

ENTOLOMATACEAE (AGARICALES, BASIDIOMYCETES) IN GREENLAND—I  
THE GENUS ENTOLOMA

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An account is given of 31 species of *Entoloma* from Greenland based on extensive collecting by T. Borgen (Påmiut), H. Knudsen, and J. Petersen (Copenhagen), supplemented by herbarium specimens of M. Lange and P. Milan Petersen at the Botanical Museum, Copenhagen. Descriptions and illustrations are given, a key to the species in sect. *Rhodopolia*, and comments on distribution and ecology. Ten new taxa are described, viz. *Entoloma olidum*, *E. rimulosum*, *E. bipelle*, *E. borgenii*, *E. melanosmum*, *E. langei*, *E. subarcticum* with var. *obscurum*, *E. bicorne*, and *E. pusillum*. Three new combinations are made, viz.: *E. anthracinellum*, *E. cancrinellum*, and *E. subsepiaceum*.

Although the members of the cosmopolitan genus *Entoloma* are wide-spread and fairly to very common in (sub-)arctic and (sub-)alpine habitats, not much is known on their taxonomy and distribution. Only Favre (1955) and Kühner (1977) published extensive accounts of *Entoloma* in the Alps and in Scandinavia. The contributions of Gulden & Lange (1971), Ohenoja (1971), M. Lange (1957), Lamoure & al. (1982), and Watling (1977) contain only a few records of *Entoloma*-species, often with the admission that numerous collections had not been identified. The main reason for this situation is found in the taxonomic difficulties concerned and the lack of appropriate literature. In general the species of *Entoloma* from alpine or arctic habitats look very much the same to the unexperienced eye, and much experience and patience is necessary to recognize taxa with the aid of subtle macroscopic and microscopic characters.

My own interest in *Entoloma* from subarctic habitats started during a series of foot-trips through the mountains and planes of Northern Europe (Lapland) during the past ten years. As collecting facilities were usually limited, only a few records were made (Noordeloos, 1979), but I got impressed by the numerous carpophores, and obviously also species, found in certain habitats, like *Salix herbacea* snow-beds and *Dryas octopetala* vegetations. Also the subalpine *Salix* and *Betula* copses offered a great number of interesting *Entoloma*. In 1978 I was able to stay at the Subarctic Research Station at Kevo, which resulted in my first paper on subarctic *Entoloma* (Noordeloos, 1981b). In the meantime contact had been made with Henning Knudsen (Copenhagen) and Torbjörn Borgen (Påmiut, Greenland) which resulted in a close cooperation with regard to *Entoloma* from Greenland. Borgen critically collected *Entoloma*, particularly in the Påmiut-area during the years 1978–1983, and a joint expedition of Knudsen, Borgen and J. Petersen in summer 1983 supplied me with so much additional material that I decided to publish my studies in the present paper. Additional material has been studied

in the herbarium of the Botanical Museum, Copenhagen, where the large collections made by M. Lange and P. Milan Petersen are housed. With the help of the experience obtained from the recent collections I was able to find a name for some of the older, less annotated collections. A large number, however, remained unnamed due to the lack of appropriate macroscopic notes.

In the present study 31 species of *Entoloma* have been recorded from Greenland. This is considerably more than for example Lange (1957) who recorded 10 species, and Lamoure & al. (1982) who recorded only 4 species from the Godthaab area. It is to be expected, however, that many more species will turn up after continued study of the agaric flora of Greenland. As a matter of fact large areas of this island have not yet been explored, and even in well-known areas the *Entoloma* flora has been neglected in the past. Therefore no keys to all species known from Greenland are given with the exception of the species in section *Rhodopolia*, as that key gives a better understanding of the differences between the species involved.

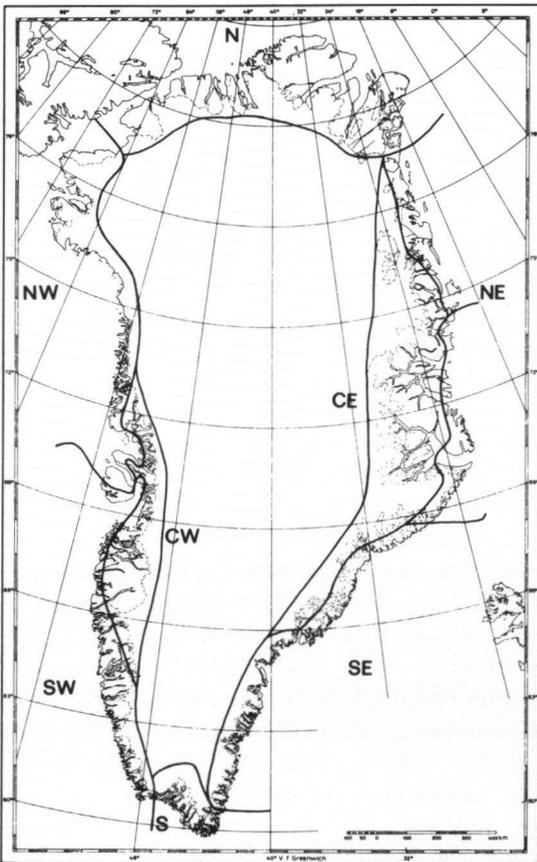


Fig. 1. The floristical provinces of Greenland.

## METHODS AND PRESENTATION

The methods used to study the specimens and the presentation of the results is the same as in previous *Entoloma*-studies by the author. The magnification of the figures is as follows: Habit  $\times 1$ , spores  $\times 2000$ , basidia and cystidia  $\times 1000$ , all other structures  $\times 500$ .

The following colour-codes have been used: (1) Colour identification-chart (Henderson, Orton & Watling, 1969), (2) Methuen Handbook of Colour (Kornerup & Wanscher, 1967), (3) Munsell Soil Color Charts (Munsell Color Co., Baltimore).

Distribution of the species in Greenland is indicated by the capitals NW, SW, S, etc. referring to the floristic regions of Greenland (cf. fig. 1).

Under the heading 'collections examined' the following abbreviations have been used: TB = Torbjörn Borgen; HK c.s. = H. Knudsen, T. Borgen & J. Petersen; ML = Morten Lange; PMP = Peter Milan Petersen.

Unless otherwise stated all material studied has been deposited at the herbarium of the Botanical Museum Copenhagen.

## ACKNOWLEDGEMENTS

I am very grateful to Torbjörn Borgen (Pâmiut, Greenland) and Henning Knudsen (Copenhagen) for their discussions and for their great help in supplying me with well-documented material and colour-slides.

They also read through critically the manuscript of this paper. I owe my best thanks to the director of the Botanical Museum, Copenhagen, for hospitality during my stays at Copenhagen and for the loan of specimens.

## THE COLLECTING-SITES. — Fig. 2

For the climatological and vegetational conditions of the collecting sites of M. Lange and P. Milan Petersen reference is made to the publications of M. Lange (1957) and Lamoure & al. (1982). As the flora of the Agaricales in Pâmiut and Narsarsuaq/Qinngua was practically unknown until now, a characteristic of the climate and vegetation of these places is given here.

Pâmiut (Frederikshaab). Situated at 62°00' N, 49°40' W on a low peninsula in the southeastern part of W. Greenland. The mountains are low and rounded (0–200 m alt.), gneissic with acid soil. The climate is low-arctic/oceanic. The average maximum temperature for July is 6°C and the precipitation about 1200 mm/year. Behind the Pâmiut Peninsula the mountains are higher, 500–1000 m alt. At the bottom of the fiord in an area 10–30 km land inwards from Pâmiut, the climate is more continental (e.g. Eqaliut).

In the coastal areas the vegetation is dominated by moist heaths with moss, *Empetrum hermaphroditicum* and *Vaccinium uliginosum*, alternating with boggy areas with mosses (occasionally *Sphagnum*) and often with *Salix arctophila*, *Polygonum viviparum*, *Eriophorum*, and *Carex* div. spp. Snow-beds (at sea-level) are dominated by *Salix herba-*

*cea*. On sheltered, sunny slopes 20–30 cm high stands of *Salix glauca* occur, which are in moist places rich in herbs like *Arnica*, *Phyllodoce coerulea*, *Gnaphalium norvegicum*, *Campanula gieseckiana*, *Taraxacum* etc. and on drier spots with *Potentilla tridentata* and *Alchemilla alpina*. Depending on the thickness of the humus, exposition and wind, dry heaths occur here and there with *Salix glauca*, *Betula pubescens* and a greater abundance of lichens. However, few sharp limits are found between these types of vegetation. *Salix herbacea* for instance is found in almost every vegetation-type, but it is dominant, forming large clones in snow-beds. In the inner fiords dry heaths occur with scattered *Juniperus*. The snow-beds are here situated between 300 and 400 m above sea level, but their fungal flora has not been explored.

Narsarsuaq and Qinngua Valley, situated at 61°10'N, 45°26' W and 60°15'N, 44°30'W respectively, are situated far from the coast in the very south of Greenland. The mountains are 500–2000 m high and the soil is less acid than in the Pâmiut region, sometimes even basic. The climate is more subarctic-subcontinental with an average maximum tem-

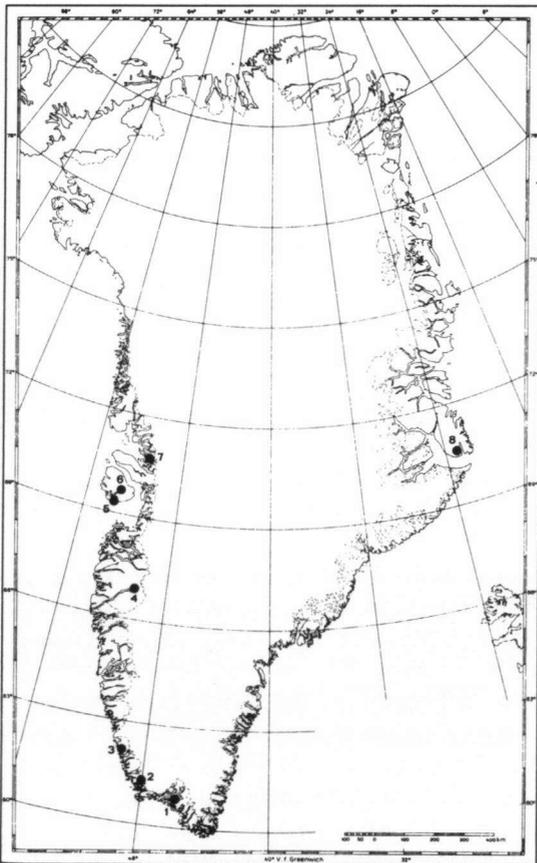


Fig. 2. Collecting sites mentioned in the text. — 1. Narsaq-Narsarsuaq area (incl. Rosenvinges plantation, Qinngua Valley, Tasarsuaq Lake, and Erik the Red's Fiord). — 2. Ivigtut. — 3. Pâmiut (Frederikshaab area, incl. Eqaqut and Kvaneöen). — 4. Kangerdlugssuaq (Söndre Strömfjord, incl. Ravneklippen and Hassels Fjeld). — 5. Kuanit (Disko Island). — 6. Kuanerssiut (Disko Island). — 7. Umânak. — 8. Jameson Land.

perature in July of 10–11°C and an annual precipitation of about 800 mm. In this area the following plant-communities were investigated:

(1) Mixed *Betula pubescens*/*Salix glauca* copses with a rich herbal flora and scattered *Juniperus*. The lower, moist places are dominated by *Salix glauca*, whereas *Betula pubescens* prefers the drier spots. At Narsarsuaq the *Betula*-trees attain a height of 2–4 m, but in the Qinnua Valley even 5–8 m, forming real woods.

(2) Large grassland vegetations grazed by sheep in the Narsarsuaq area. Both vegetation-types appeared to be rich in agarics, many of which new to Greenland (Borgen & Knudsen, pers. comm.).

#### THE ECOLOGY OF ENTOLOMA ON GREENLAND

Favre (1955), M. Lange (1957), Kobayasi & al. (1971), Kühner (1977) have reported the occurrence of *Entoloma* species associated with dwarf *Salix* (*S. herbacea*, *S. retusa*) in arcto-alpine habitats. Kobayasi & al. (l.c.) and Ohenoja (1971) suggested the existence of a mycorrhizal relationship of the *Entoloma* species with *Salix*. Antibus & al. (1981) were the first who experimentally demonstrated ectomycorrhiza between a species of *Entoloma* (*E. sericeum*) and *Salix rotundifolia*, a dwarf-*Salix* from Alaska. In Greenland some *Entoloma* species seem to be associated with *Salix herbacea* (Table I), and some seem to be restricted to *Salix herbacea* snow-beds (*E. alpicola*, *E. bicorne*, *E. anthracinum*). This agrees with the observations of Kühner (1977) in the alps. It might be very interesting to study the possible ectomycorrhizal symbiosis of these species. Other species, like *E. atrosericeum* are found in *Salix herbacea* snow-beds, but also in dry heaths with scanty vegetation of lichens and mosses, which seems to exclude mycorrhizae. There are, however, many other mycorrhizal fungi in *Salix herbacea* snow-beds, like an undescribed *Amanita* species (Bas, pers. comm.), *Cortinarius favrei* and many other *Cortinarius* species; many species of *Inocybe*; *Lactarius aurantiacus* sensu Kühner, *Russula norvegica*, *R. oreiana* and others (Borgen, pers. comm.).

The *Salix glauca* scrubs in the fiords of the Pâmiut-region have a rather rich *Entoloma* flora with *Entoloma bipelle*, *E. subarcticum* var. *obscurum*, and *E. juncinum*. In similar vegetation on Disko Island *Entoloma* aff. *placidum* was found (see Lamoure & al., 1982). *Entoloma langei* and *E. fuscumentosum* have their optimum in the moist heaths with *Empetrum hermaphroditicum* and *Vaccinium uliginosum*, but these species also occur in communities of *Salix herbacea*. *Entoloma turci* has a similar distribution as *E. atrosericeum*, viz. in snow-beds with *Salix herbacea* and in dry heaths with scanty vegetation. I found *Entoloma turci* in the Alps in more or less open stands of *Pinus mugo* among herbs and lichens on calcareous rock, but the species also occurs in mossy dune-valleys with *Salix repens* in the coastal dunes of the Netherlands, so it seems to have a rather wide ecological range.

The peaty areas with mosses, sometimes with *Sphagnum* and *Salix arctophila* have their own *Entoloma* species. *Entoloma cetratum* occurs here, but only occasionally. This is in contrast with the rather frequent occurrence of this species in the palsa-bogs of northern Europe (Noordeloos, 1981b). Other species of these bogs are *Entoloma pusillum*,

TABLE 1. Ecology of *Entoloma*-species in Greenland

	Salix herbacea communities	Salix glauca copses	boggy areas with moss/Sphagnum sometimes with Salix arctophila	moist heath with Empetrum herma- phroditicum and Vaccinium	dry heath with moss and lichens	Salix glauca/Betula pubescens copses	grassland
<i>E. alpicola</i>	+						
<i>E. bicorne</i>	+						
<i>E. anthracinum</i>	+						
<i>E. bipelle</i>	+	+					
<i>E. borgenii</i>	+		+				
<i>E. fuscotomentosum</i>	+		+	+			
<i>E. langei</i>	+			+		+	
<i>E. atrosericeum</i>	+				+		
<i>E. turci</i>	+				+		
<i>E. subspiaceum</i>		+					
<i>E. subarcticum</i> var. <i>obscurum</i>		+					
<i>E. juncinum</i>		+					
<i>E. aff. placidum</i>		+					
<i>E. politum</i>		+	+				
<i>E. cetratum</i>			+				
<i>E. pusillulum</i>			+				
<i>E. engadinum</i>			+				
<i>E. rimulosum</i>			+				
<i>E. anthracinellum</i>			+				
<i>E. sericeonitens</i>			+			+	
<i>E. vinaceum</i>				+			
<i>E. papillatum</i>					+		
<i>E. olidum</i>					+	+	
<i>E. melanosmum</i>						+	
<i>E. subarcticum</i> var. <i>subarcticum</i>						+	
<i>E. aff. chalybaeum</i>						+	
<i>E. aff. vernum</i>						+	
<i>E. sarcitulum</i>							+
<i>E. serrulatum</i>							+
<i>E. sericeum</i>							+

*E. rimulosum*, *E. anthracinellum*, and *E. engadinum* (the latter species occurs in the Alps also in moist, mossy places, with or without *Salix herbacea*, according to Kühner, 1977).

The mixed *Betula pubescens*/*Salix glauca* stands in southern Greenland have a very rich agaric-flora comprising many species of *Russula*, *Lactarius*, *Cortinarius*, *Mycena*, and *Clitocybe*, many of them new to the Greenland flora. This is not surprising if one considers the fact that these vegetations do not occur in the northern areas like Søndre Strømfjord and Disko Island, where most of the observations of M. Lange and P. Milan Petersen were made. Some *Entoloma* species are found only in these copses like *Entoloma olidum*, *E. melenosmum*, *E. subarcticum* var. *subarcticum*, *E. sericeonitens*, *E. aff. chalybaeum* and *E. aff. vernum*. Some of the *Entoloma* species characteristic of the boreal/subarctic *Betula* forest in northern Europe, such as *Entoloma juncinum*, *E. minutum*, and *E. nidorosum*, are lacking however.

The grasslands grazed by sheep in the Narsarsuaq area revealed many species of *Hygrocybe*, *Bovista nigrescens*, many coprophilous fungi, and some species of *Entoloma* typical of grasslands like *Entoloma sericeum*, *E. serrulatum*, and *E. sarcitulum*.

## TAXONOMIC PART

### SECTION ENTOLOMA

#### 1. *Entoloma olidum* Noordel. & Borgen, *spec. nov.* — Fig. 3

Statura in Entolomate sectione *Entoloma* odore putrido. Pileus brunneus, pileipellis pro parte ixotrichoderma cum cellulis cystidiformibus. Lamellae pallidae. Stipes firmus, albus. Sporae 8.7–10.8 × 6.8–9 μm. Basidia 4-sporigera. Cystidia nulla. Fibulae abundantes. — Holotypus: *T. Borgen 79/106*, 25-VIII-1979, 'Pâmiut, Greenland' (C; isotypus L).

Pileus 40–60 mm broad, conico-convex then convex with blunt umbo, with inflexed margin when young, later straight, weakly hygrophanous, when moist grey-brown at centre (Muns. 10 YR 4/2–4/3), more yellow-brown towards margin (2.5 Y 6/4), pallescent on drying to yellow-brown (2.5 Y 6/4–7/2) not striate, smooth on drying with more or less felted centre. Lamellae distant, deeply emarginate, ventricose, long remaining so, then pink with pallid eroded edge. Stipe 35–60 × 7–10 mm, cylindrical or tapering downwards, white with aeriferous-fibrillose covering lengthwise. Flesh firm, thick, white. Smell strong like that of trimethylamin or rotten shellfish. Taste cabbage-like.

Spores 8.7–10.8 × 6.8–9.0 (averages 9.2–9.5 × 7.5–8.3 μm), Q = 1.1–1.3, (sub-) isodiametric 6–8-angled in side-view. Basidia 38–52 × 10–13 μm, 4-spored with clamp. Cystidia absent. Hymenophoral trama regular, made up of short inflated cells. Pileipellis an ixocutis at margin with transitions to an ixotrichoderm at centre, with cylindrical terminal cells or, especially at centre cystidioid cells, 15–60 × 2.5–9 μm. Pigment intracellular in pileipellis. Clamp-connections numerous in all tissues.

Habitat.—Typically in loose clusters on fairly dry heaths, for instance among *Empetrum* and *Cladonia rangiferina*, near *Betula glandulosa*, but also found in subalpine *Betula pubescens* copses or stands, rather common in the very south of Greenland, rare in the Pâmiut area.

Collections examined.—SW: Pâmiut, Eqaliut, 25 Aug. 1979, *TB 79.106*; 27 Aug. 1983, *TB 83.17*; S: Narsarsuaq, 29 July 1983, *HK c.s. 29*; 10 Aug. 1983, *HK c.s. 406*.

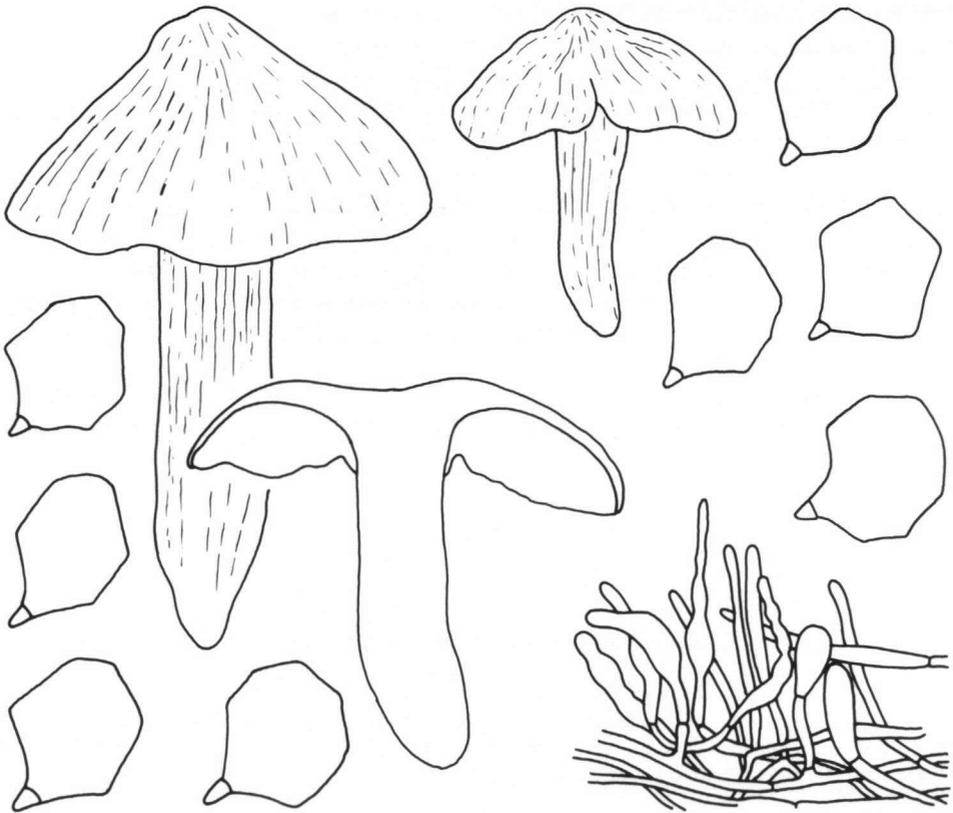


Fig. 3. *Entoloma olidum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

*Entoloma olidum* is a fairly remarkable species with its rather large carpophores and peculiar smell, which is more or less strong like that of trimethylamin, especially when young and fresh. The taste is somewhat cabbage-like with a slight farinaceous component. It is a typical member of section *Entoloma*, and so far the only representative of this section from Greenland. It differs from all other species known in this section by its remarkable smell and the structure of the pileipellis, which is more or less trichodermal at the centre with cystidioid terminal cells.

#### SECTION RHODOPOLIA

Species from section *Rhodopolia* are very numerous in subalpine and subarctic habitats (Kühner, 1977). The greater part of the collections studied from Greenland belong to this section, and they form the main bulk of real subarctic taxa associated with *Salix herbacea* and *S. glauca*. General characteristics of this group of taxa are the relatively small size of the basidiocarps and the dark colours. Within this macroscopically rather

uniform group several taxa could be recognised on account of microscopical characters such as structure and pigmentation of the upper layers of the pileus and the occurrence of cheilocystidia. Spore-size and -shape, however, are rather uniform.

#### KEY TO THE SPECIES OF SECTION RHODOPOLIA FOUND IN GREENLAND

- 1 a. Pigment exclusively intracellular (subject. *Rhodopolia*): . . . . . 2  
 b. Pigment encrusting, sometimes together with intracellular pigment (subject. *Typodochroa*): . . . . . 4
- 2 a. Pileus rather dark brown, almost black, not translucently striate: . . . . . 3  
 b. Pileus moderately dark brown in mature specimens, distinctly translucently striate when moist  
     4. *E. subsepiaecum*
- 3 a. Pileus 27–65 mm broad, relatively thick-fleshed . . . . . 2. *E. alpicola*  
 b. Pileus 17–22 mm broad, relatively thin-fleshed . . . . . 3. *E. spec.*, aff. *E. alpicola*
- 4 a. Cheilocystidia present: . . . . . 5  
 b. Cheilocystidia absent: . . . . . 6
- 5 a. Cheilocystidia subcylindrical to lecithiform; pigment predominantly encrusting, sometimes in addition some intracellular pigment; basidia 4-spored . . . . . 6. *E. rimulosum*  
 b. Cheilocystidia lageniform; pigment intracellular and in addition encrusting the walls of the narrowest hyphae of pileipellis and pileitrama; basidia 2-spored . . . . . 9. *E. bicorne*
- 6 a. Pigment exclusively encrusting: . . . . . 7  
 b. Pigment both intracellular and encrusting: . . . . . 9
- 7 a. Spores distinctly ellipsoid in outline, many angled in side-view,  $Q = 1.15-1.3-1.4$   
     5. *E. anthracinellum*  
 b. Spores more or less isodiametrical in outline, 6–8-angled in side-view,  $Q = 1.0-1.1-1.2$ : . . . . . 8
- 8 a. Pileus 15–35 mm broad, black to date-brown, not translucently striate, often radially fibrillose becoming fibrillose-subsquamulose in exposed specimens; lamellae fairly dark grey-pink; stipe 20–40 × 2–6 mm, grey with white-fibrillose covering; associated with *Salix herbacea*  
     7. *E. atrosericeum*  
 b. Pileus 20–65 mm broad, moderately dark brown to yellow brown, sometimes darker, especially at centre, translucently striate at margin, smooth or more or less hairy at centre; lamellae pallid; stipe 20–60 × 2–9 mm, pallid; with *Salix glauca* and *Betula* on moist places  
     8. *E. subarcticum*
- 9 a. Pileus 30–40 mm broad, usually distinctly umbonate; encrusting pigments dominant in pileipellis, suprapellis well developed with intracellular pigment; lamellae adnate-sinuate or adnexed; among moss on relatively dry spots with *Salix glauca* and *S. herbacea* . . . . . 10. *E. bipelle*  
 b. Pileus 15–30 mm broad, usually depressed, sometimes with small papilla in this depression, intracellular pigment predominant in pileipellis; encrusting pigment in deeper layers; subpellis not distinctly developed; lamellae adnate to subdecurrent; on moist places or on boggy soil among *Sphagnum* and near *Salix arctophila* . . . . . 11. *E. borgenii*

#### 2. *Entoloma alpicola* (Favre) Noordel. — Fig. 4

*Rhodophyllus clypeatus* var. *alpicola* Favre, Champ. Supér. Zone alp.: 200. 1955. — *Rhodophyllus alpicola* (Favre) Kühn. in Bull. Soc. mycol. Fr. 93: 453. 1977. — *Entoloma alpicola* (Favre) Noordel. in Persoonia 11: 237. 1981.

Greenland record. — Lamoure & al. (1982: 89).

Pileus 27–65 mm broad, relatively thick-fleshed, hemispherical then convex with low umbo and slightly inflexed margin, finally flattened with broad umbo and irregularly undulating marginal zone, hygrophanous, when moist dark (brown-)black, margin slight-

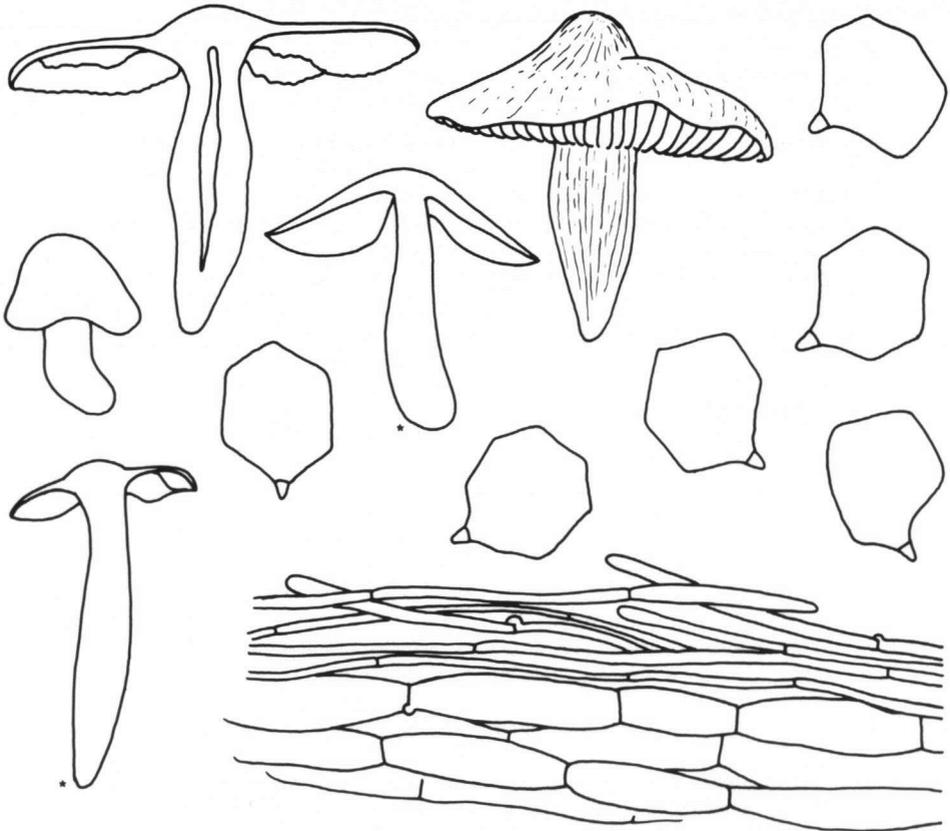


Fig. 4. *Entoloma alpicola*. — Habit, spores, and pileipellis. (Habit from TB 81.153 (\*) and TB 78.17, all other figs. from TB 78.17).

ly paler, not striate, pallescent on drying to 'snuffbrown', smooth, shining, innately fibrillose when dry. Lamellae  $L = 45-50$ ,  $l = 3-5$ , (broadly) adnate or emarginate, ventricose, greyish white (Muns. 10 YR 7/1) when young then sordid brown-pink ('claybuff'; 10 YR 6/3) to grey-brown with pink tinge when old, with irregular, slightly paler edge. Stipe  $30-60 \times 6-16$  mm, cylindrical often attenuated towards base, pale then sordid buff with dense white fibrillose covering. Flesh in cortex of pileus and stipe concolorous with surface, inner parts whitish, firm. Smell spontaneously weak, on cutting farinaceous. Taste farinaceous. Spore-print pale clay-pink.

Spores  $8.1-10.8 \times 7.2-9.6 \mu\text{m}$  (averages  $8.9-9.0 \times 8.1-8.6 \mu\text{m}$ ),  $Q = 1.0-1.1-1.2$ , subisodiametrical with 6-8 angles in side-view and basal facet. Basidia  $30-50 \times 9-13.5 \mu\text{m}$ , 4-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of cylindrical to inflated cells up to  $27 \mu\text{m}$  wide. Pileipellis a  $30-50 \mu\text{m}$  thick (ixo-)cutis of  $4-9 \mu\text{m}$  wide, cylindrical hyphae sometimes with slightly gelatinised walls, with scattered ascending, clavate terminal cells up to  $11 \mu\text{m}$  wide. Pileitrama regular, made up of inflated cells,  $22-120 \times 10-30 \mu\text{m}$ . Pigment intracellular, pale in pileipellis, dark brown in upper pileitrama. Clamp-connections present in all tissues.

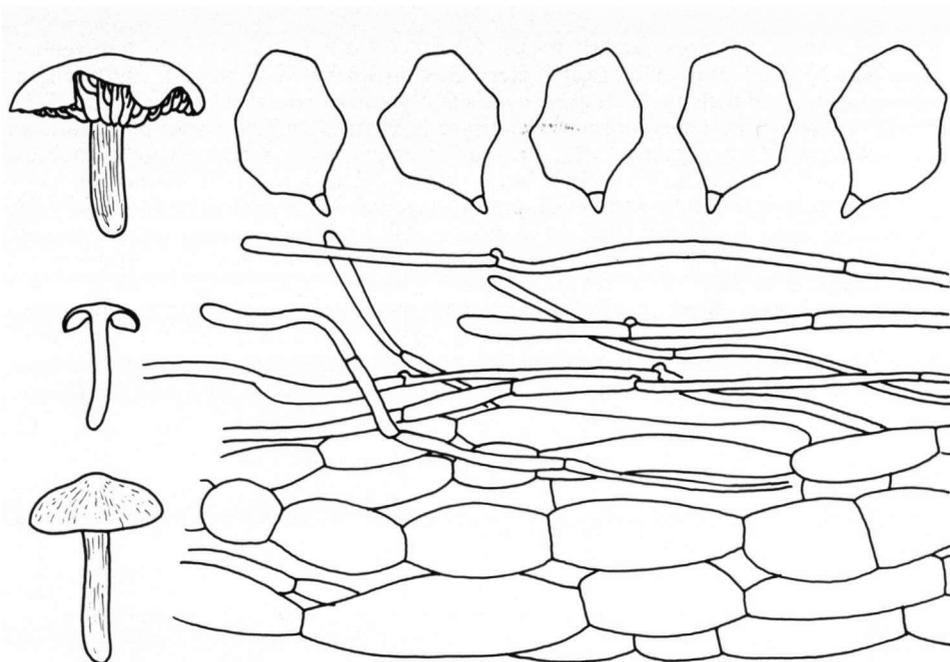


Fig. 5. *Entoloma* spec., aff. *alpicola*. — Habit, spores, and pileipellis. (All figs. from TB 83.5.)

**Habitat.**—In loose clusters in snow-beds of *Salix herbacea*. Wide-spread in arctic/alpine habitats.

**Collections examined.**—NW: Umânak, 1982, *John Kjaerström*; SW: Pâmiut, 8 Aug. 1978, TB 78.17; 28 Aug. 1981, TB 81.79; 16 Aug. 1981, TB 81.153; 4 Aug. 1982, TB 82.14.

*Entoloma alpicola* is a typical snow-bed fungus associated with *Salix herbacea*. It has been recorded from the Alps (Favre, 1955), France (Kühner, 1977), and Scandinavia (Kühner, 1977; Gulden & Lange, 1971). I have also found it among collections from Spitzbergen and Jan Mayen (unpubl.). I agree with Kühner (l.c.) that *Entoloma alpicola* is a species of its own right, and by no means related to *Entoloma clypeatum*, a much larger species with vernal appearance in the lowlands, and associated with Rosaceae.

### 3. *Entoloma* spec. (aff. *alpicola*).—Fig. 5

Pileus 17–22 mm broad, planoconvex with enrolled margin often with a very slight flat umbo, sometimes with slightly depressed pileus, margin remaining inflexed, weakly hygrophanous, when moist almost black, (Muns. 10 YR 2/1), dark brown at the enrolled part of margin only, later dark brown, not striate, on drying pallescent to cigarbrown or snuffbrown, but centre (umbo) remaining darker, smooth, dry, becoming more or less radially fibrillose under lense on drying. Lamellae adnexed or slightly emarginate, not very crowded, L = 25–30, l = 1–3, ventricose, 3.5 mm broad, when young vinace-

ous-buff, when old more reddish brown (about 7.5 YR 6/4), distinctly transvenose. Stipe 15–20 × 2.5 mm, cylindrical, watery grey-brown but with whitish fibrils lengthwise appearing whitish to the naked eye, slightly darker when old (10 YR 5/2–5/3). Flesh relatively firm, concolorous with surface in relatively broad part of pileal surface, inner part pale, thin, especially near the margin of the pileus, but not membranaceous. Smell strongly farinaceous on cutting, but fugaceous. Taste strongly farinaceous.

Spores 8.1–9.9(–10.8) × 6.8–8.1  $\mu\text{m}$  (average 9.2 × 8.0  $\mu\text{m}$ ), Q = 1.0–1.15–1.3, subsodiametrical to shortly ellipsoid in outline with 6–7 angles and basal facet. Basidia 4-spored, clamped. Cystidia none. Hymenophoral trama made up of short, sausage-shaped cells. Pileipellis an ixocutis of narrow cylindrical hyphae, 3–7  $\mu\text{m}$  wide with abundant brown intracellular pigment, subpellis well-developed, made up of inflated cells, 50–87 × 15–30  $\mu\text{m}$ . Pigment abundant, brown, intracellular in all parts of the pileipellis. Pileitrama regular, made up of short inflated cells. Clamp-connections numerous in all tissues.

*Habitat*.—On moist soil among mosses with scattered *Salix herbacea* and *Polygonum viviparum*, gregarious.

Collection examined.—SW: Pâmiut, 24 Aug. 1983, TB 83.5.

The collection described above resembles *Entoloma alpicola* very much, but differs in smaller size of the basidiocarps.

#### 4. *Entoloma subsepiaceum* (Kühn.) Noordel., *comb. nov.* — Fig. 6

*Rhodophyllus subsepiaceus* Kühner in Bull. Soc. mycol. Fr. 93: 454. 1977 (basionym).

Pileus up to 40 mm broad, broadly conical with inflexed margin then expanding, always with distinct, small umbo, hygrophanous, when moist weakly, translucently striate up to half the radius, at first blackish or 'cigarbrown' with paler margin (near 'hazel'), then more like 'umber' of 'snuffbrown', paler at margin and between the striae, pallescent on drying, weakly shining, smooth but innately radially fibrillose. Lamellae L = about 40, l = 1–3, broadly adnate with decurrent tooth then emarginate, ventricose up to 8 mm broad, pale grey (Muns. 10 YR 6/2), paler, almost white near edge, when mature brown with pink tinge (7.5 YR 7/2, 10 YR 5/2, 5/3) with entire, paler edge. Stipe 40–45 × 5 mm, cylindrical, white, fibrillose-striate lengthwise, silky shining. Flesh concolorous with surface in cortex, inner parts pale, relatively firm, not very brittle. Smell and taste strongly farinaceous or rancid.

Spores 7.2–10.8(–11.7) × 6.3–7.2  $\mu\text{m}$  (averages 8.9–10 × 7–8.1  $\mu\text{m}$ ), Q = 1.15–1.25–1.4, 7–9-angled in side-view with basal facet. Basidia 35–45 × 9–12.5  $\mu\text{m}$ , 4-spored or mixed 2- and 4-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of short, inflated cells, 70–130 × 6–19  $\mu\text{m}$ . Pileipellis thin, cutis of narrow, cylindrical hyphae, 2–5  $\mu\text{m}$  wide, subpellis well-developed, made up of inflated cells, 20–86 × 8.5–16  $\mu\text{m}$ . Pigment brown, intracellular in pileipellis and upper pileitrama. Pileitrama regular, made up of short inflated cells. Clamp-connections abundant in all tissues.

*Habitat*.—Among mosses, *Carex rariflora*, *Salix arctophila*, *S. glauca*, and *Empetrum hermaphroditicum*.

Collection examined.—SW: Pâmiut, 2 Sept. 1981, TB 81.226 and 29 Aug. 1982, TB 82.107.

The habit, colours, and microscopical characters of the collections described above agree very well with those of Kühner, who described *Rhodophyllus subsepiaceus* from

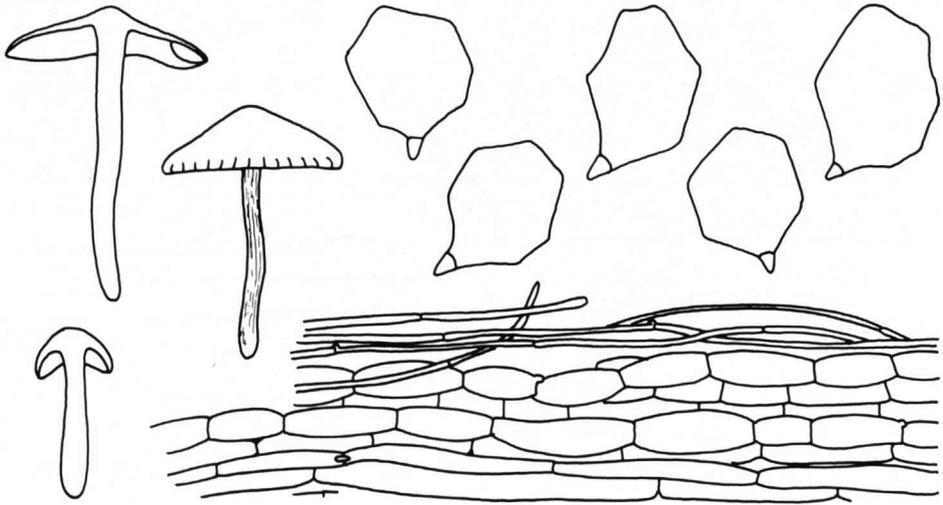


Fig. 6. *Entoloma subsepiaecum*. — Habit, spores, and pileipellis. (All figs. from TB 82.107.)

two different localities near Abisko in Swedish Lapland, one associated with *Salix herbacea*, the other from a wet place. He described also a collection from the Norwegian mountains near Hardanger with slightly brown lamellae and a white stipe. In the Swedish lots the lamellae were pale and the stipe showed a tinge of grey. The collections from Greenland are somewhat intermediate with pale lamellae and a white stipe. The colour of the stipe cannot always be determined precisely if the surface is strongly aeriferous-striate as in our collections. One should look critically to the cortex of the stipe to see whether the background shows a certain amount of pigmentation. *Entoloma subsepiaecum* comes very close to *E. sericatum*, *E. nidorosum* and *E. sordidulum*, from which it differs in a combination of characters and the habitat. *Entoloma alpicola* differs in having a much stronger pigmented pileus, a more fleshy habit, and particularly in a structure of the pileipellis which has a strongly developed subcellular subpellis, where most of the pigment is located. In *E. alpicola* the pigment is almost restricted to the subpellis, leaving the thin hyphae of the slightly gelatinized suprapellis almost colourless.

It is remarkable that TB 82.107 differs from TB 81.226 in having slightly smaller spores and almost exclusively 4-spored basidia.

##### 5. *Entoloma anthracinellum* (M. Lange) Noordel., *comb. nov.* — Fig. 7

*Rhodophyllus anthracinellus* M. Lange in Meddr Grönland 148(2): 42. 1956 (basionym).

Pileus 11–25 mm broad, conico-convex then expanding to almost flattened with small papilla or slightly depressed at centre, hygrophanous, when moist dark grey-brown to almost black (Muns. 10 YR 3/2) slightly paler towards margin (10 YR 4/2, 5/2), weakly translucently striate at margin, pallescent on drying to (pale) grey-brown, innate-

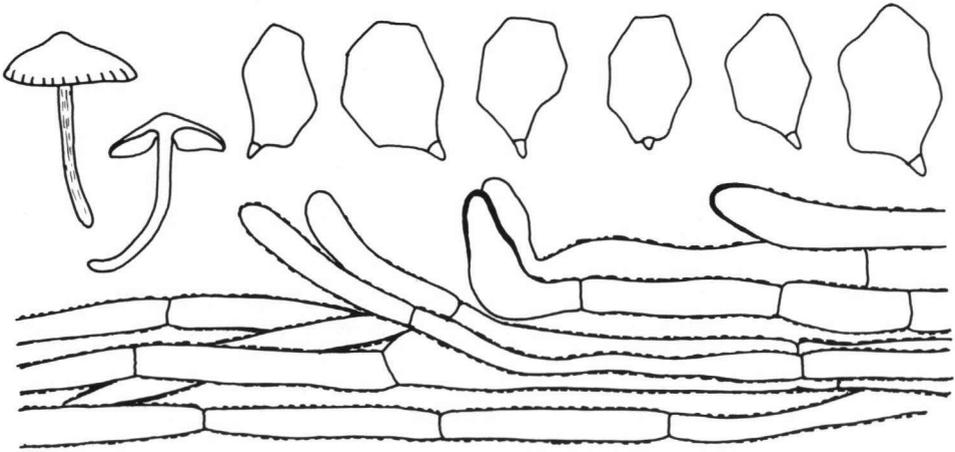


Fig. 7. *Entoloma anthracinellum*. — Habit, spores, and pileipellis. (All figs. from TB 82.20.)

ly fibrillose. Lamellae rather crowded, broadly adnate with decurrent tooth, sometimes slightly emarginate, pale grey when young then darker, with colour almost like pileus, hardly pink when mature, with concolorous edge. Stipe 15–35 × 1–4 mm, cylindrical or somewhat flattened, concolorous with pileus or paler, sparsely white fibrillose lengthwise. Flesh concolorous with pileus or paler than surface. Smell weak, sometimes slightly farinaceous. Taste farinaceous.

Spores 7.4–10.2 × 5.4–7.4(–8.0)  $\mu\text{m}$  (averages 8.2–9.0 × 6.4–7.0  $\mu\text{m}$ ),  $Q = 1.15$ –1.3–1.4, (broadly) ellipsoid 5–8-angled in side-view with basal facet. Basidia 25–40 × 7.2–11.7  $\mu\text{m}$ , 4-spored with clamp. Cystidia none. Hymenophoral trama regular, made up of rather short, cylindrical cells, 50–180 × 11–27  $\mu\text{m}$ , interspersed with narrow cylindrical hyphae, 3–8  $\mu\text{m}$  wide with minutely asperulate-encrusted walls. Pileipellis a cutis of 4–8.5  $\mu\text{m}$  wide, cylindrical hyphae with scattered clavate terminal cells up to 15  $\mu\text{m}$  wide. Pigment coarsely encrusting the hyphae of pileipellis and pileitrama. Pileitrama regular, made up of short, inflated cells, 42–90 × 10–20  $\mu\text{m}$ , with coarsely encrusted, sometimes slightly thickened walls. Clamp-connections absent from all tissues, except for the hymenium where they are rather abundant.

*Habitat*.— Among mosses (*Sphagnum* or other moss) in moist heath.

*Collection examined*.— CW: Kangerdlugssuaq, Hassels Fjeld, 4 Aug. 1948, *ML 218* (holotype); SW: Pámiut, Kvaneöen, 6 Aug. 1982, *TB 82.20*.

*Entoloma anthracinellum* is a very distinctive species with its relatively narrow, elongate spores and dark colours. *Entoloma atrosericeum* comes close, but has isodiametrical spores and numerous clamp-connections. Both species certainly have been named *Entoloma sericeum* in the past. That species, however, differs in a number of characters, such as structure of hymenophoral and pileal trama. See also below.

## 6. *Entoloma rimulosum* Noordel., *spec. nov.* — Fig. 8

Pileus 35–38 mm latus, planoconvexus, margine involutus, centro interdum papillatus, hygrophanus, obscure griseo-brunneus margine striatus, pallescens, leviter radialiter rimulose-venosulus; lamel-

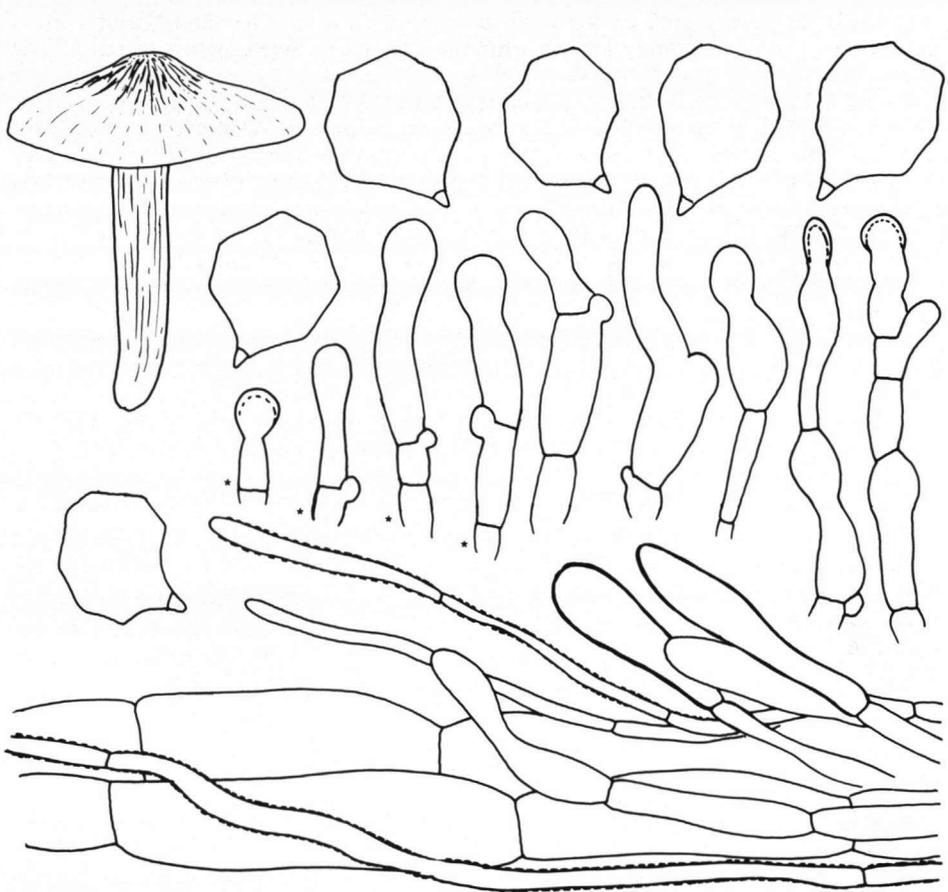


Fig. 8. *Entoloma rimulosum*. — Habit, spores, cheilocystidia, and pileipellis. (Figs. with (\*) from Boertmann 83.084, all other figs. from holotype.)

lae confertae, griseobrunneae; stipes 35 × 6 mm, pallidus, striatus; odore leviter nitrosa; sapore farinacea. Sporeae 8.1–10.8 × 6.3–8.1(–9.5)  $\mu\text{m}$ , 6–8-angulata; basidia tetrasporigera; cheilocystidia 20–55 × 4–12  $\mu\text{m}$ , subcylindracea vel lecitiformia; pileipellis cutis vel trichoderma cellulis terminalis cystidiformibus; pigmentis incrustantibus; fibulae presentes. In graminosis ad terram turfosam. — Holotypus: *T. Borgen* 82.116, 31-VII-1982, Pâmiut, Greenland (C; isotypus L).

Pileus 35–38 mm broad, planoconvex with inflexed margin, finally flattened, sometimes with small papilla, hygrophanous, when moist dark grey-brown (Meth. 6E5–6F6; 'cigarbrown') with slightly paler margin translucently striate at margin only, when moist with slightly radially rimulose-venose surface, pallescent on drying (Muns. 10 YR 5/4) or slightly darker in young specimens), shining and radially fibrillose-felted. Lamellae, L = about 40, narrowly emarginate, subventricose, grey-brown (near Muns. 10 YR 5/3, 5/4) in older specimens slightly paler and more pinkish with concolorous, entire edge. Stipe up to 35 × 6 mm, cylindrical, apex coarsely white-felted, white fibrillose striate

downwards on watery grey background, pallescent on drying to almost white. Flesh concolorous in cortex, watery greyish white in inner parts. Smell slightly nitrous. Taste farinaceous.

Spores  $8.1-10.8 \times 6.3-8.1(-9.5) \mu\text{m}$  (averages  $8.7-9.5 \times 7.3-7.6 \mu\text{m}$ ),  $Q = 1.15-1.25-1.4(-1.45)$ , 6-8-angled in side-view. Basidia 4-spored, clamped. Lamella edge heteromorphous; cheilocystidia  $20-55 \times 4-12 \mu\text{m}$ , subcylindrical to lecithiform, very variable in shape, often with slightly thickened, brownish apex. Hymenophoral trama regular made up of inflated cells,  $45-150 \times 7-20 \mu\text{m}$ . Pileipellis a cutis of cylindrical hyphae,  $2.5-7(-10) \mu\text{m}$  wide with scattered trichodermal tufts of cystidioid cells up to  $15 \mu\text{m}$  wide. Pigment coarsely encrusting the hyphae of pileipellis and pileitrama, terminal cells of pileipellis often with thickened, brown walls. Clamp-connections present in all tissues.

**Habitat.**— Among grasses, mosses, and herbs (e.g. *Polygonum viviparum*) on moist soil.

**Collections examined.**— SW: Pâmiut, 1 Aug. 1978, *TB 78.1* and 31 Aug. 1982, *TB 81.116* (holotype); NE: Jameson Land, 29 July 1983, *D. Boertmann 83.084*.

The distinctive characters of *Entoloma rimulosum* are the slightly rimose veined surface of pileus which turns into a sort of fluffy-fibrillose covering in dry state and the cheilocystidia, which are numerous in the holotype, and more scattered, but always present in the other collections studied. I have placed it in section *Rhodopolia* on account of the general habit of the basidiocarps, the pigment, the numerous clamps and the tramal structure, but the type of pileipellis and the shape of cheilocystidia also remind of species known in section *Phlebophora* Noordel. (Noordeloos, 1983: 75).

### 7. *Entoloma atrosericeum* (Kühn.) Noordel. — Fig. 9

*Rhodophyllus atrosericeus* Kühn. in Bull. Soc. mycol. Fr. 94: 454. 1977. — *Entoloma atrosericeum* (Kühn.) Noordel. in Persoonia 11: 229. 1981.

Greenland record: Lamoure & al. (1982: 89).

Pileus 15-25 mm broad, conical then convex with more or less straight margin, hardly hygrophanous, not striate, very dark brown ('cigarbrown' to 'snuffbrown'), radially fibrillose but appearing smooth. Lamellae deeply emarginate, very dark grey-pink or brown-pink with irregular, concolorous edge. Stipe up to  $40 \times 4-6$  mm, cylindrical, grey-brown, paler than pileus, silvery striate. Smell farinaceous or not distinctive.

Spores  $7.2-10.8 \times (6.2-7.2-9) \mu\text{m}$  (averages  $8.4-9.1 \times 8.1-8.4 \mu\text{m}$ ),  $Q = 1.0-1.1-1.15$ , (sub-)isodiametrical with 5-8 rather pronounced angles. Basidia 4-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of short inflated cells. Pileipellis a cutis of very narrow 2-10  $\mu\text{m}$  wide hyphae, subpellis not or weakly developed, and then made up of inflated cells. Pigment minutely encrusting the hyphae of pileipellis and pileitrama, often also the hymenophoral trama. Pileitrama regular, made up of short, inflated cells. Clamp-connections present in all tissues.

**Habitat.**— Among mosses and *Salix herbacea* with *Empetrum*, also in dry heaths with lichens and mosses.

**Collections examined.**— SW: Pâmiut, 19 Aug. 1979, *TB 81.165* and 20 Aug. 1982, *TB 82.71*.

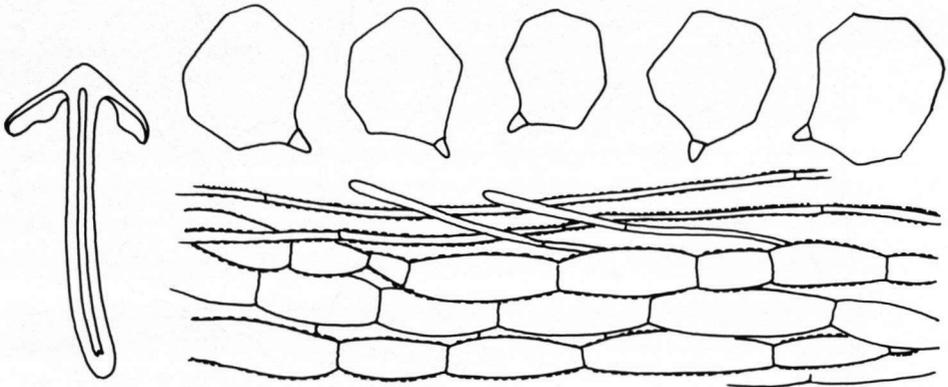


Fig. 9. *Entoloma atrosericeum*. — Habit, spores, and pileipellis. (Habit from TB 81.165, all other figs. from TB 82.71.)

*Entoloma atrosericeum* is a widely distributed species usually recorded as *Entoloma sericeum* from alpine and arctic habitats. It differs, however, from *E. sericeum* in having a non-striate, darker pileus, a different spore-shape, and trama of pileus and hymenophore made up of short, inflated cells, representative of the subgenus *Entoloma*. The ecology is also rather different, as *Entoloma atrosericeum* occurs in *Salix herbacea* snow-beds, and may have an ectomycorrhizal symbiosis with that 'tree', whereas *Entoloma sericeum* is a species of grasslands.

#### 8. *Entoloma subarcticum* Noordel., *spec. nov.* — Fig. 10

Pileus 20–40 mm latus, brunneus vel flavobrunneus, ad marginem striatus, hygrophanus, glabrus. Lamellae albae demum rosae. Stipes 20–50 × 2–6 mm, cylindraceus, albidus. Odore nulla vel leviter farinacea. Sporae 7.2–9.9(–10.4) × 6.2–8.1(–9)  $\mu\text{m}$ . Pileipellis cutis cellulisi terminalia clavata. Pigmentis manifeste incrustantibus. — Holotypus: *H. Knudsen, T. Borgen & J. Petersen 392*, VIII-1983, 'Qingua Valley, S. Greenland' (C; isotypus in L).

Pileus 20–40 mm broad, conico-convex then expanding with or without umbo, with straight, often somewhat undulating margin, slightly hygrophanous, when moist yellow-brown or sepia (Meth. 5C5–5E5) or with slight grey tinge (5C3, 5D5), translucently striate up to half the radius, pallescent on drying, smooth or with minute fibrillose patches ('squamules'). Lamellae emarginate, ventricose, white then pallid pink with concolorous, entire edge. Stipe 20–50 × 2–6 mm, cylindrical, white or whitish with pruinose apex and fluffy aeriferous-fibrillose covering downwards. Flesh pallid. Smell none or slightly farinaceous. Taste farinaceous or rancid.

Spores 7.2–9.9(–10.4) × 6.2–8.1(–9)  $\mu\text{m}$  (averages 8.5–9.5 × 7.2–8.0  $\mu\text{m}$ ), Q = 1.0–1.4,  $\bar{Q}$  = 1.2–1.3, subisodiametrical 5–6-angled in side-view. Basidia 24–48 × 8.4–12.7  $\mu\text{m}$ , 4-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of relatively short, inflated cells. Pileipellis a dry cutis of narrow cylindrical hyphae, 2.5–8  $\mu\text{m}$  wide with scattered clavate terminal cells up to 16  $\mu\text{m}$  wide. Pigment encrusting the hyphae of pileipellis and upper pileitrama, also brown-membranal in the terminal cells of pileipellis. Clamp-connections present in all tissues.

Habitat. — Among grass and moss near *Salix glauca* and/or *Betula pubescens*.

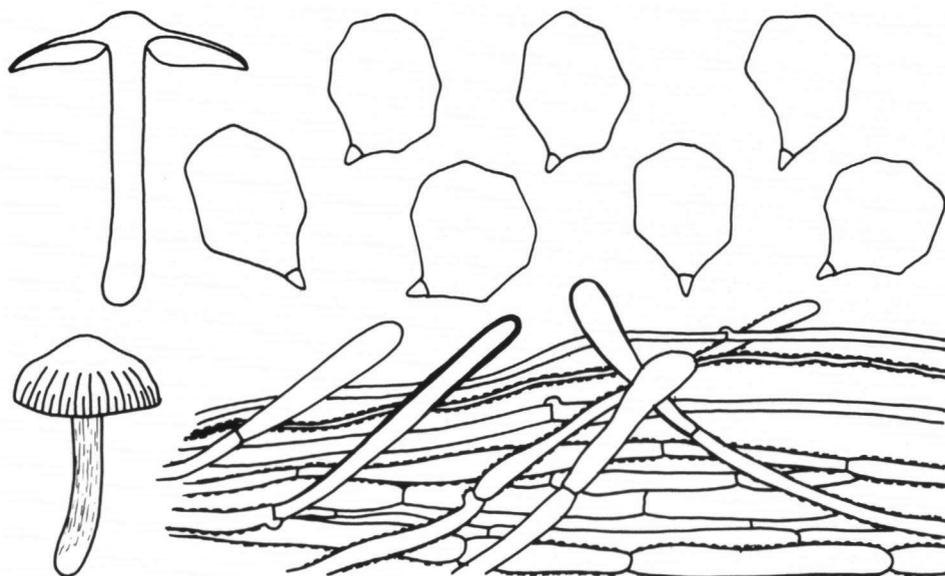


Fig 10. *Entoloma subarcticum* var. *subarcticum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

Collections examined.—S: Qinnua Valley, 9–14 Aug. 1983, *HK c.s. 392* and *509*; Narsarsuaq, 29 July 1983, *HK c.s. 173*, Rosenvinges plantation, 21 Aug. 1983, *HK c.s. 596*; Erik the Red's Fiord 5 Aug. 1981, *Th. Laessle & S. Elborne*.

*Entoloma subarcticum* belongs to subsect. *Typodochroa* and differs from *E. sericatum* in colour, and surface of the pileus, type and pigmentation of the pileipellis, and the smell; from *E. atrosericeum* in the stature, the pale, striate pileus, and the habitat. It may have been included in *Entoloma sericatum* sensu Noordel. (1981b) from subarctic *Betula* forest in northern Norway and Finland. A darker variety from more exposed, drier habitats is described below. According to the collectors *Entoloma subarcticum* is the most common *Entoloma*-species in the *Betula/Salix* forests of southern Greenland.

*Entoloma subarcticum* var. *obscurum* Noordel., var. nov.

Misapplied name.—*Rhodophyllus clypeatus* sensu M. Lange in *Meddr Grönland* 148: 41. 1957.

A varietate typica differt in stature robustiore, pileo obscuriore, haud striate. — Holotypus: *T. Borgen 81. 77*, 28 Aug. 1981, 'Pámiut, Greenland' (C; isotypus in L).

Pileus 35–65 mm broad, convex with broad umbo, hygrophanous, when moist dark fuscous brown to snuffbrown at centre, slightly paler towards 'milky-coffee' at margin, not striate, pallescent on drying to 'hazal', dull or shining, minutely radially fibrillose. Lamellae emarginate, weakly ventricose, white to pale buff when young then vinaceous

buff or claybuff, sometimes with slight grey tinge, 4–9 mm broad. Stipe 40–50 × 7–14 mm, cylindrical or compressed, white or pale grey to smoke grey, minutely fibrillose-striate, white tomentose at base. Flesh firm, at centre of pileus 3 mm thick, in cortex of pileus brown, elsewhere white. Smell farinaceous especially when cut. Taste farinaceous.

Spores 8–10.8 × 6.3–9 μm (averages 8.9–9.4 × 7.5–7.9 μm), Q = 1.1–1.2–1.3, 6–8-angled in side-view. Basidia 4-spored, clamped. Cystidia none. Hymenophoral and pileal trama regular, made up of short inflated cells. Pileipellis a cutis of 2–9 μm wide hyphae with numerous free terminal cells up to 15 μm wide. Pigment coarsely encrusting the hyphae of pileipellis and upper pileitrama, also brown membranous in terminal cells of pileipellis. Clamp-connections abundant in all tissues.

*Habitat*.—Among grass and herbs (*Taraxacum*, *Polygonum viviparum*, *Potentilla tridentata*) in *Salix glauca* scrub; also found in a deep cave with very scanty vegetation of herbs.

*Collections examined*.—CW: Kangerdlugssuaq (S. Strömfjord), Ravneklippen, 8 Aug. 1946, *ML* 262; SW: Pâmiut, 13 Aug. 1978, *TB* 78.55 and 28 Aug. 1981, *TB* 81.77; S: Narsarsuaq, 28 July 1983, *HK c.s.* 139.

*Entoloma subarcticum* var. *obscurum* differs from the type-variety in having a darker, non-striate pileus and different ecology. The microscopical characters such as size and shape of the spores, and especially the type of the pileipellis, with numerous free terminal cells with brown pigmented walls are perfectly similar to those of the type-variety.

### 9. *Entoloma bicorne* Noordel., *spec. nov.* — Fig. 11

Pileus ad 20 mm latus, convexus, leviter papillatus, atro vel obscure brunneus, radialiter fibrillosus. Lamellae sordidae. Stipes brunneus. Odor saporeque farinaceis. Spores 9–11.7 × 7.7–9.0 μm. Basidia bisporigera. Cheilocystidia presentes, lageniformia. Pileipellis ixocutis, subpellis manifestis. Pigmentis intracellulosis in pileipellis pileitramaeque vel leviter incrustantibus in pileitrama. Fibulae abundantes. — *Holotypus*: *T. Borgen* 83.8, 27 Aug. 1983, 'Pâmiut Greenland' (C, isotypus L).

Pileus up to 20 mm broad, convex with small papilla and straight margin, weakly hygrophanous, when moist black or dark brown, shortly translucently striate at margin, slightly pallescent on drying, radially fibrillose, but smooth. Lamellae broadly adnate to subdecurrent, grey when young ('smokegrey' or 'mousegrey') then brownish pink ('claybuff' to 'milky-coffee') with minutely eroded, concolorous edge. Stipe 25 × 3 mm, cylindrical, brownish (about 'drab'), in places somewhat paler, smooth. Flesh concolorous with surface. Smell farinaceous. Taste farinaceous with unpleasant slightly rancid after-taste.

Spores 9–11.7 × 7.7–9.0 μm (average 9.8 × 7.5 μm), Q = 1.1–1.15–1.3, rather regularly 5–6-angled in side-view. Basidia 22–48 × 7.5–12.5 μm, 2-spored, clamped. Cheilocystidia scattered among basidia, more or less lageniform, 18–42 × 6–10 μm. Pileipellis an ixocutis of narrow cylindrical hyphae, 2.5–9 μm wide with slightly gelatinized walls, subpellis well-developed, made up of inflated cells up to 20 μm wide. Pigment abundant intracellular in pileipellis and pileitrama, also encrusting the narrow hyphae of pileitrama. Clamp-connections abundant in all tissues.

*Habitat*.—On moderately moist places among moss near *Salix herbacea*.

*Collections examined*.—SW: Pâmiut, 27 Aug. 1983, *TB* 83.8 (Holotype, C).

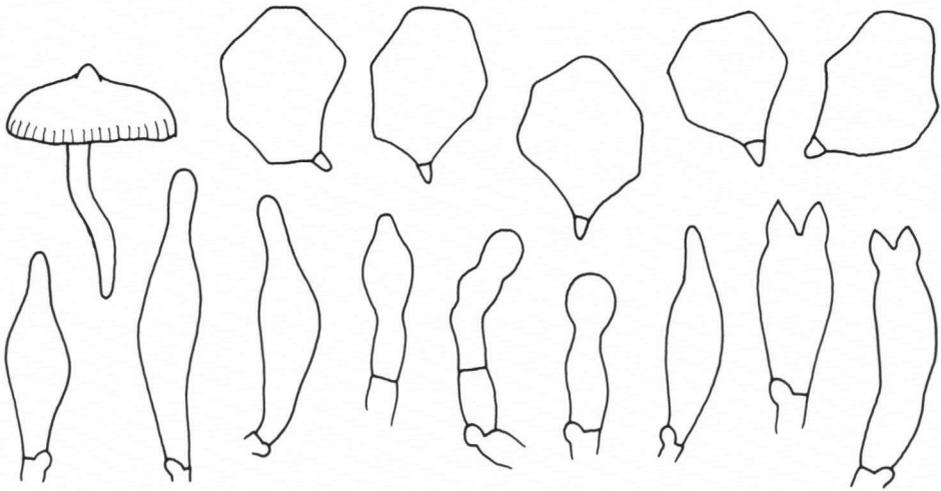


Fig. 11. *Entoloma bicorne*. — Habit, spores, basidia, and cheilocystidia. (All figs. from holotype.)

*Entoloma bicorne* (named after the two horn-like sterigmata characteristic of bi-spored species in *Entoloma*) apparently belongs to the group of small, dark coloured and macroscopically rather uniform species of *Entoloma* associated with *Salix herbacea*. It differs from all species in this group in having two-spored basidia, but spores almost similar to those of the four-spored taxa. Also the occurrence of cheilocystidia is unique in sect. *Rhodopolia*.

#### 10. *Entoloma bipelle* Noordel. & Borgen, *spec. nov.* — Fig. 12

Pileus 25–40 mm latus, conicus dein expansus, umbonatus, margine rectus, hygrophanus, obscure brunneus, paulisper striatus, glabrus. Lamellae adnatae-emarginatae, subventricose, pallidae demum sordide incarnatae. Stipes 35–55 × 4.5–7 mm, cylindraceus, pallide-griseus, albide-striatus, apicem pruinatus. Odor saporeque farinaceis. Sporae 7.6–10.4 × 6.2–9.0  $\mu\text{m}$ . Basidia 4-sporigera. Cystidia nulla. Pileipellis cutis hyphis cylindraceis, subpellis hyphis inflatis manifeste. Pigmentis incrustantibus in pileipellis pileitramaeque, in additione intracellulosis in subpelle. Fibulae abundantes. — Holotypus: *T. Borgen* 83.6: 25-VIII-1983, Pamiut, Greenland (C; isotypus, L).

Pileus 25–40 mm broad, conical at first then expanding to convex usually with small umbo and straight margin, weakly hygrophanous, when moist dark brown, ('cigarbrown' or almost black), at margin about Muns. 7.5 YR 4/4 (less intense) or 'snuff-brown', weakly striate at margin only, pallescent on drying, smooth or innately radially fibrillose, especially when dry (under handlens). Lamellae L = 30–35, l = 3–5, adnate or slightly emarginatae, (sub-)ventricose up to 6 mm broad, pallid grey then brownish flesh-colour (5 YR 7/2 then darker) with concolorous almost entire edge. Stipe 35–55 × 4.5–7 mm, cylindrical, pale brown, apex white pruinose, downwards covered with dense white-fibrillose, aeriferous covering, fistulose. Flesh concolorous with surface in cortex, inner parts whitish. Smell farinaceous. Taste slightly rancid to farinaceous.

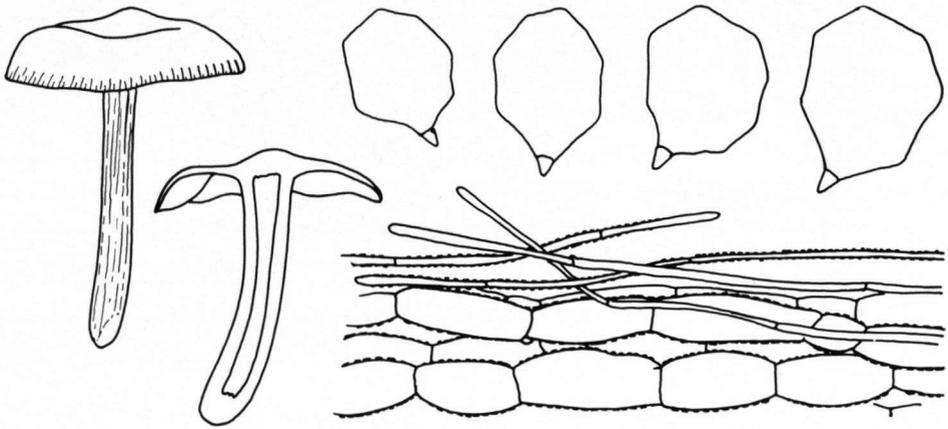


Fig. 12. *Entoloma bipelle*. — Habit, spores, and pileipellis. (All figs. from holotype.)

Spores  $(7.2-7.6-10.4(-11) \times 6.2-9.0(-9.9) \mu\text{m}$  (averages  $8.6-9.7 \times 6.8-8.7 \mu\text{m}$ ),  $Q = (1.0)1.1-1.15-1.25-1.3(-1.4)$ , rounded 5-7-angled in side-view. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of short inflated cells up to  $28 \mu\text{m}$  wide. Pileipellis cutis of narrow cylindrical hyphae,  $2.5-7.5(-9) \mu\text{m}$  wide, subpellis usually well-developed, made up of inflated, up to  $18 \mu\text{m}$  wide cells. Pigment encrusting the hyphae of pileipellis and pileitrama, in addition pale brown intracellular in subpellis. Pileitrama regular, similar to hymenophoral trama. Clamp-connections abundant.

**Habitat.**—On moist and relatively dry places in mosses (not in *Sphagnum*), sometimes with *Salix herbacea* and/or *S. glauca*.

**Collections examined.**—SW: Pâmiut, 9 Aug. 1979, *TB 79.67* and 25 Aug. 1983, *TB 83.6* (holotype); Eqaqut, 12 Aug. 1981, *TB 81.139*; Kvaneöen, 12 Sept. 1983, *TB 83.66*.

*Entoloma bipelle* is common in the Pâmiut-area where it grows on fairly moist to relatively dry places, frequently near *Salix*. It differs from *E. borgenii* in having larger basidiocarps, an umbonate pileus and a different pigmentation of the pileipellis. In *E. bipelle* the encrusting pigments are predominant, whereas in *E. borgenii* the intracellular pigments dominate. *Entoloma bipelle* also seems to prefer drier spots. *Entoloma atrosericeum* differs from *E. bipelle* in habit and pigmentation, and *E. subarcticum* has paler colours, exclusively encrusting pigment, and probably a more southern distribution.

### 11. *Entoloma borgenii* Noordel., *spec. nov.* — Fig. 13

Pileus 15-27 mm latus, planoconvexus, depressus, atro-brunneus, vel obscure brunneus, haud striatus, fibrilloso-sericeus. Lamellae (sud-)decurrentes vel adnatae, brunneo-rosae. Stipes 10-25  $\times$  1-4 mm, cylindræus, griseo-brunneus, albido-striatus. Odore saporeque farinaceis. Sporae  $(7.7-8.1-9.9(-10.8) \times 6.8-9.0 \mu\text{m}$ . Basidia tetrasporigera. Cystidia nulla. Pileipellis cutis hyphis cylindræis 2-9  $\mu\text{m}$  latis. Pileipellis intracellulosis in pileipellis pileitramaeque in additione leviter incrustantibus in pileitrama et subpelle. Fibulae abundantes. Inter muscos. — Holotypus: *T. Borgen 83.40*, 3.IX.1983, Pâmiut, Greenland, (C; isotypus, 1).

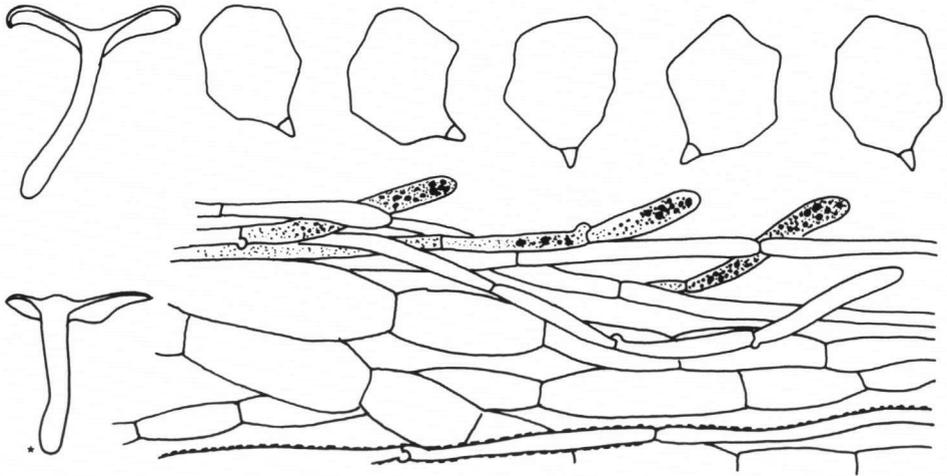


Fig. 13. *Entoloma borgenii*. — Habit, spores, and pileipellis. (Habit with (\*) from TB 79.35, all other figs. from TB 78.131.)

Pileus 15–27 mm broad, plano-convex, usually depressed, sometimes with small papilla within depression, with inflexed margin, hardly hygrophanous, not striate, dark brown almost black at centre, slightly paler at margin ('datebrown', 'snuffbrown', or 'cigarbrown'), smooth but radially innately fibrillose (under hand-lens). Lamellae moderately distant, (sub-)decurrent or broadly adnate, greyish brown then brownish pink with concolorous or slightly darker edge, sometimes transverse. Stipe 10–25 × 1–4 mm, cylindrical, grey-brown with white fibrillose-aeriferous covering. Flesh relatively firm-elastic, greyish. Smell and taste weakly to distinctly farinaceous.

Spores (7.7–)8.1–9.9(10.8) × 6.8–9.0 μm (averages 8.6–9.2 × 7.5–8.0 μm), Q = (1.0–)1.05–1.15–1.25(–1.4), (sub-)isodiametrical 6–8-angled in side-view. Basidia 25–54 × 8–11.5 μm, 4-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of cylindrical to inflated cells, 69–200 × 10–35 μm. Pileipellis a dry cutis or an ixocutis, made up of radially arranged, 2–9 μm wide hyphae, frequently with slightly swollen, subclavate terminal cells, subpellis well-developed, made up of inflated cells, 27–90(–120) × 13–27 μm. Pileitrema regular, similar to the hymenophoral trama. Pigment predominantly intracellular in pileipellis and upper pileitrema, in addition also minutely encrusting the narrow hyphae of upper pileitrema and rarely also of the subpellis. Clamp-connections abundant in all tissues.

**Habitat.**—On relatively moist, boggy places among mosses (*Sphagnum*), sometimes near *Salix herbacea* in snow-beds.

**Collections examined.**—SW: Pâmiut, 6 Sept. 1978, TB 78.131; 1 Aug. 1979, TB 79.35; 1 Sept. 1979, TB 79.120; 21 Aug. 1983, TB 83.4 and 3; Sept. 1983, TB 83.40.

*Entoloma borgenii* seems to be rather common in the Pâmiut-area where it grows on fairly wet, boggy places, sometimes in association with *Salix herbacea*. It belongs to the group of dwarf-*Entoloma* with dark fruitbodies associated with *Salix herbacea*, from which it differs in pigmentation-type. Compare also the key to species of section *Rhodopolia*.

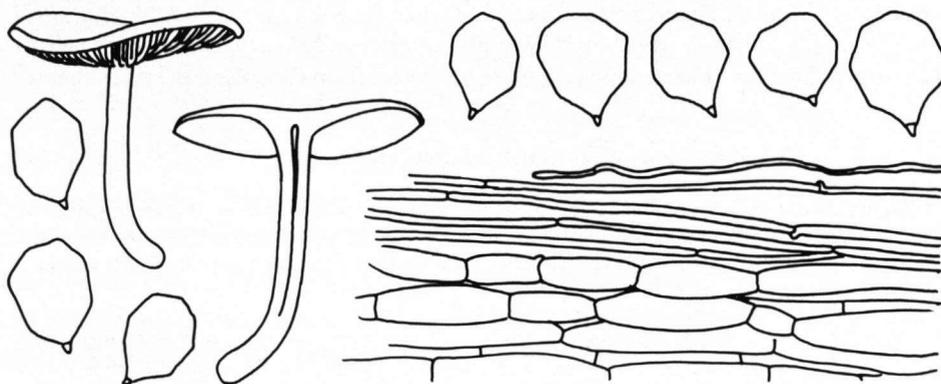


Fig. 14. *Entoloma vinaceum*. — Habit, spores, and pileipellis. (All figs. from *TB 83.55*.)

#### SECTION TURFOSA

### 12. *Entoloma vinaceum* (Scop.) Arnolds & Noordel. — Fig. 14

For full synonymy see Noordeloos (1981a: 223).

Pileus 31 mm broad, almost flattened with slightly depressed, with slightly enrolled margin, brown (centre near 'drab', margin ca. Muns. 10 YR 5/4), shortly striate at margin, dry, glabrous, under lense minutely radially fibrillose. Lamellae not crowded, narrowly emarginate, ventricose, up to 55 mm broad, whitish, transverse. Stipe 27 × 3.5 mm, yellowish brown (10 YR 7/4–7/6) dry, minutely innately fibrillose, not aeriferously striate. Flesh concolorous with surface. Smell and taste slightly farinaceous.

Spores 5.8–7.2 × 5.0–76.3 μm (average 6.0 × 5.3 μm), Q = 1.07–1.15–1.3, very thin-walled, irregularly, bluntly 6–8-angled in side-view. Basidia 4-spored with clamp. Cystidia absent. Hymenophoral trama regular, made up of rather short, cylindrical to slightly inflated cells, up to 27 μm wide. Pileipellis a thin ixocutis of 2–4(–7) μm wide cylindrical hyphae, subpellis distinct, made up of slightly inflated cells up to 15 μm wide. Pigment brown-intracellular in pileipellis. Pileitrama similar to hymenophoral trama. Lactiferous hyphae present in the pileitrama. Clamp-connections abundant.

*Habitat*.—Among mosses near *Betula glandulosa*, *Empetrum nigrum*, and *Juniperus communis*.

*Collection examined*.—SW: Pâmiut, Eqaqut, 4 Sept. 1983, *TB 83.55*.

The collection described above, agrees perfectly well with *Entoloma vinaceum* var. *vinaceum* as described by me from N.W. Europe. It seems to be rare in Greenland, as only a single specimen has been collected once near Pâmiut.

#### SECTION POLITA

Members of section *Polita* are numerous in alpine/subarctic habitats, but difficult to distinguish from each other. Kühner (1977) distinguished five species from the alps, on

account of subtle differences in colour, smell, and spore-size, viz. *Rhodophyllus nitrolens*, *R. anthracinum*, *R. subflexipes*, *R. subcollariatus*, and *R. atropellitus*. With help of Kühner's publication I sorted out a number of species from Greenland presented below.

### 13. *Entoloma melenosmum* Noordel., *spec. nov.* — Fig. 15

*Statura Entoloma sect. Polita.* Odor fragrante malo; pileus brunneus, hygrophanous, glabrus; lamellae pallidae; stipes brunneus, paulisper striatus. Ad truncis Betularum. — Holotypus: *H. Knudsen, T. Borgen & J. Petersen 338*, 12-VIII-1983 S. Greenland Qingua Valley at Tasersuaq Lake (C; isotypus L).

Pileus 20–50 mm broad, convex often depressed at centre, sometimes with small umbo within depression, with almost straight finally crenulate margin, hygrophanous, when moist dark brown (Meth. 7F4), slightly paler between striae and at margin (5C4) translucently striate up to one-third of radius pallescent on drying smooth, shining Lamellae deeply emarginate to almost free ventricose 4–5 mm broad, whitish then pale pink with somewhat fringed concolorous edge Stipe 30–50 × 3–7 mm, cylindrical or slightly broadened at apex pale yellowish brown or greyish brown with some scattered fibrils substrate lengthwise, fistulose Flesh pallid in inner parts, very fragile. Smell strong fragrant like that of ripe apples Taste weakly farinaceous

Spores 8.1–9.9 × 7.2–8.1 μm (averages 8.6 × 7.3 μm), 5–6-angled in side-view, Q = 1.05–1.1–1.25. Basidia 32–50 × 9.5–15 μm, 4(rarely 2)-spored, clamped. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 50–170 × 3.5–15 μm. Pileipellis a thin ixocutis of 2.4–9 μm wide cylindrical hyphae. Pileitrama regular, made up of inflated cells, 28–80(–100) × 7–16 μm. Pigment intracellular in pileipellis and upper pileitrama. Clamp-connections abundant.

*Habitat.*—On and around trunks and branches of *Betula glandulosa*, common in the Qingua-valley.

*Collections examined.*—S: Qingua Valley, at Tasersuaq Lake, 12 Aug. 1983, *HK c.s. 338* (holotype) and *380*.

*Entoloma melenosmum* is named after the characteristic and strong smell of apples. This smell in combination with the brown pileus, the pallid, rather distant lamellae, and the pale brown stipe make it rather different from all other species in sect. *Polita*. It has some resemblance with slender specimens of *Entoloma nidorosum*, which differs in having a pallid, fibrillose stipe, nitrous smell and a different pileipellis structure. The habitat of *Entoloma melenosmum* on and around rotten wood of *Betula* is also very distinctive.

### 14. *Entoloma politum* (Pers.: Fr.) Donk

*Entoloma politum* (Pers.: Fr.) Donk in Bull. bot. Gdns Buitenzorg, Ser. III, 18: 158. 1949.  
For full synonymy see Noordeloos (1981a: 210).

Pileus 5–16 mm broad, convex, hygrophanous when moist dark brown almost black ('fuscous-black' to 'cigarbrown') with slightly paler translucently striate margin. Lamellae L = 16–20, l = 0–1, rather distant, adnate, subventricose, pale then sordid pink

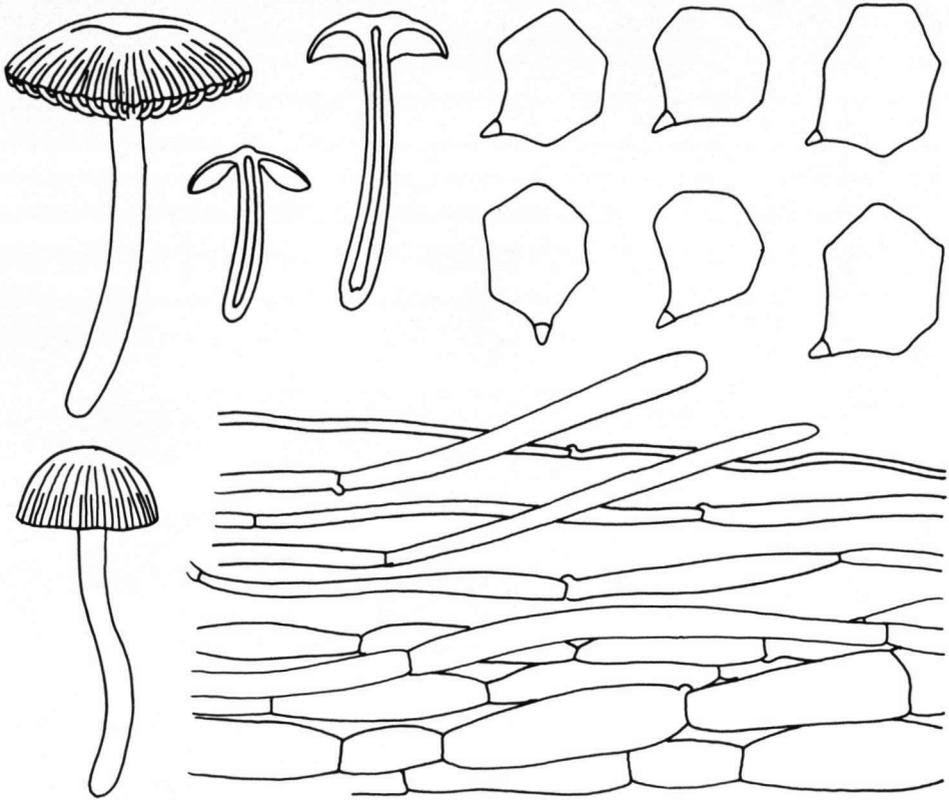


Fig. 15. *Entoloma melenosmum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

('claybuff') with concolorous, entire edge. Stipe up to  $20 \times 1-3$  mm, cylindrical, slightly paler than pileus (between 'snuffbrown' and 'cigarbrown'), smooth, polished. Smell slightly nitrous when moist. Taste not distinctive.

Spores  $8-10(-11) \times 6-8(-9) \mu\text{m}$  (averages  $9 \times 7.5 \mu\text{m}$ ),  $Q = 1.0-1.15-1.3$ , rather regularly 6-7-angled in side-view. Basidia  $30-48 \times 9-14 \mu\text{m}$ , 4 (rarely 2)-spored, clamp-ed. Cystidia none. Hymenophoral trama regular, made up of inflated cells,  $22-75(-125) \times 12-30 \mu\text{m}$ . Pileipellis an ixocutis of 2-5  $\mu\text{m}$  wide cylindrical cells with slightly to distinctly gelatinized walls, gradually passing into pileitrama. Pigment brown, intracellular in pileipellis and upper pileitrama. Pileitrama regular, made up of short, inflated cells like in hymenophoral trama. Clamp-connections numerous in all tissues.

**Habitat & distribution.**—On moist places among mosses (*Sphagnum* or other mosses) near *Salix glauca*. Common in temperate, boreal, subarctic, as well as in (sub-)alpine, regions of Europe.

**Collections examined.**—SW: Pâmiut, Ulimiut, 31 Aug. 1980, *TB 80.81*; S: Narssaq, 14 Aug. 1981, *T. Laessle & S. Elborne*.

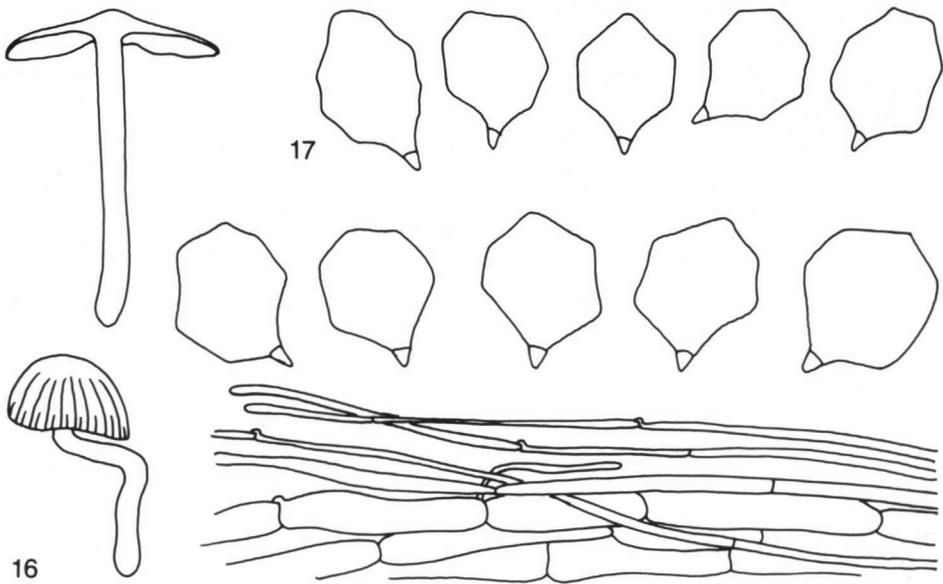


Fig. 16. *Entoloma polatum*, pallid form. — Habit, spores, and pileipellis. (All figs. from TB 81.260.)  
 Fig. 17. *Entoloma engadinum*. — Spores (from TB 82.137).

14a. *Entoloma polatum*, pale form. — Fig. 16

Pileus 15–30 mm broad, hemispherical to convex, slightly umbonate with slightly involute margin, hygrophanous, when moist pale grey-brown, translucently striate, strongly pallescent on drying to almost white, smooth becoming slightly fluffy subsquamulose on drying. Lamellae adnate, whitish then pale watery pink with grey-brown tinge, anastomosing against pileus. Stipe up to 40 × 3 mm, cylindrical slightly broadened towards base, yellowish brown subconcolorous with pileus, slightly pruinose at apex, downwards smooth and polished. Smell and taste weakly mealy.

Spores 7–9.5 × 7–9 μm (average 8.7 × 7.7 μm), Q = 1.0–1.1–1.2, rounded 5–7-angled subisodiametrical in side-view. Basidia 4-spored, clamped. Lamellae edge fertile. Cystidia absent. Hymenophoral trama regular, made up of short inflated cells. Pileipellis an ixocutis of 2–9 μm wide cylindrical hyphae. Pigment rather pale, intracellular. Clamp-connections abundant in all tissues.

Habitat. — Among mosses and *Carex* in low *Salix glauca* scrub.

Collections examined. — SW: Pâmiut, Kvaneöen, 12 Sept. 1981, TB 81.260.

This pale form fits in my concept of *Entoloma polatum* forma *pernitrosum* from the lowlands of northwestern Europe.

15. *Entoloma engadinum* (Horak) Noordel. — Fig. 17

*Entoloma engadinum* (Horak) Noordel. in Int. J. Mycol. Lich. 1: 51. 1982. — *Rhodophyllus engadinus* Horak in Z. Pilzk. 28: 17. 1962.

*Rhodophyllus subflexipes* Kühn. in Bull. trimest. Soc. mycol. Fr. 93: 453. 1977. — *Entoloma subflexipes* (Kühn.) Noordel. in Persoonia 11: 233. 1981.

Pileus 10–20 mm broad, convex with depressed centre, with undulating marginal zone, hygrophanous, translucently striate at margin, 'cigarbrown', paler at margin. Lamellae, L about 20, l = 3–5, decurrent, sordid white then greyish white with pinkish tinge. Stipe up to 30 × 1–2 mm, cylindrical, pale to pale grey-brown, silky shining, faintly striate. Flesh firm. Smell and taste farinaceous.

Spores 8.1–9.9 × (6.8)7.2–8.1 μm (average 8.9 × 7.5 μm), Q = 1.05–1.2–1.4, subisodiametrical to ellipsoid 6–8-angled in sideview. Basidia 32–45 × 9–12.5 μm, 4-spored. Lamella edge fertile. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 70–140 × 12–16 μm. Pileipellis an ixocutis of cylindrical hyphae, 2–7 μm wide. Pigment brown, intracellular in pileipellis and upper pileitrama. Pileitrama regular, made up of inflated cells, 60–170 × 10–27 μm. Clamp-connections numerous in all tissues.

Habitat & distribution.—On moist soil among mosses. Also known from the Alps.

Collections examined.—SW: Pamiut, Kvaneöen, 8 Sept. 1982, TB 82.137.

The collection described above differs from *Entoloma politum* in having slightly more ellipsoid spores, and therefore I named it *Entoloma engadinum*. *Entoloma anthracinum* differs in having much darker lamellae and slightly larger, more isodiametrical spores. However, more observations in alpine and subarctic habitats, and careful observations on macroscopical characters are needed to establish the differences between those species.

## 16. *Entoloma anthracinum* (Favre) Noordel. — Fig. 18

*Rhodophyllus anthracinum* Favre, Champ. supér. Zone alp.: 200. 1955. — *Entoloma anthracinum* (Favre) Noordel. in Persoonia 11: 288. 1981.

Greenland record. — Lamoure & al. (1982: 89).

Pileus 17–28 mm broad, hemispherical then convex, sometimes with weak blunt umbo, sometimes with slightly depressed centre, with enrolled margin when young, hygrophanous, when moist dark brown to almost black ('date-brown', 'earth-brown'), margin often slightly paler (towards 'snuffbrown'), translucently striate, up to half the radius, pallescent on drying to 'milky-coffee' or 'clay-buff', silky shining, smooth or radially rimose in some specimens. Lamellae, L = 20, l = 3–5, adnate to emarginate, segmentiform to ventricose, sordid white then brownish or greyish pink with entire, concolorous edge (Muns. 10 YR 7/2, 6/2, 6/3, 8/1, 7/1). Stipe 30–40 × 1–4 mm, cylindrical slightly tapering towards base paler and more yellowish than pileus (10 YR 5/3), 6/4; base 7/2), smooth or with some scattered innate fibrils, shining. Flesh concolorous in cortex, inner parts whitish, rather tough. Smell nasty-farinaceous with unpleasant component. Taste bitter and farinaceous.

Spores (8.7–)9.0–11.7 × 7.7–9.5 μm (averages 9.6–10.2 × 7.8–8.5 μm), Q = 1.1–1.2–1.3, about 6-angled in side-view. Basidia 4(rarely 2)-spored, clamped. Lamella edge fertile. Cystidia absent. Hymenophoral trama regular, made up of rather strongly inflated cells, 20–80 × 11–27 μm. Pileipellis a narrow (ixo-)cutis of slightly gelatinized, 2.5–8 μm wide cylindrical hyphae. Pigment brown, intracellular in pileipellis and upper pileitrama, and also in hymenophoral trama. Clamp-connections abundant in all tissues.

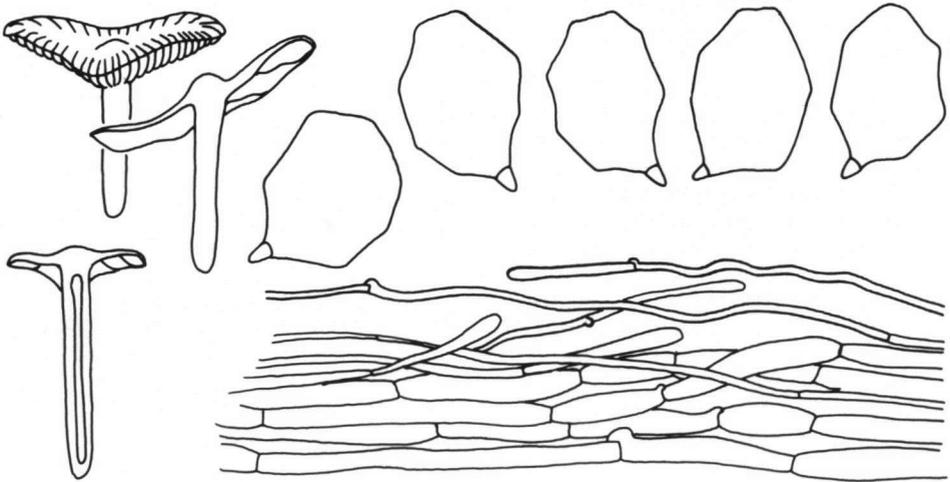


Fig. 18. *Entoloma anthracinum*. — Habit, spores, and pileipellis. (All figs. from TB 81.195.)

**Habitat.**—Among mosses and herbs (*Carex*, *Empetrum*, *Polygonum viviparum*) near *Salix herbacea*.

**Collection examined.**—SW: Pâmiut, 19 Aug. 1981, TB 81.166, 27 Aug. 1981, TB 81.195; Kvaneføen, 13 Sept. 1978, TB 78.160.

The collections described above agree with *Entoloma anthracinum* as described from the Alps and Scandinavia by Kühner (1977) in the dark coloured obscurely striate pileus and large spores. All Greenland records differ, however, in having a pronounced farinaceous-rancid smell and taste. According to Kühner the collections from the Alps studied by him were odourless and tasteless, except for a slight farinaceous after-taste. The Scandinavian records had a slight mealy smell and taste. For the time being I do not attach taxonomic value to these differences, awaiting more evidence.

#### SUBGENUS TRICHOPILUS

#### 17. *Entoloma fuscotomentosum* F. H. Moell.—Fig. 19

*Entoloma fuscotomentosum* F. H. Moeller, Fung. Faerøes 1: 251. 1945.

Pileus 20–50 mm broad, conical at first with enrolled margin then expanding to conico-convex, finally flattened with small papilla, slightly hygrophanous, not striate, dark grey-brown to sepia, strongly radially fibrillose-tomentose to minutely squamulose with dark squamules on (slightly) paler background, slightly pallescent on drying, shining. Lamellae, L = up to 40, l = up to 9, rather crowded, narrowly adnate to deeply emarginate, ventricose, when young fairly dark grey-brown then grey-pink or brown-pink with a whitish fimbriate-dentate edge. Stipe 30–50 × 2.5–4 mm, cylindrical, grey-brown, paler than pileus, apex sometimes pruinose, fibrillose-silvery striate all over, apex

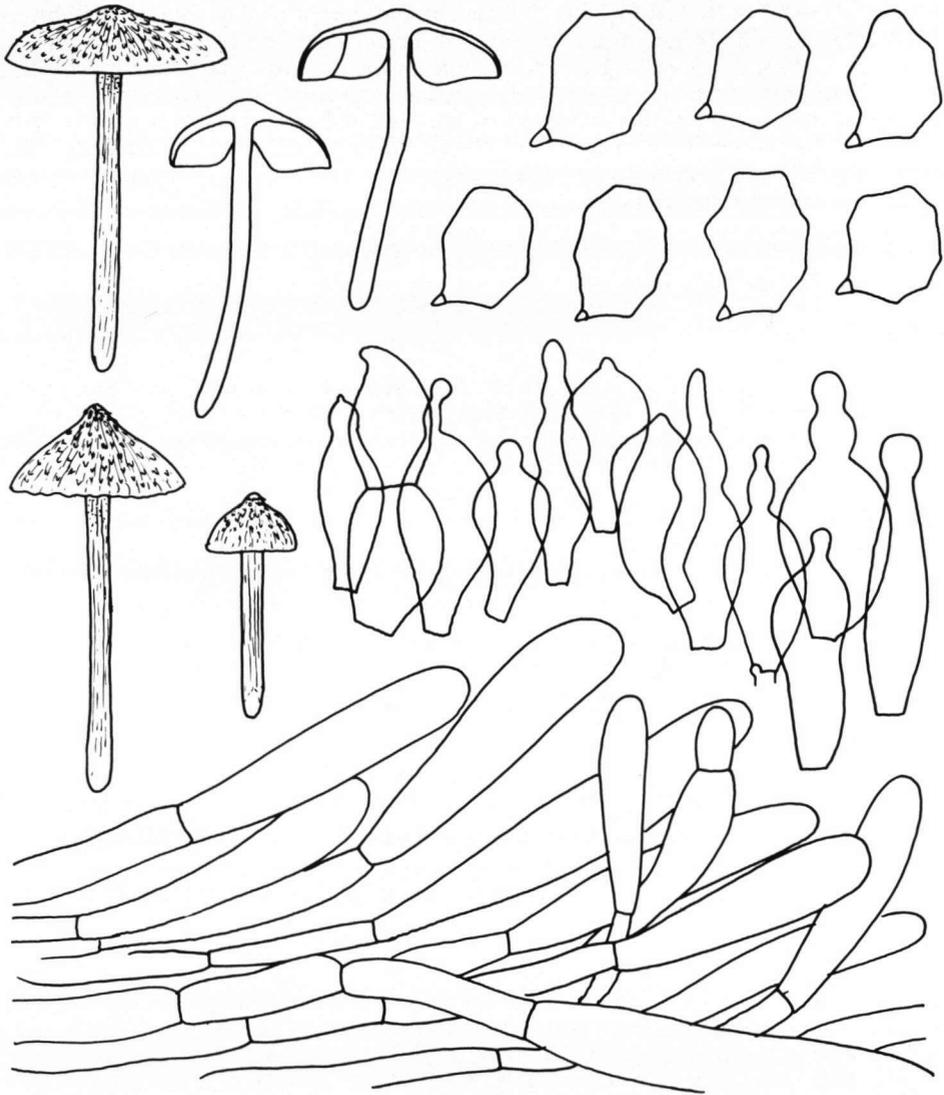


Fig. 19. *Entoloma fuscotomentosum*. — Habit, spores, cheilocystidia, and pileipellis. (Habit from TB 82.114 or TB 81.183 (\*), spores from TB 81.183, cheilocystidia from TB 81.168, pileipellis from holotype.)

sometimes pruinose, fibrillose-silvery striate all over, base white tomentose. Flesh thin, concolorous with surface or paler, especially when dry. Smell and taste fairly strongly raphanoid and slightly nasty.

Spores (7.2–)7.6–9.9(–10.8) × (5.8–)6.2–7.3(–8.1)  $\mu\text{m}$  (averages 8.2–9.6 × 6.2–7.3  $\mu\text{m}$ ), Q = 1.2–1.3–1.4(–1.5), 6–9-angled in side-view, probably with dihedral base. Basidia 25–52 × 8–14  $\mu\text{m}$ , 4-spored, clamped. Lamella edge heteromorphous. Cheilocystidia 25–75 × 7–15 × 3–11.7  $\mu\text{m}$ , versiform, vesiculose to clavate with mucronate tip to lecithiform or tibiiform, generally capitate, numerous but mixed with basidia. Hymenophoral trama regular, made up of long inflated cells. Pileipellis a cutis with transitions to a trichoderm, made up of clavate-fusiform cells up to 30  $\mu\text{m}$  wide. Pigment intracellular in pileipellis and upper pileitrama. Clamp-connections numerous in hymenium and covering layers.

**Habitat & distribution.**—Among mosses and grasses (sometimes in *Sphagnum*), frequently near *Salix* species (*S. herbacea*, *S. glauca*, *S. arctophila*) or *Empetrum* and herbs (*Polygonum viviparum*, *Carex* div. spec., *Festuca vivipara*). Wide-spread in (sub)arctic habitats. Known to occur on Greenland, The Faeröes, Spitzbergen, Lapland. Common.

**Collections examined.**—FAERO ISLANDS: Stromö, on mountain slope N. of Saxen, near Magnussens farm, 20 July 1938, *F. C. J. Moeller* (holotype, C); Nolsö, 5 Sept. 1939, *N. Petersen*. —GREENLAND: CW: Kangerdlugssuaq (S. Strömfjord), Hassels Fjeld, 6 Aug. 1946, *ML 235*; Pamiut-area, 25 Aug. 1979, *TB 79.99* (Eqaluit); 23 Aug. 1980, *TB 80.64* (Tassiussanguaq); 24 Aug. 1981, *TB 80.93*; 21 Aug. 1981, *TB 81.168*; 22 Aug. 1981, *TB 81.183*; 5 Sept. 1981, *TB 81.232*; 31 Aug. 1982, *TB 82.114*; S: Qingua Valley at Tasersuaq Lake, Aug. 1983, *HK c.s. 348*.

*Entoloma fuscotomentosum* is easily recognized by its dark brown, fibrillose-tomentose to squamulose pileus and the capitate cheilocystidia. It comes very close to *E. jubatum*, and may appear to be only a (sub-)arctic variant of it. It is one of the common species of *Entoloma* in (sub-)arctic habitats, and I have also examined collections from Greenland, Spitzbergen, and Lapland.

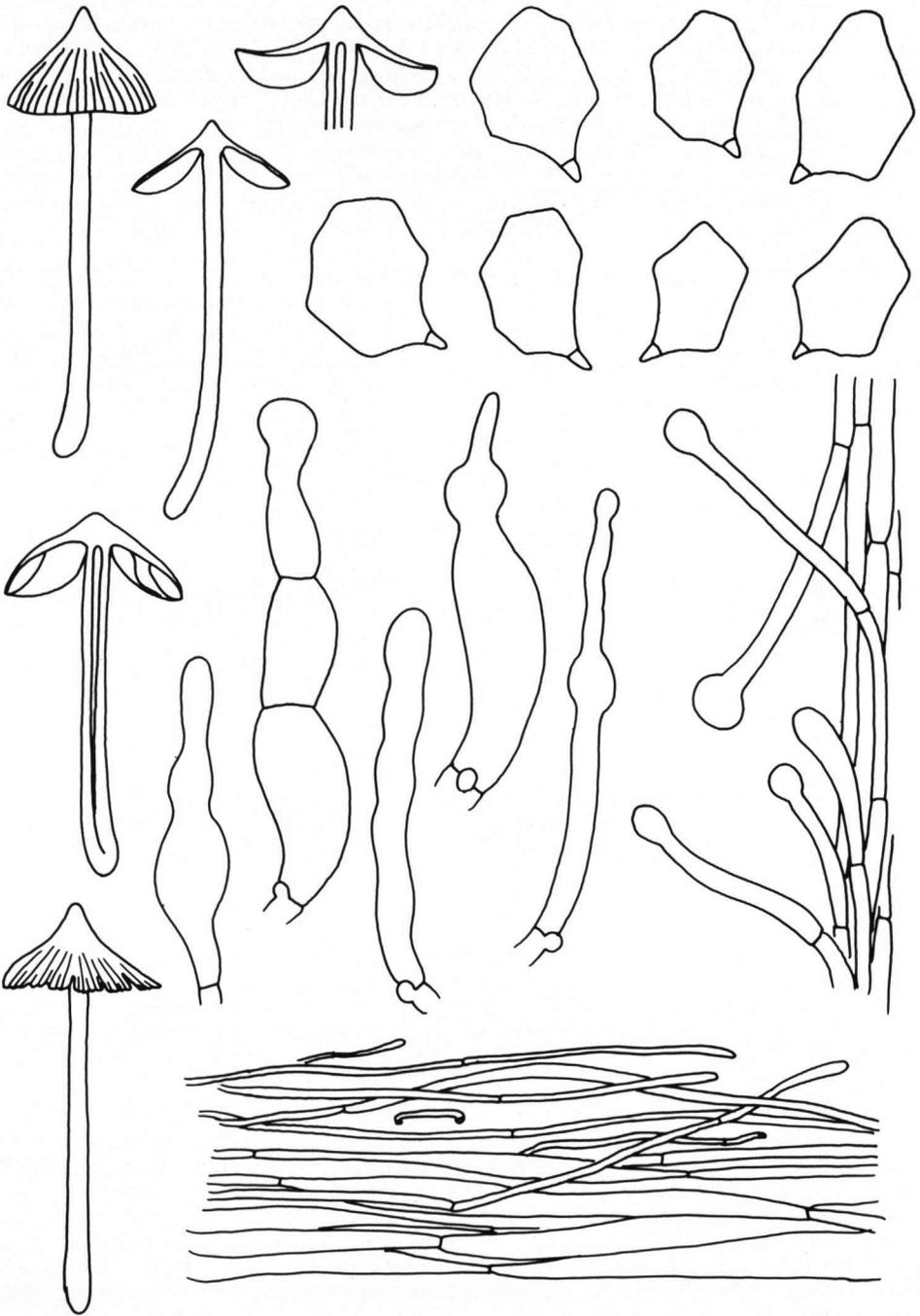
#### SUBGENUS NOLANEA

### 18. *Entoloma langei* Noordel. & Borgen, *spec. nov.* — Fig. 20

**Misapplied name.**—*Rhodophyllus nitens* sensu M. Lange in Meddr Grönland 148, 2: 43. 1957.

Pileus 10–30 mm latus, conicus demum expansus, papillatus, hygrophanus, translucido-striatus, sordide griseo-brunneus, valde expallens; lamellae moderate distantes, liberae vel adnae, albae demum brunneo-incarnatae; stipes 40–60 × 2–3(–4) mm, pileo concolor vel griseus, glaber, apice pruinosis; odore saporeque nullis; sporae 8.5–11.7 × 6.8–9.0  $\mu\text{m}$ ; basidia tetrasporigera, fibulata; cheilocystidia sparsa, valde protuberans, 45–80 × 4.5–11  $\mu\text{m}$ ; pileipellis cutis hyphis cylindraceis, 2.5–7  $\mu\text{m}$  latis pigmentis intracellulosis; caulocystidia numerosa ad apicem stipitis, cylindrico-strangulata vel capitata. Habitat inter muscos vel in graminosis in locis (sub-)arcticis. — Holotypus: *T. Borgen 79.73*, 9-VIII-1979, 'Pamiut', Greenland (C; isotypus in L).

**Fig. 20.** *Entoloma langei*. — Habit, spores, cheilocystidia, pileipellis, and stipitepellis. (Habit from *TB 79.69*, spores from *TB 78.183*, cheilocystidia from *ML 119*, pileipellis from *TB 79.69*, stipitepellis from *TB 79.73*.)



Pileus 10–30 mm broad, conical then slightly expanding, usually with small papilla and straight margin, hygrophanous, when moist deeply striate up to centre, sordid grey-brown, or 'cigarbrown', strongly pallescent to pale grey-brown or almost white on drying, strongly silky shining, smooth. Lamellae moderately distant, almost free to narrowly adnate, ventriclose, pale then pink finally brownish pink with entire, concolorous or slightly paler edge. Stipe 40–60 × 2–3(–4) mm, cylindrical sometimes slightly broadened towards base, concolorous with or slightly more grey than pileus, hairy at apex, downwards smooth, base white tomentose. Flesh thin, firm, pallid. Smell and taste none.

Spores 8.5–11.7 × 6.8–9.0  $\mu\text{m}$  (averages 9.7–9.9 × 7.4–8.0  $\mu\text{m}$ ), Q = 1.15–1.3–1.35(–1.4) in 4-spored form, 9.9–12.6 × 7.2–9.0  $\mu\text{m}$  (average 11 × 8.2  $\mu\text{m}$ ), Q = 1.2–1.35–1.5 in mixed 2- and 4-spored form (*M. Lange 119*), 5–9(–11)-angled in side-view with indistinct dihedral base. Basidia 2- and 4-spored with clamp. Cheilocystidia 45–80 × 4.5–11  $\mu\text{m}$ , versiform, cylindrical, strangulate to slenderly lageniform, sometimes (sub-)capitate, scattered among basidia but very easy to find, as they protrude strongly from hymenium. Hymenophoral trama regular, made up of long, cylindrical to inflated cells, 180–450 × 5–27  $\mu\text{m}$ . Pileipellis a dry cutis of 2.5–7  $\mu\text{m}$  wide, cylindrical hyphae. Pileitrama regular, made up in same way as hymenophoral trama. Stipitepellis at apex of stipe with numerous caulocystidia, 25–70 × 6–20  $\mu\text{m}$ , cylindrical strangulate often (sub-)capitate. Clamp-connections present in hymenium.

*Habitat*.—In moist heath in deep moss (Søndre Strømfjord), and among mosses and grasses, dwarf-*Salix* and herbs (*Stellaria*, *Polygonum*).

*Collections examined*.—CW: Kangerdlugssuaq (S. Strømfjord), 29 July 1946, *ML 119*; Idem near Ravneklippen, 8 Aug. 1946, *ML 263*; SW: Pâmiut, 9 Aug. 1979, *TB 79.69 & 79.73* (holotype); 11 Aug. 1979, *TB 79.80*; 21 Aug. 1981, *TB 81.176*; 27 July 1981, *TB 81.64 & 81.65*; S: Narsarsuaq, 22 July 1981, *TB 81.35*; idem 19 July 1983, *HK c.s. 287*; Rosenvinges plantation, 28 Aug. 1983, *HK. c.s. 584*.

The distinctive features of *Entoloma langei* are its conspicuous cheilocystidia and caulocystidia. The type of pileipellis and pigmentation place it in section *Endochromonema*, close to *E. velenovskyi*, but also with some resemblance to *E. cuneatum* and allied species, which have similar caulocystidia, but lack cheilocystidia and have differently shaped spores. *Entoloma langei* is the most common *Nolanea* of Greenland, especially in the subarctic zone.

We name this striking species in honour of Prof Dr. Morten Lange, who pioneered in macromycetology of Greenland, and who greatly stimulated the study of macromycetes in subarctic and arctic environments.

### 19. *Entoloma pusillum* Noordel. *spec. nov.* — Fig. 21

Basidiomata parva; pileus 3–5.5 mm latus, convexus margine lobatus, olivaceo-brunneus, translucido-striatus, radialiter fibrosus; lamellae distantes late adnatae, pallidae; stipes 7–13 × 0.5 mm, pileo concolor, hyalinus; sporae 7.7–10.8 × 7.2–9.0  $\mu\text{m}$ ; basidia tetrasporigera; cystidia nulla; pileipellis cutis pigmentis intracellulosis; fibulae presentes. Habitat ad foliis putridis Eriophoris angustifoliae. — Holotypus: *T. Laessøe & S. Elborne*, 14-VIII-1981, 'Narsaaq, Greenland' (C).

Basidiocarps minute. Pileus 3–5.5 mm broad convex with lobed margin, dark olivaceous brown, deeply translucently striate. Lamellae distant broadly adnate to subdecurrent whitish. Stipe 7–13 × 0.5 mm, cylindrical with bulbous base, concolorous with pileus hyaline, smooth.

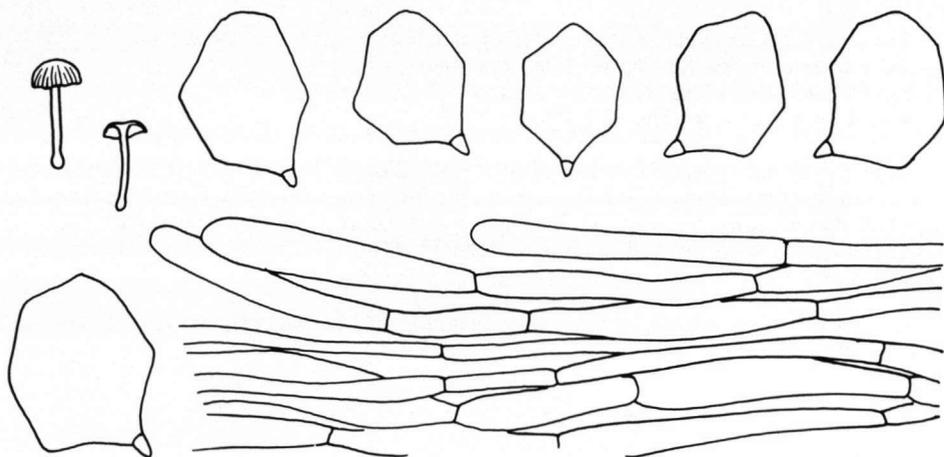


Fig. 21. *Entoloma pusillum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

Spores  $7.7\text{--}10.8 \times 7.2\text{--}9.9 \mu\text{m}$  (averages  $9.2 \times 7.8 \mu\text{m}$ ),  $Q = 1.05\text{--}1.15\text{--}1.25$ , 5-7-angled in side-view with dihedral base. Basidia  $31\text{--}45 \times 8.2\text{--}11 \mu\text{m}$ , 4-spored with clamp. Cystidia none. Hymenophoral trama made up of long, inflated cells up to  $340 \times 17 \mu\text{m}$ . Pileipellis a thin cutis of  $5\text{--}12 \mu\text{m}$  wide, cylindrical hyphae. Pigment brown, intracellular in pileipellis. Clamp-connections present.

*Habitat*. — On rotten leaves of *Eriophorum angustifolium* in *Sphagnum*.

*Collection examined*. — S: Narssaq, 14 Aug. 1981, T. Laessøe & Elborne (holotype, C).

*Entoloma pusillum* belongs to section *Endochromonema*, close to *E. calthionis* and *E. ventricosum*. It differs from both in the colour of the carpophore, tiny habit, and habitat. Besides the spores are rather small and broadly ellipsoid in outline.

## 20. *Entoloma cetratum* (Fr.) Moser. — Fig. 22

*Entoloma cetratum* (Fr.) Moser in Gams, *Kl. Krypt.-Fl.* 4. Aufl., 2(b/2): 206. 1978.

For full synonymy and description see Noordeloos (1980: 496-497).

Greenland record. — M. Lange (1957: 42).

Spores  $8.5\text{--}13.5 \times 7.2\text{--}9.9 \mu\text{m}$  (average  $11 \times 8 \mu\text{m}$ ),  $Q = 1.2\text{--}1.35\text{--}1.5$ ; basidia 2-spored, clampless. Cystidia absent. Pigment in pileipellis intracellular.

*Collection examined*. — CW: Kangerdlugssuaq (S. Strømfjord), 10 Aug. 1946, *ML 276* 'In deep moss in slope'.

The material is very scanty as the only carpophore left is entirely fragmented. The microscopic data, however, leave no doubt that *Entoloma cetratum* is involved. It seems to be rare in Greenland, whereas it grows abundantly in palsa-bogs in Northern Europe.

### 21. *Entoloma juncinum* (Kühn. & Romagn.) Noordel. — Fig. 26

*Entoloma juncinum* (Kühn. & Romagn.) Noordel. in *Persoonia* 10: 255. 1979.

For full synonymy see Noordeloos (1980: 464–466).

Description. — Noordeloos (1980, l.c.; 1981b).

Greenland record. — M. Lange (1957: 43).

Spores  $7.2\text{--}8.6 \times 6.3\text{--}8.1 \mu\text{m}$  (average  $7.8 \times 7.2 \mu\text{m}$ ),  $Q = 1.0\text{--}1.1\text{--}1.2$ , isodiametrical 5–7-angled in side-view. Basidia 4-spored, no intact basidia found. Cystidia not found. Hymenophoral trama made up of long cells (nolaneoid). Pileipellis a cutis with coarsely encrusted walls; subpellis well-developed, cells  $22\text{--}80 \times 17\text{--}25 \mu\text{m}$ , inflated. Clamp-connections present in hymenium.

Collection examined. — CW: Kangerdlugssuaq (S. Strømfjord), 31 July (label) Aug. (publ.) 1946, *ML*.

### 22. *Entoloma sericeonitens* (P. D. Orton) Noordel. — Fig. 23

*Entoloma sericeonitens* (P. D. Orton) Noordel. in *Persoonia* 10: 459. 1980. — *Nolanea sericeonitens* P. D. Orton in *Trans. Br. mycol. Soc.* 43: 333. 1960.

Pileus up to 22 mm broad, conical to hemispherical, always distinctly papillate, only slightly expanding with age, hygrophanous, when moist translucently striate up to centre, sepia, striae 'date-brown', paler at margin and between striae, pallescent on drying to greyish, smooth. dry. Lamellae,  $L = 22$ ,  $l = 1\text{--}3$ , free, ventricose, at bottom interveined, white or with slight grey tinge when young then pink with entire, concolorous edge. Stipe  $25\text{--}50 \times 2\text{--}3$  mm, cylindrical, paler than pileus ('drab' or more like 'clay-buff'), when young more or less downy all over soon glabrescent and faintly striate or smooth. Flesh membranaceous. Smell and taste none.

Spores  $(8\text{--})8.7\text{--}10.8 \times 6.8\text{--}8 \mu\text{m}$ , (average  $10 \times 7.2 \mu\text{m}$ ),  $Q = 1.2\text{--}1.3\text{--}1.35$ , 5–6-angled in side-view. Basidia 4-spored, clamped. Cystidia none. Hymenophoral trama and pileitrarna regular made up of long cells (nolaneoid). Pileipellis a dry cutis of  $2\text{--}7 \mu\text{m}$  wide cylindrical hyphae with minutely encrusted walls and very pale intracellular pigment. Clamp-connections seen in hymenium, elsewhere rare.

Habitat. — In moist place among mosses one collection (*HK c.s. 340*) near *Betula pubescens*.

Collections examined. — SW: Pâmiut, Raadne Fjeld, 30 Aug. 1978, *TB 78.101*; S: Qinnua Valley at Tasersuaq Lake, 9–14 Aug. 1983, *HK c.s. 340*.

The collections described above clearly belong to sect. *Papillata* on account of their habit, structure of trama, and type of pigmentation. Within the section they key out close to *Entoloma sericeonitens*, from which they slightly deviate in colour and spore-size. More collections from Greenland and Europe are needed to explain and value these differences.

### 23. *Entoloma vernum* Lund.

*Entoloma vernum* Lund. in *Svensk bot. Tidskr.* 31: 193. 1937.

For full synonymy see Noordeloos (1980: 476).

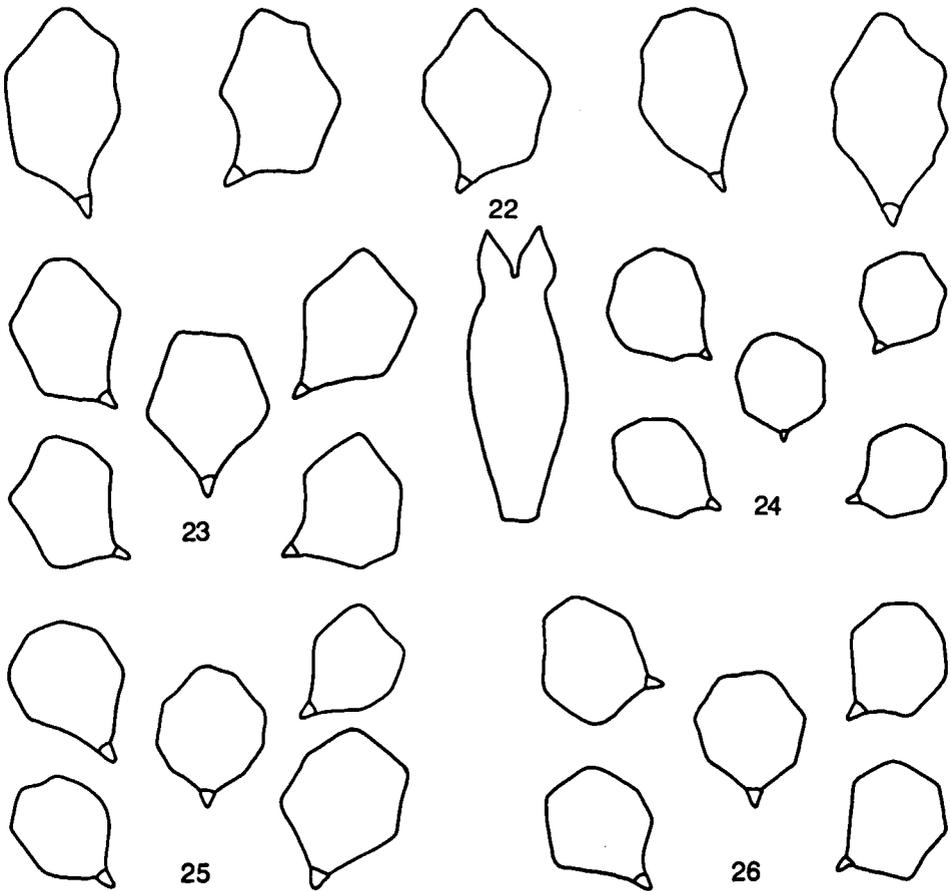


Fig. 22. *Entoloma cetratum*. — Spores and basidium. (All figs. from *ML* 276.)

Fig. 23. *Entoloma sericeonitens*. — Spores (from *TB* 78.101).

Fig. 24. *Entoloma cancrinellum*. — Spores (from holotype).

Fig. 25. *Entoloma sericeum*. — Spores (from *HK* c.s. 630).

Fig. 26. *Entoloma juncinum*. — Spores (*ML*, 31 July 1946).

Pileus blackish brown, hygrophanous, on drying shining and slightly paler. Stipe pale greyish. Smell and taste farinaceous.

Spores  $8-10.8 \times 6.4-8 \mu\text{m}$  (average  $8.6 \times 6.9 \mu\text{m}$ ),  $Q = 1.1-1.25-1.4$  Basidia 4-spored, clamped. Cystidia none. Hymenophoral trama and pileitrama made up of long, inflated cells (nolaneoid). Pileipellis a cutis of narrow cylindrical hyphae with minutely encrusted walls. Clamp-connections present in hymenium.

Habitat.— On moist soil with *Salix glauca* and *Betula pubescens*.

Collection examined.— S: Narsarsuaq, 22 July 1981, *TB* 81.38.

The few macroscopic notes and the microscopy of this collection suggest *Entoloma vernum*, at least the form described by Favre (1955) from the Alps as '*Rhodophyllus cucullatus*'. Also recorded from Greenland by Watling (pers. comm.).

#### 24. *Entoloma sericeum* (Bull.) Quél. — Fig. 25

*Entoloma sericeum* (Bull.) Quél. in Mém. Soc. Emul. Montbéliard, Sér. II, 5: 119. 1872.  
For full synonymy see Noordeloos (1980: 478).

Pileus planoconvex with small but distinct papilla, hygrophanous, striate at margin, dark grey-brown. Lamellae grey-brown. Stipe grey-brown, somewhat striate, whitish at base. Smell slightly rancid.

Spores  $7.2-8.1 \times 6.2-7.2 \mu\text{m}$  (average  $7.4 \times 6.8 \mu\text{m}$ ),  $Q = 1.0-1.1-1.2$ , isodiametrical, 5-6-angled in side-view. Basidia 4-spored, clamped. Pileipellis a cutis of 2-7  $\mu\text{m}$  wide cylindrical hyphae with encrusted pigment. Clamps seen in hymenium only.

Habitat. — In short grass with *Hygrophorus*.

Collection examined. — S: Rosenvinges plantation, 22 Aug. 1983, HK c.s. 630.

This rather poorly annotated collection is the only certain record of *Entoloma sericeum* from Greenland. All other collections studied by me, labelled as *sericeum*, appeared to be one of the dwarfish species of section *Rhodopolia*.

#### 25. *Entoloma papillatum* (Bres.) Dennis. — Fig. 27

*Entoloma papillatum* (Bres.) Dennis in Bull. trimest. Soc. mycol. Fr. 69: 162. 1953.  
For full synonymy see Noordeloos (1980: 454).

Pileus 10-21 mm broad, conical or hemispherical then expanding with small but rather sharply delimited conical papilla, hygrophanous, dark reddish brown (Meth. 9F4), hardly striate, slightly pallescent on drying. Lamellae emarginate, whitish then brown-pink. Stipe 25-40  $\times$  1 mm, cylindrical, concolorous with pileus, weakly striate lengthwise, apex pruinose, base white tomentose. Flesh whitish-pale brown. Smell and taste none.

Spores  $9-12.6 \times 7.3-9.0 \mu\text{m}$  (averages  $10.0-11.5 \times 7.8-8.3 \mu\text{m}$ ),  $Q = 1.3-1.4$ , 6-8-angled in side-view. Basidia 4-spored, clamped. Lamella edge fertile. Cystidia none. Hymenophoral trama made up of long, inflated cells. Pileipellis a dry cutis of narrow cylindrical hyphae 2-5  $\mu\text{m}$  wide. Pileitrama rather compact, regular, made up of long, inflated cells, interspersed with narrow cylindrical connective hyphae. Pigment coarsely encrusting the hyphae of pileipellis and pileitrama. Clamp-connections seen in hymenium.

Habitat. — Among grasses and lichens.

Collections examined. — SW: Pâmiut, 9 Aug. 1979, TB 79.72; S: Narsarsuaq, 28 Aug. 1983, HK c.s. 138; Rosenvinges plantation, 29 Aug. 1983, HK c.s. 165 & 174.

*Entoloma papillatum* is a common species in boreal, subalpine and subarctic areas. The Greenland collections belong to a rather dark coloured form of *Entoloma papillatum*, which comes close to *Entoloma clandestinum*, also with regard to the lack of a farinaceous smell and taste. *Entoloma clandestinum*, however, differs in having smaller spores.

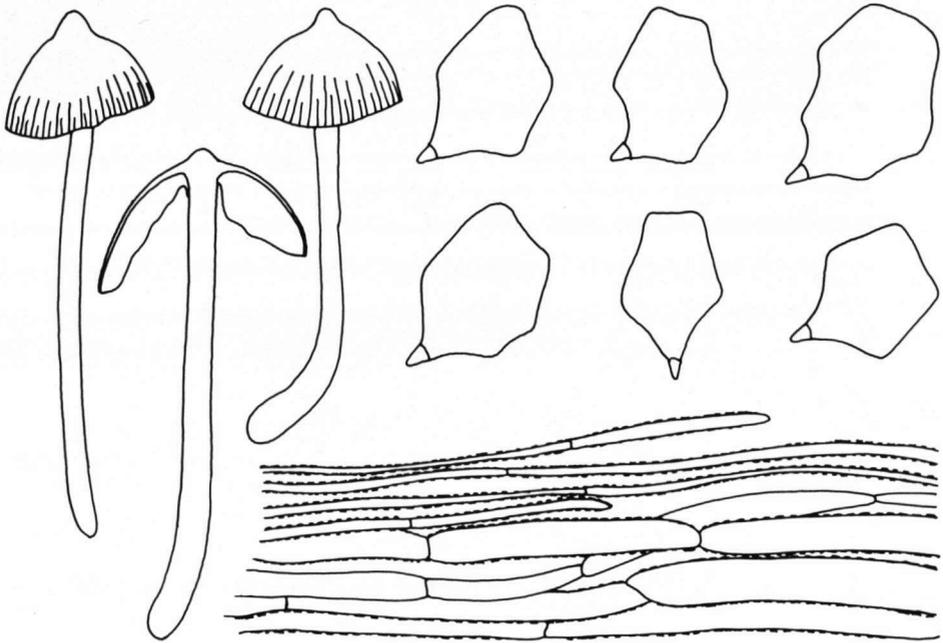


Fig. 27. *Entoloma papillatum*. — Habit, spores, and pileipellis. (All figs. from *HK c.s. 138.*)

#### SUBGENUS CLAUDOPUS

#### 26. *Entoloma cancrinellum* (M. Lange) Noordel., *comb. nov.* — Fig. 24

*Rhodophyllus cancrinellus* M. Lange in *Meddr Grønland* 149 (2): 42. 1957 (basionym). — *Rhodocybe cancrinella* (M. Lange) Horak in *Sydowia* 31: 77. ('1978') 1979.

Pileus 10 mm broad, distinctly infundibuliform, slightly fibrillose, white with a flush of cream-colour, edge somewhat incurved. Lamellae rather deeply decurrent, pinkish. Stipe 25 × 2 mm, minutely fibrillose.

Spores 6.1–7.7(–8.4) × (4–)5.2–6.5 μm, subglobose-isodiametrical in outline with 6–8-angles, very thin-walled. Basidia 22–35 × 6.5–9.5 μm, clampless. Lamella edge fertile. Cystidia none. Pileipellis a thin cutis of 2–6.5 μm wide cylindrical to slightly inflated hyphae. Pigment minutely encrusting the hyphae of pileipellis. Clamps not found.

*Habitat*. — On needles of *Juniperus*. Only known from the type-locality.

*Collection examined*. — SW: Ivigtut, Nordlandet, 27 Sept. 1948, *M. Lange* 652 (holotype, C).

The holotype of *Entoloma cancrinellum* is in a poor state: the basidiocarps are entirely fragmented now. Nevertheless I was able to study the microscopical data described above. The spores are very thin-walled and very weakly angular, similar to the spores found in subgenus *Entoloma* section *Turfosa*. Of course they are cyanophilic, as are the

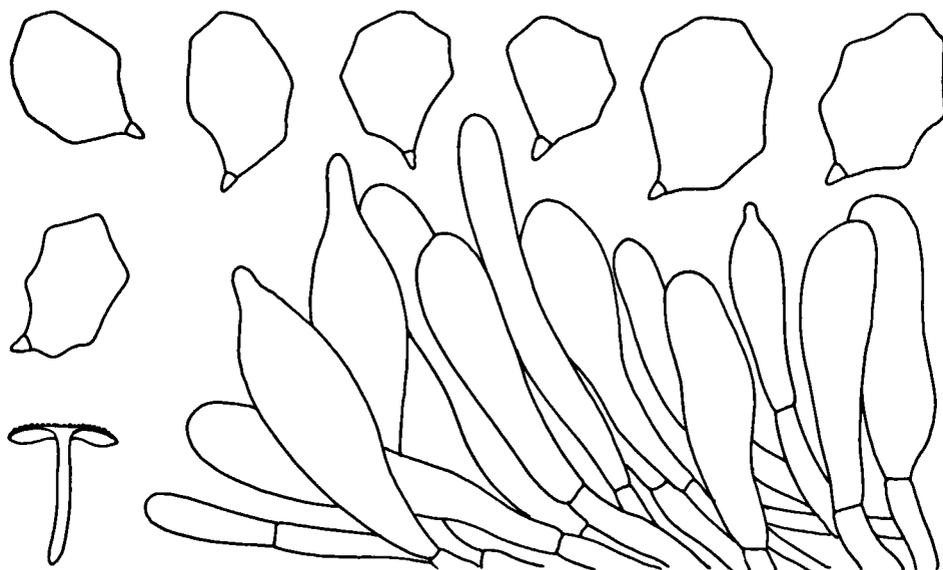


Fig. 28. *Entoloma* spec., aff. *chalybaeum*. — Habit, spores, and pileipellis. (All figs. from HK c.s. 290.)

basidiospores in all species of *Entoloma*, but here this is more obvious because of the thin spore-walls. Congo red revealed that the walls consist of thin, but unmistakable ridges, typical for the genus *Entoloma*. Therefore I disagree with Horak (1979), who places *Rhodophyllus cancrinellus* in the genus *Rhodocybe*. I prefer to keep it in the genus *Entoloma*, because of the great similarity of the spores with those of *Entoloma* sect. *Turfosa*. *Entoloma cancrinellum*, however, takes a rather isolated position in the genus *Entoloma* on account of its omphalinoid habit and encrusted pigments. Therefore I place *E. cancrinellum* in the subgenus *Claudopus*, but so far there are no strong affinities with the other species known from that subgenus.

The type of spores found in *Entoloma cancrinellum* and in the species of section *Turfosa* possibly represent a primitive stage because of their resemblance with immature spores of other species of *Entoloma*. However, Pegler & Young (1979) consider cuboid spores the most primitive type of spores in *Entoloma* sl., and adhere the opinion that the type of spores found in sect. *Turfosa* represent a rather specialised type. Both opinions are difficult to prove, but considering the other primitive characters of sect. *Turfosa*, like the collybioid habit, the abundance of clamp-connections, the simple structure of the pileipellis, and the presence of intracellular pigment, I incline to the opinion that the spore configuration in *E. cancrinellum* is primitive as well. On the contrary, the subgenus *Inocephalus*, widely distributed in tropical areas, includes a large number of species which combined the presence of cuboid spores with 'derived' characters like a complicated pileipellis structure and well-differentiated cheilocystidia. In my opinion this suggests that cuboid spores should also be considered a derived character.

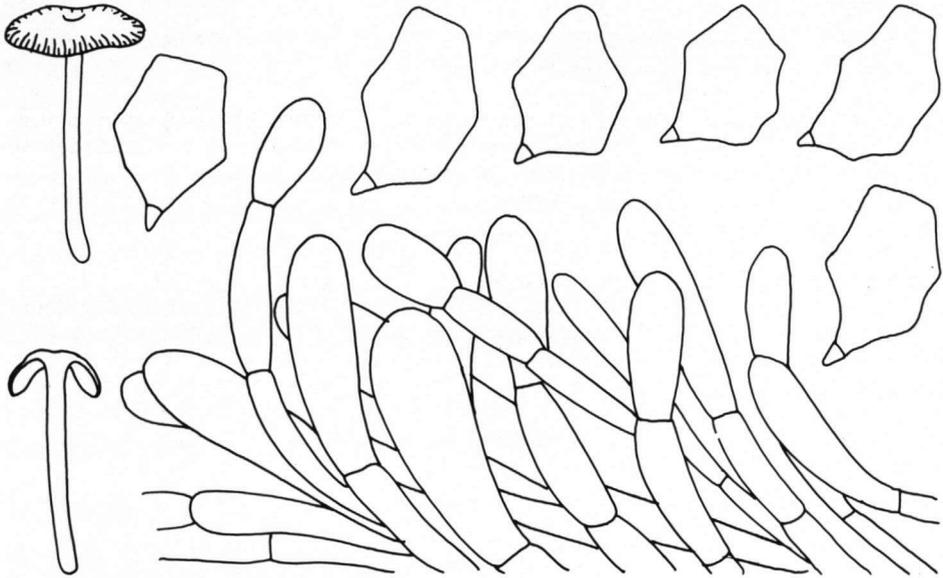


Fig. 29. *Entoloma sarcitulum*. — Habits, spores, and pileipellis. (All figs. from HK c.s. 577.)

#### SUBGENUS LEPTONIA

#### 27. *Entoloma* spec. (aff. *chalybaeum*). — Fig. 28

Pileus about 10 mm broad, plano-convex with slightly depressed centre, not hygrophanous, not striate, blackish-blue, finely squamulose all over, the densest in the centre. Lamellae adnate-emarginate, ventricose, grey-blue, slightly paler than pileus. Stipe 15 × 1 mm, cylindrical, slightly broadened at base, blackish-blue, slightly paler than pileus.

Spores 9–11.7 × 6.9–8.1  $\mu\text{m}$  (average 10.8 × 7.6  $\mu\text{m}$ ),  $Q = 1.25\text{--}1.35\text{--}1.5$ , 6–9-angled in side-view with dihedral base. Basidia 4-spored. Lamella edge fertile. Cystidia absent. Pileipellis a hymeniderm at centre, towards margin more like a trichoderm, made up of rather large, cystidioid terminal cells, 55–120 × 11–32  $\mu\text{m}$ . Pigment blue intracellular in pileipellis. Brilliant granules present in pileitrama. Clamp-connections absent.

*Habitat*.—On the ground among grasses on a S.-slope with *Juniperus* and *Betula*.

*Collection examined*.—S: Narsarsuaq, 19/20 Aug. 1983, HK c.s. 290.

The blue colour of pileus, lamellae, and stipe place this collection in the group of *Entoloma chalybaeum*. It differs however from typical *E. chalybaeum* in having a fertile lamella edge. *Leptonia chalybaea* in the sense of many authors, has a sterile lamella edge. Of the species described from northern America *Leptonia parva* Peck comes close, but this species is said to have white lamellae. The cystidioid cells of the pileipellis remind those of *Entoloma velutinum* Hesl., which also has white lamellae. For the time being I refrain from naming this collection until this difficult group is better delimited.

28. *Entoloma sarcitulum* (P. D. Orton) Arnolds. — Fig. 29

*Leptonia sarcitula* P. D. Orton in Trans Br. mycol. Soc. 43: 301. 1960. — *Entoloma sarcitulum* (P. D. Orton) Arnolds in Bibliothca mycol. 90: 348. 1983.

Pileus up to 15 mm broad, conico-convex to convex with slightly depressed centre, not distinctly hygrophanous, translucently striate at margin, dark grey-brown, paler at margin and between striae, central part with more or less uplifted squamules, towards margin almost smooth. Lamellae emarginate, ventricose, sordid pink with entire, concolorous or brown edge. Stipe up to 30 × 2 mm, yellowish grey, much paler than pileus, smooth.

Spores (8–)9.5–12.5 × 6–9 μm (average 11.3 × 7.2 μm), Q = 1.3–1.5–1.7, 5–6-angled in side-view with dihedral base. Basidia 4-spored, clampless. Lamella edge sterile with cylindrical to sublageniform cheilocystidia 20–55 × 5–12 × 2–6 μm with or without brown intracellular pigment. Pileipellis a trichoderm at the centre, towards the margin a transition between a cutis and a trichoderm, made up of inflated hyphae with clavate terminal cells, 8–17 μm wide. Pigment brown, intracellular in the pileipellis. Clamp-connections absent. Brilliant granules present in pileitrama.

Habitat. — In grasses.

Collection examined. — S: Qinngua Valley at Taserssuaq Lake, 12 Aug. 1983, *HK c.s. 442 & 443*; Rosenvinges plantation, 21 Aug. 1983, *HK c.s. 577*; Narsarsuaq, 19 Aug. 1983, *HK c.s. 486*.

*Entoloma sarcitulum* is well characterised by the dark grey-brown, translucently striate pileus which is squamulose in central part, the pale, smooth stipe, the size and shape of the spores, and the sterile, often coloured, lamella edge.

29. *Entoloma turci* (Bres.) Moser. — Fig. 30

*Leptonia turci* Bres., Fungi trident. 1: 47. 1864. — *Rhodophyllus turci* (Bres.) Kühn. & Romagn., Fl. anal. champ. super.: 205. 1953. — *Entoloma turci* (Bres.) Moser in Gams. Kl. Krypt.-Fl. 2 (b/2), 4. Aufl.: 200. 1978.

Pileus 8–20 mm broad, hemispherical to convex with depressed centre, sometimes with weak papilla within depression, with involute margin, not or weakly hygrophanous, not translucently striate, almost black at the centre, more like 'cigar-brown' or sepia-ceous brown towards margin, entirely woolly squamulose, the densest at the centre. Lamellae, L = about 30, l = 1–3, adnate-rounded adnate or slightly emarginate, segmentiform or ventricose, up to 6 mm broad, pale grey-brown then brown-pink ('milky-coffee') with grey-brown then dark brown, contrasting edge. Stipe 20–30 × 1–2 mm, cylindrical, pale grey-brown or yellow-brown, or 'snuffbrown', smooth and polished or with some scattered fibrils substrate, stuffed then narrowly fistulose. Flesh whitish except cortex of pileus, which is brownish, and a darker line above the attachment of the lamellae. Smell not particular. Taste slightly nitrous in one old specimen.

Spores 8–12.5 × 7–9 μm (averages 10.3–10.8 × 8–8.3 μm), Q = 1.1–1.25–1.4, 6–7-angled in side-view with dihedral base. Basidia 23–40 × 9–13 μm, 4-spored without clamp. Lamella edge sterile with cylindrico-clavate cheilocystidia 28–80 × 4.5–15 (–18) μm, with or without brown intracellular pigment. Pileipellis a trichoderm at the centre, towards the margin a transition between a trichoderm and a cutis, made up of

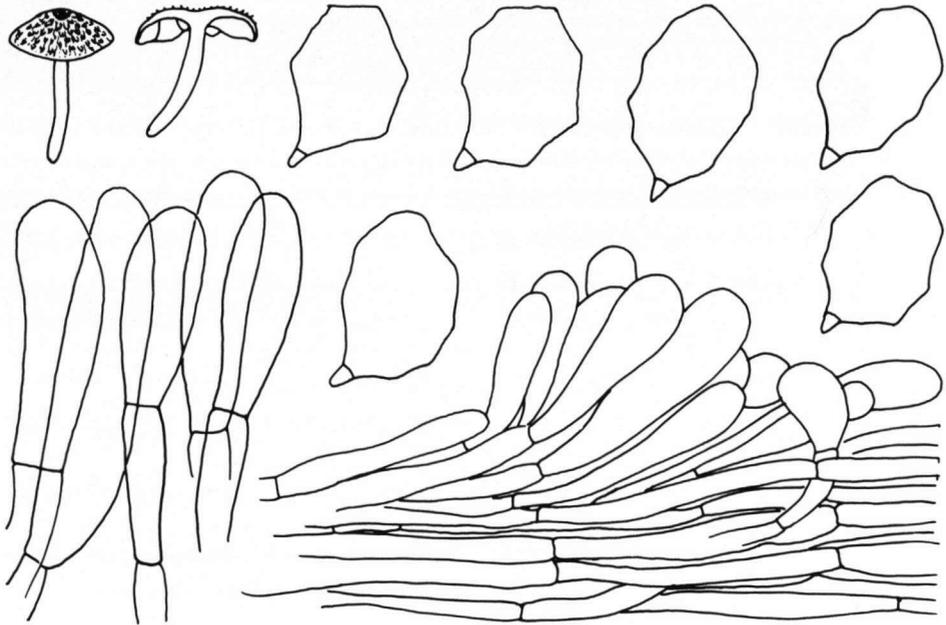


Fig. 30. *Entoloma turci*. — Habit, spores, cheilocystidia, and pileipellis. (All figs. from *TB 81.169*.)

clavate terminal cells  $35\text{--}72 \times 11\text{--}20 \mu\text{m}$ . Pigment intracellular in pileipellis and upper pileitrama. Brilliant granules present in the pileitrama, often very abundant. Clamp-connections absent.

*Habitat*.—On dry places among mosses and *Salix herbacea*.

*Collection examined*.—S: Narsarsuaq, 30 July 1983, *HK c.s. 44*; SW: Pâmiut, 21 Aug. 1981, *TB 81.169*.

The Greenland collections agree very well with the European ones studied thus far particularly in the dark coloured, not striate, entirely squamulose pileus, the dark lamellae, and the stipe. The Greenland collections have a dark brown lamella edge which is lacking in most European collections, but Favre (1955: 69) described a collection from the Alps with partly coloured lamella edge, caused by the intracellular pigment of the cheilocystidia. So far I see no reason to attach great taxonomic value to this feature.

### 30. *Entoloma serrulatum* (Pers.: Fr.) Hesl.

No material has been seen from Greenland, but a beautiful colour-slide made by J. Petersen in the summer of 1983 shows all features characteristic of this species, which is common in grassland and grassy vegetations in temperate, boreal, and subalpine re-

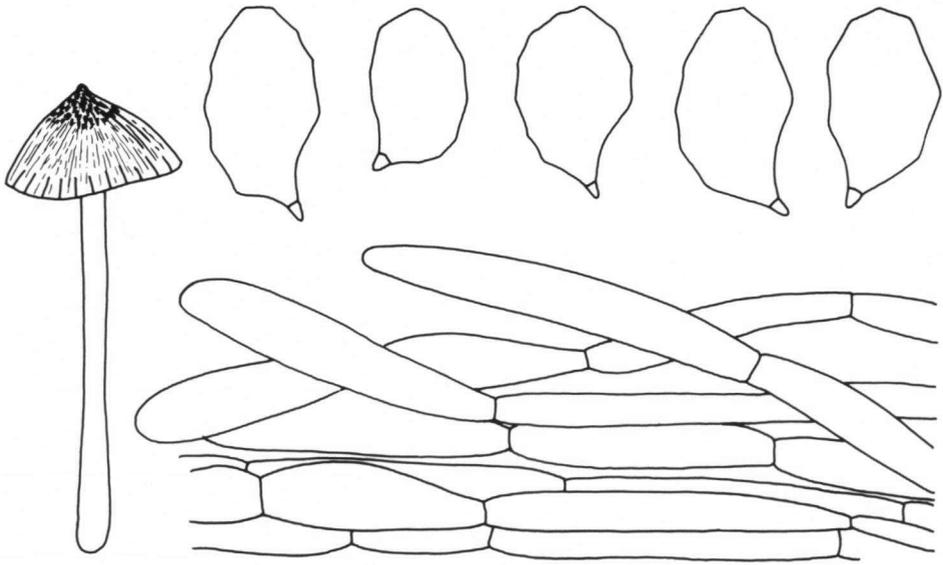


Fig. 31. *Entoloma* spec., aff. *placidum*. — Habit, spores, and pileipellis. (All figs. from *PMP* 71.122.)

gions. It seems to be rare in Greenland (see also the chapter on ecology of *Entoloma* in Greenland).

### 31. *Entoloma* spec. (aff. *placidum*). — Fig. 31

Pileus 8–23 mm broad, conical to convex with small papilla, not hygrophanous, dark brown then more brownish, slightly translucently striate at margin, centre densely squamulose, towards the margin fibrillose. Lamellae adnate or adnexed, white. Stipe 25–63 × 1.3–2.5 mm, cylindrical, violaceous blue-grey, smooth but with some scattered silvery fibrils lengthwise.

Spores 9.5–12 × 6–7.5 μm (averages 10–11 × 6.3–6.8 μm),  $Q = 1.5–1.75$ ,  $\bar{Q} = 1.5–1.75$ ,  $\bar{Q} = 1.5–1.55$ , angular-nodulose in side-view, thin-walled. Basidia 4-spored, clamped. Lamella edge fertile, cheilocystidia absent. Pileipellis a transition between a cutis and a trichoderm, made up of inflated hyphae with cylindrico-clavate terminal cells, up to 17 μm wide. Pigment brown intracellular in the pileipellis, possibly pale yellow-membranal in the pileitrama. Brilliant granules present but scarce in the pileitrama. Clamp-connections present at the base of basidia and scattered in the pileipellis.

Habitat. — Solitary in *Salix glauca* copses.

Collection examined. — SW: Disko Island, Kuanërssiut, 28 Aug. 1971, *PMP* 71.122; idem, Kuanit, 15 Sept. 1972, *PMP* 72.97.

The collections described above show some resemblance with *Entoloma placidum* with a conical, blue violaceous pileus, white lamellae and blue-violaceous stipe. However,

*Entoloma placidum* grows in northern Europe on or around *Fagus*-stumps and has slightly smaller, more angular spores with thicker walls.

It may be possible that the Greenland records represent a new taxon, but as the number of species with similar colours, described from northern America is fairly large (Largent, 1977) I feel the necessity to study some type-specimens first, before taking a final decision in this case, the more as the material from Disko Island is rather scanty.

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