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CONTENTS

AA, H. L. VAN DER & OORSCHOT, C. A. N. VAN: A redescription of some genera with staurospores . . . . .	415
ARNOLDS, E.: Notes on <i>Hygrophorus</i> —IV. New species and new combinations in Hygrophoraceae . . . . .	475
ARX, J. A. VON, DREYFUSS, M. & MÜLLER, E.: A reevaluation of <i>Chaetomium</i> and the Chaetomiaceae . . . . .	169
BAS, C., Notulae ad Floram agaricinam neerlandicam. Introduction . . . . .	29
—: <i>Flammulina</i> in western Europe . . . . .	51
— & HATANAKA, S. J.: An undescribed species of <i>Amanita</i> section <i>Lepidella</i> from Japan . . . . .	321
— & WEHOLT, Ø.: <i>Hydropus conicus</i> , a new species from Norway . . . . .	119
BOEKHOUT, T.: Notulae ad Floram agaricinam neerlandicam—IX. <i>Mycenella</i> . . . . .	427
BODIN, J. & LANQUETIN, P.: Compléments au genre <i>Vararia</i> P. Karst. (Basidiomycètes . . . . .	243
BRUMMELEN, J. VAN: Notes on cup-fungi—1 . . . . .	149
—: Notes on cup-fungi—2 . . . . .	327
CORNER, E. J. H.: The clavarioid <i>Ramaria</i> subgen. <i>Echinoramaria</i> . . . . .	21
GAMS, W., HOOG, G. S. DE, SAMSON, R. A. & EVANS, H. C.: The hyphomycete genus <i>Engyodontium</i> , a link between <i>Verticillium</i> and <i>Aphanocladium</i> . . . . .	135
HENGSTMENGEL, J.: Notes on <i>Hymenoscyphus</i> . . . . .	489
JULICH, W.: Basidiomycetes of South-East Asia—2. On <i>Scenidium apiarum</i> , with a discussion of the nomenclatural status of the genus <i>Hexagonia</i> Pollini ( <i>Hexagona</i> Fr.) . . . . .	107
—: Neotypification of <i>Hydnum barba-jovis</i> Bull.: Fr. . . . .	307
—: On <i>Tulasnella cystidiophora</i> . . . . .	317
— & STAR, W.: Ultrastructure of basidiospores. 1. <i>Beenakia</i> . . . . .	67
KUYPER, TH. W.: Studies in <i>Inocybe</i> —I. Revision of the new taxa of <i>Inocybe</i> described by Velenovský . . . . .	375
—: Studies in <i>Inocybe</i> —II . . . . .	479
— & VUURE, M. VAN: Nomenclatural notes on <i>Russula</i> . . . . .	447
LÉGER, J. C. & LANQUETIN, P.: Description of morphology, anatomy and cultural characters of <i>Hymenochaete paucisetosa</i> , spec. nov. . . . .	87
MOUCHACCA, J.: Redécouverte de <i>Thielavia coactilis</i> Nicot, un ascomycète observé sur des feuilles mortes de <i>Carpinus</i> , et ses rapports avec certaines espèces de ce genre . . . . .	441
NOORDELOOS, M. E.: Notulae ad Floram agaricinam neerlandicam—I—III. <i>Marasmiellus</i> , <i>Macrocystidia</i> and <i>Rhodocybe</i> . . . . .	31
—: Studies in <i>Entoloma</i> —7. <i>Entoloma</i> sect. <i>Phlebophora</i> , sect. nov. . . . .	75
—: Notulae ad Floram agaricinam neerlandicam—IV—V. <i>Clitopilus</i> and <i>Leucopaxillus</i> . . . . .	155
—: Studies in <i>Entoloma</i> —10—13 . . . . .	195
—: Entolomataceae in Greenland—I. The genus <i>Entoloma</i> . . . . .	263
—: Notulae ad Floram agaricinam neerlandicam—X—XI. <i>Entoloma</i> . . . . .	457
OORSCHOT, C. A. N. VAN & PIONTELLI, E.: <i>Chrysosporium vallenarense</i> , spec. nov. . . . .	487
PETERSEN, R. H.: Type studies in the clavarioid fungi—VIII . . . . .	225
—: Type studies in the clavarioid fungi—IX . . . . .	401
RAO, V., REDDY, K. A. & HOOG, G. S. DE: <i>Heliocephala</i> , a new genus of dematiaceous hyphomycetes . . . . .	239
REIJNDERS, A. F. M.: Supplementary notes on basidiocarp ontogeny in agarics . . . . .	1
SAMSON, R. A., ROMBACH, M. C. & SEIFERT, K. A.: <i>Hirsutella guignardii</i> and <i>Stilbella kiervillei</i> , two stroglobiotic entomogenous hyphomycetes . . . . .	123
SCHIPPER, M. A. & STAI PERS, J. A.: Spore ornamentation and species concept in <i>Syncephalastrum</i> . . . . .	81
STIJVE, T., KLÁN, J. & KUYPER, TH. W.: Occurrence of psilocybin and baeocystin in the genus <i>Inocybe</i> (Fr.) Fr. . . . .	469

ULJÉ, C. B. & BAS, C.: <i>Coprinus hercules</i> , spec. nov. . . . .	483
VELLINGA, E. C. & SCHREURS, J.: Notulae ad Floram agaricinam neerlandicam—VIII. <i>Pluteus</i> Fr. in West-Europe . . . . .	337
VRIES, G. A. DE: First record of <i>Stephensia crocea</i> Quéf. in the Netherlands . . . . .	463

NOTES AND BRIEF ARTICLES

VON ARX on <i>Canariomyces</i> . . . . .	181
VON ARX & CONTANTINESCU on <i>Callistospora</i> and <i>Creodiplodina</i> . . . . .	95
BAS on ' <i>Amanita in aurata</i> Secr.' . . . .	192
BAS on the name <i>Agaricus lacrymabundus</i> . . . . .	103
GUARRO, MARTINES & VON ARX on <i>Apiosordaria</i> . . . . .	181
JÜLICH on <i>Galzinia geminispora</i> . . . . .	189
KUYPER on <i>Rickenella</i> and <i>Omphalina</i> . . . . .	188
RAO & DE HOOG on <i>Myrothecium</i> . . . . .	99

BOOKS RECEIVED by the Rijksherbarium library . . . . .	194, 335, 491
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## CORRECTIONS

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## STUDIES IN ENTOLOMA—10–13

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Some nomenclatural corrections are given as a consequence of the 1983-edition of the International Code of Botanical Nomenclature. The new combinations *Entoloma* sect. *Candida* (Romagn.) Noordel. and *E.* subgen. *Pouzarella* (Mazz.) Noordel. are made. Two new species are described in sect. *Griseorubida*, viz. *Entoloma griseorubidum* and *E. calaminare*. The new combination *E. indutoides* (P. D. Orton) Noordel. is made. Section *Cyanula* is emended to include all species of subgen. *Leptonia* with blue, brown, yellow, pink, and green colours. Several new taxa are described, viz. *Entoloma chalybaeum* f. *bisporigerum*, *E. lividocyanulum*, *E. huijsmanii*, *E. viaregale*, *E. pseudoturci*, *E. porphyrofibrillum*, and *E. scabropelle*. The new combinations *E. chalybaeum* var. *lazulinum* (Fr.) Noordel., *E. cyanulum* (Lasch) Noordel., and *E. cruentatum* (Quél.) Noordel. are made. On account of some recent collections from Denmark and Scotland a new species in sect. *Polita*, viz. *E. caeruleopolitum* Noordel. & Brandt-Pedersen, is described.

These studies in *Entoloma* are the result of continued monographic research in the genus *Entoloma*, mainly of subgenus *Leptonia*. A critical monograph of all European species of *Leptonia* will be published in future. Some critical and new taxa are presented here as a precursor of the Flora agaricina neerlandica, Part 1, which will contain the Entolomataceae.

The presentation of the text, including the abbreviations used, and the terminology are the same as in other publications on *Entoloma* by the author (Noordeloos, 1979, 1980, 1981 a, b, 1982). The magnifications in the text-figures are as follows: habit  $\times 1$ , spores  $\times 2000$ , basidia and cystidia  $\times 1000$ , pileipellis  $\times 500$ .

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Thomas W. Kuyper kindly read through the text of this paper, and gave very valuable comments and advice in nomenclatural matters, for which I feel very much indebted. The directors of the Herbarium, Royal Botanic Gardens, Kew, and Royal Botanic Gardens, Edinburgh, are greatly thanked for the loan of (type-) specimens. The expertise of Prof. H. Romagnesi, Paris, and Mr. P. D. Orton, Scotland, was of great help to get a good impression of their species-concept in *Leptonia*. Many correspondents provided me with valuable material for this study, and I would like to thank here in particular Mr. Thomas

Brandt-Pedersen, Langå, Denmark; Gerhard Wölfel, Erlangen, German Federal Republic; Øyvind Weholt, Frederikstad, Norway; and Mr. J. Trimbach, Nice, France.

#### 10. ON SOME NOMENCLATORIAL CONSEQUENCES OF THE 'SYDNEY CODE'

In my paper on the infrageneric taxonomy of the genus *Entoloma* (Noordeloos, 1981a) I applied the autonymia-principle of the International Code of Botanical Nomenclature (ICBN) Art. 22 not only on the infrageneric taxa including the type-species of the genus, but also on the sections including the type-species of other subgenera. This is not in accordance with the latest version of the ICBN (Voss & al., 1983), and the following correction is necessary.

##### *Entoloma* sect. *Candida* (Romagn.) Noordel., *comb. nov.*

*Rhodophyllus* sect. *Candidi* Romagn. in Bull. mens. Soc. linn. Lyon 43: 327. 1974 (basionym).

— Holotype: *R. sericellus* (Fr.: Fr.) Quél.

*Entoloma* sect. *Alboleptonia* sensu Noordel. in Persoonia 11: 146. 1981.

According to the ICBN, Art. 10.1, the type of a genus is the same as the type of the name of the type-species. Consequently the genus *Pouzaromyces* Pilát is typified by the type of the name *Agaricus fumosellus* Wint., and not by *Pouzaromyces fumosellus* (Wint.) Pilát sensu Pilát (= *Entoloma strigosissimum*). As it is almost certain that *Agaricus fumosellus* does not represent a species of *Entoloma* (Mazzer, 1976; Noordeloos, 1979) the name *Pouzaromyces* cannot be used to accommodate the group of species typified by *Entoloma strigosissimum*. For that reason I accept the name *Pouzarella* Mazz. for that group of species, but on the level of subgenus in the genus *Entoloma*.

*Entoloma* subgen. *Pouzarella* (Mazz.) Noordel., *comb. & stat. nov.* *Pouzarella* Mazz. in Bibliotheca mycol. 46: 69. 1976 (basionym). — Holotype: *E. nodosporum* (Atk.) Noordel.

Misapplied names.—*Entoloma* subgen. *Pouzaromyces* sensu Moser in Gams, Kl. Kryptog.-Fl., 4. Aufl., 2(b/2): 191. 1978; sensu Noordel. in Persoonia 10: 209. 1979; *Rhodophyllus* subgen. *Pouzaromyces* sensu Romagn. in Beih. Nova Hedwigia 59: 50. 1978 (prepublication) [based on *Pouzaromyces fumosellus* (Wint.) Pilát sensu Pilát, non Wint.].

#### 11. ON TWO NEW SPECIES IN SECT. GRISEORUBIDA

##### *Entoloma griseorubidum* (Kühn. ex) Noordel., *spec. nov.* — Fig. 1

*Rhodophyllus griseorubidus* Kühn. in Kühn. & Romagn., Fl. anal. Champ. sup.: 210. 1953 (nom. nud.).

Misapplied name.—*Eccilia griseorubella* (Lasch: Fr.) sensu Konr. & Maubl., Ic. sel. Fung., pl. 185-1. 1928; non Lasch nec Bres., J. Lange.

Pileus 20–32 mm latus, umbilicatus, haud vel paulisper hygrophanus, haud vel paulisper translucido-striatus, griseobrunneus, radialiter fibrillosus, centro subsquamuloso, lamellae adnatae-sub-

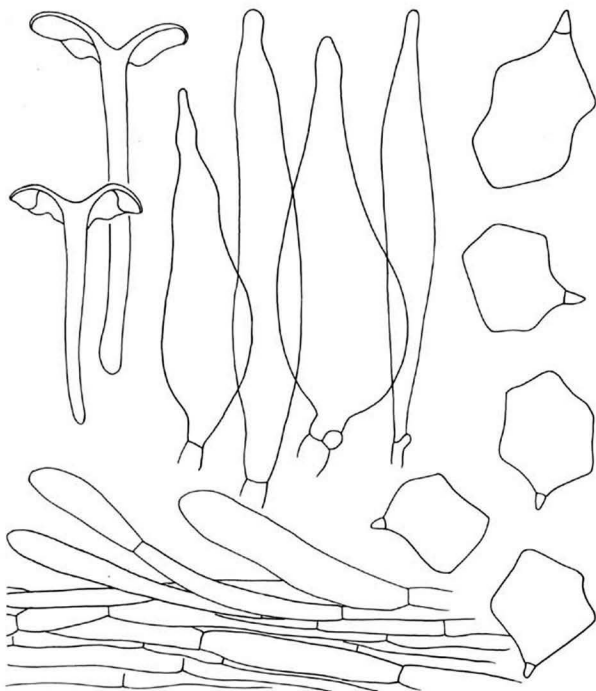


Fig. 1. *Entoloma griseorubidum*. — Habit, spores, cheilocystidia, and pileipellis (habit from *J. Trimbach*, 1982; all other figs from holotype).

decurrentes, albae demum roseae; stipes pileo concolor vel pallidior, striatus; odore saporeque nullis; sporae  $10-14 \times 8-11.3 \mu\text{m}$ , subsodiametricae; cheilocystidia numerosa,  $35-140 \times 7.5-23 \times 3.5-6 \mu\text{m}$ , lageniformia; pileipellis cutis transiens ad trichodermam elementis inflatis,  $10-25 \mu\text{m}$  latis pigmentis intracellulosis; fibulae ad basim basidorum frequentes; in silvis. — Holotypus: *H. S. C. Huijsman*, 10-VII-1965, 'Neuchâtel, Marin, Switzerland' (L).

Pileus 20–32 mm broad, convex with depressed to umbilicate centre and involute margin, not or weakly hygrophanous, not or only slightly translucently striate, grey-brown (10 YR 3/2–4/3, EXPO E62–63), innately radially fibrillose, centre felted-granulose to subsquamulose. Lamellae, L = 18–36, l = 1–3, moderately distant, adnate-subdecurrent, segmentiform then ventricose, white then pink with fimbriate, concolorous edge which may turn brownish with age. Stipe 40–60 × 2–5 mm, cylindrical or slightly attenuated towards base, straight or slightly curved, concolorous with or slightly paler than pileus, apex somewhat scurfy-fibrillose, downwards fibrillose-striate, base white-tomentose. Flesh concolorous in cortex, inner part whitish. Smell and taste none.

Spores 9.9–14 × 8–11.3  $\mu\text{m}$  (averages 11.5–11.9 × 9.1–9.8  $\mu\text{m}$ ),  $\bar{Q}$  = 1.2–1.3, irregularly 5–9-angled in side-view, sometimes almost rectangular in outline with base difficult to interpret, not distinctly dihedral. Basidia 27–55 × 8.6–14  $\mu\text{m}$ , 4-spored, clamped. Cheilocystidia 35–110 × 7.5–23 × 3.5–6  $\mu\text{m}$ , lageniform, sometimes with more or less pointed apex, numerous, but mixed with basidia. Hymenophoral trama regular, made up of narrow cylindrical hyphae. Pileipellis a cutis with transitions to a trichoderm, made up of inflated cells, 10–25  $\mu\text{m}$  wide. Brilliant granules present or not in pileitrama. Clamp-connections abundant in hymenium.

**Habitat.** — In deciduous or mixed coniferous-deciduous forest.

**Collections examined.** — NETHERLANDS, prov. Groningen, 7 Jan. 1960, G. Douwes. — DENMARK, Amager isl. near Copenhagen, 7 July 1982, Erik Rald (C). — SWITZERLAND, NEUCHÂTEL, Marin, 10 July 1965, H. S. C. Huysman (holotype). — AUSTRIA, Tirol, Wörgl (Inntal), 7 Sept. 1982, J. Trimbach.

The collections described above agree perfectly well with *Eccilia griseorubella* as depicted by Konrad & Maublanc (l.c.) and also with the short diagnosis of Kühner in Kühner & Romagnesi (1953). I fully agree with Kühner that the fungus of Konrad & Maublanc does not agree with the original diagnosis of *Agaricus griseorubellus* Lasch and therefore deserves to be described as a new species. For comments on the name *Agaricus griseorubellus* see the discussion under *Entoloma huijsmanii*.

*Entoloma indutoides*<sup>1</sup> comes close to *E. griseorubidum* but differs in having dirty olivaceous tinges in pileus and stipe, and narrower spores.

### *Entoloma calaminare* Noordel., *spec. nov.* — Fig. 2

Pileus 17–18 mm latus conico-convexus vel truncatus, centro leviter depresso, haud hygrophanus, haud striatus, pallide griseo-ochraceus, valde radialiter fibrillosus; lamellae L = 18–20, l = 1–3, adnatae cum denticulo decurrento, pallide griseae demum roseo-griseae; stipes 25–50 × 1–2.3 mm, cylindraceus, pallide brunneus griseo tinctus, glabrus; odore saporeque nullis. Sporae 9.9–13.9 × 6.8–9  $\mu\text{m}$ , noduloso-angulatae; cheilocystidia 27–58 × 16–29  $\mu\text{m}$ , late ventricosa vel lageniformia; pileipellis cutis; pigmentis intracellulosis; fibulae presentes. Ad radicis graminosis in pascuis ad terram argillaceam calaminariam. — Holotypus: M. E. Noordeloos 729, 21-IX-1978, 'Cottessen, along river Geul, prov. Limburg, the Netherlands' (L).

Pileus 17–18 mm broad, conico-convex, truncate with slightly depressed centre, with straight margin, not hygrophanous, not striate, pale greyish-ochraceous, strongly radially

<sup>1</sup>*Entoloma indutoides* (P. D. Orton) Noordel., *comb. nov.* — *Leptonia indutoides* P. D. Orton in Trans. Br. mycol. Soc. 43: 295. 1960 (basionym).

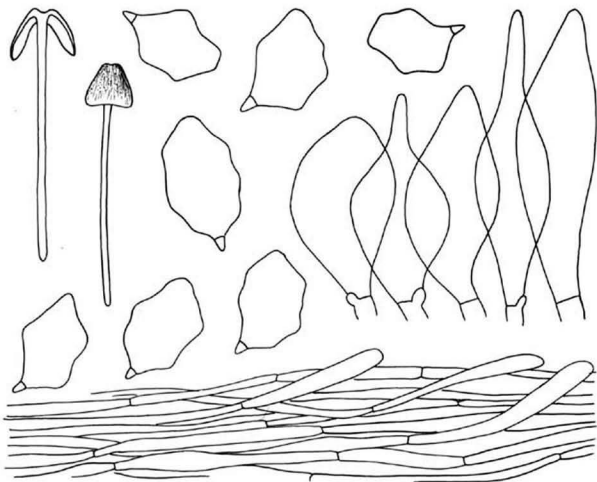


Fig. 2. *Entoloma calaminare*. — Habit, spores, cheilocystidia, and pileipellis (all figs from holotype).

fibrillose, reminiscent of a species of *Inocybe*, shining. Lamellae L = 18–20, l = 1–3, adnate-emarginate with small decurrent tooth, triangular then ventricose, grey then grey-pink (10 YR 7/3–7/2 then 7.5 YR 8/4–7/2) with entire, concolorous edge. Stipe 25–50 × 1–2 mm, cylindrical or slightly broadened at base, pale brown with slight grey tinge (10 YR 8/3–8/2), smooth, dull, base white tomentose. Flesh concolorous with surface, in stipe very brittle. Smell and taste none.

Spores 9.9–13.9 × 6.8–9  $\mu\text{m}$  (averages 10.9 × 7  $\mu\text{m}$ ), Q = 1.2–1.4–1.6, irregularly nodulose-angular with dihedrad base. Basidia 27–43 × 10.5–14  $\mu\text{m}$ , 4-spored, clamped. Cheilocystidia 27–58 × 16–29  $\mu\text{m}$ , broadly ventricose-rostrate to lageniform, numerous. Hymenophoral trama regular, made up of narrow, cylindrical hyphae up to 16  $\mu\text{m}$  wide. Pileipellis a cutis with scattered trichodermal bundles of clavate cells up to 12(–15)  $\mu\text{m}$  wide. Pigment intracellular, brown, most abundant in terminal cells of pileipellis, elsewhere very pale if present. Brilliant granules absent. Clamp-connections present in hymenium.

**Habitat.**— On grass-roots in grassland along river on clayey soil rich in zinc.

**Collection examined.**— NETHERLANDS, prov. Limburg, Cottesen along river Geul, 21 Sept. 1978, M. E. Noordeloos 729 (holotype, L).

On account of the conical pileus and the smooth stipe *Entoloma calaminare* comes close to *Entoloma cocles* from which it differs in having much paler colours of pileus and stipe, and in the narrow spores. *Entoloma calaminare* has also a superficial resemblance to *Entoloma* species from section *Versatilia*, from which it differs in many respects, however, such as covering of stipe, abundant clamp-connections and pigmentation. *Entoloma canosericeum* differs in having encrusted pigments in pileipellis and hymenophoral trama, dark coloured pileus and stipe and slightly smaller, more broadly ellipsoid spores.

## 12. ON SOME CRITICAL TAXA IN SECTION CYANULA

### *Entoloma* (subg. *Leptonia*) sect. *Cyanula* (Romagn.) Noordel. emend.

*Entoloma* sect. *Cyanula* (Romagn.) Noordel. in *Persoonia* 11: 452. 1982. — *Rhodophyllus* sect. *Cyanuli* Romagn. in *Bull. mens. Soc. linn. Lyon* 43: 328. 1974. — Holotype: *R. serrulatus* (Fr.: Fr.) Quél.

*Leptonia* sect. *Chalybaeae* Konr. & Maubl., *Agaricales*: 261. 1948. — Lectotype (design. mihi): *L. lazulina* (F.) Quél. (nom. nud., no lat. diagn.).

*Rhodophyllus* sect. *Fragiles* Romagn. in *Bull. mens. Soc. linn. Lyon* 43: 329. 1974. — Holotype: *R. euchlorus* (Fr.) Quél.

*Rhodophyllus* sect. *Rufocarnei* Romagn., l.c.: 329. 1974. — Holotype: *R. rufocarneus* (Berk. & Br.) Romagn.

*Rhodophyllus* sect. *Fuliginosi* Romagn., l.c.: 329. 1974. — Holotype: *R. sarcitulus* Kühn. & Romagn.

*Leptonia* sect. *Roseicaules* Largent in *Mycologia* 66: 1013. 1974. — Holotype: *L. rosea* Longyear.

*Leptonia* sect. *Albidicaules* Largent, l.c.: 1012. — Holotype: *L. albinella* Peck.

*Leptonia* sect. *Viridicaules* Largent, l.c.: 1013. 1974. — Holotype: *L. incana* (Fr.) Gill.

*Leptonia* sect. *Cereicaules* Largent, l.c.: 1014. 1974. — Holotype: *L. longistriata* Peck.

*Leptonia* sect. *Chromocystotae* Largent in *Bibliotheca mycol.* 55: 130. 1977. — Holotype: *L. serrulata* (Fr.) Kumm.

Misapplied name. — *Leptonia* sect. *Paludocybe* Largent sensu Largent in *Mycologia* 66: 1013. 1974 [based on *L. lampropus* sensu P. D. Orton; non Fr.].

In the recent monographs of *Leptonia* (Largent, 1977) and *Rhodophyllus* (Romagnesi & Gilles, 1979) the species in subgenus *Leptonia* are arranged in sections mainly according to their colour. This resulted in a series of sections which appear rather 'unnatural' to me. I am convinced that for example the presence or absence of blue pigments does not justify a separation at sectional level, as presence or absence of these pigments is found in rather closely related species, like the *serrulatum*-group or the group of *Entoloma griseocyanum*. I am inclined to consider of greater importance the structure of lamella-edge which can be fertile in many species, or made up of a thick strand of parallel hyphae which bear cystidia in dense fascicules, like in *Entoloma serrulatum*. I definitely feel more comfortable in accommodating all clampless species of subgenus *Leptonia* in one large section, accepting differences in colour as an important feature to distinguish species, but not to distinguish higher taxa. Also a coloured lamella-edge, caused by pigmented cheilocystidia, used by Largent, l.c. to distinguish sect. *Chromocystotae* is

not accepted. Many species have pigmented cheilocystidia or not, sometimes even in one population (mycelium), and I do not consider this character as one of high taxonomic value. For all these reasons I have emended sect. *Cyanula* to include all species concerned. For a more detailed account of the characters used to distinguish taxa in subgenus *Leptonia* reference is made to a future monographic treatment of the subgenus by the author.

### 12.1. On the species in the group of *Entoloma chalybaeum*

The species in the group of *Entoloma chalybaeum* can be characterised by the following combination of characters: pileus some shade of blue, violaceous-blue or blackish blue, lamellae blue when young with concolorous or brown, never blue-black and serrulate edge; stipe blue with same colour of the pileus or paler, smooth, except for the pruinose apex in some taxa, and the basal mycelium.

In northwestern Europe three species were known in literature, viz. *E. chalybaeum* with non-translucent, entirely woolly squamulose pileus, *E. lazulinum* with a smoother, translucently striate pileus, and *E. cyaneoviridescens*, with in addition to the blue colours also sulphur-green tinges in the basidiocarp.

My studies of numerous collections from various parts of Europe resulted in the recognition of at least five taxa in this group, which can be distinguished as follows.

- |   |   |
|---|---|
| 1. Lamella edge fertile, cheilocystidia absent . . . . .  | 2   |
| 2. Pileus and stipe, sometimes also lamellae with distinct sulphur-yellow tinges, basal mycelium of stipe sulphur-yellow . . . . .  | <i>E. cyaneoviridescens</i>   |
| 2. Pileus and lamellae bright blue without sulphur-yellow tinges, stipe blue often fading to greenish blue with age, basal mycelium white then bright ochraceous orange or reddish yellow |   |
|   | <i>E. cruentatum</i>  |
| 1. Lamella edge entirely sterile with cylindrico-clavate cheilocystidia, which often have brown intracellular pigment . . . . .   | 3   |
| 3. Pileus distinctly translucently striate when moist, at least up to half the radius, (sub-)squamulose in central part only . . . . .  | 4   |
| 4. Basidia in majority 4-spored . . . . .   | <i>Entoloma chalybaeum</i> var. <i>lazulinum</i> f. <i>lazulinum</i>    |
| 4. Basidia in majority 2-spored . . . . .   | <i>Entoloma chalybaeum</i> var. <i>lazulinum</i> f. <i>bisporigerum</i> |
| 3. Pileus not translucently striate when moist, entirely woolly-squamulose  |   |
|   | <i>Entoloma chalybaeum</i> var. <i>chalybaeum</i>                       |

### *Entoloma cruentatum* (Quél.) Noordel., *comb. nov.* — Fig. 3

*Nolanea coelestina* var. *cruentata* Quél. in C.r. Ass. fr. Av. Sci. (Grenoble, 1885): 446. 1886 (Champ. Jura & Vosges, suppl. 14) (basionym). — *Rhodophyllus coelestinus* var. *cruentatus* (Quél.) Quél., Enchir. Fung.: 65. 1886. — *Nolanea cruentata* (Quél.) Sacc. Syll. Fung. 5: 727. 1887.

Selected icones.—Quél. in C.r. Ass. fr. Av. Sci. (Grenoble, 1885) pl. 12, fig. 4. 1886 (Champ. Jura Vosges 14).

Pileus 5–30 mm broad, campanulate-conical then expanding finally flattened, almost always with minute but pronounced papilla, rarely papilla within slight central depression, with slightly involute margin when young, not hygrophanous, when moist distinctly translucently striate at least up to half the radius, dark indigo-blue or violaceous grey-

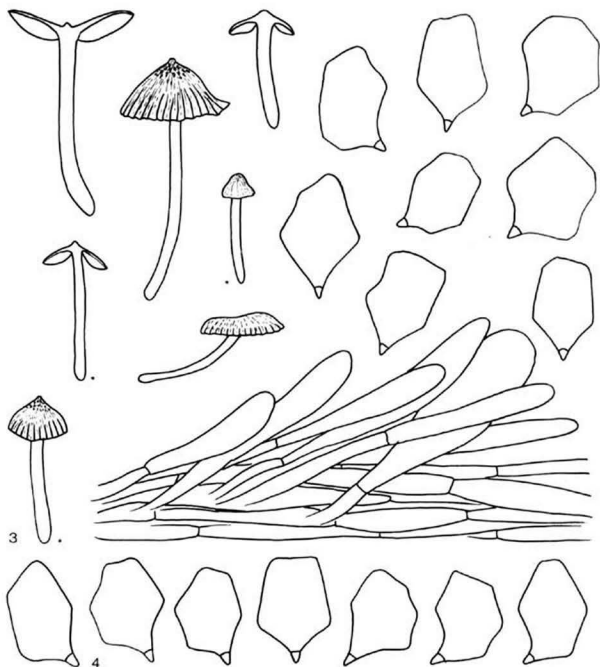


Fig. 3. *Entoloma cruentatum*. — Habit, spores, and pileipellis (Habit from Noordeloos 8350 and 8351 (\*), spores from Noordeloos 8350, pileipellis from Noordeloos 8351).

Fig. 4. *Entoloma cyaneoviridescens*. — Spores (from holotype).

blue at centre and on striae (Meth. 16F3, 18F4, 20F3–F5), slightly paler between the striae and at margin (Meth. 19E3, D4, C1 or Muns. 7.5 YR 5/2) minutely granulose all over when young, in mature specimens minutely granulose-squamulose at centre only, smooth or radially fibrillose-irguate towards margin. Lamellae, L = 20–30, l = 1–3–5, adnate-decurrent to deeply emarginate, narrowly to broadly ventricose, blue grey then



with pink tinge, with concolorous, entire edge, sometimes veined on sides. Stipe 15–50 × 1–3 mm, cylindrical or flattened, sometimes distinctly broadened towards base, concolorous with or slightly paler than pileus, with age basal part often turning greenish, basal tomentum yellow-ochraceous to bright orange. Flesh concolorous with surface, in fleshy specimens with pale inner parts. Smell and taste inconspicuous.

Spores 8.1–10.8(–11.5) × 6.3–8.1 μm (averages 9.3–10.0 × 7.0–7.7 μm), Q = 1.15–1.3–1.4–1.5, 5–6–7-angled in side-view with distinct dihedral base. Basidia 27–54 × 7–12.5 μm, 4-spored, clampless. Lamelle edge fertile. Cystidia absent. Hymenophoral trama regular, made up of cylindrical hyphae up to 16 μm wide. Pileipellis a cutis at margin, gradually passing into a trichoderm towards centre, made up of cylindrical to inflated hyphae, 7–17 μm wide, at centre almost hymenidermal, made up of clavate cells 30–70 × 12–20 μm. Pigment blue, intracellular in pileipellis and upper pileitrama. Vascular hyphae present and often abundant in pileitrama. Brilliant granules abundant in pileitrama. Clamp-connections absent.

**Habitat & distribution.**—In mossy grassland on acid soil. So far known from two different places in Scotland and from the Jura (France).

**Collections examined.**—GREAT BRITAIN, Scotland, Inverness-shire, Fort William, Glen Nevis, near Glen Nevis Youth Hostel, 18 Sept. 1983, *M. E. Noordeloos 8350, 8351*, idem 20 Sept. 1983, *M. E. Noordeloos 8353*; Perthshire, Blair Atholl, Struan Birchwood, 22 Sept. 1983, *M. E. Noordeloos 8371*.

Quélet (1886) described *Entoloma cruentatum* as a variety of *Nolanea coelestina*, because of the resemblance with regard to conical, papillate pileus and the blue colour of the entire basidiocarp. According to Quélet, one of the striking differences with *Nolanea coelestina* is the stipe-base which turns red on bruising (*cruentata* means smeared with blood). When I visited Scotland during the jubilee-foray of the Dutch Mycological Society, I found a very attractive species of *Leptonia*, close to *E. chalybaeum*, with a striking orange-red stipe-base when handled (sometimes the reddish pigment stained my fingers). It could easily be identified with Quélet's description, and especially the coloured plate of *Nolanea coelestina* var. *cruentata*. The Scottish fungus differs clearly from *Entoloma coelestinum* in my concept (Noordeloos, 1982), and I consider Quélet's taxon as a good species, closely related to *E. chalybaeum* and *E. cyaneoviridescens*.

*Entoloma cruentatum* differs from *Entoloma chalybaeum* in the absence of cheilocystidia, the papillate pileus, the slightly smaller spores, and the reddish stipe-base. *Entoloma cyaneoviridescens* comes very close to *E. cruentatum* in microscopical characters, but it clearly differs in having sulphur-yellow or sulphur-green colours in the basidiocarp. Thanks to the courtesy of Mr. P. D. Orton I was able to study his water-colour paintings of *Leptonia cyaneoviridescens*, and I am convinced Orton's species is a species in its own right.

*Entoloma cyanulum*<sup>2</sup> has about the same colour as *E. cruentatum*, but differs in having white then pale pink lamellae, white basal tomentum of the stipe, and much larger spores.

The reddish colour of the stipe-base, especially when handled, is found in two other species of sect. *Cyanula* in Europe, viz.: *Entoloma pyrospilum* and *E. turci*. *Entoloma*

<sup>2</sup>*Entoloma cyanulum* (Lasch) Noordel., *comb. nov.* — *Agaricus cyanulus* Lasch in *Linnaea* 4: 540. 1829 (basionym).

*pyrospilum* differs in having a depressed, pale brownish-glaucous pileus, similarly coloured stipe, and a sterile lamella edge. *Entoloma turci* is a dark brown species without any trace of blue with much larger spores and a sterile lamella edge. Also two species from North America have a red stipe-base, viz. *Leptonia inversa* Largent with a purplish black squamulose pileus, and *L. nigra* (Murr.) Murr. with a non-striate, entirely tomentose-scaly pileus, and a fibrillose-rimose stipe-surface.

***Entoloma cyaneoviridescens* (P. D. Orton) Noordel. — Fig. 4**

*Leptonia cyaneoviridescens* P. D. Orton in Trans. Br. mycol. Soc. 43: 292. 1960. — *Entoloma cyaneoviridescens* (P. D. Orton) Noordel. in Persoonia 11: 470. 1982.

Pileus 8–17 mm broad, convex, then expanded, slightly umbilicate, deep ultramarine blue-black and tinged bright sulphur-greenish from centre out, margin sometimes tinged blue-violaceous, entirely minutely silky-tomentose at first, then minutely tomentose-scaly under lens (scales at centre denser and larger), sometimes appearing radially striate at margin from denser scales in radial streaks, translucently striate when moist, margin sometimes lacerate. Lamellae adnate, sometimes emarginate or with tooth, pale ultramarine-blue then glaucous-bluish tinged yellow-greenish especially near flesh of pileus, subcrowded,  $L = 18-20$ ,  $l = 3-7$ , edge sometimes paler. Stipe 22–38 × 1–2 mm, equal or slightly swollen at base, often flexuose, ultramarine-blue-blackish fading to greenish blue or glaucous-greenish grey from base up, smooth, dull; apex sometimes slightly white pruinose, stuffed then hollow; base sulphur-yellow tomentose from the yellow mycelium. Flesh pale ultramarine-blue then greenish blue, sometimes paler in stipe-base, bluish white in centre of pileus and stipe. Smell none or slightly rancid-oily.

Spores 8.6–10.8 × 6.8–8.1  $\mu\text{m}$  (averages 9.6 × 7.5  $\mu\text{m}$ ),  $Q = 1.2-1.3-1.45$ , (5–)6-angled in side-view with dihedral base. Basidia 4-spored, clampless. Lamelle edge fertile, no cystidia found. Pileipellis a cutis of cylindrical 5–12  $\mu\text{m}$  wide hyphae, with trichodermal tufts of clavate cells, up to 18  $\mu\text{m}$  wide, denser and more frequent towards centre. Pigment intracellular, no trace of membranous or encrusting pigments seen. Pileitrama regular, made up of long cylindrical top inflated cells. Clamp-connections absent.

Collection examined.—GREAT BRITAIN, Scotland, Invernesshire, Glen Affric, Tomich, along river Affric, 18 Sept. 1958, P. D. Orton (holotype, K; isotype, E).

The macroscopical characters given above are adopted from the original description by Orton. The type-collection is in a bad state, but the microscopical characters reveal that *Entoloma cyaneoviridescens* is a good species in section *Cyanula*. I could not find the encrusted hyphae described by Orton (1960). Thanks to the generous hospitality of Mr. P. D. Orton during my stay in Scotland in August/September 1981 I was able to study his water-colour paintings of *Leptonia cyaneoviridescens*. The bright sulphur-greenish tinges of the basidiocarp are fairly characteristic, and sufficient evidence to distinguish this species from other species of subg. *Leptonia*. For a comparison with *Entoloma cruentatum* see above.

*Entoloma querquedula*, another species of *Leptonia* with greenish and blue tinges in pileus and stipe, differs in having much larger spores and a sterile lamellae-edge with blue intracellular pigment.

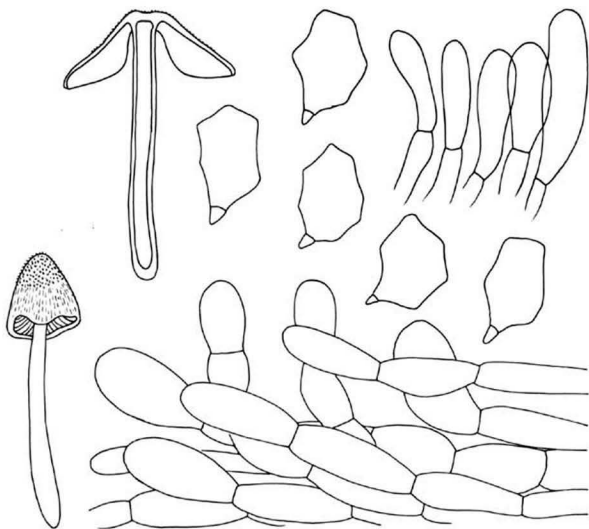


Fig. 5. *Entoloma chalybaeum* var. *chalybaeum*. — Habit, spores, cheilocystidia and pileipellis (habit from *Kuyper*, 1977; all other figs from *Boekhout*, 1982).

***Entoloma chalybaeum* (Fr.: Fr.) Noordel. var. *chalybaeum*. — Fig. 5**

*Agaricus chalybaeus* Fr., *Observ. mycol.* 2: 93. 1818. — *Agaricus chalybaeus* Fr.: Fr., *Syst. mycol.* 1: 203. 1821. — *Leptonia chalybaea* (Fr.: Fr.) Kumm., *Fürh. Pilzk.*: 96. 1871. — *Entoloma chalybaeum* (Fr.: Fr.) Noordel. in *Nord. J. Bot.* 2: 163. 1982.

Misapplied names. — *Rhodophyllus chalybaeus* (Pers.) Qué!, *Enchir. Fung.*: 60. 1886 sensu Qué!, non Pers. 1801.

*Agaricus columbarius* Bull. sensu Sowerby, *Col. Figs. Engl. Fungi* 2, pl. 161. 1799.

Excluded. — *Agaricus chalybaeus* Pers., *Syn. meth. Fung.*: 343. 1801 (= *Agaricus columbarius* Bull.).

Selected icones. — Bres., *Iconogr. mycol.* pl. 574. 1929 (as *L. chalybaea*). — Konr. & Maubl., *lc. sel. Fung.* pl. 181, fig. 1. 1929 (as *L. chalybaea*). — Sowerby, *Col. Figs. Engl. Fungi* 2, pl. 161. 1799 (as *A. columbarius*).

Pileus 14–40 mm broad, conical or campanulate, sometimes truncate, usually not or only slightly depressed at centre, with involute margin, not very much expanding with age to conico-convex or convex, not hygrophanous, not or obscurely striate at margin only, rarely up to half the radius, dark indigo-blue, almost black at centre, towards margin slightly paler, then more brownish-violaceous blue, entirely velvety-tomentose breaking up in minute, radially arranged, adpressed to slightly reflexed squamules with age, sometimes glabrescent, marginal zone sometimes radially grooved. Lamellae,  $l = 20-40$ ,  $l = 1-3-5$ , deeply emarginate to almost free, ventricose, grey-violaceous or blue-violaceous when young, then greyish pink with entire, brownish edge. Stipe 20–50 × 2–3.5 mm, cylindrical with slightly to distinctly broadened base, sometimes flattened with longitudinal groove, dark (grey-)blue usually slightly to distinctly paler and brighter than pileus, minutely pruinose at apex, downwards normally smooth, in one collection with minute, rather spread white tomentum, base white tomentose. Flesh concolorous with surface, whitish in innermost part of pileus and stipe. Smell inconspicuous. Taste none or slightly bitter.

Spores 8.7–12.6 × 6.3–8.7  $\mu\text{m}$  (averages 10.4–10.5 × 6.9–7.3  $\mu\text{m}$ ),  $Q = 1.2-1.45-1.7$ , 6–9-angled in side-view with dihedral base. Basidia 27–51 × 8.7–14  $\mu\text{m}$ , 4-spored, clampless. Lamellae edge entirely sterile with dense clusters of clavate-cylindrical cheilocystidia, 34–75 × 5–18  $\mu\text{m}$ . Pileipellis a trichoderm, at centre almost a hymeniderm of clavate cells, up to 35  $\mu\text{m}$  wide. Pigment brown, intracellular in pileipellis and upper trama. Vascular hyphae present in pileitrama. Granules present in trama of lamellae and pileus. Clamp-connections absent in all tissues.

Habitat & distribution.—In poorly manured, semi-natural grassland. Collections seen from the Netherlands and Austria, but certainly more wide-spread, possibly more rare than var. *lazulinus*.

Collections examined.—NETHERLANDS, prov. Overijssel, Havelte, 'aeroport', 16 Oct. 1982, *T. Boekhout*; prov. Gelderland, Nijmegen, Heumensoord, 26 Aug. 1977, *Th. W. Kuyper*; prov. Noord Holland, Isl. Texel, Nature reserve 'de Geul', 31 Aug. 1977, *M. E. Noordeloos* 425. — AUSTRIA, Parschallen am Attersee, 30 Sept. 1962, *C. Bas* 2757.

### *Entoloma chalybaeum* (Fr.: Fr.) Noordel. var. *lazulinum*

(Fr.) Noordel., *comb. & stat. nov.* — Fig. 6

*Agaricus lazulinus* Fr., *Epicr.*: 153. 1838 (basionym). — *Leptonia lazulina* (Fr.) Quél. in *Mem. Soc. Emul. Montbéliard* 2, 5: 344. 1872. — *Rhodophyllum lazulinum* (Fr.) Quél., *Enchir. Fung.*: 60. 1872. — *Entoloma lazulinum* (Fr.) Noordel. in *Nord. J. Bot.* 2: 162. 1982.

*Agaricus glaucus* Bull. ex D.C., *Fl. franc.* 2: 179. 1805 (later homonym of *A. glaucus* Batsch, *Elenc. Fung. Cont. pr.*: 123. 1786). — Lectotype: Bull., *Herb. France* pl. 521. 1792 (as *Agaricus glaucus*).

Misapplied name.—*Rhodophyllum cyanulus* Lasch sensu J. Lange, *Fl. agar. dan.* 2: pl. 77F. 1936.

Selected icones & descriptions.—Bres., *Icon. mycol. pl.* 570–2 (as *L. lazulina*). — J. Lange, *Fl. agar. dan.* 2, pl. 77F. 1936 (as *R. cyanulus*). — Phillips, R., *Mushr. other Fungi*: 117. 1982. (as *L. lazulina*).

Pileus 6–35 mm broad, conical to campanulate, usually rounded, sometimes truncate, expanding to conico-convex or convex, usually slightly depressed at centre, not umbilicate, rarely with minute papilla in central depression, with margin strongly involute when young and longtime remaining so, not really hygrophanous but slightly pallescent and becoming brilliant on drying, distinctly translucently striate at least up to half the

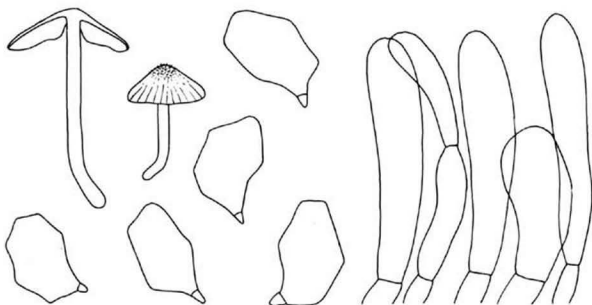


Fig. 6. *Entoloma chalybaeum* var. *lazulinum* f. *lazulinum*. — Habit, spores and cheilocystidia (all figs from Noordeloos 1810).

radius, frequently up to centre, bright ultramarine, indigo or grey-blue, at centre and on striae often blackish blue, towards margin and between striae (slightly) paler, often while expanding and also with age becoming more brownish especially towards margin, giving a violaceous total impression (eg. Meth. 20A4, 18F4, 15F3–4, when old towards 7F3–4 with blue tinge) when young entirely plushy-tomentulose then rugulose to reflexed fibrillose scaly at centre and smooth to radially fibrillose-irgiate towards margin. Lamellae  $L = 10-24$ ,  $l = (1-3)$ , moderately distant, adnate with decurrent tooth to adnexed or (deeply) emarginate, segmentiform to ventricose, sometimes veined on sides, (dark) ultramarine, blue grey or dark violaceous-blue when young then paler and with pinkish-grey tinge, finally brown-pink retaining the blue tint at margin of pileus, with entire, concolorous or brownish (rarely blackish-brownish) edge. Stipe  $20-45 \times 1.5-3$  mm, cylindrical, frequently slightly broadened at base, sometimes flattened with groove lengthwise, deep grey-blue, ultramarine or indigo-blue, initially more or less concolorous with pileus, later on usually paler, aged and weathered specimens often turn greenish-blue in basal part of stipe, apex minutely white pruinose, downwards smooth and polished or very minutely fibrillose striate, base with white tomentum. Flesh pale blue in pileus and stipe, in stipe of fleshy specimens whitish. Smell not distinctive. Taste none or slightly oily-rancid.

Spores  $8.5-12.2 \times 6.3-8.6 \mu\text{m}$  (averages  $9.6-10.8 \times 6.9-7.4 \mu\text{m}$ ),  $Q = 1.2-1.45-1.7$ ,  $(5-6-8(-9))$  angled in side-view with dihedral base. Basidia  $28.5-50 \times 8-12 \mu\text{m}$ , in majority 4-spored, clampless. Lamella edge generally entirely sterile made up of parallel hyphae which bear numerous cylindrical-clavate cheilocystidia,  $34-70 \times 5-15 \mu\text{m}$ , sometimes with pale brown intracellular pigment. Pleurocystidia none. Pileipellis a cutis at margin of  $12-18 \mu\text{m}$  wide inflated hyphae with trichodermal tufts of clavate terminal cells, up to  $25 \mu\text{m}$  wide, at centre a dense trichoderm to a hymeniderm of densely packed clavate cells up to  $35 \mu\text{m}$  wide. Pigment blue, intracellular in pileipellis and upper pileitrama. Pileitrama regular, made up of cylindrical to inflated cells up to  $25 \mu\text{m}$  wide with numerous brilliant granules. Vascular hyphae often numerous in upper pileitrama. Clamp-connections absent from all tissues.

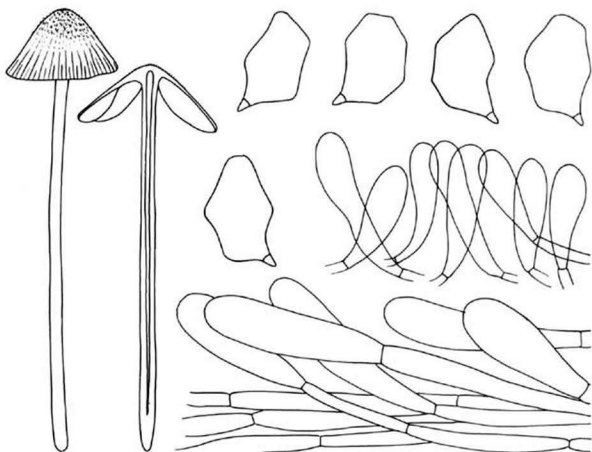


Fig. 7. *Entoloma chalybaeum* var. *lazulinum* f. *bisporigerum*. — Habit, spores, cheilocystidia, and pileipellis (all figs from holotype).

**Habitat & distribution.**—In grasslands on acidulous and calcareous soils. Wide-spread in Europe and fairly common.

**Collections examined.**—SWEDEN, Bohuslän, Valla, Sydsby, 20 Sept. 1977, *Stig Jacobsson* 77289. — GREAT BRITAIN, Devonshire, Membury, 3 Nov. 1957, *P. D. Orton* 1267 (E); Perthshire, Blair Atholl, Struan Birchwood, 22 Sept. 1983, *Steen Elborne* (*M. E. Noordeloos* 8370). — NETHERLANDS, prov. Zuid Holland, Isl. Voorne, Oostvoorne, near Biological Station Weeversduin, 14 Oct. 1960, *C. Bas* 2269; Prov. Gelderland, Staverden, Loam-pits, 25 July 1981, *Th. W. Kuyper* 1638. — GERMAN FEDERAL REPUBLIC, Rheinland-Pfalz, Gerolstein, Munterlei, Papenkeule, 23 Sept. 1980, *H. v. d. Aa*. — BELGIUM, prov. Namur, Ave-et-Auffe, Le Roptai, 21 Sept. 1974, *M. E. Noordeloos* 64 and 8 Oct. 1982, *M. E. Noordeloos* 1810.

***Entoloma chalybaeum* var. *lazulinum* forma  
*bisporigerum* Noordel., *f. nov.* — Fig. 7**

A *f. lazulina* differt in basidiis bisporigeris raro trisporigeris. — Holotypus: *H. Huyser* s.n., 6-X-1982, 'Drongelens kanaal, Helvoirt, prov. N. Brabant, Netherlands' (L).

Pileus 20–30 mm broad, truncate conical, deep grey-blue almost black at centre and on striate, deeply translucently striate up to half the radius, central part granulose-mi-

nutely squamulose, fibrillose towards margin. Lamellae deeply emarginate almost free, ventricose, blue-grey with slightly coloured, entire edge. Stipe blue almost with same colour as pileus, smooth.

Spores (9–)9.9–12.6(–13.5) × (6.8–)7.2–9.0(–9.5)  $\mu\text{m}$  (averages 11.4 × 8.4  $\mu\text{m}$ ), Q = 1.2–1.4–1.6. Basidia 2 rarely 3-spored, clampless. All other microscopical characters as in the type-forma.

*Agaricus chalybaeus* Pers., (Syn. meth. Fung.: 343. 1801) was created to replace *Agaricus columbarius* 'Sow' (Sowerby, 1799, pl. 161). It is clear from the description, however, that Sowerby identified his plate with *Agaricus colombarius* Bull. (Bulliard, 1789, pl. 413, fig. 1), and that he did not intend to publish a new name. Consequently *Agaricus chalybaeus* Pers. is typified by Bulliard's plate, and must be considered as a superfluous name when created.

*Agaricus colombarius* Bull., according to the type-plate is a species of *Entoloma* subgen. *Leptonia* with a conical then convex, blue, violaceous or grey, radially fibrillose, not striate pileus, free, ventricose, pale or blue-grey lamellae with or without a blue-coloured edge, and with a blue or grey, smooth stipe which is sometimes bulbous at base. This combination of characters does not fit with any of the species of *Leptonia* known to me, and I have the strong feeling that Bulliard depicted a mixture of species, including species like *Entoloma euchroum* and *E. serrulatum*, but also other species may have been included. It seems impossible to select one of the known species of *Leptonia* to fit with Bulliard's plate in a convenient way, and therefore I consider *Agaricus columbarius* Bull. as a nomen dubium, and accordingly also *Agaricus chalybaeus* Pers.

Sowerby, however, depicted quite another species, known by modern authors as '*Leptonia chalybaea* (Pers. ex Fr.) Kumm.' It is clear that these authors-names cannot be used for the species concerned. Fries (1815 and 1818) was aware of the discrepancy of the plate of Bulliard and Sowerby. *Agaricus chalybaeus* Fr., 1818 has as synonym '*Agaricus columbarius* Sowerb. t. 161 (excl. synonym.)'. Fries (1815: 19) placed *Agaricus columbarius* Bull. in the synonymy of *Agaricus lampropus*. As Fries (1818) definitely excluded the type-plate of *Agaricus chalybaeus* Pers., one must consider *Agaricus chalybaeus* Fr. 1818 as a new species, and I select the plate and description of *Agaricus columbarius* sensu Sow., (1799) as the lectotype of this species. Fries sanctioned *Agaricus chalybaeus* Fr.: Fr. in 1821, and therefore the correct name for the species involved is now *Entoloma chalybaeum* (Fr.: Fr.) Noordel.; non *Agaricus chalybaeus* Pers., 1801.

Ever since Bulliard (1792) and Sowerby (1799), and strongly influenced by the works of Fries (1821, 1838), European mycologists have tried to distinguish two species of *Leptonia* with blue pileus, lamellae and stipe, and without a blue-black serrulate lamella edge, viz. '*Leptonia*' *lazulina* Fr. with a deeply striate, almost smooth pileus, except for the centre, and '*Leptonia*' *chalybaea* Pers. with a non-striate, entirely woolly-felted to subsquamulose pileus. Even nowadays Orton (1960) and Moser (1982) distinguish these taxa. Kühner & Romagnesi (1953) accepted a wider concept of '*Rhodophyllus*' *lazulinus*, including *chalybaea*, and after close study of a number of collections from various parts of N.W. Europe, I am inclined to follow their suggestion. I have seen only few collections (e.g. *Th. W. Kuyper*, 26 Aug. 1977) which fully agree with *Leptonia*

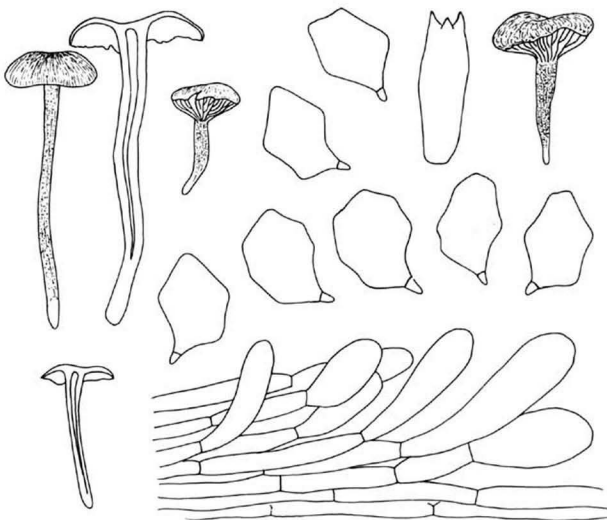


Fig. 8. *Entoloma viaregale*. — Habit, spores, basidium and pileipellis (all figs from holotype).

*chalybaea* as depicted by Konrad & Maublanc (1926) and Bresadola (1929), the other collections cited under *E. chalybaeum* var. *chalybaeum* show weak to distinct transitions to more typical *E. lazulinum* with deeply striate pileus. I have the strong impression that all intermediates occur from typical *E. lazulinum* into typical *E. chalybaeum*. Microscopically all collections studied are rather uniform. For the time being I reduce *Entoloma lazulinum* to a variety of *E. chalybaeum*, with the expectation that in future, with more collections, it will even be reduced to a mere form of *E. chalybaeum*.

*Leptonia nigra* (Murr.) Murr. comes very close to *E. chalybaeum* var. *chalybaeum*. According to Largent, the type-collection of *L. nigra* shows a sterile lamella-edge, which make it highly probably that it is synonymous with our *E. chalybaeum*. However, in the collections from California studied by Largent, the lamella edge appeared to be fertile, which make it highly improbable that Largent's concept of the species is in agreement with the original concept of Murrill.



12.2 On *Entoloma viaregale**Entoloma viaregale* Noordel., *spec. nov.* — Fig. 8

Pileus 10–30 mm latus, conicus, campanulatus vel subglobosus, demum convexus, haud vel leviter depressus, margine involuto demum recto, haud hygrophanus, haud striatus, atro-brunneus vel atro-sepiaceus, toto squamulosus; lamellae, L = 20–30, l = 1–3(–5), late adnatae vel subdecurrentes vel emarginate, segmentiformes, sordide incarnatae demum obscure brunneo-incarnatae; stipes 20–70 × 1.5–3 mm, cylindraceus vel compressus, chalybaeo-griseus expallens, tot albedo-pruinosis; odore saporeque farinaceis; spores (8.1–)8.7–11.5(–12.3) × (6.4–)7–8.1 μm; basidia tetrasporigera; cystidia nulla; pileipellis hymeniformis vel trichoderma elementis inflatis, pigmentis intracellulosis; fibulae absentes. — Holotypus: *M. E. Noordeloos* 365, 2 Aug. 1977, 'Kings' road, Fokstua, Dombås, Oppland, Norway' (L, isotypus in O).

Pileus 10–30 mm broad, conical to campanulate or hemispherical, then expanding with or without slightly depressed centre, with margin slightly enrolled when young later straight, not hygrophanous, not translucently striate, very dark blackish brown or blackish sepia, only slightly paler towards margin, entirely concentrically minutely squamulose with blackish brown squamules, densest around centre. Lamellae, L = 20–30, l = 1–3(–5), broadly adnate with decurrent tooth or slightly emarginate, segmentiform, sordid grey-white when young then rather dark brown-pink with subentire to serrulate, concolorous edge. Stipe 20–70 × 1.5–3 mm, cylindrical or compressed with longitudinal groove, slightly tapering towards base or subbulbous, pale to dark blue-grey becoming paler and more brownish with age, dull downy pruinose all over to substriate, base white tomentose (turning red when bruised in the holotype). Flesh concolorous with surface, pale in inner parts of fleshy specimens. Smell and taste distinctly farinaceous.

Spores (8.1–)8.7–11.5(–12.5) × (6.4–)7.0–8.1 μm (averages 9.2–10.9 × 7.2–7.6 μm), Q = (1.1–)1.2–1.3–1.4(–1.5), 5–7-angled in side-view with dihedral base. Basidia 4-spored, clampless. Lamella edge fertile, cystidia absent. Pileipellis a hymeniderm at disc, more trichodermal towards margin made up of strongly inflated, clavate terminal cells, 8–21 μm wide. Pigment intracellular, brown, abundant in pileipellis and upper pileitrama. Brilliant granules present or absent in pileitrama. Vascular hyphae present or absent in pileitrama. Clamp-connections absent.

Habitat & distribution.—Grassy roadside near *Betula* or *Picea* in subalpine woodland on sandy morene. Norway. Only known from the type-locality.

Collections examined.—NORWAY, Oppland, Dombås, Kongeveien to Fokstua, 750 m alt., 2 Aug. 1977, *M. E. Noordeloos* 364, 365 (holotype), 368, idem, 5 Aug. 1977, *M. E. Noordeloos* 381, 382, 383.

*Entoloma viaregale* belongs to the group of taxa related to *Entoloma anatinum*, characterized by a not hygrophanous, not striate, entirely felted-squamulose pileus and a stipe surface which is not polished-smooth. *Entoloma viaregale* is distinguished from other species in this group by having a rather dark brown pileus, pruinose-downy stipe and farinaceous smell.

12.3. On *Agaricus griseorubellus* and its interpretations

*Agaricus griseorubellus* was described by Lasch (1829) with the following characters.

'Pileo sericeo subcinereo, lamellis subdecurrentibus latiusculus subdistantibus cano-carneis; stipite farcto fibrilloso basi subincrassato. Descr. br. Pileus membranaceus subconvexus umbilicatus  $\frac{3}{4}$ – $1\frac{1}{2}$  unc. latus, subinde flexuosus, humidus subfusco-griseus, striatus, siccus griseus sericeo-fibrillosus, saepe lacerus. Lamellae 4–8 seriales, postice attenuatae, subtenues, integerrimae etiam latae. Stipes 1– $1\frac{1}{2}$  unc longus, 1– $1\frac{1}{2}$  linea crassus, subcinereus vel griseus apice leviter flocculosus, basi lanatus, fibrillosus, demum subcavus. Subfragilis. Odor farinae. In silvis umbrosis praesertim circa Coryli truncos, subgregariae. Aug.-Sept.'

This diagnosis gives room to various interpretations, but in my opinion it most likely depicts a species of *Entoloma* with a brownish grey, hygrophanous, translucent, smooth pileus which turns paler and becomes shiningly fibrillose on drying, with rather distant, broad, adnexed to subdecurrent lamellae and a fibrous, greyish stipe. Although it generally has been interpreted as a species of *Leptonia*, I see no reason why *Agaricus griseorubellus* should not belong to subgenus *Entoloma* as one of the small species in sect. *Rhodoplia* or *Polita*. As it will never be clear, I consider *Agaricus griseorubellus* as a nomen dubium.

As there exist at least three different interpretations of *Agaricus griseorubellus* Lasch in literature, there is need for a re-evaluation of these taxa.

'*Eccilia*' *griseorubella* sensu Konrad & Maublanc (Ic. sel. Fung., pl. 185 fig. 1. 1928) has been renamed by Kühner *Rhodophyllus griseorubidus* (nom. nud.). I have validated this name as *Entoloma griseorubidum* above.

There exist two other well-known interpretations of *Agaricus griseorubellus* in literature, viz. *Eccilia griseorubella* 'Fr.' sensu Bresadola (Iconogr. mycol. pl. 594. 1929) and *Rhodophyllus griseorubellus* sensu J. Lange (Fl. agar. dan. 2, pl. 80F. 1936). As I think that both are different from the original *Agaricus griseorubellus*, I describe them as new species below.

### *Entoloma huijsmanii* Noordel., spec. nov. — Fig. 9

Misapplied name.—*Rhodophyllus griseorubellus* sensu J. Lange, Fl. agar. dan. 2, pl. 80F; non Lasch, nec Bres.

Pileus 10–30(–40) mm latus, convexus vel planus, umbilicatus, pallide vel medio griseo-brunneus vel corneus, translucido-striatus, centro squamuloso, margine fibrilloso-virgato vel glabro; lamellae, L = 20, l = 1–3–5, haud confertae, adnatae vel subdecurrentes, albiae demum pallide griseo-rosacea acie concolore; stipes 25–60 × 1–3 mm, cylindraceus vel compressus, griseo-violaceus, glaber; odore saporeque nullis; sporae (8.7–)9.3–13.5 × 6.2–8.3(–9)  $\mu$ m; basidia bisporigera vel tetrasporigera; cystidia nulla; pileipellis trichoderma, hyphis inflatis pigmentis intracellulosis; fibula nulla. — Holotypus: H. S. C. Huijsman, 9-VIII-1952, 'Estate Bijvank, Bergh, Beek, the Netherlands' (L).

Pileus 10–30(–40) mm broad, convex then planoconvex usually deeply umbilicate, weakly hygrophanous, pale to moderately dark grey-brown or hornbrown, when moist translucently striate up to centre, centre granulo-subsquamulose, margin radially fibrillose-virgate to (almost) smooth. Lamellae, L = about 20, l = 1–3–5, adnate or subdecurrent, triangular-segmentiform then (sub-)ventricose, white or very pale grey then pink with or without a faint grey tinge, with entire, concolorous edge. Stipe 25–60 × 1–3 mm, cylindrical or flattened, grey-violaceous with slight tendency to blue in some

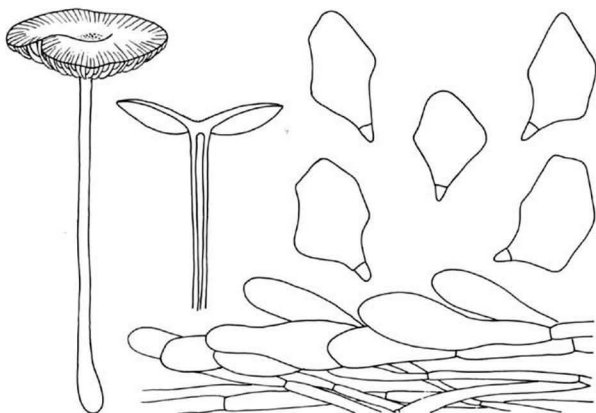


Fig. 9. *Entoloma huijsmanii*. — Habit, spores, and pileipellis (all figs from holotype).

collections (Meth. 6D4–6D3, 7D3–7E4 or like Lange, pl. 80F, l.c.), smooth or in upper part violaceous-pruinose and downwards with blackish-violaceous fibrils, dull, base white tomentose-villose. Flesh concolorous with surface in cortex, inner parts paler. Smell and taste inconspicuous.

Spores  $(8.7-9.3-13.5 \times 6.2-8.3(-9.0) \mu\text{m}$  (averages  $10-12 \times 6.9-7.8 \mu\text{m}$ ,  $Q = 1.2-1.45-1.6(-1.7)$ ), irregularly 6–9-angled in side-view with dihedal base. Basidia 2-spored or mixed 2- and 4-spored, clampless. Lamella edge fertile, cystidia absent. Pileipellis a trichoderm at centre, made up of broadly swollen clavate cells up to  $30 \mu\text{m}$  wide, towards margin more like a cutis of inflated hyphae and terminal cells, up to  $20 \mu\text{m}$  wide. Pigment brown intracellular in pileipellis. Pileitrama regular, made up of cylindrical to slightly or broadly inflated cells, up to  $26 \mu\text{m}$  wide. Brilliant granules present or absent in pileitrama. Clamp-connections absent. Vascular hyphae may be present in pilei- and hymenophoral trama.

**Habitat & distribution.**—In dry grassland and open places in forest. Rare (?). Known to occur in Denmark, the Netherlands, France and Switzerland.

**Collections examined.**—DENMARK, Jutland, Langaa, 12 Sept. 1982, *T. Brandt-Pedersen* 82–155. — NETHERLANDS, prov. Gelderland, Beek, Bergh, estate Bijvanck, 9 Aug. 1952, *H. S. C. Huijsman* (holotype); Buren, Leemputten, 7 Sept. 1977, *M. E. Noordeloos* 440. — FRANCE, dept. Doubs, les Brenots, 4 Aug. 1969, *H. S. C. Huijsman*. — SWITZERLAND, Neuchâtel, Schwarzgraben, 12 Aug. 1960, *H. S. C. Huijsman*; idem, La Rusille, Bois du Chassagne, 12 Aug. 1976, *H. S. C. Huijsman*.

*Entoloma huijsmanii* is named after H. S. C. Huijsman, honorary member of the Netherlands Mycological Society, to honour his great stimulating influence of Netherlands and French Mycology, and for the gift of his valuable herbarium to the Rijksherbarium, Leiden.

*Entoloma huijsmanii* differs from *E. lividocyanulum* in having larger spores, 2-spored or mixed 2- and 4-spored basidia, darker pileus and violaceous tinges in the stipe. It may be identical with *Rhodophyllus griseorubellus* forma, as depicted by J. Lange, Fl. agar. dan. pl. 80F, but the stipe-colour of that picture slightly deviates, and there is no authentic material left of Lange's fungus.

*Rhodophyllus asprellus* sensu J. Lange differs among other things in having almost free, dark-coloured lamellae, blue stipe, and 4-spored basidia. *Entoloma viaregale* and *E. anatinum* differ in having a much darker, entirely woolly-velvety or squamulose, not striate pileus.

### *Entoloma lividocyanulum* (Kühn. ex) Noordel., spec. nov. — Fig. 10

*Rhodophyllus lividocyanulus* Kühn. in Kühn. & Romagn. in Rev. Mycol. 19: 37. 1954 (nom. inval., no full reference to basionym). — *Leptonia lividocyanula* (Kühn.) P. D. Orton in Trans. Brit. mycol. Soc. 43: 105. 1960 (nom. inval.).

Misapplied name. — *Eccilia griseorubella* 'Fr.' sensu Bres., Iconogr. mycol. 12, pl. 594, 1929; non Lasch.

Selected icones. — Bresadola, l.c.; Dähncke & Dähncke, 700 Pilze: 259. 1979 (excellent picture!).

Pileus 10–35 mm latus, convexus demum explanatus, umbilicatus, flavobrunneus, glabrus solido in centro granuloso-squamuloso; lamellae adnatae vel subdecurrentibus, pallidae; stipes caeruleus, in brunneo vergens; spora (7.2–)8.1–9.9(–10.8) × 6.5–7.2 μm; basidia 4-sporigera; cystidia nulla; pileipellis cutis vel trichoderma, pigmentis intracellulosis; fibula nulla. — Holotypus; *M. E. Noordeloos* 8366, 22-IX-1983, 'Struan Birchwood, Blair Atholl, Perthshire, Scotland. (L).

Pileus 10–35 mm broadly convex then flattened, (deeply) umbilicate with enrolled margin, especially when young, not distinctly hygrophanous, when young sepia then rather pallid yellow brown with darker brown granulose-subsquamulose centre ('calotte'), translucently striate almost up to centre, margin smooth or radially fibrillose-irregular. Lamellae, L = 20–36, l = 3–5–7, moderately crowded, adnate to subdecurrent, triangular then segmentiform, white then pale pink with concolorous, entire edge. Stipe 25–60 × 1–3(–4.5) mm, cylindrical or compressed with longitudinal groove, moderately dark to rather pale blue often fading to more or less brownish tinge with age, smooth or pruinose at apex, base white tomentose. Flesh concolorous with surface, but also in old, faded specimens with distinct blue tinge in stipe-cortex, inner part of relatively fleshy specimens pallid. Smell and taste inconspicuous or slightly herbaceous.

Spores (7.2–)8.1–9.9(–10.8) × 6.5–7.2(–8.1) μm (averages 8.2–9.4 × 6.4–7.1 μm), 5–6-angled in side-view with dihedral base. Basidia 25–54 × 6.5–10.5 μm, 4-spored, clampless. Lamella edge fertile, cystidia absent. Pileipellis a trichoderm of clavate cells, 7.5–30 μm wide at centre, towards margin gradually passing into a cutis of cylindrical to slightly inflated hyphae, up to 22 μm wide. Pigment intracellular in pileipellis and sometimes also in pileitrama. Brilliant granules usually present and abundant in pileitrama. Clamp-connections absent.

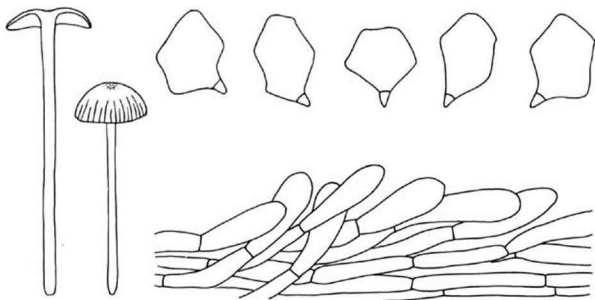


Fig. 10. *Entoloma lividocyanulum*. — Habit, spores, and pileipellis (all figs from holotype).

**Habitat & distribution.**—In grasslands usually on more or less calcareous soil, wide-spread, not uncommon.

**Collections examined.**—NORWAY, Hedmark, Auma, Hamndalseter, 11 July 1979, *M. E. Noordeloos* 958. — SWEDEN, Medelpad, Selanger s.n., Lembygdsgaard, 4 Sept. 1980, *H. Lindström*. — GREAT BRITAIN, Scotland, Perthshire, Blair Atholl, Struan Birchwood, 22 Sept. 1983, *M. E. Noordeloos* 8365, 8366. — NETHERLANDS, prov. Limburg, Heijthuisen, 'De Groote Moost', 20 Aug. 1967, *C. Ph. Verschueren*. — GERMAN FEDERAL REPUBLIC, Ulm, old cemetery, 6 Aug. 1982, *M. Enderle*. — AUSTRIA, Tirol, Jenbach, Falzthurntal, 9 Sept. 1982, *M. E. Noordeloos* 1716; idem Dristenautal, 6 Sept. 1982, *H. Marxmüller*; Innsbruck, Gnadenwald, 9 Sept. 1982, *J. Schreurs*.

*Entoloma lividocyanulum* is a very characteristic species with its pale colours, deeply striate almost smooth pileus, small spores and fertile lamella edge.

#### 12.4. On some new species in the group of *E. turci*

The group of taxa around *E. turci* is characterized by brown colours of the basidiocarp, a not striate, often entirely fibrillose-squamulose pileus and stipe surface which is smooth or flocculose-striate to flocculose-squamulose or villose. Three new taxa have been found during my studies in *Leptonia* which are described below.

##### *Entoloma pseudoturci* Noordel., *spec. nov.* — Fig. 11

Pileus 8–50 mm latus, convexus vel conicus, truncatus, centro depresso, haud hygrophanus, haud striatus, obscure umbrinus vel sepiaceus, toto villosus demum centro squamulosus, margine fibrilloso-virgatulo. Lamellae late adnatae vel leviter emarginatae, pallidae demum rosaea brunneo tinctae. Stipes 25–50 × 2–3(–4) mm, flavobrunneus vel griseobrunneus. Sporae 7.5–11 × 6–7(–8)  $\mu\text{m}$ .

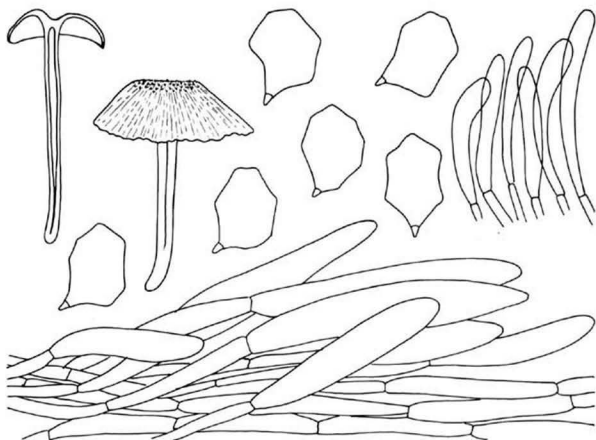


Fig. 11. *Entoloma pseudoturci*. — Habit, spores, cheilocystidia, and pileipellis (all figs from holotype).

Basidia 4-sporigera, haud fibulata. Acies lamellarum sterilis vel heteromorpha cheilocystidiis cylindraceis vel clavatis. Pileipellis hymenoderma vel trichoderma pigmentis brunneis intracellulosi. Fibulae nullae. Habitat in graminosis. — Holotypus: C. Bas 7668, 14-IX-1980, 'Dunes of Amsterdam Watersupply, Vogelenzang, prov. Noord-Holland, the Netherlands' (L).

Pileus 8–50 mm broad, truncate-conical or convex, with depressed centre, with involute margin when young then more or less straight, not hygrophanous, not translucently striate or faintly striate at margin only, dark (reddish) brown or sepiceous, sometimes tinged grey (Muns. 10 YR 3/3, 4/3, 4/4, 5/3, 6/5; 7.5 YR 5/4) with darker centre (towards 10 YR 3/2) entirely minutely velvety-peluchy when young then centre fibrillose-squamulose with adpressed or slightly uplifted, small squamules, towards margin fibrillose-virgate with adpressed fibrils. Lamellae, L = 20–25, l = 1–3–7, broadly adnate sometimes slightly emarginate, segmentiform to ventricose, pallid, almost white when young then pale brown pink (7.5 YR 8/4, 7/4) with concolorous, entire edge. Stipe 25–50 × 2–3(–4) mm, cylindrical slightly broadened at base or slightly tapering downwards, sometimes flexuose, pale yellow-brown or grey-brown often more grey or with metallic tinge towards base, paler than pileus, smooth and polished or substriate with some scattered aeriferous longitudinal fibrils, base white tomentose. Flesh concolorous with surface, inner parts paler. Smell none or faintly aromatic-fruity or flowerlike. Taste none or slightly acrid.

Spores  $7.5-11 \times 6-7(-8) \mu\text{m}$  (averages  $8.5-9.5 \times 6.5-7 \mu\text{m}$ ),  $Q = 1.1-1.7$ ,  $\bar{Q} = 1.35-1.4$ ,  $6-7(-8)$ -angled in side view with dihedral base. Basidia  $28-45 \times 7-14 \mu\text{m}$ ,  $4(-2-3)$ -spored, clampless. Lamella edge entirely sterile or heteromorphous with cylindrico-clavate cheilocystidia  $3-11.5 \mu\text{m}$  wide. Hymenophoral trama regular with long, slightly to broadly inflated cells up to  $250 \times 4-19 \mu\text{m}$ . Pileipellis a trichoderm, almost hymenidermal at centre, made up of inflated hyphae with clavate terminal cells,  $45-115 \times 7.5-25(-35) \mu\text{m}$ . Pigment brown, intracellular in pileipellis. Stipitepellis at apex of stipe with cylindrical hairs,  $25-75 \times 8-17 \mu\text{m}$ . Brilliant granules few, but present in pileitrama. Clamp-connections absent.

**Habitat & distribution.**—In moist dune-valleys among grass and moss in calcareous coastal dunes (the Netherlands), in xerophytic grassland on calcareous soil (Belgium) and in subalpine meadow grazed by sheep (Norway).

**Collections examined.**—NORWAY, Hedmarken, Auma near Tynset, Hamndalseter, 12 July 1979, *M. E. Noordeloos* 972. — NETHERLANDS, prov. Noord Holland, Vogelenzang, dunes of Amsterdam Watersupply, 14 Sept. 1980, *C. Bas* 7668 (holotype); idem, 6 Sept. 1983, *I. Wijtenbrug* (in Herb. C. Ulje); prov. Noord Brabant, Helvoirt, along Drongelens Kanaal, 1 Oct. 1983, *H. Huyser*. — BELGIUM, prov. Namur, Ave-et-Auffe, Le Roptai, 8 Oct. 1982, *M. E. Noordeloos* 1811.

*Entoloma pseudoturci*, as the name suggests, is closely related to *E. turci*, from which it differs in the consistently smaller spores (in *E. turci*;  $9-13.5 \times 6-9 \mu\text{m}$  (averages  $10-11.5 \times 7-8 \mu\text{m}$ ),  $Q = 1.25-1.75$ ,  $\bar{Q} = 1.4-1.5$ ), and the lack of red tinges in the stipe-base and flesh when bruised.

### *Entoloma porphyrofibrillum* Noordel., *spec. nov.* — Fig. 12

Pileus 35–65 mm latus, convexus-umbilicatus, haud hygrophanus, haud striatus, griseoporphyraeus, radialiter fibrillose-tomentosus centro squamuloso; lamellae adnatae-emarginatae, incarnatae acie serrulata, concolore; stipes 60–85  $\times$  3–4 mm, fibrosus, pileo subconcolorus, fibrilloso-flocculosus cum fibrillis porphyraceo-griseis; sporae 10–13.5  $\times$  6–8  $\mu\text{m}$ . Acies lamellarum sterilis, cheilocystidiis cylindraceutis vel clavatis. Pileipellis trichoderma hyphis inflatis ad 15  $\mu\text{m}$  latis pigmentis intracelulosi. Fibula nulla. Habitat in graminosis. — Holotypus: *J. Schreurs* s.n., 19 Aug. 1979, 'Willinks Weust, Winterswijk, prov. Gelderland, the Netherlands' (L).

Pileus 35–65 mm broad, convex, deeply umbilicate, with almost straight margin, not hygrophanous, not translucently striate, grey-porphyraceous with purplish tinge strongly radially fibrillose-tomentose centre breaking up in squamules, becoming strongly radially fibrillose almost rimose towards margin when old. Lamellae, L about 30, l = 3–5–7, crowded, adnate-emarginate, sometimes broadly adnate-uncinate with small decurrent tooth, segmentiform to subventricose, pale yellowish pink (Muns. 7.5 YR 7/4) with strongly serrate, concolorous edge. Stipe 60–85  $\times$  3–4 mm, cylindrical slightly broadened towards base, apex whitish-creamy, smooth, downwards densely fibrillose-flocculose striate with grey-porphyraceous fibrils, subconcolorous with pileus, base white tomentose. Flesh fibrous, brittle, pallid with slight purple tinge in pileus. Smell and taste none.

Spores  $10-13.5 \times 6-8 \mu\text{m}$  (averages  $11-12 \times 6.5-7.0 \mu\text{m}$ ),  $Q = 1.4-2$ ,  $\bar{Q} = 1.6-1.65$ , irregularly many-angled almost nodulose in side-view with dihedral base. Basidia  $32-54 \times 8-14 \mu\text{m}$ , (2–)4-spored, clampless. Lamella edge entirely sterile with dense bundles of parallel hyphae with tufts of cylindrico-irregularly clavate cheilocystidia  $15-40 \times 5-12(-15) \mu\text{m}$ . Hymenophoral trama regular, made up of inflated cells up to

45  $\mu\text{m}$  wide. Pileipellis a trichoderm at centre, more like a cutis with transitions to a trichoderm towards margin, made up of inflated terminal cells 7–15  $\mu\text{m}$  wide. Pigment intracellular in pileipellis. Pileitrama regular, made up of inflated hyphae with pale yellow walls (in KOH). Brilliant granules absent. Clamp-connections absent.

*Habitat*.—In grassland with mosses, *Juniperus communis* near-by on slightly decalcified and thus acidulous soil, deeper soil heavy calcareous loam. Only known from the type-locality.

*Collections examined*.—NETHERLANDS, prov. Gelderland, Winterswijk, estate Willinks Weust, 19 Aug. 1979, *J. Schreurs* (type) and 13 July 1980, *J. Schreurs*.

This beautiful robust *Leptonia* species, which I have seen in perfect and fresh state, has a very remarkable colour, more or less similar to *Entoloma porphyrophaeum*. It also resembles the plate of *J. Lange* (1936, pl. 73E, as *Rhodophyllus griseocyaneus* forma). The real *E. griseocyaneum* differs in having a blue stipe, reddish brown pileus, differently shaped spores and fertile lamella edge. *Entoloma porphyrophaeum* differs in having a conical pileus with broad umbo, capitate cheilocystidia and clamped hyphae, which place it in subgenus *Trichopilus*. So far it is only known from the Netherlands, but *Lange's* plate cited above suggest that it also occurs in Denmark.

#### *Entoloma scabropelle* Noordel., *spec. nov.* — Fig. 13

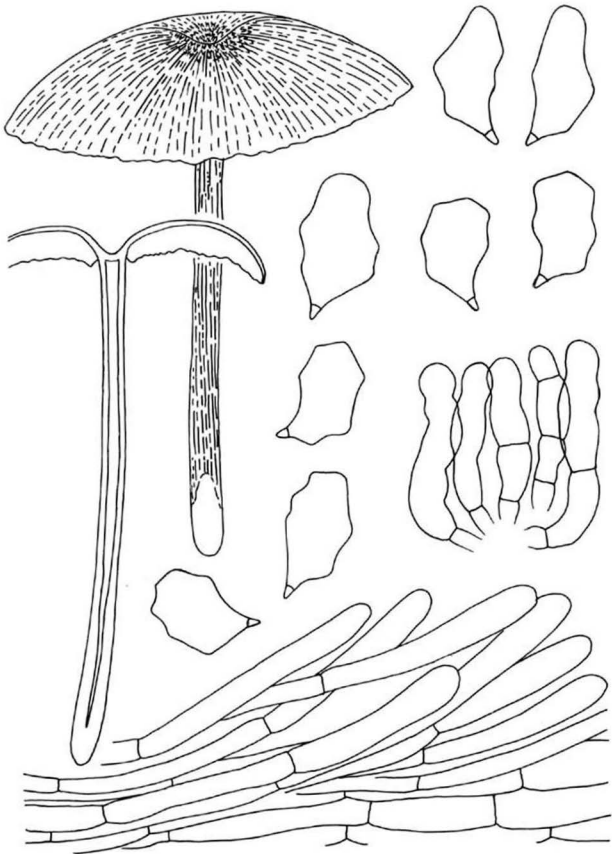
Pileus 12–40 mm latus, conico-campanulatus demum expansus leviter papillatus raro depressus, margine involuto demum recto, haud hygrophanus, haud striatus, pallide flavobrunneus toto obscure brunneo fibrilloso-squamulosus demum scabrosus; lamellae, L = 20–24, L = 3–5–7, emarginatae, ventricosae, pallidae demum rosae acie concolore; stipes 20–45  $\times$  3–5 mm, cylindraceus vel compressus, dilute griseobrunneus, ad apicem scabroso-flocculosus basin versus albo arachnoideus. Caro pallida. Odore nulla.

Sporae (8–)9–12  $\times$  (6–)7–8(–9)  $\mu\text{m}$ . Basidia bi- vel tetrasporigera. Acies lamellarum fertilis. Pileipellis trichoderma versus marginem vel hymeniderma in centro, cellulis fusoidis-clavatis 50–120  $\times$  8–22  $\mu\text{m}$  pigmentis intracellulosis. Fibulae nullae. Habitat in graminosis. — Holotypus: *M. E. Noordeloos 955*, 11-VII-1979, 'Hamndalseter, Auma, Hedmarken, Norway' (L).

Pileus 13–40 mm broad, conico-campanulate broadly umbonate with enrolled margin then expanding with weak umbo or with slightly depressed centre with straight margin, not hygrophanous, not translucently striate, dark felted squamulose with brown fibrils when young (Muns. 10 YR 5/4, 4/4, 4/3, 3/2), when mature breaking up in radially arranged, rather coarse squamules, showing paler background in-between the radial rows (10 YR 8/3, 7/3, 6/4, 5/4), shining with an almost micaceous sheen. Lamellae, L = 20–24, l = 3–5–9, deeply emarginate, ventricose, sometimes anastomosing, pale cream (10 YR 8/2, 8/3) then pallid pink (7.5 YR 8/2, 8/4) with concolorous, entire edge, staining brown on sides and edge when bruised. Stipe 20–45  $\times$  3–5 mm, cylindrical or compressed with longitudinal groove, base sometimes broadened, pale creamy at apex downwards greyish brown (10 YR 6/2, 6/3, 5/3), apex scurfy-flocculose downwards densely covered with white-arachnoid-aeriferous fibrils. Flesh subcartilagineous, easily splitting lengthwise in stipe, firm in pileus, white. Smell and taste none.

Fig. 12. *Entoloma porphyrofibrillum*. — Habit, spores, cheilocystidia and pileipellis (all figs from holotype).





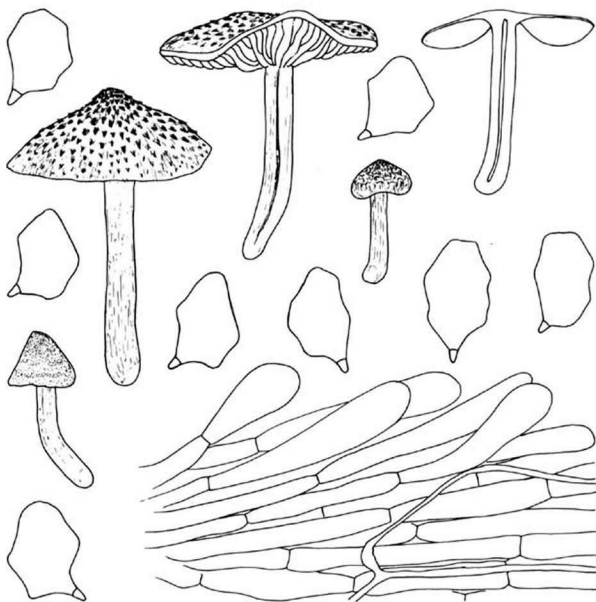


Fig. 13. *Entoloma scabropelle*. — Habit, spores, and pileipellis (all figs from holotype).

Spores  $(8.1-9-11.5 \times 6.5-8(-8.5) \mu\text{m}$  (averages  $10-10.5 \times 7.5-8 \mu\text{m}$ ),  $Q = 1.15-1.3-1.45(-1.7)$ , 5-7-angled in side-view with dihedral base. Basidia  $30-50 \times 8-14 \mu\text{m}$ , 2- and 4-spored, clampless. Lamellae edge fertile. Hymenophoral trama regular, made up of cylindrical cells,  $40-120 \times 5-32 \mu\text{m}$ . Pileipellis hymeniderm at centre, towards margin a transition between cutis and trichoderm, made up of fusoid-inflated cells,  $50-110 \times 8-22 \mu\text{m}$ . Pigment brown, intracellular in pileipellis. Brilliant granules absent or very scarce in pileitrama. Clamp-connections absent.

**Habitat & distribution.**—In subalpine mossy meadow grazed by sheep. Only known from the type-locality.

**Collections examined.**—NORWAY, Hedmarken, Auma near Tynset, Hamndalseter, 11 July 1979, *M. E. Noordeloos* 955 (holotype), and 12 July 1979, *M. E. Noordeloos* 963.

*Entoloma scabropelle* belongs to the group of *Rhodophyllus griseocyaneus* in Kühner & Romagnesi (1953). It differs from *E. griseocyaneum* in colour and slightly smaller spores; *E. turci* is much darker, has an almost smooth stipe, larger spores, and a sterile lamella edge. *Entoloma resutum* has a smooth stipe, clamped hyphae and is placed by me in subgenus *Inocephalus*.

### 13. ON A NEW SPECIES IN SUBG. ENTOLOMA SECT. POLITA

#### *Entoloma caeruleopolitum* Noordel. & Brandt-Pedersen, *spec. nov.* — Fig. 14

Pileus 8–25 mm latus, conicus demum expansus depressus vel obsolete papillatus, hygrophanus, translucido-striatus, obscure violaceo-brunneus, purpureo-brunneus vel porphyraceo-brunneus, centro obscuriore, in sicco pallescens, glaber; lamellae distantes, late adnatae, leviter emarginatae, obscure griseae, costatae; stipes 40–60 × 2–5 mm, cylindraceus vel compressus, caeruleus demum griseo-brunneus violaceo-tinctus, apice pruinato vel glabro, toto politus; carne violaceo-caerulea; spora 8–10(–11) × 6.5–8 μm, 6–9-angulatae; basidia tetrasporigera, fibulata; acies lamellarum fertiles; cystidia nulla; pileipellis ixocutis hyphis cylindraceis, 3–8(–11) μm latis pigmentis intracellulosis, brunneis; fibulae abundantes. Habitat inter muscos vel in graminosis in Piceeto vel Ericeto, Dania, Scotica. — Holotypus: *T. Brandt-Pedersen* 82.268, 18-X-1982, 'Hövild Forest, Silkeborg, Central Jylland, Denmark' (C; isotypus, L).

Pileus 8–25 mm broad, conical to convex or flattened, usually shallowly depressed, sometimes slightly papillate, hygrophanous, translucently striate when moist, sometimes very obscurely striate in dark-coloured specimens, dark violaceous-brown, purplish-brown or porphyraceous brown (e.g. Muns. 5 YR 3/2–3/3), sometimes almost black at centre, pallescent on drying, smooth. Lamellae, L = about 20, l = 3–5–7, distant, broadly adnate-slightly emarginate or with small decurrent tooth, dark grey to grey-brown with pink tinge (e.g. 5 YR 4/3, 5/3) often costate-veined on sides, with entire, concolorous edge. Stipe 15–60 × 2–5 mm, cylindrical or compressed with longitudinal groove, often tapering towards base, sky-blue (Meth. 16F(4)3–2) (reminiscent of the stipe-colour of *Entoloma nitidum*) when old often with brown tinge or violaceous-brown, apex pruinose or not, rest smooth and polished, shining. Flesh dark grey in pileus, in stipe with blue tinge. Smell and taste none.

Spores 8–10(–11) × 6.5–8 μm, (averages 9–9.5 × 7–7.5 μm), Q = 1.1–1.2–1.3, subisodiametrical 6–7-angled in side-view. Basidia 2–4-spored with clamp. Lamellae edge fertile, cystidia absent. Hymenophoral trama regular, made up of short subcylindrical cells, 30–145 × 4–15(–20) μm with clamped septae. Pileipellis an ixocutis of narrow, cylindrical, 3–8(–11) μm wide hyphae with slightly gelatinized walls, subpellis well-developed, made up of up to 24 μm wide cylindrical cells. Pigment brown-violaceous, intracellular in pileipellis. Clamp-connections abundant.

Habitat & distribution.—Between moss in *Picea*-plantations and on sawdust (Denmark), in subalpine *Calluna*-heath among grass and moss (Scotland).

Collections examined.—DENMARK, Jylland, Silkeborg, Hövild Skov, 18 Oct. 1982, *T. Brandt-Pedersen* 82.268 (holotype, C, isotype, L); idem, Addit Skov, 22 Oct. 1982, *H. Knudsen* (C), idem Velling Skov, 19 Oct. 1982, *T. Brandt-Pedersen* 82.297 (C); Sjaelland, Saerløse Overdrev, 2 Oct. 1982, *S. Klug-Andersen* (C). — GREAT BRITAIN, Scotland, Perthshire, Cairnwell, 27 Sept. 1983, *H. Knudsen* (C, L).

The blue stipe with shingly polished surface, and the small shape of the basidiocarps remind of species of subgenus *Leptonia* sect. *Cyanula*. However, the smooth,

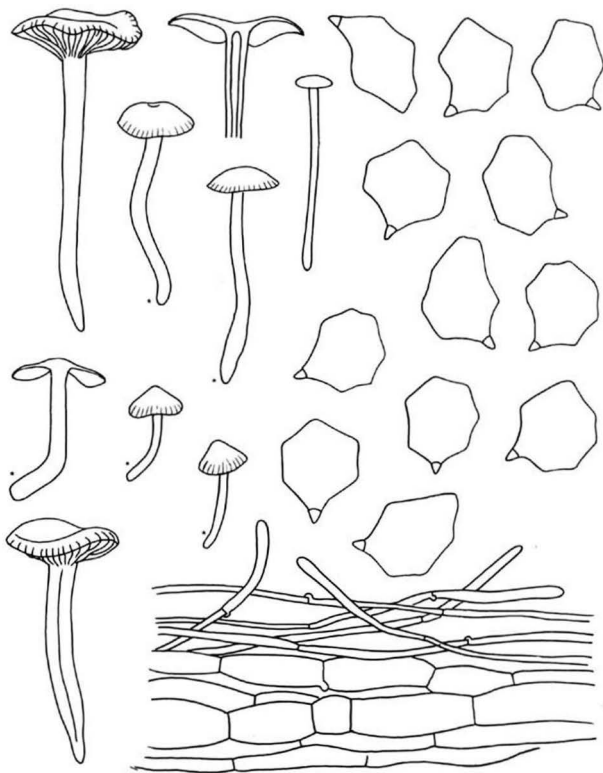


Fig. 14. *Entoloma caeruleopolitum*. — Habit, spores, and pileipellis (Habit with \* from Noorderloos 8385, all other figs from holotype).

hygrophanous pileus, type of pileipellis, structure of hymenophoral trama, subsodiometrical spores and numerous clamp-connections place *Entoloma caeruleopolitum* in subgenus *Entoloma* sect. *Polita*. Blue colours are rare in the subgenus, but occur in *Entoloma nitidum* and *E. madidum* in sect. *Entoloma*, and in *Entoloma vinaceum* var. *violipes* in sect. *Turfosa*. *Entoloma caeruleopolitum* is distinguished from the first two species in the brown colour of the pileus, the slender habit, and the polished stipe. It differs from the last mentioned species mainly in size and shape of spores. *Entoloma caeruleopolitum* may be identical with *Entoloma turbidum* var. *macrius* Karst. which was described as having a red-brown pileus and blue stipe, occurring in coniferous forests (Karsten, 1879: 266). Unfortunately the diagnosis is very short, and the type is lacking at H, so the identity of *Entoloma turbidum* var. *macrius* remains obscure. Anyway, I consider *Entoloma caeruleopolitum* not closely related with *E. turbidum* in the sense of modern authors.

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TYPE STUDIES IN THE CLAVARIOID FUNGI—VIII

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The type specimens of several clavarioid taxa are described, and modern placement of these names discussed. *Ramaria atkinsonii* (Bres. in Atk.) R. H. Petersen, *Ramariopsis dealbata* (Berk.) R. H. Petersen, and *Ramaria decolor* (B. & C.) R. H. Petersen are proposed as new combinations.

'Housekeeping' in taxonomy is a tedious process, but satisfying in that examination of type specimens is the only sure way to lead to a stable classification. The type specimens redescribed below were sought as part of my work on Pacific clavarioid fungi, and most have been revealing for reasons discussed under each.

*Clavaria alaicornis* Zollinger & Moritzi. 1844. In *Natuur- Geneesk. Arch. Neerl.-Indie*, p. 382. Holotype: L (cf. Petersen, 1981); representative specimen: PC – herb. Zollinger, ... Tjuruk ..., 2. iii. 1843, no. 1125, *Planta Javanica Exsiccati*.

The PC material, while numbered as the holotype at L, does not include location data as near Tjikoya (unless Tjuruk is synonymous), and the collection data do not agree with that of the original description. Instead, there is a second label by Léveillé and to it has been added (in a third handwriting) '*ad terram pr. tjikoya*'.

At the same time, the specimen comprises most of one fruitbody (the stipe portion is missing), similar in shape to that in the Leiden specimen. Tramal hyphae are unclamped, the hymenium is adherent, and spores are as described previously (Petersen, 1980). In short, I consider this specimen to represent *Clavaria zollingeri*, as does the L material.

Corner (1950, 1970) treated the species in *Clavulinopsis*, but his specimen at PC (Malaya, Tembeling, 9.xi.1930, *Corner 556*) is a *Clavulina*, perhaps *C. leveillei* var. *atricha*.

*Clavaria angulispora* Patouillard. 1888. In *Bull. Soc. mycol. Fr.* 4: 41.

≡ *Scytinopogon angulispora* (Pat.) Corner. 1950. In *Ann. Bot. Mem.* 1: 648.

Holotype: FH – herb. Patouillard, Orenoque, no date, *A. Gaillard*, s.n. (annot. Corner).

My observation of this specimen supports Corner's annotation, which reads as follows: 'This collection of Gaillard represents a species of *Clavulina* which I identify with *Clavulina connata* (Berk.) Corner, though Gaillard's specimen has slightly smaller spores. A. Gaillard. Orenoque: – sp. 6.5–8 × 4.7–6 μm, broadly ellipsoid, smooth, not angular:

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basidia typical of *Clavulina*, 2-sterigmate: hyphae 2.5–5.5  $\mu\text{m}$  wide, *without* clamps. 27.iv.55.' Thus it was Corner's opinion, and mine, that the 'type' specimen hardly conformed to the leading specific character, angular spores.

Further nomenclatural problems follow, for Corner continued to use this epithet as placed in *Scytinopogon* through 1970, even though he had annotated the type specimen in 1955. First, when Corner (1950) transferred *angulispora* from *Clavaria* to *Scytinopogon*, he placed *Pterula pallescens* Bresadola [ $\equiv$  *Lachnocladium pallescens* (Bres.) Bres.;  $\equiv$  *Scytinopogon pallescens* (Bres.) Singer, 1945] in synonymy under *S. angulispora* (Pat.) Corner. Because *pallescens* has priority over *angulispora* in *Scytinopogon*, Corner's transfer of *angulispora* created a nomen superfluum (assuming that *S. pallescens* and *S. angulisporus* are taxonomic synonyms). Under these conditions, the correct name for the taxon is *S. pallescens*.

Second, and perhaps worse, Corner (1950: 647) listed *S. angulisporus* as the type species of the genus, on the basis (presumably) of his own mistaken synonymy. The type species, named by Singer, was *Clavaria (Scytinopogon) pallescens* Bres.

Whether Patouillard erred in his description of the Gaillard specimen, or whether he (or someone later) muddled the specimen itself, is not known at this time. Until some more appropriate specimen is unearthed however, the Gaillard specimen cannot be overlooked, and I must accept *Clavaria angulispora* as a synonym under *Clavulina connata* (Berk.) Corner.

With *angulispora* eliminated from *Scytinopogon* on this basis, there is even less reason why *S. pallescens* should not be used, barring some equally unfortunate taxonomic confusion over its type.

*Lachnocladium atkinsonii* Bresadola in Atkinson. 1902. In J. Mycol. 8: 119.

Holotype: S – herb. Bresadola, USA, North Carolina, vic. Blowing Rock, viii-ix. 1899, G. F. Atkinson 4216.

Fruitbody (Fig. 2) one, 105  $\times$  45 mm, somewhat pressed, elongate obpyriform in outline. Stipe single, 50  $\times$  8 mm, cylindrical, white, tomentose with superficial strigose bloom, evidently mostly below substrate level, involving very little substrate, originally terete, drying chalky-friable. Major branches 2–3, strictly ascending; branches erect, rebranching in 5–6 ranks; axils rounded, internodes long, diminishing gradually; apices minutely dichotomous to quadrid. 'Entire plant and spores ochre-yellow' (Atkinson).

On soil in mixed woods.

Tramal hyphae of stipe 6–10  $\mu\text{m}$  diam., hyaline, thin-walled, hardly inflated, clamped, interwoven; ampulliform clamps up to 10  $\mu\text{m}$  broad, thin-walled, knuckle-shaped, minutely ornamented. Hyphae of stipe surface 2–3  $\mu\text{m}$  diam., hyaline, clamped, adherent except for free tips, thin-walled. Tramal hyphae of branches 5–12  $\mu\text{m}$  diam., hyaline, clamped (at least occasionally), more or less parallel. Basidia 60–75  $\times$  10  $\mu\text{m}$ , clavate, clamped; contents homogeneous to granular; sterigmata 4, stout, divergent.

Spores, (Fig. 1) 10.8–13  $\times$  5.0–5.8  $\mu\text{m}$  ( $E = 1.88$ – $2.40$ ;  $E^m = 2.09$ ;  $L^m = 11.58$   $\mu\text{m}$ ), broadly cylindrical to narrowly ellipsoid, flattened adaxially, barely roughened in profile; contents homogeneous or with a few small guttules; wall up to 0.3  $\mu\text{m}$  thick; hilar appendix prominent, somewhat curved, without discernable throat; ornamentation of very low, sparse warts or low meandering ridges arranged in generally longitudinal or spiralled configurations, but many spores without discernable ornamentation.

The taxon should be well marked in the field by the single stipe bearing a tomentum, and yellow-ocher color. The long internodes may be a function of age. Microscopically, the tomentum hyphae, friable flesh, clamps, and spore characters are diagnostic. Under oil magnification, the spores are hardly roughened, but the wall appears gritty. In cotton blue, ornamentation can be seen on some spores.

Coker (1923) could not locate the type specimen at CUP or S, and assumed the taxon to be the same as *Clavaria (Ramaria) stricta*, but that species is a member of *Ramaria* subg. *Lentoramaria*, with dimitic rhizomorphs, etc. The type specimen of *L. atkinsonii* must be placed in subg. *Laeticolora*.

Several taxa with similar fruitbodies must be separated as follows:

*Ramaria flavo-brunnescens*: stipe brunnescent, spores small and consistently ornamented.

*R. obtusissima*: much larger fruitbodies and smooth, larger spores.

*R. flava*: stouter fruitbodies, larger spores and tapering, smooth stipe.

Bresadola received the type specimen from Atkinson, wrote the Latin description and apparently sent it (perhaps together with a portion of the specimen, although Coker did not locate it) back to Atkinson, who published it. The correct citation must be as above.

Bresadola observed that the hymenium was unilateral, which led him to placement in *Lachnocladium*, but this character is relatively common in *Ramaria*, and the type fruitbody clearly fits in the latter genus.

Corner (1950) treated *L. atkinsonii* as a possible synonym under *Lentaria micheneri*, perhaps because of Bresadola's report of smooth spores and Coker's inclusion under *Clavaria stricta*. The taxon is not a *Lentaria*. Remarkably, I cannot find a later name under which this taxon fits, nor do I have such a taxon in my notes and keys. To find a yellow *Ramaria* from the southern Appalachians not known to me by now is surprising. Nonetheless, the name must be transferred as follows:

***Ramaria atkinsonii*** (Bres. in Atk.) R. H. Petersen, *comb. nov.*. Basionym: *Lachnocladium atkinsonii* Bres. in Atk. 1902. In *J. Mycol.* 8: 119.

***Clavaria bessonii*** Patouillard. 1885. *Tab. Analyt. Fung.*, Ser. I, p. 163.

≡ *Clavulina bessonii* (Pat.) Corner. 1950. In *Ann. Bot. Mem.* 1: 299.

Holotype: herb. Patouillard, Jura, autumn, 1884, *Patouillard & Besson* (not located). Neotype: FH – herb. Patouillard, Bois de Gerage, Jura, 7.viii.1890, s.n.

The specimen at FH reported on by Corner (1970) and assumed by him to be the type cannot qualify as such, for it was collected some five years after the original description. Moreover, Corner stated that the specimen did not conform to the circumscription by Patouillard. Differences between the 1890 specimen and Patouillard's circumscription are qualitative, however. Corner's report of spore dimensions ( $8.5-9.5 \times 7-8.5 \mu\text{m}$ ) was correct, and fruitbodies are taller than as reported by Patouillard (up to 25 mm high). I surmise that in the absence of a holotype specimen, the 1890 specimen may be accepted as a neotype.



*Lachnocladium cartilagineum* Berkeley & Curtis. 1868. In J. Linn. Soc. (Bot.) 10: 330.

≡ *Clavulina cartilaginea* (B. & C.) Corner. 1950. In Ann. Bot. Mem. I: 298.

Type (isotype): FH — Cuba, X, C. *Wright 204*, B. & C. Fung. Cub. no. 388.

Fruitbodies two, branched vase-shaped, pressed; stipe discrete, up to  $16 \times 2$  mm, lobed in cross-section, smooth, here and there with small patches of minutely cottony mycelium, arising from mycelium in soil but with no discernable mat. Branches in 2–4 ranks, flattened, drying cartilaginous; hymenium apparently unilateral; axils narrowly rounded; internodes diminishing gradually; apices awl-shaped to minutely dichotomous, not cristate.

Trama hyphae of branches  $2.5\text{--}4.5 \mu\text{m}$  diam., uninflated, hyaline, without clamp connections, loosely parallel, thin-walled to somewhat thick-walled (wall up to  $0.3 \mu\text{m}$  thick). Tramal hyphae of stipe similar, but with walls up to  $0.5 \mu\text{m}$  thick. Hymenium thickening up to  $600 \mu\text{m}$ , coherent, of effete basidia and subbasidial cells; basidia not supporting measurement (about  $30\text{--}40 \mu\text{m}$  long), hyaline; contents homogeneous; post-partial septation not observed; sterigmata two, slender, spindly, divergent-curved.

Spores  $7.9\text{--}8.6 \times 6.1\text{--}8.3 \mu\text{m}$  ( $E = 1.04$ ;  $E^m = 1.16$ ;  $L^m = 8.25 \mu\text{m}$ ), subglobose to broadly pip-shaped, hyaline, smooth, thin-walled, uniguttulate; hilar appendix broad, papillate.

Corner's (1950) commentary under *Clavulina cartilaginea* is excellent. One fruitbody from the type specimen is very similar to his text fig. 115, lefthand figure, the other being considerably closer in gross appearance text fig. 131, left figure, under *C. decipiens*, and indeed several characters are quite similar, from significantly thickened hymenium to spore dimensions. Two characters separate the two: (1) Clamps in *C. decipiens*, none in *C. cartilaginea* (Corner reports a few from his specimens); and (2) inflated stipe tramal hyphae in *C. decipiens*, uninflated in *C. cartilaginea*. Both appear to be tropical taxa.

Most surfaces of fruitbodies have dried cartilaginous, with the hymenium translucent and waxy. Where the hymenium has remained dry, it flakes off in very small patches. This reflects the very thick hymenium and almost non-existent subhymenium.

The hymenium appears to be composed of hyaline, withered bricks on end, substratified, with only the surface basidia still intact. Because both fruitbodies are mature, no young hymenium was observed, and basidial measurements were impossible to obtain.

*Lachnocladium chartaceum* Patouillard. 1907. In Anns mycol. 5: 365.

Type: FH — herb. Patouillard, Brazil, Prov. Sao Paulo, Campinas, iii.X.1897, *F. Noack 834*.

Annotation, E. J. H. Corner: '*Scytinopogon pallescens* (Bres.) Singer. [= *S. angulisporus* (Pat.) Corner, Monograph of Clavaria, etc. 648. This is the type of *Lachnocladium chartaceum* Pat., and has the characteristic spores ( $5\text{--}6 \times 3\text{--}3.7 \mu\text{m}$ , echinulate, ....) and uninflated hyphae. ix.55].'

Fruitbodies two, up to  $65 \times 37$  mm, pressed, arbuscular. Stipe discrete, up to  $6 \times 5$  mm, arising from mycelium-invested duff, but with no (? remaining) mat, clothed below in white, felty mat, smooth and suede-like above, ? flattened; branches in 3–5 ranks, flattened, probably white or off-white when fresh; internodes diminishing gradually; axils rounded; apices flagelliform, long, slender, awl-shaped; hymenium clearly uni-

lateral, appearing waxy, matt; sterile surfaces drying cartilaginous; flesh drying cartilaginous.

Tramal hyphae of branches 1.8–3  $\mu\text{m}$  diam., hyaline, uninflated, clamped, thin-walled, strictly parallel, tightly packed. Hymenium thickening; basidia 15–20  $\times$  6–8  $\mu\text{m}$ , broadly digitate, four-sterigmate.

Spores (Fig. 10) 5.0–6.1  $\times$  3.2–4.0  $\mu\text{m}$  ( $E = 1.40$ – $1.89$ ;  $E_m = 1.62$ ;  $L_m = 5.61 \mu\text{m}$ ), irregularly ellipsoid, thin-walled; contents obscure; hilar appendix small, papillate; ornamentation of gross spines, sometimes saddle-or molar-shaped, up to 1.2  $\mu\text{m}$  high, so stout as to distort the outline of the spore profile.

This is clearly a *Scytinopogon*, as indicated by Corner. For comments on his use of *S. angulispora*, see under that species. I would hesitate to accept this synonymy on two bases: (1) I am not familiar enough with the genus to judge, and (2) spore ornamentation in *L. chartaceum* is mostly of spines, not saddle-shaped warts as in *Scytinopogon pallescens*.

*Clavaria colensoi* Berkeley. 1855. In Hooker, *Flora of New Zealand*, p. 186.

Type specimen (holotype): K – New Zealand, no date, *Colenso*, herb. Berkeley, s.n., Annot. Dodd, viii. 70. Isotype: PDD.

Fruitbodies three, lax-ascending to erect, repeatedly pyxidately branched, up to 25 mm high, up to 12 mm broad (but pressed), now dark brown and cartilaginous. All parts slender, with stipe not exceeding 1.5 mm diam., and branches considerably less than 1 mm diam., arising from a minutely hispid, small mycelial pad on wood; branches in 3–4 ranks; apices less than 1 mm long, acerose, extremely fine.

Tramal hyphae of two kinds: a) generative, 4–8  $\mu\text{m}$  diam., hyaline, thin-walled, clamped, loosely parallel; and b) gloeoplerous, 4–7  $\mu\text{m}$  diam., yellow under phase contrast, coccinoidal. Hymenium thickening, of three elements: (a) basidia 20–25  $\times$  3.5–4.0  $\mu\text{m}$ , narrowly clavate, adherent but not gelatinized; (b) leptocystidia, vaguely ventricose, 3–5  $\mu\text{m}$  diam.; and (c) gloeocystidia, 4–7  $\mu\text{m}$  diam., hardly emergent from hymenium, rounded-lanceolate.

Spores 4–5  $\times$  3–3.5  $\mu\text{m}$ , subglobose to broadly ovate, thin-walled, weakly amyloid, asperulate.

Dodd (1972. In *Mycologia* 64: 755–756) treated this species, and it is from his dissertation (1970, Univ. Tennessee) that some of the information above was gathered. Corner (1950), while adopting the name as separate from others, was unsure of synonymy under it, but Dodd and Corner (1970) agreed that *Clavicornia candelabrum* Massee exhibited thick-walled tramal hyphae.

There are two common taxa of *Clavicornia* in New Zealand, readily separable in the field, for the fruitbodies of one [*C. piperata* (Kauffman) Leath. & Smith] are much more robust and stouter than those of the other. *Clavicornia colensoi* seems endemic, while *C. piperata*, according to Dodd, may occur around the Pacific bowl, including western North America.

*Clavaria dealbata* Berkeley. 1856. In *J. Bot.* (ed. Hooker) 8: 275.

$\equiv$  *Lachnocladium dealbatum* (Berk.) Cooke. 1901. In *Grevillea* 20: 10.

$\equiv$  *Scytinopogon dealbatum* (Berk.) Corner. 1970. In *Beih. Nova Hedwigia* 33: 89.

Holotype: K – Brazil, Panur , iii.1853, *Spruce 159*; merotype: FH.

Fruitbodies two, up to  $3 \times 2$  cm, arbuscular, pressed. Stipe  $8 \times 1$  mm, discrete, somewhat flattened, covered with loose, delicate, pale tomentum. Primary branches two; branches dichotomous throughout, in 3–4 ranks, terete; internodes short, hardly diminishing; axils lunate to rounded, slightly expanded; apices acerose, awl-shaped.

Trama hyphae 2–7  $\mu\text{m}$  diam., hyaline, clamped, thin-walled, free, parallel. Basidia  $14\text{--}20 \times 5\text{--}6$   $\mu\text{m}$ , clamped, broadly clavate to barrel-shaped, not adherent; sterigmata 4, slender, divergent.

Spores (Fig. 5)  $3.4\text{--}3.8 \times 2.4\text{--}3.0$   $\mu\text{m}$  ( $E = 1.17\text{--}1.46$ ;  $E^m = 1.27$ ;  $L^m = 3.52$   $\mu\text{m}$ ), broadly ellipsoid to subglobose, slightly flattened adaxially; wall thin; contents homogeneous; hilar appendix not prominent; ornamentation of acute spines up to 0.3  $\mu\text{m}$  long, scattered over wall surface.

The above is taken from the FH merotype, while Corner's (1970) examination assumedly was from Kew material. In 1950, Corner included the epithet as perhaps a form of *Ramariopsis kunzei*, but in 1970, he transferred the species to *Scytinopogon*. At the same time (p. 86) he indicated that *Scytinopogon* had 'begun to lose character and to merge at the clavarioid end with *Ramariopsis* ...'

I am disposed to accept *C. dealbata* as representative of a taxon of *Ramariopsis*. Basidia and tramal hyphae are typical of this genus, and tramal clamps are conspicuous, unlike those of *Scytinopogon*. Spores are not angular, but broadly ellipsoid, beset with spines quite typical of the rough-spored *Ramariopsis* taxon. Spore size is quite small for *Scytinopogon*, but typical for *Ramariopsis*. Fruitbody color and shape are very similar to those of *R. kunzei* but in *Scytinopogon* branches are usually flattened. All in all, removal of *C. dealbata* from *Scytinopogon* would leave the latter more homogeneous.

***Ramariopsis dealbata*** (Berk.) R. H. Petersen, *comb. nov.* — Basionym: *Clavaria dealbata* Berk. 1856. In *J. Bot.* (ed. Hooker) 8: 275.

***Clavaria decolor*** Berkeley & Curtis. 1858. *Proc. Am. Acad. (Arts. Sci.)* 4: 124.

Type specimen (holotype): FH – Hong Kong, Ringgold & Rodgers Exp., 14.viii.1854, *C. Wright*, s.n. (no. 112 of expedition labels); isotype: K-(specimen missing, only sketch remaining).

Fruitbodies (Fig. 4) two,  $25 \times 5$  mm and  $29 \times 3$  mm, branched, pressed, now dull ochraceous olive, arising from a strigose-felty basal mat including debris and siliceous chips (mat probably white when fresh; now dull ivory-ochre). Stipe discrete, here and there covered with extension of basal mat, probably circum 2 mm thick when fresh. Major branches two, rebranching 1–2 ranks, terete when fresh; axils narrowly rounded; apices acute, dichotomous to irregular; hymenium apparently amphigenous but axils decurrent-sterile and browner than hymenial surface. Color 'white – soon turning brown or black' (teste Wright).

Tramal hyphae and basidia clamped, not supporting further analysis.

Spores (Fig. 3)  $11.9\text{--}13 \times 4.7\text{--}5.8$   $\mu\text{m}$  ( $E^m = 2.31$ ;  $L^m = 12.54$   $\mu\text{m}$ ), comma-shaped to curved teardrop-shaped, grossly ornamented; contents homogeneous (with age?); wall up to 0.2  $\mu\text{m}$  thick, thinner apically; hilar appendix almost indistinguishable as an extension of the spore; ornamentation of gross spines up to 2.5  $\mu\text{m}$  long distally and proximally, and transverse ridges with crests medially.

Corner described *Ramaria zippelii* var. *crystallospora*, which was accepted at species rank by Petersen. *Clavaria decolor* is the same organism, and a new combination is required, as follows:

**Ramaria decolor** (B. & C.) R. H. Petersen, *comb. nov.*. Basionym: *Clavaria decolor* Berkeley & Curtis (l.c.).

≡ *Ramaria zippelii* var. *crystallospora* Corner. 1967. J. Linn. Soc. Lond. 178: 103.

≡ *Ramaria cristatospora* (Corner) R. H. Petersen. 1981. *Bibliotheca mycol.* 79: 64.

The epithet surely must come from Wright's notes concerning color changes from white to brown or black, but whether this was a bruising reaction (I suspect so) or an ontogenetic progression is unknown. No such process was reported by Corner for *R. zippelii* var. *crystallospora*.

Corner's (1950) series *Decolorans* of *Ramaria* was derived from *Clavariella decolorans* Karsten.

**Lachnocladium furcellarioides** P. Hennings 1899. In *Monsunia* 1: 142.

Holotype: — Java, Tjibodas, 24.vi.1898, *M. Fleischer*, s.n.

Fruitbody single, on wood, 68 × 8 mm, branched. Stipe 36 × 2 mm, erect, brownish black, terete, hard, smooth; branches dichotomous, ascending-erect, terete, up to 1.5 mm thick; axils narrowly rounded; internodes long, hardly diminishing; apices long, awl-shaped to acerose, dark brown.

Tramal hyphae of two types: (1) generative, hyaline, 2–3 μm diam., clamped, thin-walled, uncommon; and (2) skeletal, 2.5–5 μm diam., brown, branched, arising from clamp connections, with occasional 'cloisons de retrait', producing common flagelliform hyaline side branches from clamp connections.

Basidia 13–16 × 5 μm, broadly clavate, clamped, pale yellow under phase contrast; contents granular; sterigmata 4.

Spores not observed.

This is surely a *Lachnocladium*, but the skeletal hyphae are not differentiated into clearcut dichophyses or asterosetae. In fact, they give off hyaline, thin-walled (generative) branches at clamped septa, and so are not typical of the dichophyses of *Lachnocladium*.

Hennings reported that the spores of the type were 3.5–4 × 3–3.5 μm, smooth and hyaline to pale yellow, but I observed no spores. Not emphasizing this genus in my research, I am loath to use more material to check the spores, and it remains for future workers to ascertain the place of the taxon more specifically than to genus.

**Clavaria holmskjoldii** Oudemans. 1902. In *Beih. bot. Zentbl.* II: 525.

≡ *Clavulinopsis holmskjoldii* (Oudem.) Corner. 1950. In *Ann. Bot. Mem.* I: 373.

≡ *Ramariopsis holmskjoldii* (Oudem.) R. H. Petersen. 1978. In *Mycologia* 70: 668.

Lectotype: L — Netherlands, Bergen op Zoom, xi.1900, ad terram, *la Fontijn*, L. no. 939.194.701 (annot. C. Cool).

Fruitbodies two, up to 5 × 4 cm, pressed, branched, ramarioid. Stipe 7 × 7 mm, rounded at base, probably white, sulcate, tapering downward. Major branches two, short (–6 mm), stout (–4 mm broad), rebranching in 2–4 ranks; branches probably terete when fresh, dichotomous throughout, white or whitish when fresh (teste Oudemans); internodes longest in median area, diminishing downward and upward; axils lunate; apices digitate to subclavate, up to 2 mm thick, avellaneous when fresh (teste Oudemans).

Tramal hyphae 2–6  $\mu\text{m}$  diam., thin-walled, hyaline, clamped, interwoven to generally parallel, free. Hymenium thickening significantly; basidia 60–110  $\times$  8–9  $\mu\text{m}$ , clavate, usually with attenuate base, clamped, hyaline to pale yellow under phase contrast; sterigmata 4, long, stout, subcornute.

Spores 6.8–8.3  $\times$  6.1–7.2  $\mu\text{m}$  ( $E = 1.00$ –1.18;  $E^m = 1.10$ ;  $L^m = 7.27 \mu\text{m}$ ), globose to subglobose, hyaline; wall thin, smooth; contents opalescent to uniguttulate; hilar appendix very large, conical, up to 2.5  $\mu\text{m}$  long.

Corner (1950) correctly interpreted Oudemans' circumscription as pertaining to *Clavulinopsis*, but Petersen (1978a), in reorganizing three genera, transferred the epithet to *Ramariopsis*. Examination of the type confirms that the spores are very strongly apiculate and that the basidia are among the longest in the clavarioid fungi. Oudemans drew attention to the anise-like odor, also reported by Petersen (1971: in *Persoonia* 6: 225).

Oudemans associated his species with Holmskjöld's circumscription of '*Ramaria coralloides alba apicibus purpurascens*', which has been cited as synonymous with *Ramaria botrytis*. This species has been accepted as the type of *Ramaria*, but Holmskjöld's fungus has also been identified as some form of *Clavulina cristata*. Oudemans' opinion was as good as others, but no better, for no Holmskjöld specimen remains, nor any authentic report on spores or other micromorphological characters. The problem, therefore, has moved from taxonomy to nomenclature, in which Holmskjöld's name has been 'legislated' as a *Ramaria*.

Oudemans reported on collections from September and December, 1900, from the same location. Two specimens at L conform to this (no. 939.194.671, 10.xii.00; no. 939.194.673, 16.xii.00) and qualify as paratypes, although their labels indicate syntypes.

*Clavariella holsatica* P. Hennings. 1888. In *Kryptog.-Fl. Schles.* 3: 240.

$\equiv$  *Clavaria holsatica* (P. Henn.) Sacc. 1895. *Syll. Fung.* II: 134.

$\equiv$  *Ramaria holsatica* (P. Henn.) Corner. 1950. In *Ann. Bot. Mem.* I: 597.

Type (neotype): S – Holsatia, ix.1898, *P. Hennings*, s.n.

Fruitbodies (Fig. 6) up to 20  $\times$  4 mm, caespitose in clusters of 3–13, broadly club-shaped, on moss, minutely rugose-cristate, off-white, branched once or twice.

Tramal hyphae 2.5–5  $\mu\text{m}$  diam., hyaline, clamped, free, thin-walled. Basidia 30–40  $\times$  6–8  $\mu\text{m}$ , narrowly clavate to subcylindrical, clamped, hyaline; sterigmata two, divergent, somewhat cornute.

Figs. 1, 2. *Lachnocladium atkinsonii*. — 1. Spore. — 2. Outline of fruitbody.

Fig. 3, 4. *Clavaria decolor*. — 3. Spore. — 4. Fruitbody.

Fig. 5. *Clavaria dealbata*, spore.

Fig. 6. *Clavaria holsatica*, fruitbody.

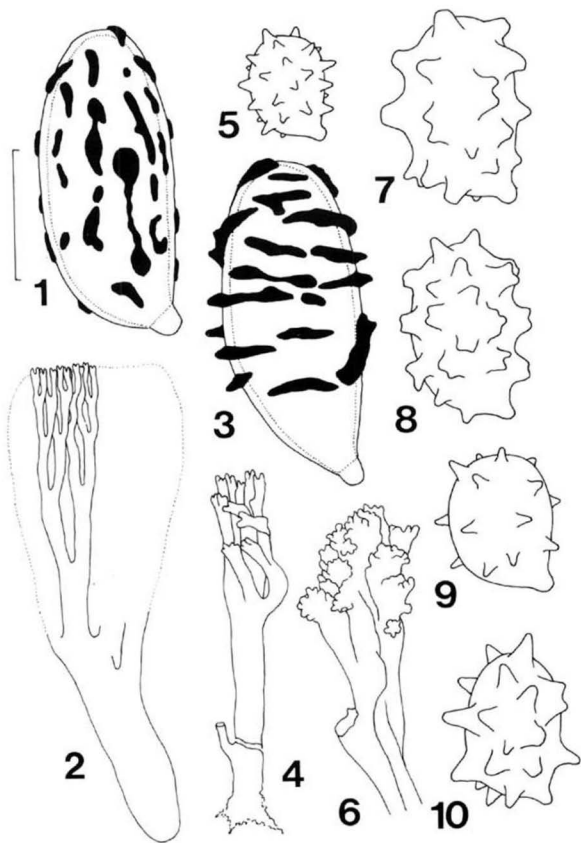
Fig. 7. *Clavaria implexa*, spore.

Fig. 8. *Clavaria umbrina*, spore.

Fig. 9. *Clavaria semivestita*, spore.

Fig. 10. *Lachnocladium chartaceum*, spore.

Standard line = 5  $\mu\text{m}$  for spores. Fruitbody sizes given in text.



Spores  $7.4\text{--}8.6 \times 5.6\text{--}7.8 \mu\text{m}$ , broadly ellipsoid to subglobose, hyaline, thin-walled; hilar appendix abrupt, papillate.

Although transferring this species to *Ramaria*, Corner (1950) stated: 'The branching and subglobose spores suggest *Clavulina*.' The specimen represents a depauperate cluster of a *Clavulina* similar to, or contaxic with *C. cristata*.

This specimen cannot qualify as holo- or lectotype material, for it was collected some years after the original description. Concomitantly, however, the specimen matches the description and was collected on topotype ground by the original author.

*Clavaria implexa* Lévillé. 1846. In *Annls Sci. nat. (Bot.)* III 5: 154.

Holotype: PC — herb. Lévillé, Java, 'ad terram, Tjikoya,' no date, *Zollinger 1311* (included under primary label to *Clavaria umbrina* Lév., no. 2077); merotype: BPI, ex herb. Bresadola.

Fruitbody single,  $34 \times 17$  mm, arbuscular, much-branched. Stipe  $7 \times 3$  mm, discrete, somewhat flattened, hard, with very thin white mycelial 'bloom' at base. Major branches two, about 2 mm thick; branches in 5–7 ranks, mostly dichotomous, somewhat flattened (? by pressing), now slightly cartilaginous, very slender; internodes short, hardly diminishing; axils rounded; apices long, awl-shaped, much less than 1 mm thick.

Trama hyphae  $3\text{--}7 \mu\text{m}$  diam., hyaline, clamped, adherent to somewhat agglutinated, thin-walled. Basidia not observed.

Spores (Fig. 7)  $5.9\text{--}6.7 \times 3.7\text{--}4.4 \mu\text{m}$  ( $E = 1.31\text{--}180$ ;  $E^m = 1.44$ ;  $L^m = 5.79 \mu\text{m}$ ), ellipsoid, perhaps adaxially flattened, grossly roughened; contents homogeneous; wall thin; hilar appendix not prominent; ornamentation of molar-shaped or pronged warts up to  $0.8 \mu\text{m}$  high, so large as to obscure the general profile of the spore.

Except for the height of the fruitbody, Lévillé's description matches the PC and BPI specimens well, but this could be said almost equally of his description of *C. umbrina*. I am persuaded that this specimen represents *C. implexa* because the BPI merotype cites only one number and includes only one taxon.

Corner (1950) correctly treated the epithet under *Scytinopogon*, but in 1970, included it only in a discussion of my report under *Clavaria umbrina* (q.v.). Using Corner's (1970: 87) key to *Scytinopogon* taxa, I am led to *S. echinospora*. The tramal hyphae are somewhat inflated, but no papillae are visible on the undersides of the branches. This would mean that the type specimens of both *C. implexa* and *C. umbrina* were of the same taxonomic species, although the tramal hyphae of the latter are not inflated. Their spores are nearly identical. I am not familiar enough with the micromorphological variation within the genus to make pronouncements on synonymy, and so demur from doing so.

*Clavaria javanica* Saccardo & Sydow. 1890. *Syll. Fung.* 14: 258.

≡ *Clavaria coronata* Zippel apud Lévillé. 1944. In *Annls Sci. nat. (Bot.)* III 2: 215. (non *C. coronata* Schweinitz. 1832).

≡ *Clavicorona javanica* (Sacc. & Syd.) Corner. 1950. In *Ann. Bot. Mém.* 1: 289.

Holotype: L — herb. Zippel, Java, on wood (not seen); merotype: ?K.

Saccardo and Sydow avowedly supplied only a new name, for Zippel's epithet (published by Lévillé) was preempted by that of Schweinitz. Therefore, both Zippel's *coro-*

*nata* and Saccardo's *javanica* must be represented by the same type specimen, namely that of the earlier epithet. The specimen cited by Corner (1950: 290) as the type cannot be accepted. Lévillé clearly stated the type from Zippel's collections. If it may be assumed that the Lévillé material alluded to by Corner (1950: 291) is a portion of the type, then there would seem even less reason to accept Corner's collection in that capacity.

*Clavaria rhizomorpha* Berkeley, 1860. In Hooker, *Flora Tasmaniae* 1: 242.

Type specimen (holotype): K – Tasmania, no date, *Archer*, herb. Berkeley, s.n. Isotype: PDD.

The specimen consists of two fragments of wood, on one of which is a sheet of membranous mycelium with a few finger-like projections. I can find no sign of basidia or spores, but the hyphae are clamped.

The fungus could be very juvenile agaric fruitbodies, aberrant productions of mycelium within the rotten wood, or almost any other form. The name should be rejected as a *nomen dubium*.

*Clavaria semivestita* Berkeley & Broome, 1874. In *J. Linn. Soc. (Bot.)* 14: 75.

≡ *Clavulinopsis semivestita* (B. & Br.) Corner, 1950. In *Ann. Bot. Mem.* 1: 387.

Type specimen (holotype): K – Peradeniya, Ceylon, herb. Berkeley, no date, no. 677.

Fruitbodies four, up to 25 mm high, up to 15 mm broad, branched from the base or with discrete stipe up to  $10 \times 2$  mm. Stipe base conical, minutely felty or minutely tomentose, involving a small ball of sandy soil, and arising from an extensive but thin mycelial mat; stipe terete to somewhat flattened, straight or ascending. Major branches 2–3; branching more or less dichotomous throughout; branches terete; axils rounded but narrow; internodes diminishing gradually in three fruitbodies; apices minutely, abruptly, repeatedly dichotomous in three fruitbodies. Color (teste Berkeley and Broome) white, then brownish to yellow brown in age, drying ochraceous to ochraceous brown. One fruitbody with flattened, palmate flaring of stipe and irregularly cristate apices.

Tramal hyphae  $1.8\text{--}3.5 \mu\text{m}$  diam., hyaline, clamped, free, generally parallel. Hymenium thickening, coherent on drying; basidia not supporting measurement, but not more than  $25 \times 6 \mu\text{m}$ ; sterigmata 4, slender, erect.

Spores (Fig. 9)  $4.3\text{--}5.0 \times 3.6\text{--}4.3 \mu\text{m}$  ( $E = 1.08\text{--}130$ ;  $E^m = 1.20$ ;  $L^m = 4.75 \mu\text{m}$ ), subglobose to broadly ellipsoid, thin-walled; hilar appendix abrupt, papillate; ornamentation of scattered prickles up to  $0.3 \mu\text{m}$  long.

Corner (1950) recombined Berkeley and Broome's epithet under *Clavulinopsis*, presumably based on the original circumscription, and Petch's (1925) later report. The small, spiny spores, small basidia, branched fruitbodies and clamped hyphae (presumably the spores are hyaline) combine to dictate its true placement in *Ramariopsis* subg. *Ramariopsis*. Previously, I (Petersen, 1978b) reported on the genus from southeastern Australia, where *R. cinnamomea* and *R. kunzei* both strongly resemble *C. semivestita*. The original authors described the color as 'ochracea', so I am persuaded to place the taxon with *R. cinnamomea*, over which epithet it would take priority. Concomitantly, one must wonder whether the original circumscription referred to fresh colors or to colors of the specimen when it arrived in England. Corner (1950) gathered



the conclusion that fruitbodies were white, then brownish, from Petch (1925) who reported them so, in spite of his quotes from the original circumscription. Petch also reported the spores as 'smooth, globose, 5–7  $\mu\text{m}$  diameter', repeated by Corner.

Berkeley and Broome, and Petch cited the type specimen ambiguously. From Petch's analysis, no. 677 must have covered specimens named *C. echinospora* and *C. semivestita*, and some of the latter may have found their way into the Currey Herbarium (at K) under the same number. Of the four fruitbodies now present in herb. Berkeley, two are glued to paper, the other two are free in a small packet, but one of these was glued sometime in its history. They all represent the same taxon, however, and one must assume that they were part of the original specimen.

*Lachnocladium tonkinense* Patouillard. 1981. In *J. Bot.* (ed. Morot) 5: 314.

Holotype: FH – herb. Patouillard, Tonkin, no date, *Bon 4043* (annot. Corner, ix.55); merotype: NY.

Fruitbodies three, on wood (monocot, teste Patouillard) up to 22  $\times$  13 mm, pressed, branched, arising from a large patch of effuse mycelium (probably white when fresh). Stipe very short, almost branched from base, pruinose-tomentose at base, up to 2.5 mm broad. Major branches up to 4, rebranched in 2–3 ranks, branches tan to fleshy tan; internodes diminishing gradually; axils narrowly rounded; apices awl-shaped or minutely dichotomous.

Tramal hyphae 3–7  $\mu\text{m}$  diam., hyaline, thin- to somewhat thick-walled (wall up to 0.5  $\mu\text{m}$  thick), conspicuously clamped, free, more or less parallel. Basidia 60–80  $\times$  8–11  $\mu\text{m}$ , broadly clavate, hyaline, clamped, sterigmata 4.

Spores 12.6–15.1  $\times$  3.6–5.4  $\mu\text{m}$  ( $L^m = 14 \mu\text{m}$ ) boletoid to cylindrical-swayback, thin-walled, hyaline.

Both portions of the type bear abundant contaminant spores, but these do not hinder more pertinent observations. All features are typical of *Lentaria surculus*, as surmised by Corner, and I accept the epithets as synonymous. Basidiospores are not common, and too few were measured for accurate E-values.

*Clavaria umbrina* Léveillé. 1846. In *Annls Sci. nat.* (Bot.) III 5: 393.

$\equiv$  *Clavulinopsis umbrina* (Lév.) Corner. 1950. In *Ann. Bot. Mem.* I: 393.

Holotype: PC – herb. Léveillé, Java, Tjikoya, no. 2077, *Zollinger*; merotype: FH – (cf. Petersen. 1968. In *Sydowia* 21: 21).

Fruitbody single, 55  $\times$  30 mm, much branched, pressed. Stipe 4  $\times$  2.5 mm, roughened. Branches up to 2 mm thick, in 6–9 ranks, flattened (? in pressing), internodes up to 4 mm long, hardly diminishing; axils rounded, apices awl-shaped, minute, acerose. Hymenium unilateral.

Tramal hyphae 1.5–4  $\mu\text{m}$  diam., hyaline, clamped, tightly packed, parallel, now adherent. Basidia not observed.

Spores (Fig. 8) 5.8–6.5  $\times$  3.6–4.3  $\mu\text{m}$  ( $E = 1.45$ –180;  $E^m = 1.56$ ,  $L^m = 6.16 \mu\text{m}$ ), ellipsoid, grossly roughened, thin-walled, apparently hyaline; contents homogeneous; hilar appendix papillate, hardly prominent; ornamentation of flattened or molar-shaped warts up to 0.7  $\mu\text{m}$  high, often confluent.

Corner (1970: 41) took me to task for transcribing the label notes from the FH portion of this specimen. That label bore two numbers, 2077 and 1311, which correspond to two different epithets, and Corner rightly complained that there was confusion over epithets, and that there was confusion over the use of the name, therefore. Instead of examining type material, however, he continued to treat the epithet under *Clavulinopsis*.

The situation is clarified by the PC specimen. Again, the label refers to two numbers, the data being as follows: '2077. *Clavaria umbrina* Lév. (writing no. 1), *affin Clavaria kunzei* Fr. no. 1311 (writing no. 2) *ad terram* Tjikoya (writing no. 1), *scripsit* Lévillé. *In Java legit* Zollinger (writing no. 3).'

Moreover, two specimens are present. The fruitbody in the outer packet is described above under *Clavaria implexa*, and matches a portion of no. 1311 at BPI. The presence of two specimens, both types, under one packet label explains the confusion which may have been perpetuated by my report.

Lévillé wrote of specimens in the Paris herbarium, so his statement 'Toute la plante est d'une couleur brun-fauve' may have referred to the fruitbody when he saw it, not fresh. Even so, the ornamentation of the spores and the very profuse, delicate branches match the description of *Scytinopogon echinospora* (B. & Br.) Corner furnished by Corner (1970) from type material.

Corner (1950) treated the epithet under *Clavulinopsis*. Further on (Corner, 1970), the name was treated under *Clavaria* (p. 41), where no new taxonomic data were furnished, nor an explanation of why the epithet was so placed, and again under *Clavulinopsis* (p. 78).

In my previous report on the FH portion of the type, I did not observe clamps. They are not prominent, but are present on tramal hyphae. I was not equipped at that time to place a name on the specimen, but now this seems possible. *Clavaria umbrina* should be considered for synonymy under Corner's concept of *Scytinopogon echinospora*.

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## HELIOCEPHALA, A NEW GENUS OF DEMATIACEOUS HYPHOMYCETES

VASANT RAO\*, K. ADINARAYANA REDDY\*\* &amp; G. S. DE HOOG\*\*\*

A new anamorph-genus, *Heliocephala*, with *H. proliferans* as type species, is described. It is characterized by erect conidiophores, bearing radiate heads of rostrate conidia.

During a study on microfungi from the Province of Orissa, India, the first two authors collected a remarkable, apparently unknown dematiaceous hyphomycete. It is described as follows.

***Heliocephala*** V. Rao, K. A. Reddy & de Hoog, *gen. nov.*

Cononiae effusae, pallidae vel atrogriseae. Mycelium partim superficiale, partim immersum. Conidiophora primaria, macronemata, mononemata, simplicia, septata, secundaria et tertiaria conidiophora ferentia. Cellulae conidiogenae monoblasticae, discretae, determinatae, ampulliformes vel ovatae, in verticillos primarios, secundarios et tertiarios dispositae. Conidia solitaria, sicca, acrogena, obclavata, 2-septata, pedicellata, rostrata, disposita in primaria, secundaria et tertiaria capitula.

Species typica: *Heliocephala proliferans* V. Rao, K. A. Reddy & de Hoog.

Colonies effuse, light to dark grey. Conidiophores macronematous, mononematous, brown, bearing terminal conidiogenous cells which are monoblastic, ampulliform or ovoidal in dense, drepanoid arrangement. Conidia produced in radial, compact heads, dry, obclavate, 2-septate, rostrate, sometimes bearing heads of second or third order.

***Heliocephala proliferans*** V. Rao & K. A. Reddy & de Hoog, *sp. nov.* — Figs. 1, 2

Cononiae effusae, pallide vel atro-griseae. Conidiophora erecta, singula terminaliter vel lateraliter ex hyphis vegetativis oriunda, simplicia, rigida, recta vel modice flexuosa; ad 210  $\mu\text{m}$  longa, 3.0–3.5  $\mu\text{m}$  crassa in parte basilari, 3.5–4.0  $\mu\text{m}$  ad apicem. Cellulae summae binae majores, ovoideae, ad 3.5  $\mu\text{m}$  latae, e quibus nonnullae cellulae conidiogenae ampulliformes oriuntur. Cellulae conidiogenae, monoblasticae, discretae, ampulliformes vel ovoideae, cellulo brevi terminatae. Conidia radiatim in capitulis compactis disposita, sicca, obclavata, 2-septata, cellula basilari minute verruculosa, apicali in rostrum subulatum vel filiforme, rectum vel fluxuosum vel uncinatum extensa; conidia in parte inferiore dilute brunnea, in parte distali pallidiora, (10–)15–50(–145)  $\times$  3.0–4.0  $\mu\text{m}$ .

Typus: VMRL 800 (holotypus) = CBS H-1640 (isotypus), in folio plantae innominatae, Balimela, India, mensis Novembris anni 1980, a K. A. Reddy et V. Rao lectus.

Colonies effuse, light to dark grey, conidiophores under binocular pinhead-like. Mycelium partly superficial, partly immersed, composed of septate, branched, anastomo-

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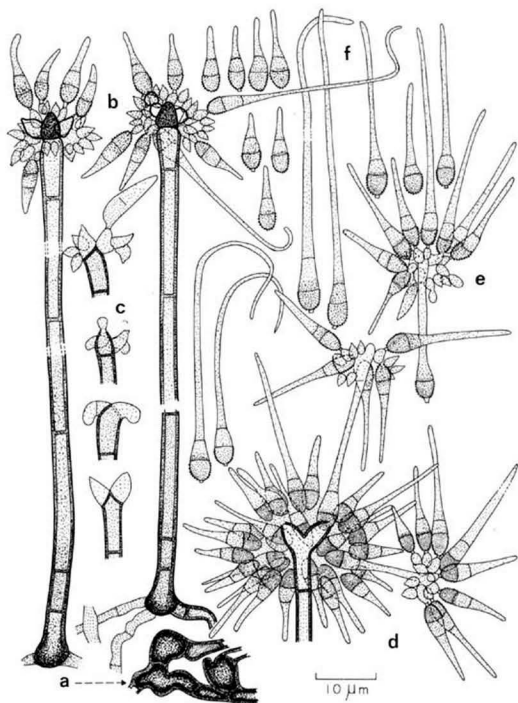


Fig. 1. *Helioccephala proliferans*, VMRL 800 on the natural substrate. — a. Mycelium. — b. Conidiophores with primary whorls of conidiogenous cells and conidia. — c. Development of conidiogenous cells. — d. Apex of primary conidiophore with primary head of conidia bearing secondary conidiophores. — e. Secondary conidiophore bearing secondary whorl of conidiogenous cells and conidia. — f. Conidia.

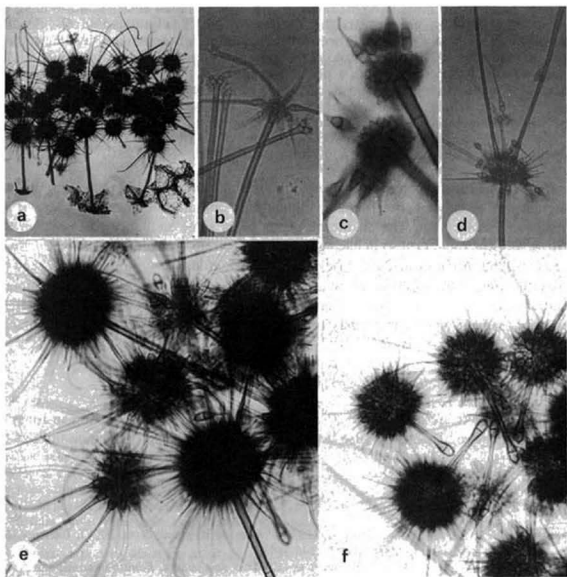


Fig. 2. *Heliocephala proliferans*, VMRL 800 on the natural substrate. (a,  $\times 280$ ; b-f,  $\times 1120$ ).

sing, smooth, subhyaline to pale brown,  $1.5-3.5 \mu\text{m}$  thick hyphae, cells later becoming thick-walled. Conidiophores erect, arising singly, terminally or laterally from undifferentiated hyphae, unbranched, stiff, straight or slightly flexuous, septate; the first two septa very close, others remote, last septum formed just below the apex; basal cell swollen, conical, dark brown,  $5.0-9.5 \mu\text{m}$  thick, stipe up to  $210 \mu\text{m}$  long, regularly  $3.0-3.5 \mu\text{m}$  wide above the base,  $3.5-4.0 \mu\text{m}$  wide at the apex. Conidiophores ending in large, ovoidal subtending cells up to  $3.5 \mu\text{m}$  diam., from which a number of ampulliform conidiogenous cells arise, or bearing two short, downwardly curved or hooked, 1-2 celled branches, the cells of which transform into conidiogenous cells from which conidiogenous cells of second order are produced in dense, more or less drepanoid arrangement. Conidiogenous cells monoblastic, discrete, ampulliform or ovoidal with short necks,

determinate, smooth- and thin-walled, first formed cells are brown to pale brown, later formed cells subhyaline. Conidia radially arranged in compact heads, dry, obclavate, 2-septate, basal cell minutely verruculose, median and terminal cells smooth-walled, the apical cell drawn into a sharp, straight, subulate or long, continuous, filiform, flexuous or unciform rostrum. Conidia pale brown below, gradually becoming subhyaline towards apex of rostrum, (10–)15–50(–145)  $\mu\text{m}$ , sometimes up to 200  $\mu\text{m}$  long, 3.0–4.0  $\mu\text{m}$  wide. A few (1–4) conidia from a primary head develop a single septum in the lower part, rostrum remaining continuous, or form a second septum in the middle or near the apex of the rostrum, and are then transformed into secondary conidiophores which apically produce secondary heads of conidiogenous cells.

Type specimen.—VMRL 800 (holotype) = CBS H-1640 (isotype), on unidentified rotten leaf, Balimela, India, K. A. Reddy and V. Rao, Nov. 1980.

*Heliocephala* is characterized by erect, mononematous conidiophores bearing discrete, ampulliform or ovoidal, determinate, monoblastic conidiogenous cells in more or less drepanoid arrangement. The anamorph genus bears some similarity to *Uncispora* Sinclair & Morgan-Jones (1979) in having obclavate, rostrate, hooked conidia. In *Uncispora* the conidiophores are usually in fascicles or synnematos, very rarely solitary, and the ultimate, integrated cells bear conidia on rather broad scars. *Edmundmasonia* Subram. (Subramanian, 1958) is somewhat similar in having light conidiogenous cells in drepanoid arrangement on darker primary cells, but the fertile system has much looser branching and the conidia are clavate.

#### ACKNOWLEDGEMENTS

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## COMPLEMENTS AU GENRE VARARIA P. KARST. (BASIDIOMYCETES)

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Description de *Vararia alticola*, nov. sp. et *V. malaysiana*, nov. sp. de Malaisie, de *V. cinnamomea* de Madagascar, et de *V. parmastoi* d'Asie soviétique. Données sur les cultures des trois derniers; *V. malaysiana* est partiellement compatible avec *V. dussii*.

Des récoltes de Malaisie dues à E. J. H. Corner, de Madagascar faites par G. Gilles, et des républiques soviétiques proches de l'Afghanistan confiées par E. Parmasto nous permettent d'apporter ici d'utiles compléments à la connaissance du genre *Vararia*. Nous verrons successivement

A. *Vararia* de la péninsule malaise,B. *Vararia* malgaches,C. Un *Vararia* du génévrier en Ouzbekistan, Tadjikistan et Turkménistan (URSS).

## A. VARARIA DE LA PENINSULE MALAISE

1. *Vararia alticola* Corner et Boidin, nov. sp. — Fig. 1

Expansa, ascendens, dein 1-1,8 cm reflexa, facie Fomitidis parvi et obliqui, usque 1 cm crassa, superficie subplana vel leniter sulcata, e crema gilva, dein fuliginosa brunnea per vetustatem. Hymenium laeve, e crema gilva. Trama mollis sub novaculam, gilva, multistratosa. Basidioma e dichophysibus praesertim constans: superne, dichophyses hyalinae, inferne e brunneo luteae, stipitem aspectu simplicis hyphae, ramos tunica crassa et ultimos ramulos gracillimos habentes. Gloeocystidia 6-8  $\mu$ m lata. Basidia parva, 4 sterigmatibus. Sporae subsphaericae, 2,75-3  $\mu$ m diametro, laeves, haud amyloideae.

In Dipterocarpo vivo, Malaysia. Holotypus LY 8362.

Le récolteur a noté: "Effuso-reflexed conchate patches up to 7.5 cm wide and 5 cm high, with steeply ascending upperside as a narrow semicircular pileus up to 18 mm in radius. Pileus matt, even, or slightly concentrically sulcate, cream-buff to pale tan, becoming fuscous brown or blackish at the base, with a sharp demarcation in colour; margin obtuse, entire, tan or yellowish tan. Hymenium smooth, light yellowish tan or cream-buff".

En herbar: étalé ascendant puis réfléchi sur 1-1,5-1,8 cm, à aspect de petit *Fomes* à port redressé, oblique, épais jusqu'à 1 cm au centre et 2 mm à la marge libre. Face supérieure mate, plane ou faiblement sillonnée, crème chamois (Munsell 2,5 YR 8/5) mais devenant sur le vieux près du support brun bistré (7,5 YR 4/2 à 3/2), lisse ou irrég-

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gulièrément bosselée. Hyménium lisse, uniformément crème chamois (2,5 YR 9/4 à 9/6); le champignon, à texture tendre et homogène sous le rasoir, se montre sur une coupe, multistratifié, beige chamois ou cannelle (10 YR 7/5 à 6/6).

L'étude microscopique est difficile. Le champignon est formé dans toute son épaisseur d'éléments dichophytiques enchevêtrés. Ils sont plus serrés et à branches plus étroites sur 100  $\mu\text{m}$  d'épaisseur environ côté stérile. La face supérieure des parties réfléchies est limitée par 20–50–100  $\mu\text{m}$  d'une matière d'abord hyaline, vitreuse, sans éléments figurés, qui s'assombrit sur la partie la plus âgée des vieux spécimens.

Les coupes sont beige brunâtre et s'assombrissent dans KOH; sous le microscope, on voit de nombreuses bandes étroites plus sombres. Dans le Melzer, seule la face fertile est bien dextrinoïde. De gros cristaux forment des lignes parallèles aux strates notamment dans la partie âgée. Les éléments dichophytiques enchevêtrés qui constituent la presque totalité du champignon sont très difficiles à observer isolément et les écrasements dans les solutions alcalines ne livrent que des fragments jaunâtres à paroi épaissies, des rameaux ultimes longs et grêles, quelquefois des stipes hyphiformes  $\times 2-3 \mu\text{m}$  à paroi mince. Les dichophyses de surface ont une envergure de 25–50  $\mu\text{m}$ ; elles ont un stipe à paroi mince non dextrinoïde sauf au sommet, des branches de premier et deuxième ordre raides à paroi épaissie, assez longues, mais les rameaux ultimes sont toujours grêles souvent recourbés, parfois involutés (dichophyses géométriques à extrémités capillaires). Hyphes génératrices,  $\times 1,5-2 \mu\text{m}$ , à cloisons simples. Gloeocystides, environ 20–25  $\times 6-8 \mu\text{m}$ , au contenu concrété et qui peuvent porter une schizopapille; notées fréquentes à la récolte, elles sont difficilement discernables en herbar. Basides dispersées, larges de 4  $\mu\text{m}$ , à 4 stérigmates. Spores subsphériques, petites, 2,75–3  $\mu\text{m}$  de diamètre, lisses, non amyloïdes. Il semble que le champignon soit entièrement constitué, de la base au sommet, de dichophyses, celles de la profondeur étant semblables à celles de surface, mais de plus fort calibre et aux rameaux ultimes grêles, longs, souvent droits, 10–15  $\times 0,3-0,5 \mu\text{m}$ , mais toutes ayant un stipe hyphiforme à paroi mince. C'est pour cette raison que cette espèce doit être rangée dans le genre *Vararia*.

Récolté uniquement sur arbres vivants, il paraît être parasite.

Récoltes examinées. — LY 8362, holotype, sur l'écorce de *Dipterocarpus* vivant où il forme des plages discontinues le long du tronc et jusqu'à 25 m de hauteur. Kuala Tekai, Pahang, Malaisie, juin 1931, E. J. H. Corner, S.F.N. 24 860; LY 8361, Ulu Tiram, Johore, Malaisie, octobre 1932, et LY 8363, même lieu, 23 avril 1933, E. J. H. Corner, tous deux sur *Dipterocarpus* sp. vivant.

Répartition géographique. — Forêts à *Dipterocarpus*, Malaisie.

A l'oeil nu, comme sur une coupe observée au microscope, on peut penser à un épais *Scytinostroma*, cependant il n'est pas constitué de fibres emmelées, mais de dichophyses enchevêtrées. Son port semble être celui de *Stereofomes nodulosus* Rick qui est dit "species habitu *Fomitis unguiformis* . . ." (Rick, 1940: 145). Ce dernier, selon le spécimen "on palm, Sta Catharina", (in herb. Lloyd, cat. No. 70, in BPI) est formé lui aussi de dichophyses intriquées mais nous a montré de rares spores amyloïdes et de plus grande taille (9  $\mu\text{m}$  de diamètre environ).

## 2. *Vararia malaysiana* Boid. et Lanq., nov. sp. — Fig. 2

Jacens adhaerensque, impolita, e rufo pallide brunnea; margine pruinosa, pallidiore, gradatim decrescenti; hyphis genetricibus fibulatis; inferiore parte e dichophysibus geometricis constante; in summo strato, dichophysibus trunco dextrinoideo, tunica crassa, ramis brevibus et ultimis ramulis gracilibus sinuosique; gloeocystidiis cylindraceis, 15–20  $\times$  5–7  $\mu\text{m}$ , ope S.A. coloratis, 1–2(–3)



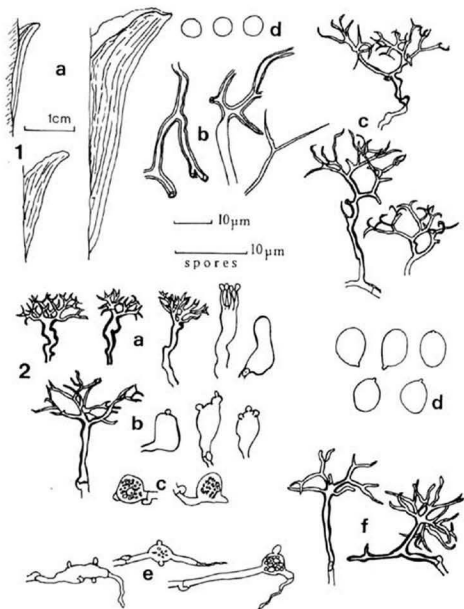


Fig. 1. *Vararia alticola* Corner et Boid., nov. sp. (holotype, LY 8362). — a. Port (E. J. H. Corner). — b. Fragment du contexte. — c. Dichophyses de la surface hyméniale. — d. Spores vues sur le basidiome.

Fig. 2. *Vararia malaysiana* Boid. et Lanq., nov. sp. (holotype, LY 8308). — a. Dichophyses superficielles, une baside et une basidiole. — b. Une dichophyse profonde et trois gloeocystides sulfaldéhyde positives. — c. Pleurogloeocystides de la base. — d. Spores (sporée dans KOH-phloxine). — e. Gloeocystide sur milieu de Nobles. — f. Dichophyses vues seulement en cultures sur milieu au galacol.

schizopapillas ferentibus; basidiis 15–22 × 4–5  $\mu\text{m}$ , 4-sterigmatibus; sporis subovoideis, 4,5–6 × 3,5–4  $\mu\text{m}$ , uninucleatis, haud amyloideis. In ligno emortuo in vicinia Singapour. Holotypus LY 8308.

Largement étalé, adhérent, mat, mince puis plus épais (200 et 350  $\mu\text{m}$ ), brun rougeâtre pâle à gris rosé (5 YR 5/3 à 6/3 ou 6/2) en sporulation, à marge atténuée, parfois pruneuse, plus pâle.

En herbier, très adhérent, mat, beige (10 YR 7/3, vinaceous buff R.), plus sombre au centre, ocracé (7/4 ou même 6,5/4), plus clair vers les bords (1 Y 8/2); il peut se fendiller densément là où il a une certaine épaisseur.

Champignon mince, 30–70  $\mu\text{m}$ , puis peu épais 150–200  $\mu\text{m}$ , montrant à la base des amas solidifiés, réfringents. Quelques hyphes hyalines horizontales, × 1,5–2,5–4  $\mu\text{m}$ , à paroi parfois un peu épaissie (après ammoniac 60° C), bouclées, de forme assez régulières constituent une très mince couche (moins de 5  $\mu\text{m}$ ). Elles portent quelques renflements sphériques pouvant rappeler de petites chlamydospores, 6–7–9 × 5–6–7  $\mu\text{m}$  au contenu dense très guttulé et peuvent montrer une à trois papilles latérales. Ce sont des gloeocystides type mycélien sulfo-positives. Dichophyses supérieures, à tronc dextrinoïde, 12–25(–35) × 2–2,5(–3)  $\mu\text{m}$ , à paroi épaissie, souvent sinueux, bouclées à la base qui seule a une paroi submince. Elles ont des branches courtes, groupées au sommet du stipe et une envergure de 7–15(–17)  $\mu\text{m}$ . Les rameaux ultimes ne sont jamais raides, ils peuvent apparaître grêles, longs et sinueux sur les dichophyses profondes et moyennes, ou assez courts et à paroi flasque en surface. Les dichophyses inférieures sont de type géométrique avec branches de premier et deuxième ordre assez longues; leur envergure peut atteindre 30 à 40  $\mu\text{m}$ . Gloeocystides surtout remarquables par leur contenu réfringent sulfoaldéhyde positif. En surface ce sont de petits éléments courts, 15–20 × 5–7  $\mu\text{m}$ , grossièrement subcylindriques ou claviformes, porteurs au sommet de 1–2(–3) petites schizopapilles sphériques; leur paroi est mince, sauf l'anneau de base des papilles.

Basides sinueuses, plus renflées au tiers inférieur (× 5,5  $\mu\text{m}$ ) et alors utriformes, 15–22 × 4–4,8  $\mu\text{m}$ , à 4 stérigmates longs de 4  $\mu\text{m}$ ; à maturité elles peuvent émerger de 4  $\mu\text{m}$ .

Basidiospores subovoïdes, 4,5–6 × 3,5–4  $\mu\text{m}$ , ( $\bar{x}$  = 4,99 ± 0,37 × 3,73 ± 0,20), à paroi lisse non amyloïde, uninucléées et sans guttules.

Récoltes examinées. — LY 8308 holotype, branche près du sol, Bukit Timah, Singapour, le 20 août 1977, J. Boidin; LY 8358, sur *Rhodamnia* (Myrtaceae) mort, servant de support aux orchidées dans le jardin botanique, Singapour, 9 novembre 1943, E. J. H. Corner.

Ces deux spécimens montrent, dans le bois, des hyphes génératrices bouclées mêlées à des amas de fibres dextrinoïdes; ce sont en fait des dichophyses géométriques de grande envergure, 22–32(–50)  $\mu\text{m}$ , à stipe hyphiforme.

Pour le spécimen LY 8358, Corner a noté à la récolte: "Margin whitish then pale ochraceous, indeterminate or very minutely byssoid; hymenium fulvous ochraceous to cinnamon or fawn brown, smooth; flesh 350  $\mu\text{m}$  thick."

De même il indique des spores blanches en masse, 5–6,5 × 4–5  $\mu\text{m}$ . En coupe cette récolte est formée de deux strates séparées par une mince couche horizontale haute de 5  $\mu\text{m}$ .

Ce *Vararia* est apparenté au *V. dussii* Bojd. et Lanq. (1977) d'Amérique centrale et surtout au *V. ubatubensis* (Viegas) Bojd. et Hallenb. brésilien qui ne nous est connu que par l'étude du spécimen type (I.A.M.C. No. 1856) et pour lequel nous ne possédons ni

sporée pour mesures précises, ni cultures, ni réactions aux sulfo-aldéhydes (Boidin et Lanquetin, 1977).

Les deux spécimens de Singapour diffèrent de *V. ubatubensis* par une couleur plus pâle, une épaisseur moindre, ce qui peut être dû à l'âge ou au développement. Microscopiquement, *V. ubatubensis* qui est beaucoup plus dense, est formé pour l'essentiel de dichophyses verticales, serrées, au tronc fort (souvent  $4\ \mu\text{m}$ ) à paroi très épaisse porteur de ramifications étagées en grande partie avortées, les dernières nées à aspect subcoralloïde. Les quelques spores vues sur l'hyménium ne mesurent que  $3-3,5-4 \times 2-2,5\ \mu\text{m}$ . *V. malaysiana* montre beaucoup plus d'éléments générateurs et s'il possède encore des dichophyses au tronc dextrinoïde à paroi épaissie, leur largeur est bien moindre (en général  $2\ \mu\text{m}$ ) et leur paroi plus mince; leurs ramifications sont moins courtes, moins raides et forment une tête terminale.

*Vararia dussii* a comme *V. malaysiana* des sulfocystides, mais ses dichophyses sont bien différentes d'aspect; si leur tronc est encore à paroi épaissie dextrinoïde, leur ramure est plus développée (envergure  $10-35\ \mu\text{m}$ ) et les rameaux ultimes sont longs et souples.

#### CARACTERES CULTURAUX DE VARARIA MALAYSIANA

**Spores.** — Uninucléées.

**Germinations.** — Après 24 heures, la spore émet un ou deux filaments formés d'articles régulièrement uninucléés.

#### Monospermes

Leurs hyphes sans boucles sont constituées d'articles régulièrement uninucléés. Ils possèdent les mêmes petites sulfocystides que les cultures polyspermes et certains d'entre eux ont montré des oïdies.

**Polarité:** 20 monospermes ont été appriés, 15 d'entre eux se sont répartis en 4 pôles. L'espèce est donc tétrapolaire.

$A_1B_1 = 1 - 3 - 11 - 12 - 13 - 15 - 17 - 20$

$A_1B_2 = 6 - 8 - 18$

$A_2B_2 = 16 - 19$

$A_2B_1 = 9 - 10.$

Les cinq autres monospermes  $2 - 4 - 5 - 7 - 14$  ont montré un comportement irrégulier, bien qu'ils soient dépourvus de boucles ou de crochets.

**Tests d'intercompatibilité:** tentés avec les 4 pôles d'une espèce très proche, *V. dussii*, ils sont résumés dans le Tableau I.

Sur 32 confrontations, 20 sont restées totalement négatives, 8 ont montré localement des crochets en séries et, uniquement à la ligne de contact, enfin 4 se sont révélées partiellement positives avec formation locale de boucles sur la ligne de contact et (pour trois d'entre elles) large dicaryotisation du monosperme LY 8308.

Ces résultats laissent entendre que les deux espèces sont effectivement très voisines et qu'elles manifestent une certaine tendance à l'hybridation. Mais les mycéliums dicaryotiques obtenus sont instables: boucles et crochets disparaissent rapidement après repiquages.

#### Polysperme

**Croissance:** moyenne (boîte couverte en 4 semaines).

**Aspect:** marge régulière, appliquée. Mycélium aérien blanc, peu abondant, réduit à un maigre aranéum ne cachant pas totalement le milieu sauf vers la bouture. Revers inchangé. Odeur légère, pas toujours détectée.

TABLEAU I

Confrontations entre cultures monospermes de *Vararia malaysiana* et *V. dussii*

		<i>V. malaysiana</i> LY 8308							
		A <sub>1</sub> B <sub>1</sub>				A <sub>2</sub> B <sub>2</sub>		A <sub>2</sub> B <sub>1</sub>	A <sub>1</sub> B <sub>2</sub>
		1	3	11	12	16	19	6	10
V. dussii LY 8115	A <sub>1</sub> B <sub>1</sub> = 1	+	-			-	-		-
		+	cr	-	-	cr	cr	-	+
		-	-			-	-		-
	A <sub>2</sub> B <sub>2</sub> = 2	-	-			-	+	-	+
		cr	cr	-	-	cr	FB & cr	cr	cr
									cr
	A <sub>2</sub> B <sub>1</sub> = 5	-	-			-		-	-
			cr	-	-	-		-	-
	A <sub>1</sub> B <sub>2</sub> = 3	-	-			-		-	-

+ : hyphes bouclées; +̄ quelques hyphes seulement sont bouclées; FB: fausses boucles; cr: crochets en séries observés localement; - : hyphes sans boucles.

Quand figurent 3 signes pour une confrontation: les signes du milieu, du haut et du bas correspondent à l'observation de prélèvements effectués respectivement sur la ligne de contact, sur le territoire du monosperme de la colonne verticale et sur le territoire du monosperme de la colonne horizontale.

**Microscopie.**—Mycélium aérien formé: (1) d'hyphes assez régulières,  $\times 1-2-3(-4)$   $\mu\text{m}$ , la plupart étroites,  $\times 1-2$   $\mu\text{m}$ , beaucoup sont vidées et affaissées, à 6 semaines, à paroi distincte, à contenu homogène, à boucles constantes; et (2) de nombreuses petites sulfocystides semblables à celles de *V. dussii* (Fig. 2c) avec une partie renflée,  $\times (3-)$   $4-6$   $\mu\text{m}$ , montrant 2-4(-5) schizopapilles, le plus souvent trois. Ces papilles ont parfois 2 à 3  $\mu\text{m}$  de diamètre. Le contenu des gloeocystides guttulé dans le Rouge-Congo, vire au violet-noir dans le réactif sulfo-anisique.

Remarque: les cultures polyspermes sur Nobles n'ont jamais montré d'oïdies ni de dichophyses. Toutefois, ces dernières ont pu être observées dans une culture sur milieu au gaïacol à 0,2 g par litre (Fig. 2f). Leur stipe,  $\times 1,5-2$   $\mu\text{m}$ , à paroi très vite épaissie, congophile, s'élargit au sommet pouvant atteindre 4  $\mu\text{m}$ ; leur envergure est de 17 à 25  $\mu\text{m}$ .

Mycélium submergé: hyphes  $\times 1,5-3(-5)$   $\mu\text{m}$ , à contenu très homogène, boucles constantes et paroi toujours bien distincte, un peu épaissie,  $\times 0,25$   $\mu\text{m}$ , réfringente à rarements mais nettement épaissie localement,  $\times 0,5-1$   $\mu\text{m}$ .

*Cytologie*: articles régulièrement binucléés.

*Oxydases*: ac. gallique: +++++, tr.

gaïacol: +++++, tr.

p-crésol: —

tyrosine: + à +++, tr.

*Code*: 2 — 3c — 15ap — 32 — (35) — 36 — 38 — 44 — 54 — 60 — 61 (selon Nobles, 1965, complété: voir Boidin et Lanquetin, 1983).

Les cultures de *V. malaysiana* et *V. dussii* sont très voisines. Cependant *V. dussii* a des hyphes larges,  $\times 4-5(-6) \mu\text{m}$ , plus abondantes que dans *V. malaysiana* où par contre la paroi des hyphes paraît plus épaisse.

En outre, contrairement à *V. malaysiana*, *V. dussii* a un mycélium généralement coloré qui a toujours montré des dichophyses et de nombreuses oïdies. Observons toutefois que la variation intraspécifique des mycéliums de *V. malaysiana* n'est pas connue, une seule souche ayant été cultivée à ce jour.

### 3. *Vararia sphaericospora* Gilberts.

*Vararia sphaericospora* Gilberts in Pap. Mich. Acad. Sci. 50: 176, fig. 5. 1965; Boidin et Lanquetin in Bull. Soc. mycol. Fr. 91: 507, pl. IX B. 1975; Boidin, Lanquetin et Gilles in Cryptog. Mycol. 1: 332, f. 25. 1980.

Le récolteur a noté: "resupinate, thin, floccose-firm, becoming dull brown, scarcely separable; hymenium dull fulvous to cinnamon-drab, paler towards the high ochraceous yellow to mustard yellow margin; flesh  $450 \mu\text{m}$  thick."

Les dichophyses géométriques raides, de  $20-40-60 \mu\text{m}$  d'envergure, à paroi très épaisse même dans le tronc, les longues gloeocystides à schizopapille terminale avec contenu finalement solidifié en une ou plusieurs masses réfringentes, les hyphes bouclées, les spores subsphériques à gros apicule font de suite penser au *V. sphaericospora*.

Notons toutefois. — (1) La présence en grand nombre de chlamydospores de  $15-20 (-25) \mu\text{m}$  de diamètre à paroi très épaisse ( $1,5$  à  $2 \mu\text{m}$ ) et ferrugineuse, ornée de dépressions arrondies; après traitement ammoniacal à  $60^\circ\text{C}$  la paroi atteint  $7 \mu\text{m}$  d'épaisseur et se montre nettement constituée de deux couches épaisses de  $3,5 \mu\text{m}$ .

(2) La taille des spores notée par Corner:  $8-10 \times 7,5-8,5 \mu\text{m}$  est supérieure à celle donnée par Gilbertson:  $7-7,5 \mu\text{m}$  ou notée par nous:  $6,5-7-8,2 \mu\text{m}$  (1975) et sur spécimen gabonais une moyenne de  $6,67 \mu\text{m}$  (1980). Sur le spécimen de Singapour, nous n'en n'avons cependant pas vu dépassant  $8,8 \times 8 \mu\text{m}$ .

(3) La taille des basides, ici de  $45-75 \times 7-8 \mu\text{m}$ , est de  $40-45 \times 6-7,5 \mu\text{m}$  pour Gilbertson, de  $35-45 \times 7,5-8,2 \mu\text{m}$  pour nous (1975) mais peut atteindre  $60 \times 7 \mu\text{m}$  sur LY 8687 du Gabon (1980).

Si Gilbertson ne signale pas de chlamydospores, ni nous-mêmes en 1975, les cultures gabonaises (Boidin et coll., 1976) sont très riches en chlamydospores de  $10-17 \mu\text{m}$  de diamètre à paroi jaune épaisse de  $3 \mu\text{m}$  dans l'eau; d'autre part de nouvelles récoltes gabonaises (Boidin et Lanquetin, 1980) en ont montré à la base des basidiomes.

La taille légèrement supérieure des spores et basides ne permet pas de distinguer cette récolte du *V. sphaericospora*.

Récolte examinée. — LY 8356, sur tronc mort de rottin, Jardin Botanique de Singapour, 4 novembre 1943, E. J. H. Corner.

Répartition géographique. — AMERIQUE, Géorgie (USA); AFRIQUE, Gabon et République Centrafricaine; ASIE, Singapour, Indes (selon 3 récoltes reçues de G. S. Dhingra, de W. Bengal sur *Cryptomeria japonica* et *Quercus* sp.).

Cette très large répartition et les petites différences (rhizomorphes seulement signalés sur le type américain, taille des spores . . .) notées rendent souhaitables des essais d'intercompatibilité.

## B. LES VARARIA MALGACHES

### 4. *Vararia* cf. *calami* Boid. et Lanq.

*Vararia* cf. *calami* Boid. et Lanq. in Bull. Soc. mycol. Fr. 91: 471. 1975; Boid., Lanq. et Gilles in Cryptogamie 1: 298. 1980.

LY 9657 récolté sur *Pinus* sp., la Mandraka, le 8 mars 1981, leg. G. Gilles montre les caractères microscopiques du type de *V. calami*, c'est-à-dire des dichophyses peu distinctes, racémeuses en choux-fleur, des gloecystides et pleurogloeocystides nombreuses, cylindriques irrégulières, sulfo-aldéhydes négatives, et des spores roses, fusiformes de face, longuement naviculaires de profil avec dépression sous l'apicule et face dorsale parfois cambrée; elles mesurent  $14-17,8 \times 3,8-4,5 \mu\text{m}$  ( $\bar{x} = 14,55 \mp 0,92 \times 4 \mp 0,20$ ).

Le collecteur a noté une couleur plus rosée sur le frais (5 YR 8/3); en hercier alutacé vif à chamois pâle (10 YR 8/6 à 2,5 Y 8/6) au centre, avec marge pâle amincie. Les caractères culturels sont de même très voisins de ceux de *V. calami* (code de Nobles: 2 - 3c - 15b p - 32 - 36 - 39 - 46 - 55 - 58 - 61). Les gloecystides du *Vararia* malgache montrent des ramifications moins nombreuses et souvent plus larges ( $\times 5 \mu\text{m}$ ).

Des tests d'intercompatibilité avec des récoltes gabonaises LY 8596, 8597 et 8612 ont donné 10 résultats totalement négatifs sur 10 confrontations.

Si de futures récoltes manifestent le même comportement, il faudrait, malgré son étroite ressemblance avec *V. calami*, dénommer cette espèce malgache dont le support et l'habitat: *Pinus* à 1300 m d'altitude, différent beaucoup de ceux des *V. calami* connus à ce jour de la forêt sempervirente d'Afrique équatoriale.

### 5. *Vararia cinnamomea* Boid., Lanq. et Gilles, *nov. sp.* — Figs. 3 et 7

Jacens, adhaerens, luteola vel cinnamomea, 150-400  $\mu\text{m}$  crassa. Constat ex strato hypharum inferiorum cohaerentium, pariete brunnea, sine fibulis, praesertim in ora superiore fibris dichophyticis praedito. Catahymenio crassescente, constante ex dichophysibus brunneis, trunco lato (4-6  $\mu\text{m}$ ), pariete crassa, post decolorationem dextrinoidea, coralloideis. Basidiis subcylindratis, irregularibus, 45-65  $\times$  8-10  $\mu\text{m}$ , 4 grandibus sterigmatibus. Sporibus oblongis vel subellipsoideis, interdum paulum depressis, 9-13  $\times$  5-7,2  $\mu\text{m}$ , haud amyloideis neque cyanophilis.

In ligno, in silva densa. Holotypus LY 9750.

Etalé adhérent, mat, chamois (10 YR 7/8 ou 6/8), cannelle (6,5 YR 5/6) avec marge souvent plus pâle. Imbu il peut prendre une teinte acajou (vers 10 YR 4/8). En hercier, tenace, très mat, ocracé (10 YR 7/4) à ocre foncé (10 YR 6/4) cannelle (7/6) ou ferrugineux (10 YR 6/6, argillaceus R.) avec marge atténuée plus pâle souvent festonnée avec extrême bord vilieux blanchâtre; les spécimens âgés sont uniformément cannelle (7,5 YR 6/6) avec marge assez brusque, concolore. Chair ocre foncé à cannelle.

En coupe, épais de 150 à 400  $\mu\text{m}$ , entièrement brunâtre sous le microscope. Une nette couche basale de 30-50-80(-150)  $\mu\text{m}$  d'épaisseur, est formée d'hyphe parallèles cohérentes, comme soudées, larges de 2 à 6  $\mu\text{m}$ , à paroi brune le plus souvent épaissie, sans boucles. Après traitement ammoniacal à 60°C puis montage dans le Melzer acétique, technique appelée AMA (cf. Boidin, Lanquetin et Gilles, 1980: 270), cette couche est hyaline et les hyphe apparaissent séparées; on voit alors quelques éléments horizon-

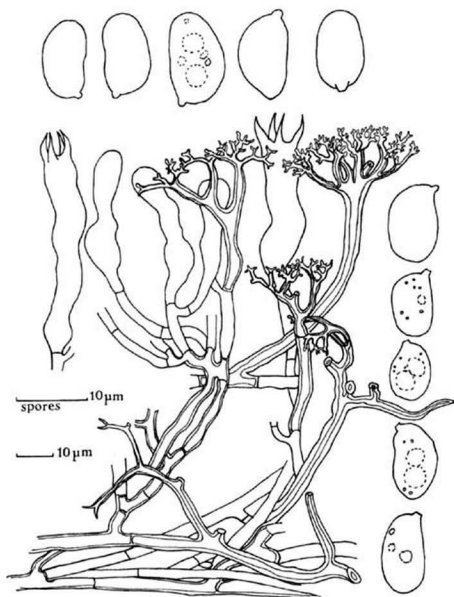


Fig. 3. *Vararia cinnamomea* Boid., Lanq. et Gilles, holotype (LY 9750) avec, en haut ses spores; à droite les spores du paratype (LY 9766).

taux à paroi épaisse et dextrinoïde qui sont des fibres dichophytiques très dispersées; au sommet du contexte par contre nombreux éléments fibriformes dextrinoïdes,  $\times 3,5-4,5 \mu\text{m}$ , qui sont en fait les longs troncs cylindriques des premières dichophyses hyméniales; ils peuvent atteindre  $120 \mu\text{m}$  de longueur. Les hyphes se redressent ensuite rapidement dans une zone de passage très lisible faite d'hyphes génératrices espacées, distinctes, à paroi jaune plus épaissie mêlées aux troncs fibriformes redressés décrits ci-dessus. L'hyménium d'abord mince puis crassécant, haut de  $100$  à  $300 \mu\text{m}$ , est parfois un peu stratifié; il est formé de dichophyses brunes à tronc large de  $3,8-6 \mu\text{m}$  et paroi atteignant  $1,2 \mu\text{m}$  dans le Melzer, davantage après traitement alcalin. Après AMA les troncs sont nettement dextrinoïdes dès leur naissance. Ils mesurent  $20-50(-120) \times 3-6 \mu\text{m}$ .

Les dichophyses sont de type coralloïde avec branches des premiers ordres allongées et écartées à paroi épaissie, et rameaux ultimes cylindriques obtus assez nombreux; leur envergure est de 30–50–65  $\mu\text{m}$ ; celles de surface ont des branches plus courtes, regroupées en éventail donnant des dichophyses flabelliformes de plus faible envergure, 15–25  $\mu\text{m}$ . Les dichophyses dernières nées sont moins colorées et leur stipe comme les branches de 1er ordre ont une paroi peu épaissie.

Basidioles un peu étranglées passant à des basides faiblement utriformes ou irrégulièrement subcylindriques, 45–65(–80)  $\times$  8–10  $\mu\text{m}$ , les plus longues sont hyphiformes à la base puis brusquement élargies. Elles portent 4 forts stérigmates de 6–7  $\times$  2  $\mu\text{m}$ . Certaines basides flétries sont traversées par une cloison de retrait médiane. Aucune gloeocystide n'a pu être mise en évidence; elles sont donc soit absentes, soit similaires aux basidioles.

Spores oblongues parfois subovoïdes rarement un peu déprimées, 9–11–13  $\times$  5–6–7,2  $\mu\text{m}$ , lisses, non amyloïdes ni cyanophiles, un peu teintées en masse de rose orangé, binucléées.

LY 9750 (Type) 12,21  $\pm$  0,68  $\times$  6,81  $\pm$  0,49  $\mu\text{m}$ ,

LY 9746 11,7  $\pm$  0,88  $\times$  6,08  $\pm$  0,50  $\mu\text{m}$ ,

LY 9766 9,85  $\pm$  0,80  $\times$  6,10  $\pm$  0,33  $\mu\text{m}$ .

Le rapport entre la longueur moyenne des spores les plus longues (9750) et celle des spores les plus courtes (9766) est de 12,21/9,85 = 1,24, rapport du même ordre que ceux que nous avions signalés chez d'autres *Vararia* sans boucles: *V. minidichophysa* 1,27, *V. cremea* 1,33 (Boidin, Lanquetin et Gilles, 1980).

Récoltes examinées. — LY 9746 en forêt dense, Andasibé, 4 avril 1981; LY 9750, holotype, bois mort suspendu, *ibid.*; LY 9765, *ibid.*, 18 avril 1981; LY 9766, 9767 et 9768 *ibid.*; LY 9771, *ibid.* 19 avril 1981; LY 9799 *ibid.* 9 mai 1981; LY 9815 *ibid.*, 17 mai 1981, tous dus à G. Gilles.

Les dichophyses de type coralloïde à rameaux ultimes cylindriques obtus et branches des premiers ordres longues et raides rappellent par leur ramure celle de *V. gracilispora*; comme chez ce dernier les dichophyses superficielles plus ramassées, aux branches plus courtes prennent un aspect plus ou moins racémeux. Par contre le stipe sauf chez les dernières nées, est ici à paroi dextrinoïde et épaisse ce qui ne se rencontre pas chez *V. gracilispora* mais par exemple chez *V. rugosispora*.

Il est cependant très facile à distinguer de ces deux espèces; *V. gracilispora* a des boucles et des spores étroitement naviculaires; *V. rugispora* a des spores ruguleuses, une structure différente avec fibres brunes... Dans les clés que nous donnions en 1980 pour les *Vararia* du Gabon, il se placerait auprès de ce dernier.

#### CARACTERES CULTURAUX DE VARARIA CINNAMOMEA

Spores. — Binucléées (LY 9746, LY 9750, LY 9766).

Germinations. — En 24 heures la spore émet un long filament (600–700  $\mu\text{m}$ ) qui se vide laissant de nombreuses cloisons de retrait et se termine par un article vivant qui possèdent parfois 3 ou 4 mais le plus souvent 2 noyaux.

#### Monospermes

Des colorations nucléaires ont été faites sur 4 cultures de LY 9746, une de LY 9750 et 3 de LY 9766, toutes ces cultures monospermes sont constituées d'hyphes depour-



vues de boucles aux articles plurinucléés contenant (2-)4-7 noyaux par article sauf les terminaux qui peuvent en contenir 4 à 14, exceptionnellement 18 et même 24. Cette constitution étant la même que celle des cultures polyspermes, l'espèce est donc présumée homothalle. Toutefois alertée par les observations de Coates, Rayner et Todds (1981) dans les espèces holocénocytiques présumées homothalles, nous avons apparié 2 à 2, 10 monospermes LY 9766 en boîtes de Pétri de 14 cm de diamètre. Au bout de 10 jours certaines confrontations montrent dans une région centrale englobant les deux boutures, un mycélium blanc, feutré, "dense" alors que dans le reste de la culture le mycélium aérien est peu développé. Dans ces boîtes appelées "d" à cause de ce mycélium dense, aucune coloration n'est observée. Les autres confrontations présentent un mycélium aérien d'aspect "homogène" dans toute la boîte qui se teinte de brun à la périphérie; ces boîtes sont appelées "h" (Figs. 7a, b). Après 6 semaines, dans les confrontations "d", la partie feutrée dense, blanche, a alors envahi toute la boîte; on observe seulement quelques taches rouilles ponctuelles (2,5 Y 8/8 à 10 YR 6/4) et le revers des cultures n'est pas bruni. Dans les confrontations notées "h", l'aspect du mycélium reste homogène, il est crème avec une zone périphérique brune, (7,5 YR 6/4 - 5/4 et 5/6 à 6/6) cannelle, havane et très localement "rubiginosus", ou uniformément teinté de 10 YR 7/3 - 7/4 - 7/6 à 6/6, avec dans tous les cas un revers totalement bruni.

Si l'on inscrit les observations dans un tableau de polarité:

	1	4	2	3	5	7	8	9	6	10
1		h	d	d	d	h	h	h	h	h
	4		d	d	d	h	h	h	h	h
		2		h	h	h	h	h	h	h
			3		h	h	h	h	h	h
				5		h	h	h	h	h
					7		h	h	d	d
						8		h	d	d
							9		d	d
								6		h
									10	

d: mycélium dense blanc, apparu après contact des mycéliums, revers incolore.

h: culture d'aspect très homogène, revers brun.

On constate que les monospermes se répartissent en 4 groupes:

1-4 à réagissent avec 2 - 3 - 5

6-10 réagissent avec 7 - 8 - 9.

Ces différences d'aspect des mycéliums rappellent bien celle décrites par Coates, Rayner et Todds (1981) pour *Stereum hirsutum*. Il était donc intéressant de tenter comme eux de "multiple testing of monospore interactions." Nos résultats peuvent se résumer ainsi:

Dans les confrontations de monospermes appartenant à 2 souches différentes de *V. cinnamomea*, les cultures sont totalement homogènes ne permettant plus de distinguer les deux implants originaux. Quand, selon la méthode de Coates et coll., nous avons placé à la périphérie d'une boîte de 14 cm de diamètre 4 monosperme LY 9766 appartenant à deux des groupes identifiés ci-dessus et au centre un monospore 9746 d'une autre récolte de *V. cinnamomea*, 3 mois plus tard la plupart des boîtes présentaient des lignes fines formant une croix et traversant en diagonale la bouture centrale (Fig. 7c). Ces lignes seraient le signe d'un antagonisme mutuel entre les mycéliums dicaryotiques résultant de la confrontation réussie des monospermes de souches différentes, donc une preuve d'intercompatibilité. Nous devons toutefois signaler que des tests effectués ultérieurement avec les mêmes souches de *V. cinnamomea* conservées un an en mycothèque à 12°C n'ont plus montré de résultats bien nets: les lignes d'antagonisme sont peu visibles ou absentes.

Par contre, si on ensemence à la périphérie des boîtes 4 monospermes LY 9766 appartenant à chacun des 4 groupes identifiés précédemment et au centre, un monospore d'une autre espèce ex.: *Vararia breviphysa* Boid. et Lanq. (1975), il se forme autour de cet implant central un carré très net souligné par une ligne vide de mycélium qui peut atteindre 2 à 3 mm de large (Fig. 7d).

Il semble donc que dans cette espèce holocénocytique on puisse observer des phénomènes assez semblables à ceux relatés par Coates et coll. (1981). Nous n'oserons pas conclure à une hétérothallie (qui pourrait même être dite ici tétrapolaire ou bifactorielle) pour *V. cinnamomea* mais il semble cependant probable que s'installe une hétérocaryose dans les confrontations notées "d".

Ajoutons à ce propos que d'autres croisements de monospermes d'espèces holocénocytiques (*Stereum insignitum* LY 9918, *Stereum hirsutum* LY 9938, *Meruliopsis corium* LY 9795, *Phanerochaete velutina* LY 10016, *Gloeocystidiellum flammeum* LY 9759) n'ont donné lieu à aucune observation de ce genre après plusieurs mois.

#### Polysperme (LY 9746, 9766, 9799)

*Croissance*: rapide (boîtes couvertes à 3 semaines).

*Aspect*: la marge est régulière. Mycélium aranéeux bas subfeutré blanc à 10 YR 8/2 et localement alutacé (10 YR 8/6), devenant sublaineux à pelucheux par plage où il est alors teinté de 10 YR 7/8 à 5/8, parfois taché de havane (7,5 YR 4/4) et pouvant atteindre sur la bouture ou contre le verre, ferrugineux (10 YR 6/8 à 5/8). Le mycélium est en plus caractérisé par la formation de fines lignes ou crêtes, qui apparaissent plus ou moins rapidement dans les cultures d'une même récolte. Elles sont présentes dès la première semaine dans toutes les boîtes LY 9766 et dans 2 boîtes sur 3 pour LY 9799, mais il faut attendre la 4<sup>ème</sup> semaine pour en observer dans la 3<sup>ème</sup> boîte LY 9799 et la 6<sup>ème</sup> semaine pour en apercevoir des ébauches dans LY 9746. Revers: localement brun; odeur nulle.

*Fructification*: à 8 semaines LY 9799 et à 12 semaines LY 9766 fructifient, en donnant 1 sporée blanchâtre dans le couvercle. Les fructifications apparaissent comme des

petits granules alutacés (10 YR 8/4, 8/6) à chamois (10 YR 7/6). Basides et dichophyses sont semblables à celles des carpophores.

**Microscopie.** — Mycélium aérien: hyphes  $\times (1,5-2-2.5(-3) \mu\text{m}$  avec des axes plus larges,  $\times 5-5,5(-6) \mu\text{m}$ ; toutes sont dépourvues de boucles, à contenu homogène et à paroi distincte parfois un peu jaunâtre. Dichophyses et éléments gloeocystidiens n'ont jamais été observés. La coupe dans un crête montre un puzzle typique fait d'hyphes très intriquées à paroi épaisse. On peut voir à la marge de la crête, des hyphes terminales courtes à paroi très épaisse et lumen subnul.

Mycélium submergé: les hyphes sont moins denses, plus irrégulières, à contenu souvent hétérogène. Les axes atteignent  $7 \mu\text{m}$  de diamètre avec une paroi un peu épaisse.

**Boucles:** absentes.

**Cytologie:** hyphes formées d'articles plurinucléés contenant (2-4) à 10 noyaux sauf les terminaux qui peuvent en montrer 4 à 25 selon le diamètre de l'hyphe.

**Oxydases:** ac. gallique: +++++, tr. gaïacol: +++ (+), 0

p-crésol: - à L tyrosine: +++, tr.

**Code:** 2a - (2b) - 6 - 10 - 32 - 37 - 39 - 43 - 54 - (57) - 66.

## 6. *Vararia firma* Boid.

*Vararia firma* Boid. in Cah. Maboké 5: 27, pl. II f. 2. 1967; Boid., Lanq. et Gilles. in Cryptog. Mycol. 1: 305, f. 13. 1980.

La récolte de G. Gilles LY 9749, sur bois mort au-dessus du sol, Andasibé, le 4 avril 1981, a la structure et les caractères de *V. firma*. La seule culture monosperme obtenue a donné des résultats partiellement positifs avec les monospermes LY 5529 et 6080 de Centrafrique. Alors que LY 9749 a des spores de taille normale ( $\bar{x} = 13,42 \pm 1,18 \times 4,65 \pm 0,30$ ) une autre récolte (LY 9806 faite à Andasibé le 17 mai 1981) a des spores nettement plus allongées ( $\bar{x} = 17,3 \pm 1,33 \times 4,66 \pm 0,33$ ) soit 1,3 fois plus longues ( $Q = L/l = 1,3$ ).

## 7. *Vararia gomezii* Boid. et Lanq.

*Vararia gomezii* Boid. et Lanq. in Bull. Soc. mycol. Fr. 91: 462. 1975; in Mycotaxon 6: 299, f. 5. 1977; Boid., Lanq. et Gilles in Cryptog. Mycol. 1: 310, f. 15. 1980.

Une récolte typique a été faite à Andasibé le 4 avril 1981 (LY 9745).

## 8. *Vararia trinidadensis* Welden. — Fig. 4

*Vararia trinidadensis* Welden in Mycologia 57: 515, f. 4. 1965; Boid. Lanq. et Gilles in Cryptog. Mycol. 1: 334, f. 26. 1980.

La récolte LY 9787, la Mandraka, alt. 1300 m, le 25 avril 1981, a les caractères macroscopiques et microscopiques de *V. trinidadensis*. Les spores (Fig. 4a), si elles sont de taille comparable, sont cependant de forme assez différentes de celles que nous avons figurées (1980, fig. 26b) pour les récoltes gabonaises; en effet, leur aspect en croissant avec sommet rétréci donnant une allure biapiculée correspond mieux aux figures de Welden.

Les récoltes gabonaises diffèrent donc par des spores plus allongées, moins courtes et à sommet obtus.

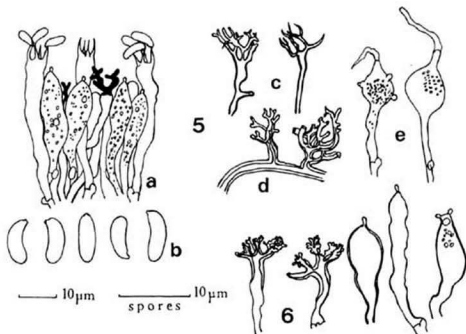
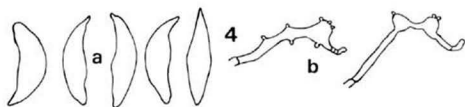


Fig. 4. *Vararia trinidadensis* Welden (LY 9787). — a. Spores (KOH-phloxine). — b. Sulfo-cystides en culture.

Fig. 5. *Vararia parmastoi* Boid. et Lanq. nov. sp. — a. Portion d'hyménium (Melzer). — b. Spores (Melzer). — c. Dichophyses superficielles. — d. Dichophyses profondes (Congo ammoniacal à 60° C). — e. Sulfocystides en culture. (Holotype, LY 9981, sauf e, LY 6776).

Fig. 6. *Vararia parmastoi* (LY 6776), éléments de l'hyménium après Congo ammoniacal à 60° C.

#### CARACTERES CULTURAUX DE *V. TRINIDADENSIS*

Spores.—Uninuclées.

Monospermes

Deux seulement ont pu être isolés; ils possèdent les mêmes gloecystides que le polysperme mais leurs hyphes sont formées d'articles uninuclées; leur croisement a donné un mycélium aux hyphes pareillement constituées d'articles uninuclées.

Polysperme

Croissance: moyenne (boîtes couvertes à 5 semaines).

Aspect: mycélium aérien d'aspect homogène, blanchâtre (10 YR 9/1 à 9/2), peu abondant, ne cachant pas le milieu sauf sur la bouture où il est cotonneux et localement

dans la zone âgée de la culture où il est bas, aranéeux à subfeutré. Odeur: nulle. Le revers est caramel pâle sous la bouture et ses abords (vers 7,5 YR 7/6).

*Microscopie*. — Mycélium aérien formé: (1) d'hyphes régulières, sans boucles,  $\times 1,5-3 (-4) \mu\text{m}$ , (le plus souvent  $\times 2 \mu\text{m}$ ), à paroi mince et contenu homogène; et (2) de nombreuses sulfo-cystides, petites ou plus allongées,  $(50-80) \mu\text{m}$ , à contenu granuleux dans le Rouge Congo. Leur forme est variable mais elles présentent toutes des petites renflements,  $\times (4-5)-8(-10) \mu\text{m}$ , portant des schizopapilles souvent minuscules (Fig. 4b). Dans le réactif sulfo-anisique, ces parties renflées réagissent bien et donnent aux gloeocystides un aspect noduleux. Nous n'avons pas observé de dichophyses, et de très rares fibres congophiles ramifiées n'ont été trouvées que dans des cultures sur lame gélosée.

Mycélium submergé: majorité d'hyphes  $\times 2 \mu\text{m}$ , avec quelques hyphes axiales,  $\times 3-4 \mu\text{m}$ , toutes régulières, sans boucles, à paroi mince.

*Cytologie*: hyphes constituées d'articles régulièrement binucléés.

*Oxydases*: ac. gallique: +++ (+), 0            gaïacol: +++, 0

p-crésol: —                                    tyrosine: —, 0

Code: 2a — 6 — 15ap — 32 — 36 — (38) — 45 — (54) — 58 — 61.

Tous les *Vararia* sans boucles cultivés à ce jour possèdent des monospermes dont la cytologie est identique à celle des polyspermes, et sont donc des espèces présumées homothalles. *Vararia trinidadensis* serait le premier *Vararia* hétérothalle sans boucles. Ce résultat reste à préciser sur une récolte qui permettrait l'obtention d'un plus grand nombre de monospermes.

#### C. UN VARARIA DU GENEVRIER EN OUZBEKISTAN, TADZHIKISTAN ET TURKMENISTAN (ASIE SOVIETIQUE)

##### 9. *Vararia parmastoi* Boid. et Lanq., *nov. sp.* — Figs. 5 et 6

Jacens, subceracea firma, gilva, cinnamomea vel e rufo brunnea, margine haerente, gradatim de-  
rescenti, dein determinata per vetustatem. Cathahyemium crassescens, e gloeocystidiis  $20-40 \times$   
 $6-10 \mu\text{m}$ , ope S.A. coloratis, atque dichophysibus ramulis brevibus, dextrinoideis cyanophilisque  
constans. Basidia  $35-42 \times 4-5 \mu\text{m}$ . Sporae cylindratae, arcuatae,  $6-7,5 \times 1,8-2,4 \mu\text{m}$ , tunica laevi  
amyloideaque. In Juniperis, in altitudine, in rossica Asia. Holotypus LY 9981.

Sur le frais, étalé, subcéracé ferme, parfois grossièrement bosselé, prumineux, beige  
cannelle (7,5 YR 6,5/4), gris rosâtre (5 YR 6/3 à 6/2 ou 5,5/2) et même brun rougeâtre  
(5 YR 5/2, benzo brown R), à marge adhérente amincie, un peu plus pâle. Les spécimens  
s'épaississent rapidement (0,5 mm) et ont alors une marge brusque. Il se crevasse beau-  
coup en séchant, et pâlisent, gris beige (10 YR 7/2, clay buff R.).

En coupe, épais de  $120-650 \mu\text{m}$ , jaunâtre sauf en surface, tout encombré de dépôts  
cristallins engageants; il peut être formé d'éléments tous verticaux, c'est-à-dire d'un  
cathahyménium crassescens, sans contexte, ou au contraire, montrer à la base une zone  
confuse d'épaisseur variable englobant des fragments du support, faite d'hyphes serrées,  
irrégulières, peu distinctes, à paroi mince ou un peu épaissie, bouclées; rarement une  
couche horizontale de  $30-40 \mu\text{m}$  de hauteur s'étale sur le support; elle est alors formée  
d'hyphes peu régulières  $\times 2-3,5 \mu\text{m}$ , bouclées, à paroi un peu épaisse.

L'hyménium crassescens est formé des éléments suivants. —

(1) Gloeocystides nombreuses, au contenu dense, sulfoaldéhyde positif dans les 200  
 $\mu\text{m}$  supérieurs, se relayant jusqu'à la surface où elles peuvent émerger et se terminer par

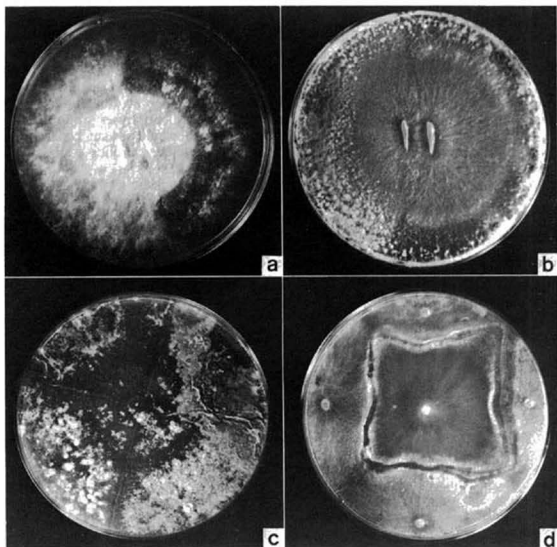


Fig. 7. *Vararia cinnamomea* (voir explications dans le texte). — a. LY 9766, confrontation 1 × 2, appelée "d" car on voit se former au centre un mycélium "dense" englobant les deux implants. — b. LY 9766, confrontation 3 × 9, appelée "h" parce que le mycélium a un aspect "homogène" dans toute la culture. — c. "Multiple testing" entre deux souches de *V. cinnamomea*. Au centre monosporme, LY 9746, à la périphérie, 4 monospermes de la souche LY 9766. — d. "Multiple testing" entre *V. cinnamomea*, LY 9766, monospermes 1, 2, 6, 7, placés à la périphérie et *V. breviphysa*, LY 8712, monosporme 1, placé au centre.

une schizopapille; plus profondément leur contenu est moins remarquable ou même nul; ces gloeocystides à paroi mince ou un peu épaisse sont ovoïdes à fusiformes,  $20-40 \times 6-10 \mu\text{m}$ , souvent avec pied cylindrique; quelques unes, nées profondément ont 2 "racines" (plagio-gloeocystides).

(2) Dichophyses: les superficielles à stipe  $\times 2-2,5 \mu\text{m}$  à paroi mince portent quelques branches à paroi épaisse dextrinoïde enrobées d'une substance hyaline réfringente et cassante; les stipes sont souvent sensiblement cyanophiles. Les dichophyses les plus pro-

fondes apparaissent dans le Melzer comme non dextrinoïdes, un peu jaunâtres, très peu distinctes si non comme des amas de granules réfringents. Dans le bleu-coton au contraire, on voit parfois un stipe à paroi mince, souvent un tronc à paroi épaisse ou même très épaisse et alors cyanophile porteur de quelques branches à paroi épaisse, cyanophile, irrégulièrement ramifiées une ou deux fois. Le stipe mesure  $33 \times 1,8-2,5(-3) \mu\text{m}$ , les branches sont larges de  $1,8 \mu\text{m}$ , l'envergure de ces dichophyses est de  $20(-35) \mu\text{m}$ .

(3) Hyphes peu discernables,  $\times 2-3,5 \mu\text{m}$ , les unes à paroi mince, d'autres assez épaisse.

(4) Basides étroitement claviformes ou subcylindriques irrégulières,  $35-42 \times 4-4,5 (-5) \mu\text{m}$ , à 4 stérigmates effilés longs de  $4-5 \mu\text{m}$ ; elles émergent de  $7-9 \mu\text{m}$  à maturité.

Spores cylindriques arquées,  $6-7,5 \times 1,8-2,4 \mu\text{m}$  ( $\bar{x} = 6,63 \pm 0,44 \times 2,14 \pm 0,15$  pour le type), uninucléées, à paroi mince, amyloïde.

Récoltes examinées.—LY 6776, sur *Juniperus turcomanica*, distr. Bachardin, Arvaz, TURKMENISTAN (URSS), alt. 1700 m, 18 octobre 1971, A. Lindre, TAA 55.486; LY 9979 sur *Juniperus semiglobosa*, Rovluk-sai pr. Jangi-Kurgon, regio Tashkent, OUZBEKISTAN (URSS), alt. 2200 m, 24 avril 1982, E. Parmasto, TAA 104.299; LY 9980, ibid., TAA 104.302; LY 9981, holotype, ibid., TAA 104.303; LY 9982, sur *Juniperus seravschanica*, Kulab-sai pr. Brichmulla, regio Tashkent, OUZBEKISTAN, alt. 2200 m, 23 avril 1982, E. Parmasto, TAA 104.308; LY 9983 et 9984, sur *Juniperus semiglobosa*, Chingan, Bolshoi Kok-sai, regio Tashkent, OUZBEKISTAN, alt. 2300 m, 25 avril 1982, E. Parmasto, TAA 104.430 et 104.440; LY 10.000, sur *Juniperus* sp., Hodzha-Odigarm, TADZHIKISTAN (URSS), B. Kullmann 593.

La position générique de ce champignon n'est pas évidente. Il fait penser à un *Amylostereum* par son aspect, son habitat (comme *A. laevigatum*, il croît sur *Juniperus*), ses spores blanches, cylindriques et amyloïdes, mais il est dépourvu de cystides et possède des dendrodichophyses. Il possède en outre des gloeocystides sulfo-aldéhyde positives comme on en rencontre entre autres chez des *Peniophora*, les *Amylostereum*, certains *Vararia*, *Aleurodiscus* et *Gloeocystidiellum* sensu lato, chez les *Amylocorticium*, . . . Des *Peniophora* subg. *Cryptochate* (P. Karst.) Boid. et Lanq. (1974), il se rapproche par ses gloeocystides sulfo-positives, ses éléments dendrodichophytiques, l'absence de cystides, mais il n'en a pas les spores roses et non amyloïdes et ses dichophyses sont dextrinoïdes et cyanophiles. Ce dernier caractère se rencontre chez les *Lachnocladiaceae*. Ses spores cylindriques et lisses l'éloignent des *Dichostereum* Pilát. Reste le genre *Vararia* Karst. dont certaines espèces, celles de la section *Fusamyspora* Boid. et Lanq. (1975) ont des spores lisses et amyloïdes. Il faut cependant remarquer qu'il diffère des *Vararia* sect. *Fusamyspora* par ses basides non utriformes, la forme des spores, les gloeocystides sulfo-aldéhyde positives et le type de dichophyses (qui rappelle davantage celle des *Vararia* subg. *Vararia* comme *V. breviphysa* Boid. et Lanq.).

Le caractère qui nous incline à le placer dans le genre *Vararia* est donc la dextrinoïdie (et cyanophilie) des éléments dichophytiques, dextrinoïdie qui ne se rencontre pas chez les *Peniophora* par exemple.

Si l'on retient un "ensemble naturel par enchaînement" (Gluchoff-Fiasson et Kühner, 1982) basé sur la présence d'esters du vélutinal (gloeocystides sulfo-positives) notre *V. parmastoi* peut servir de lien entre deux genres qui n'ont jamais été rapprochés jusqu'ici: *Vararia* et *Amylostereum*.

## CARACTERES CULTURAUX DE V. PARMASTOI

**Spores.** — Uninucléées.

**Germinations.** — Elles apparaissent après 2 ou 3 jours. La spore émet deux filaments dont les articles sont régulièrement uninucléées.

**Monospermes** (LY 6776, 9980, 9981, 9984, 10000)

Ils sont formés d'hyphes sans boucles à paroi distincte et de nombreuses petites sulfocystides au contenu guttulé dense. Les huit monospermes étudiés possèdent des hyphes aux articles régulièrement uninucléés.

**Recherche de la polarité.** — Avec LY 6776, les essais successifs d'appariements de 10 monospermes, puis de 10 autres, n'ont donné, dans le meilleur cas, que deux confrontations assez nettement positives et deux très partiellement positives.

Avec LY 9981, le premier essai a donné, au bout de deux mois, deux confrontations partiellement positives, le deuxième une seule confrontation positive.

Avec LY 9984, lors du premier essai on a pu observer deux confrontations positives ( $1 \times 4$ ;  $4 \times 6$ ) et quatre partiellement positives sur la ligne de contact ( $2 \times 6$ ,  $2 \times 7$ ,  $2 \times 9$  et  $6 \times 7$ ). Dans une deuxième tentative effectuée avec les mêmes cultures monospermes, après deux mois toutes les confrontations (quoique bien développées) sont négatives.

Il n'a donc pas été possible d'établir le type de polarité de cette espèce, mais nous avons confronté nos différents souches entre elles.

**Tests d'intercompatibilité:** vingt confrontations effectuées entre les monospermes de nos souches, LY 6776, 9980, 9981, 9984 et 10000, se sont toutes révélées positives après un mois ou deux avec souvent dicaryotisation totale des haplontes; les récoltes sont donc intercompatibles.

**Polyspermes** (LY 6776, 9980, 10000)

**Croissance:** moyenne (boîtes couvertes entre 4 et 5 semaines).

**Aspect:** la marge est régulière, parfois submergée. Mycélium aérien subnul dans la partie jeune des cultures, puis mycélium aérien pauvre, de teinte uniforme (vers 9 YR 6/4), ne cachant pas le milieu. Seule la bouture et ses abords sont parfois (pour LY 6776 et 10000) totalement couverts par un mycélium cotonneux ou feutré, teinté d'ochre pâle à isabelle pâle (7,5 YR 8/4 à 7/4). A la périphérie, contre le verre, il atteint localement testacé pâle à cannelle (5 YR 6/6 à 7,5 YR 6/6).

**Odeur:** nulle. Revers brun sous la bouture et dans la partie âgée.

**Microscopie.** — Mycélium aérien formé des éléments suivants: (1) Hyphes irrégulières,  $\times 1,2-3(-4) \mu\text{m}$ , à paroi mince, ferme ou localement épaissie, à boucles constantes parfois de formes irrégulières; quelques hyphes axiales atteignent  $6-7 \mu\text{m}$  de diamètre.

(2) Nombreuses sulfocystides (cf. Fig. 5e) qui présentent le plus souvent une partie renflée subsphérique, de  $5-7(-9) \mu\text{m}$  de diamètre, au contenu guttulé ou pailleté et dont la paroi, généralement mince, peut parfois être épaisse d'un  $\mu\text{m}$ . Elles montrent un à trois (quelquefois même davantage) petits bourgeons qui pourraient faire penser à des schizopapilles, mais ici nous n'avons pas observé d'épaississement membranaire à la base des excroissances, ni de cicatrices comme en laissent les schizopapilles cassées, par contre certains bourgeons s'allongent et donnent un petit appendice. Le sommet effilé de ces gloecystides se vide en laissant des cloisons de retrait.

(3) Parfois de longs ramaux terminaux grêles  $200-250 \times 1,5 \mu\text{m}$ , rarement ramifiés, à paroi ferme, faisant penser à des sortes de fibres. Après une nuit dans KOH 10% à  $60^\circ\text{C}$  pour décolorer leur paroi un peu jaunâtre, aucune coloration n'est observée dans le rouge Congo ou le Melzer.

**Mycélium submergé:** hyphes très irrégulières,  $(1,5-)-2-4(-6) \mu\text{m}$ , à paroi mince ou un peu ferme ou localement épaissie, à boucles constantes de forme irrégulière.



*Boucles*: constantes, toutefois les repiquages ont montré une tendance à perdre localement ou même totalement les boucles avec retour à l'état haploïde. Ceci explique peut-être les difficultés rencontrées dans la recherche de polarité.

*Cytologie*: articles régulièrement binucléés.

*Oxydases*: ac. gallique: +++++, 0

gaïacol: +++++, 0

p-crésol: —

tyrosine: —, 0

Code: 2a — 3c — 15a — 32 — 39 — 44 — 45 — 55 — 58 — 61.

### CONCLUSIONS

Ce travail a pour but d'apporter des données complémentaires sur le genre *Vararia*. Nous insistons à nouveau sur l'intérêt des cultures et notamment des tests d'intercompatibilité. Si Madagascar semble recéler des espèces connues en Amérique chaude (*V. gomezii*, *V. trinidadensis*), celles-ci sont sans boucles. Par contre deux espèces bouclées (*V. calami* et *V. firma*) décrites d'Afrique équatoriale ont été rencontrées qui se montrent totalement (*V. cf. calami*) ou partiellement (*V. firma*) interincompatibles avec les souches africaines: l'isolement insulaire de Madagascar tend à développer, aussi chez nos champignons, un endémisme certain.

### REMERCIEMENTS

Nos très vifs remerciements s'adressent à nos collègues, les Professeurs E. J. H. Corner de Cambridge, et E. Parmasto de Tartu (Estonie), ainsi qu'à notre ami G. Gilles, qui tous nous ont adressé de très intéressantes récoltes.

### Summary

Some species from the malaysian peninsula are described; *Vararia alticola*, Corner & Boldin, sp. nov. — having a *Fomes* habit, essentially composed of dichophyses with a hyphal-like stipe. *Vararia malaysiana* Boid. & Lanq., sp. nov. — close to *V. dussii* Boid. & Lanq. from Guadeloupe and with which it gave a very incomplete, non lasting intercompatibility reaction. Also mentioned is *V. sphaericospora* Gilbertson having rather large basidiospores and many chlamydospores.

The following are recorded from Madagascar: *V. cf. calami* Boid. & Lanq. collected on *Pinus* sp. at high altitude, interincompatible with *V. calami* from Gabon; *V. firma* Boid. partially compatible with several central African specimens of *V. firma*; *V. gomezii* Boid. & Lanq. and *V. trinidadensis* Welden. The cultural characteristics of the last-mentioned are given. This is the first species of *Vararia* without clamps, which has shown to be really heterothallic. *Vararia cinnamomea* Boid., Lanq. & Gilles, sp. nov. is described and its mycelial characters are studied. This holocoenocytic species, without clamp connections, showed two types of interactions in pairings between monosporous strains, similar to certain strains of *Stereum hirsutum* (Coates et al., 1981) — a holocoenocytic species with rare, sometimes verticillate or paired, clamped connections. Tentatively we conclude, that these phenomena might be explained by the possible formation of heterokaryotic mycelia in certain pairings only (designated here by the letter "d"). But we would not like to go as far as Coates et al. who call these Phenomena heterothallism and polarity.

Finally a description is given of *V. parmastoi* Boid. & Lanq., sp. nov. living on *Juniperus* at high altitudes in the meridional provinces of Soviet Asia. Its systematic position is debatable. It shows smooth, amyloid, cylindrical basidiospores, a white spore print, sulfocystidia, and dextrinoid dich-

physes (at least after alkaline treatment at 60° C). Certain features relate it to the genus *Amylostereum*, especially the aspect, habitat, spores and sulfocystidia; but this genus is cystidiate and without dendrohyphidia. *Peniophora* subg. *Cryptochaete* (P. Karst.) Boid. & Lanq. (1974) is also brought to mind, except that *V. parmastoi* the spores are white and amyloid, and the dichophyses dextrinoid. Links with *Vararia* sect. *Fusamyspora* are also possible, but the basidia are not utriform and on various other points it seems rather unrelated to *V. pectinata* (Burt) Rog. & Jacks.

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

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

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

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

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

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

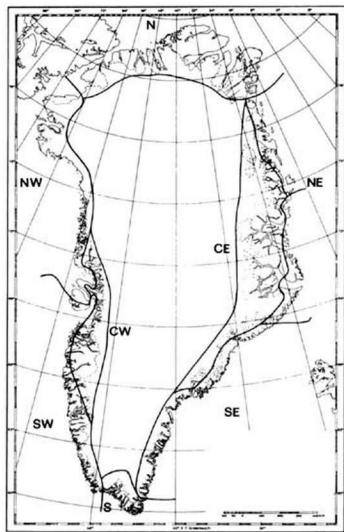


Fig. 1. The floristical provinces of Greenland.

## METHODS AND PRESENTATION

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

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

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

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

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

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

## THE COLLECTING-SITES. — Fig. 2

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

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

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

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

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

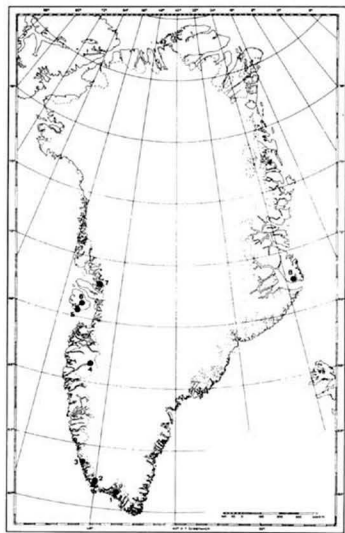


Fig. 2. Collecting sites mentioned in the text. — 1. Narsaq-Narsarsuaq area (incl. Rosenvinges plantation, Qinnngua Valley, Tasersuaq Lake, and Erik the Red's Fiord). — 2. Ivigtut. — 3. Pamiut (Frederikshaab area, incl. Eqaluit and Kvaneöen). — 4. Kangerdlugssuaq (Søndre Strömfiord, incl. Ravneklippen and Hassels Fjeld). — 5. Kuanit (Disko Island). — 6. Kuanerssiut (Disko Island). — 7. Umának. — 8. Jameson Land.

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

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

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

#### THE ECOLOGY OF ENTOLOMA ON GREENLAND

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

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

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

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

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



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

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

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

## TAXONOMIC PART

### SECTION ENTOLOMA

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

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

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

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

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

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

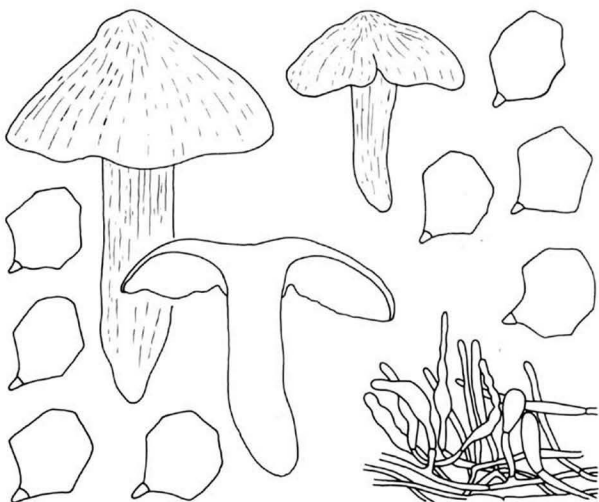


Fig. 3. *Entoloma olidum*. — Habit, spores, and pileipellis. (All figs. from holotype.).

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

#### SECTION RHODOPOLIA

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

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

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

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

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

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

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

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

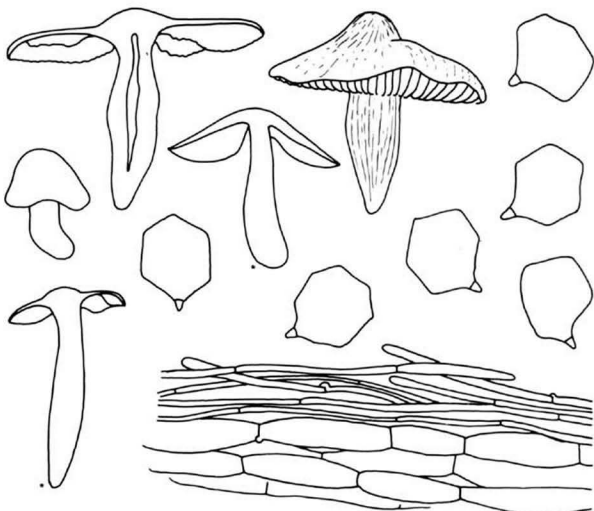


Fig. 4. *Entotoma alpicola*. — Habit, spores, and pileipellis. (Habit from TB 81.153 (\*) and TB 78.17, all other figs. from TB 78.17).

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

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

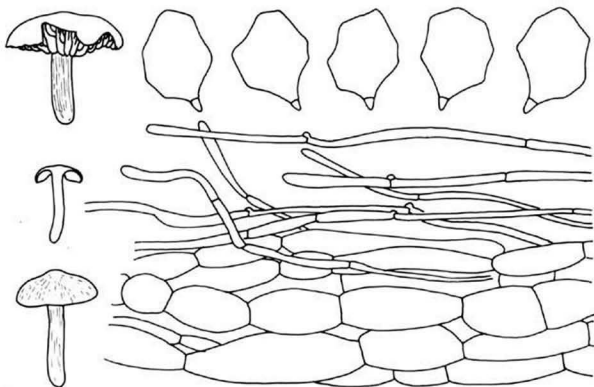


Fig. 5. *Entoloma* spec., aff. *alpicola*. — Habit, spores, and pileipellis. (All figs. from TB 83.5.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

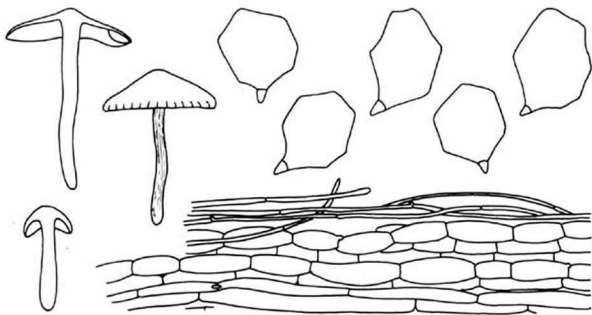


Fig. 6. *Entoloma subsepiaceum*. — Habit, spores, and pileipellis. (All figs. from TB 82.107.)

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

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

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

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

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

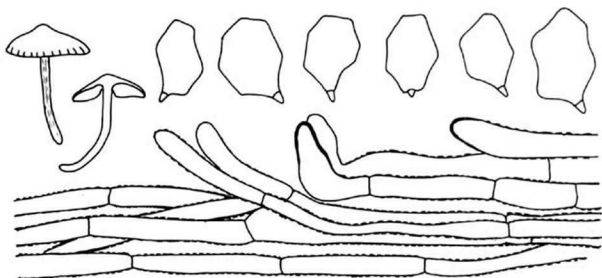


Fig. 7. *Entoloma anthracinellum*. — Habit, spores, and pileipellis. (All figs. from TB 82.20.)

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

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

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

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

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

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

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



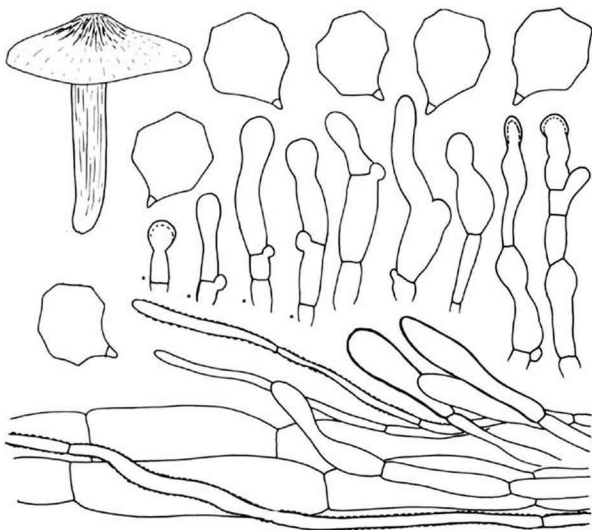


Fig. 8. *Entoloma rimulosum*. — Habit, spores, cheilocystidia, and pileipellis. (Figs. with (\*) from Boertmann 83.084, all other figs. from holotype.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

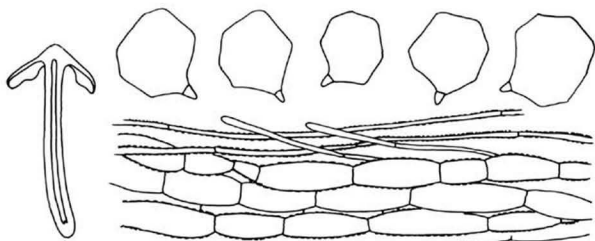


Fig. 9. *Entoloma atrosericeum*. — Habit, spores, and pileipellis. (Habit from TB 81.165, all other figs. from TB 82.71.)

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

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

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

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

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

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

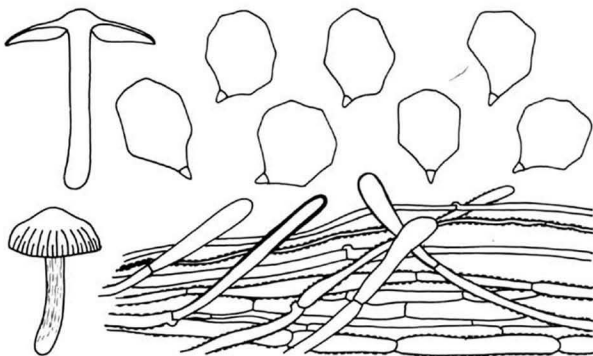


Fig 10. *Entoloma subarcticum* var. *subarcticum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

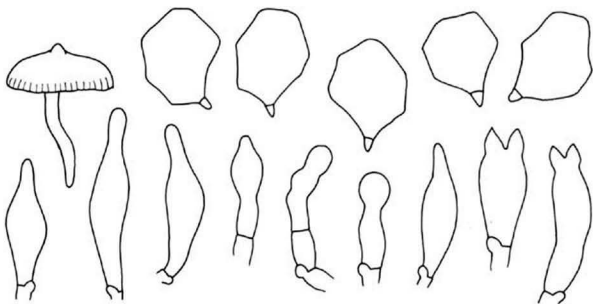


Fig. 11. *Entoloma bicorne*. — Habit, spores, basidia, and cheilocystidia. (All figs. from holotype.)

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

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

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

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

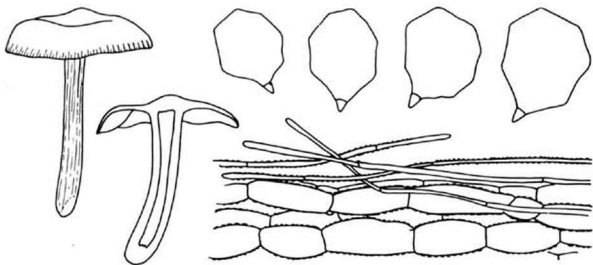


Fig. 12. *Entoloma bipelle*. — Habit, spores, and pileipellis. (All figs. from holotype.)

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

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

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

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

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

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

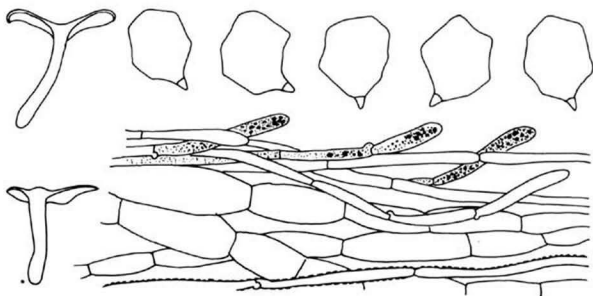


Fig. 13. *Entoloma borgenii*. — Habit, spores, and pileipellis. (Habit with (\*) from TB 79.35, all other figs. from TB 78.131.)

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

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

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

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

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



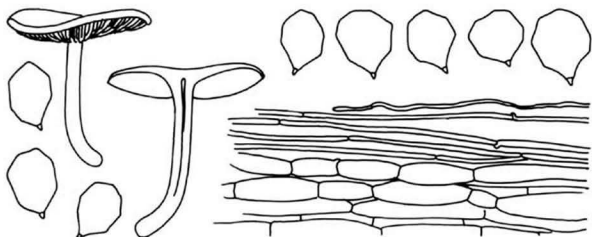


Fig. 14. *Entoloma vinaceum*. — Habit, spores, and pileipellis. (All figs. from TB 83.55.)

#### SECTION TURFOSA

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

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

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

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

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

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

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

#### SECTION POLITA

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

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

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

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

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

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

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

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

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

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

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

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

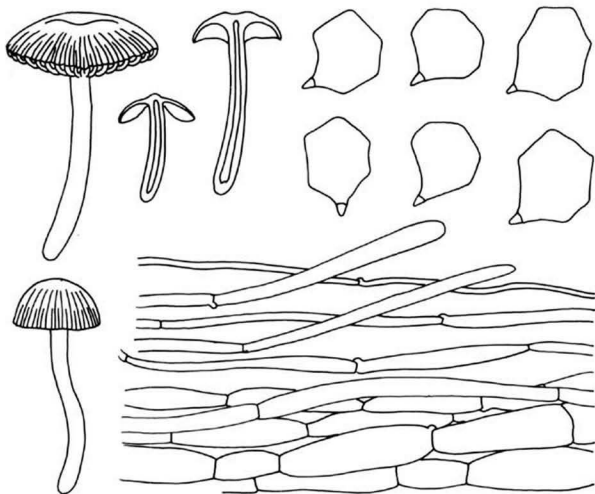


Fig. 15. *Entoloma melanosmum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

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

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

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

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

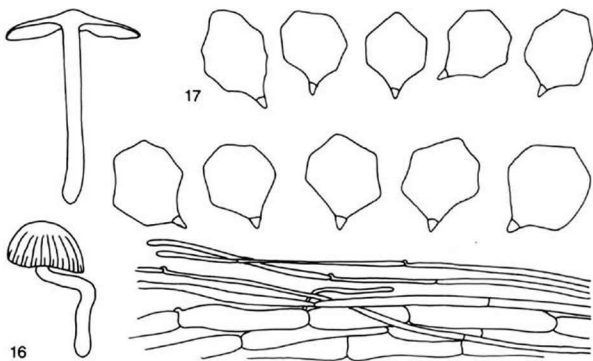


Fig. 16. *Entoloma politum*, pallid form. — Habit, spores, and pileipellis. (All figs. from *TB 81.260*.)  
 Fig. 17. *Entoloma engadinum*. — Spores (from *TB 82.137*).

#### 14a. *Entoloma politum*, pale form. — Fig. 16

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

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

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

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

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

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

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

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

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

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

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

Collections examined.—SW: Pâmiut, Kvanecöen, 8 Sept. 1982, TB 82.137.

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

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

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

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

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

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

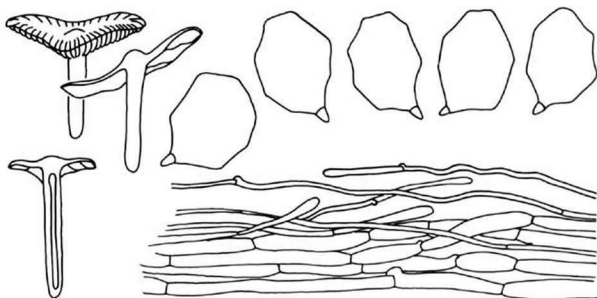


Fig. 18. *Entoloma anthracinum*. — Habit, spores, and pileipellis. (All figs. from *TB 81.195*.)

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

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

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

#### SUBGENUS TRICHOPILUS

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

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

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

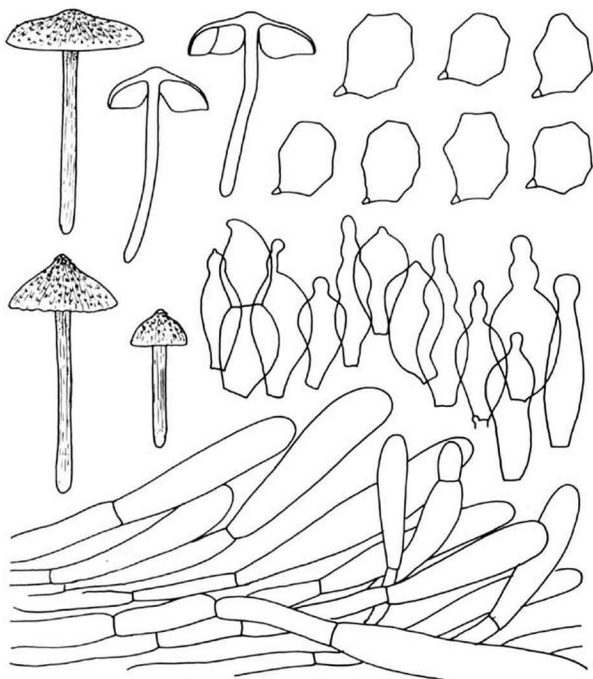


Fig. 19. *Entoloma fuscotomentosum*. — Habit, spores, cheilocystidia, and pileipellis. (Habit from TB 82.114 or TB 81.183 (\*), spores from TB 81.183, cheilocystidia from TB 81.168, pileipellis from holotype.)

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

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

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

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

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

#### SUBGENUS NOLANEA

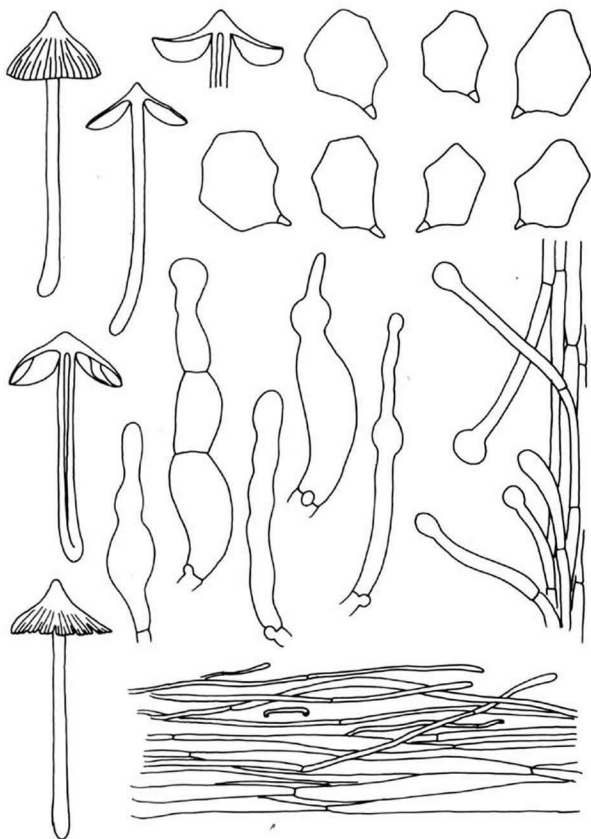
### 18. *Entoloma langei* Noordel. & Borgen, *spec. nov.* — Fig. 20

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

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

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





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

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

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

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

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

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

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

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

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

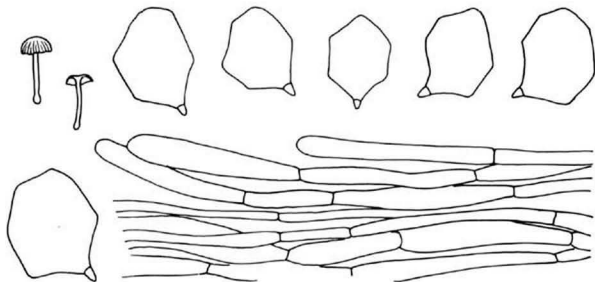


Fig. 21. *Entoloma pusillum*. — Habit, spores, and pileipellis. (All figs. from holotype.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## 23. *Entoloma vernum* Lund.

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

For full synonymy see Noordeloos (1980: 476).

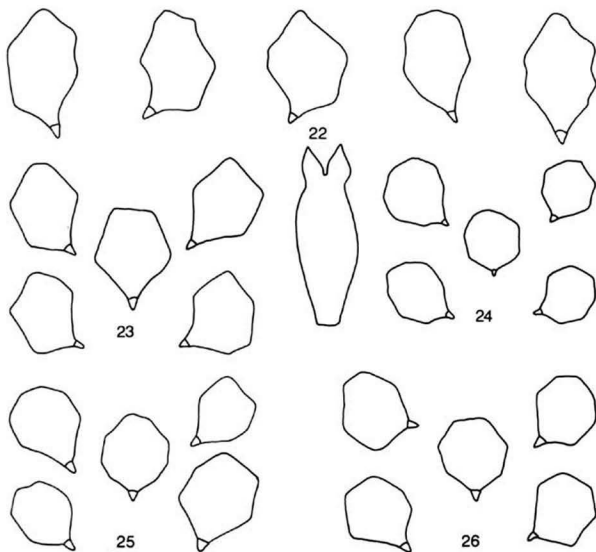


Fig. 22. *Entoloma cetratum*. — Spores and basidium. (All figs. from *ML* 276.)

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

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

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

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

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

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

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

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

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

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

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

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

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

Habitat. — In short grass with *Hygrophorus*.

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

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

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

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

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

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

Habitat. — Among grasses and lichens.

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

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

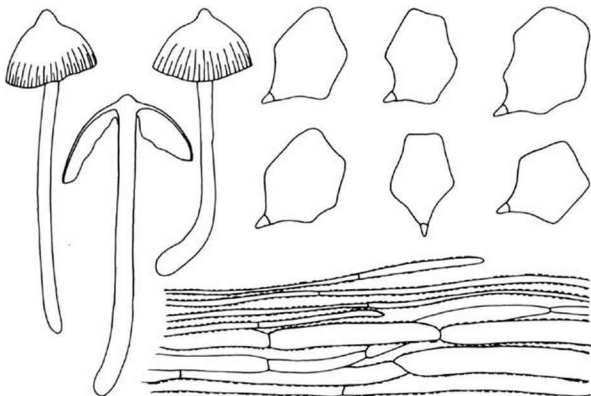


Fig. 27. *Entoloma papillatum*. — Habit, spores, and pileipellis. (All figs. from HK c.s. 138.)

#### SUBGENUS CLAUDOPUS

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

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

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

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

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

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

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

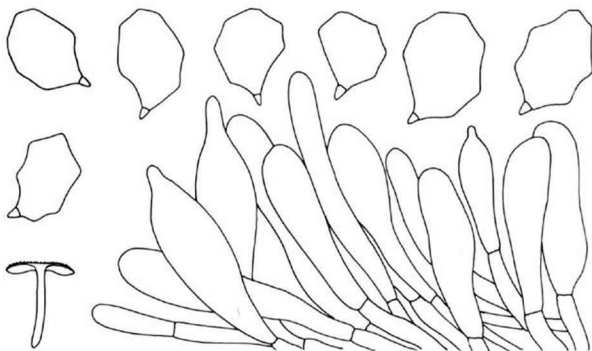


Fig. 28. *Entoloma* spec., aff. *chalybaeum*. — Habit, spores, and pileipellis. (All figs. from HK c.s. 290.)

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

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



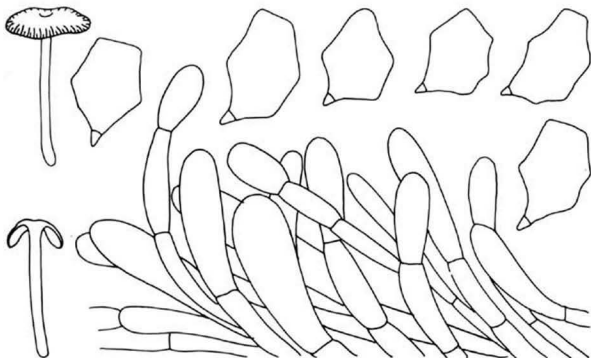


Fig. 29. *Entoloma sarcitulum*. — Habits, spores, and pileipellis. (All figs. from HK c.s. 577.)

#### SUBGENUS LEPTONIA

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

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

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

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

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

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

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

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

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

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

Habitat. — In grasses.

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

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

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

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

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

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

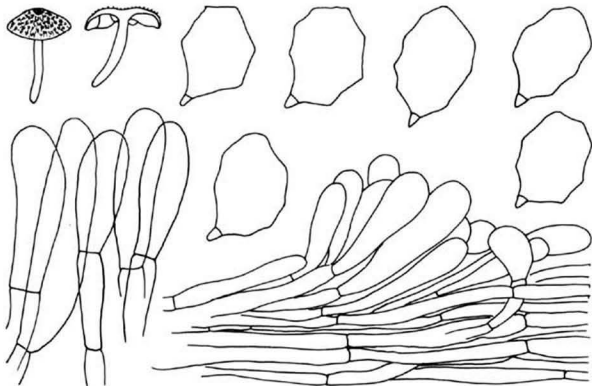


Fig. 30. *Entoloma turci*. — Habit, spores, cheilocystidia, and pileipellis. (All figs. from *TB* 81.169.)

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

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

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

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

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

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

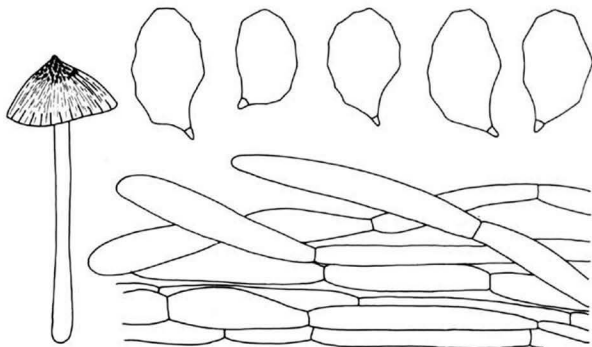


Fig. 31. *Entoloma* spec., aff. *placidum*. — Habit, spores, and pileipellis. (All figs. from PMP 71.122.)

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

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

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

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

Habitat.— Solitary in *Salix glauca* copes.

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

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

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

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

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NEOTYPIFICATION OF *HYDNUM BARBA-JOVIS* BULL.: FR.

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*Rijksherbarium, Leiden*

It is shown that *Hydnum barba-jovis* Bull.: Fr. can neither be placed in *Mycoacia* nor in *Steccherinum*, but does belong to the genus *Hyphodontia* J. Erikss., a synonym of *Grandinia* Fr.. A neotype is described which is in accordance with the current widely accepted concept of the specific name.

In 1791, Bulliard described (p. 303) a resupinate hydroid fungus under the name *Hydnum barba-jobi*. According to his diagnosis, the species is sessile, membranaceous, totally adnate, yellow or straw-coloured with reddish tinge (when mature), and shows spines which are apically penicillate; young specimens are whitish. The spines are at first simple, white and wart-like, but develop finally from the apex several filaments which in turn may become subdivided. The fungus grows on dead branches of trees.

The accompanying colour plate (Bulliard, 1791: pl. 481, fig. II D-E) shows a resupinate specimen with a straw-coloured to pale ochraceous basidiocarp and delicate, apically penicillate spines. The Rijksherbarium copy of the plate shows no reddish tinge on the basidiocarp. The spines are conical, apically rounded and develop deeper coloured hyphal fascicles.

During the last decades, Bulliard's taxon was usually interpreted as belonging to the genus *Hyphodontia* J. Erikss. (1958), a later synonym of *Grandinia* Fr. (1838). Some authors, notably Bourdot & Galzin (1914, 1928), placed the species as a variety under *Acia stenodon* (now *Mycoacia*); a solution favoured by Burdsall & Larsen (1983) who state (p. 514): 'Bulliard's description and illustration and Fries' descriptions could be interpreted as referring to any of a number of species of *Mycoacia* or *Steccherinum*.'

According to Burdsall & Larsen (1983), *Hydnum barba-jovis* Bull.: Fr. has to be removed from the genus *Hyphodontia*, but a closer study showed that the reverse is the case: the species in question can remain in *Hyphodontia* and cannot be placed in *Mycoacia* or *Steccherinum*.

When Withering (1801: 331) accepted the taxon, he gave a short description drawn from Bulliard: '*Hyd. Barba-jovis*. Tawny, membranaceous, spreading, the ends of the prickles pencil-shaped.' His descriptions seems to be based on Bulliard's plate, no reddish tinge is mentioned. Withering changed the name to *Hydnum barba-jovis*, the same was done by de Candolle (1805: 109) who called the species '*Hydnum barba Jovis*' and mainly repeated Bulliard's diagnosis.

When Fries (1821: 421) dealt with the species (as '*H. Barba Jovis*'), he referred the taxon to 'Bull. Ch. t. 481. f. 2. With. arr. IV. p. 337, and mentioned some other descrip-

tions. His text runs as follows: 'effusum, tomentosum, pallido-album, aculeis teretibus pubescentibus, apice aurantio-barbatis.' He has seen dried material and states about the colour, that the basidiocarp is 'junius album, dein flavo-rufescens.' In the index to volume one, the species is listed as '*HYDNUM Barba Jovis* Bull.'

This concept of Fries is obviously for a large part based on Bulliard's colour plate where the marginal parts of the basidiocarp are whitish, the central parts straw-coloured and only the fimbriate apices of the spines show a deeper, reddish brown colour. The same situation is found when dried material of *Hydnum barba-jovis* is examined under a binocular—and we should keep in mind that Fries at that time had seen dried specimens only. The basidiocarp is quite pale and only the hyphal fascicles at the apex of the spines show a deeper colour.

If our interpretation of *Hydnum barba-jovis* is based on Bulliard's plate and Fries' description of dried material, then I see no reason to exclude *H. barba-jovis* from *Hyphodontia*. We would continue a tradition which started very early and was only interrupted by comparatively few diverging interpretations which mainly go back to Bourdot & Galzin (1914, the description and notes are repeated without any changes or additions in 1928). These authors placed '*Hydnum barba-Jovi* Bull.' as a variety under *Acia stenodon*, a decision which is not acceptable for several reasons.

(i) The spines of *Acia stenodon* and of all other European species of the genus now called *Mycoacia* never develop long projecting hyphal fascicles. The apex is either smooth or only covered with very short, whitish hyphae, clearly contrasting in dried condition with the deeper coloured spines. Besides, these very short projecting hyphae were probably invisible to Bulliard who had only low-power lenses at his disposal. In every case, the dark coloured, elongated hyphal fascicles originating from a lighter coloured spine, as described by Fries and illustrated by Bulliard, is a character not known of *Mycoacia*.

(ii) Bourdot & Galzin (1914, 1928) described the marginal part of the basidiocarp to develop rigid, radiating fibrils which remain either adnate to the substrate or form ascending tufts of hyphae. At certain points these hyphal fascicles form even a tawny *Ozonium*-like structure. ('Vers la bordure ces faisceaux forment des fibres rigides, radiées, les unes ascendantes en touffes, les autres apprimées. En certains points, ces fibres forment un véritable *Ozonium* fulvescent.' 1914: 15). This also is a character not found in Bulliard's description or plate. On the contrary, the specimen depicted by Bulliard shows an entire margin without any tufts of hyphal fascicles.

Because of the conspicuous, penicillate spines and the absence of hyphal fascicles or hyphal tufts at the margin, Bourdot & Galzin's interpretation of *Hydnum barba-jovis* Bull.: Fr. is not acceptable. If we start now to compare the widely accepted concept of *Hyphodontia barba-jovis* with Fries' description and Bulliard's plate, then we will not find convincing evidence for Burdsall & Larsen's statement (1983: 515) 'that *H. barba-jovis* does not appear to represent a species of *Hyphodontia*.' On the contrary, we can see that a dried specimen of *Hyphodontia barba-jovis* (Bull.: Fr.) J. Erikss. agrees perfectly in shape and colour of the basidiocarp, as well as with the enlarged details of the apical part of the spines. The fruit-body is straw-coloured to pale ochraceous, the marginal part is often abruptly delimited and shows no hyphal fascicles or *Ozonium*-like

structures. The spines are conical, pale coloured, with deeper stained to reddish-brownish fibrils at their apex.

Therefore, there is no reason to abandon the hitherto widely accepted concept of *Hydnum barba-jovis* Bull.: Fr., nor is there any reason to accept Burdsall & Larsen's statement that *H. barba-jovis* is 'a species name which may well be representative of *Mycoacia* or *Steccherinum*' (l.c.: 514). I have compared the basidiocarps and especially the apical parts of the spines of all European taxa of *Mycoacia* and *Steccherinum* and found all of them to be devoid of the typical fibrillate apices so clearly illustrated by Bulliard. The spines of taxa of the two mentioned genera are clearly different and cannot be confused with Bulliard's species. The situation is illustrated on Plates 1 and 2, where the spines of different species of *Mycoacia*, *Steccherinum* and of *Hyphodontia barba-jovis* are shown.

Since Bourdot & Galzin's interpretation of *Hydnum barba-jovis* Bull.: Fr., as well as Burdsall & Larsen's proposal to remove the taxon from *Hyphodontia* (= *Grandinia*) are not acceptable, it seems necessary to stabilize the prevailing interpretation of *H. barba-jovis* by the designation of a neotype. This would also make unnecessary the adoption of *Kneiffia irpicoides* P. Karst. as a substitute for *Hydnum barba-jovis*. The name *Kneiffia irpicoides*, which Burdsall & Larsen (1983) transferred to *Hyphodontia*, is rather misleading, since the basidiocarp is not irpicoid; moreover, it has never been used. According to Bresadola (1897: 97) and Miller (1934: 23), *Kneiffia irpicoides* is a synonym of *Hydnum barba-jovis*, which again illustrates the long tradition in the use of the latter name.

### *Hydnum barba-jovis* Bull.: Fr.—Figs. 1, 2

*Hydnum barba-jovis* Bulliard, Hist. Champ. Fr. 1 (2): 303, pl. 481, fig. II D—E. 1791; Fries, Syst. Mycol. 1: 421. 1821.

Basidiocarp annual, resupinate, effused, totally adnate, at first rounded, later confluent, membranaceous, with homogeneous context; margin narrow, without rhizomorphs or hyphal strands. Hymenial surface odontoid with conical, about 1 mm long, apically penicillate teeth, young whitish, later cream-coloured to ochraceous; the fimbriate apices of the teeth often deeper coloured to reddish-brownish.

Hyphal system monomitic. Hyphae hyaline in the subhymenial part, hyaline to slightly yellowish in the subiculum, distinct, cylindrical, 2–4  $\mu\text{m}$  wide, somewhat thick-walled (up to 1  $\mu\text{m}$ ), with smooth surface; clamps always present. Cystidia numerous, especially in the apical part of the teeth, hyaline or somewhat yellowish in the basal part, cylindrical or flexuous to somewhat constricted, up to 300  $\times$  6–8  $\mu\text{m}$ , thick-walled (up to 1–2  $\mu\text{m}$ ), smooth, with a basal clamp and often with some secondary septa, projecting; contents homogeneous. Basidia hyaline, at first narrowly clavate, later suburniform, 14–18  $\times$  4–5.5  $\mu\text{m}$ , thin-walled, with a basal clamp and four, rarely two subulate sterigmata; contents homogeneous. Spores hyaline, subglobose when young, later broadly ellipsoid, thin-walled, smooth, 4.5–6(–6.5)  $\times$  3.5–4(–4.3)  $\mu\text{m}$ , with small apiculus; contents homogeneous or 1-guttulate; the spore wall neither amyloid, nor dextrinoid, nor cyanophilous.

Habitat.—On wood or bark of a deciduous tree.



Neotype specimen.—France, SW. of Paris, Forêt d'Ecouves, 17.IX.1952, *M. A. Donk 11.138* (L 980.40-137).

#### SPECIMENS EXAMINED

*Hydnum barba-jovis*: France, Forêt d'Ecouves, 17.IX.1952, *M. A. Donk 11.138* (neotype, L; Figs. 1b, c, 2a, b). — Sweden, Dalarna, Norrbäcke parish, Smedjebacken, 30.VII. 1937, *K. G. Ridehius* (Lundell & Nannfeldt, Fung. exs. suec. 1018; L; Fig. 2c).

*Mycoacia aurea*: Austria, Kärnten, near Rosegg, 20.VII.1931, *J. Tobisch* (W; Fig. 3b, d).

*Mycoacia fusco-atra*: Sweden, S. of Stockholm, 5.X.1970, *W. Jülich* (herb. Jülich; Fig. 4a, b).

*Mycoacia uda*: Great Britain, England, Northumberland, Whitefriars Wood, 23.IX.1971, *M. A. Donk* (L; Fig. 3a, c).

*Steccherinum fimbriatum*: Denmark, Bornholm, Døndalen, 12.X.1964, *M. A. Donk* (L; Fig. 5c, d).

*Steccherinum laeticolor*: Federal Republic of Germany, Baden, Bodman, Bodensee, 26.VIII. 1973, *O. Baral* (L; Fig. 4c, d).

*Steccherinum ochraceum*: The Netherlands, Noord-Brabant, Oisterwijk, Staalbergven, IX.1962, *M. A. Donk* (L; Fig. 5a, b).

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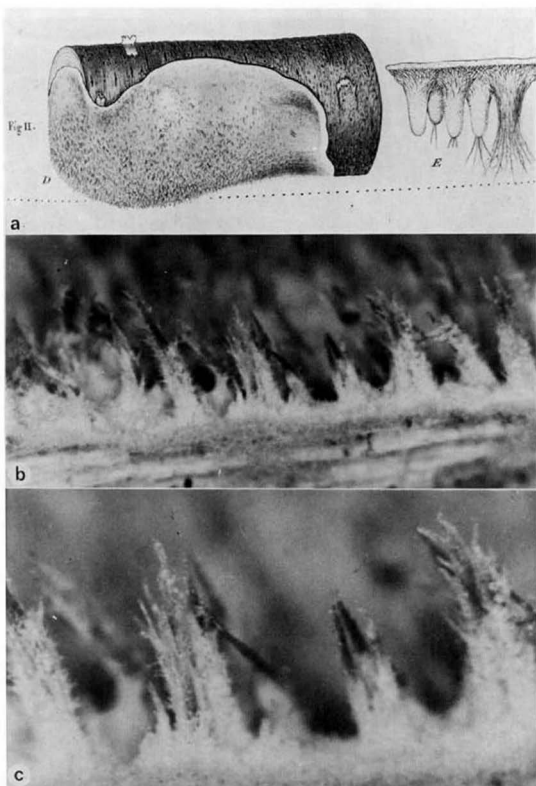


Fig. 1. *Hydnum barba-jovis*. — a. From Bulliard (1791: pl. 481, fig. II, reduced). — b, c. Neotype, from France (b  $\times$  38, c  $\times$  70).

*Neotygea sparsa* (Fr.) — France, SW. of Paris, Trudy (Luzon), 17 Dec 1969  
(M. J. Donk 22/30) (L 950/46147)



Fig. 2. *Hydnum barba-jovis*. — a, b. Neotype, from France ( $\times 120$ ). — From Sweden ( $\times 120$ ).

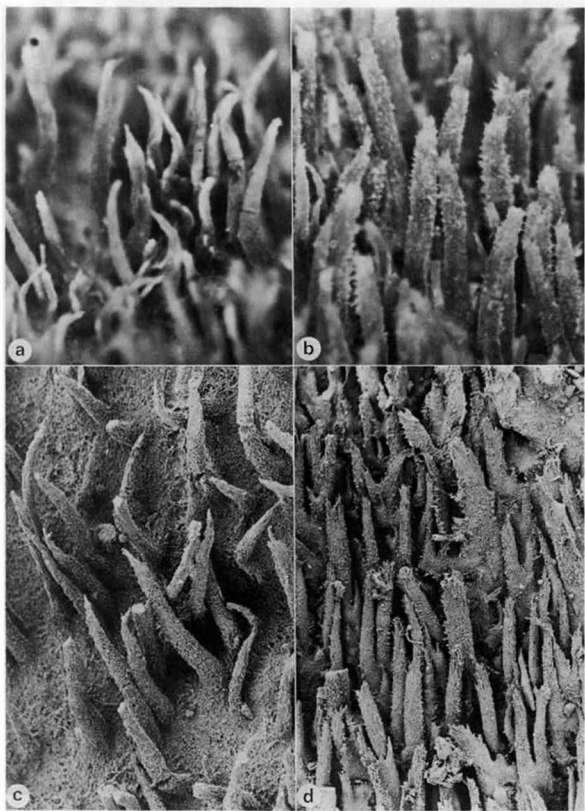


Fig. 3. a, c. *Mycoacia uda* (a  $\times 38$ , c  $\times 57$ ). — b, d. *M. aurea* (b  $\times 38$ , d  $\times 26$ ).

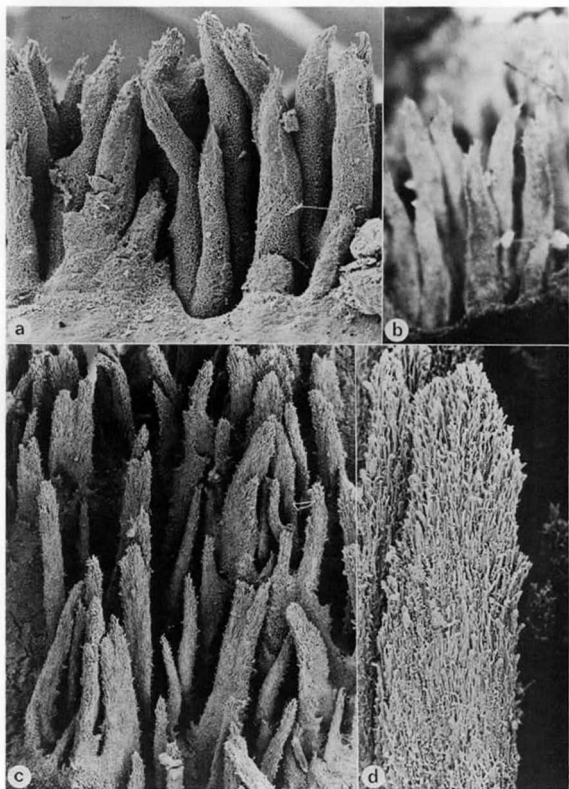


Fig. 4. a, b. *Mycoacia fusco-atra* (a  $\times 41$ , b  $\times 38$ ). — c, d. *Steccherinum laeticolor* (c  $\times 26$ , d  $\times 120$ ).

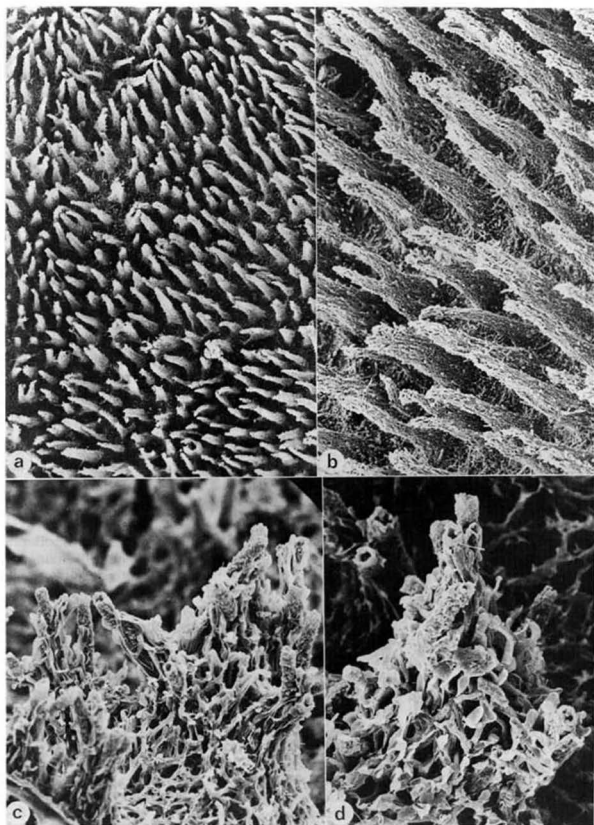


Fig. 5. a, b. *Steccherinum ochraceum* (a  $\times 26$ , b  $\times 28$ ). — c, d. *S. fimbriatum* (c  $\times 380$ , d  $\times 620$ ).

## ON TULASNELLA CYSTIDIOPHORA

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Type material of *Tulasnella cystidiophora* Höhn. & Litsch. has been studied. The species is characterized by often moniliform gloeocystidia and clamp-less hyphae (at least in the subhymenium).

When von Höhnelt & Litschauer (1907) studied Karsten's taxa from the Helsinki herbarium, they found that a specimen filed under the name *Prototremella tulasnei* Pat. did not belong to that species but to a new taxon which they called *Tulasnella cystidiophora* Höhn. & Litsch. This species seems to be rare, it was found only by a few European specialists (Bourdot & Galzin, 1928; Pearson, 1928) and is not yet well understood.

Recently a British specimen of a gloeocystidiate *Tulasnella*, possibly representing *T. cystidiophora*, was sent for identification. Since the available descriptions did not allow a designation with certainty, the type material was studied. A description and figures are given here which should make future identification of the taxon easier.

***Tulasnella cystidiophora* Höhnelt & Litsch. — Fig. 1, 2**

*Tulasnella cystidiophora* Höhnelt & Litsch. in Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. I, 155: 1557. 1907.

Misapplied name. — *Prototremella tulasnei* Pat. sensu P. Karst. in *Hedwigia* 35: 45. 1896.

Basidiocarp annual, resupinate, effused, up to 1–2 cm large, adnate, ceraceous when dry, context homogeneous, margin thinning out, indistinct, rhizomorphs or hyphal strands lacking. Hymenial surface even, not cracked when dry. Thin specimens are pale yellowish brownish and almost invisible when dry, thicker specimens are darker brownish to blackish and then somewhat visible. Hyphal system monomitic. Hyphae hyaline, cylindrical or in the subhymenium often slightly inflated and rather densely arranged, branching often near the septa, thin- to somewhat thick-walled (0.2–0.6  $\mu\text{m}$ ), 3–5(–10)  $\mu\text{m}$  wide, with smooth surface; clamps absent in the subhymenium, probably also absent in the subiculum; septa show prominent dolipores; contents of the hyphae homogeneous. Gloeocystidia present, abundant, of hymenial to subhymenial origin, with hyaline walls, clavate when young, later moniliform or of irregular shape, 30–72  $\times$  5–10  $\mu\text{m}$ , thin-walled throughout or the basal part somewhat thick-walled (0.2–0.4  $\mu\text{m}$ ), smooth, always without a basal clamp, enclosed or projecting; contents pale yellowish (type) or hyaline, homogeneous (type) or guttulate. Basidia hyaline, broadly clavate when mature, 12–18  $\times$  8–10  $\mu\text{m}$ , thin-walled, smooth, four-spored; basal clamp always lacking; contents homogeneous or slightly guttulate. Epibasidia ellipsoid, slightly guttulate, 8–10  $\times$  5.5–6.5  $\mu\text{m}$ , finally growing out to a short and conical or tubular (up to 20  $\times$  2  $\mu\text{m}$ ) upper part. Spores hyaline, broadly ellipsoid when mature, subglobose when young, thin-walled, smooth, 5.5–6.5(–7)  $\times$  5.5–6  $\mu\text{m}$ , with distinct apiculus, contents homogene-

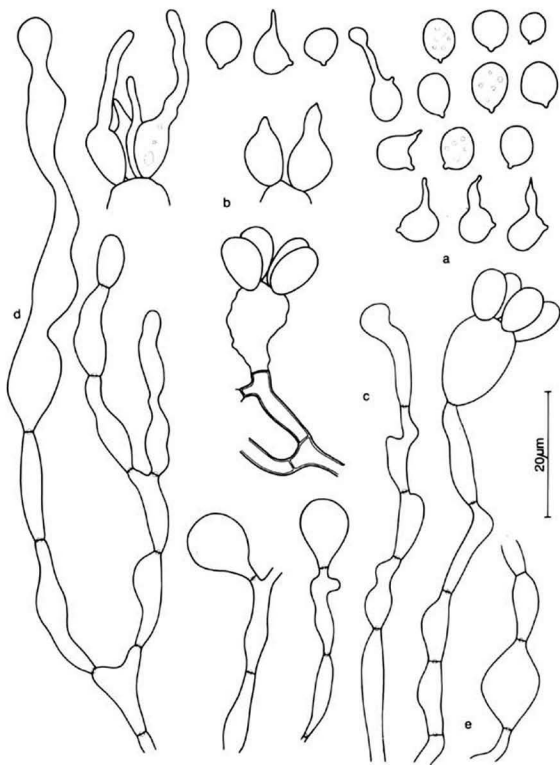


Fig. 1. *Tulasnella cystidiophora* (type). — a. Spores. — b. Epibasidia. — c. Basidia. — d. Gloeocystidia. — e. Hyphae with dolipores.



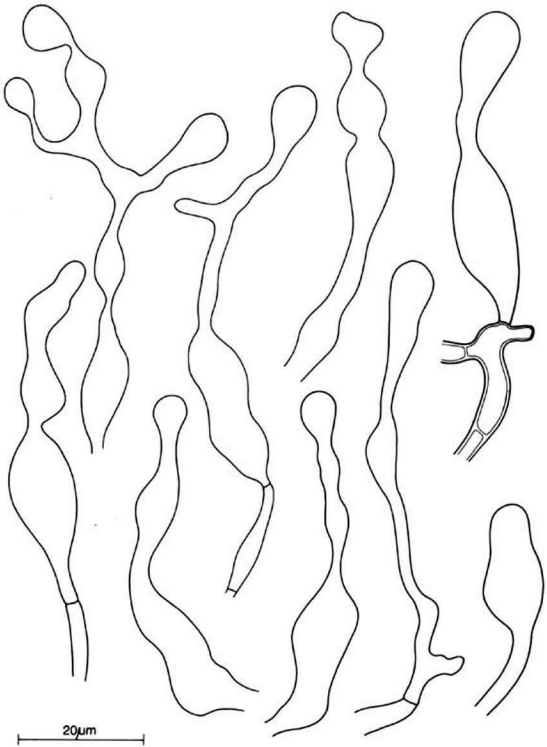


Fig. 2. *Tulasnella cystidiophora* (type), gloeocystidia.

ous or slightly guttulate or somewhat granular; the walls neither amyloid, dextrinoid nor cyanophilous.

*Habitat*.—Saprophytic on wood or bark of trees.

*Distribution in Europe*.—Finland, France, Great-Britain.

*Material studied*.—Finland, 'Mustiala in cortice interiore Populi, Oct. 1895', P. A. Karsten (type, H).

According to Karsten's publication (Karsten, 1896: 45) the specimen grew on bark of *Salix phylicaeifolia*, which seems to be an error because in Karsten's herbarium the substrate is given as bark of *Populus*, a fact already pointed out by von Höhnelt & Litschauer (1907).

The most conspicuous character of this species is the presence of moniliform gloeocystidia whose contents are slightly yellowish, a feature only visible in unstained preparations. Whether or not these gloeocystidia are always yellow is difficult to decide without a larger number of specimens. Another character is still not well known, viz. the presence or absence of clamps. According to von Höhnelt & Litschauer and most subsequent authors dealing with this species, clamps are rare. But my own studies have not shown any clamps on hyphae definitely belonging to *Tulasnella cystidiophora*. Basidia, gloeocystidia, and subhymenial hyphae are invariably devoid of clamps and so are most hyphae from the subiculum. Close to the substrate are some hyphae with clamp connections, but I could not make sure that these hyphae really belonged to the *Tulasnella* species. In this group of fungi with barely visible, very thin basidiocarps, one often finds hyphae of other fungal taxa growing on the same spot and between the hyphae of the main fungus. It is therefore not always possible to differentiate between these taxa, especially when colour, shape, and size of the hyphae is very similar. No clamps were found on subhymenial hyphae and on those subicular hyphae clearly belonging to *Tulasnella cystidiophora* because they produced the typical basidia or gloeocystidia of that species. Therefore one can safely state that clamps are either completely absent or occur only rarely on subicular hyphae.

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## AN UNDESCRIBED SPECIES OF AMANITA SECTION LEPIDELLA FROM JAPAN

C. BAS\* &amp; S.-I. HATANAKA\*\*

*Amanita miculifera*, spec. nov., belonging to *Amanita* section *Lepidella* subsection *Solitariae* and resembling the North American *A. omusta* is described from central Japan where it was found under *Abies*.

A rather large, deeply rooting, pale grey *Amanita* with small much darker grey volval warts and crumbs on the pileus and a lanose-floccose partial veil falling apart was found in the middle of Japan and was subjected to chemical analyses by the second author and his colleagues. Material of it was sent for identification to the first author, who in the beginning thought it to represent a luxuriant form of *A. omusta*, a species known thus far only from eastern North America. Careful examination, however, revealed quite a few differences which together warrant the description of the Japanese fungus as a species in its own right.

*Amanita miculifera* Bas & Hatanaka, sp. nov. — Figs. 1-4

Pileus c. 70-120 mm latus, conicus vel plano-conicus, margine laevis appendiculatusque, pallide griseus, fragmentis volvae griseis, verruciformibus vel miculiformibus ornatus; verrucae volvae apice albae. Lamellae liberae, confertae, angustae, albae vel albae; lamellulae attenuatae. Stipes c. 140-240 × 15-25 mm, bulbo ventricoso, profunde radicans, exannulatus, albidus vel griseolus, fragmentis volvae inconspicuis. Velum parziale album vel albedo-griseolum, floccoso-lanosum, friabile. Sporae 10-12.5 × 6.5-8 μm, late ellipsoideae vel oblongo-ellipsoideae, amyloideae. Fragmenta volvae cellulis globosis vel clavatis, 25-80 × 20-80 μm, terminalibus vel subcatenulatis, inconditis vel suberectis composita. Fibulae praesentes. Typus: 'S.-I. Hatanaka, 26.VIII.1975, Karuizawa, Nagano Prefecture, Honshu, Japan' (L).

E t y m o l o g y: micula, small crumb; -fer, carrying.

Pileus 70-120 mm, conical with obtuse apex to plano-conical, with inflexed, non-sulcate, (at first rather strongly) appendiculate margin, pearl grey (whitish-greyish, Munsell c. 10 YR 8/1 slightly tending towards 7.5 YR 8/0, Methuen between 1A1 and 1B1), probably subviscid, decorated at centre with small and low subpyramidal volval warts with moderately dark grey base (Munsell 7.5 YR 6/2-5/2) and pale apex, towards margin passing gradually into small moderately dark grey volval crumbs or, near outer margin, thin, subfelted-subflocculose disintegrating patches. Lamellae free, crowded, rather narrow, whitish or white, with edges greyish or whitish pulverulent at first; lamellulae very gradually attenuate. Stipe 140-240 mm long (inclusive of pseudorrhiza) and 15-25 mm thick, subcylindrical with ventricose-bulbose, 35-40 mm thick, strongly rooting

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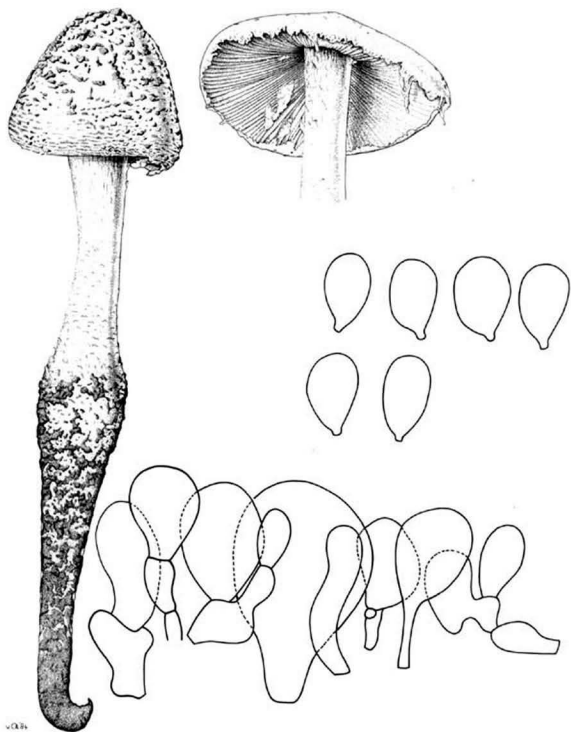


Fig. 1. *Amanita miculifera*. — Habit ( $\times 0.5$ ), spores ( $\times 1500$ ), and marginal tissue of lamella ( $\times 1000$ ). (All figs. from type.)

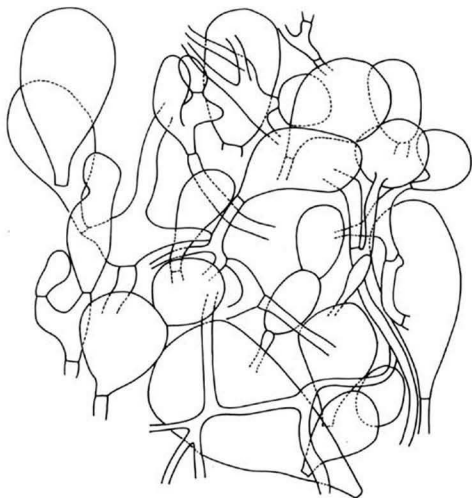


Fig. 2. *Amanita miculifera*. — Tissue of volval wart from near centre of pileus of type ( $\times 500$ ).

base (pseudorrhiza about as long or slightly longer than bulb and part of stipe above bulb together), probably solid, exannulate, greyish-whitish to pale grey, upper c. 30–40 mm whitish floccose-lanose from partial veil, lower down appressedly subfelted-subtomentose to somewhat pale grey flocculose-subsquamulose, with inconspicuous floccose-felted remnants of volva only here and there provoking formation of small recurving scales on upper part of bulb. Partial veil incoherent, whitish to greyish whitish, lanose-floccose, at first forming rags at edge of pileus and on apex of stipe, later practically disappearing, probably never forming an annulus. Characters of context, smell, taste and spore print not recorded.

Spores [20/1] (9.0–)10–12.5(–13.5)  $\times$  (6.0–)6.5–8  $\mu\text{m}$ , Q (1.2–)1.3–1.8, average Q 1.6, broadly ellipsoid, ellipsoid or oblong-ellipsoid, thin-walled, colourless, with relatively large and broad apiculus, amyloid. Basidia c. 45–60  $\times$  8.5–12  $\mu\text{m}$ , 4-spored (but quite a few irregularly shaped), with distinct clamp. Marginal tissue a rather narrow sterile strip of rather small, narrowly to broadly clavate, thin-walled, colourless cells, 12–36 (–48)  $\times$  6.5–17.5(–32)  $\mu\text{m}$ , partly in short chains and then second cell much smaller than top-cell. Hymenophoral trama bilateral with scarce acrophysalides; most larger inflated elements (e.g. 70  $\times$  15  $\mu\text{m}$ ) connected with subhymenium; with scarce oleiferous

hyphae; subhymenium c. 15–20  $\mu\text{m}$  thick, (still?) densely ramose. Pileipellis made up of a 140–180  $\mu\text{m}$  wide gelatinized suprapellis and a greyish non-gelatinized subpellis with abundant oleiferous hyphae. Volval warts on pileus consisting of abundant ellipsoid, ovoid, piriform, clavate and fairly abundant (sub)globose cells, 25–80(–95)  $\times$  20–80  $\mu\text{m}$ , single or in rows of two on fairly abundant broad-celled, branching hyphae, 4–15  $\mu\text{m}$  wide; elements irregularly disposed but rows and elongate cells often in a more or less erect position; inflated cells fairly dark brown in lower part to almost colourless in upper part of warts. Trama of stipe acrophysalidic; cells up to 45  $\mu\text{m}$  wide and up to 410  $\mu\text{m}$  long observed; with scarce oleiferous hyphae. Clamps present.

**Habitat & distribution.**—Under *Abies homolepis* at 1000 m alt. Known only from the type-locality in Central Japan.

**Collections examined.**—Japan, Honshu, Nagano Prefecture, Karuizawa, 26 Aug. 1975 (type, L), 26 Aug.–6 Sept. 1976 (L), 12 Oct. 1976 (TNS: F 198224, F 198225), all leg. *S.-I. Hatanaka* L.

The macroscopic description above is based on a series of excellent, very detailed colour photographs and observations on the well-dried specimens.

*Amanita miculifera* is rather closely related to *A. onusta* (Howe) Sacc. from eastern and north-eastern North America (see Bas, 1959: 428). Just as the latter species it has a grey, friable volva forming warts on the pileus, an incoherent, lanose-floccose, finally disappearing partial veil, clamped basidia and in addition it has spores of about the same size and with the same length-width ratio.

Nevertheless, the outward appearance of *A. miculifera* is rather different from that of *A. onusta*. Besides in the somewhat larger size, the more conical pileus and the more prominent pseudorrhiza, the reasons for this difference are to be found mainly in the properties of the volva:

1. The volval layer of *A. miculifera* is thinner than that in *A. onusta* and therefore the volval warts on the pileus are smaller and less prominent and do not give an echinate look to the pileus.

2. The volval layer of *A. miculifera* consists, at least at the centre of the pileus, of a grey inner layer and a paler to almost whitish outer layer; accordingly the volval warts have a grey base and a pale apex. Under the microscope the inflated cells of the volva of *A. onusta* are darker than those of *A. miculifera* and are just as dark or even darker in the tips of the volval warts.

3. The arrangement of the elements in the volva of *A. miculifera* is quite irregular (see Fig. 2) and the inflated cells are not arranged in rather long, parallel, erect rows as in *A. onusta* (see Bas, 1969: fig. 157); consequently the volval warts are not so neatly conical as those in *A. onusta*.

4. The volval remnants at the base of the stipe of *A. miculifera* are inconspicuous and white to whitish and do not or hardly form recurving scales, whereas in *A. onusta* the coloured volval warts and/or scales at the base of the stipe are very characteristic.

In the key to the stirps of subsection *Solitariae* of *Amanita* section *Lepidella* published by Bas (1969: 386), *A. miculifera* does not key out with *A. onusta* in stirps *Microlepis*, but in stirps *Virgineoides* which has to be emended in order to include also species with a coloured volva.

Paper chromatographic survey revealed a specific pattern of non-protein amino acids in *A. miculifera* and two closely related new amino acids have been isolated and characterized. These results will be published in the near future.

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## NOTES ON CUP-FUNGI—2

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The coprophilous *Lasiobolus monascus* Kimbr. is described from specimens of Papua New Guinea and France. The pyrophilous *Lachnea brunneola* Rehm is described from recent Bavarian material and the type specimen. For this species the new name *Anthracobia rehmi* Brumm. is proposed.

*Lasiobolus monascus* Kimbr. — Figs. 1, 2

*Lasiobolus monascus* Kimbrough in Mycologia 66: 909. 1974.

Apothecia solitary or in small groups, superficial, sessile on a narrow base, 0.2–0.3 mm diam., 0.4–0.6 mm high. Receptacle at first pyriform with an inconspicuous opening at the top, then more elongated, becoming flask-shaped to subcylindrical, almost pure white; surface covered with isolated colourless hairs; margin not differentiated. Hymenium with a single ascus only. Hypothecium not clearly differentiated, consisting of only a few relatively thick-walled subglobular cells 9–14(–18)  $\mu\text{m}$  wide. Flesh not differentiated. Excipulum near the base 35–90  $\mu\text{m}$  thick, at the margin 6–12  $\mu\text{m}$  wide, hyaline, consisting of rounded and subangular cells 5–32  $\times$  4–28  $\mu\text{m}$  (textura globularis or angularis). Hairs rather superficial, arising from the two outermost layers of excipular cells, single, up to 2-septate, straight, thick-walled (1–4.5  $\mu\text{m}$ ), 80–190  $\mu\text{m}$  long, near the base often swollen 7–12(–22)  $\mu\text{m}$  wide, with acuminate apices, often slightly roughened in the terminal half. Asci ellipsoid to subpyriform without a stalk, forced to open by a more or less round operculum at the top, rather thick-walled (c. 2  $\mu\text{m}$  near the base, reaching 8  $\mu\text{m}$  at the top) (210–)270–370  $\times$  (115–)170–220  $\mu\text{m}$ , with more than 1000 spores, not blue in Melzer's reagent, with a conspicuous rimmed plug near the base (4–5.5  $\mu\text{m}$ , with rim up to 16–18  $\mu\text{m}$  diam.). Ascospores arranged in a large subovoid cluster, ellipsoid (length/width ratio (1.6–)1.7–1.9(–2.0), average 1.8), hyaline, very variable in size, (6.5–)7.5–13.0(–16.0)  $\times$  (3.7–)4.5–7.0(–8.8)  $\mu\text{m}$ , without oil globules, thin-walled, smooth. Paraphyses rather scarce, septate, slender filiform, sparsely branched, hyaline, 1.6–2.0  $\mu\text{m}$  thick, not enlarged at the tip, not embedded in mucus. Mycelium of hyaline hyphae 1.8–5.0  $\mu\text{m}$  wide, straight or curved, branching.

**Habitat.**—On dung of porcupine and rabbit.

**Specimens examined.**—PAPUA NEW GUINEA, Mt. Suckling, on porcupine dung, 6.IX.1972, *van Brummelen 3563* (L). —FRANCE, La Sarthe, Fontaines Chauds, near Epau, S. of Le Mans, on rabbit dung, 2.III.1984, *van Brummelen 7167* (L).

This species with very small and inconspicuous fruit-bodies has only rarely been collected. So far it is only known from Gainesville (U.S.A.), Mount Suckling (Papua New Guinea), and Le Mans (France). Despite its rarity, the structure of this species is exceptionally well known. Its anatomy, development, and cytology were studied by Kim-



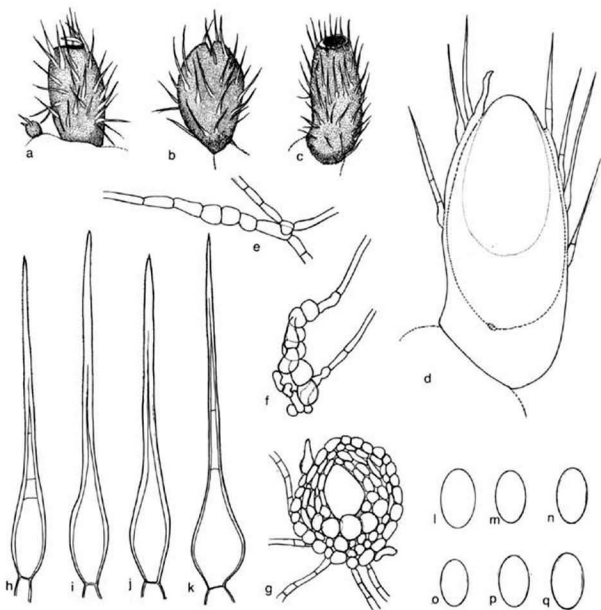


Fig. 1. *Lasiobolus monascus*. — a-c. Habit of fruit-bodies  $\times 63$ . — d. Diagrammatic section of fruit-body  $\times 160$ . — e, f. Antheridia and ascogonia  $\times 400$ . — g. Young fruit-body in section. — h-k. Hairs  $\times 400$ . — l-q. Ascospores  $\times 1600$ . (All from van Brummelen 7167.)

brough (1966), its ultrastructure by Merkus (1976), van Brummelen (1978), and Kimbrough & Benny (1978).

Thus far it is the only species of the genus *Lasiobolus* Sacc. known to have multi-spored, uniascal fruit-bodies (Bezerra & Kimbrough, 1975).

While the hairs in other species of *Lasiobolus* are non-septate, part of the hairs in *L. monascus* shows one or two septa. Although hairs without septa are more frequent in the upper part of the fruit-body, these are very similar to those with one or two septa and should not be considered a separate type, as proposed by Kimbrough (1966).

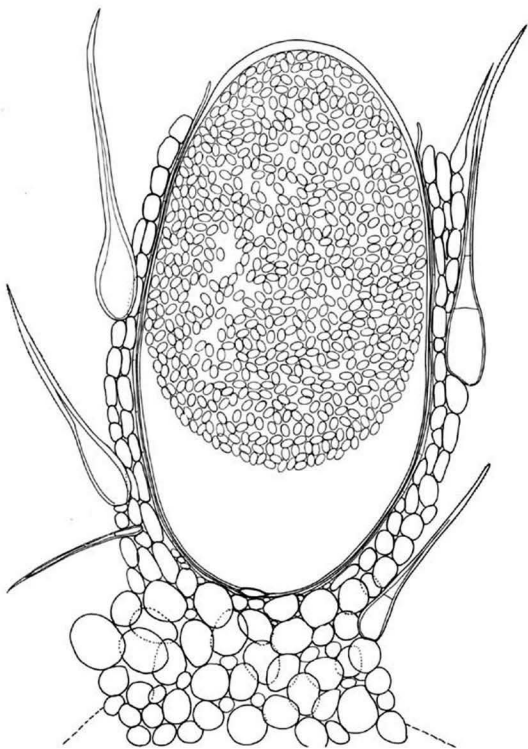


Fig. 2. *Lasiobolus monascus*, median section of fruit-body  $\times 400$  (from van Brummelen 7167.)

Near the base of the fruit-body small, some unswollen hairs without orientation may occur. These probably represent a transition between the seta-like hairs and the anchoring hyphae.

The excipular hairs and the asci in *Lasiobolus monascus* agree well in shape and structure with those in other species of *Lasiobolus*.

Other genera of the Thelebolaceae with pilose fruit-bodies are *Trichobolus* (Sacc.) Kimbr. & Cain apud Kimbr. & Korf, *Mycoarctium* Jain & Cain, and *Lasiothelebolus* Kimbr. & Luck-Allen.

In *Trichobolus* the hairs are straight, stiff, pointed, septate, thick-walled, and not swollen near the base; the asci are thick-walled, multi-spored, and opening irregularly without operculum.

In *Mycoarctium* the hairs are straight, rather flexuous, pointed, septate, thick-walled, with coiled or hooked apex; the asci are thick-walled, 8-spored, and opening without operculum.

In *Lasiothelebolus*, a genus which according to its name and the combination of characters might also accommodate the present species, marginal hairs are of a unique structure. These hairs are blunt, septate, hyaline above, yellow below, and enlarged to 7–8  $\mu\text{m}$  diameter, measuring 15–20  $\mu\text{m}$  long. In *Lasiothelebolus oblongisporus* Kimbr. & Luck-Allen, the only species of the genus known till now, the hairs 'appear to deliquesce at the apices' and 'are different from those described by Eckblad and from any that the authors have seen described' (Kimbrough & Luck-Allen, 1974). However, the detailed photomicrograph of these hairs (l.c.: fig. 3) clearly reveals their true nature. This figure shows ampulliform phialids with a long cylindrical collarette and an ellipsoid venter at the base. Also cylindrical enteroblastic-phialidic conidia, responsible for the 'septation', can be observed. Phialids and conidia of this type are e.g. characteristic of several species of the genus *Chalara* (Corda) Rabenh. (cf. Nag Raj & Kendrick, 1975).

Since *Lasiothelebolus* seems to be based on a mixture of an eight-spored species of *Thelebolus* Tode and a phialidic anamorph of another fungus, it is not necessary to consider it further for eventual accommodation of *Lasiobolus monascus*.

The wide range of variation of the size of the ascospores in *L. monascus* is mainly a consequence of the variable number of spores formed in a single ascus. This number can vary from about 1000 to over 4000. Besides, the number of postmeiotic mitoses within the single ascus can be different in adjoining regions of the same spore-cluster. This results in different spore-sizes in the same ascus, as could be established in the material of Le Mans.

#### *Anthracobia rehmii* Brumm., *nom. nov.* — Figs. 3–5

*Lachnea brunneola* Rehm, Rabenh. Kryptog.-Fl. (Pilze) 3: 1048. 1895 (replaced synonym); not *Lachnea brunneola* (Desm.) Gill, Champ. France, Discomycètes 67. 1880. — Holotype: G. Winter, Gr.-Winterberg, Saxonia, Germany, end of VIII. 1891 (S).

Apothecia gregarious or closely crowded, superficial, sessile on a broad base, 2–5 mm diam., about 2 mm high. Receptacle at first globular and apparently closed, then

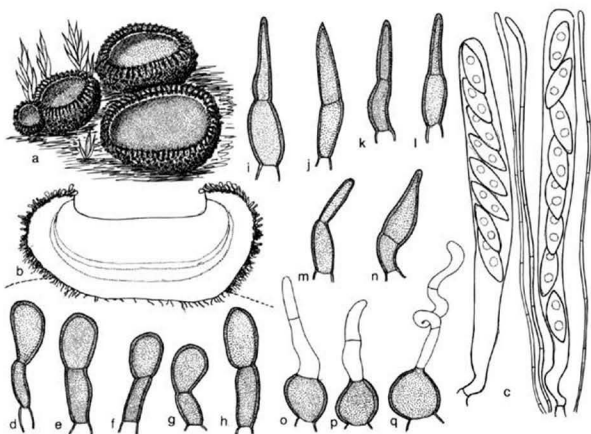


Fig. 3. *Anthracobia rehmi*. — a. Habit of fruit-bodies  $\times 10$ . — b. Diagrammatic section of young fruit-body  $\times 40$ . — c. Asci and paraphyses  $\times 400$ . — d-h. Marginal hairs  $\times 400$ . — i-n. Lateral hairs  $\times 400$ . — o-q. Rhizoidal hairs  $\times 400$ . (a-c. From Hanff, IX-X.1983. — d-q. From holotype.)

cup-shaped and expanding, becoming saucer-shaped, pale brown; consistency fleshy; surface covered with tufts and rows of dark brown hairs; margin slightly enrolled at first, densely clothed with vertical rows of brown hairs. Disc concave, even, pale yellowish brown. Hymenium about  $250 \mu\text{m}$  thick. Hypothecium not very compact,  $15\text{--}25 \mu\text{m}$  thick, of thin-walled hyphae  $2\text{--}5 \mu\text{m}$  wide and isodiametric cells up to  $9 \mu\text{m}$  across. Flesh  $30\text{--}50 \mu\text{m}$  thick of intermingled thin-walled hyphae  $3.5\text{--}7 \mu\text{m}$  wide (textura intricata). Excipulum clearly differentiated, near the base  $90\text{--}200 \mu\text{m}$  thick, at the margin up to  $50 \mu\text{m}$  wide, brownish by intercellular pigment, consisting of large polyhedral cells  $15\text{--}46 \mu\text{m}$  diam. (textura angularis, towards the surface textura globulosa). Hairs of three different types. Marginal excipular elements ending in terminally inflated, short, 1-3-celled, dark-walled hairs  $30\text{--}55 \times 11\text{--}20 \mu\text{m}$ . Lateral 2-4-celled, dark-walled hairs  $35\text{--}75 \times 10\text{--}15 \mu\text{m}$ , usually ending in a narrow blunt tip, arranged in rows or tufts together with thick-walled brown cells  $15\text{--}26 \times 15\text{--}18 \mu\text{m}$ . Many long, twisting, septate, hyaline, rhizoidal hairs  $7\text{--}19 \mu\text{m}$  wide, at the base of the fruit-body. Asci cylindrical-clavate, narrower towards the base, rounded above,  $180\text{--}240 \times 15\text{--}19 \mu\text{m}$ , 8-spored; the wall not staining blue with iodine. Ascospores obliquely monostichous, fusiform with pointed ends (length/width ratio 2.3-3.2, average 3.0), hyaline,  $(19.0\text{--})25.0\text{--}29.0$  ( $-34.5$ )  $\times$   $(6.5\text{--})9.0\text{--}11.0$  ( $-12.0$ )  $\mu\text{m}$ , with 1 or usually 2 oil globules, smooth. Paraphyses rather frequent, septate, filiform, sparsely branched, pale brownish, c.  $2 \mu\text{m}$  thick, slightly enlarged up to  $3.5 \mu\text{m}$  at the tip, not embedded in mucus.

**Habitat.**—On burnt ground.

**Etymology.**—After Dr. Heinrich Rehm, the famous Bavarian physician and mycologist who first described this species with a name unacceptable under the present International Code of Botanical Nomenclature.

**Specimens examined.**—GERMAN FEDERAL REPUBLIC: Bavaria, Kreis Coburg, Rottenbach, on about six till twelve months old burnt ground among mosses and on hymenium and rhizoids of fruit-bodies of *Rhizina undulata* Fr.: Fr., 17.IX-14.X.1983, B. Hanff s.n. (L). — GERMAN DEMOCRATIC REPUBLIC: Saxonia, Gr.-Winterberg, on burnt ground, end of VIII.1891, G. Winter s.n. (holotype, Herb. Rehm, S).

This species, which was kindly sent to me by Mr. B. Hanff, is characterized by its short, blunt, brown hairs arranged in tufts or rows, its large smooth, fusiform, guttulate ascospores, and its habitat.

It is a typical representative of the genus *Anthracobia* Boud. and was described by Rehm (1895) as *Lachnea brunneola* Rehm. Apparently it is very rare, as it has not been recorded since.

Moser (1963) placed it with doubt in the synonymy of *Anthracobia maurilabra* (Cooke) Boud., but this species has a different colour and smaller, ellipsoid ascospores.

*Lachnea brunneola* Rehm is a later homonym of *Lachnea brunneola* (Desm.) Gill. — a synonym of *Dasyscyphus fuscescens* (Pers.: Fr.) Rehm (fide Dennis, 1949: 37). According to the 'Sydney Code', Arts. 64.1 and 72.1, *L. brunneola* Rehm is illegitimate and the taxon is in need of a new name. Apparently, no synonym is available. Therefore the new name *Anthracobia rehmii* Brumm. is chosen to replace *L. brunneola* Rehm.

I am greatly indebted to the authorities of the herbarium at Stockholm (S) for the loan of material and to Mr. B. Hanff for sending a fine collection of *Anthracobia rehmii*.

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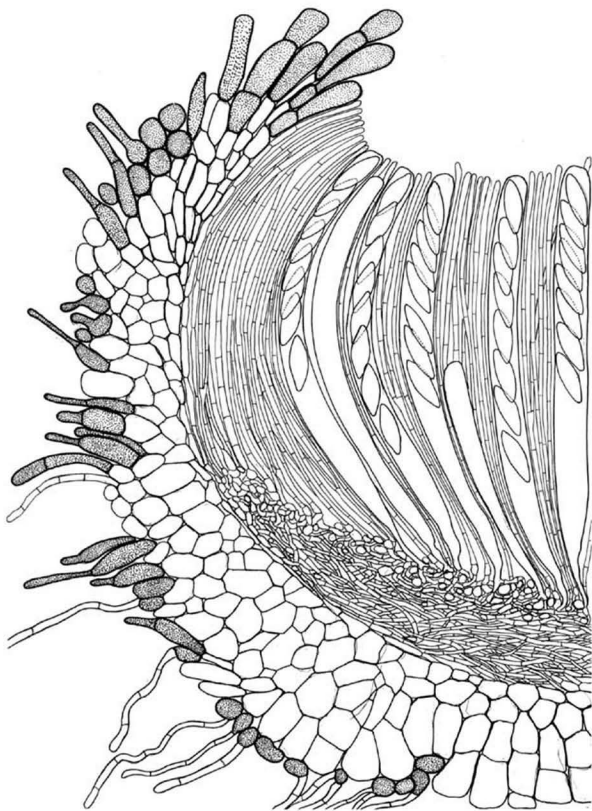


Fig. 4. *Anthracobia rehmlii*, median section of margin of fruit-body  $\times 400$  (from coll. Hanff).

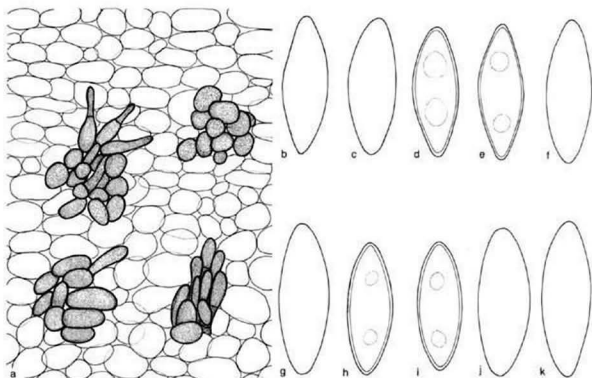


Fig. 5. *Anthracobia rehmi*. — a. Texture of excipulum seen from outside  $\times 250$ . — b-k. Ascospores  $\times 1000$ . (a-e. From Hanff, IX-X.1983. — f-k. From holotype.)

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## BOOKS RECEIVED BY THE RIJKSHERBARIUM LIBRARY

G. W. Martin & C. J. Alexopoulos & M. L. Farr, *The genera of Myxomycetes*. (University of Iowa Press, Iowa City. 1983.) Pp. XI + 102, 41 Col. Pls. Price: US \$ 35.-.

The present work represents an abridged, updated version of the Martin & Alexopoulos monograph 'The Myxomycetes' of 1969, omitting all taxonomic information on subgeneric taxa of the text. The introductory chapters are supplemented by the results of investigations since 1969. In the taxonomic part three families and two genera, described as new since 1969, are accepted. The 41 coloured plates, representing 367 species of Myxomycetes, are the same as those of the monograph. Typography and binding are up to the same high standard.

S. Nilson (Editor) (Authors: A. Käärik, J. Keller, E. Kiffer, J. Perreau & O. Reisinger). *Atlas of airborne fungal spores in Europe*. (Springer Verlag, Heidelberg. 1983.) Pp. 139, 10 Text-figs., 87 Pls. Price: US \$ 55.20.

After a short introduction, dealing with methods, terminology and life cycles, the main part of this atlas consists of 87 plates with short descriptions of the spores or conidia illustrated. Each plate is devoted to a single species and shows at least a scanning electron micrograph (SEM), usually also a light micrograph, and in a few cases even a transmission electron micrograph (TEM) of a thin section or a carbon replica of airborne fungal spores or conidia. Many of the spores are illustrated here with SEM or TEM for the first time. The choice of species is such that the morphology and the ultrastructure of spores from most major taxonomic groups of fungi (incl. Myxomycota) are represented.

It is a valuable source of information for those who are studying the dispersal of fungal spores in the air, like airobiologists, phytopathologists, medical mycologists, or allergologists.

P. Heinemann & J. Rammeloo. *Gyrodontaceae p.o. (Boletineae)*. (Flore illustrée des champignons d'Afrique centrale 10. Jardin Botanique National de Belgique, Meise. 1983.) Pp. 26, 23 Text-figs., 1 Black and white Pl., 3 Col. Pls. Price: B. Frs. 550.-.

Another fascicle of this well-known illustrated flora of the fungi of central Africa, successor of the 'Flore iconographique des Champignons du Congo'.

Keys and full descriptions are given to the central African representatives of the Gyrodontaceae (minus *Phlebopus*, treated already in fascicle 7 of the same work), viz. *Gyrodon* (6 spp.), *Pseudogyrodon* (1 sp.), *Gyroporus* (3 spp.), *Rubinoboletus* (7 spp.), and *Setogyroporus* (1 sp.). Seven of the species included are pictured in colour; microscopic characters are illustrated in the text-figures, and on the black & white plate.

An English key to all central African members of the Gyrodontaceae is added.



W. Jülich. *Die Nichtblätterpilze, Gallertpilze und Bauchpilze. Aphylophorales, Heterobasidiomycetes, Gastromycetes.* (Kleine Kryptogamenflora. Band IIb/1. Fischer Verlag: Stuttgart. 1984.) Pp. IX + 626, 175 Text-figs. Price: DM 88.-.

This flora covers the European taxa of Aphylophorales, hymenomycetous Heterobasidiomycetes, and Gastromycetes. Keys to all genera and species are provided together with special, easier keys to the more common taxa of the larger or difficult genera. Macro- and microscopical characters are described. Additional information is given on the substrate, the type of woodrot, and the distribution of the fungi within Europe (using country codes).

The flora deals with almost 1600 species and includes furthermore about 2000 synonyms mainly based on European material. Relevant literature is cited in the general part and also under the genera. References to good illustrations of the species are included.