

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

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(With 51 Text-figures)

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

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## INTRODUCTION

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

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

## MATERIAL, METHODS AND PRESENTATION

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

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

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

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

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

## ACKNOWLEDGEMENTS

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

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

## TAXONOMIC PART

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

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

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

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

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

KEY TO THE SECTIONS AND SUBSECTIONS  
OF SUBGENUS ENTOLOMA

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

## SYNOPTICAL KEY TO THE SPECIES OF SUBGENUS ENTOLOMA

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

## Pileus

## colour

- when moist brilliantly white or very pale, greyish or yellowish: (6), (7), 11, (12), (13), (16), (17).
- with blue or blue-violaceous tinges: 3, 4.
- with greenish tinges: 48.

## surface

- not hygrophanous, not or hardly striate when moist: 1, 2, 3, (4), 5, 11, 12, 13, (41), 42, 43, (48).

## shape

- with depressed centre or umblicate: (14), (22), (27), (28), 29, 30, 31, (34), (35), (36), (37), (41).

## Lamellae

## colour

- with distinct yellow tinge, at least when young: 2, 7.
- with slight green tinge: 48.
- distinctly brown or grey, sometimes with only slight pink tinge: (22), (29), 37, 39, 40, 46, 47.
- thickish: 33.

## Stipe

## colour

- yellow: 7, 34.
- greenish: 48.
- violaceous: 36.

## surface

- smooth, as if polished, not striate: 27, 28, 29, 30, 47.

## Smell

- aromatic, like toffee, cumarine: (33).
- fetid, like rotten cabbage or *Allium ursinum*: 41.
- nitrous, like chlorine: 14, (23), (24), (27), 28.

## Basidia

- In majority 2-spored: 30.
- clampless: 9, 31.

## Cheilocystidia

- present: 17.

## Pigment

- encrusting at least the narrowest hyphae of pileipellis and pileitrama, often in addition intracellular pigment present: 20, 21, 22, 23, 24, 25, 26, 40, 47.

## Fruiting period

- exclusively vernal: 5, 6, 7, 8, 9, 10, 11, 12, 13.

TABLE I

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

Section <i>Entoloma</i>		25. <i>E. majaloides</i>	p. 205
1. <i>E. lividum</i>	p. 159	26. <i>E. sordidulum</i>	p. 207
2. <i>E. sinuatum</i>	p. 160	Section <i>Polita</i>	
3. <i>E. madidum</i>	p. 161	27. <i>E. politum</i>	
4. <i>E. nitidum</i>	p. 164	f. <i>politum</i>	p. 210
Section <i>Nolanidea</i>		28.    f. <i>pernitrosum</i>	p. 211
5. <i>E. clypeatum</i>		29. <i>E. caccabus</i>	p. 213
f. <i>clypeatum</i>	p. 167	30. <i>E. bisporigerum</i>	p. 215
6.    f. <i>pallidogriseum</i>	p. 171	Section <i>Clitopiloides</i>	
7.    f. <i>xanthophyllum</i>	p. 172	31. <i>E. costatum</i>	p. 217
8.    f. <i>hybridum</i>	p. 173	Section <i>Turfosa</i>	
9.    var. <i>defibulatum</i>	p. 173	32. <i>E. turbidum</i>	
10. <i>E. aprile</i>	p. 174	var. <i>turbidum</i>	p. 220
11. <i>E. niphoides</i>	p. 176	33.    var. <i>pachylamellatum</i>	p. 222
12. <i>E. saundersii</i>	p. 178	34. <i>E. vinaceum</i>	
13. <i>E. sepium</i>	p. 181	var. <i>vinaceum</i>	p. 223
Section <i>Rhodopolia</i>		35.    var. <i>fumosipes</i>	p. 225
Subsection <i>Rhodopolia</i>		36.    var. <i>violeipes</i>	p. 226
14. <i>E. nidorosum</i>	p. 184	Extralimital	
15. <i>E. lividoalbum</i>	p. 186	37. <i>E. alnobetulae</i>	p. 227
16. <i>E. speculum</i>	p. 188	38. <i>E. alpicola</i>	p. 227
17. <i>E. leucocarpum</i>	p. 189	39. <i>E. anthracinum</i>	p. 228
18. <i>E. subradiatum</i>	p. 191	40. <i>E. atrosericeum</i>	p. 229
19. <i>E. sphagneti</i>	p. 192	41. <i>E. brassicolens</i>	p. 229
Subsection <i>Typodochroa</i>		42. <i>E. inocybeforme</i>	p. 230
20. <i>E. myrmecophilum</i>		43. <i>E. prunuloides</i>	p. 231
var. <i>myrmecophilum</i>	p. 196	44. <i>E. pseudoturbidum</i>	p. 232
21.    var. <i>atrogaleatum</i>	p. 198	45. <i>E. rhodopolium</i>	p. 233
22. <i>E. gerriae</i>	p. 199	46. <i>E. subflexipes</i>	p. 233
23. <i>E. sericatum</i>		47. <i>E. venosum</i>	p. 234
f. <i>sericatum</i>	p. 201	48. <i>E. viridans</i>	p. 235
24.    f. <i>saliciphilum</i>	p. 203		

## ENTOLOMA SECT. ENTOLOMA

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

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

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

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

## KEY TO THE SPECIES OF SECTION ENTOLOMA

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

## 1. ENTOLOMA LIVIDUM (Bull. ex St.-Am.) Quél.

Figs. 1a–c

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

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

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

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

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

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

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

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

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

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

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

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

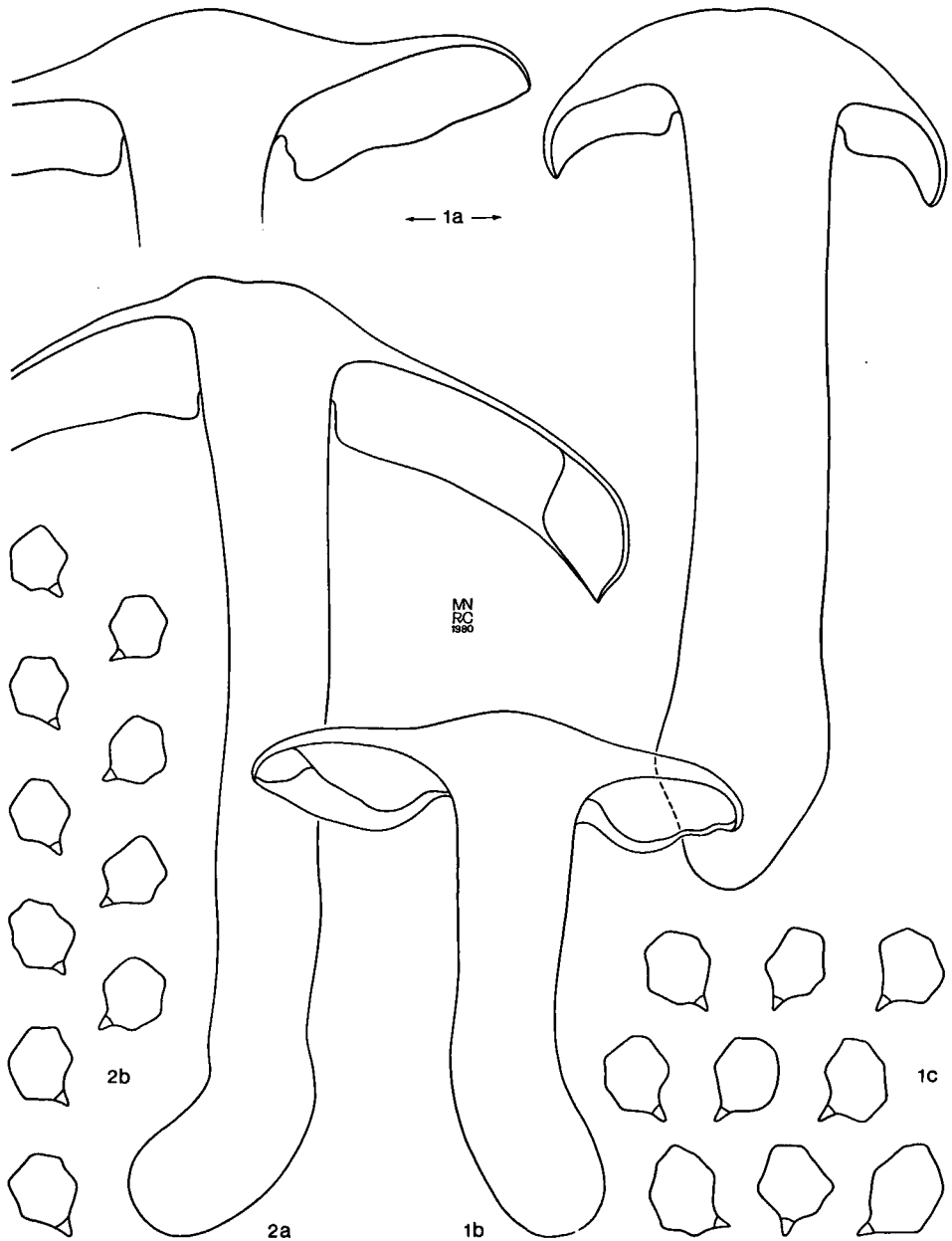
Pale-coloured taxa in section *Nolanidea*, viz. *E. clypeatum* f. *pallidogriseum*, *E. saundersii* and *E. sepium* differ from *E. lividum* among other things in the strictly vernal appearance and the habitat.

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

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

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





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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## 4. ENTOLOMA NITIDUM Quél.—Figs. 4a–c

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

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

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

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

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

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

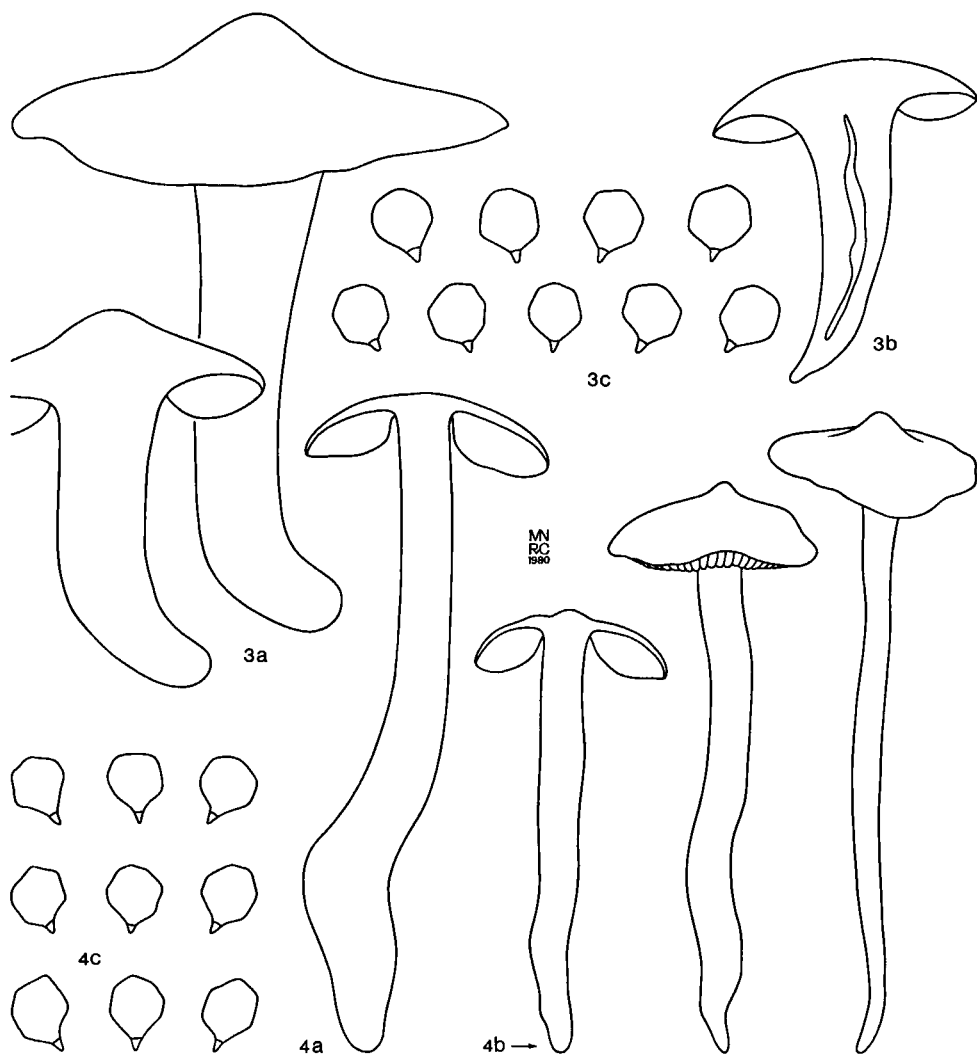
Spores (6.9–)6.5–8.7 × (5.8–)6.4–7.5(–8.1)  $\mu\text{m}$ , Q = 1.0–1.1–1.15, (–1.2), L–D = 0.0–0.6–1.2  $\mu\text{m}$ , 6–8-angled in side-view, relatively thin-walled, subglobose with large, hyaline apiculus. Basidia 24–36(–43) × 7.5–12.5  $\mu\text{m}$ , 4-spored. Cystidia none. Hymenophoral trama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

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

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

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

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



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

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

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

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

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

#### ENTOLOMA section NOLANIDEA (Fr.) Quél.

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

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

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

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

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

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

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

#### KEY TO THE SPECIES OF SECTION NOLANIDEA

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

- 5a. Pileus brilliantly white, marbled with pink only when water-soaked; flesh white, not changing colour when bruised by insects, at most slowly turning yellowish . . . . . *E. niphoides*, p. 176
- b. Pileus white only when young, later always distinctly pigmented: pale greyish, yellowish, brownish or ochraceous . . . . . 6
- 6a. Pileus not hygrophanous, at least when young covered with a fugaceous veil in mature specimens often forming a characteristic pattern of silverish arachnoid patches on a grey or grey-brown, smooth and shining background; spores large and rounded, 10.4–12.7(–14) × 10–12 μm, Q = 1.0–1.1; appearing very early in spring under *Ulmus*. . . . . *E. saundersii*, p. 178
- b. Pileus weakly but distinctly hygrophanous, without veil; spores narrower and more heterodiametrical; under rosaceous plants . . . . . 7
- 7a. Flesh in apex of stipe guaiac-negative; flesh white, not changing colour when bruised or in insect-holes etc. Pileal margin often distinctly striate when moist, under *Malus*, *Crataegus* etc. . . . . 8
- b. Flesh in apex of stipe guaiac-positive, flesh white changing to reddish yellow in insect-holes or when otherwise bruised, pileus pale, often with a reddish yellow shade, frequent in dense copses of *Prunus spinosa* but also in orchards, gardens etc. under *Malus*, *Pyrus* and *Prunus*, rarely met with *Crataegus sepium*. p. 181
- 8a. Lamellae moderately crowded, thin, adnate-emarginate, pale grey or whitish then pink; stipe white to grey. . . . . *E. clypeatum* f. *pallidogriseum*, p. 171
- b. Lamellae fairly distant, thickish, adnate-subdecurrent, yellow only late with pink shade; stipe white soon yellow as lamellae. . . . . *E. clypeatum* f. *xanthophyllum*, p. 172

## 5. ENTOLOMA CLYPEATUM (L. ex Fr.) Kumm.

## f. CLYPEATUM—Figs. 5a–d

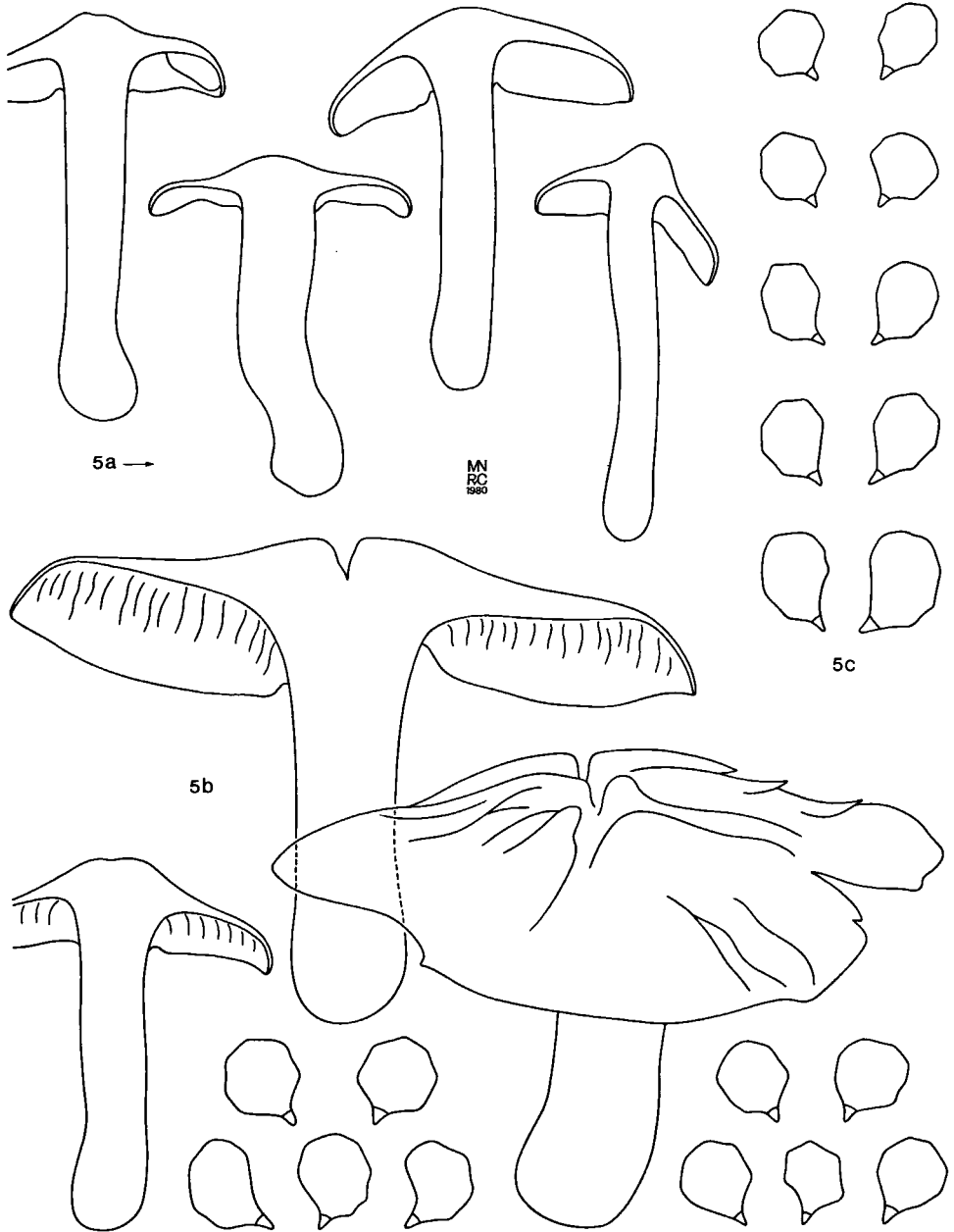
*Agaricus clypeatus* L., Syst. plant. 2: 1174. 1753. — *Agaricus clypeatus* L. ex Fr., Epicr.: 146. 1838. — *Entoloma clypeatum* (L. ex Fr.) Kumm., Führ. Pilzk.: 98. 1871. — *Rhodophyllum clypeatus* (L. ex Fr.) Quél., Enchir.: 59. 1886. — *Hyporrhodius clypeatus* (L. ex Fr.) Schroet. in Cohn, KryptogFl.Schles.: 616. 1889. *Agaricus phonospermus* Bull. ex Mérat, Nouvelle Flore Env. Paris, 2e Ed.: 76. 1821.

*Agaricus fertilis* Pers. ex Fr., Syst. mycol. 1: 197. 1821. (pro parte).

SELECTED ICONES.—Romagnesi, H., Nouv. Atl. Champ. 1: pl. 77b. 1956. — Cool, C. & v. d. Lek, H. A. A., Paddestbk., 3e Druk, 2: 105 fig. 49. 1935. — Marchand, A., Champ. Nord & Midi 2: pl. 119. 1973.

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

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



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



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

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

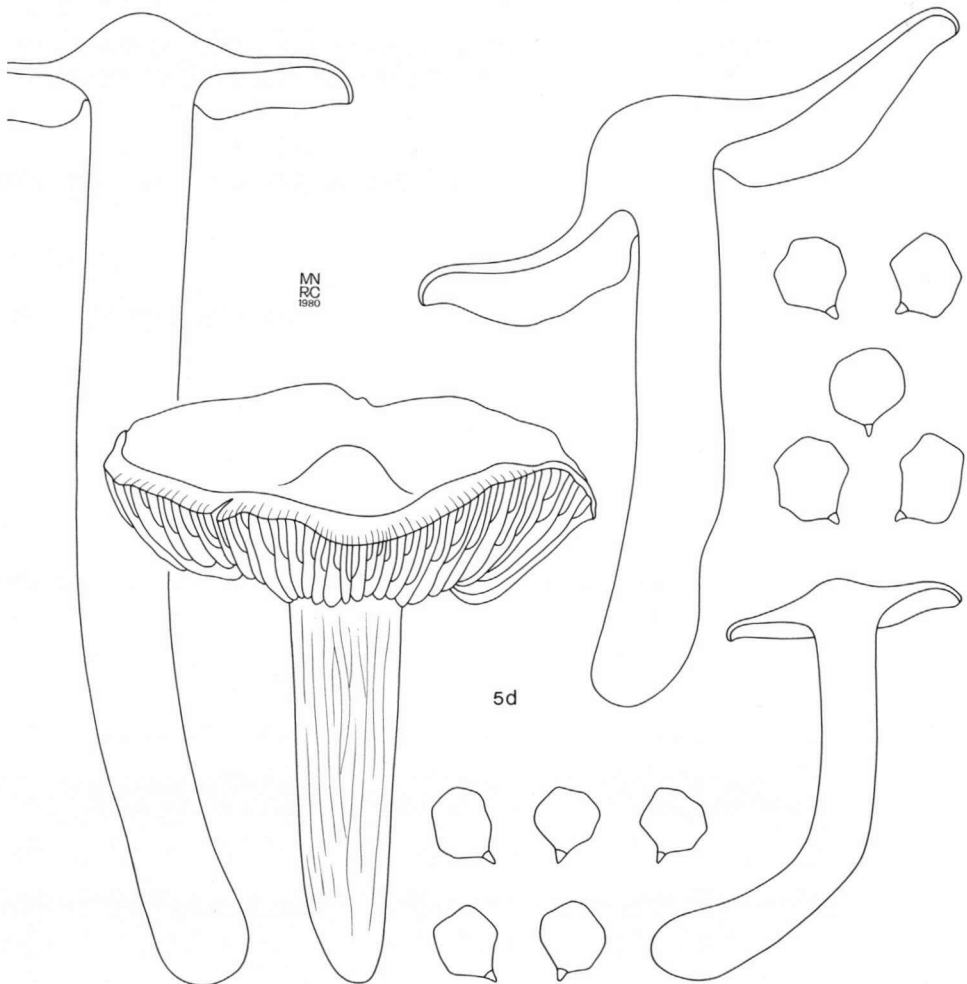


Fig. 5d. *Entoloma clypeatum* var. *clypeatum*. — Habit and spores (all figs. from v. Brummelen, 20 May 1979).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### 7. ENTOLOMA CLYPEATUM (Fr.) Quél.

forma *xanthophyllum* Noordeloos, *forma nova*

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

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

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

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

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

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

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

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

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

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

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

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

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

COLLECTIONS EXAMINED.—NETHERLANDS, prov. Zuid-Holland, Wassenaar, dune-area 'Meyendell', 8 May 1977, *M. E. Noordeloos* 326.

FRANCE, Paris, Exposition of Soc. mycol. Fr., 25 April 1977, *M. E. Noordeloos* 302.

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

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

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

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

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

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

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

**COLLECTIONS EXAMINED.**—NETHERLANDS: prov. Noord-Holland: Overveen, 22 April 1961, *J. van Brummelen* 1279 (holotype); idem, 16 May 1969, *J. van Brummelen* 2723 and 19 May 1969, *J. van Brummelen* 2727; prov. Zuid-Holland: Lisse, estate 'Keukenhof'; 8 May 1970, *C. Bas* 2510; Voorschoten, estate 'ter Horst', 14 May 1973, *C. Bas* 6005; IJsselmerpolders, Oostelijk Flevoland, sandy shore of Veluwemeer between Kampen and Elburg, 14 May 1977, *M. E. Noordeloos* 355.

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

#### 10. ENTOLOMA APRILE (Britz.) Sacc.—Figs. 6a-d

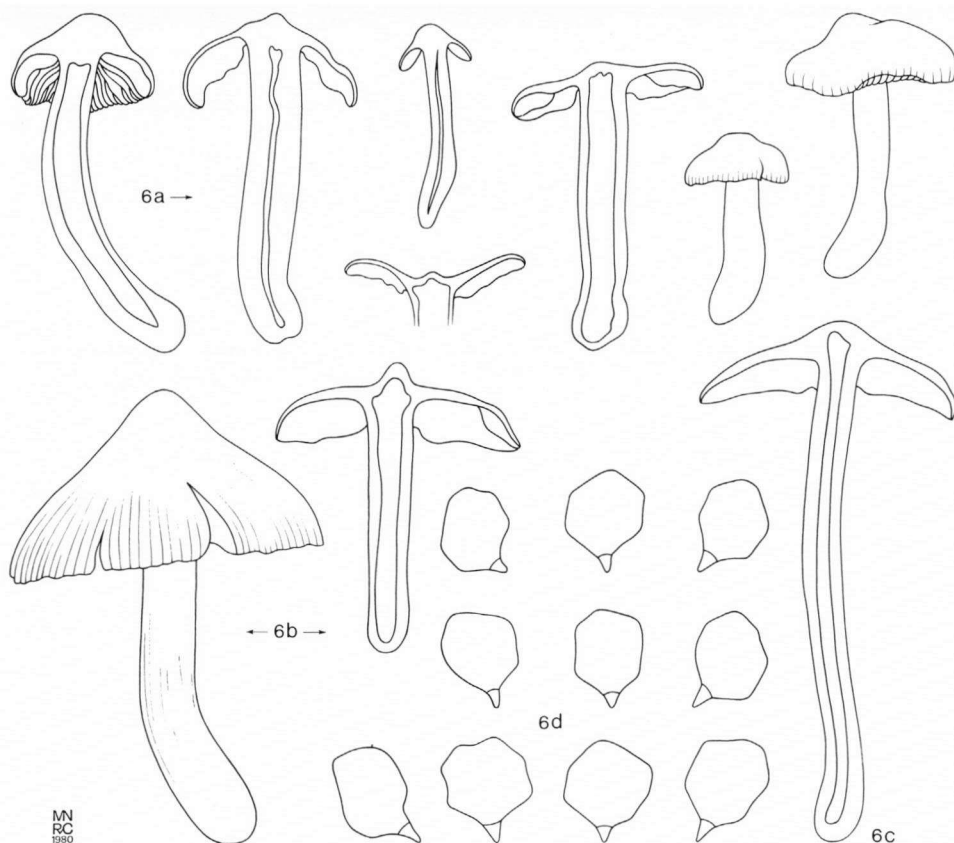
*Agaricus aprilis* Britz. in Ber. naturhist. Ver. Augsburg 28: 149. 1885. — *Entoloma aprile* (Britz.) Sacc., Syll. Fung. 5: 696. 1887. — *Rhodophyllus aprilis* (Britz.) Romagn. in Bull. Soc. mycol. Fr. 63: 199, 1947.

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

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

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

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



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

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

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

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

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

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

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

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

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

*Rhodophyllus niphoides* Romagn. in Bull. Soc. mycol. Fr. **63**: 198. 1947. — *Entoloma niphoides* (Romagn.) P. D. Orton in Trans. Br. mycol. Soc. **43**: 64. 1960.

*Rhodophyllus clypeatus* var. *niveus* Quéf. in C. R. Ass. franc. (Saint-Etienne, 1897) **26** (2): 448. 1898.

MISAPPLIED NAMES.—*Entoloma speculum* Fr. sensu Cooke, Ill. Br. Fungi **3**: pl. 342 (308). 1884–1886.

SELECTED ICONES.—Cooke, Ill. Br. Fungi **3**: pl. 342 (308). 1884–1886.

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

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





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

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

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

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

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

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

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

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

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

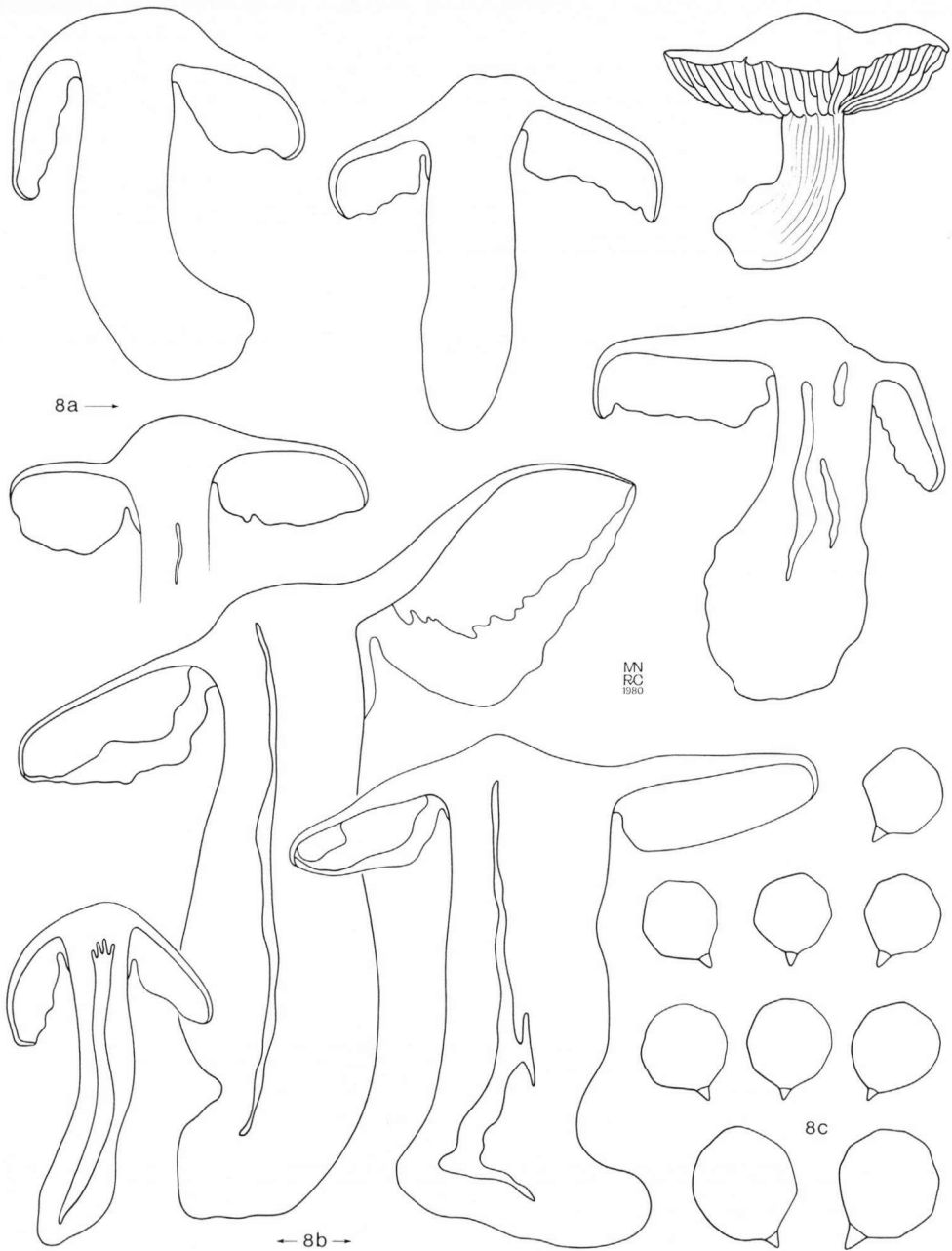
*Agaricus saundersii* Fr., *Hymenom. eur.*: 192. 1874. — *Entoloma saundersii* (Fr.) Sacc., *Syll. Fung* 5: 689 1887. — *Rhodophyllus saundersii* (Fr.) Romagn. in *Bull. Soc. mycol. Fr.* 63: 195. 1947.

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

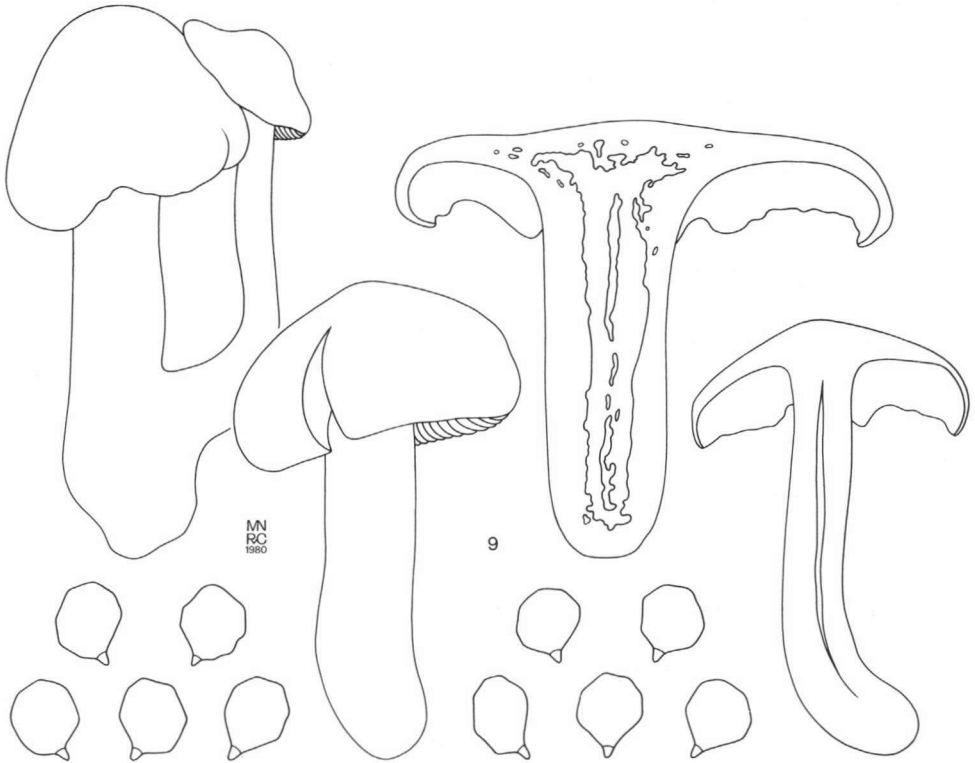


Fig. 9. *Entoloma sepium*. — Habit and spores (all figs. from Kalff, 17 June 1965).

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

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

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

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

## ENTOLOMA section RHODOPOLIA (Fr.) Noordeloos

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

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

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

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

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

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

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

## KEY TO THE SUBSECTIONS OF SECTION RHODOPOLIA

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

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

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

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

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

## KEY TO THE SPECIES OF SUBSECTION RHODOPOLIA

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

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

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

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

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

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

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

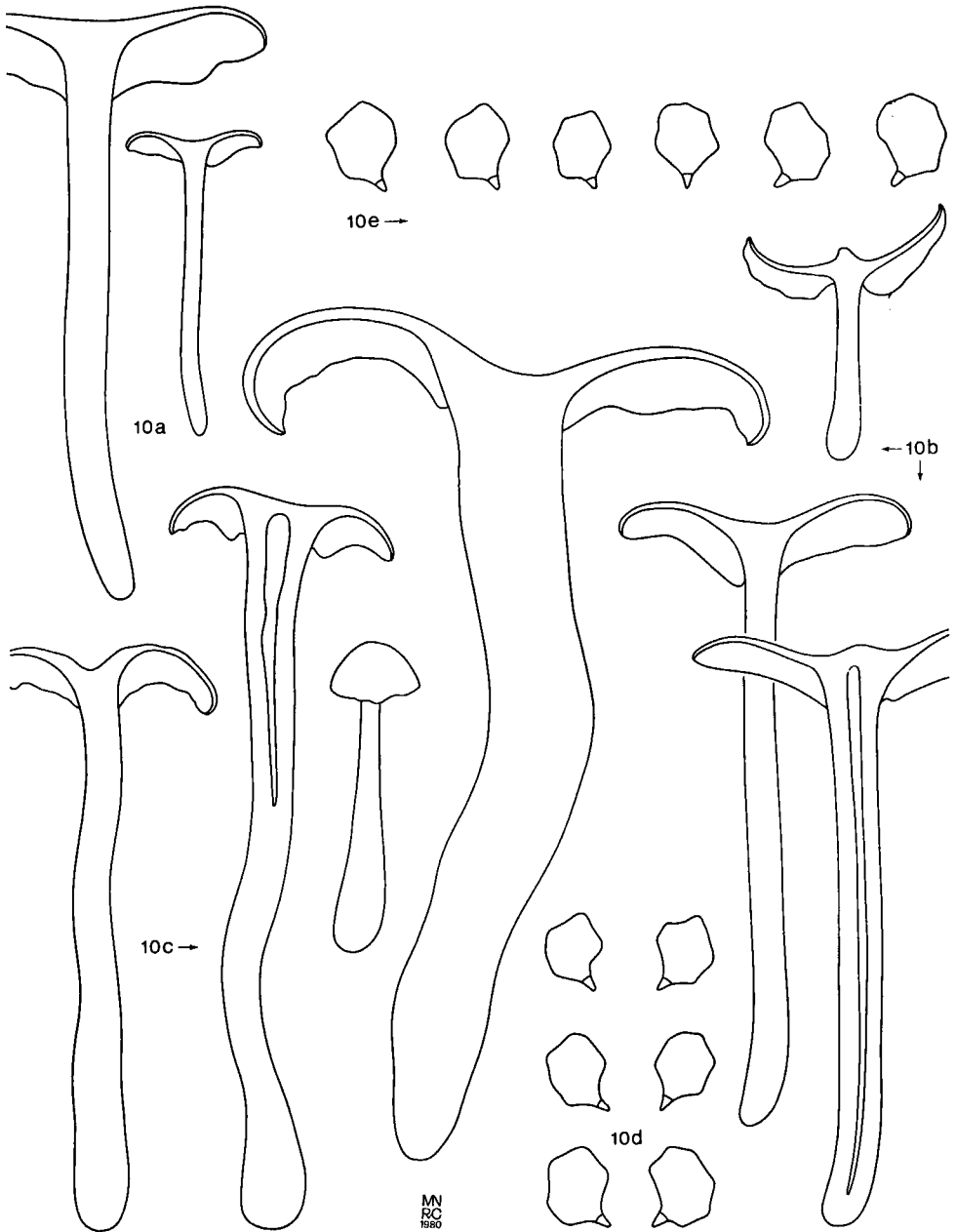
Pileus (10–)20–75 mm broad, conico-convex when young, soon expanding to plano-convex or plano-concave, usually with slight central depression, more rarely with faint to distinct umbo, with margin slightly involute when young, but straight later on, with marginal zone undulating with age, hygrophanous,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

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

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

COLLECTIONS EXAMINED.—NETHERLANDS: prov. G e l d e r l a n d : Winterwijk, Bek-en-Delle, 26 Sept. 1976, J. Schreurs; Putten, Schovenhorst, 26 Aug. 1978. T. Boekhout; prov. U t r e c h t : Harmelen, Vijverbos, 14 & 24 Oct. 1978, T. Boekhout; Breukelen, estate 'Guntersteyn', 20 Sept. 1978, T. Boekhout; prov. N o o r d - H o l l a n d , Isl. Texel, along Waal-en-Burgse dijk, 25 Oct. 1977, M. E. Noordeloos 557; prov. Z u i d - H o l l a n d , Voorschoten, estate 'ter Horst', 13 Sept. 1978, M. E. Noordeloos 713; prov. N o o r d -





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

B r a b a n t : Zevenbergen, Eendekooi, 31 Oct. 1978, *P. B. Jansen*; Strijbeek, Patersven, 30 Aug. 1961, *C. Bas* 2389; Budel, Visvijvers, 9 Oct. 1977, *M. E. Noordeloos* 524; prov. L i m b u r g : Gronsveld, Savelsbos, 11 Sept. 1977, *T. Kuyper & J. Schreurs*; Bunde, Bunderbos, 10 Sept. 1977, *T. Kuyper & J. Schreurs*.

S W E D E N : Småland, Femsjö, Södra Färgen, 22 Aug. 1976, *M. Moser* 76/152 (1B); Värnamo, near Elgarud, 14 Sept. 1959, *C. Bas* 1770. — D E N M A R K , Isl. Amager, S. E. of Copenhagen, estate 'Kongelund', 9 Sept. 1980, *M. E. Noordeloos* 1203, and 14 Sept. 1980, *M. E. Noordeloos* 1218. — B E L G I U M : prov. Limburg, Bévercé, along river Warsche, 26 Sept. 1976, *M. E. Noordeloos* 193; prov. Namur: Ave-et-Auffe, Fond d'Ave, 8 Sept. 1975, *M. E. Noordeloos* 123; Banalbois near Han-sur-Lesse, 22 Sept. 1974, *C. Bas* 6370.

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

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

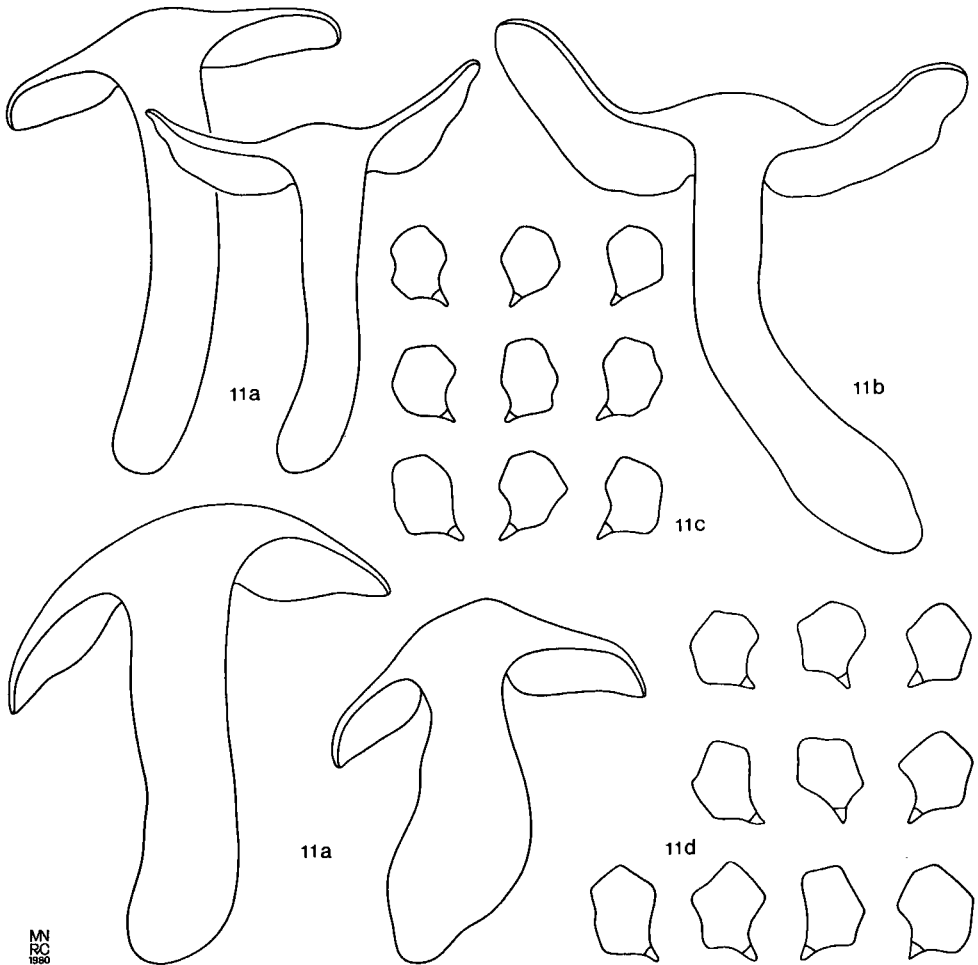
#### 15. ENTOLOMA LIVIDOALBUM (Kühn. & Romagn.) Kubička — Figs. 11a–d

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

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

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

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



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

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

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

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

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

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

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

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

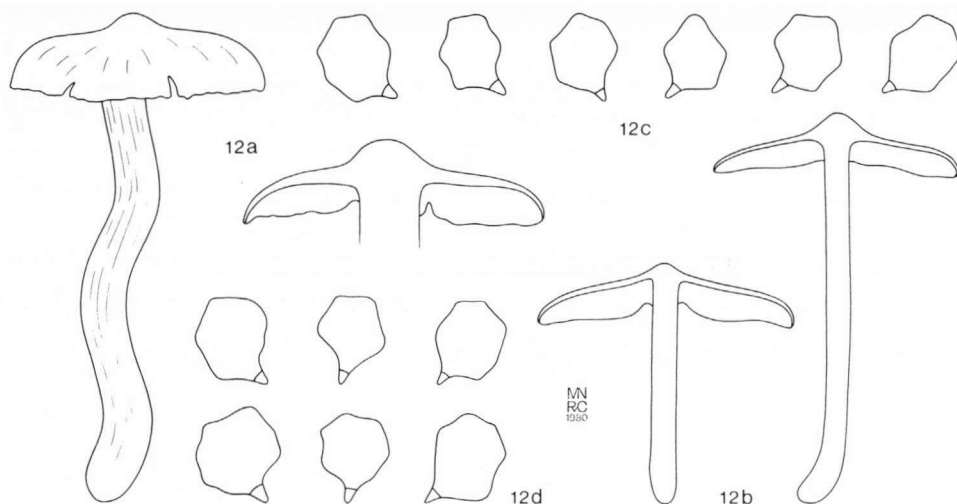
EXCLUDED.—*Entoloma speculum* sensu Cooke Ill. Br. Fungi 3: pl. 342 (308). 1884–1886 (= *E. niphoides* (Romagn.) P. D. Orton).

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

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

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

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



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

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

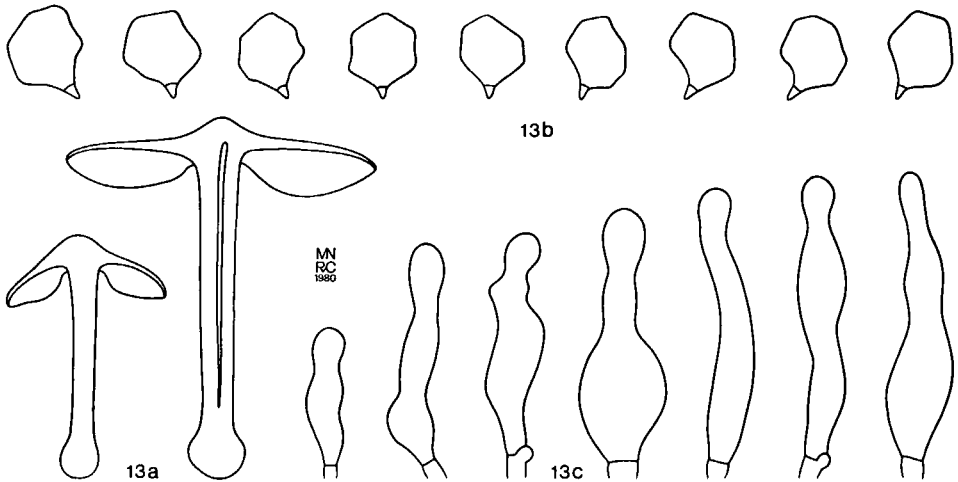
The small carpophores, pale colours, and the appearance in summer in humus-rich frondose forests are quite distinctive for *E. speculum*. *E. niphoides* has much larger carpophores, more isodiametrical and more weakly angled spores and grows in spring in *Prunus spinosa* thickets. *Entoloma leuocarpum*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

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

#### 17. *Entoloma leuocarpum* Noordeloos, *spec. nov.*—Figs. 13a-c

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

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



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

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

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

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

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

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

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

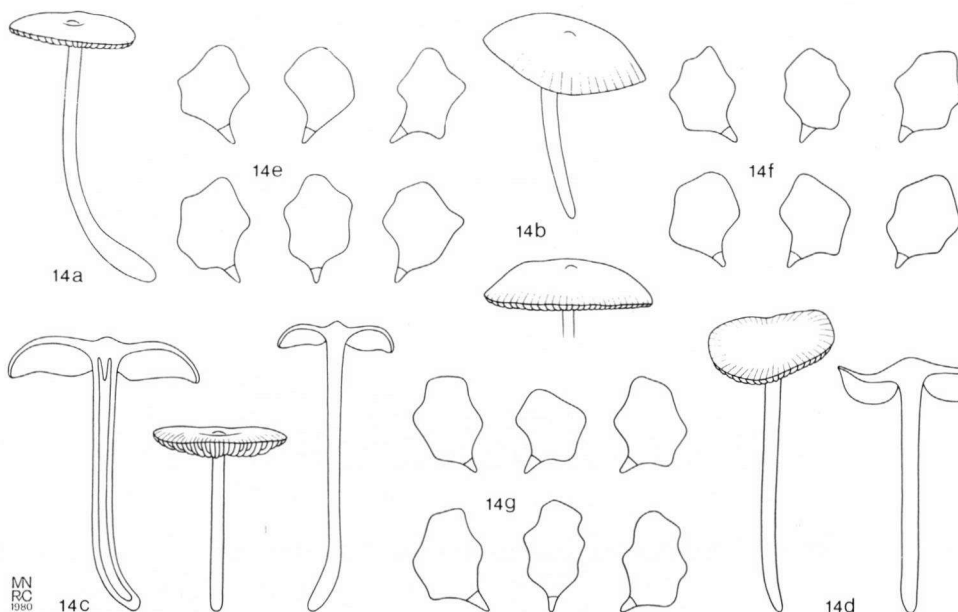
the subfelted pileus and the abruptly bulbous base of the stipe made me consider it as a species in its own right. *Entoloma cinerascens* Hesler from the U.S.A. seems to be related, but differs by the plane, almost depressed pileus, the non-bulbous stipe and the lack of clamp-connections. The cheilocystidia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

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

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

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

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



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

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

Spores (8.1–)8.7–11.2(–12.7) × 7.0–8.1(–10.4)  $\mu\text{m}$ ,  $Q = 1.1-1.2-1.3(-1.35)$ ,  $L-D = (0.6-1)2-2.0-2.5 \mu\text{m}$ , 5–7-angled in side-view. Basidia 32–47 × 9–16  $\mu\text{m}$ , (2–)4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated cells, 38–150 × 9–27  $\mu\text{m}$ . Pileipellis a thin cutis of 2.4–7  $\mu\text{m}$  wide, cylindrical hyphae, sometimes with ascending, clavate terminal cells, particularly at centre, with abundant intracellular pigment, sometimes with slightly gelatinised walls, subpellis usually well developed, made up of strongly inflated cells, 27–65(–80) × 8.5–32  $\mu\text{m}$ , with intracellular pigment. Pileitrama regular, made up of inflated cells, 45–125(–140) × 7.5–29  $\mu\text{m}$ . Clamp-connections numerous in all tissues.

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

COLLECTIONS EXAMINED.—NETHERLANDS: prov. O v e r i j s s e l, Denekamp, estate 'Singraven', 8 July 1961, *E. Kits v. Waveren*; prov. G e l d e r l a n d: Winterswijk, Bek-en-Delle, 3 Sept. 1979, *J. Schreurs*; Nijmegen, grounds of Radboudt-hospital, 3 Aug. 1977, *M. E. Noordeloos 436*; Neerijnen, estate 'Neerijnen', 21 Aug. 1979, *J. Schreurs*; prov. U t r e c h t, Loenen, estate 'Over-Holland', 29 July 1961, *E. Kits v. Waveren*; prov. N o o r d - H o l l a n d: Heemstede, Leyduin, 2 Aug. 1968, *E. Kits v. Waveren*; Bloemendaal, estate 'Elswout', 21 Oct. 1966, *E. Kits v. Waveren*.

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

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

#### 19. ENTOLOMA SPHAGNETI Naveau.—Fig. 15

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

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

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





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

striate; without smell; spores  $9.3-12.7 \times 6.5-8.7(-9.3) \mu\text{m}$ ,  $Q=1.3-1.4$  on the average per collection, ellipsoid and multi-angled-gibbose in outline; pigment very abundant, intracellular; in dead or living *Sphagnum* and on peat.

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

Spores  $9.3-12.7 \times 6.5-8.7(-9.3) \mu\text{m}$ ,  $Q=(1.2-1.35-1.5(-1.8))$ ,  $L-D=(1.5-1.2)3-3.5-4.5(-5.0) \mu\text{m}$ , multiangled-nodulose, ellipsoid. Basidia 27–48  $\times$  8.5–16  $\mu\text{m}$ , 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 35–110(–120)  $\times$  8–32  $\mu\text{m}$ . Pileipellis a cutis or radially arranged, 2.5–9  $\mu\text{m}$  wide, cylindrical hyphae with abundant intracellular pigment. Pileitrama regular, made up of inflated cells, 37–140  $\times$  7.5–34  $\mu\text{m}$ . Clamp-connections abundant.

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

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

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

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

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

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

## KEY TO THE SPECIES OF SUBSECTION TYPODOCHROA

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

## 20. ENTOLOMA MYRMECOPHILUM (Romagn.) Moser

var. MYRMECOPHILUM.—Figs. 16a-d

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

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

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

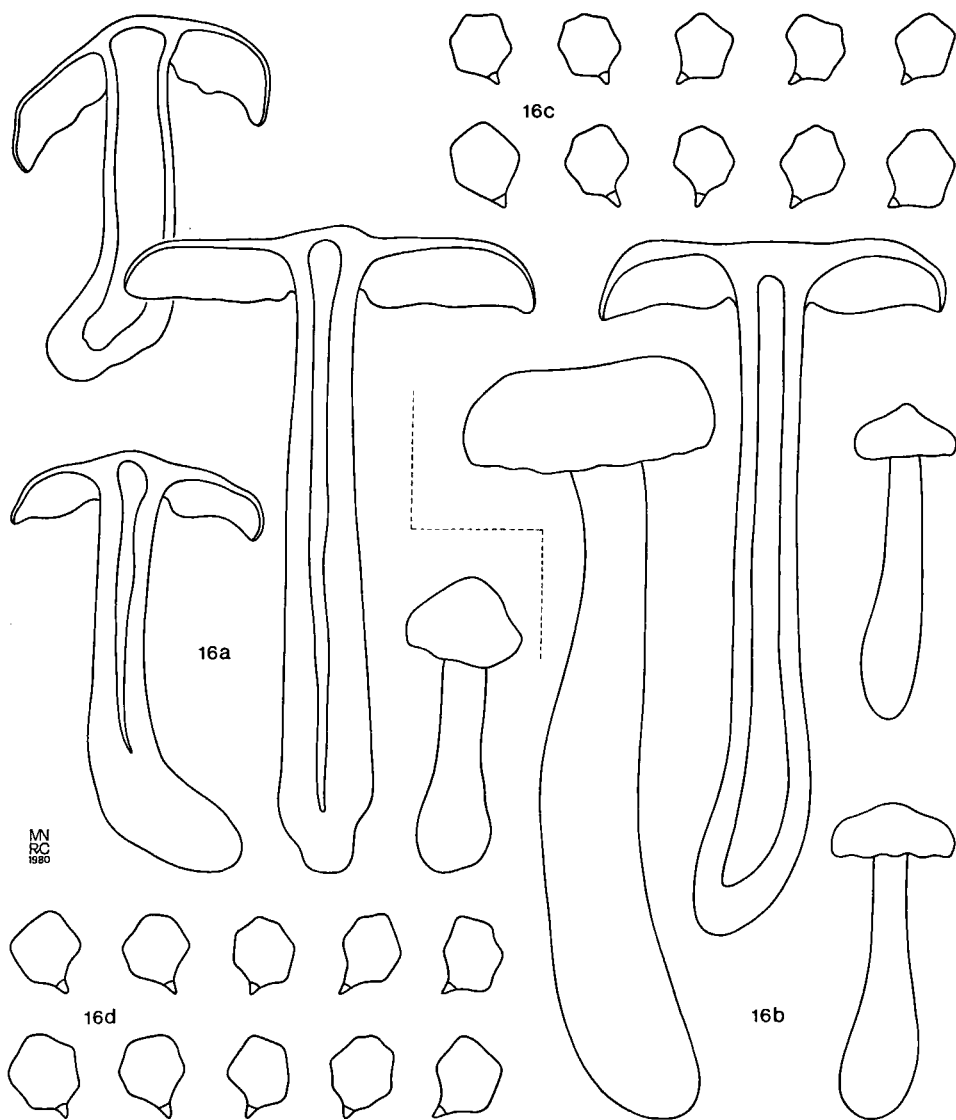
CHARACTERISTICS.—Pileus dark brown to blackish brown, not or only slightly paler at margin, not or only short translucently striate at margin; lamellae white or pale when young later on with grey or brown tinge; stipe usually paler than pileus, strongly silvery-white on grey-brown background; spores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

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

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

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

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



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

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

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

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

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

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

## 21. ENTOLOMA MYRMECOPHILUM var. atrogaleatum Noordeloos

var. nov.—Fig. 17

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

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

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

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

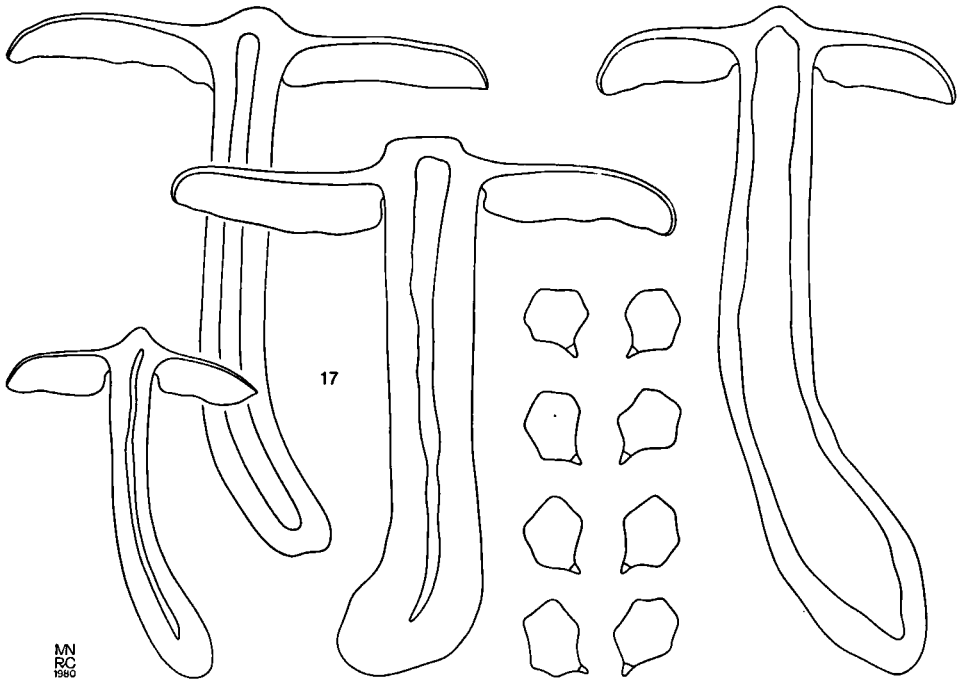


Fig. 17. *Entoloma myrmecophilum* var. *atrogaleatum*. — Habit and spores (all figs. from holotype).

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

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

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

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

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

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

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

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

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

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

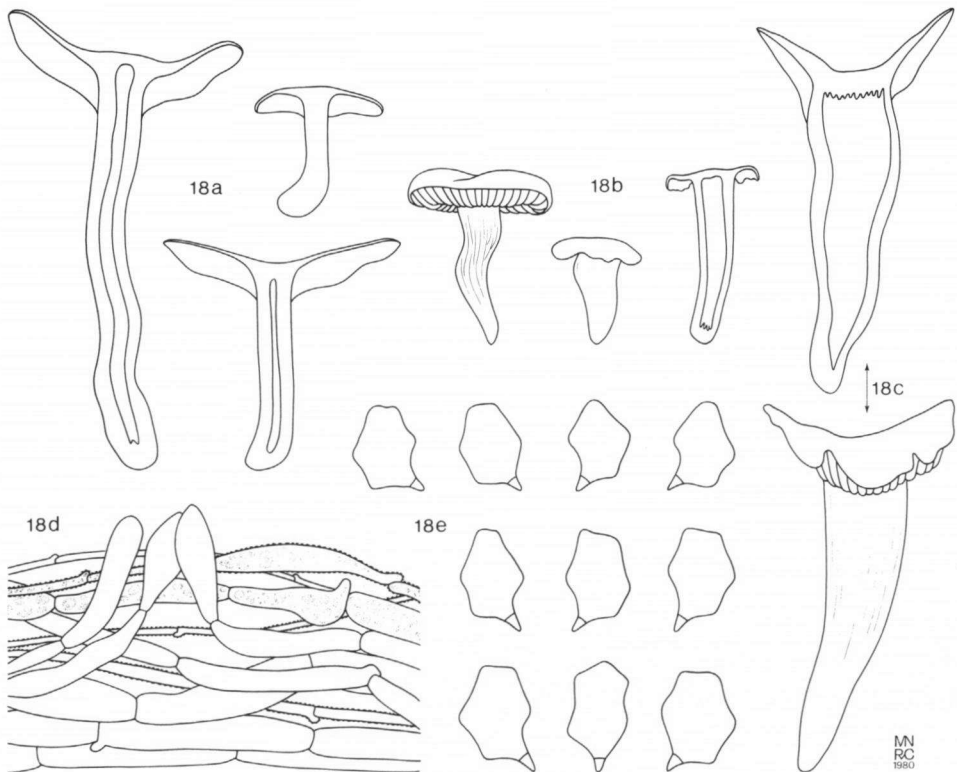


Fig. 18a–e. *Entoloma gerriae*. — Habit, spores and pileipellis (18a, d, e from holotype; 18b from *Wisman* 16 Oct. 1978; 18c from *Piepenbroek* 1039a).



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

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

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

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

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

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

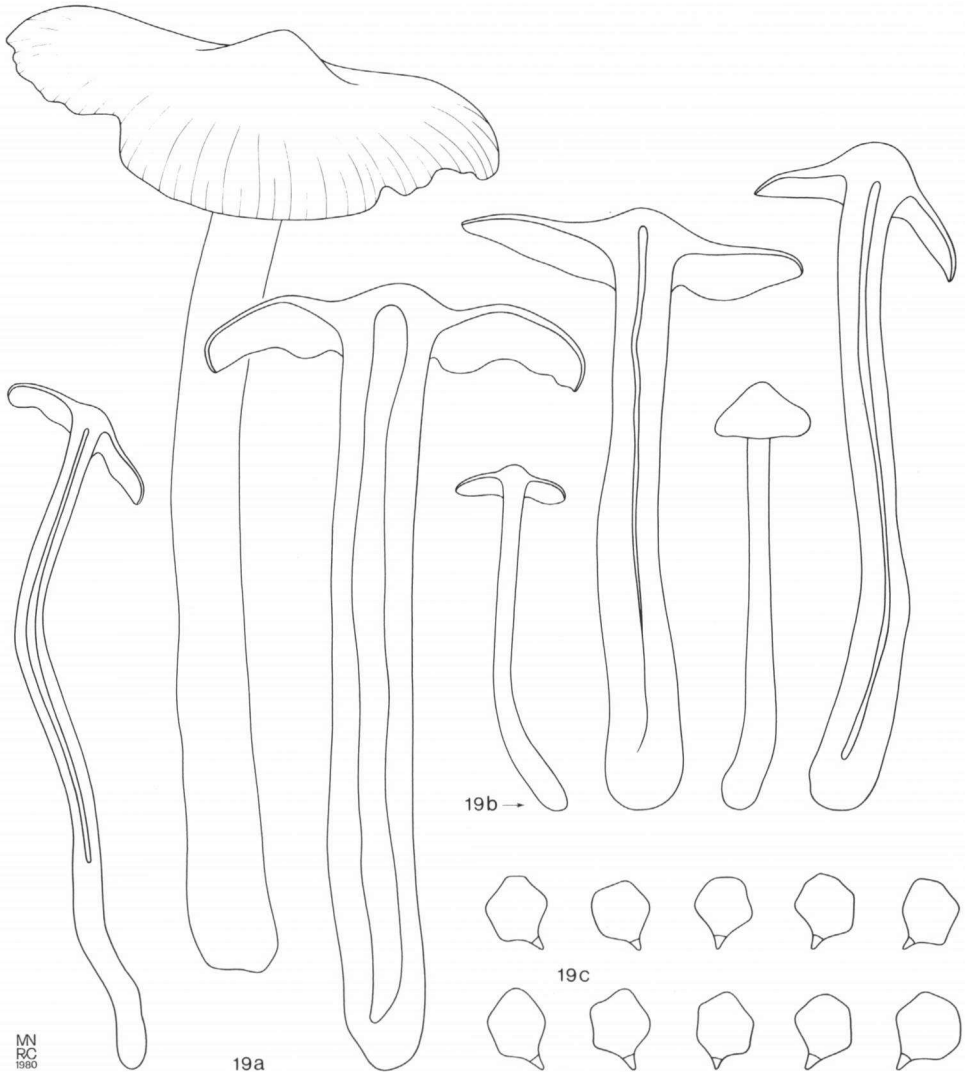
### 23. ENTOLOMA SERICATUM (Britz.) Sacc. forma SERICATUM.—Figs. 19a–c

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

Spores  $7.6-10.4 \times (7-7.2-8.6(-9.3) \mu\text{m}$ ,  $Q = (1.0)1.05-1.15-1.25(-1.3)$ ,  $L-D = (0-)0.6-1.5-2.0 \mu\text{m}$ , rather rounded 5-6-angled in side-view. Basidia  $27-40 \times 10-12.5 \mu\text{m}$ , 4-spored. Cystidia

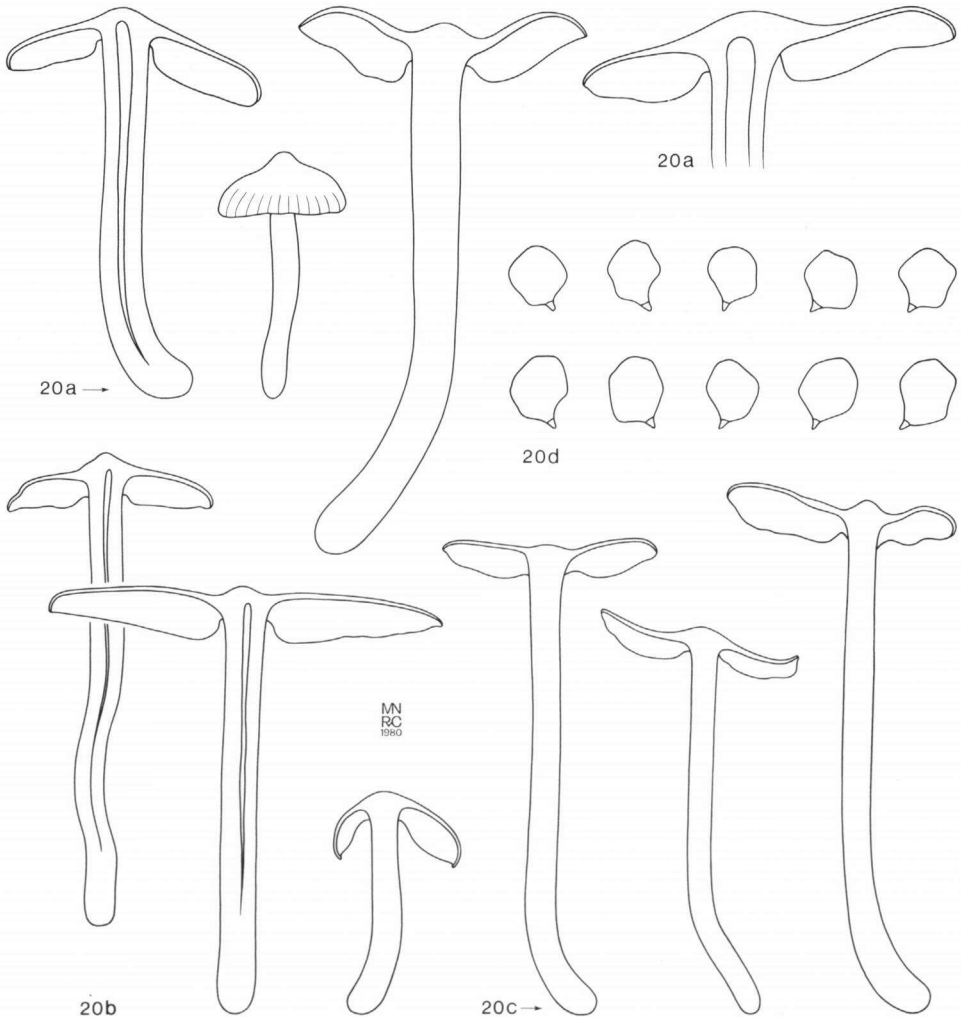


Fig. 20a–d. *Entoloma sericatum* forma *saliciphilum*. — Habit and spores (20a, d from *Noordeloos* 1079; 20b from holotype; 20c from *Noordeloos* 1080).

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

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

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

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

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

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

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

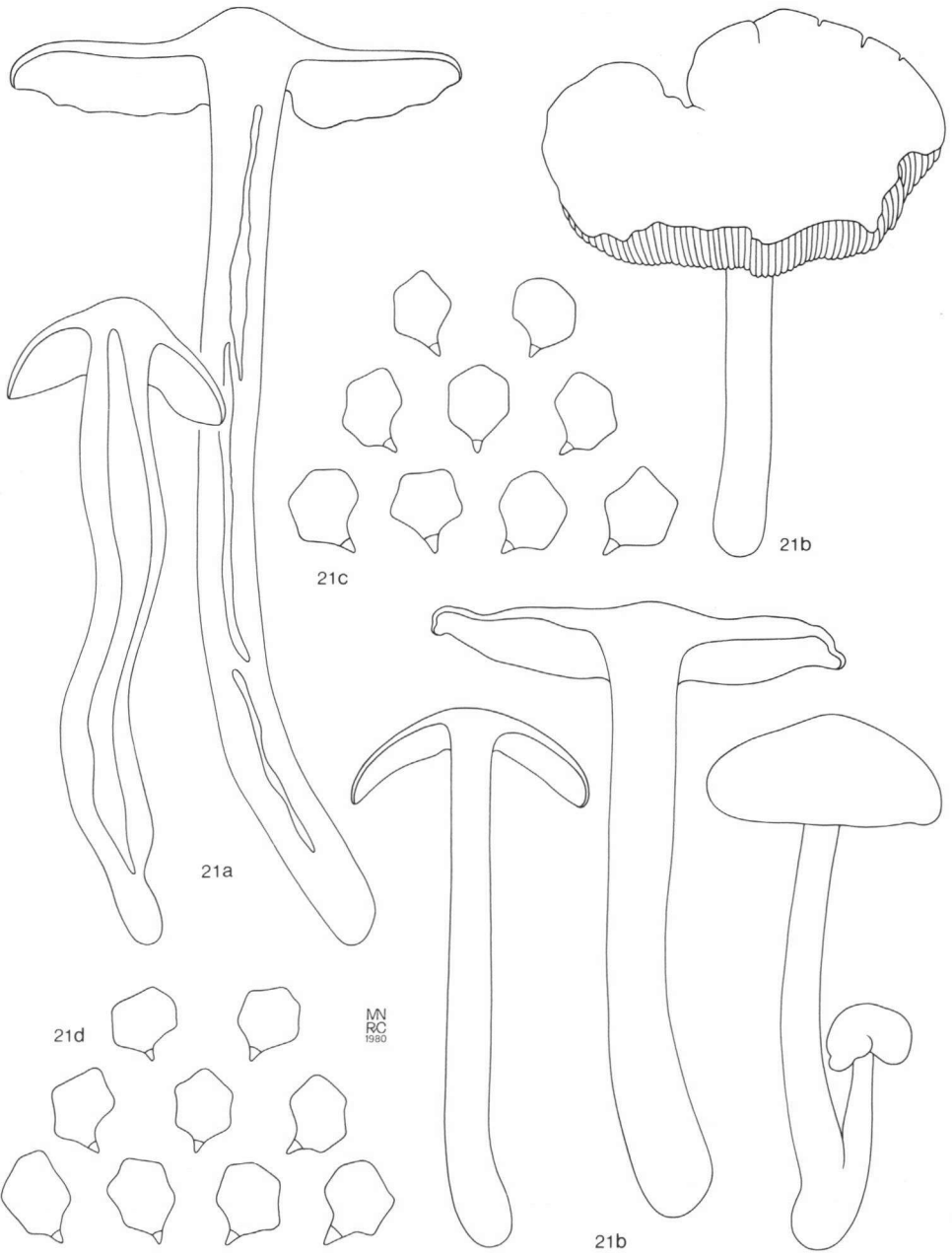
## 25. ENTOLOMA MAJALOIDES P. D. Orton.—Fig. 21a–d

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

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

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

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



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

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

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

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

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

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

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

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

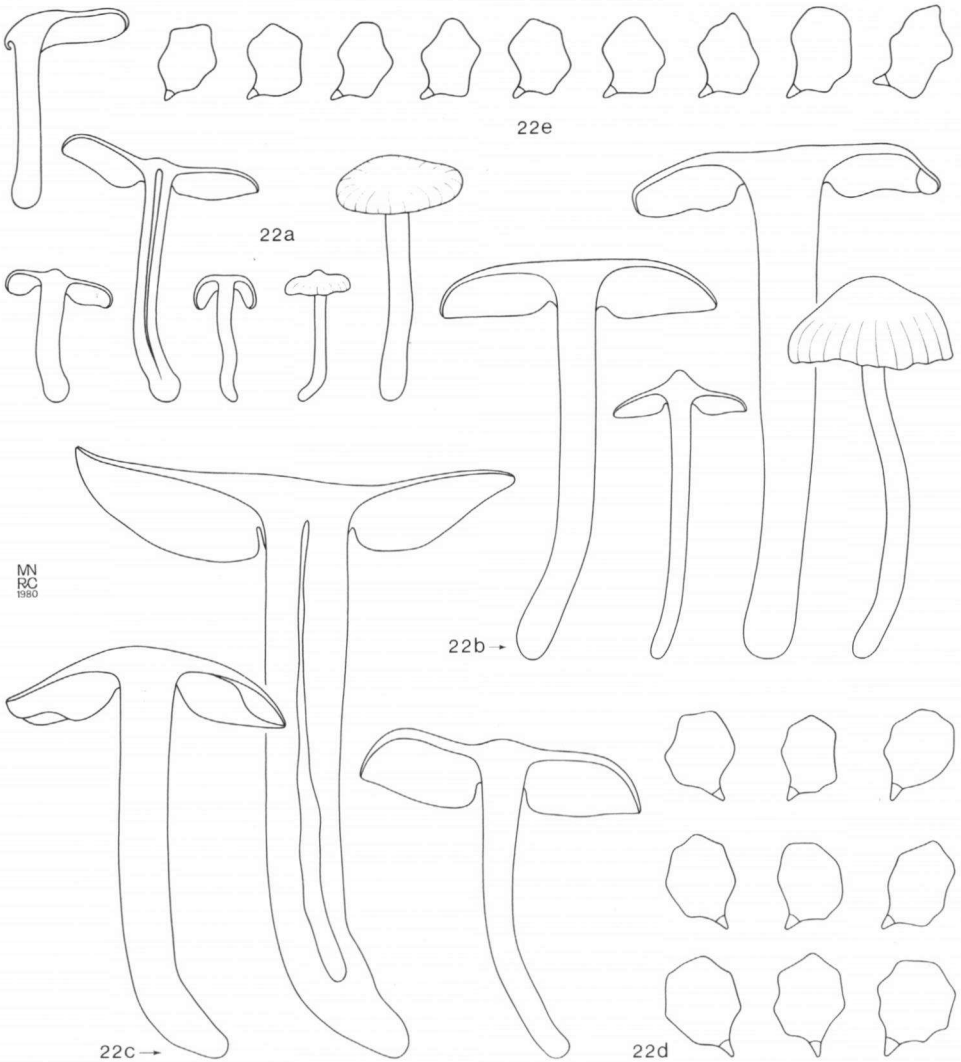
*Rhodopyllus sordidulus* Kühn. & Romagn. in Rev. Mycol. 19: 10. 1954 (Fl. anal.: 194. 1953, nom. nud.).—*Entoloma sordidulum* (Kühn. & Romagn.) P. D. Orton in Trans. Br. mycol. Soc. 43: 175. 1960.

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

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

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

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



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

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



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

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

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

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Groningen, Leek, Nienoord, 14 Sept. 1976, *M. E. Noordeloos* 170; prov. Drenthe, Roden, 12 Oct. 1977, *J. Schreurs*; prov. Gelderland: Wilp, near estate 'de Lathmer', 28 Aug. 1977, *H. Piepenbroek & G. Piepenbroek-Grooters* 1041, Winterswijk, Bek-en-Delle, 20 Sept. 1976, *M. E. Noordeloos* 188; idem, 3 Sept. 1979, *J. Schreurs*; Oosterhout, estate 'Oosterhout', 23 Aug. 1980, *M. E. Noordeloos* 1176, 1178; Beesd, estate 'Mariëwaard', 10 Aug. 1977, *C. Bas* 5867; idem, 15 Oct. 1977, *J. Schreurs*; prov. Utrecht: Bunnik, estate 'Amelisweerd', 25 Sept. 1978, *M. E. Noordeloos* 740; Neerijnen, estate 'Neerijnen', 6 Sept. 1980, *T. Kuyper & J. Schreurs*; Vleuten, Bijleveld, 11 Nov. 1976, *M. E. Noordeloos* 258; prov. Noord-Holland: Bergen, Komlaan, in garden, 13 Oct. 1976, *M. E. Noordeloos* 223; Amsterdam, Amsterdamse bos, 16 July 1959, *E. Kits v. Waveren*; Kortenhoef, near hotel 'de Zuwe', 14 Oct. 1957, *C. Bas* 1284; prov. Zuid-Holland: Oegstgeest, estate 'Poelgeest', 20 Aug. 1979 and 16 Oct. 1979, *M. Brand*; Leiden, Leidsche Hout, 4 Sept. 1977, *M. E. Noordeloos* 438; idem, 29 Sept. 1976, *C. Bas & T. Gordijn*; Leiden, Heempark, 4 Sept. 1977, *M. E. Noordeloos* 437; prov. Noord-Brabant, Dorst, 6 July 1959, *P. B. Jansen*; prov. Limburg, Schaelsberg, Savelsbos, 20 Aug. 1977, *P. B. Jansen*.

GERMAN FEDERAL REPUBLIC: Westfalen, Detmold, Externsteine, 7 Oct. 1976, *C. Bas*; idem, Sandebeck forest, 5 Oct. 1976, *M. E. Noordeloos* 210. —FRANCE: dept. Seine, Bois de Vincennes, Sept. 1933, *H. Romagnesi s.n.* (Herb. Romagn., PC); idem, Oct. 1937, *H. Romagnesi* 37.248 (lectotype, design. mihi, Herb. Romagn., PC); dept. Seine & Oise, Luzarches, 29 July 1942, *H. Romagnesi* 42.249 (Herb. Romagn., PC); Coye-la-Forêt, 15 Sept. 1950, *H. Romagnesi* 50.266 (Herb. Romagn., PC).

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

#### ENTOLOMA section POLITA (Romagn.) ex Noordeloos

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

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

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

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

#### KEY TO THE SPECIES OF SECTION POLITA

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

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

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

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

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

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

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

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

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

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

**COLLECTIONS EXAMINED.**—NETHERLANDS: prov. Overijssel, Delden, Carelshaven, 29 Sept. 1974, *E. Kits v. Waveren*; prov. Utrecht, Leusden, Stoutenburg, 22 Oct. 1978, *T. Boekhout*; prov. Noord-Holland, Kortenhoef, 14 Oct. 1957, *C. Bas 1287*; prov. Noord-Brabant: Breda, Liesbos, 13 Aug. 1965, *P. B. Jansen 65–172*; Strijbeek, Goudbergven, 31 May 1959, *P. B. Jansen*.

BELGIUM, prov. Namur, Vencimont, N. of river Houille, 3 Oct. 1977, *M. E. Noordeloos 478*. — GREAT BRITAIN, Wales, Lake Vyrnwy, 8 Sept. 1977 and 19 Sept. 1979, *E. Kits v. Waveren*. — FRANCE: dept. Ain, St. Etienne du Bois, 18 Oct. 1962, *R. Kühner 62–23A* (herb. Kühner, LY); dept. Landes, Lac d'Aureilhan, 13 Oct. 1977, *H. Romagnesi 77.327* (herb. Romagn., PC).

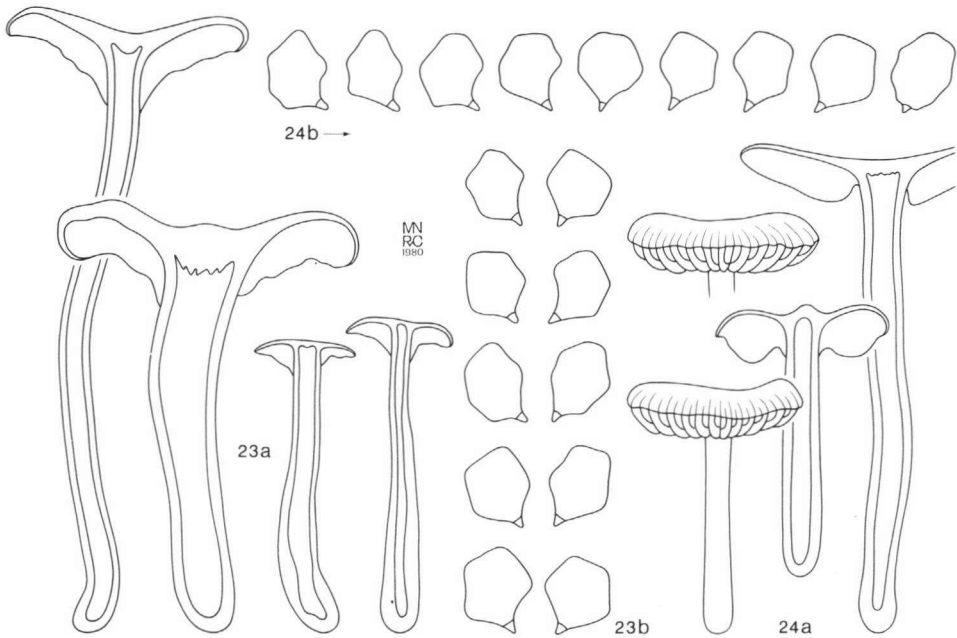
## 28. ENTOLOMA POLITUM forma **pernitrosum** (P. D. Orton)

Noordeloos, *comb. & stat. nov.*—Figs. 24a–b

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

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

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



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

Figs. 24a-b. *Entoloma politum* forma *pernitrosus*. — Habit and spores (all figs. from Noordeloos 467).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

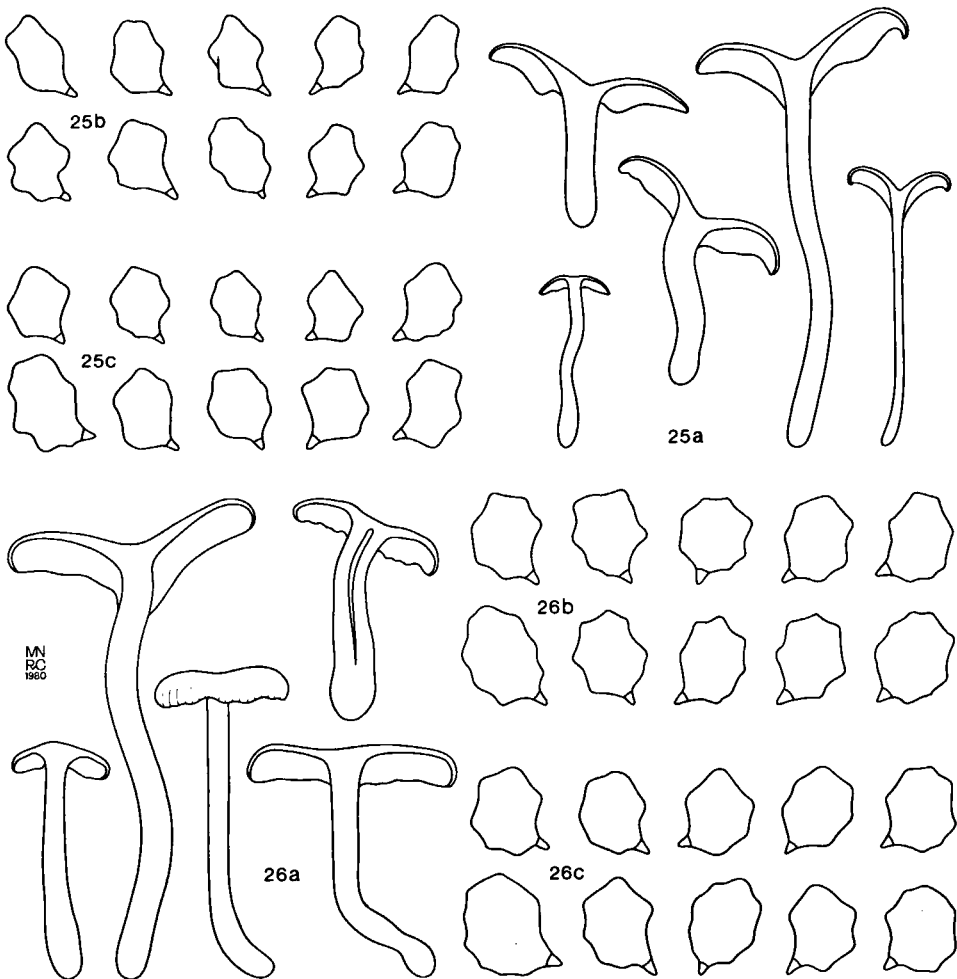
### 30. ENTOLOMA BISPORIGERUM (P. D. Orton) Noordeloos.—Figs. 26a–c

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

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

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

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



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

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

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

**COLLECTIONS EXAMINED.**—NETHERLANDS: prov. Groningen, Vlagtwedde, Lieftingsbroek, 21 Oct. 1978, *M. E. Noordeloos* 817, 818, 819, 821; prov. Drenthe, Beilen 'Knyppstra's veentje', 18 Oct. 1977, *P. B. Jansen*; prov. Overijssel, Ommen, 26 Sept. 1964, *E. Kits v. Waveren*; prov. Zuid-Holland, estate 'ter Horst', 28 Sept. 1977, *M. E. Noordeloos* 469, 470; prov. Noord-Brabant: Budel, visvijvers,



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

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

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

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

#### ENTOLOMA section CLITOPILOIDES (Romagn.) Noordeloos

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

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

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

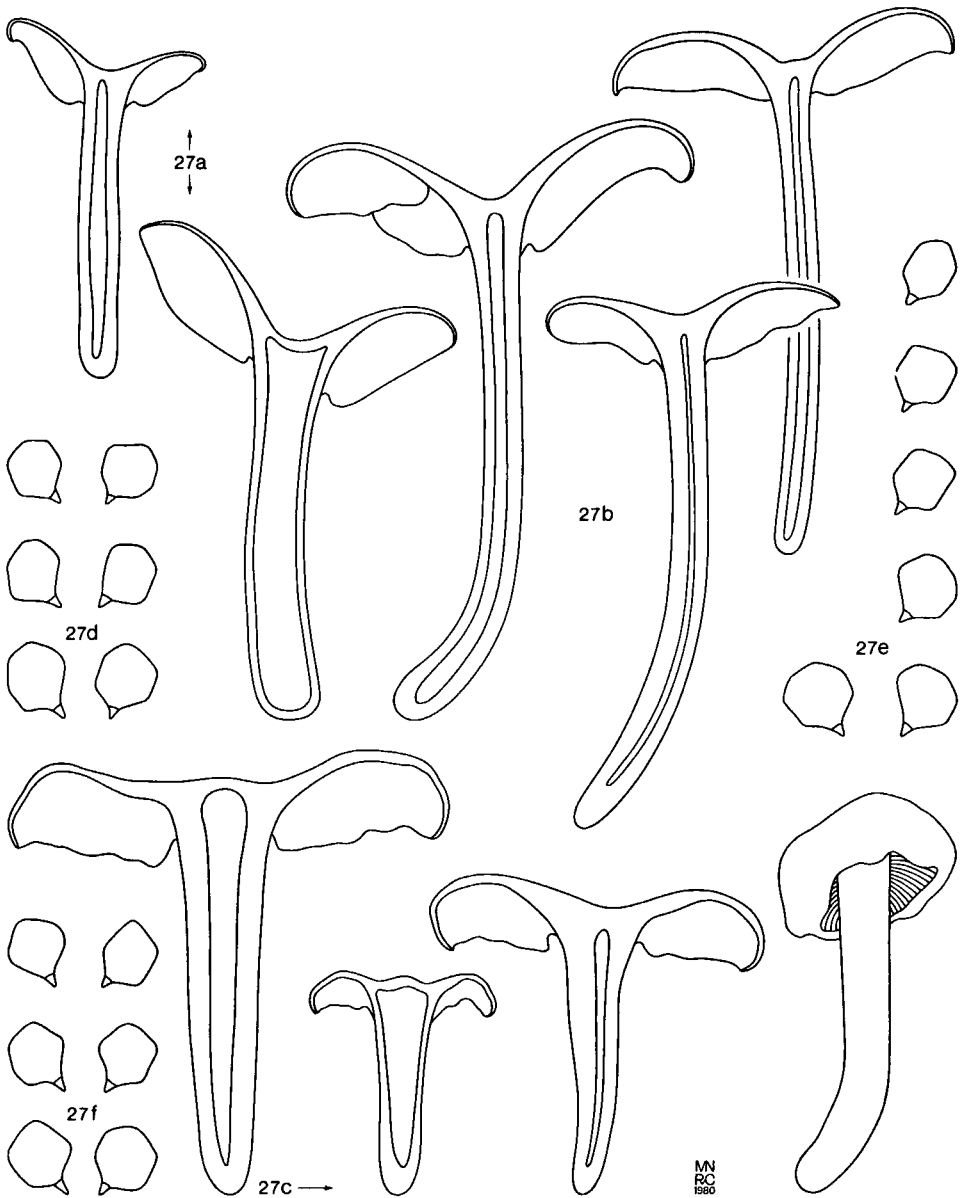
#### 31. ENTOLOMA COSTATUM (Fr.) Kumm.—Figs. 27a—f

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

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

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

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



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

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

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

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

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

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

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

#### ENTOLOMA section TURFOSA (Romagn.) Noordeloos

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

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

## KEY TO THE SPECIES OF SECTION TURFOSA

- 1a. Carpophores small, collyboid to mycenoid; pileus 8–32 mm broad, convex with depressed centre, rarely subpapillate; lamellae broadly adnate, sometimes with decurrent tooth, rarely slightly emarginate; stipe 1.5–3 mm broad; in grasslands, heathlands, etc. . . . . 2
- b. Carpophores small to medium-sized rarely large, tricholomatoid; pileus 15–60(–85) mm broad, conical to convex, finally flattened, with broad, rounded umbo; lamellae deeply emarginate to almost free; stipe 3–8(–13) mm broad; in moist coniferous forest, more rarely in mixed or frondose woods, also in heathlands or dune-meadows with *Salix repens* . . . . . 4
- 2a. Stipe with violaceous and/or lilaceous tinges. . . . . *E. vinaceum* var. *violeipes*, p. 226
- b. Stipe with yellow and/or grey tinges only . . . . . 3
- 3a. Stipe with distinct ochraceous or yellow tinge. . . . . *E. vinaceum* var. *vinaceum*, p. 223
- b. Stipe smoke-grey or grey-brown . . . . . *E. vinaceum* var. *fumosipes*, p. 225
- 4a. Lamellae crowded, normally thick; stipe distinctly silvery striate lengthwise . . . . . 5
- b. Lamellae fairly distant, thickish; smell absent or pronouncedly aromatical like that of cumarine (like *Anthoxanthum odoratum*); stipe fibrillose but not really striate  
*E. turbidum* var. *pachylamellatum*, p. 222
- 5a. Smell and taste strongly farinaceous; stipe distinctly brown; carpophores relatively large and brittle; in frondose forests (*Fagus sylvatica*). . . . . *E. pseudoturbidum*, p. 232
- b. Smell none or only weakly farinaceous; taste rancid with bitterish aftertaste or weak; stipe pale brown, but appearing white because of dense silvery-fibrillose striation; carpophores small to medium-sized; flesh relatively firm; in or near coniferous forests or in heathlands, poorly manured pastures, etc.  
*E. turbidum* var. *turbidum*, p. 220

## ENTOLOMA TURBIDUM (Fr.) Quél.

*Agaricus turbidus* Fr., Syst. mycol. 1: 205. 1821. — *Entoloma turbidum* (Fr.) Quél. in Mém. Soc. Emul Montbéliard, sér. II, 5: 119. 1872. — *Rhodophyllus turbidus* (Fr.) Quél., Enchir.: 59. 1886.

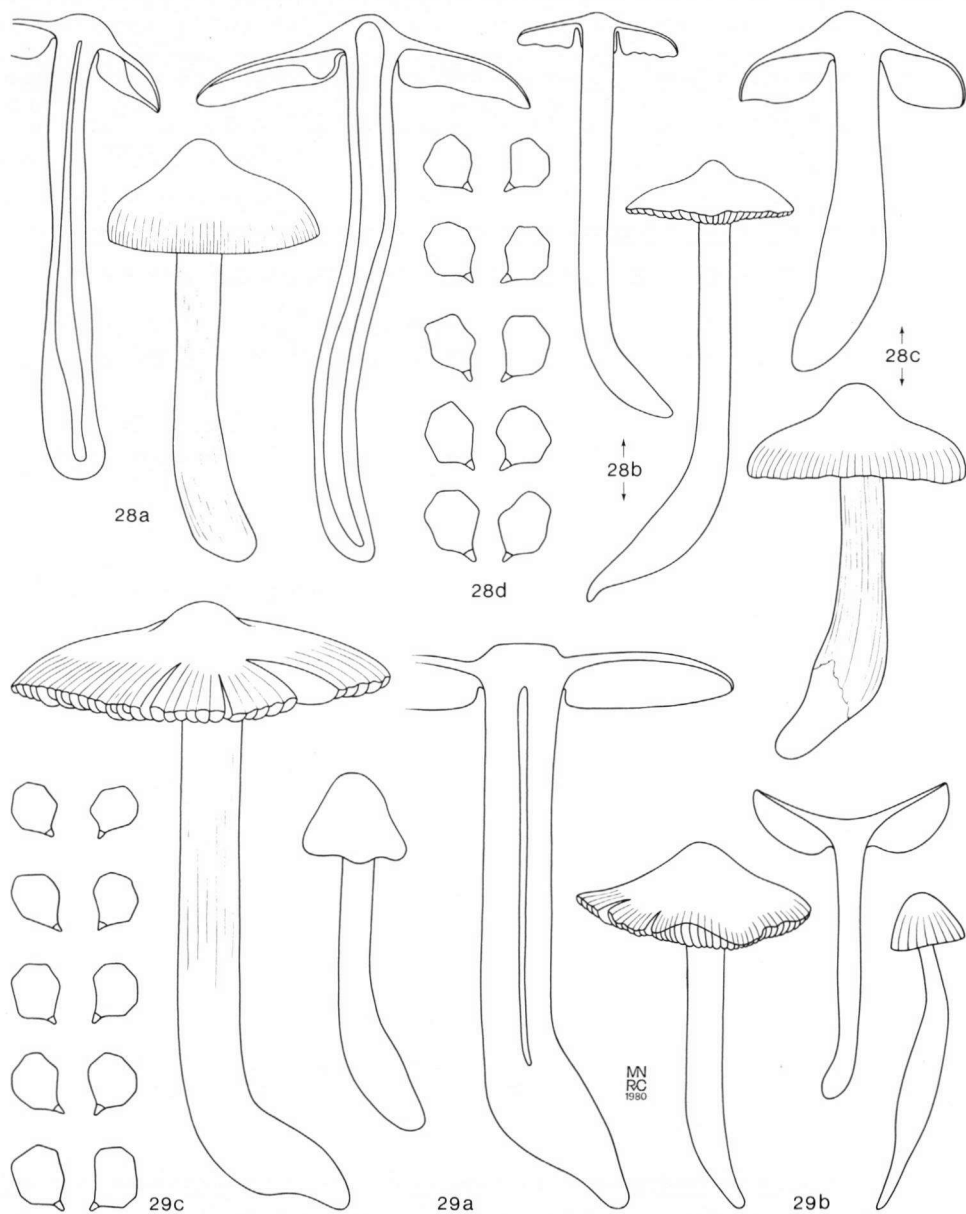
*Entoloma costatum* var. *cordae* P. A. Karst., Hattsv. 1: 268. 1879. — *Entoloma cordae* (P. A. Karst.) P. A. Karst. in Meddn Soc. Fl. fenn. 5: 9. 1879. (Symb. ad Myc. fenn. 6).

## 32. var. TURBIDUM.—Figs. 28a–d

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

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

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



Figs. 28a-d. *Entoloma turbidum* var. *turbidum*. — Habit and spores (28a, d from Noordeloos 175; 28b from Noordeloos 224; 28c from Bas, 5 Nov. 1977).

Figs. 29a-c. *Entoloma turbidum* var. *pachylamellatum*. — Habit and spores (all figs. from holotype).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

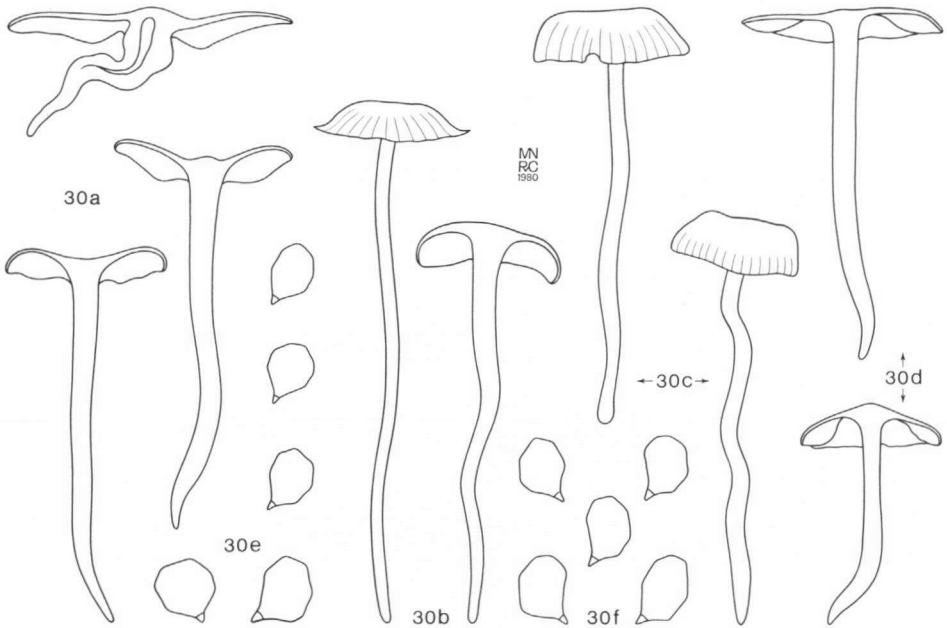
#### 34. var. VINACEUM—Figs. 30a–f

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

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

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

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



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



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

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

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

### 35. var. *FUMOSIPES* Arnolds & Noordeloos

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

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

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

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

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

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

### 36. var. VIOLEIPES Arnolds & Noordeloos

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

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

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

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

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

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

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Drenthe: Westerbork, Mantinge, Mantingerzand, 13 Nov. 1974, *E. Arnolds* 3322 (holotype), idem, Boekweitenplas, 25 Oct. 1974, *E. Arnolds* 3268 (WBS); Elp, near Zwiggelsterstraat, 31 Oct. 1974, *B. de Vries* (WBS); Dwingelo, Geuringerveld, 2 Dec. 1974, *E. Arnolds*; prov. Zeeland, Isl. Walcheren, Vrouwenpolder, near Oranjesbosch, 9 Nov. 1970, *C. Bas* 5511.

GREAT BRITAIN; Wales, Lake Vyrnwy, 15 Sept. 1977, *E. Kits van Waveren*.

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

- (i) The typical variety with a yellow stipe: var. *vinaceum*.
- (ii) A variety with a violaceous stipe: var. *violeipes*. (See also *E. turbidum* var. *macrius*, p. 244).
- (iii) A variety with a smoke-grey stipe: var. *fumosipes*.

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

### EXTRALIMITAL SPECIES

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

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

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

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

HABITAT & DISTRIBUTION.—In subalpine *Alnus viridis* stands and in *Salix-Betula* swamp-forests, France.

COLLECTION EXAMINED.—FRANCE, dept. Haute Savoie, Samoëns, 23 Aug. 1952, R. Kühner 52. 76 (herb. Kühner, LY).

*Entoloma alnobetulae* is a small member of subsection *Rhodopolia* close to *E. subradiatum*, from which it differs in the dark coloured lamellae and stipe and in the habitat.

#### 38. *Entoloma alpicola* (Favre) Noordeloos, *comb. nov.*—Fig. 45

*Rhodophyllus clypeatus* var. *alpicola* Favre, Champ. supér. Zone alp.: 200. 1955 (basionym).—*Rhodophyllus alpicola* (Favre) Kühn. in Bull. Soc. mycol. Fr. 93: 453. 1977.

SELECTED ICONES & DESCRIPTIONS.—Favre, l.c.: 61, fig. 14, pl. 4 fig. 14. 1955. — Kühner, l.c.: 460–464. 1977. — Lange, M. & Gulden in Norw. J. Bot. 18: 13, 1971.

**CHARACTERISTICS.**—Pileus 15–60 mm broad, conico-convex to campanulate, then expanding to bluntly conical or convex, with involute margin when young, hygrophanous, when moist dark blackish brown, reddish brown or greyish brown, in mature specimens with paler, yellowish brown or reddish brown limb, very obscurely translucently striate at margin or not, pallescent on drying, smooth or particularly at centre slightly rimose. Lamellae almost free to adnexed, adnate or emarginate, ventricose, white or greyish to pale grey-brown, finally with pink tinge, with irregular, concolorous or slightly paler edge. Stipe 6–45 × 4–10 mm, cylindrical usually tapering towards base, white or whitish, striate, often with aeriferous, almost pruinose surface, solid or narrowly fistulose. Smell spontaneously weakly to distinctly farinaceous. Taste rancid-farinaceous.

Spores (7.4–)8.1–10.4 × 7.1–8.5  $\mu\text{m}$ ,  $Q = 1.05–1.15–1.25$ , almost isodiametrical, 5–7-angled in side-view. Basidia 4-spored. Cystidia absent. Pileipellis a cutis of 2–7  $\mu\text{m}$  wide, cylindrical hyphae, sometimes, particularly at centre with numerous ascending, clavate terminal cells, with brown intracellular pigment. Clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—In snowbed-communities with *Salix herbacea* in alpine and subarctic habitats in central Europe and Scandinavia, known to occur in France, Switzerland, Norway and Sweden.

**COLLECTION EXAMINED.**—NORWAY, Hordaland, Ulvik, Finse, between Finse and Lille Finsenuet, 22 Aug. 1975, G. Gulden 173/75.

*Entoloma alpicola* is one of the most common *Entoloma* species in alpine and subarctic snowbed communities with *Salix herbacea* (Kühner, l.c. 1977; G. Gulden, pers. comm.) and has a wide distribution. It differs from *E. clypeatum* among other things in the habitat, periodicity, size and shape of the spores and in the structure of the pileipellis. It enters subsection *Rhodopolia* close to *E. lividoalbum* and *E. subradiatum*.

### 39. *Entoloma anthracinum* (Favre) Noordeloos, *comb. nov.*—Fig. 48

*Rhodophyllus anthracinus* Favre, Champ. supér. Zone alp.: 200. 1955 (basionym).

**SELECTED ICONES AND DESCRIPTIONS.**—Favre, l.c.: 60, fig. 39, pl. 5 fig. 10. 1955.—Kühner in Bull. Soc. mycol. Fr. 93: 471–472. 1977.

**CHARACTERISTICS.**—Carpophores dwarfish, very dark grey-brown in all parts; pileus 7–27(–38) mm broad, hemispherical when young, soon flattened with slightly depressed centre, with involute margin when young, slightly hygrophanous, very dark blackish brown, translucently striate at margin only or not, slightly pallescent on drying, smooth or somewhat rugulose-fibrillose. Lamellae often rather distant, adnate-subdecurrent to adnate-emarginate, sinuate then segmentiform finally narrowly ventricose, grey-brown. Stipe 6–20 × 0.7–3 mm, greyish brown, paler than pileus, smooth as if polished.

Spores 7.5–11.5(–12.7) × 6.7–9.5(–10.0),  $Q = 1.15–1.25$ , subisodiametrical to slightly ellipsoid in outline, with (4–)5–7(–8) angles in side-view. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 40–230  $\mu\text{m}$  long. Pileipellis a thin cutis of narrow, 2–7.5  $\mu\text{m}$  wide hyphae with abundant intracellular pigment. Clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—In subalpine *Salix herbacea*-heaths, France, Switzerland.

**COLLECTION EXAMINED.**—FRANCE, dept. Vanoise, Région du Col de l'Iséran, 26 Aug. 1973, R. Kühner 73–306 (herb. Kühner, LY).

*Entoloma anthracinum* enters section *Polita* on account of its polished stipe, intracellular pigment and numerous clamp-connections. It differs from *E. politum* and *E. caccabus* in the dark-pigmented, hardly striate pileus, large subsodiametrical spores and in the habitat. *Entoloma subflexipes*, also described from the subalpine zone, differs in its smaller, distinctly ellipsoid spores, paler lamellae and farinaceous smell (see below).

#### 40. *Entoloma atrosericeum* (Kühn.) Noordeloos, *comb. nov.*—Fig. 37

*Rhodophyllus atrosericeus* Kühn. in Bull. Soc. mycol. Fr. 93: 454. 1977 (basionym).

SELECTED DESCRIPTION.—Kühner, l.c.: 487–491. 1977.

CHARACTERISTICS.—Carpophores reminding of those of *E. sericeum*. Pileus 10–38 mm, broad, conico-campanulate at first with slightly reflexed margin, then campanulate, hemispherical or conical, sometimes expanding to convex, then usually with umbo, very dark grey-brown or bistre, almost blackish, rarely with slight olivaceous tinge, not or very obscurely striate at margin only, smooth, shining. Lamellae moderately crowded, sinuate or emarginate, often almost free, always rather dark, tinged with grey-brown or brown, often with an ochraceous, yellowish or olivaceous tinge, with concolorous or slightly paler edge. Stipe 9–35 × 2–6(–7) mm, cylindrical, rarely flattened, pale grey then grey-brown, often with yellowish or olivaceous-grey tinge, at first aeriferously striate lengthwise, sometimes becoming innately fibrillose or even fibrillose-costate with age. Flesh brownish, thin in pileus. Smell usually distinctly farinaceous-rancid.

Spores (7–)8–10(–11) × 6.4–8.3(–9)  $\mu\text{m}$ ,  $Q = (1.0\text{--})1.05\text{--}1.1\text{--}1.2\text{--}(1.3)$ , 5–7-angled in side-view, subsodiametrical to slightly ellipsoid in outline. Basidia 4-spored. Cystidia none. Hymenophoral trama regular, made up of relatively short (45–170 × 3–27  $\mu\text{m}$ ) inflated cells. Pileipellus a cutis of narrow cylindrical hyphae, 2.5–7  $\mu\text{m}$  wide, gradually passing into pileitrama. Pileitrama in upper layer made up of cylindrical hyphae, 7–20  $\mu\text{m}$  wide, in lower parts made up of chains of cylindrical to inflated cells, 55–210 × 5–31  $\mu\text{m}$ . Pigment coarsely encrusting in all coloured parts of the carpophore. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In alpine and subarctic grasslands, also near *Salix herbacea* or *S. retusa* or in *Dryas*-heaths; Alps (France) and Scandinavia (Norway, Sweden), common (according to Kühner; l.c.).

COLLECTIONS EXAMINED.—NORWAY, Hordaland, Hardanger, Djuptj., 1320 mm alt. near Hallingskarvet, 31 July 1967, R. Kühner 67.18 (herb. Kühn., LY).

In the field *E. atrosericeum* resembles *E. sericeum* strongly but is considerably darker. Furthermore in *E. atrosericeum* clamp-connections are very abundant in all tissues, including the covering layers, whereas in *E. sericeum* clamp-connections only rarely occur in other parts than in the hymenium (Noordeloos 1980: 479). In addition the size and shape of cells in the hymenophoral trama of *E. atrosericeum* made Kühner decide to describe his finds as a new species in the subgenus *Entoloma* and not in subgenus *Nolanea*, where *E. sericeum* belongs.

#### 41. *Entoloma brassicolens* (Reid) Noordeloos, *comb. nov.*—Fig. 39

*Nolanea brassicolens* Reid in Trans. Br. mycol. Soc. 48: 518. 1965 (basionym).

SELECTED ICONES AND DESCRIPTION.—Reid in Fung. rar. Icon. col. 2: 12–13 fig. 9a–d, pl. 13a. 1967.

**CHARACTERISTICS.**—Pileus 22–38 mm, broad, conico-convex to convex, sometimes with weak umbo, sometimes slightly depressed, not hygrophanous when young, pale yellowish brown with grey-brown centre, smooth, dull, in older specimens hygrophanous, when moist dull brown with closely grooved margin, pallescent to yellowish brown on drying, with greasy-waxy surface when moist and then densely and minutely radially wrinkled under lens. Lamellae not very crowded, adnexed, up to 6 mm broad, at first buff, finally yellowish fawn with pinkish tinge. Stipe about 20–30 × 4–10 mm, white at first, in older specimens yellowish fawn, cylindrical and solid at first, becoming fistulose and broadened, clavate at base with age. Flesh white when young, at length greyish. Smell strongly like that of rotting cabbage or more like *Allium ursinum*.

Spores 7.6–9.3 × 7.0–8.3 μm (according to Reid: 8–10 × 6–8 μm), subisodiametrical in outline, Q=1.05–1.15–1.25, with 5–7 angles in side-view. Basidia 4-spored. Cystidia absent. Hymenophoral trama made up of more or less inflated cells, 34–95(–120) × 12–40 μm. Pileipellis a cutis with transitions to a trichodermium, made up of cylindrical 4.5–12 μm wide hyphae, frequently with bundles of more or less ascending, cylindrical ‘hairs’, up to 85 μm long and up to 14 μm wide, with intracellular pigment. Clamp-connections numerous in all parts of carpophore.

**HABITAT & DISTRIBUTION.**—In mixed woodland; so far only known from two localities in Northern Ireland.

**COLLECTION EXAMINED.**—GREAT BRITAIN, Northern Ireland, Co. Down, Saintfield Demesne, 5 Sept. 1964, D. A. Reid (holotype, K).

*Entoloma brassicolens* is a fairly remarkable species with the changing aspect of its pileal surface from non-hygrophanous and smooth when young to distinctly hygrophanous and radially wrinkled when older and its strong fetid smell, which is rare in the genus *Entoloma*. This type of smell is only known from one other species, viz. *E. foetulentum* Noordeloos (= *Nolanea foetida* Killerm.) That species, however, differs widely from *E. brassicolens*, among other things in its habit, its colour, and its large spores which are distinctly ellipsoid in outline.

*Entoloma brassicolens* is transferred here from subgenus *Nolanea*, in which it was originally placed, to subgenus *Entoloma* on account of the size and shape of the tramal elements, the numerous clamps in all parts of the carpophore and the intracellular pigmentation. It keys out here in subsection *Rhodopolia*, but the affinities with other species of this subsection are rather obscure, as *E. brassicolens* has a rather unique set of characters viz. those of the pileal surface, the small, isodiametrical spores and the fetid smell.

#### 42. *ENTOLOMA INOCYBEFORME* Bon—Fig. 43

*Entoloma inocybeforme* Bon in Doc. mycol. 37–38: 90. 1979.

**CHARACTERISTICS.**—Carpophores tricholomatoid; pileus 30–50(–60) mm broad, conical at first then expanding to convex with rather pronounced conical umbo, with margin remaining long slightly involute, not or weakly hygrophanous, when moist yellowish brown with slight olivaceous tinge, darker at centre, not or slightly pallescent on drying, with strongly radially fibrillose-rimose surface. Lamellae narrowly adnate to broadly ventricose, sordid beige, only late becoming slightly tinged with pink. Stipe 30–50 × 8–10 mm, cylindrical, slightly tapering at base, whitish, slightly tinged yellowish at base, striate. Flesh whitish. Smell farinaceous when freshly cut, but later often with slight aromatic component.

Spores (7-)8.5-10(-11) × (6-)8-10 μm, subisodiametrical. Basidia 4-spored. Cystidia none. Pileipellis an ixocutis made up of 3-5 μm wide cylindrical hyphae with gelatinized walls. Clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—Terrestrial in grasslands (*Meso-Bromion*) on calcareous or loamy soils, France.

*Entoloma inocybeforme* is a member of section *Entoloma* close to *E. prunuloides*, from which it differs in the darker coloured, strongly radially fibrillose-rimose pileus.

During a foray of the Netherlands' Mycological Society in the Eifel in Western Germany in 1979 one specimen was collected of a species which most probably is identical with *E. inocybeforme*. It had the following characters:

Pileus about 60 mm broad, convex with broad umbo, fairly dark grey-brown (centre 10 YR 2/2-3/2; limb 10 YR 5/2, 6/2, 7/2), paler at margin, very strongly radially fibrillose-fissurate. Lamellae L about 60, l = 1-3, almost free, ventricose, pale pink (10 YR 7/3 to 7.5 YR 8/4). Stipe 58 × 10 mm, slightly tapering towards base, sordid brown-grey with slight purple tinge (about 7.5 YR 5/2-4/2), innately striate lengthwise, whitish-yellowish at base (2.5 Y 8/4). Flesh sordid white, firm. Smell faint, slightly farinaceous when cut. Taste strongly farinaceous-rancid.

Spores 8.1-8.7 × 7.6-8.1 μm, Q = 1.0-1.07, rounded 5-6-angled in side-view, almost isodiametrical. Basidia 4-spored. Cystidia absent. Pileipellis an ixocutis made up of 2-5(-7) μm wide cylindrical hyphae with easily desintegrating-gelatinizing walls, filled with brown intracellular pigment.

**HABITAT.**—In sun-lit xerophytic grassland on calcareous soil.

**COLLECTION EXAMINED.**—GERMAN FEDERAL REPUBLIC; Rheinland-Pfalz, Eifel, Gerolstein, Feriendorf Felsenhof, 30 Sept. 1979, *Th. W. Kuyper*.

This collection deviates from Bon's original diagnosis only in the slightly darker pileus and the purplish tinge of the stipe.

#### 43. ENTOLOMA PRUNULOIDES (Fr.) Quél.—Figs. 32a-b

*Agaricus prunuloides* Fr., *Syst. mycol.* 1: 198. 1821. — *Entoloma prunuloides* (Fr.) Quél. in *Mém. Soc. Emul. Montbéliard*, sér. II, 5: 117. 1872. — *Rhodophyllus prunuloides* (Fr.) Quél., *Enchir.*: 57. 1886.

*Entoloma autumnale* Velen., *Novitates mycologicae novissimae*: 133. 1939.

**MISAPPLIED NAME.**—*Entoloma repandum* sensu J. Lange, *Fl. agar. dan.* 2: pl. 73A. 1936.

**EXCLUDED NAME.**—*Rhodophyllus prunuloides* sensu Konrad & Maublanc, *Icon. sel. Fung.* 2: pl. 187. 1930 (= *E. sepium*).

**SELECTED ICONES AND DESCRIPTIONS.**—Einhellinger in *Ber. Bayer. bot. Ges.* 41: 107, figs. 22-24, pl. 11a. 1969. — Kühner in *Bull. Soc. mycol. Fr.* 93: 457-459. 1977. — Lange, J., *Fl. agar. dan.* 2: pl. 73A (as *R. repandum*) and pl. 73B. 1936. — Möller, F. H., *Fungi Faeröes* 1: 250. 1945.

**CHARACTERISTICS.**—Habit tricholomatoid; pileus non-hygrophanous greyish-brownish or yellowish-greyish, smooth, viscidulous when moist; lamellae pale then pink; stipe white or grey, fibrillose striate; smell strongly farinaceous, particularly when cut; spores small, isodiametrical, about 6-8 μm in diameter; in grasslands.

Pileus up to 70 mm broad, more or less convex with broad rounded umbo and strongly undulating marginal zone, not hygrophanous, pale yellowish-greyish (2.5 Y 8/3 towards 10 YR 8/4, at centre more like 10 YR 8/6-8/8), viscidulous when moist, smooth. Lamellae L = 45-50, l

= 1–3, distant, thickish, deeply emarginate, ventricose, pink, with serrate, concolorous edge. Stipe 75 × 12 mm, cylindrical, white, downwards with weak yellow tinge, coarsely fibrillose striate lengthwise, stuffed. Flesh white, firm. Smell strongly farinaceous, particularly when cut.

Spores 6.8–8.0(–8.6) × 6.4–8.0 μm, Q=1.0–1.05–1.1; L–D=0–0.6(–1.0) μm, almost isodiametrically 5–7-angled in side-view. Basidia 27–45 × 7–13 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of cylindrical to distinctly inflated cells, 45–110 × 12–20 μm. Pileipellis a simple cutis of 2.5–5(–7) μm wide cylindrical cells with easily desintegrating walls and pale brownish intra-cellular pigment. Pileitrama regular, made up of cells similar to those of hymenophoral trama. Clamp-connections numerous.

HABITAT & DISTRIBUTION.—In grasslands (preferably in mountainous areas?). Rare. Known to occur in north-western Europe and in France (Kühner, l.c.).

COLLECTION EXAMINED.—DENMARK, Sjaelland, Eskebjerg Vesterlyng, 15 Sept. 1974, *H. Knudsen* (C). —GERMAN FEDERAL REPUBLIC, Eifel, Gerolstein, Feriendorf Felsenhof, 26 Sept. 1980, *M. E. Noordeloos* 1284.

*Entoloma prunuloides*, the type-species of the genus, seems to be rather rare and according to Kühner (1977, l.c.) typical for mountainous meadows. However, it has occasionally been found also in lowlands as demonstrated by Möller (l.c.) and by the collection from Denmark mentioned above. The macroscopical description given above is based on only one collection (*Noordeloos* 1284) and therefore not representative for the species. For more details on the variability of *E. prunuloides* I refer to the excellent descriptions given by Kühner (l.c.) and J. Lange (l.c.).

#### 44. ENTOLOMA PSEUDOTURBIDUM (Romagn.) Moser—Fig. 34

*Rhodophyllus pseudoturbidus* Romagn. in (Trav. mycol. d'éd. R. Kühner) Bull. mens. Soc. Linn. Lyon 43 (Num. spéc.): 386. 1974. — *Entoloma pseudoturbidum* (Romagn.) Moser in Beih. Sydowia 8: 269. 1979. SELECTED ICON AND DESCRIPTION.—Dähnke & Dähnke, 700 Pilze: 252. 1979.

Pileus 30–85 mm broad, bluntly conical or hemispherical, then expanding to plano-convex with or without broad umbo, with margin slightly involute when young, but straight when older, hygrophanous, not (or at outermost margin only) translucently striate, dark amber brown or sepia, slightly pallescent on drying, subviscid when moist, on drying becoming strongly innately radially fibrillose to subrugulose. Lamellae crowded, ascending and almost free, ventricose, up to 11 mm broad, sordid greyish (to grey-brown) already when young, later on turning reddish brown, with serrulate, concolorous edge. Stipe (70–)90–110 × (5–)8–13 mm, cylindrical or distinctly broadened at base, greyish or greyish-brownish, almost concolorous with limb of pileus, striate with shining fibrils, sometimes twisted. Flesh whitish or especially when water-soaked brownish, brittle. Smell and taste strongly farinaceous.

Spores 6.3–8.1 × 6.5–7.3 μm, 5–7-angled in side-view, almost isodiametrical with rounded or more or less pronounced angles, thin-walled. Basidia 32–45 × 8.4–14 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 60–97(–110) × 12–32 μm. Pileipellis a cutis of narrow, cylindrical 3.5–7 μm wide hyphae with easily desintegrating walls and brown intracellular pigment; subpellis regular, made up of relatively short, inflated cells. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In frondose forest (*Fagus sylvatica*), terrestrial. So far known only from the type-locality in France and from Poland (Moser, 1979: 270).

COLLECTION EXAMINED.—FRANCE, dept. Oise, Forêt de Hez-Froidmont, 18 Nov. 1960, *M. Gasnier* (holotype, herb. Romagn. 58. 432, PC).



*Entoloma pseudoturbidum* differs from *E. turbidum* in the large, brittle carpophores, relatively dark coloured stipe, strong farinaceous smell and taste, and most probably also in the habitat: frondose forests (*Fagus sylvatica*) probably on rich soils. *Entoloma turbidum* prefers acidulous soils and grows mainly in or near coniferous forests, heath-like vegetations such as *Ericeta*, and on poorly manured pasture-lands. *Entoloma pseudoturbidum* is apparently rare as it has been recorded only twice, from quite different places.

#### 45. *ENTOLOMA RHODOPOLIUM* (Fr.) Kumm.—Fig. 44

*Agaricus rhodopolius* Fr., Syst. mycol. 1: 197. 1821. — *Entoloma rhodopolium* (Fr.) Kumm., Führ. Pilzk. 98. 1871. — *Rhodophyllus rhodopolius* (Fr.) Quél., Enchir.: 59. 1886.

SELECTED ICONES & DESCRIPTION.—J. Lange, Fl. agar. dan. 2: 95–96, pl. 75A. 1936.

Pileus 50–90(–110) mm broad, conico-convex, soon plano-convex or flattened with weak umbo, with margin slightly involute when young but becoming straight with age, hygrophanous, when moist pale greyish-brownish, pallescent on drying to sordid grey or whitish. Lamellae adnate, sometimes with slight decurrent tooth, white then pink. Stipe up to 120 × 6–12 mm, cylindrical, sordid white, fibrillose-striate lengthwise. Flesh sordid white, brittle. Smell none. Taste none or slightly farinaceous.

Spores (7.5–)8.1–9.3 × 7.0–8.1 μm, Q = 1.05–1.15–1.25, L–D = 0.6–1.2–1.7 μm, irregularly 6–8(–9)-angled in side-view, probably with dihedral base. Basidia 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated cells, 60–125 × 7–29 μm. Pileipellis a simple cutis of 1.8–8.0 μm wide cylindrical hyphae with pale brown walls and scattered also some intracellular pigment. Clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—In frondose woods; according to J. Lange in *Fagus* forests, according to some other danish mycologists in *Betula* forests. Recorded from many countries in Europe, but in its present narrow concept only known with certainty from Denmark.

COLLECTION EXAMINED.—DENMARK, 2 collections brought in at the exposition at Jaegersborg Dyrehave, Klampenborg, Sjælland, Sept. 1980, *M. E. Noordeloos 1234 & 1237*.

The description given above represents *E. rhodopolium* in the sense of J. Lange, which may be the same as that of Kühner & Romagnesi (1954: 20–21). It is a fairly stout fungus with pale colours with hardly any smell and with predominately membranal pigment. *Entoloma nidorosum* is very close, but is usually smaller, more slender, slightly darker sometimes, and less grey and usually has a distinct nitrous smell, a nasty-rancid taste, and exclusively intracellular pigment.

Fries' description of the species agrees with J. Lange's interpretation, but his diagnosis permits other interpretations as well, such as *E. sericatum* and *E. majaloides*. There is a great need for neotypification of this classical Friesian species.

#### 46. *Entoloma subflexipes* (Kühn.) Noordeloos, *comb. nov.*—Fig. 40

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

Carpophores small. Pileus 5–15 mm broad, convex-umbilicate, finally with strongly undulating marginal zone, dark brown to blackish, translucently striate up to half the radius,

smooth or slightly rugulose. Lamellae distant, adnate or weakly adnate-decurrent, pink with brownish shade. Stipe 12–20 × 1–2.5 mm, grey-brown, paler than pileus, smooth as if polished, in some specimens with flocculose apex. Smell farinaceous.

Spores 8.1–9.3 × 6.4–8.1  $\mu\text{m}$ ,  $Q = (1.05\text{--})1.15\text{--}1.2\text{--}1.25$ , distinctly ellipsoid in outline with pronounced angles, often with distinctly dihedral base. Hymenophoral trama regular, made up of inflated cells, 46–110 × 14–32  $\mu\text{m}$ . Pileipellis a cutis of cylindrical 2–7  $\mu\text{m}$  wide hyphae, with brown, intracellular pigment. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In marshy places near *Salix herbacea* in alpine zone, France.

COLLECTION EXAMINED.—FRANCE, dept. Vanoise, environs de Prolognan; Cirque du Petit Marchet, 2390 m alt., 10 Aug. 1965, R. Kühner 65–67 (holotype; herb. Kühn., LY).

*Entoloma subflexipes* belongs to section *Polita* close to *E. politum* and *E. caccabus*. It differs from both in its dark pigmented pileus and its habitat, and from *E. politum* moreover in its distinctly ellipsoid spores. *Entoloma anthracinum* differs in the distinctly darker lamellae and larger, more irregularly shaped spores.

#### 47. ENTOLOMA VENOSUM Gill.—Figs. 31a–d

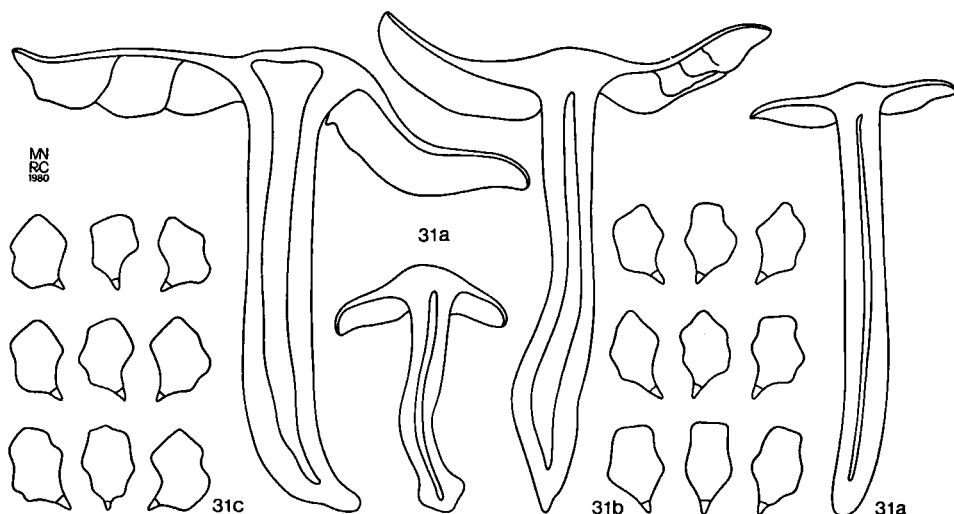
*Entoloma venosum* Gill., Hymen. Fr.: 403. 1876. — *Rhodophyllus venosus* (Gill.) Kühn. & Romagn., Fl. anal.: 193. 1953.

CHARACTERISTICS.—Pileus strongly hygrophanous, when moist very dark sepia, umber to blackish brown, not or very obscurely translucently striate at margin only, strongly pallescent on drying. Lamellae very dark grey-brown, frequently venose. Stipe with grey-brown tinge. Flesh brittle. Smell and taste strongly farinaceous-rancid. Spores 8–10.4 × 6.4–8  $\mu\text{m}$ ,  $Q = 1.25\text{--}1.3$  on the average per collection. Pigment of two types: coarsely encrusting the hyphae of pileipellis and pileitrama and in addition also intracellular. In or near coniferous forests in central Europe.

Pileus 25–75 mm broad, conico-campanulate at first then expanding, often with conical umbo, with involute margin when young, strongly hygrophanous, when moist very dark sepia, umber brown or blackish brown, not or only slightly translucently striate at margin, strongly pallescent on drying, smooth, often slightly felted at centre. Lamellae moderately distant, sometimes more or less crowded, adnate to adnexed, sometimes emarginate, segmentiform or narrowly ventricose, sometimes veined, usually already when young with distinct grey-brown tinge, becoming dark flesh-coloured brown with age, with slightly irregular, concolorous edge. Stipe 35–60 × 3.5–8 (–12) mm, cylindrical, sometimes slightly attenuated or broadened at base, moderately dark grey-brown, fibrillose striate lengthwise, pruinose-flocculose at apex. Flesh concolorous with surface, brittle. Smell and taste strongly farinaceous-rancid.

Spores 8.1–10.3 × 6.4–8  $\mu\text{m}$ ,  $Q = 1.1\text{--}1.4$  (–1.45), on the average per collection between 1.25 and 1.3,  $L\text{--}D = 0.6\text{--}1.7\text{--}2.5$   $\mu\text{m}$ , (5–)6–7-angled in side-view with pronounced angles, with distinct dihedral base. Basidia 32–50 × (7.5–)8.5–15  $\mu\text{m}$ , 4-spored. Cystidia none. Hymenophoral trama regular, made up of inflated or cylindrical cells, 32–95 (–115) × 7–18  $\mu\text{m}$ , frequently with brown, intracellular pigment. Pileipellis a cutis made up of up to 10  $\mu\text{m}$  wide cylindrical hyphae with coarsely brown-encrusted walls and, in addition, dark brown intracellular pigment. Pileitrama regular. Clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In or near coniferous forests (particularly *Picea*) in central Europe, preferably in mountainous areas.



Figs. 31a–d. *Entoloma venosum*. — Habit and spores (31a, b from *Romagnesi* 75.208; 31c from *Philipp & Bresinsky*, 17 Aug. 1968).

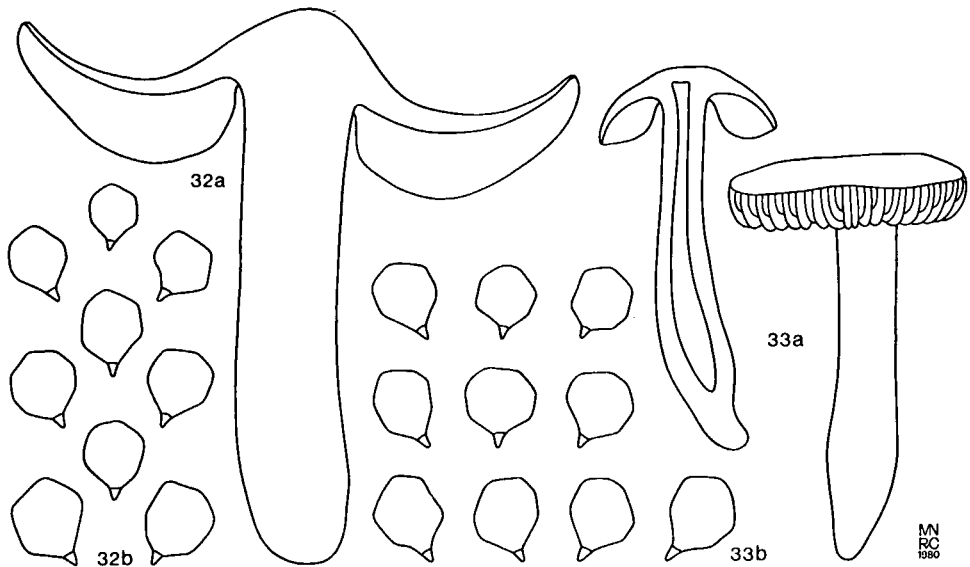
COLLECTIONS EXAMINED.—GERMAN FEDERAL REPUBLIC, Bayern, Traunstein, Knappenfelder Moor, 17 Aug. 1968, *Philipp & A. Bresinsky* (M). — POLAND, Lysogorskie, Swieta Katarzyna, Wilkowska dolina, 11 Sept. 1966, *C. Bas* 4755. — FRANCE, dept. Doubs, near Pontarlier, Sept. 1975, *H. Romagnesi* 75.208 (herb. Romagn., PC).

*Entoloma venosum* is very well characterized in its very dark pileus with two types of pigment and distinctly elongate spores. *Entoloma myrmecophilum* is closely related, but differs in having more isodiametrical spores, a preference for another habitat (frondose forests) and in the geographical distribution. *Entoloma platyphylloides* has a different pileal surface, viz. strongly radially fibrillose instead of smooth and shining, reminiscent of the pileal surface of *Oudemansiella platyphylla*. It should be mentioned, however, that I did not manage to get a clear concept of *E. platyphylloides* up till now (see insufficiently known taxa below, p. 245).

#### 48. ENTOLOMA VIRIDANS (Fr.) P. Karst.—Figs. 33a–b

*Agaricus viridans* Fr., Monogr. 2: 345. 1863. — *Entoloma viridans* (Fr.) P. A. Karst., Hattsv. 1: 262. 1874 (non *Entoloma viridans* Harrison & Lovejoy in Bot. Gaz. 50: 385. 1910). — *Rhodophyllus viridans* (Fr.) Quéll., Enchir.: 58. 1886.

CHARACTERISTICS.—Carpophores tricholomatoid, medium-sized; pileus, lamellae and stipe with distinct green tinge; pileus not hygrophanous, not striate; spores isodiametrical, small, (7.6–)8.1–8.7(–9.3) × 6.4–8.1 μm.



Figs. 32a–b. *Entoloma prunuloides*. — Habit and spores (all figs from Noorderloos 1284).

Figs. 33a–b. *Entoloma viridans*. — Habit and spores (all figs. from Kits v. Waveren, 2 Sept. 1969).

Pileus about 30 mm broad, hemispherical or conico-convex at first, soon flattened without umbo, with straight margin, not hygrophanous, not striate, dark greyish brown with green tinge at centre, towards margin paler and with more distinctly green tinge (at centre 10 YR (3/4), 4/4, 5/4, at limb 10 YR 4/4 to 2.5 Y 6/4), smooth, dry, at limb with small fibrillous-white patches ('veil'). Lamellae moderately distant, emarginate to almost free, ventricose, up to 6 mm broad, extending under pileus in mature specimens, greyish-greenish (5 Y 7/3, 6/3), only in late stages with pink tinge, with concolorous edge. Stipe up to 60 × 6 (at apex) × 9 (at base) mm, distinctly broadened at base then abruptly tapering, greyish-greenish (2.5 Y 5/4), minutely silvery striate lengthwise, smooth. Flesh concolorous with surface in cortex, in inner parts white, firm. Smell and taste indistinct.

Spores (7.6–)8.1–8.7(–9.3) × 6.4–8.1 μm, Q=1.0–1.1–1.25, L–D=0–1.0–1.7 μm, iso-diametrical, 6–8-angled in side-view. Basidia 21–35 × 7–10 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of inflated or subcylindrical cells, 70–200 × 8–19 μm. Pileipellis a cutis made up of 2.5–7.8 μm wide cylindrical hyphae with slightly gelatinizing walls. Pileitrama regular, made up of inflated cells, 45–110 × 7.5–17 μm, with brown intracellular pigment in upper layers. Vascular hyphae very numerous in pileitrama. Clamp-connections numerous in all tissues studied.

**HABITAT & DISTRIBUTION.**—The welsh collection was found along a brook in *Quercus* forest, growing in mosses. Rare; so far known with certainty from only two localities, one in Sweden and one in Great Britain. Occurring perhaps also in the German Federal Republic (see below).

**COLLECTION EXAMINED.**—G R E A T B R I T A I N, Wales, Lake Vyrnwy, 2 Sept. 1969, *E. Kits v. Waveren*.

In the Herbarium of the Botanische Staatssammlung, München, the following collection was encountered: *Entoloma viridans*, Augsburg, 1912, *S. Killermann*. It contains one dried specimen with a water-colour sketch giving the following details:

Pileus conico-campanulate to conico-convex, not hygrophanous (?), greyish-olivaceous (about 2.5 Y 8/2–8/4), shining. Lamellae almost free, narrowly ventricose (not extending under the pileus) sordid pink. Stipe about 60 × 5 (apex) – 8 (base) mm, distinctly broadened at base, concolorous with pileus. Spores 7.1–8.7 × 6.4–7.1 (–8.1)  $\mu\text{m}$ ,  $Q = (1.0\text{--})1.07\text{--}1.13\text{--}1.25$ ,  $L\text{--}D = (0\text{--})0.6\text{--}1.1\text{--}1.7$   $\mu\text{m}$ , (sub-)isodiametrical, 6–8-angled in side-view. Basidia 4-spored, with clamp.

The poor condition of the collection did not allow a critical study of the trama and the covering layers. I did not see any pigment.

Fries described *Agaricus viridans* on the evidence of a collection made by von Post. Probably he saw only the water-colour that has been published in his *Icones* (1867: pl. 98 fig. 3). It depicts a vivid green *Entoloma*, even with green flesh. As far as I could verify, this remarkable species has never been found again. However, on account of its remarkable characters it has usually been accepted by later mycologists, who copied Fries description. *Entoloma viridans* has invariably been placed in section *Entoloma* close to *E. madidum* (P. Karst., 1886: 58; Saccardo 1887: 686).

In the herbarium of Dr. E. Kits v. Waveren, Amsterdam, I met with the collection described above, which fits more or less the Friesian diagnosis of *Agaricus viridans*. It belongs undoubtedly to section *Entoloma* on account of its habit, its non-hygrophanous pileus and its small, isodiametrical spores. The green tinges in pileus and stipe are unmistakable but not as bright as in the type plate. Also the habit is different: the type plate shows a slender *Entoloma* with an acutely umbonate pileus and a straight cylindrical stipe. The collection of Dr. E. Kits v. Waveren differs in the lack of an umbo and having a distinctly broadened stipe. These differences, however, may be due to infra-specific variation. (Compare the variability in habit and colour of *E. madidum*, p. 161).

The collection made by the Bavarian mycologist Killermann represents probably a more slender and paler form of *E. viridans*. It is unknown whether the colours of Killermann's painting have changed; they are rather pale olivaceous grey now.

From all this we may conclude that in section *Entoloma* there exist at least one taxon more or less resembling *Agaricus viridans* Fr. More well-annotated material is needed to allow more definite conclusions.

#### INSUFFICIENTLY KNOWN TAXA

**accola.**—*Agaricus accola* Britz. in Ber. naturhist. Ver., Augsburg 26: 138. 1881. — *Entoloma accola* (Britz.) Sacc., Syll. Fung. 5: 693. 1887.

**CHARACTERISTICS.**—Pileus convex-umbilicate, reddish brown, fibrillose-shining; lamellae white then pink, finally with brownish edge, adnexed to slightly decurrent; stipe slightly paler than pileus, white at base; spores 10–11 × 6–8  $\mu\text{m}$ , ellipsoid in outline, irregularly 6-angled.

**HABITAT & DISTRIBUTION.**—In forests, E. Bayern, German Federal Republic.

Type non-existent. According to the description and plates *E. accola* is close to *E. costatum*, but seems to differ in the elongate spores.

**appositivum.**—*Agaricus appositivus* Britz. in Ber. naturhist. Ver. Augsburg 28: 149. 1885. — *Entoloma appositivum* (Britz.) Sacc., Syll. Fung. 5: 684. 1887.

CHARACTERISTICS.—Pileus convex, dark brown; lamellae brownish pink; stipe greyish, up to two times longer than the diameter of the pileus.

HABITAT & DISTRIBUTION.—In forest near Oberstaufen, Bayern, German Federal Republic.

Type non-existent. *Entoloma appositivum* is obviously a member of section *Rhodopolia*.

**atropellitus.**—*Rhodophyllus atropellitus* Favre, Champ. supér. Zone alp.: 200. 1955.

Characteristics.—Pileus 12 mm broad, hemispherical with inflexed margin, not hygrophanous, grey-brown to blackish, glabrous; lamellae L = about 30, l = 1–3, rather thick, segmentiform, brownish-greyish, almost without any pink; stipe 12 × 1.5 mm, 2.5 mm at base, dark grey-brown, minutely powdered at apex, downwards smooth; smell and taste inconspicuous; spores 9–11.5 × 6–8 μm (Kühn., 1977: 478, measured 10–12(–13) × 6.5–8.5 μm), multi-angled to almost gibbose in side-view, thin-walled; basidia 4-spored. Pileipellis a cutis, made up of radially arranged 3–7 μm wide, cylindrical hyphae with numerous, non-inflated terminal cells; pigment intracellular; clamp-connections numerous in all tissues.

HABITAT & DISTRIBUTION.—In alpine *Salix herbacea* heath, Switzerland, France.

Type not studied. Kühner (1977: 478–480) gives a long discussion on this species, which so far has only been found twice and in both cases solitary. Because of its intracellular pigment and general habit *R. atropellitum* seems to be closely related to *E. anthracinum*. Kühner, however, confirms the difference in spore-shape of both species already mentioned by Favre, l.c. With regard to the spore-shape *R. atropellitus* resembles *E. sphagneti*, another dark pigmented *Entoloma*. The latter differs, however, in many respects, among other things in size, distinctly hygrophanous, conical pileus, and habitat.

**bahusiense.**—*Entoloma bahusiense* Lundell, Fungi Exsicc. suecici 41–42, no. 2007. 1953.—Fig. 36.

CHARACTERISTICS.—Fruit-bodies somewhat more fragile than in *E. clypeatum*; pileus 30–55 mm broad, broadly campanulate to obtusely convex, not hygrophanous, dark grey sometimes with olivaceous tinge, smooth; lamellae greyish white then greyish pink, with slightly uneven, but not really serrulate edge; stipe 70–90 × 5–7 mm, flexuose, cylindrical, white at apex and base, in the middle part with grey tinge, solid when young, but becoming fistulose with age.

HABITAT & DISTRIBUTION.—On soil, amongst grasses, ferns, etc. on somewhat moist locality under *Prunus spinosa* and *Salix* spp.; Sweden (Bohuslän).

Notes on the holotype: S W E D E N, Bohuslän, Uddevalla, Björback. May, 1948/49, S. Woldmar (UPS):

Spores (8.1–)9.3–10.4(–11.5) × (7.0–)8.1–9.3(–10.4) μm, Q = 1.05–1.2(–1.3), isodiametrical, 5–7-angled in side-view. Basidia 38–50 × 11–13.5 μm, 4-spored, clamped. Subhymenium thin, slightly gelatinised. Hymenophoral trama regular, made up of short cells, 35–75 × 8–27 μm. Pileipellis an ixocutis of 3–5(–7) μm wide, cylindrical hyphae, with brown, intracellular pigment.

Pileitrama regular, made up of inflated cells,  $25-80 \times 8-20 \mu\text{m}$ . Clamp-connections numerous in hymenium, elsewhere infrequent or rare.

On the strength of the description given by Lundell and the facts revealed by my type-study, *E. bahusiense* is placed in section *Nolanidea*. The smooth pileus, slender, quickly fistulose stipe and relatively scarce clamp-connections in trama and cortical layers suggest a close relationship with *E. aprile*. The latter, however, has a strongly hygrophanous pileus and a different habitat. I wonder whether Lundell's observations concerning the non-hygrophanous aspect of the pileus were correct. For the time being I refrain from accepting *E. bahusiense* as a distinct species. More information, particularly on the hygrophanicity of the pileus, is needed.

**batschianum.**—*Agaricus batschianus* Fr., Epicr.: 144. 1838. — *Entoloma batschianum* (Fr.) P. A. Karst., Hattsv. 1: 261. 1879. — *Rhodophyllus batschianus* (Fr.) J. Lange in Dansk bot. Ark. 2(11): 31. 1921.

**CHARACTERISTICS.**—Fruitbodies slender; pileus 20–40 mm broad, very dark brown or blackish, not hygrophanous (?); lamellae adnate to adnexed, sordid white then pink with grey or brown tinge; stipe long and slender, dark grey, striate, fistulose; smell inconspicuous.

**HABITAT & DISTRIBUTION.**—In forests, Sweden (Småland).

This dark brown, slender species is unknown to me. Probably it belongs to section *Rhodopolia*, but the information provided by the descriptions available does not permit a secure interpretation. *Rhodophyllus batschianus* sensu J. Lange (1921, l.c.) is identical with *Entoloma vinaceum* (see p. 223).

**bulbigenus.**—See below under *persoonianus*.

**difforme.**—*Entoloma difforme* Naveau in Natuurw. Tijdschr. 5: 75. 1923.—Fig. 49.

**CHARACTERISTICS.**—Habit like that of '*Tricholoma aggregatum* Schff. (= *Lyophyllum decastes*) or '*Tricholoma conglobatum* Vitt. (= *Lyophyllum fumosum*); pileus grey-brown, becoming blackish, almost viscid, with regular, inflexed-involute margin, about 40 mm broad; lamellae almost free or emarginate or decurrent, white then pale pink; stipe  $50 \times 1.5$  mm, white, almost striate, broadened towards base; flesh white, fibrous, inner parts more or less spongy; smell none.

**HABITAT & DISTRIBUTION.**—Terrestrial, caespitose, in *Pinetum*, only known from the type-locality in North Belgium.

Notes on the type: BELGIUM, Oostmalle, 5 Sept. 1920, *E. Lahaye* (BR). The type consists of four specimens in a fairly bad state; it appeared to be impossible to reconstruct the tissues and covering layers. The following characters have been observed:

Spores  $8.1-9.3(-10.4) \times 7.0-8.1 \mu\text{m}$ ,  $Q = 1.15-1.2-1.3$ ,  $L-D = 1.2-1.7-2.2 \mu\text{m}$ , 5-6-angled in side-view with rather pronounced angles. Basidia most probably 4-spored. Pigment in pileipellis distinctly intracellular.

*Entoloma difforme* is a remarkable species with a habit reminiscent of that of a species of *Lyophyllum*, a dark pileus and a white stipe. It bears some resemblance to *E. myrmecophilum* with its dark pileus and habit, but I failed to find any encrusting pigment in *E. difforme*. Furthermore the lamellae and the stipe of *E. myrmecophilum* are tinged grey or grey-brown. Another dark pigmented species of *Entoloma* that resembles *E. difforme*, viz. *Rhodophyllum nigrocinnamomeus* Kalchbr. sensu J. Favre, differs in having a grey-brown stipe.

**dispermus.**—*Rhodophyllum dispermus* Kühn. in Bull. Soc. mycol. Fr. 93: 454. 1977.

**CHARACTERISTICS.**—Pileus 14 mm broad, convex with umbo, hygrophanous, when moist brown, translucently striate, glabrous but minutely innately rugulose under lens; lamellae adnate, segmentiform, brownish; stipe 13 × 2.5–3 mm, greyish yellow, minutely aeriferously striate; spores 10–12.5 × 8.5–10 μm, Q = 1.2–1.3; basidia 2-spored; cystidia absent; pileipellis a cutis of radially arranged, 5–8 μm wide, cylindrical hyphae with intracellular pigment; trama of pileus and lamellae regular, made up of short cells; clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—In subalpine *Salix herbacea* vegetation; Sweden (Lapland, near Abisko).

Type not studied. *Rhodophyllum dispermus* is one of the few bisporous species in subgenus *Entoloma*. It differs from *E. bisporiger* in the slightly aeriferous-fibrillose stipe-surface, brown lamellae and habitat. However, the description given above is based on only one carpophore. More information is needed for a definite decision on the status of *R. dispermus*.

**elaphinum.**—*Agaricus elaphinus* Fr., Monogr. 2: 296. 1863. — *Entoloma elaphinum* (Fr.) P. A. Karst. Hattsv. 1: 266. 1879. — *Rhodophyllum elaphinus* (Fr.) Quél., Enchir.: 59. 1886.

**CHARACTERISTICS.**—Pileus 30–60 mm broad, bluntly convex, hygrophanous, when moist reddish brown to amber, translucently striate at margin, pallescent on drying; lamellae sinuate, triangular then ventricose, pallid then flesh-colour; stipe 30–40 mm long, cylindrical or slightly broadened at base, livid to brownish, fibrillose striate, glabrous; flesh white, inodorous.

**HABITAT & DISTRIBUTION.**—In mossy grassland with trees, Sweden, Småland.

Type non-existent. *Entoloma elaphinum* can be characterised as a small to medium-sized *Entoloma* in section *Rhodopolia*. It is not unlike *E. sordidulum* or *E. subradiatum*, but these two species frequently have a farinaceous smell and a different ecology. It is impossible to decide in this matter, because information on the microscopical characters of *E. elaphinum* is lacking.

**farrahi.**—*Entoloma farrahi* Mass. & Crossl., Fung. Fl. Yorkshire: 63. 1905.

**CHARACTERISTICS.**—Pileus 60–80 mm broad, conical then campanulate, blackish-bluish, dry, shingly fibrillose; lamellae sinuate-adnate, ventricose, flesh-coloured; stipe 50–70 × 15–20 mm, concolorous with pileus, white at base; spores about 10 × 4.5–5.0 μm; cystidia 50–60 × 12–15 μm, ventricose-cuspidate.

**HABITAT & DISTRIBUTION.**—In the grass, Great-Britain.



Type non-existent. *Entoloma farrahi* is apparently a member of section *Entoloma* and closely related to *E. madidum*, from which it differs in the heterodiametrical spores and presence of (cheilo?) cystidia.

**fertile.**—*Agaricus fertilis* Pers., Synopsis: 328. 1801. — *Agaricus fertilis* Pers. ex Fr., Syst. mycol. 1: 197. 1821. — *Entoloma fertile* (Pers. ex Fr.) Gill., Hymenom. Fr.: 504. 1874.

**CHARACTERISTICS.**—Pileus up to 60 mm broad, campanulate then expanding, moderately dark reddish brown; lamellae emarginate, up to 12 mm broad, with serrulate edge; stipe about 60 × 10 mm, white.

**HABITAT & DISTRIBUTION.**—Originally described from forests in France (Bulliard, 1792).

Type non-existent. Persoon referred for his *A. fertilis* to two plates of Bulliard, viz. pl. 534 and 547 fig. 1, (1792), both illustrating *A. phonospermus* Bull. Later, Fries (1821: 197) distinguished two varieties of *A. fertile*, viz. the typical variety, based upon Bulliard, pl. 547 fig. 1 and 590 (1793); and var. *intybaceum*, with a grey, virgate pileus, for which he referred to Bull., pl. 534. According to Fries (1874: 193) the typical variety represents the same species as *E. sinuatum* (= *E. lividum* in this work). Var. *intybaceum* is probably the same as *E. clypeatum*.

**fuliginarium.**—*Entoloma fuliginarium* P. A. Karst. in *Hedwigia* 32: 292. 1892.

**CHARACTERISTICS.**—Pileus ca. 20 mm broad, convex or hemispherical then expanding, finally often slightly depressed, thin-fleshed, with margin slightly involute at first, translucently striate, blackish livid, pallescent on drying; lamellae adnate, crowded, pallid, weakly veined; stipe up to 60 × 4 mm, paler than pileus, at apex pruinose, downwards smooth, base white tomentose; smell none.

**HABITAT & DISTRIBUTION.**—In coniferous forest, Sept., S. Finland.

Type non-existent. According to Karsten *Entoloma fuliginarium* reminds of '*Collybia*' *atrata*.

**gabrettae.**—*Entoloma gabrettae* Pilát, *Agaric. europ. Clavis Dichot.*: 244. 1951 (nom. invalid., no latin diagnosis). Name change for *Entoloma costatum* sensu Pilát in *Mykologia* 7: 58–59. 1930.

**CHARACTERISTICS** (kindly translated by Dr. Z. Pouzar, PRM). — Fruit-bodies densely caespitose-clustered; pileus brown-grey, mostly paler at centre and darker at margin, glabrous, slightly innately silky fibrillose with faintly darker striation, lustrous when dry and on dry spots, shallowly dotted at some places, convex, later expanding, sometimes even becoming umbilicate, on the whole very irregular, lobed at margin, sometimes excentric, 5–8 cm broad, leathery-fleshy; lamellae almost free or emarginate with decurrent denticule, rather distant, ventricose, up to 8 mm broad, pale greyish, later sordid flesh-coloured, transversely veined, with dentate, concolorous edge; stipe 60–100 × 7–30 mm, usually irregularly shaped, often compressed, almost fistulose, white or whitish, very much paler than pileus, fibrillose-rimose lengthwise; flesh white, mild; spores 8–9.5 × 7–8 μm.

**HABITAT & DISTRIBUTION.**—In grassland, Czechoslovakia.

Type non-existent. *Entoloma gabrettae* resembles *E. costatum*, but differs among other things in having distinctly heterodiametrical spores, and the strong contrast in colour between pileus and stipe. Compare also *E. rhodopolium*.

**griseoluridum.**—*Rhodophyllus griseoluridus* Kühn. in Rev. Mycol. 19: 4. 1954. — *Entoloma griseoluridum* (Kühn.) Moser in Gams, Kl. KryptogFl. 4. Aufl., 2b/2: 196. 1978.

CHARACTERISTICS.—Pileus 40–90 mm broad, convex to flattened with large blunt umbo, when moist horn brown with grey tinge but with a distinct chocolate, reddish brown or purplish brown tinge at centre, pallescent on drying; lamellae adnate-emarginate, grey-brown with pinkish tinge; stipe 40–120 × 6–12(–14) mm, pale sordid grey sometimes with purplish or lilaceous tinges; smell strongly farinaceous, particularly when cut; spores 8.5–10.5 × 7–9 μm, 5–6-angled in side-view, with basal facet; pileipellis a cutis of narrow, cylindrical, 5–10 μm wide hyphae with intracellular pigment. Clamp-connections abundant.

HABITAT & DISTRIBUTION.—In *Fagus* forest, France (Haute Savoie).

Type not studied. *Entoloma griseoluridum* is a rare species (probably only known from the type-locality), closely related to *E. lividoalbum* in section *Rhodopolia*, from which it differs in the purplish-greyish tinges in pileus and stipe.

**griseo-olivaceum.**—*Agaricus griseo-olivaceus* Britz. in Bot. Zbl. 62: 5. 1895. — *Entoloma griseo-olivaceum* (Britz.) Sacc., Syll. Fung. 14: 127. 1899.

CHARACTERISTICS.—Pileus 30–70 mm broad, convex-umbilicate, yellowish brown to greyish olivaceous, minutely fibrillose; lamellae crowded, broadly adnate-decurrent, white or whitish-brownish or pink; stipe 40–90 × 4–6 (middle) × 7–11 (base), cylindrical, flexuose, distinctly broadened towards base, white or with brown tinge; spores heterodiametrical, 8–10 × 6–7 μm.

HABITAT & DISTRIBUTION.—In moist places; Bayern, German Federal Republic.

Type non-existent. *Entoloma griseo-olivaceum* is a remarkable species with its grey-olivaceous, umbilicate pileus. It comes close to the concept of *E. rhodopolium* of Kühn. & Romagn. (1953: 196).

Compare also the notes on *E. olivaceum* Velen. below.

**illicibile.**—*Agaricus illicibilis* Britz. in Ber. naturhist. Ver. Augsburg 28: 149. 1885. *Entoloma illicibile* (Britz.) Sacc., Syll. Fung. 5: 684. 1887.

CHARACTERISTICS.—Pileus 20–60 mm broad, conical then expanding, brownish-greyish; lamellae whitish then pink; stipe up 70 × 6–12 mm, distinctly broadened towards base, brown, striate with whitish fibrils; smell farinaceous; spores 10–11 × 6–8 μm.

HABITAT & DISTRIBUTION.—In forest near Oberstaufen in Bayern, German Federal Republic.

Type non-existent. Originally described as a species intermediate between *E. helodes* and *E. batschianum*.

**macrius.**—*Entoloma turbidum* var. *macrius* P. A. Karst., Hattsv. 1: 266. 1879.

CHARACTERISTICS.—Differs from the typical variety in having a reddish brown pileus and a more slender, cylindrical blue stipe.

HABITAT & DISTRIBUTION.—In coniferous forest, Finland.

Type non-existent. The diagnosis is fairly short, but it might be *E. vinaceum* var. *violeipes*.

**mediocre.**—*Agaricus mediocris* Britz. in Bot. Zbl. 15–17: 8. 1893. — *Entoloma mediocre* (Britz.) Sacc., Syll. Fung. 11: 45. 1895.

CHARACTERISTICS.—Pileus hemispherical then expanding, whitish, at centre with yellow or brown tinge, up to 100 mm broad; lamellae adnate, flesh-coloured; stipe up to 60 × 15 mm, irregularly compressed and flexuose, fistulose, white; flesh white; smell none.

HABITAT & DISTRIBUTION.—In forests; Bayern, German Federal Republic.

According to Britzelmayer close to *E. turbidum*.

**nigrocinnamomeus.**—*Agaricus nigrocinnamomeus* Schulz. in Kalchbr., Hymenom. Hung. 1: 21, pl. 11 fig. 1. 1873. — *Entoloma nigrocinnamomeum* (Schulz.) Sacc., Syll. Fung. 5: 694. 1887. — *Rhodophyllus nigrocinnamomeus* (Schulz.) Favre, Assoc. fong. hauts-marais: 51. 1948.

CHARACTERISTICS.—Pileus up to 80 mm broad, convex, then flattened, depressed around weak umbo, hygrophanous, blackish-brownish, pallescent on drying, smooth; lamellae adnexed then secedent, reddish cinnamon; stipe about 30–60 × 4–12 mm, greyish-brownish, fibrillose; smell farinaceous.

HABITAT & DISTRIBUTION.—In grassland, Hungary.

Type non-existent. *Entoloma nigrocinnamomeum* probably finds its place in section *Rhodopolia* close to *E. myrmecophilum* and *E. venosum*. Favre described *E. nigrocinnamomeum* from a moist coniferous forest. It might turn out to be identical with *E. venosum* in the sense of Kühner & Romagnesi accepted by me. (see also Kühner, 1977: 495). But, as information is lacking on size and shape of the spores and the type of pigmentation of *E. nigrocinnamomeum*, its identity remains obscure.

**olivaceum.**—*Entoloma olivaceum* Velen., Novitates mycologicae: 140. 1939.

Belongs to section *Rhodopolia*, close to *E. rhodopolium*. Compare *E. griseo-olivaceum* and the type study by Noordeloos (1980b: 82).

**persoonianus.**—*Agaricus persoonianus* Phill., in Gard. Chron. 16: 874. 1881; non *Agaricus persoonii* Fr., Hymen. Eur.: 25. 1874. — *Agaricus persoonii* Du Port in Cooke, Ill. Br. Fungi, pl. 324 (315). 1884–1886 (change of name) — *Entoloma persoonii* (Du Port) Sacc., Syll. Fung. 5: 697. 1887. — *Entoloma bulbigenum* Berk. & Br. in Ann. Mag. nat. Hist., Ser. V, 9: 177. 1882. (change of name).

All these names refer to the same type, viz. a fungus collected by *J. M. Du Port*, febr. 1882, Sibbertoft, Northshire, Great Britain (K). The type has been studied by Dr. R. W. G. Dennis (1948: 205) and identified by him as a species of *Collybia* or *Marasmius*.

**placenta.**—*Agaricus placenta* Batsch, Elenchus Fung.: pl. 5 fig. 18. 1783. — *Agaricus placenta* (Batsch) ex Fr., Spicilegium: 5. 1836. — *Entoloma placenta* (Batsch ex Fr.) Quél. in Mém. Soc. Emul. Montbéliard, ser. II, 5: 117. 1872.

**CHARACTERISTICS.**—Pileus about 50 mm broad, convex then flattened with umbo, brown, subviscid when moist; lamellae adnexed-emarginate, white then pink; stipe 40–60 × 4–6 mm, cylindrical, brownish, fibrillose-striate, often twisted; smell none.

**HABITAT & DISTRIBUTION.**—In forests, Germany, Sweden.

Type non-existent. Judging from the type plate *E. placenta* must be close to *E. rhopolium*. Cooke (1884–1886: pl. 321(214)) probably depicted the same species.

**platyphylloides.**—*Rhodophyllus platyphylloides* Romagn. in Rev. Mycol. 19: 5. 1954. — *Entoloma platyphylloides* (Romagn.) Largent in Mycologia 66: 1019. 1974.

**CHARACTERISTICS.**—Pileus 40–70 mm broad, convex with irregular margin, grey or grey-brown, weakly hygrophanous, distinctly radially fibrillose-irregular; lamellae adnate-emarginate, subsegmentiform, pale, then greyish pink; stipe about 50–80 × 7–15 mm, white, striate; smell and taste farinaceous; spores (8.0) 8.5–11.0 × 6.5–8.5 μm, heterodiametrical, 5–7-angled in side-view, pileipellis an ixocutis of radially arranged, 4–5 μm wide cylindrical hyphae with intracellular pigment; pileitrama regular, in upper trama with membranous and encrusting pigment; clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—In mixed deciduous forest (*Quercus*, *Fagus*); France.

Type not-studied. *Entoloma platyphylloides* is fairly distinct with its greyish-brownish, radially fibrillose pileus resembling that of *Oudemansiella platyphylla*. *Entoloma myrmecophilum* and *E. venosum* are closely related, but differ in their much darker, almost blackish brown, smooth pileus. Apparently *E. platyphylloides* is very rare.

**pluteoides.**—*Agaricus pluteoides* Fr., Hymen. eur. 2: 345. 1863. — *Entoloma pluteoides* (Fr.) P. A. Karst, Hattsv. 1: 265. 1879. — *Rhodophyllus pluteoides* (Fr.) Quél., Fl. mycol. France: 181. 1888.

**CHARACTERISTICS.**—Fruit-bodies pluteoid, growing on rotten wood; pileus 10–20 mm broad, convex then expanding, hygrophanous, when moist whitish-greyish, translucently striate, pallescent on drying to sordid yellow, slightly radially fibrillose; lamellae emarginate-adnexed, white then pink; stipe about 40 × 4 mm, cylindrical, white, tinged yellow, with fibrillose-subtomentose surface.

**HABITAT & DISTRIBUTION.**—On rotten wood of *Abies*; Sweden, France.

Type non-existent. Fries placed *Agaricus pluteoides* in subgenus *Entoloma* on account of the continuous flesh in stipe and pileus and adnexed lamellae. It needs rediscovery.

**pomaceum.**—*Entoloma pomaceum* Velen., *Novitates mycologicae*: 139. 1939.

Belongs probably to section *Entoloma* (see type study by Noordeloos, 1980b: 83–84).

**praecox.**—*Entoloma praecox* P. A. Karst. *In Hedwigia* 32: 59. 1893.

**CHARACTERISTICS.**—Pileus 30–60 mm broad, conico-convex, then expanding and with undulating, lobed margin, hygrophanous, when moist sordid brown (fuliginous) and translucently striate, pallescent on drying, shining; lamellae almost free, sordid then flesh colour; stipe 30–60 × 6 mm, fistulose, flattened, pallid sordid brown, striate; spores 7–10  $\mu$ m in diameter, (sub-)isodiametrical.

**HABITAT & DISTRIBUTION.**—In sandy places in mixed forest, May; S. Finland.

Type non-existent. *Entoloma praecox* belongs to section *Nolanidea* and is close to *E. aprile* and *E. bahusiense*.

**principalis.**—*Agaricus principalis* Britz. *in Ber. naturhist. Ver. Augsburg* 31: 163. 1894.  
*Entoloma principale* (Britz.) Sacc., *Syll. Fung.* 11: 45. 1895.

**CHARACTERISTICS.**—Fruit-bodies robust, tricholomatoid; pileus up to 140 mm broad, thick-fleshed, convex to flattened with umbo, greyish-violaceous or greyish blue, smooth; lamellae emarginate, segmentiform to ventricose, white then pink; stipe up to 180 × 30 mm, cylindrical, sometimes tapering at base, sometimes broadened, bluish-violaceous, paler than pileus; flesh white, smell none; spores isodiametrical.

**HABITAT & DISTRIBUTION.**—In poor grassland, Bayern, Germany.

Type non-existent. According to Britzelmayer, *E. principale* is intermediate between *E. porphyropheum* and *E. pleropicum* (= *E. nitidum*). In my opinion it might easily be identical with *E. madidum*.

**pseudoexcentricus.**—*Rhodophyllus pseudoexcentricus* Romagn. *in Rev. Mycol.* 2: 37. 1937. — Fig. 47.

**CHARACTERISTICS.**—Pileus 35–65 mm broad, subcampanulate at first, then expanding to convex or plano-convex, often undulating and irregular, with margin inflexed at first, but later on straight, weakly umbonate, hygrophanous, greyish brown or pale brownish, translucently striate, strongly pallescent on drying to almost white, dry, glabrous; lamellae moderately distant, sinuate-adnate, segmentiform, white then pink with slight orange tinge, rarely slightly veined; stipe 40–95 × 4–13 mm, cylindrical, slightly attenuated at base, often strongly flexuose and twisted, solid, becoming more or less fistulose with age, white, slightly tinged brown with age, striate, base with white mycelium; flesh fairly firm, white; smell strongly farinaceous; taste farinaceous; spores 9.3–11.5 × 7.0–8.3(–8.7)  $\mu$ m,  $Q = 1.15$ – $1.25$ – $1.3$ (– $1.4$ ),  $L-D = 1.2$ – $2.1$ – $2.7$   $\mu$ m, usually 6–7-angled in side-view, distinctly heterodiametrical with dihedral base; basidia (2–)4-spored; cystidia none; hymenophoral trama regular, made up of slightly inflated cells, 25–110 × 7–23  $\mu$ m; pileipellis a cutis of cylindrical, 2.7–7.5(–9.0)  $\mu$ m wide hyphae with very pale

intracellular pigment; pileitrama regular, made up of relatively short up to 140  $\mu\text{m}$  long cells; clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—Along streamlet under *Populus*, France.

**COLLECTION EXAMINED.**—F R A N C E, dept. Seine & Oise, bois de la Grange, Sept. 1932, *H. Romagnesi* (lectotype (design. mihi), herb. Romagn., PC).

*Entoloma pseudoexcentricum* belongs to section *Rhodopolia* and is close to *E. rhodopolium*, from which it differs, according to Romagnesi, in the strong farinaceous smell and the slightly more heterodiametrical spores.

**pustulatum.**—*Entoloma pustulatum* Velen. in *Mykologia* 5: 113. 1928.

**CHARACTERISTICS.**—Pileus 30–40 mm broad, violaceous-greyish; stipe white, at apex violaceous and densely beset with darker granules; smell very strongly like dung; spores elliptical, angular, 10–12  $\mu\text{m}$  long.

**HABITAT & DISTRIBUTION.**—In the grass, near Prague, Czechoslovakia.

No type material is left at PRC nor PRM. Judging from the description this species might belong to subgenus *Leptonia*, close to *E. mougeotii*.

**quisquiliaris.**—*Entoloma quisquiliaris* P. A. Karst. in *Acta. Soc. Fauna Fl. fenn.* 9: 329. 1867. — Fig. 35.

Lectotype (design. mihi): F I N L A N D, East Bothnia, Vaasa, Lahti ölbryggeri, 1 Aug. 1867, *P. A. Karsten 1661* (H).

The type consists of several specimens with spores 8.1–9.3  $\times$  4.0–4.7  $\mu\text{m}$ , ellipsoid in side-view, slightly angular in apical view, thin-walled, yellowish-pinkish under the microscope (Fig. 35). This type of spores is found in the genus *Clitopilus*.

**radiatus.**—*Rhodophyllus radiatus* J. Lange, *Fl. agar. dan.* 5: VIII. 1940 (*Fl. agar. dan.* 2: 96. 1936; nom. nud.). — *Nolanea radiata* (J. Lange) P. D. Orton in *Trans. Br. mycol. Soc.* 43: 179. 1960. — Fig. 42.

**CHARACTERISTICS.**—Pileus 15–25 mm broad, convex-expanding with a small, rather acute umbo, pale dingy date-brownish, coarsely radially striate up to half-way; lamellae horizontal, rotundate behind, pallid; stipe short (about 40 mm), pallid, slightly hollow.

**HABITAT & DISTRIBUTION.**—In copses, on naked ground or among grass and weeds, Denmark.

No type material is left at C, but there are some sporeprints left of three later gatherings of the species made by J. Lange in Denmark, viz. on Isl. Fyn: Ålökkeskov, 5 Aug. 1938 and 16 Aug. 1941, and at Husmandskolen, Aug. 1941. I found the spores of these three collections to measure 8.1–10.0(–10.4)  $\times$  7.0–8.1  $\mu\text{m}$ ,  $Q = (1.07\text{--})1.15\text{--}1.25\text{--}1.3(-1.35)$ ,  $L\text{--}D = (0.6\text{--})1.2\text{--}2.0\text{--}2.7 \mu\text{m}$ , usually 6-angled in side-view and probably with basal facet.

*Rhodophyllus radiatus* is probably the same as *E. subradiatum*. The spores seem to be slightly smaller, but since an important character, viz. the pigmentation type of *R. radiatus*, cannot be verified the conspecificity of the two taxa cannot be proved.

*Nolanea radiata* sensu P. D. Orton (1960, l.c.) is close to *E. sericeum* in subgenus *Nolanea* (Noordeloos 1980a: 528).

**repandus.**—*Agaricus repandus* Bull., Herb. Fr.: pl. 423 fig. 2. 1789. — *Agaricus repandus* (Bull.) ex Fr., Syst. mycol. 1: 255. 1821. — *Entoloma repandum* (Bull. ex Fr.) Gill., Hymenom. Fr.: 401. 1876. — *Rhodophyllus repandus* (Bull. ex Fr.) J. Lange in Dansk bot. Ark. 3(11): 30. 1921.

Type non-existent. *Agaricus repandus* in the original concept of Bulliard refers to a species of *Inocybe*, probably close to, or identical with *I. patouillardii*. This was also the concept accepted by Fries (1821, l.c.).

However, in 1812(586) Bulliard emended his *Agaricus repandus* by including also *A. sinuatus*, depicted by him on pl. 579 (1790). The latter is most probably identical with our *E. lividum*. This misled Gillet to interpret *Agaricus repandus* Bull. as a species of *Entoloma*. An other misapplication is: *Rhodophyllus repandus* sensu J. Lange, 1921, l.c., and 1936: 95, pl. 73A (= *E. prunuloides*).

*Entoloma repandus* sensu Cooke (1884–1886, pl. 320(313)) most probably also refers to a species of *Inocybe*.

**rigidulum.**—*Entoloma rigidulum* Velen., Novitates mycologicae: 139. 1939. — Doubtful species from section *Rhodopolia* or *Polita* (Noordeloos 1980b: 84).

**rubellum.**—*Agaricus rubellus* (Scop.) ex Fr., Spicilegium: 6. 1836: — *Entoloma rubellum* (Scop. ex Fr.) Gill., Hymenom. Fr.: 400. 1876. — *Rhodophyllus rubellus* (Scop. ex Fr.) Quél., Epicr.: 58. 1886.

CHARACTERISTICS.—Pileus 20–30 mm broad, convex then flattened, flesh colour, glabrous, viscid when moist; lamellae adnexed, crowded, pink, with serrulate edge; stipe 40–100 × 5 mm, cylindrical, white, becoming brownish, solid, firm.

HABITAT & DISTRIBUTION.—In forest (*Fagus*) on rotten trunc of *Alnus*, Hungary, France (de Seynes, 1863: 100).

*Entoloma rubellum* is generally placed in section *Entoloma*, close to *E. madidum*. It is remarkable for its flesh-coloured pileus.

**singularis.**—*Rhodophyllus singularis* Romagn. in (Trav. mycol. déd. R. Kühner) Bull. mens. Soc. linn. Lyon 43 (Num. spéc.): 386. 1974. — Fig. 41.

CHARACTERISTICS.—Pileus 60 mm broad, ± flattened, weakly hygrophanous, moderately dark bistre-ochraceous (reminiscent of *Lyophyllum aggregatum*), slightly translucently striate at

margin only, pallescent on drying; lamellae crowded, adnexed-emarginate, segmentiform, grey-yellow then with slight pink tinge, with brown-yellow, entire edge, veined on sides; stipe 85 × 10 mm, cylindrical, attenuated at base, pale at apex, downwards grey-brown with a very slight grey-lilaceous tinge, pruinose at apex, downwards smooth, strongly fibrillose striate; flesh thin but very rigid, white, with brown tinge when moist, flesh-colour in cortex of apex of stipe towards base of stipe distinctly grey-lilaceous or grey-blue; smell and taste slightly farinaceous; spores (8.1–)8.7–11 × 7.1–8.3 μm, 5–7-angled in side-view, with sometimes very distinct dihedral base; basidia 4-spored, with clamp: hymenophoral trama regular, made up of short, inflated cells; pileipellis a narrow ixocutis of 3–8(–9.5) μm wide, cylindrical hyphae with intracellular pigment; pileitrama regular, made up of short, inflated cells; clamp-connections numerous in all tissues.

**HABITAT & DISTRIBUTION.**—In humid frondose forest; France.

**COLLECTION EXAMINED.**—FRANCE, dept. Aisne, Forêt de Retz, 10 Oct. 1954, *H. Romagnesi* 54. 339 (holotype, herb. Romagn., PC).

*Rhodophyllus singularis* is a rather remarkable species, according to Romagnesi reminiscent of *Lyophyllum aggregatum*. It belongs to section *Rhodopolia*, but differs from all species known in this section in the peculiar lilaceous-bluish tinges of the stipe. So far only known from the type-locality; only one carpophore found.

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

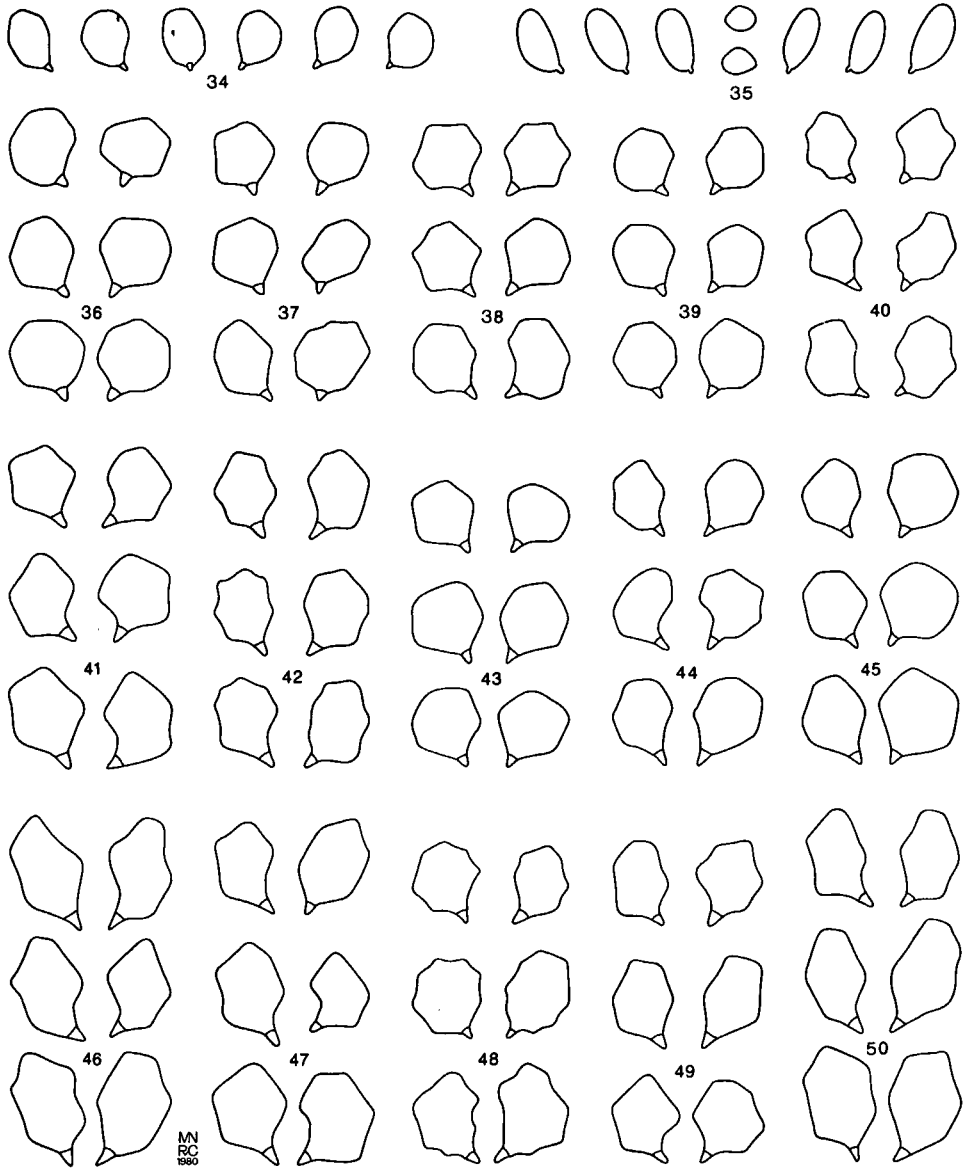
**CHARACTERISTICS.**—Pileus 11–22 mm broad, convex, with centre slightly depressed or very slightly umbonate, dark bistre, innately fibrillose or fibrillose-rugulose; lamellae very distant, adnate, but loosening from the stipe and then forming a collarium, ventricose, relatively dark grey-brown; stipe 11–16 × 1.2–2 mm, cylindrical, dark grey-brown, smooth, polished or with some scattered silvery fibrils lengthwise; flesh thin; smell none; spores 10–11 × 7–8.5 μm, heterodiametrical, 6-angled in side-view; basidia 4-spored; pileipellis a thin cutis of 2.5–5 μm wide, cylindrical hyphae with intracellular pigment; pileitrama and hymenophoral trama regular, made up of relatively long cells (up to 450 μm long!); clamp-connections present in all tissues.

**HABITAT & DISTRIBUTION.**—Among *Salix herbacea* in the Alps; so far only known from the type-locality in France.

According to Kühner, *R. subcollariatus* is close to *E. anthracinum*, from which it differs in the more heterodiametrical spores and the pseudocollarium. I have not seen the type. It should be noted that the rather long cells of the pileitrama are not very typical for subgenus *Entoloma*.

Fig. 34. *Entoloma pseudoturbidum*, spores (from holotype). — Fig. 35. *Entoloma quisquiliare*, spores (from holotype). — Fig. 36. *Entoloma bahusiense*, spores (from holotype). — Fig. 37. *Entoloma atrosericeum*, spores (from holotype). — Fig. 38. *Entoloma alnobetulae*, spores (from holotype). — Fig. 39. *Entoloma brassicolens*, spores (from holotype). — Fig. 40. *Entoloma subflexipes*, spores (from holotype). — Fig. 41. *Rhodophyllus singularis*, spores (from holotype). — Fig. 42. *Rhodophyllus radiatus*, spores (from *J. Lange*, 16 Aug. 1941). — Fig. 43. *Entoloma inocybiforme*, spores (from *Kuyper*, 30 Sept. 1979). — Fig. 44. *Entoloma rhodopolium*, spores (from *Noordeloos* 1237). — Fig. 45. *Entoloma alpicola*, spores (from *Gulden* 173/75). — Fig. 46. *Entoloma chionoderma*, spores (from holotype). — Fig. 47. *Rhodophyllus pseudoexcentricus*, spores (from holotype). — Fig. 48. *Entoloma anthracinum*, spores (from *Kühner* 73.206). — Fig. 49. *Entoloma difforme*, spores (from holotype). — Fig. 50. *Entoloma eximia*, spores (from holotype).





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**sublividus.**—*Agaricus sublividus* Britz., Hymenom. Südbayern 8: 5. 1891. — *Entoloma sublividum* (Britz.) Sacc., Syll. Fung. 11: 45. 1895.

**CHARACTERISTICS.**—Pileus up to 90 mm broad, campanulate with slightly reflexed margin, yellowish grey, sordid grey, brown-grey, strongly radially fibrillose, with rugulose centre; stipe 80 × 25 mm, attenuate towards base, white, solid; smell farinaceous.

**HABITAT & DISTRIBUTION.**—In forest; Wetsheim, Bayern, German Federal Republic.

Type non-existent. According to Britzelmayer close to *E. lividum*, but different in size and colour of the pileus.

**subsepiaceus.**—*Rhodophyllus subsepiaceus* Kühn. in Bull. Soc. mycol. Fr. 93: 454. 1977.

**CHARACTERISTICS.**—Pileus 15–35 mm broad, convex, sometimes bluntly umbonate, dark brown, slightly translucently striate at margin, pallescent on drying, more or less smooth; lamellae adnate, pink, sometimes with brown tinge; stipe up to 55 × 3–5.5(–8.0) mm, white or with grey tinge, usually with aeriferous fibrils lengthwise; smell and taste weakly to distinctly farinaceous; spores about 8–11 × 7–9 μm; pileipellis a cutis of narrow cylindrical 3–6 μm wide hyphae with intracellular pigment; pileitrama and hymenophoral trama regular, made up of relatively short, cylindrical or slightly inflated cells; clamp-connections present in all tissues.

**HABITAT & DISTRIBUTION.**—Moist places, sometimes near *Salix herbacea*, in subalpine zone; Scandinavia.

*Rhodophyllus subsepiaceus* seems to be closely related to *E. subradiatum* and *E. sordidulum*. Kühner (1977: 454) described also a variety with encrusting pigment, viz. var. *incrustatus*. I have not studied this species.

**turbidatum.**—*Agaricus turbidatus* Britz., Hymenom. Südbayern 8: 5. 1891. — *Entoloma turbidatum* (Britz.) Sacc., Syll. Fung. 11: 45. 1895.

**CHARACTERISTICS.**—Pileus up to 80 mm broad, hemispherical to convex, deeply umbilicate, yellow-brown to brown, often rimose; lamellae adnate, sometimes emarginate, sometimes almost decurrent, sordid pink; stipe up to 60 × 15 mm, cylindrical, sometimes broadened, sometimes attenuate towards base, slightly paler than pileus, fibrillose; smell none.

**HABITAT & DISTRIBUTION.**—In forest near Augsburg, Bayern, German Federal Republic.

*Entoloma turbidatum* resembles *E. costatum* very much in habit, and odourless flesh, but the colours are slightly different and the spores are, according to Britzelmayers' plate, distinctly heterodiametrical (compare *E. accola*, pag. 238).

## ENTOLOMA subgenus ALLOCYBE Noordeloos

*Entoloma* subgenus *Allocybe* Noordeloos in *Persoonia* 11: 143. 1981. — Holotype: *E. excentricum* Bres. *Rhodophyllus* section *Excentrici* Romagn. in *Bull. mens. Soc. linn. Lyon* 43: 332. 1974. — Holotype: *R. excentricus* (Bres.) Romagn.

**CHARACTERISTICS.**—Carpophores tricholomatoid, sometimes reminding of a robust species of *Inocybe*; pileus conical or flattened, not hygrophanous, not striate, white or leather brown; pileipellis a cutis of cylindrical to inflated, 5–20  $\mu\text{m}$  wide hyphae, sometimes with ascending, slightly inflated terminal cells; pigment membranous or minutely encrusting; spores heterodiametrical, 10–15  $\mu\text{m}$  long, with basal facet; hymenophoral trama made up of relatively long up to 320  $\mu\text{m}$  long, cylindrical or fusoid cells; clamp-connections numerous in hymenium, elsewhere rare or lacking.

The taxonomic position of subgenus *Allocybe* is rather isolated within the genus *Entoloma*. The general habit reminds of that of some species in section *Entoloma*, but there are striking differences. Romagnesi (1978: 37) considered *E. excentricum* one of the most enigmatic species in the European *Entoloma*-flora with its large spores with a basal facet and its large cheilocystidia. He pointed to similarities with subgenus *Trichopilus* considering these two characters, but considered the relatively simple pileipellis and the membranous pigmentation sufficient reasons not to include section *Excentrici* in subgenus *Trichopilus*, which has, as we know, a trichoderm-like pileipellis with intracellular pigment. Therefore he retained section *Excentrici* within the subgenus *Entoloma*, emphasizing, however, its isolated position there.

Characters worked out by me, but not mentioned by Romagnesi, are the size and shape of the elements of the trama of lamellae and pileus. In all species studied (viz. *E. excentricum*, *E. eximium* and *E. chionoderma*) these elements range from 90–320  $\mu\text{m}$  in length and are more or less fusoid or cylindrical. This type of tramal elements has never been found in other sections of subgenus *Entoloma*, but commonly in subgenus *Nolanea* and *Trichopilus*. In addition I found in the pileipellis of *E. excentricum* some scattered, large, inflated terminal cells, up to 20  $\mu\text{m}$  wide, and clamp-connections are rare, except in the hymenium. These facts support the idea that section *Excentrici* is not in its right place within the subgenus *Entoloma*, nor does it fit, especially on account of the pigmentation and structure of pileipellis, in the subgenus *Trichopilus*. Therefore I accommodate the species of section *Excentrici* in a new subgenus. (I avoid the use of *Excentrici* for the obvious reason that an excentric stipe only very exceptionally occurs in the group of species concerned and cannot be considered to be characteristic at all. According to the Code of Botanical Nomenclature one is not obliged to use the same epithet when the rank of an infrageneric taxon is changed).

## KEY TO THE SPECIES OF SUBGENUS ALLOCYBE

- 1a. Pileus conical, brilliantly white; cheilocystidia absent. . . . . *E. chionoderma*, p. 254
- b. Pileus pale brown or leather brown; cheilocystidia present. . . . . 2
- 2a. Pileus conical, not expanding; lamellae entirely free; smell like that of coconut or *Lactarius glyciosmus*; in forests. . . . . *E. eximium*, p. 254
- b. Pileus conical than flattening, with aeriferous-micaceous patches; lamellae adnate-emarginate; smell weak, sometimes subfarinaceous or slightly rancid; in grasslands. . . . . *E. excentricum*, p. 252

49. *ENTOLOMA EXCENTRICUM* Bres.—Figs. 51a–e

*Entoloma excentricum* Bres., Fungi trident. 1: 11, pl. 8. 1881. — *Rhodophyllus excentricus* (Bres.) Romagn in Kühn. & Romagn., Fl. anal.: 198. 1953.

SELECTED ICONES AND DESCRIPTIONS.—Bohus in Bot. Kötlem. 57: 14. 1970. — Cetto, Funghi Vero 1: 240, pl. 98. 1975. — Einhellinger in Ber. Bayer. bot. Ges. 41: 103, figs. 18, 21, 23, pl. 9c. 1969. — Konrad in Bull. Soc. mycol. Fr. 43: 174–176. 1927. — Konrad & Maublanc, Icon. sel. Fung. 4: pl. 191. 1928. — Pearson in Trans. Br. mycol. Soc. 22: 29. 1938.

CHARACTERISTICS.—Pileus 23–57 mm broad, conico-convex then flattened, pale leather brown, subfelted-micaceous with involute margin; lamellae crowded, segmentiform to subventricose, pink often tinged brown or with brown edge; stipe 30–80 × 4–80 mm, white, with brown tinge at base; cheilocystidia up to 100 µm long, protruding from the hymenium, fusiform to lageniform.

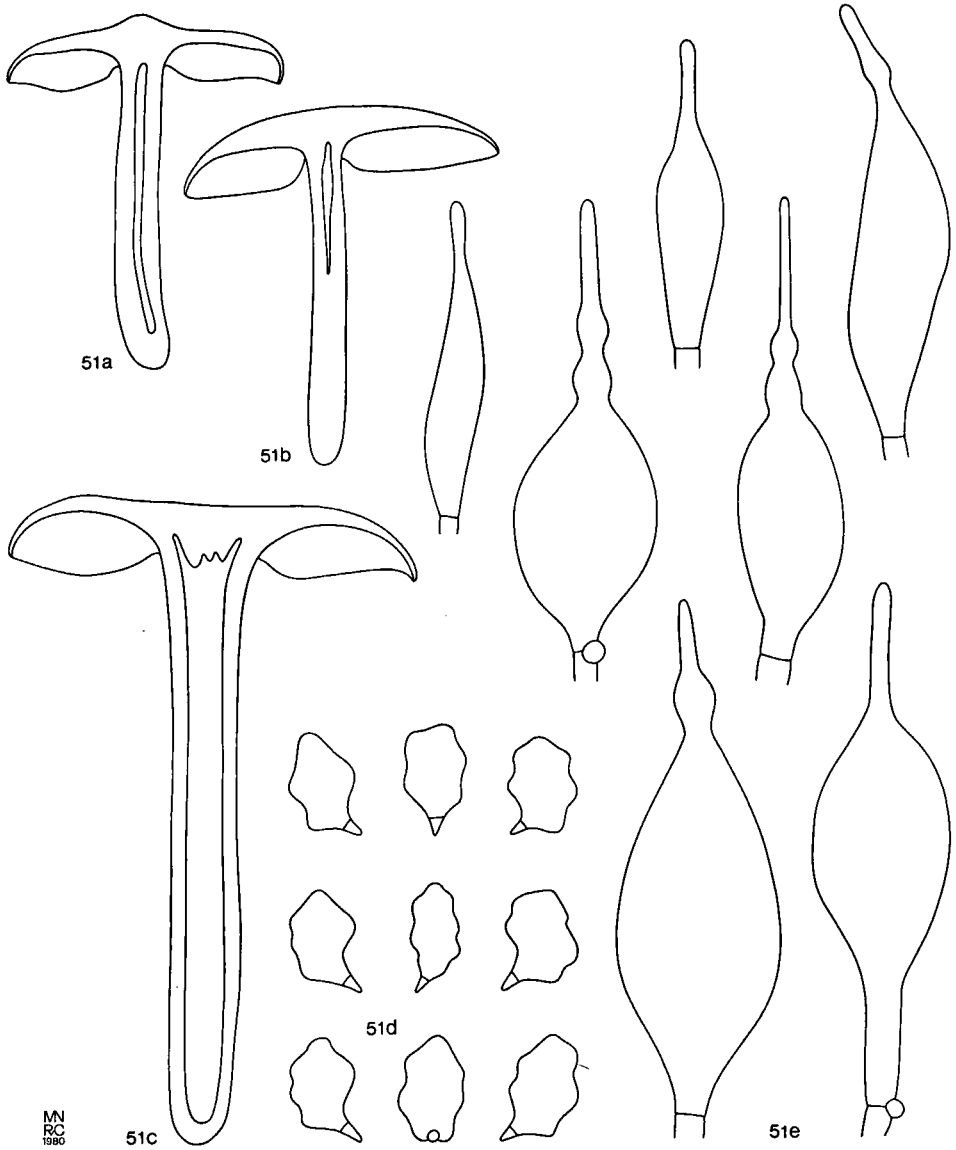
Pileus 23–57 mm broad, convex then plano-convex, usually with flattened, rarely with subumbonate centre, with involute margin, not hygrophanous, not translucently striate, very pale brown, 'café-au-lait' or leather brown (about 10 YR 7/3), smooth to subfelted, often with remarkably spotted surface with alternating micaceous and subfelted patches, near margin with adpressed, brown fibrils. Lamellae L=about 50, l=3–5, crowded, adnate-emarginate, segmentiform, rarely subventricose, 4–10 mm broad, pale pink, with brown tinge when old, with concolorous or brown, irregular-subfloccose edge. Stipe 30–80 × 4–8 mm, cylindrical or slightly tapering towards base, sometimes twisted, whitish with brown or yellowish tinges, longitudinally fibrillose-constate, base white tomentose. Flesh white sometimes with brown tinge. Smell weak, rarely more or less farinaceous or reminding of that of *Clitocybe rivulosa*. Taste unpleasant, subfarinaceous.

Spores (10.2–)11.2–12.7(–14.0) × (6.8–)7.0–8.4(–9.3) µm, Q = 1.25–1.5–1.7, L–D = 2.4–4.0–6.0 µm, irregularly 5–7-angled in side-view with basal facet. Basidia 35–56 × 11–17 µm, 4-spored. Cheilocystidia 50–90(–108) × 10–21 µm, broadly fusiform to lageniform with broad, swollen part and long, protruding, attenuate, sometimes moliniform neck, colourless or minutely encrusted particularly in upper part, rarely filled with brown intracellular pigment-clots. Hymenophoral trama regular, made up of lang, fusoid cells, up to 300 µm long and 10–27 µm wide, sometimes with pale brown intracellular pigment. Pileipellis varying from a simple cutis to, particularly at centre, a trichoderm, made up of up to 20 µm wide cylindrical hyphae, sometimes with long, fusoid terminal cells, with pale brown walls. Pileitrama regular and made up of radially arranged hyphae in limb, becoming irregular-intermixed in centre of pileus, with hyaline or pale brown walls. Clamp-connections present in hymenium, rare elsewhere.

HABITAT & DISTRIBUTION.—In xerophilic grasslands, preferably on calcareous soils, rare, till now not found in the Netherlands but occurring rarely in adjacent Belgium and Germany. Widely distributed: probably more common in the southern parts of Europe. Aug.–Oct.

COLLECTIONS EXAMINED.—SWEDEN, Isl. Öland, Stora Alvaret, 19 Aug. 1979, S. Ryman 5382. — BELGIUM, prov. Namur, Ave-et-Auffe, le Roptai, 11 Oct. 1973, P. B. Jansen. — FRANCE: dept. Manche, Quineville, 26 Aug. 1971, H. Romagnesi 71.192 (herb. Romagn., PC); dept. Seine & Marne, Fontainebleau, 23 Sept. 1951, H. Romagnesi 51.300 (herb. Romagn., PC); dept. Doubs, Lougres, 19 Sept. 1955, Maillot and 18 Aug. 1956, H. S. C. Huysman. — GERMAN FEDERAL REPUBLIC, Gerolstein, 22 Sept. 1980, M. E. Noordeloos 1256. — HUNGARY, Bugac Puszta, 25 km S. of Keskemét, 20 Oct. 1978, C. Bas 7324. — ITALY, Andalo, 'in pratis andis', Aug. 1901, G. Bresadola (S).

Bresadola (1881: 11 and 1929: pl. 556) characterised *E. excentricum* as a rather pale, not hygrophanous *Entoloma* with lamellae 'ex albo carnae'. The descriptions and plates of Konrad & Maublanc (l.c.) and Cetto (l.c.) suggest that typical *E. excentricum* has fairly purely pink



Figs. 51a-e. *Entoloma excentricum*. — Habit and spores (51a from Noordeloos 1256; 51b from Jansen, 11 Oct. 1973; 51c, d, e from Bas 7324).

MN  
RC  
1980

lamellae. However, some of the collections studied by me, including that from the Bresadola herbarium at Stockholm, show brown colours in the lamellae, which are caused by brown intracellular clots of pigment in cheilocystidia and basidia and extracellular pigment-clots in the hymenium. The pigment is usually concentrated on and near the edge of the lamellae, in some cases (e.g. in *Bas 7324*) even causing a more or less brown edge visible to the naked eye. This type of pigment is also found in subgenus *Pouzaromyces* (see Noordeloos, 1979) and in some members of subgenus *Inocephalus* (= *Inopilus* Romagn. sensu Romagnesi 1978). The name 'necropigment' used by Mazzer (1976) for this type of pigment is incorrect as it also occurs in living tissues and not only in so-called 'abortive' basidia.

50. *Entoloma chionoderma* (Pilát) Noordeloos, *comb. nov.*—Fig. 46

*Nolanea chionoderma* Pilát in *Acta Mus. nat. Prag.* 9B(2): 57, f. 63. 1953 (basionym).

CHARACTERISTICS.—Pileus 35 mm broad, conical to conico-campanulate, then expanding with reflexed margin, white, at centre with grey tinge, silky-shining, subfibrillose, thin-fleshed, not hygrophanous; lamellae moderately crowded, emarginate, pallid grey-brown without pink tinge; stipe 70 × 7 mm, cylindrical, white or with slight grey tinge, fibrillose, striate, sometimes twisted; flesh thin, white or whitish, rather firm; smell and taste inconspicuous.

Spores 10.8–12.4 × (7.4–)7.8–8.4 μm, Q = 1.4–1.45–1.6, L–D = 3.6–4.5 μm, 6-sided in side-view, with basal facet. Basidia 40–46 × 13.5–17.5 μm, 4-spored. Cystidia absent. Hymenophoral trama regular, made up of long, fusoid cells, 90–320 × 12.5–40 μm. Pileipellis a cutis or radially arranged, cylindrical, 7–15 μm wide hyphae without visible pigment. Clamp-connections seen in the hymenium.

HABITAT & DISTRIBUTION.—Under *Fagus* in mixed mountainous virgin forest (*Fagus sylvatica* and *Abies alba*) at 1200 m alt. Only known from the type-locality in central Slovakia, Czechoslovakia.

COLLECTION EXAMINED.—CZECHOSLOVAKIA, Slovakia, Polana near Detva, 24 Aug. 1951, A. Pilát (holotype, PRM).

*Entoloma chionoderma* is likely to be a beautiful species with its shining, pale pileus with a shape similar to that of a species of *Inocybe*. It is closely related to *E. eximium*, from which it differs by the lack of cystidia in the hymenium.

51. *Entoloma eximium* (Romagn.) Noordeloos, *comb. nov.*—Fig. 50

*Rhodophyllus eximius* Romagn. in *Bull. Soc. mycol. Fr.* 60: 99. 1944 (basionym).

Pileus 35–63 mm broad, acutely conical, only slightly expanding, finally convex with acute umbo, often very irregular and excentric, with very irregular, lobed-undulating margin, not hygrophanous, not striate, pale ivory or pale yellowish brown, strongly shining, not fibrillose, absolutely smooth. Lamellae distant and thickish, free, ventricose, whitish ivory or yellowish, then with pink tinge, with irregular, denticulate, concolorous edge. Stipe 85–100 × 5.5–9 mm, cylindrical, gradually broadening towards base, brittle, very fibrillose, whitish then becoming slightly yellowish, fibrillosely striate lengthwise, sometimes floccose at apex. Flesh thin but tough in pileus, white or whitish. Smell farinaceous when picked up but later on entire carpophore with the smell of coconut (like that of *Lactarius glycosmus*).

Spores  $10-12 \times 7.5-8.5 \mu\text{m}$ , with basal facet. Basidia  $30-43 \times 10-13 \mu\text{m}$ , 2-4-spored. Cheilocystidia and pleurocystidia  $60-70 \times 18-22 \times 6-8.5 \mu\text{m}$ , lageniform, rare, scattered among basidia. Hymenophoral trama regular, made up of long,  $8-18 \mu\text{m}$  wide, hyphae. Pileipellis a thin cutis of radially arranged cylindrical,  $6-8 \mu\text{m}$  wide, hyphae sometimes with minute encrustations; subpellis made up of long,  $11-30 \mu\text{m}$  wide, hyphae.

HABITAT & DISTRIBUTION.—Under *Carpinus*, only known from the type-locality.

COLLECTION EXAMINED.—FRANCE, dept. Seine & Oise, Forêt St. Germain, près de Maison Lafitte, 19 Aug. 1943, Landier (holotype, herb. Romagn. PC).

The type-collection is in a very poor state and therefore difficult to study. *Entoloma eximium* is a remarkable species with its almost inocyboid habit, pale colours and large cheilo- and pleurocystidia. It is closely related to *E. excentricum*, which differs in habit, colour, structure of pileipellis and pileitrama and in the lack of pleurocystidia. The North American species *E. megacystidiosum* Hesler is obviously closely related to *E. eximium*, but it has a more flattened, viscid pileus. *Entoloma chionoderma* Pilát differs in the total lack of cystidia.

#### INSUFFICIENTLY KNOWN SPECIES

**accline.**—*Agaricus acclinis* Britz. in Ber. naturhist. Ver., Augsburg 26: 136. 1881. — *Entoloma accline* (Britz.) Sacc., Syll. Fung. 5: 689. 1887.

CHARACTERISTICS.—Pileus convex then expanding with uplifted margin, white with yellow tinge at centre, shining; lamellae crowded, white then rufescent with brown edge; stipe solid then fistulose, white, shining.

HABITAT & DISTRIBUTION.—Caespitose, terrestrial, Bayern, German Federal Republic.

According to Britzelmayer is *Entoloma accline* close to *E. sinuatum* (*E. lividum* in the present work). In my opinion, however, the plate and description suggest that *E. accline* belongs to subgenus *Allocybe* close to *E. chionoderma* and *E. eximium*. But as no type is available and information is lacking on the occurrence of cystidia and on the pigmentation, this cannot be verified.

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