

ASTROSPORINA (AGARICALES) IN INDOMALAYA AND AUSTRALASIA

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(With 32 Text-figures)

Keys, descriptions and illustrations are given of 30 species of *Astrosporina* Schroeter (1889; Agaricales) until now known from the region between India and Australia. Of these 30, 21 species and one variety are new. The others, partly critical or insufficiently documented, of which types or authentic material have been studied, are discussed. *Astrosporina* species from New Zealand have been studied earlier (Horak, 1977).

From Indomalaya and Australasia there is still scarce information available about number, occurrence and distribution of the species belonging to the genus *Astrosporina* Schroeter (1889; Kryptogamenfl. Schlesien 2:576). To our knowledge *Astrosporina* is reported from the following countries only: India (Masse, 1904), Sri Lanka (Ceylon; Petch, 1917), Indonesia (Java; Boedijn, 1951), Australia (Cleland, 1933, 1934) and New Zealand (Horak, 1971, 1977).

By tradition (Fries, 1863; Masse, 1904; Heim, 1931; Kühner & Boursier, 1932; Kühner & Romagnesi, 1953; Singer, 1975; Moser, 1978) the numerous described species of *Inocybe* (Fr.) Fr. (typified by *Agaricus geophyllus* Fr., with smooth spores) are conventionally grouped into two subgenera:

1. for smooth-spored species: subgen. *Inocybium* Earle 1909 (syn. *Agmocybe* Earle 1909)
2. for gibbous-spored species: subgen. *Clypeus* (Britzm.) Fayod 1889 (subgen. *Inocybe* sensu Singer, Moser and other authors is illegitimate).

In 1889 Schroeter introduced the genus *Astrosporina* (= subgen. *Clypeus*) to accommodate *Inocybe*-like species with the major morphologic features: Pileus convex, umbonate or acute-papillate; stipe central, cylindric, equal or marginate-bulbous at base; veil remnants absent or present; spore print brown; spores nodulose, gibbous, stellate or spinose; cystidia often metuloid and encrusted with crystals; odour frequently characteristic.

This typification demonstrates clearly that the morphology of the spores is a principal character in separating *Astrosporina* from *Inocybe*. In the field only the collector who is very much familiar with the local fungus flora will recognize *Astrosporina* and *Inocybe* and needless to say there are numerous species whose spores can be considered as intermediate between the two types mentioned above (compare in this paper *A. imbricata* Clel.).

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Nevertheless I follow Schroeter's concept in separating *Astrosporina* from *Inocybe*. Firstly because *Astrosporina* is the first proposal (on generic rank) to name and to unify gibbous-spored species formerly classified in *Inocybe* (Horak, 1967: 646; compare remarks on *Clypeus* (Britzm.) Fayod), secondly the name indicates typical characters of the genus i.e. its species and thirdly the ever growing number of new species is allotted from the beginning to two genera distinguished by significant microscopic features.

The results presented in this contribution have been obtained from material of different provenience. The majority of collections have been gathered by the author and by Prof. E. J. H. Corner (Cambridge, U.K.). Again I am very grateful to Prof. Corner who offered for studies his rich collections (dried and preserved in formaline) from the tropical Far East. A third source of information comes from type and authentic material sent on loan by the curators of the herbaria ADW, BO, CAN, E, FH, K, PDD.

Concerning field work I have to thank for the facilities provided by the Department of Forests, Forest Research Centre, Bulolo, Papua New Guinea and the Herbarium Bogor, Indonesia. Finally I am indebted to the Swiss Society of Natural Sciences by financing a collecting expedition to New Caledonia and Indonesia in 1977.

Type material of the new species is kept in ZT and in the personal herbarium of Prof. Corner.

If not otherwise stated the magnifications of the figures are: carpophores (nat. size), spores ($\times 2000$), basidia and cystidia ($\times 1000$) and vertical section of cuticle ($\times 500$).

KEY TO THE INDOMALAYAN AND AUSTRALASIAN
SPECIES OF *Astrosporina*

(The New Zealand species are keyed out in Horak, 1977.)

- | | | |
|----|--|------------------------------|
| 1. | Base of stipe clavate, bulbous or marginate | 2 |
| 1* | Stipe cylindric and equal from apex to base | 12 |
| 2. | Stipe fibrillose (pruinose in uppermost part only); veil remnants present (at least in young specimens visible). Compare also <i>A. neoumbrina</i> (no. 16; p. 182) | 3 |
| 2* | Stipe conspicuously pruinose over whole length | 5 |
| 3. | Pileus — 30 mm, convex to plane with conic umbo, pale ochraceous, covered with fuscous fibrils; stipe — 35 \times 3 mm, white when young; odour not distinctive; spores 6–8 \times 5.5–7 μ m, nodulose; cystidia apically metuloid, crystals absent; on soil in forests. Singapore 27. <i>A. mediocris</i> , p. 198 | |
| 3* | Stipe with conspicuous persistent submembranous <i>Telamonia</i> -like belts of veil, especially in lower two-thirds (compare also <i>A. olivaceonigra</i> f. <i>volvata</i> (24b, p. 195)) | 4 |
| 4. | Pileus — 70 mm, umbonate, bright yellow, squarrose-scaly; stipe — 75 \times 8 mm, yellowish, with orange girdles of veil; odour not spermatic but strong; spores 8–10 \times 5–6 μ m, nodulose; cystidia broadly fusoid, hyaline, metuloid, crystals rare; on soil in forests (under <i>Quercus</i>). Malaysia.
10. <i>A. squarrosolutea</i> , p. 175 | |
| 4* | Pileus — 60 mm, conic, brown, squamulose-squarrose; stipe — 120 \times 4 mm, very slender, concolorous with pileus, veil remnants pale brown; odour not distinctive; spores 10–13 μ m, subglobose, with isolated conic (up to 3 μ m long) projections; cystidia yellowish, metuloid, crystals present; on soil (under <i>Lithocarpus</i> , <i>Castanopsis</i>). Papua New Guinea, Sabah | 4. <i>A. gemina</i> , p. 166 |

5. Context and lamellae reddening on bruising (drying specimens turn reddish also); pileus -35 mm, conicoconvex, argillaceous to orange-brown with distinct reddish tint, smooth to fibrillose; stipe -50 x -3 mm, concolorous with pileus; odour sweet, fruity; spores 6.5-8.5 x 5-6 μ m, angular to nodulose; cheilocystidia cylindrical to clavate, thin-walled, crystals absent; pleuro- and caulocystidia metuloid, hyaline to yellowish, crystals present; on soil in forests. Papua New Guinea; Europe (type)
1. *A. bresadolae*, p. 162
- 5*. Context and lamellae not changing colour on bruising 6
6. Pileus orange to apricot, -30 mm, umbonate, glabrous-fibrillose; lamellae orange; stipe -45 x -5 mm, orange; odour unpleasant, like burnt horn; spores 5.5-8 x 5-6 μ m, nodulose; cystidia metuloid, hyaline to yellowish, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea; Japan (type) 26. *A. lutea*, p. 197
- 6*. Pileus, lamellae and stipe with different colour 7
7. Marginate bulb (of stipe) with persistent, membranous, volvate, white remnants of veil; pileus olive-brown; on soil in forests (under *Castanopsis*, *Lithocarpus*). Papua New Guinea. (The other characters correspond with those of the type variety.) 24b. *A. olivaceonigra* f. *volvata*, p. 195
- 7*. Volva and other veil remnants on stipe absent 8
8. Spores 15-17 μ m, with conspicuous conic projections up to 3 μ m long, apex often bifurcate; pileus -60 mm, conic to umbonate, brown, fibrillose-squamulose or squarrose; stipe -200 x -6 mm, slender, reddish brown; odour not distinctive; cystidia hyaline to yellowish, metuloid, crystals present; on soil in forests (*Lithocarpus*, *Castanopsis*). Malaysia, Java, Papua New Guinea; Ceylon (type)
3. *A. petchii*, p. 164
- 8*. Spores different 9
9. Spores < 10 μ m; margin of pileus becoming split with age 10
- 9*. Spores > 10 μ m; pileus convex with conic umbo; odour (absent or) slightly spermatic 11
10. Odour sweet or fruity; lamellae normally spaced; pileus -40 mm, with distinct conic papilla, brown, squarrose at disc; stipe -45 x -3 mm, pale red-brown; spores 8-10 x 7-8.5 μ m, nodulose; cystidia metuloid, yellow, crystals absent; on soil in forests (*Castanopsis*, *Lithocarpus*). Java; Japan (type).
28. *A. titibuensis*, p. 199
- 10*. Odour spermatic (at least in aged specimens); lamellae very crowded and narrow; pileus -40 mm, convex to umbonate-campanulate, whitish, yellowish or ochraceous-argillaceous, centre smooth to fibrillose; stipe -75 x -3 mm, often rather slender, concolorous with pileus; spores 6.5-9 x 4.5-6 μ m, nodulose; cystidia metuloid, hyaline, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea, Java, Sabah. 25. *A. angustifolia*, p. 195
11. Spores 9-11 x 7-9 μ m, nodulose, knobs hemispheric or conic; pileus -40 mm, yellowish to pale brown; stipe -50 x -4 mm; cystidia hyaline to yellowish, metuloid, crystals present; on soil in forest (*Nothofagus*). Papua New Guinea; New Zealand (type) 29. *A. avellana*, p. 200
- 11*. Spores 10-14 x 8-12 μ m, with distinct conic projections, stellate; pileus -35 mm, pale brown to fuscous, margin rimose with age; stipe -60 x -4 mm; cystidia yellow to yellow-brown, metuloid, crystals present; on soil in forests. Sabah, Malaysia; Europe (type), Japan, New Zealand.
30. *A. asterospora*, p. 202
- 12(1*). Stipe conspicuously pruinose over whole length; veil remnants absent 13
- 12*. Stipe fibrillose (not pruinose except uppermost part), tomentose or lanuginous especially towards base, often with conspicuous veil remnants (cortina, belts of veil) 19
13. Pileus and stipe white, -25 mm, umbonate-campanulate, viscid, rimose towards margin; stipe -40 x -2 mm; odour spermatic; spores 6-7.5 x 5.5-6.5 μ m, nodulose, projections (knobs) hemispheric and often crested; cystidia hyaline, very thick-walled, crystals present; on soil in lowland forests. Papua New Guinea 22. *A. albovicida*, p. 191
- 13*. Pileus and stipe not white; cuticle of pileus dry 14
14. Pileus and stipe lilac to violaceous; pileus -50 mm, convex with acute umbo, fibrillose-rimose; stipe -50 x -8 mm, robust, fibrillose towards base; odour acidulous; spores 7-8 x 5.5-6 μ m, nodulose; cystidia hyaline, thin-walled, occasionally with resinous crust at apex; on soil in montane forests. Sabah 18. *A. corneri*, p. 184

- 14*. Pileus and stipe with different colour(s) 15
15. Pileus, lamellae and stipe yellow (at least in young specimens); pileus—30 mm, convex to campanulate, brown squarrose scales at centre, margin appendiculate from brown membranous lumps of veil; stipe—45 × 5 mm, below fibrillose cortina with several incomplete appressed brown belts of veil; odour fishy; spores 7.5–10 × 5.5–7.5 μm, nodulose; cystidia yellowish, metuloid near apex only, crystals present; on soil in montane forests (*Nothofagus*). Papua New Guinea (compare *A. neoumbrina*, p. 182). 11. *A. luteifolia*, p. 176
- 15*. Pileus fuscous, brown, pale brown, argillaceous or pale yellow-brown, occasionally with distinct olive or wine red tint over disc of pileus or in context of stipe 16
16. Pileus fuscous to black-brown with distinct olive tint at disc, —30 mm, conic to campanulate, fibrillose; stipe—45 × 2 mm, slender, pale brown (base submarginate-volvate in var. *volvata*, 24b, p. 195); spores 8–9.5 × 5.5–6.5 μm, nodulose; cystidia hyaline, metuloid, crystals present; on soil in forests (*Castanopsis*). Papua New Guinea 24a. *A. olivaceonigra*, p. 194
- 16*. Pileus with paler colour, olive tint absent 17
17. Pileus—25 mm, umbonate, fuscous turning fawn with age, covered with small squarrose scales; stipe—30 × 3 mm; odour not distinctive; spores 10–12 × 8–11 μm, ovoid with conspicuous conic projections; cystidia yellow, metuloid, apex encrusted with resinous cap; on soil in forests. Malaysia 6. *A. pahangi*, p. 168
- 17*. Carpophores fragile, pileus—10 mm; stipe—1 mm diam. 18
18. Pileus—8 mm, argillaceous to pale fuscous, densely covered with strigose white hairs, margin fimbriate; stipe—10 × 0.5 mm, concolorous with pileus; odour fruity or spermiatic; spores 6–7.5 × 4.5–5.5 μm, inconspicuously nodulose; cystidia hyaline to pale yellow-brown, metuloid, crystals present; on soil or on rotten wood. Papua New Guinea, Singapore. 2. *A. pusillima*, p. 163
- 18*. Pileus—10 mm, campanulate, yellow-brown to dark brown, scurfy to granular at apex, viscid (if moist); stipe—25 × 1 mm, yellow-brown to reddish brown; odour pleasant but changing to spermiatic (after cutting); spores 6.5–7.5 × 5–6 μm, nodulose; cheilocystidia vesiculose, thin-walled; pleuro- and caulocystidia yellow, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea 23. *A. granulosiceps*, p. 191
19. Context (in pileus and stipe) wine red; pileus—40 mm, convex to plane, amber to red-brown, squarrose-scaly; stipe—60 × 7 mm, robust, concolorous with pileus, coarsely fibrillose to subsquarrose; lamellae red-brown; odour not distinctive; spores 6–8.5 × 5.5–6.5 μm, nodulose; cheilocystidia vesiculose, thin-walled; with conspicuous red-brown plasmatic pigment, crystals absent; caulocystidia absent; on soil in montane forests (*Nothofagus*). Papua New Guinea. 19. *A. magnifica*, p. 186
- 19*. Context of pileus and stipe not wine red 20
20. Spores with distinct, ± isolated conic projections with acute tips 21
- 20*. Spores nodulose, projections (knobs) indistinct, hemispheric or conic with obtuse tips 22
21. Pileus—30 mm, conico-convex to campanulate, argillaceous to pale brown, squarrose; stipe—75 × 4 mm, with small squarrose scales towards base, cortina fugaceous; odour pleasant; spores 7.5–10 μm, subglobose, projections up to 3 μm long, numerous; cheilocystidia clavate, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Lithocarpus*, *Castanopsis*). Papua New Guinea. 5. *A. echinosimilis*, p. 168
- 21*. Pileus—25 mm, conico-convex with acute papilla, ochraceous to fuscous, striate-sulcate towards margin, fibrillose; stipe—45 × 1.5 mm, concolorous with pileus, pinkish fibrils below subsistent fibrillose cortina; odour none; spores 10–12.5 × 8.5–11 μm, subglobose to ovate, projections rather scattered; cystidia thin-walled, with yellow plasmatic pigment, crystals absent; on soil in forests. Singapore, Malaysia. 7. *A. hydrocybiformis*, p. 170
22. Knobs on spores low, indistinctly nodulose in profile 23
- 22*. Knobs on spores distinct, i.e. crested, obtusely conic or hemispheric 24
23. Spores 9–12 × 5–6.5 μm; pileus—16 mm, umbonate-campanulate, brown, fibrillose to scaly; stipe—25 mm long, pale brown; odour?; cystidia brown at apex, metuloid, crystals rare; on soil. Australia 21. *A. imbricata*, p. 190

- 23*. Spores 6–7.5 × 4.5–6 μm; pileus –20 mm, umbonate-campanulate, dark brown with reddish or olive tint; stipe –30 × –2 mm, base bulbous (occasionally submarginate), yellow, with coarse whitish fibrils towards base; odour absent; cystidia hyaline, thick-walled (at apex only), crystals scattered; on soil in forests (under Fagales). Papua New Guinea; Japan (type). 16. *A. neoumbrina*, p. 182
24. Majority of projections crested or obtusely bifurcate 25
- 24*. Projections (knobs) hemispheric or obtusely conic 26
25. Spores 10.5–13 μm, subglobose; cheilo- and pleurocystidia hyaline to yellowish, metuloid, crystals present; pileus –15 mm, campanulate, squarrose at disc, brown; stipe –50 × –2 mm, fibrillose to villous from white to ochraceous fibrils; odour absent; on soil in forests (under Fagales). Papua New Guinea 8. *A. lasseroides*, p. 173
- 25*. Spores 8–10.5 × 7–8.5 μm; cheilocystidia with yellow plasmatic pigment, thin-walled, crystals absent; pileus –14 mm, conic to subumbonate, fawn to pale brown, covered with minute fibrillose squamules; stipe –20 × –1.5 mm, fibrillose; odour none; on soil in forests. Singapore 9. *A. alienospora*, p. 173
26. Growing on rotten wood; pileus –30 mm, umbonate, dark brown, squamulose-squarrose; stipe –30 × –5 mm, pale brown with whitish fibrils especially towards base; odour none; spores 9–11 × 7.5–8.5 μm, substellate to nodulose; cystidia hyaline, thin-walled or metuloid, crystals absent or scattered. Sabah; New Zealand (type) 15. *A. paracerasphora*, p. 181
- 26*. Growing on soil. 27
27. Spores large, stellate, 11–13.5 × 8–10 μm; basidia 2-spored; cheilo- and pleurocystidia capitate, hyaline, thin-walled, crystals absent; pileus –30 mm, conic, dark brown, squarrose-scaly; stipe –75 × –3 mm, concolorous with pileus, brown subsquarrose squamules towards base; odour none; on soil in montane forests (*Nothofagus*). Papua New Guinea. 20. *A. aberrans*, p. 187
- 27*. Spores smaller; cystidia never capitate, always metuloid (at least pleurocystidia) 28
28. Spores 10–12 × 7.5–8.5 μm; pileus –25 mm, convex with prominent conic papilla, brown, centre subsquarrose-scaly; stipe –45 × –2 mm, pale ochraceous fibrils especially towards base, cortina absent; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea 17. *A. papillata*, p. 183
- 28*. Spores smaller; pileus not conic-papillate but obtusely umbonate to campanulate, centre dotted, granular or minutely squarrose, not scaly 29
29. Spores 6–8 × 5.5–7 μm, subglobose to ovoid, with numerous low hemispheric knobs (reminding of blackberries); pileus –20 mm, centre conspicuously dotted or granular, dark brown to ochraceous-brown; stipe –45 × –2 mm, with white fibrils from cortina at apex, several brownish appressed belts from outer veil near base; odour strong, like *Pelargonium*; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in forests (*Castanopsis*, *Lithocarpus*). Papua New Guinea. 13. *A. punctatosquamosa*, p. 178
- 29*. Spores nodulose, knobs obtusely conic and pronounced 30
30. Pileus –20 mm, hazel brown to dark brown, minutely squamulose-squarrose; stipe –35 × –2 mm, white, at apex with white fibrillose remnants from cortina, near base with indistinct white appressed belts from outer veil; odour strong, fruity or like *Pirola*; spores 6–9 × 5–7.5 μm; cheilocystidia clavate to vesiculose, thin-walled; pleurocystidia yellowish, metuloid, crystals present; on soil in submontane-montane forests (under Fagales). Papua New Guinea 14. *A. incognita*, p. 179
- 30*. Pileus –20 mm, umber brown, squarrose at centre; stipe –40 × –2 mm, concolorous with pileus, with white fibrillose belts from outer veil; odour absent; spores 7–8.5 × 5.5–6.5 μm; cheilocystidia clavate to broadly subfusoid, hyaline, sometimes with yellow-brown plasmatic pigment, thin-walled, crystals absent; pleurocystidia absent; on soil in forests. Singapore 12. *A. cingulatisipes*, p. 177

I. SECT. RUBELLAE Kühner & Boursier 1932

1. *Astrosporina bresadolae* (Mass.) Horak, *comb. nov.*—Fig. 1

Inocybe bresadolae Mass. in Ann. Bot. 18: 465. 1904 (basionym).

Description of material from Papua New Guinea:

Pileus —35 mm diam., conico-convex when young becoming campanulate or umbonate-expanded; argillaceous, brown or orange-brown, with distinct reddish or red-brown tint especially over disc; smooth when young, soon fibrillose at estriate margin, squamulose to scaly at centre; dry, veil remnants absent. Lamellae adnexed to subfree, ventricose, crowded (L—20, —5);

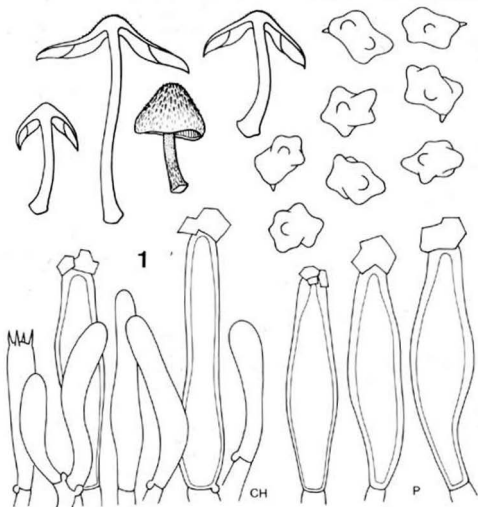


Fig. 1: *A. bresadolae* (Mass.) Horak (ZT 72/74): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P).

whitish or argillaceous turning brown, reddening after bruising, edge albofimbriate. Stipe 20–50 × 2–3 mm, cylindrical, with distinct marginate base, often slender; whitish at apex, concolorous with pileus towards base, reddening when bruised; upper half pruinose, lower half appressedly fibrillose; dry, solid, veil remnants none, single or grown together, in groups. Context whitish or pale brown, slowly but conspicuously reddening. Odour strong, sweetly or fruity.

Spores 6.5–8.5 × 5–6 μm, angular to nodulose, knobs hemispheric, often not distinct, yellow-brown. Basidia 30–36 × 6–8 μm, 4-spored. Cheilo-, pleuro- and caulocystidia 45–75 × 8–18 μm, subcylindrical to slender fusoid, metuloid, hyaline or yellowish (KOH); cheilocystidia often intermixed with cylindrical or subclavate, thin-walled hyaline cells, 30–60 × 5–10 μm. Cuticle a cutis or trichoderm of cylindrical hyphae (4–7 μm diam.), with yellow-brown plasmatic and/or encrusting pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Castanopsis*, *Lithocarpus*, *Nothofagus*). Europe (type), Papua New Guinea.

MATERIAL.—FRANCE: Oise, Coye-la-Forêt (under oak), 25.VI.1950, *Romagnesi* (S). — PAPUA NEW GUINEA: Eastern Highlands, Goroka, 13.I.1972, *Horak* (ZT 72/74); Same locality, 17.I.1972, *Horak* (ZT 72/87); Western Highlands, Mt. Hagen, Kuna, 18.V.1972, *Horak* (ZT 72/455).

On the Papua New Guinean material all characters observed agree well with those reported for this remarkable species from Europe (Kühner & Boursier, 1932: 158; Stangl, 1977: 131).

II. Sect. PETIGINOSAE Heim 1931

2. *Astrosporina pusillima* Corner & Horak, *spec. nov.* —Fig. 2

Pileo – 8 mm, convexo vel plano, fusco, albostrigoso-fibrilloso. Lamellis adnexis, argillaceis. Stipite – 10 × 0.5 mm, cylindrico, cinnamomeo, pruinoso. Odore subspermatico. Sporis 6–7.5 × 4.5–5.5 μm, nodulosi. Cystidiis metuloideis, incrustatis. Ad terram et lignum in silvis. Nova Guinea. Typus: ZT 73/273.

Pileus – 8 mm diam., hemispheric when young, soon becoming plane and expanded, occasionally subumbonate; argillaceous or pale fuscous, densely covered with strigose appressed white fibrils, especially towards the striate fimbriate margin; dry, veil remnants absent. Lamellae (L 6–8, 3) adnexed to almost free, ventricose; cinnamon to pale argillaceous, edge concolorous or albofimbriate. Stipe 4–10 × 0.5 mm, cylindrical, equal, slender; concolorous with pileus, white pruinose all over; dry, solid, single, in groups. Context pale brown. Odour fruity or spermatic, sometimes not distinctive.

Spores 6–7.5 × 4.5–5.5 μm, nodulose, knobs not pronounced, brown. Basidia 20–26 × 4–6 μm, 4-spored. Cheilo-, pleuro- and caulocystidia 30–50 × 12–18 μm, lageniform, metuloid (membrane up to 3 μm thick), with crystals at apex, hyaline or pale yellow-brown, numerous. Cuticle a cutis or trichoderm of fasciculate cylindrical hyphae (2–5 μm diam.), membranes hyaline, thick-walled, terminal cells not encrusted with pigment. Clamp connections present.

HABITAT.—On mossy soil or rotting wood, in forests. Papua New Guinea, Singapore.

MATERIAL.—PAPUA NEW GUINEA: Eastern Highlands, E. of Ayura (Kainantu), 27.V.1973, *Horak* (ZT 73/273, holotype). — SINGAPORE: Bukit Timah, Fern Valley, 19.IV.1941, *Corner* (ZT 78/43).

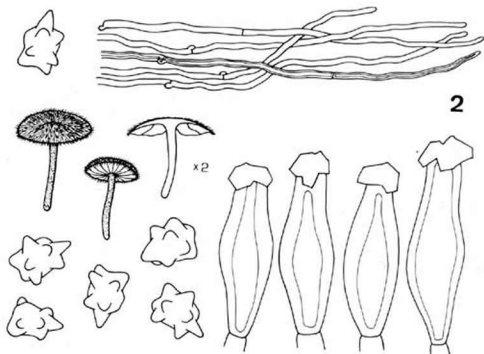


Fig. 2: *A. pusillima* Corner & Horak (ZT 78/43): carpophores ($\times 2$), spores, cheilocystidia, cuticle.

This species is closely related to *A. petiginosa* (Fr.) Rea. *A. pusillima*, however, is distinguished by its small and delicate size and the argillaceous lamellae.

III. Sect. CALOSPORAЕ Lange 1917

3. *Astrosporina patchii* (Boed.) Horak, *comb. nov.*—Fig. 3

Inocybe patchii Boed. in Sydowia 5: 223. 1951 (basionym).

Inocybe umbonata Petch in Ann. R. bot. Gdns Peradeniya 6: 202. 1917 (non Quél. 1876).

Description of the Papua New Guinean material:

Pileus—60 mm, hemispheric or convex finally plane or subdepressed, with conic or umbonate centre; light brown to dark brown, rarely with reddish brown tinge; fibrillose when young, rimose towards the split margin, becoming squamulose or squarrose due to recurved scales; dry, veil remnants absent. Lamellae adnexed to subfree, ventricose, crowded; argillaceous or cinnamon, edge albofimbriate. Stipe—200 \times 6 mm, cylindric, equal or slightly attenuated towards apex, base with distinct (~10 mm) marginate bulb; reddish brown all over, conspicuously pruinose over whole length, veil remnants absent; dry, solid or fistulose single in groups. Context whitish. Odour and taste not distinctive.

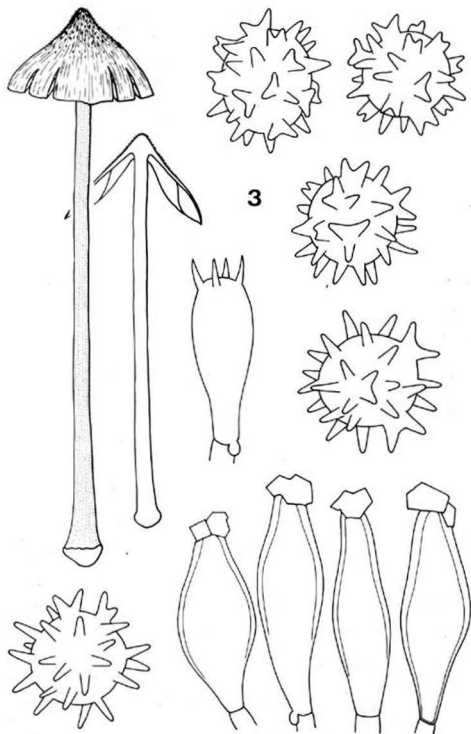


Fig. 3: *A. petchii* (Boed.) Horak (ZT 77/188): carpophores, spores, cheilocystidia.

Spores 15–17 μm , stellate, with up to 3 μm long conic or bifurcate projections, brown. Basidia 40–50 \times 12–20 μm , 4-spored. Cheilo- and pleurocystidia 35–70 \times 12–25 μm , fusoid or lageniform, metuloid (membrane up to 3 μm diam.), hyaline or yellowish (KOH), crystals present. Caulocystidia like cheilocystidia but larger, intermixed with clavate thin-walled cells. Cuticle a cutis or trichoderm of cylindrical hyphae (3–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections on septa.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Ceylon (type), Malaysia, Java, Papua New Guinea.

MATERIAL.—CEYLON: Peradeniya, VII.1912, *Petch 3499* (holotype of *I. umbonata* Petch, K). —MALAYSIA: Johore, Gunong Panti, 500 m; 7.IX.1930, *Corner (ZT 78/44)*. —JAVA (INDONESIA): Bogor, Tjibodas, 1800 m, 11.IV.1972, *Corner (J-5, ZT 79/190)*; Bogor, Tjibodas, 14.III.1977, *Horak (ZT 77/188)*. —PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 25.IV.1972, *Horak (ZT 72/476)*; Western Highlands, Mt. Hagen, Baiyer River, 22.V.1972, *Horak (ZT 72/476)*.

Astrosporina petchii is one of the most outstanding species of the genus. Based upon the records hitherto known this fungus is probably common throughout tropical and temperature South East Asia. It is closely related to *A. gemina*. The two species have been found growing together in the oak forest of Papua New Guinea. However, there are no difficulties to separate them already in the field. *A. petchii* is characterized by the pruinose stipe and the lack of veil remnants on pileus and stipe.

According to notes and drawings kept in the Bogor Herbarium (BO), v. Overeem was well acquainted to this species (collected in the oak forests of Tjibodas). To him the large spinose spores appeared to merit creating a new but never published genus.

4. *Astrosporina gemina* Horak, *spec. nov.*—Fig. 4

Pileo –40 mm, conico-papillato vel conico-umbonato, ex avellaneo umbrino, castaneo tinctu, dense squamuloso, marginem versus e velo albo vel concolori obtecto, sicco, rimoso-striato. Lamellis adnexis, albidis dein argillaceis, fimbriatis. Stipite –120 \times 4 mm, cylindraceo, ad basim sub-marginato (–8 mm diam.), pileo concolori, toto e zonis pallide brunneis e velo multicingulato, sicco. Odore nullo. Sporis 16–18 μm , stellatis, luteobrunneis. Cheilocystidiis 25–55 \times 15–30 μm , ventricosofusoideis, metuloideis, crystalliferis, stramineis. Ad terram in silvis *Lithocarpi*. Nova Guinea. Typus: ZT 72/425.

Pileus 10–40(–60) mm diam., conico-convex, convex with prominent conical umbo, mammillate, hazel-nut brown, umber brown or deep brown, often with red-brown tinge, all over covered with concolorous small squamules, sulcate-striate towards the margin, which is covered with subpersistent, white, membranaceous patches of veil, dry. Lamellae adnexed to emarginate-adnate, ventricose, crowded, whitish turning pale ochraceous or argillaceous, pale brown in mature carpophores, edge fimbriate. Stipe 50–120 \times 2–4 mm, cylindric or attenuated towards apex, base submarginate (–8 mm diam.), concolorous with pileus, all over covered with incomplete belts or appressed squamules of concolorous or pale brown remnants of veil, not pruinose, solid becoming hollow, single in groups. Context red-brown in pileus and stipe, white in base of stipe. Odour none. Spore print brown.

Spores 10–13 μm , subglobose, with prominent conical projections (up to 3 μm long), rarely with saddle-shaped spines, yellow-brown. Basidia 35–45 \times 12–18 μm , 4-spored. Cheilocystidia 25–55 \times 12–18 μm , ventricose-fusoid or lageniform, metuloid, yellowish, encrusted with crys-

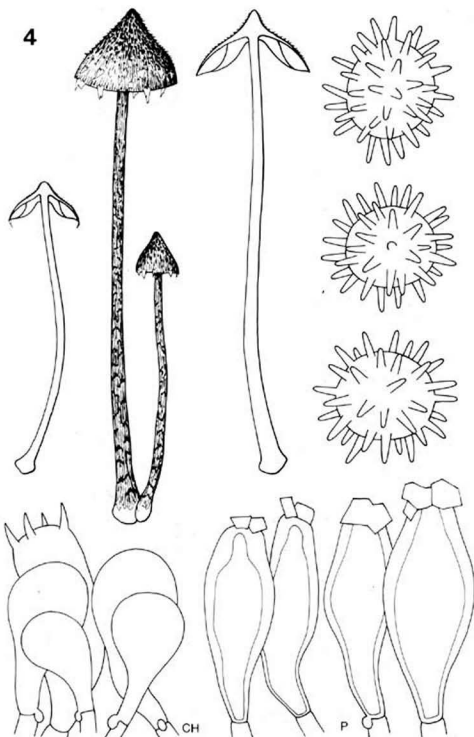


Fig. 4: *A. gemina* Horak (type): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P).

tals, occasionally intermixed with clavate, thin-walled cystidia ($-45 \times -20 \mu\text{m}$). Cuticle a cutis or trichoderm of cylindric hyphae ($6-10 \mu\text{m}$ diam.), with yellowish (KOH) encrusting and vacuolar pigment. Clamp connections present.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Papua New Guinea, Sabah (Borneo).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Watut, 28.IV.1972, Horak (ZT 72/425, holotype); Bulolo, Manki, 28.III.1973, Horak (ZT 73/116); Central Highlands: Mt. Hagen, Baiyer River, 22.V.1972, Horak (ZT 72/477). — SABAH (BORNEO): Mt. Kinabalu, 1800 m, 18.I.1964, Corner (RSNB 5007, ZT 78/45).

Microscopically this species is extremely similar to *A. petchii* (Boed.) Horak but the white appendiculate veil remnants along the margin of the pileus and the girdles of veil on the non-pruinose stipe distinguish well the two taxa from each other.

5. *Astrosporina echinosimilis* Horak, *spec. nov.*—Fig. 5

Pileo 30 mm, conico-convexo, papillato-expando vel campanulato, argillaceo, dense squamis subsquarrosis concoloribus oblecto. Lamellis adnatis, ex albedo argillaceis. Stipite -75×-4 mm, cylindraceo, pileo concolori, fibrillis vel squamulis albis argillaceisve in toto oblecto. Odore grato. Sporis $7.5-10 \mu\text{m}$, subglobose vel ovoideis, spinis conicis ($-3 \mu\text{m}$ altis) instructis, brunneis. Cheilocystidiis clavatis, tenuitunicatis. Pleurocystidiis metuloideis, incrustatis. Ad terram in silvis fagineis. Nova Guinea. Typus: ZT 71/200.

Pileus 10–30 mm diam., conico-convex, papillate-expanded or campanulate, beige or pale brown, densely covered with small squarrose concolorous scales and squamules, fibrillose-rimose towards margin, covered with white fibrils of cortina when young, dry. Lamellae adnate to adnexed, ventricose, crowded (L 14–20, 3–5), pallid, yellowish or beige turning argillaceous, edge albobimbriate. Stipe 30–75 \times 1.5–4 mm, cylindric, base slightly swollen but not bulbous, whitish to pale brown, all over covered with concolorous fibrillose or minutely squamules, pruinose at apex, dry, solid becoming hollow, single or fasciculate. Context whitish. Odour fruity. Spore print brown.

Spores 7.5–10 μm , subglobose to ovoid, covered with conical apically obtuse spines (up to 3 μm long), brown. Basidia 35–50 \times 9–11 μm , 4-spored. Cheilocystidia 20–45 \times 12–22 μm , clavate or ovoid, thin-walled, hyaline, forming sterile gill edge. Pleurocystidia 30–50 \times 8–20 μm , fusoid to lageniform, metuloid (membranes $-2 \mu\text{m}$ diam.), yellowish (KOH), encrusted with crystals. Caulocystidia like pleurocystidia. Cuticle a trichoderm of cylindric hyphae (4–8 μm diam.), encrusted with yellow-brown (KOH) pigment. Clamp connections present.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis* (Fagaceae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 22.X.1971, Horak (ZT 71/200, holotype); Bulolo, Manki, 17.XII.1971, Horak (ZT 71/430); Bulolo, Manki, 2.V.1972, Horak (ZT 72/433).

6. *Astrosporina pahangi* Corner & Horak, *spec. nov.*—Fig. 6

Pileo 25 mm, subumbonato dein plano, fusco, squamis fibrillosis subsquarrosis oblecto. Lamellis adnexis, ochraceis. Stipite -30×-2 mm, cylindrico, ad basim subclavato, flavido, pruinoso, velo nullo.

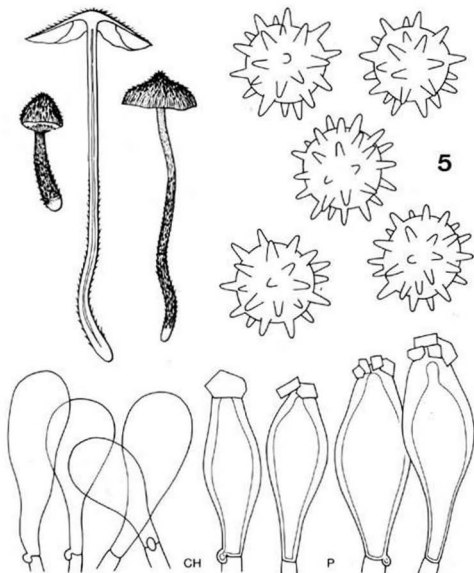


Fig. 5. *A. echinosimilis* Horak (type): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

Sporis $10-12 \times 8-11 \mu\text{m}$, conico-gibbosis, brunneis. Cystidiis lageniformibus, crasse tunicatis, haud cristiferis. Epicute ex hyphis fibuligeris cylindraceisque cutem formantibus, incrustatis. Ad terram in silvis. Malaya. Typus: ZT 78/46.

Pileus $\sim 25 \text{ mm}$ diam., umbonate becoming plane, fuscous turning fawn in aged carpophores, densely covered with numerous small pyramidal and over the disc recurved squamules, dry, veil remnants absent. Lamellae adnexed, crowded, fawn to pale ochraceous, edge concolorous. Stipe $15-30 \times 1-3 \text{ mm}$, cylindric, base slightly swollen ($\sim 4 \text{ mm}$ diam.), fawn, minutely pruinose all over, cortina absent, solid, dry, single in groups. Context concolorous or paler as pileus, whitish at apex of stipe. Odour not distinctive.

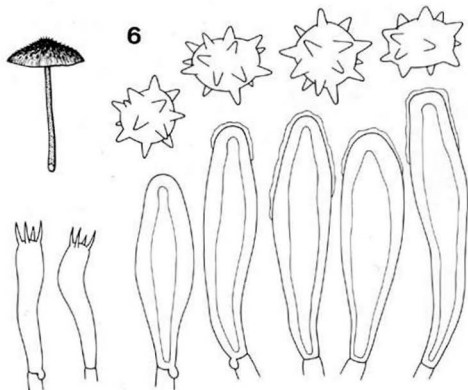


Fig. 6: *A. pahangi* Corner & Horak (type): carpophore, spores, basidia, cheilo- and pleurocystidia.

Spores $10\text{--}12 \times 8\text{--}11 \mu\text{m}$, covered with conspicuous conic projections, yellow-brown. Basidia $25\text{--}30 \times 5\text{--}6 \mu\text{m}$, 4-spored. Cheilocystidia $45\text{--}70 \times 12\text{--}16 \mu\text{m}$, lageniform, thick-walled, membrane yellow in KOH, apex encrusted with resinous cap, crystals absent. Pleurocystidia like cheilocystidia, often hyaline, rather scattered. Cuticle a cutis of cylindric repent hyphae ($5\text{--}10 \mu\text{m}$ diam.), bundled and semi-erect in squamules, with yellow-brown encrusting and plasmatic pigment. Clamp connections numerous.

HABITAT.—On sandy mossy soil in forest. Malaysia.

MATERIAL.—MALAYSIA: Pahang, Cameron Highlands, 1600 m, 27.VII.1934, *Corner* (ZT 78/46, holotype).

The following characters are distinctive for *A. pahangi*: Small yellow-brown carpophores, scaly pileus, stellate spores, and fusoid metuloid cystidia with yellow (KOH) membrane and lacking crystals.

7. *Astrosporina hydrocymbiformis* Corner & Horak, *spec. nov.*—Fig. 7

Pileo $\text{--}25 \text{ mm}$, acuto-conico dein papillato-plano, melleo vel fusco, senectudine pallidiori, striato-sulcato, glabro. Lamellis adnexo-adnatis, melleo-cinnamomeis, albofimbriatis. Stipite $\text{--}45 \times \text{--}1,5 \text{ mm}$, cylindrico, pileo concolori vel pallidiori, fibrillis albis vel roseis e velo instructo, cortina fibrillosa subpersistente ornato.

Spores $10-12.5 \times 8.5-11 \mu\text{m}$, conico-gibbosis. Cheilocystidiis cylindraceis vel sublageniformibus, tenuitunicatis, haud cristalliferis. Epicute ex hyphis cylindraceis cutem formantibus, incrustatis, fibulatis. Ad terram in silvis. Singapore. Typus: ZT 78/47.

Pileus $10-25 \text{ mm}$ diam., conico-convex with acute prominent umbo, in aged carpophores centre around papilla depressed and margin often upturned, ochraceous, yellow-brown or fuscous, becoming paler with age, hygrophanous, smooth or sprinkled with minute concolorous or pinkish fibrils (from the veil), sulcate to striate near margin, membranaceous, dry. Lamellae adnate to adnexed, ventricose, crowded (L $6-12$, -3), argillaceous turning pale fuscous or cinnamon, edge white to pinkish, fimbriate. Stipe $15-45 \times 1-1.5 \text{ mm}$, cylindrical, slender, concolorous with pileus or paler, base white, covered with pale yellow or pinkish fibrils, occasionally with distinct cortina-like girdle, apex pruinose, dry, hollow, single in groups. Context pale brown. Odour and taste not distinctive.

Spores $10-12.5 \times 8.5-11 \mu\text{m}$, subglobose to ovate, with conspicuous conic, rarely saddle-shaped projections, spines up to $2.5 \mu\text{m}$ long, yellow-brown. Basidia $25-30 \times 5-6 \mu\text{m}$, 4-spored. Cheilocystidia $30-55 \times 6-15 \mu\text{m}$, cylindrical or sublageniform, thin-walled, with yellow-brown plasmatic pigment, forming sterile gill edge. Caulocystidia like cheilocystidia, crystals absent.

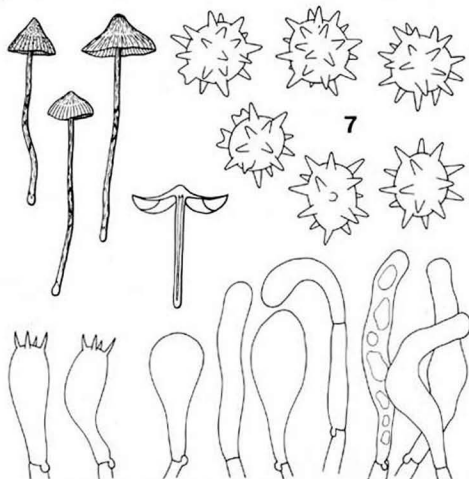


Fig. 7: *A. hydrocybiformis* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia.

Pleurocystidia absent. Cuticle a cutis of cylindric hyphae (5–12 μ m diam.), with yellow-brown plasmatic and encrusting pigment. Clamp connections present.

HABITAT.—On soil in forests. Singapore, Malaysia.

MATERIAL.—SINGAPORE: Botanical Gardens, 5.IX.1940, *Corner* (ZT 78/47, holotype).
—MALAYSIA: Johore, Gunong Pantii, 4.IV.1931, *Corner* (ZT 78/78); Johore, Mawai, Dohol River, 12.VII.1931, *Corner* (ZT 78/49).

Owing to the habit, the colour and the veil remnants on the stipe this species resembles very much *Cortinarius* (i.e. *C. acutus*). Spores and cystidia, however, are those of a typical *Astrosporina* sect. *Calosporae*.

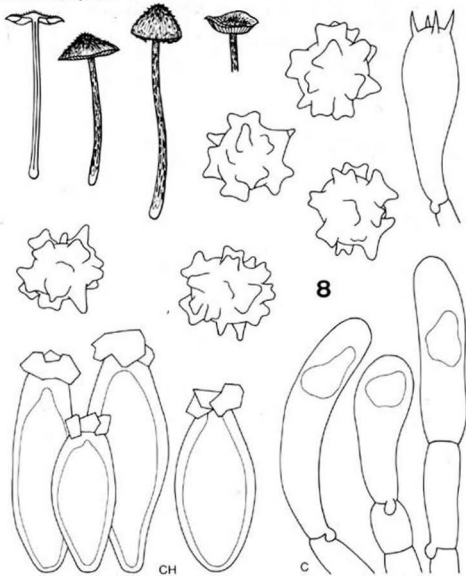


Fig. 8: *A. lasserooides* Horak (type): carpophores, spores, basidium, cheilo- and pleurocystidia (CH), caulocystidia (C).

8. *Astrosporina lasseroides* Horak, *spec. nov.*—Fig. 8

Pileo -15 mm, conico convexo subcampanulato, obscure avellaneo, squamis squarrosis concoloribus oblecto. Lamellis adnatis, albidis dein argillaceis. Stipite -50 × -2 mm, cylindraceo, subbulboso, pileo concolori, fibrillis albis ochraceis dense instructo. Odore nullo. Sporis 10,5-13 µm, subglobose, crectis irregularibus instructis (*A. lasseroides* simile), brunneis. Cystidiis fusoides metuloideisque, incrustatis. Ad terram in silvis Lithocarp. Nova Guinea. Typus: ZT, 72/422.

Pileus 10-15 mm diam., conico-convex or campanulate, becoming umbonate-expanded, brown (hazel-nut brown), radially fibrillose, disc densely covered with appressed or subsquarrose concolorous scales and squamules, margin estriate, covered with white fibrillose or submembranous remnants of veil in young carpophores, dry. Lamellae adnexed to adnate, ventricose, crowded (L 10-16, -3), whitish turning argillaceous, edge even, concolorous. Stipe 30-50 × 1,5-2 mm, cylindric, slightly swollen at base, concolorous with pileus or of paler colour, whitish at base, densely covered with white or pale ochraceous fibrils of veil, distinct belt of cortina absent, dry, solid becoming hollow, single in groups. Context brownish. Odour none. Spore print brown.

Spores 10,5-13 µm, subglobose to ovoid, covered with conic, crestlike, forked or saddle-shaped projections (up to 2,5 µm high), brown. Basidia 30-44 × 12-15 µm, 4-spored. Cheilo- and pleurocystidia 35-55 × 12-20 µm, ovoid-fusoid, metuloid (membranes -3 µm diam.), hyaline or yellowish (KOH), encrusted with crystals. Caulocystidia cylindric, thin-walled, often with strong refractive inclusions. Cuticle a cutis or trichoderm of cylindric hyphae (6-10 µm diam.), encrusted with brown (KOH) pigment. Clamp connections numerous.

HABITAT.—On soil under *Castanopsis* and *Lithocarpus* (Fagaceae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Watut, 28.IV.1972, Horak (ZT 72/422, holotype).

In the field this fungus may be mistaken for *A. echinosimilis* Horak. Both taxa grow in similar ecologic conditions under *Castanopsis* and *Lithocarpus*. The crested spores remind of those found on *A. lasseroides* (Dennis) described from Venezuela.

9. *Astrosporina alienospora* Corner & Horak, *spec. nov.*—Fig. 9

Pileo -14 mm, conico dein subumbonato-plano, argillaceo-stramineo, fibrilloso vel subsquamuloso. Lamellis adnatis, albidis senectudine argillaceis vel cinnamomeis. Stipite -20 × -1,5 mm, cylindrico, pileo concolori, fibrilloso, haud pruinoso. Sporis 8-10,5 × 7-8,5 µm, nodulose-angulatis, crectis furcatis saepe instructis, brunneo-luteis. Cheilocystidiis clavato-cylindraceis, tenuitunicatis, hyalinis, pigmento luteo-brunneo impletis, haud crystalliferis. Ad terram in silvis. Singapore. Typus: ZT 78/50.

Pileus -14 mm diam., conic, becoming plane or even slightly concave, centre often subumbonate, dingy fawn when young, turning pale fuscous, covered with minute fibrillose squamules and scales (recurved at centre), faintly striate-sulcate towards the subrimose margin, veil remnants absent, dry. Lamellae adnexed, subdistant, pallid white when young, turning pale cinnamon, edge white, fimbriate. Stipe 10-20 × 1-1,5 mm, cylindric, equal, slender, fawn later turning pale fuscous, fibrillose-villous when young, fibrillose in mature specimens, cortina absent, dry, single in groups. Context concolorous with pileus. Odour faint, waxy.

Spores 8-10,5 × 7-8,5 µm, nodulose-angular, often with saddle-shaped or flange-like warts and projections, occasionally intermixed with conic broad spines, yellow-brown. Basidia 27-34

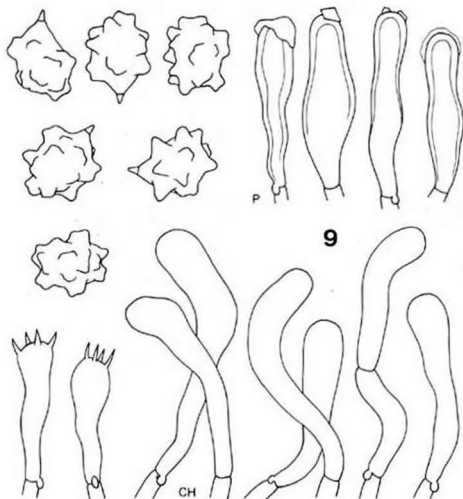


Fig. 9: *A. alienospora* Corner & Horak (type): spores, basidia, cheilocystidia (CH), pleurocystidia (P).

$\times 7-10 \mu\text{m}$, 4-spored. Cheilocystidia $30-65 \times 6-11 \mu\text{m}$, cylindric to subclavate, often curved, thin-walled, with yellow-brown plasmatic pigment (frequently clumped in plasma), crystals absent. Pleurocystidia $35-50(-75) \times 8-14 \mu\text{m}$, subclavate to lageniform, thick-walled at apex, hyaline, with resinous incrustation, scattered. Cuticle a cutis of repent cylindric hyphae ($6-10 \mu\text{m}$ diam.), membranes encrusted with brownish pigment. Clamp connections present.

HABITAT.—On bare soil. Singapore.

MATERIAL.—SINGAPORE: Botanical Gardens, 4.IX.1937, *Corner* (ZT 78/50, holotype); Botanical Gardens, 7.XI.1934, *Corner* (ZT 78/51).

This species is characterized by the clavate-cylindrical cheilocystidia and the shape of the spores. The spore-ornamentation is intermediate between the simple-gibbous and the crested-bifurcate type of projections.

IV. Sect. CORTINATAE Kühner & Boursier 1932

10. *Astrosporina squarrosolutea* Corner & Horak, *spec. nov.*—Fig. 10

Pileo –70 mm, umbonato vel convexo, luteo, squamis recurvatis conspicuisque concoloribus vel aurantiacis oblecto. Lamellis adnatis vel adnato-decurrentibus, luteis dein pallide fuscis. Stipite –75 × 8 mm, cylindrico vel attenuato apicem versus, submarginato, luteo, fibrilloso, zonis fibrillosis aurantiacisque e velo ornato. Sporis 8–10 × 5–6 μ m, nodulosis. Cystidiis fusioideis, interdum incrustatis. Ad terram in silvis. Malaya. Typus: ZT 78/52.

Pileus 30–70 mm, convex or plane with umbonate centre; bright yellow, becoming pale brown over the disc; centre covered with stout, erect, conic, fibrillose scales (up to 4 mm high, 1–2 mm wide), coarsely fibrillose towards the strongly inrolled margin; dry, veil remnants consisting of orange fibrils. Lamellae adnate to adnato-decurrent, often subsinuate, crowded (L–25, –3); light yellow turning to pale yellow-fuscous, edge concolorous, even. Stipe 40–75 × 3.5–8 mm, cylindrical or attenuated towards apex, stout, submarginate base up to 16 mm wide; yellow; apex pruinose, towards base covered with conspicuous, orange, appressed, floccose-fibrillose girdles of the veil, distinct cortina absent; dry, solid, single in groups. Context pale yellow in stipe, orange beneath cuticle. Odour strong, not spermiatic.

Spores 8–10 × 5–6 μ m, nodulose, knobs hemispheric to subconic, yellow-brown. Basidia 18–26 × 5–7 μ m, 4-spored. Cheilo- and pleurocystidia 30–60 × 14–25 μ m, broadly fusoid to lageniform, metuloid, hyaline, rarely with small crystals or resinous incrustation. Caulocystidia not distinctive. Cuticle a cutis or trichoderm of cylindrical hyphae (4–10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest under oak. Malaysia.

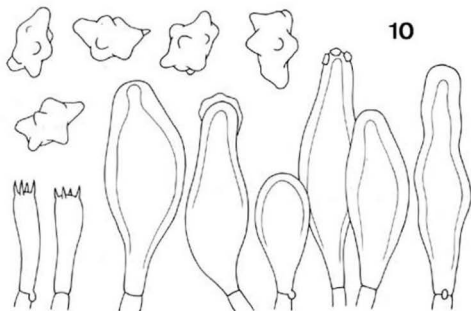


Fig. 10: *A. squarrosolutea* Corner & Horak (type): spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—MALAYSIA: Pahang, Cameron Highlands, 1500 m, 31.VII.1934, *Corner* (ZT 78/52, holotype).

This yellow species is well characterized by its large size, the scaly pileus and the orange fibrillose veil remnants on the stipe. *A. squarrosolutea* is a close relative of *A. lutea* (Kobay. & Hongo, 1952) whose spores, however, are distinctly smaller.

11. *Astrosporina luteifolia* Horak, *spec. nov.*—Fig. 11

Pileo —30 mm, convexo-campanulato, luteo squamis brunneis squarrosis oblecto, sicco. Lamellis adnatis, luteis dein ochraceis. Stipite —45 × —5 mm, cylindraceo, luteo, squamis brunneis e velo cingulato, sicco. Caro lutea. Odore ingrato. Sporis 7,5–10 × 5,5–7,5 μm, nodulosis. Cystidiis lageniformibus, incrustatis, ad apicem metuloideis, luteolis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 73/218.

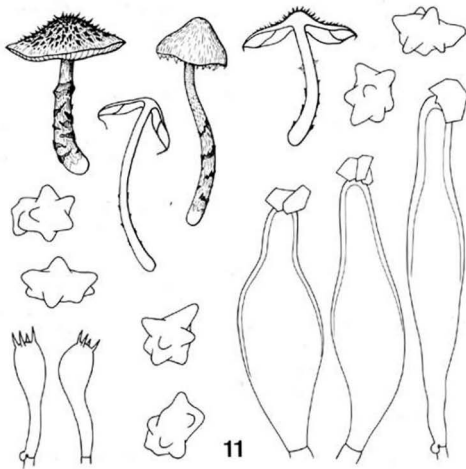


Fig. 11: *A. luteifolia* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

Pileus -30 mm diam., hemispheric when young, becoming convex or campanulate; yellowish, covered with light brown or dark brown fibrills or (in old carpophores) squarrose scales especially at the umbo, fibrillose-rimose towards the margin, with yellow-brown patches and squamules from the veil, dry. Lamellae adnate to adnexed, ventricose, crowded; deep yellow turning ochraceous or yellow-beige, with white fimbriate edges. Stipe 20-45 x 3-5 mm, cylindrical, equal or slightly attenuated above; yellow, towards the base covered with several incomplete yellow-brown zones or girdles from the veil; dry, apically inconspicuously pruinose, solid, single in groups. Context yellow (in pileus and stipe!). Odour unpleasant, fishy.

Spores 7.5-10 x 5.5-7.5 μ m, nodulose, knobs conspicuous, brown. Basidia 25-30 x 8-9 μ m, 4-spored. Cheilo- and pleurocystidia 55-85 x 10-20 μ m, cylindrical to slender fusoid, hyaline to yellowish, thick-walled near the encrusted apex. Caulocystidia none. Cuticle a cutis consisting of cylindrical hyphae (5-10 μ m diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*, *N. grandis*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 11.V.1973, Horak (ZT 73/218, holotype).

This striking species is found under *Nothofagus* spp. in temperate montane forests in Papua New Guinea (above 2000 m a.s.l.). Due to the yellow lamellae and the brown appressed zones of veil on the yellow stipe *A. luteifolia* is readily recognized in the field.

12. *Astrosporina cingulatipes* Corner & Horak, *spec. nov.*—Fig. 12

Pileo -20 mm, convexo, umbonato-gibboso, umbrino, minute squarroso. Lamellis adnexis, umbrinis, albofimbriatis. Stipite -40 x -2 mm, cylindric, pileo concolori, zonis albis subperonatis e velo instructo. Sporis 7-8.5 x 5.5-6.5 μ m, nodulosi. Cystidiis vesiculososo-subfusoidis, tenuitunicatis, haud incrustatis. Ad terram in silvis. Singapore. Typus: ZT 78/53.

Pileus 10-20 mm diam., conic becoming convex or plane with umbonate or gibbous centre; brown to umber, disc darker, paler towards the striate-sulcate margin; centre covered with squarrose, small, recurved scales, appressedly fibrillose towards margin, dry, fibrillose veil remnants present in young specimens. Lamellae adnexed, subventricose, rather crowded (L -20, -3); concolorous with pileus, edge albofimbriate. Stipe 30-40 x 1.5-2 mm, cylindrical, equal, slender; concolorous with pileus or bay-rufous, covered with several white fibrillose or subperonate belts of the veil, apex subpruinose; dry, hollow, single in groups. Context brown. Odour not distinctive.

Spores 7-8.5 x 5.5-6.5 μ m, nodulose, knobs hemispheric to subconic, yellow-brown. Basidia 20-25 x 6-7 μ m, 4-spored. Cheilocystidia 30-40 x 14-20 μ m, vesiculose or subfusoid, thin-walled, hyaline, occasionally with yellow-brown (KOH) inclusion, crystals none. Pleuro- and caulocystidia absent. Cuticle a cutis or trichoderm of bundled cylindrical hyphae (5-10 μ m diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil in forest. Singapore.

MATERIAL.—SINGAPORE: Botanic Garden, Garden's Jungle, 15.III.1943, Corner (ZT 78/53, holotype).

A. cingulatipes is close to *A. lanuginosa* (Fr.) Schroeter and its related species. The Malayan fungus is separated from its European relatives by the white fibrillose veil which remains as distinct (and often peronate) belts on the stipe.

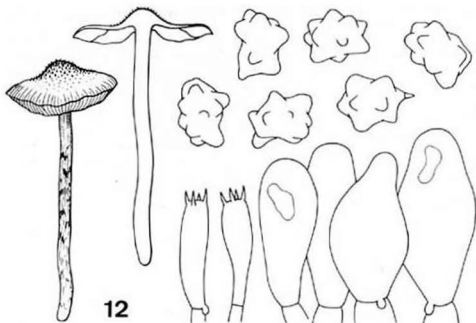


Fig. 12: *A. cingulatis* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia.

13. *Astrosporina punctatosquamosa* Horak, *spec. nov.*—Fig. 13

Pileo —20 mm, convexo campanulato, ochraceobrunneo, squamis minutis brunneis oblecto, marginem versus fibrilloso. Lamellis adnatis vel emarginatis, argillaceis. Stipite —45 × 2 mm, cylindraceo, brunneolo, ad apicem fibrillis albis appressis e velo, basim versus fibrillis brunneolis cingulato, sicco. Odore *Pelargonii* in mentem revocante. Sporis 6–8 × 5.5–7 μm, nodulosi. Cystidiis dimorphis, pleurocystidiis fusoidis, metuloideis, incrustatis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 72/445.

Pileus —20 mm diam., hemispheric when young becoming umbonate-convex or campanulate; ochraceous-brown to brown, densely covered with compact wart-like dark brown squamules especially at the disc, fibrillose towards the obscurely striate margin, margin attached with white fibrillose veil remnants in young specimens, dry. Lamellae adnate or emarginate, ventricose, crowded (L 14–20, –5); whitish to beige, turning brownish (with ochraceous tints), albosimbriate edges. Stipe 30–45 × 2 mm, cylindrical, equal, slender; beige to brownish, at apex densely covered with white fibrils from cortina, towards the base with several brownish incomplete girdles from veil; dry, hollow, single in groups. Context brownish. Odour strong, pleasant (like squashed leaves of *Pelargonium*).

Spores 6–8 × 5.5–7 μm, ovoid in profile, numerous hemispheric knobs, brown. Basidia 22–32 × 8–9 μm, 4-spored. Cheilocystidia 20–30 × 10–16 μm, clavate to vesiculose, thin-walled, not encrusted. Pleurocystidia 40–65 × 15–25 μm, fusoid, metuloid, encrusted, hyaline to yellowish (in KOH). Cuticle a trichoderm of bundled cylindrical short cells (6–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil under *Lithocarpus* and *Castanopsis*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 5.V.1972, Horak (ZT 72/445, holotype); Bulolo, Manki, 9.IV.1973, Horak (ZT 73/155); Bulolo, Manki, 30.XI.1972, Horak (ZT 72/675).

This well-defined species of *Astrosporina* is common on soil in the *Castanopsis-Lithocarpus*-forests of Papua New Guinea. The minute punctate squamules on the pileus, the strong odour of *Pelargonium* and the specific spores distinguish this taxon from other members of *Astrosporina*.

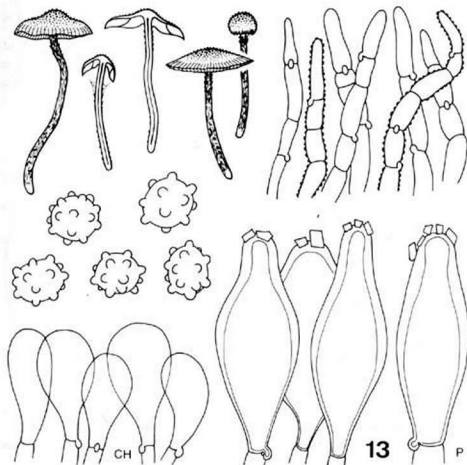


Fig. 13: *A. punctatosquamosa* Horak (type): carpophores, spores, cheilocystidia (CH), pleurocystidia (P), cuticle.

14. *Astrosporina incognita* Horak, *spec. nov.*—Fig. 14

Pileo -20 mm, e conico-convexo campanulato, aetate unbonato-plano, dilute brunneo vel brunneo, ad marginem velo albo instructo, squamis minutis brunneis oblecto. Lamellis emarginato-adnexis, ex albidio-argillaceis. Stipite -35 x -3 mm, cylindraco, pileo concolori, fibrillis albis e velo dense oblecto, sicco. Odore grato. Sporis 6-9 x 5-7,5 μ m, nodulosis. Cheilocystidiis clavatis vel vesiculosus, crassetunicatis, haud incrustatis. Pleurocystidiis fusoides, metuloideis, incrustatis. Caulocystidiis praesentibus. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/472.

Pileus -20 mm diam., convex when young, soon becoming conic and later campanulate, knob-like papilla always conspicuous; light brown, hazel brown, dark brown; centre densely

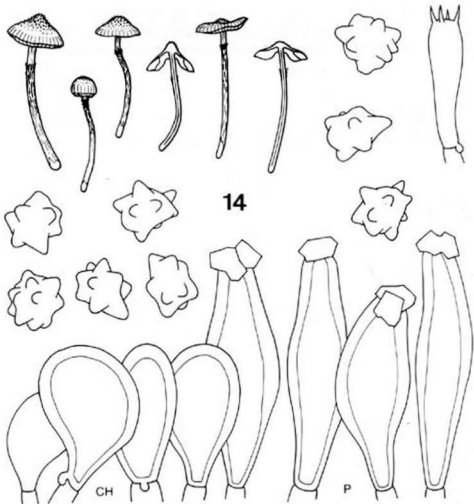


Fig. 14: *A. incognita* Horak (type): carpophores, spores, basidium, cheilocystidia (CH), pleurocystidia (P).

covered with concolorous squamules or minute scales, fibrillose towards the margin with (in young carpophores) white fibrils from the veil; striate or not, dry, occasionally hygrophanous. Lamellae emarginate-adnexed, ventricose, crowded (L 8–22, –3); whitish, beige turning argillaceous, with white, fimbriate edges. Stipe 20–35 × –2 mm, cylindric, equal, rarely base swollen; concolorous with pileus or paler, densely covered with white or brownish coarse fibrils or squamules from the veil, occasionally with distinct fibrillose belt from cortina; dry, fragile, hollow, single or in clusters. Context light brown. Odour pleasant, like fruit or flowers of *Pirola*, especially in young specimens.

Spores 6–9 × 5–7.5 μm, nodulose, brown. Basidia 22–30 × 6–9 μm, 4-spored. Cheilocystidia 20–45 × 10–24 μm, clavate to vesiculose, thick-walled, not encrusted. Pleurocystidia 40–65 × 13–18 μm, fusoid, metuloid, encrusted, hyaline to yellowish. Caulocystidia inconspicuous, cylindric or clavate-fusoid, thin-walled, rarely encrusted. Cuticle a cutis or trichoderm of short cylindric hyphae (5–15 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests, rarely also under *Castanopsis*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Western Highlands, Mt. Hagen, Kuna, 20.V.1972, Horak (ZT 72/472, holotype); Eastern Highlands, Mt. Michael, Frigano, Okapa track, 4.XII.1971, Horak (ZT 71/357); Eastern Highlands, Mt. Michael, Frigano, Hut track, 31.XII.1971, Horak (ZT 71/475); Morobe district, Wau, Mt. Kaindi, 2400 m, 28.XII.1971, Horak (ZT 71/460); Eastern Highlands, Goroka, Mt. Otto, 13.I.1972, Horak (ZT 72/72); Morobe district, Wau, Mt. Kaindi, 5.X.1972, Horak (ZT 72/587).

In the *Nothofagus* forests of Papua New Guinea *A. incognita* represents the most common member of *Astrosporina*. Although a variable fungus, the scaly pileus and the particular smell distinguish this rather small and brown coloured species from others also found in the same biotop.

15. *Astrosporina paracerasphora* Horak—Fig. 15

Astrosporina paracerasphora Horak in N. Zealand J. Bot. 15: 731. 1977.

Description of the collection from Sabah (Borneo):

Pileus 10–30 mm diam., umbonate, becoming plane; sepia brown turning paler with age, with whitish fibrils along the margin; densely squarrose-squamulose, rimose towards the margin, dry.

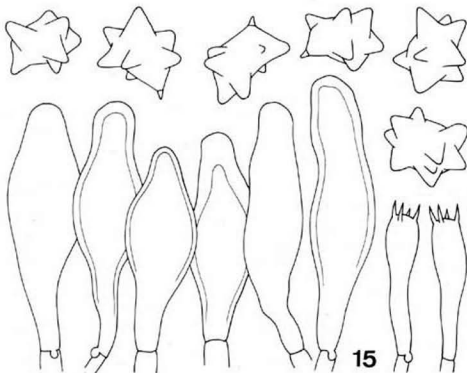


Fig. 15: *A. paracerasphora* Horak (ZT 78/54): spores, basidia, cheilo- and pleurocystidia.

Lamellae adnexed, crowded (L 12–18, –3); pale argillaceous becoming pallid fawn, edge albofimbriate. Stipe 20–30 × 2–5 mm, subcylindric; pale brown, covered with white cottony fibrils, dry. Context brown. Odour not distinctive.

Spores 9–11 × 7.5–8.5 μm, nodulose to substellate, conic knobs well pronounced, yellow-brown. Basidia 30–36 × 10 μm, 4-spored. Cheilo- and pleurocystidia 40–70 × 12–16 μm, fusoid to lageniform, thin-walled or metuloid (at least towards apex), hyaline, crystals absent or scattered. Caulocystidia 40–100 × 6–13 μm, cylindric to subfusoid, thin-walled (1–2 μm diam.), with brown (KOH) membranous pigment. Clamp connections present.

HABITAT.—On rotten wood. Sabah; New Zealand (type).

MATERIAL.—NEW ZEALAND: Westcoast, Lake Haupiri, Kopara, 8.XII.1967, Horak (PDD 27108, holotype).—SABAH (BORNEO): Mt. Kinabalu, Bembangan River, –1800 m, 25.II.1964, Corner (RSNB 5457 B, ZT 78/54).

Astrosporina paracerasphora Horak was originally described from New Zealand where this fungus grows on rotten wood of *Nothofagus* (Fagaceae). This species is closely related to the European *A. lanuginosa* (Fr.) Schroeter and *A. cerasphora* (Singer) from Argentina and Chile. Both fungi also are reported to inhabit rotten moss-covered stumps and logs.

16. *Astrosporina neuumbrina* (Y. Kobay.) Horak, *comb. nov.*—Fig. 16

Inocybe neuumbrina Y. Kobay. in Nagaoa 2: 106. 1952 (basionym).

Description of the material from Papua New Guinea:

Pileus –20 mm diam., hemispheric when young soon conico-convex or umbonate to campanulate; pale brown to dark brown, often with distinct reddish or olive tint at centre, paler towards estriate margin; smooth at disc, fibrillose or rimose (occasionally also split) at margin; dry, subviscid when moist, fibrillose veil remnants absent. Lamellae adnexed to emarginate-adnate, ventricose, crowded (L –20, –3); whitish soon turning argillaceous or pale brown, edge albofimbriate. Stipe –30 × –2 mm, cylindric, base slightly swollen or bulbous (up to 3.5 mm diam.) but not marginate; pale yellow to brownish, darker towards base, densely covered with white or concolorous fibrils especially above base, apex pruinose; dry, cortina absent, solid, single in groups. Context pale brown. Odour not distinctive.

Spores 6–7.5 × 4.5–6 μm, angular to subnodulose, knobs often inconspicuous, yellow-brown. Basidia 20–28 × 6–8 μm, 4-spored. Cheilo- and pleurocystidia 40–60 × 10–18 μm, fusoid, thin-walled on edge of lamella, metuloid at apex in pleurocystidia, crystals small and rare, usually absent. Distinctive caulocystidia absent. Cuticle a cutis of cylindric, slightly gelatinized hyphae (2–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Nothofagus*, *Castanopsis-Lithocarpus*). Japan (type), Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 1.V.1972, Horak (ZT 72/428); Wau, Mt. Kaindi, 2300 m, 11.V.1973, Horak (ZT 73/213).

The material gathered in Papua New Guinea agrees in all essential characters with the type described from Japan. *A. neuumbrina* closely approaches *A. subclavata* (New Zealand) and *A. umbrina* or *A. brevispora* respectively (if not conspecific with *A. umbrina*?; Europe).

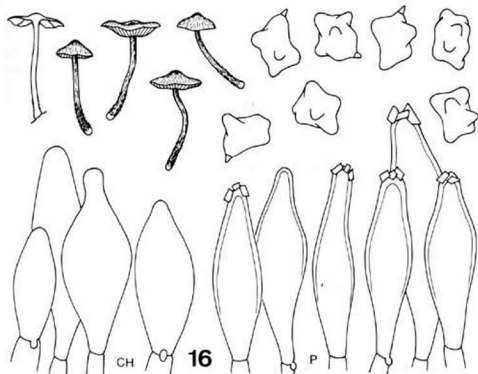


Fig. 16: *A. neoumbrina* (Y. Kobay.) Horak (ZT 72/428): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

17. *Astrosporina papillata* Horak, *spec. nov.*—Fig. 17

Pileo -25 mm, conico convexo semper papilla conica instructo, brunneo, squamis concoloribus dense oblecto. Lamellis adnatis, ex argillaceo brunneis. Stipite -45 × -2 mm, cylindraceo, pileo concolori, fibrillis ochraceis dense instructo. Odore nullo. Sporis 10-12 × 7,5-8,5 μm, nodulosus. Cystidiis subfusoides, crassetunicatis, incrustatis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 72/43.

Pileus -25 mm diam., in young and aged carpophores with prominent conic papilla, convex to expanded; light to dark brown, date brown, densely covered with concolorous minute sub-squarrose scales, fibrillose towards the striate margin, membranous, dry, obvious veil remnants absent. Lamellae adnate, occasionally submarginate, argillaceous turning brown, white fimbriate edges; crowded (L 10-14, -3), ventricose. Stipe 25-45 × -2 mm, cylindric, equal, slender, coloured like pileus or paler, densely covered with light ochraceous fibrils especially towards the base, conspicuous cortina absent, dry, hollow, single, in groups. Context brownish. Odour not distinctive.

Spores 10-12 × 7,5-8,5 μm, nodulose, with conspicuous conic knobs, brown. Basidia 28-32 × 8-9 μm, 4-spored. Cheilocystidia 20-30 × 12-17 μm, clavate, thin-walled, not encrusted. Pleurocystidia 40-50 × 12-15 μm, fusoid, metuloid (-3,5 μm diam.), encrusted, hyaline to yellowish. Caulocystidia like cheilo- and pleurocystidia. Cuticle a cutis or trichoderm consisting of cylindrical hyphae (8-12 μm diam.), encrusted with brown pigment. Clamp connections numerous.

HABITAT.—On soil under *Castanopsis-Lithocarpus*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Eastern Highlands, Kainantu, Okapa Road, 7.I.1972, Horak (ZT 72/43, holotype).

This species has the appearance of *A. paracerasphora* Horak, *A. incognita* Horak or *A. punctatosquamosa* Horak all described from Papua New Guinea. However, the rather large spores with conspicuous knobs definitely separate *A. papillata* from the three taxa mentioned.

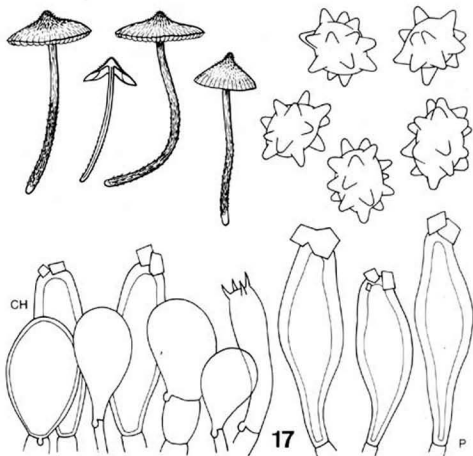


Fig. 17: *A. papillata* Horak (type): carpophores, spores, basidium and cheilocystidia (CH), pleurocystidia (P)

18. *Astrosporina corneri* Horak, *spec. nov.*—Fig. 18

Pileus 50 mm, umbonato-convexo, violaceo-brunneo, rimoso. Lamellis adnexis, ochraceis. Stipite 50 × 8 mm, cylindrico, violaceo, fibrilloso. Sporis 7–8 × 5.5–6 μm, nodulosi. Cystidiis lageniformibus, tenuitunicatis, haud incrustatis. Ad terram in silvis. Sabah. Typus: ZT 78/55.

Pileus 50 mm diam., convex or plane, with acute umbo; violaceous or violaceous-brown; radially fibrillose becoming rimose, dry, veil remnants absent. Lamellae adnexed, crowded (L-

24, -3); pale yellow to ochraceous, edge concolorous. Stipe 50×8 mm, cylindrical, equal, stout; pale violaceous or pale lilaceous, becoming pale yellow; fibrillose-tomentose towards base, pruinose at apex; dry, solid, single in groups. Context whitish, pale brown in stipe. Odour not strong, somewhat like corn.

Spores $7-8 \times 5.5-6 \mu\text{m}$, nodulose, knobs hemispheric, not well pronounced, yellow-brown. Basidia $26-35 \times 7-9 \mu\text{m}$, 4-spored. Cheilo- and pleurocystidia $50-70 \times 12-20 \mu\text{m}$, broadly fusoid to lageniform, membrane thin-walled, hyaline, apex often with yellowish resinous incrustation, crystals absent. Caulocystidia $90 \times 15 \mu\text{m}$, cylindrical to subfusoid, thin-walled, hyaline. Cuticle a cutis of cylindrical hyphae ($3-8 \mu\text{m}$ diam.), encrusted with yellow-brown pigment. Clamp connection present.

HABITAT.—On soil in forest. Sabah (1700 m).

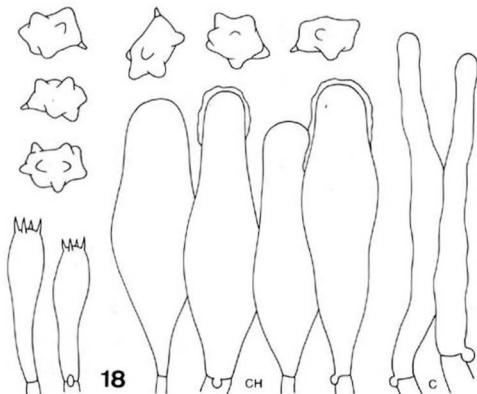


Fig. 18: *A. corneri* Horak (type): spores, basidia, cheilo- and pleurocystidia (CH), caulocystidia (C).

MATERIAL.—SABAH (BORNEO): Mt. Kinabalu, Mesilau River, 20.IV.1964, Corner (RSNB 8367, ZT 78/55, holotype).

Due to the colour and the shape of the carpophores this lilac species recalls *A. magnifica* which grows under *Nothofagus* in montane forest of Papua New Guinea. Microscopically, however, the two taxa are well distinguished by shape and size of the spores and the cheilocystidia.

This particular species is named after Prof. E. J. H. Corner whose numerous collections of *Astrosporina* added much further information about occurrence and distribution of this genus in Indomalaya and Australasia.

19. *Astrosporina magnifica* Horak, *spec. nov.*—Fig. 19

Pileo 40 mm, convexo campanulato, aetate plano-subdepresso, castaneo-umbrino, squarroso marginem versus rimoso. Lamellis adnato-subdecurrentibus, vinaceobrunneis dein castaneis. Stipite 60 × 7 mm, cylindraceo, pileo concolori, fibrillis castaneis squarrosis oblecto, siccio. Odore nullo. Sporis 6–8,5 × 5,5–6,5 μm, angulato-nodulosis. Cystidiis clavato-vesiculososis, tenuitunicatis, pigmento castaneo impletis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/747.

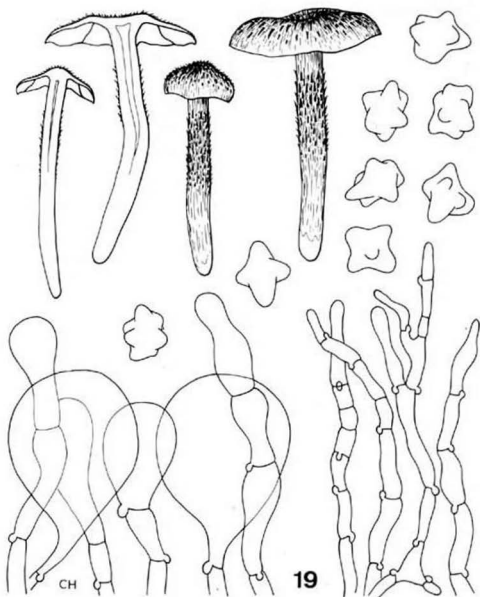


Fig. 19: *A. magnifica* Horak (type): carpophores, spores, cheilocystidia (CH), cuticle.

Pileus 15–40 mm diam., hemispherical becoming convex or campanulate, later expanded and centre depressed; dark brown to chestnut brown; covered with coarse squarrose scales, towards the margin fibrillose-rimose, veil remnants absent, dry. Lamellae broadly adnate to subdecurrent, crowded; wine red-brown turning red-brown or even dark brown, edges darker and fimbriate. Stipe 35–60 × 5–7 mm, cylindrical, occasionally attenuated towards the base, terete; concolorous with pileus or black-brown; covered with coarse concolorous fibrils or (nearing the apex) squarrose scales, veil remnants absent, dry, hollow, single in groups. Context wine red or lilac-red all over. Chemical reactions: KOH on cuticle — wine red. Odour none.

Spores 6–8.5 × 5.5–6.5 μ m, angular to nodulose, occasionally cruciform, brownish. Basidia 45–65 × 7–10 μ m, 4-spored. Cheilocystidia 20–70 × 12–35 μ m, clavate to vesicular, thin-walled, not encrusted, in KOH with conspicuous red-brown plasmatic pigment. Pleuro- and caulocystidia none. Cuticle a trichoderm of short cylindrical hyphae (5–7 μ m diam.), with in KOH red-brown plasmatic pigment, membranes thin, smooth. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 4.I.1973, Horak (ZT 72/747, holotype).

Among all species studied in this contribution *A. magnifica* is the most outstanding representative. The fungus is associated with *Nothofagus* (Papua New Guinea) and is readily recognized by the following characters: scales on pileus and upper portion of stipe, wine red context after bruising, small spores and red-brown (KOH) plasmatic pigment in the cheilocystidia and cuticular hyphae.

20. *Astrosporina aberrans* Horak, *spec. nov.*—Fig. 20

Pileo 30 mm, brunneo cervino, squamis squarrosis obtecto, sicco. Lamellis adnexis vel subliberis, brunneis. Stipite 75 × 3 mm, cylindraceo, pileo concolori, apicaliter pruinoso basim versus squamoso. Odore nullo. Sporis 11–13.5 × 8–10 μ m, stellato-nodulosi. Cystidiis fusoideo-capitatis, tenuitunicatis, haud incrustatis, hyalinis. Ad terram in silvis nothofagineis. Nova Guinea. Typus: ZT 72/361.

Pileus 30 mm diam., conic or campanulate with conic umbo; date brown to dark brown; completely covered with small squarrose concolorous scales, coarsely fibrillose towards the inrolled margin; dry, veil remnants absent. Lamellae adnexed to almost free; crowded, not ventricose; brown like pileus, with white, fimbriate edges. Stipe 40–75 × 2–3 mm, cylindrical, equal, slender; concolorous with pileus or paler; apically pruinose, towards the base densely covered with brown flakes and squamules; veil remnants absent, dry, solid, single in groups. Context brown. Odour not distinctive.

Spores 11–13.5 × 8–10 μ m, nodulose, with conspicuous conic knobs, brown. Basidia 25–34 × 10 μ m, 2-spored. Cheilo- and pleurocystidia 40–80 × 10–17 μ m, fusoid-capitate, apex pestle-like (8–14 μ m diam.), thin-walled, hyaline, not encrusted. Caulocystidia absent. Cuticle a trichoderm consisting of short cylindrical hyphae (5–8 μ m diam.), encrusted with brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests (*N. carrii*, *N. grandis*). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Wau, Mt. Kaindi, 2400 m, 2.IV.1972, Horak (ZT 72/361, holotype).

Macroscopically *A. aberrans* is reminiscent of several species described above. However, the large stellate spores and the thin-walled and often capitate cheilocystidia define and separate this fungus from all others known so far. Among temperate species of *Astrosporina* from the Northern hemisphere the closest relative is thought to be *A. longicystis* (Atk.).

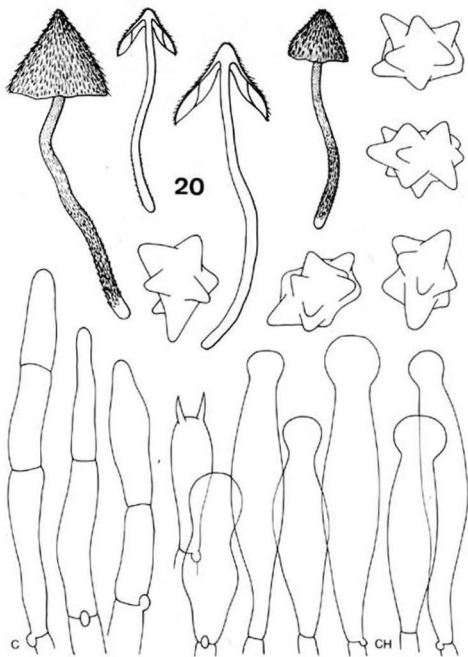


Fig. 20: *A. aberrans* Horak (type): carpophores, spores, basidium with cheilo- and pleurocystidia (CH), caulocystidia (C).

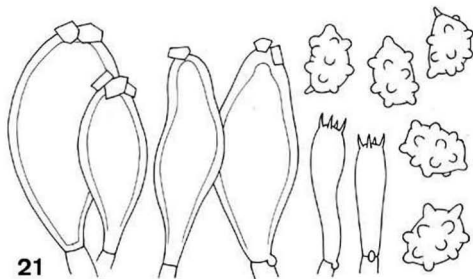


Fig. 21: *A. exigua* Clel. (type): spores, basidia, cheilo- and pleurocystidia.

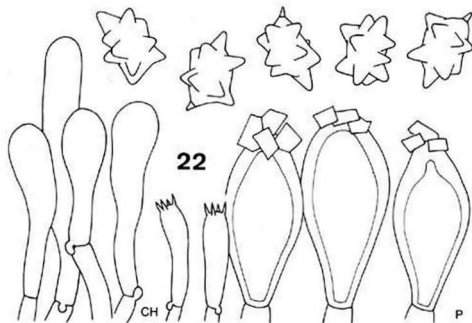


Fig. 22: *A. discissa* Clel. (type): spores, basidia, cheilocystidia (CH), pleurocystidia (P).

21. *ASTROSPORINA IMBRICATA* Clel.—Fig. 23

Astrosporina imbricata Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.

Inocybe murrayana Clel. l.c.: 192. 1933.

MISAPPLIED NAME.—*Astrosporina asterospora* (Quél.) sensu Clel., Toadstools and mushrooms of South Australia: 118. 1934.

Nothing can be added to the macroscopic characters already published.

Spores $9-12 \times 5-6.5 \mu\text{m}$, ellipsoid, with low and rather indistinct knobs or angles (like spores of *Entoloma* spp.), brown, thin-walled membrane, germ pore absent. Basidia $28-35 \times 8-9 \mu\text{m}$, 4-spored. Cheilo-, pleuro- and caulocystidia $50-75 \times 12-20 \mu\text{m}$, lageniform, metuloid, membrane hyaline or pale brown, rarely without crystals, numerous. Cuticle a cutis or trichoderm of cylindrical hyphae ($6-12 \mu\text{m}$ diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil. South Australia.

MATERIAL.—AUSTRALIA: South Australia: Kinchina, 8.VI.1925, Cleland (ADW 12687, holotype); Kinchina, 8.VI.1925, Cleland (ADW 12673, holotype of *Inocybe murrayana* Clel.); Mt. Lofty, National Park, 12.IV.1917, Cleland (ADW 12691, auth. mat. of *Astrosporina asterospora* (Quél.) sensu Clel.).

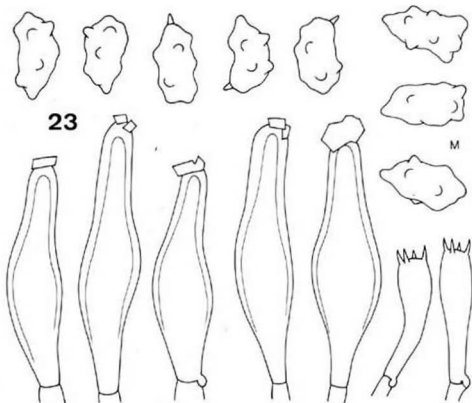


Fig. 23: *A. imbricata* Clel. (type): spores, basidia, cheilo- and pleurocystidia; spores of *Inocybe murrayana* Cleland (type) (M).

This species is recognized best by the particular spores which remind of those known for the New Zealand *A. straminea* Horak (1977). Concerning the shape of the spores several European taxa are related to the Australian fungus, viz. *A. umbrina* (Bres.) Rea, *A. commixta* (Bres.) and *A. renyi* (Berk. & Br.) Rea.

V. Sect. MARGINATAE Kühner 1933

22. *Astrosporina alboviscida* Horak, *spec. nov.*—Fig. 24

Pileo -25 mm, convexo campanulato, albo, glutinoso, fibrilloso-rimoso. Lamellis griseis dein argillaceis, adnexis. Stipite -40 × -2 mm, cylindraco, albo, pruinoso, sicco. Odore spermatico. Sporis 6-7,5 × 5,5-6,5 μm, nodulosi. Cystidiis cylindraco-fusoideis, metuloideis, incrustatis. Ad terram in silvis virgineis. Nova Guinea. Typus: ZT 72/515.

Pileus -25 mm diam., convex when young, becoming broadly umbonate-expanded to campanulate; white; glutinous, viscid even in dry weather; smooth at centre, fibrillose-rimose towards the margin, often splitting. Lamellae adnexed to almost free, ventricose, crowded; grey turning argillaceous to clay brown; with white fimbriate edges. Stipe 20-40 × -2 mm, cylindric, equal, slender; white; densely pruinose all over, veil remnants absent; dry, solid, single in groups. Context white. Odour spermatic.

Spores 6-7,5 × 5,5-6,5 μm, nodulose, knobs conic or often saddle-shaped, ovoid in profile, brown. Basidia 22-26 × 8-9 μm, 4-spored. Cheilo- and pleurocystidia 30-50 × 16-20 μm, cylindric to subfusoid, thick-walled (-5 μm diam.), encrusted, hyaline. Caulocystidia like cheilocystidia, 50-65 × 20-25 μm. Cuticle a cutis consisting of gelatinized hyphae (2-4 μm diam.), cells of subcutis -15 μm diam.; membranes smooth or inconspicuously encrusted with pigment. Clamp connections numerous.

HABITAT.—On soil in coastal rain forest, under *Anisoptera* sp. (Dipterocarpaceae) and *Intsia* sp. (Leguminosae). Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Lae, Oomsis, 4.VII.1972, R. Johns (ZT 72/515, holotype).

Among the Papua New Guinean representatives of *Astrosporina* sect. *Marginatae* this species is immediately recognized by its white colour, spermatic odour, particular cystidia and spores with conic and crested projections.

23. *Astrosporina granuloseps* Horak, *spec. nov.*—Fig. 25

Pileo -10 mm, campanulato papilla conica semper instructo, brunneo pallidiori marginem versus, squamis minutissimis oblecto. Lamellis adnexis, argillaceis vel ferrugineo-ochraceis. Stipite -25 × 1 mm, cylindraco, dilute rubrobrunneo, pruinoso, sicco. Odore ingrato. Sporis 6,5-7,5 × 5-6 μm, nodulosi. Cheilocystidiis clavatis, pleurocystidiis fusoideis, metuloideis, incrustatis. Ad terram in silvis quercuum. Nova Guinea. Typus: ZT 73/239.

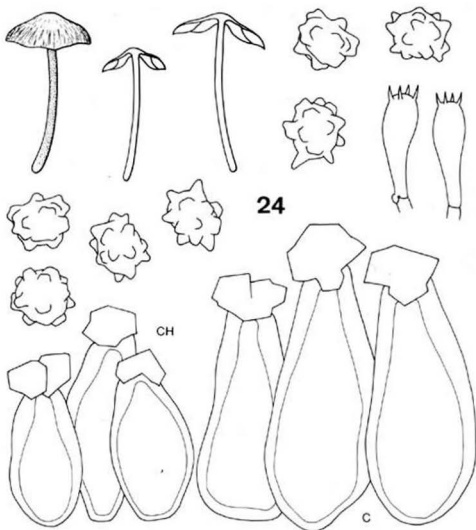


Fig. 24: *A. alboviscida* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia (CH), caulocystidia (C).

Pileus—10 mm diam., campanulate, with conspicuous conic papilla or umbo; yellow-brown to dark brown at centre, paler towards the margin; covered with minute concolorous squamules, scurfy, granular; dry, but viscid when wet, aged carpophores micaceous, shiny, veil remnants absent. Lamellae adnexed, ventricose, L 8–12, –3; light rust brown, turning rust ochraceous, later deep brown, white fimbriate edges. Stipe—25 × 1 mm, cylindric, equal, slender; yellow-brown to reddish brown; pruinose for whole length, towards base often also with white fibrils; dry, veil remnants absent, solid, single in groups. Context brownish, reddish brown in stipe. Odour pleasant at first; changing to spermiatic.

Spores 6.5–7.5 × 5–6 μm, nodulose, knobs conspicuous, one big conic projection at apical end, brown. Basidia 20–25 × 7–9 μm, 4-spored. Cheilocystidia 20–35 × 10–20 μm, clavate or vesiculose, thin-walled, not incrustated, in clusters. Pleurocystidia (and caulocystidia) 35–60 × 10–

18 μ m. fusoid, thick-walled, encrusted, yellow (in KOH). Cuticle consisting of globose, fusoid or cylindric irregularly arranged cells, thin-walled membranes, slightly gelatinized, encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in *Castanopsis-Lithocarpus* forests. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 30.V.1973, Horak (ZT 73/239, holotype); Morobe district, Bulolo, Manki, 16.V.1973, Horak (ZT 73/228).

This peculiar species is recognized best by the small size of the brown carpophores, spores and cystidia. The most distinctive character, however, is the epithelium-like cuticle which is rather unique among the taxa of *Astrosporina* described so far.

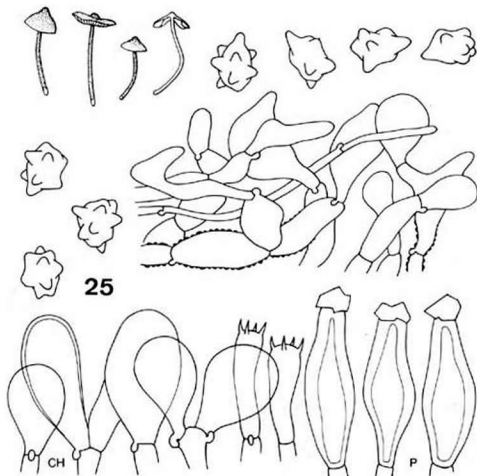


Fig. 25: *A. granuloseps* Horak (type): carpophores, spores, basidia, cheilocystidia (CH), pleurocystidia (P), cuticle.

24a. *Astrosporina olivaceonigra* Horak, *spec. nov.*—Fig. 26

Pileo —40 mm lato, e conico convexo campanulato, argillaceo, nigroolivaceo tinctu, fibrilloso, sicc. Lamellis adnexis vel subliberis, argillaceis. Stipite —45 × —2 mm, cylindraceo, pileo concolori, pruinoso. sicc. Odore spermatico. Sporis 8–9,5 × 5,5–6,5 μm, nodulosi. Cystidiis fusoidis, metuloideis, incrustatis. Ad terram in silvis *Castanopsisidis*. Nova Guinea. Typus: ZT 72/192.

Pileus —30 mm diam., conico-convex becoming campanulate or broadly umbonate-expanded; disc olive-black, argillaceous towards the estriate margin; fibrillose, slightly rimose when old; dry, without veil remnants. Lamellae adnexed to almost free, ventricose, crowded (L 10–14, —5); beige when young, turning argillaceous or brownish, white fimbriate edges. Stipe 30–45 × —2 mm, cylindric, equal, slender; beige to light brownish; pruinose over whole length, no veil remnants; dry, single in groups. Context light brownish. Odour spermatic.

Spores 8–9,5 × 5,5–6,5 μm, nodulose, with pronounced conic knob at apical end, brown. Basidia 20–26 × 7–8 μm, 4-spored. Cheilo- and pleurocystidia 45–60 × 13–16 μm, subfusoid, metuloid (—3,5 μm diam.), encrusted, hyaline. Caulocystidia like cheilocystidia. Cuticle a cutis consisting of short cylindric hyphae (3–8 μm diam.), with conspicuous brown (in KOH) plasmatic (!) and encrusting pigment. Clamp connections numerous.

HABITAT.—On soil in *Castanopsis* forests. Papua New Guinea.

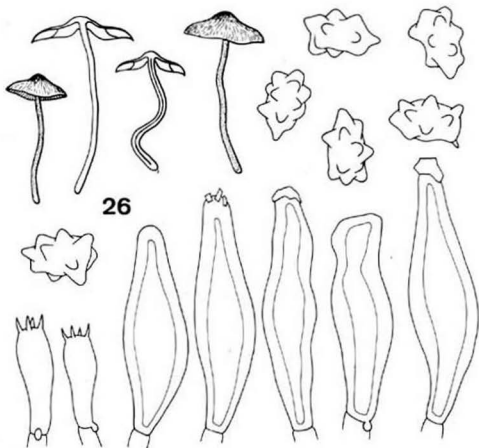


Fig. 26: *A. olivaceonigra* Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Heads Hump, 1200 m, 9.III.1972, Horak (ZT 72/192, holotype); Morobe district, Bulolo, Manki, 21.X.1971, Horak (ZT 71/196). Eastern Highlands, Goroka, Mt. Otto, 17.I.1972, Horak (ZT 72/102).

In Papua New Guinea this species is common in forests dominated by *Castanopsis*. It is distinguished by the rather delicate carpophores, the olive-black fibrillose pileus and the cylindrical pruinose stipe.

24b. *ASTROSPORINA OLIVACEONIGRA* forma *volvata* Horak, *f. nov.*

Differt a typo volva distincta minuta alba. Ad terram in silvis. Nova Guinea. Typus: ZT 73/128.

HABITAT.—On soil under *Castanopsis* - *Lithocarpus*. Papua New Guinea.

MATERIAL.—PAPUA NEW GUINEA: Morobe district, Bulolo, Manki, 1400 m, 29.III.1973, Horak (ZT 73/128, holotype of form); Morobe district, Bulolo, Heads Hump, 21.X.1971, Horak (ZT 71/180).

This form of *A. olivaceonigra* is characterized by the occurrence of rather conspicuous membranous veil remnants at the (occasionally submarginate) base of the stipe.

25. *Astrosporina angustifolia* Corner & Horak, *spec. nov.*—Fig. 27

Pileo -40 mm, hemisphaerico-convexo dein campanulato vel expando, albido, stramineo vel pallide argillaceo, conspicue fibrilloso-rimoso. Lamellis adnexis vel subliferis, angustis, densissimis, argillaceo-brunneis vel stramineis. Stipite -75 × -3 mm, cylindraceo, marginato-bulboso, pruinoso, pileo concolori. Odore spermatico. Sporis 6,5-9 × 4,5-6 μm, nodulosi. Cystidiis fusoides, metuloides, incrustatis. Ad terram in silvis (plerumque fagineis). Nova Guinea. Typus: ZT 72/406.

Pileus 10-40 mm diam., hemispheric or convex when young, becoming campanulate or umbonate-expanded; whitish, straw yellow, pale ochraceous or pale yellow-ochraceous, disc darker, turning argillaceous; smooth to innately fibrillose at centre, fibrillose to rimose towards (the often split) margin, occasionally squamulose around disc; dry, subviscid when moist, estriate, veil remnants absent. Lamellae adnexed to almost free, very narrow and very densely crowded, strongly intermixed (L -40, -15); whitish to yellowish turning argillaceous or brown, edge albofimbriate. Stipe 35-75 × 2-3 mm, cylindric, equal, slender, with small but distinct marginate bulb at base, cartilaginous; concolorous with pileus, pruinose all over; dry, solid, tough, veil remnants absent, single in groups. Context pale yellow-brown. Odour spermatic.

Spores 6,5-9 × 4,5-6 μm, nodulose, knobs conspicuous, yellow-brown. Basidia 20-34 × 6-9 μm, 4-spored. Cheilo-, pleuro- and caulocystidia 32-60 × 10-20 μm, fusoid, metuloid (up to 4 μm diam.), hyaline to yellowish membrane, encrusted. Cuticle a cutis of cylindric hyphae (4-10 μm diam.), encrusted with yellowish pigment. Clamp connections numerous.

HABITAT.—On soil in forest under *Castanopsis*-*Lithocarpus*. Papua New Guinea, Indonesia (Java), Sabah (Borneo).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 25.IV.1972, Horak (ZT 72/406, holotype); Bulolo, Manki, 14.X.1971, Horak (ZT 71/114); 22.X.1971, Horak (ZT 71/199); 1.V.1972, Horak (ZT 72/429); Bulolo, Susu, 26.IV.1973, Horak

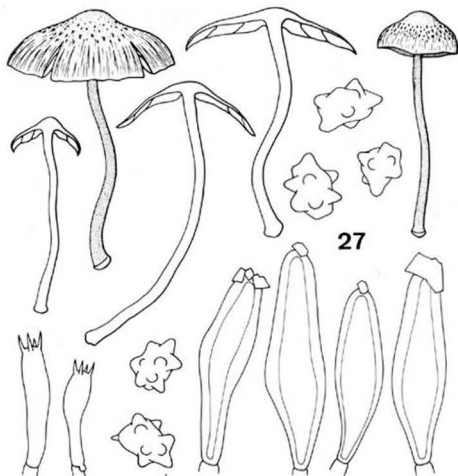


Fig. 27: *A. angustifolia* Corner & Horak (type): carpophores, spores, basidia, cheilo- and pleurocystidia.

(ZT 73/190); Wau, McAdam Memorial Park, 30.III.1972, Horak (ZT 72/342); Western Highlands, Mt. Hagen, Baiyer River Hallström Park, 22.V.1972, Horak (ZT 72/475); Trauna Valley Farm, 26.II.1972, Horak (ZT 73/70). — INDONESIA (JAVA): Bogor, Tjibodas, 1800 m, 11.V.1972, Corner (J-2, ZT 79/187); Bogor, Tjibodas, 14.III.1977, Horak (ZT 77/108); 16.III.1977, Horak (ZT 77/200); — SABAH (BORNEO): Mt. Kinabalu, Mesilau River, 2100 m: 7.VII.1961, Corner (RSNB 707, ZT 78/56); 1.IV.1964, Corner (RSBN 8038, ZT 78/57); 13.IV.1964, Corner (RSNB 8273, ZT 78/58); 14.IV.1964, Corner (RSNB 8279, ZT 78/59); 19.IV.1964, Corner (RSNB 8344, ZT 78/60); 21.IV.1964, Corner (RSNB 8385, ZT 78/61); Mt. Kinabalu, Bembangan River: 25.I.1964, Corner (ZT 78/62); 27.II.1964, Corner (ZT 78/63).

According to present knowledge *A. angustifolia* is one of the most widespread species of *Astrosporina* in Indomalaya and Australasia. The fungus occurs in the oak forests of Papua New Guinea, Java and Sabah. Variable in morphology and colour this species is readily recognized in the field due to the following peculiar characters: innately fibrillose to subsquamulose pileus, very narrow and densely crowded lamellae, slender cartilaginous and pruinose stipe (with a small marginate bulb at the base) and spermatic odour.

26. *ASTROSPORINA LUTEA* Kobay. & Hongo—Fig. 28

Astrosporina lutea Kobay. & Hongo in Nagaoa 2: 103. 1952.

Description of the material from Papua New Guinea:

Pileus —30 mm diam., convex to conico-convex becoming campanulate; orange to apricot, covered with concolorous radially arranged fibrils when young, later turning brownish, silky towards estriate margin; dry, veil remnants absent. Lamellae adnexed to almost free, narrow, crowded; orange or deep apricot turning orange-brown, with white fimbriate edges. Stipe 25–45 × 3.5–5 mm, cylindric, bulbous-marginate at base (—7 mm diam.); orange to apricot; pruinose all over, sometimes longitudinally striate; dry, without veil remnants, solid, single in groups. Context orange. Odour unpleasant, like burnt horn.

Spores 5.5–8 × 5–6 μ m, nodulose, knobs conspicuous, brown. Basidia 20–26 × 7 μ m, 4-spored. Cheilo- and pleurocystidia 40–65 × 13–26 μ m, lageniform to fusoid, metuloid, encrusted, hyaline to yellowish (in KOH). Caulocystidia similar. Cuticle a cutis consisting of cylindrical hyphae (3–8 μ m diam.), encrusted with orange brownish pigment. Clamp connections numerous.

HABITAT.—On soil in forests (under *Castanopsis* and *Lithocarpus* in Papua New Guinea). Papua New Guinea; Japan (type).

MATERIAL.—PAPUA NEW GUINEA: Morobe district: Bulolo, Manki, 1400 m, 28.III.1972, Horak (ZT 72/335), 21.V.1973; Horak (ZT 73/248); Eastern Highlands, Ayura, Kassem Pass, 1850 m, 11.XII.1972, Horak (ZT 72/803).

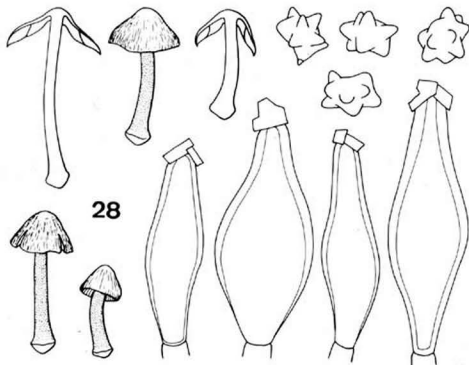


Fig. 28: *A. lutea* Y. Kobay. & Hongo (ZT 72/335): carpophores, spores, cheilo- and pleurocystidia.

Despite some minor differences the material collected in Papua New Guinea is considered conspecific with the type from Japan. The fungus is readily identified by its conspicuous orange to apricot yellow colour on stipe, lamellae and pileus. Another peculiar character is the unpleasant odour described as 'iod-like' by Kobayasi (1952: l.c.) or, according to our observations in Papua New Guinea, like burnt horn.

27. *Astrosporina medioeris* Corner & Horak, *spec. nov.*—Fig. 29

Pileo –30 mm, conico-convexo dein umbonato-repando, fusco-ochraceo, fibrilloso. Lamellis adnexis, pallide argillaceis dein subochraceis. Stipite –35 × –3 mm, cylindrico, marginato-bulboso, albo, senectudine pallide ochraceo, glabro. Odore nullo. Sporis 6–8 × 5,5–7 μm, angulato-nodulosus. Cystidiis clavatis vel fusoideis, submetuloideis, haud incrustatis. Ad terram in silvis. Singapore. Typus: ZT 78/64.

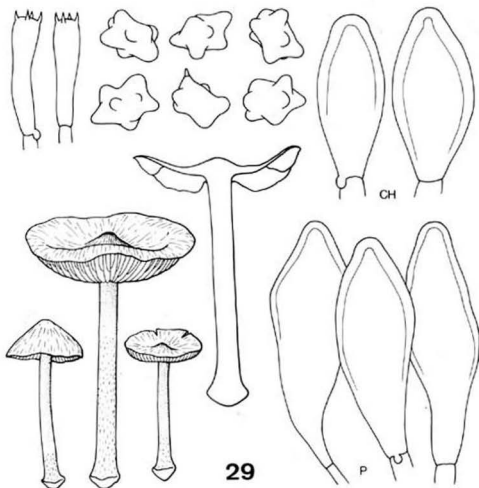


Fig. 29: *A. medioeris* Corner & Horak (type): carpophores, spores, basidia, cheilocystidia (CH), pleurocystidia (P).

Pileus 10–30 mm diam., conic when young, becoming conico-convex or plane with conspicuous conic umbo, centre often depressed in aged specimens; pale ochraceous, covered with radially arranged ochraceous-fuscosus or fuscous fibrils, estriate margin with whitish fibrils when young; dry, veil remnants absent. Lamellae adnexed, subventricose, crowded (L-25), narrow; whitish at first turning pale ochraceous, edge concolorous. Stipe 20–35 × 2–3 mm, cylindrical, equal, with distinct bulbous or slightly marginate base; white, later turning pale ochraceous, pruinose at apex, glabrous towards the base; dry, solid to fistulose, veil remnants absent, single in groups. Context white. Odour not distinctive.

Spores 6–8 × 5.5–7 μm , nodulose, knobs hemispheric, yellow-brown. Basidia 22–28 × 7–8 μm , 4-spored. Cheilocystidia 30–40 × 15–25 μm , clavate to broadly fusoid, membrane metuloid at apex, with yellow-brown (KOH) plasmatic pigment. Pleurocystidia 40–60 × 15–23 μm , fusoid to lageniform, metuloid at apex, with yellow-brown (KOH) plasmatic pigment. Caulocystidia absent. Cuticle a cutis of cylindrical hyphae (3–10 μm diam.), encrusted with brown pigment. Clamp connections present.

HABITAT.—On soil in forest. Singapore.

MATERIAL.—SINGAPORE: Botanic Garden, Garden's Jungle, 15.III.1943, *Corner* (ZT 78/64, holotype).

The taxonomic position of this species is near the European *A. napipes* (Lange) Pearson and its relatives. The distinguishing characters are: colour of stipe, shape and size of spores and cystidia.

28. *ASTROSPORINA TITIBUENSIS* Y. Kobay.—Fig. 30

Astrosporina titibuensis Y. Kobay. in *Nagaoa* 2: 110. 1952.

Description of the material from Indonesia (Java):

Pileus 40 mm diam., conic when young soon becoming convex or plane with conspicuous umbo; pale brown to dark brown (especially at the centre), paler towards the split margin; rimose-fibrillose, splitting towards margin in mature specimens, centre densely covered with small squamulose concolorous scales; dry, without veil remnants. Lamellae adnexed to subfree, ventricose, crowded; pale argillaceous-grey becoming cinnamon or pale brown, edge paler. Stipe 25–45 × 2–3 mm, cylindrical or slightly attenuated towards apex, with conspicuous marginate (–5 mm diam.) bulb at base; pale pink, white pruinose all over; dry, solid, single in groups. Context pale brown. Odour distinctly fruity, sweet, not spermatic.

Spores 9–10 × 7–8.5 μm , nodulose, with numerous hemispheric or conic knobs, yellow-brown. Basidia 25–30 × 9–10 μm , 4-spored. Cheilo- and pleurocystidia 50–90 × 16–30 μm , clavate to lageniform, metuloid (–3 μm diam.), membrane yellow (KOH), rarely encrusted with crystals. Caulocystidia similar, apex usually with conspicuous crystals. Cuticle a cutis or trichoderm of cylindrical hyphae (3–7 μm diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in forest (under *Castanopsis-Lithocarpus* in Java). Indonesia (Java); Japan (type).

MATERIAL.—INDONESIA (JAVA): Bogor, Tjibodas, 14.III.1977, *Horak* (ZT 77/94).

The macroscopic appearance and the microscopic characters of the Javanese collection are identical with those reported and drawn in the original description of *A. titibuensis* Y. Kobay. (1952). Habit and the strongly split margin remind of *A. scissa* Horak (1977), but the two taxa are distinctly separated by the shape of the cystidia.

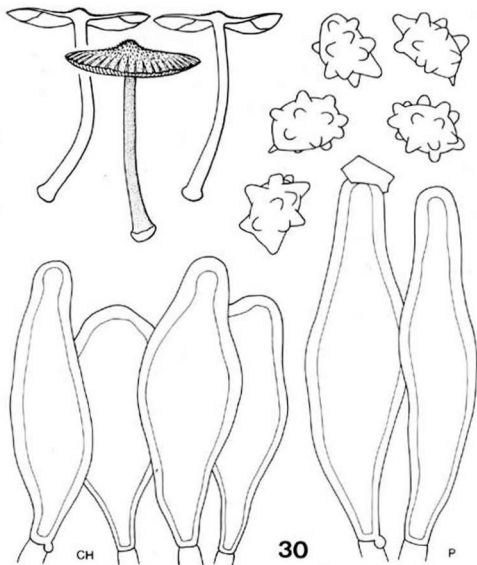


Fig. 30: *A. titibuensis* Y. Kobay. (ZT 77/94): carpophores, spores, cheilocystidia (CH), pleurocystidia (P).

29. ASTROSPORINA AVELLANA Horak—Fig. 31

Astrosporina avellana Horak in N. Zealand J. Bot. 15: 744, 1977 (non *Inocybe avellana* Y. Kobay. in Nagaoa 2: 94, 1952).

Description of the material from Papua New Guinea:

Pileus —40 mm diam., hemispheric when young, soon convex with conspicuous conic umbo or campanulate; yellowish, ochraceous, light brown, rarely dark brown; radially fibrillose, disc

smooth but occasionally with minute squamules, veil remnants absent; dry, margin not incurved. Lamellae adnexed to almost free; whitish or grey when young, turning grey-beige to brownish, with white fimbriate edges; crowded (L 14–18, –3). Stipe 20–50 × 1.5–4 mm, cylindric, base marginate, rarely only clavate; white, soon turning cream or yellowish to light ochraceous, in aged carpophores with brownish tint; pruinose all over, veil remnants lacking, solid, single in groups. Context white. Odour not distinctive or slightly spermiatic.

Spores 9–11(13) × 7–9(10) μm , nodulose, with prominent conic knobs, brown. Basidia 22–30 × 8–12 μm , 4-spored. Cheilo- and pleurocystidia 30–70 × 15–25 μm , fusoid, metuloid, encrusted, hyaline to yellowish (in KOH), often intermixed with clavate thin-walled cells. Caulocystidia like cheilocystidia. Cuticle a cutis consisting of cylindric hyphae (4–9 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil in *Nothofagus* forests. Papua New Guinea, New Zealand (type).

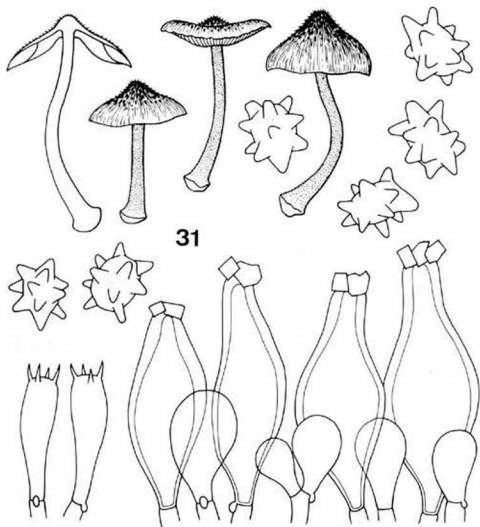


Fig. 31: *A. avellana* Horak (ZT 72/60): carpophores, spores, basidia, cheilo- and pleurocystidia.

MATERIAL.—NEW ZEALAND: Westcoast, Lake Haupiri, 16.I.1968, *Horak* (PDD 27118, holotype). — PAPUA NEW GUINEA: Morobe district: Wau, Mt. Kaindi, 5.XI.1972, *Horak* (ZT 72/588); Wau, Mt. Kaindi, 3 VI.1973, *Horak* (ZT 73/299); Eastern Highlands: Mt. Michael, Frigano, Okapa Track, 4.XII.1971, *Horak* (ZT 71/364); Goroka, Daulo Pass, 12.I.1972, *Horak* (ZT 72/60); Goroka, Mt. Otto, S-ridge, 17.I.1972, *Horak* (ZT 72/103); Western Highlands, Mt. Hagen, Kuna, 20.V.1972, *Horak* (ZT 72/471).

This rather inconspicuous species occurs under *Nothofagus* in New Zealand and Papua New Guinea. Taxonomically it belongs to the group of species around *A. asterospora* (Quél.) Rea which is separated among other characters by distinctly larger spores.

30. *ASTROSPORINA ASTEROSPORA* (Quél.) Rea—Fig. 32

Inocybe asterospora Quél. in Bull. Soc. bot. France 26: 50. 1879. — *Astrosporina asterospora* (Quél.) Rea, Brit. Basidiomycetae: 213. 1922.

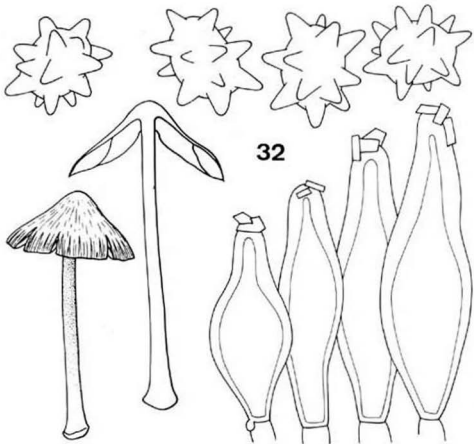


Fig. 32: *A. asterospora* (Quél.) Rea (ZT 78/65): carpophores, spores, cheilo- and pleurocystidia.

Description of the material from Sabah (Borneo):

Pileus 20–35 mm diam., conic or convex with acute or conic umbo; pale brown to dark brown, fuscous, paler towards the estriate margin; fibrillose at first, centre becoming squamulose, margin conspicuously rimose; dry, veil remnants none. Lamellae adnexed, subventricose, crowded (L–15); whitish when young turning argillaceous or pale brown, edge albobimbricate. Stipe 60 × 4 mm, cylindric, base subdiscooid to marginate-bulbous; whitish, pale brown or ochraceous; pruinose all over; dry, veil remnants absent, solid, single in groups. Context whitish, brown beneath cuticle. Odour none or slightly spermiatic.

Spores 10–14 × 8–12 μm, stellate, conic knobs very conspicuous, yellow-brown. Basidia 24–36 × 7–12 μm, 4-spored. Cheilo-, pleuro- and caulocystidia 40–75 × 13–28 μm, fusoid or lageniform, metuloid, yellow or yellow-brown membrane, encrusted with crystals. Cuticle a cutis of cylindric hyphae (4–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections present.

HABITAT.—On soil in lowland and montane forests. Malaysia, Sabah; Europe (type), Japan (Kobayasi, 1952: 112 – record doubtful), New Zealand.

MATERIAL.—SABAH (BORNEO): Mt. Kinabalu, Mesilau River, up to 1700 m, 19.I.1964, Corner (RSNB 5015, ZT 78/67); 21.IV.1964, Corner (RSNB 8387, ZT 78/65). —MALAYSIA: Pahang, Tembeling, 8.XI.1930, Corner (ZT 78/66).

All characters observed on the specimens gathered in Malaysia and Sabah are identical with those described from European collections (Kühner & Boursier, 1932; Stangl, 1977). In the Far East this fungus occurs also in Japan (Imazeki & Hongo, 1971) and New Zealand (Horak, 1977).

DOUBTFUL AND INCOMPLETELY KNOWN SPECIES

exigua. — *Astrosporina exigua* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.—Fig. 21.

Nothing can be added to the macroscopic characters already described. The type material is in bad condition.

Spores 7.5–10 × 6–7 μm, ellipsoid, with pronounced hemispheric knobs, yellow-brown, thin-walled membrane, germ pore absent. Basidia 25–33 × 8–9 μm, 4-spored. Cheilo- and pleurocystidia 40–65 × 15–30 μm, lageniform to clavate, metuloid, membrane hyaline, crystals present. Structure of cuticle unknown. Clamp connections on septa of hyphae.

HABITAT.—On sandy soil. South Australia.

MATERIAL.—AUSTRALIA: South Australia, Adelaide, Hope Valley, 29.IX.1923, Cleland (ADW 12693, holotype).

The infrageneric position of this small brown *Astrosporina* remains doubtful since Cleland in the original diagnosis does not mention absence or presence of the veil or the shape of the stipe. Fresh material is needed to delimit and redescribe this taxon.

emergens. — *Astrosporina emergens* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933.

There is no type material in ADW.

discissa. — *Astrosporina discissa* Clel. in Trans. R. Soc. S. Australia 57: 192. 1933 (non *Inocybe discissa* Fr., Epicrisis: 174. 1834). — Fig. 22.

Nothing can be added regarding the macroscopic characters.

Spores 8–10 × 6–7 μm, nodulose, with conspicuous conic knobs, yellow-brown, thin-walled membrane. Basidia 22–26 × 6 μm, 4-spored. Cheilocystidia 30–65 × 7–9 μm, cylindric to sub-clavate, hyaline, thin-walled, crystals absent. Pleurocystidia 35–50 × 15–25 μm, broadly fusoid, metuloid, hyaline, crystals present, scattered. Cuticle a cutis of cylindric hyphae (5–10 μm diam.), encrusted with yellow-brown pigment. Clamp connections numerous.

HABITAT.—On soil. South Australia.

MATERIAL.—AUSTRALIA: South Australia, Upper Tunkalilla Creek, 4.VI.1930, Cleland (ADW 12686, holotype).

The macroscopic and microscopic characters of *A. discissa* indicate that this species is related to the European *A. napipes* (Lange) Pearson. However, the two taxa are readily distinguished by the shape of the cheilo- and pleurocystidia. Since the macroscopic diagnosis lacks several observations important for the taxonomy of *Astrosporina* I prefer to consider this species as 'doubtful' until fresh material is collected again.

EXCLUDED SPECIES

longipes. — *Inocybe longipes* Mass. in Kew Bull. 1908: 1. — *Entoloma longipes* (Mass.) Horak, *comb. nov.*

Type material in K. Full description and illustration in Horak (1979).

rhombospora. — *Inocybe rhombospora* Mass. in Ann. Bot. 18: 48. 1904.

According to the microscopic characters found on the scarce type material (K) this fungus represents a species of *Psilocybe*.

ZUSAMMENFASSUNG

Aus der geographischen Region zwischen Indien und Australien werden 30 der bisher (gut) bekannten Arten von *Astrosporina* Schroeter 1889 (Agaricales) ausgeschlüsselt, beschrieben und abgebildet. 21 Species und eine Varietät sind neu. Die übrigen (z.T. kritischen oder ungenügend dokumentierten) Arten wurden an Hand von Typus- oder authentischem Material nachuntersucht und diskutiert. Die neuseeländischen Arten von *Astrosporina* sind schon früher von Horak (1977) ausführlich beschrieben worden.

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ENTOLOMA SUBGENUS *POUZAROMYCES* EMEND. IN EUROPE

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(With 58 Text-figures)

Entoloma (Fr.) Kumm. emend. Donk subgenus *Pouzaromyces* (Pilát) Moser is emended by including *Rhodophyllus* Quél. section *Versatilis* Romagn. 1974. A revision of the European taxa is given based on all collections and additional information available in the major European herbaria. Eleven taxa are recognized of which three are new: *Entoloma dysthaloides*, *E. romagnesii* and *E. dysthales* f. *acystidiosum*. Four new combinations are introduced, viz. *E. strigosissimum*, *E. hirtum*, *E. araneosum* f. *fulvostrigosum* and *E. nodosporum*.

In 1953 Pilát erected in the Rhodophyllaceae the monotypical genus *Pouzaromyces*, typified by *Nolanea fumosella* (Wint.) Sacc. sensu Pilát (= *N. strigosissima* Rea = *Rhodophyllus babingtonii* (Blox. apud Berk. & Br.) Quél. sensu Quél., Kühn. & Romagn., non auct.). In Pilát's concept the genus is well suited to accommodate the same species as *Rhodophyllus* Quél. sect. *Induti* Kühn. apud Kühn. & Romagn. (1953: 186).

Pouzaromyces covers then a small group of entolomatoid fungi formerly placed in *Nolanea* (Fr.) Kumm., characterized by a mycenoid stature, non-hygrophanous cap with metallic-shining, fibrillous-hairy or subsquamulose surface and with encrusting pigments in all tissues. Most members are tiny and rare, and consequently easily overlooked.

Moser (1973) attempted to disentangle the taxonomical and nomenclatural confusion in the group but succeeded only partly, mainly because of the lack of properly documented collections. Mazzer (1976) monographed the group of fungi concerned, but paid little attention to the European species. The present revision is based on as much information as was available in herbaria, private collections and from personal observation. However, probably because most species are rather rare, much information on the variability, particularly of macroscopical characters, is still lacking.

Pouzaromyces Pilát will be treated in this paper as a subgenus of *Entoloma* (Fr.) Kumm. emend. Donk. The concepts of Romagnesi, 1974 and 1978, and Moser, 1978, are emended by including *Rhodophyllus* section *Versatilis* Romagn., typified by *Agaricus versatilis* Fr.¹

¹ Romagnesi (1978: 48) emended the concept of *Inopilus* by changing the type from *Rhodophyllus versatilis* (Fr.) Moser to *R. inocephalus* Romagn., because he wanted as a type species a more typical representative for the, mainly tropical, taxon *Inopilus*. This is, however, against the rules of the International Code of Botanical Nomenclature. In this paper *Inopilus* is treated in its original concept, and considered a synonym of section *Versatilis*.

It should be noted here that the Introduction of the work of Romagnesi & Gilles (1979) has been pre-published by Romagnesi in 1978. Unfortunately the pagination of the pre-publication differs from that of the Introduction of the definite book. In the present paper there is always referred to the pre-publication (Romagnesi, 1978).

Though the differences between section *Pouzaromyces* and section *Versatilis* are considerable, the resemblances in pigmentation-pattern, spore-shape, tramal structure (especially of the lamellae, including the cellular subhymenium and distinctly developed hymenopodium), and the presence of so-called 'abortive' basidia (Mazzer, 1976) are so striking, that a distinction on subgeneric level does not seem justified.

Pouzarella Mazzer (1976), published as a new name for *Pouzaromyces*, is considered a nomen superfluum. In this respect McVaugh (1968: 460) is followed in the opinion that the type of a genus is the species the author had in mind in creating the genus, not the mere name applied to it. Pilát typified *Pouzaromyces* with '*Nolanea fumosella* Wint.', a misapplication of Winter's epithet to *Nolanea strigosissima* Rea. As Pilát mentioned Rea's species in the synonymy and preserved the type-collection in PRM, the genus *Pouzaromyces* is clearly defined and should not be rejected. This opinion is shared with Romagnesi (1978), Moser (1978) and Pegler (1977).

A critical evaluation of the taxonomic position of *Pouzaromyces* within the genus *Entoloma* will be published in a future paper (Noordeloos, 1980).

MATERIAL, METHODS AND PRESENTATION

Of the eleven taxa recognized here I studied only three in fresh condition. Most of the collections studied were dried, exceptionally they were preserved on liquid.

The descriptions in this work are composed of (i) data derived from observations on the collections cited, (ii) data taken from labels, collectors' notes and accompanying drawings and colour-slides and (iii) data derived from publications and illustrations relevant to the collections I studied myself. It should be noted that no information was available from all these sources on the colour of the fresh (or dried) spore-print. That may be due to the rareness of most species and to the fact that usually only a few carpophores are found. The mycenoid, thin-fleshed stature does not guarantee of getting a good spore-print without spoiling the specimen used.

Colours of fresh carpophores were usually compared with Munsell Soil Colour Charts, Baltimore.

Microscopical structures were observed and measured in water (fresh carpophores) or in 10% NH_4OH solution or in an ammoniac 1% Congo Red solution (dried specimens), usually under oil-immersion.

Spores, basidia and cystidia were observed and measured in squash preparations of minute parts of the lamellae. Hymenophoral trama was observed both in squash preparations and in transversal sections. The pileipellis was observed on radial sections of the cap. The stipitepellis was observed on longitudinal sections through the cortex of the stipe, respectively one at the apex, one in the middle and one at the base of the stipe.

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

The following abbreviations are used:

Q.—Length-width ratio, usually given as follows: $Q = 1.2-1.3-1.4$ which means Q between 1.2 and 1.4 with an average of 1.3. The size of the spores relates to the largest length and width, excluding the apiculus.

L-D = 1-2-3 μ m.—Length minus width between 1 and 3 μ m with an average of 2 μ m.
 Lamellae L = 20-25, l = 1-3.—20-25 entire lamellae with 1-3 lamellulae between each pair.

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ENTOLOMA (Fr.) Kumm. *emend.* Donk subgenus *POUZAROMYCES* (Pilát) Moser *emend.* Noordeloos

Pouzaromyces Pilát in Acta Mus. Nat. Prag. (b) 9(2): 60. 1953. — *Entoloma* (Fr.) Kumm. subgen. *Pouzaromyces* (Pilát) Moser in Gams, Kl. KryptogFl. 4. Aufl., 2(b/2): 191. 1978. — *Rhodophyllus* Quél. subgen. *Pouzaromyces* (Pilát) Romagn. in Beih. Nova Hedwigia 59: 50. 1978. — Type: *Nolanea funosella* (Wint.) Lange sensu Pilát = *Entoloma strigosissimum* (Rea) Noordeloos.

Pouzarella Mazzer in Bibliothca mycol. 46: 69. 1976 (nom. illeg.). — Type: *P. nodospora* (Atk.) Mazzer.
Rhodophyllus Quél. subgen. *Inopilus* Romagn. sect. *Inopilus* in Bull. Soc. linn. Lyon 43: 329. 1974. — *Entoloma* subgen. *Inopilus* (Romagn.) Moser in Gams, Kl. KryptogFl. 4. Aufl. 2(b/2): 191. 1978. — Type: *R. versatilis* (Fr.) Quél.

Rhodophyllus Quél. sect. *Luctuarii* Romagn. emend Romagn. in Bull. Soc. linn. Lyon 43: 330. 1974. — Type: *R. habingtonii* (Blox. apud Berk. & Br.) Quél. sensu Quél., Romagn.

Rhodophyllus Quél. sect. *Induti* Kühn. & Romagn., Fl. anal.: 186. 1953. — Type: *R. indutus* (Boud.) Romagn.

Carpophores mycenoid, rarely tricholomoid. Pileus conical to campanulate, sometimes truncate, usually only slightly expanding, not or weakly hygrophanous, translucently striate at margin or not, metallic-shining, fibrillose, fibrillose-hairy to fibrillose-squamulose. Lamellae adnate, emarginate or nearly free, narrow to ventricose, mostly (dark) grey to grey-brown with slight pink tinge. Stipe filiform or cylindrical, concolorous with cap or slightly paler, entirely covered with fibrillose or arachnoid longitudinal striation, sometimes distinctly hairy to sub-squamulose; base strigose with radiating hairs.

Spores angular or gibbose, medium-sized to large, 9–21 μm long, ellipsoid to elongate in outline, with weakly or well developed basal facet.¹ Basidia large, broadly clavate, abortive basidia present. Cheilocystidia mostly abundant, rarely lacking, lageniform or subcylindrical, subglobose to clavate, frequently encrusted. Subhymenium cellular. Hymenophoral trama usually with strongly developed hymenopodium of narrow, cylindrical, strongly encrusted hyphae and with mediostratum of broader, cylindrical or inflated hyphae. Pileipellis a cutis with transitions to a trichodermium of repent or ascending hairs. Pigment abundant, membranal-encrusting in trama and covering layers, rarely accompanied by intracellular pigment in pileipellis. Clamp-connections absent. Type of development of carpophore unknown.

HABITAT & DISTRIBUTION. — Terrestrial, rarely on decayed wood in damp, shady places, usually in deciduous forests, rarely in grasslands. Solitary or in groups. Wide-spread, both in lowlands as well in submontaneous or subboreal habitats. Appearing from May to November with an optimum in late summer and early autumn.

KEY TO THE SECTIONS OF SUBGENUS POUZAROMYCES

- 1a. Pileus fibrillose-hairy to fibrillose-squamulose. Pileipellis with long, septate, mostly attenuate, encrusted hairs. Pigment exclusively membranal-encrusting in all parts of carpophore. Cheilocystidia subglobose to clavate or subcylindrical, with rounded or conical tip. Section *Pouzaromyces*, p. 210
- b. Pileus with metallic sheen, subglabrous or radially fibrillose. Pileipellis with long cylindrical to fusiform hairs, with diffuse or granular intracellular pigment, and not or only minutely encrusted walls. In entire carpophore membranal pigment predominant, but accompanied by fine encrustations. Cheilocystidia lageniform. Section *Versatilis*, p. 229

SECTION POUZAROMYCES

Rhodophyllus Quél. sect. *Luctuarii* Romagn. emend Romagn. in Bull. Soc. linn. Lyon 43: 330. 1974. — Type: *R. habingtonii* (Blox. apud Berk. & Br.) Quél. sensu Quél., Romagn. = *E. strigosissimum* (Rea) Noordeloos.

Rhodophyllus Quél. subgen. *Pouzaromyces* (Pilát) Romagn. in Beih. Nova Hedwigia 59: 50. 1978. — *Entoloma* (Fr.) Kumm. subgen. *Pouzaromyces* (Pilát) Moser in Gams, K1. KryptogFl. 4. Aufl. 2(b/2): 191. 1978.

Pouzarella Mazzer sect. *Pouzarella*.

Pouzarella Mazzer sect. *Dysthales* Mazzer in Biblita. mycol. 46: 92. 1976. Type: *P. nodospora* (Atk.) Mazzer.

¹ Pegler & Young (1978) proposed a new classification of spore-types in *Entoloma*. In subgenus *Pouzaromyces* they recognized the so-called 'Pouzaromyces'-type in *E. strigosissimum* and *E. dysthales*; 'Y-base'-type mixed with 'Common'-type in *E. araneosum* and 'Simple-base'-type in *E. versatilis*.

Pileus fibrillose-hairy to fibrillose-squamulose. Pileipellis a cutis with transitions to a trichodermium with long, septate, attenuate hairs. Pigment exclusively membranal-encrusting. Cheilocystidia rarely absent, subcylindrical, subglobose or clavate, mostly brown-encrusted, with rounded or conical tip.

KEY TO THE SPECIES OF SECTION *POUZAROMYCES*

- 1a. Spores on the average more than 15 μm long; $Q = 1.7$ or more. 2
 b. Spores on the average considerably less than 15 μm long; $Q = 1.7$ or less. 4
 2a. Carpophore densely covered with red or red-brown setiform hairs with uniformly coloured, thickened, not encrusted walls. Pileus not translucently striate when moist. *E. strigosissimum*, p. 211
 b. Pileus fibrillose-squamulose. Stipe more sparsely hairy with long, multiseptate, attenuate but not setiform, minutely to coarsely encrusted hairs. Pileus usually translucently striate at margin when moist. 3
 3a. Cheilocystidia present. *E. dysthales*, p. 215
 b. Cheilocystidia absent. *E. dysthales* f. *acystidiosum*, p. 219
 4a. Spores rather obtusely angular and relatively thin walled; $Q = 1.3-1.4-1.6$ 5
 b. Spores more pronouncedly angular and slightly thick-walled; $Q = (1.3-1.4)-1.6-1.8$ 6
 5a. Spores 7.8-10.8(-11.8) \times 6.4-7.4 μm , L-D = 1-3(-4) μm . Pileus and stipe sepia-brown ('bistre') Hairs on stipe 1-2-celled, cylindrico-clavate with pale, not encrusted walls. *E. romagnesii*, p. 225
 b. Spores 10.2-12.5(-13) \times 7-8(-8.7) μm , L-D = 2.1-4.7 μm . Pileus and stipe pale grey-brown. Hairs on stipe 2-4-celled with brown, minutely encrusted walls. *E. pulvereum*, p. 226
 6a. Spores (10.2-11-15(15.5) \times 6.8-8(-9.9) μm , L-D = 3.0-6.0 μm . Pileus and stipe ash grey, on pileus sometimes with sepia flush in centre. Hairs on stipe 2-4-celled with pale, not encrusted walls. *E. hirtum*, p. 223
 b. Spores 10.3-13.5(-15) \times 6.8-8.2(8.7) μm , L-D = 3.5-7 μm . Pileus and stipe rather dark grey-brown. Hairs on stipe 2-4-6-celled with brownish-yellow encrusted walls. *E. dysthaloides*, p. 219

***Entoloma strigosissimum* (Rea) Noordeloos, comb. nov.**

Figs. 1-6

Nolanea strigosissima Rea in Trans. Br. mycol. Soc. 6: 325, pl. VII. 1920. — *Leptonia strigosissima* (Rea) P. D. Orton in Trans. Br. mycol. Soc. 43: 178. 1960. — *Rhodophyllus strigosissimus* (Rea) Horak apud Moser in Gams, Kl. KryptogFl. 3. Aufl., 2(b/2): 164. 1967. — *Pouzaromyces strigosissimus* (Rea) Horak, Syn. Gen. Ag.: 502. 1968. — *Pouzarella strigosissima* (Rea) Mazzer in Biblioth. mycol. 46: 125. 1976.

MISAPPLIED NAMES.—*Pouzaromyces fumosellus* (Wint.) Pilát sensu Pilát non Wint., nec J. Lange, in Acta Mus. Nat. Prag. (B) 9 (2): 60. 1953.

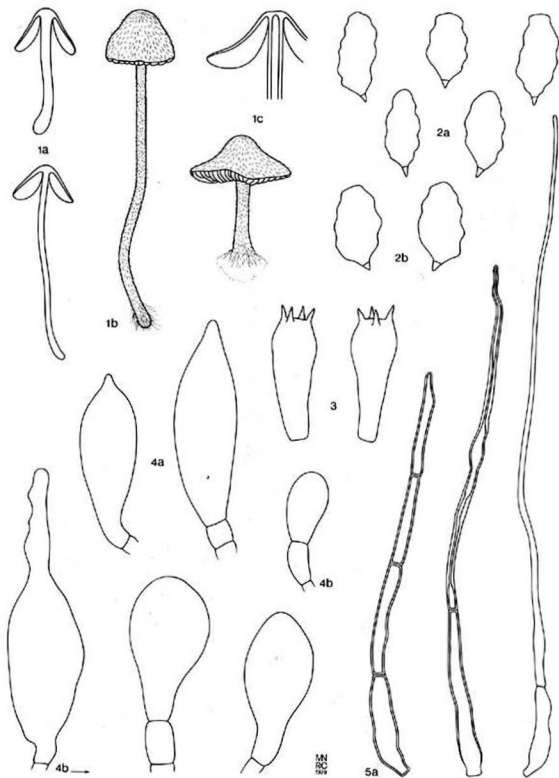
Rhodophyllus babingtonii (Blox.) Quél. sensu Quél., Kühn. & Romagn., non auct., nec Pat., nec Orton, nec Moser.

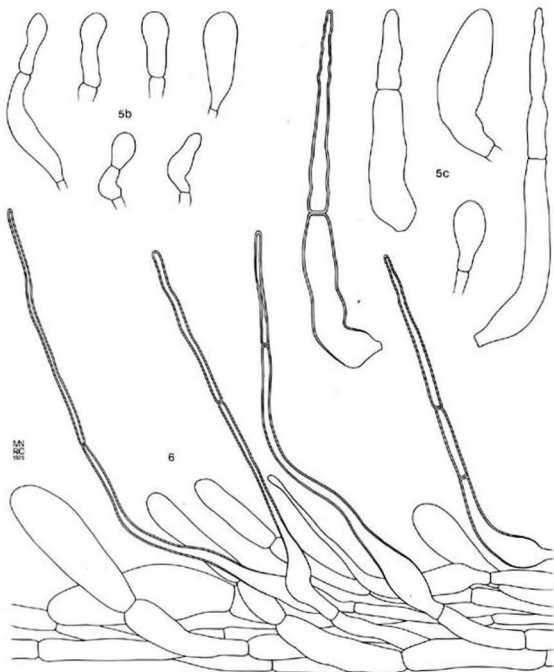
SELECTED ICONES.—Rea, l.c., pl. VII. 1920.

SELECTED DESCRIPTIONS.—Horak, l.c., 1968. — Moser, in Persoonia 7: 286. 1973. — Mazzer, l.c., 1976.

CHARACTERISTICS.—Small, slender mycenoid fruitbodies, entirely covered with red to red-brown setiform hairs, particularly when young. Spores large, 15-20 μm long.

Pileus 4-22 mm broad, conical then conico-campanulate, never expanding, obtuse, rarely umbonate, with margin sub-involute then straight, not striate when moist, (dark) grey-brown to dark reddish brown, entirely and densely covered with red-brown hairs sometimes forming small, radially arranged squamules sometimes becoming subglabrous with age. Lamellae L = about 20, l = 1, adnate, sometimes emarginate, rarely nearly free, narrowly segmentiform to





Figs. 1-6. *Entoloma strigosissimum*. — 1. Habitus. — 2. Spores. — 3. Basidia. — 4. Cheilocystidia. — 5. Hairs of stipe (5a from lower and 5b, c from upper part). — 6. Pileipellis. (Figs. 1a, 3 and 4b from *Haxe*, Oct. 1976; 1b from *J. Daams*, Aug. 1956; 1c from *Bas 5840*; 2a and 5a from type; 2b, 4a and 5c from *Jansen*, Aug. 1968; 5b and 6 from *Bas 2144*).

slightly ventricose, flesh-coloured grey then reddish brown with pruinose edge concolorous with sides or slightly paler or darker than sides. Stipe 25–60 × 1–3.5 mm, cylindrical or sometimes filiform, sometimes flexuous, with or without longitudinal groove, cartilaginous, dark brown, entirely woolly with red-brown hairs (similar to those on pileus), at base with ochraceous-reddish radiating hairs. Flesh rather dark blackish to reddish brown. Smell spontaneously none, slightly unpleasant-spermatial when bruised. Taste not recorded. Spore-print dark reddish brown.

Spores (12.7–)14–19(–20.3) × (7.0–)7.8–9.5(–11) μm ; Q = 1.5–1.9–2.3; L–D = 5.7–7.2–10.2 μm ; rather strongly nodulose-angular, brownish in H₂O. Basidia (35–)40–58 × 12.5–18 μm ; Q = 2.4–3.3; 4-spored. Abortive basidia rather frequent. Cheilocystidia (24–)47–92 × (15–)20–34 μm , rather variable in shape, slenderly to broadly clavate, obpyriform or subglobose, sometimes, particularly those near margin of cap, with conical appendix, often yellowish brown-encrusted, especially in middle part, sometimes with brown intracellular pigment, at margin of cap passing into setiform hairs of pileipellis. Subhymenium thin, cellular, colourless. Hymenopodium strongly developed; hyphae 2–6 μm wide, cylindrical, coarsely brown-encrusted. Mediostratum consisting of inflated brown-encrusted elements, e.g. 100–270 × 15–35 μm , near edge of lamellae often more strongly inflated and supporting cheilocystidia. Pileipellis a trichodermium with cylindrical to clavate, up to 25 μm broad cells often in bundles, intermixed with multiseptate setiform hairs, up to 1000 × 10–20 (base) × 2.5–5 (apex) μm , with broadly swollen base, abruptly passing or gradually tapering into very long neck with attenuate, sometimes forked apex, often with irregularly thickened, hyaline, red-brown, not encrusted walls. Pileitrama regular; hyphae 12–20 μm wide, cylindrical in subpellis but deeper in trama slightly inflated, brown-encrusted. Stipitepellis two-layered: subpellis a cutis of 8–12 μm wide, thick-walled, brown-encrusted, cylindrical hyphae; suprapellis a trichodermium with long, setiform hairs as on pileus. Clamp-connections absent.

HABITAT.—Originally described from rotten coniferous wood, but later found also in other habitats: e.g. terrestrial on bare soil in deciduous forests (*Fagus sylvatica*), with *Salix repens* in damp valley in coastal dunes: June–October.

COLLECTIONS EXAMINED.—NORWAY: Nordland, Rana, Storaltern, 10 Sept. 1976, *H. Knudsen* (O). — GREAT BRITAIN: Surrey, St. George's College, Weybridge, 9 Oct. 1919, *Ph. J. Alexander* (Holotypus, K); Surrey, Mickleham Downs, 11 Aug. 1965, *P. D. Orton* 2827 (E). — NETHERLANDS: prov. Noord-Holland, 's-Gravenland, Hilverbeek, 30 Aug. 1956, *J. Daams* (L); prov. Zuid-Holland, Isl. Voorne, 'Parnassia-valley', 28 June 1972, *C. Bas* 5840 (L); Eastern Flevopolder, Bremerbergbos, Oct. 1968, *P. Haxe* (L); prov. Noord-Brabant, Dorst, 31 Aug. 1968, *P. B. Jansen* (L). — GERMAN FEDERAL REPUBLIC: Bayern, 1962, *Dreher & Pilát* (PRM). — FRANCE: dept. Oise, Chaumontel, 17 Aug. 1945, *H. Romagnesi* (Herb. Romagn., PC); dept. Seine & Oise, Luzarches, 26 Aug. 1946, *H. Romagnesi* 275 (Herb. Romagn., PC). — CZECHOSLOVAKIA: Low Tatra, Bystrá Dolina, N. of Brezno, 8 Sept. 1960, *C. Bas* 2144 (L); Bohemia, Srbsko prope Beroun, 8 Sept. 1951, *Z. Pouzar* (PRM, type-collection of Pouzaromyces Pilát); Bohemia, Praha-Kinského sady, 15 Sept. 1966, *Wichánský & Pilát* (PRM).

The setiform hairs on pileus and stipe are highly characteristic for *E. strigosissimum*, and confusion with other species is therefore unlikely as far as the European situation is concerned. In contradiction with Mazzer (1976: 127) the type has not been lost, but is present at K in a relatively good state (see Figs. 2a, 5a).

Noteworthy are the transitions between cheilocystidia and pileal hairs, to be found in some specimens at the lamellar edge near margin of pileus (Fig. 4b). Also at the apex of the stipe one finds simple clavate cells, reminding of the cheilocystidia, with transitions to the setiform hairs found downwards (Fig. 5c). This is also observed in other species, e.g. in *E. dysthales* (Fig. 10b).

Mazzer (1976: 71) places *E. strigosissimum* and the closely related *E. nodosporum*¹ from N. America in the section *Pouzarella*² on account of the setiform hairs. These setiform hairs are the only difference with sect. *Dysthales*. Considering the variation in stipe-covering found in *Pouzaromyces* I do not follow this suggestion and place all species from sect. *Dysthales* and *Pouzarella* in one section: section *Pouzaromyces*.

Entoloma strigosissimum is wide-spread in Europe and relatively one of the more common members of *Pouzaromyces*. The species has probably a wide ecological range as it has been found in rather different habitats. Unfortunately most collections studied were badly annotated on the habitat. As a consequence the knowledge of the ecology of *E. strigosissimum* is still incomplete.

ENTOLOMA DYSTHALES (Peck) Sacc. f. DYSTHALES—Figs. 7–12

Agaricus dysthales Peck in Ann. Rep. N.Y. State Mus. 32: 28. 1879. — *Entoloma dysthales* (Peck) Sacc., Sylloge Fung. 9: 83. 1891. — *Nolanea dysthales* (Peck) Murrill in North Am. Fl. 10: 101. 1917. — *Rhodophyllus dysthales* (Peck) Romagn. in Bull. Soc. mycol. Fr. 53: 328. 1937. — *Leptonia dysthales* (Peck) Konr. & Maubl., Les Agaricales 2: 184. 1953. — *Pouzarella dysthales* (Peck) Mazzer in Bibliotheca mycol. 46: 105. 1976.

Inocybe bucknallii Mass. in Ann. bot. 18: 473. 1904. — *Astrosporina bucknallii* (Mass.) Rea, Brit. Bas.: 213. 1922.

MISAPPLIED NAMES.—*Nolanea babingtonii* (Blox.) Sacc. sensu R. W. G. Dennis in Trans. Br. mycol. Soc. 31: 206. 1948. — *Leptonia babingtonii* (Blox.) Orton in Trans. Br. mycol. Soc. 43: 177. 1960 (see p. 240, excl. names).

Rhodophyllus fumosellus (Wint.) J. Lange in Dansk bot. Ark. 2(11): 36. 1921.

EXCLUDED NAMES.—*Nolanea dysthales* (Peck) Murrill sensu T. Nathorst-Windahl in Acta Horti Gotoburg. 16: 142. 1946 (= *Entoloma dysthaloides*).

Rhodophyllus dysthales (Peck) Romagn. sensu O. v. Schulmann in Karstenia 5: 31. 1960 (= *Entoloma dysthaloides*).

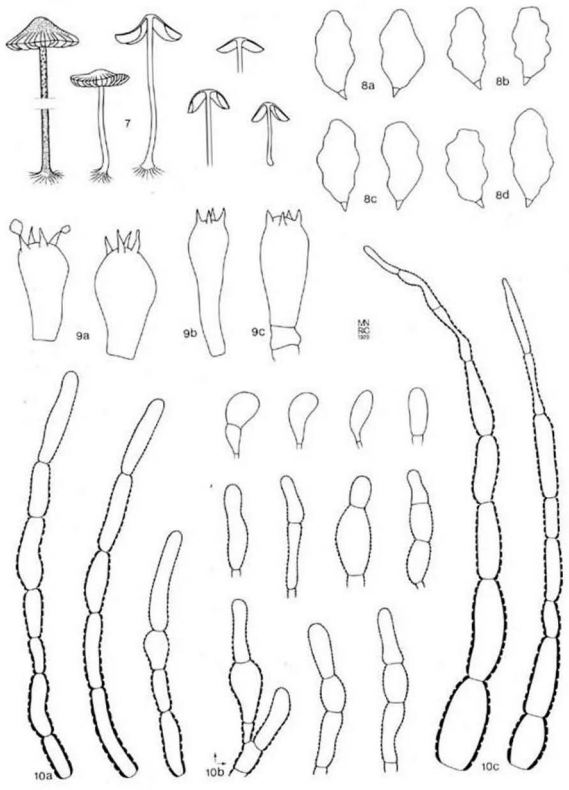
SELECTED DESCRIPTIONS AND ILLUSTRATIONS.—Heim, Genre *Inocybe*: 360, fig. 206. 1931 (as *I. bucknallii* Mass.). — Moser in Persoonia 7: 283. 1973. — Mazzer in Bibliotheca mycol. 46: 105, figs. 27, 31, 35, 53–57. 1976.

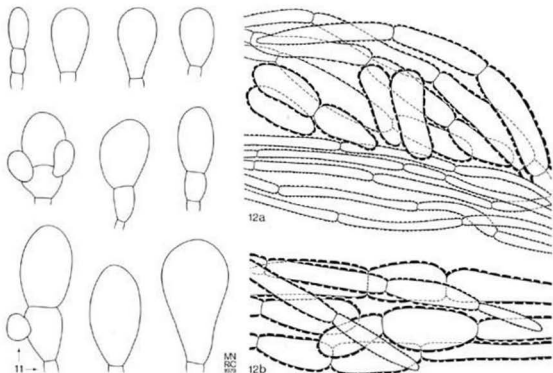
CHARACTERISTICS.—Rather slender agaric; stipe often filiform; pileus and stipe dark grey-brown; pileus pale to brownish fibrillose-squamulose; stipe flocculose; spores 14–20 μ m long.

Pileus (2–)6–18 mm broad, conico-campanulate or hemispherical, expanding to conico-convex, rarely plano-convex and then with small umbo, with margin straight and undulating with age, finally often reflexed, weakly hygrophanous, when moist translucently striate up to 1/2 or 3/4 of cap-radius, blackish-greyish or sepia brown (10 YR [3/1] 3/2), slightly paler at margin (10 YR 4/3–5/4), when dry slightly paler, remaining dark at centre, when young with silvery-shining hyaline to pale brown hairs (turning brown in dried specimens), later finely fluffy-scaly, at centre with fine, pointed squamules, at margin fringed and sometimes rimose, sometimes entirely minutely squamulose. Lamellae L = 10–17, l = 1–3, distant to moderately crowded, narrowly adnate or emarginate, narrowly segmentiform at first, then ventricose, often extending

¹ *Entoloma nodosporum* (Atk.) Noordeloos comb. nov. (basionym: *Nolanea nodospora* Atk. in J. Mycol. 8: 114. 1902).

² *Pouzarella babingtonii* (Berk. & Br.) Mazzer was also included in section *Pouzarella*; see discussion under excluded names, p. 240.





Figs. 7–12. *Entoloma dysthales*. — 7. Habitus. — 8. Spores. — 9. Basidia. — 10. Hairs of stipe (10b from upper part and 10c from lower part). — 11. Cheilocystidia. — 12. Pileipellis. (Fig. 7 from *Bas* 1472; 8a, 9a, 10a, and 12a from *Jansen, Nov. 1957*; 8b and 9b from *Moser 66/24*; 8c from *Orton 538*; 8d, 9c, 10b, 10c and 11 from *Noordeloos 841*; 12b from type).

under pileus, sometimes transversely veined, dark grey to grey-brown, finally with pink tinge (7.5 YR 3/2–4/2), with slightly paler flocculose edge. Stipe 12–48 × 0.3–2.0 mm, filiform to cylindrical, sometimes slightly broadened at base, concolorous with pileus (10 YR 3/2), longitudinally silvery striate, sparsely to densely flocculose-hairy or subsquamulose with pale to dark brown hairs, especially on basal half; base strigose with long, radiating pale yellowish brown hairs. Flesh thin in pileus, relatively firm, concolorous with surface. Smell inconspicuous (like flowers of *Primula*, acc. to Moser). Taste mild.

Spores (13.5–)14–19.5(–21.5) × (7.4–)7.9–10.3(–11) μm; Q = (1.5–)1.6–1.8–2.1; L–D = (4.5–)6–10 μm, irregularly nodulose-angular, with slightly thickened, brown walls. Basidia 33–62 × 11–20 μm, broadly clavate, 4-spored. Abortive basidia frequent. Cheilocystidia (17–)21–82(–90) × 8–21 μm, subglobose, obpyriform or slenderly to broadly clavate, sometimes in 2–3-celled chains, often with broad supporting cell, with rounded to conical apex, rarely with finger-like apical projection, with brown, sometimes encrusted wall, numerous often mixed with basidia. Subhymenium cellular, colourless, thin. Hymenopodium strongly developed, regular, composed of (2.5–)4–12(–17) μm wide, cylindrical, coarsely brown-encrusted hyphae. Medios-tratum often thin, composed of inflated elements, e.g. 160–280 × 14.5–28 μm, with less heavily encrusted walls. Pileipellis a trichodermium with transitions to a pallisade of ellipsoid to clavate cells, 32–90 × 10–32 μm, growing out to long, multiseptate, attenuate hairs with elements measuring 45–200 × 10–35 (at base) × 9–12 (at apex) μm, with slightly thickened, brown-encrusted walls; hairs repent or erect, often in bundles. Pileitrama regular, hyphae in subpellis cylindrical, 4–14 μm wide; in deeper layers slightly more inflated and up to 21 μm wide, (coarsely)

brown-encrusted. Stipitipellis a cutis of cylindrical, 4–17 μm wide, brown-encrusted hyphae with at apex 1–3-celled, globose to cylindrico-inflated, brown-encrusted hairs with cells 20–55 \times 10–33 μm ; downwards with longer, multiseptate hairs, often in bundles and similar to hairs on pileus, with cells 25–70(–110) \times 17.5–29 (at base) \times 5–12 (at apex) μm and terminal elements frequently attenuate and with slightly thickened, refringent wall. Base of stipe with 4–12 μm wide, yellow-brown, not encrusted, cylindrical hyphae. Stipitetrara regular, consisting of 4.5–13(–22) μm wide parallel hyphae with yellow-brown, not encrusted walls. Clamp-connections absent, except on hairs at base of stipe.

HABITAT & DISTRIBUTION.—Europe and North America. In Europe usually terrestrial on moist, shady places near *Alnus*, both in *Alnus glutinosa* copses in the lowlands as well as in submontaneous or boreal *Alnus viridis* stands. Rarely with other trees (*Moser 66/24* with *Fagus*). One find in meadow dominated by *Salix repens* in coastal dunes (*Noordeloos 841*). Wide-spread but apparently overlooked; June–November.

COLLECTIONS EXAMINED.—SWEDEN: Bohuslän, Göteborg, Rya-Skog, 23 Aug. 1955, *T. Nathorst-Windahl* (GB). — DENMARK: Sjaelland, Jaegersborg Dyrehave, 25 Sept. 1976, *H. Knudsen* (C); Lindeborg Skov, 26 July 1949, *M. Lange* (C). — GREAT BRITAIN: Somerset, Broomfield Hill, 14 Aug. 1958, *P. D. Orton 1607* (E); Morayshire, Darnaway, 24 Sept. 1955, *P. D. Orton 538* (E); Langcliffe Wood Settle, 29 Aug. 1958, *D. N. Henderson 4138* (E); Tarn Use Place, 1 Sept. 1958, *R. Watling 1596* (E); King's Cliffe, 2 Oct. 1860, *Berkeley & Broome* (K); Wiltshire Chilmark M.O.D., Salisbury, 30 July 1974, *J. B. Hintley* (K); Gloucestershire, Bristol, Leigh Down, spring 1882, *C. Bucknall* (Type of *Inocybe bucknallii*, K). — NETHERLANDS: prov. Friesland, Terschelling, Oosterend, Dazenplak, 3 Nov. 1978, *M. E. Noordeloos 841* (L); prov. Noord-Brabant, Zundert, 5 Nov. 1957 & 30 July 1975, *P. B. Jansen*, 1 Aug. 1958, *C. Bas 1472* (L), 26 July 1957, *P. B. Jansen* (Herb. P. B. Jansen). — BELGIUM: prov. Namur, Rochefort, Fond-de-Faux, 10 Sept. 1975, *C. Bas 6633a* (L). — GERMAN FEDERAL REPUBLIC: Bayern, 1962, *A. Dreher* (PRM); Bayern, Garching Heide, 3 Oct. 1965, *A. Einhellinger* (M). — AUSTRIA: Tirol, Issanger, 7 Oct. 1961, *M. Moser 51.169* (M); Tirol, Elbuchtal, 12 June 1966, *M. Moser 66/24* (IB). — FRANCE: Seine & Oise, Pontpoint, 1 June 1958, *H. Romagnesi 5825* (Herb. Romagn., PC); Bellefontaine, 25 June 1958, *H. Romagnesi 5852* (Herb. Romagn., PC). — SWITZERLAND: Grisons, Tarasp Val-latscha, 2 Sept. 1954, *J. Favre* (CHUR); Geneva, Chambésy, 25 Oct. 1943 & 5 Nov. 1944, *S. Ruhlé* (G). — U. S. A.: New York, Catskill Mountains, *Peck* (Type, NYS); Michigan, Inverness, Mud Lake Bay, 12 July 1961, *D. A. Reid* (K).

In *E. dysthales* the density of the hairs on the stipe as well as the colour of the hairs on the pileus vary considerably with the degree of freshness and with the age of the carpophore. In general the hairs become darker with age, whereas hairs that are pale in fresh state, turn uniformly brown in dried specimens. In specimens with a sparsely hairy stipe it may take some time before the characteristic multiseptate hairs are found in microscopical preparations.

Size of the spores and shape vary considerably within one collection, but on the average the length considerably exceeds 15 μm . This is an important distinctive character with respect to the closely related *E. dysthaloides*, which species frequently occurs in the same habitat.

The observations of *J. Favre* (1948: 44) on *E. dysthales* are based on a mixture of this species and *E. dysthaloides*, as herbarium studies have shown. The cited Chambésy collection agrees perfectly well with *E. dysthales*, whereas the Grisons collection appeared to be a mixture, and finally the Sentier collection contains two specimens of *E. dysthaloides*.

Inocybe bucknallii Massee is a synonym of *E. dysthales*. The strongly nodulose spores, grey lamellae and squamulose-hairy, conical pileus induced Massee (l.c.) and Heim (1931: 360) to place the species in the genus *Inocybe* Fr.

Nolanea fibrillosipes Murr. described from N. America is macroscopically very similar to *E.*

dysthales. According to Mazzer (1976: 117) it differs from the latter in the presence of a subpellis of strongly inflated cells. Mazzer suggested that *E. dysthales* as described by Humblot (1926: 78–80) and Moser (1967: 164) might be identical with *N. fibrillosipes*. On account of the collections available I could not establish the occurrence of *N. fibrillosipes* in Europe. In well developed specimens of *E. dysthales* the pileipellis may be composed of 2–3 layers of clavate elements and repent hairs (Fig. 12a) but a cellular subpellis as described by Mazzer for *N. fibrillosipes* and by Romagnesi (1941: 77) for *Rhodophyllus fumosellus* var. *homomorphus* has not been observed.

ENTOLOMA DYSTHALES (Peck) Sacc. f. *acystidiosum*

Noordeloos, *f. nov.*—Figs. 38–40

A typo differt lamellarum acie cheilocystidiis destituta. Holotypus: R. W. G. Dennis, 18 X 1955, 'Sierra de Morao, between Amorante and Villa Real, Portugal' (K).

Macroscopical notes by Dr. R. W. G. Dennis: Cap dark grey, gills slightly ascending with decurrent tooth, broad, dark grey with whitish edge. Stipe striate with whitish fibrils.

Notes on dried specimens: Pileus 6 mm broad, conico-convex, sepia grey-brown, densely hairy-flocculose with yellowish brown hairs. Lamellae L = 20, l = 1, grey-brown, concolorous with pileus, pinkish-yellowish powdery, with slightly paler edge. Stipe up to 30 × 1 mm, slightly broadened at base, dark grey-brown, minutely fibrillose-hairy, at base strigose with yellowish-ochraceous radiating hairs.

Spores 13.9–17.4(–18.0) × (7.6–)8.1–9.3(–10) μm; Q = 1.6–1.9; L–D = 5.8–8.1(–9.0) μm. Basidia 45–52 × 12.5–15 μm, 2–4-, rarely 3-spored. Subhymenium cellular, colourless. Trama and covering layers as in the typical form.

HABITAT.—Terrestrial.

DISTRIBUTION.—Only known from type locality.

COLLECTION EXAMINED.—PORTUGAL, Sierra de Morao, between Amorante and Villa Real, 18 Oct. 1955, R. W. G. Dennis (holotype, K).

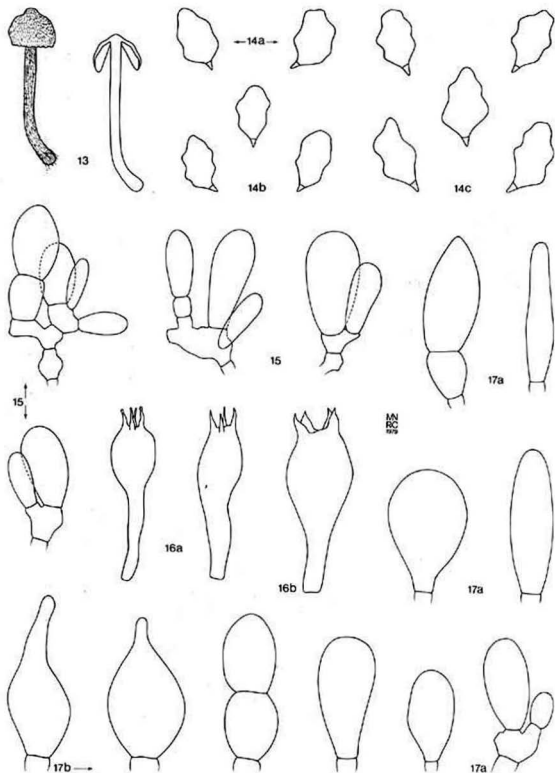
This collection is perfectly identical with *E. dysthales* except for the absence of cheilocystidia. In *E. dysthales* I observed that the cheilocystidia usually cover the entire edge. However, within some collections forms with cheilocystidia scattered among basidia were also found. Therefore I am inclined to consider the collection described above as a mere form of *E. dysthales* without cheilocystidia.

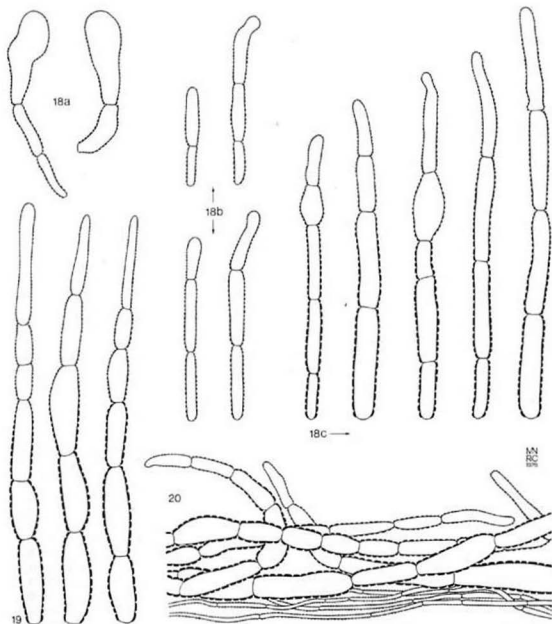
Rhodophyllus fumosellus var. *homomorphus* Romagn. from Madagascar differs in having a strongly developed cellular subpellicular layer in pileus, which characterizes it as a distinct species.

Entoloma dysthaloides* Noordeloos, *spec. nov.

Figs. 13–20

MISAPPLIED NAMES.—*Nolanea dysthales* (Peck) Murrill sensu T. Nathorst-Windahl in *Acta Horti Gotoburg.* 16: 142. 1946. — *Rhodophyllus dysthales* (Peck) Romagn. sensu O. v. Schulmann in *Karstenia* 5: 31. 1960.





Figs. 13–20. *Entoloma dysthaloides*. — 13. Habitus. — 14. Spores. — 15. Basidiolae. — 16. Basidia. — 17. Cheilocystidia. — 18. Hairs of stipe. — 19. Hairs of Pileus. — 20. Pileipellis. (Figs. 13, 16d and 18a from Jansen, Oct. 1978; 14a and 18b from Bas 4996; 14b from Nathorst-Windahl 672; 14c, 15, 16a, 17b, 18c and 20 from type; 17a from Moser 73/154; 19 from Kubička, July 1948).

Rhodophyllus araneosus Quél. sensu A. Einhellinger in Ber. Bayer. Bot. Ges. 43: 40. 1973.

? *Nolanea fulvostrigosa* Berk. & Br. sensu Bresadola, Iconogr. mycol. pl. 591. 1929.

SELECTED DESCRIPTION.—*Rhodophyllus* spec., Moser in Persoonia 7: 286–287, figs. 1a, 2c, 3c–2. 1973.

Pileus 3–15(–20) mm latus, conico-campanulatus demum explanatus, conico-convexus vel plano-convexus, leviter umbonatus, margine rectus, translucido-striatus, haud hygrophanus, fuscus vel fuliginosus, argenteo-fibrillosus vel hirtus demum fibrilloso-squamulosus. Lamellae L = 14–24, 1 = 1(–3), adnatae, interdum uncinatae, arcuatae demum ventricosae, badio-fuscae, acie concolore. Stipes 15–50 × 0.5–2 mm, filiformis vel cylindraceus, fuscus vel fuliginosus, albo-striatulus, pallide brunneo-flocculosus, basi ferrugineo-strigosus. Caro membranacea, pallide vel obscure brunnea vel fusca. Odore et sapore inconspicuis. Sporae 10.5–13.5(–15) × 6.8–8.2(–8.7) μ m, noduloso-angulatae. Basidia 40–54 × 14–19 μ m, clavata, 4-sporigera. Cheilocystidia 26–60 × 15–28 μ m, clavata vel subcylindracea vel obovata, pallide testaceo-incrustata. Pileipellis cutis aspectu trichodermatis; pilis multiseptatis, attenuatis, incrustatis. Stipitepilis cutis aspectu trichodermatis, pilis multiseptatis, attenuatis, incrustatis. Fibulae nullae. Habitat: in locis paludosis in vicinitate *Alni* (locis eisdem ac *E. dysthales*). Holotypes: *M. Moser* 77/44, 6 VII 1977, Austria, Bludenz, in silvis (IB).

Pileus 3–15(–20) mm broad, conico-campanulate then expanding to conico-convex rarely plano-convex with small umbo, with straight margin, not hygrophanous, when moist translucently striate up to 1/2 or 3/4 of cap-radius or not, dark brown or fuliginous (centre 5 YR 2.5/2; margin 10 YR 4/3), when young silvery-white or greyish, radially fibrillose-hairy becoming concentrically squamulose with minute, pointed squamules with brownish tips. Lamellae L = 15–24, 1 = 1(–3), moderately crowded, adnate or emarginate, narrowly to broadly ventricose, brown to grey-brown, sometimes darker than pileus (e.g. 7.5 YR 4/2), tinged pink, with slightly eroded edge, concolorous with sides. Stipes 15–60 × 0.5–2 mm, filiform to cylindrical, sometimes flexuous, concolorous with or slightly paler than pileus (e.g. 7.5 YR 4/2), longitudinally silvery striate, minutely hairy-flocculose with pale hairs turning brown with age, strigose at base with yellowish to rusty brown, radiating hairs. Flesh pale to dark brown, sometimes with grey tinge, membranaceous in pileus, firm in stipe of large specimens. Smell and taste inconspicuous.

Spores 10.5–13.5(–15) × 6.8–8.2(–8.7) μ m; Q = 1.4–1.6–1.8; L–D = 3.5–7 μ m, nodulose-angular with pronounced angles and large apiculus, pale brown. Basidia 40–54 × 14–19 μ m, broadly clavate, 4-spored. Abortive basidia frequent. Cheilocystidia 26–60 × 15–28 μ m, slenderly to broadly clavate, subcylindrical or obovate, with rounded or attenuate-conical tip, frequently with brown encrusted walls, with broad supporting cell. Subhymenium cellular, colourless, thin. Hymenopodium distinct; hyphae 4.5–6 μ m wide, cylindrical, coarsely brown encrusted. Mediostratum with inflated elements, 85–170 × 12–20 μ m, brown-encrusted. Pileipellis a cutis with transitions to a trichodermium with repent or erect, multiseptate, attenuate hairs, often in bundles, with cells 28–110 × 10–36 (at base) × 7–11 (at apex) μ m, with brown-encrusted walls. Pileitrama regular, consisting of cylindrical, 3.5–10 μ m wide, coarsely brown-encrusted hyphae. Stipitepilis a cutis of 4.5–10 μ m wide, cylindrical, brown-encrusted hyphae, with scattered bundles of up to 400 μ m long, cylindrical, usually slightly attenuate, septate hairs with cells 22–110 × 12–15(–21) (at base) × 7–10(–20) (at apex) μ m; terminal cells usually conical-attenuate, clavate or rarely slightly swollen. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial, often in groups in moist, shady places, particularly near *Alnus* (the same habitat as *E. dysthales*), wide-spread; June–September. Europe.

COLLECTIONS EXAMINED.—SWEDEN: Bohuslän, Ellesbu, 3 Aug. 1937, *T. Nathorst-Windahl* 672 (GB). —NETHERLANDS: prov. Noord-Holland, Castricum, 30 Sept. 1975, *E. Kits van Waveren* (L); prov. Noord-Brabant, Dorst, 24 Aug. 1968, *C. Bas* 4996 (L), 24/31 Aug. 1968, 26 June 1972, 16 July 1974, 25 Oct. 1978, *P. B. Jansen* (L); Breda, Ulvenhoutse bos, 28 July 1961, *P. B. Jansen* (L). —GERMAN FEDERAL REPUBLIC: Bavaria, Isarau bei Ismaning, 13 Sept. 1970, *A. Einhellinger* (M). —SWITZERLAND: St. Gallen, Rheinauen bei Sargans, 28 Sept. 1973, *M. Moser* 73/154 (IB); Jura vaudois, Sentier, 12 Sept. 1940,

J. Favre (G). — AUSTRIA: Kärnten, oberhalb Gölttschach, Sattnitz, 26 Sept. 1966, *M. Moser* 66/257 (IB); Auenwald bei Bludenz, 6 Aug. 1977, *M. Moser* 77/43 (Holotypus, IB). — CZECHOSLOVAKIA: Rusyně, 23 July 1948, *J. Herink* (PRM); Turnov, 7 Aug. 1948, *J. Herink* (PRM); Turnov, July 1948, *J. Kubička* (PRM); Bohemia, Cernosice, 6 Aug. 1950, *V. Vacek* (PRM).

Entoloma dysthaloides occurs in the same habitat as *E. dysthales* and is macro- and microscopically very close to the latter. The main difference lies in the consistently smaller spores. In Europe several closely related species with small spores occur. *Entoloma hirtum* differs in the ash grey colour of pileus and stipe, the different type of covering of the stipe and perhaps also in the habitat: grassy, xerophytical, sunlit places. *Entoloma romagnesii* differs in the subglabrous stipe with scattered, clavate, not encrusted hairs and in the smaller, more broadly ellipsoid spores. *Entoloma pulvereum* differs in the paler colours of pileus and stipe, the robust stature and the differently shaped spores. *Rhodopyllus babingtonii* sensu Moser differs in the lack of cheilocystidia, but this might be an aberrant specimen of our species (see also p. 241 under excluded taxa).

Judging from the description *E. dysthales* sensu O. v. Schulmann is identical with our species. The collection at H, labelled as this find, contains however specimens of a species close to *E. clandestinum* belonging to the subgenus *Nolanea*; it is likely that material from another find erroneously has been put under this label.

***Entoloma hirtum* (Velen.) Noordeloos, comb. nov.**

Figs. 21–26

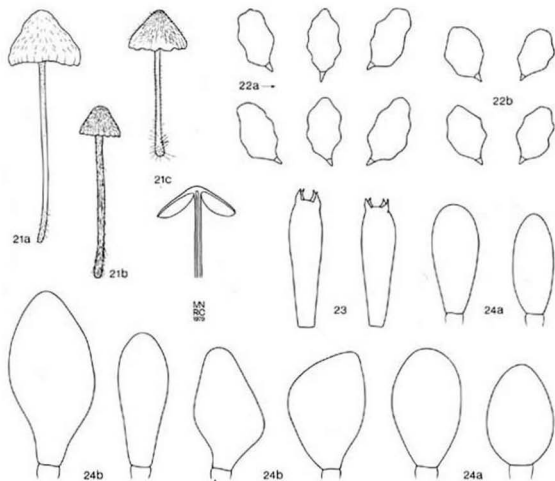
Nolanea hirta Velen. in *Mykologia* 6: 28. 1929. — *Pouzarella hirta* (Velen.) Mazzer in *Bibltca mycol.* 46: 99. 1976.

Nolanea setulosa Velen., *Novitates mycologicae*: 147. 1939. — *Pouzarella setulosa* (Velen.) Mazzer in *Bibltca mycol.* 46: 108. 1977.

CHARACTERISTICS.—Pileus ash grey, sometimes with sepia flush at centre; stipe ash grey with pale, not encrusted, simple cylindrical hairs.

Pileus 4–20 mm broad, conical, sometimes truncate, never depressed, expanding to convex with umbo, margin straight, sometimes crenulate, not hygrophanous, not or only at margin striate, ash grey with centre blackish, sometimes with sepia flush, entirely fibrillous-squamulose, with triangular squamules from erect at centre to adpressed on limb. Lamellae L = up to 24, l = 1–3, moderately distant, adnate-emarginate, often almost free, ventricose, dark grey-brown with pinkish flush, with edge nearly entire or flocculose and concolorous with sides or slightly paler. Stipe 30–70 × 1–3 mm, cylindrical or slightly tapering downwards, solid then narrowly fistulose, concolorous with pileus or slightly paler, with pale, sometimes brownish arachnoid covering, glabrescent, at base strigose with yellow-brown radiating hairs. Flesh very thinly membranaceous, concolorous with surface, in disk of cap slightly paler. Smell none. Taste bitter (according to Bon in field-note).

Spores (10.2–)11–15(–15.5) × 6.8–8(–9) μm; Q = 1.3–1.55–1.7(–1.8), 6–8-angled in side-view, with pronounced angles, pale brown. Basidia 34–46 × 10.5–15(–20) μm, broadly clavate, 4-spored. Abortive basidia scattered. Cheilocystidia 20–60(–75) × (9–)12–25(–36) μm, numerous, usually slenderly to broadly clavate with rounded or conical apex, rarely subglobose or subcylindrical, with thin or slightly thickened brownish walls often with brown encrustations. Subhymenium cellular, hyaline, colourless. Hymenopodium often very distinct and broad, composed of cylindrical, 2.5–12 μm wide coarsely encrusted hyphae. Mediostratum made up of



Figs. 21–24. *Entoloma hirtum*. — 21. Habitus. — 22. Spores. — 23. Basidia. — 24. Cheilocystidia. (Fig. 21a from *Bon 780616*; 21b and 22b from *Noordeloos 531*; 21c, 22a, 23 and 24a from type; 24b from *Svrček, June 1944*).

slightly inflated elements, 55–220(–300) × 8–22 μm , less heavily encrusted. Pileipellis a cutis with transitions to a trichodermium with long, multisepate, brown-encrusted, attenuate hairs with cells 46–110 × 11–20 (at base) × 4–7 (at apex) μm . Pileitrama regular, consisting of cylindrical hyphae, distinctly constricted at septae and coarsely brown-encrusted. Stipitipellis a cutis of narrow up to 14 μm wide, brown, sometimes slightly encrusted hyphae with scattered 1–3-septate, yellow-brown, not encrusted, cylindrical hairs up to 170 μm long, up to 16 μm wide. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial in sun-lit, xerophytic, grassy vegetations on calcareous soils with *Prunus spinosa* and/or *Juniperus communis*. Rare. Known from Czechoslovakia, France, The Netherlands and Denmark; June–September.

COLLECTIONS EXAMINED.—DENMARK: Isl. of Mön, Judeleiet, 16 Oct. 1976, *M. E. Noordeloos 531* (L). — NETHERLANDS: prov. Limburg, Gronsveld, Savelsbos, 11 Sept. 1977, *J. Schreurs & T. Kuiper* (L). — FRANCE: Francheville, 16 June 1978, *M. Duchemin* (ex Herb. Bon 780616, L). — CZECHOSLOVAKIA: Bohemia, Radotin, June 1926, *J. Velenovský* (Holotypus, PRM); Bohemia, Mnichovice, Jidasky,

June 1931, *J. Velenovský* (Type of *N. setulosa*, PRM); Bohemia, Kostoř near Prague, 25 June 1944, *M. Svrček* (PRM); Bohemia, Slivenec near Prague, 10 June 1946, *M. Svrček*. (PRM).

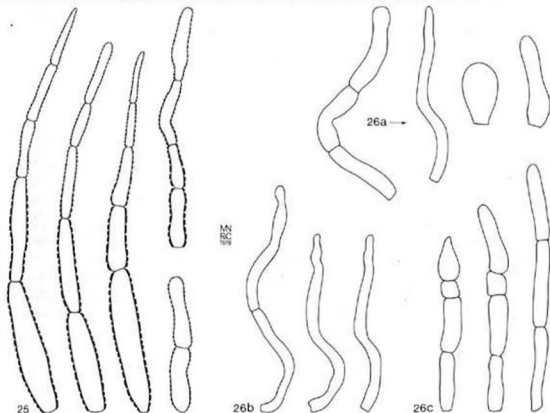
Entoloma hirtum differs from the closely related *E. dysthaloides* in the ash grey colour of pileus and stipe and in the covering of the stipe. Perhaps also the habitat is different. *Entoloma romagnesii* has smaller spores, and *E. pulvereum* has a more robust stature and differently shaped spores. *Leptonia cinerea* Velen. might be identical with *E. hirtum*, but on account of the sparse information on the variation of characters within *E. hirtum*, *L. cinerea* is placed among the insufficiently known taxa below (see p. 241).

***Entoloma romagnesii* Noordeloos, spec. nov.—Figs. 35–37**

MISAPPLIED NAMES.—*Rhodophyllus subnigrellus* Romagn. sensu Romagn. in *Rev. Mycol.* 2: 86. 1937. — *Rhodophyllus dysthales* f. *subnigrellus* (Romagn.) Kühn. & Romagn., *Fl. anal.*: 186. 1953.

Pouzarella nigrella (Velen.) Mazzer sensu Mazzer, non Velen. nec *Eccilia nigrella* Pers. in *Biblta mycol.* 46: 96. 1976.

Pileus 10–12 mm latus, conico-campanulatus demum leviter expansus, margine involutus, obscure sepiceus, leviter tomentosus-velutinus. Lamellae distantes, adnatae, emarginatae, obscure brunneae roseo-



Figs. 25–26. *Entoloma hirtum*. — 25. Hairs on pileus. — 26. Hairs on stipe. (Fig. 25 from type; 26a from Bon 780616; 26b from Noordeloos 531; 26c from Schreurs & Kuyper, Sept. 1977).

tinctae. Stipes 30–40 × 1.25–1.5 mm, cylindraceus, rigidus, fistulosus, fulvus, pileo pallidior, fibrilloso-striatus, sericeus, basi strigosus. Caro fulva, pallescens. Odore et sapore inconspicuis. Sporae 7.8–10.8 (–11.8) × 6.4–7.4 μm, obtusioriter angulatae, tenuitunicatae. Basidia 41–52 × 11–14.5 μm, 2- vel 4-sporigera. Cheilocystidia 20–55 × 12–25 μm, ellipsoidea vel clavata, interdum leviter incrustata. Pileipellis cutis aspectu trichodermatis; pilis multiseptatis, haud incrustatis. Pilis stipitum cylindraceis vel clavatis haud incrustatis. Fibulae nullae. Habitat: Ad terram paludosam in silvis. Holotypus: Herb. Romagnesi 139, IX 1935, Yerres, Seine & Oise, Gallia (Herb. Romagn., PC).

CHARACTERISTICS.—Slender species with dark yellow-brown pileus and stipe, short ellipsoid spores and not encrusted hairs on pileus and stipe.

Pileus 10–12 mm broad, conico-campanulate with involute margin, then expanding with small umbo, dark bistre, entirely velvety-hairy with slightly paler hairs. Lamellae distant, interspaced with lamellulae, adnate, emarginate, sometimes with decurrent tooth, broad, dark brown with slightly paler edge, tinged pink. Stipe 30–40 × 1.25–1.5 mm, cylindrical, straight, fistulose, brown, paler than pileus, shinningly longitudinally fibrillose-striate, minutely flocculose, base strigose. Flesh dark brown, expallent. Smell and taste inconspicuous.

Spores 7.8–10.8 (–11.8) × 6.4–7.4 μm; Q = 1.2–1.4–1.55; L–D = 1–3 (–4) μm, broadly ellipsoid in outline, rounded nodulose-angular, thin-walled. Basidia 41–52 × 11–14.5 μm, clavate, 2- and 4-spored. Cheilocystidia 20–55 × 12–25 μm, broadly ellipsoid to clavate, sometimes minutely brown-encrusted. Subhymenium cellular. Hymenophoral trama regular; hyphae cylindrical, brown-encrusted. Pileipellis a cutis with transitions to a trichodermium with long, septate hairs gradually tapering towards apex; cells 40–130 × 10–23 (at base) × 7–12 (at apex) μm, uniformly pale brown, not encrusted. Stipitepellis a cutis of 6–14 μm wide, cylindrical, brown, sometimes minutely encrusted hyphae with spread cylindrico-clavate, pale, not encrusted hairs, cells 30–60 × 7–20 μm. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial on moist soil along brooklet in deciduous forest. Known only from the type locality.

COLLECTION EXAMINED.—FRANCE: dept. Seine & Oise, Yerres, au bord du ruisseau 'Le Réveillon', Sept. 1935, M^{mc} A. Buffetcau (Herb. Romagn. 139, PC; holotypus).

NOMENCLATURE OBSERVATIONS.—Romagnesi (1937: 86) created *R. subnigrellus* as a new name for *Leptonia nigrella* Velen.: to avoid homonymy with *R. nigrellus* (Weinm. ex Pers.) Quél. Consequently the type of *R. subnigrellus* is the same as of *L. nigrella*. The present author studied the type of *L. nigrella* (Noordeloos, 1979: 260) and concluded that *L. nigrella* Velen. is different from the collection Romagnesi described as *R. subnigrellus*. As no legitimate name was available to replace *R. subnigrellus* Romagn. sensu Romagn., it is described here as a new species, named in honour of the excellent French mycologist Henri Romagnesi. *Pouzarella nigrella* (Velen.) Mazzer sensu Mazzer is based on *R. subnigrellus* Romagn. sensu Romagn. and therefore a misapplication.

Entoloma romagnesii is easily distinguished from the other members of subg. *Pouzaromyces* in the small, rounded-angular, thin-walled spores. *Entoloma pulverum* has some resemblance in spore-shape but differs in the more robust stature and encrusted hairs on pileus and stipe.

ENTOLOMA PULVEREUM Rea—Figs. 27–32

Entoloma pulverum Rea in Trans. Br. mycol. Soc. 2: 170, pl. 14, 1907. — *Leptonia pulverea* (Rea) P. D. Orton in Trans. Br. mycol. Soc. 43: 178, 1960. — *Pouzarella pulverea* (Rea) Mazzer in Bibliotheca mycol. 46: 97, 1976.

CHARACTERISTICS.—Rather robust species with reddish brown hairs on stipe, very obtusely angular spores and strongly inflated hyphae of pileitrama.

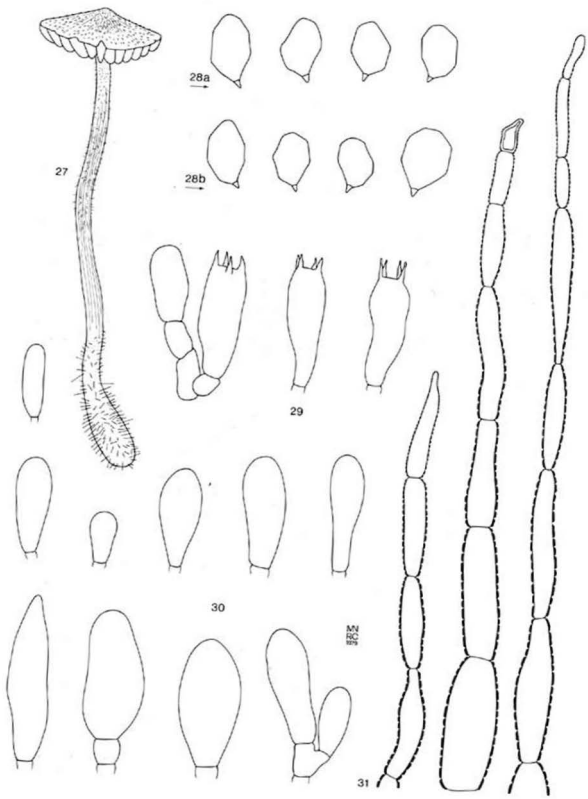
Pileus 25 mm broad, conico-convex with straight margin, not hygrophanous, not striate, pale grey-brown, densely covered with minute, yellowish brown squamules with often erect tips. Lamellae $L = 24$, $l = 1$, broadly adnate with small decurrent tooth, broadly ventricose, up to 6 mm broad, strongly transversely veined especially at base, intervenose, dark grey-brown with pinkish spore-dust, slightly more yellowish brown towards flocculose edge. Stipe $95 \times 2-3$ mm, cylindrico-flexuous, firm, greyish yellow, silky-shining, densely punctate with reddish brown squamules, at base strigose with radiating yellowish brown hairs becoming reddish with age. Flesh dark grey-brown. Smell none, taste not recorded.

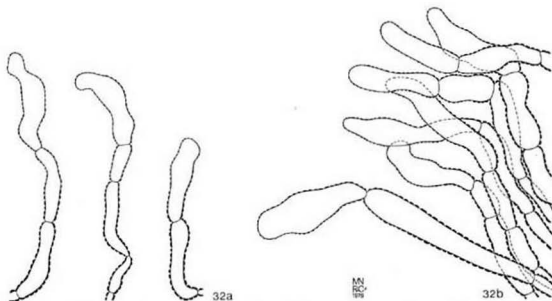
Spores $10.2-12.5(-13.0) \times 7.0-8.1(-8.7) \mu\text{m}$; $Q = 1.3-1.4-1.6$; $L-D = 2.1-3.0-4.7 \mu\text{m}$, 6-8-angled in side-view, with rather obtuse angles, thin-walled, hyaline in water. Basidia $40-67 \times 12-15 \mu\text{m}$; $Q = 3.2-4.0$, 4-, rarely 2-spored, some with brown intracellular granules. Cheilocystidia $(17-)25-70 \times 7.5-20(-25) \mu\text{m}$, subcylindrical to broadly clavate, with rounded or attenuate-conical apex and yellowish brown encrusted thickish walls, mostly with broad supporting cell, rarely in short chains. Subhymenium cellular, hyaline, colourless. Hymenophoral trama regular; hymenopodium consisting of $4-11 \mu\text{m}$ wide cylindrical hyphae; mediostatum composed of inflated hyphae, with coarsely brown-encrusted cells $90-240 \times (7.5-)12-29 \mu\text{m}$. Pileipellis a cutis with transitions to a trichodermium with long, repent or slightly ascending multiseptate hairs with cells $30-110(-120) \mu\text{m}$ long, $14-33 \mu\text{m}$ wide in basal elements, gradually narrowing towards apex, and there cells $2.5-14 \mu\text{m}$ wide, with brown-encrusted, often slightly thickened walls. Pileitrama regular with moderately to strongly inflated elements, $82-270 \times (7-)11-35 \mu\text{m}$, brown-encrusted. Stipitepellis a cutis of $5-14 \mu\text{m}$ wide, cylindrical, brown hyphae, covered with scattered clusters of 1-3(-5)-septate hairs with inflated-cylindrical cells $45-97(-125) \times (10-)12-23(-27) \mu\text{m}$; terminal elements usually clavate with rounded apex, with brown, often slightly encrusted walls. Hairs at base of stipe $3.5-7 \mu\text{m}$ wide, cylindrical, deep brown, not encrusted. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial in thick layer of humus near *Quercus*. Great Britain, Netherlands. Rare.

COLLECTIONS EXAMINED.—GREAT BRITAIN: Surrey, Nork, Park-Wood, 3 Oct. 1953, *P. D. Orton* (E). — NETHERLANDS: prov. Noord-Holland, Castricum, Geversduin, 21 Oct. 1956, *Chr. Maas Geesteranus* (L); Amsterdam, Amsterdamse bos, 27 July 1960, *E. Kits van Waveren* (L).

This remarkably robust member of *Pouzaromyces* could easily be taken for a robust specimen of *E. dysthaloides*. It differs however in the paler, more yellowish brown colouration, the brown to reddish brown squamules and the reddish tinged strigose hairs on stipe, the slightly smaller, differently shaped, thin-walled spores, the inflated hyphae in the trama of the pileus, and perhaps in the different habitat. The Netherlands' collections, on which the macroscopical description given above is based, agree very well with the original description and plate given by Rea (l.c.). Unfortunately the type-collection got lost.





Figs. 27–31. *Entoloma pulvereum*. — 27. Habitus. — 28. Spores. — 29. Basidia. — 30. Cheilocystidia. — 31. Hairs of pileus. — 32. Hairs of stipe. (Figs 27, 28b, 29, 30, 31 and 32b from *Chr. Maas G.*, Oct. 1956; 28a and 32b from *Orton 156*).

***Entoloma* sect. *Versatilis* (Romagn. ex Romagn.)
Noordeeloos, *comb. nov.***

Rhodophyllus sect. *Versatilis* Romagn., *Rhodoph. Madag.*: 44. 1941 (nom. nud.). — *Rhodophyllus* sect. *Versatilis* Romagn. ex Romagn. in *Bull. Soc. linn. Lyon* 43: 329. 1974.

Rhodophyllus subg. *Inopilus* Romagn. in *Bull. Soc. linn. Lyon* 43: 329 non sensu Romagn. in *Beih. Nova Hedwigia* 59: 48. 1978 (see note 1, p. 207). — *Entoloma* subg. *Inopilus* (Romagn.) Moser in *Gams, Kl. KryptogFl.* 4. Aufl., 2(b/2): 191. 1978.

Pouzarella sect. *Versatilis* Mazzer in *Bibltca mycol.* 46: 71. 1976 (nom. superfl.).

Pileus micaceous-fibrillose, subglabrous to coarsely radially fibrillose-hairy. Cheilocystidia lageniform. Pigment in pileipellis of two kinds: granular-intracellular and very minutely encrusting, in rest of carpophore hyphal membranes coloured and minutely encrusted. Holotypus: *Agaricus versatilis* Fr.

KEY TO THE SPECIES OF SECT. *VERSATILIS*

- 1a. Pileus mouse grey, sometimes with brown tinge. Spores ellipsoid in outline, Q = on the average 1.4–1.6 per collection. 2
 b. Pileus with olivaceous greenish or olivaceous yellow or bluish grey tinges. Spores broadly ellipsoid in outline, Q = on the average 1.2–1.4 per collection. 3
 2a. Pileus when young with greyish veil. Base of stipe with white to greyish, radiating hairs.
 E. araneosum f. *araneosum*, p. 234
 b. Pileus without veil. Base of stipe with reddish, radiating hairs.
 E. araneosum f. *fulvostrigosum*, p. 236
 3a. Pileus brown with olivaceous greenish or olivaceous yellow tinges, metallic shining, subglabrous-fibrillose. *E. versatilis*, p. 230
 b. Pileus bluish grey ('ardoisé') with reddish flush at centre, fibrillose-squamulose, not metallic shining.
 E. indutum, p. 239

ENTOLOMA VERSATILIS (Fr.) Moser—Figs. 41–46

Agaricus versatilis Fr., Monogr. 2: 297. 1863. — *Nolanea versatilis* (Fr.) Gill., Hyménom. Fr.: 418. 1874. — *Rhodophyllus versatilis* (Fr.) Quél., Enchir.: 63. 1886. — *Pouzarella versatilis* (Fr.) Mazzer in *Bibltca mycol.* 46: 76. 1976. — *Entoloma versatilis* (Fr.) Moser in Gams, Kl. KryptogFl. 4. Aufl., 2(b/2): 208. 1978.

Rhodophyllus viridulus Herink in *Česká Mykol.* 9: 6. 1955 (non *Leptonia viridula* P. Henn.).

SELECTED ICONES.—Ricken, *Blätterpilze*: pl. 74 fig. 7. 1913. — Herink, l.c.: 7 (as *R. viridulus*).

SELECTED DESCRIPTIONS.—Romagnesi in *Rev. Mycol.* 2: 87. 1937. — Reijnders in *Fungus* 14: 63–64. 1943.

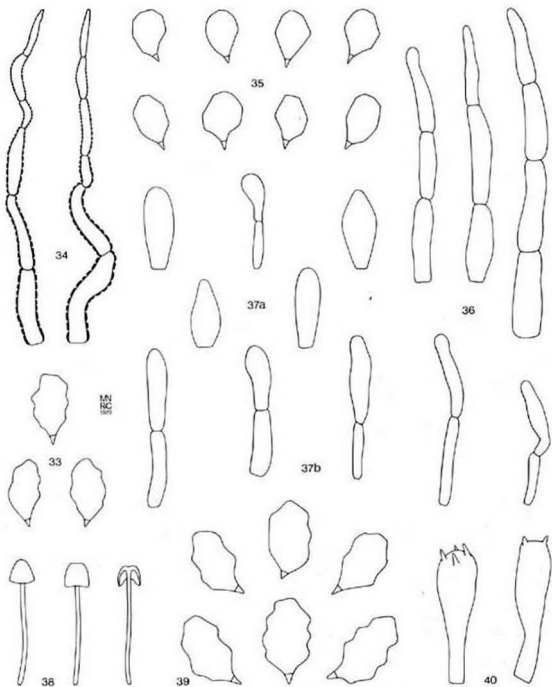
CHARACTERISTICS.—Pileus with metallic sheen, subglabrous-fibrillose, brown with olivaceous yellow tinge.

Pileus 15–30 mm broad, conical then conico-campanulate, usually umbonate, rarely truncate, with margin involute when young, then straight, weakly hygrophanous, when moist translucently striate at margin or not, olivaceous brown to olivaceous grey (2.5 Y 4/4 or 5 Y 4/2 towards 5 Y 3/2), slightly paler when dry (5 Y 6/4, 5 Y 6/2 or 5 Y 5/4), minutely radially fibrillose, with metallic sheen, finally with small, innate scales especially at centre. Lamellae L = up to 30, l = 1–3, narrowly adnate to nearly free, triangular when young, then ventricose, up to 4 mm broad, grey then grey-brown (10 YR 5/3, 10 YR 4/4 or 10 YR 4/2), then pinkish powdery, with edge flocculose and concolorous with sides or distinctly paler. Stipe 25–50 × 2–3 mm, cylindrical but sometimes slightly broadened at base, solid then hollow, cartilaginous, pale at apex, downwards darker to rather dark grey, sometimes with olivaceous tinge, sometimes blackish, at base often with purplish flush, entirely silvery fibrillose-arachnoid striate, at apex pruinose to flocculose, at base strigose with radiating whitish hairs. Flesh in pileus brown-grey with olive green tinge, in upper half of stipe grey-brown becoming darker downwards, firm. Smell none or spermatol-sourish. Taste not recorded.

Spores (9–)9.5–11.7(–12.5) × 6.8–7.9(–9.0) μm; Q = 1.2–1.35–1.5; L–D = (1.2–)2–3.5(–4.5) μm, 5–6–7-angled in side-view, simple to rather asymmetrical, variable in shape. Basidia 34–51 × 11.5–13(–15) μm; Q = 2.6–3.8, broadly clavate, 4-spored. Abortive basidia scattered. Cheilocystidia (42–)60–110 × 10.5–25(–31) μm, narrowly to broadly lageniform, mostly with broad, swollen basal part and long, attenuate, sometimes moniliform neck, thin-walled, colourless or brown-encrusted, particularly in broadest part, usually intermixed with basidia. Pleurocystidia similar to cheilocystidia, usually scarce and only present near edge of lamellae, in many collections lacking. Subhymenium (sub)cellular, thin, colourless. Hymenopodium weakly developed, filamentous, consisting of 3.2–6 μm wide, cylindrical, minutely encrusted hyphae. Mediostratum regular; cells up to 280 μm long, cylindrical to inflated, 8–20(–27) μm wide. Pileipellis a cutis with transitions to a trichodermium of long cylindrical hairs with terminal cells 110–168(–200) × 12.5–21 μm and cylindrical or clavate with conical apex, with pale yellow-brown walls and granular intracellular pigment. Pileitrama regular; cells up to more than 300 μm long, 8–21 μm wide, with yellow-brown, minutely to coarsely encrusted walls. Stipitepellis a poorly differentiated cutis of 5–16 μm wide, cylindrical hyphae, with scattered cylindrical free tips, mostly uniformly yellow-brown, sometimes minutely encrusted. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial on bare soil in deciduous forests, parks etc. Rare, but wide-spread in Europe. August–October.

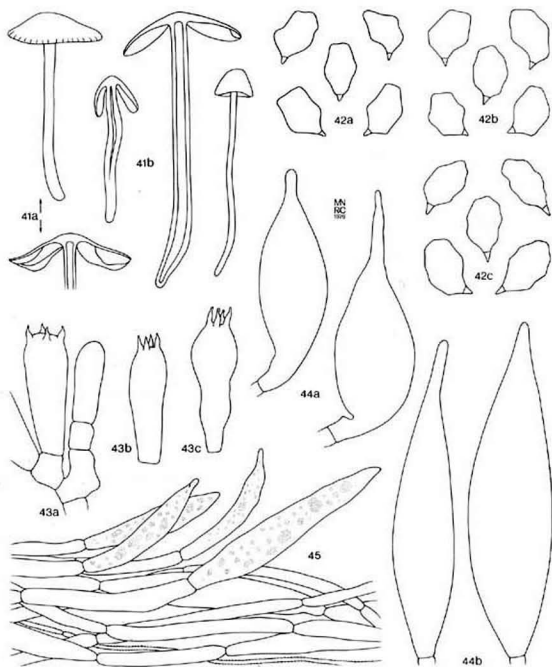
COLLECTIONS EXAMINED.—SWEDEN: Vestergötland, Göteborg, Slottskogen, 29 Aug. 1940, T. Nathorst-Windahl, in Fungi exsicc. succ. No. 1134 (UPS, PC, PRM, GB); idem, Oct. 1944 (O). — GREAT BRITAIN: Yorkshire, Skipton, Currer Wood, Sept. 1965, C. Jeffrey (K); Yorkshire, Malham, 1 Sept. 1958, R. Watling 1779 (E); Oxford county, Oxford, Corbury estate, 13 Sept. 1969, E. Kits van Waveren (L); Norfolk, Brooke, Brooke wood, 9 Oct. 1976, P. D. Orton 4853 (E); Wales, lake Vyrnwy, 8 Sept. 1977, E. Kits van Waveren (L). — GERMAN FEDERAL REPUBLIC: Westphalen, Teutoburgerwald, Beller Holz,



Figs. 33–34. *Rhodophyllus babingtonii* sensu Moser. — 33. Spores. — 34. Hairs on pileus. (All Figs. from Moser 66/304).

Figs. 35–37. *Entoloma romagnesii*. — 35. Spores. — 36. Hairs on pileus. — 37. Hairs on stipe: a. at apex; b. near base. (All Figs. from type).

Figs. 38–40. *Entoloma dysthales* f. *acystidiosum*. — 38. Habitus. — 39. Spores. — 40. Basidia. (All Figs. from type).



Figs. 41–45. *Entoloma versatilis*. — 41. Habitus. — 42. Spores. — 43. Basidia. — 44. Pleurocystidia. — 45. Pileipellis. (Fig. 41a from *Bon* 74092702; 41b from *Romagnesi* 46.296.; 42a, 43a and 45 from *Bas* 4567; 42b, 43b and 44a from *Kits* v. *Waveren*, *Sept.* 1977; 42c from *Herink*, *Sept.* 1937; 43c and 44b from *Nathorst-Windahl*, *Aug.* 1940).

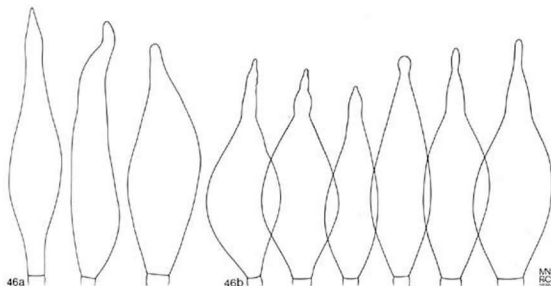


Fig. 46. *Entoloma versatilis*. Cheilocystidia. (Fig. 46a from Nathorst-Windahl, Aug. 1940; 46b from Kits v. Waveren, Sept. 1977).

1 km E. of Bad Meinberg, 25 Sept. 1969, *C. Bas* 4567 (L). — FRANCE: dept. Orne, Bellême, Les Chaises, 25 Sept. 1974, *M. Bon* 74092702 (Herb. Bon); dept. Oise, Cerçay, 13 Aug. 1936, *H. Romagnesi* 36.99 (Herb. Romagn., PC); dept. Oise, Coye-la-Forêt, 14 Sept. 1946, *H. Romagnesi* 46.296 (Herb. Romagn., PC). — CZECHOSLOVAKIA: Bohemia, Praha 18, obera Hvezda, 1 Sept. 1937, *J. Herink* (Type of *R. viridulus*; PRM); idem, 30 Aug. 1937, *J. Herink* (PRM).

OBSERVATIONS.—One rather aberrant collection was met with, viz. *Nolanea versatilis* (Fr.) Gill., Malham town pasture, in Woodland, 20 Aug. 1958, *anonymus* (E). This collection differs from all other collections studied in having 2- and 4-spored basidia equally distributed in the hymenium. As a result of this two spore-classes were found: firstly spores measuring $10.8-11.7 \times 7-8.2(-9) \mu\text{m}$, $Q = 1.2-1.35-1.5$, $L-D = 1.8-3.6 \mu\text{m}$, apparently representing spores from 4-spored basidia, and secondly spores measuring $12.3-14.0 \times 8.8-9.3 \mu\text{m}$, $Q = 1.3-1.45-1.55$, $L-D = 3-5 \mu\text{m}$, which were obviously born on 2-spored basidia. The only available observation on the fresh fungus is written on the label, viz. 'cap tinged olive'.

Although Fries' *Icones* (1875, pl. 98) show a rather robust agaric which in no way fits the description given above, the original diagnosis and a later description (Fries, 1874: 206) give considerable less doubt on the identity of our species. It is well known, however, that Fries' *Icones* do not always give a typical representation of his species. Considering the descriptions cited above, I see no reason to follow Herink's suggestion (l.c.) to adopt a new name for *Nolanea versatilis* Fr. sensu Ricken, *Romagnesi*.

The rareness of *E. versatilis* is reflected in the lack of good descriptions. The only modern description is given by Romagnesi (1937: 87-88). The colour of the pileus seems to vary considerably, viz. from pale olivaceous brown to dark grey-brown with olivaceous tinge. Also the colouration of the stipe is rather variable (see description). The pigmentation of the trama of pileus and lamellae may vary from membranous and uniformly yellow-brown with only minute encrustations, to rather coarsely encrusted. The intensity of the pigmentation also increases from

the upper part of the trama of the pileus downwards. The size and shape of the spores is rather variable. Within one collection the side-view may vary from 5-sided symmetrical to rather irregularly 7-sided asymmetrical, with rather pronounced angles. The latter type of spores is predominant in the type of *R. viridulus*. Pleurocystidia, often used to distinguish *E. versatilis* from the most related members of sect. *Versatilis*, are usually rather scarce. In a number of collections I could not find any. The value of pleurocystidia as a distinguishing character is therefore doubtful.

Entoloma versatilis as described from North America by Mazzer (l.c.) has considerably larger spores. (It should be noted that these spores are born on 4-spored basidia.) Mazzer gives $10.8-14.4 \times 7.5-8.9 \mu\text{m}$. In a collection from Michigan in L, collected by Dr. Bas, I found spores $11.5-14 \times 7.6-8.7 \mu\text{m}$. All these spores were born on 4-spored basidia. This difference suggests that the North American *E. versatilis* represents another taxon than *E. versatilis* from Europe.

ENTOLOMA ARANEOSUM (Quél.) Moser

f. ARANEOSUM—Figs. 47–51

Nolanea araneosa Quél. in Bull. Soc. bot. Fr. 23: 327. 1876. — *Rhodophyllus araneosus* (Quél.) Quél., Enchir.: 63. 1886. — *Pouzarella araneosa* (Quél.) Mazzer in Biblca mycol. 46: 100. 1976. — *Entoloma araneosum* (Quél.) Moser in Gams, Kl. KryptogFl. 4. Aufl., 2(b/2): 208. 1978.

EXCLUDED NAMES.—*Rhodophyllus araneosus* sensu Einhellinger in Ber. Bayer. bot. Ges. 44: 40. 1973 (= *E. dysthaloides*).

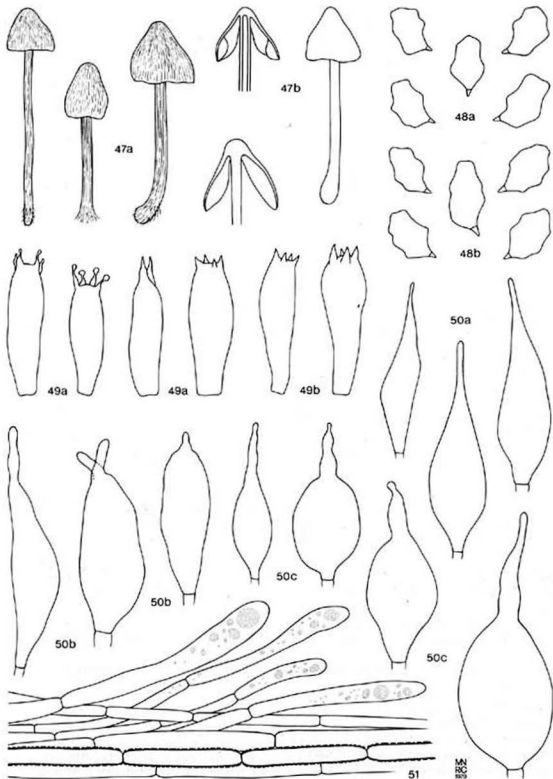
SELECTED ICONES AND DESCRIPTIONS.—Quél., 1876, l.c., pl. 2 fig. 3. — Dössing in Friesia 6: 335–337, fig. 1. 1961.

CHARACTERISTICS.—Pileus and stipe mouse-grey sometimes tinged brown; pileus strongly radially fibrillous, margin with velar remnants at least when young; stipe-base with pale greyish radiating hairs.

Pileus 9–35 mm broad, conico-campanulate, sometimes truncate, only very slightly expanding with age, then umbonate, with margin straight, finally slightly undulating, not hygrophanous, not or very obscurely striate at margin when moist but at marginal zone sometimes radially grooved, mouse grey, finally sometimes with brown tinge, densely covered with radially arranged silvery white or greyish fibrils, at margin especially when young flocculose with grey veil. Lamellae L = up to 30, 1 = 1–2, narrowly adnate, ventricose, sometimes thickish, occasionally transversely veined, pale grey at first then pinkish grey with brown tinge, with entire or flocculose, slightly paler edge. Stipe 26–63 \times 1.5–4 mm, cylindrical with slightly broadened base, sometimes flexuose, stuffed then hollow, subcartilagineous, grey to grey-brown, paler than pileus, rarely tinged with red at base, white pruinose or flocculose at apex, entirely silvery white longitudinally fibrillose-arachnoid, at base with pale grey or whitish radiating hairs. Flesh concolorous with surfaces, firm. Smell faint: gas-like, nauseating (*Bas 6363*); farinaceous (*Dössing, Romagnesi*). Taste not recorded.

Spores (9.3–)10.2–14.0(–15) \times (6.8–)7–8.1(–9.0) μm ; Q = (1.2–)1.4–1.5–1.8; L–D = (1.5–)2.5–4(–7) μm , (broadly) ellipsoid to elongate in outline, 6–8-angled in side-view, relatively thin-

Fig. 47–51. *Entoloma araneosum* f. *araneosum*. — 47. Habitus. — 48. Spores. — 49. Basidia. — 50. Cheilocystidia. — 51. Pileipellis. (Figs. 47a, 48a, 49a and 50c from *Bas 6363*; 47b and 50b from *Bas 5818*; 48b, 49b and 50a from *Kuyper 1046*; 51 from *Dössing, June 1966*).



MBCN

walled, pale. Basidia (35–)41–55 × 10.5–15 μ m. Abortive basidia present. Cheilocystidia 45–75(–100) × 10–30 × 2.5–5.4 μ m, lageniform with broad basal part and short to rather long, attenuate or moniliform neck, rarely subcapitate, hyaline, colourless or slightly brown-encrusted in broadest part. Pleurocystidia none. Subhymenium (sub)cellular, thin, colourless. Hymenopodium distinct, but thin, consisting of 3.4–5(–7) μ m wide, densely entangled to subregularly arranged, rather strongly encrusted hyphae. Mediostratum regular, made up of up to 15(–21) μ m wide, slightly inflated, uniformly brown, sometimes minutely encrusted hyphae. Pileipellis a cutis with transitions to a trichodermium made up of thin-walled up to 400 μ m long repent and/or ascending cylindrical hairs, with slightly thick-walled, refractive apex, terminal cells (40–)65–250 × (8–)13–27 μ m, cylindrical or slightly inflated or fusiform, uniformly yellowish brown by membranous but also minutely encrusting pigment together with a grey-brown diffuse or granular intracellular pigment. Pileitrama regular, composed of cylindrical to inflated hyphae up to 21 μ m wide with yellow-brown walls intermixed with 2.3–5.7(–7) μ m wide, cylindrical, minutely encrusted hyphae. Stipitpellis a differentiated cutis composed of 5.7–14 μ m wide hyphae with reflexed cylindrical to clavate, up to 20 μ m wide free ends ('hairs') with uniformly coloured, not encrusted walls. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial, solitary or in small groups on bare soil in deciduous forests rich in humus; May–November. Widespread but apparently rare. Europe.

COLLECTIONS EXAMINED.—FINLAND: Inkoo, Fagervik park, 31 Aug. 1963, *O. v. Schulmann* (H). — DENMARK: Lolland, Toreby-skov, 8 Sept. 1960, *L. Dössing* (C); Falster, Bangebro-skov, 27 Aug. 1963 & 12 June 1966, *L. Dössing* (C). — GREAT BRITAIN: Durham County, Peterslee, 18 Oct. 1971, *C. Bas 5815* (L). — NETHERLANDS: prov. Zuid-Holland, Ridderkerk, estate 'Huys ten Donk', 12 Nov. 1977, *T. Kuypers* (L). — BELGIUM: prov. Namur, Han sur Lesse, Bois Banale, 22 Sept. 1971, *C. Bas 6363* (L). — GERMAN FEDERAL REPUBLIC: Saarland, Völklingen, 11 Aug. 1973, *H. Derbsch* (M). — FRANCE: dept. Oise, Compiègne, 13 Oct. 1949, *H. Romagnesi* (Herb. Romagn., PC); dept. Oise, La Chapelle-en-Serrail, 6 Oct. 1976, *H. Romagnesi* (Herb. Romagn., PC); dept. Somme, Gouy-Cahon, Sept. 1968, *M. Bon 80972* (Herb. Bon); dept. Nord, Bergues, 27 May 1976, *Bèle* (Herb. Bon); dept. Aisne, St. Gobain, Oct. 1976, *M. Bon* (Herb. Bon); dept. Pas de Calais, Auchel, Aug. 1977, *M. Bon & Jaquetant* (Herb. Bon). — CZECHOSLOVAKIA: Bohemia centralis, ad pagum Menany prope vicum Liten, 23 Aug. 1959, *M. Svrček* (PRM).

ENTOLOMA ARANEOSUM (Quél.) Moser f. fulvostrigosum
(Berk. & Br.) Noordeloos, *comb. & stat. nov.*—Figs. 52–55

Agaricus fulvostrigosus Berk. & Br. in Ann. Mag. nat. Hist., Ser. V, 1: 19. 1878. — *Leptonia fulvostrigosa* (Berk. & Br.) P. D. Orton in Trans. Br. mycol. Soc. 43: 177. 1960. — *Pouzarella fulvostrigosa* (Berk. & Br.) Mazer in Biblta mycol. 46: 100. 1976. — *Entoloma fulvostrigosa* (Berk. & Br.) Moser in Gams, Kl. KryptogFl. 4. Aufl., 2(b/2): 208. 1978.

Rhodophyllus araneosus (Quél.) Quél. sensu Kühn. & Romagn., Fl. anal.: 186. 1953, pro parte.

SELECTED DESCRIPTION & ICONES.—Reid, Col. Ic. rare inter. Fungi 3: 21–23, pl. 19C, fig. 10 a–c. 1968.

CHARACTERISTIC.—Differs from *f. araneosum* in the lack of a veil and in the reddish hairs at the base of the stipe.

Pileus 7–25 mm broad, up to 10 mm high, conico-campanulate, then expanding, subumbonate or truncate, rarely flattened with slightly depressed centre, with margin straight and somewhat crenulate in expanded caps, not hygrophanous, not striate, mouse grey then tinged brown, at centre slightly paler when dried up, entirely and densely silvery-fibrillose, shining, mostly without remnants of veil at margin. Lamellae moderately crowded with 1–3(–5) lamel-

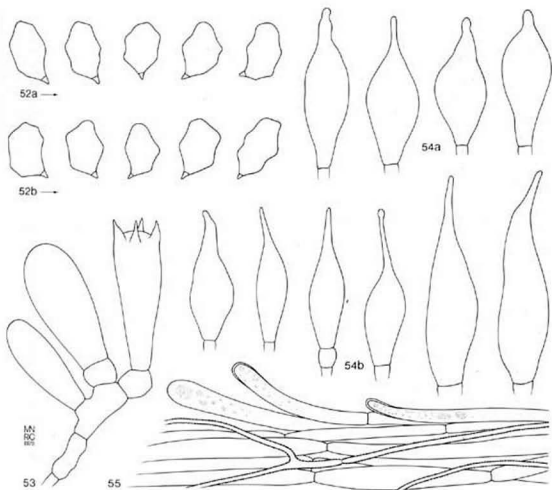


Fig. 52–55. *Entoloma araneosum* f. *fulvostrigosum*. — 52. Spores. — 53. Basidia. — 54. Cheilocystidia. (Figs. 52a and 54b from type; 52b, 53 and 54a from Clark, Oct. 1975).

lulae between each pair, adnate, sometimes slightly emarginate and then with short decurrent tooth, ventricose, thin, grey then pinkish grey with edge slightly paler and pruinose. Stipe 25–55 × 1–2 mm, subcylindrical, sometimes flexuous, narrowly fistulose with age, grey, becoming purplish brown towards base, entirely longitudinally silvery fibrillose-striate, at base with radiating reddish hairs. Flesh grey-brown, in base of stipe reddish brown. Smell unpleasant-fishy (Reid), farinaceous (Romagnesi, personal communication). Taste mild, then farinaceous (Romagnesi, personal communication).

Spores 10.2–13.6 × 6.8–8(–8.5) μm; Q = 1.3–1.45–1.6(–1.7); L–D = (2.4)–3–5 μm, ellipsoid-elongate in outline, 6–7(–8)-angled in side-view, with pronounced angles, pale, thin-walled. Basidia 40–62 × 11.5–16 μm; Q = 3.5–4.2, 4-spored. Abortive basidia present. Cheilocystidia 35–79 × 14–21.5 × 2–4.5(–5.2) μm, lageniform, with broad, swollen basal part and long, tapering, sometimes moniliform neck, thin-walled, colourless. Subhymenium cellular, colourless, thin. Hymenopodium thin but distinct, composed of irregularly branching, minutely encrusted, 2.5–5.7(–6.2) μm wide, cylindrical hyphae. Mediostratum regular, very compact, with inflated

cells, 110–250(–300) × 12–21 μm , with yellow-brown sometimes in addition minutely encrusted walls. Pileipellis a cutis with transitions to a trichodermium, composed of cylindrical to slightly inflated hyphae with repent or ascending terminal cells up to 500 μm long and up to 20 μm wide, cylindrical to slightly inflated with rounded tip, with brown, sometimes very minutely encrusted walls and brown diffuse or granular intracellular pigment. Pileitrama regular, composed of slightly inflated up to 24 μm wide hyphae, slightly constricted at septae, intermixed with 2–5.5 (–6) μm wide, cylindrical, brown-encrusted hyphae, Stipitepellis a cutis composed of 5–11 μm wide, cylindrical, brown sometimes minutely encrusted hyphae, with scattered cylindrical or slightly inflated, pale brown, sometimes minutely encrusted free ends ('hairs'). Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial in deciduous forests; August–October. Rare, up to now only known from Great-Britain, German Federal Republic and France.

COLLECTIONS EXAMINED.—GREAT BRITAIN: Durham County, Castle Eden Dene, 18 Sept. 1972, *B. Brand* (E); Yorkshire, Leeds, Branham Park Wood, 24 Sept. 1971, *M. C. Clark* (E); Warwickshire, Whichford Wood, 10 Oct. 1967, *Miss M. Holden* (K); Warwickshire, Ansty Wood, 18 Oct. 1975, *M. C. Clark* (K); Somerset, Higher Merridge Bridgewater, 26 Aug. 1958, *Mrs. Marriage* (K); Kent, Maidstone, 13 Sept. 1878, (*Berkeley?*) (Holotypus, K). —GERMAN FEDERAL REPUBLIC: Bavaria, München, Nymphenburg, Kapuziner Hölzl, 12 Oct. 1977, *A. Einhellinger* (M). —FRANCE: dept. Oise, Forêt de Fontainebleau, 13 Oct. 1937, *H. Romagnesi 37.100* (Herb. Romagn., PC).

Both forma's of *E. araneosum* appear to be rather rare. Therefore their variability has never been studied critically. The main difference between *Entoloma araneosum* and *E. fulvostrigosum* should be the presence of a weakly developed veil and the whitish-greyish hairs at the base of the stipe in the former and the lack of a veil and the reddish hairs in the latter.

Studying the collections and descriptions available I found these characters to be rather variable. In young specimens of *E. araneosum* the veil is usually distinct, but this phenomenon is not strictly correlated with whitish-greyish hairs. *Romagnesi 37.100* combines a distinct veil with reddish hairs. This collection (in Herb. Romagn.) is marked on the sheet as var. *rubrolanatus* R. Maire, an unpublished name.

In typical *E. araneosum* the colour of the cortex in the base of the stipe is greyish. In some collections, however, a purplish tone has been observed, whereas the hairs are grey. Some collections showed both types of colour of the cortex (*Bas 6363*; *Dössing, 1961*). In typical *E. fulvostrigosum* this part of the cortex is purplish.

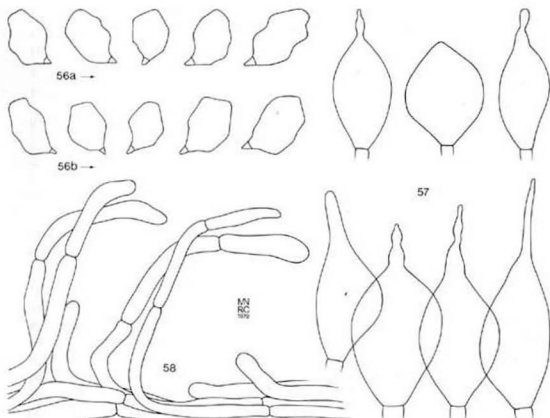
In *E. araneosum* the spores seem to vary in length more than in *E. fulvostrigosum*, but the overall length-width ratio shows no significant difference between both taxa.

As a consequence of all this I consider these taxa conspecific, and subordinate *E. fulvostrigosum* as a forma to *E. araneosum*.

Nolanea rhodoura Gilbert (1933: 253–255, pl. 11) is likely to be a synonym of *E. araneosum*. The plate shows a red of the stipe with radiating grey hairs. In this diagnosis the author does not mention cheilocystidia. As I have been unable to locate the type, the synonymy could not be verified.

Nolanea fulvostrigosa sensu Bres. (1929, pl. 591) probably represents *E. dysthaloides*; unfortunately the material under this name is lacking in Bresadola's herbarium at S.

Leptonia fulvostrigosa sensu Orton (l.c.) was based upon the Bresadola interpretation mentioned above, *Rhodophyllus dysthales* sensu Favre (1948: 44) and *Rhodophyllus araneosus* sensu Kühn. & Romagn. (1953: 186). From my point of view this is a mixed species-concept. The first



Figs. 56–58. *Entoloma indutum*. — 56. Spores. — 57. Cheilocystidia. — 58. Pileipellis. (Figs. 56a and 57 from Reid, Oct. 1970; 56b and 58 from type).

two refer to *E. dysthaloides* whereas *R. araneosus* sensu Kühn. & Romagn. represents both f. *araneosum* and f. *fulvostrigosum* of *E. araneosum* (see also Reid, 1968: 23).

ENTOLOMA INDUTUM Boudier—Figs. 57–58

Entoloma indutum Boudier in Bull. Soc. mycol. Fr. 16: 193–194, pl. 8 fig. 2 a–g. 1900. — *Rhodophyllus indutus* (Boudier) Romagn., Rhodoph. Madag.: 44. 1941. — *Leptonia induta* (Boudier) P. D. Orton in Trans. Br. mycol. Soc. 43: 177. 1960. — *Pouzarella induta* (Boudier) Mazzer in Biblita mycol. 46: 88. 1976.

CHARACTERISTICS.—Pileus slate blue with reddish tinge at centre, coarsely radially fibrillose, resembling a species of *Inocybe*.

Pileus up to 30 mm broad, conico-campanulate then expanding to convex with small umbo, pale slate blue, at centre more greyish with reddish flush, coarsely radially fibrillose. Lamellae uncinately to nearly free, ventricose, ash grey then with pink tinge. Stipe 22–27 × 5–10 mm, cylindrical, fistulose, concolorous with pileus, longitudinally fibrillose-striate. Smell and taste not recorded.

Spores 9.6–12(–12.7) × 7.4–9.3 μm; Q = 1.2–1.3–1.4(–1.5); L–D = 2–4 μm, rather rounded 6–8-angular in side-view, thin-walled. Basidia 40–52 × (11.3–)12.5–17 μm; Q = 2.6–3.8, clavate, 4-spored. Cheilocystidia 32–80 × 17–30 μm, lageniform with broad, swollen base and long, tapering neck, colourless and thin-walled, occasionally minutely encrusted on broadest part. Subhymenium thin, cellular, colourless. Hymenopodium thin, hyphae 2.5–7(–9) μm wide, cylindrical, brown-encrusted. Mediostratum of lamellae regular, elements strongly inflated, up to 20.5 μm wide, with yellow-brown, occasionally minutely encrusted walls. Pileipellis a cutis with transitions to a trichodermium, composed of 8.5–15 μm wide, cylindrical or slightly inflated hyphae with single or subfasciculate, repent or ascending 1–3-celled hairs, up to 250 μm long and up to 17.5 μm wide, with pale brown, sometimes minutely encrusted walls and pale bluish brown intracellular pigment. Pileitrama regular, composed of yellow-brown sometimes minutely encrusted hyphae. Clamp-connections absent.

HABITAT & DISTRIBUTION.—Terrestrial in deciduous forests on clayey soil. Only known from the type-locality in France and from one locality in Great Britain.

COLLECTIONS EXAMINED.—FRANCE: dept. Oise, Ecoeu, Nov. 1898, *E. Boudier* (Holotypus, PC). — GREAT BRITAIN: Sussex, Duncton Hill, 12 Oct. 1970, *D. A. & D. G. Reid* (K).

This species is unique in *Pouzaromyces* because of its blue colour and relatively firm, short stipe. In the field it could easily be taken for a species of *Leptonia* because of its blue tinges and fibrillose-scaly pileus, which is out of the question, however, considering the structure of the pileipellis, the pigmentation and the abortive basidia.

Entoloma indutum seems to be rather rare as it has only been refound once in recent years. Unfortunately no macroscopical data are available on this second collection.

Excluded or insufficiently known taxa

ambrosius.—*Rhodophyllus ambrosius* Quél. in C.r. Ass. Franc. Av. Sci. 24(2): 618. 1896. — *Pouzarella ambrosia* (Quél.) Mazzer in *Biblta mycol.* 46: 83. 1976.

This species, very distinctive by its fragrant smell like orange-blossom has recently been rediscovered and redescribed by Romagnesi (1974b: 365–368). It is quite clear that this is a species belonging to subgen. *Nolanea* and not, as Mazzer (l.c.) suggested, to sect. *Versatilis*.

autumnalis.—*Nolanea autumnalis* Velen. in *Mykologia* 6: 28. 1929. — *Pouzarella autumnalis* (Velen.) Mazzer in *Biblta mycol.* 46: 84. 1976.

No type could be found at PRC or PRM; most probably it got lost. Judging from the diagnosis it may be close to *E. hirtum* or *E. araneosum*.

babingtonii.—*Agaricus babingtonii* Blox. apud Berk. & Br. in *Ann. Mag. nat. Hist.* 2(2): 399. 1854. — *Rhodophyllus babingtonii* (Blox. apud Berk. & Br.) Quél., *Enchir.*: 61. 1886. — *Nolanea*

babingtonii (Blox. apud Berk. & Br.) Sacc., Syll. Fung. 5: 717. 1887. — *Leptonia babingtonii* (Blox. apud Berk. & Br.) P. D. Orton in Trans. Br. mycol. Soc. 43: 177. 1960. — *Entoloma babingtonii* (Blox. apud Berk. & Br.) Hesl. in Beih. Nova Hedwigia 23: 173. 1967. — *Pouzarella babingtonii* (Blox. apud Berk. & Br.) Mazzer in Bibliotheca mycol. 46: 127. 1976. — Holotype: *A. Bloxam*, 21 Nov. 1851, Twycross (K).

The type collection is in a rather poor state. The lamellae are entirely lacking; the surfaces and layers of trama of pileus and stipe are very difficult to study. Masee (1893: 258) studied the type and stated: 'Spores subglobose or slightly oblong, apiculate, nodulose, 7–8 μ m, cystidia absent.' The latter remark suggests that in Masee's time the gills were at least partially intact. Dennis (1948: 206) who studied the same collection could not find any spores, basidia or cystidia. Another collection in K, labelled '*Ag. babingtonii* B., King's Cliffe, Oct. 2. 1860' was also studied by him and appeared to be conspecific with *Agaricus dysthales* Peck. This is the reason why Orton & al. (1960: 103) placed *A. dysthales* among the synonyms of *A. babingtonii*.

Moser (1973: 282–283) restudied both collections and found on the type spores measuring 9–12 \times 6–7 μ m. From this he concluded that Orton & al. (l.c.) incorrectly placed *A. dysthales* among the synonyms of *A. babingtonii*. Moser (l.c.) gave a redescription based on a recent collection from his own herbarium of what he believed to be the true *A. babingtonii*. This collection was studied by me. It contains one specimen which is remarkable in the absence of cheilocystidia. Macro- and microscopically it is quite close to *E. dysthaloides* (Figs. 33, 34). As there is only one specimen available I hesitate to describe this collection as an acystidiate form of *E. dysthaloides*.

Mazzer (1976: 127–130) also studied both collections at K. He found on the stipe of *A. babingtonii* spores measuring 15.1–19.2 \times 7.2–8.5 μ m. In addition he described shrivelled hairs found on the stipe, interpreting them as setiform. Consequently he placed *Pouzarella babingtonii* in the vicinity of *P. strigosissima*.

The observations on the type tend to contradict each other. Considering the bad state of the type-collection, the impossibility of interpreting important characters such as size and shape of spores, aspect of covering layers, presence or absence of cheilocystidia and form and pigmentation of tramal hyphae, I consider *A. babingtonii* a nomen dubium.

Other misapplications of *A. babingtonii*: *Rhodophyllus babingtonii* sensu Quél., Pat., Kühn. & Romagn., representing without any doubt *E. strigosissimum*; *Entoloma babingtonii* sensu Hesler (1967: 173) is a mixture of *E. dysthales* and *E. nodospora* (see Mazzer, l.c.).

cinerea.—*Leptonia cinerea* Velen., České Houby: 623. 1921. Holotypus: J. Velenovský, Mnichovice, Aug. 1919 (PRC).

This species is very close to *E. hirtum*, but on account of the slightly narrower spores I hesitate to place it among the synonyms of *E. hirtum*. For details I refer to Noordeloos (1979: 256).

fumosellus.—*Agaricus fumosellus* Wint. in Rabenhorst, KryptogFl. 2. Aufl., I(1): 853. 1844.

It is very doubtful whether this species in its original sense is entolomatoid or not; it could easily belong to the genus *Psathyrella* as well (Mazzer, 1976: 131). Misapplications of this name are: *Rhodophyllum fumosellus* sensu J. Lange (1921: 36 and 1936: 102, pl. 78E) = *E. dysthales*; *Pouzaromyces fumosellus* sensu Pilát = *E. strigosissimum* (see p. 208).

nigrella.—*Leptonia nigrella* Velen., Česká Houby: 623. 1920. (Holo?)-typus in PRC.

The type-collection does not agree in a satisfactory way with the protologue. As a consequence I consider *L. nigrella* as a nomen dubium (Noordeloos, 1979: 260).

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TYPE STUDIES ON ENTOLOMATOID SPECIES IN THE VELENOVSKÝ HERBARIUM—I

Species described in the genera *Nolanea*, *Leptonia* and *Telamonia*.

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(With 29 Text-Figures)

All types of entolomatoid fungi available in the Velenovský Herbarium at Prague have been studied. In this first report the types of 30 species described by Velenovský in *Nolanea*, *Leptonia* and *Telamonia* (one species) are described. Species accepted here have, if necessary, been transferred to *Entoloma*, which resulted in 18 new combinations and 4 new names. One described in *Nolanea* had to be transferred to *Pluteus*.

In the course of his long life Josef Velenovský (1858-1949) described a great number of new taxa in various groups of fungi. Kotlaba (1977) in his revision of the polypores in Velenovský's herbarium gives a thorough survey of Velenovský's life and work.

Until recently only a minor part of Velenovský's new taxa in the Agaricales have been revised: Harmaja (1970, 1974) published on those in *Clitocybe* and *Omphalina*, Horniček (1957) on those in *Tricholoma* and Svrček (1966) on those in various small genera.

The present work deals with Velenovský's species in the genera *Nolanea* and *Leptonia* and with one entolomatoid species erroneously described in *Telamonia*. A revision of his entolomatoid species described in the genera *Entoloma*, *Eccilia*, *Claudopus*, *Clitocybe* and *Arenicola* is in preparation. All entolomatoid agarics are considered by the present author to belong to one single genus, viz. *Entoloma* (Fr.) Kumm. *emend.* Donk (syn. *Rhodophyllus* Quél.).

As Velenovský's library was restricted to the works of Fries, Saccardo and Ricken, one cannot be surprised that many species described as new by Velenovský appeared to be identical with species previously described in literature unknown to him. This was explicitly shown in Kotlaba's revision of Velenovský's polypores mentioned above. In the entolomatoid fungi this phenomenon is not so manifest because this group of fungi is rather neglected in Europe, except in France, thanks to the excellent work of Romagnesi and Kühner. Moreover Velenovský's collecting sites are rather favourable for species of *Entoloma*. In some cases however it appeared to be necessary to create new names for Velenovský's taxa, as many combinations in *Entoloma* were preoccupied.

Velenovský's types are deposited in the Herbarium of the National Museum, Prague, (PRM) as *exsiccata*, and in the Botanical Institute of the Charles University, Prague, (PRC) in liquid. The latter collection contains most species described in České Houby (1921).

In the present paper the infrageneric taxonomy of Romagnesi (1974, 1978) is followed in great lines. However, as I use the generic name *Entoloma* instead of *Rhodophyllus* some new combinations are necessary:

Entoloma subgenus **Alboleptonia** (Largent & Benedict) Noordeloos, *comb. & stat. nov.* (Basionym: *Alboleptonia* Largent & Benedict in *Mycologia* **62**: 439, 1970.)

Entoloma sect. **Papillati** (Romagn.) Noordeloos, *comb. nov.* (Basionym: *Rhodophyllus* Quél. sect. *Papillati* Romagn. in *Bull. Soc. linn. Lyon* **43**: 330, 1974.)

Entoloma sect. **Endochromonema** (Largent & Thiers) Noordeloos, *comb. nov.* (Basionym: *Nolanea* (Fr.) Kumm. sect. *Endochromonema* Largent & Thiers in *Northwest Sci.* **46**: 35, 1972.)

Velenovský's species accepted here will be treated more extensively in another publication (Noordeloos, 1980) and future papers on *Entoloma* by the present author.

METHODS AND PRESENTATION

The microscopical structures of the exsiccata were observed, measured and drawn in ammoniac 1% Congo Red solution after remoistening in 10% NH_4OH . The liquid preserved collections were observed in their own liquid, and usually also after staining with Congo Red. Drawings were made with the aid of a camera lucida.

The magnifications of the figures are: spores, $\times 1000$; all other microscopical details, $\times 670$. The following abbreviations are used:

Q.—Length-width ratio, usually given as follows: $Q = 1.2-1.3-1.4$, which means 'Q between 1.2 and 1.4 with an average of 1.3'. The size of the spores relates to the largest length and width, excluding the apiculus.

L-D.—Length minus width, usually given as follows: $L-D = 1-2-3 \mu\text{m}$, which means 'length minus width between 1 and $3 \mu\text{m}$ with an average of $2 \mu\text{m}$ '.

ACKNOWLEDGEMENTS

Sincere thanks are due to Dr. Z. Urban, head of the Mycological Department of the Charles University, Praha, for providing working facilities, and to Dr. J. Klán at the same institute for his assistance and generous hospitality. Dr. Z. Pouzar and Dr. M. Svrček at the Botanical Department of the National Museum, Praha are greatly acknowledged for their help and for the loan of specimens. I am very grateful to Dr. C. Bas for critically reading the manuscript of this paper.

Species described in *Nolanea*

alba. — *Nolanea alba* Velen., České Houby: 629. 1921. — Neotype (*design. mihi*): J. Velenovský, July 1940, Mnichovice, collis Rlechač (*PRM 154381*). — Fig. 10.

There is no original type material preserved in PRM or PRC. In PRM, however, there are under this name two later collections, gathered and named by J. Velenovský, viz.:

PRM 154381, Mnichovice, collis Rlechač, July 1940. This is obviously the collection cited by Velenovský in 1947 (: 78).

PRM 154481, Mnichovice, Vsěsimy, in piceto vetere, 16 Sept. 1940. This collection contains three dark pigmented specimens of a species which is different from *PRM 154381*.

According to the protologue *Nolanea alba* is a pale coloured species common in early summer in deciduous forests. Considering this I select collection *PRM 154381* as a neotype for *Nolanea alba* Velen. The neotype collection contains one specimen in a relatively bad state, partly attacked by a mould, showing the following microscopical characters:

Spores (9.0–)9.6–10.8(–11.3) × 6.8–7.9 μm, Q = 1.2–1.35–1.4, L–D = 2.4–3.5(–4.0) μm, 5–6 angled in side-view. Basidia about 30–36 × 9–10 μm, 4-spored. Cheilocystidia scattered (?; parts of gill-edge destroyed.) 40–55 × 7–9 μm, cylindrico-subcapitate with hyaline walls often slightly thickened at apex. Pileipellis a cutis of radially arranged, 4–11 μm wide hyphae. Pileitrama regular, cells cylindrical to inflated. Pigment not seen. Vascular hyphae numerous in pileitrama. Clamp-connections numerous in hymenium, rare in trama.

Nolanea alba is close to *N. mammosa* Fr. sensu P. D. Orton (1960: 329) but differs in the lack of pigment. *Entoloma cuneatum* (Bres.) Moser differs in the more pronouncedly pigmented cap and the lack of cheilocystidia. *Entoloma album* Hesler is quite different in many characters and belongs to subgenus *Alboleptonia*. *Entoloma cinerascens* Hesler is more robust and more typically a member of subgenus *Entoloma*.

Nolanea alba seems to represent a distinct species, which still has to be transferred to *Entoloma*. The name *E. album* however is already occupied. Therefore I propose the new name **Entoloma nivescens** Noordeloos, *nom. nov.* (Basionym *Nolanea alba* Velen., České Houby: 629. 1921; non *Entoloma album* Hesler, 1967.)

autumnalis. — *Nolanea autumnalis* Velen. in *Mykologia* 6: 28. 1929. — No type material is left at PRM, nor at PRC.

betulina. — *Nolanea betulina* Velen., *Novitates mycologicae novissimae*: 79. 1947. — Holotypus: J. Velenovský, 20 July 1943, Mnichovice (*PRM 154455*) — Fig. 17.

The type consists of one specimen, partly damaged by a mould, with subglobose to broadly ellipsoidal, thin-walled spores, 7.5–8.6 × 5.0–6.8 μm.

Without any doubt this specimen represents a species belonging to the genus *Pluteus* Fr. The following transfer is made: **Pluteus betulinus** (Velen.) Noordeloos, *comb. nov.* (Basionym: *Nolanea betulina* Velen., *Novitates mycologicae novissimae*: 79. 1947.)

crassipes. — *Nolanea crassipes* Velen, České Houby: 627. 1921. — Holotypus: O. Zvěřina, aprílii 1920, Hvězda, Pragae. (PRC; bottle 123a). — Fig. 20.

The type consists of one well preserved specimen. Cap about 30 mm broad, conico-convex. Lamellae fairly crowded, ventricose. Stipe about $70 \times 5-6$ (at apex), $\times 12$ mm (at base). Spores $10.3-12.4 \times (7.5-8.3-10.2 \mu\text{m})$, $Q = (1.2-1.25-1.35)$, $L-D = 2-3.2 \mu\text{m}$, 5-6-angled in side-view. Basidia $(30-35-47 \times 9-10.5 \mu\text{m})$, $Q = 3.6-4.4$, 4-spored. Cystidia none. Hymenophoral trama regular, composed of long, inflated elements, $230-435 \times 12-21 \mu\text{m}$, thin-walled, colourless. Pileipellis a thin, poorly differentiated cutis of $4-10(-12) \mu\text{m}$ wide, cylindrical hyphae. Pileitrama regular; hyphae composed of cylindrical to inflated, about $300-520 \times 20-32 \mu\text{m}$ cells. Pigmentation inconspicuous, probably diffusely intracellular; also some hyphal walls pale yellow; no encrusting pigments seen. Stipitpellis a differentiated cutis with loosely arranged, cylindrical, $4-10 \mu\text{m}$ wide hairs with rounded, sometimes subcapitate tip. Clamp-connections present in hymenium.

Nolanea crassipes is very close to *Entoloma cuneatum* (Bres.) Moser, which differs in a typical yellow papilla on the pileus and a more or less glabrous stipe. *Nolanea holoconiota* Largent & Thiers differs in having cheilocystidia. As the name *Entoloma crassipes* already exists, the following new name has to be introduced: **Entoloma lanuginosipes** Noordeloos, *nom. nov.* (Basionym: *Nolanea crassipes* Velen., České Houby: 627, 1921; non *Entoloma crassipes* Petch, 1924.)

depressa. — *Nolanea depressa* Velen., Novitates mycologicae: 148. 1939. — Holotypus: J. Velenovský, Aug. 1939, in formatione Calamagrostis Epigeios in colle silv. prope Mirešovice (PRM 154453) — Fig. 3.

The type consists of one partly damaged specimen, with the following microscopical characters: Spores $9-10.7(-11.3) \times 6.8-7.9 \mu\text{m}$, $Q = 1.15-1.3-1.45$, $L-D = 2.4-3.5 \mu\text{m}$, rather pronouncedly 4-5-angled in side-view. Basidia $27-39 \times 9-12 \mu\text{m}$, 4-spored. Pileipellis a cutis of narrow, slightly encrusted hyphae. Vascular hyphae present. Clamp-connections present in hymenium.

The convex-umbilicate pileus, the colouration, the cottony base of the stipe and, microscopically, the size and the shape of the spores and the pigmentation agree perfectly well with *Entoloma minutum* (P. Karst.) Noordeloos, *comb. nov.* var. **polymorphum** (Romagn.) Noordeloos, *comb. nov.* (Basionyms: *Nolanea minuta* P. Karst., Hattsv. 1: 281, 1879, and *Rhodophyllus minutus* (P. Karst.) Romagn. var. *Polymorphus* Romagn. in Rev. Mycol. 19: 7. 1954.)

fracta. — *Nolanea fracta* Velen., Novitates mycologicae: 146. 1939. — Holotypus: J. Velenovský, July 1936, Mnichovice, Struhařov. (PRM 154483)—Fig. 1.

The type consists of 6 well-preserved specimens with the following microscopical characters: Spores $6.8-7.9 \times (4.5-5.7-6.7 \mu\text{m})$, $Q = 1.1-1.2-1.4$, $L-D = 1.2-1.8-2.4 \mu\text{m}$, (4-) 5-angled in side-view. Basidia $25-32 \times 7.6-10.2 \mu\text{m}$, slenderly clavate, 4-spored. Cystidia none. Hymenophoral trama regular, cells cylindrical or inflated, up to $270 \mu\text{m}$ long and $10-24 \mu\text{m}$ wide, hyaline, thin-walled, colourless. Pileipellis a cutis with transitions to a trichodermium, composed of cylindrical to slightly inflated hyphae, $7-17(-22) \mu\text{m}$ wide, with at centre of pileus tufts of clavate, terminal cells, $32-60 \times 8-22 \mu\text{m}$, with brown-encrusted walls and brown-olivaceous intracellular pigment granules. Pileitrama regular with cylindrical to slightly inflated brown-encrusted hyphae. Clamp-connections absent in all tissues studied.

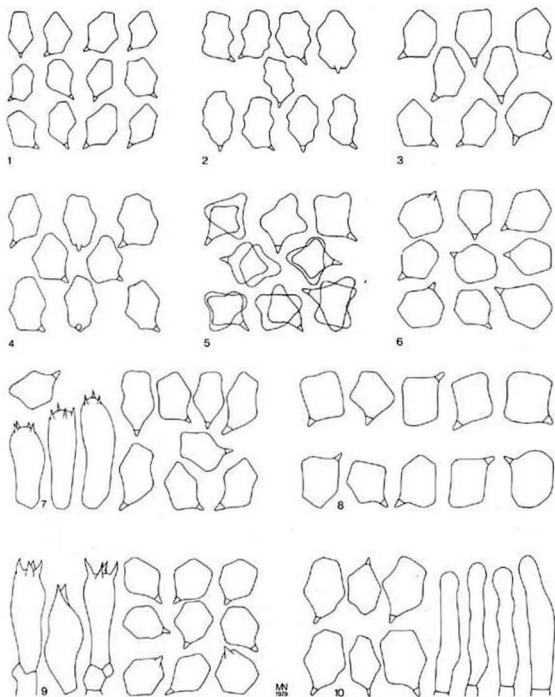


Fig. 1. *Nolanea fracta*, spores. — Fig. 2. *Nolanea tristis*, spores. — Fig. 3. *Nolanea depressa*, spores. — Fig. 4. *Nolanea robiniae*, spores. — Fig. 5. *Nolanea pusilla*, spores. — Fig. 6. *Nolanea zonata*, spores. — Fig. 7. *Leptonia omphaliaeformis* spores and basidia. — Fig. 8. *Nolanea inodora*, spores. — Fig. 9. *Nolanea globispora*, spores and basidia. — Fig. 10. *Nolanea alba*, spores and cheilocystidia. (All figs. from type.)

Nolanea fracta comes very close to *Entoloma fernandae* (Romagn.) Noordeloos, *comb. nov.* (Basionym: *Rhodophyllus fernandae* Romagn. in Rev. Mycol. 1: 162. 1936.) The spores, pileipellis and pigmentation are similar. The colours, however, are much darker in *N. fracta*, especially the pileus which is 'atro-fusco, centro nigro', whereas *E. fernandae* has the pileus 'umbrino-griseo'. Also the shape of the pileus is different: *N. fracta* has a pileus which is 'acute-conico'; in *E. fernandae* the pileus is 'aplani, à peine mamelonné'. *Entoloma psilopus* Arnolds & Noordeloos (1979) has a glabrous, convex, only slightly umbonate moderately grey-brown, distinctly hygrophanous pileus. *Nolanea fracta* seems to represent a distinct species. Therefore the following transfer is made: *Entoloma fractum* (Velen.) Noordeloos, *comb. nov.* (Basionym: *Nolanea fracta* Velen., Novitates mycologicae: 146. 1939.)

galeraeformis. — *Nolanea galeraeformis* Velen., Novitates mycologicae novissimae: 78. 1947. — No type collection is left at PRM or PRC.

globispora. — *Nolanea globispora* Velen., České Houby: 628. 1921. — Lectotype (*design. mihi*): J. Velenovský, July 1919, Mnichovice (PRC bottle 48a).—Fig. 9.

In Velenovský's herbarium in PRC there are two collections that agree with the protologue: Mnichovice, July 1918 (bottle 400a) and July 1919 (bottle 48a). Bottle 48a contains two well preserved specimens and bottle 400a only a fragment of one specimen in a bad state, but conspecific with the first collection. Therefore I selected bottle 48a as the lectotype of *Nolanea globispora*.

Spores (8.5–)9.0–11.3 × 7.7–9.3(–10.3) μm , Q = 1.0–1.1–1.2, L–D = 0–1.2 μm . (4–)5–6 angled in side-view, isodiametrical – subglobular with rounded angles. Basidia 32–44 × 8.2–13.5 μm , Q = 3.0–3.8, 4-spored. Cystidia none. Hymenophoral trama regular with cells in mediotratum 200–350 × 11–35 μm , colourless, inflated, hyaline and thin-walled. Pileipellis a thin and poorly differentiated cutis of 3.5–7(–11) μm wide, cylindrical hyphae with brown, encrusted walls. Pileitrama regular with cylindrical to slightly inflated hyphae with brown, encrusted walls. Clamp-connections frequent in hymenium, elsewhere rare or absent.

The additional collections: bottle 400a at PRC and no 154484, 154380 and 154377 at PRM, all collected by J. Velenovský in the vicinity of Mnichovice are all conspecific with the lectotype.

Nolanea globispora is undoubtedly identical with *Rhodophyllus juncinus* Kühn. & Romagn. (See discussion following the description of *Nolanea zonata* Velen., p. 255).

hirta. — *Nolanea hirta* Velen. in Mykologia 6: 28. 1928. — *Entoloma hirtum* (Velen.) Noordeloos in Persoonia 10: 223 1979. — Holotype: J. Velenovský, June 1926, Radotin (PRM 148449).

The type consists of 5 well-preserved specimens with the following microscopical characters: Spores (10.2–)10.7–13.0(–14.7) × (6.3–)6.8–7.9(–9.0) μm , Q = 1.4–1.55–1.75, L–D = (3–)3.5–

4–5.7 μm , irregularly nodulose-angular, slightly thick-walled, brownish in water. Basidia 34–50 \times 10.2–11.5 μm , 4-spored. Cheilocystidia 36–60 \times 16.5–24(–36) μm , slenderly to broadly clavate with brown-encrusted walls. Subhymenium cellular, colourless. Hymenophoral trama with distinctly developed hymenopodium of 2.5–7 μm wide, coarsely encrusted hyphae, and mediostreatum composed of cylindrical to slightly inflated cells, 70–220 \times 8–16 μm . Pileipellis a cutis with transitions to a trichodermium with repent or ascending long, multiseptate, attenuate hairs with heavily yellowish brown encrusted walls. Pigment encrusting all hyphae of covering layers and trama. Clamp-connections absent.

A redescription and discussion on the taxonomical position of *E. hirtum* is given in another paper (Noordeloos, l.c.).

inodora. — *Nolanea inodora* Velen., České Houby: 629. 1921. — Holotype: J. Velenovský, Julio 1919, in collibus insolatis prope Myšlin (PRC; bottle 120a).—Fig. 8.

The type consists of two specimens in a very bad state. Obviously the collection dried out and has been remoistened again, which caused considerable damage to the tissues. Spores 10.2–12.4 \times 8.3–9.7 μm , $Q = 1.1$ –1.15–1.25, $L-D = 1$ –2 μm , irregularly cuboid. Hymenium in such a bad state that no intact basidia could be found. Some clamp-connections were seen at the base of young basidia and at several septa in the hymenophoral trama. Pigment granular-intracellular in upper layers of pileus only. No incrustations seen.

Nolanea inodora is rather well characterised by the irregular cuboid spores and the intracellular pigments. The other species in Europe with similar spores, viz. *Entoloma rhombisporum* (Kühn. & Bours.) Horak and *E. prismatospermum* (Romagn.) Horak differ in having encrusting pigments and considerably smaller spores. The extra-European *Entoloma incertum* (Romagn.) Horak differs in having a non-hygrophanous pileus. In my opinion **Entoloma inodorum** (Velen.) Noordeloos, *comb. nov.* (basionym: *Nolanea inodora* Velen., České Houby: 629. 1921) is a distinct species which awaits rediscovery.

majalis. — *Nolanea majalis* Velen., Novitates mycologicae: 147. 1939. — Holotype: J. Velenovský, 12 May 1937, Mnichovice (PRM 154375).—Fig. 11.

The type consists of fragments of two specimens with the following microscopical characters: Spores (9–)10.2–12.4 \times (6.8–)7.4–7.9 μm , $Q = (1.3$ –)1.4–1.45–1.6, $L-D = (2.4$ –)3–4.5 μm , 6-angled in side-view. Basidia 35–46 \times 9–14.5 μm , $Q = 3.7$ –4.2, 4-spored. Cystidia none. Hymenophoral trama regular, composed of long, strongly inflated, thin-walled, colourless cells. Pileipellis a poorly differentiated cutis of 4–10(–12) μm wide cylindrical hyphae, here and there with a clavate terminal cell up to 18 μm wide. Pileitrama regular; hyphae made up of long, slightly inflated cells up to 17.5 μm wide. Pigmentation indistinct: pale diffusely intracellular. In pileipellis and upper layer of pileitrama sometimes also hyphal walls pale-coloured, but never encrusted. Clamp-connections frequent in hymenium, but extremely rare in other parts of the carpophore.

Nolanea majalis agrees perfectly with **Entoloma pallescens** (P. Karst.) Noordeloos, *comb. nov.* (Basionym: *Nolanea pallescens* P. Karst. in Meddn Soc. Fauna Flora fenn. 16: 94. 1890 (Symb. Myc. fenn. 29).) This species will be discussed in another paper (Noordeloos, 1980).

nitens. — *Nolanea nitens* Velen., České Houby: 627. 1921. — *Rhodophyllus nitens* (Velen.) Kühn & Romagn., Fl. anal.: 190. 1953. — No type-collection is left at PRM or PRC.

Romagnesi (1974b: 372) gives an excellent description of his interpretation of Velenovský's species, which probably agrees with the original concept. Therefore I introduce the name *Entoloma nitens* (Velen.) Noordeloos, *comb. nov.* (Basionym: *Nolanea nitens* Velen., České Houby: 627. 1921.).

paludosa. — *Nolanea paludosa* Velen., České Houby: 628. 1921. — No type-collection is left at PRM or PRC.

perpusilla. — *Nolanea perpusilla* Velen. in *Mykologia* 8: 22. 1931. — No type-collection is left at PRM or PRC.

pusilla. — *Nolanea pusilla* Velen., České Houby: 626. 1921. — Holotypus: J. Velenovský. July 1919, Mnichovice (PRC; bottle 85).—Fig. 5.

The type-collection consists of one, well-preserved specimen with the following microscopical characters: Spores $(9.3-10-12.4 \times 9.3-11.2 \mu\text{m})$, $Q=1.0-1.1$, $L-D=0-1.5 \mu\text{m}$, cruciform-stellate. Basidia $25-41 \times 8-12 \mu\text{m}$, 4-spored. Pileipellis a simple cutis of $4-11 \mu\text{m}$ wide, cylindrical hyphae with pale diffusely intracellular pigment, sometimes in addition minutely encrusted. Clamp-connections none.

Nolanea pusilla represents a slender variety of *Entoloma staurosporium* (Bres.) Hesler, characterized by its consistently slender nature and its habitat on rotten wood. *Rhodophyllus xylophilus* J. Lange (non *Entoloma xylophilum* Speg.) is identical. The following transfer is to be made: *Entoloma staurosporium* (Bres.) Hesler var. **pusillum** (Velen.) Noordeloos, *comb. & stat. nov.* (Basionym: *Nolanea pusilla* Velen., České Houby: 626. 1921.)

robiniae. — *Nolanea robiniae* Velen., *Novitates mycologicae novissimae*: 78. 1947. — Holotypus: J. Velenovský, July 1940, Mnichovice, in *Robinieto* (PRM 154379).—Fig. 4.

The type consists of the pileus of one specimen, partly covered with a mould, with the following microscopical characters: Spores $9.0-10.2(-11) \times 7.4-7.9 \mu\text{m}$, $Q=1.2-1.3-1.4$, $L-D=1.8-3.4 \mu\text{m}$, (5-) 6-angled in side-view. Basidia $25-36 \times 10-12 \mu\text{m}$, clavate, 4-spored. Hymenophoral trama regular, composed of cylindrical to slightly inflated, thin-walled, colourless cells, $180-220 \times 6-14 \mu\text{m}$. Pileipellis (difficult to interpret because of presence of mould) probably a cutis of thin, $3.5-8 \mu\text{m}$ wide, cylindrical hyphae. Hypoderm strongly developed, about $60-80 \mu\text{m}$ thick, composed of long chains of slightly inflated cells, $40-62 \times 10-24 \mu\text{m}$. Pileitrama under hypoderm regular; hyphae up to $15 \mu\text{m}$ wide, cylindrical. Pigment difficult to locate; hyphal wall uniformly coloured, not encrusted. Clamp-connections present in hymenium, rare elsewhere.

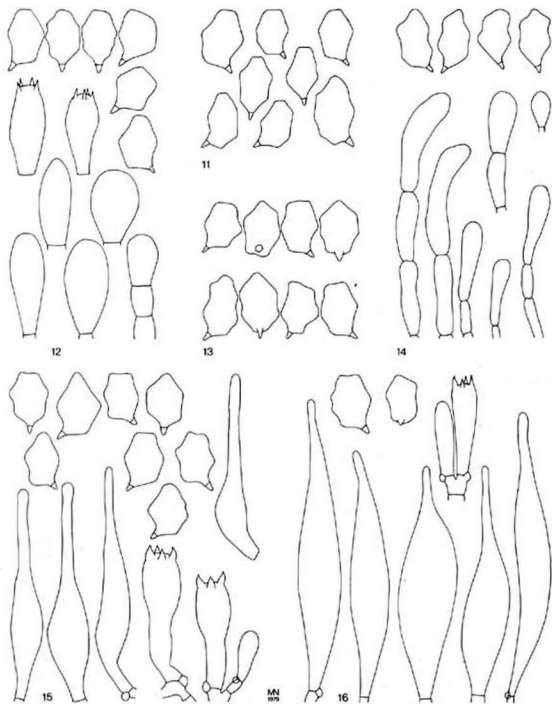


Fig. 11. *Nolanea majalis*, spores. — Fig. 12. *Leptonia brunnea*, spores, basidia and cheilocystidia. — Fig. 13. *Leptonia conica*, spores. — Fig. 14. *Nolanea setulosa*, spores and stipe-hairs. — Fig. 15. *Leptonia aurea*, spores, basidia and cheilocystidia. — Fig. 16. *Leptonia conica*, spores, basidia and cheilocystidia. (All figs. from type.)

On account of its spores and its pigmentation *Nolanea robiniae* belongs to section *Endochromonema* of subgenus *Nolanea*. *Entoloma pallescens* differs in slightly larger and more elongate spores and the lack of a hypoderm. Velenovský's name seems to stand for a distinct species: ***Entoloma robiniae*** (Velen.) Noordeloos, *comb. nov.* (Basionym: *Nolanea robiniae* Velen., *Novitates mycologicae novissimae*: 78. 1974.)

setulosa. — *Nolanea setulosa* Velen., *Novitates mycologicae*: 147. 1939. — *Pouzarella setulosa* (Velen.) Mazzer in *Biblioth. mycol.* 46: 108. 1976. — Holotypus: J. Velenovský, June 1931, Jidásky prope Mnichovice (PRM 154485).—Fig. 14.

The type consists of two well-preserved specimens with the following microscopical characters: Spores 11–12.5(–14.7) × 6.8–7.9 μm , $Q = 1.3–1.55–1.6(–1.8)$, $L-D = 4–4.5 \mu\text{m}$, irregularly angular-gibbose, pale brown in water. Basidia 35–48 × 10–16 μm , broadly clavate, 4-spored, Cheilocystidia (difficult to find; only a few measured) 30–57 × 14–20 μm , slightly brown-encrusted. Hymenophoral trama with distinctly developed hymenopodium of narrow, cylindrical, coarsely encrusted hyphae and with mediostratum of inflated hyphae with cells 55–110 × 12–22 μm , brown and minutely encrusted. Pileipellis a cutis with transitions to a trichodermium with repent or slightly ascending, long, attenuate, multiseptate, brown-encrusted hairs with cells 12–25 μm wide (at base) to 6–14 μm wide (at apex). Stipitepellis a simple cutis with scattered clavate hairs in upper part of stipe and with 2–3-celled, not encrusted, 8–20 μm wide hairs in lower part of stipe. Clamp-connections absent.

Velenovský stated in his diagnosis of *Nolanea setulosa* that the spores are 15–18 μm long. This misled Mazzer (l.c.) in interpreting it as a distinct species. The present author places *N. setulosa* in the synonymy of *Entoloma hirtum* (see Noordeloos, 1979: 223).

tristis. — *Nolanea tristis* Velen., *České Houby*: 630. 1921. — Holotypus: J. Velenovský, May 1920, Krč, Bohemia (PRC; bottle 370a).—Fig. 2.

The type consists of one specimen in a very bad state. The hyphal walls are partly disintegrated and the tissues are therefore difficult to study. The microscopical characters are: Spores 9.3–11.3 × (6.2–)6.8–7.9 μm , $Q = 1.25–1.35–1.55$, 6–7-angled in side-view. Basidia 4-spored. pileipellis a cutis of radially arranged, thin-walled, 6–11 μm wide, cylindrical hyphae, sometimes intermixed with fusoid, up to 15–18 μm wide terminal cells. Pileitrama regular, with long, inflated, fusiform cells measuring 250–310 × 27 μm . Pigment abundant, dark brown, granular-intracellular in pileipellis and in broad adjacent zone in pileitrama. No encrusting pigment observed. Clamp-connections seen in hymenium.

Nolanea tristis has to be placed in section *Endochromonema* of subgenus *Nolanea*. It differs from the other species in this section by its rather dark colour. It has some resemblance to *Agaricus piceus* Kalchbr., but the latter species has a non-striate stipe which is concolorous with the pileus, and has a strong, cucumber-like or fish-like smell. (It is not unlikely that Kalchbrenner's species is identical with *Macrocystidia cucumis* (Pers. ex Fr.) Heim.) The following new combination has to be introduced: ***Entoloma tristis*** (Velen.) Noordeloos, *comb. nov.* (Basionym: *Nolanea tristis* Velen., *České Houby*: 630. 1921.)

undulata. — *Nolanea undulata* Velen., České Houby: 627. 1921. — No type-collection is left at PRM of PRC.

variegata. — *Nolanea variegata* Velen., České Houby: 630. 1921. — No type-collection is left at PRM or PRC.

zonata. — *Nolanea zonata* Velen., Novitates mycologicae novissimae: 78. 1947. — Holotypus: J. Velenovský, July 1940, Mnichovice, in palude inter gramine (*PRM 154454*).—Fig. 6.

The type consists of two specimens in a rather bad state, attacked by moulds and by mites. The microscopical characters are: Spores $7.9-9 \times 7.8-8.4 \mu\text{m}$, $Q = 1.0-1.05$, $L-D = 0-0.5 \mu\text{m}$, 5-angled in side-view, subglobose-isodiametrical. Basidia 4-spored, clamped. Because of the bad state of the material other microscopical characters could not be checked.

Judging from the microscopical characters and the protologue I am convinced that this collection represents a somewhat aberrant form of the rather common *Entoloma juncinum* (Kühn. & Romagn.) Noordeloos, *comb. nov.* (Basionym: *Rhodophyllus juncinus* Kühn. & Romagn. in Rev. Mycol. 19: 5. 1954.)

Synonyms: *Nolanea globispora* Velen., České Houby: 628. 1921; non *Entoloma globisporum* Morg.-Jones, 1971. — *Nolanea zonata* Velen., Novitates mycologicae novissimae: 78. 1947; non *Entoloma zonatum* Hesler, 1967.

Species described in *Leptonia*

aurea. — *Leptonia aurea* Velen., České Houby: 618. 1921. — Holotypus: J. Velenovský, July 1918, Jevany (PRC; bottle 146b).—Fig. 15.

The type-collection consists of one, well-preserved specimen with the following microscopical characters: Spores $(10.3-10.8-11.3(-11.8) \times 7.2-8.2 \mu\text{m}$, $Q = 1.25-1.4-1.65$, $L-D = 2-3.2-4.5 \mu\text{m}$, 6-angled in side-view. Basidia $37-44 \times 12.3-14.5 \mu\text{m}$, $Q = 2.5-3$, clavate, 4-spored. Cheilocystidia $65-84 \times 12-22 \times 3-7 \mu\text{m}$, lageniform, thin-walled, scattered, often in clusters. Pileipellis a trichodermium of broad, subcylindrical to clavate cells, $30-100 \times 16-30 \mu\text{m}$. Pileitrama regular, composed of short, broad elements. Pigment yellow-brown, intracellular, abundant in pileipellis and adjacent pileitrama. Clamp-connections present in hymenium.

Leptonia aurea belongs to subgenus *Alboleptonia* and is identical with *Entoloma kervernii* (Gill.) Noordeloos, *comb. nov.* (Basionym: *Leptonia kervernii* Gill., Hymen. Fr.: 413. 1876.)

brunnea. — *Leptonia brunnea* Velen., České Houby: 618. 1921. — Holotypus: J. Velenovský, coll. date & local. not indicated (PRC; bottle 320).—Fig. 12.

The type-collection contains five well-preserved specimens with the following microscopical characters: Spores $11.2\text{--}12.8 \times 8.2\text{--}8.7 \mu\text{m}$, $Q = 1.45\text{--}1.5\text{--}1.6$, $L\text{--}D = 3.7\text{--}4.1\text{--}4.7 \mu\text{m}$, 5–6-angled in side-view. Basidia $23\text{--}31 \times 10.3\text{--}12.3 \mu\text{m}$, 4-spored. Cheilocystidia $25\text{--}35 \times 12\text{--}18 \mu\text{m}$, scattered, broadly-rounded clavate, thin-walled, colourless. Hymenophoral trama regular; cells $49\text{--}87\text{--}(110) \times 16\text{--}21 \mu\text{m}$, cylindrical to inflated, thin-walled, colourless. Pileipellis a cutis of cylindrical, up to $10 \mu\text{m}$ wide hyphae with transitions to a trichodermium, especially at centre of pileus, with cylindrico-clavate cells up to $27 \mu\text{m}$ broad. Pileitrama regular; cells cylindrical, $65\text{--}140\text{--}(200) \times 8\text{--}16 \mu\text{m}$. Pigment brown, granular-intracellular, abundant in pileipellis and adjacent pileitrama. Clamp-connections absent.

Leptonia brunnea is a true *Leptonia* close to *Rhodophyllus asprellus* Fr. sensu J. Lange, Quél., Kühn. & Romagn. The group of species around *R. asprellus* is not yet disentangled in Europe. There are a lot of different interpretations of *Leptonia* species with a brown squamulose pileus and a blue-tinged stipe. For the time being I do not give *Leptonia brunnea* Velen. a new name, awaiting a revision of the *R. asprellus*-complex. (Velenovský's name cannot be transferred to *Entoloma* because of the name *Entoloma brunneum* Petch, 1924).

cinerascens. — *Leptonia cinerascens* Velen., České Houby: 623. 1921. — Holotypus: J. Velenovský, Julio 1919, in colle sicco graminis inter Stránčice et Božkov. (PRC; bottle 48b).— Fig. 24.

The type-collection consists of one well-preserved specimen with the following microscopical characters: Spores $9\text{--}11.3 \times 7.2\text{--}8.3 \mu\text{m}$, $Q = 1.2\text{--}1.3\text{--}1.5$, $L\text{--}D = 1.7\text{--}3.2 \mu\text{m}$, 5–6-angled in side-view. Basidia $34\text{--}45 \times 10.3\text{--}13.4 \mu\text{m}$, $Q = 2.7\text{--}3.7$, clavate, 4-spored. Cystidia none. Hymenophoral trama regular; cells $320\text{--}360 \times 15\text{--}26 \mu\text{m}$, cylindrical to inflated, thin-walled, colourless. Pileipellis a thin cutis of $4\text{--}9 \mu\text{m}$ wide, cylindrical hyphae. Pileitrama regular, inner hyphae slightly inflated with cells $270\text{--}350 \times 10\text{--}19 \mu\text{m}$. Pigment minutely encrusting hyphae of pileipellis and pileitrama. Stipitepellis a cutis, at apex of stipe with clusters of cylindrical, sometimes subcapitate hairs, $4\text{--}7\text{--}(10) \mu\text{m}$ wide. Clamp-connections present in hymenium at base of basidia.

Leptonia cinerascens is both macro- and microscopically completely identical with *Entoloma tenellum* (Favre) Noordeloos, *comb. nov.* (Basionym: *Rhodophyllus tenellus* Favre, Assoc. fong. hauts-marais: 212. 1948.) Transfer of Velenovský's epithet to *Entoloma* would result in a later homonym of *E. cinerascens* Hesler, 1967.

cinerea. — *Leptonia cinerea* Velen., České Houby: 623. 1921. — Holotypus: J. Velenovský, Aug. 1919, Mnichovice (PRC; bottle 400b).— Fig. 23.

The type consists of one specimen in very bad state; the base of the stipe is missing. The following microscopical characters have been observed: Spores $12.4\text{--}15 \times 7.2\text{--}8.7 \mu\text{m}$, irregularly nodulose-angular. Basidia clavate, 4-spored. (Most basidia are damaged and impossible to measure.) Hymenophoral trama regular; mediostroma regular; hyphae inflated, $6\text{--}17 \mu\text{m}$ wide, minutely encrusted. Pileipellis a cutis with transitions to a trichodermium of minutely encrusted, attenuate, multiseptate hairs. Pileitrama regular; hyphae brown-walled and minutely

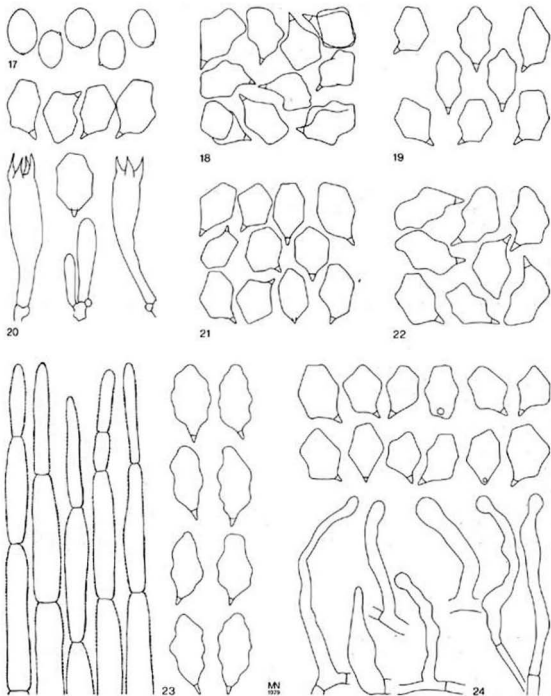


Fig. 17. *Nolanea betulina*, spores. — Fig. 18. *Leptonia citrina*, spores. — Fig. 19. *Leptonia involuta*, spores. — Fig. 20. *Nolanea crassipes*, spores and basidia. — Fig. 21. *Leptonia densifolia*, spores. — Fig. 22. *Leptonia mammillata*, spores. — Fig. 23. *Leptonia cinerea*, hairs of pilus and spores. — Fig. 24. *Leptonia cinerascens*, spores and hairs of stipe-surface. (All figs. from type.)

encrusted. Stipitepellis a cutis of cylindrical hyphae, with scarce, clavate, not encrusted hairs. Clamp-connections absent.

Judging from the microscopical data *Leptonia cinerea* is very close to *Entoloma hirtum* (Velen.) Noordeloos. But the spores seem to be slightly more elongate and Velenovský describes the stipe as being glabrous. Recombination of Velenovský's epithet would result in a later homonym of *Entoloma cinereum* Hesler (1967). Because of the bad state of the type-collection I do not want to give *Leptonia cinerea* Velen. a new name before it has been rediscovered.

citrina. — *Leptonia citrina* Velen., Novitates mycologicae novissimae: 79. 1947. — Holotypus: J. Velenovský (leg. L. Hostánova), 10 Aug. 1940, Mnichovice (PRM 152894).—Fig. 18.

The type consists of three badly dried specimens with the following microscopical characters: Spores $8.2-11.3 \times (6.7-7-8.2 \mu\text{m})$, $Q = 1.1-1.3-1.5$, $L-D = 0.5-2.3-3.7 \mu\text{m}$, rather variable in shape. Basidia 4-spored (I was unable to find intact basidia). Cystidia not found. Hymenophoral trama regular, consisting of cylindrical cells, $(60-100-240 \times 20-35 \mu\text{m})$. Covering layers damaged. Pigment probably intracellular, no trace of any encrusting pigment found. Clamp-connections not seen with certainty.

The bad state of the material does not permit a certain identification. Judging from the diagnosis it could be a lemon yellow *Alboleptonia* close to *Entoloma sericellum* (Bull. ex Fr.) Kumm.

conica. — *Leptonia conica* Velen., České Houby: 623. 1921. — Lectotype (design. mihi): J. Velenovský, July 1919, Mnichovice (PRC; bottle 85).—Fig. 13, 16.

Another collection in PRC, bottle 193a, is also labelled *Leptonia conica* Velen. That collection was made at Libochovický, a site quite a long distance from the type-locality Božkov, situated quite near Mnichovice. Therefore collection 85 is selected here a lectotype.

Spores $10.3-12.5 \times 7.7-8.3 \mu\text{m}$, $Q = 1.2-1.4-1.6$, $L-D = 2.4-5.3 \mu\text{m}$, mostly 6-angled in side-view. Basidia $38-44 \times 11-14 \mu\text{m}$, $Q = 3.1-3.7$, clavate, 4-spored. Cheilocystidia scattered, $55-90 \times 11-20 \times 2-5 \mu\text{m}$, lageniform with moderately to distinctly swollen basal part and long slender neck, thin-walled. Hymenophoral trama regular with cells up to 250 (and more) μm long and $11-27 \mu\text{m}$ wide, thin-walled, colourless. Pileipellis a thin cutis of cylindrical $4-8 \mu\text{m}$ wide hyphae, loosely arranged, gradually passing into pileitrama. Pileitrama regular; hyphae cylindrical or slightly inflated, made up of thin-walled cells, $220-270 \times 12-23 \mu\text{m}$. Pigment exclusively intracellular, abundant in pileipellis and adjacent pileitrama. Clamp-connections frequent in hymenium, rare elsewhere.

Leptonia conica belongs to subgenus *Nolanea* but it takes a rather isolated position in having lageniform cheilocystidia and intracellular pigment. As the combination *Entoloma conicum* is preoccupied, I introduce in honour of J. Velenovský for it the new name: **Entoloma velenovskyi**

Noordeloos *nom. nov.* (Basionym: *Leptonia conica* Velen., *České Houby*: 623, 1921; *non Entoloma conicum* (Peck) Hesler 1967.)

Entoloma velenovskyi var. *longicystidium* Arnolds & Noordeloos (1979: 296) differs in the distinctly larger and more irregularly shaped spores and the longer and more fusiform cheilocystidia.

decurrens. — *Leptonia decurrens* Velen., *České Houby*: 624, 1921. — No type-collection is left at PRM or PRC.

densifolia. — *Leptonia densifolia* Velen., *České Houby*: 621, 1921. — Holotypus: J. Velenovský, July 1919, Myšlin (PRC; bottle 54b).—Fig. 21.

The type-collection contains one specimen in a very bad state. Apparently the bottle dried out and has been refilled afterwards, which made the trama 'glassy', very brittle and impossible to study. Spores $(8.2-8.7-10.3(-11.3) \times 7.2-7.7(-8.2) \mu\text{m}$, $Q = 1.2-1.3-1.4$, $L-D = 1.7-2.0-3.7 \mu\text{m}$. Clamp-connections not seen with certainty. Some hyphae with intracellular pigment.

It is impossible to identify this collection. It is, however, certainly a true *Leptonia*, close to *Entoloma griseocyaneum* (Fr.) Kumm. sensu Kühn. & Romagn.

involuta. — *Leptonia involuta* Velen., *České Houby*: 621, 1921. — Holotype: J. Velenovský, July 1919, Mnichovice (PRC; bottle 54a).—Fig. 19.

The type-collection contains two specimens in a very bad state, caused by the process of drying-out and remoistening. The hymenium is impossible to study. Spores $10-10.7(-11.3) \times 7.2-7.9(-8.2) \mu\text{m}$, $Q = 1.25-1.42-1.7$, $L-D = 2-4 \mu\text{m}$. 5-6-angled in side-view. Pileipellis a trichodermium of clavate cells up to $15 \mu\text{m}$ wide. Vascular hyphae seen in trama of pileus and hymenophore. Clamp-connections not seen.

Leptonia involuta apparently belongs to subgenus *Leptonia* and is close to or identical with *Entoloma ardosiacum* (Fr.) Hesler (= *Rhodophyllus mougeotii* (Fr.) Quél.)

mammillata. — *Leptonia mammillata* Velen., *České Houby*: 622, 1921. — Holotype: J. Velenovský, July 1919, Mnichovice (PRC; bottle 54c).—Fig. 22.

The type consists of one partly damaged specimen, with the same brittle-glassy consistency as the type of *Leptonia densifolia* has. Spores $10.8-13.4 \times 7.2-8.7 \mu\text{m}$, $Q = (1.2-)1.25-1.5-1.7$, $L-D = (2-)2.6-4-5.3 \mu\text{m}$, rather irregular and asymmetrical in side-view. Basidia 4-spored. Cystidia none. Hyphal walls in pileipellis, pileitrama and in hymenophoral trama brown and finely to coarsely encrusted. Clamp-connections frequent in hymenium, rare elsewhere.

Leptonia mammillata is a form of *Entoloma papillatum* (Bres.) Hesler sensu Romagn. with slightly larger and more irregularly shaped spores. It will be discussed in another paper (Noordeloos, 1980).

minima. — *Leptonia minima* Velen., *Novitates mycologicae novissimae*: 79. 1947. — Holotype: J. Velenovský, 6 Sept. 1940, Mnichovice, collis Plecháč, in verrimenti (*Melampyrum*) (PRM 153890, under the manuscript-name *Leptonia nivea* Velen.).—Fig. 27.

The type consists of a fragment of the pileus of one specimen with the following microscopical characters: Spores $9.3-10.7 \times (6.1-6.6-7.7) \mu\text{m}$, $Q = 1.2-1.35-1.4$, $L-D = 2-3.5 \mu\text{m}$, 5-6-angled in side-view. Basidia $30-40 \times 9.5-15 \mu\text{m}$, clavate, 4-spored. Cystidia none. Pileipellis a trichodermium of clavate, $7-12 \mu\text{m}$ wide cells. Pigment not seen. Clamp-connections numerous in hymenium and trama.

Leptonia minima belongs to subgenus *Alboleptonia*. It seems to be a distinct species, for which the following transfer is made: **Entoloma minimum** (Velen.) Noordeloos, *comb. nov.* (Basionym: *Leptonia minima* Velen., *Novitates mycologicae novissimae*: 79. 1947.)

Rhodophyllus omphaliformis Romagn. and **Entoloma cephalotrichum** (P. D. Orton) Noordeloos, *comb. nov.* (basionym: *Leptonia cephalotricha* P. D. Orton in *Trans. Br. mycol. Soc.* **43**: 291, 1960), differ in having considerably narrower spores. **Entoloma olorum** (Romagn. & Favre) Noordeloos, *comb. nov.* (basionym: *Rhodophyllus olorinus* Romagn. & Favre in *Rev. Mycol.* **3**: 75, 1938), differs in its omphaloid stature and more isodiametrical spores. *Entoloma subsericellum* Murr., as redescribed by Largent & Benedict (1970: 441-442), is possibly the closest related species, but differs in the far more robust stature.

mycenoides. — *Leptonia mycenoides* Velen., *Novitates mycologicae*: 141. 1939. — Holotypus: J. Velenovský, Oct. 1939, Mnichovice (PRM 153891).—Fig. 25.

The type-collection consists of three badly dried specimens, covered by a mould, showing the following microscopical characters: Spores $8-10.7(-11.2) \times 6.7-7.2(-7.7) \mu\text{m}$, $Q = 1.1-1.3-1.5$, $L-D = 0.5-2-3 \mu\text{m}$, 5-6-angled in side-view. Basidia $30-35 \times 8-11 \mu\text{m}$, clavate, 4-spored. Cystidia not found. Hymenophoral trama regular, composed of cells measuring $100-120 \times 7-10 \mu\text{m}$, hyaline, colourless. Pileipellis difficult to remoisten, damaged by mould; some cylindriclavate, up to $17 \mu\text{m}$ wide cells observed. Pigment none. Clamp-connections numerous in all tissues studied.

Leptonia mycenoides belongs to subgenus *Alboleptonia*. It seems to be identical with *Entoloma minimum* (Velen.) Noordeloos. However, the edges of the lamellae are now entirely overgrown with moulds. It is therefore possible that originally cheilocystidia were present. In that case *L. mycenoides* would represent small specimens of *E. sericellum* (Bull. ex Fr.) Kumm.

nigrella. — *Leptonia nigrella* Velen., *České Houby*: 623. 1921. — Holotypus: O. Zvěřina, July 1919, locis graminis prope Babice (PRC; bottle 120b).—Fig. 26.

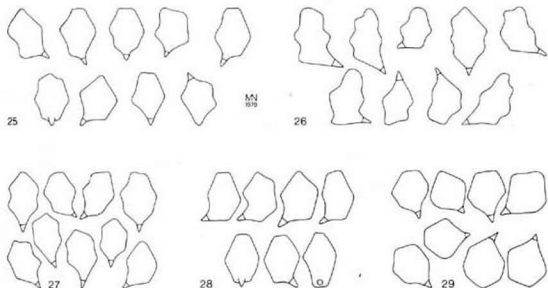


Fig. 25. *Leptonia mycenoides*, spores. — Fig. 26. *Leptonia nigrella*, spores. — Fig. 27. *Leptonia minima*, spores. — Fig. 28. *Leptonia papillata*, spores. — Fig. 29. *Telamonia brevipes*, spores. (All figs. from type.)

The type-collection consists of one partly damaged specimen. The tissues are impossible to reconstruct. The hymenial elements are also difficult to interpret. Pileus about 15 mm broad, dark brown, glabrous. Lamellae about 30, emarginate, brown tinged pink. Stipe watery grey but only the upper 10 mm left. Spores $10\text{--}12.3 \times 6.7\text{--}8.3 \mu\text{m}$, $Q = 1.3\text{--}1.5\text{--}1.7$, $L\text{--}D = 3.2\text{--}4.3 \mu\text{m}$, rather strongly asymmetrical-angular in side-view. Pigment in pileal surface layer brown, minutely encrusting. Clamp-connections observed in subhymenium.

The type of spores and the pigmentation place this species in section *Papillati* of subgenus *Nolanea*. The macroscopical characters of the type-collection are contrary to Velenovský's diagnosis which suggests a species of *Pouzaromyces*. It is very unlikely that the type-material really represents the species described by Velenovský. Some error seems to be committed. Therefore I consider *Leptonia nigrella* Velen. a nomen dubium.

omphaliaeformis. — *Leptonia omphaliaeformis* Velen., *Novitates mycologicae novissimae*: 79. 1947. — Holotype: J. Velenovský, 28 Sept. 1940, Mnichovice, Menčice, in colle (*Sarothamnus*) (*PRM 153893*).—Fig. 7.

The type consists of three specimens in bad condition, attacked by moulds. The following microscopical characters were observed: Spores $(10.2\text{--})10.5\text{--}11.8\text{--}(12.4) \times 7.2\text{--}8.2\text{--}(8.7) \mu\text{m}$, $Q = 1.3\text{--}1.45\text{--}1.5$, $L\text{--}D = 3\text{--}3.5\text{--}4 \mu\text{m}$, 5-angled in side-view. Basidia $32\text{--}40 \times 10.5\text{--}12 \mu\text{m}$, $Q = 2.7\text{--}3.3$, rather broadly clavate or cylindrical, 4-spored. Cystidia not found. Hymenophoral trama regular, consisting of cylindrical, sometimes inflated, hyaline, thin-walled cells, $40\text{--}100\text{--}$

150) \times 12–17 μ m. Pileipellis difficult to interpret, probably a cutis, but also some inflated elements seen. Pileitrama regular with cylindrical to inflated cells. Pigment diffuse, intracellular, pale brown in pileipellis and adjacent pileitrama; without a trace of encrusting pigment. Clamp-connections absent. Vascular hyphae numerous in pileitrama.

The stature, pigmentation, clampless hyphae and simple spores place *L. omphaliaeformis* in subgenus *Eccilia* (Fr.) emend. Romagn. 1978. *Entoloma parkensis* (Fr.) Noordeloos, *comb. nov.* (basionym: *Agaricus parkensis* Fr. in Kongl. Vitensk. Akad. Förh. 18: 45. 1851) and *E. leptonipes* (Kühn. & Romagn.) Moser both differ macro- and microscopically. Therefore the following recombination is made: *Entoloma omphaliaeformis* (Velen.) Noordeloos, *comb. nov.* (Basionym: *Leptonia omphaliaeformis* Velen., *Novitatis mycologicae novissimae*: 79. 1949.)

papillata. — *Leptonia papillata* Velen., *České Houby*: 622. 1921. — Holotypus: J. Velenovský, July 1919, Mnichovice (PRC; bottle 85a).—Fig. 28.

The type consists of one specimen in relatively good state with the following microscopy: Spores 9.3–10.7(–11.3) \times 7.2–8.3 μ m, Q = 1.2–1.3–1.4, L–D = 1.7–3.2 μ m, 5–6-angled in side-view. Basidia 33–44 \times 7.2–12.4 μ m, Q = 3–4.6(–5.7), 4-, rarely 2-spored. Cystidia none. Hymenophoral trama regular; hyphae cylindrical to inflated, composed of 270–500 \times 20–30 μ m cells, mixed with 4–7 μ m wide, cylindrical hyphae. Pileipellis a poorly differentiated cutis of 6–10 μ m wide, cylindrical hyphae, gradually passing into pileitrama. Pileitrama regular, consisting of cylindrical to inflated up to 20 μ m wide hyphae, intermixed with very narrow (1.5–4 μ m wide) hyphae. Pigment membranous and encrusting in hyphae of pileipellis and pileitrama and in narrow hyphae of the hymenophoral trama. Clamp-connections abundant in hymenium.

Leptonia papillata is identical with *Entoloma papillatum* (Bres. 1887) Hesler. (see also Noordeloos, 1980).

xanthopa. — *Leptonia xanthopa* Velen., *České Houby*: 622. 1921. — No type-collection is left in PRM or PRC.

Romagnesi (in Kühn. & Romagn., 1953: 205) introduced *Rhodophyllus poliopus* as a new name for *Leptonia xanthopa* Velen. He called attention to the very unsuitable name given by Velenovský: 'xanthopa' means with 'yellow stipe'. In the diagnosis the stipe is described 'chalybaeo-coerulescenti vel plumbeo-griseo'. Later Romagnesi described *R. poliopus* as a new species (in Kühn. & Romagn. 1954: 8). As no type is left, I consider *Leptonia xanthopa* Velen. a nomen dubium. As it will never be certain whether *L. xanthopa* is identical with *R. poliopus* Romagn. or not, it seems to be better to use the latter name for the typical *Leptonia*, excellently described by Romagnesi. Therefore the following new combination is made: *Entoloma poliopus* (Romagn.) Noordeloos, *comb. nov.* (Basionym: *Rhodophyllus poliopus* Romagn. in *Rev. Mycol.* 19: 8. 1954.)

A species described in *Telamonia*

brevipes. — *Telamonia brevipes* Velen., České Houby: 458. 1921. — Holotype: J. Velenovský, Aug. 1915, Mnichovice (PRC; bottle 183).—Fig. 29.

The label of the type-collection bears the following note: '*Leptonia brevipes* Velen., Mnichovice, 8. 1915, p. 458 sub *Telamonia*' The type-collection contains five well preserved specimens. Spores $8.2-9.7(-10.3) \times (7.7-8.2-8.7(-9.3)) \mu\text{m}$, $Q = 1.0-1.05-1.1(-1.15)$, $L-D = 0-0.5-1 \mu\text{m}$, isodiametrical-subglobose, 5(-6)-angled in side-view. Basidia $35-42 \times 11-15.5 \mu\text{m}$, $Q = 2.5-3.2$, 4-spored. Cystidia none. Hymenophoral trama composed of cylindrical to clavate elements, $160-310 \times 8-24 \mu\text{m}$, thin-walled, colourless. Pileipellis a thin, hardly differentiated cutis of 2-6 μm wide, cylindrical hyphae, gradually passing into trama. Pileitrama regular, composed of cylindrical to inflated, up to 20 μm wide hyphae intermixed with 2-5 μm wide, narrow-cylindrical hyphae. Hyphal walls brown in pileipellis and adjacent pileitrama, also encrusted in the narrow hyphae of pileipellis and pileitrama. Stipitepellis a simple cutis of parallel, 3.5-7 μm wide, thin-walled, yellow-brown, not encrusted hyphae. Vascular hyphae numerous in pilei- and stipitetrama. Clamp-connections frequent in hymenium, rare in trama.

Telamonia brevipes differs from all members of subgenus *Nolanea* section *Papillati* with isodiametrical spores in the dark pigmented, non-striate pileus and the habitat, viz. coniferous forest. Therefore I introduce the new name **Entoloma pseudotelamonia** Noordeloos, *nom. nov.* (Basionym: *Telamonia brevipes* Velen., České Houby: 458, 1921; non *Entoloma brevipes* Murrill, 1917.)

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sericellum (Bull. ex Fr.) Kumm.	258, 260	depressa Velen.	248
stauosporum (Bres.) Hesler	252	fracta Velen.	248
var. pusillum (Velen.) Noordeloos	252	galeraeformis Velen.	250
subsericellum Murrill	260	globispora Velen.	250, 255
tenellum (Favre) Noordeloos	256	hirta Velen.	250
tristis (Velen.) Noordeloos	254	holoconiota Largent & Thiers	248
velenovskyi Noordeloos	259	inodora Velen.	251
var. longicystidium		majalis Velen.	251
Arnolds & Noordeloos	259	nitens Velen.	252
xylophilum Speg.	252	pallescens P. Karst.	251
zonatum Hesler	255	paludosa Velen.	252
Leptonia		perpusilla Velen.	252
aurea Velen.	255	pusilla Velen.	252
brevipes Velen.	263	robiniae Velen.	252
brunnea Velen.	255	setulosa Velen.	254
cephalotricha P. D. Orton	260	tristis Velen.	254
cinerascens Velen.	256	undulata Velen.	255
cinerea Velen.	256	variegata Velen.	255
citrina Velen.	258	zonata Velen.	255
conica Velen.	258	Pluteus	
decurrens Velen.	259	betulinus (Velen.) Noordeloos	247
densifolia Velen.	259	Rhodophyllus	
involuta Velen.	259	asprellus (Fr.) J. Lange	256
mammillata Velen.	259	fernandae Romagn.	250
minima Velen.	260	juncinus Kühn. & Romagn.	250, 255
mycenoides Velen.	260	minutus (P. Karst.) Romagn.	248
nigrella Velen.	260	var. polymorphus Romagn.	248
omphaliaeformis Velen.	261	mougeotii (Fr.) Quéf.	259
papillata Velen.	262	olorinus Romagn. & Favre	260
xanthopa Velen.	262	omphaliformis Romagn.	260
Nolanea		polioporus Romagn.	262
alba Velen.	246	tenellus J. Favre	256
autumnalis Velen.	247	xylophilus J. Lange	252

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SOME PYCNIDIAL FUNGI OCCURRING ON ATRIPLEX
AND CHENOPODIUM

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(With six Text-figures)

A number of pycnidial fungi described from *Atriplex* and *Chenopodium*, in Europe, North- and South-America are brought into synonymy with *Phoma variospora* nom. nov., *Phoma dimorphospora* (Speg.) comb. nov. and *Ascochyta caulina* (P. Karst.) comb. nov. Descriptions of these species in vivo and in vitro are given and the differentiating characters are discussed. *A. caulina* represents the type species of *Chaetodiplodia* P. Karst., which genus is reduced to the level of a section of *Ascochyta* Lib.

Numerous pycnidial fungi with 1- or more-celled, hyaline or pigmented conidia from leaves and stems of *Atriplex* and *Chenopodium* spp. (Chenopodiaceae), have been described and classified according to the sporological system of Saccardo. Comparative studies of herbarium specimens, fresh collections and pure cultures revealed that most of these species are synonymous. A number of species listed under *Phyllosticta*, *Phoma*, *Ascochyta*, *Stagonospora* and *Septoria* appear to represent two related fungi belonging to the form-genus *Phoma* Sacc. emend. Boerema & Bollen (1975). Several other species formerly described under *Ascochyta*, *Ascochytulula*, *Chaetodiplodia*, *Diplodia*, *Diplodina*, *Macrophoma*, *Microdiplodia*, *Phleospora*, *Phyllosticta*, *Septoria*, *Stagonospora* and *Stagonosporopsis* are recognized as two related fungi belonging to *Ascochyta* Lib. emend. Boerema & Bollen (1975). Both *Ascochyta* species, characterized by occasionally setose pycnidia and subhyaline to yellowish brown conidia represent a separate section of *Ascochyta*, original described as the genus *Chaetodiplodia* P. Karst. (1884). One of these species was recently discussed by Boerema & al. (1977).

PHOMA Sacc. emend. Boerema & Bollen

Phoma Sacc. emend. Boerema & Bollen in *Persoonia* 8: 134-135. 1975.

The form-genus *Phoma*, according to its modern concept, includes pycnidial states with hyaline or slightly coloured conidia which may be 1-celled but also partly 2- or even more-celled.

The conidial septation in species of *Phoma* can be characterized as a secondary process occurring independently of the conidiogenesis; this in contrast with the distoseptation-process of the conidia in *Ascochyta* species, which is an essential part of the completion of the conidial development (Boerema & Bollen, 1975). In culture under normal laboratory conditions the conidia of *Phoma* species usually remain 1-celled. The septate conidia formed on the host plant by the two species treated below are relatively large (macroconidia) in comparison with the 1-celled conidia (microconidia) produced in vivo as well as in vitro.

1. *Phoma variospora* v. d. Aa & v. Kest. *nom. nov.*—Fig. 1

Phyllosticta chenopodii Westend. in Bull. Acad. r. Belg. Cl. Sci. II, 2: 567. 1857. — *Septoria westendorpii* Wint. in Hedwigia 26: 26. 1887. — non *Phyllosticta chenopodii* Sacc. in Syll. Fung. 3: 55. 1884 [= *Phoma exigua* Desm. *vide* von Arx in Bibliotheca mycol. 24 (Revis. Gloeosporium, 2nd Ed.): 140. 1970]; non *Septoria chenopodii* Westend. in Bull. Acad. r. Belg. Cl. Sci. 18: 396–397. 1851 [= *Cercospora dubia* (Riess) Wint.; see under *Ascochyta caulina*, p. 275]; non *Phoma chenopodii* Ahmad in Sydowia 2: 79. 1948 [see discussion]; non *Phoma chenopodii* Pavgi & U. P. Singh in Mycopath. Mycol. appl. 30: 265. 1966 [= *Phoma chenopodii* Ahmad]; non *Phoma westendorpii* Tosquetin *apud* Westendorp in Bull. Acad. r. Belg. Cl. Sci. II, 2: 564. 1857.

Description in vivo.

Leaf spots roundish, pale yellowish brown to almost white, 1–5 cm diam., surrounded by a purplish brown or brownish, rather narrow border. Pycnidia epiphyllous, scattered over the infected spots, sometimes in concentric rings, subglobose or pyriform, 100–550 μm diam., usually distinctly papillate with an apical, 15–60 μm wide porus. Wall 2–5 cells (6–14 μm) thick and composed of rather thin-walled, pale yellowish brown, in the ostiolar region darker, isodiametrical cells, 3–10 μm diam. Conidiogenous cells lining the whole cavity, subglobose to short conical, sometimes hardly differentiated from the inner wall cells, 4–10 μm in size, phialidic. Conidia of two types: macroconidia ellipsoidal or cylindrical or somewhat irregular in shape, rounded at the apex, rounded or somewhat attenuate and truncate at the base, 1- or 2-, seldom 3- or 4-celled, not constricted at the septa, hyaline, irregularly multiguttulate (8–)15–20(–27) \times (3–)3.5–4.5(–7) μm ; microconidia ellipsoidal or short cylindrical, sometimes curved or irregular in shape, rounded at both ends, 1-celled, hyaline, minutely bi-guttulate, 3–6 \times 1.2–1.7 μm .

Cultural characters.

Colonies growing slowly on oatmeal, malt and cherry decoction agars, attaining a diameter of 11–16 mm in 8 days, 35–45 mm in 21 days at room temperature. Growing zone irregularly fimbriate at the margin; aerial mycelium well-developed, whitish or greyish, sometimes with yellowish or greenish sectors; submerged mycelium pale yellowish brown, with local patches in various greenish or yellowish shades on malt agar. Pycnidia formed from about the 10th day; further transfers soon becoming sterile, except when exposed to near-UV light; the addition of sterilized lupine stems also stimulating the development of pycnidia. Conidia of two types: 1-celled conidia (3–)4–5.1(–6.8) \times (1.2–)1.75–2(–2.5) μm and, very scarce, more-celled conidia 12.5–17.5 \times 3.25–5.0 μm in size.

Material examined.

HERBARIUM MATERIAL.—*Phyllosticta chenopodii* Westend., Herb. crypt. (Ed. Beyaert-Feys) no. 959. on leaves of *Chenopodium sucecium* (*viride*) and *Chenopodium urbicum*, Belgium, Beverloo, no date (holotype ex Herb. G. D. Westendorp, BR; two specimens of isotype, BR).

Phoma variospora v. d. Aa & v. Kest., Herb. mycol. H. A. van der Aa no. 726, on leaf spots on *Chenopodium* spec., Aarhus, Jutland, Denmark, *J. Gremmen* 2497, 30 July 1968; Herb. mycol. H. A. van der Aa no. 678 and no. 712, both on *Chenopodium album*, leaf spots, Baarn, Netherlands, resp. 3 and 24 July 1968 (all in CBS).

Septoria westendorpii Wint., Kabát & Bubák, *Fungi imp. exs.* no. 568, on living leaves of *Chenopodium album*, Czechoslovakia, Böhmen, Vazovectale near Turnau, *J. E. Kabát*, 15 June 1903 (M).

LIVING CULTURES.—CBS 448.68, isolated from leaf spots of *Chenopodium album* (H. A. van der Aa no. 678, see above); CBS 513.77 isolated from leaf of *Chenopodium album*; Z. Flevoland, Netherlands, *J. W. Veenbaas-Rijks*, 17 July 1975.

Phoma variospora is a very common parasite on various species of *Chenopodium* in Europe. On account of the septate macroconidia in vivo it is sometimes confused with the leaf form of *Ascochyta caulina* (p. 271). *Phoma variospora* may be considered a European counterpart of the American species *Phoma dimorphospora* (p. 269), from which it is most easily distinguished by the occasionally also in vitro occurring septate macroconidia and the colonial morphology.

A new combination with the epithet '*chenopodii*' could not be made as this would have been homonymous with *Phoma chenopodii* Ahmad, a quite different fungus (cf. type, IMI 85383).

2. *Phoma dimorphospora* (Speg.) v. d. Aa & v. Kest., *comb. nov.*—Fig. 2

Basionym: *Phyllosticta dimorphospora* Speg. in *An. Mus. nac. Buenos Aires*, III, 20: 334. 1910.

Stagonospora chenopodii Peck in *Rep. N.Y. St. Mus. nat. Hist.* 40: 60. 1887¹. — non *Phoma chenopodii* Ahmad in *Sydowia* 2: 79. 1948 [see under *Phoma variospora*]; non *Phoma chenopodii* Pavgi & U. P. Singh in *Mycopath. Mycol. appl.* 30: 265. 1966 [= *Phoma chenopodii* Ahmad].

Description in vivo.

Pycnidia either epiphyllous on angular or roundish, up to 1 cm wide, very pale brown leaf spots or on eye-shaped lesions on stems, subglobose, 80–200 µm seldom up to about 300 µm wide with a rather flat papilla pierced by a 10–18 µm wide porus. The pycnidial wall 10–25 µm thick and composed of an outer prosenchymatous layer with rather thin-walled, yellowish brown, 2–4.5 µm wide hyphae, a sometimes incomplete pseudoparenchymatous, 1–4 cells (5–15 µm) thick middle layer composed of isodiametrical, rather thick-walled, brownish, 4–12 µm wide cells and a 1–7 cells thick inner layer, composed of thin-walled, hyaline, isodiametrical cells, 3–7 µm diam. Conidiogenous cells subglobose or short coniform, often hardly differentiated from the inner wall cells, 3–8 µm in diameter, phialidic. Conidia of two types: macroconidia ellipsoidal to cylindrical, straight or slightly curved, rounded at both apices or somewhat truncate at the base, 1- or 2-, seldom 3-celled, not constricted at the septa, hyaline, 16.25–22.5(25) × 3.75–4.5(6.8) µm; microconidia short cylindrical or ellipsoidal, hyaline, 1-celled, 4.25–5.0 × 2–2.5 µm.

Cultural characters.

Colonies on oatmeal, malt and cherry decoction agar growing rather slowly, attaining a diameter of 14–23 mm in 8 days, 55–60 mm in 21 days at room temperature in daylight. Growing zone lobate, finely fimbriate at the margin. Aerial mycelium whitish with a shade of yellowish brown to olivaceous brown (on malt agar), reduced under near-UV light. Submerged mycelium subhyaline to yellowish brown, somewhat darker in old cultures; the medium becomes cinnamon

¹ In 'Petrak's List 1' (1930) erroneously cited as '*Stagonospora chenopodii* House 1920. *Bull. N.Y. St. Mus.* 219/220 p. 58', which however refers to a reprint of Peck's Report (1887).

to rusty brown on oatmeal and cherry decoction agar and olivaceous green to dark brown on malt agar. Pycnidia are formed in fresh isolates from about the 8–10th day, arranged in concentric rings or irregularly scattered. After several transfers, near-UV light and the addition of sterile lupine stems stimulated good sporulation. Generally the pycnidia in vitro contain only microconidia.

Material examined.

HERBARIUM MATERIAL.—*Phyllosticta dimorphospora* Speg., Colect. micol. Museo Inst. Spegazzini no. 11.353, on leaves of *Chenopodium hircinum*, La Plata, C. Spegazzini, 13 October 1906 (holotype, LPS).

Stagonospora chenopodii Peck, Fl. New York, on leaves of *Chenopodium album*, Menands, Albany, C. H. Peck, August 1886 (holotype, NYS).

Characteristic specimens of this fungus have also been distributed under names referring to the European *Phoma variospora* [p. 268], viz. '*Phyllosticta chenopodii* Westend.' in Ellis, N. Am. Fungi no. 10.1158, on leaves of *Chenopodium album*, Ohio, W. A. Kellerman, June 1883 (M), and '*Septoria westendorpii* Wint.' in Rabenh.-Wint. Fungi europ. extraeurop. no. 3500, on leaves of *Chenopodium album*, Amand, Ohio, W. A. Kellerman, June 1883 (M).

LIVING CULTURES.—CBS 165.78 and 166.78, isolated from stem of *Chenopodium quinoa*, International Potato Center, Lima, Peru, 1977, by L. J. Turkensteen; CBS 345.78 = PD 76/1015, isolated from lesions on stems of *Ch. quinoa*, Peru, 1976, by V. Otazu; CBS 245.79 = PD 79/139, isolated from *Ch. quinoa*, Yanamuri near Puno, Peru, 3800 m. alt., March 1979, by L. J. Turkensteen.

Phoma dimorphospora is a parasite on species of *Chenopodium* in North- and South-America. In some parts of S. America the fungus causes eye-shaped stem lesions on *Chenopodium quinoa*. The species is closely related to the European *Phoma variospora*, as it shows the same conidial dimorphism. It differs in its cultural characters and in that in vitro usually only microconidia are formed.

The oldest name is *Stagonospora chenopodii* Peck, but the epithet '*chenopodii*' can not be used since this would result in a homonym of *Phoma chenopodii* Ahmad (see discussion under *Phoma variospora*).

ASCOCYTA Lib. emend. Boerema & Bollen

Ascochyta Lib. sect. **Chaetodiplodia** (P. Karst.) v. d. Aa & v. Kest., *comb. nov.*

Basionym: *Chaetodiplodia* P. Karst. in Hedwigia 23: 62. 1884. — Type: *Ascochyta caulina* (P. Karst.) v. d. Aa & v. Kest.

Ascochyta species with occasionally setose pycnidia and subhyaline to yellowish brown conidia.

The two species of this section which are found on Chenopodiaceae, are characterized by showing two different pycnidial phenotypes, depending on growth conditions and the substrate. Conidia on leaves (often associated with leaf spots) are relatively large, oblong, hyaline to yellowish green and 1-, seldom 2- or 3-distoseptate at maturity; those on the stems and in pure culture are smaller, ellipsoidal, yellowish to pale brown and 1-distoseptate at maturity. In the European representative of the section described below the pycnidia are distinctly setose on the

stems and in pure culture, but not setose in the leaf spots. The American representative only shows a few setae which are restricted to the ostiolar region.

The automatically created section *Ascochyta* contains the bulk of the known species and is distinguished by pycnidia devoid of setae and hyaline or subhyaline conidia.

1. *Ascochyta caulina* (P. Karst.) v. d. Aa & v. Kest., *comb. nov.*—Figs. 3–6

Basionym: *Chaetodiplodia caulina* P. Karst. in *Hedwigia* 23: 62. 1884 [stem form: s.f.].

Sphaeria (*Depazea*) *vagans* forma ('e') *atriplicicola* Fr. in *Syst. mycol.* 2: 532. 1823; Rabenh. KryptogFl. (1. Aufl.): 139. 1844 [leaf form: l.f.].

Depazea vagans subsp. (' β ') *atriplicis* Kickx in *Fl. crypt. Env. Louv.*: 125. 1835 (with the annotation '*Ascochyta atriplicis* Frank in litt.') nomen nudum. — *Phyllosticta atriplicis* (Kickx) Westend. in *Bull. Acad. r. Belg. Cl. Sci.* 18(2): 397. 1851 (as *P. a.* 'Nob'), nomen nudum, ex Kickx, *Fl. crypt. Fland.* 1: 414. 1867; illegitimate as later homonym of *P. atriplicis* Desm. (see below). — *Stagonospora atriplicis* (Kickx ex Kickx) Lind, *Danish Fungi*: 444. 1913 (as *S. a.* '(West.) Lind'). [l.f.].

Ascochyta atriplicis Lasch in *Klotzschii Herb. mycol.* (Ed. Rabenh.) Cent. 9, no. 861. 1846, nomen nudum [l.f.].

Phyllosticta atriplicis Desm. in *Annls Sci. nat. (Bot.)* III, 16: 298. 1851. — *Septoria atriplicis* (Desm.) Sacc. in *Michelia* 1: 190. 1878; illegitimate as a later homonym of *S. atriplicis* Fuckel, see below [l.f.].

Septoria atriplicis Fuckel in *Fungi rhen. (suppl. Fasc. 2)* no. 1680. 1866; in *Jb. Nassau. Ver. Naturk.* 23–24 (= *Symb. mycol.*): 390. 1870 ('1869 und 1870') [l.f.].

Diplodina chenopodii P. Karst. in *Hedwigia* 25: 73. 1885. — *Ascochyta chenopodii* (P. Karst.) Died. in *Annls mycol.* 10: 139. 1912; illegitimate, as later homonym of *A. chenopodii* Rostr. (see below). — *Ascochyta chenopodiicola* Pisareva in *Byzova & al., Flora Sporovykh Rastenii Kazakhstana* 5, 2: 229. 1968 [s.f.].

Ascochyta nebulosa Sacc. & Berl. apud Sacc. in *Bull. Soc. r. Bot. Belg.* 28: 98. 1889; *Syll. Fung.* 10: 305–6. 1892 [s.f.].

Diplodina atriplicis Vestergr. in *Bih. K. svenska VetenskAkad. Handl.* 22, Afd. 3, 6: 19. 1896 [s.f.].

Macrophoma chenopodii Oudem. in *Ned. kruidk. Archf. Sér. 3*, 2: 733. 1902 [l.f.].

Ascochyta atriplicis Died. in *Annls mycol.* 2: 180. 1904 [l.f.].

Ascochyta chenopodii Rostr. in *Bot. Tidsskr.* 26: 311. 1905 [s.f.].

Microdiplodia henningsii Staritz in *Hedwigia* 53: 163. 1913 [s.f.].

Ascochyta atriplicis Died. in *KryptogFl. Mark Brandenb.* 9, *Pilze* 7: 409. 1915 [s.f.].

Stagonosporopsis atriplicis A. Bond. in *Mat. Mykol. Obsled. Ross.* 2: 5. 1921 [l.f.].

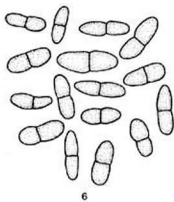
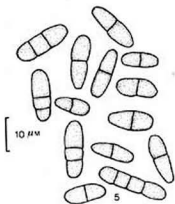
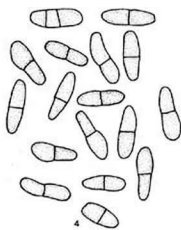
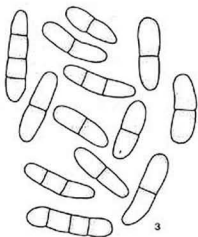
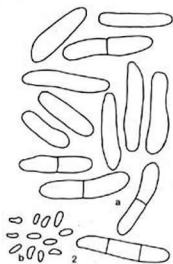
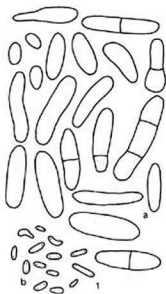
Ascochyta atriplicis Beeli in *Bull. Soc. r. Bot. Belg.* 56: 67. 1924 [l.f.].

Stagonospora chenopodii Baudys & Picbauer in *Práce Moravsk. pfirod. Společ. 3*, 2 (Sign. F 22): 32–33. 1926 [as '*Stagonospora*'] [s.f.].

Diplodia chenopodii Cherepanov in *J. Bot. U.S.S.R.* 36: 274. 1951 [s.f.].

Description in vivo.

Pycnidia either irregularly scattered over pale, yellowish brown, roundish or somewhat irregularly shaped leaf spots, 5–15 mm, seldom up to 30 mm diam., surrounded by a small brownish border, or on withering and dead stems, immersed, secondarily erumpent or almost free, especially on old stems; usually single, globose or pyriform with a broad papilla provided with an apical roundish, about 25 μ m wide porus, covered with rather stiff, 1–5-septate, 30–110 μ m long, 2–7.5 μ m broad setae and these tapering to a rounded apex, with a thick-walled and dark brown base, becoming thin-walled and yellowish brown to subhyaline at the apex; setae on the immersed pycnidia only apical, on the erumpent pycnidia and in pure culture all around but most dense in the substiolar zone. Pycnidial wall 15–30 μ m thick and differentiated into an outer pseudoparenchymatous layer, 1–4 cells thick and composed of thick-walled, brownish, 5–



17 μm wide cells, darkest in the ostiolar region, and a 2–7 cells thick inner layer with hyaline, thin-walled, isodiametric cells, 3–10 μm diam. The outer cell layers containing a dark to almost blackish, irregularly distributed intercellular pigment giving the wall a characteristic appearance.

Conidiogenous cells regularly lining the cavity, conical, 4–7 μm diam., sometimes hardly differentiated from the inner wall cells, annellidic (cf. Boerema & Bollen, 1975), but the older ones sometimes showing a distinct collar, with the light microscope not to distinguish from the phialidic collarette ('annellated collar' cf. Boerema & Bollen, 1975). Conidia ellipsoidal to fusiform, usually with a rounded apex and a truncate base, with 1, seldom 2–3 septa (distoseptate), not or only slightly constricted at the septum, subhyaline to yellowish-green, olivaceous or rarely brownish, irregularly multiguttulate, 12.0–27 \times 3.5–7.5 μm , (generally distinctly smaller in pure culture), olivaceous-brown 'en masse'.

Cultural characters.

Colonies growing rather fast, attaining a diameter of 35–40 mm on oatmeal and malt agar or up to 30 mm on cherry decoction agar in 8 days at about 20 °C (room temperature). Growing zone pinnate to fimbriate at the margin. Aerial mycelium irregularly tufted, whitish to greyish, later gaining with various local shades of an olivaceous green, yellowish green or rust colour. Submerged mycelium subhyaline to various shades of brown, giving the culture an olivaceous-green and later very dark to almost black reverse, with a bright yellow to olivaceous marginal growing zone. In fresh isolates pycnidia immediately formed in a usually regular concentric arrangement, especially on oatmeal and cornmeal agars; in further transfers the use of near-UV and the addition of sterile lupine stems aided good sporulation.

Material examined.

HERBARIUM MATERIAL.—*Chaetodiplodia caulina* P. Karst., Herb. P. A. Karsten, on stem of *Chenopodium* spec., Finland, Tammela, Mustiala, 15 May 1872, holotype (of the genus *Chaetodiplodia* P. Karst., S).

Ascochyta atriplicis Died., on leaves of *Atriplex* spec., Nieder-Lausitz, Sommerfeld (Lubsko, Poland), H. Diedicke, 15 July 1910 (B); Kabát & Bubák, Fungi imp. exs. no. 556, on living and dying leaves of *Atriplex nitens*, Czechoslovakia, Bohemia, Melnik, J. E. Kabát (as 'A. a. (Desm.) Diedicke'), 24 June and 3 August 1908 (B).

Ascochyta atriplicis Lasch, Klotzschii Herb. mycol. (Ed. Rabenh.) no. 861, on leaves of *Atriplex* spec. (nitens?), Driesen (Dresdenko, Poland), no date (holotype, B; isotype B and M).

Ascochyta caulina (P. Karst.) v. d. Aa & v. Kest., on stems of *Atriplex hastata*, Zoutelande, 14 August 1968 (PD); on leaves of *Atriplex* spec., Maurik at Nederrijn, J. Gremmen, 16 July 1968 (PD); on stems of *Atriplex hastata*, Bergen op Zoom, 19 Nov. 1976 (PD); Herb. mycol. H. A. van der Aa no. 879, on leaves of *Atriplex hastata*, Texel, De Schorren, 21 Oct. 1968 (CBS); idem no. 5953, on dead stems of *Atriplex hastata*, Texel, dyke of Waddenzee, near Oost, 28 June 1977 (CBS).

Ascochyta chenopodii Rostr., Herb. E. Rostrup, on leaves of *Atriplex littoralis*, Aarhus, J. Lind, 11 May 1904 (holotype, C), on leaves of *Atriplex littoralis* and *Chenopodium album*, Aarhus, J. Lind, 11 May 1904 (paratype and isotype, C); Herb. E. Rostrup and J. Lind, Fl. dan., on leaves of *Chenopodium glaucum*, Aarhus, J. Lind, 7 Sept., 1898 (C); Fl. suec. no. 5466, on living stems of *Chenopodium* spec. (*suecicum* ?), Sweden, Ulleråker at river Fyris, N. Lundqvist, 11 August 1967 (UPS).

Ascochyta nebulosa Sacc. & Berl., Herb. P. A. Saccardo no. 1443, on stems of *Chenopodium* spec., Siberia, prov. Tomsk, Kultchek, N. Martinoff, no date (holotype, PAD).

Diplodina atriplicis Vestergr., Herb. T. Vestergr., on dead leaf-stalks of *Atriplex hastata*, Gotland, Visby,

Fig. 1. *Phoma variospora*, in vivo (H. A. v. d. Aa 4787). — a. Macroconidia. — b. Microconidia.

Fig. 2. *Phoma dimorphospora* (holotypus, LPS). — a. Macroconidia. — b. Microconidia.

Fig. 3–4. *Ascochyta caulina*, leaf form (H. A. v. d. Aa 879). — 3. In vivo. — 4. In vitro.

Fig. 5–6. *Ascochyta caulina*, stem form (H. A. v. d. Aa 5953). — 5. In vivo. — 6. In vitro.

March 1895 (holotype and paratype, S); Vill, Fungi bav. no. 853, on stems of *Atriplex hortensis*, Unterfranken-Donnersdorf, March 1906 (S); Sydow, Mycoth. germ. no. 2957, on dead stems of *Atriplex oblongifolium*, Nordhausen, 7 April 1935 (S); Jaap, Fungi sel. exs. no. 172, on dead stems of *Atriplex hastata*, Sylt, Munkmarsch, 21 July 1904 (S).

Diplodia chenopodii P. Karst., Herb. P. A. Karsten no. 3129, on dead stems of *Chenopodium suecicum* (*viride*), Finland, Tammela, Mustiala, 30 June 1871 (holotype, H); on stems of *Chenopodium vulvaria*, France, F. Fautrey, no date (UPS); Petrak, Fl. Morav. no. 4, no date, and Petrak, Fl. Boh. Morav. exs. Ser. II Abt. I no. 1132, 5 Dec. 1914, both on *Chenopodium glaucum*, Czechoslovakia, Weisskirchen (in both cases as *D. c.* '(Karst.) Died.', BPI).

Microdiplodia henningsii Staritz, in Sydow, Mycotheca germanica no. 142, on dry stems of *Chenopodium album*, Anhalt, Ziebigk near Dessau, R. Staritz, Nov. 1903 (isotype, U 15407).

Phyllosticta atriplicis Desm., Herb. J. B. H. J. Desmazières, on leaves of *Atriplex hastata*, France, Remparts d'Abbeville, 6 Sept. 1850 (holotype, PC).

Phyllosticta atriplicis (Kickx) Westend. ex Kickx, Herb. crypt. (Ed. Beyaert -Feys) no. 960, on leaves of *Atriplex hastata*, Belgium, Ghent, no date (as *P. a.* 'Nob.', BR).

Septoria atriplicis Fuckel, Fungi rhen. no. 1680, on living leaves of *Atriplex patula*, Hattenheim (Rheingau), no date (syntype, M); Krieger, Fungi sax. no. 644, on leaves of *Atriplex nitens*, Königstein (Elbe), July 1890/91 and Fungi sax. no. 1945, on leaves of *Atriplex hastata*, Königstein, August 1905 (both as *S. a.* '(West.) Fekl.', M); Herb. A. Vill, on leaves of *Atriplex hastata*, Unterfranken, August 1898, and Vill, Fungi bav. no. 778, on leaves of *Chenopodium murale*, Unterfranken-Brünnau, Sept. 1903 (both as *S. a.* '(West.) Fuckel', M); Herb. G. Niessl von Mayendorf, on leaves of *Atriplex spec.*, Leipzig, G. Winter, June 1874 (M); on leaves of *Atriplex hortensis*, France, Meaux, P. Dumée, June 1900 (as *S. a.* '(West.) Fuck.', M).

Stagonospora atriplicis (Kickx ex Kickx) Lind, Fl. dan., on leaves and petioles of *Chenopodium album*, Aarhus, 11 August 1901 (as *S. a.* '(West.) Lind', C), on leaves of *Atriplex patula*, Sjaelland, Overby, O. Rostrup, 3 Sept. 1917 (as *S. a.* '(West.) Lind', C).

Stagonospora atriplicis A. Bond, on leaves of *Atriplex hortense*, near Korotscha, garden, A. Bondartsev, 26 July 1915 (lectotype, LE); on leaves of *Atriplex lacinata*, near Belgorod, A. Bondartsev, 9 Aug. 1915 (LE). Numerous herbarium specimens of this fungus have been filed under the misapplied name '*Septoria chenopodii* Westend.' (see discussion), viz. Keissler, Kryptog. exs. no. 2228, on living leaves of *Chenopodium murale*, Hungary/Czechoslovakia, Hont, Prencsfalu, A. Kmeř, no date (M); Fuckel, Fungi rhen. no. 1679, on living leaves of *Chenopodium viride*, Bundenheim (Rheingau) no date (M); Fungi Schemnitziensis, on leaves of *Chenopodium murale*, Schemnitz (Banská Stiaavnica, Czechoslovakia), Preňow, A. Kmeř, 14 Sept. 1887 (M); Petrak, Fungi polon. exs. no. 223, on leaves of *Chenopodium hybridum*, Stanislaw (Ivano-Frankovsk, Russia), 12 Oct. 1917 (M); Sydow, Mycoth. germ. no. 2401, on leaves of *Chenopodium bonus-henricus*, no date, no location (M).

LIVING CULTURES.—CBS 787.68, isol. fr. leaves of *Atriplex hastata*, Texel, De Schorren, 21 Oct. 1968 (Herb. mycol. H. A. van der Aa no. 879); CBS 344.78 = PD 68/682, isol. fr. stems of *Atriplex hastata*, Zoutelande, 14 August 1968 (Herb. PD); CBS 343.78, isol. fr. dead stems of *Atriplex hastata*, Texel, dyke Waddenzee, near Oost, 28 June 1977 (Herb. mycol. H. A. van der Aa no. 5953); CBS 246.79 = PD 77/655, isol. fr. leafspots of *Atriplex nastata*, Sylt, 20 July 1977, by G. H. Boerema.

Ascochyta caulina is wide spread in Europe and is also found in central Siberia. It is the cause of leaf spots and stem necroses on various species of *Chenopodium* and *Atriplex*. The appearance on stems and leaves is so different that it is hard to believe that these phenotypes belong to only one species. However, in all our isolates, kept under various laboratory circumstances, only the pycnidia of the stem-phenotype were formed. In one occasion pycnidia of the leaf phenotype were formed on some plate cultures which had been kept outside on a balcony in Wageningen during several weeks in the autumn of 1976. Reinoculation experiments have proved that which phenotype appears depends on the substrate. In the list of synonyms those marked with s.f. (stem form) are based on the stem-phenotype, which is characterized by setose pycnidia and dark, 2-

celled conidia; synonyms marked with l.f. (leaf form) are based on the leaf-phenotype, characterized by pycnidia without setae and relatively large, subhyaline, 2–4-celled conidia.

Webster & Lucas (1959) have isolated quite a similar fungus from ascospores of *Pleospora calvescens* (Fr.) Tul. which also occurs on various *Chenopodiaceae*. They identified this fungus as *Microdiplodia henningsii* Staritz by comparison with the type collection. Menzies (1966) found the same connection between isolates from *Chenopodium album* in New Zealand (his so-called 'Group III') and a *Pleospora* for which he also adopted the name used by Webster & Lucas. *Microdiplodia henningsii* is here included in the synonymy of *Ascochyta caulina* on the basis of a study of an isotype collection. Although the present authors did not find an ascigerous state in the rather extensive pycnidial state material which they studied, it seems to be without doubt that *Pleospora calvescens* ss. Webster & Lucas is the ascigerous state of *Ascochyta caulina*. Von Arx & Müller (1975) only listed *Alternaria*, *Stemphylium*, *Dendryphon* and *Phoma* as conidial connections of *Pleospora* species.

The oldest known name for the conidial state is Fries's forma *atriplicicola* of the collective species *Sphaeria* (*Depazea*) *vagans* Fr. (cf. Desmazières, 1851, and Kickx, 1867). However, at the specific level the epithet '*atriplicicola*' bears no priority (Leningrad Code art. 60). At the specific level, under *Ascochyta* the epithet *caulina*, from *Chaetodiplodia caulina* P. Karst. (1884) bears priority above *Ascochyta nebulosa* Sacc. & Berl. (Saccardo, 1889 l.c.), *A. atriplicis* Died. (1904 l.c.) and *A. chenopodii* Rostr. (1905 l.c.).

It should be noted that Saccardo (1892) and others (see material examined) also considered *Septoria chenopodii* Westend. (1851) to be a synonym of this species. However, the original material of *Septoria chenopodii* (holotypus in Herb. Westendorp, BR, and iso-types in Herb. Crypt. 643, BR and M) shows that this name refers to *Cercospora dubia* (Riess) Winter.

Macrophoma chenopodii Oudem. is included as a synonym in accordance with Petrak & Sydow (1927). *Ascochyta atriplicis* Beeli, *Stagonospora chenopodii* Baudys & Picbauer and *Diplodia chenopodii* Cherepanov are included on the basis of the descriptions. Several further synonyms probably exist but in many cases the original material is unavailable at present and the diagnoses are insufficient.

2. ASCOCHYTA HYALOSPORA (Cooke & Ellis) Boerema & al.

Diplodia hyalospora Cooke & Ellis in *Grevillea* 7: 5. 1878 [s.f.]. — *Ascochyta hyalospora* (Cooke & Ellis) Boerema, S. B. Mathur & Neergaard in *Neth. J. Pl. Path.* 83: 156. 1977.

Diplodina ellisii Sacc. in *Syll. fung.* 3: 417. 1884 [s.f.].

Pleospora chenopodii Ellis & Kellerm. in *J. Mycol.* 4: 26. 1888 [l.f.].

For description and illustration see Boerema & al. (loc. cit.)

Ascochyta hyalospora occurs in N. and S. America and causes leaf spots and stem necroses on *Chenopodium album* and *C. quinoa* respectively, and probably also on other *Chenopodiaceae*. Boerema & al. studied the fungus on isolates from infected seeds of *C. quinoa*. It was obvious that the species resemble *Ascochyta caulina* in many respects (personal communication Boerema). However, the ellipsoidal, dark, 2-celled conidia are larger than those of *A. caulina* in vitro.

Further the pycnidia show only a few rather short setae in the ostiolar region. After inoculation of stems from *Chenopodium album* and *C. quinoa*, pycnidia and conidia were formed which could be compared with those obtained in pure culture. After inoculation of the leaves, pycnidia were formed in leaf spots and the conidia were oblong, subhyaline, and 2–3 celled. The phenomenon of two pycnidial types, dependent on the substrate, is the same as in *Ascochyta caulina*. The synonyms *Diplodia hyalospora* and *D. ellisii* are based on the stem-phenotype (stem form: s.f.); the synonym *Phleospora chenopodii* is based on the leaf-phenotype (leaf form: l.f.).

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THREE MYCENAS REVISED

R. A. MAAS GEESTERANUS

Oegstgeest

(With 10 Text-figs.)

Mycena flocculentipes is reduced to the synonymy of *M. hiemalis*. *Mycena metata* is maintained as the correct name for *M. vitrea* var. *tenella* sensu Ricken, and *M. phyllogena* becomes a synonym. *Mycena corticola* is rejected as an ambiguous name, while *M. meliigena* seems a plausible choice as the correct name for *M. corticola* sensu Kühner.

In the course of my study of the genus *Mycena* the following cases were encountered which called for comment.

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MYCENA FLOCCULENTIPES Huijsm.

Mycena flocculentipes Huijsm. in *Blumea*, Suppl. 4: 160, fig. 2. 1958.

The present species proves to key out so near the two-spored form of *M. hiemalis* (Osb. apud Retz. ex Fr.) Quél. that a closer inspection seemed in order. The more important features taken from the descriptions of both are tabulated below.

	<i>M. flocculentipes</i> (after Huijsman)	2-spored <i>M. hiemalis</i> (after Kühner, 1938: 577)
Habitat	on rotten wood of broad-leaved tree	on mossy trunks of broad-leaved trees
Pileus	6-9 mm across, striate nearly to centre, brown in centre, more greyish, beige or whitish near margin	5-15 mm across, long striate, grey-brown to brown in centre, passing into whitish or white near margin
Flesh	very thin, more or less concolorous, not amyloid	thin, brownish, not amyloid
Odour	practically none	none
Lamellae	adnate, somewhat ventricose, white	not very broadly adnate, ascending or ventricose-sinuate, pure white or often whitish, sometimes with grey-brown shade along the base

	<i>M. flocculentipes</i> (cont.)	2-spored <i>M. hiemalis</i> (cont.)
Stipe	24–30 × 0.6–1 mm, finely pruinose, farinose above, covered with long hairs at the base, whitish	5–30(–40) × 0.5–1(–1.2) mm, densely but briefly pubescent throughout, with long hairs at the base, white
Basidia	22–28 × 6–7 μm, 2-spored	21–30 × 5.5–8 μm, 2-spored
Spores	7–8 × 5–6 μm, broadly ellipsoid, not amyloid	5.7–9.5 × 4.5–7 μm, briefly pruiniform, ovoid to almost spherical, not amyloid
Cheilocystidia	(40–)60–72(–80) × 9–15 μm, very numerous, usually lageniform	22–35 × 5–15 μm, scattered, cylindrical to more or less strongly ventricose
Pleurocystidia	absent or some present near edge of lamellae	absent or some present near edge of lamellae
Caulocystidia	subcylindrical to fusiform, more or less irregularly shaped	cylindrical or fusiform, more or less irregularly shaped

Except for the cheilocystidia which appear much longer in *M. flocculentipes* and are moreover said to be very numerous, the two descriptions offer no other points of difference by which *M. flocculentipes* could be effectively separated from *M. hiemalis*. Since, however, in many species of *Mycena* numbers as well as size and shape of cheilocystidia may vary within wide limits, one Swedish and two indubitable Dutch collections of *M. hiemalis* were procured for further investigation. The essential features of the cheilocystidia of these collections are tabulated as follows. Spore measurements are added 'pour acquit de conscience'.

Mycena hiemalis

	I	II	III
Cheilocystidia	36–45 × 5.5–12.5 μm, numerous	40–60 × 7–10 μm, scattered to numerous	36 × 6.5–9 μm, scarce
Spores	7.3–9 × 5.5–6.3 μm	8.1–8.5 × 5.8–6.5 μm	7.2–9 × 6.7–7.2 μm

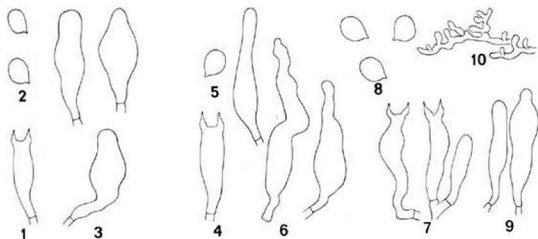
I: Netherlands: Noord-Holland, Amstelveen, 9 Aug. 1978, *J. Reijnders* (L).

II: Netherlands: Overijssel, Delden, 11 Oct. 1968, *E. Kits van Waveren* (herb. v. W.).

III: Sweden: Fungi exs. suec. praes. upsal. 1746 (UPS).

By comparing these data and their relevant drawings (figs. 1–9) with those bearing upon the two species under discussion it will be readily seen that the supposed gap between *M. flocculentipes* and *M. hiemalis* is bridged by intermediates.

Two more points may be brought forward in support of my view that the two species are truly identical. (i) In both species, that is, in their two-spored forms, the basidia and cheilocystidia lack



Figs. 1-3. *Mycena hiemalis* (Netherlands: Noord-Holland, *J. Reijnders*). — 1. Basidium. — 2. Spores. — 3. Cheilocystidia.

Figs. 4-6. *Mycena hiemalis* (Netherlands: Overijssel, *E. Kits van Waveren*). — 4. Basidium. — 5. Spore. — 6. Cheilocystidia.

Figs. 7-9. *Mycena hiemalis* (Sweden, *Fungi exs. succ.* 1746). — 7. Basidia. — 8. Spores. — 9. Cheilocystidia.

Fig. 10. *Mycena flocculentipes* (holotype), hyphae from pileipellis 1.8-2.7 μm wide, showing simple and branched excrescences.

(All figures, $\times 700$.)

clamp connections. (ii) Although the hyphae of the pileipellis in *M. flocculentipes* were stated to be 'lisses ou pourvues de quelques aspérités difficiles à résoudre', some of the said hyphae in the holotype were actually seen to possess excrescences (Fig. 10), very much like those described and depicted by Kühner (1938: 580, fig. 202 c).

MYCENA PHYLLOGENA (Pers.) Sing.

Agaricus phyllogena Pers., *Mycol. eur.* 3: 242. 1828. — *Mycena phyllogena* (Pers.) Sing. in *Persoonia* 2: 38, fig. 25. 1961.

Singer, on examination of the type of *Agaricus phyllogena* in Herb. Persoon, proposed the combination *Mycena phyllogena*, pointing out that this represented what Kühner (1938: 289) had described as *Mycena vitrea* var. *tenella* sensu Ricken. I restudied Persoon's type but failed to find cheilocystidia. Yet, in view of Singer's microscopic description and Persoon's diagnosis, I am inclined to agree with the former author's identification, but I do not share his opinion that *Mycena phyllogena* is the correct name for the species. Instead, I concur with Dennis, Orton & Hora (1960: 119) that the (earlier and) correct name is *Mycena metata* (Fr. ex Fr.) Kummer. Singer's attempt at stabilizing nomenclature, however, makes one thing abundantly clear. It is high time that action be taken and that Fries's species become fixed by the intelligent choice of neotypes. In my eyes, going by the description given by Lundell (1935: 10), it seems that the material of Lundell & Nannfeldt, *Fungi exs. succ.* no. 119 would make an excellent neotype for

Mycena metata. Redescription and illustration also of the microscopic features will be necessary before the choice is actually made.

In a later publication Singer (apud Singer & Moser, 1965: 156) indicated that two of his South American collections compared well to Kühner's and Favre's ideas of *Mycena vitrea*, although the colours of one of them were said to be in better agreement with *M. vitrea* var. *tenella*. Singer solved this problem by considering both collections to be mere colour forms of one species, *M. phyllogena*. It may be remembered, however, that in Europe and at least by a number of mycologists *Mycena vitrea* sensu Kühner and *M. vitrea* var. *tenella* sensu Ricken are taken to represent two separate species, and that Dennis, Orton & Hora (1960: 121) regarded *Mycena sepia* J. Lange as the correct name for *M. vitrea*. If Singer's observation, which requires repetition in Europe, is correct *M. sepia* would fall into the synonymy of *M. metata*.

MYCENA CORTICOLA (Pers. ex Fr.) S. F. Gray

Agaricus corticola Pers., Syn. meth. Fung.: 394. 1801; ex Fr., Syst. mycol. I: 159. 1821. — *Mycena corticola* (Pers. ex Fr.) S. F. Gray, Nat. Arrang. Br. Pl. I: 621. 1821.

Persoon's diagnosis and description of *Agaricus corticola* allow very few conclusions, and these are negative. The recording of his fungus as 'fuscescens' may be taken to mean either darkish or darkening, but since this term was followed by 'Recens pallescit, exsiccatus crispus et fuscus' there is no room for doubt. Such a description can on no account be applied to *Mycena corticola* as understood by modern authors. But, then, how to interpret Persoon's species? Here is where Singer's opinion (1961: 18–19) and mine diverge.

Persoon referred to Bulliard's *Agaricus corticulis* and the accompanying illustration, pl. 519 fig. 1A, B, with which the description of his own *A. corticola* shows a marked correspondence. If indeed this is what *A. corticola* looked like, Persoon's fungus may well have been any of several corticolous species: *Mycena supina* (Fr.) Gillet, *M. venustula* Quél., *M. alba* (Bres.) Kühn., *M. hiemalis* (Osb. apud Retz. ex Fr.) Quél., *M. speirea* (Fr. ex Fr.) Gillet, to name some of the more obvious possibilities. I fail to find any feature in Persoon's account that applies to one of the above species to the exclusion of the others. My conclusion is that it is impossible to be certain about the identity of *A. corticola* from the information available.

Fries in accepting Persoon's species gave a description of his own but, while the latter's colour annotation is simple enough, Fries must have had a much wider concept of the species in that he included dark or darkening forms (exemplified by *Agaricus corticulis* Bull. and *A. corticola* Pers.), whitish forms (exemplified by *A. umbellifera* Scop., *A. clavularis* Batsch, and *A. hiemalis* Retz.), and still others apparently seen fresh by him which were stated to vary 'incarnatus, rufescens, cyaneus, etc.' It is no use speculating what colour was foremost in Fries's mind in view of the diverse examples he gave.

The conclusion to be drawn from this is that *Agaricus corticola* Pers. ex Fr. must be rejected as a nomen ambiguum and the same applies to *Mycena corticola*. I therefore agree with Singer (although my grounds for this conclusion are different) that *M. corticola* in the sense of Kühner must be renamed, and I also agree with him that the correct name for this species would seem to be *Mycena meliigena* (Berk. & Cooke apud Cooke) Sacc., the type of which I have not studied.

Singer based his arguments largely on his examination of the material he had seen. Of the two sheets in Herb. Persoon under the name *A. corticola*, Singer suggested L 910.258-421 as lectotype. (The second sheet is of no consequence as it does not bear Persoon's handwriting.) Considering as proved by his account of this material, Singer proclaimed that 'Persoon's type must be recognized as the type of *A. corticola*.' I am not convinced. It is true that in Singer's redescription of the one whole basidiome he has seen (and of which now nothing remains) the size of the pileus (3.5 mm broad) and the size of the stipe (7.5 mm long) are well in agreement with those given by Persoon — pileus $1\frac{1}{2}$ lin. (3.2 mm) latus, stipes 3-5 lin. (6.3-10.5 mm) longus — but Singer ignored the presence of six additional stipes on the sheet. Five lack a pileus, the sixth bears a poor fragment of the pileus, with no trace left of the lamellae, but with inamyloid context, while the narrower hyphae of the stipe possess clamps. On the evidence of these two important features I am inclined to accept that the stipes on the sheet and the specimen redescribed by Singer belong to the same species. No evidence, however, can be obtained that the stipes, which may well have been gathered in a period after the publication of the Synopsis, are also conspecific with *A. corticola* as originally described by Persoon. The six stipes now range from 12 to 22 mm long. Very likely they were appreciably longer when fresh, and this coincides in no way with the measurements indicated by Persoon. It may seem futile to use the greater length of the stipe of a number of specimens as an argument to disprove their connection with an earlier description. I may point out, however, that in view of the importance of the choice of a lectotype every bit of evidence counts, and there is very little else of it available in the present case. While I admit that my own arguments inevitably contain some indecisive elements, I cannot see any justification in accepting Singer's view as correct.

Perhaps an additional piece of (circumstantial) evidence may be presented. Singer described the base of the stipe as 'now velutinous but insititious.' A stipe is called insititious if it is attached directly to the substratum, that is, without rooting fibrils. This description vividly recalls Bulliard's illustration referred to by Persoon and depicting a stipe which looks glabrous except for the very base and which does not seem to be fastened by rooting fibrils. The actual situation in the six stipes is completely different. Towards the base they are increasingly covered in long, flexuous fibrils with which the stipes are attached to the surrounding mosses.

Summing up, I maintain that the relation between the material of L 910.258-421 and the original description of *A. corticola* has not been and cannot be conclusively ascertained. In other words, the identity of the material, albeit authentic, cannot be taken to coincide with the identity of the species as originally described.

There is yet another consideration which comes into play in case Singer's choice of the lectotype would have been correct. Singer, in redescribing the specimen he regarded as lectotype, failed to give a description of the cheilocystidia, stating that they 'must be rare.' This is a circuitous way of admitting that he has not seen any. He further admitted to have observed spores 'of various types and apparently different sources...the subglobose ones most consistently appearing...taken to belong to these carpophores...' In my opinion here two defects are disclosed, and they are so serious as to render the material under discussion completely unsuitable as lectotype.

A final point may be mentioned, although it has no direct connection with the foregoing. Singer held the opinion that his redescription, in which stress is laid on subglobose spores,

'coincides with *Omphalia corticola* Peck which, according to A. H. Smith...is *Mycena hiemalis*.' Actually, Smith's wording was more cautious, for this author said '...in all probability ...' (1947: 359). I should add here that Smith who had studied Peck's type stated that the material was very scanty; he said nothing about the spores. The matter acquires a very different aspect when, on consulting the original description (1891: 130), the spores of Peck's species (compare also his pl. 2 fig. 12) turn out to be 'elliptical, .0003 in. long, .00016 broad', that is, almost twice as long as their width. Further, Peck's illustration shows the lamellae to be narrow and arcuate, whereas those of *M. hiemalis* are definitely ventricose. This clearly demonstrates that Peck's fungus and *M. hiemalis* are not conspecific.

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NEW TAXA OF ENTOLOMA FROM GRASSLANDS IN DRENTHÉ, THE NETHERLANDS

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(With 36 Text-figures)

Fourteen new species and three new varieties of *Entoloma* from grassland vegetations in the province of Drenthe, The Netherlands, are described: *E. acidophilum*, *E. argenteostriatum*, *E. calthionis*, *E. chlorinosum*, *E. cryptocystidiatum*, *E. cuciculorum*, *E. defibulatum*, *E. farinogustus*, *E. occultopigmentatum*, *E. psilopus*, *E. tibicystidiatum*, *E. undulatosporum*, *E. velenovskyi* var. *longicystidiatum*, *E. ventricosum*, *E. vinaceum* var. *fumosipes* and var. *violeipes* and *E. xanthocaulon*. For nomenclatorial reasons one new name is introduced: *E. ortonii*. Short comments are given on the taxonomical position of some of these new taxa, more will follow in future publications (see References).

During the years 1973-1977 the first author was carrying out a mycosociological and -ecological study of different grassland-communities in the province of Drenthe, situated in the north-eastern part of the Netherlands. This area mainly consists of pleistocene sands and holocene peat, by nature poor in lime and most other minerals and with a low pH (3.5-5). Full results will be published before long, including taxonomic notes on some of the observed macrofungi.

The second author is carrying out an extensive study of the genus *Entoloma* (Fr.) Kumm. emend. Donk (= *Rhodophyllus* Quél.) in the Netherlands and adjacent Belgium and Western Germany, with critical regard to the European taxa.

In course of the investigations of the first author numerous collections were made of species belonging to the genus *Entoloma*, especially in the subgenus *Nolanea*. The identification of many collections offered great difficulties. Therefore we decided to investigate these *Entoloma*-collections in cooperation.

After these studies we arrived to the conclusion that the collections contained several new taxa, from which we introduce in this paper 14 new species and 3 new varieties, all belonging to the

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subgenera *Nolanea* and *Entoloma*. Moreover one new name has been introduced for nomenclatorial reasons.

Nine of these taxa will be described extensively in English and illustrations of microscopical details will be given. For the remaining taxa we restrict ourselves to the Latin diagnosis, as descriptions and figures will be given in Arnolds & Noordeloos (1980). The latter publication will contain coloured plates of the species mentioned above and of some other interesting *Entoloma*-species.

The taxonomic position and relationships of the species treated in this paper will be discussed more detailed in Noordeloos, 1980a–c. These papers will also contain keys to the species and varieties which will offer a better opportunity for comparison of the taxa presented here.

MATERIAL AND METHODS

Taxonomic characters of *Entoloma* and methods of studying them will be discussed by Noordeloos (1980a). For the moment we suffice with some explanations, necessary to interpret and understand the descriptions given below.

1. Typification.—At first all collections had been preserved in the herbarium of the Biological Station at Wijster (WBS). For the sake of safety and accessibility a part of each type has been deposited in the Rijksherbarium at Leiden (L). When a collection consisted of a large number of specimens the major part was designated holotype and deposited at L. From small collections the holotype has been kept at WBS and only one carpophore or fragment in L as isotype. It should be mentioned that the Latin diagnosis has been based on the type-collection only, whereas the English description covers all material studied.

2. Methods and presentation of data.—Colours of fresh carpophores are usually compared with Kornerup & Wanscher (1967), exceptionally with Cailleux & Taylor (1958).

Spores are observed and measured in water, ammoniac 10% or mostly in ammoniacal Congo red solution, under oil-immersion lense (1000–1500 \times). The size relates to the largest length and width, excluding the apiculus (in contrast to Orton, 1960: 162).

The elements of hymenophoral trama have been measured in squash preparations of the gills, which may give different results from measurements on transversal sections.

The pileipellis is always studied on radial sections through the cap.

Drawings are made with camera lucida or drawing prisma.

The following abbreviations have been used:

M 6F7,8: Colours according to Kornerup & Wanscher, comprising 6F7 as well as 6F8.

M 6F7/8: idem, but colour intermediate between 6F7 and 6F8.

Expo: Colours according to Cailleux & Taylor.

L=21–30, 1=3–7: 21–30 entire lamellae per carpophore, 3–7 lamellulae between each pair.

Spores [20/2/1]: 20 spores measured on two carpophores out of one collection.

L–D=1–3–5 μ m: Length minus width between 1–5 μ m with an average of 3 μ m.

Q=1.3–1.5–1.7: Ratio of length and width ('quotient')=1.3–1.7 with an average of 1.5.

ACKNOWLEDGMENTS

The authors wish to express their gratitude to Anne Dekker, Leiden, for providing the Latin diagnoses. We are very much indebted to Dr. R. A. Maas Geesteranus, Oegstgeest, for correcting the Latin diagnoses and for improving the English descriptions. Eva van Santen, Leiden, has kindly read through the English text.

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Entoloma acidophilum Arnolds & Noordeloos, *spec. nov.*

Pileus 10–15 mm latus, primo conico-convexus demum convexus vel planus, leviter umbonatus, postea leviter depressus, valde hygrophanus in udo pallide griseo-brunneus, leviter roseo-tinctus, centro obscuriore, striatus, in sicco pallide griseo-ochraceus, siccus, glaber, centro subrugosus sub lente. Lamellae L = 12–17, l = (1)3–4, moderate distantes, adnexae, ascendentes, ventricosae, crassiusculae, albae demum salmoneae vel sordide incarnatae. Stipes 10–32 × 1–2 mm, cylindraceus, interdum deorsum curvatus et dilatatus, pallide griseo-brunneus, argenteo-striatus. Caro eodem colore ac superficies, in pileo membranacea, fragilis. Odore valde farinaceo.

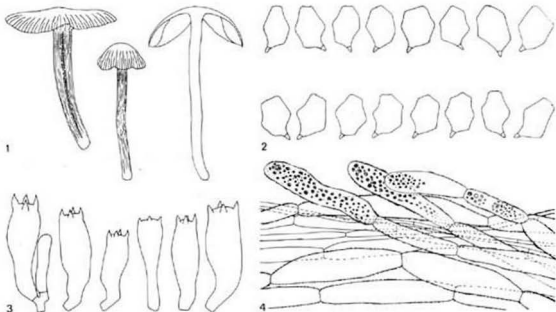
Sporae 8.5–10.3(–10.8) × (6.3)6.7–7.7(–8.0) μm , Q = (1.15)1.2–1.45, (5)6–7-angulatae. Basidia (30)31–41(–42) × (8.6)9.4–11.1(–11.6) μm , 2–4-, raro 1-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceo-inflatae, usque ad 340 μm et ultra longae, usque ad 17 μm latae. Pileipellis cutis non vel paulo differentiata, centro aspectu trichodermatis. Pigmentis duobus: pileipellis pileitramaeque hypharum tunicam incrustantibus, pariter in pileipelle intracellulosis. Fibulae nullae. Habitat: Inter graminis ad terram acido-arenosam ad ostium cuniculorum cavi. Typus: *E. J. M. Arnolds 3593*, 21 IX 1976, 'Terhorster zand, near Beilen, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

Entoloma argenteostriatum Arnolds & Noordeloos,
spec. nov.—Figs. 1–4

Pileus 9–25 mm latus, conico-convexus, explanatus, margine rectus, postea undulato, valde hygrophanus, in udo obscure fuscus, longe striatus, in sicco pallescens, sericeus. Lamellae moderate distantes, late adnatae vel subliberae, fuscae demum incarnatae. Stipes 23–32 × 1.8–4 mm, cylindraceus, interdum compressus, fuscus, pileipelle pallidior, argenteo-striatus. Caro membranacea, firma, albogrisea in pileo, in stipite fragilis, fusca. Odore farinaceo demum cucumerem revocante. Sporae 7.4–9.5(–10.6) × 5.8–6.9(–7.4) μm , 5–7-angulatae. Basidia 29–38(–41) × 8.5–10.6 μm , clavata, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceae vel inflatae, (74)101–212(–223) × (7.4)12.7–19.1(–20.1) μm . Pileipellis cutis hyphae cylindraceae, 4–12(–13) μm latae, centro aspectu trichodermatis. Pigmentis duobus: pileipellis pileitramaeque hypharum tunicam incrustantibus, pariter in pileipelle intracellulosis. Fibulae nullae. Habitat: Locis graminosis muscosisque ad terram arenosam. Typus: *E. J. M. Arnolds 3609*, 28 IX 1976, 'Wijster, along Linthorst-Homan canal, municipality of Beilen, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

Pileus 9–25 mm broad, conico-convex or convex then expanding to plano-convex, with straight margin, marginal zone often undulating with age, strongly hygrophanous, when moist



Figs. 1–4. *Entoloma argenteostriatum*. — 1. Carpophores. — 2. Spores. — 3. Basidia. — 4. Pileipellis.

dark grey-brown, translucently striate up to centre, drying pale brown-grey, satiny. Lamellae moderately distant, variably inserted, broadly to narrowly adnate, pale brown-grey when young then dingy flesh-coloured. Stipe 23–32 × 1.8–4 mm, cylindrical, sometimes flattened and up to 7 mm broad, grey-brown, paler than cap, silvery striate lengthwise, upper part densely powdered. Flesh in cap thin (1.5 mm), greyish white, firm, in stipe cortex grey-brown (0.5 mm), context greyish white, easily splitting lengthwise. Smell farinaceous when fresh, later more cucumber-like.

Spores [30/3]7.4–9.5(–10.6) × 5.8–6.9(–7.4) μm , $Q = (1.15)1.2–1.35–1.5$, $L-D = 1.1–2.3–3.2$ μm , 5–7-angular in side-view, with acute angles. Basidia 29–38(–41) × 8.5–10.6 μm , $Q = 3.0–3.3–3.7$, clavate, 4-spored. Cystidia none. Hymenophoral trama regular, elements (74–)101–212(–223) × (7.4–)12.7–19.1(–20.1) μm , cylindrical to inflated, mixed with narrow connective hyphae, 2.5–6 μm wide, sometimes faintly encrusted.

Pileipellis a cutis of 4–12(–13) μm wide, cylindrical hyphae with transitions to a trichodermium especially in centre and in young specimens, of clavate or subcylindrical cells, 28–59 × 7.4–10.6(–15) μm , with brown encrusted walls and brownish intracellular granules or clots. Pileitrama regular, hypoderm weakly to distinctly developed, elements inflated, 32–110 × 7–17(–20) μm , deeper trama composed of long, inflated hyphae up to 27 μm wide, mixed with narrow, (1.5–)2.4–5.3 μm wide, cylindrical connective hyphae, entire trama (coarsely) brown-encrusted, in upper pileitrama also scarcely granular-intracellular. Clamp-connections none.

HABITAT.—In poor vegetation of short grass with much moss (mainly *Polytrichum piliferum*) on dry, acid sandy soil.

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Beilen, along Linthorst-Homan canal E. of Wijster, 28 Sept. 1976, *E. J. M. Arnolds* 3609 (holotypus in L; isotypus in WBS).

The size and shape of the spores and double pigmentation place our species in the *E. fernandae*-complex in section *Papillati* of subg. *Nolanea*. It differs from its closest relative *E. acidophilum*

nob. which has also a white-striate stipe and fibrillose flesh in the stipe, by the dark pigmented cap and lamellae, firm flesh in cap and perhaps by the exclusively 4-spored basidia.

Entoloma fernandae (Romagn.) Noordeloos, *E. psilopus* nob. and *E. fractum* (Velen.) Noordeloos differ among other things in having a non-striate, smooth stipe.

Entoloma calthionis* Arnolds & Noordeloos, *spec. nov.

Pileus (10-)12-28 mm latus, variabilis, conicus vel convexus vel planus, interdum umbonatus, valde hygrophanus, in udo pallide brunneus, aurantiaco-tinctus, griseo-brunneo striatus, in sicco pallide ochraceo-griseus, sericeus, radialiter rugosulus. Lamellae L = 22-27, l = 1-3(-5), moderate confertae, liberae, valde ventricosae, albae demum pallide incarnatae, haud griseo-tinctae. Stipes 22-47 × 1.5-3.5 mm, gracilis, cylindraceus, basi dilatatus, fistulosus, lividus vel fulvus, striatulus, apice albo-flocculosus, basi leviter albotomentosus. Caro membranacea, fragilis-fibrillosa, eodem colore ac superficies. Odore atque sapore leviter mucidis. Sporae (8.5-)9-10.6(-11.5) × 7.2-8.5(-9.0) μm, Q = 1.1-1.25-1.4, acute 5-6-angulatae. Basidia 30-37.6 × 9.5-11.7 μm, clavata, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceae ad septa attenuatae, e elementis 200-350 × 11-15 μm constantes. Pileipellis cutis sicca, paulo differentia, hyphae 2-5 μm latae. Pileitrama subregularis, hyphae cylindraceae, 7-17.5 μm latae. Pigmentis intracellulosis, pallide testaceis. Fibulae ad basem basidiorum frequentes, in trama desunt. Habitat: In Calthione, ad terram paludosam. Typus: *E. J. M. Arnolds 3831*, 12 V 1977, 'Taarlose Diep, Taarlo, municipality of Vries, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

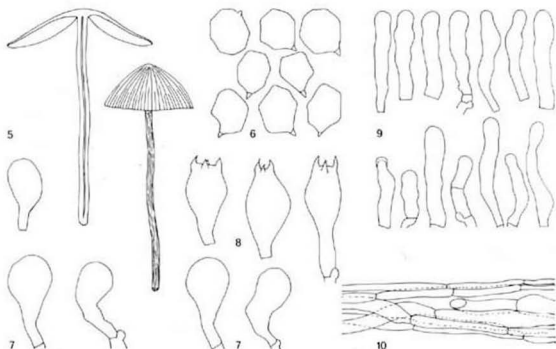
Entoloma chlorinosum* Arnolds & Noordeloos, *spec. nov.

Pileus 7-14 mm latus, semiglobosus demum convexus, apice acutus vel frequenter papillatus, hygrophanus, in udo fulvo-ochraceus, striatus, in sicco pallide testaceus, glaber, centro subtiliter furfuraceus, siccus. Lamellae L = 12-17, l = 1, distantes, ascendentes, adnatae vel liberae, valde ventricosae, albae demum roseae. Stipes 28-35 × 0.6-1.3 mm, tenuissimus, cylindraceus, basi incrassatus, strictus vel flexuosus, solidus, colore variabili, pallide testaceus vel fuscus, glaber, basi albo-tomentosus. Caro membranacea, pallide fulva, in stipite fusca. Odore chlorini valde fragrans post sectionem. Sapore subdulci. Sporae 7.5-8.1(-8.3) × (5.1-)5.2-5.8(-6.0) μm, Q = 1.3-1.5, 5-6-angulatae, valde irregulares. Basidia 23.3-29.7(-31.8) × 7.2-9.0(-9.5) μm, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceae vel leviter inflatae, e elementis (116-)159-233(-297) × (7.4-)15.9-21.2(-23.2) μm constantes. Pileipellis cutis leviter differentia, hyphae superficiei 4-6 μm latae, deorsum 7-10 μm latae, cylindraceae, sensim in pileitramam transientes. Pileitrama regularis, e elementis usque ad 200 μm longis, 10-18 μm latis. Pigmentis dissolutis intracellulosis in pileitrama superficiali. Fibulae non frequentes in hymenio ac trama. Habitat: Inter muscos (*Rhizidiadelphus squarrosus*) in *Crepido-Junco* *acutiflori*. Typus: *E. J. M. Arnolds 3168*, 24 IX 1974, 'Burgvallen N. of Nieuwlanden, Anlo, prov. of Drenthe, The Netherlands' (holotype in L; isotype in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

***Entoloma cryptocystidium* Arnolds & Noordeloos, *spec. nov.*—Figs. 5-10**

Pileus 20-32 mm latus, conico-convexus vel convexus, margine leviter involutus, in udo pallide griseo-fuscus, centro obscuriore, margine pallidior, longe striatus, in sicco argenteo-subalbus ochraceo-tinctus, valde sericeus. Lamellae L = 21-23, l = 3-5, confertae, liberae, ventricosae, pallide fusco-griseae. Stipes 47-



Figs. 5–10. *Entoloma cryptocystidium*. — 5. Carpophores. — 6. Spores. — 7. Basidiolae. — 8. Basidia. — 9. Cheilocystidia. — 10. Pileipellis.

53 × 1.5–2.5 mm, cylindraceus, fistulosus, fragilis, pallide griseo-fuscus, argenteo-striatus. Caro membranacea, superficis concolor. Odore et sapore inconspicuis. Sporae [20/1] (8.5–)8.7–10(–10.2) × (7.5–)7.7–8.3 μm , Q = 1.1–1.2–1.3, L–D = 0.4–1.4 μm . Basidia 29–37(–38.3) × (7.9–)11.5–12.5 μm , clavata, 4-sporigera. Basidiolae 24–33.5 × 10.5–16(–19) μm , valde clavata. Cheilocystidia (8.1–)15.3–37.8(–43.1) × 4.8–7.2(–7.6) μm , subcylindracea, saepe subcapitata. Hyphae lamellarum tramae cylindraceae, e elementis 110–206 × 6.7–17 μm constantes. Pileipellis cutis hyphae 3.5–5.8 μm latae. Pileitrama regularis, hyphae 5–20 μm latae. Pigmentis intracellulosis dispersis in pileipelle atque pileitrama. Fibulae frequentes in hymenio ac subhymenio, rariores in trama. Habitat: In graminosis paludosis (*Calthion palustris*). Typus: *E. J. M. Arnolds 3408*, 3 IX 1975, 'Taarlose Diep, municipality of Vries, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus 20–32 mm broad, conico-convex with margin at first narrowly involute then straight, strongly hygrophanous, when moist rather pale grey-brown (M 5D4) with slightly darker centre and slightly paler margin, translucently striate up to centre, on drying considerably expallent with radial streaks to silvery white with ochraceous tinge, conspicuously silky. Lamellae L = 21–23, 1 = 3–5, crowded, free, ventricose, 2.5–4 mm broad, pale brown-grey (M 5D4 to 5C3) without any pinkish tinge. Stipe 47–53 × 1.5–2.5 mm, slender, cylindrical, fistulose, brittle, pale grey-brown, silvery-striate lengthwise (as in *E. staurosporum*). Flesh in cap thin, brown-grey, in stipe brown-grey. Smell fungoid, weak. Taste inconspicuous.

Spores [20/2] (8.5–)8.7–10(–10.2) × (7.5–)7.7–8.3 μm , Q = 1.1–1.2–1.3, L–D = 0.4–1.4 μm , 5–6-angular in side-view with rather blunt angles. Basidia 29–37(–38.3) × (7.9–)11.5–12.5 μm , Q = 2.5–2.9(–4.0), usually broadly clavate, 4-spored, mature basidia rather scarce. Basidiolae 24–33 × 10.5–16(–19) μm , Q = (1.75–)2.0–2.9, broadly clavate. Cheilocystidia (8.1–)15.3–37.8(–42.1) × 4.8–7(–7.6) μm , subcylindrical sometimes flexuous, often subcapitate, sometimes with thickened, refringent tip, scattered between basidia, not protruding beyond the hymenium.

Subhymenium strongly developed, filamentous-ramose. Hymenophoral trama subregular, elements $110\text{--}206 \times 6.7\text{--}17 \mu\text{m}$, cylindrical or weakly inflated. Pileipellis a cutis of cylindrical, repent hyphae, $3.3\text{--}5.8 \mu\text{m}$ wide, gradually passing into trama. Pileitrama regular, hyphae $5\text{--}20 \mu\text{m}$ wide, radially arranged. Pigment diffuse, intracellular in pileitrama and pileipellis. Clamp-connections rather frequent in hymenium and subhymenium, rare in trama.

HABITAT.—In non-manured hayfield (*Calthion palustris*) on rather eutrophic wet peaty soil.

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Vries, Taarlo, Taarlose Diep, 3 Sept. 1975, *E. J. M. Arnolds* 3408 (holotypus in WBS; isotypus in L).

Entoloma cryptocystidium belongs to subgenus *Nolanea*; it may be a member of section *Parammosi* Romagn. (Romagnesi 1978: 52). The remarkable combination of cylindrical-subcapitate cheilocystidia, rather broad basidiolae and intracellular pigmentation is suggestive of a species in its own right.

Entoloma cuniculorum Arnolds & Noordeloos, *spec. nov.*—Figs. 11–14

Pileus $12\text{--}16 \text{ mm}$ latus, semiglobosus, demum convexus papilla parva ornatus, membranaceus, margine excedente, hygrophanus, in udo pallide fuscus, margine pallidiore, centro obscuriore, obscure fusco striatus usque ad centrum, in sicco pallescens, glaber. Lamellae ascendentes, adnexae, paulo ventricosae, usque ad 3 mm latae, pallide incarnatae-griseae, basi fusco-tinctae. Stipes usque ad $25 \times 1.5\text{--}2 \text{ mm}$, cylindraceus, fragillimus, pallide fuscus pileo concolor, haud striatus, glaber, apice pruinosis. Caro in pileo obscure fusca, in stipite superficie concolor. Odore valde farinaceo. Sporae $(8.4\text{--})9\text{--}11.3\text{--}(12) \times 6.3\text{--}7.9 \mu\text{m}$, forma variabili. Basidia $32.2\text{--}41.3 \times 10.3\text{--}12 \mu\text{m}$, clavata, 4-sporigera. Hyphae lamellarum tramae e elementis cylindraceis vel inflatis, $97\text{--}193\text{--}(236) \times (4.5\text{--})7.5\text{--}13\text{--}(16) \mu\text{m}$ constantes. Pileipellis cutis, siccus, hyphae cylindraceae, $(4.5\text{--})6\text{--}14 \mu\text{m}$ latae. Pileitrama regularis, hyphae $7.5\text{--}22.5 \mu\text{m}$ latae. Pigmentis duobus; pileipellis pileitramaeque hypharum tunicam incrustantibus, pariter in pileipelle intracellulosis. Fibulae nullae. Habitat: in gramine, pasto cuniculus. Typus: *E. J. M. Arnolds* 3772, 17 XI 1976, 'Kraloërveld, near Moddergat, municipality of Ruinen, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus $12\text{--}16 \text{ mm}$ broad, bluntly conical or semiglobose then conico-convex or convex with small papilla, with straight margin sometimes exceeding the lamellae, hygrophanous, when moist rather pale grey-brown (Expo E 52) with pale margin (Expo C 52), dark grey-brown striate up to dark grey-brown centre, on drying exallant with radial streaks from centre. Lamellae moderately distant, narrowly adnate, ascending, slightly ventricose up to 3 mm broad, pale grey-brown at first, gradually becoming incarnate from the base. Stipe $20\text{--}32 \times 1.5\text{--}2 \text{ mm}$, cylindrical, rather pale grey-brown, not striate, at apex finely pruinose. Flesh very thin in cap, dark brown-grey, in stipe concolorous with surface, fairly brittle. Smell rather strongly farinaceous.

Spores $[60/3/2] (8.4\text{--})9\text{--}11.4\text{--}(12.5) \times (6.0\text{--})6.2\text{--}7.7\text{--}(8.2) \mu\text{m}$, $Q = 1.3\text{--}1.45\text{--}1.7\text{--}(1.8)$, variable in shape, mostly 5–7-angular in side-view with pronounced angles and large, triangular apiculus. Basidia $31.6\text{--}46 \times 10.3\text{--}12\text{--}(13) \mu\text{m}$, $Q = 2.6\text{--}4.2$, 4-spored, broadly clavate. Cystidia none. Hymenophoral trama regular with long cylindrical to inflated elements, e.g. $97\text{--}193\text{--}(236) \times (4.5\text{--})7.5\text{--}16\text{--}(22) \mu\text{m}$, intermixed with narrow, cylindrical, $4.3\text{--}9 \mu\text{m}$ wide, finely encrusted connective hyphae. Pileipellis a dry cutis of $(4.5\text{--})6\text{--}14 \mu\text{m}$ wide cylindrical hyphae with encrusted walls and diffuse, and/or granular pale brown intracellular pigment. Pileitrama regular, composed of radially arranged, inflated hyphae $7.5\text{--}22.5 \mu\text{m}$ wide, intermixed with narrow, cylindrical, $4.3\text{--}9 \mu\text{m}$ wide connective hyphae, both types with encrusted walls. Clamp-connections none.

HABITAT.—In poor vegetation of moss-interspersed short grass, grazed by rabbits on dry acid, sandy soil.

COLLECTIONS EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Ruinen, Kraloërveld near Moddergat, 17 Nov. 1976, *E. J. M. Arnolds* 3772 (Holotypus in WBS; isotypus in L). — Municipality of Beilen, Terhorster Zand, S. of Koninginnepad, 10 October 1976, *E. J. M. Arnolds* 3640 (WBS).

The large spores easily distinguish this species from *Entoloma fernandae* (Romagn.) Noordeloos and relatives. The finely encrusted tramal hyphae and connectives suggest relationship with *E. papillatum* (Bres.) Hesler from which it differs among other things in the clampless basidia, double pigmentation and in the pale tinges in pileus and stipe.

Entoloma defibulatum* Arnolds & Noordeloos, *spec. nov.

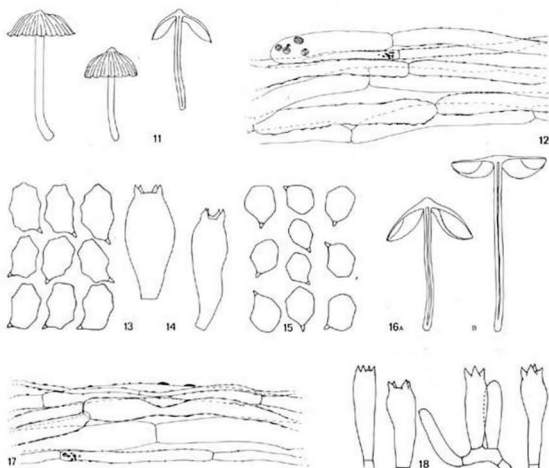
Figs. 15–18

Pileus 19 mm latus, 13 mm altus, conico-campanulatus, centro acutus, hygrophanus, in udo fuliginosus, longe striatus, in sicco brunneo-griseus, sericeus, opacus, margine undulatus, fissuratus. Lamellae L = 21, l = 3–5(–7), moderate distantes, ascendentes, subliberae, ventricosae, usque ad 4 mm latae, pallide griseo-brunneae, roseo-tinctae, aciem versus magis roseae. Stipes 28 × 2 mm, cylindraceus, rectus, brevis, griseo-brunneus, sub lente albo-striatulus, basi albo-tomentosus. Caro in pileo usque ad 1.8 mm lata, fusco-hyalina. Odore atque sapore farinaceo-rancidis vel cucumerum revocantibus. Sporae (6.5–)6.7–7.9(–8.1) × 5.6–6.8(–7.0) μm, obtusioriter 5–6-angulatae. Basidia 28.3–34.1(–37.7) × 7.9–10.2 μm, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceo-inflatae e elementis 170–320 × 7.5–16(–20) μm constantes. Pileipellis cutis paulo differentiatia, hyphae (2.8–)5–12.5(–15) μm latae, cylindraceo-inflatae. Pileitrama regularis, hyphae cylindraceae, e elementis 159–269 × 10–21(–26.5) μm constantes. Pigmentis duobus: pileipellis pileitramaeque hypharum tunicam valde incrustantibus, pariter in pileipelle granulatis, intracellulosis. Fibulae nullae. Habitat: In graminosis, ad terram acido-arenosam. Typus: *E. J. M. Arnolds* 3187, 30 IX 1974, 'Benderse Berg, municipality of Dwingeloo, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus 19–21 mm broad, at first conico-campanulate, then flattened without papilla, with margin straight, slightly undulating with age, sometimes splitting; hygrophanous, when moist dark grey-brown (M 6F5), paler towards margin (M 6E5, 6D4), darker translucently striate up to centre, drying expallent brown-grey, opaque. Lamellae L = 16–21, l = 3–7, moderately distant, narrowly adnate to almost free, ventricose, up to 4 mm broad, pale grey-brown then tinged incarnate pink, especially near edge. Stipe 28–40 × 2 mm, straight, cylindrical, narrowly fistulose, rather dark greyish brown (M 6E5), finely striate under lense, base white tomentose, apex sometimes finely pruinose. Flesh in cap thin, concolorous with surface, in stipe cartilaginous, hyaline, grey-brown. Smell and taste cucumber-like or farinaceous-rancid.

Spores [40/2/2] (6.5–)6.7–7.9(–8.1) × (5.3–)5.6–6.8(–7.0) μm, Q = 1.1–1.2–1.3(–1.4), rounded-angular in side-view, subglobose to broadly ellipsoid in outline. Basidia 28.3–34.8(–37.7) × 7.7–10.2 μm, Q = (2.7–)3.3–4.3(–4.6), rather broadly clavate, 4-spored. Cystidia none. Hymenophoral trama (sub)regular, elements 170–320 × 7.5–16(–20) μm, cylindrical, mixed with narrow connective hyphae. Pileipellis a poorly differentiated cutis of (2.8–)5–12(–15) μm wide, cylindrical, repent hyphae. Pileitrama regular, elements 159–269 × 10–21(–25) μm, cylindrical to inflated, mixed with narrow, cylindrical connective hyphae. Pigmentation of two kinds; membranous pigment encrusting the hyphae of pileipellis and pileitrama, often coarsely so, especially the narrow hyphae of pileipellis and the connective hyphae in pileitrama, also finely encrusting the connective hyphae of the hymenophoral trama; intracellular-granular pigment in large clots in pileipellis and rarely also in pileitrama. Clamp-connections none.

HABITAT.—In poor vegetation of moss and short grass, on rather moist to rather dry acid peat or humus-rich sand.



Figs. 11–14. *Entoloma cuniculorum*. — 11. Carpophores. — 12. Pileipellis. — 13. Spores. — 14. Basidia. (All figs. from type).

Figs. 15–18. *Entoloma defibulatum*. — 15. Spores. — 16. Carpophores. — 17. Pileipellis. — 18. Basidia. (All figs. from type, except 16b from Arnolds 3676).

COLLECTIONS EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Dwingeloo, 'Benderse Berg', 30 Sept. 1974, *E. J. M. Arnolds 3187* (holotypus in WBS; isotypus in L). — Municipality of Dwingeloo, 'Dwingelose Heide', S. of Smitsveen, 20 Oct. 1976, *E. J. M. Arnolds 3676* (WBS).

The two pigmentation-types, clampless basidia, expanding cap and small spores indicate close relationship with the *Entoloma fernandae*-complex. *Entoloma defibulatum* differs from all species in this group in the rather rounded-angular spores with $Q = 1.2$ on the average.

Microscopical characters show also some resemblance with *E. ortonii* (= *Nolanea farinolens* Orton), but the latter species has clamped basidia, only finely encrusting pigments and moreover a more robust stature and distinctly white-striate stipe.

Entoloma farinogustus* Arnolds & Noordeloos, *spec. nov.

Pileus 6–20 mm latus, obtuse conicus vel semiglobosus demum explanatus, interdum umbonatus vel centro leviter depressus, membranaceus, hygrophanus, in udo satis pallide ochraceo-brunneus, centro aurantiaco-testaceus, margine valde pallidus, in statu juvenili totus aurantiaco-testaceus, in sicco pallescens e centro demum pallide roseo-testaceus. Lamellae L = 20–25, I = 1–5, moderate distantes, anguste adnatae, leviter ventricosae, usque ad 2 mm latae, albae demum pallide roseae, haud brunneo-vel griseo-tinctae. Stipes 13–28 × (1.5–)2–3 mm, cylindraceus, basi dilatatus vel bulbosus, pallide ochraceus vel aurantiaco-testaceus, glaber, nudus, basi albo-tomentosus, apice pruinosis. Caro usque ad 1.5 mm lata in pileo, superficie concolor. Odore subfarinaceo-subdulcis. Sapore rancido vel olie jecinorum. Sporae 9–12(–12.4) × 6.9–8.2(–9.5) μm , variables, ellipsoideae vel elongatae, in ambitu 6–8-angulatae. Basidia (31–)34.4–39.6(–42.1) × (8.2–)8.6–10.8(–11.2) μm , clavata, 2 (raro 4- vel 1-)sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceae, e elementis satis brevibus (54–)63–126(–148) × 7.4–21.2 μm constantes. Pileipellis cutis hyphae cylindraceae, 4–12 μm latae. Hypoderma valde crassa, e elementis cylindraceae, 24–85 × 13–28 μm constantes, gradatim in tramam transiens. Pileitrama regularis, e elementis cylindraceis, 52–150 × 8–20 μm constantes. Pigmentis intracellulosis in pileipellis atque pileitrama. Fibulae nullae. Habitat: Ad terram in graminosis et in detritis Callunae. Typus: *E. J. M. Arnolds 3775*, 17 XI 1976, 'Dwingeloo, S. of Smitsveen, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

Entoloma ocultopigmentatum* Arnolds & Noordeloos, *spec. nov.

Pileus 25–48 mm latus, conico-convexus demum planus, irregulariter undulatus, interdum leviter umbonatus vel leviter depressus, margine involutus, hygrophanus, in udo griseo-fuscus, margine pallidior, dimidiis radii et ultra striatus, in sicco pallidior. Lamellae L = 24–27, I = 7–14, adnatae vel emarginatae, ventricosae, sordido-griseae demum griseo-incarnatae. Stipes 30–60 × 2.6–6 mm, cylindraceus, fistulosus, rectus vel incurvatus, pallide griseo-fuscus, valde argenteo-striatus, basi tomentosus. Caro in pileo membranaceo-rigida, in stipite fissurato-fragilis, superficiei concolor. Odore atque sapore farinaceis. Sporae (7.4–)7.6–9.4(–9.6) × (6.4–)6.9–8.1(–8.6) μm , Q = 1.05–1.15–1.25, subisodiametricae, 4–6-angulatae. Basidia 28.7–41 × 8.4–14 μm , late clavata, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae e elementis usque ad 500 μm et ultra longae, usque ad 27 μm latae constantes. Pileipellis cutis paulo differentiatia hyphae cylindraceae 3–7(–11) μm latae. Pileitrama subregularis e elementis subcylindraceis constantes. Pigmentis in pileipelle pileitramaeque hypharum tunicam probabiliter pariter in pileipelle intracellulosis. Fibulae basi basidiorum presentes, in trama rarissimae. Habitat: In *Scirpeto sylvatici*, ad terram. Typus: *E. J. M. Arnolds 3588*, 15 IX 1976, 'Taarlose Diep, E. of Taarlo, municipality of Vries, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

Entoloma ortonii* Arnolds & Noordeloos, *nom. nov.

Basionym: *Nolanea farinolens* Orton in Trans. Br. mycol. Soc. 43: 330. 1960 (non *Entoloma farinolens* Horak in Beih. Nova Hedwigia 43: 11. 1973).

Entoloma psilopus Arnolds & Noordeloos, *spec. nov.*

Figs. 19–22

Pileus 10–21 mm latus, semiglobosus demum planus, non papillatus, margine recto, hygrophanus, in udo fuliginosus vel fuscus, longe striatus, in sicco pallide griseo-fuscus, glaber. Lamellae subdistantes vel subconfertae, adnexae vel adnatae, ventricosae, albae demum salmoneae, haud brunneo-tinctae. Stipes 17–30 × 1.2–2 mm, cylindraceus, deorsum paulo dilatatus, pallide griseo-fuscus vel brunneus, glaber, nudus, haud striatus, basi albo-tomentosus. Caro membranacea ac firma in pileo, in stipite subfragilis. Odore nulla vel leviter farinaceo. Sapore farinaceo. Sporae 7.4–8.5(–9.6) × 5.7–6.5 μm, Q = 1.15–1.3–1.4, obtuse (4–)5–7-angulatae. Basidia 25.8–33 × 9–12 μm, Q = 2.5–3.5, clavata, 2–4-sporigera. Cystidia nulla. Hyphae lamellarum trameae cylindraceae vel inflatae, e elementis (76–)120–217 × 7.6–21 μm constantes. Pileipellis cutis paulo differentiatia centro aspectu trichodermatis. Pileitrama regularis. Pigmentis abundantibus, duobus: pileipellis pileitramaeque hypharum tunicam incrustantibus, pariter in pileipelle intracellulosis. Fibulae nullae. Habitat: In terra acido-arenosa in *Spergulo-Corynephorum*. Typus: *E. J. M. Arnolds 3734*, 3 XI 1976, 'Mantingerzand, Mantinge, municipality of Westerbork, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

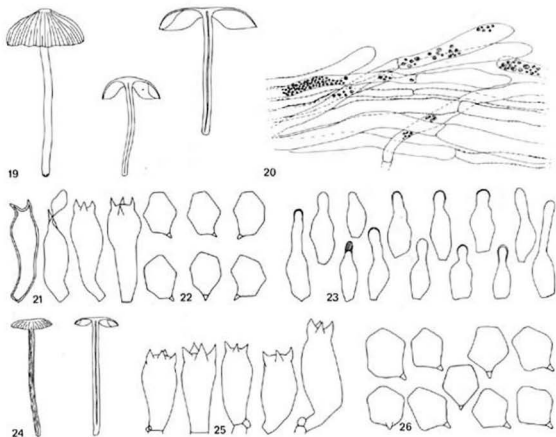
Etymology: ψιλός, smooth: – ποίος, foot, stipe.

Pileus 8–22 mm broad when young conical soon expanding, finally flattened, non papillate, sometimes with weak umbo, often slightly depressed in centre when old, with straight margin, hygrophanous, when moist grey-brown to dark grey-brown, sometimes with slight reddish tinge (M 6E6, 6E6/6F6, 6E6/7E6), translucently striate up to centre, on drying exallant to pale grey-brown (M 6C4, 5C4), glabrous, usually dull. Lamellae moderately crowded to rather distant, narrowly to broadly adnate, ventricose, white then salmon-pink or incarnate, at base (very) slightly tinged brown (M 7A4/7B4, 7B4, 6B4). Stipe 15–38 × 1–2.5(–3) mm, cylindrical, straight or slightly flexuous, solid then fistulose, pale to rather dark grey-brown (M 4C4, 6C4, 6C4/D4, 6D5/E6), glabrous, non striate. Flesh thin-membranaceous in cap, rather firm or fragile in stipe, concolorous with surfaces. Smell weakly to distinctly farinaceous-rancid. Taste farinaceous.

Spores [95/10/5] (6.8–)7.2–9.1(–10.1) × 5.7–7.0(–7.4) μm, Q = 1.15–1.3–1.4, L–D = 1.1–1.7–2.0, 5–6-angled in side-view with pronounced angles. Basidia (21–)23–37(–42.5) × 8.5–11.5(–13.6) μm, Q = (1.8–)2.2–3.5(–4.1), broadly clavate, mainly 4-spored, but in all collections 2-spored basidia occur (in *Arnolds 3734* numerous, slenderly clavate, Q = 5). Cystidia none. Hymenophoral trama regular, elements cylindrical to weakly inflated, (55–)76–217 × 7.6–21 μm, mixed with narrow-cylindrical, 3–6.2 μm wide hyphae. Pileipellis a poorly differentiated cutis of 2.9–8 μm wide, cylindrical hyphae with transitions to a trichodermium, especially in centre of cap, composed of cylindrical to clavate elements, 22–70 × 6–11(–17) μm, with brown-encrusted walls and intracellular pigment present as brown clustered granules or clots. Pileitrama regular, hyphae long cylindrical to inflated, up to 25 μm wide. Clamp-connections absent.

HABITAT.—In open moss-rich grasslands on very dry sand poor in humus (*Spergulo-Corynephorum*), in poor grassland on dry humus-rich sand (*Violion caninae*), and in heath of *Erica tetralix* (*Ericetum tetralicis*) on moist loamy sand. Always on strongly acid, very oligotrophic soils.

COLLECTIONS EXAMINED.—The Netherlands, prov. of Drenthe: municipality of Westerbork, Mantingerzand, in *Corynephorum*, 3 Nov. 1976, *E. J. M. Arnolds 3734* (holotypus in L; isotypus in WBS); idem, Hullenzand, in grassheath, 3 Nov. 1976, *E. J. M. Arnolds 3732* (WBS); idem, Hullenzand, in *Corynephorum*, 3 Nov. 1976, *E. J. M. Arnolds 3733* (WBS); idem, Hullenzand, in *Cladonia-facies*, 14 Oct. 1974, *E. J. M. Arnolds 3237* (WBS); municipality of Rolde, Eexterveld, Westerbork, N.E. of Anderen, in *Ericetum*, 22 Sept. 1976, *E. J. M. Arnolds 3595* (WBS).



Figs. 19–22. *Entoloma psilopus*. — 19. Carpophores. — 20. Pileipellis. — 21. Basidia. — 22. Spores. (All figs. from type).

Figs. 23–26. *Entoloma tibicystidium*. — 23. Cheilocystidia. — 24. Carpophores. — 25. Basidia. — 26. Spores.

Entoloma psilopus is very closely related to *E. fernandae* which differs in the weakly hygrophanous pileus which is minutely squamulose, especially at centre and which is only obscurely striate at margin.

Entoloma tibicystidium* Arnolds & Noordeloos, *spec. nov.

Figs. 23–26

Pileus 10–15 mm latus, irregulariter plano-convexus, non papillatus, hygrophanus, pallide griseo-fuscus, striatus, in sicco ochraceo-griseus. Lamellae moderate distantes, subliberae, angustae, pallide salmoneo-roseae. Stipes usque ad 38 × 2 mm, cylindraceus, pallide griseo-fuscus, argenteo-striatus. Odore farinaceo. Sporae (7.7–)7.9–10.5(–11.0) × (6.4–)6.8–9.0 μm, Q = 1.0–1.1–1.2(–1.3), (4–)5–6-angulatae, isodiametricae. Basidia 21–30(–35) × 10.5–12.5 μm, clavata, 4 (raro 2)-sporigera. Cheilocystidia (17–)20–35 × 6–8 × 2.5–5 μm, tibiiformia, interdum subcylindraceo-subcapitata, apice frequenter capitulo putitoso-prae-dita, sparsa. Pleurocystidia desunt. Hyphae lamellarum tramae (113–)150–320 × 10–27 μm, subcylindraceae vel inflatae. Pileipellis cutis paulo differentiata, hyphae cylindraceae 2.5–5(–8) μm latae. Pigmentis

incrumbentibus in pileipelle atque pileitrama. Fibulae basi basidiorum frequentes, in tramis rarissimae. Habitat: Ad terram paludosam in Calthione. Typus: *E. J. M. Arnolds 3663*, 15 X 1976, 'Reestdal near Havikshorst, municipality of De Wijk, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus 10–15 mm broad, irregularly plano-convex without papilla, margin straight, hygrophanous, when moist rather pale grey-brown, translucently striate, drying ochraceous grey. Lamellae almost free, thin, fairly distant, pale salmon-pink. Stipe up to 38 × 2 mm, slender, cylindrical, pale grey-brown, silvery striate lengthwise. Smell farinaceous.

Spores [20/2] (7.7–)7.9–10.5(–11) × (6.4–)6.8–9 μm, Q = 1.0–1.1–1.2(–1.3). L–D = 0–0.6–1.1 μm. (4–)5–6-angled in side-view, rounded-isodiametrical. Basidia 21–30(–35) × 10.5–12.5 μm, Q = 1.9–2.4(–3.3), broadly clavate, 4 (rarely 2)-spored. Cheilocystidia scattered, (17–)20–35 × 6–8 × 2.5–5 μm, tibiiform, rarely subcylindrical-subcapitate, thin-walled, often with hyaline mucous cap covering the tip. Pleurocystidia none. Hymenophoral trama regular, elements (113–)150–320 × 10–27 μm, cylindrical or inflated, constricted at septa. Pileipellis a poorly differentiated cutis of 2.5–5(–8) μm wide cylindrical hyphae, gradually passing into trama. Pileitrama regular, elements cylindrical or inflated, up to 31 μm wide. Pigment membranous and often encrusting the walls of hyphae in pileipellis and pileitrama.

HABITAT.—In poorly fertilized hayfield (*Calthion palustris*) on wet, in winter inundated, peaty soil.

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, municipality of De Wijk, valley of rivulet 'Reest' near estate 'de Havixhorst', 15 Oct. 1976, *E. J. M. Arnolds 3663* (holotypus in WBS; isotypus in L).

The type of pigmentation and the spores of *E. tibiicystidium* suggest a close relationship with *E. sericeum*, but it differs from the latter in the presence of cheilocystidia with a remarkable shape.

Entoloma undulatosporum Arnolds & Noordeloos, *spec. nov.*

Figs. 27–29

Pileus 15–23 mm latus, convexus demum explanatus, haud umbonatus, margine recto, hygrophanus, in udo atro-brunneus, margine pallidior striatus, in sicco fuliginosus, sericeus, radialiter rugosulus. Lamellae moderate distantes, anguste, adnatae, crassae, ventricosae, usque ad 5 mm latae, pallide fuliginosae, demum roseo-tinctae, apice sordide incarnato-griseae. Stipes 22–27 × 1.8–2.8 mm, satis brevis, cylindraceus, pileo pallidior atque magis brunneus, glaber, basi albo-tomentosus, fistulosus. Caro membranacea, subcartilaginea in pileo, in stipite fragilis. Odore atque sapore leviter sed distincte farinaceis. Sporae (7.7–)7.9–10.8(–12) × (5.7–)6–6.8(–7.5) μm, variables, tunica undulata. Basidia 25–32 × 9.6–11.5(–12) μm, valde clavata, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae e elementis (113–)160–378(–400) × 17–27(–32) μm constantes. Pileipellis cutis paulo differentiatia, hyphae cylindraceae, 3.8–15 μm latae. Pileitrama regularis, hyphae cylindraceae vel inflatae, usque ad 35 μm latae. Pigmentis dissolutis vel granulatis intracellulosus in pileipelle atque pileitrama superficiali. Fibulae abundantes in hymenio, raras in trama. Habitat: In pratis (*Lolio-Cynosuretum*). Typus: *E. J. M. Arnolds 3642*, 11 X 1976, 'along Linthorst-Homan canal, municipality of Beilen, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus 15–23 mm broad, convex then expanding, not umbonate, with straight margin, hygrophanous, when moist blackish brown (M 5F6) with slightly paler margin, translucently striate at margin only, drying from centre to grey-brown (M 5D4), satiny, very finely radially rugulose. Lamellae narrowly adnate, moderately distant, rather thick, ventricose, up to 5 mm broad, pale grey-brown (M 5D4) with incarnate grey edge. Stipe 22–27 × 1.8–2.8 mm, relatively

short, cylindrical, paler and slightly more brown than moist cap (M 5D5), glabrous, slightly white tomentose at base, narrowly fistulose. Flesh thin in pileus, relatively firm, brittle in stipe. Smell and taste distinctly farinaceous.

Spores [30/2] (7.7–)7.9–10.8(–12.0) × (5.7–)6.0–6.8(–7.5) μm , $Q = (1.25\text{--})1.3\text{--}1.4\text{--}1.6(1.7)$, rather variable in shape, ellipsoid to elongate in outline, irregularly 6–9-angled-gibbose, thin-walled, with small apiculus. Basidia 25–32 × 9.6–11.5 μm , $Q = 2.5\text{--}3.3$, 4-spored, rather broadly clavate. Cystidia none. Hymenophoral trama regular, with cylindrical to slightly inflated elements, (113–)160–378(–400) × 17–27(–32) μm , sometimes slightly constricted at septa, colourless, hyaline, thin-walled. Pileipellis a poorly differentiated cutis of 3.8–15 μm wide cylindrical hyphae, gradually passing into trama. Pileitrama regular, hyphae cylindrical to inflated up to 35 μm wide. Pigment diffuse, sometimes granular, intracellular in pileipellis and upper pileitrama. Clamp-connections numerous in hymenium, rare in trama.

HABITAT.—Poorly manured meadow (*Lolio-Cynosuretum*) on dry, humus-rich sandy soil.

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Beilen, along Linthorst-Homan canal, 11 Oct. 1976, *E. J. M. Arnolds 3642* (holotypus in WBS; isotypus in L).

The characteristic shape of the spores, the pigmentation and clamped basidia distinguish *E. undulatosporum*, a good species in a somewhat isolated position in subgenus *Nolanea*. Its general appearance places the species in section *Papillati*, but within this section it does not seem to be closely related to any of the other species on account of its hyphae with exclusively intracellular pigment.

ENTOLOMA VELENOVSKYI Noordeloos var. *longicystidium*

Arnolds & Noordeloos, var. nov.—Figs. 30–33

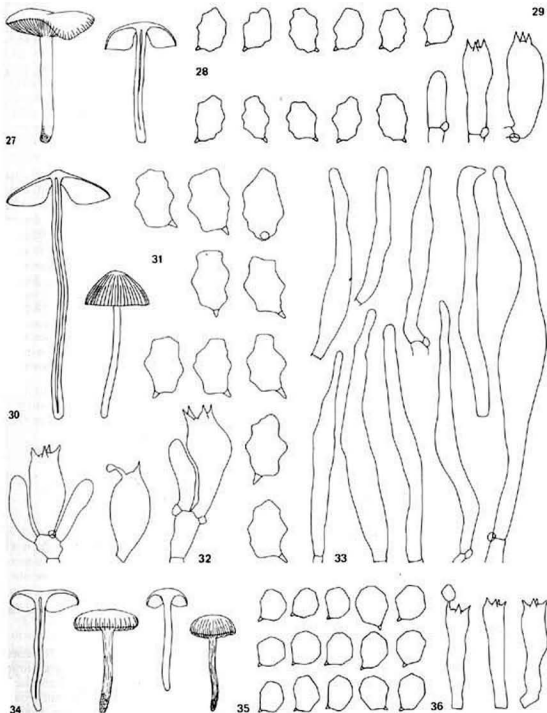
A type differt sporis cheilocystidiisque longioribus. Typus: *E. J. M. Arnolds 3653*, 13 X 1976, 'Elp, nature-reserve De Reitma, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

Pileus 18–24 mm broad, convex with narrowly involute margin, expanding to plano-convex with small umbo, strongly hygrophanous, when moist dark grey-brown at centre, paler brown towards margin, translucently striate up to centre, drying dull grey-ochre. Lamellae moderately distant, adnexed, ventricose, thickish, flesh-coloured brown (M 5C5/5D5), more pinkish towards edge. Stipe 20–46 × 1.5–2 mm, slender, cylindrical, pale grey-brown, glabrous. Flesh membranaceous. Smell and taste not noted (inconspicuous?).

Spores [20/2] (10.1–)11–15.9(–16.3) × (7.2–)7.9–9.6(–10.6) μm , $Q = (1.2\text{--})1.3\text{--}1.5\text{--}1.7$, $L:D = (2.1\text{--})3.2\text{--}4.5\text{--}6.4$ μm , rather irregularly angled, ellipsoid to elongate in outline, 5–6(–8)-angular in side-view. Basidia 28.7–41.5 × 9–14 μm , $Q = 2.2\text{--}3.7$, broadly clavate, 4-spored, a few 2-spored. Cheilocystidia mixed with basidia, (50–)70–149 × (6.2–)7.4–15.9 × 2.7–4.2 μm , slenderly lageniform to fusiform, rarely subcylindrical, with gradually tapering, pointed or rounded apex, thin-walled, hyaline, often with colourless granules in plasma. Hymenophoral trama regular, with long, cylindrical to slightly inflated elements, 167–290(–405) × 16–27 μm , narrowing towards septa or not, intermixed with narrow, cylindrical connective hyphae 3.5–10 μm wide. Pileipellis a weakly differentiated cutis of radially arranged, repent, 2.5–10.5 μm wide hyphae, with diffuse or granular intracellular pigment. Pileitrama regular, elements cylindrical to strongly inflated, 206–270 × 10.8–29 μm , with dispersed intracellular pigment. Clamp-connections frequent in hymenium, rare in hymenophoral trama.

HABITAT.—In poor hayfield (*Cirsio-Molinietum*), extensively grazed by sheep, on moist, peaty soil.

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, Westerbork, near Elp, nature reserve 'de Reitma', 13 Oct. 1976, *E. J. M. Arnolds 3653* (holotypus in WBS; isotypus in L).



Figs. 27-29. *Entoloma undulatosporum*. — 27. Carpophores — 28. Spores. — 29. Basidia.
 Figs. 30-33. *Entoloma velenovskyi* var. *longicystidium*. — 30. Carpophores. — 31. Spores. — 32. Basidia.
 — 33. Cheilocystidia.
 Figs. 34-36. *Entoloma vinaceum* var. *fumosipes*. — 34. Carpophores. — 35. Spores. — 36. Basidia.

The cheilocystidia are much longer and more slender than in typical *E. velenovskyi* (see Noordeloos, 1979: 258). In addition the average spore is much longer. Macroscopically our collection is very close to the type. For the time being we consider our collection a variety of *E. velenovskyi*.

On account of the absence of any membranal and/or encrusting pigment this taxon does not seem to be closely related to *E. mammosum*.

***Entoloma ventricosum* Arnolds & Noordeloos, spec. nov.**

Pileus 13–24 mm latus, obtuse conicus explanatus, leviter umbonatus, margine leviter involutus, lamellas excedens, paulo hygrophanus, in udo centro fuscus, marginem versus pallidior, interdum ochraceo-tinctus, fulgineo-striatus usque ad centrum, in sicco ochraceo-griseus, glaber, sericeus. Lamellae L = 15–18, l = 1–3, adnatae, distantae, valde ventricosae, excedentes, crassiusculae, venosae, pallide griseo-roseae demum brunneo-roseae, acie incarnata. Stipes 30–48 × 2–3.7 mm, fragilis, cylindraceus, leviter inflexus, solidus vel fistulosus, pallide ochraceus vel fuscus, glaber, subtiliter striatulus, basi leviter tomentosus, in sicco pallescens, striatus. Caro membranacea, fragilis, fibrillosa, superficie concolor. Odore atque sapore inconspicuis. Sporae (8.3–)9.1–11(–11.5) × 7–8.3 μm, Q = 1.15–1.25–1.4, acute 5–6-angulatae. Basidia (28.2–)30–40 × 9.1–13.8 μm, clavata, 4 (raro 2)-sporigera. Cystidia nulla. Hyphae lamellarum tramae longae, cylindraceae, e elementis (166–)195–614(–652) × (5.0–)6.2–24.9(–29.8) μm constantes. Pileipellis cutis paulo differentiatia, hyphae cylindraceae, 4–8 μm latae. Pileitrama regularis, hyphae cylindraceae, e elementis 90–500 × 8–32 μm constantes. Pigmentis dissolutis intracellulosis in pileipelle atque pileitrama. Stipitepellis cutis, hyphae repentes vel ascendentes, 5–8 μm latae. Fibulae frequentes in hymenio, in trama desunt. Habitat: In prato muscoso ovibus depasto. Typus: *E. J. M. Arnolds 3357*, 4 XII 1974, 'Eexterveld, municipality of Rolde, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

English description, plate and figures in Arnolds & Noordeloos, 1980.

***Entoloma vinaceum* (Scop. ex Fr.) Arnolds & Noordeloos, comb. nov.**

Agaricus vinaceus Scop. ex Fr., *Epicrisis*: 157. 1838 (basionym).

ENTOLOMA VINACEUM var. *fumosipes* Arnolds & Noordeloos, var. nov.

Figs. 34–36

A typo differt stipite griseo-brunneo vel fumoso-tincto statu juvenili vel adulto. Typus: *E. J. M. Arnolds 3728*, 3 XI 1976, 'Hullenzand, S. of Mantinge, municipality of Westerbork, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

Pileus 8–19 mm broad, at first semiglobose then convex with flattened or slightly depressed centre, margin involute, hygrophanous, when moist rather pale brown (M 6D6), dark brown striate up to dark brown centre (M 6C3), drying pale brown-grey (M 6D3), glabrous. Lamellae L = 19–24, l = 1–3(–5), rather broadly adnate, rather crowded, ventricose, up to 5 mm broad, thin, pale greyish pink (M 6B3) with pale grey edge (M 6B2). Stipe 16–23 × 1.5–2.7 mm, slightly tapering towards base, pale grey-brown (M 5C4), distinctly finely silvery-striate lengthwise, base white-tomentose. Flesh in centre of cap relatively thick (up to 2.5 mm), firm, white, in stipe firm, non fibrillose. Smell and taste weak, sweetish.

Spores [20/2] (5.9)–6.3–6.8(–7.4) \times 5.1–6.2(–6.8) μm , $Q = (1.0\text{--})1.1\text{--}1.15\text{--}1.2(1.3)$, L–D = 0–1(–1.7) μm , subglobose to broadly ellipsoid in outline, rounded many-angled in side-view, thin-walled, congophilous, especially when young. Basidia 26–36.2 \times 9–10.2 μm , $Q = 2.7\text{--}3.1\text{--}3.5$, broadly clavate, 4-spored. Hymenophoral trama regular, elements (64–)100–190(–212) \times (6.4–)7.4–13.8(–16) μm , cylindrical to weakly inflated. Pileipellis a thin cutis of more or less radially arranged loose, cylindrical 2.3–3.5 μm wide hyphae with slightly to distinctly gelatinizing-desintegrating walls. Pileitrama subregular, composed of rather short, inflated elements 40–110 \times 12.5–23 μm . Pigment diffuse intracellular in upper pileitrama and in pileipellis. Clamp-connections frequent in hymenium, lamellae and pileitrama, scarce in pileipellis.

HABITAT.—In poor vegetation rich in mosses (mainly *Polytrichum piliferum*) on dry acid sand-dunes (*Spergulo-Corynephorum*).

COLLECTION EXAMINED.—The Netherlands, prov. of Drenthe, municipality of Westerborg, Hullenzand, S. of Mantinge, 3 Nov. 1976, *E. J. M. Arnolds 3728* (holotypus in L; isotypus in WBS).

Entoloma vinaceum var. *fumosipes* differs from typical *E. vinaceum* in the consistently greytinged stipe also in mature specimens. (Compare also *E. vinaceum* var. *violeipes* nob.) In typical *E. vinaceum* young specimens tend to have a grey-tinged stipe, but in mature specimens the yellow colour is unmistakable. As there is no significant microscopical difference between *E. vinaceum* var. *vinaceum*, var. *fumosipes* and var. *violeipes* we treat these taxa at the varietal level.

ENTOLOMA VINACEUM var. *violeipes* Arnolds & Noordeloos, var. nov.

A typo differt stipite violaceo-tincto statura juvenili vel adulto. Typus: *E. J. M. Arnolds 3322*, 13 XI 1974, 'Westerborg, Mantingerzand, 2 km S. of Mantinge, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

English description, plate and figures in Arnolds & Noordeloos, 1980.

Entoloma xanthocaulon Arnolds & Noordeloos, spec. nov.

Pileus 13–32 mm latus, obtuse conicus mox expansus usque ad plano-convexus vel plano-concavus, valde hygrophanus, in udo brunneus roseo-tinctus, longe striatus, mox exsiccatus, pallescens, ochraceo-griseus, sericeus. Lamellae moderate distantes, adnatae, ventricosae, usque ad 5 mm latae, angustae, albae demum salmoneae. Stipes 28–50 \times 1.5–2.8 mm, gracilis, cylindraceus, basi leviter incrassatus, griseo-ochraceus, pileo magis luteus, glaber, politus. Caro in pileo usque ad 1 mm crassa, fragilis, in stipite fragilis. Odore et sapore farinaceis. Sporae 7.2–8.3 \times 5.7–6.7 μm , $Q = (1.15\text{--})1.2\text{--}1.25\text{--}1.3$, 5–6-angulatae. Basidia 24–34 \times 8.1–11.2(–12.6) μm , clavata, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceae, e elementis 159–286(–346) \times 12–28.5 μm constantes. Pileipellis cutis, hyphae cylindraceae, 2.5–7.5(–11) μm latae, centro aspectu trichodermatis e elementis clavatis, usque ad 16 μm latis constantes. Pileitrama subregularis, hypoderma valde differentiatum, e elementis inflatis, brevibus (50.7–)65.7–95.4(–106) \times (5–)18–23(–25) μm constantes. Pigmentis duobus: pileipelle pileitramaeque hypharum tunicam valde incrustantibus pariter in pileipelle granulato-intracellulosis. Fibulae nullae. Habitat: Inter muscos ad terram acido-arenosam. Typus: *E. J. M. Arnolds 3645*, 13 X 1976, 'Oude Westerborgseweg near Holtherzand, municipality of Beilen, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

Etymology: ξανθός, yellow; κωνία, stipe.

English description, plate and figures in Arnolds & Noordeloos, 1980.

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LE DEVELOPPEMENT DE LIMACELLA GLIODERMA (FR.) R. MAIRE

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(With 10 Text-figures)

L'ontogénèse des carpophores de *Limacella glioderma* se révèle un peu plus primitive que celle de *Limacella guttata*, à cause d'une piléocarpie moins accusée, de l'organisation tardive du piléipellis et de la trame moins spécialisée du champignon.

INTRODUCTION

Pendant l'automne de 1978 nous avons eu l'occasion de récolter une série de primordiums de *Limacella glioderma*. La présence de stades jeunes permettait d'en déterminer les particularités du développement. Une comparaison avec celui de *Limacella guttata* (Fr.) Konrad & Maublanc (= *lenticulare* Lasch ex Fr.) que nous avons examiné jadis (Reijnders, 1963) s'avérait être intéressant sous divers rapports. Nous constatons déjà que l'étude du développement apporte un argument important en faveur de l'affinité avec *Amanita*, fait d'ailleurs reconnu universellement; c'est l'organisation de la trame du champignon pendant les stades précoces (Reijnders, 1977). Nous avons pu démontrer que cette structure, à première vue fort caractéristique, ne dévie en principe pas de celle de la trame jeune, présente dans presque tous les Agaricales. Aussi, le cas de *Limacella glioderma* nous fournit-il une belle confirmation de cette manière de voir.

Nous nous proposons de discuter les nuances entre les structures ontogénétiques de ces deux *Limacella* et les conclusions qui en résultent après la description du développement.

Le matériel a été fixé dans le mélange de Bouin et la coloration a été effectuée par le safranine-violet de gentiane.

DESCRIPTION

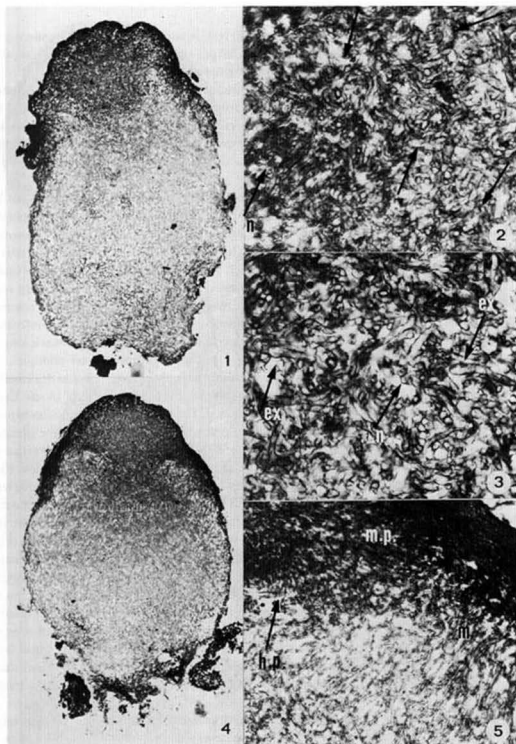
1. Le stade le plus jeune que nous puissions représenter (Fig. 1) a une longueur de 1,8 mm. et une largeur d'environ 880 μ m. A la périphérie du primordium se trouve une assise chromophile dont les hyphes extérieures sont couchées (sauf au sommet, au milieu de la surface piléique) et déjà partiellement gélifiées. Sous ces hyphes périphériques se trouve une zone également plus colorée que l'autre tissu, à hyphes intriquées et plus ou moins ondoyantes, mais cette structure se restreint à peu près à la partie supérieure; elle s'amincit vers la base et manque dans le tiers inférieur du primordium. On peut voir cette zone chromophile comme une matrice du voile, mais en réalité, la situation est plus complexe, car ce même tissu fait naître plus tard le piléipellis. Ses

hyphes sont plus minces (diamètre 2–3 μm) que celles de la trame (diamètre 3–6 μm) et plus colorées à cause d'un contenu proroplasmique plus frappant. L'épaisseur de cette couche formatrice avec les hyphes gélifiées au contour, est de $\pm 130 \mu\text{m}$ au sommet du primordium. Cette structure dépasse l'endroit où naîtra l'hyménophore, indiqué dans ce stade par deux taches claires dans la partie supérieure du primordium des deux côtes de l'axe (à environ 4/5 de la hauteur). Ces taches claires se dessinent par l'absence ou la rareté d'hyphes en cet endroit; elles représentent donc la future chambre lamellaire.

Dans la partie stipitaire, on ne rencontre guère d'hyphes strictement parallèles. Les hyphes à l'intérieur des taches claires et au-dessus de celles-ci sont également un peu plus chromophiles et, de ce fait, la trame piléique est plus ou moins ébauchée. C'est dans cette trame piléique que l'on trouve déjà plusieurs nodules, ces structures caractéristiques du plectenchyme (Reijnders, 1977). Ces nodules consistent en des groupes d'hyphes qui adhèrent les unes aux autres et qui sont parfois densément enchevêtrées; il y a lieu d'admettre que les divisions cellulaires y sont plus nombreuses que dans le tissu plus lâche environnant, ou bien que les ramifications provisoirement courtes d'hyphes y abondent. On observe souvent des hyphes enroulées, contournant les nodules et y pénétrant. Sous leur forme la plus évoluée, ces structures révèlent des conglomerats de cellules, entourés de faisceaux d'hyphes qui serpentent entre eux et qui s'enroulent en spirale vers les nodules en formant à leurs extrémités des chaînes de cellules (Russulaceae, Amanitaceae; Reijnders, 1977, fig. 1).

Les nodules (ou bien les pelotes d'hyphes) dans la trame de ce jeune stade sont encore plus simples; ils se composent d'hyphes fermement entrelacées, parfois déjà entourées d'une hyphe courbée (mais pas toujours). Leur délimitation est assez vague parce qu'elles sont coupées dans tous les sens et leur diamètre dans le plan de la coupe paraît être très variable (de ± 16 –50 μm). Ils sont particulièrement abondants justement sous la couche de la matrice du voile dans la partie apicale du primordium (Fig. 2). En plus de ces nodules, le plectenchyme de la trame révèle beaucoup d'extrémités libres d'hyphes, qui peuvent être un peu en massue (Fig. 3). Elles représentent en général les extrémités d'hyphes un peu plus larges (diamètre 5–8 μm), droites, qui s'étendent souvent sur un plus grand espace dans le segment de la coupe. Ici, comme dans plusieurs autres groupes d'Agaricales, elles font partie d'un système d'hyphes, remarquable par les hyphes droites qui s'entrecroisent, se manifestant surtout dans les jeunes primordiums et dont la fonction est inconnue (voir Discussion et Reijnders, 1977). Des extrémités libres naissent également par le bourgeonnement de ramifications dans les nodules, mais celles-ci sont d'abord plus minces.

2. Le stade suivant que nous représentons est un stade intermédiaire (Fig. 4; longueur du primordium 2,8 mm., largeur au niveau de l'hyménophore 1,3 mm.). Au-dessus des taches claires, nous voyons des hyphes qui se courbent en bas, de manière à se diriger enfin parallèlement à l'axe. Nous avons affaire aux hyphes palissadiques de l'hyménophore auxquelles se joignent vers l'extérieur les hyphes de la marge piléique mais ces dernières ne sont pas encore strictement parallèles (Fig. 5). A mi-hauteur environ du stipe se trouve, sous les taches claires, une zone étroite où la direction prédominante des hyphes est longitudinale; en-dessous de cette partie, on remarque la partie basale du primordium ou le bulbe où les hyphes sont déjà bien enflées (diamètre jusqu'à $\pm 30 \mu\text{m}$). Les extrémités libres d'hyphes en massue, divisées en chaînes



Figs. 1-5. *Limacella glioderma*. — 1. Coupe médiane d'une jeune stade, $\times 40$. — 2. Nodules (n.) dans la trame pileïque de ce stade, $\times 330$. — 3. Extrémités libres (ex.) et nodules dans la trame pileïque, $\times 400$. — 4. Coupe médiane d'un stade intermédiaire, $\times 25$. — 5. Hyphes palissadiques (h.p.), marge pileïque (m.p.) et matrice du voile (m.) dans ce stade intermédiaire, $\times 195$.

de cellules enflées, sont abondantes dans ce tissu. On remarque donc en étudiant ce stade, que les hyphes parallèles dans la marge piléique ne se dessinent pas encore nettement, alors qu'une partie des hyphes stipitaires prend déjà une direction longitudinale.

Dans la trame piléique il y a encore beaucoup de nodules; ils se sont étendus un peu à cause du diamètre élargi de ses éléments. Par-ci par-là, on rencontre déjà des fragments de tissus où les nodules se dissolvent: leurs hyphes se lâchent, s'élargissent et s'étendent. Les hyphes enroulées y sont moins distinctes. Parfois, un certain nombre d'extrémités libres se développent à partir des nodules.

3. Pour terminer, un stade avancé (diamètre au niveau de l'hyménophore 3,3 mm.; Fig. 6). La différenciation entre chapeau et pied est complète, mais la marge piléique est encore appliquée contre le pied et elle est enveloppée d'un voile fortement gélifié. Le voile se trouve également le long du stipe: on distingue les hyphes parallèles extérieures et la couche matrice. Juste sous la marge piléique, le voile a une largeur de $\pm 280 \mu\text{m}$. Il y a un lipsanenchyme étroit qui s'étend à partir de la marge piléique incurvée jusqu'au sommet du stipe. Les hyphes couchées du voile s'étendent aussi latéralement à la marge piléique, mais la couche que nous avons nommée 'matrice' s'étend le long du stipe jusqu'à sa limite supérieure (c'est l'angle entre la face inférieure du chapeau et le stipe). Ainsi, ce tissu est à même de produire aussi des hyphes couchées le long de la face inférieure du lipsanenchyme, ces hyphes se gélifient également; c'est pourquoi, un revêtement muqueux relie la marge piléique au stipe lorsque le chapeau s'étale. Les deux assises du voile ont sur le chapeau une épaisseur de $\pm 96 \mu\text{m}$, la couche extérieure de $16 \mu\text{m}$. Cette dernière y est fortement gélifiée. Dans la couche matrice un changement s'est produit: ses hyphes ont pris une direction anticline, de façon à se diriger perpendiculairement à la surface piléique. Elles sont encore confluentes avec les hyphes couchées de la couche extérieure; là où les assises se fondent l'une dans l'autre, on voit que les hyphes changent soudainement de direction: elles s'inclinent sous un angle de 90° (Fig. 7). Ces éléments dressés et bien pressés se trouvent seulement sur la face piléique; ils ne se trouvent pas le long du stipe. Cette assise est en outre renforcée par de nombreux éléments en massue (diamètre $\pm 5 \mu\text{m}$, bout $\pm 7 \mu\text{m}$) qui y pénètrent de bas en haut et qui émanent souvent des nodules, situés juste sous le revêtement piléique (Fig. 8). Nous avons déjà remarqué plus haut qu'une structure piléique se différenciant dans une assise du voile universel, semble être un peu contradictoire. La nature est toujours plus compliquée que les catégories créées par nous au profit de la compréhensibilité des phénomènes. Nous connaissons encore un autre exemple d'une différenciation vélaire qui est limitée à la surface piléique, mais le cas semble être rare. Quoiqu'il en soit, nous constatons que le derme piléique (c'est le terme exact pour les revêtements à éléments dressés), ne se différencie que relativement tard pendant le développement de cette espèce et qu'il se compose d'hyphes déjà présentes dans l'assise matrice et d'hyphes qui émanent d'un tissu plus profond: la périphérie de la trame piléique.

Les hyphes dans le pied sont dès maintenant strictement parallèles, leur largeur varie beaucoup, mais on observe par-ci par-là des éléments déjà fortement enflés (diamètre 5–15 μm). Le passage à la trame piléique est abrupt.

La trame piléique consiste en une partie centrale plus lâche et une partie périphérique. Dans cette dernière, on observe beaucoup de nodules, se desserrant à cause de l'inflation de leurs

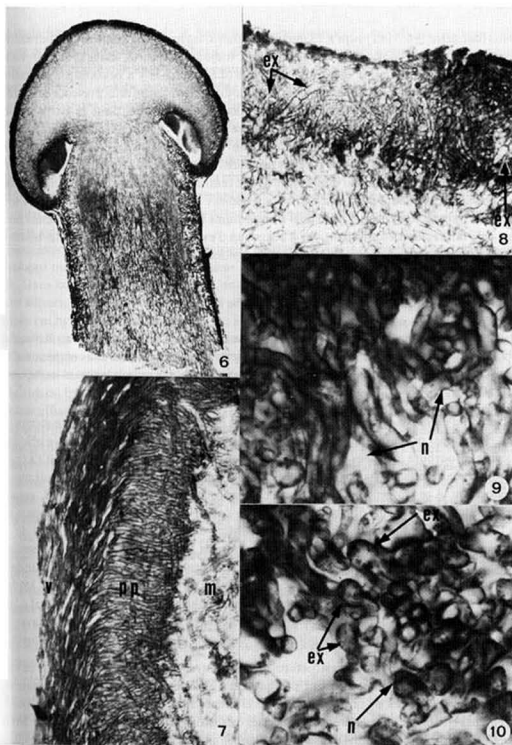


Fig. 6-10. *Limacella glioderma*. — 6. Coupe médiane d'un stade avancé, $\times 16$. — 7. Matrice du voile (m.), pileipellis (p.p.) et voile (v.) dans la partie latérale du pileus d'un stade avancé, $\times 330$. — 8. Extrémités libres (ex.) pénétrant de bas en haut dans le pileipellis, $\times 330$. — 9. Nodules (n.) qui se dilatent dans un stade avancé par l'inflation de ses éléments, $\times 1000$. — 10. Nodule (n.) dans un stade avancé avec plusieurs extrémités libres (ex.) qui en émanent, $\times 1000$.

éléments (diamètre $\pm 6,5 \mu\text{m}$ jusqu'à $15 \mu\text{m}$). Néanmoins, les hyphes enroulées, contournantes, se dessinent par-ci par-là. Les hyphes droites sont toujours présentes, mais elles sont moins marquées à cause de l'inflation des autres éléments ($d. 5-6 \mu\text{m}$). Il y a beaucoup d'extrémités libres en massue ($-13 \mu\text{m}$), mais elles ne sont pas toujours nettes à cause de la présence de chaînes de cellules, dont certaines sont beaucoup plus enflées que les autres. Dans la partie la plus périphérique, par contre, on trouve un grand nombre de nodules jeunes à structure caractéristique, parfois munis d'une rosette au centre (selon la direction de la coupe; Fig. 9). Ces configurations typiques évoquent les rosettes primaires de la trame des Russulaceae et naissent lorsqu'une hyphe s'enroule autour d'une autre hyphe centrale s'élevant en direction perpendiculaire. Cependant, on doute que toutes les rosettes soient nées de cette manière, car elles sont nombreuses dans la jeune trame de maints primordiums (voir Reijnders, 1977). Comme nous l'avons déjà fait remarquer plus haut, il y a beaucoup d'extrémités libres émanant des nodules; elles sont d'abord courtes, mais elles s'allongent rapidement.

DISCUSSION

Nous avons publié une description du développement de *Limacella guttata* (Fr.) Konrad & Maublanc dans notre livre de 1963 et cette étude nous met à même de faire une comparaison de ces deux développements. Nous examinerons en même temps les correspondances et les différences.

1. *Limacella guttata* a des primordiums piriformes, épais, bulbeux, qui restent longtemps en cet état. Les jeunes primordiums de *L. glioderma* sont beaucoup plus sveltes ou plus oblongs. Une légère recourbure d'hyphes poussant en bas dans un anneau perpendiculaire à l'axe du primordium marque la naissance du chapeau. Ces hyphes vont former la marge piléique et l'hyménophore. A ce moment, le protenchyme est encore complètement emmêlé chez *L. guttata* et une direction longitudinale des hyphes du stipe ne s'observe que beaucoup plus tard dans un stade très avancé (Reijnders, 1963; pl. 52 fig. 3). Mais dans notre stade de la Fig. 4 du *L. glioderma*, où les hyphes parallèles de l'hyménophore et de la marge piléique se dessinent nettement, la direction longitudinale d'hyphes se présente également dans une zone étroite dans le stipe sous les taches claires (et à l'intérieur de celles-ci). Il faut remarquer que les hyphes palissadiques de l'hyménophore manquent encore dans le plus jeune stade de *L. guttata* (l.c.: pl. 51 fig. 1), de sorte que la coupe de *L. glioderma* représente un primordium un peu plus avancé. Malgré ce détail, il est évident que la piléocarpie de *L. guttata* est beaucoup plus prononcée.

2. Il vaut la peine de comparer les structures du voile universel et du piléipellis à partir de leur origine. La terminologie du revêtement piléique chez les champignons adultes est toujours confuse. Dans bien des cas, on ne distingue pas les éléments du voile et ceux du piléipellis. On ne comprend pas très bien ces structures périphériques quand on n'étudie pas leur ontogénie. Nous espérons revenir sur ces questions dans une prochaine publication. Le voile universel à hyphes couchées est manifeste dans les deux espèces, mais il est beaucoup plus développé et permanent chez *L. glioderma*. Par contre, le piléipellis de *L. guttata* se présente beaucoup plus tôt sous une forme déjà remarquablement différenciée. Il se compose d'éléments dressés, constituant une

palissade irrégulière à cause de la formation d'une multiplicité de cellules isodiamétrales et encore petites à leurs extrémités. Chez *L. glioderma* il y a, sous les hyphes couchées, une assise lâche bien marquée que nous avons nommée 'matrice'. Cette enveloppe est beaucoup moins accentuée chez *L. guttata* quoiqu'une zone sous le voile, à hyphes plus minces que celles de la trame, n'y manque pas. Les hyphes péricleines du voile sont donc les extrémités d'hyphes plus profondes qui se continuent souvent à la périphérie en faisant un angle de 90°. Lorsque le piléipellis va se développer, les hyphes dans un secteur déterminé de la couche matrice se dressent en se muant toujours en hyphes couchées du voile. Le piléipellis est renforcé par maints éléments en massue qui émanent des nodules de la périphérie de la trame piléique (Fig. 10). De cette façon se forme un palissadoderme qui va remplacer le trichoderme initial. En prenant sa structure définitive, le piléipellis de *L. guttata* devient plutôt un épithélium (selon la terminologie de certains auteurs).

Nous avons déjà traité plus haut du curieux phénomène que le piléipellis se constitue dans une enveloppe que l'on est forcé de considérer comme un voile universel.

3. Dans les tissus plectenchymateux, on observe souvent, dispersés dans le tissu qui est plus lâche ailleurs, des endroits où les hyphes adhèrent les unes aux autres. Dans leur forme la plus simple, ces hyphes collées sont parallèles, mais dans bien des cas elles sont plus emmêlées que dans le tissu environnant; c'est pourquoi, une analyse de la naissance de nouvelles cellules prête à confusion dans une coupe plane (par les hyphes coupées et entrecroisées). Néanmoins, une observation comparative et prolongée conduit, selon nous, à la conclusion qu'une division cellulaire est fréquente dans les nodules et que les cellules formées en ces endroits provoquent, par leur inflation, une dilatation du tissu. Par suite de la naissance d'une multiplicité de cellules dans leur intérieur, les nodules accusent une structure particulière: une masse de cellules entourées d'hyphes qui s'enroulent et y pénètrent (Reijnders, 1977: fig. 1). Chez les Russulaceae, les hyphes situées immédiatement au contour des grumelots sont divisées en chaînes de sphérocytes naissantes. Chez les Amanitaceae, beaucoup de ramifications en masse sortent des nodules. Généralement, elles s'allongent en formant des hyphes étendues à extrémités libres, mais chez les Amanitas, la plupart d'entre elles restent courtes en formant les cellules latérales enflées, bien connues.

Chez *L. guttata*, les grumelots de cellules deviennent gros et, avec les faisceaux d'hyphes qui serpentent entre eux, le tissu égale la structure de la jeune trame croissante de *Russula*, de *Lactarius* ou d'*Amanita*. Chez *Limacella glioderma*, les dimensions des nodules restent plus modestes, leur structure est à peu près conforme à celle des nodules qu'on rencontre souvent dans le bulbe et la jeune trame d'Agaricales très variés. Chez *L. glioderma*, on les trouve surtout dans la périphérie de la trame piléique où l'augmentation de cellules est particulièrement d'une nécessité impérieuse.

Quoique les hyphes à extrémités libres soient abondantes dans la jeune trame de *L. glioderma*, elles sont beaucoup plus apparentes et semblent être plus nombreuses encore chez *L. guttata*, atteignant une largeur de $\pm 16\mu\text{m}$. (Chez l'autre espèce 7-10 μ seulement.) Elles s'étendent souvent sur une grande distance dans le plan de la coupe; nous ignorons si elles fonctionnent de la même manière que le système d'hyphes droites que l'on trouve déjà dans le tissu de primordiums beaucoup plus jeunes et dont nous avons parfois pensé qu'il joue un rôle déterminateur pendant le développement.

Nous arrivons donc à conclure que le développement de *L. glioderma* accuse un type plus primitif que celui de *L. guttata* dans presque tous ses aspects. En résumant nous pouvons dire:

a. Le développement de *L. guttata* est beaucoup plus concentré, ce qui se manifeste par les dimensions des primordiums bulbeux et par une piléocarpie plus accentuée. L'autre espèce est plutôt piléostipitocarpe.

b. Le pileipellis de *L. guttata* est un palissadoderme précoce qui se dissout en cellules, de sorte qu'il se forme un épithélium; celui de *L. glioderma* naît beaucoup plus tard et a, du moins au début, plutôt l'air d'un ixotrichoderme.

c. L'organisation ontogénique de la trame chez les deux espèces accuse des nuances: chez *L. guttata* se présente une structure plus spécialisée qui se rapproche de la trame des Amanites par les dimensions des nodules et le nombre et la nature des ramifications à extrémité libre.

L'auteur exprime sa reconnaissance à M. J. van Brummelen et à M^{me} A. Schutte-Kleine pour avoir soigné respectivement les microphoto's et la correction du texte.

Summary

A comparison of the development of *Limacella guttata* (Fr.) Konrad & Maublanc with that of *L. glioderma* (Fr.) R. Maire shows clearly that the latter is of a more primitive type. This conclusion is based on the following observations:

a. *Limacella guttata* has a pileocarpic development: the first differentiation inside the primordium is that of the outgrowing and curving hyphae of the margin of the pileus; when similar hyphae appear in the primordium of *L. glioderma* longitudinal hyphae are simultaneously formed in the stipe. The concentrated development of the former species is moreover indicated by the pear-shaped or bulbous primordia. The primordia of *L. glioderma* are much more slender.

b. The pileipellis of *L. guttata* is initiated in a very early phase of the development in the shape of a palisadodermium of which each cell divides into smaller cells thus forming an epithelium. The pileipellis of *L. glioderma* originates tardily in a kind of matrix-layer which belongs to the universal veil; at first it has the nature of an ixo-trichodermium, but later it is reinforced by elements that penetrate into it from below.

c. The structure of the young trama of the two species is somewhat different: with *L. guttata* the hyphal knots are taller with more cells in the centre; these complexes of cells with their encircling hyphae remind of the organisation of the trama of *Amanita*. Moreover, there are more and larger club-shaped extremities of hyphae in this species. In the other species the hyphal knots look more like those common in most other Agaricales.

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G. GUZMÁN, *Identificación de los hongos comestibles, venenosos, alucinantes y destructores de la madera*. (Editorial Limusa, Mexico City, 1979). Pp. 452 including 218 Plates. Price: \$ 9.- (excl. postage).

This is the first flora of macromycetes published for Mexico. The first part of it contains rather elaborate keys to nearly 600 species; the second part illustrations of all species treated, partly as line-drawings, partly as black-and-white photographs (often more than one per species). The variation of fungi represented reflects the great ecological diversity of Mexico. A list of Mexican names of fungi and lists of edible, poisonous, hallucinogeneous and wood-destroying fungi are added, as well as a Spanish glossary. The disadvantage of the lack of microscopical characters in the keys is partly compensated by the presence of numerous illustrations.

G. GUZMÁN, *Hongos*. (Editorial Limusa, Mexico City, 1978). Pp. 194 including 186 coloured photographs. Price: \$ 7.- (excl. postage).

In this book, meant for amateurs, the most common mushrooms of Mexico are illustrated by coloured photographs of rather varying quality.

M. A. A. SCHIPPER, (1) *On certain species of Mucor with a key to all accepted species*, (2) *On the genera Rhizomucor and Parasitella*. (Studies in Mycology 17, C.B.S., Baarn, 1978). Pp. respect. 52 and 19, 34 Text-figs. Price: Hfl. 20.-.

In the first paper 21 species and varieties of *Mucor* (4 of which are new) not earlier treated by the author, are described and illustrated. A key is given to all 49 species of *Mucor* accepted. — In the second paper the genus *Rhizomucor* is reintroduced for 3 thermophilic species and *Parasitella* accepted for one parasitic species of *Mucor*.

R. A. SAMSON, *A compilation of the Aspergilli described since 1965*. (Studies in Mycology 18, C.B.S., Baarn, 1979). Pp. 38, 7 Text-figs. Price: Hfl. 10.-.

Of the 99 taxa of *Aspergillus* described after the publication of the monograph of Raper & Fennell (1965), 34 are accepted, summarily described and taxonomically discussed. The remaining names are considered to be synonymous or doubtful.