noordeloos 478*. — GREAT BRITAIN, Wales, Lake Vyrnwy, 8 Sept. 1977 and 19 Sept. 1979, *E. Kits v. Waveren*. — FRANCE: dept. Ain, St. Etienne du Bois, 18 Oct. 1962, *R. Kühner 62–234* (herb. Kühner, LY); dept. Landes, Lac d'Aureilhan, 13 Oct. 1977, *H. Romagnesi 77.327* (herb. Romagn., PC).

28. ENTOLOMA POLITUM forma **pernitrosum** (P. D. Orton) Noordeloos, *comb.* & *stat. nov.*—Figs. 24a–b

Leptonia pernitrosa P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 297. 1960. — *Eccilia pernitrosa* (P. D. Orton) P. D. Orton *in* Bull. bot. Gdns Edinb. **29**: 76. 1969.

CHARACTERISTICS.—Habit variable; pileus pale creamy yellow to yellowish brown, usually with distinct central depression or umbilicus, sometimes, however, papillate; lamellae creamy-white, then pink, sometimes with brown tinge, stipe often paler than pileus, polished; smell usually persistently nitrous.

Pileus 10–45 mm broad, rather variable in shape, hemispherical to convex with depressed or umbilicate, rarely papillate centre, with margin involute when young, later straight or even reflexed and usually strongly undulating, strongly hygrophanous, when moist horn brown, yellowish brown or cream (2.5 Y 7/4, 10 YR 8/4, 7/3, 7/4, 6/3, 6/4, 5/3, 7.5 YR 7/4), at centre sometimes slightly darker (10 YR 5/3, 5/4, 4/4, 7.5 YR 7/4), translucently striate up to $\frac{1}{2}$ ($-\frac{3}{4}$) of the radius, strongly pallescent on drying (10 YR 8/4, 8/3, 2.5 Y 8/4), at centre often slightly rugulose or fluffy, at limb fibrillose but smooth, shining, rarely with entire surface more or less hoary with innate silvery-fibrillose patches. Lamellae L = (16–)20–30, l = (1–)3–7, moderately distant, broadly adnate to uncinate, sometimes emarginate with decurrent tooth, segmentiform or ventricose and then extending under pileus and with broadest part near stipe, sometimes veined, white or cream, then pink, finally with brown tinge (10 YR 8/3, 8/4, then 10 YR 7/4, finally 7.5 YR 7/4) with entire, concolorous edge. Stipe 25–60 × 1.5–5 mm, cylindrical or flattened, often flexuose, sometimes tapering downwards, concolorous with pileus or paler



Figs. 23a–b. *Entoloma politum* forma *politum*. — Habit and spores (all figs from *Noordeloos* 816).
Figs. 24a–b. *Entoloma politum* forma *pernitrosum*. — Habit and spores (all figs. from *Noordeloos* 467).

particularly at apex (2.5 Y 8/4, 10 YR 8/4, 7/4, 6/4), at apex rarely minutely pruinose, downwards smooth, polished, rarely with some scattered innate fibrils (lens), base sometimes somewhat tomentose. Flesh concolorous with surface, inner parts of fleshy specimens almost white, brittle in pileus, cartilagineous in stipe, Smell usually strongly and persistantly like that of chlorine (nitrous), sometimes weak. Taste somewhat nasty, petroleum-like, not farinaceous.

Spores (7.6–)8.1–9.9(–10.4) × (6.5–)7.0–8.1(–8.7) μm, Q = (1.0–)1.05–1.15–1.3, on the average 1.1–1.2 per collection, L–D = (0–)0.6–1.2–2.5(–3.0) μm, 5-, rarely 6-angled in side-view, with basal facet or blunt dihedral base, ('base tronqué'). Basidia (22–)26–34(–42) × (7.0–)8–13 μm, 4-spored. Cystidia none. Hymenophoral trama regular, composed of chains of inflated sausage-like cells 27–92(–120) × 7–21(–27) μm. Pileipellis a cutis of radially arranged cylindrical hyphae, 4–12 μm wide with easily desintegrating walls, subpellis made up of strongly inflated cells, 40–92(–120) × 12–28 μm, with abundant pale brown intracellular pigment. Pileitrama regular, made up of inflated cells up to 140 μm long, 10–22 μm wide, usually not pigmented. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION. — As the type-forma, viz. on the ground in damp thickets and forests mainly of *Alnus glutinosa*, *Salix* spp., *Fraxinus excelsior*, etc. Probably not uncommon in the plains and the mountains of western and northern Europe. Recorded from Great Britain, Scandinavia, Netherlands, German Federal Republic, Belgium and France. Sept.–Nov.

COLLECTIONS EXAMINED. — NETHERLANDS: prov. Groningen, estate 'Westerbroek', 10 km. N.E. of Groningen-town, 12 Oct. 1958, *L. S. Wildervanck*; prov. Gelderland, Winterswijk, Willinks Weust, 20 Oct. 1977, *M. E. Noordeloos 551*; prov. Zuid-Holland, Voorschoten, estate 'ter Horst', 25 Sept. 1977, *M. E. Noordeloos 467*, 13 Sept. 1978, *M. E. Noordeloos 704*, 711; prov. Noord-Brabant, Bergen op Zoom, Zoomland, 27 Oct. 1973, *P. B. Jansen* 73-195; Budel, near 'Visvijvers', 9 Oct. 1977, *M. E. Noordeloos 512*.

BELGIUM: prov. Limburg, Bèvercé, along river 'Warsche', 24 Sept. 1972, *P. B. Jansen 72–211*; prov. Namur: Ave-et-Auffe, Source d'Ave, 7 Oct. 1977, *M. E. Noordeloos 511*; Vencimont, N. of river Houille, 3 Oct. 1977, *M. E. Noordeloos 477, 480, 482*. — GERMAN FEDERAL REPUBLIC, Westphalen, Detmold, Sandebeckforest, 5 Oct. 1976, *M. E. Noordeloos 206, 207, 209*. — GREAT BRITAIN, Dorset, Studland, 21 Nov. 1955, *P. D. Orton* (holotype, K).

Entoloma politum is a species which is quite common in moist deciduous forests, in particular in copses and thickets of *Alnus*, *Fraxinus* and/or *Salix*, both in the lowlands and in the mountainous and boreal habitats of northern and western Europe. It is characterized by its small, omphalioid habit, polished stipe, almost isodiametrical spores, and in some cases also by the faint to strong and persistant nitrous smell. Because of the latter character many people have most probably identified this species as a small *E. nidorosum*, which differs, however, strikingly in the striate, fibrous stipe, more robust habit and differently shaped spores.

Entoloma politum frequently occurs in the same habitat as *E. caccabus* and *E. bisporigerum* and grows often in between populations of these other two species in the field. *Entoloma caccabus* and *E. bisporigerum* can often be distinguished from *E. politum* by their rancid-farinaceous smell. Besides, there are differences in spore-size and spore-shape.

Kühner (1977: 470–471) has given a new name, viz. *Rhodophyllus nitriolens*, to *Rhodophyllus politus* sensu Lange and Kühner & Romagnesi. He has done this on account of the fact that Fries did not mention the nitrous smell in his diagnosis of *Agaricus politus*. In my experience the smell of *E. politum* is often weak, and the nitrous character of it can often only be observed at the moment of collecting; in many cases the smell disappears completely later on. Moreover, many people have no sense for the subtle nitrous smell. I tested several experienced mycologists during forays of the Netherlands Mycological Society on the ability to perceive this smell. It appeared to be a fifty-fifty chance to get a positive or negative reaction. Furthermore Fries' sense for smells was reputedly bad. Considering all this, I don't think that the nitrous smell of many collections of *E. politum* as described here is a very good argument to rename this species, as there is no other evidence that our concept is specifically different from that of Fries.

The colour of *E. politum* is very variable. One frequently finds pale forms perfectly fitting the description given by Orton of his '*Leptonia pernitrosa*'. These pale forms, however, grow often intermixed with typical *E. politum* and I got the strong impression that intermediate colour-forms occur. Therefore I see no reason to distinguish these two taxa on specific level.

29. ENTOLOMA CACCABUS (Kühn.) Noordeloos—Figs. 25a–c

Rhodophyllus caccabus Kühn. apud Kühn. & Romagn. *in* Rev. Mycol. 19: 3–4. 1954 (Fl. anal.: 195. 1953, nom. nud.). — *Entoloma caccabus* (Kühn.) Noordeloos *in* Persoonia 11: 86. 1980.
Eccilia paludicola P. D. Orton *in* Trans. Br. mycol. Soc. 43: 227. 1960.

CHARACTERISTICS.—Carpophores omphalioid; pileus convex-umbilicate, dark (reddish) brown; lamellae pale then pink, often with brown tinge; stipe usually paler than pileus, smooth, polished; smell strongly farinaceous-rancid to rancid-fetid; spores heterodiametrical, Q = 1.25 on the average per collection.

Pileus 10–25(–40) mm broad, convex to concave with depressed, often umbilicate centre, rarely subumbonate; with margin involute when young, often remaining so a long time, finally straight, with marginal zone undulating with age, hygrophanous, when moist dark (reddish) brown or date brown with grey tinge (10 YR 3/4, 4/4; 7.5 YR 3/2, 4/2, 4/4; 5 YR 2/2, 3/2), only slightly paler towards margin, translucently striate at margin only or up to half the radius, on drying pallescent to reddish brown or greyish brown (7.5 YR 4/2, 5/2; 10 YR 5/3, 6/3, 6/4, 7/3), smooth, shining. Lamellae L = 20–30, l = (1–)3–5–7, moderately distant, arcuate-triangular then segmentiform, sometimes ventricose with broadest part near stipe, pale, then pink, often with distinct brown tinge (10 YR 7/4; 7.5 YR 7/4, 6/4, 5/4), with concolorous or slightly paler, entire or eroded edge. Stipe 12–45 × 1–3(–4) mm, cylindrical or flattened, sometimes tapering downwards, rarely slightly broadening towards base, often flexuose, yellowish brown or greyish brown, often distinctly paler than pileus, often basal part paler than upper part, even to almost white (10 YR 4/3, 5/4, 5/3, 6/3, 6/4, 7/3; 7.5 YR 4/2, 5/4, base sometimes 2.5 Y 7/4, 8/4) smooth, polished. Flesh concolorous with surfaces, in fleshy specimens in inner parts pale, brittle in pileus, (sub-)cartilagineous in stipe. Smell often strong, farinaceous-rancid to rancid-fetid, like that of rotten cabbage or paraffin oil. Taste rancid, nasty.

Spores 8.1–11.5(–12.0) × (6.5–)7.0–8.7(–9.3) μm, Q = (1.05–)1.10–1.25–1.40(–1.50), L–D = (0.6–)1.2–2.4–4.0 μm, mostly 6-angled in side-view, probably with dihedral base. Basidia 27–45 × 8.5–14.0 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, composed of sausage-shaped cells, (45–)60–120 × 12–27 μm. Pileipellis a cutis of cylindrical 7–14(–18) μm wide hyphae, sometimes with clavate terminal cells, made up of sausage-shaped hyphae, up to 125 μm long and 10–24 μm wide, with intracellular pigment particularly in upper layers. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—Terrestrial, often on bare soil in moist places in deciduous forests. In the Netherlands frequently found in *Alneta*, in *Fraxinus excelsior* stands on peaty-sandy, humus-rich soils and *Salix* bushes. Known to occur in the Netherlands, German Federal Republic (Einhellinger, 1977: 116) Great Britain and France. Not uncommon. July–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel: Denekamp, Singraven, Arboretum, 13 Oct. 1961, *C. Bas 2507*; Denekamp, Singraven, 7 Oct. 1966, *E. Kits v. Waveren*; Delden, Carelshaven, 22 Sept. 1969, *E. Kits v. Waveren*; prov. Zuid-Holland, Voorschoten, estate 'ter Horst', 7 Aug. 1974, *M. E. Noordeloos 30*; idem, 13 Sept. 1978, *M. E. Noordeloos 706/707/708*; prov. Zeeland, Walcheren, Oostkapelle, estate 'Westhoven', 4 Aug. 1968, *P. B. Jansen 68–221*; prov. Noord-Brabant: Nuenen, 't Rietgat, 24 Sept. 1961, *C. Bas 2445*; Zevenbergen, 31 Oct. 1978, *P. B. Jansen*; Nieuw Ginneken, Goudbergven, 18 Aug. 1959, *R. A. Maas Geesteranus 12919*; idem 29 Aug. 1974, *P. B. Jansen 74–278* and 23 Sept. 1978, *P. B. Jansen 78–242*; Bergen op Zoom, Zeezuiper, 7 July 1974, *P. B. Jansen 74–273*; Zundert, 'Krochten', 28 July 1955, *C. Bas 782*; prov. Limburg, Echt, 'de Doort', 6 Oct. 1962, *J. v. Brummelen 1528*.

GREAT BRITAIN, Sussex, Amberley, 25 May 1959, *D. A. Reid* (holotype of *Eccilia paludicola*, K).

Type study of *Eccilia paludicola* P. D. Orton, Great Britain, Sussex, Amberley, 25 May 1959, *D. A. Reid* (K): The type collection consists of 4 fruit-bodies in good state with the following microscopical characters: Spores 8.2–10.4(–11.5) × (6.4–)7.0–8.1(–9.3) μm, Q = 1.1–1.3–1.5, L–D = (0.6–)1.1–2.5–3.5 μm, rather irregularly 6-angled in side-view, probably with dihedral base. Basidia 25–34 × 8–11.5 μm, 4-(rarely 2-)spored. Cystidia none. Hymenophoral trama composed of sausage-shaped cells 42–100 × 8–14(–21) μm. Pileipellis a cutis of 4.5–11.5 μm wide cylindrical hyphae with rather abundant brown intracellular pigment. Pileitrama regular with inflated hyphae up to 27 μm wide. Clamp-connections numerous in all tissues studied.

The Netherlands' collections agree very well with Kühner's description of *Rhodophyllus caccabus* as well as with Orton's description of *Eccilia paludicola*. According to Orton the latter differs from the former in spore-size and habitat. However, I found the spores of the holotype of *E. paludicola* considerably broader (8–10 × 7–8 μm) than Orton did (8–10(–11) × 5.5–7 μm).

Unfortunately it was not possible to study the type of *R. caccabus*, but in the Netherlands' collections cited above I found a range of spores-sizes comprising that of the type of *E. paludicola* as well as that given in the original description of *R. caccabus*. Moreover, I have not the impression that there is an essential difference in habitat. Kühner and Orton both collected their species in different types of deciduous forests. The Netherlands' collections were made in different types of deciduous forest as well.

Therefore, in spite of the lacking type-study of *R. caccabus*, but greatly helped by Kühner's excellent description of that species, I do not hesitate to place *E. paludicola* Orton in its synonymy.

Entoloma caccabus differs from *E. politum* by the more elongate spores and the smell and from *E. bisporigerum* it is easily distinguished by the 4-spored basidia and the differently shaped spores.

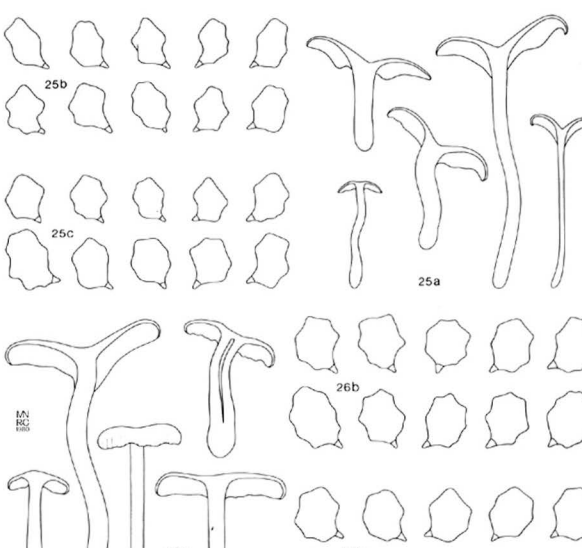
30. ENTOLOMA BISPORIGERUM (P. D. Orton) Noordeloos. — Figs. 26a–c

Eccilia bisporigera P. D. Orton *in* Notes Roy. bot. Gdn. Edinb. **29**: 99. 1969. — *Entoloma bisporigerum* (P. D. Orton) Noordeloos *in* Persoonia **11**: 86. 1980.

CHARACTERISTICS. — Carpophores omphalioid; pileus flattened, often with depressed centre, moderately dark to dark sepia, horn brown or reddish brown; lamellae slightly decurrent or broadly adnate, white, then sordid pink; stipe paler than pileus, smooth, polished; smell farinaceous; taste farinaceous with rancid aftertaste; spores irregularly nodulose-angular, 9.3–12(–13) × 8–10(–10.4) μm; basidia 2-spored.

Pileus 9–35(–57) mm broad, convex or flattened, often with slightly depressed centre, rarely deeply umbilicate or with slight papilla, with involute margin, with undulating marginal zone when old, strongly hygrophanous, when moist moderately dark to dark sepia, horn brown or reddish brown (10 YR 3/2, 6/4, 7.5 YR 3/2), at margin sometimes (distinctly) paler (10 YR 3/4, 4/2, 4/4, 5/4, 6/4, 7.5 YR 5/4), translucently striate up to one half or two-thirds of the radius, on drying pallescent to greyish brown (10 YR 5/4, 6/4, 6/3), often remaining darker at centre, smooth of with granular, rugulose or subtomentose centre, shining. Lamellae L = 16–26(–30), l = 1–3–5(–7), broadly adnate or with decurrent tooth or short decurrent, segmentiform, rarely ventricose, white, then pink or salmon, finally often tinged with brown (10 YR 8/2, 7/2, 7/3, 7/4, 6/4, 7.5 YR 7/2, 7/4, 6/2, 6/4), with concolorous, often irregular edge. Stipe 17–47 × 1.5–4 mm, cylindrical or with slightly swollen base, often flexuose, pale, whitish when young, then with yellow and/or brown tinge (2.5 Y 6/2, 10 YR 8/3, 7/3, 6/3, 6/4, 5/4) with smooth, polished surface, rarely substriate with some scattered innated fibrils, at apex sometimes minutely pruinose. Flesh concolorous with surface, in fleshy specimens with white inner part, brittle in pileus, subcartilagineous in stipe. Smell spontaneously often weak, but distinctly farinaceous when cut. Taste farinaceous-rancid.

Spores (9.3–)10–12(–13) × (7–)8–9.3(–10.4) μm, Q = 1.15–1.25–1.4(–1.5), L–D = (0.6–)1.2–2.0–3.0 μm, irregularly 6–9-angled-subnodulose in side-view, with small basal facet. Basidia 24–40 × 8–13.5 μm, 2-spored. Cystidia absent. Hymenophoral trama regular, made up of cylindrical to inflated cells, 25–110 × 8–21(–25) μm. Pileipellis a cutis made up of radially arranged cylindrical hyphae, 3.5–12(–18) μm wide, with numerous, up to 25 μm wide terminal cells particularly at centre, with brown intracellular pigment. Pileitrama regular, made up of cylindrical to inflated cells, 32–110 × 8.5–27(–30) μm. Clamp-connections numerous in all tissues.



Figs. 25a–c. *Entoloma caccabus*. — Habit and spores (25a, b from *Noordeloos* 706; 25c from holotype of *Eccilia paludicola*).

Figs. 26a–c. *Entoloma bisporigerum*. — Habit and spores (26a, b from *Noordeloos* 819; 26c from holotype).

HABITAT & DISTRIBUTION.—Terrestrial, often on bare soil in damp forests of *Alnus glutinosa*, *Salix* spp., *Fraxinus excelsior*, etc., often growing together with *E. politum* and *E. caccabus*. Recorded from Great Britain, the Netherlands and Belgium, not uncommon, most probably frequently overlooked. Aug.–Oct.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Groningen, Vlagtwedde, Lieftinksbroek, 21 Oct. 1978, *M. E. Noordeloos 817, 818, 819, 821*; prov. Drenthe, Beilen 'Knypstra's veentje', 18 Oct. 1977, *P. B. Jansen*; prov. Overijssel, Ommen, 26 Sept. 1964, *E. Kits v. Waveren*; prov. Zuid-Holland, estate 'ter Horst', 28 Sept. 1977, *M. E. Noordeloos 469, 470*; prov. Noord-Braban t: Budel, visvijvers,

S. of Budel-berg, 9 Oct. 1977, *M. E. Noordeloos 513*; Strijbeek, Patersven, 30 Aug. 1961, *C. Bas 2412*; Nieuw Ginneken, Goudbergven, 28 Aug. 1963, 15 Aug. 1964, 13 Sept. 1964 and 14 Oct. 1965, *P. B. Jansen*; Zundert, Lange Goren, 4 & 21 Sept. 1963, *P. B. Jansen*; Terheyden, eendekooi, 15 Aug. 1978, *P. B. Jansen 78–131*; idem, 28 Oct. 1978, *P. B. Jansen 78–447*; prov. Limburg, Epen, near 'Heimansgroeve', 16 Sept. 1978, *M. E. Noordeloos 714*.

GREAT BRITAIN: Herefordshire, Downwood, Shobdon, Oct. 1958, *P. D. Orton 24 & 31* (holotype, K); Scotland, Loch Lomond, 28 Aug. 1963, *E. Kits v. Waveren*. — BELGIUM, prov. Namur, le-Chenet/Vonèche, E. of Beauraing, 7 Oct. 1977, *M. E. Noordeloos 510*.

Entoloma bisporigerum is closely related to *E. caccabus*. It is often difficult to distinguish these species in the field, but the bispored basidia and slightly larger, more irregularly angular spores make it easy to identify *E. bisporigerum* microscopically. *Rhodophyllus dispermus* Kühn. differs among other things in the aeriferous surface of the stipe, which in addition is powdered at the apex (see below, p. 241).

Other two-spored species of *Entoloma*, viz. *E. cetratum* and *E. farinogustus*, belong to subgenus Nolanea and differ among other things in the clampless hyphae and differently shaped tramal cells.

ENTOLOMA section CLITOPILOIDES (Romagn.) Noordeloos

Rhodophyllus section *Clitopiloides* Romagn. *in* Beih. Nova Hedwigia **59**: 55. 1978. — *Entoloma* section *Clitopiloides* (Romagn.) Noordeloos *in* Persoonia **11**: 139. 1981.—Holotype: *R. cyathus* Romagn. & Gilles.

CHARACTERISTICS.—Habit clitocyboid; pileus depressed, dark brown; lamellae broadly adnate to subdecurrent; stipe fibrillosely striate lengthwise; spores cuboid to subisodiametrical; pigment intracellular; clamp-connections absent.

In the Netherlands represented by one species: *E. costatum* (Fr.) Kumm.

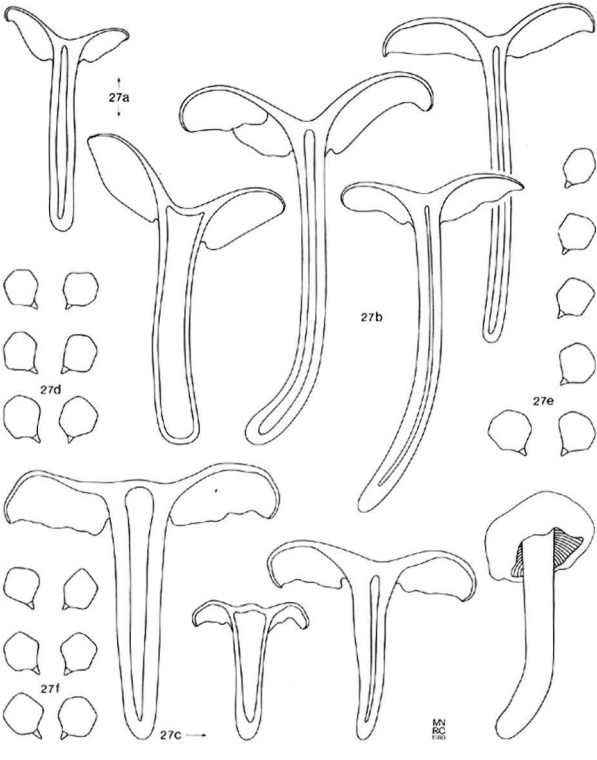
31. ENTOLOMA COSTATUM (Fr.) Kumm.—Figs. 27a—f

Agaricus pascuus var. *costatus* Fr., Syst. mycol. **1**: 206. 1821. — *Agaricus costatus* (Fr.) Fr. Epicr.: 147. 1838. — *Entoloma costatum* (Fr.) Kumm., Führ. Pilzk.: 98. 1871. — *Rhodophyllus costatus* (Fr.) Quél., Enchir.: 59. 1886.

SELECTED ICONES & DESCRIPTIONS.—J. Lange *in* Dansk bot. Ark. **2** (11): 32. 1921. — J. Lange, Fl. ag. dan. **2**: pl. 76F. 1936. — Romagnesi *in* (Trav. mycol. déd. R. Kühner) Bull. mens. Soc. Linn. Lyon **43** (Num. spéc.): 385. 1974. — Einhellinger *in* Ber. bayer. bot. Ges. **41**: 103. 1969.

CHARACTERISTICS.—Pileus convex central depression or umbilicate, dark brown; lamellae dark brown with pink tinge, often veined; stipe usually about as long as the diameter of the pileus, paler than pileus; spores isodiametrical, $(7.0–)7.6–9.3(–10.5) \times (6.0–)7.0–8.1(–9.3)$ µm.

Pileus (10–)20–65 mm broad, convex with flattened, slightly depressed to distinctly umbilicate centre, with involute margin, with undulating marginal zone with age, hygrophanous, when moist dark sepia, reddish brown or blackish brown (5 YR 4/2; 7.5 YR 3/2, 5/4; 10 YR 2/2, 3/2), not or only very slightly paler at margin, not striate, pallescent on drying to golden brown or sepia or yellowish brown, and then often with grey tinge (10 YR 5/3, 6/3, 7/3, 7/4), shining, often



Figs. 27a–f. *Entoloma costatum*. — Habit and spores (27a, d from *Bas*, 6 Oct. 1976; 27b, e from *Noordeloos* 237; 27c, f from *Piepenbroek* 1072).

(strongly) fibrillose-fissurate on limb, often subrugulose to subtomentose at centre. Lamellae L = 30–60, l = 1–3–5, crowded, broadly adnate with decurrent tooth to uncinate or emarginate, segmentiform or slightly ventricose, often coarsely veined, pale brown, then dark brown with pink tinge (10 YR 6/4, 5/3; 7.5 YR 6/4, 5/4), with concolorous or slightly paler, entire or subserrulate edge. Stipe 25–95 × 3–7(–9) mm, cylindrical or flattened, often slightly tapering downwards, grey-brown or reddish brown, usually paler than pileus (10 YR 5/3, 6/4, 7/3; 7.5 YR 3/2, 4/2, 5/2, 6/2) coarsely fibrillose-striate lengthwise, solid then fistulose. Flesh concolorous with surface, but pale in inner part, brittle. Smell indistinct or fungoid or herbaceous, rarely subfarinaceous. Taste often somewhat nasty-rancid.

Spores (7.0–)7.6–9.3(–10.5) × (6.0–)7.0–8.1(–9.3) µm, Q = (1.0–)1.05–1.15–1.30, L–D = (0–)0.2–2.0–2.5(–3.0) µm, (4–)5–6-angled in side-view, sub-isodiametrical with dihedral base. Basidia 28.5–40 × 9–14 µm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of strongly inflated cells, 50–200(–270) × 12–30(–50) µm. Pileipellis a cutis of radially arranged cylindrical hyphae, 2.5–8 µm wide with numerous, up to 15 µm wide, terminal cells, particularly at centre of pileus, with abundant intracellular pigment. Pileitrama regular, made up of inflated cells, up to 300 µm long, and 12–30 µm wide, with intracellular pigment, particularly in upper layer, rarely in addition with membranal or minutely encrusting pigment particularly near the septa. Clamp-connections absent. Vascular hyphae numerous in pileitrama of some collections.

HABITAT & DISTRIBUTION.—In poorly manured grasslands, rare. Recently recorded from the Netherlands, France, Denmark and the German Federal Republic. Oct.–Nov.

COLLECTION EXAMINED.—NETHERLANDS: prov. Overijssel, Hengforderwaarden, between Olst and Deventer, 31 Oct. 1977, *H. Piepenbroek & G. Piepenbroek-Grooters 1060*; idem, 12 Nov. 1977, *H. Piepenbroek & G. Piepenbroek-Grooters 1064, 1065 & 1072*; prov. Utrecht, Eemnes, Noordpolderse Veld, 12 Nov. 1978, *T. Bockhout, s.n.*; prov. Zeeland, Veere, Veerse bos, 31 Oct. 1976, *M. E. Noordeloos 237*.

GERMAN FEDERAL REPUBLIC: Friesland, Isl. of Borkum, 30 Oct. 1977, *C. Bas 7262*; Westfalen, Detmold, Merlsheim, 6 Oct. 1976, *C. Bas 7070*.

The Netherlands' collections agree perfectly well with the descriptions given by J. Lange and H. Romagnesi, (l.c.) and J. Lange's plate, (l.c.). *Entoloma costatum* is easily recognized by its habit, the isodiametrical spores, clampless hyphae and type of pigmentation. The two latter characters differentiate *E. costatum* clearly from *E. sericeum*. Other *Entoloma* species with a depressed or umbilicate pileus, such as *E. politum* and related species differ among other things in the aspect of the pileal and stipital surface and the clamped hyphae. *Entoloma sericoides* differs by its encrusting pigments.

ENTOLOMA section TURFOSA (Romagn.) Noordeloos

Rhodophyllus sect. *Turfosi* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — *Entoloma* sect. *Turfosa* (Romagn.) Noordeloos *in* Persoonia **10**: 529. 1980.—Holotype: *Entoloma turbidum* (Fr.) Quél.

CHARACTERISTICS.—Carpophores tricholomatoid, rarely small and collybioid; pileus distinctly hygrophanous; lamellae with distinct, often predominantly grey or grey-brown tinge; spores small, 6–8(–9) µm long, (sub-)isodiametrical-rounded, multiangled in side-view with weakly developed angles, thin-walled, more or less cyanophilous, pileipellis a cutis, sometimes with tendency to become an ixocutis, made up of narrow cylindrical hyphae with gelatinizing walls; pigment intracellular; clamp-connections numerous in all tissues studied.

KEY TO THE SPECIES OF SECTION TURFOSA

1a. Carpophores small, collyboid to mycenoid; pileus 8–32 mm broad, convex with depressed centre, rarely subpapillate; lamellae broadly adnate, sometimes with decurrent tooth, rarely slightly emarginate; stipe 1.5–3 mm broad; in grasslands, heathlands, etc. 2

b. Carpophores small to medium-sized rarely large, tricholomatoid; pileus 15–60(–85) mm broad, conical to convex, finally flattened, with broad, rounded umbo; lamellae deeply emarginate to almost free; stipe 3–8(–13) mm broad; in moist coniferous forest, more rarely in mixed or frondose woods, also in heathlands or dune-meadows with *Salix repens* 4

2a. Stipe with violaceous and/or lilaceous tinges. . . . . *E. vinaceum* var. *violeipes*, p. 226

b. Stipe with yellow and/or grey tinges only 3

3a. Stipe with distinct ochraceous or yellow tinge.. . . . . *E. vinaceum* var. *vinaceum*, p. 223

b. Stipe smoke-grey or grey-brown . . . . . *E. vinaceum* var. *fumosipes*, p. 225

4a. Lamellae crowded, normally thick; stipe distinctly silvery striate lengthwise 5

b. Lamellae fairly distiant, thickish; smell absent or pronouncedly aromatical like that of cumarine (like *Anthoxanthum odoratum*); stipe fibrillose but not really striate
E. turbidum var. *pachylamellatum*, p. 222

5a. Smell and taste strongly farinaceous; stipe distinctly brown; carpophores relatively large and brittle; in frondose forests (*Fagus sylvatica*). . . . . *E. pseudoturbidum*, p. 232

b. Smell none or only weakly farinaceous; taste rancid with bitterish aftertaste or weak; stipe pale brown, but appearing white because of dense silvery-fibrillose striation; carpophores small to medium-sized; flesh relatively firm; in or near coniferous forests or in heathlands, poorly manured pastures, etc.
E. turbidum var. *turbidum*, p. 220

ENTOLOMA TURBIDUM (Fr.) Quél.

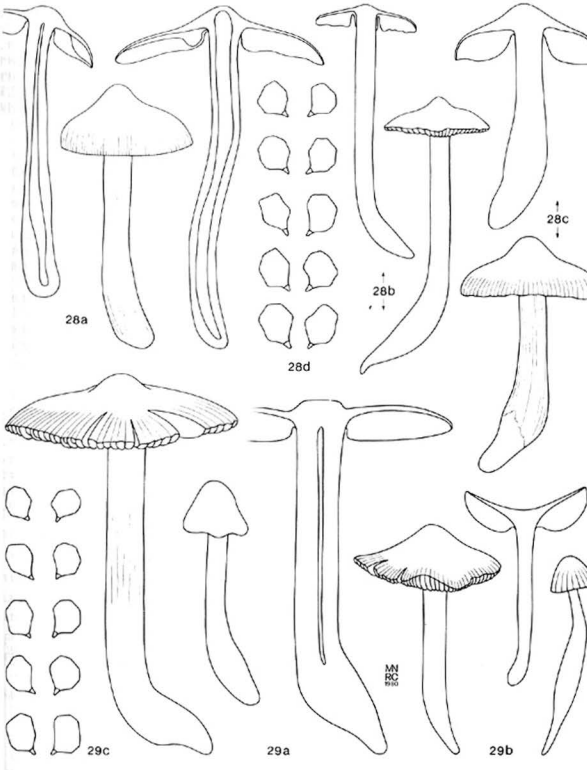
Agaricus turbidus Fr., Syst. mycol. 1: 205. 1821. — *Entoloma turbidum* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, 5: 119. 1872. — *Rhodophyllus turbidus* (Fr.) Quél., Enchir.: 59. 1886.
Entoloma costatum var. *cordae* P. A. Karst., Hattsv. 1: 268. 1879. — *Entoloma cordae* (P. A. Karst.) P. A. Karst. in Meddn Soc. Fl. fenn. 5: 9. 1879. (Symb. ad Myc. fenn. 6).

32. var. TURBIDUM.—Figs. 28a–d

SELECTED ICONES & DESCRIPTIONS.—Arnolds & Noordeloos *in* Fung. rar. Icon. col. **12**; pl. 94 fig. D. 1981. — Lange, Fl. ag. dan. **2**: pl. 76D. 1936. — Nathorst-Windahl *in* Friesia **8**: 11. 1966. — P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 231, fig. 268. 1960. — Pilát, Hym. novi **1**: 32, fig. 26. 1951. — Ricken, Blätterpilze: 286, pl. 76, fig. 4. 1913. — Romagnesi *in* (Tranv. mycol. déd. R. Kühner) Bull. mens. Soc. linn. Lyon **43** (Num. spéc.): 374. 1974.

CHARACTERISTICS.—Carpophores tricholomatoid; pileus conical then expanding to plano-convex with broad, rounded umbo; lamellae grey then grey-brown with only slight pink tinge; stipe strongly silvery striate on greyish-brownish background; smell indistinct.

Pileus (17–)20–45(–60) mm broad, truncate-campanulate or conico-convex then expanding, finally plano-convex with broad, rounded umbo, with slightly involute margin when young, hygrophanous, when moist dark grey-brown or grey-sepia, sometimes with slight reddish flush, paler on limb and at margin (centre 10 YR 2/2, 3/2, 3/3, 4/3, 4/4, 5/3; 7.5 YR 3/2, margin 10 YR 3/4, 4/4, 5/3, 6/3, 6/6, 7/6), translucently striate up to 1/2 of the radius, subviscid, strongly pallescent on drying to pale greyish brown with centre often remaining darker (centre 10 YR 4/3, 4/2, 5/2, limb and margin 10 YR 6/3, 7/3, 8/3) dry, subpruinose or subfelted at centre (lens).



Figs. 28a–d. *Entoloma turbidum* var. *turbidum*. — Habit and spores (28a, d from *Noordeloos* 175; 28b from *Noordeloos* 224; 28c from *Bas*, 5 Nov. 1977).
Figs. 29a–c. *Entoloma turbidum* var. *pachylamellatum*. — Habit and spores (all figs. from holotype).

Lamellae L = 30–45, l = (1–)3–7, crowded, deeply emarginate to almost free, rarely narrowly adnexed, ventricose, extending under pileus, grey then grey-brown finally with slight pink tinge (10 YR 7/2, 7/3, 5/2, 5/3, 6/2; 7.5 YR 8/4, 7/4, 6/2, 6/4, 5/3, 5/4, 4/2) with entire or slightly irregular, concolorous or slightly paler edge. Stipe (25–)30–70(–110 × (3–)4–8 (12 at base) mm, cylindrical, often somewhat flexuose, with broadening or tapering base, pale greyish-brownish with dense, adpressed, silvery-white striation, general appearance whitish, at base often with yellowish tinge, particularly when bruised (10 YR 7/3, 7/4, 6/2, 6/3, 6/4, 5/2 base 5 Y 9/6, 9/8; 2.5 Y 8/2, 8/4). Flesh pale grey-brown or yellow-brown, firm. Smell weak, sweetish, very rarely weakly farinaceous. Taste inconspicious or in some specimens unpleasant, rancid with bitterish aftertaste.

Spores 6.8–8.5(–9.0) × (5.8)6.3–7.0(–7.4) μm, Q = 1.0–1.1–1.2(–1.25), thin-walled, subglobose in outline, weakly multi-angled in side-view, cyanophilous, particularly when young. Basidia 27–42 × 7.9–10.4 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of cylindrical to distinctly inflated cells, 50–124 × 11–24 μm. Pileipellis a simple cutis of loosely arranged 2.5–5(–7) μm wide, cylindrical hyphae with easily desintegrating, gelatinizing walls, at centre with ascending, clavate cells, with brown intracellular pigment; subpellis made up of chains of inflated cells, 25–78 × 8–23 μm, not sharply delimited from underlaying pileitrama. Pileitrama regular, made up of inflated cells, 40–140 × 12.5–40 μm with brown-olivaceous intracellular pigment in upper layer. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—In moist, mossy coniferous forests, rarely in mixed forest, frequently also met with in moist heathland; not uncommon. Sept.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Friesland: Isl. Ameland, 'Lange duinen' N. of Hollum and Ballum, 13 Nov. 1979, *J. Schreurs*; Isl. Schiermonnikoog, 'Kooiduinen' 1 Nov. 1975, *C. Bas 6706*; prov. Drenthe: Roden 'Moltmakersstuk', Mensingebos, 15 Sept. 1976, *M. E. Noordeloos 175*; Kraloo, 13 Oct. 1969, *J. J. Barkman*; Mantinge, 'Hullenzand', 22 Oct. 1975, *E. J. M. Arnolds 3463* (WBS); prov. Overijssel: Staphorst, boswachterij, 16 Oct. 1976, *M. E. Noordeloos 224*; Delden, Haagsche bos, 22 Oct. 1970, *E. Kits v. Waveren*; prov. Gelderland: Winterswijk, Korenburgerveen, 1 Nov. 1947, *H. S. C. Huysman 1674* and 6 Sept. 1952, *H. S. C. Huysman s.n.*; Lochem, 2 Nov. 1964, *C. Bas 4478*; prov. Noord-Holland: Isl. Texel, 'de Geul', 31 Aug. 1977, *M. E. Noordeloos 423*; Callantsoog, 'Zwanewater', 5 Nov. 1977, *C. Bas*; Bergen 8 Oct. 1967, *C. Bas 4956*; Velzen, 29 Sept. 1940, *H. J. v. d. Laan*; prov. Zuid-Holland: Warmond, 6 Nov. 1969, *C. Bas 5171*; Goeree, Westduinen, 13 Nov. 1969, *E. Kits v. Waveren*; prov. Noord-Brabant, along Drongelens Kanaal near Cromvoortse brug, 29 Oct. 1980, *P. B. Jansen*; prov. Limburg, Mook, 15 Oct. 1964, *E. Kits v. Waveren*.

In the Netherlands *E. turbidum* is not uncommon on the pleistocene sandy soils and in the old coastal dunes, preferably in coniferous forests and in heath-like vegetations with *Erica*, *Calluna* and/or *Empetrum*. It is rarely met with in poorly manured grasslands and in frondose forests (e.g. *Quercus*-bushes on very poor sandy soil). *Entoloma pseudoturbidum* is closely related, but differs in the slightly more robust habit, darker coloured, brittle flesh, strongly farinaceous smell and in the habitat, viz. *Fagus*-forests (See under extralimital taxa below). A variety of *E. turbidum* with rather distant, thickish lamellae is described below as var. *pachylamellatum*.

33. ENTOLOMA TURBIDUM var. **pachylamellatum** Noordeloos, *var. nov.*—Figs. 29a–c

A forma typica differt in lamellis distantibus, crassis, griseo-brunneo, stipite haud striato; praetera in pascius obvenit.—Typus: *M. E. Noordeloos 808*, 18-X-1978, 'Westduinen, Isl. Goeree, prov. Zuid-Holland, Netherlands' (L).

CHARACTERISTICS.—Differs from var. *turbidum* in the distant, thickish lamellae, the grey-brown non-striate stipe and the habitat.

Pileus (7–)15–45 mm, conical then conico-convex expanding to plano-convex with broad, rounded umbo, with margin involute when young, hygrophanous, when moist rather dark sepia or grey-brown (10 YR 2/2, 3/2, 3/3, 3/4 at centre, 10 YR 4/3, 4/4, 5/3, 5/4 on limb, 10 YR 6/3, 7/4 at outermost margin) shining, subviscid (reminding of *Collybia butyracea*) on drying pallescent to grey-brown (10 YR 7/2, 7/3, 8/3) smooth, shining. Lamellae L = 20–40, l = 1–3, rather distant, thickish, emarginate to almost free, ventricose up to 7 mm broad, rather dark greyish brown or greyish yellow with only a faint pink shade (10 YR 6/3, 6/4, 5/4, 4/3, 3/2), slightly paler towards subentire edge. Stipe 25–80 × 2–6.5 mm, cylindrical, flexuose, often broadening toward base and then abruptly tapering, almost rooting, solid, grey to grey-brown (10 YR 4/2, 4/3, 5/4) strongly fibrillose, but fibrils not very much contrasting with background (certainly not silvery striate), base sometimes with yellow tinge. Flesh watery grey, rather firm. Smell weak or strongly aromatical, reminding of that of cumarine (like *Anthoxanthum odoratum* or toffee). Taste unpleasant, rancid.

Spores (6.4–)6.8–7.9(–9.0) × (5.4–)5.8–7.4(–8.0) μm, Q = 1.08–1.15–1.2, L–D = 0.6–1.0–1.5 μm, thin-walled, subglobose in outline with many, weak angles in side-view. Basidia 30–44 × 9–12 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 42–95(–115) × 8–32 μm. Pileipells a cutis with transitions to an ixocutis, made up of 2.5–6 μm wide, cylindrical hyphae with gelatinized walls, and brown intracellular pigment. Pileitrama regular, made up of inflated celles, 35–110 × 11–34 μm, with brown intracellular pigment in upper layers only. Clamp-connections abundant in all tissues studied.

HABITAT & DISTRIBUTION.—In extensively grazed meadow in old, coastal dunes, only known from the type-locality.

COLLECTION EXAMINED.—NETHERLANDS: prov. Zuid-Holland, Isl. of Goeree, Westduinen, 18 Oct. 1978, *M. E. Noordeloos 808* (holotype, L), *810*.

Entoloma turbidum var. *pachylamellatum* differs from the typical variety in some minor characters, viz. the distant, thickish lamellae, the hardly paler fibrils on the grey or grey-brown stipe, the peculiar smell of some specimens, and the habitat. This variety was quite abundant at the type-locality, and has been collected at three different places always growing in the grass, near the edge of *Salix repens* patches.

ENTOLOMA VINACEUM (Scop. ex Fr.) Arnolds & Noordeloos

Agaricus vinaceus Scop., Fl. carn. **1**: 444, 1772. — *Agaricus vinaceus* Scop. ex Fr., Epicr.: 157. 1838. — *Nolanea vinacea* (Scop. ex Fr.) Kumm. Führ. Pilzk.: 95. 1871. — *Rhodophyllus vinaceus* (Scop. ex Fr.) Quél., Enchir.: 64. 1886. — *Entoloma vinaceum* (Fr.) Arnolds & Noordeloos *in* Persoonia **10**: 298. 1979.

MISAPPLIED NAMES.—*Rhodophyllus batschianus* sensu J. Lange *in* Dansk. bot. Ark. **2**(11): 32, 1921, and Fl. agar. dan. **2**: pl. 76E. 1936.

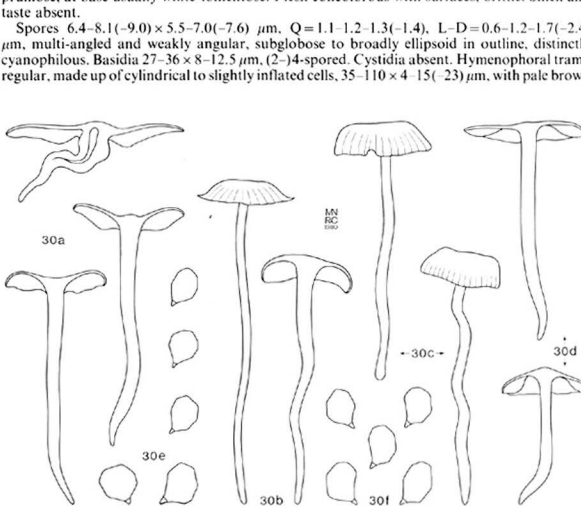
34. var. VINACEUM—Figs. 30a–f

SELECTED ICONES & DESCRIPTIONS.—Arnolds & Noordeloos *in* Fung. rar. Icon. col. **12**: pl. 94 fig. a. 1981.—Favre *in* Bull. Soc. mycol. Fr. **53**: 277, fig. 3. 1937. — Lange, J., Fl. agar. dan. **2**: pl. 76E. 1936. (as *R. batschianus*).

CHARACTERISTICS.—Carpophores small to medium-sized, collybioid more than tricholomatoid; pileus up to 35 mm broad, convex with central depression, with involute margin, dark brown; lamellae brownish-greyish with pink tinge; stipe yellow, yellow-brown, melleous or ochraceous-grey; smell none.

Pileus 13–32 mm broad, convex, usually with (slightly) depressed centre, rarely slightly umbonate, with margin involute when young, but sometimes becoming straight with age, hygrophanous, when moist horn brown with darker centre, greyish sepia, grey-brown or reddish brown, only slightly paler at margin (10 YR 2/2, 3/2, 3/4, 4/3; 7.5 YR 3/2 margin towards 10 YR 5/4) translucently striate at margin only or up to 1/2 (2/3) of the radius, strongly pallescent on drying to greyish brown sometimes with ochraceous or olivaceous tinges, smooth or at centre subtomentose (under lens), shining. Lamellae L = 20–25(–40), l = 1–3, moderately distant, adnate or slightly emarginate, segmentiform or ventricose and, then broadest part near stipe extending under pileus, grey when young then grey-brown with pink tinge (10 YR 7/2, 7/3, 5/3; 7.5 YR 5/4) with entire or crenulate, concolorous edge. Stipe 27–60 × 1.5–3 mm, cylindrical or flexuose, with tapering foot, sometimes almost rooting, at apex greyish, particularly when young, downwards yellow, wax-colour, yellowish brown, ochraceous or melleous (2.5 Y 7/4, 6/4, 5/4; 10 YR 6/6), smooth, polished or with scattered silvery fibrils lengthwise, at apex sometimes pruinose, at base usually white-tomentose. Flesh concolorous with surfaces, brittle. Smell and taste absent.

Spores 6.4–8.1(–9.0) × 5.5–7.0(–7.6) µm, Q = 1.1–1.2–1.3(–1.4), L–D = 0.6–1.2–1.7(–2.4) µm, multi-angled and weakly angular, subglobose to broadly ellipsoid in outline, distinctly cyanophilous. Basidia 27–36 × 8–12.5 µm, (2–)4-spored. Cystidia absent. Hymenophoral trama regular, made up of cylindrical to slightly inflated cells, 35–110 × 4–15(–23) µm, with pale brown



Figs. 30a–f. *Entoloma vinaceum* var. *vinaceum*. — Habit and spores (30a, e from *Schreurs*, 13 Nov. 1979; 30b from *v. Winden*, 2 Nov. 1974; 30c, f from *Bas* 5510; 30d from *Kits v. Waveren*, 13 Nov. 1965).

intracellular pigment. Pileipellis a cutis, sometimes with transitions to an ixocutis, composed of 2–5(–7) μm wide, cylindrical hyphae with easily desintegrating, gelatinized walls and brown intracellular pigment. Pileitrama regular, made up of inflated cells, 54–100(–125) × 8–20 μm, with intracellular pigment in upper layers. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—In grassland or open grassy vegetations, also in heathland, usually on poor, sandy and slightly to distinctly acid soils, in the Netherlands particularly found on the pleistocene sands in the eastern and southern parts and in the old coastal dune-areas. Known to occur in entire north-western Europe (in lit.). Optimum fruiting usually late in the season: Oct.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Friesland: Isl. Ameland, 13 Nov. 1979, *J. Schreurs*; Isl. Terschelling, Noordsvaarder, N. of West, 27 Oct. 1974, *M. E. Noordeloos 113*; prov. Overijsel: Staphorst, boswachterij, 16 Oct. 1976, *M. E. Noordeloos 225*; Haaksbergen, Buurserven, 19 Oct. 1972, *C. Bas 5945*; prov. Gelderland: Hulsthorst, Hulsthorsterzand, 9 Nov. 1974, *F. Tjallingii & G. Tjallingii-Beukers*; Ede, Wekeromse zand, 26 Nov. 1972, *F. Tjallingii & G. Tjallingii-Beukers*; Hoenderloo, Hoge Veluwe, Rieselose zand, 15 Nov. 1975, *F. Tjallingii & G. Tjallingii-Beukers*; Arnhem, in garden Amsterdamseweg 216, 12 Dec. 1977, *J. Hoogschagen*; prov. Noord-Holland: Castricum, 7 Nov. 1964, 13 Nov. 1965 and 9 Nov. 1968, *E. Kits v. Waveren*; Overveen, Koningshof, 2 Nov. 1974, *F. Tjallingii & G. Tjallingii-Beukers*; idem, 2 Nov. 1974, *P. v. Winden*; prov. Zuid-Holland: Noordwijkerhout, duinen near 'badweg', 30 Nov. 1958, *C. Bas 1692*; Isl. Goeree, Westduinen, 17 Nov. 1977, *M. E. Noordeloos 574*; prov. Zeeland: Isl. Schouwen, Haamstede, S.E. of 'Verklikker', 10 Nov. 1970, *C. Bas 5516*; Isl. Walcheren, near Oranjebosch, 9 Nov. 1970, *C. Bas 5510*.

35. var. FUMOSIPES Arnolds & Noordeloos

Entoloma vinaceum var. *fumosipes* Arnolds & Noordeloos *in* Persoonia **10**: 298–299, figs. 34–36. 1979.

CHARACTERISTICS.—Differs from var. *vinaceum* in the grey-tinged stipe, without any trace of yellow.

Pileus 8–23 mm broad, trapezoid, hemispherical or convex with depressed centre, with involute margin, hygrophanous, when moist pale brown to horn brown with dark brown centre (Meth. 6C3, Expo F64 towards H 53) translucently striate up to 2/3 of the radius, on drying pallescent to pale greyish brown (Meth. 6D3, Expo D72), at centre sometimes remaining darker (Expo F72), smooth or faintly radially fibrillous, minutely granular at centre (under lens). Lamellae L = 19–30, l = 1–3–7, moderately crowded, broadly adnate, ventricose, up to 7 mm broad, very pale grey-brown with pink tinge (Meth. 6B3; Expo C61) with concolorous or slightly paler entire edge. Stipe 16–50 × 1.5–3 mm, cylindrical, slightly tapering at base, pale grey brown or smoky (Meth. 5C4; Expo B82, base between D63 and E74), at apex downy-pruinose, downwards minutely silvery fibrillose. Flesh concolorous with surface. Smell and taste absent.

Spores (5.4–)6.2–6.8(–7.4) × 5.1–6.2(–6.8) μm, Q = 1.1–1.15–1.2(–1.3), L–D = 0–1(–1.2) μm, rounded-multi-angled in side-view, thin-walled, cyanophilous. Basida 24–37 × 8–11.5 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of cylindrical or weakly inflated cells, 50–190(–212) × 6–16(–20) μm, with pale brown intracellular pigment. Pileipellis a thin cutis of loosely arranged cylindrical hyphae, 2–5 μm wide, with desintegrating, gelatinized walls and brown intracellular pigment. Pileitrama regular, made up of inflated cells, 40–120 × 6–27 μm, with brown intracellular pigment particularly in the upper layers. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—At mossy places on sandy soil; the type collected in a *Spergulo-Corynephoretum*, a second collection in moss (*Dicranum*) in coastal dunes near *Populus*, *Pinus*, and *Quercus*, a third one from a grassy and mossy place on peaty soil; probably rare. Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Drenthe, Westerbork, Hullenzand, S. of Mantinge, 3 Nov. 1976, *E. Arnolds 3728* (holotype); prov. Noord-Holland, Velzen, Duin-en-Kruidberg, 13 Nov. 1962, C. Bas 2902; prov. Zuid-Holland, Stolwijkse boezem, Mudde, 17 Nov. 1977, *P. B. Jansen*.

36. var. VIOLEIPES Arnolds & Noordeloos

Entoloma vinaceum var. *violeipes* Arnolds & Noordeloos *in* Persoonia **10**: 299. 1979.

SELECTED ICONES & DESCRIPTION.—Arnolds & Noordeloos, *in* Fung. rar. Icon. col. **12**: pl. 94 figs. c & d. 1981.

CHARACTERISTICS.—Differs from var. *vinaceum* and var. *fumosipes* in the lilaceous-violaceous tinges on the stipe.

Pileus 12–24 mm broad, convex to plano-convex with flattened often depressed centre, sometimes with small, rounded umbo within central depression, with margin involute at first but later more or less reflexed, hygrophanous, when moist dark brown, horn brown or date brown, sometimes with slight grey tinge, slightly paler at margin (10 YR 2/2, 3/2, 3/4, 4/4; 7.5 YR 3/2, 4/2) sometimes with conspiciously darker spot at centre, translucently striate up to 1/2 or 2/3 or the radius, lubricous-subviscid, strongly pallescent on drying to greyish brown (10 YR 6/3), at centre sometimes remaining darker (10 YR 3/2, 3/3, 5/4), innately radially fibrillous (under lens), centre sometimes minutely pruinose-subtomentose (under lens). Lamellae L = about 25, l = 1–3, moderately distant, adnate with decurrent tooth or adnate, sometimes slightly emarginate, sinuate, segmentiform to subventricose, pale brownish grey when young, becoming darker and tinged pink with age (10 YR 7/3, 6/3, 6/4, 5/3; 7.5 YR 5/4) with entire, concolorous edge. Stipe 20–55 × 1.5–3.5 mm, cylindrical often flexuose, sometimes somewhat flatted, often with tapering, almost rooting base, lilaceous brown-grey, greyish-lilaceous-violaceous or brownish-violaceous (2.5 YR 7/2; 5 YR 3/2, 4/3, 5/2, 6/3; 7.5 YR 5/2), at apex and base often quite differently coloured, more yellowish-brownish (10 YR 7/4, 7/6; 2.5 Y 7/4, 7/6), with silvery white arachnoid or fibrillose striation all over, at base sometimes white tomentose. Flesh when moist greyish brown in pileus, distinctly lilaceous-violaceous in cortex of stipe, relatively firm. Smell and taste none.

Spores 6.0–7.9 × (5.0–)5.5–6.8 μm, Q = 1.05–1.15–1.3, L–D = 0.6–1.2–2.0 μm, multi-angled in side-view, subglobose or broadly ellipsoid in outline with not very much pronoundced angles thin-walled, slightly cyanophilous. Basidia 24–44(–47) × 7.5–12 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of short, inflated cells, 57–160(–170) × 6–32 μm, with pale brown intracellular pigment. Pileipellis a thin ixocutis of 1.7–5.4 μm wide, cylindrical hyphae with distinctly gelatinising walls and brown intracellular pigment. Pileitrama regular, made up of inflated cells, (25–)40–115(–130) × 15–27(–32) μm with dispersed, brown intracellular pigment in upper layers. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—In moist, grassy heath-like vegetations, e.g. *Ericetum* and *Nardo-Galion*; also found in old dunes between mosses and grasses, always on slightly to distinctly acid, sandy soils. So far known from five localitities in the Netherlands and one in Great-Britain. Sept.–Nov.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Drenthe: Westerbork, Mantinge, Mantingerzand, 13 Nov. 1974, *E. Arnolds 3322* (holotype), idem, Boekweitenplas, 25 Oct. 1974, *E. Arnolds 3268* (WBS); Elp, near Zwiggelterstraat, 31 Oct. 1974, *B. de Vries* (WBS); Dwingelo, Geuringerveld, 2 Dec. 1974, *E. Arnolds*; prov. Zeeland, Isl. Walcheren, Vrouwenpolder, near Oranjebosch, 9 Nov. 1970, *C. Bas 5511*. GREAT BRITAIN: Wales, Lake Vyrnwy, 15 Sept. 1977, *E. Kits van Waveren*.

Entoloma vinaceum is very variable species which is found on more or less acid, sandy or peaty soils. In the Netherlands it prefers the pleistocene sands in the eastern and southern provinces and in the old dune-areas along the coast. The colour of the stipe is rather variable to such an extent that three variaties are distinguished here, viz.:

(*i*) The typical variety with a yellow stipe: var. *vinaceum*.

(*ii*) A variety with a violaceous stipe: var. *violeipes*. (See also *E. turbidum* var. *macrius*, p. 244).

(*iii*) A variety with a smoke-grey stipe: var. *fumosipes*.

Entoloma vinaceum is often placed in subgenus *Nolanea* on account of its slender, almost mycenoid or collybioid habit. On account of the shape and size of the spores, the structure of the pileipellis and the type of pigmentation however, I consider it closely related to *E. turbidum*.

EXTRALIMITAL SPECIES

37. **Entoloma alnobetulae** (Kühn.) Noordeloos, *comb. nov.*—Fig. 38

Rhodophyllus alnobetulae Kühn. *in* Bull. Soc. mycol. Fr. **93**: 453. 1977 (basionym).

CHARACTERISTICS.—Fruit-bodies small, in all parts fairly dark yellowish brown to greyish brown. Pileus 10–35 mm broad, convex to planoconvex with slightly depressed centre with small umbo, hygrophanous, smooth, translucently striate up to centre when moist. Lamellae adnate, sinuate to ventricose, dark grey-brown. Stipe 8–50 × 1–4 mm with aeriferous-fibrillose, striate surface when young, latter on more or less smooth as if polished. Smell and taste strongly farinaceous.

Spores 7.6–10.4 × (6.4–)7.1–8.3(–8.7) μm, Q = 1.05–1.15–1.2, L–D = 0.6–1.0–1.7 μm, 6–7-angled in side-view, subisodiametrical. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 50–170 × 7–21 μm. Pileipellis a cutis of radially arranged hyphae, 4–9 μm wide, with abundant intracellular pigment. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In subalpine *Alnus viridis* stands and in *Salix-Betula* swamp-forests, France.

COLLECTION EXAMINED.—FRANCE, dept. Haute Savoye, Samoëns, 23 Aug. 1952, *R. Kühner 52. 76* (herb. Kühner, LY).

Entoloma alnobetulae is a small member of subsection *Rhodopolia* close to *E. subradiatum*, from which it differs in the dark coloured lamellae and stipe and in the habitat.

38. **Entoloma alpicola** (Favre) Noordeloos, *comb. nov.*—Fig. 45

Rhodophyllus clypeatus var. *alpicola* Favre, Champ. supér. Zone alp.: 200. 1955 (basionym).—*Rhodophyllus alpicola* (Favre) Kühn. *in* Bull. Soc. mycol. Fr. **93**: 453. 1977.

SELECTED ICONES & DESCRIPTIONS.—Favre, l.c.: 61, fig. 14, pl. 4 fig. 14. 1955. — Kühner, l.c.: 460–464. 1977. — Lange, M. & Gulden *in* Norw. J. Bot. **18**: 13. 1971.

CHARACTERISTICS.—Pileus 15–60 mm broad, conico-convex to campanulate, then expanding to bluntly conical or convex, with involute margin when young, hygrophanous, when moist dark blackish brown, reddish brown or greyish brown, in mature specimens with paler, yellowish brown or reddish brown limb, very obscurely translucently striate at margin or not, pallescent on drying, smooth or particularly at centre slightly rimose. Lamellae almost free to adnexed, adnate or emarginate, ventricose, white or greyish to pale grey-brown, finally with pink tinge, with irregular, concolorous or slightly paler edge. Stipe 6–45 × 4–10 mm, cylindrical usually tapering towards base, white or whitish, striate, often with aeriferous, almost pruinose surface, solid or narrowly fistulose. Smell spontaneously weakly to distinctly farinaceous. Taste rancid-farinaceous.

Spores (7.4–)8.1–10.4 × 7.1–8.5 μm, Q = 1.05–1.15–1.25, almost isodiametrical, 5–7-angled in side-view. Basidia 4-spored. Cystidia absent. Pileipellis a cutis of 2–7 μm wide, cylindrical hyphae, sometimes, particularly at centre with numerous ascending, clavate terminal cells, with brown intracellular pigment. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In snowbed-communities with *Salix herbacea* in alpine and subarctic habitats in central Europe and Scandinavia, known to occur in France, Switzerland, Norway and Sweden.

COLLECTION EXAMINED.—NORWAY, Hordaland, Ulvik, Finse, between Finse and Lille Finsenut, 22 Aug. 1975, *G. Gulden 173/75*.

Entoloma alpicola is one of the most common *Entoloma* species in alpine and subarctic snowbed communities with *Salix herbacea* (Kühner, l.c. 1977; G. Gulden, pers. comm.) and has a wide distribution. It differs from *E. clypeatum* among other things in the habitat, periodicity, size and shape of the spores and in the structure of the pileipellis. It enters subsection *Rhodopolia* close to *E. lividoalbum* and *E. subradiatum*.

39. **Entoloma anthracinum** (Favre) Noordeloos, *comb. nov.*—Fig. 48

Rhodophyllus anthracinus Favre, Champ. supér. Zone alp.: 200. 1955 (basionym).

SELECTED ICONES AND DESCRIPTIONS.—Favre, l.c.: 60, fig. 39, pl. 5 fig. 10. 1955.—Kühner *in* Bull. Soc. mycol. Fr. **93**: 471–472. 1977.

CHARACTERISTICS.—Carpophores dwarfish, very dark grey-brown in all parts; pileus 7–27(–38) mm broad, hemispherical when young, soon flattened with slightly depressed centre, with involute margin when young, slightly hygrophanous, very dark blackish brown, translucently striate at margin only or not, slightly pallescent on drying, smooth or somewhat rugulose-fibrillose. Lamellae often rather distant, adnate-subdecurrent to adnate-emarginate, sinuate then segmentiform finally narrowly ventricose, grey-brown. Stipe 6–20 × 0.7–3 mm, greyish brown, paler than pileus, smooth as if polished.

Spores 7.5–11.5(–12.7) × 6.7–9.5(–10.0), Q = 1.15–1.25, subisodiametrical to slightly ellipsoid in outline, with (4–)5–7(–8) angles in side-view. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 40–230 μm long. Pileipellis a thin cutis of narrow, 2–7.5 μm wide hyphae with abundant intracellular pigment. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBTUION.—In subalpine *Salix herbacea*-heaths, France, Switzerland.

COLLECTION EXAMINED.—FRANCE, dept. Vanoise, Région du Col de l'Iséran, 26 Aug. 1973, *R. Kühner 73–306* (herb. Kühner, LY).

Entoloma anthracinum enters section *Polita* on account of its polished stipe, intracellular pigment and numerous clamp-connections. It differs from *E. politum* and *E. caccabus* in the dark-pigmented, hardly striate pileus, large subisodiametrical spores and in the habitat. *Entoloma subflexipes*, also described from the subalpine zone, differs in its smaller, distinctly ellipsoid spores, paler lamellae and farinaceous smell (see below).

40. **Entoloma atrosericeum** (Kühn.) Noordeloos, *comb. nov.*—Fig. 37

Rhodophyllus atrosericeus Kühn. *in* Bull. Soc. mycol. Fr. **93**: 454. 1977 (basionym).
SELECTED DESCRIPTION.—Kühner, l.c.: 487–491. 1977.

CHARACTERISTICS.—Carpophores reminding of those of *E. sericeum*. Pileus 10–38 mm, broad, conico-campanulate at first with slightly reflexed margin, then campanulate, hemispherical or conical, sometimes expanding to convex, then usually with umbo, very dark grey-brown or bistre, almost blackish, rarely with slight olivaceous tinge, not or very obscurely striate at margin only, smooth, shining. Lamellae moderately crowded, sinuate or emarginate, often almost free, always rather dark, tinged with grey-brown or brown, often with an ochraceous, yellowish or olivaceous tinge, with concolorous or slightly paler edge. Stipe 9–35 × 2–6(–7) mm, cylindrical, rarely flattened, pale grey then grey-brown, often with yellowish or olivaceous-grey tinge, at first aeriferously striate lengthwise, sometimes becoming innately fibrillose or even fibrillose-costate with age. Flesh brownish, thin in pileus. Smell usually distinctly farinaceous-rancid.

Spores (7–)8–10(–11) × 6.4–8.3(–9) μm, Q = (1.0–)1.05–1.1–1.2(–1.3), 5–7-angled in side-view, subisodiametrical to slightly ellipsoid in outline. Basidia 4-spored. Cystidia none. Hymenophoral trama regular, made up of relatively short (45–170 × 3–27 μm) inflated cells. Pileipellus a cutis of narrow cylindrical hyphae, 2.5–7 μm wide, gradually passing into pileitrama. Pileitrama in upper layer made up of cylindrical hyphae, 7–20 μm wide, in lower parts made up of chains of cylindrical to inflated cells, 55–210 × 5–31 μm. Pigment coarsely encrusting in all coloured parts of the carpophore. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In alpine and subarctic grasslands, also near *Salix herbacea* or *S. retusa* or in *Dryas*-heaths; Alps (France) and Scandinavia (Norway, Sweden), common (according to Kühner; l.c.).

COLLECTIONS EXAMINED.—NORWAY, Hordaland, Hardanger, Djuptj., 1320 mm alt. near Hallingskarvet, 31 July 1967, *R. Kühner 67.18* (herb. Kühn., LY).

In the field *E. atrosericeum* resembles *E. sericeum* strongly but is considerably darker. Furthermore in *E. atrosericeum* clamp-connections are very abundant in all tissues, including the covering layers, whereas in *E. sericeum* clamp-connections only rarely occur in other parts than in the hymenium (Noordeloos 1980: 479). In addition the size and shape of cells in the hymenophoral trama of *E. atrosericeum* made Kühner decide to describe his finds as a new species in the subgenus *Entoloma* and not in subgenus *Nolanea*, where *E. sericeum* belongs.

41. **Entoloma brassicolens** (Reid) Noordeloos, *comb. nov.*—Fig. 39

Nolanea brassicolens Reid *in* Trans. Br. mycol. Soc. **48**: 518. 1965 (basionym).
SELECTED ICONES AND DESCRIPTION.—Reid *in* Fung. rar. Icon. col. **2**: 12–13 fig. 9a–d, pl. 13a. 1967.

CHARACTERISTICS.—Pileus 22–38 mm, broad, conico-convex to convex, sometimes with weak umbo, sometimes slightly depressed, not hygrophanous when young, pale yellowish brown with grey-brown centre, smooth, dull, in older specimens hygrophanous, when moist dull brown with closely grooved margin, pallescent to yellowish brown on drying, with greasy-waxy surface when moist and then densely and minutely radially wrinkled under lens. Lamellae not very crowded, adnexed, up to 6 mm broad, at first buff, finally yellowish fawn with pinkish tinge. Stipe about 20–30 × 4–10 mm, white at first, in older specimens yellowish fawn, cylindrical and solid at first, becoming fistulose and broadened, clavate at base with age. Flesh white when young, at length greyish. Smell strongly like that of rotting cabbage or more like *Allium ursinum*.

Spores 7.6–9.3 × 7.0–8.3 μm (according to Reid: 8–10 × 6–8 μm), subisodiametrical in outline, Q = 1.05–1.15–1.25, with 5–7 angles in side-view. Basidia 4-spored. Cystidia absent. Hymenophoral trama made up of more or less inflated cells, 34–95(–120) × 12–40 μm. Pileipellis a cutis with transitions to a trichodermium, made up of cylindrical 4.5–12 μm wide hyphae, frequently with bundles of more or less ascending, cylindrical 'hairs', up to 85 μm long and up to 14 μm wide, with intracellular pigment. Clamp-connections numerous in all parts of carpophore.

HABITAT & DISTRIBUTION.—In mixed woodland; so far only known from two localities in Northern Ireland.

COLLECTION EXAMINED.—GREAT BRITAIN, Northern Ireland, Co. Down, Saintfield Demesne, 5 Sept. 1964, *D. A. Reid* (holotype, K).

Entoloma brassicolens is a fairly remarkable species with the changing aspect of its pileal surface from non-hygrophanous and smooth when young to distinctly hygrophanous and radially wrinkled when older and its strong fetid smell, which is rare in the genus *Entoloma*. This type of smell is only known from one other species, viz. *E. foetulentum* Noordeloos (= *Nolanea foetida* Killerm.) That species, however, differs widely from *E. brassicolens*, among other things in its habit, its colour, and its large spores which are distinctly ellipsoid in outline.

Entoloma brassicolens is transferred here from subgenus *Nolanea*, in which it was originally placed, to subgenus *Entoloma* on account of the size and shape of the tramal elements, the numerous clamps in all parts of the carpophore and the intracellular pigmentation. It keys out here in subsection *Rhodopolia*, but the affinities with other species of this subsection are rather obscure, as *E. brassicolens* has a rather unique set of characters viz. those of the pileal surface, the small, isodiametrical spores and the fetid smell.

42. ENTOLOMA INOCYBEFORME Bon—Fig. 43

Entoloma inocybeforme Bon *in* Doc. mycol. **37**–**38**: 90. 1979.

CHARACTERISTICS.—Carpophores tricholomatoid; pileus 30–50(–60) mm broad, conical at first then expanding to convex with rather pronounced conical umbo, with margin remaining long slightly involute, not or weakly hygrophanous, when moist yellowish brown with slight olivaceous tinge, darker at centre, not or slightly pallescent on drying, with strongly radially fibrillose-rimose surface. Lamellae narrowly adnate to broadly ventricose, sordid beige, only late becoming slightly tinged with pink. Stipe 30–50 × 8–10 mm, cylindrical, slightly tapering at base, whitish, slightly tinged yellowish at base, striate. Flesh whitish. Smell farinaceous when freshly cut, but later often with slight aromatic component.

Spores (7–)8.5–10(–11) × (6–)8–10 μm, subisodiametrical. Basidia 4-spored. Cystidia none. Pileipellis an ixocutis made up of 3–5 μm wide cylindrical hyphae with gelatinized walls. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—Terrestrial in grasslands (*Meso-Bromion*) on calcareous or loamy soils, France.

Entoloma inocybeforme is a member of section *Entoloma* close to *E. prunuloides*, from which it differs in the darker coloured, strongly radially fibrillose-rimose pileus.

During a foray of the Netherlands' Mycological Society in the Eifel in Western Germany in 1979 one specimen was collected of a species which most probably is identical with *E. inocybeforme*. It had the following characters:

Pileus about 60 mm broad, convex with broad umbo, fairly dark grey-brown (centre 10 YR 2/2–3/2; limb 10 YR 5/2, 6/2, 7/2), paler at margin, very strongly radially fibrillose-fissurate. Lamellae L about 60, l = 1–3, almost free, ventricose, pale pink (10 YR 7/3 to 7.5 YR 8/4). Stipe 58 × 10 mm, slightly tapering towards base, sordid brown-grey with slight purple tinge (about 7.5 YR 5/2–4/2), innately striate lengthwise, whitish-yellowish at base (2.5 Y 8/4). Flesh sordid white, firm. Smell faint, slightly farinaceous when cut. Taste strongly farinaceous-rancid.

Spores 8.1–8.7 × 7.6–8.1 μm, Q = 1.0–1.07, rounded 5–6-angled in side-view, almost isodiametrical. Basidia 4-spored. Cystidia absent. Pileipellis an ixocutis made up of 2–5(–7) μm wide cylindrical hyphae with easily desintegrating-gelatinizing walls, filled with brown intracellular pigment.

HABITAT.—In sun-lit xerophytic grassland on calcareous soil.

COLLECTION EXAMINED.—GERMAN FEDERAL REPUBLIC: Rheinland-Pfalz, Eifel, Gerolstein, Feriendorf Felsenhof, 30 Sept. 1979, *Th. W. Kuyper*.

This collection deviates from Bon's original diagnosis only in the slightly darker pileus and the purplish tinge of the stipe.

43. ENTOLOMA PRUNULOIDES (Fr.) Quél.—Figs. 32a–b

Agaricus prunuloides Fr., Syst. mycol. **1**: 198. 1821. — *Entoloma prunuloides* (Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, sér. II, **5**: 117. 1872. — *Rhodopyllus prunuloides* (Fr.) Quél., Enchir.: 57. 1886.

Entoloma autumnale Velen., Novitates mycologicae novissimae: 133. 1939.

MISAPPLIED NAME.—*Entoloma repandum* sensu J. Lange, Fl. agar. dan. **2**: pl. 73A. 1936.

EXCLUDED NAME.—*Rhodophyllus prunuloides* sensu Konrad & Maublanc, Icon. sel. Fung. **2**: pl. 187. 1930 (= E. sepium).

SELECTED ICONES AND DESCRIPTIONS.—Einhellinger *in* Ber. Bayer. bot. Ges. **41**: 107, figs. 22–24, pl. 11a. 1969. — Kühner *in* Bull. Soc. mycol. Fr. **93**: 457–459. 1977. — Lange, J., Fl. agar. dan. **2**: pl. 73A (as *R. repandus*) and pl. 73B. 1936. — Möller, F. H., Fungi Faeröes **1**: 250. 1945.

CHARACTERISTICS.—Habit tricholomatoid; pileus non-hygrophanous greyish-brownish or yellowish-greyish, smooth, viscidulous when moist; lamellae pale then pink; stipe white or grey, fibrillosely striate; smell strongly farinaceous, particularly when cut; spores small, isodiametrical, about 6–8 μm in diameter; in grasslands.

Pileus up to 70 mm broad, more or less convex with broad rounded umbo and strongly undulating marginal zone, not hygrophanous, pale yellowish-greyish (2.5 Y 8/3 towards 10 YR 8/4, at centre more like 10 YR 8/6–8/8), viscidulous when moist, smooth. Lamellae L = 45–50, l

= 1–3, distant, thickish, deeply emarginate, ventricose, pink, with serrate, concolorous edge. Stipe 75 × 12 mm, cylindrical, white, downwards with weak yellow tinge, coarsely fibrillosely striate lengthwise, stuffed. Flesh white, firm. Smell strongly farinaceous, particularly when cut.

Spores 6.8–8.0(–8.6) × 6.4–8.0 μm, Q = 1.0–1.05–1.1; L–D = 0–0.6(–1.0) μm, almost isodiametrically 5–7-angled in side-view. Basidia 27–45 × 7–13 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of cylindrical to distinctly inflated cells, 45–110 × 12–20 μm. Pileipellis a simple cutis of 2.5–5(–7) μm wide cylindrical cells with easily desintegrating walls and pale brownish intra-celullar pigment. Pileitrama regular, made up of cells similar to those of hymenophoral trama. Clamp-connections numerous.

HABITAT & DISTRIBUTION.—In grasslands (preferably in mountainous areas?). Rare. Known to occur in north-western Europe and in France (Kühner, l.c.).

COLLECTION EXAMINED.—DENMARK, Sjaelland, Eskebjerg Vesterlyng, 15 Sept. 1974, *H. Knudsen* (C). — GERMAN FEDERAL REPUBLIC, Eifel, Gerolstein, Feriendorf Felsenhof, 26 Sept. 1980, *M. E. Noordeloos 1284*.

Entoloma prunuloides, the type-species of the genus, seems to be rather rare and according to Kühner (1977, l.c.) typical for mountainous meadows. However, it has occasionally been found also in lowlands as demonstrated by Möller (l.c.) and by the collection from Denmark mentioned above. The macroscopical description given above is based on only one collection (*Noordeloos 1284*) and therefore not representative for the species. For more details on the variability of *E. prunuloides* I refer to the excellent descriptions given by Kühner (l.c.) and J. Lange (l.c.).

44. ENTOLOMA PSEUDOTURBIDUM (Romagn.) Moser—Fig. 34

Rhodophyllus pseudoturbidus Romagn. *in* (Trav. mycol. déd. R. Kühner) Bull. mens. Soc. Linn. Lyon **43** (Num. spéc.): 386. 1974. — *Entoloma pseudoturbidum* (Romagn.) Moser *in* Beih. Sydowia **8**: 269. 1979.

SELECTED ICON AND DESCRIPTION.—Dähnke & Dähnke, 700 Pilze: 252. 1979.

Pileus 30–85 mm broad, bluntly conical or hemispherical, then expanding to plano-convex with or without broad umbo, with margin slightly involute when young, but straight when older, hygrophanous, not (or at outermost margin only) translucently striate, dark umber brown or sepia, slightly pallescent on drying, subviscid when moist, on drying becoming strongly innately radially fibrillose to subrugulose. Lamellae crowded, ascending and almost free, ventricose, up to 11 mm broad, sordid greyish (to grey-brown) already when young, later on turning reddish brown, with serrulate, concolorous edge. Stipe (70–)90–110 × (5–)8–13 mm, cylindrical or distinctly broadened at base, greyish or greyish-brownish, almost concolorous with limb of pileus, striate with shining fibrils, sometimes twisted. Flesh whitish or especially when water-soaked brownish, brittle. Smell and taste strongly farinaceous.

Spores 6.3–8.1 × 6.5–7.3 μm, 5–7-angled in side-view, almost isodiametrical with rounded or more or less pronounced angles, thin-walled. Basidia 32–45 × 8.4–14 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 60–97(–110) × 12–32 μm. Pileipellis a cutis of narrow, cylindrical 3.5–7 μm wide hyphae with easily desintegrating walls and brown intracellular pigment; subpellis regular, made up of relatively short, inflated cells. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In frondose forest (*Fagus sylvatica*), terrestrial. So far known only from the type-locality in France and from Poland (Moser, 1979: 270).

COLLECTION EXAMINED.—FRANCE, dept. Oise, Forêt de Hez-Froidmont, 18 Nov. 1960, *M. Gasnier* (holotype, herb. Romagn. 58. 432, PC).

Entoloma pseudoturbidum differs from *E. turbidum* in the large, brittle carpophores, relatively dark coloured stipe, strong farinaceous smell and taste, and most probably also in the habitat: frondose forests (*Fagus sylvatica*) probably on rich soils. *Entoloma turbidum* prefers acidulous soils and grows mainly in or near coniferous forests, heath-like vegetations such as *Ericeta*, and on poorly manured pasture-lands. *Entoloma pseudoturbidum* is apparently rare as it has been recorded only twice, from quite different places.

45. ENTOLOMA RHODOPOLIUM (Fr.) Kumm.—Fig. 44

Agaricus rhodopolius Fr., Syst. mycol. **1**: 197. 1821. — *Entoloma rhodopolium* (Fr.) Kumm., Führ. Pilzk.: 98. 1871. — *Rhodophyllus rhodopolius* (Fr.) Quél., Enchir.: 59. 1886.

SELECTED ICONES & DESCRIPTION.—J. Lange, Fl. agar. dan. **2**: 95–96, pl. 75A. 1936.

Pileus 50–90(–110) mm broad, conico-convex, soon plano-convex or flattened with weak umbo, with margin slightly involute when young but becoming straight with age, hygrophanous, when moist pale greyish-brownish, pallescent on drying to sordid grey or whitish. Lamellae adnate, sometimes with slight decurrent tooth, white then pink. Stipe up to 120 × 6–12 mm, cylindrical, sordid white, fibrillose-striate lengthwise. Flesh sordid white, brittle. Smell none. Taste none or slightly farinaceous.

Spores (7.5–)8.1–9.3 × 7.0–8.1 μm, Q = 1.05–1.15–1.25, L–D = 0.6–1.2–1.7 μm, irregularly 6–8(–9)-angled in side-view, probably with dihedral base. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 60–125 × 7–29 μm. Pileipellis a simple cutis of 1.8–8.0 μm wide cylindrical hyphae with pale brown walls and scattered also some intracellular pigment. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In frondose woods; according to J. Lange in *Fagus* forests, according to some other danish mycologists in *Betula* forests. Recorded from many countries in Europe, but in its present narrow concept only known with certainty from Denmark.

COLLECTION EXAMINED.—DENMARK, 2 collections brought in at the exposition at Jaegersborg Dyrehave, Klampenborg, Sjaelland, Sept. 1980, *M. E. Noordeloos 1234* & *1237*.

The description given above represents *E. rhodopolium* in the sense of J. Lange, which may be the same as that of Kühner & Romagnesi (1954: 20–21). It is a fairly stout fungus with pale colours with hardly any smell and with predominatly membranal pigment. *Entoloma nidorosum* is very close, but is usually smaller, more slender, slightly darker sometimes, and less grey and usually has a distinct nitrous smell, a nasty-rancid taste, and exclusively intracellular pigment.

Fries' description of the species agrees with J. Lange's interpretation, but his diagnosis permits other interpretations as well, such as *E. sericatum* and *E. majaloides*. There is a great need for neotypification of this classical Friesian species.

46. **Entoloma subflexipes** (Kühn.) Noordeloos, *comb. nov.*—Fig. 40

Rhodophyllus subflexipes Kühn. *in* Bull. Soc. mycol. Fr. **93**: 453. 1977 (basionym).

Carpophores small. Pileus 5–15 mm broad, convex-umbilicate, finally with strongly undulating marginal zone, dark brown to blackish, translucently striate up to half the radius,

smooth or slightly rugulose. Lamellae distant, adnate or weakly adnate-decurrent, pink with brownish shade. Stipe 12–20 × 1–2.5 mm, grey-brown, paler than pileus, smooth as if polished, in some specimens with flocculose apex. Smell farinaceous.

Spores 8.1–9.3 × 6.4–8.1 μm, Q = (1.05–)1.15–1.2–1.25, distinctly ellipsoid in outline with pronounced angles, often with distinctly dihedral base. Hymenophoral trama regular, made up of inflated cells, 46–110 × 14–32 μm. Pileipellis a cutis of cylindrical 2–7 μm wide hyphae, with brown, intracellular pigment. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In marshy places near *Salix herbacea* in alpine zone, France.

COLLECTION EXAMINED.—FRANCE, dept. Vanoise, environs de Prolognan; Cirque du Petit Marchet, 2390 m alt., 10 Aug. 1965, *R. Kühner 65–67* (holotype; herb. Kühn., LY).

Entoloma subflexipes belongs to section *Polita* close to *E. politum* and *E. caccabus*. It differs from both in its dark pigmented pileus and its habitat, and from *E. politum* moreover in its distinctly ellipsoid spores. *Entoloma anthracinum* differs in the distinctly darker lamellae and larger, more irregularly shaped spores.

47. ENTOLOMA VENOSUM Gill.—Figs. 31a–d

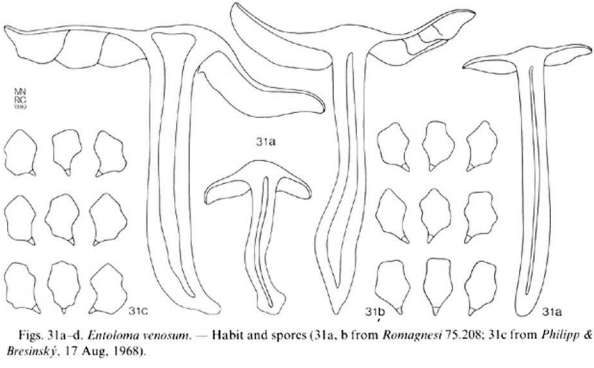
Entoloma venosum Gill., Hymen. Fr.: 403. 1876. — *Rhodophyllus venosus* (Gill.) Kühn. & Romagn., Fl. anal.: 193. 1953.

CHARACTERISTICS.—Pileus strongly hygrophanous, when moist very dark sepia, umber to blackish brown, not or very obscurely translucently striate at margin only, strongly pallescent on drying. Lamellae very dark grey-brown, frequently venose. Stipe with grey-brown tinge. Flesh brittle. Smell and taste strongly farinaceous-rancid. Spores 8–10.4 × 6.4–8 μm, Q = 1.25–1.3 on the average per collection. Pigment of two types: coarsely encrusting the hyphae of pileipellis and pileitrama and in addition also intracellular. In or near coniferous forests in central Europe.

Pileus 25–75 mm broad, conico-campanulate at first then expanding, often with conical umbo, with involute margin when young, strongly hygrophanous, when moist very dark sepia, umber brown or blackish brown, not or only slightly translucently striate at margin, strongly pallescent on drying, smooth, often slightly felted at centre. Lamellae moderately distant, sometimes more or less crowded, adnate to adnexed, sometimes emarginate, segmentiform or narrowly ventricose, sometimes veined, usually already when young with distinct grey-brown tinge, becoming dark flesh-coloured brown with age, with slightly irregular, concolorous edge. Stipe 35–60 × 3.5–8(–12) mm, cylindrical, sometimes slightly attenuated or broadened at base, moderately dark grey-brown, fibrillosely striate lengthwise, pruinose-flocculose at apex. Flesh concolorous with surface, brittle. Smell and taste strongly farinaceous-rancid.

Spores 8.1–10.3 × 6.4–8 μm, Q = 1.1–1.4(–1.45), on the average per collection between 1.25 and 1.3, L–D = 0.6–1.7–2.5 μm, (5–)6–7-angled in side-view with pronounced angles, with distinct dihedral base. Basidia 32–50 × (7.5–)8.5–15 μm, 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated or cylindrical cells, 32–95(–115) × 7–18 μm, frequently with brown, intracellular pigment. Pileipellis a cutis made up of up to 10 μm wide cylindrical hyphae with coarsely brown-encrusted walls and, in addition, dark brown intracellular pigment. Pileitrama regular. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTON.—In or near coniferous forests (particularly *Picea*) in central Europe, preferably in mountanous areas.



Figs. 31a–d. *Entoloma venosum*. — Habit and spores (31a, b from *Romagnesi* 75.208; 31c from *Philipp & Bresinský*, 17 Aug. 1968).

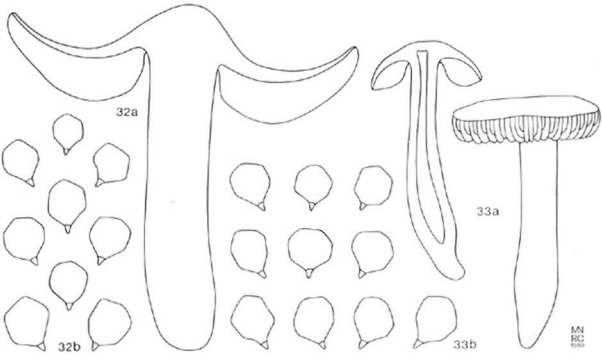
COLLECTIONS EXAMINED.—GERMAN FEDERAL REPUBLIC, Bayern, Traunstein, Knappenfelder Moor, 17 Aug. 1968, *Philipp & A. Bresinský* (M). — POLAND, Lysogorskie, Swieta Katarzyna, Wilkovska dolina, 11 Sept. 1966, *C. Bas 4755*. — FRANCE, dept. Doubs, near Pontarlier, Sept. 1975, *H. Romagnesi 75.208* (herb. Romagn., PC).

Entoloma venosum is very well characterized in its very dark pileus with two types of pigment and distinctly elongate spores. *Entoloma myrmecophilum* is closely related, but differs in having more isodiametrical spores, a preference for another habitat (frondose forests) and in the geographical distribution. *Entoloma platyphylloides* has a different pileal surface, viz. strongly radially fibrillose instead of smooth and shining, reminiscent of the pileal surface of *Oudemansiella platyphylla*. It should be mentioned, however, that I did not manage to get a clear concept of *E. platyphylloides* up till now (see insufficiently known taxa below, p. 245).

48. ENTOLOMA VIRIDANS (Fr.) P. Karst.—Figs. 33a–b

Agaricus viridans Fr., Monogr. **2**: 345. 1863. — *Entoloma viridans* (Fr.) P. A. Karst., Hattsv. **1**: 262. 1874 (non *Entoloma viridans* Harrisson & Lovejoy *in* Bot. Gaz. **50**: 385. 1910). — *Rhodophyllus viridans* (Fr.) Quél., Enchir.: 58. 1886.

CHARACTERISTICS.—Carpophores tricholomatoid, medium-sized; pileus, lamellae and stipe with distinct green tinge; pileus not hygrophanous, not striate; spores isodiametrical, small, (7.6–)8.1–8.7(–9.3) × 6.4–8.1 μm.



Figs. 32a–b. *Entoloma prunuloides*. — Habit and spores (all figs from *Noordeloos* 1284).
Figs. 33a–b. *Entoloma viridans*. — Habit and spores (all figs. from *Kits v. Waveren*, 2 Sept. 1969).

Pileus about 30 mm broad, hemispherical or conico-convex at first, soon flattened without umbo, with straight margin, not hygrophanous, not striate, dark greyish brown with green tinge at centre, towards margin paler and with more distinctly green tinge (at centre 10 YR (3/4), 4/4, 5/4, at limb 10 YR 4/4 to 2.5 Y 6/4), smooth, dry, at limb with small fibrillous-white patches ('veil'). Lamellae moderately distant, emarginate to almost free, ventricose, up to 6 mm broad, extending under pileus in mature specimens, greyish-greenish (5 Y 7/3, 6/3), only in late stages with pink tinge, with concolorous edge. Stipe up to 60 × 6 (at apex) × 9 (at base) mm, distinctly broadened at base then abruptly tapering, greyish-greenish (2.5 Y 5/4), minutely silvery striate lengthwise, smooth. Flesh concolorous with surface in cortex, in inner parts white, firm. Smell and taste indistinct.

Spores (7.6–)8.1–8.7(–9.3) × 6.4–8.1 μm, Q = 1.0–1.1–1.25, L–D = 0–1.0–1.7 μm, isodiametrical, 6–8-angled in side-view. Basidia 21–35 × 7–10 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated or subcylindrical cells, 70–200 × 8–19 μm. Pileipells a cutis made up of 2.5–7.8 μm wide cylindrical hyphae with slightly gelatinizing walls. Pileitrama regular, made up of inflated cells, 45–110 × 7.5–17 μm, with brown intracellular pigment in upper layers. Vascular hyphae very numerous in pileitrama. Clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—The welsh collection was found along a brook in *Quercus* forest, growing in mosses. Rare; so far known with certainty from only two localities, one in Sweden and one in Great Britain. Occurring perhaps also in the German Federal Republic (see below).

COLLECTION EXAMINED.—GREAT BRITAIN, Wales, Lake Vyrnwy, 2 Sept. 1969, *E. Kits v. Waveren*.

In the Herbarium of the Botanische Staatssamlung, München, the following collection was encountered: *Entoloma viridans*, Augsburg, 1912, *S. Killermann*. It contains one dried specimen with a water-colour scetch giving the following details:

Pileus conico-campanulate to conico-convex, not hygrophanous (?), greyish-olivaceous (about 2.5 Y 8/2–8/4), shining. Lamellae almost free, narrowly ventricose (not extending under the pileus) sordid pink. Stipe about 60 × 5 (apex) –8 (base) mm, distinctly broadened at base, concolorous with pileus. Spores 7.1–8.7 × 6.4–7.1(–8.1) μm, Q = (1.0–)1.07–1.13–1.25, L–D = (0–)0.6–1.1–1.7 μm, (sub-)isodiametrical, 6–8-angled in side-view. Basidia 4-spored, with clamp.

The poor condition of the collection did not allow a critical study of the trama and the covering layers. I did not see any pigment.

Fries described *Agaricus viridans* on the evidence of a collection made by von Post. Probably he saw only the water-colour that has been published in his Icones (1867: pl. 98 fig. 3). It depicts a vivid green *Entoloma*, even with green flesh. As far as I could verify, this remarkable species has never been found again. However, on account of its remarkable characters it has usually been accepted by later mycologists, who copied Fries description. *Entoloma viridans* has invariably been placed in section *Entoloma* close to *E. madidum* (P. Karst., 1886: 58; Saccardo 1887: 686).

In the herbarium of Dr. E. Kits v. Waveren, Amsterdam, I met with the collection described above, which fits more or less the Friesian diagnosis of *Agaricus viridans*. It belongs undoubtedly to section *Entoloma* on account of its habit, its non-hygrophanous pileus and its small, isodiametrical spores. The green tinges in pileus and stipe are unmistakeble but not as bright as in the type plate. Also the habit is different: the type plate shows a slender *Entoloma* with an acutely umbonate pileus and a straight cylindrical stipe. The collection of Dr. E. Kits v. Waveren differs in the lack of an umbo and having a distinctly broadened stipe. These differences, however, may be due to infra-specific variation. (Compare the variability in habit and colour of *E. madidum*, p. 161).

The collection made by the Bavarian mycologist Killermann represents probably a more slender and paler form of *E. viridans*. It is unknown whether the colours of Killermans painting have changed; they are rather pale olivaceous grey now.

From all this we may conclude that in section *Entoloma* there exist at least one taxon more or less resembling *Agaricus viridans* Fr. More well-annotated material is needed to allow more definite conclusions.

INSUFFICIENTLY KNOWN TAXA

accola.—*Agaricus accola* Britz. *in* Ber. naturhist. Ver., Augsburg **26**: 138. 1881. — *Entoloma accola* (Britz.) Sacc., Syll. Fung. **5**: 693. 1887.

CHARACTERISTICS.—Pileus convex-umbilicate, reddish brown, fibrillose-shining; lamellae white then pink, finally with brownish edge, adnexed to slightly decurrent; stipe slightly paler than pileus, white at base; spores 10–11 × 6–8 μm, ellipsoid in outline, irregularly 6-angled.

HABITAT & DISTRIBUTION.—In forests, E. Bayern, German Federal Republic.

Type non-existent. According to the description and plates *E. accola* is close to *E. costatum*, but seems to differ in the elongate spores.

appositivum.—*Agaricus appositivus* Britz. *in* Ber. naturhist. Ver. Augsburg **28**: 149. 1885. — *Entoloma appositivum* (Britz.) Sacc., Syll. Fung. **5**: 684. 1887.

CHARACTERISTICS.—Pileus convex, dark brown; lamellae brownish pink; stipe greyish, up to two times longer than the diameter of the pileus.

HABITAT & DISTRIBUTION.—In forest near Oberstaufen, Bayern, German Federal Republic.

Type non-existent. *Entoloma appositivum* is obviously a member of section *Rhodopolia*.

atropellitus.—*Rhodophyllus atropellitus* Favre, Champ. supér. Zone alp.: 200. 1955.

Characteristics.—Pileus 12 mm broad, hemispherical with inflexed margin, not hygrophanous, grey-brown to blackish, glabrous; lamellae L = about 30, l = 1–3, rather thick, segmentiform, brownish-greyish, almost without any pink; stipe 12 × 1.5 mm, 2.5 mm at base, dark grey-brown, minutely powdered at apex, downwards smooth; smell and taste inconspicuous; spores 9–11.5 × 6–8 μm (Kühn., 1977: 478, measured 10–12(–13) × 6.5–8.5 μm), multi-angled to almost gibbose in side-view, thin-walled; basidia 4-spored. Pileipellis a cutis, made up of radially arranged 3–7 μm wide, cylindrical hyphae with numerous, non-inflated terminal cells; pigment intracellular; clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In alpine *Salix herbacea* heath, Switzerland, France.

Type not studied. Kühner (1977: 478–480) gives a long discussion on this species, which so far has only been found twice and in both cases solitary. Because of its intracellular pigment and general habit *R. atropellitum* seems to be closely related to *E. anthracinum*. Kühner, however, confirms the difference in spore-shape of both species already mentioned by Favre, l.c. With regard to the spore-shape *R. atropellitus* resembles *E. sphagneti*, another dark pigmented *Entoloma*. The latter differs, however, in many respects, among other things in size, distinctly hygrophanous, conical pileus, and habitat.

bahusiense.—*Entoloma bahusiense* Lundell, Fungi Exsicc. suecici **41–42**, no. 2007. 1953.—Fig. 36.

CHARACTERISTICS.—Fruit-bodies somewhat more fragile than in *E. clypeatum*; pileus 30–55 mm broad, broadly campanulate to obtusely convex, not hygrophanous, dark grey sometimes with olivaceous tinge, smooth; lamellae greyish white then greyish pink, with slightly uneven, but not really serrulate edge; stipe 70–90 × 5–7 mm, flexuose, cylindrical, white at apex and base, in the middle part with grey tinge, solid when young, but becoming fistulose with age.

HABITAT & DISTRIBUTION.—On soil, amongst grasses, ferns, etc. on somewhat moist locality under *Prunus spinosa* and *Salix* spp.; Sweden (Bohuslän).

Notes on the holotype: SWEDEN, Bohuslän, Uddevalla, Björback. May, 1948/49, *S. Woldmar* (UPS):

Spores (8.1–)9.3–10.4(–11.5) × (7.0–)8.1–9.3(–10.4) μm, Q = 1.05–1.2(–1.3), isodiametrical, 5–7-angled in side-view. Basidia 38–50 × 11–13.5 μm, 4-spored, clamped. Subhymenium thin, slightly gelatinised. Hymenophoral trama regular, made up of short cells, 35–75 × 8–27 μm. Pileipellis an ixocutis of 3–5(–7) μm wide, cylindrical hyphae, with brown, intracellular pigment.

Pileitrama regular, made up of inflated cells, 25–80 × 8–20 μm. Clamp-connections numerous in hymenium, elsewhere infrequent or rare.

On the strength of the description given by Lundell and the facts revealed by my type-study, *E. bahusiense* is placed in section *Nolanidea*. The smooth pileus, slender, quickly fistulose stipe and relatively scarce clamp-connections in trama and cortical layers suggest a close relationship with *E. aprile*. The latter, however, has a strongly hygrophanous pileus and a different habitat. I wonder whether Lundell's observations concerning the non-hygrophanous aspect of the pileus were correct. For the time being I refrain from accepting *E. bahusiense* as a distinct species. More information, particularly on the hygrophaneity of the pileus, is needed.

batschianum.—*Agaricus batschianus* Fr., Epicr.: 144. 1838. — *Entoloma batschianum* (Fr.) P. A. Karst., Hattsv. **1**: 261. 1879. — *Rhodophyllus batschianus* (Fr.) J. Lange *in* Dansk bot. Ark. **2**(11): 31. 1921.

CHARACTERISTICS.—Fruitbodies slender; pileus 20–40 mm broad, very dark brown or blackish, not hygrophanous (?); lamellae adnate to adnexed, sordid white then pink with grey or brown tinge; stipe long and slender, dark grey, striate, fistulose; smell inconspicuous.
HABITAT & DISTRIBUTION.—In forests, Sweden (Småland).

This dark brown, slender species is unknown to me. Probably it belongs to section *Rhodopolia*, but the information provided by the descriptions available does not permit a secure interpretation. *Rhodophyllus batschianus* sensu J. Lange (1921, l.c.) is identical with *Entoloma vinaceum* (see p. 223).

bulbigenus.—See below under *persoonianus*.

difforme.—*Entoloma difforme* Naveau *in* Natuurw. Tijdschr. **5**: 75. 1923.—Fig. 49.

CHARACTERISTICS.—Habit like that of '*Tricholoma*' *aggregatum* Schff. (= *Lyophyllum decastes*) or '*Tricholoma*' *conglobatum* Vitt. (= *Lyophyllum fumosum*); pileus grey-brown, becoming blackish, almost viscid, with regular, inflexed-involute margin, about 40 mm broad; lamellae almost free or emarginate or decurrent, white then pale pink; stipe 50 × 1.5 mm, white, almost striate, broadened towards base; flesh white, fibrous, inner parts more or less spongy; smell none.
HABITAT & DISTRIBUTION.—Terrestrial, caespitose, in *Pinetum*, only known from the type-locality in North Belgium.

Notes on the type: BELGIUM, Oostmalle, 5 Sept. 1920, *E. Lahaye* (BR). The type consists of four specimens in a fairly bad state; it appeared to be impossible to reconstruct the tissues and covering layers. The following characters have been observed:

Spores 8.1–9.3(–10.4) × 7.0–8.1 μm, Q = 1.15–1.2–1.3, L–D = 1.2–1.7–2.2 μm, 5–6-angled in side-view with rather pronounced angles. Basidia most probably 4-spored. Pigment in pileipellis distinctly intracellular.

Entoloma difforme is a remarkable species with a habit reminiscent of that of a species of *Lyophyllum*, a dark pileus and a white stipe. It bears some resemblance to *E. myrmecophilum* with its dark pileus and habit, but I failed to find any encrusting pigment in *E. difforme*. Furthermore the lamellae and the stipe of *E. myrmecophilum* are tinged grey or grey-brown. Another dark pigmented species of *Entoloma* that resembles *E. difforme*, viz. *Rhodophyllus nigrocinnamomeus* Kalchbr. sensu J. Favre, differs in having a grey-brown stipe.

dispermus.—*Rhodophyllus dispermus* Kühn. *in* Bull. Soc. mycol. Fr. **93**: 454. 1977.

CHARACTERISTICS.—Pileus 14 mm broad, convex with umbo, hygrophanous, when moist brown, translucently striate, glabrous but minutely innately rugulose under lens; lamellae adnate, segmentiform, brownish; stipe 13 × 2.5–3 mm, greyish yellow, minutely aeriferously striate; spores 10–12.5 × 8.5–10 μm, Q = 1.2–1.3; basidia 2-spored; cystidia absent; pileipellis a cutis of radially arranged, 5–8 μm wide, cylindrical hyphae with intracellular pigment; trama of pileus and lamellae regular, made up of short cells; clamp-connections numerous in all tissues.
HABITAT & DISTRIBUTION.—In subalpine *Salix herbacea* vegetation; Sweden (Lappland, near Abisko).

Type not studied. *Rhodophyllus dispermus* is one of the few bispored species in subgenus *Entoloma*. It differs from *E. bisporiger* in the slightly aeriferous-fibrillose stipe-surface, brown lamellae and habitat. However, the description given above is based on only one carpophore. More information is needed for a definite decision on the status of *R. dispermus*.

elaphinum.—*Agaricus elaphinus* Fr., Monogr. **2**: 296. 1863. — *Entoloma elaphinum* (Fr.) P. A. Karst, Hattsv. **1**: 266. 1879. — *Rhodophyllus elaphinus* (Fr.) Quél., Enchir.: 59. 1886.

CHARACTERISTICS.—Pileus 30–60 mm broad, bluntly convex, hygrophanous, when moist reddish brown to umber, translucently striate at margin, pallescent on drying; lamellae sinuate, triangular then ventricose, pallid then flesh-colour; stipe 30–40 mm long, cylindrical or slightly broadened at base, livid to brownish, fibrillosely striate, glabrous; flesh white, inodorous.
HABITAT & DISTRIBUTION.—In mossy grassland with trees, Sweden, Småland.

Type non-existent. *Entoloma elaphinum* can be characterised as a small to medium-sized *Entoloma* in section *Rhodopolia*. It is not unlike *E. sordidulum* or *E. subradiatum*, but these two species frequently have a farinaceous smell and a different ecology. It is impossible to decide in this matter, because information on the microscopical characters of *E. elaphinum* is lacking.

farrahi.—*Entoloma farrahi* Mass. & Crossl., Fung. Fl. Yorkshire: 63. 1905.

CHARACTERISTICS.—Pileus 60–80 mm broad, conical then campanulate, blackish-bluish, dry, shiningly fibrillose; lamellae sinuate-adnate, ventricose, flesh-coloured; stipe 50–70 × 15–20 mm, concolorous with pileus, white at base; spores about 10 × 4.5–5.0 μm; cystidia 50–60 × 12–15 μm, ventricose-cuspidate.
HABITAT & DISTRIBUTION.—In the grass, Great-Britain.

Type non-existent. *Entoloma farrahi* is apparently a member of section *Entoloma* and closely related to *E. madidum*, from which it differs in the heterodiametrical spores and presence of (cheilo?) cystidia.

fertile.—*Agaricus fertilis* Pers., Synopsis: 328. 1801. — *Agaricus fertilis* Pers. ex Fr., Syst. mycol. **1**: 197. 1821. — *Entoloma fertile* (Pers. ex Fr.) Gill., Hymenom. Fr.: 504. 1874.

CHARACTERISTICS.—Pileus up to 60 mm broad, campanulate then expanding, moderately dark reddish brown; lamellae emarginate, up to 12 mm broad, with serrulate edge; stipe about 60 × 10 mm, white.

HABITAT & DISTRIBUTION.—Originally described from forests in France (Bulliard, 1792).

Type non-existent. Persoon referred for his *A. fertilis* to two plates of Bulliard, viz. pl. 534 and 547 fig. 1, (1792), both illustrating *A. phonospermus* Bull. Later, Fries (1821: 197) distinguished two varieties of *A. fertile*, viz. the typical variety, based upon Bulliard, pl. 547 fig. 1 and 590 (1793); and var. *intybaceum*, with a grey, virgate pileus, for which he referred to Bull., pl. 534. According to Fries (1874: 193) the typical variety represents the same species as *E. sinuatum* (= *E. lividum* in this work). Var. *intybaceum* is probably the same as *E. clypeatum*.

fuliginarium.—*Entoloma fuliginarium* P. A. Karst. *in* Hedwigia **32**: 292. 1892.

CHARACTERISTICS.—Pileus ca. 20 mm broad, convex or hemispherical then expanding, finally often slightly depressed, thin-fleshed, with margin slightly involute at first, translucently striate, blackish livid, pallescent on drying; lamellae adnate, crowded, pallid, weakly veined; stipe up to 60 × 4 mm, paler than pileus, at apex pruinose, downwards smooth, base white tomentose; smell none.

HABITAT & DISTRIBUTION.—In coniferous forest, Sept., S. Finland.

Type non-existent. According to Karsten *Entoloma fuliginarium* reminds of '*Collybia*' *atrata*.

gabrettae.—*Entoloma gabrettae* Pilát, Agaric. europ. Clavis Dichot.: 244. 1951 (nom. invalid., no latin diagnosis). Name change for *Entoloma costatum* sensu Pilát *in* Mykologia **7**: 58–59. 1930.

CHARACTERISTICS (kindly translated by Dr. Z. Pouzar, PRM). — Fruit-bodies densely caespitose-clustered; pileus brown-grey, mostly paler at centre and darker at margin, glabrous, slightly innately silky fibrillose with faintly darker striation, lustrous when dry and on dry spots, shallowly dotted at some places, convex, later expanding, sometimes even becoming umbilicate, on the whole very irregular, lobed at margin, sometimes excentric, 5–8 cm broad, leathery-fleshy; lamellae almost free or emarginate with decurrent denticule, rather distant, ventricose, up to 8 mm broad, pale greyish, later sordid flesh-coloured, transversily veined, with dentate, concolorous edge; stipe 60–100 × 7–30 mm, usually irregularly shaped, often compressed, almost fistulose, white or whitish, very much paler than pileus, fibrillose-rimose lengthwise; flesh white, mild; spores 8–9.5 × 7–8 μm.

HABITAT & DISTRIBUTION.—In grassland, Czechslovakia.

Type non-existent. *Entoloma gabrettae* resembles *E. costatum*, but differs among other things in having distinctly heterodiametrical spores, and the strong contrast in colour between pileus and stipe. Compare also *E. rhodopolium*.

griseoluridum.—*Rhodophyllus griseoluridus* Kühn. *in* Rev. Mycol. **19**: 4. 1954. — *Entoloma griseoluridum* (Kühn.) Moser *in* Gams, Kl. KryptogFl. 4. Aufl., **2b/2**: 196. 1978.

CHARACTERISTICS.—Pileus 40–90 mm broad, convex to flattened with large blunt umbo, when moist horn brown with grey tinge but with a distinct chocolate, reddish brown or purplish brown tinge at centre, pallescent on drying; lamellae adnate-emarginate, grey-brown with pinkish tinge; stipe 40–120 × 6–12(–14) mm, pale sordid grey sometimes with purplish or lilaceous tinges; smell strongly farinaceous, particularly when cut; spores 8.5–10.5 × 7–9 μm, 5–6-angled in side-view, with basal facet; pileipellis a cutis of narrow, cylindrical, 5–10 μm wide hyphae with intracellular pigment. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—In *Fagus* forest, France (Haute Savoye).

Type not studied. *Entoloma griseoluridum* is a rare species (probably only known from the type-locality), closely related to *E. lividoalbum* in section *Rhodopolia*, from which it differs in the purplish-greyish tinges in pileus and stipe.

griseo-olivaceum.—*Agaricus griseo-olivaceus* Britz. *in* Bot. Zbl. **62**: 5. 1895. — *Entoloma griseo-olivaceum* (Britz.) Sacc., Syll. Fung. **14**: 127. 1899.

CHARACTERISTICS.—Pileus 30–70 mm broad, convex-umbilicate, yellowish brown to greyish olivaceous, minutely fibrillose; lamellae crowded, broadly adnate-decurrent, white or whitish-brownish or pink; stipe 40–90 × 4–6 (middle) × 7–11 (base), cylindrical, flexuose, distinctly broadened towards base, white or with brown tinge; spores heterodiametrical, 8–10 × 6–7 μm.

HABITAT & DISTRIBUTION.—In moist places; Bayern, German Federal Republic.

Type non-existent. *Entoloma griseo-olivaceum* is a remarkable species with its grey-olivaceous, umbilicate pileus. It comes close to the concept of *E. rhodopolium* of Kühn. & Romagn. (1953: 196).

Compare also the notes on *E. olivaceum* Velen. below.

illicibile.—*Agaricus illicibilis* Britz. *in* Ber. naturhist. Ver. Augsburg **28**: 149. 1885. — *Entoloma illicibile* (Britz.) Sacc., Syll. Fung. **5**: 684. 1887.

CHARACTERISTICS.—Pileus 20–60 mm broad, conical then expanding, brownish-greyish; lamellae whitish then pink; stipe up 70 × 6–12 mm, distinctly broadened towards base, brown, striate with whitish fibrils; smell farinaceous; spores 10–11 × 6–8 μm.

HABITAT & DISTRIBUTION.—In forest near Oberstaufen in Bayern, German Federal Republic.

Type non-existent. Originally described as a species intermediate between *E. helodes* and *E. batschianum*.

macrius.—*Entoloma turbidum* var. *macrius* P. A. Karst., Hattsv. **1**: 266. 1879.

CHARACTERISTICS.—Differs from the typical variety in having a reddish brown pileus and a more slender, cylindrical blue stipe.
HABITAT & DISTRIBUTION.—In coniferous forest, Finland.

Type non-existent. The diagnosis is fairly short, but it might be *E. vinaceum* var. *violeipes*.

mediocre.—*Agaricus mediocris* Britz. *in* Bot. Zbl. **15**–**17**: 8. 1893. — *Entoloma mediocre* (Britz.) Sacc., Syll. Fung. **11**: 45. 1895.

CHARACTERISTICS.—Pileus hemispherical then expanding, whitish, at centre with yellow or brown tinge, up to 100 mm broad; lamellae adnate, flesh-coloured; stipe up to 60 × 15 mm, irregularly compressed and flexuose, fistulose, white; flesh white; smell none.
HABITAT & DISTRIBUTION.—In forests; Bayern, German Federal Republic.

According to Britzelmayer close to *E. turbidum*.

nigrocinnamomeus.—*Agaricus nigrocinnamomeus* Schulz. *in* Kalchbr., Hymenom. Hung. **1**: 21, pl. 11 fig. 1. 1873. — *Entoloma nigrocinnamomeum* (Schulz.) Sacc., Syll. Fung. **5**: 694. 1887. — *Rhodophyllus nigrocinnamomeus* (Schulz.) Favre, Assoc. fong. hauts-marais: 51. 1948.

CHARACTERISTICS.—Pileus up to 80 mm broad, convex, then flattened, depressed around weak umbo, hygrophanous, blackish-brownish, pallescent on drying, smooth; lamellae adnexed then secedent, reddish cinnamon; stipe about 30–60 × 4–12 mm, greyish-brownish, fibrillose; smell farinaceous.
HABITAT & DISTRIBUTION.—In grassland, Hungary.

Type non-existent. *Entoloma nigrocinnamomeum* probably finds its place in section *Rhodopolia* close to *E. myrmecophilum* and *E. venosum*. Favre described *E. nigrocinnamomeum* from a moist coniferous forest. It might turn out to be identical with *E. venosum* in the sense of Kühner & Romagnesi accepted by me (see also Kühner, 1977: 495). But, as information is lacking on size and shape of the spores and the type of pigmentation of *E. nigrocinnamomeum*, its identity remains obscure.

olivaceum.—*Entoloma olivaceum* Velen., Novitates mycologicae: 140. 1939.

Belongs to section *Rhodopolia*, close to *E. rhodopolium*. Compare E. *griseo-olivaceum* and the type study by Noordeloos (1980b: 82).

persoonianus.—*Agaricus persoonianus* Phill., *in* Gard. Chron. **16**: 874. 1881; non *Agaricus persoonii* Fr., Hymen. Eur.: 25. 1874. — *Agaricus persoonii* Du Port *in* Cooke, Ill. Br. Fungi, pl. 324 (315). 1884–1886 (change of name) — *Entoloma persoonii* (Du Port) Sacc., Syll. Fung. **5**: 697. 1887. — *Entoloma bulbigenum* Berk. & Br. *in* Ann. Mag. nat. Hist., Ser. V, **9**: 177. 1882. (change of name).

All these names refer to the same type, viz. a fungus collected by *J. M. Du Port*, febr. 1882. Sibbertoft, Northshire, Great Britain (K). The type has been studied by Dr. R. W. G. Dennis (1948: 205) and identified by him as a species of *Collybia* or *Marasmius*.

placenta.—*Agaricus placenta* Batsch, Elenchus Fung.: pl. 5 fig. 18. 1783. — *Agaricus placenta* (Batch) ex Fr., Spicilegium: 5. 1836. — *Entoloma placenta* (Batsch ex Fr.) Quél. *in* Mém. Soc. Emul. Montbéliard, ser. II, **5**: 117. 1872.

CHARACTERISTICS.—Pileus about 50 mm broad, convex then flattened with umbo, brown, subviscid when moist; lamellae adnexed-emarginate, white then pink; stipe 40–60 × 4–6 mm, cylindrical, brownish, fibrillose-striate, often twisted;smell none.
HABITAT & DISTRIBUTION.—In forests, Germany, Sweden.

Type non-existent. Judging from the type plate *E. placenta* must be close to *E. rhopolium*. Cooke (1884–1886: pl. 321(214)) probably depicted the same species.

platyphylloides.—*Rhodophyllus platyphylloides* Romagn. *in* Rev. Mycol. **19**: 5. 1954. *Entoloma platyphylloides* (Romagn.) Largent *in* Mycologia **66**: 1019. 1974.

CHARACTERISTICS.—Pileus 40–70 mm broad, convex with irregular margin, grey or grey-brown, weakly hygrophanous, distinctly radially fibrillose-virgate; lamellae adnate-emarginate, subsegmentiform, pale, then greyish pink; stipe about 50–80 × 7–15 mm, white, striate; smell and taste farinaceous; spores (8.0)8.5–11.0 × 6.5–8.5 μm, heterodiametrical, 5–7-angled in side-view, pileipellis an ixocutis of radially arranged, 4–5 μm wide cylindrical hyphae with intracellular pigment; pileitrama regular, in upper trama with membranal and encrusting pigment; clamp-connections numerous in all tissues.
HABITAT & DISTRIBUTION.—In mixed deciduous forest (*Quercus, Fagus*); France.

Type not-studied. *Entoloma platyphylloides* is fairly distinct with its greyish-brownish, radially fibrillose pileus resembling that of *Oudemansiella platyphylla*. *Entoloma myrmecophilum* and *E. venosum* are closely related, but differ in their much darker, almost blackish brown, smooth pileus. Apparently *E. platyphylloides* is very rare.

pluteoides.—*Agaricus pluteoides* Fr., Hymen. eur. **2**: 345. 1863. — *Entoloma pluteoides* (Fr.) P. A. Karst, Hattsv. **1**: 265. 1879. — *Rhodophyllus pluteoides* (Fr.) Quél., Fl. mycol. France: 181. 1888.

CHARACTERISTICS.—Fruit-bodies pluteoid, growing on rotten wood; pileus 10–20 mm broad, convex then expanding, hygrophanous, when moist whitish-greyish, translucently striate, pallescent on drying to sordid yellow, slightly radially fibrillose; lamellae emarginate-adnexed, white then pink; stipe about 40 × 4 mm, cylindrical, white, tinged yellow, with fibrillose-subtomentose surface.
HABITAT & DISTRIBUTION.—On rotten wood of *Abies*; Sweden, France.

Type non-existent. Fries placed *Agaricus pluteoides* in subgenus Entoloma on account of the continuous flesh in stipe and pileus and adnexed lamellae. It needs rediscovery.

pomaceum.—*Entoloma pomaceum* Velen., Novitates mycologicae: 139. 1939.

Belongs probably to section *Entoloma* (see type study by Noordeloos, 1980b: 83–84).

praecox.—*Entoloma praecox* P. A. Karst. *In* Hedwigia **32**: 59. 1893.

CHARACTERISTICS.—Pileus 30–60 mm broad, conico-convex, then expanding and with undulating, lobed margin, hygrophanous, when moist sordid brown (fuligineous) and translucently striate, pallescent on drying, shining; lamellae almost free, sordid then flesh colour; stipe 30–60 × 6 mm, fistulose, flattened, pallid sordid brown, striate; spores 7–10 μm in diameter, (sub-)isodiametrical.

HABITAT & DISTRIBUTION.—In sandy places in mixed forest, May; S. Finland.

Type non-existent. *Entoloma praecox* belongs to section *Nolanidea* and is close to *E. aprile* and *E. bahusiense*.

principalis.—*Agaricus principalis* Britz. *in* Ber. naturhist. Ver. Augsburg **31**: 163. 1894. — *Entoloma principale* (Britz.) Sacc., Syll. Fung. **11**: 45. 1895.

CHARACTERISTICS.—Fruit-bodies robust, tricholomatoid; pileus up to 140 mm broad, thick-fleshed, convex to flattened with umbo, greyish-violaceous or greyish blue, smooth; lamellae emarginate, segmentiform to ventricose, white then pink; stipe up to 180 × 30 mm, cylindrical, sometimes tapering at base, sometimes broadened, bluish-violaceous, paler than pileus; flesh white, smell none; spores isodiametrical.

HABITAT & DISTRIBUTION.—In poor grassland, Bayern, Germany.

Type non-existent. According to Britzelmayer, *E. principale* is intermediate between *E. porphyropheum* and *E. pleropicum* (= *E. nitidum*). In my opinion it might easily be identical with *E. madidum*.

pseudoexcentricus.—*Rhodophyllus pseudoexcentricus* Romagn. *in* Rev. Mycol. **2**: 37. 1937. — Fig. 47.

CHARACTERISTICS.—Pileus 35–65 mm broad, subcampanulate at first, then expanding to convex or plano-convex, often undulating and irregular, with margin inflexed at first, but later on straight, weakly umbonate, hygrophanous, greyish brown or pale brownish, translucently striate, strongly pallescent on drying to almost white, dry, glabrous; lamellae moderately distant, sinuate-adnate, segmentiform, white then pink with slight orange tinge, rarely slightly veined; stipe 40–95 × 4–13 mm, cylindrical, slightly attenuated at base, often strongly flexuose and twisted, solid, becoming more or less fistulose with age, white, slightly tinged brown with age, striate, base with white mycelium; flesh fairly firm, white; smell strongly farinaceous; taste farinaceous; spores 9.3–11.5 × 7.0–8.3(–8.7) μm, Q = 1.15–1.25–1.3(–1.4), L–D = 1.2–2.1–2.7 μm, usually 6–7-angled in side-view, distinctly heterodiametrical with dihedral base; basidia (2-)4-spored; cystidia none; hymenophoral trama regular, made up of slightly inflated cells, 25–110 × 7–23 μm; pileipellis a cutis of cylindrical, 2.7–7.5(–9.0) μm wide hyphae with very pale

intracellular pigment; pileitrama regular, made up of relatively short up to 140 μm long cells; clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—Along streamlet under *Populus*, France.

COLLECTION EXAMINED.—FRANCE, dept. Seine & Oise, bois de la Grange, Sept. 1932, *H. Romagnesi* (lectotype (design. mihi), herb. Romagn., PC).

Entoloma pseudoexcentricum belongs to section *Rhodopolia* and is close to *E. rhodopolium*, from which it differs, according to Romagnesi, in the strong farinaceous smell and the slightly more heterodiametrical spores.

pustulatum.—*Entoloma pustulatum* Velen. *in* Mykologia **5**: 113. 1928.

CHARACTERISTICS.—Pileus 30–40 mm broad, violaceous-greyish; stipe white, at apex violaceous and densely beset with darker granules; smell very strongly like dung; spores elliptical, angular, 10–12 μm long.

HABITAT & DISTRIBUTION.—In the grass, near Prague, Czechoslovakia.

No type material is left at PRC nor PRM. Judging from the description this species might belong to subgenus *Leptonia*, close to *E. mougeotii*.

quisquiliaris.—*Entoloma quisquiliaris* P. A. Karst. *in* Acta. Soc. Fauna Fl. fenn. **9**: 329. 1867. — Fig. 35.

Lectotype (design. mihi): FINLAND, East Bothnia, Vaasa, Lahti ölbryggeri, 1 Aug. 1867, *P. A. Karsten 1661* (H).

The type consists of several specimens with spores 8.1–9.3 × 4.0–4.7 μm, ellipsoid in side-view, slightly angular in apical view, thin-walled, yellowish-pinkish under the microscope (Fig. 35). This type of spores is found in the genus *Clitopilus*.

radiatus.—*Rhodophyllus radiatus* J. Lange, Fl. agar. dan. **5**: VIII. 1940 (Fl. agar. dan. **2**: 96. 1936; nom. nud.). — *Nolanea radiata* (J. Lange) P. D. Orton *in* Trans. Br. mycol. Soc. **43**: 179. 1960. — Fig. 42.

CHARACTERISTICS.—Pileus 15–25 mm broad, convex-expanding with a small, rather acute umbo, pale dingy date-brownish, coarsely radially striate up to half-way; lamellae horizontal, rotundate behind, pallid; stipe short (about 40 mm), pallid, slightly hollow.

HABITAT & DISTRIBUTION.—In copses, on naked ground or among grass and weeds, Denmark.

No type material is left at C, but there are some sporeprints left of three later gatherings of the species made by J. Lange in Denmark, viz. on Isl. Fyn: Ålökkeskov, 5 Aug. 1938 and 16 Aug. 1941, and at Husmandskolen, Aug. 1941. I found the spores of these three collections to measure 8.1–10.0(–10.4) × 7.0–8.1 μm, Q = (1.07–)1.15–1.25–1.3(–1.35), L–D = (0.6–)1.2–2.0–2.7 μm, usually 6-angled in side-view and probably with basal facet.

Rhodophyllus radiatus is probably the same as *E. subradiatum*. The spores seem to be slightly smaller, but since an important character, viz. the pigmentation type of *R. radiatus*, cannot be verified the conspecifiey of the two taxa cannot be proved.

Nolanea radiata sensu P. D. Orton (1960, l.c.) is close to *E. sericeum* in subgenus *Nolanea* (Noordeloos 1980a: 528).

repandus.—*Agaricus repandus* Bull., Herb. Fr.: pl. 423 fig. 2. 1789. — *Agaricus repandus* (Bull.) ex Fr., Syst. mycol. **1**: 255. 1821. — *Entoloma repandum* (Bull. ex Fr.) Gill., Hymenom. Fr.: 401. 1876. — *Rhodophyllus repandus* (Bull. ex Fr.) J. Lange *in* Dansk bot. Ark. **3**(11): 30. 1921.

Type non-existent. *Agaricus repandus* in the original concept of Bulliard refers to a species of *Inocybe*, probably close to, or identical with *I. patouillardii*. This was also the concept accepted by Fries (1821, l.c.).

However, in 1812(:586) Bulliard emended his *Agaricus repandus* by including also *A. sinuatus*, depicted by him on pl. 579 (1790). The latter is most probably identical with our *E. lividum*. This mislead Gillet to interprete *Agaricus repandus* Bull. as a species of *Entoloma*. An other misapplication is: *Rhodophyllus repandus* sensu J. Lange, 1921, l.c., and 1936: 95, pl. 73A (= *E. prunuloides*).

Entoloma repandus sensu Cooke (1884–1886, pl. 320(313)) most probably also refers to a species of *Inocybe*.

rigidulum.—*Entoloma rigidulum* Velen., Novitates mycologicae: 139. 1939. — Doubtful species from section *Rhodopolia* or *Polita* (Noordeloos 1980b: 84).

rubellum.—*Agaricus rubellus* (Scop.) ex Fr., Spicilegium: 6. 1836: — *Entoloma rubellum* (Scop. ex Fr.) Gill., Hymenom. Fr.: 400. 1876. — *Rhodophyllus rubellus* (Scop. ex Fr.) Quél., Epicr.: 58. 1886.

CHARACTERISTICS.—Pileus 20–30 mm broad, convex then flattened, flesh colour, glabrous, viscid when moist; lamellae adnexed, crowded, pink, with serrulate edge; stipe 40–100 × 5 mm, cylindrical, white, becoming brownish, solid, firm.

HABITAT & DISTRIBUTION.—In forest (*Fagus*) on rotten trunc of Alnus, Hungary, France (de Seynes, 1863: 100).

Entoloma rubellum is generally placed in section *Entoloma*, close to *E. madidum*. It is remarkable for its flesh-coloured pileus.

singularis.—*Rhodophyllus singularis* Romagn. *in* (Trav. mycol. déd. R. Kühner) Bull. mens. Soc. linn. Lyon **43** (Num. spéc.): 386. 1974. — Fig. 41.

CHARACTERISTICS.—Pileus 60 mm broad, ± flattened, weakly hygrophanous, moderately dark bistre-ochraceous (reminiscent of *Lyophyllum aggregatum*), slightly translucently striate at

margin only, pallescent on drying; lamellae crowded, adnexed-emarginate, segmentiform, grey-yellow then with slight pink tinge, with brown-yellow, entire edge, veined on sides; stipe 85 × 10 mm, cylindrical, attenuated at base, pale at apex, downwards grey-brown with a very slight grey-lilaceous tinge, pruinose at apex, downwards smooth, strongly fibrillosely striate; flesh thin but very rigid, white, with brown tinge when moist, flesh-colour in cortex of apex of stipe towards base of stipe distinctly grey-lilaceous or grey-blue; smell and taste slightly farinaceous; spores (8.1–)8.7–11 × 7.1–8.3 μm, 5–7-angled in side-view, with sometimes very distinct dihedral base; basidia 4-spored, with clamp: hymenophoral trama regular, made up of short, inflated cells; pileipellis a narrow ixocutis of 3–8(–9.5) μm wide, cylindrical hyphae with intracellular pigment; pileitrama regular, made up of short, inflated cells; clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In humid frondose forest; France.

COLLECTION EXAMINED.—FRANCE, dept. Aisne, Forêt de Retz, 10 Oct. 1954, *H. Romagnesi 54. 339* (holotype, herb. Romagn., PC).

Rhodophyllus singularis is a rather remarkable species, according to Romagnesi reminiscent of *Lyophyllum aggregatum*. It belongs to section *Rhodopolia*, but differs from all species known in this section in the peculiar lilaceous-bluish tinges of the stipe. So far only known from the type-locality; only one carpophore found.

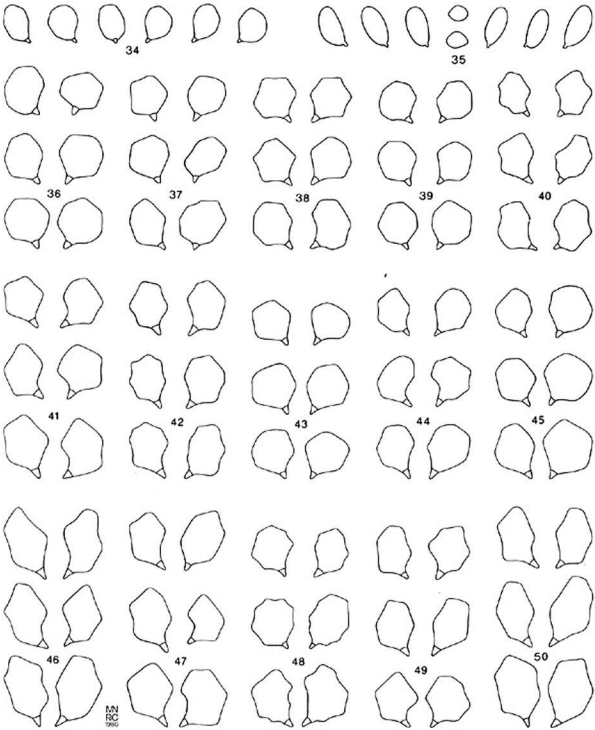
subcollariatus. — *Rhodophyllus subcollariatus* Kühn. *in* Bull. Soc. mycol. Fr. **93**: 453. 1977.

CHARACTERISTICS.—Pileus 11–22 mm broad, convex, with centre slightly depressed or very slightly umbonate, dark bistre, innately fibrillose or fibrillose-rugulose; lamellae very distant, adnate, but loosening from the stipe and then forming a collarium, ventricose, relatively dark grey-brown; stipe 11–16 × 1.2–2 mm, cylindrical, dark grey-brown, smooth, polished or with some scattered silvery fibrils lengthwise; flesh thin; smell none; spores 10–11 × 7–8.5 μm, heterodiametrical, 6-angled in side-view; basidia 4-spored; pileipellis a thin cutis of 2.5–5 μm wide, cylindrical hyphae with intracellular pigment; pileitrama and hymenophoral trama regular, made up of relatively long cells (up to 450 μm long!); clamp-connections present in all tissues.

HABITAT & DISTRIBUTION.—Among *Salix herbacea* in the Alps; so far only known from the type-locality in France.

According to Kühner, *R. subcollariatus* is close to *E. anthracinum*, from which it differs in the more heterodiametrical spores and the pseudocollarium. I have not seen the type. It should be noted that the rather long cells of the pileitrama are not very typical for subgenus *Entoloma*.

Fig. 34. *Entoloma pseudoturbidum*, spores (from holotype). — Fig. 35. *Entoloma quisquiliare*, spores (from holotype). — Fig. 36. *Entoloma bahusiense*, spores (from holotype). — Fig. 37. *Entoloma atrosericeum*, spores (from holotype). — Fig. 38. *Entoloma alnobetulae*, spores (from holotype). — Fig. 39. *Entoloma brassicolens*, spores (from holotype). — Fig. 40. *Entoloma subflexipes*, spores (from holotype). — Fig. 41. *Rhodophyllus singularis*, spores (from holotype). — Fig. 42. *Rhodophyllus radiatus*, spores (from *J. Lange*, 16 Aug. 1941). — Fig. 43. *Entoloma inocybeforme*, spores (from *Kuyper*, 30 Sept. 1979). — Fig. 44. *Entoloma rhodopolium*, spores (from *Noordeloos* 1237). — Fig. 45. *Entoloma alpicola*, spores (from *Gulden* 173/75). Fig. 46. *Entoloma chionoderma*, *spores* (from holotype). — Fig. 47. *Rhodophyllus pseudoexcentricus*, spores (from holotype). — Fig. 48. *Entoloma anthracinum*, spores (from *Kühner* 73.206). — Fig. 49. *Entoloma difforme*, spores (from holotype). — Fig. 50. *Entoloma eximia*, spores (from holotype).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sublividus.—*Agaricus sublividus* Britz., Hymenom. Südbayern **8**: 5. 1891. — *Entoloma sublividum* (Britz.) Sacc., Syll. Fung. **11**: 45. 1895.

CHARACTERISTICS.—Pileus up to 90 mm broad, campanulate with slightly reflexed margin, yellowish grey, sordid grey, brown-grey, strongly radially fibrillose, with rugulose centre; stipe 80 × 25 mm, attenuate towards base, white, solid; smell farinaceous.
HABITAT & DISTRIBUTION.—In forest; Wetsheim, Bayern, German Federal Republic.

Type non-existent. According to Britzelmayer close to *E. lividum*, but different in size and colour of the pileus.

subsepiaceus.—*Rhodophyllus subsepiaceus* Kühn. *in* Bull. Soc. mycol. Fr. **93**: 454. 1977.

CHARACTERISTICS.—Pileus 15–35 mm broad, convex, sometimes bluntly umbonate, dark brown, slightly translucently striate at margin, pallescent on drying, more or less smooth; lamellae adnate, pink, sometimes with brown tinge; stipe up to 55 × 3–5.5(–8.0) mm, white or with grey tinge, usually with aeriferous fibrils lengthwise; smell and taste weakly to distinctly farinaceous; spores about 8–11 × 7–9 μm; pileipellis a cutis of narrow cylindrical 3–6 μm wide hyphae with intracellular pigment; pileitrama and hymenophoral trama regular, made up of relatively short, cylindrical or slightly inflated cells; clamp-connections present in all tissues.
HABITAT & DISTRIBUTION.—Moist places, sometimes near *Salix herbacea*, in subalpine zone; Scandinavia.

Rhodophyllus subsepiaceus seems to be closely related to *E. subradiatum* and *E. sordidulum*. Kühner (1977: 454) described also a variety with encrusting pigment, viz. var. *incrustatus*. I have not studied this species.

turbidatum.—*Agaricus turbidatus* Britz., Hymenom. Südbayern **8**: 5. 1891. — *Entoloma turbidatum* (Britz.) Sacc., Syll. Fung. **11**: 45. 1895.

CHARACTERISTICS.—Pileus up to 80 mm broad, hemispherical to convex, deeply umbilicate, yellow-brown to brown, often rimose; lamellae adnate, sometimes emarginate, sometimes almost decurrent, sordid pink; stipe up to 60 × 15 mm, cylindrical, sometimes broadened, sometimes attenuate towards base, slightly paler than pileus, fibrillose; smell none.
HABITAT & DISTRIBUTION.—In forest near Augsburg, Bayern, German Federal Republic.

Entoloma turbidatum resembles *E. costatum* very much in habit, and odourless flesh, but the colours are slightly different and the spores are, according to Britzelmayers' plate, distinctly heterodiametrical (compare *E. accola*, pag. 238).

ENTOLOMA subgenus ALLOCYBE Noordeloos

Entoloma subgenus *Allocybe* Noordeloos *in* Persoonia **11**: 143. 1981. — Holotype: *E. excentricum* Bres.
Rhodophyllus section *Excentrici* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 332. 1974. — Holotype: *R. excentricus* (Bres.) Romagn.

CHARACTERISTICS. — Carpophores tricholomatoid, sometimes reminding of a robust species of Inocybe; pileus conical or flattened, not hygrophanous, not striate, white or leather brown; pileipellis a cutis of cylindrical to inflated, 5–20 μm wide hyphae, sometimes with ascending, slightly inflated terminal cells; pigment membranal or minutely encrusting; spores heterodiametrical, 10–15 μm long, with basal facet; hymenophoral trama made up of relatively long up to 320 μm long, cylindrical or fusoid cells; clamp-connections numerous in hymenium, elsewhere rare or lacking.

The taxonomic position of subgenus *Allocybe* is rather isolated within the genus *Entoloma*. The general habit reminds of that of some species in section *Entoloma*, but there are striking differences. Romagnesi (1978: 37) considered *E. excentricum* one of the most enigmatic species in the European *Entoloma*-flora with its large spores with a basal facet and its large cheilocystidia. He pointed to similarities with subgenus *Trichopilus* considering these two characters, but considered the relatively simple pileipellis and the membranal pigmentation sufficient reasons not to include section *Excentrici* in subgenus *Trichopilus*, which has, as we know, a trichodermlike pileipellis with intracellular pigment. Therefore he retained section *Excentrici* within the subgenus *Entoloma*, emphasizing, however, its isolated position there.

Characters worked out by me, but not mentioned by Romagnesi, are the size and shape of the elements of the trama of lamellae and pileus. In all species studied (viz. *E. excentricum*, *E. eximium* and *E. chionoderma*) these elements range from 90–320 μm in length and are more or less fusoid or cylindrical. This type of tramal elements has never been found in other sections of subgenus *Entoloma*, but commonly in subgenus *Nolanea* and *Trichopilus*. In addition I found in the pileipellis of *E. excentricum* some scattered, large, inflated terminal cells, up to 20 μm wide, and clamp-connections are rare, except in the hymenium. These facts support the idea that section *Excentrici* is not in its right place within the subgenus *Entoloma*, nor does it fit, especially on account of the pigmentation and structure of pileipellis, in the subgenus *Trichopilus*. Therefore I accommodate the species of section *Excentrici* in a new subgenus. (I avoid the use of *Excentrici* for the obvious reason that an excentric stipe only very exceptionally occurs in the group of species concerned and cannot be considered to be characteristic at all. According to the Code of Botanical Nomenclature one is not obliged to use the same epithet when the rank of an infrageneric taxon is changed).

KEY TO THE SPECIES OF SUBGENUS ALLOCYBE

1a. Pileus conical, brilliantly white; cheilocystidia absent. . . . . *E. chionoderma*, p. 254
b. Pileus pale brown or leather brown; cheilocystidia present. 2
2a. Pileus conical, not expanding; lamellae entirely free; smell like that of coconut or *Lactarius glyciosmus*; in forests. . . . . *E. eximium*, p. 254
b. Pileus conical than flattening, with aeriferous-micaceous patches; lamellae adnate-emarginate; smell weak, sometimes subfarinaceous or slightly rancid; in grasslands. . . . . *E. excentricum*, p. 252

49. ENTOLOMA EXCENTRICUM Bres.—Figs. 51a–e

Entoloma excentricum Bres., Fungi trident. **1**: 11, pl. 8. 1881. — *Rhodophyllus excentricus* (Bres.) Romagn. *in* Kühn. & Romagn., Fl. anal.: 198. 1953.

SELECTED ICONES AND DESCRIPTIONS.—Bohus *in* Bot. Közlem. **57**: 14. 1970. — Cetto, Funghi Vero **1**: 240, pl. 98. 1975. — Einhellinger *in* Ber. Bayer. bot. Ges. **41**: 103, figs. 18, 21, 23, pl. 9c. 1969. — Konrad *in* Bull. Soc. mycol. Fr. **43**: 174–176. 1927. — Konrad & Maublanc, Icon. sel. Fung. **4**: pl. 191. 1928. — Pearson *in* Trans. Br. mycol. Soc. **22**: 29. 1938.

CHARACTERISTICS.—Pileus 23–57 mm broad, conico-convex then flattened, pale leather brown, subfelted-micaceous with involute margin; lamellae crowded, segmentiform to subventricose, pink often tinged brown or with brown edge; stipe 30–80 × 4–80 mm, white, with brown tinge at base; cheilocystidia up to 100 μm long, protruding from the hymenium, fusiform to lageniform.

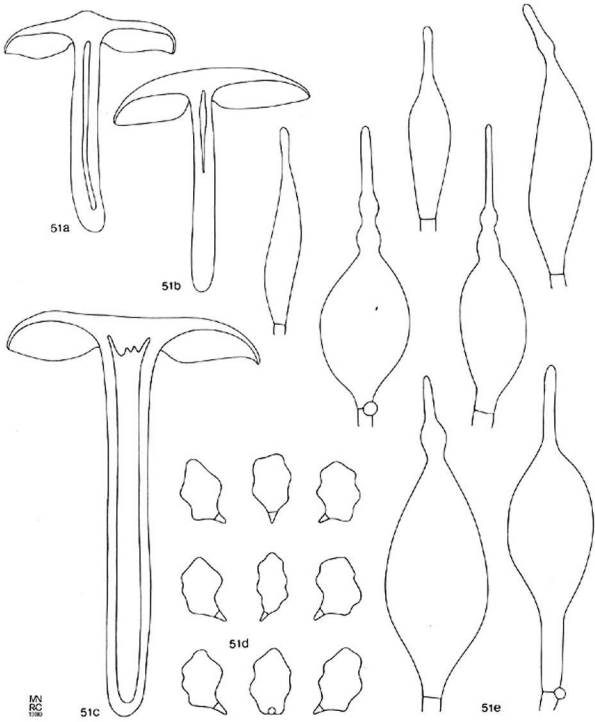
Pileus 23–57 mm broad, convex then plano-convex, usually with flattened, rarely with subumbonate centre, with involute margin, not hygrophanous, not translucently striate, very pale brown, 'café-au-lait' or leather brown (about 10 YR 7/3), smooth to subfelted, often with remarkably spotted surface with alternating micaceous and subfelted patches, near margin with adpressed, brown fibrils. Lamellae L = about 50, l = 3–5, crowded, adnate-emarginate, segmentiform, rarely subventricose, 4–10 mm broad, pale pink, with brown tinge when old, with concolorous or brown, irregular-subfloccose edge. Stipe 30–80 × 4–8 mm, cylindrical or slightly tapering towards base, sometimes twisted, whitish with brown or yellowish tinges, longitudinally fibrillose-constate, base white tomentose. Flesh white sometimes with brown tinge. Smell weak, rarely more or less farinaceous or reminding of that of *Clitocybe rivulosa*. Taste unpleasant, subfarinaceous.

Spores (10.2–)11.2–12.7(–14.0) × (6.8–)7.0–8.4(–9.3) μm, Q = 1.25–1.5–1.7, L–D = 2.4–4.0–6.0 μm, irregularly 5–7-angled in side-view with basal facet. Basidia 35–56 × 11–17 μm, 4-spored. Cheilocystidia 50–90(–108) × 10–21 μm, broadly fusiform to lageniform with broad, swollen part and long, protruding, attenuate, sometimes moliniform neck, colourless or minutely encrusted particularly in upper part, rarely filled with brown intracellular pigment-clots. Hymenophoral trama regular, made up of lang, fusoid cells, up to 300 μm long and 10–27 μm wide, sometimes with pale brown intracellular pigment. Pileipellis varying from a simple cutis to, particularly at centre, a trichoderm, made up of up to 20 μm wide cylindrical hyphae, sometimes with long, fusoid terminal cells, with pale brown walls. Pileitrama regular and made up of radially arranged hyphae in limb, becoming irregular-intermixed in centre of pileus, with hyaline or pale brown walls. Clamp-connections present in hymenium, rare elsewhere.

HABITAT & DISTRIBUTION.—In xerophitic grasslands, preferably on calcareous soils, rare, till now not found in the Netherlands but occurring rarely in adjacent Belgium and Germany. Widely distributed: probably more common in the southern parts of Europe. Aug.–Oct.

COLLECTIONS EXAMINED.—SWEDEN, Isl. Öland, Stora Alvaret, 19 Aug. 1979, *S. Ryman 5382*. — BELGIUM, prov. Namur, Ave-et-Auffe, le Roptai, 11 Oct. 1973, *P. B. Jansen*. — FRANCE: dept Manche, Quineville, 26 Aug. 1971, *H. Romagnesi 71.192* (herb. Romagn., PC); dept. Seine & Marne, Fontainebleau, 23 Sept. 1951, *H. Romagnesi 51.300* (herb. Romagn., PC); dept. Doubs, Lougres, 19 Sept. 1955, *Maillot* and 18 Aug. 1956, *H. S. C. Huysman*. — GERMAN FEDERAL REPUBLIC, Gerolstein, 22 Sept. 1980, *M. E. Noordeloos 1256*. — HUNGARY, Bugac Puszta, 25 km S. of Keskemêt, 20 Oct. 1978, *C. Bas 7324*. — ITALY, Andalo, 'in pratis andis', Aug. 1901, *G. Bresadola* (S).

Bresadola (1881: 11 and 1929: pl. 556) characterised *E. excentricum* as a rather pale, not hygrophanous *Entoloma* with lamellae 'ex albo carnae'. The descriptions and plates of Konrad & Maublanc (l.c.) and Cetto (l.c.) suggest that typical *E. excentricum* has fairly purely pink



Figs. 51a–e. *Entoloma excentricum*. — Habit and spores (51a from *Noordeloos* 1256; 51b from *Jansen*, 11 Oct. 1973; 51c, d, e from *Bas* 7324).

lamellae. However, some of the collections studied by me, including that from the Bresadola herbarium at Stockholm, show brown colours in the lamellae, which are caused by brown intracellular clots of pigment in cheilocystidia and basidia and extracellular pigment-clots in the hymenium. The pigment is usually concentrated on and near the edge of the lamellae, in some cases (e.g. in *Bas 7324*) even causing a more or less brown edge visible to the naked eye. This type of pigment is also found in subgenus *Pouzaromyces* (see Noordeloos, 1979) and in some members of subgenus *Inocephalus* (= *Inopilus* Romagn. sensu Romagnesi 1978). The name 'necropigment' used by Mazzer (1976) for this type of pigment is incorrect as it also occurs in living tissues and not only in so-called 'abortive' basidia.

50. **Entoloma chionoderma** (Pilát) Noordeloos, *comb. nov.*—Fig. 46

Nolanea chionoderma Pilát *in* Acta Mus. nat. Prag. **9B**(2): 57, f. 63. 1953 (basionym).

CHARACTERISTICS.—Pileus 35 mm broad, conical to conico-campanulate, then expanding with reflexed margin, white, at centre with grey tinge, silky-shining, subfibrillose, thin-fleshed, not hygrophanous; lamellae moderately crowded, emarginate, pallid grey-brown without pink tinge; stipe 70 × 7 mm, cylindrical, white or with slight grey tinge, fibrillose, striate, sometimes twisted; flesh thin, white or whitish, rather firm; smell and taste inconspicuous.

Spores 10.8–12.4 × (7.4–)7.8–8.4 μm, Q = 1.4–1.45–1.6, L–D = 3.6–4.5 μm, 6-sided in side-view, with basal facet. Basidia 40–46 × 13.5–17.5 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of long, fusoid cells, 90–320 × 12.5–40 μm. Pileipellis a cutis or radially arranged, cylindrical, 7–15 μm wide hyphae without visible pigment. Clamp-connections seen in the hymenium.

HABITAT & DISTRIBUTION.—Under *Fagus* in mixed mountainous virgin forest (*Fagus sylvatica* and *Abies alba*) at 1200 m alt. Only known from the type-locality in central Slovakia, Czechslovakia.

COLLECTION EXAMINED.—CZECHOSLOVAKIA, Slovakia, Polana near Detva, 24 Aug. 1951, *A. Pilát* (holotype, PRM).

Entoloma chionoderma is likely to be a beautiful species with its shining, pale pileus with a shape similar to that of a species of *Inocybe*. It is closely related to *E. eximium*, from which it differs by the lack of cystidia in the hymenium.

51. **Entoloma eximium** (Romagn.) Noordeloos, *comb. nov.*—Fig. 50

Rhodophyllus eximius Romagn. *in* Bull. Soc. mycol. Fr. **60**: 99. 1944 (basionym).

Pileus 35–63 mm broad, acutely conical, only slightly expanding, finally convex with acute umbo, often very irregular and excentrical, with very irregular, lobed-undulating margin, not hygrophanous, not striate, pale ivory or pale yellowish brown, strongly shining, not fibrillose, absolutely smooth. Lamellae distant and thickish, free, ventricose, whitish ivory or yellowish, then with pink tinge, with irregular, denticulate, concolorous edge. Stipe 85–100 × 5.5–9 mm, cylindrical, gradually broadening towards base, brittle, very fibrillose, whitish then becoming slightly yellowish, fibrillosely striate lengthwise, sometimes floccose at apex. Flesh thin but tough in pileus, white or whitish. Smell farinaceous when picked up but later on entire carpophore with the smell of coconut (like that of *Lactarius glyciosmus*).

Spores 10–12 × 7.5–8.5 μm, with basal facet. Basidia 30–43 × 10–13 μm, 2–4-spored. Cheilocystidia and pleurocystidia 60–70 × 18–22 × 6–8.5 μm, lageniform, rare, scattered among basidia. Hymenophoral trama regular, made up of long, 8–18 μm wide, hyphae. Pileipellis a thin cutis of radially arranged cylindrical, 6–8 μm wide, hyphae sometimes with minute encrustations; subpellis made up of long, 11–30 μm wide, hyphae.

HABITAT & DISTRIBUTION.—Under *Carpinus*, only known from the type-locality.

COLLECTION EXAMINED.—FRANCE, dept. Seine & Oise, Forêt St. Germain, près de Maison Lafitte, 19 Aug. 1943, *Landier* (holotype, herb. Romagn. PC).

The type-collection is in a very poor state and therefore difficult to study. *Entoloma eximium* is a remarkable species with its almost inocyboid habit, pale colours and large cheilo- and pleurocystidia. It is closely related to *E. excentricum*, which differs in habit, colour, structure of pileipellis and pileitrama and in the lack of pleurocystidia. The North American species *E. megacystidiosum* Hesler is obviously closely related to *E. eximium*, but it has a more flattened, viscid pileus. *Entoloma chionoderma* Pilát differs in the total lack of cystidia.

INSUFFICIENTLY KNOWN SPECIES

accline.—*Agaricus acclinis* Britz. *in* Ber. naturhist. Ver., Augsburg **26**: 136. 1881. — *Entoloma accline* (Britz.) Sacc., Syll. Fung. **5**: 689. 1887.

CHARACTERISTICS.—Pileus convex then expanding with uplifted margin, white with yellow tinge at centre, shining; lamellae crowded, white then rufescent with brown edge; stipe solid then fistulose, white, shining.

HABITAT & DISTRIBUTION.—Caespitose, terrestrial, Bayern, German Federal Republic.

According to Britzelmayer is *Entoloma accline* close to *E. sinuatum* (*E. lividum* in the present work). In my opinion, however, the plate and description suggest that *E. accline* belongs to subgenus *Allocybe* close to *E. chionoderma* and *E. eximium*. But as no type is available and information is lacking on the occurence of cystidia and on the pigmentation, this cannot be verified.

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PERSOONIA
Published by the Rijksherbarium, Leiden
Volume 11, Part 2, pp. 257 (1981)

ENTOLOMA SUBGENUS NOLANEA—ADDITIONS

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1. The sectional name *Cosmeoexonema* Largent & Thiers (1972) has priority over the sectional name *Papillata* Romagnesi 1974. This has been corrected in Noordeloos, 1981: 141. As a consequence the following new combination is necessary: **Entoloma** subsection **Papillata** (Romagn.) Noordeloos *comb. nov.*—Basionym: *Rhodophyllus* section *Papillati* Romagn. *in* Bull. mens. Soc. linn. Lyon **43**: 330. 1974.

2. Subsection *Endochromonema* has been published by me (Noordeloos, 1980: 495) without a Latin diagnosis; no type has been indicated. This is corrected below:

Entoloma subsection **Endochromonema** Noordeloos, *subsect. nov.*

Pigmentae pallidae, intracellulosae vel membranares, haud incrustantes; sporae heterodiametricae vel isodiametricae, haud multiangulatae nodulosae; pileus griseo-brunneus vel ochraceo-fulvus, nunquam atro-brunneus; stipes fibrillosus, saepe striatus, haud citrinus vel flavovirens; odore nullo vel farinaceo, nunquam aromatico.—Typus: *Entoloma cetratum* (Fr.) Moser.

3. Some spelling-corrections: Read *Entoloma cuspidiferum* in stead of *E. cuspidifer* and *E. globuliferum* in stead of *E. globulifer*.

4. In my key to the sections and subsections (Noordeloos, 1980: 431–432) the couplets 6 and 11 have to be changed in the following way:

6a. Cheilocystidia tibiiform, sphaeropedunculate or cylindrical to clavate, sometimes subcapitate, spores with dihedral base . . . . . Subsect. *Cosmeoexonema*, p. 472

11b. Carpophores moderately to strongly pigmented; lamellae always with distinct grey or brown tinge 11'

11'a. Spores with dihedral base . . . . . Subsect. *Cosmeoexonema*, p. 472

11'b. Spores with basal facet . . . . . Subsect. *Papillata*, p. 553

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INDEX

New names are in **bold-face** type. Subdivisions of genera are indicated by the sign §, illustrations by an asterisk (*)

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Volume 11, Part 2, pp. 265–268 (1981)

BOOKS RECEIVED BY THE RIJKSHERBARIUM LIBRARY

H. C. BELS-KONING & W. M. VAN KUIJK, *Mushroom terms. Polyglot on research and cultivation of edible fungi. English, German, Dutch, Danish, French, Italian, Spanish and Latin* (Pudoc, Centre for Agricultural Publishing and Documentaion, Wageningen, 1980). Pp. 312. Price: ± DM 100.–.

This glossary of technical and scientific terms used in the world of the growers of edible fungi is the considerably enlarged successor of 'Mushroom terms in five languages', a publication which was out of print for more than 10 years. To the original five languages English, German, Dutch, Danish and French, two more have been added, viz. Italian and Spanish.

The main table of the glossary consists of 1169 numbered English terms in alphabetical order, each followed by the corresponding terms in the other six languages. Additional alphabetical indices in these other languages refer to the numbers of the terms in the main table.

D. M. DRING, *Contribution toward a rational arrangement of the Clathraceae*, Edited by R. W. G. Dennis (Reprint from Kew Bull. 35(1), 1980; published by the Royal Botanic Gardens, Kew). Pp. 96. Price: £ 5 (£ 6 by surface post overseas).

By the untimely death of Dr. Dring, Kew, his far advanced manuscript on the Clathraceae of the world remained unfinished. Fortunately Dr. Dennis prepared it for publication and provided it with identification keys.

The great interest of the resulting paper lies in the author's efforts to arrange genera and species in several supposedly phyllogenetic series. *Clathrus* (augmented by the inclusion of *Anthurus* and *Linderia*) is considered the most primitive genus. Two of the five series distinguished remain within the boundaries of the extended genus *Clathrus* (the Anthuroid and the Clathrelloid series), the Laternoid and the Blumenavioid series would find their origin in *Clathrus* and the Lysuroid series with *Colus*, *Pseudocolus*, *Lysurus* (including *Simblum* and *Kalchbrennera*) is thought to be related to the Clathrelloid series. Not more than eight genera are maintained and all together about 40 species are described.

This publication is not a complete monograph but presents a well-argumented and well-illustrated endeavour to put systematics of the Clathraceae on the right track.

B. GEDEK, *Kompendium der medizinischen Mykologie* (Parys Studientexte 25, Paul Parey Verlag, Berlin/Hamburg, 1980). Pp. 395, 195 Text.-figs., 2 Col. Pls., and 34 Tables. Price: DM 48.–.

The main part of the compendium is preceded by a condensed introduction to the principles of mycology (136 pp.). In the successive chapters are treated morphology, reproduction, nutrition,

physiology and metabolites, occurrence (particularly in food of man and animal) and detection and isolation technics for fungi and mycotoxins. The important terms and concepts are printed in bold type.

In the special part the mycopathology of man and animal is treated in three chapters respectively on mycoses, mycological allergies and mycotoxicoses. All diseases caused by fungi are treated in the same comprehensive way, beginning with name and symptoms as well as the name(s) of the fungus and toxin(s), followed by data on geographical distribution, ecology, epidemiology, clinical aspects, characteristics and detectability of the fungal agent, therapy and prevention.

This well-indexed book is written in the first place for medical and veterinarian students, physicians, veterinaries and medical microbiologists.

W. JÜLICH & J. A. STALPERS, *The resupinate non-poroid Aphyllophorales of the temperate northern hemisphere* (Verh. Kon. Nederl. Akad. Wetensch. Afd. Natuurkunde, 2nd Ser., Vol. 74, North-Holland Publishing Company, Amsterdam/Oxford/New York, 1980). Pp. 338, 81 Text-figs., 1 Table. Price: Dfl. 120.—.

A book consisting for the greater part of a comprehensive key to about 800 species in 131 genera of resupinate non-poroid Aphyllophorales of the northern temperate zone. To make identification as easy as possible, in the main entries easily recognizable characters are used instead of more fundamental characters that are difficult to observe. The use of the key to the genera (14 pp.) is facilitated by a preceding 'basic key' using the main characters which makes it possible to start identification immediately at the relevant part of the generic key.

The main body of the book (248 pp.) consists of descriptions of the genera (treated in alphabetical order) followed by keys to the species in which diagnostic descriptions of the species are incorporated. Distributional data are given only on the level of continents. Information on the substrate is always given in general terms in the generic descriptions and in the species description only if of special interest.

The authors have refrained from arranging the genera in families because such an arrangement 'is bound to be artificial, leaving too many intermediate taxa'. This point is well illustrated on a folded Table showing a rather dense net of supposed relationships. The bibliography is impressive (409 entries).

R. KÜHNER, *Les Hyménomycètes agaricoïdes (Agaricales, Tricholomatales, Pluteales, Russulales)—Etude général et classification* (Bull. Soc. linn. Lyon **49** (Num. spéc), 1980). Pp. 1045, with Text-figs. (drawings and black-and-white photographs) on 203 pp. Price: Frs. 580.— till June 30, 1981; Frs. 650.— after that date.

A well-bound volume of more than 1000 continuously numbered pages containing the reprints of a series of papers published in the Bulletin de la Société Linnéenne de Lyon from March 1978 to May 1980. The reprints are supplemented with an introduction, a synoptical table of the proposed classification, a French and an English summary of each about 30 pp., a very extensive bibliography, and indices.

This is undoubtedly the most important publication in the field of agaricology since many years. In it the whole system of the agaricoid Hyménomycètes is probed and reconsidered and, as a result of this, many major and minor alterations are introduced.

The system of the Agaricales as gradually modelled by Singer in the three editions of his book 'The Agaricales in modern taxonomy' is in broad outlines accepted by many agaricologists. Kühner has shown now that there are very serious reasons to partly revise this system. To a fuller extent than ever before Kühner has evaluated the information accumulated in recent years on the ultrastructure of spore walls, the cytology of basidia, spores and hyphal tips, the chemistry of pigments, the ontogeny of the fruit-body, etc. and hence drawn his conclusions.

A grouping of the families with emphasis on the characters of the spore wall and on cytological data has led to the recognition of five orders (Tricholomatales, Agaricales, Pluteales, Russulales and Boletales) instead of the single order in Singer's classification.

The number of families is in both systems about the same (Kühner, 19; Singer, 18). This does however not mean that these authors have the same point of view on the family level. Only seven families have more or less the same circumscription in both systems. Six of Kühner's families are lacking in Singer's classification and five of those accepted by Singer are lowered in rank or dispersed by Kühner.

Perhaps of still greater importance is a considerable amount of reshuffeling done by Kühner in the rest of the families; e.g. the Resupinatae and the Panae (= Panelleae Sing.) are moved to the Pleurotaceae, the Cystodermateae to the Tricholomataceae and the Panaeoleae together with the Bolbitiaceae to the Strophariaceae. Moreover the last-named family is strongly enlarged by Kühner by inclusion of the Crepidotaceae and, at the cost of the Cortinariaceae, by transferring *Galerina*, *Naucoria* (without *Alnicola*), *Phaeocollybia*, and *Gymnopilus* to it. Thus the Strophariaceae have become a large family, rather difficult to define.

On the genus level there is a strong tendency in Kühner's book to reduction of the number of genera, this standing in strange contrast to the increase of taxa on higher levels in the same work. Kühner advocates the maintenance of large classical genera as *Lepiota* and *Cortinarius* in their widest sense. In addition several well-known genera are merged in others, such as *Stropharia* and *Hypholoma* in *Psilocybe*; *Tubaria*, *Phaeomarasmius*, *Phaeogalera*, and *Flammulaster* in one genus *Naucoria* (exclusive of *Alnicola*); *Dermoloma*, *Porpoloma* and *Armillaria* s. Singer (type: *A. luteovirens*) in *Tricholoma*, and perhaps more surprisingly *Alnicola* in *Hebeloma*, *Marasmiellus* in *Micromphale*, *Megacollybia* (type: *Collybia platyphylla*) in *Hydropus*, *Geopetalum* in *Lentinus*, etc.

This book is so crammed with information that it takes about a year to digest. But that is not surprising as it gives us a life-time of experience with agarics of one of the greatest mycologists of our time.

G. Lazzari, *Glossario micologico in cinque lingue* (Suppl. Boll. Gruppo micol. Bresadola, Trento, 1980). Pp. 165. Price: ?

This well-edited and attractively printed and bound booklet is a mycological glossary with Italian as the leading language. Nearly 1000 terms, in alphabetical order, are defined and of each the equivalents in Latin, French, German and English are given. Indices in each of these 'foreign' languages refer back to the numbers of the terms in the main list.

W. J. SUNDBERG & J. R. RICHARDSON, *Mushrooms and other fungi of Land Between The Lakes* (Tennessee Valley Authority, 1980) Pp. 60, 93 col. photographs. Price: $ 3.50 (only to be ordered, with simultaneous payment by check, from W. J. Sundberg, Dept. of Botany, Southern Illinois University, Carbondale, IL 62901 U.S.A.).

This is a modest field guide to the larger fungi of Land Between The Lakes, a peninsula in western Kentucky and Tennessee. About 90 species are illustrated on good to excellent coloured photographs and briefly described. Several of the species depicted are unknown in Europe.

V. WIRTH, *Flechtenflora — Ökologische Kennzeichnung und Bestimmung der Flechten Südwestdeutschlands und angrenzende Gebiete* (Uni-Taschenbücher 1062, Verlag Eugen Ulmer, Stuttgart, 1980). Pp. 552, 136 Photographs and a number of Text-figs. Price: DM 29.80.

A lichen-flora intended as the successor of K. Bertsch's 'Flechtenflora von Südwestdeutschland' (1955). However, the number of species included has been considerably increased, the keys are more elaborate and, above all, the ecological information has been considerably enlarged. Typical of this flora is that the length of the part with the ecological characteristics of the species of a genus usually exceeds the length of the key of that genus, in which the rather concise morphological information is included.

This work covers in the first place the lichens of South-western and Western Germany and adjacent regions of Switzerland and France, but it is claimed to be useful in the whole of Central Europe exclusive of coastal and strictly alpine habitats.