

BASIDIOMYCETES OF SOUTH-EAST ASIA

1. The genus *Paraphelaria* (Auriculariales)

W. JÜLICH

Rijksherbarium, Leiden

The genus *Paraphelaria* is divided into *Paraphelaria* s. str. (with pale basidiocarps) and *Aphelariopsis* (with dark brown basidiocarps). *Paraphelaria* is restricted to South-east Asia, while *Aphelariopsis* occurs also in South America.

In a number of previous papers (Jülich, 1976a, b, 1978, 1979, 1980) some new taxa of Basidiomycetes, mainly Aphyllophorales, have been described for South-east Asia. The work has been continued with a study of some auriculariaceous taxa.

The genus *Paraphelaria* was described by Corner (1966), based on a coriaceous, branched fungus originally described as *Thelephora amboinensis* Lév. (1844). Corner could demonstrate that the basidia of this clavarioid species are long, cylindrical and distinctly transversely septate. This was a rather unexpected character which necessitated the description of the new genus *Paraphelaria* and its removal to the Auriculariaceae of the Heterobasidiomycetes.

Clavarioid basidiocarps are rather uncommon in Heterobasidiomycetes where examples can be found in the Dacrymycetales (e.g. *Calocera*), Tremellales (e.g. *Tremellodendron*, *Tremellodendropsis*), and Auriculariales (e.g. *Paraphelaria*). Usually, the basidiocarps of Heterobasidiomycetes have a more or less gelatinous context, which makes it easy for beginners to recognize this group. But many clavarioid genera, with the exception of the clavarioid Dacrymycetales, have an often distinctly coriaceous texture composed of dry, slightly or strongly thick-walled hyphae. Contrary to clavarioid Homobasidiomycetes, some taxa of clavarioid Heterobasidiomycetes lack a well developed hymenium. This is particularly obvious in auriculariaceous taxa, and especially in *Paraphelaria amboinensis*. In that taxon, basidia are loosely produced on hyphae of the outer layer of the basidiocarp, and not in a well defined palisade-like hymenium. Since the basidia are intermingled with and partly covered by the longitudinally arranged hyphae, the surface of the basidiocarp is reached by sterigmata of very variable length. Neither between the hyphae nor on the surface of the basidiocarp is any mucilage produced.

The genus *Paraphelaria* with its Asian species *P. amboinensis* remained monotypic until Welden (1971) described a second species, *P. colombiana*, from South America. A third species, again from South-east Asia, was described by Jülich (1980) under the name *P. borneensis*. The latter species differed from the generic type species mainly in its small, nearly unbranched basidiocarps with brown colour.

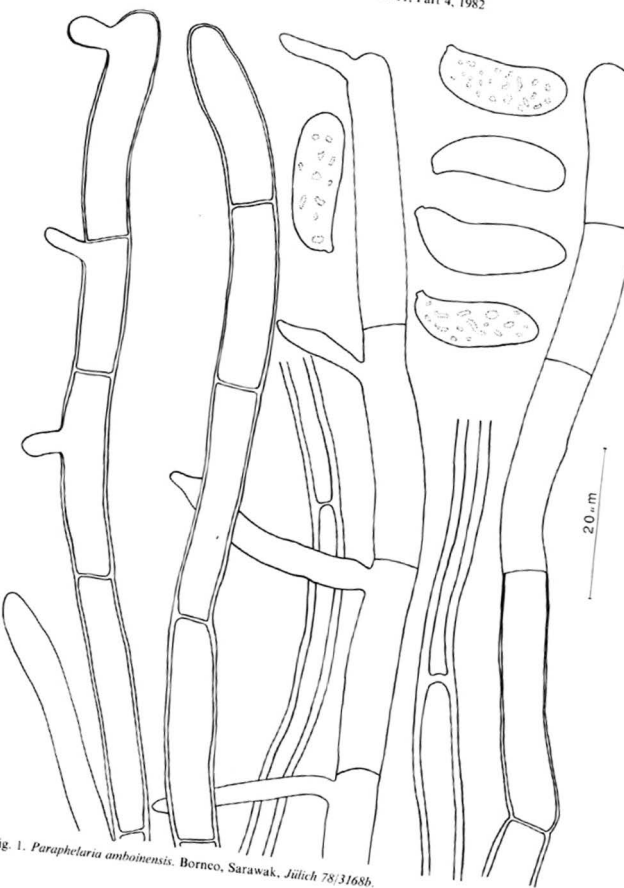


Fig. 1. *Paraphelaria amboinensis*. Borneo, Sarawak, Jülich 78/3168b.

Prof. Welden kindly sent me the type specimen of his species for study. I realized with great surprise that the South American *P. colombiana* and the South-east Asian *P. borneensis* are closely related, both having only slightly (often only apically) branched basidiocarps and a dark brown colour. A detailed study of all three species hitherto described revealed that *Paraphelaria* (with the type species *P. amboinensis*) should remain monotypic, whereas *P. borneensis* and *P. colombiana* should be brought together in a genus of their own.

There are no distinct probasidia recognizable in *P. amboinensis* and *P. colombiana*. The basidia which are formed terminally on main hyphae or lateral hyphae, are narrowly cylindrical and thin- or somewhat thick-walled. In *P. borneensis*, however, basidia originate usually laterally on the generative hyphae. Often a distinct probasidium is formed which is globose or broadly ellipsoid and thin- or mostly somewhat thick-walled, germinating to form a cylindrical or sinuous phragmobasidium.

The differences between the recognized taxa can be keyed out as follows:

- 1a. Basidiocarp light coloured, up to 15 cm high, strongly branched when mature, tips of branches not penicillate. Hyphae hyaline to light yellowish. Basidia without inflated probasidia, 100–130 μm long. Spores 20–25 \times 6–7.5 μm . In South-east Asia *Paraphelaria amboinensis*
- 1b. Basidiocarp dark brown, up to 1–3 cm high, not or only slightly branched (tips of branches then distinctly penicillate). Hyphae dark brown in the context, yellowish-brown in the subhymenial part. Basidia with or without inflated probasidia, 30–36–50 μm long. 2
- 2a. In South-east Asia. Basidiocarp 1–1.5 cm long, usually unbranched. Probasidia laterally on the generative hyphae, globose to broadly ellipsoid, thin- to somewhat thick-walled. Metabasidia cylindrical of more often sinuous, 30–36 μm long. Spores 12–14 \times 4–4.5 μm .
Aphelariopsis borneensis
- 2b. In South America. Basidiocarp up to 3 cm long, only slightly branched and with penicillate tips. Probasidia not present or not distinct. Basidia terminally on generative hyphae, cylindrical, 30–50 μm long. Spores 11–13–17 \times 4.5–5.5–6.5 μm *Aphelariopsis colombiana*

PARAPHELARIA CORNER 1966

in *Persoonia* 4: 346.

Basidiocarp clavarioid, strongly branched when mature, light coloured, tips of branches not penicillate, consistency coriaceous, not gelatinous, without typical hymenium. Monomitic. Hyphae hyaline to pale yellowish, cylindrical or partly slightly inflated, thick-walled, without clamps. Cystidia absent. Basidia (phragmobasidia) cylindrical, thin- to slightly thick-walled, transversely septate, with four rather long sterigmata. Spores hyaline, cylindrical or slightly curved, smooth, thin-walled, inamyloid. — Monotypic.

PARAPHELARIA AMBOINENSIS (Lév.) Corner 1966, in *Persoonia* 4: 346

Syn.: *Thelephora amboinensis* Lév. 1844, in *Annls Sci. nat. (Bot.)*, sér. III, 2: 207.

Thelephora funalis Lév. 1844, loc. cit., p. 208.

Thelephora scoparia Lév. 1844, loc. cit., p. 207.

Basidiocarp erect, single or in small groups, somewhat or usually much branched, at first whitish, later (and when dry) pale yellowish brownish, up to 15 cm high, with a basal at first glabrous, later strigose trunk 1–6 cm \times 2–15 mm. Branches 1–2.5(–8) mm wide, fertile on all sides, but without a distinct hymenium. Rhizomorphs lacking. Hyphal system monomitic.

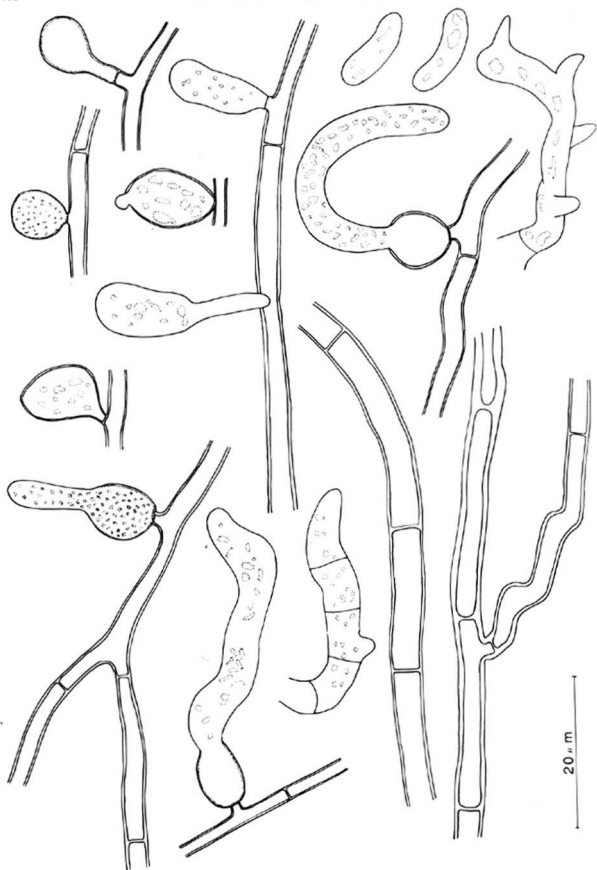


Fig. 2. *Aphetariopsis borneensis*. Borneo, Sarawak, Jülich 78/2541 (type).

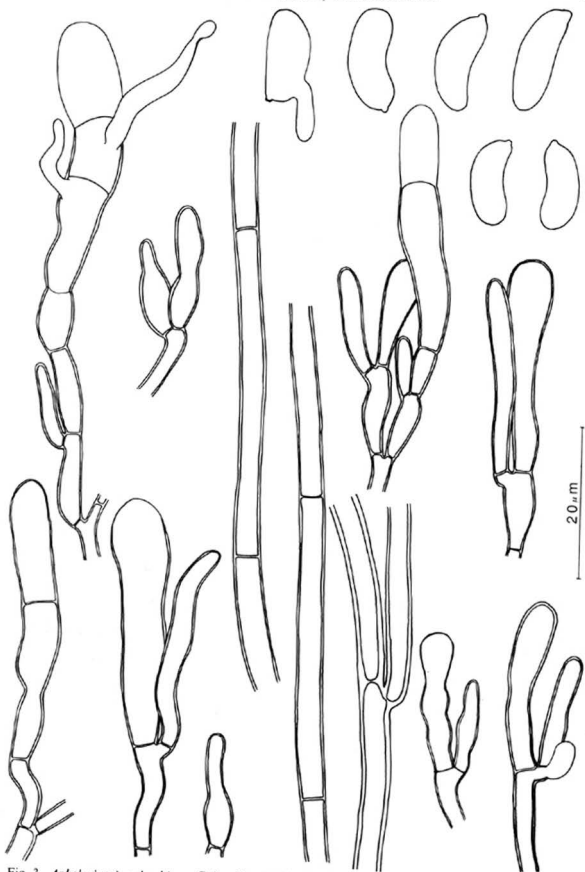


Fig. 3. *Aphelariopsis colombiana*. Colombia, Welden (type).

Hyphae hyaline when fresh, pale yellowish when dry, distinct, cylindrical with occasional subterminal or intercalary swelling, densely interwoven, branching often near the septa, anastomoses present, slightly to strongly thick-walled ($0.3-2.5 \mu\text{m}$), $3-8 \mu\text{m}$ wide, at some places inflated up to $15 \mu\text{m}$, sidebranches often constricted at the point of origin, with smooth surface, clamps absent from all septa, contents homogeneous (except for the slightly guttulate hyphal tip); changing to a brilliant yellow colour in Melzer's, slightly cyanophilous when still thin-walled and hyaline, but not so when thick-walled and yellowish. Cystidia absent. Basidia (phragmobasidia) scattered in the outer parts of the context, not in a typical hymenium, hyaline, sinuous-cylindrical when mature, young basidia cylindrical (probasidia lacking), $100-130 \times 6-8 \mu\text{m}$, at least the basal part slightly thick-walled, smooth, a basal clamp always lacking, contents guttulate to oleaginous, with four cylindrical sterigmata. Spores hyaline, broadly cylindrical to slightly navicular, often somewhat curved, thin-walled, smooth, $20-25 \times 6-7.5 \mu\text{m}$, with rather large apiculus, contents guttulate to oleaginous, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: on the ground (or on strongly decayed wood?).

DISTRIBUTION: South-east Asia: Java, Ambon, Aru Islands, Solomon Islands, Borneo (Sarawak).

MATERIAL STUDIED: BORNEO, Sarawak, Gunong Mulu National Park, Melinau Gorge, path to Long Berar, 5.III.1978, *W. Jülich 78/1350b* (L). — Gunong Mulu National Park, along path from base camp to camp 1, alt. c. 60 m, 28.III.1978, *W. Jülich 78/3168b* (L).

Aphelariopsis Jülich, *gen. nov.*

Carposomata erecta, thelephoroidea, haud vel parum ramosa, fusca, coriacea, hymenio \pm typico. Systema hypharum monomiticum. Hyphae brunneae, cylindratae, haud inflatae, paulo incrassatae tunicatae. Cystidia desunt. Probasidia adsunt vel desunt, late ellipsoidea aut globosa, tenuiter vel paulo incrassatae tunicatae. Metabasidia (phragmobasidia) hyalina aut lutea, cylindratae vel sinuosa, tenuiter vel paulo incrassatae tunicata, transverse septata, 3-4 sterigmatibus. Sporae hyalinae, cylindratae vel paulo arcuatae, laeves, tenuiter tunicatae, inamyloideae.

Typus: Paraphelaria borneensis Jülich 1980, in *Persoonia* 10: 539.

Basidiocarp erect, thelephoroid, not or only slightly branched, dark brown, coriaceous, with more or less typical hymenium. Hyphal system monomitic. Hyphae brown, cylindrical, not inflated, somewhat thick-walled. Cystidia absent. Probasidia present or absent, broadly ellipsoid or globose, thin- or slightly thick-walled. Metabasidia (phragmobasidia) hyaline or yellowish, cylindrical or sinuous, thin- or slightly thick-walled, transversely septate, with 3-4 sterigmata. Spores hyaline, cylindrical or slightly curved, smooth, thin-walled, inamyloid.

Aphelariopsis borneensis (Jülich) *comb. nov.*

Basionym: *Paraphelaria borneensis* Jülich 1980, in *Persoonia* 10: 539.

Basidiocarp erect, dark brown, cylindrical, usually unbranched with subulate tips, sometimes apically penicillate with very short sidebranches, gregarious or connected at the base by a small, sterile subiculum, 10-15 mm long, 1-2 mm thick, coriaceous, with homogeneous context, rhizomorphs lacking. Hymenium not well developed, even, dark brown when dry, not cracked. Hyphal system monomitic. Hyphae dark brown in the context, more yellowish brown in the subhymenium, cylindrical, not inflated, densely arranged in subhymenium and trama, branching from all parts of the hyphae, somewhat thick-walled, $2.5-3.5 \mu\text{m}$ wide in the subhymenium, $3.5-4.5 \mu\text{m}$ wide in the context, with smooth surface, clamps absent from all septa, contents homogeneous. Cystidia absent. Probasidia present, at first globose, then broadly

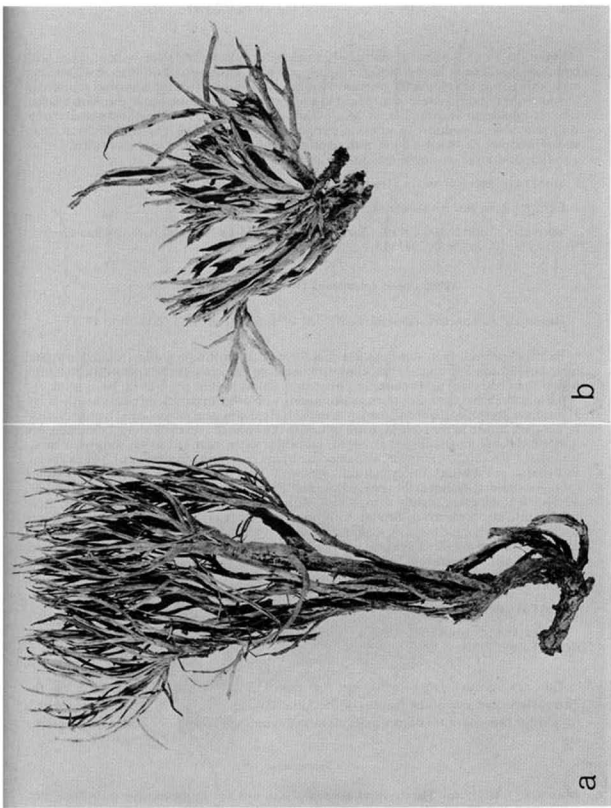


Fig. 4. *Paraphelaria amboinensis*. Borneo, Sarawak. — a. Jülich 78/3168b ($\times 1.1$). — b. Jülich 78/1350b ($\times 1.6$).

ellipsoid, $10-16 \times 5.5-8 \mu\text{m}$, hyaline or often pale yellowish, slightly thick-walled, at first with homogenous contents, later granular to slightly guttulate, sessile or with an up to $10 \times 2 \mu\text{m}$ large stalk, originating laterally from generative hyphae. Metabasidia (phragmobasidia) scattered in the outer part of the context or arranged in a more or less well developed hymenium, hyaline, sinuous-cylindrical when mature, $30-36 \times 4-5 \mu\text{m}$, thin-walled, guttulate, without a basal clamp, with four large cylindrical to subulate sterigmata. Spores hyaline, curved-cylindrical, thin-walled, smooth, $12-14 \times 4-4.5 \mu\text{m}$, with small apiculus, contents more or less guttulate, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: saprophytic on very rotten wood on the ground.

DISTRIBUTION: Borneo (Sarawak).

MATERIAL STUDIED: BORNEO, Sarawak, Gunong Mulu National Park, around Camp 1, 19.III.1978, *W. Jülich 78/2541* (L).

Aphelariopsis colombiana (Welden) Jülich, *comb. nov.*

Basionym: *Paraphelaria colombiana* Welden 1971, in *Tulane Stud. Zool. Bot.* 17: 19.

Basidiocarp erect, up to 3 cm long, less than 1 mm thick, growing in groups from a thin hyphal mat, dark brown, only slightly branched with few main branches, the tips penicillate, multifid, lighter than branches, pale ochraceous when dry, almost hyaline when fresh; basal trunk c. $5 \times 0.6 \text{ mm}$; branches flattened, often anastomosing with other branches, inconspicuously hairy. Hymenium developed, light coloured, pulverulent. Hyphal system monomitic. Hyphae distinct, rather dark brown in the context, more yellowish brown in the subhymenium, cylindrical, not inflated, densely longitudinally arranged, branching often near the septa, somewhat thick-walled ($0.3-0.6 \mu\text{m}$), $3-4 \mu\text{m}$ wide, with smooth surface, contents homogeneous. Cystidia absent. Probasidia not distinct or cylindrical, yellowish and slightly thick-walled. Metabasidia (phragmobasidia) hyaline at the apex, yellowish elsewhere, broadly cylindrical when mature, $30-50 \times 6.5-8.5 \mu\text{m}$, often slightly thick-walled, without a basal clamp, contents granular, more rarely guttulate, transversely septate with three or four lateral subulate sterigmata. Spores hyaline, ellipsoid, cylindrical or slightly curved, thin-walled, smooth, $11-13-17 \times 4.5-5.5-6.5 \mu\text{m}$, with small but distinct apiculus, contents granular or slightly guttulate, neither amyloid, dextrinoid, nor cyanophilous.

SUBSTRATE: saprophytic on bamboo.

DISTRIBUTION: South America (Colombia).

MATERIAL STUDIED: COLOMBIA, Valle State at La Palestina, 17.6.1968, *A. L. Welden* (herb. Tulane 7257).

The new genus *Aphelariopsis* can be placed together with *Paraphelaria* in the Paraphelariaceae, one of the families of the Auriculariales (Jülich, 1981). The family deviates from other families of that order in its clavarioid basidiocarps with dry, coriaceous context.

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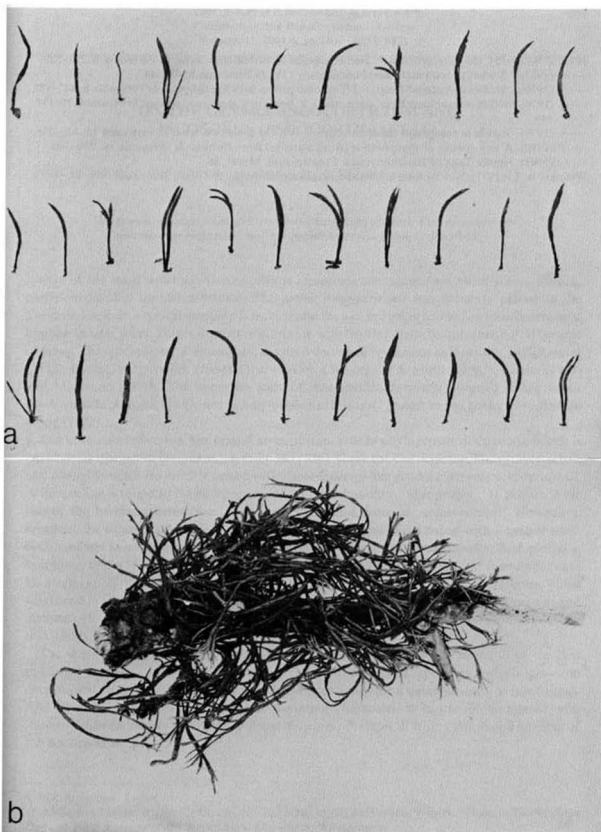


Fig. 5a. *Aphelariopsis borneensis*. Bornco, Sarawak, Jülich 78/3168b (type) ($\times 1.6$). — b. *Aphelariopsis colombiana*. Colombia, Welden (type) ($\times 1.6$).

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ON THE GENERA ASCOCORTICIUM AND ASCOSORUS (ASCOCORTICIACEAE).

W. JÜLICH* & B. DE VRIES**

The genera *Ascocorticium* and *Ascosorus* have been studied. For *Ascocorticium vermisporum* Hanerslev, the new genus *Ascocorticiellum* is described.

One of the most unusual Ascomycetes is *Ascocorticium anomalum* which forms whitish, corticioid patches on the substrate. The genus *Ascocorticium* was formerly placed in the Taphrinales, since a typical ascocarp is lacking and the asci are being formed on loosely arranged hyphae. In later years, a more distinct relationship with the Helotiales (inoperculate asci) became obvious. The type species, *A. anomalum*, has been described by various authors, e.g. by Schroeter (1893), Earle (1902), Svrček (1954), Oberwinkler, Casagrande & Müller (1967), Cooke (1968) and Malençon (1979). The imperfect state of that species, formerly assigned to the genus *Rhinotrichella* Arnaud (1953, not validly published), is now placed in the genus *Acrodontium* Hoog (1972).

The genus *Ascocorticium* has played an important role in phylogenetic discussions, which is particularly distinct in Gäumann's text-book (1926) where the Corticiaceae, Dacrymycetaceae, and related families are directly linked with *Ascocorticium*-like genera ('*Ascocorticium*gruppe'). A similar line is found in Roger's paper (1934) on the basidium: 'It is proper... to postulate the rise of the basidiomycetes from some such resupinate form as *Ascocorticium*.' Nowadays, however, the genus is placed in the Helotiales as a very specialized taxon with a unique fruit-body, and not as an ancestor of the Basidiomycetes. With *Ascocorticium albidum* Bref. placed in synonymy under *A. anomalum* (Ell. & Harkn.) Schroeter, the genus remained monotypic until Hauerlev (1975) described a second species under the name *A. vermisporum*. This species, which was found in Denmark growing on bark of *Pinus*, differs from *A. anomalum* in its larger asci and distinctly elongate, vermicular and septate spores. The shape of the fruit-body, i.e. whitish, very thin and corticioid, is the same in both species.

The second author found *A. vermisporum* in the Netherlands, which seems to be the first published account outside of Denmark. The well developed specimen, which grew on decorticated wood of *Pinus*, gave an excellent opportunity for a detailed study of this fungus. And since *A. vermisporum* shows some deviating characters, it has to be compared with *Ascocorticium anomalum* and with the genus *Ascosorus* P. Henn. & Ruhl., the second member of the Ascocorticiaceae.

* Rijksherbarium, Leiden

** Biologisch Station, Wijster. — Comm. No. 223 of the Biological Station, Wijster. — Comm. No. 61 of the Dept. of Plant Ecology of the Agricultural University, Wageningen.

Ascocorticiaceae Schroet.

Ascocorticiaceae Schroet. in Cohn 1893, *Krypt. Fl. Schles.* 3 (2): 15.

Schroeter (1893) erected for the monotypic genus *Ascocorticium* the family Ascocorticiaceae and placed it in a special 'Unterabteilung' Ascocorticini of the Discomycetes, immediately behind the Taphriini. One year later he (Schroeter, 1894) placed both the Ascocorticiaceae and the Exoascaceae (incl. *Taphrina*) in the 'order' Protodiscineae. Korf (1973) included in this family also the genus *Ascosorus*.

ASCOCORTICIUM Bref.

Ascocorticium Bref. 1891, in *Unters. Gesamtgeb. Mykol.*, vol. IX, p. 145.

Ascocarp resupinate, thin. Subiculum thin, with hyaline, cylindrical hyphae. Margin thinning out, not differentiated. Asci hyaline, cylindrical to narrowly clavate, often with a lateral outgrowth at the base, smooth, 15–25 μm long, 8-spored. Paraphyses hyaline, cylindrical. Spores hyaline, ellipsoid, aseptate, thin-walled, smooth, inamyloid. — On wood or bark of gymnosperms and angiosperms.

ASCOCORTICIUM ANOMALUM (Ell. & Harkn.) Schroet.

Ascocorticium anomalum (Ell. & Harkn.) Schroet. in *Engl. Prantl. Nat. Pfl. Fam.* 1 (1): 161. 1894.

Ascomyces anomalum Ell. & Harkn. 1881, in *Bull. Torrey Bot. Club* 8: 26. *Exoascus anomalus* (Ell. & Harkn.) Sacc. 1888, *Syll. Fung.* 8: 820.

Ascocorticium albidum Bref. 1891, *Unters. Gesamtgeb. Mykol.* 9: 145.

Ascocarp resupinate, forming rounded and often discrete patches (c. 1–2–5 mm in diam.) or confluent, whitish or pale greyish, thin but clearly visible, pruinose-waxy, the margin thinning out and becoming indistinct. Subiculum thin, loose, c. 15–25 μm thick. Hyphae hyaline, rather loosely arranged and more or less archnoid, cylindrical, thin- or slightly thick-walled, 1.5–2.5(–4) μm wide. Asci hyaline, cylindrical or narrowly clavate, often with a short lateral outgrowth at the base, with thickened wall toward the apex with a smooth surface, 15–25(–28) \times 4.5–7 μm , inoperculate, 8-spored, inamyloid. Paraphyses hyaline, cylindrical or tapering often flexuous, not branched, 18–30 \times 1.2–2 μm . Ascospores hyaline, ellipsoid, one-celled, thin-walled, smooth, 3.8–6(–8) \times 1.8–3 μm , often bi-guttulate, inamyloid.

SUBSTRATE: Mainly found on bark of gymnosperms (*Pinus*, *Picea*, *Juniperus*, *Larix*), but also recorded from angiosperms (*Acacia*, *Betula*, *Calluna*). In two cases the species was found on a dead *Amylostereum*. *Juniperus* seems to be the preferred substrate in Europe.

DISTRIBUTION: Known from several parts of Europe, North America, and from North Africa.

IMPERFECT STATE: *Acrodontium* sp. (= *Rhinothrichella* sp.) Aerial hyphae yellowish to brownish, 1–2.5 μm wide, thin-walled, smooth. Conidiophores scattered, subulate with a denticulate rachis, up to 50 μm long, pale brown near the base, becoming hyaline towards the apex. Conidia hyaline, broadly ellipsoid, thin-walled, smooth or finely verrucose, not septate, 3.5–5 \times 3–3.5 μm .

Two varieties can be recognized, characterized by differences in substrate and in the size of spores and asci.

Ascocorticium anomalum var. *anomalum* is known mainly from bark of *Pinus*. This variety has rather small spores (c. $3.5-4.5 \times 1.5-2.2 \mu\text{m}$) and small asci (c. $15-23 \times 5-6 \mu\text{m}$). The second variety was often collected on bark of *Juniperus* and differs in its larger spores (c. $4.5-8 \times 2-3 \mu\text{m}$) and larger asci (c. $16-28 \times 5.5-7 \mu\text{m}$). It is called

Ascocorticium anomalum (Ell. & Harkn.) Schroet. var. ***juniperi*** Jülich & Vries, var. nov. Differt a varietate anomala ascis sporisque majoribus. Typus: Denmark, Jutland, Silkeborg, Vissingkloster, 26.X.1980, *B. de Vries* 4284 (L).

ASCOSORUS P. Henn. & Ruhl. in P. Henn. 1900

Ascosorus P. Henn. & Ruhl. in P. Henn. 1900, Bot. Jb. 28: 276.

Ascocarp resupinate, small, ochraceous. Subiculum thin, with hyaline, cylindrical hyphae. Margin not differentiated. Asci hyaline, clavate, smooth, somewhat thick-walled, with 4-8 spores. Paraphyses rare, hyaline, cylindrical. Ascospores hyaline, septate, somewhat thick-walled, smooth, inamyloid. — On living leaves of angiosperms.

ASCOSORUS FLORIDANUS (Ellis & Martin) P. Henn. & Ruhl.

Ascosorus floridanus (Ellis & Martin) P. Henn. & Ruhl. in P. Henn. 1900, Bot. Jb. 28: 276.

Ascomycetella floridana Ellis & Martin 1884, in Amer. Naturalist 18: 1148.

Ascocarp resupinate, 0.2-0.5 mm wide, thin, ochraceous, with indistinct margin. Subiculum thin, rather loose, c. $15-30 \mu\text{m}$ thick. Hyphae hyaline, cylindrical, thin- to somewhat thick-walled (c. $0.4 \mu\text{m}$), $2-3 \mu\text{m}$ wide. Asci hyaline, clavate, with short stipe, a regularly thickened wall and smooth surface, $70-100 \times 16-20 \mu\text{m}$, inoperculate, with 4-8 spores. Paraphyses rare, hyaline, cylindrical, thin-walled, not branched, c. $60-110 \mu\text{m}$ long. Ascospores hyaline, elongate, with (3-)5-7 thickened septa, somewhat thick-walled ($0.5 \mu\text{m}$), smooth, $50-70 \times 5.5-6.5 \mu\text{m}$.

SUBSTRATE: on living leaves of *Quercus laurifolia*.

DISTR.: southern parts of U.S.A.

There is no doubt that *Ascocorticium anomalum* and *Ascosorus floridanus* should be kept in different genera, but '*Ascocorticium*' *vermisporum* presents more difficulties. It is certainly not congeneric with *Ascocorticium anomalum*, since it differs in size and shape of the asci, and in the number, form and septation of the spores; the only characters in common are the thin, pruinose ascocarps and the substrate (saprophytic on wood or bark). On the other hand, there seems to be also no closer relationship to *Ascosorus floridanus*, from which '*Ascocorticium*' *vermisporum* also differs in a number of characters: the asci are shorter with a rather wide apical opening (at least when immature) and with 16 spores per ascus while the spores are very narrow and thin-walled. There is another deviating character rarely found (or reported) in Ascomycetes: the asci of '*Ascocorticium*' *vermisporum* are clearly warty under the scanning electron microscope and appear to be somewhat uneven or even scaly under the light microscope; asci are completely smooth in both other taxa.

These differences are tabulated below.

	<i>Ascocorticium anomalum</i>	<i>Ascosorus floridanus</i>	' <i>Ascocorticium</i> ' <i>vermisporum</i>
ASCI			
form	± cylindrical	clavate	broadly clavate
size	15-25(-28) × 4.5-7	70-100 × 16-20	20-40 × 15-18
opening	small	small	wide
surface	smooth	smooth	warty
spores	8	4-8	16
SPORES			
form	ellipsoid	elongate	elongate
size	3.8-6(-8) × 1.8-3	50-70 × 5.5-6.5	20-30 × 1.2-1.5
wall	thin	thick	thin
septa	0	(3-)5-7	c. 3
SUBSTRATE	saprophytic on (wood or) bark	parasitic (?) on living leaves	saprophytic on wood or bark

***Ascocorticium* Jülich & Vries, gen. nov.**

Carposomata resupinata, tenuia, pallida, pruinosa. Subiculum tenue, margo tenuescens vel indistincta. Asci hyalini aut pallide lutei, late clavati, superficiei aspra, 16-spori. Paraphyses hyalinae, cylindraceae, haud septatae. Ascospores hyalinae, elongatae, vermiformes, tenuiter tunicatae, laeves, 3-septatae.

Typus: *Ascocorticium vermisporum* Hauerslev 1975 in *Friesia* 10: 317.

Ascocarp resupinate, light coloured, thin, pruinose. Subiculum thin, margin thinning out or indistinct. Hyphae hyaline, cylindrical, often slightly thick-walled. Asci hyaline or slightly yellowish, broadly clavate, with uneven surface, 16-spored. Paraphyses hyaline, cylindrical, not branched.

Ascospores hyaline, elongate, more or less vermiform, thin, smooth, 3-septate.

***Ascocorticium vermisporum* (Hauerslev) Jülich & Vries, comb. nov.**

Basionym: *Ascocorticium vermisporum* Hauerslev 1975, in *Friesia* 10: 317.

Ascocarp forming resupinate, rounded patches up to a few millimeters in diameter, very thin, hardly visible, pruinose, whitish or light greyish. Subiculum very thin, arachnoid, producing fascicles of asci. Margin thinning out or indistinct. Hyphae hyaline or pale yellowish-brownish near the substrate, 1-2 µm or 2-3.5 µm wide, thin-walled or often slightly thick-walled (0.3-0.4 µm), smooth, septate. Asci broadly clavate, 20-40 × 15-18 µm, hyaline or with slightly yellowish, thickened walls, the surface somewhat uneven under the light microscope, distinctly warty under the SEM, after pressure with a very wide apical opening (no fully mature asci observed), 16-spored. Paraphyses hyaline, cylindrical or with narrowly clavate apical part, 25-30 × 5-8 µm.

Ascospores hyaline, vermiform, thin-walled, smooth, $20-30 \times 1.2-1.5 \mu\text{m}$, with three (or four?) septa.

SUBSTRATE: saprophytic on bark or wood of *Pinus*.

DISTRIBUTION: known only from Denmark and the Netherlands.

Ascocorticium is tentatively placed in the Ascocorticaceae (Helotiales), a family characterized by resupinate, corticioid ascocarps. It is, however, believed that the three genera of that family have not much in common except their growth habit, and it is not unlikely that these taxa with strongly reduced and modified ascocarps but quite different asci are not closely related.

The ascus of the genus *Ascocorticium* deviates from a typical Helotiales-ascus in several respects. After pressure on the cover glass of a microscopic preparation, there appears a wide apical opening at the ascus and the whole cytoplasm is pressed out which seems to be surrounded by some kind of an endoascus since it keeps its form; a swelling, hyaline body is observed on the upper part of the cytoplasm (preparations in KOH). In lactophenol, a small porous-like structure can be seen in the apex of the ascus.

The ascus wall in many operculate Discomycetes is covered by a periascus which forms a granular or wrinkled surface (Brummelen, 1981). In Helotiales, however, asci are usually smooth. The development of the ascocarps of the three treated genera is distinctly eugymnohymenial: the hymenium is exposed from the first stages through the maturation of the asci, with the paraphyses free at the top and not interconnected (Kimbrough, 1981).

A fourth genus, viz. *Karstenella* Harmaja, has to be mentioned in this connection. This genus was described as belonging to the operculate Discomycetes (Harmaja, 1969; Korf, 1972, 1973) but was recently placed in the inoperculate Discomycetes (Kimbrough, 1981). *Karstenella* is well characterized by its narrow, rather long asci ($150-190 \times 8-12.5 \mu\text{m}$) and ellipsoid, one-celled spores ($12-15 \times 5.5-7.2 \mu\text{m}$). Furthermore, it differs from the other three genera in its brownish red ascocarps which are roundish, 3-12 mm wide and 0.4-0.7 mm thick.

COLLECTIONS EXAMINED.

(a) *Ascocorticium anomalum*

SWEDEN: Hallandsaosen, Frestensfälla, 21.X.1972, *B. de Vries* 1351 (WAG-W); Hallandsaosen, Hulrugered, 20.X.1972, *B. de Vries* 1352 (WAG-W).

DENMARK: Bornholm, Paradisbakkerne, 10.X.1964, *M. P. Christiansen* (L); — Frederikshavn, Gerum Kirke, 15.X.1980, *B. de Vries* (L); 24.X.1980, *B. de Vries* 4286 (WAG-W); — Frederikshavn, 13.X.1972, *B. de Vries* 1354 (WAG-W); 11.X.1980, *B. de Vries* 4280 (WAG-W); — Frederikshavn, Hestvang, 10.X.1972, *B. de Vries* 1355 (WAG-W); 17.X.1980, *B. de Vries* 4283 (WAG-W); — Femmøller, 13.X.1979, *J. Schreurs* 365 (WAG-W); — Holstebro, 30.X.1980, *B. de Vries* 4282 (WAG-W); — Silkeborg, Højkol, 28.X.1980, *B. de Vries* 4285 (WAG-W); — Silkeborg, Vissingkloster, 26.X.1980, *B. de Vries* 4284 (WAG-W); — Hirtshals, Tolne-Bakker, 17.X.1980, *B. de Vries* 4281 (WAG-W); — Hjörning, Bjaergby kirke, 23.X.1980, *B. de Vries* 4163 (WAG-W).

GERMAN DEMOCRATIC REPUBLIC: Rügen, Hiddensee, Fährinsel, 18.X.1975, *B. de Vries* 3114 (WAG-W).

GERMAN FEDERAL REPUBLIC: Schleswig-Holstein, Sachsenwald bei Friedrichsruh, 21.IX., 18.X.1908, *O. Jaap* (= Jaap, Fung. sel. exs. 306) (L); — Lingen-Brögbern, 5.XI.1975, *B. de Vries* 3115 (WAG-W); — Alstätte, Hörsteloe, 24.1971, *B. de Vries* 1961 (WAG-W); — Meppen, 20.X.1978, *B. de Vries* 3696 (WAG-W); — Emlichheim, 30.IX.1971, *B. de Vries* 1033 (WAG-W); — Lüneburger Heide, Steingrund, 17.IX.1979, *B. de Vries* 3877; Niederhaverbeck, 9.X.1974, *B. de Vries* 2059; Wilsederberg, 13.IX.1979, *B. de Vries* 3875 (WAG-W); — Groß-Jörl, Rimmelsberg, 2.X.1972, *B. de Vries* 3003 (WAG-W).

THE NETHERLANDS: Prov. Drenthe: Westerbork, Mantingerzand, 20.XI.1979, *B. de Vries* (L); — Wijster, 22.XI.1978, 29.XI.1978, *B. de Vries* 4135, 3691 (WAG-W); — Holthe, 13.X.1978, *B. de Vries* 3693 (WAG-W); — Mantinge, 20., 21., 29.XI.1979, *B. de Vries* 4136, 4137, 3690 (WAG-W); — Rolde, 16.X.1978, *B. de Vries* 3695 (WAG-W); — Prov. Overijssel: Hengevelde, 22.X.1979, *B. de Vries* 3879 (WAG-W); — Marienberg, 25.X.1978, *B. de Vries* 3694 (WAG-W); — Ommen, Eerderveld, 9.X.1978, 10.X.1979, *B. de Vries* 3692, 3878 (WAG-W).

(b) *Ascosorus floridanus*

U. S. A.: Florida, Green Cove Springs, on living leaves of *Quercus laurifolia*, .II.1885, *G. Martin* (= Ellis et Everh., North Amer. Fungi 2069) (L).

(c) *Ascocorticium vermisporum*

DENMARK: Sjælland, Tisvilde Hegn, 29.VIII.1965, *K. Hauerslev* 2376 (type) (C) — Falster, Distr. 37, Bótø, 8.X.1956, *K. Hauerslev* 1525 (C).

THE NETHERLANDS: Prov. Drenthe, Diever, Berkenheuvel, 3.XI.1980, *B. de Vries* (L).

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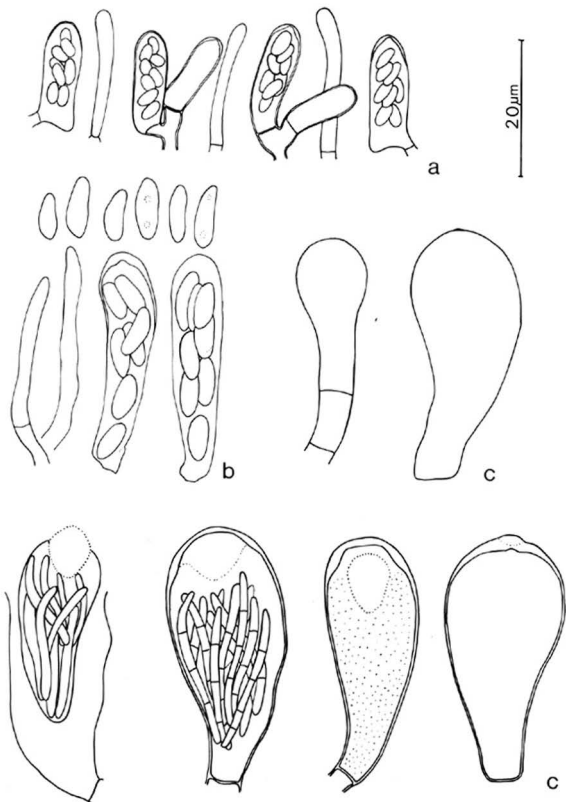


Fig. 1a. *Ascocorticium anomalum* var. *anomalum*. Jaap, Fung. sel. exs. 306. — b. *Ascocorticium anomalum* var. *juniperi*. Denmark, B. de Vries 4284 (type). — c. *Ascocorticium vermisporum*. Netherlands, 3.XI.1980, B. de Vries.

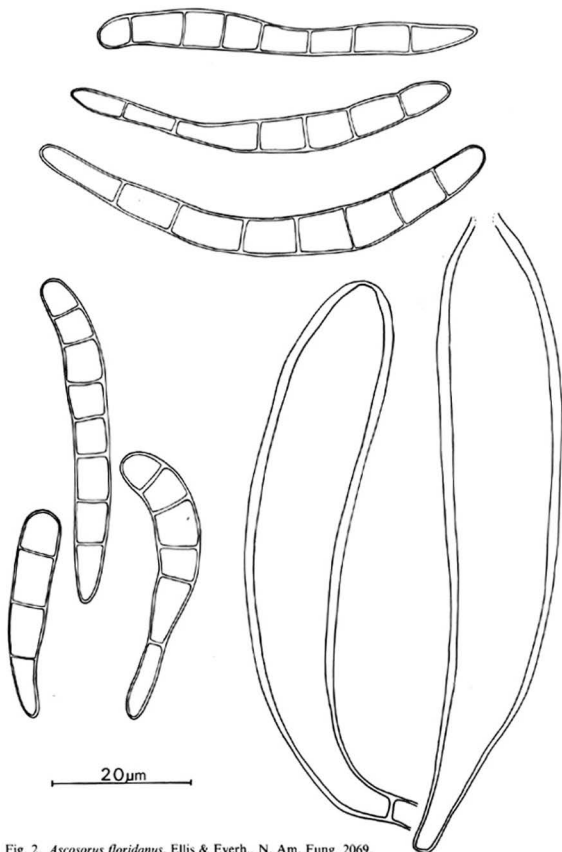


Fig. 2. *Ascosorus floridanus*. Ellis & Everh., N. Am. Fung. 2069.

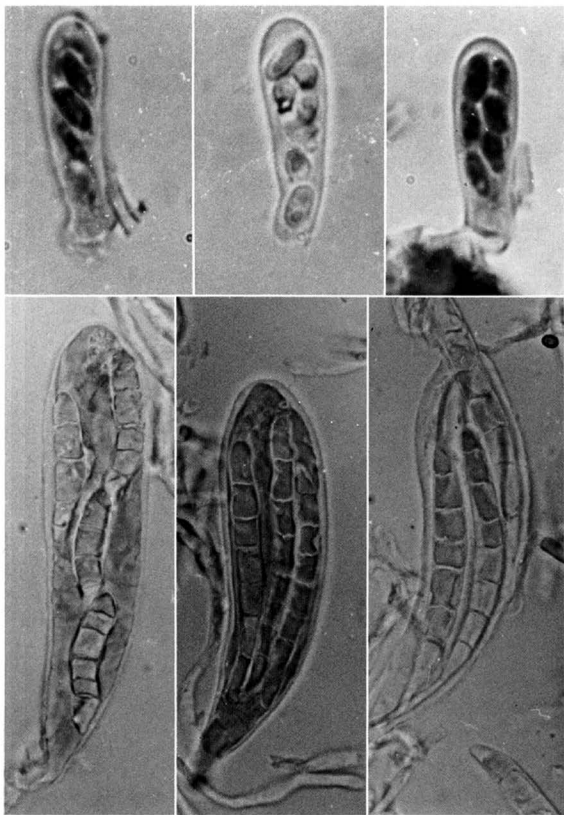


Fig. 3. Above. *Ascocorticium anomalum*. Denmark, Bornholm, M. P. Christ. ($\times 2600$). — Below. *Ascosorus floridanus*. Ellis & Everh., N. Am. Fung. 2069 ($\times 1000$).

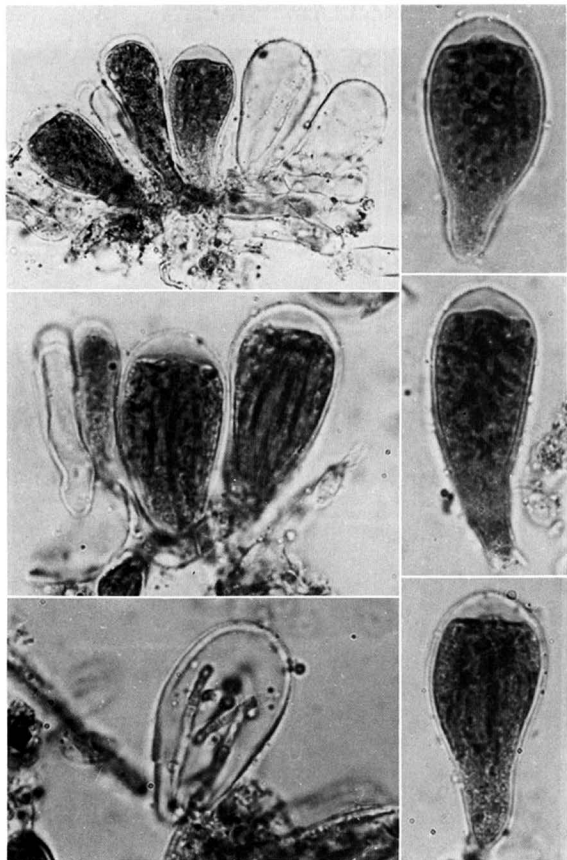


Fig. 4. *Ascocorticiellum vermisporum*. Denmark, *Hauerslev 2376* (type). (Above left: $\times 990$, all others $\times 1580$.)

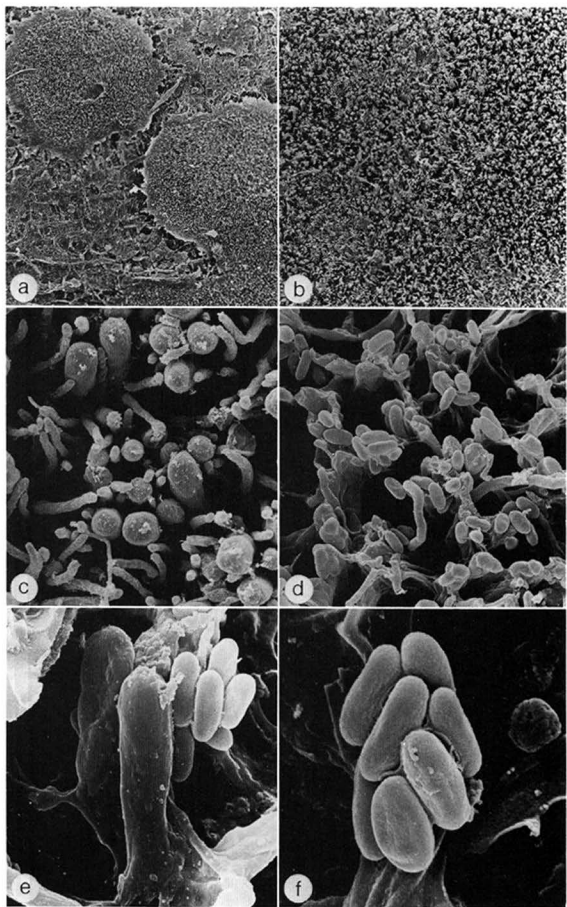


Fig. 5. *Ascocorticium anomalum*. — a-c. Denmark, *B. de Vries* 4164. (a, $\times 60$; b, $\times 160$; c, $\times 1600$). — d-f. Germany, Jaap, Fung. sel. exs. 306. (d, $\times 1600$; e, $\times 4000$; f, $\times 6800$.)

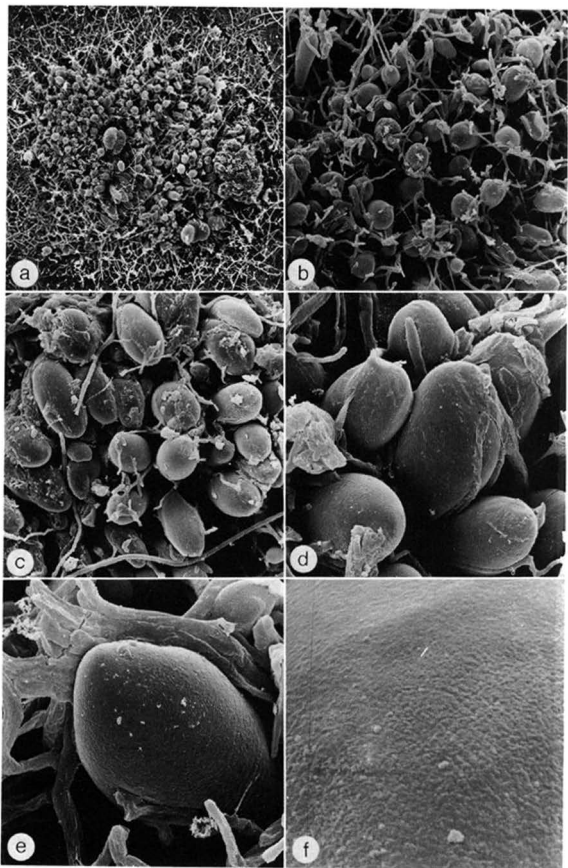


Fig. 6. *Ascosorus floridanus*, Ellis & Everh., N. Am. Fung. 2069 (type) (a, $\times 100$; b, $\times 360$; c, $\times 450$; d, $\times 1200$; e, $\times 1800$; f, $\times 9000$).

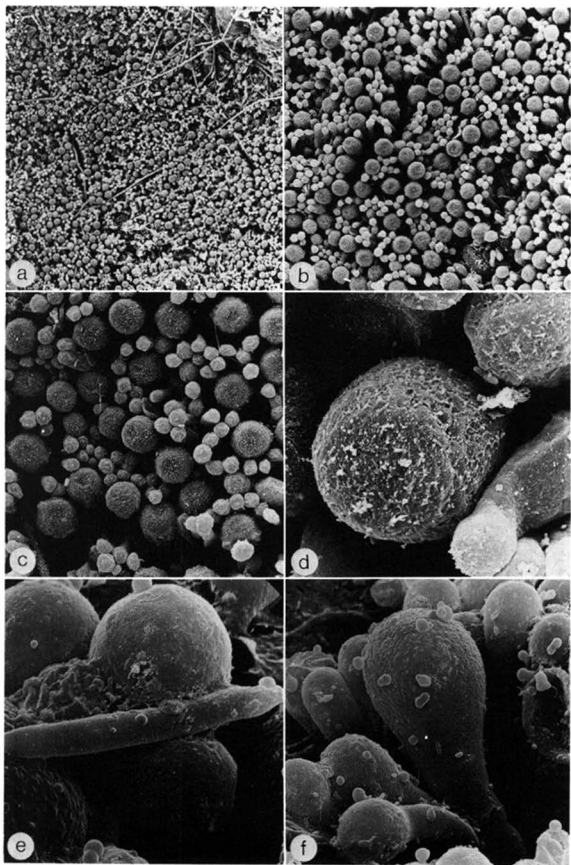


Fig. 7. *Ascocorticium vermisporum*. — a-d. Denmark, *Hauerslev* 2376 (type) (a, $\times 160$; b, $\times 400$; c, $\times 750$; d, $\times 4000$). — e-f. Netherlands, 3.XI.1980, *B. de Vries* (e, $\times 3300$; f, $\times 1600$).

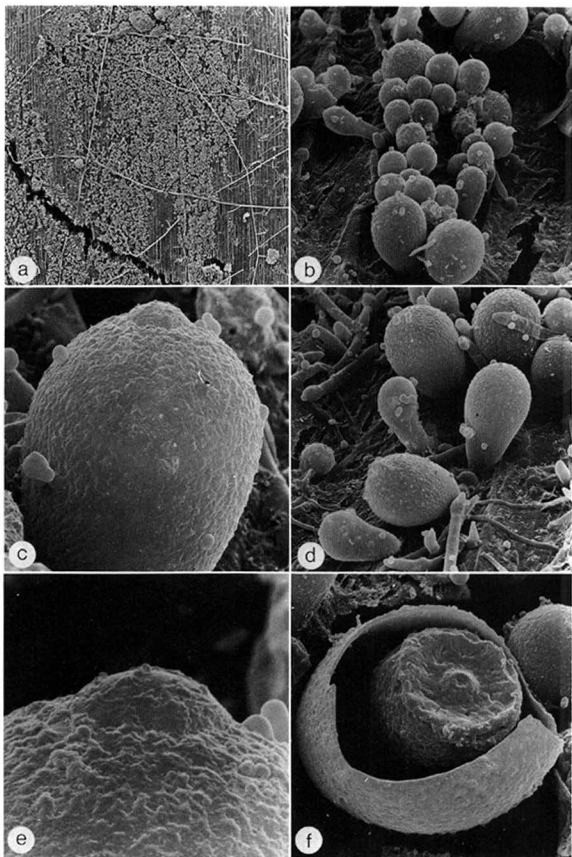


Fig. 8. *Ascocorticiellum vermisporum*. Netherlands, 3.XI.1980, B. de Vries (a, $\times 25$; b, $\times 900$; c, $\times 3300$; d, $\times 2000$; e, $\times 8000$; f, $\times 3300$).

NOTES ON SOME BASIDIOMYCETES
(APHYLLOPHORALES AND HETEROBASIDIOMYCETES)

W. JÜLICH

Rijksherbarium, Leiden

Some taxa of Aphyllophorales and Heterobasidiomycetes are discussed and several new genera and new combinations are proposed. For the genus *Eocronartium* with septal pores without parenthosomes, a new family is described.

ON PELLICULARIA ASPERULA

This species belongs to the *Botryobasidium*-complex, but differs from *Botryobasidium* s. str. in its ornamented spores with small warts (*Botryohypochnus* has spores with distinct spines). It is probably more closely related to *Cyanobasidium*, but differs from that taxon in its 6-8-spored basidia lacking strongly cyanophilous guttules.

Cyanohypha Jülich, *gen. nov.*

Carposomata resupinata, effusa, hypochnoidea, laevia. Systema hypharum monomiticum. Hyphae hyalinae vel basales pallide brunneae, effibulatae, valde cyanophileae. Cystidia desunt. Basidia hyalina, cylindracea, 6-8-spora. Sporae hyalinae, ellipsoideae, verrucosae, cyanophileae, inamyloideae.

Typus: *Pellicularia asperula* D. P. Rogers 1943, in *Farlowia* **I**: 100.

Basidiocarp resupinate, effused, several cm large, loosely adnate, hypochnoid, context homogeneous, margin thinning out, rhizomorphs absent. Hymenial surface even, whitish when fresh, cream-coloured to ochraceous when old. Hyphal system monomitic. Hyphae hyaline in the subhymenium, pale yellow to medium brown in the trama, distinct, cylindrical, loosely arranged, thin- to somewhat thick-walled, smooth or warted, with strongly cyanophilous walls. Cystidia absent. Basidia hyaline, cylindrical, thin-walled, with 6-8 subulate sterigmata. Spores hyaline, ellipsoid, somewhat thick-walled, densely covered with small warts, the walls strongly cyanophilous.

Cyanohypha asperula (D. P. Rogers) Jülich, *comb. nov.*

Basionym: *Pellicularia asperula* D. P. Rogers 1943, in *Farlowia* **I**: 100.

ON SCOPULOIDES (Masse) Höhn. & Litsch.

This genus was validly published by Höhnel & Litschauer (1908) in their account on Austrian Corticiaceae. Hjortstam & Ryvarden (1979), however, stated that the genus was not validly published, since Höhnel & Litschauer used the name only provisionally. The crucial sentence in Höhnel & Litschauer's publication is the following: 'Vertreter der Gattungen *Aldrigea*, *Scopuloides* (Massee als Sektion von *Peniophora*) und *Hypochnella* haben wir nicht gesehen und

daher diese drei Gattungen nur provisorisch in die Tabelle aufgenommen.' From this sentence we can only safely conclude that according to these authors the place of *Scopuloides* within their key to the genera of Corticiaceae is provisional, but not necessarily the genus itself (they did not write 'provisorische Gattungen'). — I therefore follow Donk (1957) and accept the genus *Scopuloides* as published by Höhnelt & Litschauer, since there is no convincing evidence that their genus is not validly published.

The genus remained monotypic up to now. Its only species, *S. hydroides* (Massee & Cooke), is characterized by ceraceous, odontoid basidiocarps, clamp-less hyphae, heavily encrusted lamprocystidia, narrowly clavate basidia, and hyaline, ellipsoid, thin-walled, smooth, and inamyloid spores. The genus is certainly related to *Phanerochaete*. One of the most striking characters not found in *Phanerochaete*, is the presence of an additional type of cystidia: those are septate, heavily encrusted and confined to the centre of the teeth, with the lamprocystidia present only at the lateral and basal parts. Type studies revealed that there exists an older specific name for the taxon in question, viz. *Peniophora rimosa* Cooke. The type specimens of both, *Peniophora hydroides* and *P. rimosa* are conspecific.

***Scopuloides rimosa* (Cooke) Jülich, comb. nov.**

Basionym: *Peniophora rimosa* Cooke 1881, in *Grevillea* 9: 94. Type specimen: *Peniophora rimosa* Cke. Coed Coch, on bark, Oct. 1880 (K).

The synonymy with *P. hydroides* was already suggested by Wakefield (in litt. ad Rea 1922: 693).

There is another species with similar septate cystidia and similar spores (but without one-celled lamprocystidia), viz. *Peniophora septocystidiata* Burt. This taxon was recently transferred to *Phanerochaete* by Eriksson & Ryvarden (1978) where it represents a deviating element because of the septate cystidia: almost all taxa of *Phanerochaete* have subulate to conical cystidia which may be either thin- or thick-walled, smooth or encrusted, but which are invariably one-celled; very few species have no cystidia at all. *Peniophora septocystidiata* can be better placed in the genus *Scopuloides*.

***Scopuloides septocystidiata* (Burt) Jülich, comb. nov.**

Basionym: *Peniophora septocystidiata* Burt 1929, in *Ann. Mo. bot. Gdn.* 12: 260.

ON TYROMYCES s. lat.

The poroid genus *Tyromyces*, characterized by soft, light coloured basidiocarps, mono- or dimitic hyphal system and hyaline, inamyloid spores was recently treated by David (1980). Contrary to Lowe's revision (1975), she divided the genus into a number of smaller genera, based on cytological and cultural characters, as well as on wood rot and the reaction with Cresyl blue. For the preparation of a key to the European species of *Tyromyces* s. lat., I studied a number of additional taxa and realized that for the species with metachromatic hyphae and brown rot a generic name had to be found. David (l.c.) used the name *Spongiporus* Murrill 1905, but an older name is available which has to be used, viz. *Postia* Fr. 1874. This genus was described by Fries for a number of poroid taxa with soft basidiocarps, small pores, and thin dissepiments. One year

later, Boiss. & Blanch. (1875) described a new genus of Compositae, also with the name *Postia*; this genus remained very small with only four described species. Since it was published one year earlier, the Friesian name has priority and can be used for the group of taxa in question.

POSTIA Fr. 1874, Hymen. Europ. p. 586.

Basidiocarp lignicolous, resupinate, effused-reflex or pileate, sessile or slightly stipitate, poroid. Context light coloured, fleshy when fresh, hard when dry. Hyphal system monomitic. Generative hyphae hyaline, thin to thick-walled, with clamps, metachromatic in Cresyl blue. Cystidia or cystidioles present or absent, hyaline, thin to slightly thick-walled. Basidia hyaline, narrowly clavate or suburniform, four-spored. Spores hyaline, allantoid, cylindrical or ellipsoid, smooth, thin-walled, inamyloid or rarely amyloid. Producing a brown rot.

Type species: *Polyporus lacteus* Fr. 1821.

The genera recognized within *Tyromyces* s. lat. can be distinguished as follows.

1a. With amyloid cystidia	<i>Amylocystis</i>
1b. Cystidia absent or inamyloid	2
2a. Hyphal walls not metachromatic, not stained in Cresyl blue; producing a white rot	<i>Tyromyces</i> s. str.
2b. Hyphal walls metachromatic, distinctly stained in Cresyl blue	3
3a. Hyphae without clamps	<i>Leptoporus</i>
3b. Hyphae with clamps	4
4a. With imperfect state in or near the perfect state	<i>Oligoporus</i>
4b. Without imperfect state in nature	5
5a. Producing a brown rot	<i>Postia</i>
5b. Producing a white rot	<i>Ceriporiopsis</i>

The following species are accepted in the genus *Postia*: ***Postia balsamea*** (Peck) Jülich, *comb. nov.* (basonym: *Polyporus balsameus* Peck 1878, in Ann. Rept. N.Y. State Mus. 30: 46). — *Postia caesia* (Schrad. ex Fr.) P. Karst. 1881 — ***Postia ceriflua*** (Berk. & Curt. in Berk.) Jülich, *comb. nov.* (basonym: *Polyporus cerifluus* Berk. & Curt. in Berk. 1872, in Grevillea 1: 50). — ***Postia floriformis*** (Quél. in Bres.) Jülich, *comb. nov.* (basonym: *Polyporus floriformis* Quél. in Bres. 1884, Fung. trident. 1: 61). — ***Postia fragilis*** (Fr.) Jülich, *comb. nov.* (basonym: *Polyporus fragilis* Fr. 1828, Elench. Fung. 1: 86). — ***Postia guttulata*** (Peck) Jülich, *comb. nov.* (basonym: *Polyporus guttulatus* Peck 1883, in Ann. Rept. N.Y. State Mus. 33: 37; in Sacc. 1888, Syll. Fung. 1: 86). — ***Postia hibernica*** (Berk. & Br.) Jülich, *comb. nov.* (basonym: *Polyporus hibernicus* Berk. & Br. 1871, in Ann. Mag. Nat. Hist., Ser. 4, 7: 428). — ***Postia inocybe*** (David & Malenç.) Jülich, *comb. nov.* (basonym: *Tyromyces inocybe* David & Malenç. 1979, in Bull. Soc. mycol. France 94: 406–407). — ***Postia johnstonii*** (Murrill) Jülich, *comb. nov.* (basonym: *Poria johnstonii* Murrill 1920, in Mycologia 12: 303). — *Postia lactea* (Fr.) P. Karst. 1881 — ***Postia leucomallela*** (Murrill) Jülich, *comb. nov.* (basonym: *Tyromyces leucomallelus* Murrill 1940, in Bull. Torrey bot. Club 67: 63). — ***Postia leucospongia*** (Cooke & Harkness in Cooke) Jülich, *comb. nov.* (basonym: *Polyporus leucospongia* Cooke & Harkness in Cooke 1883, in Grevillea 11: 106). — ***Postia lowei*** (Pilát) Jülich, *comb. nov.* (basonym: *Leptoporus lowei* Pilát 1953, in Sborn. Nar. Mus. Praha 9 B 2: 101). — ***Postia luteocaesia*** (David) Jülich, *comb. nov.* (basonym: *Spongiporus luteocaesius* David 1980, in Bull. Soc. linn. Lyon 49: 29). — ***Postia sericeomollis*** (Romell) Jülich, *comb. nov.* (basonym: *Polyporus sericeomollis* Romell 1911, in Ark. Bot. 11 (3): 22). — ***Postia simanii*** (Pilát) Jülich, *comb. nov.* (basonym: *Leptoporus simanii* Pilát 1953, in Sborn. Nar. Mus. Praha 9 B 2:

100–101). — *Postia stiptica* (Pers. ex Fr.) Jülich, *comb. nov.* (basionym: *Polyporus stipticus* (Pers.) ex Fr. 1821, Syst. Mycol. 1: 359). — *Postia subcaesia* (David) Jülich, *comb. nov.* (basionym: *Tyromyces subcaesius* David 1974, in Bull. Soc. linn. Lyon, num. spéc., 43: 119). — *Postia tephroleuca* (Fr.) Jülich, *comb. nov.* (basionym: *Polyporus tephroleucus* Fr. 1821, Syst. Mycol. 1: 360). — *Postia undosa* (Peck) Jülich, *comb. nov.* (basionym: *Polyporus undosus* Peck 1883, in Ann. Rept. N.Y. State Mus. 34: 42).

ON POLYPORUS FRACTIPES

The systematic position of *Polyporus fractipes* Berk. & Curt. was dubious for a long time. The species was transferred at first to the genus *Grifola* by Murrill (1907), and was placed later in the genera *Abortiporus* (Bondartsev, 1959), *Heteroporus* (Fidalgo, 1964) and *Spongipellis* (Kotl. & Pouz. 1976). The latter authors also described a separate subgenus *Loweomyces* for this species. There are a number of differences between *Spongipellis* s. str. and *Polyporus fractipes* which have to some extent been discussed by David & Candoussau (1974), Jahn (1974), and Kotlaba & Pouzar (l.c.): (i) spore germination is easily obtained in *Spongipellis*, but could not yet be induced in *P. fractipes*; (ii) basidia are quite large in *Spongipellis* (18–25 µm long in *S. spumeus*, 20–35 µm long in *S. pachyodon*), but are short in *P. fractipes* (9–12–14 µm long); (iii) skeletoid hyphae are common in *Spongipellis*, but are absent or confined to the basal part or the stipe in *P. fractipes*; (iv) tubes, plates or spines are 10–20–30 mm long in the European species of *Spongipellis*, but are only 0.5–2 mm long in *P. fractipes*.

The differences are large enough to justify a separate genus.

Loweomyces (Kotl. & Pouz.) Jülich, *stat. nov.*

Basionym: *Spongipellis* Pat. subgen. *Loweomyces* Kotl. & Pouz. 1976, in Mem. N.Y. Bot. Gard. 28 (1): 121.

Loweomyces fractipes (Berk. & Curt.) Jülich, *comb. nov.* Basionym: *Polyporus fractipes* Berk. & Curt. in Berk. 1872, in *Grevillea* 1: 39.

A second species, viz. *Tyromyces wynnei*, can be placed in *Loweomyces*. The species has also cyanophilous, clamped hyphae, small basidia and subglobose spores. It was recently excluded from *Tyromyces* s. str. (David, 1980).

Loweomyces wynnei (Berk. & Br.) Jülich, *comb. nov.* Basionym: *Polyporus wynnei* Berk. & Br. 1859, in Ann. Mag. Nat. Hist. ser. III, 3: 358.

ON FIBULOPORIA

For some taxa with resupinate and poroid hymenophors and fibulate hyphae, Bondartsev & Singer (in Singer, 1944) described *Fibuloporia*, a genus based on *Polyporus molluscus* (Pers.) ex Fr. 1821. Unfortunately, the type species had to be transferred to the genus *Trechispora* (Donk, 1967) which makes *Fibuloporia* a synonym of *Trechispora*. The correct name for *Polyporus molluscus* sensu Bond. & Sing. is *Polyporus mucidus* (Pers.) ex Fr. 1821. The systematic position

of that species is somewhat doubtful. Domański (1965, 1969) and Ryvar den (1976) accepted *Fibuloporia* (with the misapplied type species) as a distinct genus, while Ryvar den & Johansen (1980) mention the species in their key to the taxa of *Tyromyces*. The genus is probably not related to *Tyromyces* (David, 1980), since it differs in its non-ceraceous hymenophor. It differs furthermore from *Anomoporia* in its inamyloid spores. To accommodate *P. mucidus*, a new genus is described.

Porpomyces Jülich, *gen. nov.*

Carposoma resupinatum, cremeum vel ochraceum, membranaceum; poris minutis, subangulatis, 0.2–0.4 mm diam. Systema hypharum monomiticum. Hyphae hyalinae, tenuiter vel paulo incrassate tunicatae, semper fibulatae, laeves vel granulis ornatae. Cystidia desunt. Basidia hyalina, parva, distincte clavata, tetraspora. Spores hyalinae, late ellipsoideae, tenuiter tunicatae, laeves, inamyloideae.

ETYMOLOGY: η πόρπη – clamp, ο μύκης – fungus

TYPUS: **Porpomyces mucidus** (Pers. ex Fr.) Jülich, *comb. nov.* (basionym: *Polyporus mucidus* (Pers.) ex Fr. 1821, Syst. Mycol. 1: 382.) — Syn.: *Fibuloporia donkii* Domański 1969, in Acta Soc. Bot. Pol. 38: 463.

Basidiocarp resupinate, cream-coloured or ochraceous, membranaceous, with small, subangular pores (0.2–0.4 mm wide). Hyphal system monomitic. Hyphae hyaline, thin- to somewhat thick-walled, always with clamps, smooth or the basal ones covered with granules. Cystidia absent. Basidia hyaline, small, distinctly clavate, four-spored. Spores hyaline, broadly ellipsoid, thin-walled, smooth, inamyloid.

ON *Eocronartium*

The genus *Eocronartium* occupies an isolated position within the Auriculariales. Formerly placed in the Auriculariaceae, it was removed from that family because of its deviating ultrastructural characters (Khan & Kimbrough, 1980 a, b).

The fungus which is parasitic on the gametophytes of bryophytes, forms similar thin, cylindrical basidiocarps as *Typhula* but differs from the latter genus in its transversely divided basidia and the occurrence of spore repetition. The binucleate hyphal cells are divided by perforate septa, composed of two outer electron-dense layers separated by an inner electron-transparent layer. Near the pore, the cross walls become somewhat thicker, while septal pores are occluded by electron-dense material on one or both sides; a pore cap is absent. The last mentioned character, i.e. the absence of a parenthosome or pore cap, is a typical characteristic for many parasitic Heterobasidiomycetes (Uredinales, Ustilaginales, Septobasidiales, and some members of the Filobasidiaceae). On the other hand, parenthosomes are present in all Homobasidiomycetes, and also in the Tremellales and Auriculariales studied so far. The similarities in the septal ultrastructure indicate a closer relationship between *Eocronartium* and the Uredinales or Septobasidiales, but *Eocronartium* cannot be placed in one of the families of parasitic Heterobasidiomycetes, since thick-walled teliospores are lacking. Therefore, a new family is described for this genus. Further studies will show whether this new family will remain monotypic, or should include other parasitic Auriculariales like *Iola*, *Herpobasidium*, or

Platycarpa. The systematic position of this family is, however, with the Uredinales (= Pucciniales, Jülich 1982) rather than with the Auriculariales.

Eocronartiaceae Jülich, *fam. nov.*

Carposomata stipitata, anguste clavata, haud ramosa. Systema hypharum monomiticum. Hyphae hyalinae, cylindratae, tenuiter vel incrassate tunicatae, haud fibulatae, septatae, poris septorum absque parenthosomatibus. Basidia cylindrata, 3 septis transversalibus. Sporae hyalinae, laeves, tenuiter tunicatae, inamyloideae.

Typus: *Eocronartium* Atkinson 1902, in *J. Mycol.* 8: 107.

Basidiocarp stipitate, narrowly clavate, not branched. Hyphal system monomitic. Hyphae hyaline, cylindrical, thin- to slightly thick-walled, without clamps, septate, pores of cross walls without parenthosomes. Basidia cylindrical, four-celled. Spores hyaline, smooth, thin-walled, inamyloid.

ON CHRISTIANSENIA AND SYZYGOSPORIA

Mycoparasitic Basidiomycetes are rare and mainly found in Heterobasidiomycetes. Among the parasitic Aphyllophorales, two genera deserve special attention, viz. *Christiansenia* Hauerslev (Boidin, 1970, Ginns & Sunhede, 1978) and *Syzygospora* (Oberwinkler & Lowy, 1981). Both genera are characterized by more or less ceraceous or even tremelloid basidiocarps, narrowly clavate holobasidia with 2-4-6 sterigmata, hyaline spores, and conidia in the teleomorph fructification. Basidiospores are either ballisto- or statismospores, often germinating by blastospores or yeast cells. In the type species of both genera, a special kind of conidia is present, which are called zyoconidia (Boidin, 1970): these are paired, 1-nucleate blastogenous cells which fuse laterally (and thus become 2-nucleate) and are finally dispersed.

The ceraceous context and the narrowly clavate basidia point towards the Meruliales (Jülich, 1981) an order with genera like *Auriculariopsis*, *Dacryobolus*, *Merulius*, *Panellus*, *Phlebia*, and *Plicatura*. But since *Christiansenia* and *Syzygospora* differ in their parasitic habit, special types of conidia, and ballisto- or statismospores germinating with blastoconidia or yeast cells, both genera have to be placed in a family of their own.

Syzygosporaceae Jülich, *fam. nov.*

Carposomata parasitica, resupinata, effusa, laevia vel gyrosa, gelatinosa. Systema hypharum monomiticum. Hyphae hyalinae, cylindratae, tenuiter vel paulo incrassate tunicatae, saepe fibulatae. Cystidia desunt. Basidia hyalina, (anguste) clavata vel paulo suburniformia, 2-4-6 sterigmatibus. Sporae (ballistosporae vel statismosporae) hyalinae, cylindratae ad late ellipsoideae, tenuiter tunicatae, laeves, inamyloideae, saepe blastosporis. Conidia (partim zyoconidia) adsunt.

Typus: *Syzygospora* Martin 1937, in *J. Wash. Acad. Sci.* 27 (3): 112.

Basidiocarps parasitic, resupinate, effused, smooth or folded tremelloid, gelatinous. Hyphal system monomitic. Hyphae hyaline, cylindrical, thin- to somewhat thick-walled, often with clamps. Cystidia absent. Basidia hyaline, (narrowly) clavate or slightly suburniform, with 2-4-6 sterigmata. Spores (ballisto- or statismospores) hyaline, cylindrical to broadly ellipsoid, thin-walled, smooth, inamyloid, often germinating with blastospores. Conidia (partly zyoconidia) present.

SCOPE: *Christiansenia* Hauerslev 1969, *Syzygospora* Martin 1937.

Oberwinkler & Lowy (1981) who had studied *Syzygospora alba*, found dolipore septa without or with parenthosomes of the *Filobasidium*-type. This would mean that the taxon in question belongs to the Heterobasidiomycetes. But since they have only studied dried, several years old herbarium material, new studies based on fresh specimens should be carried out before any further systematic conclusions can be drawn.

SOME ADDITIONAL NEW COMBINATIONS

Cerocorticium pseudomucidum (Petch) Jülich, *comb. nov.*

Basionym: *Hydnum pseudomucidum* Petch 1916, in *Ann. R. bot. Gdns Peradeniya* **6**: 156.

Jacksonomyces lividus (Burt) Jülich, *comb. nov.* Basionym: *Peniophora livida* Burt 1926, in *Ann. Mo. bot. Gdn* **12**: 239.

Jacksonomyces subcretaceus (Litsch.) Jülich, *comb. nov.*

Basionym: *Corticium subcretaceum* Litsch. 1939, in *Österr. bot. Z.* **88**: 110.

Skeletocutis azorica (Reid) Jülich, *comb. nov.*

Basionym: *Incrustoporia azorica* Reid in Dennis, Reid & Spooner 1977, in *Kew Bull.* **32**: 106.

Trametes multicolor (Schaeffer) Jülich, *comb. nov.*

Basionym: *Boletus multicolor* Schaeffer 1774, *Fung. Bavar. Palat. Ratisb. icones*, vol. **4**: 91, pl. 269.

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STUDIES IN AMANITA—II

Miscellaneous notes

C. BAS

Rijksherbarium, Leiden

Two new species are described in *Amanita* sect. *Amanita*, viz. *A. pulverotecta* Bas from southeastern Africa and *A. brunneoconulus* Bas & Gröger from central Europe. Type studies are given of *A. hyperborea* P. Karst. (a species related to *A. friabilis* and not to *A. vaginata*), *A. vaginata* f. *oreina* J. Favre (a synonym of *A. nivalis* Greville), and *A. sternbergii* Velen. (a synonym of *A. friabilis*).

I. AN UNDESCRIBED SPECIES OF AMANITA SECTION AMANITA
FROM SOUTHEASTERN AFRICA

A specimen of a rather unusual species of *Amanita* from Malawi was kindly sent to me for identification by Dr. D. Pegler, Kew. It consists of a single large and rather fleshy carpophore with an exannulate clavate stipe and a dry powdery-granular pileal surface. There does not seem to be any type of volva and therefore the specimen does not immediately make one think of the genus *Amanita*. The divergent trama of the lamellae and the acrophysalidic tissue of the stipe nevertheless prove that the species concerned belongs to this genus. The volva is here apparently reduced to a thin powdery-granular layer that owing to a non-gelatinizing pileipellis seem to be part of the pileus itself.

No name being available for this remarkable fungus, the following new species is based upon it.

***Amanita pulverotecta* Bas, spec. nov. — Fig. 1**

Pileus c. 150 mm latus, plano-convexus, margine laevis, albidus, fragmentis volvae granuliformibus vel pulveraceis, bubalinis ornatus. Lamellae subliberae, albiae vel pallide luteolo-bubalinae; lamellulae probabiliter truncatae. Stipes c. 175 mm longus, deorsum incrassatus, bulbo c. 25 mm lato, ventricoso, subradicanti praeditus, solidus, griseolo-pulverulentus vel griseolo-subsquamulosus, exannulatus. Volva pulveracea. Caro alba. Sporae 11-13 x 5.5-7.5 μ m, ellipsoideae vel elongatae, inamyloideae. Fragmenta volvae cellulis turgidis, brunneo-flavidis, terminalibus vel subcatenulatis hyphisque inconditis composita. Fibulae absentes. Typus: 'B. Morris 186, 21 III 1980, Malawi, Zomba Plateau' (K).

ETYMOLOGY: pulvis, powder; tectus, covered.

Carpophore large and robust. Pileus 150 mm wide, plano-convex (perhaps with slight central depression)¹, with (slightly inflexed) sulcate-striate (0.15 to 0.25 R) margin, whitish but densely

¹ Macroscopic characters placed between brackets observed in dried material.

sprinkled with pale buff powdery, at centre powdery-granular, remnants of volva, dry. Lamellae just touching apex of stipe, (moderately crowded), up to 16 mm wide, whitish with yellowish buff tinge (with conspicuous, minutely flocculose, white edge; only one lamellula clearly seen and that truncate). Stipe 175 mm long, gradually broadening downwards into a subventricose, 27 mm wide bulbous base with short (± 30 mm long) rooting point, solid (probably whitish), covered with greyish powdery to powdery-subsquamosule remnants (< 1 mm) of partial veil and volva, exannulate. Volva completely pulverulent. Context white, soft and brittle. Sporeprint not available.

Spores [10/1] (10.6–)10.9 \times 12.8(–14.8) \times 5.7–7.4 μm , ellipsoid or elongate or elongate-ovoid ($Q = 1.6\text{--}2.0$, mean 1.7³), sometimes with slight suprahilar depression and somewhat tapering towards a rather broad and truncate apiculus, smooth, thin-walled, hyaline, usually with one large oil-drop, somewhat greenish in NH_4OH , inamyloid, not cyanophilous. Basidia 39–52 \times 9.5–10.5 μm , 4-spored, clampless. Marginal tissue consisting of abundant small to relatively large, thin-walled, colourless, clavate, ellipsoid and globose cells 15–45 \times 10–30 μm , terminal or in short rows, covered by an up to 200 μm thick strip of desintegrating elements. Trama of lamellae divergent (difficult to analyze in dried material). Subhymenium about 30–40 mm wide, almost pseudoparenchymatic, consisting of inflated ramose to (sub)globose cells. Pileipellis merely a dense, non-gelatinized cutis-like layer (in dried material brown probably from necropigment) between volval remnants and trama of pileus, made up of 3–7 μm wide, interwoven to subradial hyphae. Volval remnants on cap consisting of globose, ellipsoid, ovoid and more rarely elongate, yellow-brown inflated cells, 28–46 \times 20–35 μm , terminal or sometimes in short rows, with somewhat encrusted walls, on slightly thick-walled, brownish yellow encrusted, 2.5–5.5(–7) μm wide, entangled hyphae. Granular volval remnants on base of stipe resembling those on pileus but without incrustations and inflated cells often with slightly thickened yellowish wall. Trama of stipe with abundant acrophysalides, 50–220 \times 20–50 μm , and scanty oleiferous hyphae. Covering of stipe consisting of rather loose acrophysalidic tissue but at apex with crowded sphaeropedunculate, piriform and clavate terminal cells, 35–150 \times 28–46 μm . Clamps absent from all tissues.

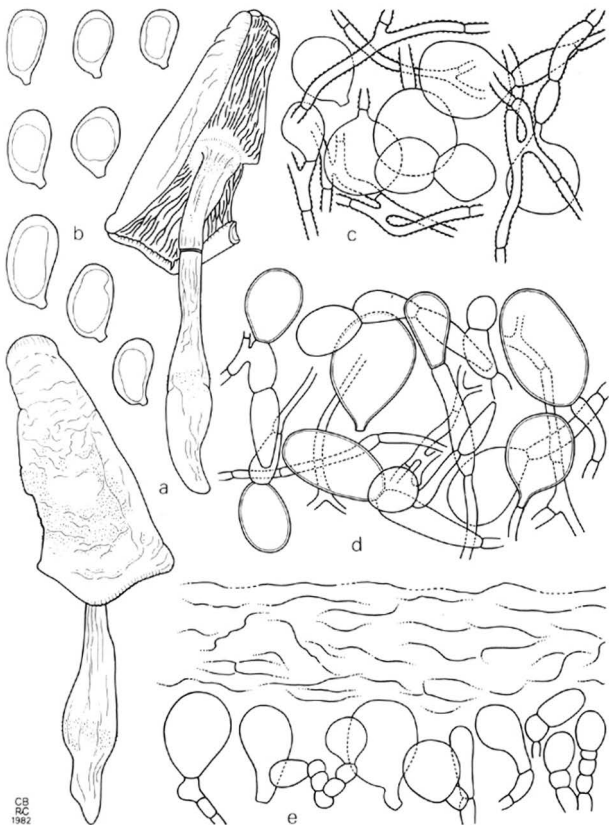
HABITAT & DISTRIBUTION. — Terrestrial at about 1000 m. alt.

COLLECTION EXAMINED.—MALAWI, Malose Mtn., Zomba Plateau, 21 March 1980, *B. Morris 186* (holotype, K).

The non-amyloid spores in combination with the sulcate-striate margin of the pileus and the bulbous base of the stipe render this species a member of section *Amanita*. There are a number of species in this section that have with *A. pulverotecta* a character in common that is somewhat unusual in *Amanita*, viz. a dry powdery or granular pileal surface caused by a pulverulent volval layer over a non-gelatinizing pileipellis. In addition the volval remnants on the base of the stipe are usually also pulverulent or granular and sometimes not or hardly discernable in mature carpophores.

It was precisely this set of characters that lead Earle (1909: 449) to create the genus *Amanitella* for the North American species *Amanita farinosa* Schw. We know now that several other species show these characters also, e.g. *A. obsita* Corner & Bas (Malaya), *A. subvaginata* Clel. & Checl

Fig. 1. *Amanita pulverotecta*. — a. Dried carpophore $\times \frac{1}{2}$. — b. Spores $\times 1250$. — c. Elements of volval remnant on pileus $\times 500$. — e. Strip of amorphous matter and underlying marginal cells at edge of lamella $\times 500$ (all figs. from type).



(Australia), *A. xerocybe* Bas (Brasil). It is tempting to bring these species together in a taxon on subsectional level, but unfortunately among themselves they differ rather strongly in other aspects, such as very small, globose versus large, ellipsoid spores, annulus present or absent, etc. Moreover, some brightly coloured species like *A. bingensis* Beeli (Congo) might have to be placed in the same group and it seems that among these the transition from a dry pileipellis with adnate pulverulent volval remnants to a more or less gelatinized pileipellis with small, friable, wart-like volval remnants is very gradual.

It is not clear yet which characters should prevail in subdividing section *Amanita*.

Among the species in section *Amanita* with a dry pulverulent pileal surface, *A. pulverotecta* is easy to recognize by its large ($> 10 \mu\text{m}$) ellipsoid spores and its large and robust fruit-body.

2. AN UNDESCRIBED SPECIES OF AMANITA SECTION AMANITA FROM CENTRAL EUROPE

It is surprising that even nowadays in Europe a very characteristic and yet undescribed species of *Amanita* can be found. The species described here, discovered and very well annotated by Mr. F. Gröger, Warza (East Germany) is somewhat intermediate in habit between *A. inaurata* Secr. and *A. friabilis* (P. Karst.) Bas, but because of the presence of a primordial bulb it is, together with *A. friabilis*, to be placed in section *Amanita*, whereas *A. inaurata*, in which a primordial bulb is lacking, belongs to section *Vaginatae*.

Amanita brunneoconulus Bas & Gröger, *spec. nov.*—Fig. 2

Pileus 20–80 mm latus, hemisphaericus vel plano-convexus, exumbonatus, margine sulcatus, (pallide) brunneus, centro verrucis conicis, brunneis, minutis, 0.5–1 mm latis ornatus. Lamellae confertae, liberae, albae. Stipes 50–80 × 8–16 mm, basi subbulbosus, farctus vel cavus, exannulatus, pallide zonatus vel brunneo-zonatus, deorsum costis 1 vel 2 brunneis, angustis, annularibus ornatus. Caro alba. Sporae 10–12 × 9.5–11.5 μm , (sub)globosae, non-amyloideae. Volvae fragmenta conica in pileo deposita cellulis turgidis brunneis clavatis vel sphaeropedunculatis hyphisque \pm erectis composita. Fibulae absentes. Typus: 'F. Gröger, 27 June 1981, East Germany, Haina' (L).

ETYMOLOGY: brunneus, brown; conulus, small cone.

Carpophores subgregarius. Pileus in type 22–44 mm wide, in paratype up to about 80 mm wide², from almost hemispherical when young to plano-convex when mature, without umbo, with rather broad sulcate margin (0.25–0.3(–0.4) R), ochraceous brown³, somewhat darker and slightly more reddish brown to olivaceous brown at centre and darker at sulcate marginal zone (because of darker radial ridges), smooth, not viscid, at centre densely set with small, 0.5–1 mm wide, truncate-conical volval warts towards margin gradually passing into somewhat larger, 2–3 mm wide, usually angular volval patches; volval warts and patches concolorous with pileus, but

² There are no field-notes on the paratype available; as the dried carpophores of this collection are considerably larger than those of the type, the measurements of the fresh carpophores as estimated from the dried ones are included in this description.

³ In the field-notes on the type the following colours are mentioned for the pileus: ochraceous brown, pale brown, pale coffee-with-milk brown, wood brown.

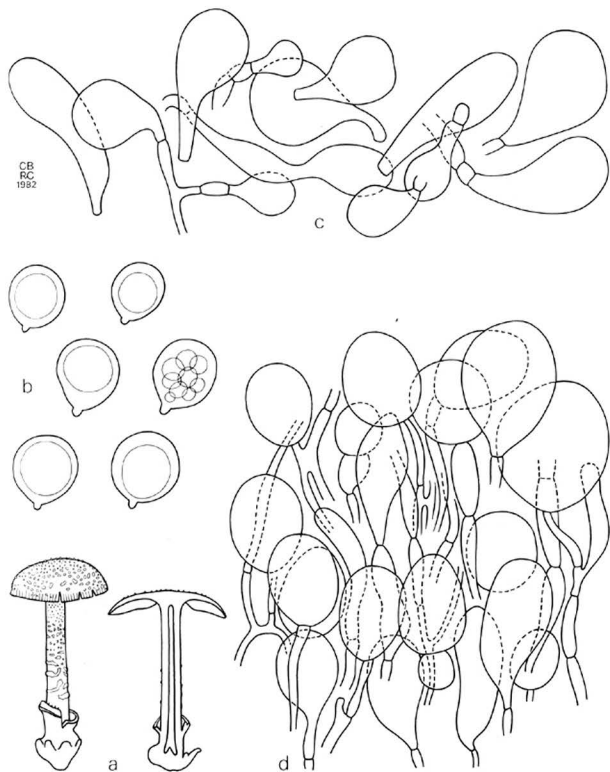


Fig. 2. *Amanita brunneoconulus*. — a. Fruit-bodies $\times \frac{1}{2}$. — b. Spores $\times 1250$. — c. Elements of marginal tissue of lamella (\pm in situ) $\times 500$. — d. Slightly dissociated elements of volva in longitudinal section of wart on pileus $\times 500$ (all figs. from type).

at first at darker centre somewhat paler than background, later with conspicuous dark brown tips, not easily removable but in paratype broad margin of pileus glabrous. Lamellae free, crowded, with 0-1(-3) truncate lamellae between each pair, near margin of pileus sometimes forked, moderately broad (up to 5 mm wide in type), whitish, with minutely fimbriate, whitish, but near margin of pileus often pale brown edge. Stipe 52-83 × 8-12 (at apex) to 9-16 mm (just above base) in type, up to 150 × 20 mm in paratype, subcylindrical to attenuate upwards, with subbulbous base (16-25 wide in type and up to 30 mm in paratype), stuffed, becoming hollow in late stages, exannulate, with whitish (at apex) to pale ochraceous brown subflocculose covering and this on middle part of stipe breaking up into zig-zag zones on white background, at base with one or two (incomplete) circular narrow volval ridges of same colour and substance as volval warts on pileus and these volval ridges often causing a splitting of superficial tissue of stipe thus giving rise to an (incomplete) pseudovolva⁴ 15-30 mm above base of stipe and causing lobbed appearance of subbulbous base itself. Context white but somewhat ochraceous in base of stipe, moderately thick in pileus (up to 4.5 mm thick above middle of lamellae in type). Taste and smell practically absent. Spore-print lacking.

Spores [20/2/2] (9.5-10.2-12.2(-13.6) × (9.1-9.6-11.6(-13.3) μm, Q = 1.0-1.15, mean Q 1.05, globose to subglobose, with medium-sized abrupt apiculus, thin-walled, smooth, colourless, usually uni-, sometimes multiguttulate, inamyloid. Basidia 52-74 × 13.5-19.5 μm, 4-, rarely 2-spored, clampless. Marginal tissue when young an up to 145 μm broad, somewhat brownish strip of irregularly arranged, narrowly clavate to spheropedunculate cells, 18-47 × 12-27 μm, terminal or rarely in rows of 2 or 3 on rather inconspicuous narrow hyphae, but very soon cells collapsing and their remains forming a narrow strip of amorphous matter with still some scattered inflated cells. Trama of lamellae probably bilateral but difficult to study in dried material; subhymenium 20-30 μm thick, broad-celled ramose, tending to become pseudoparenchymatic. Pileipellis a rather thin, ± 25-35 μm thick, colourless ixocutis of 2-3.5 (-5) μm wide straight hyphae running criss-cross over a dense, thick, brown cutis of up to 6 μm wide hyphae with vacuolar pigment. Volval warts near centre of pileus consisting of very abundant more or less erect (sub)globose, ellipsoid and clavate, thin-walled, brown cells, 20-50(-75) × 13-45(-70) μm, terminal or more rarely (particularly small cells) in short terminal rows on abundant but rather inconspicuous, ascending, 2-7.5 μm wide, branching hyphae, intermixed with scattered elongate and somewhat irregular cells and a few oleiferous hyphae, with vacuolar pigment; volval patches near margin of pileus made up of same but irregularly arranged elements. Stipitetrama consisting mainly of up to 250 × 70 μm and 275 × 36 μm large acrophysalides; some scattered oleiferous hyphae present. Covering of upper and middle part of stipe made up of loosely arranged, somewhat irregular, sublongitudinal, 4-9 μm wide hyphae and scattered relatively small ± clavate terminal cells. Brown volval ridges on base of stem of some composition as volval patches on margin of pileus; main body of pseudovolval limb consisting of stipe tissue. Clamps absent.

HABITAT & DISTRIBUTION.—Deciduous forest (*Fagus*, *Tilia cordata*, *Fraxinus*, *Prunus avium*, *Quercus petraea*, *Acer campestre*, *Crataegus*) on calcareous loam over "Muschelkalk", with *Arum maculatum*, *Asarum*, *Campanula trachelium*, *Hedera*, *Lathyrus vernus*, *Phyteuma spicata*, *Stellaria holostea*, *Micromphale foetidum*, etc. Thus far known from four localities in the Bezirk Erfurt in East Germany (Kreise Haina, Mühlhausen, Bad Langensalza, and Heiligenstadt).

COLLECTIONS EXAMINED.—EAST GERMANY, Bezirk Erfurt: Kreis Gotha, 2 km WSW of Haina, 27 June 1981, *F. Gröger* (holotype; L); Kreis Mühlhausen, Stadtwald 6 km WSW of Mühlhausen, 9 July 1977, *F. Gröger* (paratype; L, JE).

⁴ This term is used here for a structure resembling a volval limb but for the greater part consisting of the acrophysalidic tissue of the stipe.

NOTE.—Although in the field-notes the pileal surface is described as dry and the volval warts on the pileus as rather difficult to remove, in view of the presence of a thin ixocutis it is to be expected that the pileus becomes subviscid in rainy weather and that the volval warts are sometimes washed away.

Amanita brunneoconulus is fully characterized by the crowded, small, brown, truncate-conical warts on the central part of the brown pileus in combination with the exannulate stipe decorated with rather conspicuous whitish to pale brown zigzag zones of partial veil material and the few narrow strips of brown volval material on the base of the stipe. These volval strips sometimes provoke the formation of a 'pseudovolva' by splitting of the superficial tissue of the stipe.

On account of the subbulbous base *A. brunneoconulus* has to be placed in section *Amanita*, in spite of its exannulate stipe. There it finds its place near the European species *A. friabilis* (P. Karst.) Bas and *A. hyperborea* (P. Karst.) Fayod and several extra-european species. This conclusion, however, is drawn from the morphology of the base of the stipe in just expanded and mature carpophores. The presence of a true primordial bulb in this species still has to be confirmed by observations on very young unexpanded carpophores.

Amanita brunneoconulus differs from *A. friabilis* by more (sub)globose spores ($10-12 \times 9.5-11.5$ with $Q = 1.0-1.15$ in the former and $10-12.5 \times 8-10 \mu\text{m}$ with mean $Q = 1.2-1.35$ in the latter), the complete lack of grey tinges and the strictly truncate-conical volval warts at the centre of the pileus. Moreover *A. brunneoconulus* seems to prefer rich deciduous forest without *Alnus* on calcareous loam, whereas *A. friabilis* grows in wetter deciduous forest where it is associated with *Alnus*.

Amanita hyperborea is completely white, has larger, more broadly ellipsoid spores ($11.5-13 \times 9.3-11 \mu\text{m}$, $Q = 1.1-1.3$) than *A. brunneoconulus*, and is until now known only from Russian Lapland.

3. TYPIFICATION AND REDESCRIPTION OF AMANITA HYPERBOREA (P. KARST.) FAYOD

In 1876 Karsten published a new species of *Amanita* under the name *Agaricus (Amanita) hyperboreus* from material collected by him in 1861 in Russian Lapland. The name *Agaricus gemmatus* var. *lapponicus* Karst. ('Enum. Fung. Lapp. p. 197') is given as a synonym, which seems somewhat strange as the date of publication of Karsten's 'Enum. Fung. Lapp. ...' is usually given as 1882. Fortunately Dr. H. Harmaja, Helsinki (in lit.) informed me that this publication of Karsten appeared as a preprint 16 years before it was published again in a journal in 1882 (see synonymy on p. 436 of the present paper), so that the name *A. gemmatus* var. *lapponicus* is 10 years older than the name *A. hyperboreus*.

The only information on this var. *lapponicus* given by Karsten in 1866 is that it had a white cap and was found on a sandy bank of the river Tuloma. The description of the same taxon under the name *A. hyperboreus* in 1876 provides more information. From this we learn that the whole fruit-body is white, that the 6 cm wide pileus has a sulcate margin and is covered with angular warts, and that the 4 cm long stipe has a bulb and is exannulate. The spores are said to be globose and to measure $10-14 \mu\text{m}$. Karsten mentions a resemblance with varieties of *A. vaginatus* but stresses

the warts on the pileus and the habit of the fruit-body as differential characters. Later Karsten continues the use of the epithet '*hyperboreus*' (e.g. in 1879: 40, in *Amanitopsis*).

It is somewhat unexpected to find in the Karsten Herbarium in the Botanical Museum in Helsinki one collection (*Karsten 1545*) under the name *Agaricus (Amanita) hyperboreus* and another (*Karsten 1544*) under the name *Amanitopsis gemmata*,⁵ both collected on the same day and at the same locality (Russia, peninsula Kola, near Kola, among grasses on sand near the bank of the river Tuloma, 27 VII 1861).

It seems very probable that *Karsten 1545* and *Karsten 1544* originally formed one collection which for unknown reasons has been split into two parts which got different herbarium numbers. This assumption is strengthened by the facts that on the packet of *Karsten 1545* the original specific epithet of the name *Agaricus gemmatus* has been deleted and replaced by the epithet '*hyperboreus*' (in Karsten's handwriting), and that the two collections certainly are conspecific. Therefore I consider *Karsten 1544* to represent an isotype. This is of some importance as the specimen in that collection is in a somewhat better condition than the two in the holotype collection *Karsten 1545*. Particularly characters of the stem can be observed much better in the isotype.

The following description is based on the data published by Karsten and on data obtained by a study of the holotype and isotype collections.

AMANITA HYPERBOREA (P. Karst.) Fayod—Fig. 3

Agaricus gemmatus var. *lapponicus* P. Karst., Enum. Fung. Myxomyc. Lapponia orient. aest. 1861 lect.: 197. 1866.⁶ (preprint of paper in Not. Sällsk. Fauna Fl. fennica Förh. 8 n.s. 5: 197. 1882.)

Agaricus hyperboreus P. Karst., Mycol. fennica 3: 27. 1876. — *Amanitopsis hyperborea* (P. Karst.) P. Karst. in Bidr. Finl. Nat. Folk (Ryssl. Finl. Skand. Hattsv.) 32: 7. 1879. — *Amanita hyperborea* (P. Karst.) Fayod in Ann. Sc. nat., sér. 7 (Bot.) 9: 317. 1889. — *Pseudofarinaceus hyperboreus* (P. Karst.) O. Kuntze, Rev. Gen. Plant. 2: 868. 1891. — *Vaginata hyperborea* (P. Karst.) O. Kuntze, Rev. Gen. Plant. 3 (2): 539. 1898. — *Amanita vaginata* f. *hyperborea* (P. Karst.) Vesely in Annl. mycol. 31: 280. 1933.

Pileus up to 60 mm wide, convex to plano-convex, probably somewhat umbonate, thin-fleshed, with rather strongly and densely sulcate margin (dried: sulcation 0.2⁵ to 0.5 R long; about 12 grooves per 10 mm), white, at least at centre with small (dried: 0.5–1.5 mm wide and 0.5–1 mm high), (sub)conical white volval warts to felted volval patches; pileal surface in dried state mat to somewhat shiny and without distinct fibrillose pattern (even under hand lens). Lamellae free, crowded, probably rather narrow, white, probably with minutely flocculose white edge; lamellae present. Stipe relatively short, up to 40 mm long, moderately thick, with narrowly clavate to (sub)bulbous base (dried: stipe 20–30 × 4 mm, at base up to 7 mm wide), white, exannulate, slightly fibrillose, on lower quarter with small, vague, white, felted-subflocculose volval warts or patches.

Spores [30/2/2] 11.2–13.3(–13.8) × 9.4–10.8(–11.3) μm, Q 1.1–1.35, mean Q in both collections 1.2, subglobose to broadly ellipsoid or broadly obovoid, rarely ellipsoid, colourless, thin-walled.

⁵ The epithet '*lapponicus*' does not occur on the labels and packages of the two collections.

⁶ The information that Karsten's 'Enum. Fung. Myxomyc. Lapponia...' has been prepublished as a separate paper in 1866 is to be found on the fourth page of the volume of the journal in which it has been published again in 1882.

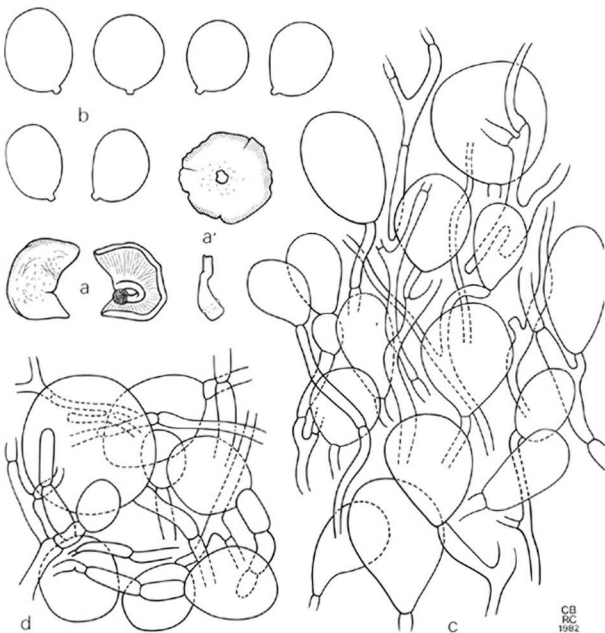


Fig. 3. *Amanita hyperborea*. — a, a'. Dried fruit-bodies $\times 1$. — b. Spores $\times 1250$. — c. Slightly dissociated elements of tissue of volval wart on pileus $\times 500$. — d. Elements of tissue of volval wart on base of stipe $\times 500$. (a, b from type; a', c, d from isotype).

with medium to small abrupt apiculus, sometimes with cloudy and somewhat refractive contents, inamyloid. Basidia $48-65 \times 12.5-14.5 \mu\text{m}$, 4-spored (very rarely 3- or 2-spored), clampless. Trama of lamellae (impossible to analyse in both collections). Pileipellis (difficult to analyse because of heavy moulding) composed mainly of $2-6 \mu\text{m}$ wide, interwoven or subradial hyphae; suprapellis a thin ixocutis. Volval remnants on pileus yellowish in NH_4OH 10%, made up of a mixture of abundant $3-8 \mu\text{m}$ wide hyphae often with somewhat refractive contents, abundant subglobose to ellipsoid or broadly ovoid inflated cells, $20-65 \times 15-55 \mu\text{m}$, terminal or in short terminal rows, and scattered oleiferous hyphae; at least in base of pileal warts hyphae and more elongate inflated cells showing a preference for the erect position. Volval remnants on

base of stipe breaking up into small, thick, felted, poorly delimited patches without a trace of a (sub)membranous outer layer, consisting of 20–70 μm long globose to ellipsoid or ovoid inflated cells terminally on 3–7 μm wide branching hyphae; all elements thin-walled and colourless except the scarce, sometimes (in NH_4OH 10%) yellowish oleiferous hyphae. Trama of stipe (difficult to analyse) acrophysalidic; inflated cells up to 25 μm wide. Clamps lacking in all tissues studied.

HABITAT & DISTRIBUTION.—Known only from the type locality in Russian Lapland from a grassy sandy bank of a river. Collected in July.

COLLECTIONS EXAMINED.—U.S.S.R., Murmansk, along river Tuloma near Kola, 27 July 1861, *P. A. Karsten* 1545 (type, H) & 1544 (isotype, H).

Amanita hyperborea has generally been considered a member of *Amanita* section *Vaginatae* and has been confused with *A. nivalis* Greville and other white or whitish taxa near *A. vaginata* (Vesely, 1933: 280; Kallio & Kankainen, 1964: 207; Kühner, 1972: 34; Bas, 1977: 86; Moser, 1978: 221). Examination of the type, however, has shown that *A. hyperborea* is to be placed in section *Amanita* near *A. friabilis* (P. Karst.) Bas, and what is more, that the possibility that it is a white variety of that species can not be neglected.

It is the distinctly clavate-subbulbous base of the stipe with indistinct, felted-flocculose, perhaps sometimes slightly wart-like remnants of the volva that excludes *A. hyperborea* from section *Vaginatae* and, as the spores are inamyloid, refers it to section *Amanita*.

In that section the rather small fruit-body with exannulate stipe and wart-like volval remnants together with the more than 10 μm long, subglobose to ellipsoid spores make *A. hyperborea* belong to a group of species of which *A. friabilis* and *A. brunneoconulus* Bas & Gröger (see p. 432) are until now the only European representatives.

Except for the lack of pigment in *A. hyperborea*, there is very little that distinguishes this species from *A. friabilis*. In the latter the spores are on an average about 1 μm smaller, viz. 10–12.5 \times 8–10 μm , but the length-width ratio of the spores of *A. hyperborea* falls well within the range of that ratio in *A. friabilis* (1.1–1.5, averages per collection 1.2–1.3⁵). The size of the basidia, the diameter and the arrangement of the hyphae in the pileipellis, and the size of the inflated cells in the volval remnants are about the same in the two taxa.

The structure of the volval warts on the pileus of the type material of *A. hyperborea* is rather difficult to analyse, but a careful comparison with that of the volval warts of *A. friabilis* has given me the impression that in the former the inflated cells form less frequently rows (and then short ones) than in *A. friabilis* where they are frequently found in rows of two to six. Moreover, the refractive contents of the probably somewhat more abundant hyphae in the volval remnants of *A. hyperborea* are practically lacking from the volval hyphae of *A. friabilis* which therefore are considerably less conspicuous. For these reasons I think that for the time being *A. hyperborea* and *A. friabilis* should be maintained as independent but closely related species, pending further information on the first of the two.

4. TYPIFICATION AND TYPE STUDY OF AMANITA VAGINATA FORMA OREINA J. FAVRE

In his study on alpine fungi Favre (1955: 158, 205, fig. 144) described a small whitish member of *Amanita* section *Vaginatae*, under the name *A. vaginata* f. *oreina*, found by him several times in

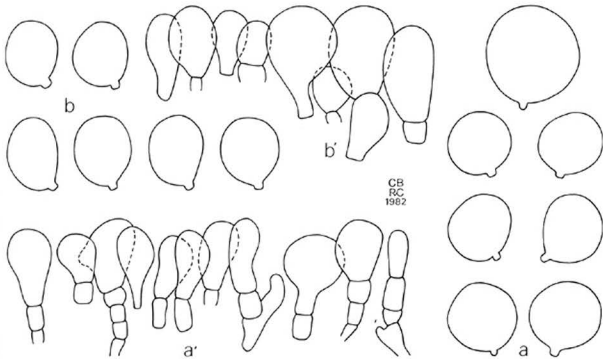


Fig. 4a-a'. *Amanita vaginata* f. *oreina*. — a. Spores $\times 1250$. — a'. Marginal cells $\times 500$ (all figs. from type).

Fig. 4b-b'. *Amanita sternbergii*. — b. Spores $\times 1250$. — b'. Marginal cells $\times 500$ (all figs. from type).

the Swiss Alps, growing with dwarf willows at altitudes between 2400 and 2650 m. Favre's description and illustrations provided the data in the macroscopical description below.

The Director of the Nationalpark-Museum at Chur kindly sent on loan to me the collection from which Favre's illustrations are drawn and which is selected here as lectotype. This collection consists of one sectioned fruit-body. The microscopical characters in the following description are those observed by me in the lectotype.

AMANITA VAGINATA FORMA OREINA J. Favre, *Champ. sup. Zone alpine Parc nation. Suisse*: 158, 205, fig. 144. 1955. — Fig. 4a.

Pileus up to 40 mm wide, convex or conico-convex, not completely expanding, sometimes with vague broadly rounded umbo, with rather short marginal striation (0.15–0.2 R in illustration), white to greyish-whitish, glabrous. Lamellae free, rather broad. Stipe relatively short, up to 50 mm long, up to 10 mm wide (at base), without bulb, hollow, exannulate (glabrous in illustration). Volva membranous and rather thick (± 1 mm in illustration), appressed against lower 10 to 15 mm of stipe, with lobbed, flaring limb (without internal limb in the one sectioned fruit-body illustrated).

Spores [20/1] (9.8–)10.5–12.6(–13.5....15) \times (9.1–)9.5–11.9(–12.5....15) μm , $Q = 1.0$ –1.1 (–1.1⁵), globose, colourless, thin-walled, often with somewhat refractive granular contents (in Favre's illustration often with one large oil-drop), with small to medium-sized abrupt apiculus, inamyloid. Basidia 54–69 \times 15–18 μm , 4-spored (in only a few sterigmata sufficiently distinct for counting), clampless. Marginal tissue consisting of subclavate to broadly clavate, thin-walled colourless terminal cells, 20–35 \times 7–25 μm , on short chains of small short cells. Subhymenium

(still?) ramose. Trama of lamellae not studied. Pileipellis (at $\pm 1/3$ R from centre) rather thin, made up of a $\pm 40 \mu\text{m}$ thick ixocutis downwards gradually passing into a $\pm 25 \mu\text{m}$ thick cutis of 1.7–2.8 μm wide, interwoven hyphae, abruptly differing from trama underneath. Volval limb at outer surface made up of abundant, 3.5–11(–14) μm wide, loosely interwoven, curving hyphae and rather scarce 50–80 μm long globose, ellipsoid and ovoid, terminal, inflated cells; at interior of 3.5–7 μm wide strongly interwoven, undulating hyphae and fairly abundant, globose, ellipsoid, ovoid and piriform cells, up to 65 \times 55 μm , or when elongate up to 70 \times 40 μm ; at inner surface of slightly gelatinizing, abundant, 2–6.5 μm wide, strongly interwoven hyphae and only scattered inflated cells similar to those inside tissue. Trama of stipe acrophysalidic; acrophysalides very abundant, relatively short and broad, 70–190 \times 23–46 μm ; vascular hyphae not found. Clamps absent.

COLLECTION EXAMINED.—SWITZERLAND, Graubünden, Mount Plazer, près de Scarl, 20 Aug. 1952. *J. Favre 186a* (lectotype, CHUR).

This is the same taxon described and pictured earlier under the name *A. nivalis* by Greville (1822: pl. 18). Unfortunately I have not yet seen a well-annotated collection from Scotland suited for neotype, although I have studied a few that agree fairly well with Greville's plate and description as well as with *A. vaginata* f. *oreina* Favre as described above.

Amanita nivalis as conceived by me now and earlier (1977: 86, fig. 1/6104) is a relatively small whitish to pale greyish buff taxon with a short sulcation at the margin of the pileus, a glabrous to subpubescent, exannulate stem without floccose girdles, a prominent membranous-saccate volva leaving no or hardly any remnants on the pileus, globose to subglobose spores, 10–12.5 \times 9.5–12 μm (Q 1.0–1.1), growing with dwarf and shrub willows in alpine and arctic regions.

As demonstrated elsewhere in this paper (p. 435) the name *A. hyperborea* (P. Karst.) Fayod is not a synonym of *A. nivalis* and *A. vaginata* f. *oreina*, as it belongs to a white species in section *Amanita*, which is close to *A. friabilis* (P. Karst.) Bas.

The material from the Alps and from Lapland extensively described by Kühner (1972: 34) under the name *A. hyperborea* with the name *A. vaginata* f. *oreina* as a synonym, undoubtedly belongs for the greater part to *A. nivalis*. However, it is possible that a few of these collections represent the same taxon as described by me in 1977 (: 86) and incorrectly named *A. hyperborea*, be it with a question-mark. Particularly the lower right-hand figure on p. 35 of Kühner's paper reminds of that taxon (compare Bas, 1977: fig. 1/6105), which has not been correctly named yet.

I have no definite opinion on the question whether *A. nivalis* should be ranked on species level or lower. Observations by M. Lange (1955: 52) and Kühner (1972: 38) seem to indicate that intermediate forms between *A. nivalis* and *A. vaginata* (Bull. ex Fr.) Vitt. do occur.

Pending further information I prefer to treat this taxon as a species in its own right with the following name and synonyms.

AMANITA NIVALIS Grev.

Amanita nivalis Grev., Scott. cryptog. fl. I (4): pl. 18. 1822. — *Agaricus nivalis* (Grev.) Loudon, Encycl. plantes: 986. 1829. — *Amanitopsis nivalis* (Grev.) Sacc., Syll. fung. 5: 22. 1887. — *Pseudofarinaceus nivalis* (Grev.) O. K., Rev. gen. plant. 2: 808. 1891. — *Vaginata nivalis* (Grev.) O. K., Rev. gen. plant. 3 (2): 539. 1898. — *Amanita vaginata* var. *nivalis* (Grev.) Guillaud & al. [*nivea* Grev.] in Ann. Sci. natur. Bordeaux 3 (2): 45. 1884; Cooke, Illustr. Brit. fungi 7: pl. 940. 1888. — *Amanitopsis vaginata* var. *nivalis* (Grev.) Peck in Ann. Rep. N. Y. St. Mus. 47: 169. 1894. — *Amanita vaginata* forma *nivalis* (Peck) Quél., Fl. mycol.: 302. 1888.

Agaricus vaginatus var. *albidus* Fr., *Epicr.*: 11. 1838 [new name based on *Amanita nivalis* Grev.]. — *Amanita vaginata* var. *albida* (Fr.) Gill., *Hymén. France*: 51. 1874. — *Amanitopsis albida* (Fr.) Imai, *Bot. Mag. Tokyo* 47: 429. 1933.

Amanita vaginata forma *oreina* Favre, *Champ. sup. zone alp. parc nation. Suisse*: 158, 205. fig. 144. 1955. — *Amanita oreina* (Favre) Heim, *Champ. Europe* 2: 441, 444, fig. 293. 1957.

5. TYPE-STUDY OF *AMANITA STERNBERGII* VELEN.

In a paper on *A. friabilis* (P. Karst.) Bas (1974: 18), the name *A. sternbergii* was included in the synonymy of that species with a question-mark. This was done because, although Velenovský's description of his new species and its habitat agree fairly well with *A. friabilis*, the spore-shape and -size as given by Velenovský (12–14 μm and globose) are aberrant for this species (10–12.5 \times 8–10 μm and subglobose to ellipsoid).

Meanwhile I have kindly been enabled to study the only fruit-body of *A. sternbergii* preserved in the Velenovský collection at Prague. The original label of that specimen is very simple and reads '*Amanita sternber. Mnich.*', the second abbreviation standing for 'Mnichovice', a little town, where Velenovský spent much of his time, at about 6 km distance from 'Pecný prope Ondřejov' which name is mentioned in the protologue of *A. sternbergii*.

Although it is not sure that Velenovský had this collection in hands when he described *A. sternbergii*, it is clear that he kept it as a sample of his new species and therefore I look upon it as the type.

The macroscopical data in the following description are taken from the type (preserved in liquid) with data taken from Pilát's (1948: 47) latin translation of Velenovský's description added between brackets. The microscopical data are those observed by me in the type collection.

AMANITA STERNBERGII Velen., *České houby* 1: 192. 1920.—Fig. 4b.

Pileus 28 mm wide (40–50 mm), plano-convex with broad, slightly depressed centre with low umbo in the middle (flattened), thin-fleshed, with sulcate-striate margin, ± 0.25 –0.3 R (with deeply striate margin), brown (sad grey-brown, 'cinereo-subfusca'), glabrous now but volval remnants probably washed away (dry, whitish pruinose, densely set with persisting grey warts). Lamellae crowded, just reaching apex of stem and narrowly adnate, c. 4 mm wide (narrow), now pale buff (white) with even, concolorous edge. Stipe c. 48 \times 6 mm (c. 10 mm wide, tall), with subclavate, 9 mm wide base (slightly thickened at base), hollow, now pallid with minute brownish squamules in places but surface structure damaged (entirely minutely grey-squamulose and below broadly squamose), only at one side of subbulbous base with some vague brownish wartlike volval remnants (with narrow, appressed, adnate vaginate volva).

Spores [10/1] 10.1–12.1 \times 8.5–9.8(–10.8) μm , Q 1.1–1.3⁵ mean Q 1.2, subglobose to broadly ellipsoid, rarely ellipsoid, sometimes obovoid, thin-walled, colourless, with medium-sized, abrupt, subtruncatate apiculus, non-amyloid. Basidia 53–83 \times 12.5–15 μm , clampless. Marginal tissue (probably partly washed away) consisting of scattered broadly clavate colourless cells, 25–40 \times 15–23 μm , among fertile basidia. Subhymenium (probably still young) made up of short cylindrical to inflated, sometimes subcoralloid cells. Pileipellis a cutis: suprapellis consisting of 3.5–5(–7) μm wide loosely interwoven, distant, slightly brownish hyphae, probably gelatinized; infrapellis of up to 10 μm wide denser subradial hyphae with brown vacuolar pigment. Volval remnants lacking from pileus, at base of stipe made up of 4–10 μm wide interwoven hyphae

carrying mostly single subglobose to obovoid, piriform or ellipsoid, brownish cells, 30–75 × 28–55 μm . Tissue of stipe acrophysalidic; terminal cells up to 260 × 40 μm . Clamps lacking from all tissues studied.

HABITAT.—In shady Alnetum on damp soil (according to protologue).

COLLECTION EXAMINED.—CZECHOSLOVAKIA, Mnichovice (type, Velenovský collection, PRC).

Velenovský's description of the volval remnants at the base of the stipe of *A. sternbergii* is somewhat ambiguous. I gather from it that Velenovský saw the volva as narrow, adnate, and vaginate and so it is also drawn in his sketch published by Sartory & Maire (1923: 501). Particularly the term vaginate does not apply to the volva of *A. friabilis*. But as a volva of that type does not go together with crowded volval warts on the pileus as described and depicted in *A. sternbergii*, I assume that Velenovský's description of the volval remnants at the base of the stem of *A. sternbergii* is based more on interpretation than on observation.

The size of the spores of the type of *A. sternbergii* (10–12 × 8.5–10 μm) fits perfectly in the range established for *A. friabilis* (10–12.5 × 8–10 μm), as all the other microscopical characters observed agree very well. Therefore no shade of doubt is left about the conspecificity of the type of *A. sternbergii* with *A. friabilis*.

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A KEY TO THE SPECIES OF GELASINOSPORA

J. A. VON ARX

Centraalbureau voor Schimmelcultures, Baarn, Netherlands

The species described in *Gelasinospora* and in the synonymous genus *Anixiella* are keyed out and listed alphabetically. Three species described as *Anixiella* are transferred to *Gelasinospora*.

Recently some isolates of the ascomycete genus *Gelasinospora* Dowding were received for study. Their identification was time-consuming because no recent treatment of the genus is available. The strains present in the CBS collection therefore were examined and compared with the few other described species. In this paper a key is given to the accepted species which are listed alphabetically.

The generic name *Gelasinospora* has been introduced by Dowding (1933) for two Ascomycetes with dark, ostiolate ascomata, cylindrical, unitunicate asci and 1-celled, dark ascospores with a pitted wall. Two further species, one with a reticulate ascospore wall, have been added by Cain (1950). Moreau and Moreau (1951) introduced some older specific epithets. Cailleux (1971) included *Anixiella* Saito & Minoura ex Cain (1961) in *Gelasinospora* char. emend., which had been described for a similar but non-ostiolate fungus. He described 11 new, partly ostiolate, partly non-ostiolate species. Based on the structure of the ascospore wall, Cailleux distinguished four sections.

The name *Anixiella* again has been used for non-ostiolate counterparts of *Gelasinospora* by Horie and Udagawa (1974), Furuya and Udagawa (1977) and Udagawa (1980). They and other Japanese authors added some more species to both genera. The genus *Anixiella*, however, should not be separated from *Gelasinospora*, as is shown also by von Arx (1973). Some species described in *Anixiella* are closer to some ostiolate species than to other non-ostiolate ones. In some strains of *G. fallaciosa* the ascomata are ostiolate, in others non-ostiolate. In the type strains of *G. seminuda* and *G. novoguineensis*, most of the ascomata are non-ostiolate, but regularly ostiolate ascomata are also present.

The genus has been characterized by Cailleux (1971) as follows:

GELASINOSPORA Dowding. *In* *Canad. J. Res., Sect. C*, **9**: 294. 1933.

type: *G. tetrasperma* Dowding

= *Anixiella* Saito & Minoura ex Cain. *In* *Canad. J. Bot.* **39**: 1667. 1961.

type: *A. reticulispora* Saito & Minoura (nom. inval.) = *Thielavia reticulata* C. Booth & Ebben = *A. reticulata* (C. Booth & Ebben) Cain = *G. reticulata* (C. Booth & Ebben) Cailleux

Ascomata superficial or (partly) immersed, pyriform and ostiolate or spherical and non-ostiolate, dark; ascomata wall membranaceous, composed of pigmented, isodiametric or slightly flattened, distinct cells; asci cylindrical, clavate or subspherical, with a persistent or evanescent

wall, usually with a disc-like, thickened, non-amyloid apex; ascospores ellipsoidal or nearly spherical, 1-celled, dark, with a foveolate (pitted) wall or covered with reticulate or irregular markings, occasionally nearly smooth, with 1, 2 or more germ pores, without gelatinous sheaths or appendages; paraphyses at maturity usually absent; anamorph absent or *Chrysonilia*-like.

KEY TO THE SPECIES

1. Ascospores with pits, extending into it as conical spines (endodontate)	2
1 Ascospores without such spines	7
2. Ascospores 18–28 × 13–20 μm	3
2. Ascospores larger	5
3. Ascomata ostiolate, ascospores 20–28 × 12–16 μm	4
3. Ascomata non-ostiolate, ascospores 18–28 × 15–21 μm, with 1 or 2 germ pores	<i>G. endodontia</i>
4. Asci 8-spored.	<i>G. calospora</i>
4. Asci 4-spored.	<i>G. tetrasperma</i>
5. Ascumata non-ostiolate, less than 250 μm diam., ascospores 30–42 × 25–30 μm	<i>G. saitoi</i>
5. Ascumata ostiolate or non-ostiolate, 300–600 μm diam.	6
6. Ascospores 27–32 × 18–21 μm, with slightly attenuated ends.	<i>G. seminuda</i>
6. Ascospores 32–38 × 22–27 μm, with rounded ends	<i>G. santi-florii</i>
7. Ascospores verrucose or covered with nonreticulate markings	8
7. Ascospores pitted, reticulate or nearly smooth.	11
8. Ascospores 16–20 μm broad, with 2 germ pores; ascumata ostiolate	9
8. Ascospores broader	10
9. Ascospores 22–26 × 16–20 μm, with rounded ends	<i>G. varians</i> (<i>G. brasiliensis</i>)
9. Ascospores 28–34 × 16–20 μm, with attenuated ends	<i>G. amorphoporcata</i>
10. Ascospores 31–39 × 26–32 μm, with 2 germ pores; ascumata usually non-ostiolate	<i>G. fallaciosa</i>
10. Ascospores 37–47 × 27–35 μm, ascumata ostiolate	<i>G. pseudoreticulata</i>
11. Ascospores reticulate or with 2.5–5 μm wide pits.	12
11. Ascospores with 0.7–1.5 μm wide pits or nearly smooth	18
12. Ascumata non-ostiolate; ascospores spherical or broadly ellipsoidal	13
12. Ascumata ostiolate, ascospores ellipsoidal or elongate	16
13. Ascospores 36–45 μm diam., spherical	<i>G. sphaerospora</i>
13. Ascospores smaller	14
14. Ascospores 23–30 × 17–20 μm	<i>G. reticulata</i>
14. Ascospores broader	15
15. Ascospores 25–31 × 22–28 μm	<i>G. indica</i>
15. Ascospores 30–35 × 27–33 μm	<i>G. stellata</i>
16. Ascospores 25–35 × 14–20 μm, asci long cylindrical.	<i>G. retispora</i>
16. Ascospores 30–42 × 20–27 μm	17
17. Ascospore pits 2–3.5 μm wide, ascumata non-ostiolate or with a recurved beak	<i>G. novoguineensis</i>
17. Ascospore pits 4–6 μm wide, ascumata ostiolate, conical, often tomentose	<i>G. mirabilis</i>
18. Ascumata spherical, non-ostiolate or with a small beak; asci evanescent	19
18. Ascumata conical or pyriform, with a distinct beak, asci persistent.	22
19. Ascospores 30–39 × 26–32 μm	<i>G. fallaciosa</i>
19. Ascospores larger	20
20. Ascospores 39–47 × 29–34 μm, ascumata with a short beak	<i>G. inversa</i>
20. Ascospores larger, ascumata usually non ostiolate	21
21. Ascospores 40–50 × 32–42 μm, with 6–8 germ pores	<i>G. micropertusa</i>
21. Ascospores 43–55 × 38–47 μm, with a single germ pore	<i>G. macrospora</i>
22. Ascospores 20–28 × 12–16 μm	see this key no 4
22. Ascospores larger	23
23. Ascospores up to 42 μm long	24

23. Ascospores up to 56 μm long	29
24. Ascospores 27–32 \times 16–18 μm	<i>G. pseudocalospora</i>
24. Ascospores broader	25
25. Ascospores 27–35 \times 22–27 μm , with a rather thick, light outer wall	<i>G. cerealis</i>
25. Ascospores larger	26
26. Ascospores 32–43 \times 25–31 μm , with a single germ pore and distinct pits	<i>G. longispora</i>
26. Ascospores with 2–6 germ pores	27
27. Ascospores with slightly attenuated ends, 34–42 \times 25–31 μm	<i>G. kobei</i>
27. Ascospores with broadly rounded ends	28
28. Ascospores 34–38 \times 24–28 μm , with distinct pits	<i>G. goundaensis</i>
28. Ascospores 35–43 \times 25–33 μm , with indistinct pits	<i>G. heterospora</i>
29. Ascospores with slightly attenuated ends, 38–52 \times 25–32 μm , pits often not sharply delimited	<i>G. foveaconica</i>
29. Ascospores with rounded ends	30
30. Ascospores 43–50 \times 34–40 μm , with distinct pits	<i>G. multiforis</i>
30. Ascospores 37–56 \times 28–36 μm , indistinctly pitted	<i>G. himalayensis</i>

LIST OF ACCEPTED SPECIES

1. *G. amorphoporcata* Udagawa. In Trans. mycol. Soc. Japan **21**: 19. 1980.

This species will have to be compared with *G. brasiliensis* Ram and *Emblemospora ditrema* Jeng & Krug. *G. varians* also is similar.

2. *G. calospora* (Mouton) C. & M. Moreau. In Rev. Mycol. 14, Suppl. colon. **2**: 50. 1949.
= *Rosellinia calospora* Mouton. In Bull. Soc. R. bot. Belg. **36**: 12. 1879.
= *Gelasinospora adjuncta* Cain. In Can. J. Res., Sect. C, **28**: 568. 1950.
= *Gelasinospora autosteira* Alexopoulos & Sun. In Mycologia **42**: 723. 1950.

The acceptance of *G. tetrasperma* as a separate species for strains with 4-spored asci is a matter of opinion. The ascospores usually are pitted, but may be also nearly smooth. The fungus then can be recognised by the absence of a gelatinous sheath and by the spiny inner wall. The ascospores usually have two germ pores.

3. *G. cerealis* Dowding. In Can. J. Res., Sect. C, **9**: 295. 1933.

The species is characterized by the undulate, light-coloured outer wall of the ascospores and therefore was classified by Cailleux (1971) in a separate section. The ascospores have two apical germ pores.

4. *G. endodonta* (Malloch & Cain) v. Arx. In Proc. Ned. Akad. Wet., Sect. C, **76**: 290. 1973.
= *Anixiella endodonta* Malloch & Cain. In Can. J. Bot. **49**: 870. 1971.

The fungus is known from two strains, isolated from Australian soil. It is characterized by rather small, non-ostiolate ascomata. The ascospores may have one or two germ pores.

5. *G. fallaciosa* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 623. 1971.

This species may be ostiolate or non-ostiolate. The ascospores have rather large and irregular pits and two germ pores.

6. *G. foveaconica* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

This species has ascospores with 6–8 distinct germ pores arranged in two subapical rings. In the type strain the ascospore pits are rather diffuse.

In CBS 493.78 the pits are more distinct. In this strain the ascospores are not ejaculated, but become free in a dark, slimy droplet.

7. *G. goundaensis* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

8. *G. heterospora* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

9. *G. himalayensis* Horie & Udagawa. In Trans. mycol. Soc. Japan **15**: 201. 1971.

This species could not be studied. It would have to be compared with *G. foveoconica*.

10. *G. indica* (Rai & al.) v. Arx. In Proc. Ned. Akad. Wet. C, **76**: 291. 1973.

= *Anixiella indica* Rai & al. In Can. J. Bot. **45**: 479. 1967.

The species has been redescribed and depicted by Udagawa (1980). *G. stellata* Cailleux may be identical.

11. *G. inversa* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

12. *G. kobei* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 621. 1971.

This species is rather close to *G. longispora*, but can be distinguished by the conical ascomata and by the formation of an anamorph with orange conidiogenous structures, similar to the *Chrysonilia* (*Monilia*) anamorph of *Neurospora sitophila* Shear & B. O. Dodge. This anamorph was not mentioned by Cailleux (1971). It usually is only imperfectly developed. The conidia are only partly separated from each other and do not form powdery masses.

13. *G. longispora* Udagawa. In Trans. mycol. Soc. Japan **8**: 50. 1967.

14. *G. macrospora* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

15. ***Gelasinospora micropertusa*** (Horie & Udagawa) v. Arx, *comb. nov.*

= *Anixiella micropertusa* Horie & Udagawa. In Trans. mycol. Soc. Japan **15**: 197. 1974 (basionym).

The species can be distinguished from *G. macrospora* only by slightly smaller ascospores and may be conspecific. In both, the ascomata are non-ostiolate.

16. *G. mirabilis* Furuya & Udagawa. In Trans. mycol. Soc. Japan **17**: 313. 1976.

17. *G. multiforis* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

18. *G. novoguineensis* Takada. In Bull. nat. Sci. Mus., Tokyo **16**: 529. 1973.

In this species the ascomata may be ostiolate or non-ostiolate; both occur in the same culture.

19. *G. pseudocalospora* Udagawa. In Bull. nat. Sci. Mus., Tokyo **16**: 517. 1973.

20. *G. pseudoreticulata* Matsushima. In Microf. Solom. Isl. Papua New Guinea p. 73. 1971.

= *Gelasinospora variabilis* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 622. 1971.

The synonymy of *G. variabilis* with *G. pseudoreticulata* was established by Furuya and Udagawa (1977) when describing the close species *G. varians*.

21. *G. reticulata* (C. Booth & Ebben) Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 534. 1971.

= *Thielavia reticulata* C. Booth & Ebben. In Trans. Br. mycol. Soc. **44**: 214. 1961.

= *Anixiella reticulata* (C. Booth & Ebben) Cain. In Can. J. Bot. **39**: 1667. 1961.

= *Anixiella reticulospora* Saito & Minoura. In J. Ferment. Technol. Osaka **26**: 4. 1948 (without Latin diagnosis).

A full description and good illustrations of this species have been given by Cain (1961).

22. *Gelasinospora retispora* Cain. In Can. J. Res., Sect. C, **28**: 573. 1950.

= *G. reticulispota* (Greis & Greis-Dengler) C. & M. Moreau. In La Mycothèque Lab. Crypt. Mus. nat. Paris **3**, suppl. **1**: 48. 1951.

= *Rosellinia reticulispota* Greis & Greis-Dengler. In Jb. wiss. Bot. **89**: 341. 1941 (without Latin diagnosis).

23. *G. saitoi* (Udagawa) v. Arx, *comb. nov.*

= *Anixiella saitoi* Udagawa. In Bull. nat. Sci. Mus., Tokyo **16**: 511. 1973 (basionym).

This species is close to *G. santi-florii*, both agree in shape, size and structure of the ascospores (30–40 × 22–28 μm, ellipsoidal, wall with inwardly extending spines). *G. santi-florii*, however, has ostiolate ascomata, whereas those of *G. saitoi* are non-ostiolate.

24. *G. santi-florii* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 621. 1971.

25. *G. seminuda* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 621. 1971.

26. *G. sphaerospora* (Horie & Udagawa) v. Arx, *comb. nov.*

= *Anixiella sphaerospora* Horie & Udagawa. In Trans. mycol. Soc. Japan **15**: 197. 1974 (basionym).

This species differs from all others by the spherical, irregularly reticulate ascospores. No specimens could be studied.

27. *G. stellata* Cailleux. In Bull. trimest. Soc. mycol. Fr. **87**: 623. 1971.

28. *G. tetrasperma* Dowding. In Can. J. Res., sect. C, **9**: 294. 1933.

= *Gelasinospora calospora* f. *tetrasperma* (Dowding) C. & M. Moreau. In La Mycothèque Lab. Crypt. Mus. natn. Paris **3**, suppl. **1**: 41. 1951.

29. *G. varians* Furuya & Udagawa. In Trans. mycol. Soc. Japan. **17**: 314. 1977.

According to the description, *G. brasiliensis* Ram. In Broteria, n.s., **37**: 18. 1968 is similar, but has narrower, 17–30 × 12–17 μm ascospores. The description of this species, however, is incomplete and no specimens were available for study.

EXCLUDED SPECIES

Anixiella monospora Malloch & Cain. In Can. J. Bot. **49**: 872. 1971 = *Monosporascus monosporus* (Malloch & Cain) Hawksworth & Ciccarone in Mycopathologia **66**: 18. 1978.

Anixiella sublineata Furuya & Udagawa in Trans. mycol. Soc. Japan **17**: 317. 1977 = *Neurospora sublineata* (Furuya & Udagawa) v. Arx, because its ascospores are broadly fusiform, longitudinally striate, and have a germ pore at each end (von Arx, 1981).

RELATED GENERA

The genus *Gelasinospora* is close to *Neurospora* Shear & Dodge. The only distinguishing character is the structure of the ascospores, which in the latter genus are broadly fusiform, longitudinally striate, with distinct apical germ pores. The genus *Diplogelasinospora* Cain (1961) differs from *Gelasinospora* by the 2-celled ascospores and the formation of an arthric anamorph of the form genus *Arthrographis* Cochet ex Sigler & Carmichael. This anamorph is related to the *Chrysonilia* (*Monilia*) anamorph of *Neurospora*, and a similar anamorph with orange conidiogenous structures has been observed in cultures of *Gelasinospora kobei* and (immature) in some more species.

The genus *Arniella* Jeng & Krug (1977) has 1-celled, dark, pitted ascospores with two germ pores. It differs from *Gelasinospora* by hairy (setose) ascomata and gelatinous appendages of the ascospore. The genus *Emblemospora* Jeng & Krug (1976) was distinguished from *Gelasinospora* by an ascospore wall covered with markings and falls within the limits of *Gelasinospora* sensu Cailleux. The type species, *E. monotrema* Jeng & Krug has 28–31 × 17–20 µm ascospores with a dark wall with numerous hyaline fissures and grooved rings at both ends surrounding the germ pores. *E. ditrema* Jeng & Krug, the second species, has ascospores without apical rings, and *G. amorphoporcata* Udagawa may be close.

Poroconiochaeta Udagawa & Furuya (1979) also is characterized by 1-celled, dark, pitted ascospores. They are, however, oblate and have a germ slit; characters which indicate a relationship to *Coniochaeta* (Sacc.) Massee (Coniochaetaceae) (von Arx, 1981).

STRAINS STUDIED

<i>G. amorphoporcata</i> :	CBS 626.80 = NHL 2814
<i>G. calospora</i> :	CBS 224.49, 225.49, 274.50 (type strain of <i>G. adjuncta</i>), 264.51 (type strain of <i>G. autosteira</i>), 265.51, 261.54, 198.55, 665.74, 444.78
<i>G. cerealis</i> :	CBS 177.33 (type strain), 256.52, 365.66, 553.66, 604.78
<i>G. endodonta</i> :	CBS 504.70 (type strain), 505.70
<i>G. fallaciosa</i> :	CBS 458.67, 574.72 (type strain), 575.72, 576.72
<i>G. foveaconica</i> :	CBS 557.72 (type strain), 493.78
<i>G. goundaensis</i> :	CBS 558.72 (type strain)
<i>G. heterospora</i> :	CBS 559.72 (type strain)
<i>G. indica</i> :	CBS 496.81 = NHL 2744
<i>G. inversa</i> :	CBS 554.72 (type strain)
<i>G. kobei</i> :	CBS 560.72 (type strain)
<i>G. longispora</i> :	CBS 458.67, 141.68 (type strain), 142.68
<i>G. macrospora</i> :	CBS 573.72 (type strain)
<i>G. mirabilis</i> :	CBS 667.77 = NHL 2758 (type strain)
<i>G. multiforis</i> :	CBS 555.72 (type strain)
<i>G. novoguineensis</i> :	CBS 647.80, 495.81 (type strain)
<i>G. pseudocalospora</i> :	CBS 439.74 = NHL 2667 (type strain), 413.78
<i>G. pseudoreticulata</i> :	CBS 556.72 (type strain of <i>G. variabilis</i>), CBS 497.81 = NHL 2695
<i>G. reticulata</i> :	CBS 435.61 (type strain), 331.68, 656.71, 451.81
<i>G. retispora</i> :	CBS 275.50 (type strain), 212.58, 868.68, 656.70, 673.74
<i>G. saitoi</i> :	CBS 435.74 (type strain)
<i>G. santi-florii</i> :	CBS 571.72 (type strain), 534.76
<i>G. seminuda</i> :	CBS 572.72 (type strain)

- G. stellata*: CBS 561.72 (type strain)
G. tetrasperma: CBS 178.33 (type strain), 575.68, 592.69, 880.69
G. varians: CBS 561.72 (type strain)

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ENTOLOMA SUBGENUS LEPTONIA IN NORTHWESTERN EUROPE—I.
Introduction and a revision of its section *Leptonia*

MACHIEL E. NOORDELOOS

Rijksherbarium, Leiden

An introduction is given to the taxonomy of *Entoloma* subgenus *Leptonia*, followed by a revision of its section *Leptonia*. Eleven species are recognized, fully described and illustrated, of which three are new, viz.: *Entoloma carbonicola*, *E. tjallingiorum* and *E. allochromum*.

Entoloma subgenus *Leptonia* represents a rather large group of taxa, often with bright colours, with a world-wide distribution. Most temperate-boreal and alpine-arctic species grow in grassland or other open vegetation and are typically saprophytes. Most tropical species, however, prefer the soil or rotten wood in forests (Horak, 1973, 1980; Largent, 1977; Romagnesi & Gilles, 1979).

Many species of *Leptonia*, particularly those of section *Cyanula* show bright colours such as blue, green, yellow or pink, and for this reason they are often collected and/or photographed or painted. Many taxonomic problems still exist, however, due, among other things, to the relative rarity of most species and their habitats, and the inconstancy of fruiting. Furthermore the infraspecific variation seems to play an important role in the taxonomic confusion.

The first attempts to sort out the problems in *Leptonia* were made by Kühner & Romagnesi (1953) and P. D. Orton (1960), but the first monograph of a restricted area was written by Largent (1977), viz. for the Pacific Coast of the United States. Unfortunately Largent was confronted with the poorly known European taxa which led inevitably to some misinterpretations. For that reason and because of the recent changes in the International Code of Botanical Nomenclature, I was forced to reject some of Largent's sectional names for nomenclatorial reasons (see below).

TYPIFICATION

In the present paper the lectotypification of the Friesian tribe *Leptonia* by *Agaricus euchrous* Pers.: Fr. is used, following Clements & Sheer (1931: 249) and Donk (1949: 159). The earlier lectotypification by *Agaricus anatinus* Lasch as proposed by Earle is rejected, as *Agaricus anatinus* did not belong to the original species enumerated by Fries (1821: 201-204). According to the 'Code' such a lectotype cannot be accepted. Earle's choice, however, was followed by Singer (1949, 1962, 1978).

I agree fully, however, with Romagnesi (1978: 32) that the choice of *Agaricus euchrous* is rather unfortunate, as this species has a somewhat isolated position in what is generally considered to

be, at least by the European authors, who only considered the temperate flora, a rather homogenous group of taxa. In other words, *Entoloma euchroum* is not a 'typical' *Leptonia*. On the other hand, I do not follow Romagnesi's suggestion of designating another species as lectotype of *Leptonia*, viz. *Agaricus serrulatus* Fr, because *A. euchroum* cannot be rejected as the lectotype of *Leptonia*, because it fully agrees with Fries' protologue. Furthermore it is a well-defined species, and typifies a fairly large section of temperate and (sub-)tropical species (Horak, 1980; Largent, 1977; Romagnesi & Gilles, 1979; the present work). The classical *Leptonia* species of European Authors are very comfortably accommodated in another section: sect. *Cyanula*¹, for which *Agaricus serrulatus* Fr. is the type-species.

KEY TO THE SECTIONS OF SUBGENUS *Leptonia* IN EUROPE

1. Clamp-connections present; pileipellis a cutis to a trichoderm of cylindrical, septate hyphae, with cylindrical or modified end-cells; stipe-surface often (innately) silvery fibrillose to fibrillose-squamulose, well-modified cheilocystidia often present. 2
1. Clamp-connections absent; pileipellis a trichoderm to a hymeniderm or cellular, terminal cells often strongly swollen to globose; stipe-surface often opaque, polished, rarely fibrillose-woolly; cheilocystidia, if present, usually basidioliform, more rarely strongly protruding from the hymenium
Section *Cyanula* (synonym: *L.* subgen. *Paludocybe* Largent)
2. Cheilocystidia enormous, filiform to fusoid; pileus usually conico-truncate or campanulate with central depression or umbilicus; basidiomes usually with greyish-brown colours . . . Section *Griseorubida*
2. Cheilocystidia, if present, not very much larger than basidia; pileus usually conical to conico-convex, with papilla or umbo, rarely depressed; basidiomes frequently with bluish or violaceous colour

Section *Leptonia*

MATERIAL, METHODS AND PRESENTATION

Material and methods are the same as used in earlier monographic treatments of other parts of the genus *Entoloma* (Noordeloos 1979, 1980, 1981b). For details please refer to these publications. As usual the magnification of the figures is as follows: habit, $\times 1$; spores, $\times 1000$; all other figures $\times 670$. Q stands for the length-width ratio of the spores: Q = 1.2-1.3-1.4 means Q between 1.2 and 1.4 with an average of 1.3.

ACKNOWLEDGEMENTS

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¹ *Entoloma* section *Cyanula* (Romagn.) Noordel., *comb. nov.*—*Rhodophyllus* sect. *cyanuli* Romagn. in Bull. mens. Soc. linn. Lyon 43: 328. 1974 (basionym).

TAXONOMIC PART

Entoloma SUBGEN. *Leptonia* (Fr.) NOORDELOOS SECT. *Leptonia* EMEND.

Rhodophyllus sect. *Leptoniarii* Romagn. in Bull. Soc. mycol. Fr. 53: 332. 1937 (nom. nud.; no latin diagnosis). — Lectotype (Noordel. 1981: 146): *Agaricus euchrous* Fr.

Leptonia sect. *Lampropodae* Konrad & Maublanc, Les Agaricales: 259. 1948 (nom. nud., no latin diagnosis). — Lectotype (design mihi): *Agaricus lampropus* Pers.: Fr.

Rhodophyllus sect. *Lampropodes* (Kühn. & Romagn., Fl. anal. 208. 1953) ex Romagn. in Bull. mens. Soc. linn. Lyon 43: 328. 1974. — Holotype: *R. lampropus* (Pers.: Fr.) Quél.

Entoloma sect. *Paludocybe* (Largent) Noordel. in Persoonia 11: 147. 1981. — *Leptonia* subgen. *Paludocybe* Largent in Mycologia 66: 1011. 1974. — Holotype: *E. lampropus* (Pers.: Fr.) Hesl.

Leptonia sect. *Lepidocybe* Largent in Mycologia 66: 1017. 1974. — Holotype: *L. coelestina* (Fr.) P. D. Orton.

Habit tricholomatoid, mycenoid or collybioid; pileus usually conico-convex to plano-convex, with or without papilla or umbo, rarely depressed; lamellae almost free to emarginate or broadly adnate or with decurrent tooth; stipe fibrillose-striate, smooth or flocculose-scaly; cheilocystidia present or not; pileipellis more or less trichodermal, made up of cylindrical, septate hyphae, sometimes with swollen end-cells ('pileocystidia'); pigment intracellular, in some species in addition encrusting; clamp-connections present and often frequent in covering layers and hymenium; terrestrial or lignicolous, in grasslands or forests.

I have emended the concept of *Leptonia*, as presented in a previous publication (Noordeloos 1981a: 146) by including also species which have some encrusted hyphae in the pileipellis. This is found in *Entoloma allochromum* and *E. lampropus*, which are related to *E. dichroum*, and in *E. hispidulum*, and which general appearance closely fits into section *Leptonia*.

KEY TO THE SPECIES OF SECTION *Leptonia*

1. Stipe brownish, dark grey or yellowish 2
1. Stipe with some shade of blue, violaceous or purplish 3
2. Pileus grey with purple sheen; cheilocystidia clavate, often with mucronate apex; pigment intracellular; spores 9-11(-12) × 7-8.7 μm, Q = 1.1-1.3-1.4 1. *E. carbonicola*
2. Pileus brown, yellow-brown or brown-grey; cheilocystidia absent; spores 9.3-13(-14) × 6.5-8.5 μm, Q = 1.3-1.45-1.7(-1.9), irregularly nodulose-angular; pigment intracellular, sometimes in addition minutely encrusting the hyphae of the pileipellis 2. *E. hispidulum*
3. Basidiomes entirely violaceous-blue, including the lamellae, which often have a brownish-violaceous edge; smell ± sweet, reminding that of violets or soap; on *Quercus* or *Alnus*, less frequently on other deciduous trees, exceptionally also on coniferous trees 3. *E. euchroum*
3. Lamellae white then pink, sometimes with brown or grey, rarely blue tinge, but never entirely violaceous with brown-violaceous edge; smell none or farinaceous; usually on other substratum 4
4. Pileus and stipe with about the same dark indigo, blackish-blue or bright blue colour 5
4. Pileus with colour different from that of stipe 7
5. Stipe minutely punctate; growing terrestrial in coniferous forest 4. *E. cedretorum*
5. Stipe smooth or innately fibrillose never punctate nor minutely squamulose; in deciduous or mixed forest 6
6. Spores 6.5-8.6 × 5.5-6.0(-6.5) μm; cheilocystidia absent 5. *E. coelestinum*
6. Spores 8.0-11.3(-11.8) × 6.0-8.2 μm; cheilocystidia absent or present, cylindrical 6. *E. lepidissimum*
7. Pileus with a distinct lilaceous-violaceous tinge; spores large, 9.3-12.7 × 7-10 μm with rather pronounced and sharp angles 8
7. Pileus grey-brown, occasionally tinged blue; spores smaller and weakly angled 9

8. Stipe blue, steel-blue or indigo, innately fibrillose or smooth; pigment intracellular 7. *E. dichroum*
 8. Stipe pale violaceous with dark violaceous-purple fibrillose-subsquamosule covering, especially in upper half; pigment intracellular in pileipellis, sometimes minutely encrusting in pileipellis and pileitrama 8. *E. allochromum*
 9. Stipe flocculose-squamosule; basiodiomes (slenderly) tricholomatoid 9. *E. tjallingiorum*
 9. Stipe smooth or innately fibrillose; basiodiomes slender, mycenoid or collybioid 10
 10. On or near trunks of *Fagus sylvatica*; pileipellis with intracellular pigment, smell farinaceous 10. *E. placidum*
 10. Terrestrial in grasslands or grassy spots; pileipellis with intracellular and encrusting pigment, especially in deeper layers, smell none 11. *E. lampropus*

1. *Entoloma carbonicola* Noordel., *spec. nov.*—Fig. 1

Pileus griseus violaceo-tinctus, haud hygrophanus, radialiter fibrillosus; lamellae rosea; stipes obscure griseus, subquamosulus; sporae 9–11(–12) × 7–8.7 μm; cheilocystidia abundantia, gracile vel late clavata apicibus acutis vel mucronatis; pileipellis trichoderma; pigmentis intracellulosis; fibulae presentes; ad terram turfosam ambustam. — Holotypus: *P. B. Jansen 60-169, 7-VIII-1960*; 'Netherlands, prov. Limburg, Ospel, Grote Peel' (L).

CHARACTERISTICS.—Pileus grey with slight violaceous tinge, not hygrophanous, not striate, radially fibrillose; lamellae pink; stipe dark grey, fibrillose to almost squamosule; cheilocystidia numerous, clavate, often with mucronate tip.

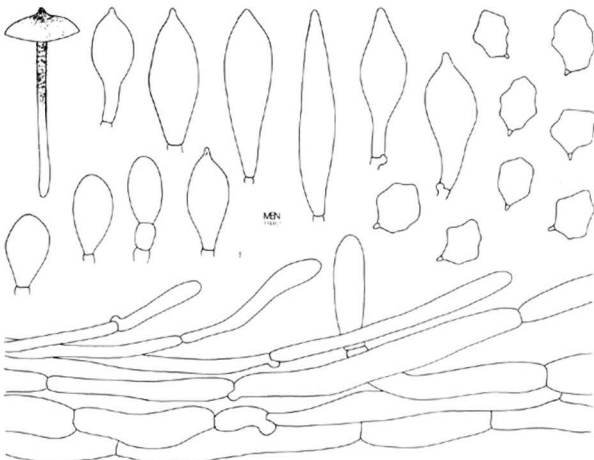


Fig. 1. *Entoloma carbonicola*. — Habit, spores, cheilocystidia and pileipellis (all figs from holotype).

Pileus 18 mm broad, conico-convex with pointed papilla, not hygrophanous, not striate, grey with slight violaceous tinge, fibrillose, somewhat shining; lamellae $L = 22$, $l = 3$, broadly adnate pink with concolorous edge; stipe 35×3 mm, cylindrical, grey with dark grey fibrils almost squamulose; smell and taste not known.

Spores $9-11(-12) \times 7-8.7 \mu\text{m}$, $Q = 1.1-1.3-1.4$, with dihedral base; basidia $22-37 \times 9-11.5 \mu\text{m}$, 4-spored, clamped; cheilocystidia $24-52 \times 10-17 \mu\text{m}$, slenderly to broadly clavate, frequently with a mucronate tip, numerous; pileipellis trichodermal made up of cylindrical hyphae $7-21 \mu\text{m}$ wide with intracellular pigment; clamp connections present in pileipellis and hymenium.

HABITAT & DISTRIBUTION.—On burnt, peaty soil, only known from the type-locality.

COLLECTION EXAMINED.—THE NETHERLANDS: prov. Noord Brabant, Ospel, Grote Peel, 7 Aug. 1960, P. B. Jansen 60-169 (Holotype, L).

Entoloma carbonicola is a very distinctive species with its peculiar acute to mucronate cheilocystidia, grey-violaceous pileus, grey fibrillose-subsquamulose stipe and by its habitat.

2. ENTOLOMA HISPIDULUM (M. Lange) Noordel.—Fig. 2

Rhodopyllus hispidulus M. Lange in *Friesia* 3: 210. 1946.—*Entoloma hispidulum* (M. Lange) Noordel. in *Nord. J. Bot* 2: 159. 1982.

Leptonia inocybeoides P. D. Orton in *Trans. Br. mycol. Soc.* 43: 296. 1960.

?MISAPPLIED NAME.—*Agaricus resutus* Fr. sensu Cooke, Ill. *Br. Fungi* pl. 334(318). 1884-1886.

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Cooke, l.c. — Noordeloos, l.c. — Orton, l.c.

CHARACTERISTICS.—Basidiomes small to medium-sized, reminiscent of a species of *Inocybe*; pileus grey-brown, densely fibrillose-scaly; lamellae pale then pink; stipe paler than pileus, greyish or yellowish, fibrillose striate; spores polyangled-nodulose, $9.3-13(-14) \times 6.5-8.5 \mu\text{m}$, $Q = 1.3-1.45-1.7(-1.9)$.

Pileus 5-20 mm broad, conico-convex only slightly expanding with margin slightly involute when young, later straight, not hygrophanous, not striate, grey-brown (10 YR 6/4, 5/4, 5/2, 4/2, 3/2) with darker centre, densely fibrillose-scaly, centre often distinctly marked by clustered, uplifted scales ('calotte'), shining; lamellae $L = 14-26$, $l = 1-3$ (moderately) distant, free or narrowly adnexed, sometimes emarginate, narrowly ventricose, rarely transversely veined, sometimes somewhat thickish, white or pale grey then pink, when old often with brown or grey tinge, with concolorous, entire edge; stipe $16-55 \times 1-3$ mm, cylindrical, straight or flexuose, paler than pileus, yellowish or greyish brown (10 YR 7/3, 7/4, 6/4, 5/2, rarely 4/2) densely silvery striate lengthwise, apex often slightly pruinose, base white tomentose, sometimes with purplish-reddish tinge at base; flesh concolorous with surface, in inner part pale to white; smell none.

Spores $9.3-12(-14) \times 6.5-8.5 \mu\text{m}$, $Q = 1.3-1.45-1.7(-1.9)$, irregularly nodulose-angular, probably with dihedral base; basidia $27-55 \times 7-15 \mu\text{m}$, (2-)4-spored with clamp; cheilocystidia absent; hymenophoral trama made up of cylindrical to slightly inflated cells, $60-220 \times 7-27 \mu\text{m}$; pileipellis a trichoderm of cylindrical to clavate of fusoid cells, up to $35 \mu\text{m}$ wide with abundant brown intracellular pigment and in addition in some collections minutely encusted walls; clamp-connections abundant in hymenium and pileipellis.

HABITAT & DISTRIBUTION.—Terrestrial in grassland and in deciduous forests, usually on sandy, slightly calcareous soils, not uncommon, wide-spread, known to occur in Denmark, Great Britain, The Netherlands and Poland.

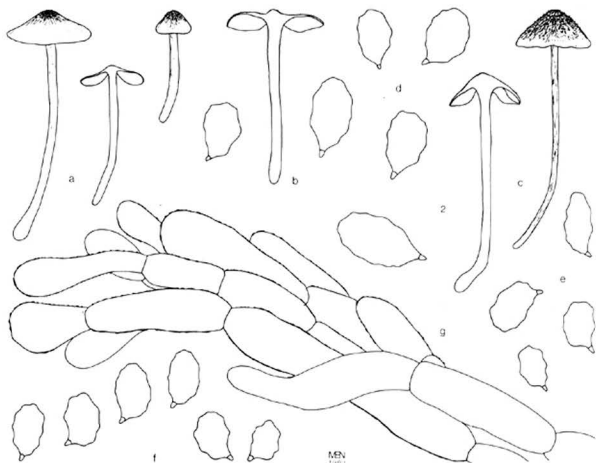


Fig. 2. *Entoloma hispidulum*. — Habit, spores, cheilocystidia and pileipellis (a, b, f from *J. Schreurs*, 8 Oct. 1981; c, e, g from *B. de Vries*, 11 Nov. 1976; d from holotype of *Leptonia inocybeoides*).

COLLECTIONS EXAMINED.—DENMARK: Sjaelland, Maglemose, Gribskov 21 Oct. 1944, *M. Lange* (Holotype, C); Jutland, Tversted Plantage, 30 Oct. 1977, *H. Knudsen* (C). — GREAT BRITAIN: Devonshire, Dawlish Warren, 17 Nov. 1956, *P. D. Orton* 867 (holotype of *L. inocybeoides*, K). — NETHERLANDS: prov. Drenthe, Elp, 11 Nov. 1976, *B. de Vries* (WBS); Buurserzand, 2 Nov. 1963, *J. J. Barkman* (WBS); prov. Overijssel, Lemelerberg, 15 Nov. 1976, *B. de Vries* 3246 (WBS); IJsselmeerpolders, Oost Flevoland, Bremerbergbos, 1 Aug. 1981, *Th. W. Kuyper* 1655 (L); idem, 8 Oct. 1981, *J. Schreurs* (L). — POLAND, Łuka, 13 Oct. 1977, *J. J. Barkman* (WBS).

Entoloma hispidulum is easily recognized by its Inocybeoid habit and its rather large, irregularly nodulose-angular spores. The purple sheen at the stipe-base, as described by *M. Lange*, is a rather variable character. Some collections show it clearly, in others it is only visible in the flesh or it is covered by the basal tomentum. In some collections there was even no trace of a purple tinge found. This was certainly the case in the type-collection of *Leptonia inocybeoides*. For the time being I do not attach much taxonomic value to this character (compare also the variability of *Entoloma araneosum* in Noordel. 1979: 238). *Entoloma hispidulum* differs clearly from *E. araneosum* in a number of characters, in particular in the size and shape of the spores, clamped hyphae, pale lamellae, stipe-colour and surface of pileus and stipe. The type of pigmentation of *E. hispidulum*, however, reminds of that found in section *Versatilia* of subgenus

Pouzaromyces. With respect to this character *E. hispidulum* takes a rather isolated position in subgenus *Leptonia*.

Agaricus resutus Fr. may be identical with *E. hispidulum*. Fries (1838. 145; 1867. 105, pl. 92 fig. 2) suggests, however, a more robust species which is related to *A. jubatus* and *A. griseocyaneus*. The plate of Cooke (1884-6, pl. 334(318) as *A. resutus* Fr.) possibly depicts *E. hispidulum*, as it shows a rather slender, Inocybeoid, brownish species more like *E. hispidulum* than *Agaricus resutus*.

3. ENTOLOMA EUCHROUM (Pers.: Fr.) Donk.—Fig. 3

Agaricus euchrous Pers., Synopsis: 343. 1801. — *Agaricus euchrous* Pers.: Fr., Syst. 1: 203. 1821. — *Leptonia euchroa* (Pers.: Fr.) Kumm., Führ. Pilzk.: 96. 1871. — *Hyporrhodius euchrous* (Pers.: Fr.) Schroet. in Cohn, KryptogFl. Schles. 1: 615. 1889. — *Rhodophyllus euchrous* (Pers.: Fr.) Quél., Enchir.: 60. 1886. — *Entoloma euchroum* (Pers.: Fr.) Donk in Bull. Bot. Gard. Buitenzorg, ser. 3, 18: 157. 1949.

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Cooke, Ill. Br. Fungi III, pl. 356(334). 1884-6. — Jahn, H., Pilze an Holz: 210, pl. 185. 1979. — Lange, J., Fl. agar. dan. 2: 98 pl. 79A. 1936. — Romagnesi in Bull. Soc. mycol. Fr. 97, Atl. pl. 225. 1981.

CHARACTERISTICS.—Basidiomes entirely violaceous-blue; lamellae often slightly tinged brown near edge; smell sweetish, like soap or like that of violets; on dead or living deciduous, rarely coniferous trees.

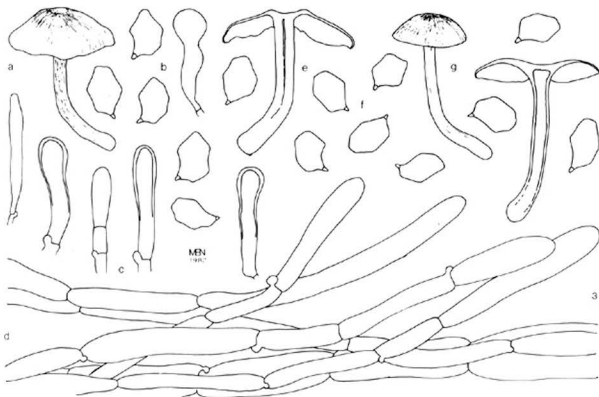


Fig. 3. *Entoloma euchroum*. — Habit, spores, cheilocystidia and pileipellis (a-d from P. B. Jansen, 25 nov. 1977; e from M. E. Noordeloos 812; f, g from C. Bas 1338).

Pileus 9–40 mm broad hemispherical or conico-convex then expanding, usually with more or less flattened centre, more rarely papillate or umbilicate, with slightly involute margin when young, later more or less straight, not hygrophanous, not striate or obscurely so at margin only, entirely blue-violaceous frequently with brownish-sepiaceous tinge, particularly at centre and with age, entirely flocculose-subsquamosule with slightly darker squamules on paler background (Meth. 17E3, 19E3 with tinges like 10 YR 4/3, background more like Meth. 17D2–18D2); lamellae L=20–40, l=1–3, adnate to adnexed, often with decurrent tooth, segmentiform to ventricose, pinkish grey-beige with distinct violaceous tinge to dark violaceous-brown with pink tinge, sometimes with brown colour at base and near the crenulate-fimbriate edge; stipe 20–60 × 1.5–5 mm, cylindrical sometimes with bulbous base, straight or bend towards base, solid to narrowly fistulose, with about the same colour as the pileus, pale to fairly dark violaceous covered with loose, darker fibrils, sometimes with sepia tinges towards base, with flocculose-subsquamosule apex, base sometimes white tomentose; flesh concolorous with surface; smell sweet, like that of violets or soap, fugaceous; taste soapy.

Spores (8–)9.3–11.5 × 5.8–8.1 μm , Q = 1.1–1.4–1.5, probably with dihedral base; basidia 27–45 × 9–12 μm , 4-spored with clamp; cheilocystidia 22–47 × 6–12 μm , versiform, narrowly cylindrical to broadly clavate or obpyriform, thin-walled and colourless or with slightly to distinctly thickened, brownish wall, particularly at apex, rarely in addition with violaceous-brownish intracellular pigment, scarce to abundant, but edge never entirely sterile; hymenophoral trama regular, made up of cylindrical hyphae with violaceous intracellular pigment; pileipellis a trichoderm made up of cylindrical, 7–19 μm wide, septate hyphae with abundant blue-violaceous pigment; clamp-connections abundant in hymenium and in covering layers.

HABITAT & DISTRIBUTION.—On dead and living deciduous trees (*Quercus*, *Alnus*, *Sorbus*, *Corylus*, *Fraxinus*) exceptionally on coniferous tree (*Chamaecyparus*), fairly common and widespread.

COLLECTIONS EXAMINED.—SWEDEN, Västergötland, W. of Tunhem, S. of Prestgarden, 12 Sept. 1944, *T. Nathorst-Windahl* (GB). — THE NETHERLANDS: prov. Drenthe, Rolde near Duserbrug, 29 Sept. 1977, *J. Schreurs* (L); prov. Overijssel, Kuinre, Kuinderbos, 4 Oct. 1975, *M. E. Noordeloos* (L); Ommen, estate 'Stekkenkamp', sept. 1979, *J. Schreurs & T. Boekhout* (L); prov. Gelderland, Laag Keppel, 19 Sept. 1951, *H. C. v. d. Gaag* (L); Doetinchem, 't Zumpé', 5 Oct. 1978, *W. Anema* (L); Epe, 17 sept. 1967, *J. W. M. Osse* (L); Gorssel, estate 't Joppe', 30 Sept. 1951, *R. A. Maas Geesteranus 8022* (L); prov. Utrecht, 25 Oct. 1980, *G. Keizer* (L); prov. Noord Holland, 's-Gravenland, 5 Sept. 1960, *J. Daams* (L); Castricum, Geversduin, 29 Sept. 1954, *G. D. Swanenburg de Veye* (L); Isl. Voorne, estate Mildenburg, 18 Oct. 1978, *M. E. Noordeloos 812* (L); prov. Noord Brabant, Drunen, estate 'de Klinkaert', 10 Sept. 1957, *C. Bas 1338* (L); prov. Limburg, Valkenburg, Ravensbos, 30 Sept. 1950, *J. Daams* (L). — GERMAN FEDERAL REPUBLIC, Benthim, Samerothwald, 25 Sept. 1977, *P. B. Jansen* (L); Bayern, Friesenerwarte, 17 Sept. 1981, *G. Wölfel* (L).

Entoloma euchroum is easily to recognize by its entirely blue-violaceous basidiomes and lignicolous habitat. It is the only species in sect. *Leptonia* with entirely violaceous lamellae sometimes with brownish edge and cannot be confounded with any of the other species. It is a relatively common species, frequently found on *Alnus* and *Quercus*, less often on other trees such as *Sorbus*, *Fraxinus* and *Carpinus*. Only once found on coniferous tree (*Chamaecyparus* spec.) Another remarkable character of *E. euchroum* is the smell which can be fairly strong like flowers or soap.

4. *Entoloma cedretorum* (Romagnesi & Rioussel) Noordel., *comb. nov.*

Rhodophyllus cedretorum Romagnesi & Rioussel in Bull. Soc. mycol. Fr. 92: 299. 1976 (basionym).

CHARACTERISTICS.—Pileus 20–30 mm broad, truncate-conical then irregular with lobed margin, not hygrophanous, not striate, opaque, dark blue-black not changing with age, micaceous with minute granulose-plucky covering becoming somewhat radially fibrillose-squamulose at margin but in general giving a smooth impression to the naked eye; lamellae adnate to almost free, ventricose, greyish cream then sordid grey-pink with entire, concolorous edge; stipe 60–70 × 3.5–5 mm, cylindrical sometimes flexuose, attenuated towards base, dark blue, paler and tinged yellow at base, minutely punctate or plucky all over, base white tomentose; flesh thin, brittle, whitish in inner parts; smell none; spores (9–)10–12.5(–13) × 7.5–8(–10) μm with dihedral base; basidia 35–60 × 11.5–12.5 μm , 4-spored, clamped; cystidia none; pileipellis a trichoderm, made up of cylindrical, 8–14 μm wide hyphae with intracellular pigment; clamp-connections present in hymenium and pileipellis.

HABITAT & DISTRIBUTION.—Terrestrial in coniferous forest (*Cedrus* sp.), only known from the type-locality.

Entoloma cedretorum is a very distinct species with its dark blue pileus and stipe, punctate-plucky stipe covering, fertile lamellar edge and habitat. *Entoloma lepidissimum* and *E. coelestinum* are smaller, have a smooth stipe and another habitat, and *E. coelestinum* has much smaller spores. *Entoloma tjallingiorum* has a grey-brown pileus and cheilocystidia.

5. *Entoloma coelestinum* (Fr.) Hesl.—Fig. 4

Agaricus coelestinus Fr., Epicr.: 158. 1838. — *Nolanea coelestina* (Fr.) Gill., Hymen. Fr.: 422. 1876. — *Rhodophyllus coelestinus* (Fr.) Quél., Enchir.: 65. 1886. — *Leptonia coelestina* (Fr.) P. D. Orton in Trans. Br. mycol. Soc. 43: 177. 1960. — *Entoloma coelestinum* (Fr.) Hesl., in Beih. Nova Hedwigia 23: 111. 1967.

EXCLUDED NAMES.—*Rhodophyllus coelestinus* ss. J. Lange in Dansk Bot. Ark. 2(11): 38. 1921; Kühn. & Romagn., Fl. anal.: 207. 1953; *Leptonia coelestina* ss. P. D. Orton, l.c.; *Entoloma coelestinum* ss. Hesl., l.c.

CHARACTERISTICS.—Pileus and stipe dark blackish blue or bright blue to steelblue, more or less of the same colour; spores small, 6.5–8.6 × 5.5–6.0(–6.5) μm ; terrestrial in mixed forest.

Pileus 4–10 mm broad, conical to conico-convex with or without distinct papilla, never umbilicate, with straight margin, not hygrophanous, not striate, dark (blackish) blue, coarsely radially fibrillose, centre almost scaly; lamellae L = 6–8, l = 0–1, distant, emarginate-adnate white then pink with concolorous, entire edge; stipe 20–40 × 1 mm, cylindrical, almost concolorous with the pileus or paler and more bright, smooth or slightly fibrillose lengthwise, base white tomentose; smell none.

Spores 6.5–8.6 × 5.5–6.0(–6.5) μm , Q = 1.1–1.3–1.4, with distinct dihedral base; basidia 36–42 × 8–10 μm , 4-spored, clamped; cheilocystidia absent; pileipellis trichodermal, made up of cylindrical, septate, clamped hyphae; pigment intracellular; clamp-connections frequent in hymenium and pileipellis.

HABITAT & DISTRIBUTION.—Terrestrial in mixed forest; rare.

COLLECTION EXAMINED.—N O R W A Y: Nordland, Mo, 9 Sept. 1976, *E. Horak* 76/141 (ETH).

The collection described above agrees perfectly with the diagnosis of Fries (1838: 158) who placed this species in *Nolanea* because of the conical pileus with straight margin. The present

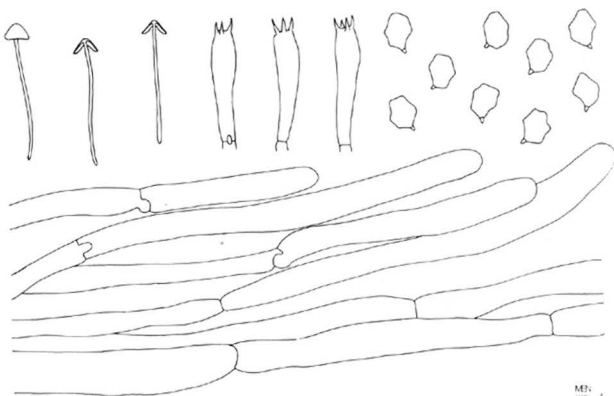


Fig. 4. *Entoloma coelestinum*.—Habit, basidia, spores and pileipellis (all figs from *E. Horak* 76/141).

author places it in subgenus *Leptonia* on account of the granular-subsquamulose pileus, type of pileipellis, attachment of the lamellae and the pigmentation. *Entoloma lepidissimum* is closely related, but differs clearly in, having much larger and differently shaped spores. The interpretations of Lange, Kühner & Romagnesi, Orton and Hesler are different, all being species belonging to section *Cyanula*.

6. *Entoloma lepidissimum* (Svrček) Noordel., *comb. nov.*—Fig. 5

Leptonia lepidissima Svrček in *Česka Mykologie* 18: 205, 1964 (basionym).—*Rhodophyllus lepidissimus* (Svrček) Moser apud Gams, *Kl. KryptogFl.* 2 b/2, 4. Aufl.: 203, 1978.

CHARACTERISTICS.—Pileus and stipe dark blue; lamellae white then pink; stipe surface minutely striate, glabrous; spores $8.0-11.5(-11.8) \times 6.0-8.2 \mu\text{m}$.

Pileus 8–15 mm broad, broadly campanulate then expanding with papilla, with straight then uplifted margin and irregularly undulating with age, not hygrophanous, not striate, dark blue, weakly shining, radially fibrillose; lamellae $L = 16-25$, $l = 1-4$, moderately distant, emarginate, segmentiform to narrowly ventricose, white then pink with concolorous, entire edge; stipe 30–35 \times 1–2.3 mm, cylindrical, straight, concolorous with pileus, shining, fibrillose-striate, glabrous; smell none.

Spores $8.0-11.5(-11.8) \times 6.0-8.2 \mu\text{m}$, $Q = 1.2-1.3-1.5$, with dihedral base; basidia 22–50

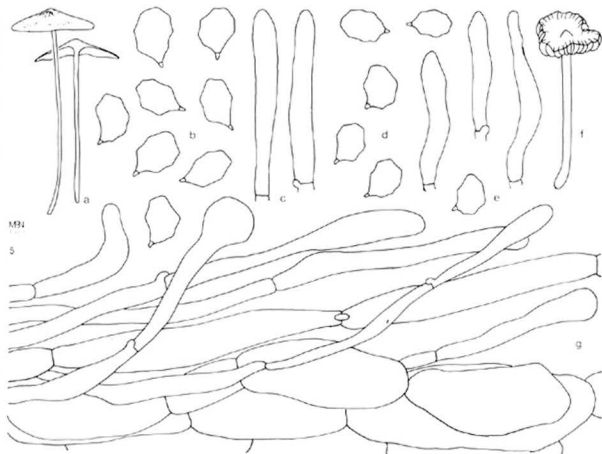


Fig. 5. *Entoloma lepidissimum*. — Habit, spores, cheilocystidia and pileipellis (a-c from holotype; d-g from *B. de Vries* 3245).

$\times 8-14 \mu\text{m}$, 4-spored with clamp; cheilocystidia $30-50 \times 5.8-15 \mu\text{m}$, cylindrical, very scattered, sometimes lacking; hymenophoral trama regular, made up of cylindrical elements, $70-200 \times 17-25 \mu\text{m}$; pileipellis a trichoderm of up to $20 \mu\text{m}$ wide cylindrical, septate hyphae, with cylindrical or slightly swollen, up to $23 \mu\text{m}$ wide terminal cells; pigment abundant, blue, intracellular; clamp-connections present in hymenium and pileipellis.

HABITAT & DISTRIBUTION.—On rotten twigs of *Alnus* in swamp-forest (holotype) and in dense moss vegetation (*Dicranum scoparium*, *Hypnum cupressiforme*) and *Mnium affine* in *Juniperus*-shrub; rare, known to occur in Czechoslovakya and German Democratic Republic.

COLLECTIONS EXAMINED.—GERMAN DEMOCRATIC REPUBLIC: Fähr Insel, 14 Oct. 1976, *B. de Vries* 3245 (WBS). — CZECHOSLOVAKYA, Bohemia merid., Vrabské near Cimelice, 20 Oct. 1963, *M. Srčček* (holotype, PRM 755801).

The distinctive features of *Entoloma lepidissimum* are its blue colours, pale lamellae, smooth stipe and perhaps the cheilocystidia. *E. coelestinum* differs in having smaller spores, and a granulose-subsquamulose pileal surface. *Entoloma cedretorum* is generally somewhat larger and has a punctate-plushy stipe-surface.

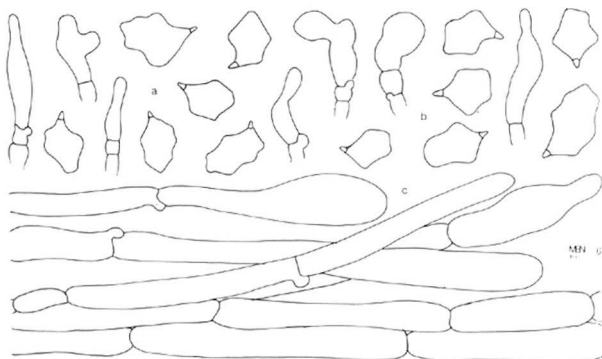


Fig. 6. *Entoloma dichroum*. — Spores, cheilocystidia and pileipellis. (a, c from *Tjallingii*, 6 nov. 1978; b from *Bresinsky* 238).

7. *Entoloma dichroum* (Pers.: Fr) Kumm.—Fig. 6

Agaricus dichrous Pers., Synopsis: 343. 1801. — *Agaricus dichrous* Pers.: Fr., Syst. 1: 202. 1821. — *Entoloma dichroum* (Pers.: Fr.) Kumm, Führ. Pilzk.: 97. 1871. — *Rhodophyllus dichrous* (Pers.: Fr.) Quél., Enchir.: 58. 1886.

EXCLUDED NAMES.—*Agaricus dichrous* ss. Fr., Summa veg. scand. 2: 287. 1849; Icon. sel. Hymen. 1: 105, pl. 92 fig. 3. 1867. — *Entoloma dichroum* ss. Bres., Icon. mycol. pl. 554. 1929; Konrad & Maublanc, Icon. sel. Fung., pl. 192. 1932. — *Rhodophyllus dichrous* ss. J. Lange, Fl. agar. dan. 2: 93, pl. 72A. 1936 (= *Entoloma tjallingiorum* Noordel.).

CHARACTERISTICS.—Pileus brownish with distinct violaceous-purple tinge; stipe dark grey-blue or violaceous blue, smooth; spores (9.0)9.3–12.0 × 7–9.3(–10), with rather pronounced, sharp angles, slightly thick-walled; pigment intracellular.

Pileus 7–55 mm broad, conical then convex finally plano-convex with or without papilla or umbo, never depressed, not hygrophanous, not striate, dark violaceous(brown) then sepia pinkish brown with purple tinge (Meth. 12F3, 13F3–4(2) then more like 10 YR 3/3–4 or 7.5 YR 4/2), entirely felted-squamulose, when young more granular-fibrillose with subsquamulose centre; lamellae L = about 25, l = 1–3, narrowly adnate-emarginate, triangular then ventricose, white then pink finally pinkish-brown (up to 7.5 YR 6/4–5/4) with entire, concolorous edge; stipe 20–60 × 2–5 mm, cylindrical, slightly broadened towards base (–8 mm), very dark grey-blue (19F3–4, 20F4–5) to violaceous-blue, usually distinctly different from colour of pileus, smooth, base white tomentose; flesh concolorous with surface, inner parts paler; smell none or slightly spermatial.

Spores (9.0)–9.3–12.0 × 7–9.3(–10.0) μm, irregularly 6-many angled in side-view with rather pronounced, sharp angles, slightly thick-walled; basidia 27–50 × 7–15 μm, 4-spored with clamp;

cheilocystidia 20–42 × 5–16(–25) μm , irregularly cylindrical to almost coralloid, sometimes septate, with hyaline, colourless walls, scattered among basidia; pileipellis a trichoderm of up to 20 μm wide cylindrical, septate hyphae with cystidiform terminal cells, 35–110 × 20–42 μm ; pigment abundant, intracellular in pileipellis and upper pileitrama; clamp-connections abundant in all tissues.

HABITAT & DISTRIBUTION.—Terrestrial in mixed forest, rare. Known from The Netherlands, Belgium and Austria.

COLLECTIONS EXAMINED.—THE NETHERLANDS: prov. Noord Holland, Egmond, 24 Oct. 1978, *A. Aptroot* (L); prov. Gelderland, Bennekom, Bennekomsebos, 6 Nov. 1978, *F. Tjallingii* & *G. Tjallingii-Beukers* (L). — BELGIUM: prov. Limburg, Bèvercé, along river Warche, 12 Aug. 1957, *C. Bas 1395* (L). — AUSTRIA, Hohe Tauern, Kesselfall im Kaprunthal, (22–28) Aug. 1963, *A. Bresinsky 238* (M).

Entoloma dichroum is a rather rare and variable species, which already gave rise to confusion about its identity early in the last century. When Fries (1821, l.c.) validated Persoon's species he had not seen it alive. Later he himself collected a species which he identified as *Agaricus dichrous* Pers., but with a question mark (1849: 287). In a footnote he expressed his doubts on his determination, but stated that he could not find a better name for his material. When comparing the description given by Persoon (1801: 343) with those of Friés (1849, l.c.; 1867, l.c.) it is obvious that two different species are concerned. Persoon described a species with a violaceous-purplish pileus and an almost smooth stipe, whereas Fries gives a picture of a species with a brown pileus and blue-violaceous, flocculose-scaly stipe. Unfortunately Fries' interpretation of *Agaricus dichrous* was followed by later mycologists and Persoon's was forgotten. While sorting out the herbarium specimens available to me it became clear that the material labelled as *Entoloma dichroum* represented a mixture of three taxa: one almost perfectly in agreement with Persoon's original species, one corresponding with Fries' misapplication and an undescribed one. As no synonym was available for Fries' taxon I described *Agaricus dichrous* sensu Fries as a new species, viz. *Entoloma tjallingiorum*, in honour of Dr. F. Tjallingii and Mrs. G. Tjallingii-Beukers, whose collection of the real *Entoloma dichroum* from Bennekom opened my eyes to the problems concerned with *Agaricus dichrous*, while the third one was described as new under the name *Entoloma allochroum*. The most important macroscopic differences between the three are the colour of pileus and stipe and the stipe-covering (see the key to the species, above) and microscopically *Entoloma tjallingiorum* is characterised by its thin-walled, weakly angled, almost nodulose spores, which collapse easily, while the other two have relatively thick-walled, pronouncedly angled spores. Compare the descriptions of *E. tjallingiorum* and *E. allochroum* below.

8. *Entoloma allochroum* Noordel., *spec. nov.*—Fig. 7

Pileus griseo-brunneus violaceo-tinctus; lamellae sordide griseo-roseae; stipes pallide vilaceus, violaceo-fibrilloso-squamulosus; sporae 9.3–12.7 × 7.0–9.3 μm , acute angulateae, crasse tunicatae; cheilocystidia sparsa; pileipellis trichoderma; pigmentis intracellulosis; fibulae abundantes; ad terram in horto.—Holotypus: *E. Kits v. Waveren*, 29-VII-1973, 'Aerdenhout, prov. Noord-Holland, Netherlands' (L).

CHARACTERISTICS.—Pileus greyish-brownish with violaceous tinge; stipe with violaceous-purple, fibrillose to subsquamulose covering; spores 9.3–12.7 × 7.0–9.3 μm , irregularly but

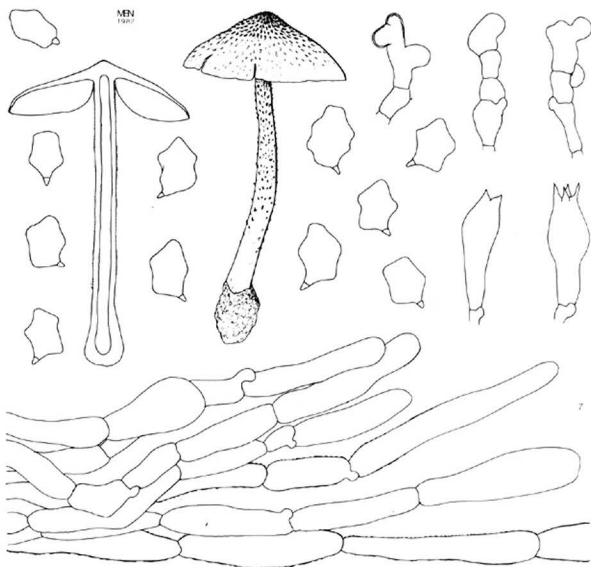


Fig. 7. *Entoloma allochromum*. — Habit, spores, cheilocystidia and pileipellis (all figs from holotype).

rather pronouncedly 6-9-angled in side-view, slightly thick-walled; pigment intracellular, in addition also minutely encrusting some hyphae of pileipellis and pileitrama.

Pileus 28-32 mm broad, about 10-12 mm high, expanded conical with slightly inflexed margin and weak umbo, hardly hygrophanous, translucently striate at margin only, with a slightly lilaceous, fairly dark grey-brown velvety covering broken up into minute granular greyish-brown flocculose warts on rather pale-pinkish-greyish background (covering 7.5 YR 3/2, 4/2, 5/2, background 7.5 YR 6/4 to 10 YR 5/3); lamellae fairly crowded, adnexed to free, moderately broad, (5-6 mm), slightly ventricose, pale brownish-pinkish sordid cream (7.5 YR 8/2 to 7/4) with slightly irregular, concolorous edge; stipe 53-60 × 3.5-4.5 mm, cylindrical with subclavate base, hollow, 7-10 mm broad at base, pale violaceous with dark purple-violaceous fibrillose covering and darker minute-fibrillose squamules, especially in upper half, with sordid white tomentum at base (seg. 689-688, fibrils and squamules 667-666); flesh glassy pale brownish grey in pileus, paler in stipe-apex with pale sordid wax-yellow tinge in stipe-base; smell and taste not distinctive.

Spores $9.3-12.7 \times 7.0-9.3 \mu\text{m}$, 6-9-angled with rather pronounced angles, slightly thick-walled; basidia $34-54 \times 9.5-11.5 \mu\text{m}$, (2-)4-spored, with clamp; cheilocystidia $30-55 \times 5-10 \mu\text{m}$, irregularly cylindrical to coralloid, septate, often slightly thick-walled, with clamp, scattered among basidia; pileipellis a trichoderm of cylindrical or swollen, septate hyphae with up to $40 \mu\text{m}$ wide terminal cells with abundant intracellular pigment, hyphal walls of some hyphae also minutely encrusted; pileitrama regular, made up of cylindrical up to $15 \mu\text{m}$ wide hyphae, occasionally with minute encrustations; stipitepellis a trichoderm made up of septate, cylindrical, $9-18 \mu\text{m}$ wide hyphae with lilaceous-purplish intracellular pigment; clamp-connections abundant in covering layers and in hymenium.

HABITAT & DISTRIBUTION.—Terrestrial in garden; only known from the type-locality.

COLLECTION EXAMINED.—THE NETHERLANDS: prov. Noord Holland, Aerdenhout, 29 Aug. 1973, *E. Kits v. Waveren* (holotype, L).

Entoloma allochroum has strong affinities with *E. tjallingiorum* from which it differs in the purplish violaceous colours in pileus and stipe, and by having rather thick-walled and pronouncedly angled, slightly larger spores. *Entoloma dichroum* has different colours and a glabrous stipe. See also the discussion under *E. dichroum* (p. 463).

9. *Entoloma tjallingiorum* Noordel., *spec. nov.*—Fig. 8

MISAPPLIED NAMES.—*Agaricus dichrous* sensu Fries, *Summa veg. scand.* 2: 287. 1849, *Icon. sel. Hymen.* 1: 105, pl. 92 fig. 3. 1867. — *Entoloma dichroum* sensu Bres., *Icon. mycol.*, pl. 554. 1929; sensu Konrad & Maublanc, *Icon. sel. fung. pl.* 190-2. 1932. — *Rhodophyllus dichrous* sensu J. Lange, *Fl. agar. dan.* 2: 93, pl. 72A. 1936; Romagnesi in *Bull. Soc. mycol. Fr.* 92: 229-301. 1976.

Agaricus placidus sensu Fries, *Icon. sel. Hymen.* 1: 109, pl. 97 fig. 1. 1867.

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Bres., l.c. — Fries, l.c. — Konrad & Maublanc, l.c. — J. Lange, l.c. — Romagnesi, l.c.

Pileus 20-50 mm latus, conico-convexus, expansus, umbonatus raro umbilicatus, haud hygrophanus, haud striatus; lamellae pallide dein roseae vel brunneo-roseae, interdum coeruleo tinctae; stipes 34-100 $2.5-7(-10)$ mm, coeruleus vel violaceus, atro-coeruleo-fibrilloso-squamulosus; spora $9-11(-11.5) \times 5.8-7.5(-8) \mu\text{m}$, tenuitunicatae paulo angulatae; cheilocystidia sparsa vel abundantia, cylindracea vel irregulariter cylindraceo-flexuosa vel lageniformia; pileipellis trichoderma; pigmentis intracellulosis et leviter incrustantibus; fibulae abundantes; ad terram vel ad lignum putrescentem Quercos.—holotypus: S. Ryman, 4-X-1980, 'Predikstolen' prope Upsaliam, Suecica (UPS).

ETYMOLOGY.—Named in honour of Dr. F. Tjallingii and Mrs. G. Tjallingii-Beukers, honorary members of the Netherlands' Mycological Society, for their invaluable stimulation of amateur mycology in the Netherlands.

CHARACTERISTICS.—Pileus grey-brown, sometimes with blue or blue-violaceous tinge, entirely squamulose; stipe blue or violaceous with blackish-blue fibrillose-squamulose covering; spores thinwalled and weakly angled; pigment intracellular and encrusting.

Pileus 20-50 mm broad, conico-convex or trapezoidal with or without weak umbo or with slightly umbilicate centre, with margin involute when young then more or less straight, not hygrophanous, not striate, dark grey-brown with or without blue patches or blue tinge especially near margin, coarsely radially fibrillose-squamulose or woolly squamulose all over; lamellae subdistant, normally thick or slightly thickish, sometimes transversely veined, segmentiform to ventricose, white then sordid pink, sometimes tinged blue, especially near edge, but edge never distinctly marked; stipe $34-100 \times 2.5-7(-10)$ mm, cylindrical often broadened towards base,

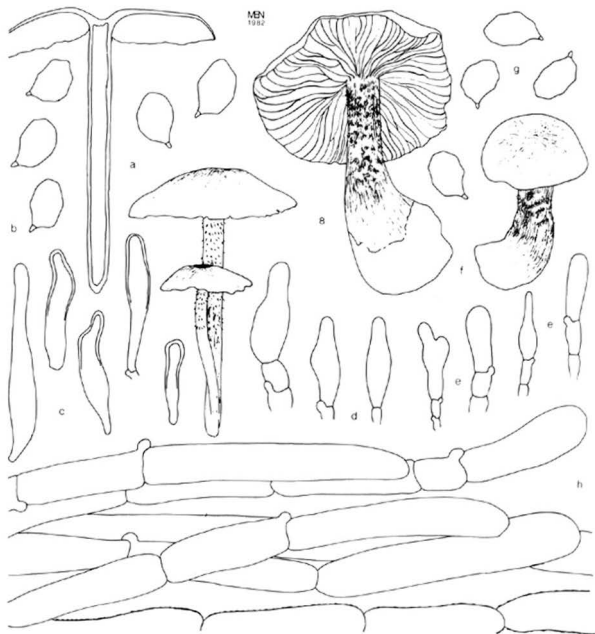


Fig. 8. *Entoloma tjallingiorum*. — Habit, spores, cheilocystidia and pileipellis (a, b, c, h from *Bas* 6502; d, g from *Nathorst-Windahl* 2231; e from holotype; f from *Wölfel*, 15 sept. 1979).

dark blue-grey or indigo at apex, downwards more greyish or violaceous-blue, with blackish-blue fibrillose-squamulose covering, especially in upper part, base sordid white tomentose; flesh beige with violaceous-blue tinge in pileus and cortex of stipe, often more greyish in stipe; smell not distinctive; taste somewhat bitterish.

Spores $9-11(-11.5) \times 5.8-7.5(-8.0) \mu\text{m}$, $Q = 1.2-1.4-1.5$, weakly angled, thinwalled; basidia $27-43 \times 8-12 \mu\text{m}$, 4-spored with clamp; cheilocystidia $20-55 \times 6-13 \mu\text{m}$, versiform, cylindrical to clavate or irregularly cylindrico-flexuose to slender lageniform, scattered among basidia, often scarce, with thin, colourless or thickened, brownish walls, especially at apex, occasionally with some bluish or brownish intracellular pigment; pileipellis a trichoderm made up of cylindrical hairs with cylindrical to somewhat swollen terminal cells, $7-24 \mu\text{m}$ wide with

abundant brown intracellular pigment and also frequently some encrusted hyphae; lactiferous hyphae numerous in pileitrama of some collections; clamp-connections numerous in all tissues studied.

HABITAT & DISTRIBUTION.—Terrestrial or on rotten wood (*Quercus*) in deciduous and mixed forest, wide-spread but rare.

COLLECTIONS EXAMINED.—NORWAY: Oppland, Lunner, Søndre Oppdalen, 12 Jun. 1978, *T. E. Brandrud* (O); Akershus, Ski, Finstadslogen, 4 Oct. 1953, *F.-E. Eckblad* (O). — SWEDEN, Småland, Femsjö, 23 Sept. 1940, *T. Nathorst-Windahl* 2231 (GB); Uppland, Bondkyrka, Predikstolen, 4 Oct. 1980, *S. Ryman* (Holotype, UPS). — DENMARK, Sjaelland, Roskilde, Boserup Skov, 13 Oct. 1955, *M. Lange* (C); Jutland, Oksholm skov near Göl, 15 Oct. 1975, *H. Knudsen* (C). — NETHERLANDS, prov. Noord Holland, 2 Nov. 1974, *C. Bas* 6502 (L). — GERMAN FEDERAL REPUBLIC, Bayern, Forchheim, 15 Sept. 1979, *G. Wölfl* (L).

While studying the collections available of *E. tjallingiorum* I found that the lamellae sometimes show a distinct bluish or brownish tinge, especially near the edge. They are never, however, entirely blue. Microscopically this is caused by a combination of intracellular and membranal pigment in the cheilocystidia. Romagnesi (1976: 302) described *Rhodophyllus dichrous* var. *corsicus* for a taxon close to *E. tjallingiorum* with entirely sterile lamellar edge with thick-walled pigmented cheilocystidia. For the moment I do not attach a taxonomic value to this character, at least not on varietal level.

For a discussion on related taxa see p. 463.

10. *Entoloma placidum* (Fr.) Noordel.—Fig. 9

Agaricus placidus Fr., Syst. 1: 202. 1821. — *Leptonia placida* (Fr.) Kumm., Führ. Pilzk.: 96. 1871. — *Rhodophyllus placidus* (Fr.) Quél., Enchir.: 60. 1886. — *Entoloma placidum* (Fr.) Noordel. in *Persoonia* 11: 150. 1981.

EXCLUDED NAME.—*Agaricus placidus* sensu Fries, Icon. sel. Hymen. 1: pl. 97-1. 1867 (= *E. tjallingiorum* Noordel.).

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—J. Lange, Fl. agar. dan. 2, pl. 76B. 1936 (as *R. placidus* var. *gracilis*). — Noordeloos, in Nord. J. Bot. 2: 161. 1982. — Krieglsteiner in Zeitschr. Mykol. 48: 52. 1982.

CHARACTERISTICS.—Basidiomes collybioid; pileus dark grey-brown entirely squamulose, not striate; lamellae pink; stipe deep blue, glabrous, shiningly innately fibrillose-striate smell farinaceous; on dead trunks of *Fagus sylvatica*.

Pileus 25–30 mm broad, convex then expanded, usually shallowly depressed, with straight margin, not hygrophanous, not striate, entirely minutely squamulose with dark brown squamules on grey background (10 YR 4/2, 3/2, centre 2/2, background 6/2,5/2); lamellae L = 20–30, l = 3–7, broadly adnate, sometimes slightly emarginate or with small decurrent tooth, segmentiform, pink; stipe 45–55 × 2–3 mm, cylindrical, slightly broadened towards base, often slightly rooting, dark indigo or bluish grey, apex minutely pruinose, downwards glabrous, innately fibrillose-striate lengthwise, shining, base white tomentose; flesh in cortex concolorous with surface; smell distinctly farinaceous when crushed.

Spores 8–11(–11.5) × 5.8–7.6 μm, Q = 1.2–1.35–1.6, 6–8-angled with dihedral base; basidia 23–46 × 7–16 μm, 4-spored; cheilocystidia none; hymenophoral trama regular, made up of 6–22 μm wide, cylindrical hyphae; pileipellis a trichoderm made up of 7–17 μm wide cylindrical hyphae, some with swollen terminal cell, with abundant intracellular pigment, subpellis usually well-developed, made up of inflated cells, 65–120 × 11–22 μm; clamp-connections frequent in hymenium and covering layers.

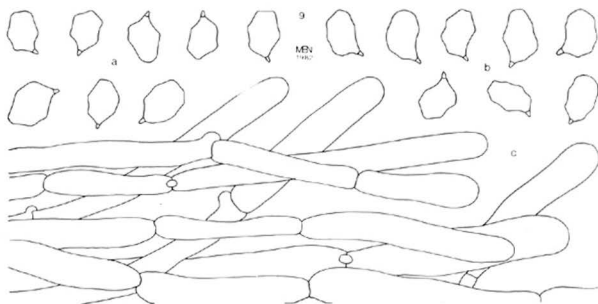


Fig. 9. *Entoloma placidum*. — Spores and pileipellis (a, c from *Einhellinger*, 15 aug. 1978; b from *Hansen*, 16 sept. 1980).

HABITAT.—On and around rotten trunks of *Fagus sylvatica*, rare but wide-spread.

COLLECTIONS EXAMINED.—DENMARK, Isl. Falster, Corzelitte Skov, 7 km. E. of Nykøbing, 16 Sept. 1980, *Lise Hansen* (L). — GERMAN FEDERAL REPUBLIC, Bayern, Schwäbische Alb bei Harburg N. of Donauwörth, 15 Aug. 1978, *A. Einhellinger* (M); Württemberg, S. of Weilheim, 28 Aug. 1981, *Krieglsteiner 206/81* (Herb. *Krieglsteiner et filii*).

The dark grey-brown squamulose pileus, glabrous, blue stipe, farinaceous smell and habitat are distinctive for *Entoloma placidum*. *Entoloma lampropus* is closely related, but differs in having slightly different colours, a different pigmentation pattern in the pileipellis, and in the lack of a farinaceous smell and habitat. *E. tjallingiorum* and *E. allochrom* differ among other things in having a flocculose scaly stipe-surface and differently shaped spores.

In another publication (Noordeloos, 1982: 160, fig. 14) I erroneously depicted cheilocystidia for *E. placidum*, which are not mentioned in the text, however. After reexamination of the collection from Denmark, I came to the conclusion that I confused basidiolles with real cystidia.

11. *Entoloma lampropus* (Fr.) Hesl.—Fig. 10

Agaricus lampropus Fr., Syst. 1: 203. 1821. — *Leptonia lampropus* (Fr.) Quél. in Mém. Soc. Emul. Montbéliard, sér. II, 5: 121. 1872. — *Rhodophyllus lampropus* (Fr.) Quél., Enchir.: 60. 1886. — *Entoloma lampropus* (Fr.) Hesl. in Beih. Növa Hedwigia 23: 154. 1967.

EXCLUDED NAMES.—*Rhodophyllus lampropus* sensu J. Lange, Fl. agar. dan. 2, pl. 76C. 1936 [= *E. corvinum* (Kühn) Noordel.].

Leptonia lampropus sensu Bres., Icon. Mycol. XII, pl. 570–1. 1929; P. D. Orton in Trans. Br. mycol. Soc. 43, suppl.: 105. 1960 [= *E. sodale* (Kühn.) Noordel.].

CHARACTERISTICS.—Basidiomes small to medium-sized; pileus (blackish-)brown; stipe blue. fibrillosely striate; pigment intracellular and encrusting; in grassland.

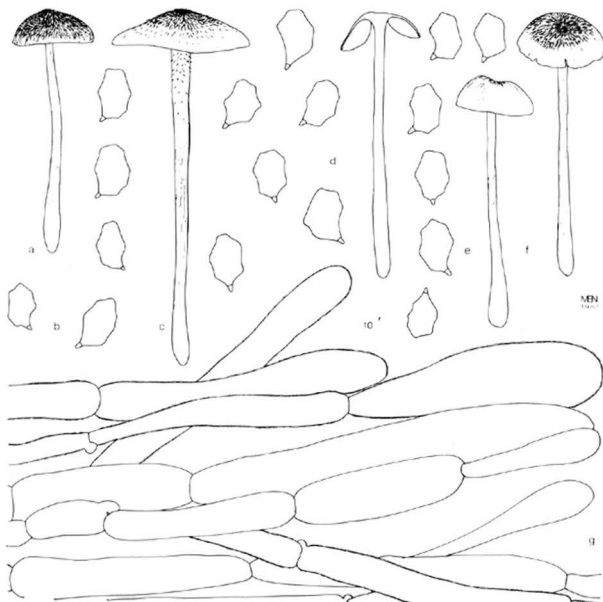


Fig. 10. *Entoloma lampropus*. — Habit, spores, cheilocystidia and pileipellis (a, d from J. J. Barkman 10386; c from J. J. Barkman 10036; b, g from A. K. Masselink, 10 nov. 1975; e, f from H. Marxmüller 79124).

Pileus 10–27 mm broad, hemispherical then expanding, usually not distinctly depressed or umbilicate, not hygrophanous, not striate with (strongly) involute margin when young, dark brown to blackish (eg. Expo F21, E62, F61, F90) darker, almost blackish at centre, paler towards margin (D42), entirely radially squamulose with small, uplifted squamules, most dense at centre; lamellae moderately distant, narrowly adnate, deeply emarginate, sometimes with decurrent tooth, narrowly ventricose, white then pale greyish or brownish pink with concolorous, smooth edge; stipe 50–60 × 1–3.5 mm, cylindrical usually broadened towards base, sometimes also broadened towards apex, adpressedly fibrillose striate with dark blue fibrils on steelblue background, apex white or blue flocculose, downwards smooth, base densely white tomentose; smell not distinctive; taste none or slightly bitter.

Spores 8.4–11.5 × 6–8.3 μm, Q = 1.2–1.4–1.6(–1.7), irregularly 6–9-angled in side-view with dihedral base; basidia 23–45 × 7.5–12 μm, 4-spored with clamp; cheilocystidia absent;

hymenophoral trama regular, made up of cylindrical elements; pileipellis a trichoderm made up of cylindrical hairs, 8–25 μm wide, septate, with abundant intracellular pigment and in addition more or less distinctly encrusted walls; clamp-connections frequent in hymenium and covering layers.

HABITAT & DISTRIBUTION.—In grassland and *Juniperus communis* vegetations, and open places in forests, rare, wide-spread.

COLLECTIONS EXAMINED.—SWEDEN, Skåne, Röstange Anderstorp, 10 Oct. 1975, *A. K. Masselink* (WBS); Hallnadsåsen, Hulrugerud, 6 Oct. 1975, *A. K. Masselink* (WBS).—DENMARK, Jutland, near Kalundborg, 4 Oct. 1975, *J. J. Barkman 10036* (WBS), Silkeborg, Glery Vissingkloster, 25 Oct. 1975, *J. J. Barkman 10386* (WBS).—GREAT BRITAIN, Scotland, Invernesshire, Rothiemurchus forest reserve, 22 Aug. 1960, *P. D. Orton 2300* (E).—FRANCE, Valenciennes, F. de Mormal, 7 Sept. 1979, *H. Marxmüller 79124* (L).

Fries (1821: 203) described *Agaricus lampropus* in stirps *Leptonia*, close to *A. placidus* with the following characteristics: 'pileo demum umbilicate fibrillosos-griseo, lamellis adnatis albidogriseus, stipite coeruleo' thus a species with grey pileus and blue stipe. This species has been variously interpreted. The most important are those of J. Lange (1936, pl. 76C); Bresadola (1929, pl. 570–1) and Kühn. & Romagn. (1953: 208). I agree with P. D. Orton (1960: 105) that Lange's interpretation must be rejected, as it represents a *Leptonia* with blue pileus. The other two interpretations both agree more or less satisfactorily with the protologue, but they are definitively different from each other. I decided to follow Kühner & Romagnesi in their interpretation of *Agaricus lampropus* Fr., being a species with relatively dark pileus, greyish lamellae and a strong resemblance, also microscopically, with *E. placidum*. To my opinion this interpretation comes closer to the original than that of Bresadola, which is the same as Orton's species. The latter, with the correct name *E. sodale* (Kühn. & Romagn.) Noordel. is a clampless species with large inflated cheilocystidia, and belongs to sect. *Cyanula* close to *E. asprellum*.

Entoloma lampropus differs from *E. placidum* in pigmentation patterns, habitat, slightly different colours and lack of a farinaceous smell.

APPENDIX

While preparing keys to the Nordic Macromycete Flora, which will be published towards the end of 1982, and keys to sect. *Cyanula* in Europe, the following new combinations appeared to be necessary:

Entoloma caesiocinctum (Kühn.) Noordeloos, *comb. nov.*—basionym: *Rhodophyllus caesiocinctus* Kühn. in Rev. mycol. 19: 4. 1954.

Entoloma catalaunica (Sing.) Noordeloos, *comb. nov.*—basionym: *Leptonia catalaunica* Sing. in Anns mycol. 34: 428. 1936.

Entoloma caeruleum (P. D. Orton) Noordeloos, *comb. nov.*—basionym: *Leptonia caerulea* P. D. Orton in Trans. Br. mycol. Soc. 43: 290. 1960.

Entoloma cyaneoviridescens (P. D. Orton) Noordeloos, *comb. nov.*—basionym: *Leptonia cyaneoviridescens* P. D. Orton in Trans. Br. mycol. Soc. 43: 292. 1960.

Entoloma ianthinum (Romagn. & Favre) Noordeloos, *comb. nov.*—basionym: *Rhodophyllus ianthinus* Romagn. & Favre in Rev. Mycol. 3: 76. 1938.

Entoloma lepiotosmus (Romagn.) Noordeloos, *comb. nov.*—basionym: *Rhodophyllus lepiotosmus* Romagn. in Rev. mycol. 19: 5. 1954.

Entoloma nigroviolaceum (P. D. Orton) Noordeloos, *comb. nov.*— basionym: *Leptonia nigroviolacea* P. D. Orton in *Trans. Br. mycol. Soc.* **43**: 296. 1960.

Entoloma querquedula (Romagn.) Noordeloos, *comb. nov.*—basionym: *Rhodophyllus querquedula* Romagn. in *Rev. mycol.* **19**: 8. 1954.

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NOTES ON THE GENUS PSATHYRELLA-VIII

Description of and key to the European species of section *Hydrophilae*

E. KITS VAN WAVEREN

Rijksherbarium, Leiden

A description of and key to twelve species of *Psathyrella* section *Hydrophilea* (Romagn.) ex Sing. emend. Kits van Wav. is given. These species are: *P. hydrophila*, *P. hydrophiloides* (spec. nov., = *Drosophila pilulaeformis* ss. Kühn. & Romagn.), *P. laevis*, *P. subpapillata* (comb. nov.), *P. fragrans* (an American species found in the Netherlands), *P. mucrocystis* (= *Drosophila chondrodermoides* Romagn.), *P. frustulenta*, *P. obtusata* with var. *utriformis* (var. nov.), *P. chondroderma*, *P. pseudocasca* (comb. nov.) *P. umbrina* (spec. nov.), and *P. rannochii* (spec. nov.). Most of these species are exceedingly rare and some have not yet been recorded from the Netherlands. Type material of *P. mucrocystis* and *Drosophila chondrodermoides* has been examined as well as material of *P. subpapillata* and *P. pseudocasca* from the Romagnesi herbarium. Of *P. frustulenta* and *P. obtusata* only brief descriptions are given as full descriptions have recently been published. The name *P. cortinarioides* P. D. Orton is considered a synonym of *P. frustulenta*.

The find of *Psathyrella chondroderma* (Berk. & Br.) A. H. Smith by Mr. and Mrs. Tjallingii on November 6th 1979 near Renkum (first record in the Netherlands) initiated this study of the group of species of *Psathyrella* that Romagnesi (1944: 52) named *Drosophila* section *Hydrophilae*.

On October 20th 1962 we had found near Denekamp a caespitose group of eight carpophores, which we had provisionally, be it with a question mark, identified as *P. chondroderma*. Restudying this find and comparing it with the Renkum find, we discovered that the two collections represented different species, our 1962 find being *Drosophila chondrodermoides*, recently described by Romagnesi (1976: 189), who very kindly sent us material for examination. Much later we discovered that Romagnesi's species had already been described by Smith (1972: 373) as *P. mucrocystis*.

Orton's (1960: 374) statement in his discussion of *P. jerdonii* that *P. chondroderma* - of which he had examined the type material - has no facial cystidia, necessitated a re-examination of this material, the result of his study seeming unlikely as all species of this group possess pleurocystidia. Moreover, the decisive difference between *P. chondroderma* and *P. mucrocystis* being the very differently shaped pleurocystidia, the type material might turn out to be either of the two species if pleurocystidia were found. Through the kindness of Dr. D. N. Pegler (K) we were enabled to study type material in which we found a sufficient number of pleurocystidia to produce a pleurocystidiogram (Fig. 5). Fortunately the cells turned out to tally with those of *P. chondroderma* as conceived by Favre (1957: 121) and Romagnesi.

Previously we had just finished a study of six collections very kindly sent us on loan from the Herbarium of the Royal Botanic Garden Edinburgh of a species that Orton (1969: 116) had described under the misapplied name *P. piluliformis* (Bull. ex Mèrat) P. D. Orton. To these six collections we were able to add three more of our own, found over the years in the British Isles, where the species apparently is fairly common. All nine collections turned out to represent *P. laevissima* (Romagn.) Sing.

Our examinations eventually led to a reappraisal and redefinition of section *Hydrophilae*.

METHODS

For our methods of examining the carpophores, in particular their microscopical characters, the reader is referred to our previous papers (1968: 132; 1971: 249; 1972: 24). Again we wish to stress the importance and the profit of studying the pigmentation of the hymenophoral trama on 'washed' gills (for technique see Kits van Waveren 1971: 249). In several species of the *Hydrophilae* this method reveals on close examination under the binocular lens against a well lit white background the pale brown colour of the minutely fimbriate edge of the gills, caused by the brown colour of cheilocystidia, characteristic of many species of this group. The method also reveals the presence of many, more or less strongly pigmented, yellow, anastomosing tissue strands, running from base to edge in the gills of most species of the group. Again we used the Munsell Soil Color Charts ed. 1971 (abbreviated to M.) and the code designating its colours for the description of the colours of the macroscopical structures of the carpophores and also the spores.

It serves no purpose to describe the colours of the spores of a very rare species in comparison to those of another equally rare species as is quite often done. Doing so presumes that the reader is acquainted with the equally rare species and this is rarely so. Unfortunately several species of section *Hydrophilae* are exceedingly rare, while the colour of their spores plays an important role in their identification. We have therefore tried, as in our previous papers, to assess the colours of the spores with the aid of 'Munsell'. The spores were studied in water, NH₄OH 10% and KOH 5%, using oil immersion and a rather strongly lit field of vision. M. Lange (1952: 79) used the same method.

Spore measurements are given both as a range and between brackets as a range of mean values. The small size of the spores being the chief characteristic of the species of section *Hydrophilae*, the mean value of length of the spores is very important. Fortunately in the genus *Psathyrella* the sizes of the spores on one gill usually vary little and often even are surprisingly equal provided only the darkest (= mature) spores are measured. Experience has taught us that measuring 20 spores lying on a gill suffices for the determination of the mean spore size of one sample. One of the chief characteristics of section *Hydrophilae* in our concept is that the length of the spores, averaged per collection, never exceeds 7.5 μm (but see *P. frustulenta* and *P. obtusata*).

From all collections studied we produced spore-, basidio-, pleurocystidio-, cheilocystidio- and caulocystidiograms; those published in the present paper are carefully selected.

In dealing with the descriptions of the twelve taxa, the species are arranged in alphabetical order. In the lists of collections the author's name is abbreviated to E. K. v. W.

ACKNOWLEDGEMENTS

We wish to thank Prof. H. Romagnesi very much indeed for sending us from his herbarium material of *Psathyrella chondroderma*, *P. microcystis*, *P. pseudocasca* and *P. subpapillata*, for allowing us to publish a translation of his very detailed description of the latter species, for supplying us with so much valuable information and criticism and for taking so much interest in our work. We also wish to thank Dr. D. N. Pegler (K) for examining for us the type material of *P. chondroderma* as to possible remnants of its substratum. Our thanks are next due to Dr. R. Watling (E) for enabling us to study material of *P. laevis* from the Royal Botanic Garden Edinburgh. Finally we are greatly indebted to Dr. C. Bas for critically reading the manuscript and to Dr. R. A. Maas Geesteranus for writing the latin descriptions.

Section HYDROPHILAE

Calling the genus *Drosophila*, Romagnesi (1944: 52) founded its section *Hydrophilae* — of subgenus *Hypholoma*, chiefly based on the presence of utriform pleurocystidia — defining it as follows: 'spores less than 11.5 μm long, sometimes very small; pale or dark; cystidia utriform but sometimes of an indistinct type; trama coloured from a yellow-brown membranous pigment, more or less encrusting the hyphae; caps often reddish.' He did not indicate a type species but distinguished two subsections: (i) subsection *Microsporae* (spores less than 6 μm long, very pale; veil often membranous, rarely rudimentary) with type species *D. hydrophila* (Fr. ex Bull.) Quél. and (ii) subsection *Frustulentae* (spores over 6 μm long, rarely pale; veil very scanty, fugacious, never membranous) with type species *D. frustulenta* (Fr.) Romagn. (sensu Romagnesi, which is not *Psathyrella frustulenta* (Fr.) A. H. Smith as described by us earlier 1977: 289). No other species were mentioned as belonging to either of these two subsections. Subsection *Microsporae* does not cover the group '*Appendiculatae*', in which *P. hydrophila* was placed by Kühner & Romagnesi (1953: 365), as the latter group includes *P. chondroderma* of which the length of the spores is given as 6–8.5 μm .

Singer (1961: 68), calling the genus *Psathyrella*, adopted Romagnesi's characterisation of section *Hydrophilae* (small spores, utriform cystidia, trama pigmented) and did not distinguish subsections. Earlier and later Singer (1951: 467; 1962: 509 and 1975: 502) gave a different definition of section *Hydrophilae* (in the subgenus—characterised by the pleurocystidia being utriform if present—in 1951 and 1962 called by him *Hypholoma*, in 1975 *Drosophila*): spores up to 6.5 μm long and sub micr. 'not very deeply coloured', cystidia 'absent on the sides of the lamellae or more rarely present on both edges and the sides of the lamellae', hymenophoral trama coloured with membranous pigment and carpophores rather large; type species *Psathyrella hydrophila* (Bull. ex Fr.) Maire; no other species mentioned as belonging to this section. The absence of pleurocystidia in this definition is a mystery as these cells are present in all species now considered to belong to this section. With Singer (1975: 503) the species of section *Frustulentae* have spores 6–11.5 μm long (colour not mentioned), numerous pleurocystidia varying from utriform to ampullaceous and a very fugacious or—if initially abundant—entirely arachnoid veil; type species *P. frustulenta* (Fr.) A. H. Smith.

In Smith's (1972: 102) very dissentient infrageneric classification of *Psathyrella*, the species belonging to Romagnesi's section *Hydrophilae* find themselves distributed over two subgenera

and three sections. We expounded our reasons for denouncing Smith's classification in an earlier paper (1976: 350).

From the species described by us below and ranked with section *Hydrophilae* as emended by us, *P. fragrans*, *P. mucrocystis*, and *P. obtusata* are placed by Smith in subgenus *Psathyrella* section *Obtusatae*, *P. hydrophila* and *P. frustulenta* in subgenus *Pannucia*, the former in section *Appendiculatae* and the latter in section *Pannuciae*.

Smith states that 'the very small spores (5–7 μm long) are the central feature of this subsection *Hydrophilae* (Romagn.) A. H. Smith, as emended here', deleting therewith the pale colour of the spores, the brown colour of the cap and gills and the shape of the pleurocystidia.

In our own definition of section *Hydrophilae* the central features are not only the small size of the spores, on the average 7.5 μm long or less, but also their pale colour and the conspicuous brown colour of cap and gills. The shape of the pleurocystidia is deleted as it greatly varies from one species to another. This definition has the advantage of allowing us to bring into this section *P. obtusata*, *P. frustulenta* and *P. pseudocasca*, all of which seem to have wandered aimlessly in the classification of the genus.

PSATHYRELLA SECT. HYDROPHILAE (Romagn.) Sing. ex Sing. emend. Kits van Wav.

Drosophila sect. *Hydrophilae* Romagn. in Bull. mens. Soc. linn. Lyon 13: 51–54, 1944. — *Psathyrella* sect. *Hydrophilae* (Romagn.) Sing. in Lilloa 22: 467, 1951 (not val. publ.); ex Sing. in Sydowia 15: 68, 1961. Type: *Drosophila hydrophila* (Bull. ex Fr.) Quél.

Carpophores caespitose, subcaespitose or solitary, sometimes gregarious, often lignicolous. Pilei small to medium-sized, 10–40(–70) mm, usually striate, reddish brown or some other shade of brown, hygrophanous, never pink on drying; veil always present but varying from rudimentary to strongly developed. Lamellae usually crowded, narrowly (never very broadly) adnate or adnexed, brown, reddish brown or purplish brown, with white or whitish edge. Stipes up to 100 mm long (rarely longer), never rooting. Spore print some shade of brown. Spores small, their length averaging not more than 7.5 μm per collection, but almost always less, some shade of brown and sometimes distinctly pale, sometimes phaseoliform. Basidia less than 10 μm broad, 4-spored. Pleurocystidia present, thin- or at most very slightly thick-walled, with at their apex no crystals and no mucoid deposits which turn green in NH_4OH 10%. Pleurocystidioid cheilocystidia sometimes very few. Pleuro- and cheilocystidia and cells of pileipellis often pale brown in NH_4OH 10%. Hymenophoral trama strongly to moderately pigmented, chiefly from membranal pigment, sometimes also from encrustations.

The small size and brown colour of the spores in combination with the brownish colour of the lamellae and the usually striking reddish brown, warm brown or ochreous brown colour of the pileus are the essential characters of the species of section *Hydrophilae*. We have abstained from subdividing this section.

KEY TO THE SPECIES OF PSATHYRELLA SECTION HYDROPHILAE

1. Spores very small, average size 5.3–6.1 \times 3.5–3.6 μm :
2. Pleurocystidia mucronate (see Figs. 20, 45, 52):
3. Gill edge whitish or concolorous *P. laevissima*, p. 490
3. Gill edge dark brown punctate *P. subpapillata*, p. 503

2. Pleurocystidia not mucronate:
 4. Germ pore very distinct (1–1.5 μm); carpophores solitary, thick-set . . . *P. hydrophiloides*, p. 488
 4. Germ pore indistinct (callus) or very small (0.5 μm); carpophores caespitose, subcaespitose, rarely isolated, rather slender:
 5. Pleurocystidia non-capitate and mainly fusiform, ventricose or clavate, some utriform, with broad short pedicel (see Figs. 24–33); germ pore indistinct (callus) . . . *P. hydrophila*, p. 485
 5. Pleurocystidia broadly capitate to subcapitate and mainly narrowly to broadly ventricose, more rarely utriform or slenderly clavate, with fairly narrow and somewhat longer pedicel (see Fig. 16); germ pore very small (0.5 μm) *P. fragrans*, p. 481
1. Spores larger, average size 6.9–7.5 \times 3.9–4.6 μm :
 6. Pleurocystidia mucronate (see Figs. 20, 45, 52):
 7. Carpophores medium-sized to fairly large; caps 30–70(–90) mm *P. mucrocystis*, p. 494
 7. Carpophores small; cap 12 mm *P. umbrina*, p. 506
 6. Pleurocystidia not mucronate:
 8. Germ pore indistinct (callus) *P. frustulenta*, p. 483
 8. Germ pore distinct:
 9. Pleurocystidioid cheilocystidia very to moderately numerous; veil abundant:
 10. Carpophores subcaespitose or solitary; many pleurocystidia with short to fairly long cylindrical to subcylindrical, often subcapitate apical elongation; spores phaseoliform *P. chondroderma*, p. 477
 10. Carpophores solitary; pleurocystidia without apical elongation; spores not phaseoliform:
 11. Pleurocystidia in their upper part covered with mucoid substance, staining dark red in neutral red *P. pseudocasca*, p. 500
 11. Pleurocystidia not as above *P. rannochii*, p. 501
 9. Pleurocystidioid cheilocystidia very scarce, spheropedunculate cells abundant; veil scanty; veil scanty:
 11. Pleurocystidia fusiform *P. obtusata*, p. 499
 11. Pleurocystidia utriform *P. obtusata* var. *utriformis*, p. 499

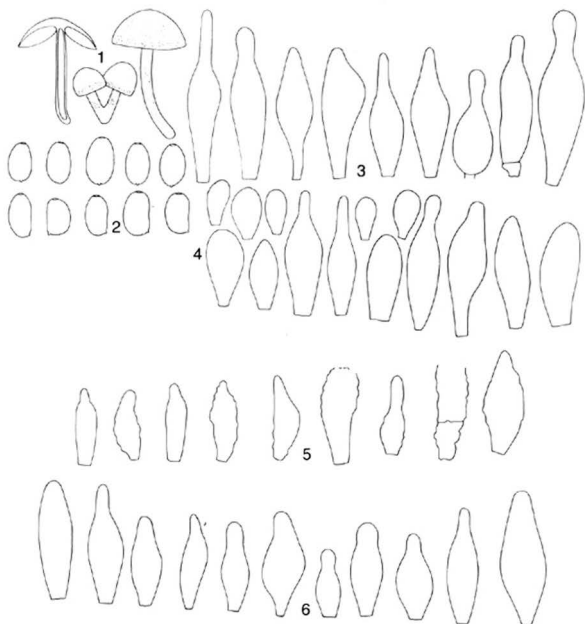
PSATHYRELLA CHONDRODERMA (Berk. & Br.) A. H. Smith—Figs. 1–6.

Agaricus chondrodermus Berk. & Br. in Ann. Mag. nat. Hist. IV, 7: 132. 1876. — *Psilocybe chondroderma* (Berk. & Br.) Sacc. in Syll. Fung. 5: 1048. 1887. — *Hypoloma chondroderma* (Berk. & Br.) P. Karst. in Bidr. Känn. Finl. Nat. Folk 48: 241. 1889. — *Psathyrella chondroderma* (Berk. & Br.) A. H. Smith in Contr. Univ. Mich. Herb. 5: 43. 1941. — *Drosophila chondroderma* (Berk. & Br.) Kühn. & Romagn., Fl. anal. 365. 1953. *Hypoloma sublentum* P. Karst. in Bidr. Känn. Finl. Nat. Folk 32: 233. 1882.

MISAPPLIED NAMES.—*Hypoloma pertinax* (Fr.) Ricken ss. Ricken, Blätterp.: 461. 1915 (non *Agaricus pertinax* Fr. in Vet. Ak. Förh. 18: 50. 1851). — *Agaricus instratus* Britz. ss. Cooke in Grevillea 18: 53. 1887. — *Hypoloma instratum* (Britz.) Mass. ss. Mass., Brit. Fung. Fl. 1: 384. 1892. (non *Agaricus instratus* Britz. in Ber. naturh. Ver. Augsburg 27: 67. 1883).

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Cooke, Ill. Brit. fungi 4: pl. 599/606 A. 1884–1886 (as *Agaricus chondrodermus*), ditto 8 suppl. pl. 1181/1157. 1889–1891 (as *A. instratus*). — Ricken, Blätterp.: 461. 1915 (as *Hypoloma pertinax*). — J. E. Lange in Dansk bot. Ark. 4 (4): 43. 1923 (as *H. instratum*); Fl. agar. dan. 4: 78, pl. 147 C. 1939 (as *H. chondroderma*). — A. H. Smith in Contr. Univ. Mich. Herb. 5: 43, pl. 17. 1941. — Kühner & Romagnesi, Fl. anal. 365. 1953 (as *Drosophila chondroderma*). — Favre in Schweiz. Z. Pilzk. 35: 121. 1957.

CHIEF CHARACTERISTICS.—Carpophores medium-sized, subcaespitose or solitary; pileus up to 30–50 mm, paraboloid, rugulose, warm ochreous brown, at centre red-brown, hygrophanous, not or little striate; veil rather strongly developed; lamellae crowded, reddish brown with whitish edge; stipe up to 45 \times 5 mm, whitish above and buff below; spores 6.3–8.1 \times 3.6–4.5 (–5) μm (mean values 7.2–7.4 \times 3.9–4.4 μm) phaseoliform, brown, with fairly distinct germ pore;



Figs. 1-6. *Psathyrella chondroderma* — 1-4, 6 Nov. 1979. — 1. Habit sketch ($\times 0.5$). — 2. Sporogram ($\times 1210$). — 3. Pleurocystidiogram ($\times 575$). — 4. Cheilocystidiogram ($\times 575$). — 5. Type, pleurocystidiogram ($\times 575$). — 6. *Romagnesi 1093* pleurocystidiogram ($\times 575$).

pleurocystidia $40-62 \times 12.5-17.5 \mu\text{m}$, numerous, fusiform-ellipsoid, usually with short to fairly long, narrower (sub-)cylindrical apical elongation; pleurocystidioid cheilocystidia and spheropedunculate to clavate cheilocystidia numerous; hymenophoral trama strongly pigmented.

MACROSCOPICAL CHARACTERS (Renkum collection, description C. Bas).—Pileus up to 30 mm (according to Favre (1957: 121) up to 50 mm.), at first broadly paraboloid, later conico-convex, not fragile, warm red-brown at centre (slightly more reddish than M. 5 YR 3/4) to warm ochreous brown in marginal region (M. 5 YR 4/4, tending to 7.5 YR 4/4-5/6), probably not translucent, not or little striate when moist, glabrous, locally radially wrinkled at maturity.

Veil in young specimens on pileus white, locally rather thick, felted-subarachnoid, at maturity buff (M. 10 YR 7/4), forming patches in 3 mm broad marginal zone, on stipe a very vague subannular fibrillose zone at about 1/4 from apex with lower down sublanose-subsquamosose pale to distinctly brown remnants, later merely brown-fibrillose.

Lamellae fairly crowded (± 15 per 10 mm midway margin and centre of pileus), narrowly adnate to narrowly adnate-adnexed, up to 4 mm broad, slightly ventricose, moderately dark clayey brown (M. 7.5 YR 4/4) to slightly more reddish (M. 5 YR 4/4-3/4), with whitish, minutely flocculose edge particularly when young; 1 = 3-7.

Stipe up to 45 x 5 mm, slightly thickening towards base, sometimes almost subclavate, sometimes connate at base, not rooting, hollow (narrow cavity of ± 1.5 mm), from pale whitish at apex to pale buff at base (presence or absence of pruinosity of apex not recorded).

Context of pileus glossy brown, drying pale buff; smell weak, when crushed rather strong, herbaceous-subspERMATIC; taste indistinctive.

Trama of 'washed' lamella strong yellow-brown (strongest in basal 1/3) from many anastomosing brownish yellow (M 10 YR 5/6) strands running from base to edge through the in itself fairly pale brown (M 10 YR 6/3-6/4) tissue; edge minutely fimbriate and pale brown.

Spore print not recorded.

MICROSCOPICAL CHARACTERS (author's examination).—Spores 6.3-8.1 x 3.6-4.5(-5) μm (mean values 7.2-7.4 x 3.8-4.4 μm ; 3 collections), in profile usually phaseoliform, sometimes subellipsoid, in face view ellipsoid, in water, NH_4OH 10% and KOH 5% brown (M. 7.5 YR 5/6) with a trace of red, with fairly distinct germ pore and distinct hilar appendix, not opaque.

Basidia 16-22.4 x 6.4-7.2 μm , subclavate, 4-spored.

Pleurocystidia 40-57.5(-62.5) x 12.5-17.5 μm , abundant, fusiform-ellipsoid with a broad and fairly short pedicel, very slightly thick-walled, in NH_4OH 10% very pale brown, usually with narrower cylindrical to subcylindrical, often subcapitate thin-walled, colourless, sometimes rather long (7.5-20 x 4-5 μm) apical elongation more or less sharply delimited from the cellbody.

Marginal cells: Pleurocystidioid cheilocystidia 30-55 x (9-)10-15(-17.5) μm , numerous, locally sometimes even densely packed, versiform as to both size and shape; spheropedunculate and clavate cells, 17.5-30 x 7.5-12.5 (-15) μm , numerous, some of the larger cells often slightly thick-walled and pale brown in NH_4OH 10%.

Caulocystidia none seen; white fibrillosity on apex of stem consisting of dense wicker-work of thin (3-4 μm) colourless hyphae.

Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: hyphae distinctly brown from membranal pigment with many yellow hyphal septa and very few encrustations on narrow hyphae.

Pileipellis a cellular, 2-4 cells deep layer of subglobose, rather thick-walled cells, 15-40 μm , very distinctly brown from membranal pigment.

Clamps present on pleurocystidioid cheilocystidia and numerous on hyphae of fibrillosity on apex of stipe.

HABITAT.—Caespitose, in small fascicles, or solitary on coniferous stumps. Very rare.

COLLECTIONS EXAMINED.—NETHERLANDS, prov. Gelderland, Renkum, Oranje Nassau's oord, 6 Nov. 1979, Mr. and Mrs. *Tjallingii* (L). — BRITISH ISLES, Scotland, Glamis, date not recorded, *J. Stevenson* (type, K). — SWITZERLAND, Alps, precise locality not recorded, 31 Aug. 1970, *R. Kühner* (herb. Romagnesi Nr. 1093).

The above description is based on the Renkum collection. The species is exceedingly rare. It was described from the area Glamis in Scotland by Berkeley & Broome (1876: 132) and according to Stevenson (1886: 326) it was found in Glamis at different places in 1875 and 1877. Reid & Austwick (1963: 294) reported it also from Glamis. Ricken (as *Hypholoma pertinax*,

1915: 461) and Kühner & Romagnesi (1953: 365) called it rare, Lange (1939: 78) rather rare. From Romagnesi (in litt.) we learned that the specimens on which the description in the 'Flore analytique' is based and of which he only saw exsiccata, came from Kühner, who in 1970 sent him another collection, from which Romagnesi very kindly sent us a part. Favre (1957: 121) recorded four collections from Switzerland. Through Pegler and Watling we learned that there is no recent material of this species in the herbaria of the Royal Botanic Gardens of Kew and Edinburgh.

Fries' descriptions of *Agaricus pertinax* (1851: 50; 1857: 429; 1874: 297) agree with *P. chondroderma* except for the fact that *A. pertinax* has no veil and was accordingly ranked by Fries in the subgenus *Psilocybe* ('velum nullum'). Fries's plate 135² (1877-1884) shows large robust specimens of which the cap is conico-convex to almost plane, rugulose and devoid of any traces of a veil. The colours of cap, gills and stem, however, fully agree with those of *P. chondroderma*. As no veilless species is known resembling *A. pertinax*, Dennis, Orton & Hora (1960: 206) correctly regarded the name as a nomen dubium. *Hypoloma pertinax* ss. Ricken — rightly regarded by Kühner & Romagnesi (1953: 365) as identical with *P. chondroderma* but erroneously quoted by them as *Psilocybe pertinax* ss. Ricken — was described as having a strongly developed veil.

Britzelmayer's (1883: 67) description and plate 310 fig. 110 of *Agaricus (Hypoloma) instratus* Britz., correspond rather well with *P. bipellis* (although no veil is mentioned or depicted) and — because of the purple colour of cap and gills — not with *P. chondroderma*. *Agaricus (Hypoloma) instratus*, described (1887: 53, and depicted by Cooke plate 1181/1157), however, fully agrees with *P. chondroderma*, also in the opinion of J. Lange (1923: 43). Masee (1892: 384) extended Cooke's description a little and called the species *Hypoloma instratum* (Britz.) Mass.

Of *Hypoloma sublentum* P. Karst. that author himself later (1889: 241) stated that this species was the same as *H. chondroderma*.

On examination of the type material of *P. chondroderma* its spores turned out to be fully identical with those of our Renkum collection and the exsiccatum received from Romagnesi and, contrary to Orton's mention (1960: 374), pleurocystidia were distinctly present (Fig. 5) and sufficiently matched those of the same two collections and not those of *P. mucrocystis*.

A. H. Smith (1941: 241) gave a good description of what he then called *Psathyrella chondroderma*, agreeing with the current descriptions and — apart from the habitat — the one given above. In it he stated that the stem soon became avellaneous near the base, that the veil was whitish to pale cinnamon buff, that on the stem the fibrils of the veil also became discolored, that the spores measured $7-8 \times 4-5 \mu\text{m}$ 'a little larger than those of European authors', and that the habitat was old logs of alder and cottonwood. He considered these differences with the European descriptions of *P. chondroderma* not great enough to be significant.

But recently (1972: 128) Smith considered his previous identification to having been an error, arguing that the American species, which he named *P. velibrunnescens*, is 'constant as to habitat' (rotting wood of frondose trees), characteristically vernal, quite accurately identified in the field by the discolorations on the veil hyphae either on the stipe or the margin of the pileus and its spores consistently $7-9 \times 4-5 \mu\text{m}$. He further pointed out that originally *P. chondroderma* was described as being associated with pines and terrestrial and that on Cooke's plate the veil is white. The (terrestrial) habitat, he believed was evident on Cooke's plate and on the type at Kew. But underneath this plate is clearly printed 'on pinewood', and Dr. N. Pegler very kindly checked for us the type at Kew and could not find proof that the specimens had been non-lignicolous.

Cooke's plate depicts rather young specimens and according to Smith the brown discoloration of the veil only appears at maturity. In later years *P. chondroderma* in Europe was always described as lignicolous on pinewood.

The brown discoloration of the veil in *P. velibrunnescens*, however, is by no means restricted to or specific for *P. velibrunnescens*. It is depicted on Lange's plate 147 C of *P. chondroderma* (in the description the veil is not called white but whitish), it was present in the Renkun find of that species and finally it was quite distinct in our Netherlands' collection of *P. mucrocystis* (the phenomenon probably escaped our attention when we described the Scottish collection of that species). It is in line with the brown discoloration of pleuro and cheilocystidia and the cells of the pileipellis in several closely related species (*P. mucrocystis*, *P. laevis*, *P. subpapillata*, *P. hydrophila*, *P. fragrans*). It seems then that the vernal appearance, the habitat (frondose trees) and the spore size ($7-9 \times 4-5 \mu\text{m}$ — in 1941 still $7-8 \times 4-5 \mu\text{m}$ — is very close to our figures, $6.3-8.1 \times 4.1-4.5(-5) \mu\text{m}$ are the only differences between Smith's *P. velibrunnescens* and *P. chondroderma* and not brown discoloration of the veil from which Smith's species derives its name. Smith saw no less than 49 collections of his *P. velibrunnescens* and none of *P. chondroderma*. From all this it appears rather doubtful that *P. velibrunnescens* is specifically different from *P. chondroderma*.

PSATHYRELLA FRAGRANS A. H. Smith—Figs. 13-18

Psathyrella fragrans A. H. Smith in Mem. N. Y. bot. Gdn 24: 372. 1972.

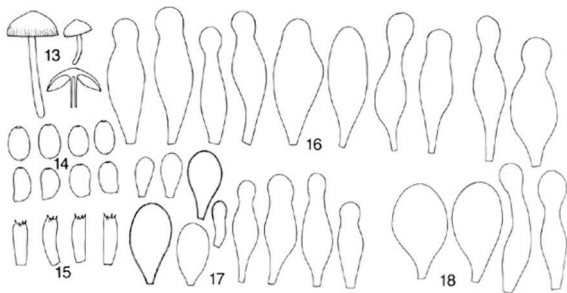
CHIEF CHARACTERISTICS.—Carpophores medium-sized and rather delicate as compared with *P. hydrophila*, subcaespitose on coniferous wood; pileus 22-45 mm, paraboloid, later convex, striate, reddish brown to brown, hygrophanous; veil rudimentary; lamellae fairly crowded, brown to reddish brown, with white edge; stipe 30-45 \times 2.5-4 mm; hymenophoral trama strongly pigmented; with distinct sweet smell; spores $5.4-6.3 \times (3.2-3.6)$ (mean values 6×3.6) μm , phaseoliform, brown, with very small germ pore (0.5 μm); pleurocystidia 40-52 \times 10-17.5 μm , abundant, capitate with rather narrow stalk; pleurocystidioid, spheropedunculate, and clavate cheilocystidia numerous.

MACROSCOPICAL CHARACTERS.—Pileus in early stages (10-15 mm) conico-paraboloid with deflexed marginal region, substriate at margin over 1 mm, very dark purple reddish brown (M. 5 YR 3/2) near edge dark reddish brown (M. 5 YR 3/3), at edge brown (M. 7.5 YR 4/4), with smooth surface, later (pileus 15-25 mm) paraboloid, striate over 3-4 mm, rugulose, very dark reddish brown with brown (M. 7.5 YR 4/4) 3 mm broad marginal zone; finally (pileus 30-45 mm) convex to almost plane and only marginal zone slightly deflexed, striate up to half-way centre, entirely or only at centre rugose, at centre still dark reddish brown (M. 5 YR 3/4), outside centre brown (M. 7.5 YR 4/4), hygrophanous, drying out to yellowish brown (M. 10 YR 6/4-5/4) with a trace of ochre, without pink, not micaceous, rather strongly rugose.

Veil scanty, in earliest stages only very delicate radial white fibrils on surface of pileus, on a ± 2 mm broad zone along margin sometimes forming small tufts, not appendiculate, in later stages few fugacious fibrils present on cap near margin, none in final stages.

Lamellae 3-5 mm broad, fairly crowded, slightly ventricose, fairly narrowly adnexed, in early stages pale brown, soon ochre brown (M. 7.5 YR 4/4) or yellowish brown (M. 10 YR 5/6) but more ochraceous, finally dark reddish brown (M. 5 YR 3/4); surface slightly veined; with somewhat paler or whitish edge.

Stipe 30-45 \times 2.5-4 mm, relatively short, cylindrical, not rooting, hollow, white or sordid



Figs. 13-18. *Psathyrella fragrans*, 17 Oct. 1963. — 13. Habit sketch ($\times 0.5$). — 14. Sporegram ($\times 1210$). — 15. Basidiogram ($\times 575$). — 16. Pleurocystidiogram ($\times 575$). — 17. Cheilocystidiogram ($\times 575$). — 18. Caulocystidiogram ($\times 575$).

white from a very thin, silvery white, superficial, longitudinally fibrillose layer; pale brown above and darker towards brown base underneath this layer; with pruinose apex.

Context of pileus in centre 2-4 mm thick, dark purplish-reddish brown (M. 5 YR 3/2, 3/3), in stipe distinctly brown. Smell distinct and sweet.

Trama of 'washed' lamellae distinctly yellow-brown from many more or less parallel, wavy, anastomosing, yellowish brown (M. 10 YR 5/4) tissue strands running from base to edge through in itself pale brown (M. 10 YR 6/3) tissue.

Spore print not recorded, but very likely some shade of brown.

MICROSCOPICAL CHARACTERS.—Spores 5.4-6.3 ($\times 3.2$)-3.6 (mean values $6 \times 3.6 \mu\text{m}$; 1 collection), in profile phaseoliform, in face view ellipsoid to ovoid, in water, NH_4OH 10% and KOH 5% brown (M. 7.5 YR 5/4) with trace of reddish, with very small germ pore ($0.5 \mu\text{m}$) and small hilar appendix, opaque to subopaque.

Basidia 17.6-20.8(-24) \times 5-6 μm , subcylindrical, 4-spored.

Pleurocystidia 40-52 \times 10-17.5 μm , abundant, mainly narrowly to broadly ventricose and broadly capitate to subcapitate, only few utriform or clavate; walls very slightly thickened; contents pale greyish with a distinct trace of brown or only just very pale brown in NH_4OH 10%; no mucus or crystals.

Marginal cells: pleurocystidioid cheilocystidia 30-40 \times 10-15 μm , numerous and rather densely packed; spheropedunculate and clavate cells, 15-20 \times 5-11 μm , also numerous; a few larger ones, 20-30 \times 12.5-15 μm ; walls often slightly thickened and such cells pale brown; no mucus or crystals.

Caulocystidia: many spheropedunculate cells, 27.5-35 \times 15-22.5 μm , some smaller, usually in clusters; few pleurocystidioid caulocystidia, 40-50 \times 7.5-14 μm .

Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: narrow hyphae strongly and broad hyphae faintly pigmented from membranal pigment; many yellow hyphal septa; no encrustations.

Pileipellis a 2-3 cells deep layer of fairly thick-walled, subglobose cells, 25-50 μm ., very pale brown in NH_4OH 10%.

Clamps on hyphae of stipe.

HABITAT.—Subcaespitose on coniferous tree stump. Very rare.

COLLECTION EXAMINED.—NETHERLANDS: prov. Overijssel, Denekamp, estate 'Singraven', area 'Beugelskamp', 17 Oct. 1963, E. K. v. W. (L).

We fully agree with Smith (1972: 372) that *P. fragrans* 'has the appearance of *P. hydrophila* but grows on a conifer substrate has a fragrant odor and differently shaped spores among other features'. Of the latter he could have added from his own description the 'nine-pin-shaped pleurocystidia with the apex capitate', furthermore the scantiness of the veil (its presence or absence on the cap is not mentioned by Smith) and the darker and distinctly phaseoliform spores, which have a distinct, be it small germ pore. *Psathyrella fragrans* and *P. hydrophila* obviously are closely related. On account of its small and comparatively pale spores, the brown colour of its cap and gills and the capitate to utriform pleurocystidia, *P. fragrans* is to be regarded as a typical member of section *Hydrophila*. Nevertheless with Smith the species finds itself in subgenus *Psathyrella* ('veil thin to rudimentary') whereas *P. hydrophila* finds itself in subgenus *Pannucia* ('veil more or less well developed'). This may go to show the impracticability of trying to use the velar development (very capricious in *Psathyrella*, even within one and the same species) as discriminating character at subgeneric level instead of at a much lower level.

PSATHYRELLA FRUSTULENTA (Fr.) A. H. Smith—Figs. 7–12.

Recently (Kits van Waveren, 1977: 289) having given a full description of and observations on *P. frustulenta*, in this paper only an abbreviated description of this species is given and a new synonym and two corrections to the 1977 description.

(1) Abbreviated description:

Carpophores small to medium-sized, terrestrial against wood, solitary.

Pileus 10–30 mm, paraboloid, later convex without or with vague to fairly distinct umbo, dark reddish brown (M. 5 YR 3/2) with marginal area reddish brown (M. 5 YR 4/3, 4/4, 5/4), hygrophanous, drying out to pale brown without pink (M. 10 YR 7/4, 6/3, 6/4) and then rugulose.

Veil strongly developed, in early stages forming a dense coating of fibrils and even adpressed flocci on pileus, in places appendiculate; stipe covered with a thick velar coating; at maturity forming distinct velar fibrils and networks up to 3–5 mm from margin of pileus and fibrils and flocci on stipe.

Lamellae 3–5(–7) mm broad, at maturity strikingly brown (M. 5 YR 4/4; 7.5 YR 5/4), with white edge.

Stipe 15–50 × 2–3.5(–5) mm, white, cylindrical.

Context of cap dark reddish brown (\pm M. 7.5 YR 4/2) later dark brown (M. 10 YR 3/3).

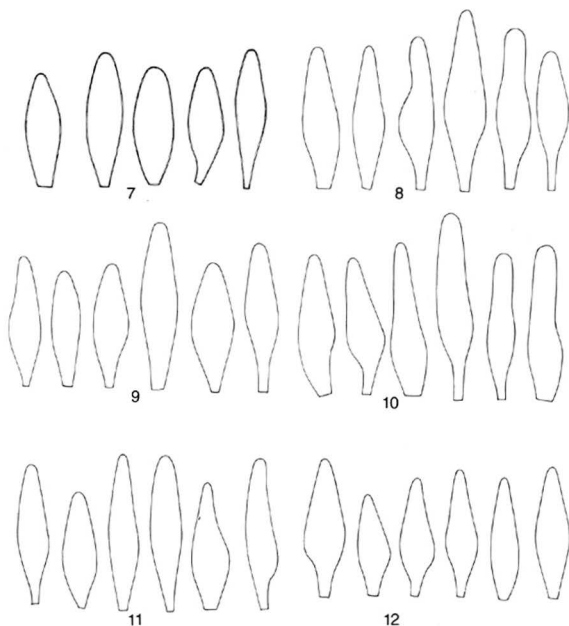
Trama of 'washed' lamellae conspicuously pigmented (yellowish brown).

Spore print pale reddish brown.

Spores 6.3–8.1 × 3.6–4.5 μ m (mean values 6.9–7.6 × 3.9–4.5 μ m: 11 collections¹), in profile distinctly phaseoliform, in water and NH₄OH 10% pale brownish yellow with a reddish hue (M. 7.5 YR 6/6), with indistinct germ pore (callus).

Pleurocystidia 40–70 × 10–16 μ m, very numerous, fusiform to subfusiform with distinct pedicel and subacute to obtuse apex, very pale brown in NH₄OH 10%.

¹ In only two out of our 11 collections the average length of the spores was 7.6 and in one collection it was 7.5, while in all the others (8) the average length varied between 6.9 and 7.3.



Figs. 7-12. *Psathyrella frustulenta*, Pleurocystidiograms ($\times 575$). — 7. 11 Oct. 1976. — 8. 13 Oct. 1976. — 9. 16 Oct. 1976. — 10. 27 March 1977. — 11. 31 Aug. 1977. — 12. 9 Oct. 1978.

Pleurocystidioid cheilocystidia (15-)22-47(-55) \times 7.5-17.5 μm , numerous, intermixed with large or locally smaller numbers of spheropedunculate and clavate cells, 12.5-30 \times 7.5-17.5 μm .

Pileipellis a 2-3 cells deep layer of globose to subglobose cells, 24-48 μm in diam., very pale brown, practically colourless, in NH_4OH 10%.

(2) As a result of our examination of the type specimen of *P. cortinarioides* P. D. Orton, we found this species in every way to be identical with *P. frustulenta*. Although not mentioned in the original description of *P. cortinarioides*, it turned out to have the same four characteristic features as *P. frustulenta*: pale spores (average sizes 7.5 \times 4.4 μm), absence of germ pore.

abundance of pleurocystidia, and conspicuously pigmented hymenophoral trama. Consequently *P. cortinarioides* is a younger synonym of *P. frustulenta*.

(3) Corrections of errors in our earlier (1977: 289) description of *P. frustulenta*:

(i) In the heading 'chief characteristics' the spores were said to have a 'distinct germ pore (callus)'. This should read 'indistinct, practically absent germ pore (callus)' as was correctly written in the full description on page 291.

(ii) On page 295, fourth line from above, it was erroneously stated that our own measurements of the spores of *P. frustulenta* were $6.8-7.2 \times 4.1-4.5 \mu\text{m}$. In accordance with the corresponding figures mentioned in the full description these figures should read $6.3-8.1 \times 3.6-4.5 \mu\text{m}$.

Since our previous paper was published we were able to examine another seven collections of this apparently not uncommon species, making a total of 11 collections of *P. frustulenta*.

PSATHYRELLA HYDROPHILA (Bull. ex Fr.) Maire—Figs. 24–35

Agaricus hydrophilus Bull., Herb. France: pl. 511. 1791; Hist. champ. France: 440. 1809. — *Agaricus stipitatus* var. *B. hydrophilus* (Bull.) ex Fr., Syst. myc. 1: 296. 1821. — *Agaricus hydrophilus* (Bull. ex Fr.) Mèrat, Nouv. fl. env. Paris., Ed. 2, 1: 83. 1821. — *Hypholoma hydrophilum* (Bull. ex Fr.) Quèl. in Mém. Soc. Emul. Montbél. (Champ. Jura Vosges) II 5: 146. 1872. — *Bolbitis hydrophilus* (Bull. ex Fr.) Fr., Hym. Eur.: 333. 1874. — *Drosophila hydrophila* (Bull. ex Fr.) Quèl., Enchir. Fung. 116. 1886. — *Psathyra hydrophila* (Bull. ex Fr.) Bertrand in Bull. Soc. myc. Fr. 17: 279. 1901. — *Psathyrella hydrophila* (Bull. ex Fr.) Maire apud Maire & Werner in Mém. Soc. Sc. nat. Maroc. 45: 113. 1937.

Hypholoma californicum Earle in Bull. N.Y. bot. Gdn 2: 344. 1902. — *Drosophila californica* (Earle) Murrill in Mycologia 4: 304. 1912.

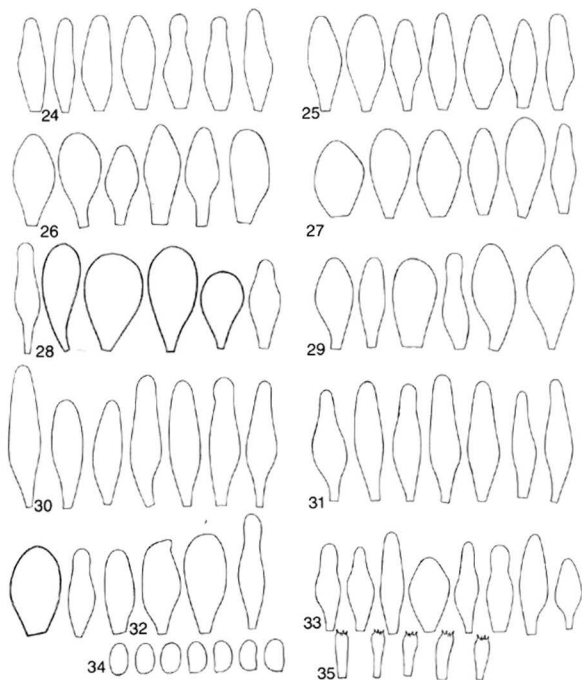
Agaricus piluliformis Bull. Herb. France: pl. 112. 1783. — *Agaricus piluliformis* Bull. ex Mèrat, Nouv. fl. env. Paris., Ed. 2, 1: 84. 1821. — *Hypholoma pilulaeforme* (Bull. ex Mèrat) Gillet, Hymenomyc. France 571. 1878. — *Drosophila pilulaeformis* (Bull. ex Mèrat) Quèl., Enchir. Fung. 116. 1886.

MISSALIPIED NAME.—*Drosophila appendiculata* (Fr.) ss. Kühn. & Romagn., Fl. anal.: 365, 1953.

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Bulliard, Herb. France: pl. 511. 1790 and Hist. Champ. France: 440. 1809. — M. C. Cooke, Ill. Brit. fungi 4: pl. 589/605 and pl. 606/610 (as *Agaricus spadicea*, no veil depicted). 1884–1886. — Ricken, Blätterp.: 247, pl. 64 fig. 6. 1912. — Konrad & Maublanc, Icon. select. Fung. 1 (fasc. II): pl. 42. 1926. — Bresadola, Icon. mycol. 18: pl. 854. 1931. — J. E. Lange, Fl. agar. dan. 4: pl. 146 A. 1939. — Kühn. & Romagnesi, Fl. anal.: 365. 1953 (as *Drosophila appendiculata*)—Romagnesi, Nouv. Atl. Champ. 1: pl. 51 B. 1956 (as *Drosophila hydrophila*). — A. H. Smith in Mem. N. Y. bot. Gdn 24: 114. 1972.

CHIEF CHARACTERISTICS.—Carpophores medium-sized, caespitose, lignicolous; pileus 15–50(–60) mm, from globose to paraboloid or convex, finally sometimes with revolute margin, substriate or not, at first dark reddish brown, later bright to dark orange-brown, yellow-brown or incarnate brown, hygrophanous, drying out to pale yellowish brown without pink; veil membranous, strongly developed, appendiculate, whitish to buff; lamellae brown to reddish brown with whitish edge; stipe 30–100(–150) \times 2–9 mm, white, lower down brownish; spore print dark purplish brown; spores $5-6.3 \times 3.2-3.6$ (mean values $5.3-6.1 \times 3.4-3.6$) μm , slightly phaseoliform, pale yellowish brown, with inconspicuous germ pore (callus); pleurocystidia $30-52.5 \times 8-17.5 \mu\text{m}$, numerous, versiform-utriform; pleurocystidioid cheilocystidia and spheropedunculate cells numerous; hymenophoral trama strongly pigmented.

MACROSCOPICAL CHARACTERS.—Pileus in early stages 5–12 mm, globose to paraboloid, later 15–50(–60) mm, spreading to paraboloid, campanulate, finally usually convex, sometimes with



Figs. 24-35. *Psathyrella hydrophila* — 24-33. Pleurocystidiogram ($\times 575$). — 24. 6 Oct. 1979. — 25. 8 Oct. 1979. — 26. 20 Oct. 1963. — 27. 12 Oct. 1968. — 28. 22 Apr. 1977. — 29. 11 Oct. 1965. — 30. 22 Oct. 1979. — 31. 29 Sept. 1979. — 32. 22 Oct. 1960. — 33. 2 Oct. 1979. — 34. Sporogram ($\times 1210$). — 35. Basidiogram ($\times 575$).

waxy, revolute margin, sometimes obtusely umbonate, normally not striate, rarely substriate at margin over 3-7 mm, in early stages dark reddish brown (M. 5 YR 3/3, 3/4, even 2.5 YR 3/4) all over, later dark (M. 5 YR 4/3, 4/4) or paler (M. 5 YR 5/4) incarnate brown, either all over or—if only at centre—then outside centre and usually all over bright orange-brown, ochre brown or yellowish brown (M. 5 YR 4/6, 5/6, 5/8; 7.5 YR 4/4, 5/4), near margin often yellowish (M. 10 YR

7/3, 7/4, 6/4), hygrophanous, young stages drying out from centre to warm ochre brown, at maturity to paler brown or yellowish brown (M. 7.5 YR 5/4, 5/6, 6/6) at centre, paler still towards margin (M. 10 YR 8/6, 7/6 or slightly more brown), without pink, not micaceous; surface often rugulose at and near centre when moist, more so when dry.

Veil in early stages white, covering stipe, forming a firm membrane connecting stipe with margin of pileus and sending up towards apex of pileus a dense coating of fibrils and tufts of fibrils in a marginal zone of 3–7 mm; in later stages sordid white to buff (but usually purplish from spore-deposits), leaving small to large membranous appendiculate patches or an appendiculate membrane along entire margin and on surface of pileus along margin a coating of radially arranged fibrils sometimes reaching up to one third of the radius of the pileus.

Lamellae 3–6 mm broad, crowded, moderately ventricose, narrowly adnate to adnexed, in earliest stages whitish, very soon pale brown (M. 10 YR 7/4, 7/3, 6/3; 7.5 YR 6/4), finally brown (M. 7.5 YR 5/4, 4/4), sordid reddish brown, chocolate brown, or incarnate brown (M. 5 YR 4/3, 4/4; 2.5 YR 4/4, 3/6), with white fimbriate edge.

Stipe at maturity generally tall and firm, 30–100(–150) × 2–9 mm, straight or flexuous, often somewhat attenuated upwards, minutely longitudinally fibrillose, hollow, at apex delicately sulcate, subpruinose, shiny and polished, white but in lower part isabelline to pale brown, at base connate and sometimes strongly set with whitish hairs.

Context of pileus 2–4 mm thick in centre, reddish brown (M. 5 YR 4/3) but very soon just brown (M. 10 YR 5/4, 4/4, 4/3, 3/3), of stipe in outer layer whitish, alongside cavity and near base pale brown. Taste and smell indistinctive.

Trama of 'washed' lamellae in young specimens fairly pale brown but at maturity dark yellowish brown from many, in early stages paler brown (M. 7.5 YR 6/4, 5 YR 6/4), but in later stages conspicuously brownish yellow (M. 10 YR 6/4, 6/6, 5/6), more or less parallel anastomosing strands running from base to edge through in itself pale brown (M. 10 YR 6/3, 7/2, 7/3; 7.5 YR 6/2; 5 YR 6/2) tissue, darkest near base; extreme edge at maturity minutely fimbriate and pale brown.

Spore print dark purplish brown to dark reddish brown.

MICROSCOPICAL CHARACTERS.—Spores 5–6.3 × 3.2–3.6 μm (mean values 5.3–6.1 × 3.4–3.6 μm ; 10 collections), in profile often slightly phaseoliform, in face view ellipsoid to slightly ovate, in water and NH_4OH 10% pale yellowish brown (M. 10 YR 6/4; 7.5 YR 6/4; 5 YR 6/4), in KOH 5% darkening to sordid yellowish brown (M. 10 YR 5/4), not opaque, with inconspicuous germ pore (callus) and minute hilar appendix.

Basidia 14.4–20.8 × (5–)5.6–7.5(–8) μm , clavate or subcylindrical, 4-spored.

Pleurocystidia 30–52.5 × 8–17.5 μm , moderately numerous to abundant, versiform often even on one lamella (see Figs. 24–33), usually fusiform, ventricose or clavate, sometimes utriform always non-capitate, with (very) obtuse apex and short broad pedicel, very slightly thick-walled, rarely with walls somewhat thicker and then refringent, almost always and sometimes distinctly, brown in NH_4OH 10%, without mucus or crystals.

Marginal cells: pleurocystidioid cheilocystidia 20–45 × 7.5–15 μm , numerous, locally often either densely packed or more or less dispersed as the numerous spheropedunculate and clavate cells, 7.5–35 × 5–12.5(–15) μm ; many cells of both kinds slightly thick-walled and pale brown in NH_4OH 10% some or quite a few of the latter cells with a somewhat thicker and refractive brown wall.

Caulocystidia (apex of stem): pleurocystidioid caulocystidia 30–60 × 10–15(–17.5) μm , versiform, rather few in number, isolated or in small clusters and then mixed with usually fairly numerous spheropedunculate cells, 10–40(–50) × 7.5–25 μm , either isolated or in clusters and either sessile on hyphae or (more often) equipped with a distinct pedicel, many slightly thick-walled.

Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: narrow hyphae of \pm 15–20 μm broad subhymenial zone at edge very brown, broad hyphae of mediostatum pale brown, both from membranal pigment; yellow hyphal septa present; no encrustations.

Pileipellis a 2-4 cells deep layer of subglobose, fairly thick-walled cells, 25-50(-55) μm , practically colourless but some very pale brown in NH_4OH 10%.

Clamps fairly numerous on caulocystidia and hyphae at apex of stipe.

HABITAT.—Caespitose on and around stumps of deciduous trees, especially *Fagus*, but also *Quercus*, rarely solitary or terrestrial or on coniferous stumps. Very common.

COLLECTIONS EXAMINED.—NETHERLANDS: prov. Overijssel: Delden, estate 'Twickel', 12 Oct. 1968, E. K. v. W.; 22 Oct. 1973, E. K. v. W.; 2 Oct. 1979, E. K. v. W.; 6 Oct. 1979, E. K. v. W.; 8 Oct. 1979 E. K. v. W.; Oldenzaal, estate 'Roderveld', 29 Sept. 1979, E. K. v. W.; estate 'Egheria', 22 Oct. 1960, E. K. v. W.; Denekamp, estate 'Singraven', 5 aug. 1961, E. K. v. W.; prov. Noord-Brabant, Drunen, 'Drunense duinen', 24 April 1977, W. Hanegraaff; prov. Limburg, Mook, 11 Oct. 1965, E. K. v. W.

As in all species of *Psathyrella* the macroscopical characters of *P. hydrophila* vary. Spores and badidia are very constant as to shape, size and colour, but the perceptibility of the germ pore and the degree by which the spores are phaseoliform (also the number of phaseoliform spores) varies to some extent. Size and above all shape of the pleurocystidia on the other hand greatly vary (see Figs.). With regard to this variability we have no faith in the specificity of the following three new species described by A. H. Smith (1972), each based on one collection: *P. alaskaensis* is said to differ from *P. hydrophila* only by the refractive walls of the cystidia as revived in KOH and the more versiform caulocystidia, *P. ogemawensis* only by a wedge-shaped form of the spores in face view, and *P. deceptiva* only by the scarcely larger spores and more copious veil.

In the past only few authors mentioned *Agaricus piluliformis* Bull. (or *A. pilulaeformis*), some doubting its genuineness, others connecting it with *P. hydrophila*, very few describing it either under *Agaricus*, *Hypholoma* or *Drosophila*. It is now universally recognised that *Agaricus piluliformis* Bull. represents very early stages of *P. hydrophila* (see discussion on page 000).

Psathyrella hydrophiloides Kits van Wav., spec. nov.—Figs. 21-23

Carpophoria statura media, crassiuscula, solitaria, terrestria. Pileus usque ad 45 mm latus, actate convexus atque depressus, estriatus, margine undulatus et incisus, badius, hygrophanus. Velum tenue, album. Lamellae haud confertae, anguste adnatae badiae, acie subconcolores. Stipes 30 \times 6 mm, eradicatus, teres, alutaceus, apice conspicue sulcatus. Sporae cumalatae obscure purpureofuscae, 5-6.3 \times 3.2-3.6 μm , subtruncatae, nonnullae subphaseoliformes, gilvae, subopacae, poro germinativo 1-1.5 μm lato. Badidia 4-sporigera. Pleurocystidia 37.5-47.5 \times 7.5-12.5 μm , haud numerosa, utriformia, nonnulla tantum fusiformi-ellipsoidea, stipite tenui manifeste munita.



Figs. 21-23. *Psathyrella hydrophiloides*, 22 May 1961. — 21. Sporogram (\times 1210). — 22. Pleurocystidiogram (\times 575). — 23. Cheilocystidiogram (\times 575).

Cheilocystidia sat numerosa, 22.5–30(–35) × 7.5–11 μm , fusiformi-ellipsoidea, raro utriformia, pleurocystidiis dissimilia, stipite brevi latoque praedita, cellulis spheropedunculatis multis, 12.5–25 × 6–10 μm , intermixtis. Typus. — Netherlands, Overijssel, Denekamp, 'Singraven', 22 May 1961 (L.)

MISAPPLIED NAME.—*Drosophila appendiculata* var. *pilulaeformis* ss. Kühn. & Romagn. Fl. anal.: 365. 1953.

CHIEF CHARACTERISTICS.—Carpophore medium-sized, solitary, terrestrial, thick-set; pileus up to 45 mm diam., at maturity convex and depressed, not striate, with wavy, indented margin, dark reddish brown, hygrophanous; veil scanty; lamellae not crowded, narrowly adnexed, dark reddish brown, edge concolorous; stipe 30 × 6 mm, conspicuously grooved at apex, very pale brown; spore print very dark purple brown. Spores 5–6.3 × 3.2–3.6 (mean values 5.9 × 3.5 μm), few slightly phaseoliform, with conspicuous germ pore (1.1.5 μm), brownish yellow, pleurocystidia not numerous, utriform and few ellipsoid; non-pleurocystidioid cheilocystidia fairly numerous and fusoid-elliptic; spheropedunculate cells numerous; hymenophoral trama pigmented.

MACROSCOPICAL CHARACTERS.—Pileus at maturity up to 45 mm, convex with distinctly depressed centre, firm and fleshy, not striate, with slightly wavy, indented margin, dark reddish brown (M. 2.5 YR 3/2), hygrophanous, drying out to fairly dark yellow (M. 10 YR 8/6, 7/6 but slightly more sordid greyish) darker at centre.

Veil scanty, forming white velar fibrils along margin of pileus and distinct garland-like remnants half-way stipe.

Lamellae 6 mm broad, not crowded, slightly ventricose, strongly ascending near stipe, narrowly adnexed, dark reddish brown (M. 5 YR 3/3), with \pm concolorous edge.

Stipe 30 × 6 mm (at base 7 mm), cylindrical, not rooting, very pale brown, at base covered with dense, cottony, whitish mycelial layer but not strigose, hollow (cavity 3 mm wide); surface very delicately fibrillose.

Context in pileus firm, comparatively thick (2.5 mm in centre) dark greyish brown, in stipe very pale brown. Taste and smell indistinctive.

Trama of 'washed' lamellae yellowish brown from brownish yellow (M. 10 YR 6/4, 6/6, 5/6), anastomosing strands running from base to edge through the in itself pale brown (M. 10 YR 6/3, 7/2) tissue; extreme edge minutely fimbriate and pale brown.

Spore print very dark purplish brown.

MICROSCOPICAL CHARACTERS.—Spores 5–6.3 × 3.2–3.6 μm (mean values 5.9 × 3.5 μm ; 1 collection), in profile adaxially flattened ellipsoid to ovoid, rarely slightly phaseoliform, in face view ellipsoid to slightly ovoid, in water and NH_4OH 10% brownish yellow (M. 10 YR 6/6), in KOH 5% sordid yellowish brown (M. 10 YR 5/6), subopaque, with conspicuous, subtruncate, hyaline germ pore (1–1.5 μm) and small hilar appendix.

Basidia 14.4–17.6 × 4.8–5.6 μm , subcylindrical, 4-spored.

Pleurocystidia 37.5–47.5 × 7.5–12.5 μm , not numerous, utriform, only few fusoid-ellipsoid, with narrow and distinct pedicel, thin-walled, very pale brown in NH_4OH 10%.

Marginal cells: fusoid-ellipsoid and rarely utriform cheilocystidia, 22.5–30(–35) × 7.5–11 μm , fairly numerous, with short and broad pedicel, many very pale brown in NH_4OH 10% (a few distinctly brown), intermixed with numerous small spheropedunculate cells, 12.5–25 × 6–10 μm (rarely larger, up to 27.5 × 15 μm), several of which pale brown in NH_4OH 10%.

Caulocystidia (apex of stipe): pleurocystidioid caulocystidia 22.5–47.5 × 7.5–9 μm , scattered and very few, versiform, utriform, thin-walled; spheropedunculate cells 17.5–30 × 10–17.5 μm , isolated or in small clusters.

Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: narrow hyphae of subhymenium (15 μm broad zone at edge) very brown, broad hyphae very pale brown, both from membranal pigment; yellow hyphal septa present; no encrustations.

Pileipellis a 2–3 cells deep layer of subglobose, thick-walled cells, 25–55 μm diam., in NH_4OH 10% distinctly pale brown.

Clamps on caulocystidia and hyphae of stipe.

HABITAT.—Terrestrial under *Fagus*, solitary. Very rare.

COLLECTION EXAMINED.—NETHERLANDS, prov. Overijssel, Denekamp, estate 'Singraven', 22 May 1961, E. K. v. W. (type, L).

Kühner & Romagnesi (1953: 365) depicted and briefly described a taxon, which they named *Drosophila appendiculata* var. *pilulaeformis* ss. Ricken. Their description fully agrees with the species described above. The name given by them to this taxon is based on Ricken's suggestion (1912: 247) that a 'kurzgestielte fast kugelige Form' of *P. hydrophila* is perhaps *A. pilulaeformis* Bull. Ricken neither described nor named this taxon. Our species obviously belongs to the genus *Psathyrella*, but cannot bear the epithet 'pilulaeformis' as *Agaricus piluliformis* Bull. represents early stages of *P. hydrophila* (see observations on *P. laevisissima*).

Psathyrella hydrophiloides differs from *P. hydrophila* by quite a number of characters: the carpophores are robust, thick-set, the cap is darker, the veil scanty, the gills are not crowded, the apex of the stem is conspicuously sulcate, the spores are slightly darker and above all have a very distinct germ pore.

The above description is based on the only specimen we ever saw and which is the only one recorded from the Netherlands. According to Kühner & Romagnesi (1953: 365) the species is fairly common in France.

PSATHYRELLA LAEVISSIMA (Romagn.) Sing.—Figs. 36–48

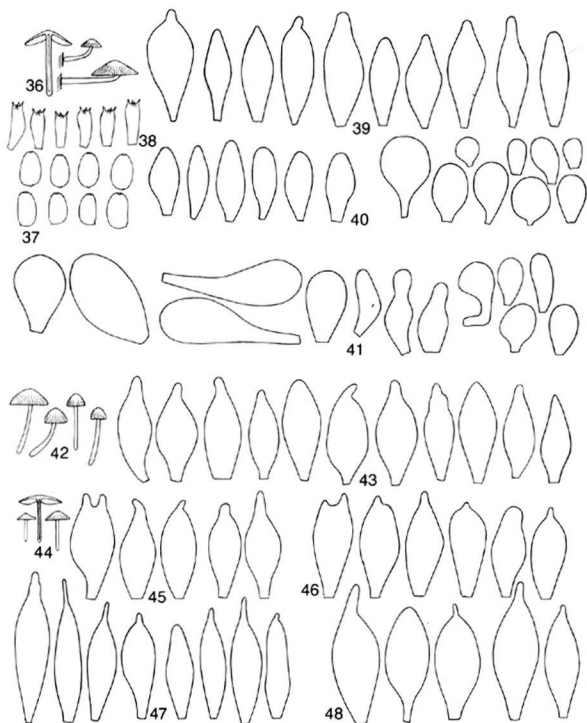
Drosophila laevisissima Romagnesi in Bull. Soc. linn. Lyon 21: 155. 1952. — *Psathyrella laevisissima* (Romagn.) Sing. in Beih. Nova Hedwigia 29: 197. 1969.

MISAPPLIED NAME.—*Psathyrella piluliformis* ss. P. D. Orton in Notes R. bot. Gdn Edinb. 29: 116. 1969.

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—Favre in Schweiz. Z. Pilzk. 33: 70. 1958 (as *Drosophila laevisissima*); P. D. Orton. in Notes R. bot. Gdn Edinb. 29: 116. 1969 (as *Psathyrella piluliformis*).

CHIEF CHARACTERISTICS.—Carpophores small to medium-sized, gregarious (not caespitose!) on and around stumps of deciduous trees; pileus 15–35 mm, convex to subumbonate, dark brown, hygrophanous; veil evident only in youngest stages; lamellae very crowded, adnexed, dark reddish brown, edge minutely fimbriate, scarcely whitish; stipe 15–40 \times 1.5–3 mm, sordid white to yellowish brown; spore print brownish black; spores 5.4–5.9 \times 3.2–3.6 (mean values 5.5–5.6 \times 3.4–3.5) μm , with small, distinct germ pore, bright brown; pleurocystidia moderately numerous, fusoid-ventricose, many with short subcylindrical extension at apex or distinctly mucronate; spheropedunculate cheilocystidia in very large numbers, 10–30 \times 10–20 μm , the majority slightly thick-walled and very pale to distinctly brown in NH_4OH 10%, intermixed with very few fusoid-ventricose, rarely mucronate cheilocystidia 27.5–32.5 \times 10–12 μm ; hymenophoral trama strongly pigmented.

MACROSCOPICAL CHARACTERS.—Pileus 15–35(–45, rarely –50) mm, rather fleshy, broadly conico-convex to convex or convex-subumbonate, delicately striate up to half-way from margin, smooth, in later stages rugulose, dark brown, date brown or reddish brown (M. 5 YR 3/4; 7.5 YR 4/4, 4/2), hygrophanous, drying from centre to pale brown or alutaceous with a trace of ochre at centre, without pink, micaceous.



Figs. 36-48. *Psathyrella laevisissima* — 36-41. 30 Aug. 1962. 36. Habit sketch ($\times 0.5$). — 37. Sporogram ($\times 1210$). — 38. Basidio-gram ($\times 575$). — 39. Pleurocystidiogram ($\times 575$). — 40. Cheilocystidiogram ($\times 575$). — 41. Caulocystidiogram. — 42, 43. 15 Sept. 1960. — 42. Habit sketch ($\times 0.5$). — 43. Pleurocystidiogram ($\times 575$). — 44, 45. 2 Sept. 1967. — 44. Habit sketch ($\times 0.5$). — 45. Pleurocystidiogram ($\times 575$). — 46-48. Pleurocystidiogram ($\times 575$). — 46. 31 Aug. 1967. — 47. 28 Aug. 1967. — 48. 12 Nov. 1967.

Veil fugacious, white, only distinct in very young stages and then only at margin of pileus, sometimes still connecting margin with stipe.

Lamellae 2.5–3 mm broad, very crowded, moderately ventricose, fairly broadly adnexed, not uncinat, at margin of pileus sharp and very narrow, at first pale brown later conspicuously dark purplish red-brown (M. 5 YR 4/2, 4/3); edge minutely fimbriate, concolorous or whitish.

Stipe 15–40 × 1.5–3 mm, hollow, not rooting, cylindrical or slightly thickened at base, minutely longitudinally fibrillose-striate, at apex and upper \pm 1/3 whitish, at lower 2/3 pale yellowish brown; apex slightly pruinose.

Context of pileus 1.5–2 mm thick in centre, dark greyish brown, of stipe pale yellowish brown. Smell and taste indistinctive.

Spore print brownish black.

Trama of 'washed' lamellae almost equably strong yellow-brown, with slightly stronger pigmented anastomosing strands running from base to edge; edge minutely dark brown punctate.

MICROSCOPICAL CHARACTERS.—Spores 5.4–5.9 × 3.2–3.6 μ m (mean values 5.5–5.6 × 3.4–3.5 μ m; 9 collections), in profile adaxially flattened ellipsoid, rarely slightly phaseoliform, in face view ellipsoid to ovoid, with small (\pm 1 μ m) but distinct germ pore and small hilar appendix, in water and NH₄OH 10% bright brown (M. 7.5 YR 5/6), in KOH 5% sordid brown (M. 7.5 YR 5/4), not opaque.

Basidia 15–17.5 × 5–6 μ m, subcylindrical to subclavate, 4-spored.

Pleurocystidia 32.5–45(–60) × 10–15(–20) μ m (including rostra), moderately numerous, fusoid-ventricose with acute to subacute, infrequently obtuse apex, slightly thick-walled and pale brown in NH₄OH 10%; apex very often drawn out into a short (2.5–6 μ m), subcylindrical, thin-walled and colourless extension or rostrum (mucronate); no mucus or crystals.

Marginal cells: spheropedunculate cells in very large numbers and densely packed, 10–20 × 7.5–17.5 μ m, a small number larger, 20–30 × 15–20 μ m, the latter, but also some of the smaller ones, with slightly thickened walls and very pale to distinctly brown (coloured cells usually in clusters), intermixed with very few scattered pleurocystidioid cheilocystidia, (15–)20–35(–40) × 7.5–15 μ m, with short and rather broad pedicel and subobtuse to subacute, rarely mucronate apex. No mucus or crystals.

Caulocystidia (apex of stipe): spheropedunculate, clavate, and versiform cells, 20–55 × 10–22.5 μ m, some with long pedicels slightly thick-walled and pale brown in NH₄OH 10%, rather few in number and usually in clusters of two or three up to ten cells, without mucus or crystals. Examination of several stipes yielded only two sublageniform caulocystidia.

Pigmentation of hymenophoral trama in NH₄OH 10% sub micr.: mediostratum consisting of broad hyphae (10–40 μ m), the thin subhymenium of narrow (4.5–9 μ m) hyphae, both mostly distinctly brown in NH₄OH 10% from membranous pigment; no encrustations, few yellow hyphal septa.

Pileipellis a 2–3 cells deep layer of subglobose cells, 15–50 μ m diam., distinctly brown in NH₄OH 10%.

Clamps numerous on hyphae of stipe.

HABITAT.—On and around stumps of deciduous trees, sometimes densely gregarious. August–November. Not reported from the Netherlands. Common in France and British Isles.

COLLECTIONS EXAMINED.—GREAT BRITAIN: Devonshire, Quantock Hills, 15 Sept. 1960 (foray Brit. Mycol. Soc.), E. K. v. W. (L); Montgomeryshire (Wales), Lake Vyrnwy, 30 Aug. 1962, E. K. v. W. (L); Hampshire, Slindon Park, 2 Sept. 1967 (foray Brit. Mycol. Soc.), E. K. v. W. (L); Surrey Gomshall, 27 Aug. 1967, P. D. Orton 3076 (E); Somerset, Selworthy, 31 Aug. 1967, P. D. Orton 3077 (E); Surrey, East Horsley, Mountain Wood, 28 Oct. 1967, P. D. Orton 3078 (E); Scotland, Perthshire, Dall, 9 Nov. 1967, P. D. Orton 3079 (E) and 12 Nov. 1967, P. D. Orton 3080 (E); Scotland, Aros Wood, 11 Sept. 1968, P. James (herb. Watling 6046, E).

The above description of the macroscopical characters is largely based on our very copious Lake Vyrnwy find. The six collections we received for examination from the Royal Botanic Garden Edinburgh were not accompanied by descriptions, but Orton's (1969: 116) description of the species is based on this material and fully adequate to go by. Of the altogether nine collections examined the macroscopical features of the dry basidiocarps and the microscopical characters were strikingly similar. In *Orton 3079* and *3080* the pleurocystidia were somewhat larger than in all our other collections, resp. $35-57 \times 10-15 \mu\text{m}$ and $40-60 \times 15-20 \mu\text{m}$. The pleurocystidioid cheilocystidia were rarely mucronate and always fusoid-ventricose except in *Orton 3079* in which most of these cells were narrow ($\times 7.5-10 \mu\text{m}$) and subcylindrical (a few of such cells sometimes occurred in other collections). The number of pleurocystidia having at their apex a short subcylindrical extension or a rostrum, varied. In some collections their number was small, while in *Orton 3077* and the Aros Wood collection several pleurocystidia had two rostra.

In the literature very little if anything at all is said about the rather conspicuous pigmentation of various tissue elements of *P. laevissima*. In all our nine collections the hymenophoral trama of the 'washed' gills turned out to be strong yellow-brown in NH_4OH 10% under the binocular lens, the colour becoming stronger towards the base. Microscopically the hyphae of the trama are distinctly brown in *P. laevissima*, but no encrustations were seen (neither by Romagnesi). As in *P. hydrophila*, the pleurocystidia are pale brown in NH_4OH 10% and so are a number of spheropedunculate cells on the gill edge. A number of the latter cells are even distinctly brown and they often find themselves in clusters, accounting for the edges of the gills being minutely dark brown punctate when observed on the 'washed' gills under the binocular lens. It also results in the edges macroscopically not really being white in spite of the presence of very large numbers of spheropedunculate cells, but \pm concolorous.

The cells of the pileipellis in *P. laevissima* are distinctly brown in NH_4OH 10%, more so than in *P. hydrophila*.

In summing up: *P. laevissima* resembles *P. hydrophila* because of the colour of its pileus and lamellae (both variable in both species and therefore in our opinion of little value as a means of distinguishing between the two species) and because of the small size and pale colour of its spores. It is sharply distinguished from *P. hydrophila* because of its quite different habit (smaller pilei and much smaller stipes), its pilei in the early stages not being globose but convex almost right from the start, its gregarious, non-caespitose growth, its rudimentary veil, its fusoid-ellipsoid-ventricose pleurocystidia having an acute or subacute (infrequently subobtuse and rarely obtuse) apex, which often is mucronate, its spores having a distinct germ pore (indistinct, callus, in *P. hydrophila*), and the edge of its lamellae lined with large numbers of spheropedunculate cells and only few pleurocystidioid cells (in *P. hydrophila* a much smaller number of spheropedunculate cells, intermixed with quite a number of pleurocystidioid cheilocystidia).

In the 'Flore analytique' Kühn. & Romagn. (1953: 366) called *P. laevissima* rare, but later (1975: 184) Romagnesi regarded the species as 'assez commun'. Favre (1958: 70) reported three collections from Switzerland; Moser (1978: 277) ranks it under the rare and still little known species; in the Netherlands it has not yet been recorded; Bona (1978: 70) reported it from Spain.

Orton (1960: 374) stated that his experience lead him to believe that 'there is a small "hydrophilus" corresponding to *A. piluliformis* Bull. and perhaps to *appendiculata* s. Kühn. & Romagn. as well as a more robust and more common "hydrophilus" (perhaps corresponding to var. *pilulaeformis* s. Kühn. & Romagn.)' but that he was not prepared to state whether these are

in fact two species. He suspected this to be so and that the smaller one grows gregariously in large numbers, whereas the larger one is densely caespitose. Later Orton (1969: 116) worked this out, stating that the smaller species was to be called *P. piluliformis* (Bull. ex Mérat) P. D. Orton, while giving a number of differences between that species and *P. hydrophila* but not all. In trying to unravel the species complex concerned, we soon discovered that the species, which Orton named *P. piluliformis* had already been described by Romagnesi (1952: 155) as a new species, *P. laevisissima*. We also found that Orton's *P. piluliformis* is quite different from Bulliard's *Agaricus piluliformis* (= early stages of *P. hydrophila*, see below) and from the taxon mentioned by Kühn. & Romagn. (1953: 365) as *Drosophila appendiculata* var. *pilulaeformis* (= a species in its own right, quite different from both *P. laevisissima* and *P. hydrophila* and in the present study named *P. hydrophiloides*).

As for *P. piluliformis*, Bulliard himself (1809: 440) clearly stated that he had made an error in describing *Agaricus piluliformis* as a species, having discovered that the specimens on which he based this species merely represented very early stages of *A. hydrophilus*. Bulliard's plate 112 shows a large caespitose (and not gregarious group) of some 30 carpophores, all of which with globose caps and habit quite different from *P. laevisissima*. Orton rightly stated that the species, described by him as *P. piluliformis* is not caespitose but gregarious. Also, long before the carpophores of *P. laevisissima* have reached the size as shown on Bulliard's plate 112, their caps are well expanded, their shape being as rightly described by Orton 'conico-convex, then expanded'. From all this it is quite clear that *P. piluliformis* (Bull. ex Mérat) P. D. Orton ss. Orton is a misapplication.

Singer (1969: 197) described (without giving pictures) a var. *nothofagi* of *P. laevisissima* from Chili, neither making clear nor stating, however, by which characters it differs from *P. laevisissima* (the spores are described as slightly larger, $6-7 \times 4-4.5 \mu\text{m}$).

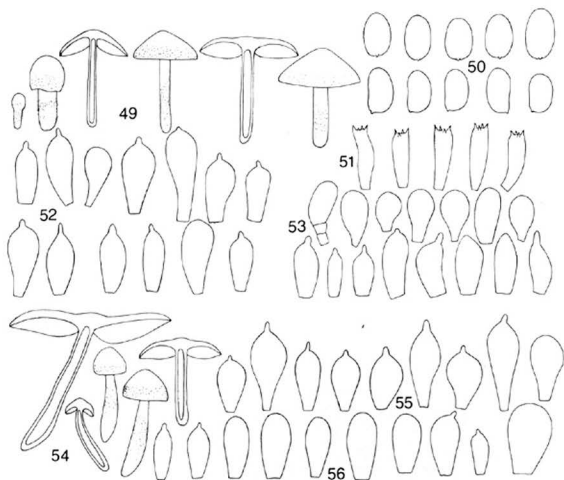
Smith (1972: 363) suggested—without giving a description of *P. laevisissima*—that *P. fuscofolia* (Peck) A. H. Smith may be conspecific with *P. laevisissima* as he regards the former species as a segregate of *P. hydrophila*, from which it differs by the almost complete absence of a veil and the pale trama in KOH. But the photographs of *P. fuscofolia* on Smith's plates 34 and 35 show densely caespitose carpophores of which the habit is totally different from that of *P. laevisissima*; the apices of the pleurocystidia of *P. fuscofolia* are very obtuse and not mucronate, while the hymenophoral trama of *P. laevisissima* is not paler than that of *P. hydrophila*.

PSATHYRELLA MUCROCYSTIS A. H. Smith—Plate 1, Figs. 49–56.

Psathyrella mucrocystis A. H. Smith in Mem. N.Y. bot. Gdn 24: 373. 1972.

Drosophila chondrodermoides Romagn. in Bull. Soc. mycol. Fr. 92: 189. 1976.

CHIEF CHARACTERISTICS.—Carpophores medium-sized to fairly large, caespitose or solitary on wood; pileus 30–70 mm diam., paraboloid, finally plane and subumbonate, not striate, dark reddish brown, hygrophanous; veil rather little to very strongly developed on both pileus and stipe, sometimes forming an annular zone on stipe; tips of velar flocci on pileus at maturity sometimes pale brown; lamellae fairly crowded, dark reddish brown to brown, with white edge; stipe 30–70 \times 4–6 mm, pale brown, darker towards base; spore print brown; hymenophoral trama strongly pigmented; spores 7.2–8.1 \times 4.1–4.5 μm , (mean values 7.1–7.5 \times 4.5 μm), brownish yellow, without germ pore or callus; pleurocystidia 20–45 \times 7.5–12.5 μm , clavate and mucronate; pleurocystidioid cheilocystidia very scarce to rather few in number; spheropedunculate marginal cells numerous.



Figs. 49-56. *Psathyrella mucrocystis*. — 49-53. 20 Oct. 1962. — 49. Habit sketch ($\times 0.5$). — 50. Sporogram ($\times 1210$). — 51. Basidiogram ($\times 575$). — 52. Pleurocystidiogram ($\times 575$). — 53. Cheilocystidiogram ($\times 575$). — 54-56. 22 Aug. 1965. — 54. Habit sketch ($\times 0.5$). — 55. Pleurocystidiogram ($\times 575$). — 56. Cheilocystidiogram ($\times 575$).

MACROSCOPICAL CHARACTERS.—Pileus in earliest stages (10-15 mm) subglobose-subparaboloid, at maturity 30-70(-90) mm and spreading via conico-paraboloid with truncate umbo to finally plane with vague and obtuse umbo and marginal area still deflexed (with Romagnesi: tending to become revolute), sometimes even depressed, firm and fleshy, not striate or sometimes substriate at margin, conspicuously dark reddish brown (M. 2.5 YR 3/4; 5 YR 3/4), at margin itself very pale brown, sometimes rugulose around centre when moist; hygrophanous, soon drying via (reddish) brown (M. 5 YR 3/3, 3/4, 4/4) and dark brown (M. 7.5 YR 4/4) to warm ochre brown (M. 5 YR 4/6, 4/8, 5/6, 5/8) or almost orange-brown (M. 5 YR 5/8), without pink, not micaceous, rugulose (with Romagnesi: at centre when moist slightly granular sub lente).

Veil strongly (going by our own two collections) to rather little (with Romagnesi) developed (see observations). Numerous white fibrils and small tufts of fibrils reaching up to 3/4 from margin, increasing in number towards margin, forming wicker-works of floccose, stellate squamules with, at maturity, distinctly pale ochre brown tips, appendiculate, on lower 2/3-1/2 of stipe forming a dense floccose lanose-fibrillose, sometimes squamulose coating with sometimes an annuliform zone. Veil in primordia and subprimordial stages covering entire stipe beneath margin of pileus with a thick, dense, lanose-squamose layer, inserting at margin of pileus, covering pileus right up to the top (with Romagnesi: veil distinct in subprimordial stage but slight and fugacious, white, only leaving traces on pileus, not on stipe).



Plate 1. *Psathyrella mucrocystis*

Lamellae 4–6 mm broad, fairly crowded, slightly ventricose, broadly adnate, in earliest stages pale brown (M. 10 YR 6/4), then brown (M. 7.5 YR 5/4, 4/4) and at maturity reddish brown (M. 5 YR 5/4, 4/4), contrasting with the dark pileus and pale brown stipe, with white, later whitish fimbriate edge.

Stipe 30–60 × 4–8 mm (Romagnesi: 40–90 × 6–13 mm), its length about equalling diameter of pileus, relatively thick, firm, cylindrical, sometimes attenuated near apex or at base or at both, upper 1/3 whitish, lower 2/3 pale sordid brown, darker at sometimes swollen base, very hollow, not rooting, distinctly pruinose at striate apex.

Context of pileus in centre 3–4 mm thick, at first reddish brown (M. 5 YR 3/3, 3/4), later dark greyish brown (M. 7.5 YR 4/2), in stipe whitish to pale yellowish brown, lower down darker and brownish grey, along cavity pale brown. Striking sweet smell of anise (Smith: almond).

Trama of 'washed' lamellae strong yellowish brown (M. 10 YR 5/6) from many anastomosing, brownish yellow (M. 10 YR 6/6) strands running from base to edge, darker and merging in basal 1/3 of lamella, through the in itself pale brown (M. 10 YR 6/3) tissue; extreme edge minutely fimbriate and pale brown.

Spore print dark brown with purplish hue.

MICROSCOPICAL CHARACTERS.—Spores (6.3–)7.2–8.1 × 4.1–4.5 μm (mean values 7.1–7.5 × 4.5; 4 collections), in profile adaxially flattened ellipsoid to subphaseoliform², in face view ellipsoid to slightly ovoid, in water, NH₄OH%, and KOH 5% brownish yellow (\pm M. 10 YR 6/6, 7.5 YR 6/6), not opaque, without germ pore or callus, with small hilar appendix.

Basidia 22.5–27.5 × 6–7.5 μm , subcylindrical, 4-spored.

Pleurocystidia: 20–32.5 × 7.5–15 μm (Romagnesi: 25–50 × 9–13.5 μm ; Smith 28–37 × 8–14 μm), very scarce to moderately numerous, clavate with at apex a narrow (1–2 μm), cylindrical, 1–4 μm long, thin-walled, colourless protuberance (mucronate); cell body usually distinctly but very pale brown in NH₄OH 10% (particularly larger cells).

Marginal cells: spheropedunculate and clavate cells 15–25(–27.5) × 7.5–15(–17.5) μm , very numerous, some with slightly thickened wall and some larger ones distinctly pale brown in NH₄OH 10%; intermixed with very few to a fair number of scattered, colourless, mucronate, pleurocystidioid cheilocystidia, 20–30 × 7.5–11 μm .

Caulocystidia: versiform, spheropedunculate, and clavate cells fairly numerous, 15–35 × 7.5–20 μm , some distinctly pedicellate; very few ellipsoid, rather large (27.5–40 × 10–15 μm), mucronate pleurocystidioid cells with up to 7.5 μm long mucro.

Pigmentation of hymenophoral trama in NH₄OH 10% sub micr.: distinctly brownish yellow from membranous pigment; scattered yellow hyphal septa; no encrustations.

Pileipellis: a 2–4 cells deep layer of subglobose, thick-walled, pale brown cells, 15–35 μm diam. Clamps present on hyphae of stem.

HABITAT.—Caespitose or solitary on stumps of coniferous or deciduous trees. June–Oct. Very rare.

COLLECTIONS EXAMINED.—NETHERLANDS, prov. Overijssel, Denekamp, estate 'Singraven', 20 Oct. 1962, E. K. v. W. (L). — GREAT BRITAIN, Scotland, county Angus, Glenisla, estate 'Brewlands', 22 Aug. 1965, E. K. v. W. (L). — FRANCE, dept. Oise, Chapelle-en-Serval, 2 June 1973, H. Romagnesi (herb. Romagn. 1130). — U. S. A., Idaho, McCall-Valley Co., Cascade Lake, 14 July 1962, A. H. Smith 65384 (type).

The mucronate cystidia are far and away the outstanding feature of this extremely rare species, in combination with the habit, the medium to large size of the firm carpophores, the striking red-

² Spores of Romagnesi's specimen more rarely and less subphaseoliform than those of our two collections.

brown colour of cap and gills, the brown spore print and the fairly (not very) pale spores which have no germ pore.

The species is only known from Smith's description (1972: 373), based on one collection and Romagnesi's description (1976: 189) based on four collections of this species, which he named *Drosophila chondrodermoides* because of its great resemblance to the almost equally rare *P. chondroderma*. Romagnesi pointed out that his *D. chondrodermoides* differed from *P. chondroderma*, which has the same habit, by its vernal appearance (one of his collections, however, was found on 2 August), its growth on old stumps of deciduous trees and its paler spores. Curiously enough he did not mention the mucronate cystidia and the absence of a germ pore.

We first studied our October 1962 collection. The spores and the shape of the mucronate cystidia are fully identical with those of *D. chondrodermoides*, but the find is not vernal, it grew on a coniferous stump, the veil is very strongly developed (with Romagnesi slight and fugacious) and the pleurocystidia are very scarce, very small ($20-26.5 \times 7.5-12.5 \mu\text{m}$) and therewith extremely difficult to find. We then found in our herbarium our Scottish collection of August 1965 (at that time still unidentified) and in the literature Smith's description of *P. mucrocystis* (1972: 373). These two turned out to be in several respects intermediate between our Netherlands' collection and the four collections described by Romagnesi. The Scottish collection was found in summer it grew on deciduous wood, its pleurocystidia are moderately numerous and slightly larger than in our Netherlands' collection, and its veil was also strongly developed. Smith's collection was also found in summer (July), it grew 'on outwash of a stream' (wood not mentioned), its pleurocystidia were scattered to abundant (apparently great variation) and were slightly larger still. Although Smith put the species in subgenus *Psathyrella* (Smith's definition: 'veil thin to rudimentary or absent'), he described the margin of its pileus as 'fringed with fibrils until near maturity, veil fibrillose pallid buff', the stem as 'lower down fibrillose to squamulose with buff colored veil fibrils, veil leaving a zone of fibrils when it breaks but the zone soon evanescent', this description clearly being intermediate between Romagnesi's description and the one given above for our two collections.

The features of Smith's, Romagnesi's and our own specimens obviously cover one and the same species. Smith's name for this species being the oldest, it has priority.

In the beginning of our correspondence with Romagnesi about *P. mucrocystis*, the facts that Smith only saw immature carpophores of his species and erroneously depicted in his fig. 783 three spores without but also three spores with a distinct germ pore (whereas he clearly stated in his description that the germ pore is 'very inconspicuous to lacking') threatened to stand in the way of convincing Romagnesi that his *P. chondrodermoides* (1976) was conspecific with *P. mucrocystis* (1972). But later and above all when we had received and compared the holotype of *P. mucrocystis* with an exsiccatum of *P. chondrodermoides*, received from Romagnesi, and could report to Romagnesi that spores, cystidia and the pigmentation of the subcutis of both species were fully identical, he regarded (in litt.) the synonymy as 'evident assez probable'. A slight difference in colour between the gills of Smith's holotype and young specimens of our own material could be explained away by the presence of very large numbers of pale and still immature spores in Smith's material. The pigmentation of the hymenophoral trama of the 'washed' gills of the type and our own material was exactly the same.

PSATHYRELLA OBTUSATA (Fr.) A. H. Smith

Psathyrella obtusata (Fr.) A. H. Smith in Contr. Univ. Mich. Herb. 5: 55. 1941.

Recently (Kits van Waveren, 1977: 299) having published a full description of and observations on *P. obtusata*, in the present study only an abbreviated description of this species is given, also additional information, a correction of our 1977 description and a description of a new variety.

ABBREVIATED DESCRIPTION.—Carpophores small to medium-sized, terrestrial, solitary; pileus 20–25 mm, conico-convex, striate, strikingly brown (M. 7.5 YR 4/4–5/4), towards margin paler (M. 10 YR 6/4), hygrophanous, drying to very pale brown (M. 10 YR 8/4) without pink and then rugulose; veil distinct but scanty; velar fibrills only along margin of cap and a few on stipe; lamellae 3–4 mm broad, strikingly pinkish brown, with white edge; stipe 60–75 × 2–3 mm, white; hymenophoral trama brown only at base; spore print brown with purplish hue; spores 7.2–8.1 × 4.5–5 μm (mean values 7.4–7.5 × 4.6–4.8 μm: 2 collections), subphascioliform, yellowish brown with a reddish hue, with small germ pore; pleurocystidia 35–50 × 9–15 μm, abundant, fusiform with fairly broad pedicel and acute to subacute apex; spheropedunculate and clavate cheilocystidia 20–30 × 12.5–20 μm, abundant, intermixed with very few pleurocystidioid or spheropedunculate cells with a very short subcylindrical neck, 30–45 × 12.5–15 μm. Pleuro- and cheilocystidia and cells of pileipellis very pale brown in NH₄OH 10%.

ADDITIONAL NOTES.—All authors describing the spores, called them pale brown; as for their size, only Petch (1924: 125) for his *P. rufescens* (which in our 1977 paper we listed as a synonym of *P. obtusata*) gave small figures (6–9 × 4–5 μm) and so did Smith (1941: 55), whose figures were 6–7 × 3.5–4 μm, and Lange (1939: 98), whose figures were 7.25–7.75 × 4.75 μm. Smith's recent figures (1972: 385) are 7–9 × 4–4.5 μm and those of Romagnesi (1975: 197) 7.7–10 × 4.7–5.7 μm. In our original 2 collections of *P. obtusata* and in the type of its var. *utriformis* the average length of the spores is 7.5 μm or less. Since 1977, however, we found 3 more collections in which the average length is 7.8, 7.9 and 7.8 μm respectively. *P. obtusata* is a border-line case between sections *Hydrophilae* and *Fatuae* to be keyed out in both.

CORRECTION.—The paragraph in our former description of *P. obtusata* (1977: 299) listing the synonyms of the species should have included '*Psathyrella obtusata* (Fr.) A. H. Smith in Contr. Univ. Mich. Herb. 5: 55. 1941'. In fig. 33 of our 1977 paper a small germ pore should have been depicted in the spores.

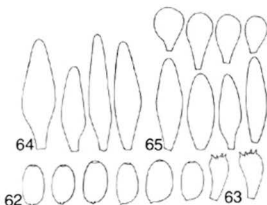
***Psathyrella obtusata* var. *utriformis* Kits van Wav., var. nov.**

A varietate typica differt pleurocystidia utriformibus.

Typus: Netherlands, prov. Zuid-Holland, Oegstgeest, 11 October 1979 (L).

This variety differs from typical *P. obtusata* by its pleurocystidia and pleurocystidioid cheilocystidia being utriform, the former (as in the type) abundant, the latter very scarce. Both pleuro- and cheilocystidia are distinctly pale brown in NH₄OH 10%.

COLLECTION EXAMINED.—NETHERLANDS, prov. Zuid-Holland, Oegstgeest, 11 Oct. 1979, *P. B. Jansen* (type, L).



Figs. 62-65. *Psathyrella pseudocasca*, 23 Apr. 1948. — 62. Sporogram ($\times 1210$). — 63. Basidiogram ($\times 575$). — 64. Pleurocystidiogram ($\times 574$). — 65. Cheilocystidiogram ($\times 575$).

***Psathyrella pseudocasca* (Romagn.) Kits van Wav., *comb. nov.* — Figs. 62-65**

Drosophila pseudocasca Romagn. in Bull. mens. Soc. linn. Lyon 21: 154. 1952 (basionym). — *Psathyrella pseudocasca* (Romagn.) Moser in Gams, Kl. KryptogFl. 2b/2 (2. Aufl.): 239. 1955 (not val. publ.).

CHIEF CHARACTERISTICS.—Carpophores small to medium-sized, solitary around stumps of deciduous trees; pileus 22-33 mm, subglobose, then convex, only in the end slightly striate, reddish brown, hygrophanous; veil copious on surface of pileus and stipe; lamellae crowded, pale greyish-brownish; stipe 40-50 \times 3-5 mm, white; hymenophoral trama moderately pigmented; spores 6.8-7.2 \times 3.6-4.5 μ m (mean values 7.1 \times 4.4 μ m), not phaseoliform, fairly pale brown, with germ pore; pleurocystidia 32.5-47.5 \times 9-12 μ m, abundant, fusiform with acute to subobtuse apex, with upper 1/4-1/2 covered with mucoid substance staining red in neutral red and not greenish blue in NH_4OH 10%; spheropedunculate and clavate cells on sterile gill edge numerous and intermixed with a moderate number of pleurocystidioid cheilocystidia.

MACROSCOPICAL CHARACTERS.—Pileus 22-33 mm, fairly fleshy, at first globose or campanulate, then convex, finally spreading with a distinct umbo gradually developing at centre, with margin regular or a little wavy, magnificently very intense reddish ochre brown, towards margin becoming more and more brown, slightly and only in the end striate, when moist glossy and smooth, hygrophanous, young pilei drying out to warm ochreous with centre for a while remaining reddish.

Veil: pileus clothed with a remarkably abundant white veil, consisting of numerous dispersed flocci, reaching almost apex of pileus, disappearing in the end, forming an appendiculate soft felty membrane along margin of pileus; very plumose on stipe.

Lamellae ± 3.5 mm broad, fairly crowded, thin, $l = 3$, subventricose, adnate, not or scarcely uncinat, at first pale yellowish grey, then pale greyish brown and remaining so, with white, strongly pruinose edge. Stipe 40-50 \times 3-5 mm, subcylindrical, rigid, fleshy, hollow, white, scarcely sordid yellow in final stages, strigose at base, vaguely grooved at apex. Context of pileus in centre 3-4 mm, when moist reddish, paler when dry.

Hymenophoral trama of 'washed' lamellae pale yellowish brown (M. 10 YR 6/4) at base, getting paler towards edge.

Spore print dark brown (sepia) with a trace of purple.

MICROSCOPICAL CHARACTERS.—Spores 6.8-7.2 \times 3.6-4.5 μ m (mean values 7.1 \times 4 μ m: 1 collection), in face view ellipsoid, in profile adaxially flattened ellipsoid, not phaseoliform, in water and NH_4OH 10% fairly pale yellowish brown to brown (M. 10 YR 5/4, slightly paler than

M. 7.5 YR 5/4), in KOH 5% yellowish brown (M. 10 YR 5/6), not opaque, with distinct germ pore (1–1.5 μm) and small hilar appendix.

Basidia 17.5–20 \times 7.5–9 μm , clavate, 4-spored.

Pleurocystidia 32.5–47.5 \times 9–12.5 μm , abundant, fusiform, subelliptic, sublageniform with acute to subobtuse apex and short, fairly broad pedicel, thin-walled, colourless, upper 1/4–1/2 (rarely more) of cells usually covered with conspicuous slightly refractive in NH_4OH 10% very pale greyish green, structureless mucoid substance, staining very dark red and becoming minutely granular in neutral red, but not staining blue-green in NH_4OH 10% (this substance locally 'dripping' along sides of cells) causing the cells seemingly to have one or more inclusions. No crystals.

Marginal cells: spheropedunculate and clavate cells small, 15–22.5 \times 8–12.5 μm , abundant, intermixed with a moderate number of pleurocystidioid cheilocystidia 27.5–40 \times 8–12.5 μm ; all cells colourless; no crystals.

Caulocystidia not found.

Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: hyphae very pale yellowish brown; few yellow hyphal septa; no encrustations.

Pileipellis a 2–3 cells deep layer of vesiculose cells, practically colourless.

Clamps present on hyphae of stipe.

HABITAT & DISTRIBUTION.—AROUND stumps of frondose trees; not reported from the Netherlands and the British Isles, according to Kühn. & Romagn. (1953: 363) not common in France.

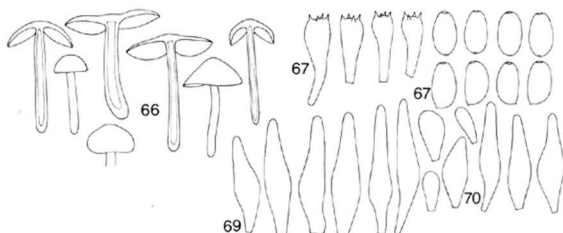
COLLECTION EXAMINED.—FRANCE: dept. Yv. Achères, 23 April 1948, *H. Romagnesi* (herb. Romagnesi no. 581, holotype).

The above description of the macroscopical characters is a translation of a full description received from Romagnesi; the description of the microscopical characters is based on the author's examination of the holotype. Romagnesi's statement (1952: 154) that his *Drosophila pseudocasca* is probably the same as *Hypholoma cascum* ss. Lange (1939: 77) is neither repeated in the 'Flore analytique' nor in the description we received from Romagnesi. In the 'Flore analytique' these taxa are described as separate species. The main and most reliable difference between the two species is that in *P. casca* the pleurocystidia are utriform and not covered by a mucoid substance staining red in neutral red; moreover its spores are larger and darker. Macroscopically the two species are very much alike so that Lange's plate 147 A of *P. casca* agrees with *P. pseudocasca* as stated already in the 'Flore analytique'.

***Psathyrella rannochii*³ Kits van Wav., spec. nov.**—Figs. 66–70.

Pileus primo badius, margine luteobrunneus, usque ad 45 mm latus, maturitate expansus paraboloides vel demum convexus, interdum planus, raro subumbonatus, e badio spadiceus, estriatus vel margine vix striatus, distincte rugulosus, hygrophanus, in sicco ochraceo colore roseo destitutus. Velum primo crassum albidum vel isabellinum, pileus 1/3–1/2 obtegens, pilei marginem cum stipite conjungens, demum pileum reticulo fibrilloso atque floccis obducens, marginem versus saepe denticulis appendiculatis, stipite nonnumquam annulo munito. Lamellae 4–7 mm latus, subconfertae, ascendentes, sublata adnatae, purpureofuscae. Stipes 40–50 \times 4–6 mm teres, floccoso-fibrillosus et albidus vel isabellinus infra velum, albus striatus pruinosisque supra velum. Caro pilei centro 2–3 mm crassa, badia vel spadicea. Sporae 6.3–8.1 \times 4.1–4.5 μm , spadiceae, purpureotinctae in cumulo, ellipsoideo-amygdaliformes, apiculo germinativo

³ This species is named after its type locality.



Figs. 66-70. *Psathyrella rannochii*, 30 Aug. 1965. — 66. Habit sketch ($\times 0.5$). — 67. Basidiogram ($\times 575$). — 68. Sporogram ($\times 1210$). — 69. Pleurocystidiogram ($\times 575$). — 70. Cheilocystidiogram ($\times 575$).

parvo. Basidia $25-35 \times 7.5-9 \mu\text{m}$, clavata, 4-sporigera. Pleurocystidia $(32.5-35-55(-60) \times 8-12.5 \mu\text{m}$, numerosa, anguste fusiformia, apice acuta vel subacuta. Cheilocystidia pleurocystidioidea $(25-27.5-45(-50) \times 7.5-10(-12) \mu\text{m}$, abundantia, cellulis spheropedunculatis immixtis $15-20 \times 7.5-8 \mu\text{m}$. Pileipellis a cellulis formata. Solitaria vel gregaria in ericetis acerosis terrestris. Typus: Great Britain, Scotland, Perthshire, Kinloch Rannoch, 30 Aug. 1965, E. K. v. W. (L).

CHIEF CHARACTERISTICS.—Carpophores medium-sized, solitary or subgregarious, terrestrial; pileus up to 45 mm, paraboloid, finally convex, rarely vaguely umbonate, dark red-brown, not or scarcely striate, rugulose, hygrophanous; veil strongly developed, often forming appendiculate denticles, sometimes an annular zone on stem; lamellae rather crowded, dark brown with purplish hue, with whitish edge; stipe up to 50×6 mm, coarsely fibrillose-shaggy, whitish above, buff below; spores $6.3-8.1 \times 4.1-4.5 \mu\text{m}$ (mean values $6.8-7.2 \times 4.2-4.4 \mu\text{m}$), ellipsoid, dark brown, with small germ pore; pleurocystidia $35-60 \times 8-12.5 \mu\text{m}$, numerous, narrowly fusiform; pleurocystidioid cheilocystidia $27.5-45 \times 7.5-10 \mu\text{m}$, abundant, intermixed with few spheropedunculate cells; hymenophoral trama pigmented.

MACROSCOPICAL CHARACTERS.—Pileus in primordia and early stages (4-13 mm) semiglobose-paraboloid with incurved margin, very dark reddish brown (M. 10 R 2.5/2; 2.5 YR 2.5/2, 2.5/4), but at margin (under velar coating) yellowish brown (M. 7.5 YR 5/6, 5/8), at maturity up to 45 mm, spreading to paraboloid, finally convex, sometimes (oldest stages) even plane with slightly deflexed marginal area and depressed centre, rarely vaguely umbonate, very dark red-brown (M. 5 YR 3/4), at margin yellowish brown (M. 7.5 YR 5/6, 5/8), red colour gradually fading from margin inward, making way for dark warm brown (M. 7.5 YR 3/2, 4/2, 4/4) as it usually still and particularly near and at centre with distinct reddish hue, not or (in oldest stages) scarcely striate at margin, but distinctly finely radially rugulose, hygrophanous, drying out to ochre brown, ochre yellowish (M. 10 YR 7/6, 6/6) or pale brown, with darker centre and then without pink, rugulose and not micaceous.

Veil in primordia and early stages forming a thick whitish to buff coating enveloping lower $1/3-1/2$ of pileus, sending up many fibrils almost to apex and forming a dense layer connecting margin with stipe and there downwards passing into a fibrillose-shaggy layer; at maturity forming on pileus a rather dense network, denser towards margin, of radially arranged fibrils, bundles of fibrils and often minute flocci, in addition often forming appendiculate denticles or even an uninterrupted fringe at margin; fibrillose and sometimes minutely floccose remnants of veil on upper part of stipe sometimes forming an erect annular zone.

Lamellae 4-7 mm broad, rather crowded, ascending, fairly straight but sometimes distinctly

ventricose, rather broadly but sometimes rounded adnate, at first pale brown (M. 10 YR 6/3), browner towards base (towards M. 10 YR 5/4), greyer towards edge, later darker brown (M. 10 YR 3/3) with a purplish hue; edge whitish or concolorous.

Stipe 40–50 × 4–6 mm, cylindrical, sometimes thickening towards base, hollow, below insertion of veil conspicuously coarsely fibrillose-shaggy and whitish to buff, above insertion white, striate and pruinose.

Context of pileus 2–3 mm thick in centre, dark reddish brown (M. 5 YR 4/2) or dark brown (M. 7.5 YR 3/2, 4/2; 10 YR 3/3), of stipe pale brown; smell and taste indistinctive.

Trama of 'washed' lamellae yellowish brown from base to edge, at base M. 10 YR 5/4, for the rest only slightly paler, M. 10 YR 6/4, scarcely paler at edge.

Spore print dark brown with purplish hue.

MICROSCOPICAL CHARACTERS.—Spores 6.3–8.1 × 4.1–4.5 μm (mean values 6.8–7.2 × 4.2–4.4 μm ; 2 collections), in profile more or less adaxially flattened ellipsoid to subovoid, in face view ellipsoid to ovoid, in water warm brown (M. 5 YR 4/6), in NH_4OH 10% dark brown (M. 5 YR 4/3), in KOH 5% sordid brown (M. 10 YR 4/3), not opaque, with small germ pore ($\pm 1 \mu\text{m}$) and small hilar appendix. Basidia 25–35 × 7.5–9 μm , clavate, 4-spored. Pleurocystidia (32.5–)35–55(–60) × 8–12.5 μm , numerous, rather narrowly fusiform, pedicellate, with acute to subacute apex, thin-walled, very pale brown in NH_4OH 10%; no mucus or crystals. Marginal cells: pleurocystidioid cheilocystidia (25–)27.5–45(–50) × 7.5–10(–12) μm , abundant, intermixed with very few spheropedunculate cells, 15–20 × 7.5–8 μm and some basidia; all cells thin-walled; no mucus or crystals. Trama of lamellae in NH_4OH 10% sub. micr. brown-yellow from membranal pigment; no yellow hyphal septa or encrustations. Pileipellis a 2–3 cells deep, layer of colourless cells, 25–50 μm diam.

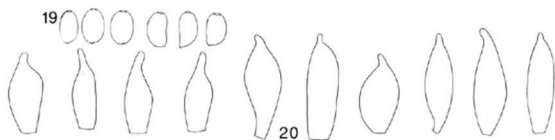
HABITAT & DISTRIBUTION.—Solitary or subgregarious, terrestrial, found along footpath close to very large saw dust area in an area of heather and some small coniferous trees. Known for certain only from type locality in Scotland (see observations).

COLLECTIONS EXAMINED.—GREAT BRITAIN, Scotland, Perthshire, Kinloch Rannoch, very close to Rannoch School, 30 Aug. 1965 (type) and 31 Aug. 1970, E. K. v. W. (L).

Macroscopically the Rannoch specimens looked exactly like the specimens depicted on Lange's plate 143 A and B (as *Stropharia spintrigera*) except for the ring on the stem, which in *P. spintrigera* is a cuff, in *P. rannochii* at most an annular zone. Microscopically *P. rannochii*, however, differs from *P. spintrigera* by the presence of numerous pleurocystidia. Kew Herbarium possesses four British collections of carpophores (all labelled *P. spintrigera*), which on examination turned out to have pleurocystidia and spores fully corresponding with those of *P. rannochii*, while the macroscopical aspect of the exsiccata was compatible with that species. Field notes, however, being virtually absent, it is impossible to identify with certainty these collections as *P. rannochii*, which they, however, probably are: (1) Perthshire, Rannoch, 4 Sept. 1963 (no notes; found at the very same site as our 1965 and 1970 collections); (2) Invernessshire, Aviemore, 31 Aug. 1953 (sole notes: 'pileus dark brown, appendiculate with veil'); (3) Sutherland, Borgie Bridge, 13 Sept. 1954 (no notes); (4) Northumberland, Dipton (no date, sole note: 'on saw dust').

***Psathyrella subpapillata* (P. Karst.) Kits van Wav., comb. nov.**—Figs 19, 20

Hypoloma subpapillatum P. Karst. in Meddn Soc. Fauna Flora fenn. 5: 31. 1879 (basionym). — *Drosophila subpapillata* (P. Karst.) Kühn. & Romagn., Fl. anal.: 366. 1953. — *Psathyrella subpapillata* (P. Karst.) Schulm. in Karstenia 3: 72. 1955 (not val. publ.).



Figs. 19, 20. *Psathyrella subpapillata*, Romagnesi 152. — 19. Sporogram ($\times 1210$). — 20. Pleurocystidiogram ($\times 575$).

SELECTED DESCRIPTIONS & ILLUSTRATIONS.—P. Karst. in Acta Soc. Sci. fenn. 1: tab. 6 fig. 27 1883 (as *Hypholoma subpapillata*). — Kühn. & Romagn., Fl. anal. 366. 1953.

CHIEF CHARACTERISTICS.—Carpophores medium-sized, solitary, on deciduous wood; pileus 30–32 mm, at first campanulate, later spreading and wavy, striate, reddish brown with yellow hue, rugulose, towards centre punctate sub lente, hygrophanous; veil rudimentary; lamellae 2–3 mm broad, crowded, with dark brown punctate edge; stipe 20–30 \times 2–4 mm, at first white, then brownish; hymenophoral trama strongly pigmented; spore print purple brown; spores 5.4–6.3 \times 3.2–3.6 μm (mean values 5.9 \times 3.5 μm) frequently phaseoliform, pale yellowish brown, with distinct germ pore ($\pm 1.5 \mu\text{m}$); pleurocystidia 30–40 \times 10–15 μm , moderately numerous, subfusoid, subclavate, rostrate; marginal cells spheropedunculate, subcylindrical, clavate, and subutriform, very distinctly brown in NH_4OH 10%, intermixed with very few pleurocystidioid cells; cells of pileipellis brown.

MACROSCOPICAL CHARACTERS.—Pileus in early stages (12–15 mm) campanulate, very slightly conical, ochre; later (30–32 mm) spreading and wavy, very delicately translucently striate, reddish brown with yellow hue (very vivid colour), with paler margin, smooth but more or less rugulose, minutely micaceous and towards centre punctate by (sub lente) small brighter granules, hygrophanous, becoming extremely pale dry and then very rugose.

Veil forming in early stages some very fugacious arachnoid filaments on pileus.

Lamellae 2–3 mm broad, crowded, unequal, adnexed, fairly pointed in front, subventricose, at first pale brownish yellow, then brown-yellow, finally brown with slightly pruinose and particularly in front – dark brown punctate edge.

Stipe 20–30 mm, rather firm though fistulose (particularly at base), more or less flexuous, springing from a remarkable tuft of rigid white hairs, at first white and shiny-silky, then pale brownish under covering of delicate longitudinal silky fibrils producing a silvery aspect, later gradually darkening, at base sometimes taking colour of pileus, with flocculose apex.

Context in centre of pileus fairly thick (3 mm), hygrophanous, when moist dark reddish brown with a yellow hue; in cortex of stipe brown yellowish, paler when dry, fragile, with strong, sweet (fungoid) smell when fresh and slightly raphanoid taste.

Trama of 'washed' lamellae strong yellow brown from numerous brownish yellow (M. 10 YR 5/6), wavy, anastomosing strands running from base to edge through the in itself pale brown (M. 10 YR 6/3, 6/4) tissue.

Spore print purplish brown.

MICROSCOPICAL CHARACTERS.—Spores 5.4–6.3 \times 3.2–3.6 (mean values 5.9 \times 3.5 μm ; 1 collection), in profile many slightly but distinctly phaseoliform, in face view ellipsoid to subovoid, in water pale yellowish brown (M. 10 YR 6/4–7/6), darker in NH_4OH 10% (M. 7.5 YR 6/6), in KOH 5% sordid pale yellowish brown (M. 2.5 Y 6/4), with distinct germ pore ($\pm 1.5 \mu\text{m}$) and small hilar appendix.

Basidia 12–15 \times 5 μm , subclavate, 4-spored (Romagnesi).

Pleurocystidia 30–40 × 10–15 μm (Romagnesi: 45–55 × 10–15 (–17 μm), moderately numerous, subfusoid, subclavate, very slightly thick-walled, sometimes very pale brown in NH_4OH 10%, equipped with an apical, short (2–6 × 1.5–2.5 μm), thin-walled, colourless, and usually curved protuberance (mucronate) according to Romagnesi sometimes enveloped by a refractive exudate.

Marginal cells: spheropedunculate, clavate, subcylindrical, and subtriform cells, 20–30 × 8–15 μm , almost all of them with slightly thickened walls and many, especially the larger cells, conspicuously brown in NH_4OH 10%; pleurocystidioid (mucronate) cheilocystidia, 25 × 12.5 μm , very sparse; no mucus or crystals.

Caulocystidia none found.

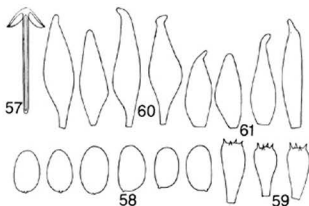
Pigmentation of hymenophoral trama in NH_4OH 10% sub micr.: narrow hyphae strong brownish yellow from membranal pigment, with a great many yellow hyphal septa; broad hyphae pale brown; no encrustations.

Pileipellis: a (2–3) cells deep layer of subglobose cells, 30–50 μm diam., brown in NH_4OH 10%.

HABITAT.—According to Romagnesi (in litt.) solitary or in groups of 2 specimens on old decaying stump of (probably deciduous) tree.

COLLECTION EXAMINED.—France, 2 Febr. 1938. *H. Romagnesi* (herb. Romagn. Nr. 152).

The description of the macroscopical characters of this species is a translation of a full description which we received from Romagnesi; the description of the microscopical characters is based on our own examination of an exsiccatum received from Romagnesi. As it turned out to be Romagnesi (in litt.) had regarded the sub lente minutely granular surface of the centre of the cap as the prime diagnostic feature of this species. But in the 'Flore analytique' it is the brown punctate gill edge which is printed in bold face as the most striking character of the species. It has been the granular surface of the cap (and not the brown punctate gill edge) which made Romagnesi (in litt.) separate *P. subpapillata* from the very closely related *P. laevis*, which has a smooth surface (hence the name). Both species have mucronate cystidia. In *P. laevis* also a number of spheropedunculate cells (often in clusters) are distinctly brown in NH_4OH 10%, be it not to the extent we found them to be in *P. subpapillata* (see observations on *P. laevis*). Karsten (1879: 31) described the surface of his *Hypholoma subpapillatum* as 'papillis minutissimus subscaber', his plate 6 fig. 27 merely showing a mat surface. A minutely granular



Figs. 57–61. *Psathyrella umbrina*, 5 Sept. 1968. — 57. Habit sketch (× 0.5). — 58. Sporogram (× 1210). — 59. Badidiogram (× 575). — 60. Pleurocystidiogram (× 575). — 61. Cheilocystidiogram (× 575).

surface of the cap, no doubt due to its cellular structure, is also occasionally seen in species of *Pluteus*, *Panaeolus* and some species of *Psathyrella*. In fact, Romagnesi himself described the surface of his *Drosophila chondrodermoides* (= *P. mucrocystis*) as 'un peu grênelée-chagrinée au milieu s.l.'. The phenomenon of the granular surface therefore, not being specific, the brown punctate gill edge not being mentioned in Karsten's description and type material being non-existent (as we learned from the Helsinki herbarium), we at first were inclined to regard Karsten's name as a nomen dubium and to describe Romagnesi's species under a new name. In the end, however, we decided to follow Romagnesi in preserving Karsten's epithet for it.

On close comparison (on one slide) of the spores of *P. subpapillata* and *P. laevissima*, we found those of the former species to be slightly paler and to have a more distinct and larger ($1.5 \mu\text{m}$) germ pore. The shape of the pleurocystidia was for both species the same.

***Psathyrella umbrina* Kits van Wav., spec. nov.—Figs. 57-61**

Carpophoria parva, separatim crescentia terrestria. Pileus 12 mm latus, campanulatus, margine subrevolutus, striatus, badius, hygrophanus, exarescens haud roseus neque rugulosus. Velum validum, fibrillosum, pilei marginem versus densum, haud appendiculatum. Lamellae 3 mm latae, anguste adnatae, brunneae, acie albae. Stipes $45 \times 1.5 \mu\text{m}$, eradicatus, albus. Caro badia in pileo, alba in stipite sed brunnea ad basin. Sporae $(6.8-7.2-8.1 \times 4.5-5 \mu\text{m})$, haud phaseoliformes, ochraceae, poro germinativo destitutae. Basidia 4-sporigera. Pleurocystidia $35-42.5 \times 10-12.5 \mu\text{m}$, modice numerosi, fusioidea, stipitata, complures mucronatae, nonnullae apicibus mucoso-obtectae. Cheilocystidia dissipata, pleurocystidiis similia. Pileipellis e cellulis formata. Typus: 'Great Britain, Scotland Invernessshire, Tomich, 5 Sept. 1968, E. K. v. W.' (L).

CHIEF CHARACTERISTICS.—Carpophore small, isolated, terrestrial (in moss); pileus 12 mm, campanulate with extreme margin revolute, striate, reddish brown, hygrophanous; veil rather strongly developed, not appendiculate; lamellae 2 mm broad, narrowly adnexed, distinctly brown, with white edge; stipe $45 \times 1.5 \text{ mm}$, white; hymenophoral trama little pigmented. Spores $(6.8-7.2-8.1 \times 4.5-5)$ (mean values $7.3 \times 4.6 \mu\text{m}$: 1 collection) not phaseoliform, without germ pore, ochreous yellow; pleurocystidia $35-42.5 \times 10-12.5 \mu\text{m}$, moderately numerous, fusoid pedicellate and many mucronate; gill edge with only pleurocystidioid cheilocystidia and basidia.

MACROSCOPICAL CHARACTERS.—Pileus 12 mm diam., campanulate, at extreme margin slightly revolute, striate up to 2/3 from margin, reddish brown (M. 5 YR 4/3), hygrophanous, soon drying from margin via brown (M. 7.5 YR 5/4) to pale yellowish brown (M. 10 YR 6/4, 6/3) without pink, neither micaceous nor rugulose.

Veil rather strongly developed on pileus, forming a fairly dense wicker-work of radially arranged white fibrils, reaching up to 1/3 from margin, densest at margin where the fibrils form a united rather dense velar zone, not appendiculate.

Lamellae 3 mm broad, moderately ventricose, narrowly adnexed, rounded near stipe, pale cocoa colour when viewed from below but distinctly brown (M. 7.5 YR 5/4) in face view, with white edge.

Stipe $45 \times 1.5 \text{ mm}$, straight, cylindrical, hollow, not rooting, shiny from a very thin white, minutely longitudinally striate fibrillose layer through which at base brown colour of context visible over a distance of 10 mm.

Context in centre of pileus 1 mm thick, reddish brown (M. 5 YR 4/3), in stipe white, in lower half pale brown, at base brown.

Hymenophoral trama of 'washed' lamellae pale brown (M. 10 YR 7/2-7/3), at extreme base yellowish brown (M. 10 YR 6/4).

Spore print not recorded.

MICROSCOPICAL CHARACTERS.—Spores (6.8–)7.2–8.1 \times 4.5–5 (mean value 7.3 \times 4.6 μ m; 1 collection), in profile more or less adaxially flattened ellipsoid (not phaseoliform), in face view ellipsoid to ovoid, in water, NH₄OH 10% and KOH 5% ochreous yellow (M. 7.5 YR 6/6), without germ pore, with small but distinct hilar appendix, not opaque.

Basidia 17.5–22.5 \times 7.5–8.5 μ m, clavate, 4-spored.

Pleurocystidia 35–42.5 \times 10–12.5 μ m, moderately numerous, fusoid, pedicellate, many distinctly mucronate (short, curved, apical appendix) and if not then with subacute apex, thin-walled, colourless, without crystals: top part (\pm 1/4–1/3) of a number of cells covered with a very thin greyish mucoid film.

Marginal cells: Pleurocystidioid cheilocystidia 25–37.5(–40) \times 7.5–12.5 μ m; rather few in number and scattered among many basidia, spheropedunculate cells absent.

Caulocystidia: pleurocystidioid caulocystidia versiform, 35–50 \times 7.5–15 μ m (1 mucronate cell seen) and scattered, spheropedunculate cells 30–35 \times 15–17.5 μ m, few in number.

Pigmentation of hymenophoral trama in NH₄OH 10% sub micr.: at base narrow hyphae distinctly brown, broad hyphae very pale brown with a small number of yellowish hyphae septa and a fair number of very small encrustations, for the rest hyphae pale brown, without yellow septa and encrustations.

Pileipellis a 2–3 cell deep layer of subglobose, cells, 25–50 μ m, very pale brown in NH₄OH 10%

Clamps on caulocystidia and numerous on hyphae of stipe.

HABITAT.—One specimen found in moss (not on wood!) under birch. Known only from type locality.

COLLECTION EXAMINED.—GREAT BRITAIN, Scotland, Invernesshire, Tomich, 5 September 1968, E. K. v. W. (Type L).

On the strength of its small and pale spores and its brown cap and gills this species deserves a place in section *Hydrophilae*. Together with *P. laevissima* and *P. subpapillata* it forms the small group of species which are characterized by their small size and mucronate pleurocystidia.

Although we are basing this species on only one specimen, its features are so characteristic (small size, campanulate brown cap, brown gills, well-developed veil, ochreous yellow spores without germ pore, mucronate pleurocystidia, heteromorphous gill edge, solitary growth in moss) that we have not hesitated in describing it as a new species.

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NOTES AND BRIEF ARTICLES

A NEW SPECIES OF ARPINIA

J. GEESINK

Herwen

During a collecting trip of the Dutch Mycological Society in the Belgian Ardennes in October 1977, a yellowish cup fungus was collected by Mrs. M. Tichelman on the slope of a hill near Resteigne, a locality regularly visited by Dutch mycologists. The material was handed to me for further investigation and identification.

The fungus turned out to be a still undescribed species belonging to the genus *Arpinia* Berthet.

***Arpinia luteola* Geesink, sp. nov.** — Fig. 1

Apothecium superficiale, stipitatum, usque ad 25 mm diam. Receptaculum initio cupulatum, deinde expansum undulatumque, luteo-aurantiacum; superficie laevi, margine crenato, stipite 10-12 mm longo, 4-6 mm lato. Discus concavus concolorus. Excipulum tristratum. Asci cylindrici, bifurcati, 125-180 × 8-10 μm, inamyloidei. Ascospores uniseriatae, ellipsoideae, hyalinae, 9.5-11.5 × 5.5-6.5 μm, biguttulatae, crasse tunicatae, laevis; nuclei haud carminophili. Paraphyses recticylindratae, septatae, c. 2.5 μm latae, ad apicem paulo inflatae usque ad 5 μm. In humo calcareo inter muscos in laricetum.

Typus: pr. Resteigne, Belgium, 4.X.1977, Mrs. M. Tichelman (L).

Apothecia in small groups, superficial, stipitate up to 25 mm diameter. Receptacle at first cup-shaped, then expanding and becoming undulate, yellowish orange (Ségui 203); surface smooth; margin crenate; stalk 10-12 mm long, 4-6 mm broad. Disc concave, yellowish orange (Ségui 203). Excipulum consisting of three layers (1) a profound layer of closely interwoven hyphae (textura intricata, cf. Eckblad, 1968: 84), (2) a median layer of thick-walled angular cells (textura angularis) here up to 25 × 15 μm, (3) an exterior layer of globular thin-walled cells (textura globulosa) reaching 20 μm in diameter and giving rise to very short hairs invisible with the unaided eye.

Asci cylindrical, bifurcate at the base, 125-180 × 8-10 μm; the wall not blued by iodine. Ascospores uniseriate, ellipsoid, hyaline, 9.5-11.5 × 5.5-6.0 μm, with two oil drops, thick-walled, smooth; nuclei non carminophilous. Paraphyses septate, c. 2.5 μm thick, slightly enlarged up to 5 μm at the tip.

HABITAT. — In a group on calcareous soil among mosses in a larch-wood.

DISTRIBUTION. — Only known from type locality.

SPECIMEN EXAMINED. — Belgium, on calcareous soil among mosses in a larch wood, near Resteigne, Ardennes, 4.X.1977, Mrs. M. Tichelman (holotype of *Arpinia luteola*, L).

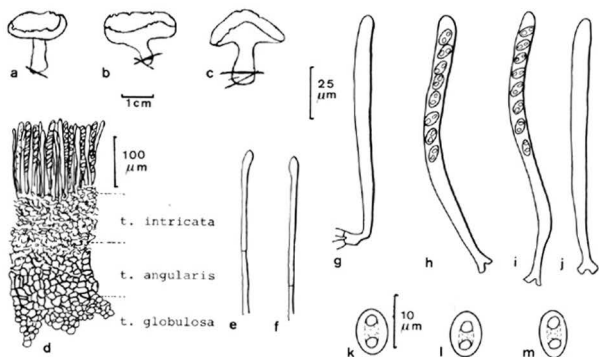


Fig. 1. *Arpinia luteola* (holotype). — a-c. Apothecia. — d. Diagrammatic section of hymenium and excipular layers. — e, f. Paraphyses. — g-j. Asci. — k-m. Ascospores.

According to Berthet (1974: 36) the presence of an excipulum differentiated like described above is characteristic of the family Otideaceae.

In my opinion the presence of a thick layer with textura intricata is responsible for the very limited shrinkage and deformation of the fruit bodies on drying. These retain their original shape almost completely.

Because of the smooth excipulum and the cup-shaped, stipitate, crenate apothecia the present species would appear very close to the genus *Tarzetta* (Cooke) Lambotte (syn. *Pustulina* Eckbl.) but on the ground of the additional furcate asci and non-carminophilous nuclei in the ascospores it fits perfectly in the genus *Arpinia*.

Arpinia luteola can easily be distinguished from *A. inops* Berthet by the larger size and the deeper yellow colour of the fruit bodies and the smaller ascospores.

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VALIDATION OF *AMANITA GRACILIOR*,
A MEDITERRANEAN SPECIES RESEMBLING *A. BOUDIERI*

C. BAS

Rijksherbarium, Leiden

M. HONRUBIA

University of Murcia, Spain

One of us (Bas, 1969: 436) described a mediterranean member of *Amanita* section *Lepidella* under the name *A. gracilior*, however, without validating this name because of scanty material and incomplete information on the fruit-bodies in fresh condition.

Meanwhile, both the present authors have collected and extensively annotated this species, so that time has come to give it legal status.

***Amanita gracilior* Bas & Honrubia, spec. nov.**—Figs. 1–2

Amanita gracilior Bas, nom. prov., in *Persoonia* 5: 436, figs. 170–172. 1969.

Pileus 30–34 mm latus, convexus, dein planus, margine appendiculatus et non vel leviter sulcatus, albus vel bubalino-cremeus, verrucis (sub)conicis, sat minutis, concoloribus, deciduis ornatus. Lamellae confertae, liberae vel anguste adnatae, modice latae, albae vel pallide bubalino-cremeae. Stipes 70–80 × 5–17 mm, radicatus, basi cylindraceus vel napiformis et usque ad 28 mm latus, solidus, albus vel pallide bulbalinus, annulo membranaceo, apicali praeditus, deorsum plerumque fragmentis volvae minutis, squamuliformibus recurvatis ornatus. Caro alba vel pallide bubalina, odore indistincto vel subnauseoso praedita. Sporae 10–12 × 5.5–6.5 μm, elongatae, in cumulo albae, amyloideae. Fragmenta volvae e cellulis turgidis catenulatis vel terminalibus, subrectis vel inconditis hyphisque composita. Fibulae frequentes. Typus: 'C. Bas 6462, 24 Oct. 1974, France, Avignon' (L).

Carpophores solitary or subgregarious, small to medium-sized, rather thickset to very slender. Pileus 30–45 mm wide, from convex with somewhat flattened centre to plano-convex or flat, with not or only slightly sulcate, first somewhat inflexed, later straight, slightly appendiculate margin, white, sordid white or buff tinged cream, with scattered but at centre crowded, small, detersile, conical to pustule-like, up to 2.5 mm wide and 1.5 mm high, volval warts often with a minutely radially fibrillose flat base or (particularly at centre of pileus) remaining connected, thus forming a felted-fibrillose, somewhat areolate volval patch carrying small adnate conical warts, sometimes becoming denudated with age; exposed parts of pileipellis viscid when moist. Lamellae crowded, free to narrowly adnate, moderately broad (up to 6.5 mm), thin, white to pale buffy cream (paler than Munsell 10 YR 8/3), straight or ventricose, with concolorous, subflocculose, thin edge; lamellulae rather abundant to scarce, irregularly truncate, subtruncate or attenuate. Stipe 70–80 (rooting part included) × 5–17 mm, with subcylindrical base or

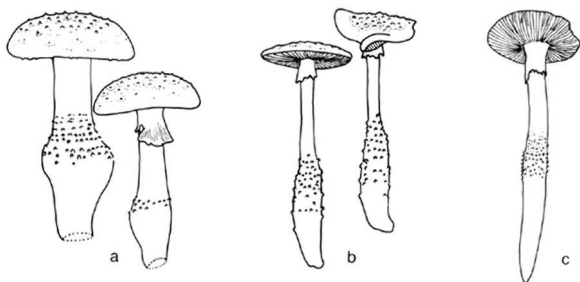


Fig. 1. *Amanita gracilior*, fruit-bodies ($\times 0.5$). — a. Type-collection. — b. Honrubia 2523. — c. Marchand 20 Oct. 1966.

fusiform to napiform basal bulb, up to 45×28 mm, tapering into a long rooting point, solid, white to sordid white or with pale buff tinge, subfelted-subfibrillose, lower down flocculose to squamulose, with (sub)apical, pending, fragile, membranous, concolorous, rather narrow (sub)striate annulus, at base (on upper half of bulbous part) with many volval remnants in the shape of small to very small recurving scales or warts. Context white to pale buff. Smell and taste indistinct to somewhat unpleasant. Spore print (available only in the case of Honrubia 2523) white.

Spores [50/3] (9–)10–12(–14) \times (5.0–)5.5–6.5(–8) μm $Q = (1.4\text{--})1.7\text{--}2.0$, average $Q\ 1.7\text{--}1.8^5$, elongate, rarely elongate-ellipsoid or subcylindrical, sometimes broadening towards apex, smooth, rather thin-walled, colourless to very slightly yellowish in NH_4OH , with subgranular to guttulate contents and small abrupt apiculus, strongly amyloid. Basidia $35\text{--}60 \times 11\text{--}14$ μm , mainly 4-spored but also frequently 3- or 2-spored, with clamp. Marginal tissue a strip of somewhat irregularly disposed ellipsoid, clavate, piriform, and subcylindrical cells, (8–)20–55 \times (7–)10–20 μm ; smaller ones sometimes catenulate. Trama of lamellae bilateral; subhymenium irregularly ramose to coralloid, with clamps. Pileipellis a cutis composed of 1.5–5 μm wide, interwoven, colourless hyphae, at first gelatinizing at surface only where exposed, later also under volval remnants. Remnants of volva on pileus consisting of abundant, mainly ellipsoid, piriform and clavate cells, 20–90 \times 15–45 μm , in short to rather long rows, more rarely terminal, on rather abundant, 3–11 μm wide branching hyphae; elements irregularly disposed in apex of warts but towards base more and more in a parallel-erect position, colourless to pale yellowish in alkaline solutions but sometimes in apex with golden yellow contents; oleiferous elements scarce; clamps rather frequent. Trama of stipe with abundant, up to 350×35 μm large acrophysalides on 2–12 μm wide branching hyphae. Clamps present at basidia, subhymenial elements, and hyphae of volval remnants on pileus.

HABITAT & DISTRIBUTION.—Terrestrial in mediterranean woods in late autumn. *Honrubia* 2523 was growing in forest of *Quercus rotundi folia*, *Q. coccifera*, and *Pinus halepensis*. Occurring in Spain, the south of France, and probably also in Italy and Yugoslavia (see discussion).

COLLECTIONS EXAMINED.—FRANCE, surroundings of Avignon (brought in at exposition of European Mycological Congress VI as *A. boudieri*), 24 Oct. 1974, *C. Bas* 6462 (type, L). — SPAIN: Gerona, Costa Brava, Estartit, 20 Oct. 1966, *A. Marchand* (L); Albacete, Almansa, El Angel, 2 Nov. 1979, *M. Honrubia* 2523 (herb. Honrubia; fragments at L).

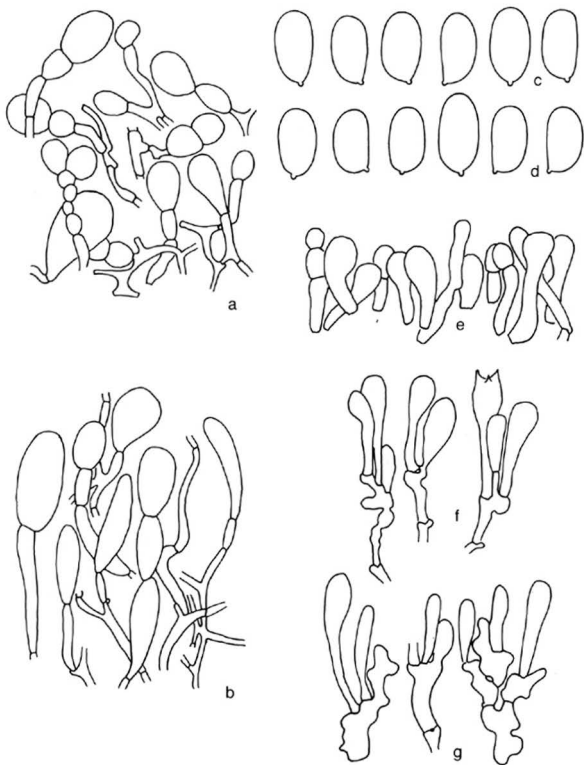


Fig. 2. *Amanita gracilior*. — a-b. Slightly dissociated elements of volval wart on pileus ($\times 250$); a. from apex of wart; b. from base of wart. — c-d. Spores ($\times 1250$). — e. Marginal tissue ($\times 500$). — f-g. Subhymenial 'trees' ($\times 500$) (a-c, e, f from type; d, g from *Honrubia* 2523).

In several aspects *A. gracilior* is intermediate between *A. boudieri* Barla¹ and *A. solitaria* (Bull. ex Fr.) Mérat (= *A. echinocephala* (Vitt.) Quél.). It is more than probable that in the past it has been collected by several mycologists (e.g. Bresadola²), but has alternately been named *A. boudieri* or *A. echinocephala* according to habit and degree of distinctness of the conical volval warts.

Amanita gracilior has with *A. boudieri* in common the whitish fruit-body, the rather small conical volval warts which particularly at the centre of the pileus show a tendency to merge into a volval patch carrying small adnate cones, relatively slender spores and a mediterranean distribution. It differs however from *A. boudieri* by:

- (i) the presence of clamps,
- (ii) the rather strong tendency to form small recurving scales on the lower half of the stipe,
- (iii) its fruiting in late autumn,
- (iv) the more membranaceous annulus, and
- (v) the slightly shorter and consequently relatively broader spores (10–12 μm versus 10.5–14 μm ; average Q 1.7–1.8⁵ versus 1.8–2.1).

Amanita gracilior reminds of *A. solitaria* because of the presence of clamps and the rather strong tendency to form recurving scales on the stipe, but differs from that species by:

- (i) its elongate spores (aver. Q 1.7–1.8⁵ versus 1.3–1.4⁵),
- (ii) the absence of a greenish-greyish tinge from the pileus and a greenish tinge from the lamellae, and
- (iii) the less concrete conical volval warts on the pileus and the tendency of these warts to merge into a volval patch (particularly at the centre of the pileus).

Bas (1969: 395) attributed to *A. solitaria* (= *A. echinocephala*) a range of averages of the length-width ratio (Q) of the spores from 1.3–1.75. In rich recent collections of this species, however, the average Q ranges from 1.3–1.4⁵. The measurements of the spores of all the collections cited by Bas (l.c.) fit this range with the exception of two collections from the mediterranean area (one from Yugoslavia and one from Perpignon, France), both without descriptive field-notes. In his discussion on *A. solitaria* Bas (l.c.: 398) suggested that among the collections cited by him under *A. solitaria* another species with more elongate spores and a slightly differently structured volva, was hiding. It has become clear now that this 'hidden' taxon and the then provisionally described *A. gracilior* are one and the same species.

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¹ Bas (1969: 442) reintroduced the name *A. baccata* (Fr.) Gill., typified by Micheli's plate 80 fig. 4 (1729: 186), for the species usually called *A. boudieri* Barla. The present study makes clear, however, that Micheli's illustration can represent *A. gracilior* just as well as *A. boudieri*, which renders *A. baccata* a dubious name. Therefore the present authors have taken up again the use of the name *A. boudieri*.

² Bresadola's plate 99 (1927) almost certainly represents *A. gracilior*, but no material of this species is available in the Bresadola herbarium at Stockholm.

A NEW AMANITA FROM CHILE

JOOST SCHALKWIJK & GERRIT M. JANSEN

During our stay in the *Nothofagus* region near Osorno from April to July 1979, we collected an interesting species of *Amanita*. Unlike *A. diemii* Sing., which appeared to be rather common in this area, the new species was collected only once.

Our *Amanita* is undoubtedly identical with *A. gayana* (Mont.) Mont., as described by Singer (1969: 151). However, checking the protologue of *Agaricus gayanus* Mont. (1853: 332), we soon discovered that we were dealing with two different species. Therefore we have to describe our (and Singer's) species as a new one, naming it *A. aurantiovelata*.

The following description is based on our single collection consisting of a young and a mature carpophore. The colours of the fresh carpophores have been annotated with the help of the colour code of the Methuen Handbook of Colour of Kornerup & Wanscher (1969), abbreviated 'Meth.'

Spores, taken from the sporeprint, were observed in an aqueous solution of ammonia (25%); all other parts studied under the microscope were stained with ammoniacal Congo red and observed in KOH (2%).

The spore sizes relate to the largest length and width, exclusive of the apiculus. The elements of the hymenophoral trama and the volva were measured in squash preparations. The pileipellis was studied in radial sections. The drawings were made with a drawing prism.

***Amanita aurantiovelata* Schalkwijk & Jansen,**
spec. nov.—Fig. 1

MISAPPLIED NAME. — *Amanita gayana* (Mont.) Mont. sensu Singer in Beih. Nova Hedwigia 29: 151–152. 1969.

Pileus c. 45 mm latus, semiglobosus dein convexus, margine sulcatus, aurantiacus (Meth. 6A8) dein pallidior (Meth. 5A6–4A6), margine pallide luteus (Meth. 4A4), fragmentis volvae aurantiaciis verruciformibus ornatus. Lamellae liberae, albae; lamellulae truncatae. Stipes c. 75 × 12 mm, sursum attenuatus, subbulbosus, pallide luteus (Meth. 2A4), interdum subaurantiacus ad basem, exanulatus, pulverulentus. Caro alba, inodora. Sporae accumulatae albae, 8–11.5 × 6.5–8 μm, ellipsoideae, non-amyloideae. Fragmenta volvae cellulis cylindricis et ellipsoideis, 18–25(–37) μm latis. Fibulae frequentes. Habitat: in terra sub *Nothofago obliqua*. Typus: G. M. Jansen & J. Schalkwijk XVI-251, 3-VI-1979, Cuinco, Chile, 40°38.5'S 73°26.5'W (L).

ETYMOLOGY: aurantius, orange; velatus, having a veil.

Fruit-body (Fig. 1a) medium-sized, solitary, terrestrial. Pileus up to 45 mm wide, from semiglobose when young to convex when older, without umbo, first slightly but later stronger sulcate-striate at margin, deep orange when young, later fading to orange or orange-yellow

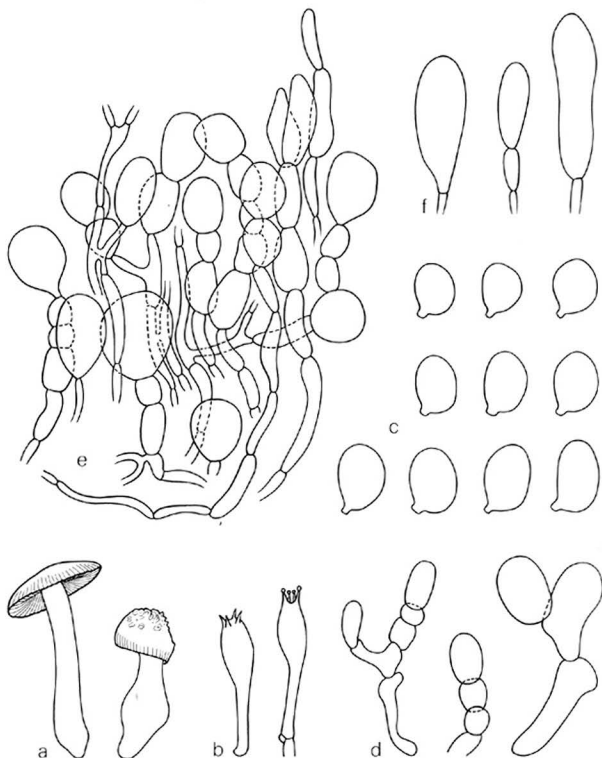


Fig. 1. *Amanita aurantiovelata* — a. Fruit-bodies $\times 1/2$. — b. Basidia $\times 500$. — c. Spores $\times 1250$. — d. Elements of marginal tissue $\times 500$. — e. Slightly dissociated elements of tissue of volval wart on pileus $\times 250$. — f. Elements of volval tissue on base of stipe $\times 250$.

(Meth. 5A6, 4A6) and pale yellow at margin, at first felted and mat, later smooth and shiny, in the beginning with up to 2 mm high, fragile, deep orange (Meth. 6A8), slenderly conical volval warts with pallescent tips, but later glabrous; pileipellis strongly peeling (up to 2/3 R); flesh underneath pileipellis pale yellow. Lamellae free, moderately crowded, white with edge fimbriate particularly near stipe; lamellulae scarce. Stipe up to 75 mm long, 10–12 mm wide at apex and up to 22 mm wide at base, from clavate when young to almost cylindrical with pointed subbulbous base with age, solid, exannulate, pale yellow (Meth. 2A4), somewhat pulverulent, with friable, deep orange, floccose volval remnants at base. Context white. Smell indistinct. Taste mild. Spore-print pure white when fresh.

Spores (Fig. 1c) 8–11.5 × 6.5–8 μm, broadly ellipsoid to ellipsoid, rarely elongate, Q = 1.2–1.5 (–1.6⁵), thin-walled, colourless, smooth, non-amyloid, with broad sometimes truncate apiculus. Basidia 35–65 × 7–14 μm, 4-spored, with clamp. Marginal tissue of lamellae consisting of chains of inflated cells, 9–45 × 10–25 μm (Fig. 1d). Trama of lamellae approximately bilateral; subhymenium inflated. Pileipellis an ixocutis of desintegrating hyphae; pigment not visible. Volval remnants on pileus (Fig. 1e) consisting of subglobose, ellipsoid and piriform, yellowish, thin-walled inflated cells, 20–65 × 18–37 μm, in long rows (4–6 cells no exception) on 5–12 μm wide branching hyphae; all elements in warts at centre of pileus in approximately erect position. Volval remnants on base of stipe (Fig. 1f), consisting of up to 175 × 80 μm large cells, terminal or in short rows on very abundant 2.5–5.5 μm wide, somewhat encrusted hyphae. Context of stipe made up of abundant, up to 200 × 35 μm large acrophysalides on 2.5–6 μm wide sparsely branching hyphae. Clamps present.

HABITAT & DISTRIBUTION.—Terrestrial under *Nothofagus obliqua* in southern Chile (from where also reported by Singer, 1969: 151).

COLLECTION EXAMINED.—Chile, Cuinco 30 km W. of Osorno, 40°38.5'S/73°26.5'W (type: L).

Because of its non-amyloid spores and the bulbous base of its stem *A. aurantiovelata* has to be placed in section *Amanita* as defined by Corner & Bas (1962: 243) and Bas (1969: 341), where it finds its place in a group of species with orange-yellow to red pigments, a friable volva and an exannulate stem, such as *A. parvicolvata* (Peck), E. J. Gilb. and *A. wellsii* (Murr.) Sacc., both from North America, and *A. mira* Corner & Bas from south-eastern Asia. *Amanita aurantiovelata* differs from these three species by the deeply orange volval remnants on pileus and base of stem, moreover from *A. parvicolvata* (see Jenkins, 1977: 95), which seems to be its closest relative, by smaller and broader ellipsoid spores (8–11.5 × 6.5–8 μm and Q 1.2–1.5 versus 11–12.5 × 6.5–8 μm and Q 1.3⁵–2). In *A. mira* the spores are considerably smaller and (sub)globose, viz. 6.5–8 × 6–7.5 μm and Q 1.0–1.1.

The only other species in section *Amanita* with a deeply bright coloured friable volva is *A. rubrovolvata* Imai from East Asia, but that species has an annulus, rounded powdery volval warts on the pileus and (sub)globose spores.

The description published by Singer (1969: 152) under the name *Amanita gayana* (Mont.) Mont. refers undoubtedly to the species described above. The true *A. gayana* (Montagne, 1853: 332, 1854: pl. 7, fig. 9), however, is a species with a white saccate volva, a white membranous annulus, yellowish lamellae and a glabrous red pileus. It clearly belongs to the cluster of closely related taxa around *A. caesarea* and *A. hemibapha*.

ACKNOWLEDGEMENTS.—The authors thank Dr. C. Bas for his comments on the manuscript of this paper and Ruth van Crevel for preparing the drawings for printing.

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BOOKS RECEIVED BY THE RIJKSHERBARIUM LIBRARY

W. JÜLICH, *Higher Taxa of Basidiomycetes*. (Cramer, Bibl. Mycol. 85). Pp. 485. Price: DM 150,-.

A new systematic arrangement of the Basidiomycetes is presented. The first fifty pages are devoted to special characters found in Basidiomycetes, and to a discussion of previous classifications. The major part of the book (c. 300 pp.) gives descriptions of the recognized orders and families as well as illustrations of important characters (53 pp, both line drawings and SEM fotos).

The division Basidiomycota is divided into two classes, the Heterobasidiomycetes and the Homobasidiomycetes. Within the Homobasidiomycetes a large number of orders and families has been recognized, while the taxonomic entities 'Gastromycetes' and 'Aphylophorales' are no longer maintained. In a phylogenetic scheme the supposed relationships of the orders are indicated. The Auriculariales and Cantharellales represent, according to the author, the most primitive orders of the Hetero- and Homobasidiomycetes respectively.

R. PHILLIPS, *Paddestoelen en schimmels van West-Europa* (Spectrum, Utrecht/Antwerpen, 1982). Pp. 288. Price: Dfl. 45,-.

This is the Netherlands' version of R. Phillips' atlas containing 900 remarkably good coloured photographs accompanied by concise descriptions of West-European macromycetes. Translation and adaption has been conscientiously done by J. Daam, A. E. Jansen, M. Noordeloos and A. Vrins.

G. J. SAMUELS, *An annotated index to the mycological writings of Franz Petrak*. Vol. 1, A-B. (DSIR Bulletin 230, Wellington, New Zealand). Pp. 240. Price: NZS 9.50

This is the first part of an index to the more than 400 scientific papers of Petrak (1886-1973). Ten volumes are planned, volume 2 is planned for the end of 1982.

L. VOGELZANG, *Guide to the prices of antiquarian and secondhand botanical books (1970-1979), Cryptogamic literature* (Boerhaave Press, P.O. Box 1051, Leiden, The Netherlands, 1982). Pp. 517. Price: Dfl. 95,-.

Valuation of books and other publications on cryptogams has considerably been simplified by the publication of this catalogue in which more than 4500 titles of books, monographs, reprints and periodicals are included. For each title, provided with full bibliographical details, the prices are given for which it was offered for sale in sales' catalogues from all over the world in the period 1970-1979.

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