

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 Drenthé, The Netherlands, are described: *E. acidophilum*, *E. argenteostriatum*, *E. calthionis*, *E. chlorinosum*, *E. cryptocystidiatum*, *E. cuniculorum*, *E. defibulatum*, *E. farinogustus*, *E. occultopigmentatum*, *E. psilopus*, *E. tibiicystidiatum*, *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 Drenthé, 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 designed 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 ×). 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 μm: Length minus width between 1–5 μm with an average of 3 μm.

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.

The investigations carried out by the first author which resulted in the present paper have been supported by a grant from the Netherlands' Organisation for the Advancement of Pure Research (Z.W.O.).

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.

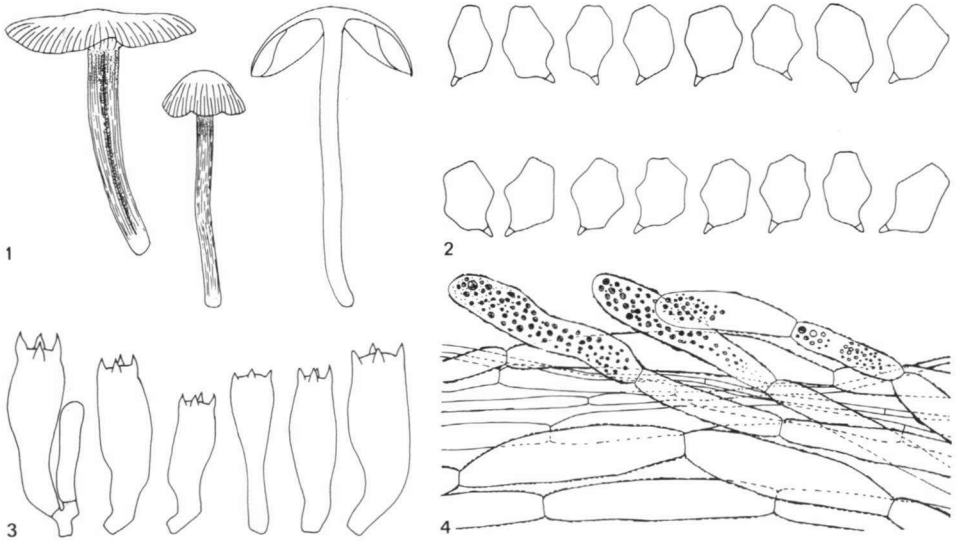
Sporae 8.5–10.3(–10.8) × (6.3–)6.7–7.7(–8.0) μm , Q = (1.15–)1.2–1.45, (5–)6–7-angulatae. Basidia (30–)31–41(–42) × (8.6–)9.4–11.1(–11.6) μm , 2–4-, raro 1-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceo-inflatae, usque ad 340 μm et ultra longae, usque ad 17 μm latae. Pileipellis cutis non vel paulo differentiat, 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 differentiatia, 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.

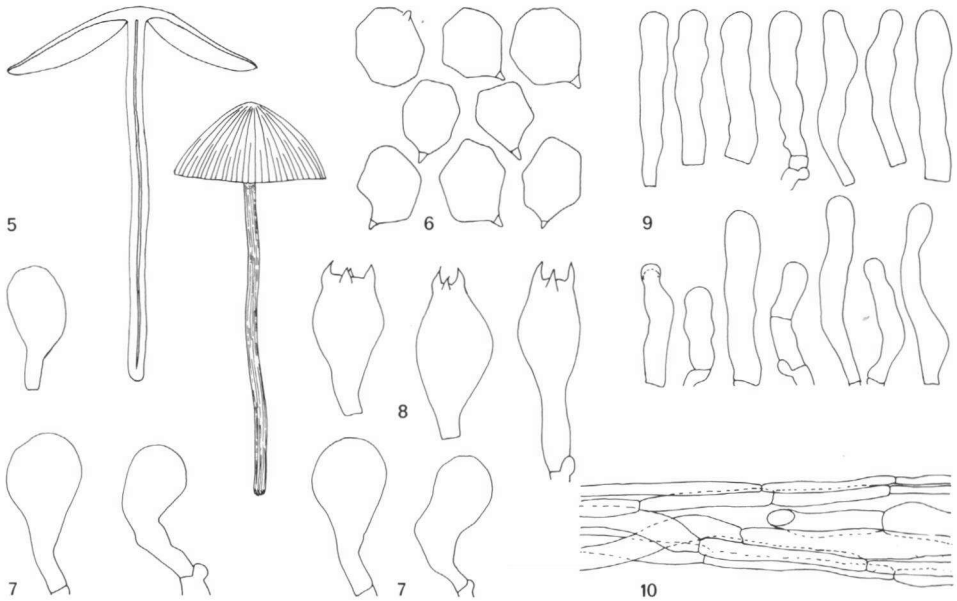
Entoloma chlorinosum* Arnolds & Noordeloos, *spec. nov.

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, strictius 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 differentiatia, hyphae superficiae 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 (*Rhytidadelphus squarrosus*) in *Crepido-Junceto 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, superficie 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, l = 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. staurosporium*). 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 *Paramammosi* 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-grisea, 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 superficiei concolor. Odore valde farinaceo. Sporae $(8.4\text{--})9\text{--}11.3(-12) \times 6.3\text{--}7.9 \mu\text{m}$, 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, $97\text{--}193(-236) \times (4.5\text{--})7.5\text{--}13(-16) \mu\text{m}$ 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 expallent 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 $[60/3/2] (8.4\text{--})9\text{--}11.4(-12.5) \times (6.0\text{--})6.2\text{--}7.7(-8.2) \mu\text{m}$, $Q = 1.3\text{--}1.45\text{--}1.7(-1.8)$, variable in shape, mostly 5–7-angular in side-view with pronounced angles and large, triangular apiculus. Basidia $31.6\text{--}46 \times 10.3\text{--}12(-13) \mu\text{m}$, $Q = 2.6\text{--}4.2$, 4-spored, broadly clavate. Cystidia none. Hymenophoral trama regular with long cylindrical to inflated elements, e.g. $97\text{--}193(-236) \times (4.5\text{--})7.5\text{--}16(-22) \mu\text{m}$, 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.

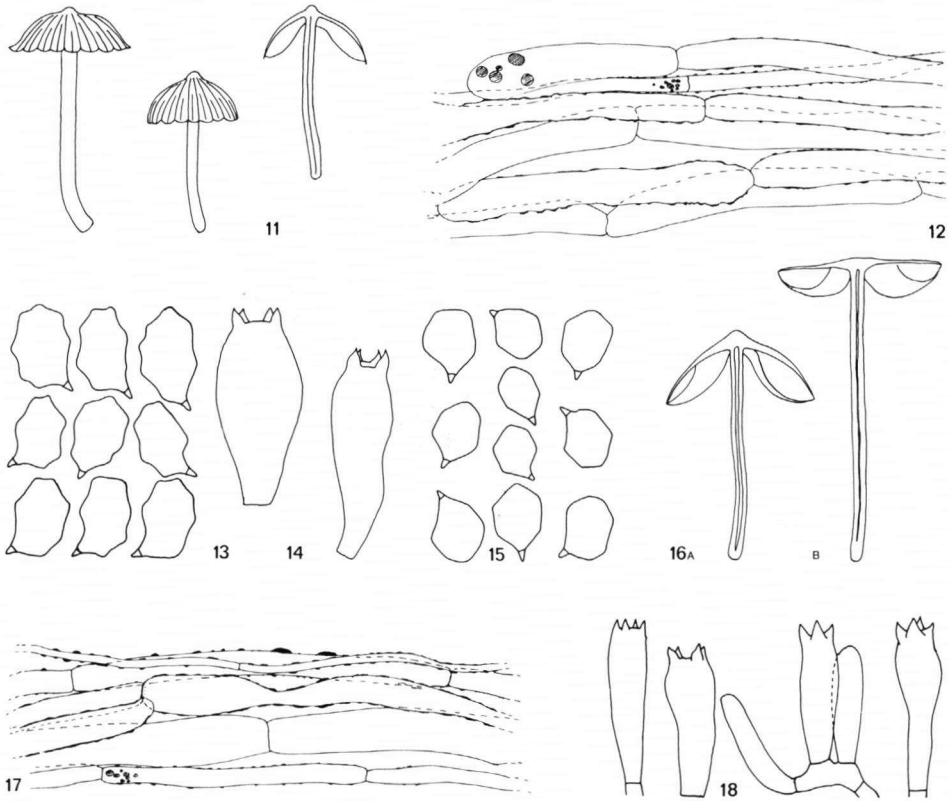
Figs. 15–18

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 $(6.5-6.7-7.9(-8.1) \times 5.6-6.8(-7.0) \mu\text{m})$, obtusioriter $5-6$ -angulatae. Basidia $28.3-34.1(-37.7) \times 7.9-10.2 \mu\text{m}$, 4-sporigera. Cystidia nulla. Hyphae lamellarum tramae cylindraceo-inflateae e elementis $170-320 \times 7.5-16(-20) \mu\text{m}$ constantes. Pileipellis cutis paulo differentiata, hyphae $(2.8-5-12.5(-15) \mu\text{m})$ latae, cylindraceo-inflateae. Pileitrama regularis, hyphae cylindraceae, e elementis $159-269 \times 10-21(-26.5) \mu\text{m}$ 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 $28-40 \times 2$ 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 $[40/2/2] (6.5-6.7-7.9(-8.1) \times (5.3-5.6-6.8(-7.0) \mu\text{m})$, $Q = 1.1-1.2-1.3(-1.4)$, rounded-angular in side-view, subglobular to broadly ellipsoid in outline. Basidia $28.3-34.8(-37.7) \times 7.7-10.2 \mu\text{m}$, $Q = (2.7-3.3-4.3(-4.6))$, rather broadly clavate, 4-spored. Cystidia none. Hymenophoral trama (sub)regular, elements $170-320 \times 7.5-16(-20) \mu\text{m}$, cylindrical, mixed with narrow connective hyphae. Pileipellis a poorly differentiated cutis of $(2.8-5-12(-15) \mu\text{m})$ wide, cylindrical, repent hyphae. Pileitrama regular, elements $159-269 \times 10-21(-25) \mu\text{m}$, cylindrical to inflated, mixed with narrow, cylindrical connective hyphae. Pigmentation of two kinds; membranal 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, l = 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, superficiei concolor. Odore subfarinaceo-subdulcis. Sapore rancido vel olie jecinorum. Sporae 9–12(–12.4) × 6.9–8.2(–9.5) μm , variabiles, 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 intracellulosus in pileipellis atque pileitrama. Fibulae nullae. Habitat: Ad terram in graminosis et in detrimentis 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 occultopigmentatum 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, dimidiatus radii et ultra striatus, in sicco pallidior. Lamellae L = 24–27, l = 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, subsodiametricae, 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 differentiata hyphae cylindraceae 3–7(–11) μm latae. Pileitrama subregularis e elementis subcylindraceis constantes. Pigmentis in pileipelle pileitramaeque hypharum tunicam probabiliter pariter in pileipelle intracellulosus. 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 tramae 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 Drente, The Netherlands' (holotypus in L; isotypus in WBS).

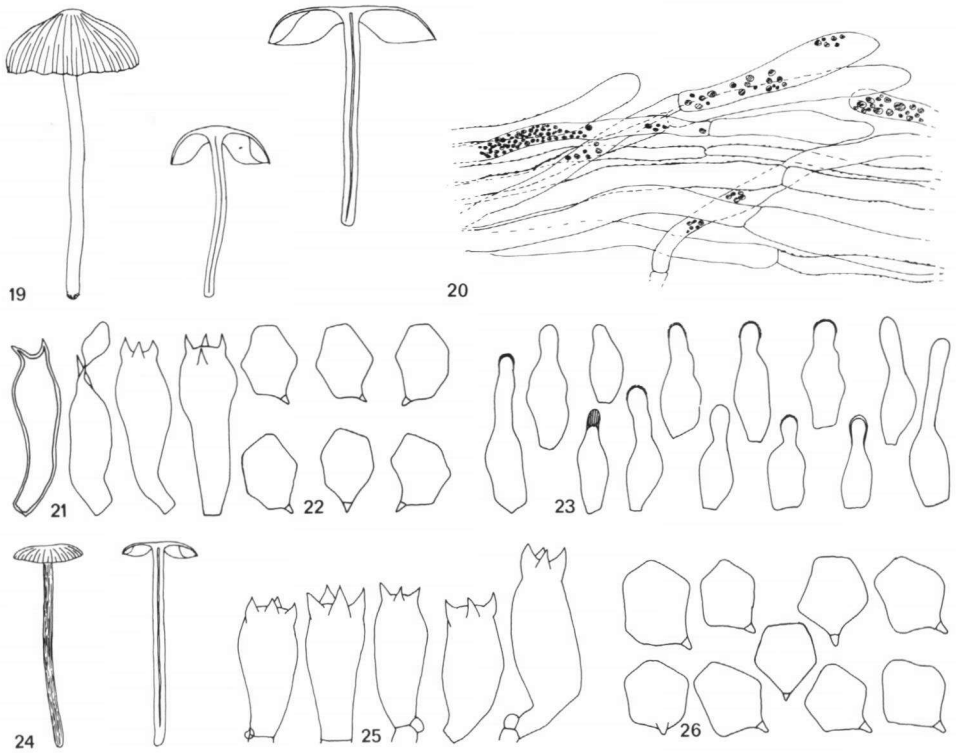
Etymology: *ψιλλός*, smooth: – *πόλις*, foot, stipe.

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 expallent 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 tibiicystidium*. — 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 tibiicystidium* 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 putuitoso-praedita, sparsa. Pleurocystidia desunt. Hyphae lamellarum tramae (113–)150–320 × 10–27 μm, subcylindraceae vel inflatae. Pileipellis cutis paulo differentiat, hyphae cylindraceae 2.5–5(–8) μm latae. Pigmentis

incrustantibus 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. tibiocystidium* 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 fuligineae, 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 intracellulosis 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

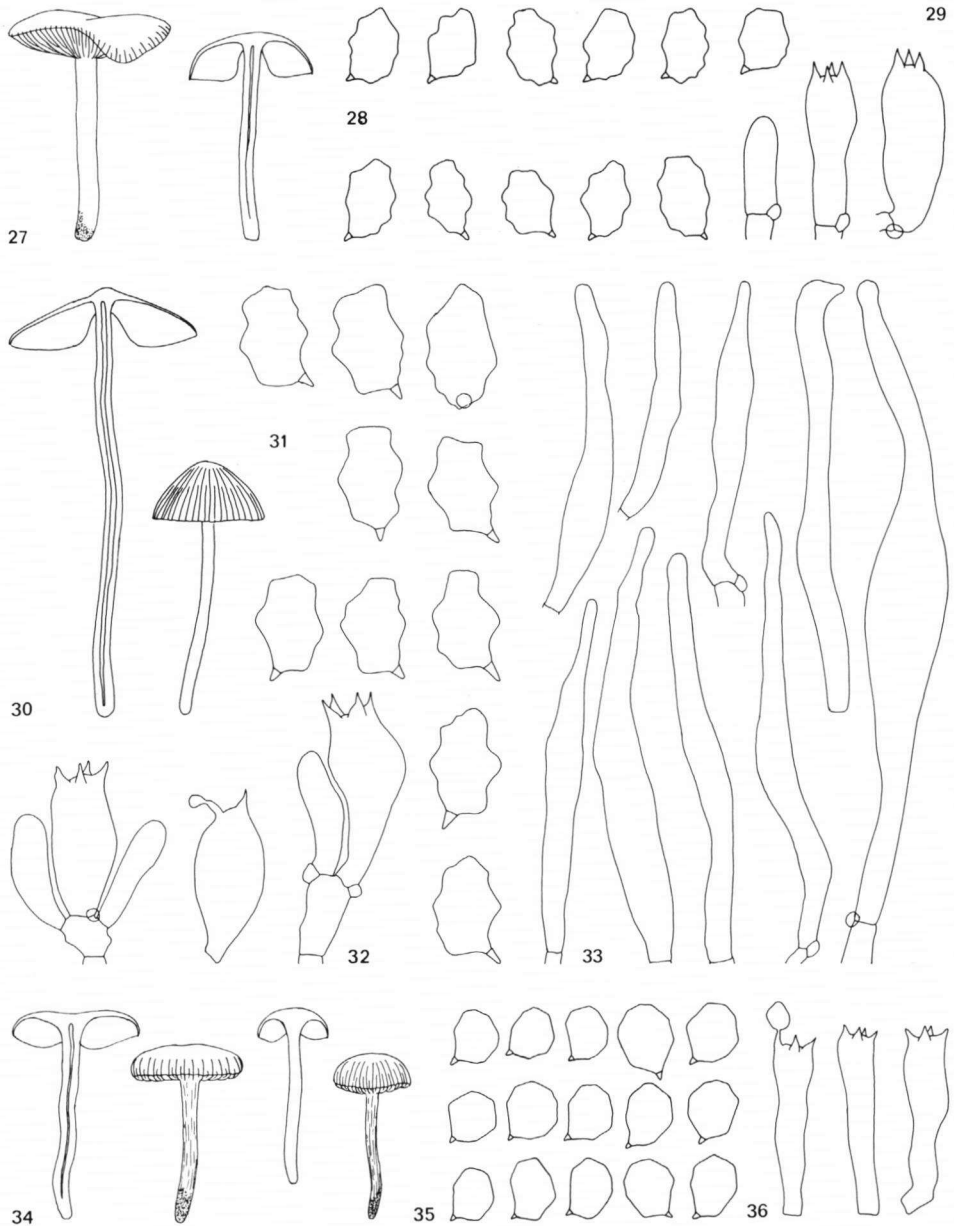
A type differt sporis cheilocystidiisque longioribus. Typus: *E. J. M. Arnolds 3653*, 13 X 1976, 'Elp, nature-reserve De Reitma, prov. of Drenthe, The Netherlands' (holotypus in WBS; isotypus in L).

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–)3.2–4.5–6.4 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. *longicystidiatum*. — 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 membranous 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, fuligineo-striatus usque ad centrum, in sicco ochraceo-griseus, glaber, sericeus. Lamellae L = 15–18, l = 1–3, adnatae, distantes, 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 , $Q=(1.0\text{--})1.1\text{--}1.15\text{--}1.2(–1.3)$, $L\text{--}D=0\text{--}1(–1.7)$ 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 Westerbork, 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 grey-tinged 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, 'Westerbork, 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 differentiata, 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 Westerborkseweg near Holtherzand, municipality of Beilen, prov. of Drenthe, The Netherlands' (holotypus in L; isotypus in WBS).

Etymology: $\xi\alpha\nu\theta\alpha\varsigma$, yellow; $\kappa\alpha\nu\lambda\alpha\varsigma$, stipe.

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

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