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THREE HYPOGEOUS FUNGI NEW TO NORWAY.

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Rather few papers have been published on the flora of hypogeous fungi of Norway (Eckblad 1954, 1962, 1971, Kers 1983 b), and these deal only with the genera Endogone (including Glomus), Elaphomyces, and the order of Tuberales. This paper presents reports on some further species within these taxa, while the major part of the hypogeous fungi, the basidiomycetes, are left for a later paper.

The previous studies (Eckblad 1954) recorded only Endogone macrocarpa (now Glomus macrocarpus) of the phycomycetous species, and the following species of Tuberales: Hydnotrya tulasnei, Tuber rufum, T. maculatum, T. dryophilum, Genea hispidula, and Balsamia platyspora. In addition several species of Elaphomyces were recorded (Eckblad 1962, 1971, see however Kers 1980, 1983 a).

Recent studies (Gerdemann & Trappe 1974) have shown that the genus Endogone Link should be divided into two genera which are possibly only distantly related, viz. Endogone s. str. and Glomus Tul. The former includes species in which the spores are zygospores, i.e. they are the result of a sexual process. In Glomus, however, the spores are simply terminal swellings of hyphae; they are termed chlamydospores as they are fairly thick-walled, see also Hall & Fish (1979).

The only previous record from Norway of Endogonaceae, _Endogone macrocarpa_ is a distinctly asexual species and so belongs in _Glomus_, as _G. macrocarpus_ Tul. Later the following, species all new to Norway have been found:

1. _Endogone pisiformis_ Link: Fr. (Fig. 1)
Locality: East of Sognsvatn, on the margin of a _Sphagnum_-bog, 29 July 1956 FEE (O).

Only a single, very small specimen about 2 mm in diameter was found. It was not discovered in the field, but under the binocular microscope at home. The single sporocarp was grey-brown, containing several zygospores that were ovate to oblong, rarely subglobose, 70-120 x 60-90 µm, with a thick, smooth outer wall, and an inner hyaline layer, always with finely granular content (Fig. 1).

It is of special interest to note that the species has been found several times at the apex of gametophytes of _Sphagnum_ in the eastern part of Canada (Dalpé 1984). Our specimens may well have fallen from such a position on to the moss.

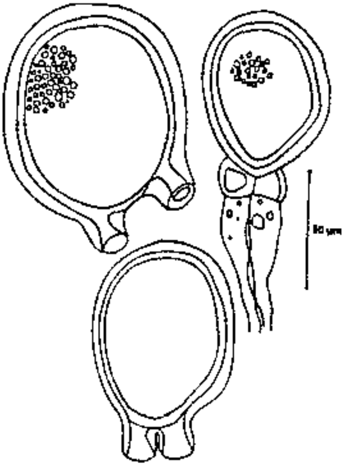

Fig. 1. _Endogone pisiformis_ Link, zygospores. Sognsvatn 1956.

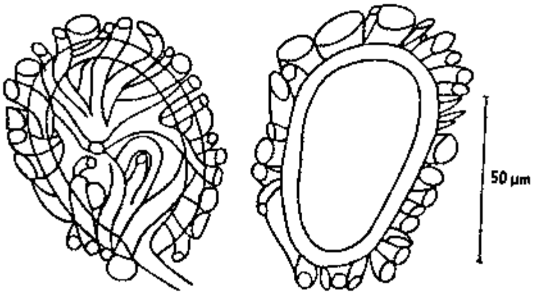

Fig. 2. _Endogone flammicorona_ Trappe & Gerdemann, zygospores with "Flammenkrone". Godthåb 1956.

2. Endogone flammicorona Trappe & Gerdemann (Fig. 2)
Localities: Akershus: Bærum: Godthåb, under Corylus 28 October 1956 leg. S. G. Sundbye (O) - Asker: Billingstad, under Tilia, among fallen leaves 15 November 1964 leg. K. Kvavik (O).

The dried specimens are brownish, about 5 mm in diameter, much firmer than those of Glomus macrocarpus. The zygospores are subglobose to ellipsoid, 70-95 x 50-70 µm, the spore wall about 7 µm thick. All spores have a thick envelope of more or less spirally or irregularly twisted hyphae of variable thickness (Fig. 2). The zygotic nature of these spores has not been clearly evident in the present material, probably because of the complete ripeness of the spores.

3. Gyrocratera ploettneriana P. Henn.
Locality: Oppland: Sør-Aurdal: Near Bukfylldammene, 10 km W of Bagn in Valdres, in an anthill 9 August 1954 leg. Kjell Haugmoen (O).

Fruitbodies 1-5 cm in diameter, externally brown, brittle, internally flesh coloured with pink brown veins and several, often large cavities. Asci cylindrical, mostly 8-spored, up to 350 µm long, about 30 µm thick. Spores broadly ellipsoid, 20-25 x 32-36 µm, including the sculpturing, hyaline at first, becoming brown. The sculpturing takes the form of thick irregular, rounded, flat or angular warts and flanges sometimes anastomosing. Paraphyses hyaline, straight, filiform, slightly swollen at the apex, strongly projecting above the asci.

Found at the base of an anthill in a spruce-birch forest at about 900 m a.s.l.

The collector noted that cows seemed to be interested in the fungus as one of them was nosing through the anthill and several other anthills had also been destroyed. The present collection consists of two specimens only. Ten specimens were, however, actually found, but most of them were already rotten. It is extremely interesting that G. ploettneriana has been found at this high altitude, almost in the subalpine region.

Nannfeldt (1936) reported the species from Sweden, but it is so far unknown from Denmark (Lange 1956).

Summary

Endogone pisiformis, *E. flammicorona* and *Gyrocratera ploettneriana* are reported from Norway for the first time.

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Interesting, rare or new macrofungi. III. Some species of Mycena, Hemimycena and Mycenella (Basidiomycètes, Tricholomataceae) rare in North of France.

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Summary : The author gives descriptions and illustrations for *Mycena abramsii* Murrill, *Mycena bulbosa* (Cejp)Kühner, *Hemimycena tortuosa* (Orton) Redhead, *Mycenella bryophila* (Vogl.)Singer, *Mycenella margaritispora* (Lange)Singer, *Mycenella salicina* (Vel.)Singer. Among them *Mycena bulbosa, Hemimycena tortuosa, Mycenella bryophila* and *Mycenella margaritispora* are new to North of France. *Mycenella salicina fo.bispora* is described as new. The geographical distribution of the species is given.

Résumé : L'auteur donne une description et une illustration de *Mycena abramsii* Murrill, *Mycena bulbosa* (Cejp)Kühner, *Hemimycena tortuosa* (Orton) Redhead, *Mycenella bryophila* (Vogl.)Singer, *Mycenella margaritispora* (Lange)Singer, *Mycenella salicina* (Vel.)Singer. *Mycena bulbosa, Hemimycena tortuosa, Mycenella bryophila* et *Mycenella margaritispora* sont nouvelles pour le Nord de la France. *Mycenella salicina fo.bispora* est décrite comme forme nouvelle. La répartition géographique des espèces est présentée.

1. *Mycena abramsii* Murrill 1916 Mycologia 8:220

= *Prunulus abramsii* Murrill 1916 N.am.Fl.9:338

Macroscopic characters (fig.1)

Cap conical, obtuse with a broad, obtuse to flattened irregular papilla; 7-15 mm.in diameter; brown to black at the disc with a paler margin, yellowish-ochraceous. Margin entire to slightly denticulate, pellucid-striate on the 1/2-radius, the striae being slightly darker. Cuticle dry, glabrous or somewhat pruinose, rugulose under the lens.

Gills ventricose, ascending, nearly free, rather distant, white-yellowish or pale creamy-greyish with a concolorous edge.

Stipe 30-90 X 1-3 mm.,brownish to blackish-brown, pruinose at apex, cylindrical, slightly thicker downwards with base bristling with mycelial thread, up to 1cm.

Flesh nearly non-existent. Smell and taste not perceived (Smell slightly alkaline or doubtfully raphanoid in Bon n°71120218).

Microscopic characters (fig.2)

Spores 8.3-13.5-(15) X 4-6-(7) µm.,more or less cylindrical to cylindrical-phaseoliform, slightly amyloid. (fig.2a)

Basidia oblong, 25-35 X 6-9 µm., 4-spored.

Pleurocystidia hyaline, numerous, spindle-shaped to sublageniform, with a rather weakly delimited appendix, but sometimes finger-like-diverticulate at apex; 49-75-(100) X 3-15-(20) µm. (fig.2b)

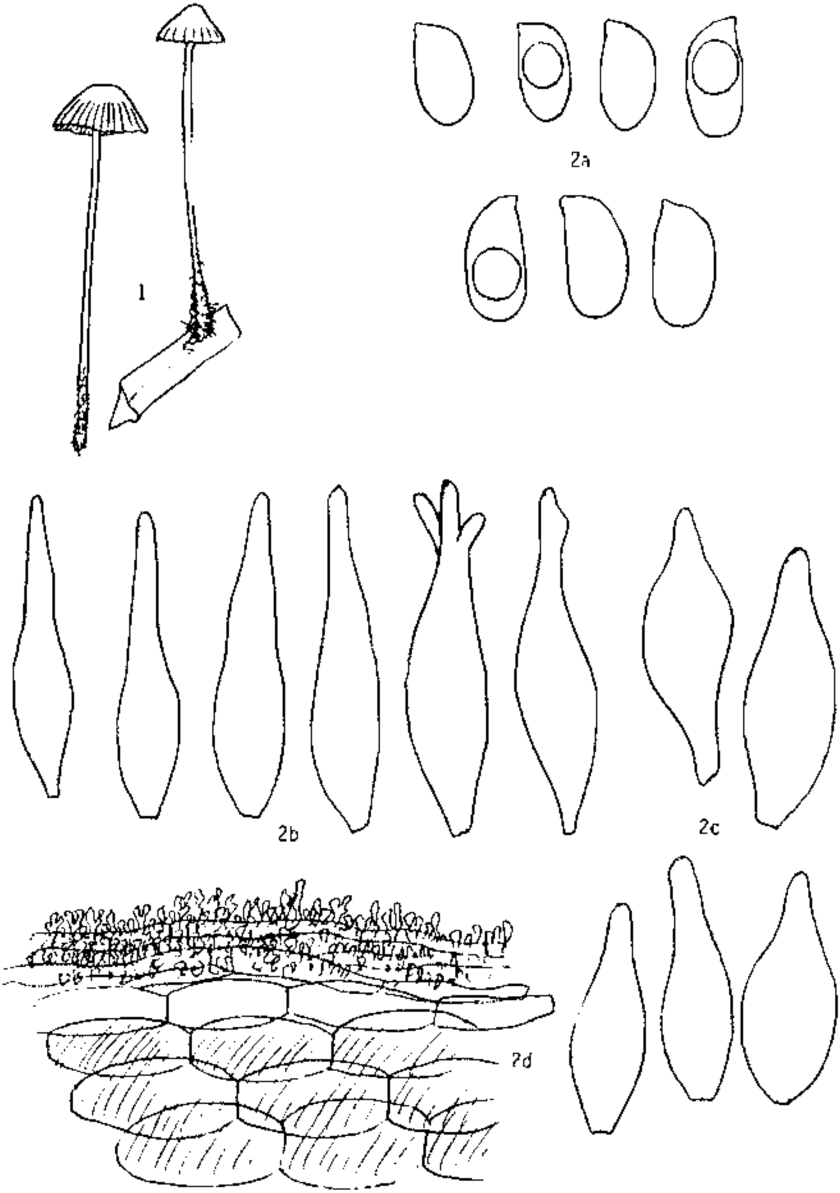


Fig.1: *Mycena abramsii* Murrill; habit - Fig.2: *Mycena abramsii* Murrill microscopic features: 2a. Spores, 2b. Pleurocystidia, 2c.Cheilocystidia 2d. Cuticular structure.

Cheilocystidia hyaline, making the gill-edge sterile, lageniform if anything, thicker and shorter than pleurocystidia; 25-42 X 3.5-15 µm. (fig.2c)

Sub-hymenium thin, confuse, made up with little, more or less flattened cells; dextrinoid.

Hymenophoral trama made up with wide hyphae, almost subcellular in the middle, weakly dextrinoid.

Lactifers present, especially in the stipe where they are numerous.

Cuticle with a filamentous epicutis, hyphae lying, with dense and short brush-like surface; subcutis with inflated vesiculose hyphae with an obvious brown intracellular pigment. (fig.2d)

Stipe with straight, parallel hyphae, mixed with lactifers.

Clamps present.

Habitat and collections

- Haute-Forêt de Desvres (P.de C.), *Sphagno-Betuletum* avec *Osmonda regalis*, on dead leaves and decaying grasses. 22.07.78; Leg.:Courtecuisse; Det.: Bon and Courtecuisse.
- La Capelle (P.de C.) Forêt de Boulogne-sur-mer, on faded *Carex pendula* in a wet ash-plantation. 2.09.84 ; Leg. and Det.: Courtecuisse. n°84.09.02.08.
- Other collections in North of France: Wimereux (P.de C.) Terrain de golf; on mossy lawn, 2.12.1971 (herb.Bon n°71120218), and Larronville (Somme) Rue, on *Calluna*-lawn; Nov.1976 (herb.Bon n°761102).

This species seems to be very rare in North of France since only 3 collections are known in Pas-de-Calais, and one in Somme, always within a rather short distance of the sea. It is an american taxon which is mentioned in Europe (but France) as far as we know, only in Scandinavia by Gulden and Lange (1971:11): Besstromfjell above Bessheim, 1060 m. in Norway, by Morander (1981:317): Skuggan, Våstmanland near Sala in Sweden, and by Knudsen (1977:40) in Denmark; and also in Czechoslovakia by Dermek (1978:223) near Brodskie, in Slovakia.

It is, to our mind, too soon to follow MaasGeesteranus who synonymises this species with *Mycena praecox* Velenovsky 1920. Collections of the latter species also exist in North of France where it is also rare. The two species seems to us to be different through ecological and anatomical characters (especially spore-size).

2. *Mycena bulbosa* (Cejp)Kühner 1938 Encycl.Mycol.10:176
= *Pseudomycena bulbosa* Cejp 1930 Publ.Fac.Sci.Univ.Charles 10:149
= *Pseudomycena juncina* Velenovsky 1947 Op.Bot.Cech.4:32

This species is mentioned here only to point out its occurence in the North of France, which had never been observed (at least as far as we know). It is probably rather common in this area, but overlooked because of its tiny size and special ecology.

Let us recall briefly that it is a tiny fungus, at most 6 mm.in diameter, whitish to greyish-cream, with a more or less hemispherical cap, very distant ventricose ascending gills, not reaching the stipe which is 15 mm.high by 1 thick, but often less, with a pronounced bulb (up to 1.5 mm.in diameter) whitish to concolorous slightly hairy. Spores non amyloid elliptical to somewhat pip-shaped, about 9.5-10 X 4.5-5 µm. Basidia 4-spored. Clamps present. Hymenophoral trama interwoven. No pleurocystidia. Cheilocystidia polymorphic, tortuose, sometimes branched or simply spindle-shaped. Gill-edge and cuticle gelatinous.

Habitat and collections

- Forêt de l'Abbé-Val Joly (Nord) Le Voyon; shore of the Val Joly lake on *Glyceria sp.*, *Juncus sp.*, hidden in the more or less decaying tufts of grasses; 22.10.84; Leg. and Det.: Courtecuisse; n°84.10.22.22.

- Beaumont-Hamel (Somme); on *Juncus sp.*; Nov.1984; Leg. and Det. J.Vast (Photo)

We collected it in Holland too: Zure Venen, near Uffelte (Drenthe), wet grassland on *Carex acutiformis*; 29.10.82; Leg. and Det.: Courtecuisse and S.Elborne; n°82.10.29.05.

This species seems to be widely distributed, but once more, overlooked because of its tiny size. Redhead (1981:583) mentions it from Canada, Aronsen (1984:47) in Norway, Elborne and Laessoe (1982:97) in Danmark, Lundell and Nannfeldt (Fung.Exs.Suec.35-36) in Sweden, Arnolds (Bibl.Mycol.90) in Holland, Winterhoff (1981:10) and Krieglsteiner (1984:43) in Germany, Pearson (TBMS26) and Dennis, Orton, Hora (1960:115) in England, Velenovsky (1947:32) and Cejp (1930:149) in Czechoslovakia, etc...

Systematic investigations in tall grasses plantations and grassy shores of lakes and pools in North of France would allow to increase the number of known spots for this taxon, as well as it would allow to go further in the distribution of other species regarded as rare, occuring in the same habitats, such as *Melanotus phillipsii* (B.and B.)Singer, *Epithele typhae* (Fr.)Pat., etc...

3. *Hemimycena tortuosa* (Orton)Redhead 1980 Fung.Canad.n°177
= *Mycena tortuosa* Orton 1960 Trans.Brit.Mycol.Soc. 43(2):307
= *Helotium tortuosum* (Orton)Redhead 1982 Canad.J.Bot. 60:2005

Macroscopic characters (fig.3)

Cap 0.5-5 mm.in diameter, globose to convex-expanded or flattened, rather regular but sometimes with an outline more orbicular than circular. Margin entire to more or less lobate with age, sometimes slightly exceeding subinvolute. Cuticle pruinose, keeping tiny droplets of water on wet and young specimens. Color pure white, then pale cream-color, sometimes getting dirty-greyish with age.

Gills well-formed, white, few in number, rather distant, but with intermediate-gills, slightly arcuate to horizontal, adnate to subemarginate.

Stipe 1-12 X 0.1-1 mm., variable, slender and straight or, more often curved, reflexed, central or excentric, hollow but generally rather regularly thickening downwards, very pruinose, keeping in fresh conditions limpid dewdroplets.

Flesh non-existent, odourless and tasteless.

Microscopic characters (fig.4)

Spores non amyloid, narrowly spindle-shaped, sometimes slightly curves or with the ventral face flat, hyaline , 8.5-10-(11) X 2.4-3.5 µm., with an oil-drop or with cloudy contents. (fig.4a)

Basidia 4-spored, small, slightly clavate, 11-17 X 4.5-6.5 µm.

Clamps not seen.

Subhymenium confuse, rather thin, seeming to be subcellular or coralloid, made up with little tortuose cells.

Hymenophoral trama subregular, with thin hyphae.

Pleurocystidia none.

Cheilocystidia numerous (gill-edge sterile) spindle-shaped, small (fig.4b), 15-20-(22) X 1.5-6.5-(8) µm. very sharp, apex regularly tapering, often more or less flexuose or pluri-strangulate.

Cuticle: upper layer of hyphae with more or less dense brush-like surface -by the specimen- with countless hairs rising above; their base sometimes inflated. They are brush-like, with a long flexuose or spiral-neck (corkscrew-like) and abruptly widened in a globose, spherical to ovoid or sometimes "irregular" head X 4-9 µm. Average size 35-65 X 1.5-4.5 µm.

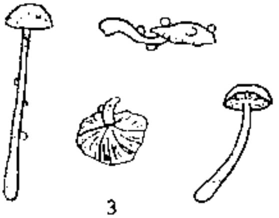
Surface of the stem similar to the cuticle, but more irregular and often with hyphae more densely brush-like

Habitat and collections

- Epagnette (Somme), near Abbeville. Willow-Alder muddy wood on twigs and branches of *Alnus glutinosa* fallen in very wet places. 6.11.83. Leg. and Det.: Courtecuisse (specimen not kept).
- Bonsecours (Nord) Belgian frontier. Bark of different deciduous trees. 29.10.83. Leg. and Det.: Courtecuisse. n°83.10.29.01
- Le Touquet (P.de C.) *Ligustro-Betuletum hydrocotyletosum* (Back-littoral forest of birch and privet, wet ss.-ass.) on bark and branches of *Salix* fallen in wet places. 10.11.84. Leg.: Courtecuisse and Vast; Det.: Courtecuisse. n°84.11.10.03.
- Forêt de Bourse (Orne) Shore of a pool with *Iris pseudoacorus*, on the lower face of a twig of *Carpinus* fallen in a wet place. 26.09.83. Leg. and Det.: Courtecuisse. n°83.09.26.01.

This species, described in 1960 was mentioned in France for the first time by Romagnesi from Manche. It is new for the North of France (Nord, Pas-de-Calais and Somme) and for Orne. It is probably more common than one could think, but once again, it easily escapes notice because of its often tiny size and its habitat, on the lower part of twigs fallen in muddy places. Redhead (1980) notes it in British Columbia in Canada.

The most closely related species is *Hemimycena cephalotricha* (Joss.) Singer, but it is easily distinguished thanks to its strongly ventricose spores.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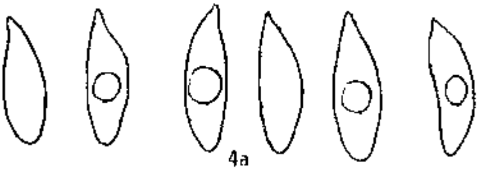
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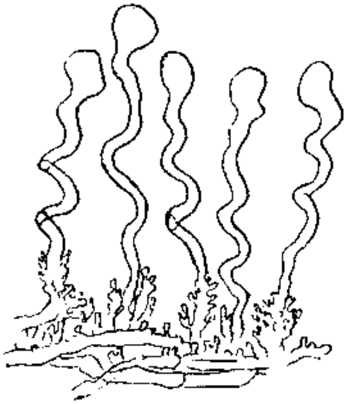



4b

4c

Fig.3: *Hemimycena tortuosa* (Orton) Redhead; habit - Fig.4: id.; microscopic features: 4a. Spores, 4b. Cheilocystidia, 4c. Cuticular structure.

4. *Mycenella bryophila* (Voglino)Singer 1938 Not.Syst.Sect.Crypt.Inst. Bot.Acad.Sci.USSR 10:9
= *Mycena bryophila* Voglino 1886 Atti.R.Ist.Veneto Sci.Let.Art.6,4: 617
= *Mycena meulenhoffiana* Oort 1928 Med.Nederl.Mycol.Ver.16-17:247
= *Mycena cooliana* Oort 1928 l.c.:248
= *Mycena lasiosperma* ss.vonHöhnel 1913
= *Mycena trachyspora* ss.A.H.Smith 1936

Macroscopic characters (fig.5)

Cap 13-20 mm. in diameter at base, to 10-15 mm. high, highly campanulate with a well-developed umbo, gilvous with the papilla brownish to blackish-brown. Margin entire, wavy to lobate, exceeding, edged with brownish ochraceous. Cuticle pruinose, mat.

Gills rather narrow, not very crowded, with intermediate gills, ventricose, ascending, nearly free or adnate, sometimes even slightly decurrent by a toothlet, with subentire edge, somewhat fimbriate, pale cream.

Stipe fistulose, radicant, 30-65 X 1-2 mm., cylindrical, gradually tapering into the ground, dark brown, sometimes almost black at base and whitish at apex, pruinose.

Flesh almost none. Smell and taste none.

Microscopic characters (fig.6) of two collections from North of France. Spores subisodiametrical to very shortly ellipsoid, X 6.5-10 µm. with a large and very prominent apiculus and obtuse, rather distinct warts. (fig.6a) Basidia 2-spored.

Pleurocystidia rather numerous, like the cheilocystidia (edge not sterile) fusi-lageniform with a rather long neck, sometimes inflated at apex or in the middle; 45-65-(95) X 3-16 µm., with thin or hardly thickened wall (to 1 µm.maximum), with neck sometimes coated with a resinous mass (fig.6b).

Subhymenium strongly tortuose, mixed, made up with thin hyphae.

Hymenophoral trama not very interwoven, subparallel here and there. Cuticle with superficial hyphae coarsely and thickly diverticulated in a brush-like surface mixed with rather thickwalled dermatocystidia, similar in the shape with the pleuro- and cheilocystidia, 50 X 8.5 µm.for example; subcutis interwoven, confuse. Hypocutis and flesh in the cap enclosing some thick-walled hyphae (2µm.) and some lactifers. (fig. 6c). Caulocystidia (fig.6d) slightly thick-walled, more or less tortuose, obtuse, entire, 50-70 X 4-15 µm. Hyphae in the stipe sometimes thick-walled (up to 2.5 µm.) and then wider and longer.

Clamps plentiful.

Habitat and collections

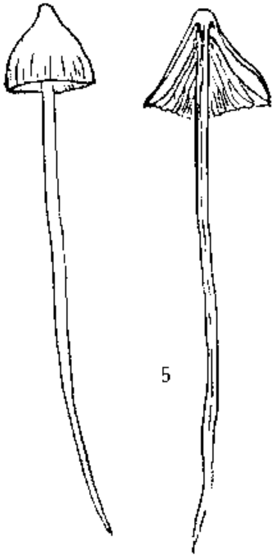
- Stella-Plage (P.de C.) Dune (?) 1.11.82. Leg.:Vanhelle; Det.: Courtecuisse (n°Vanhelle 82110132)
- Stella-Plage (P.de C.) Dune; border of an *Hippophae*-shrub (*Ligustro-Hippophaetum*) in the *Claytonio-Anthriscetum caucalidis*. 9.11. 84. Leg.: Bon; Det.: Courtecuisse. n°84.11.09.02 (Photo J.Vast).

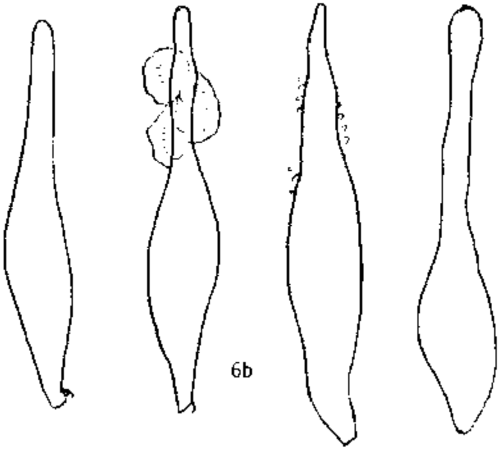
Microscopic characters (fig.7) of a vendean collection.

Spores subisodiametrical to slightly ellipsoid X 6-7-(7.5)µm. with an enormous apiculus, to 3 µm. and some scattered and low warts (fig.7a). Basidia 2-(3)-4-spores, mixed, clavate 18-25 X 6.5-8.5 µm.

Clamps present but not constant.

Pleurocystidia not very numerous, always very sharp, or even mucronate, fusiform or lageniform, ventricose with a neck often pluristrangulate, with thick to very thick wall, especially at the buldge (2-2.5 µm. in width), (50)-58-80 X 5-16-(20) µm. rarily enbedded, but sometimes granulose at apex. (fig.7b).





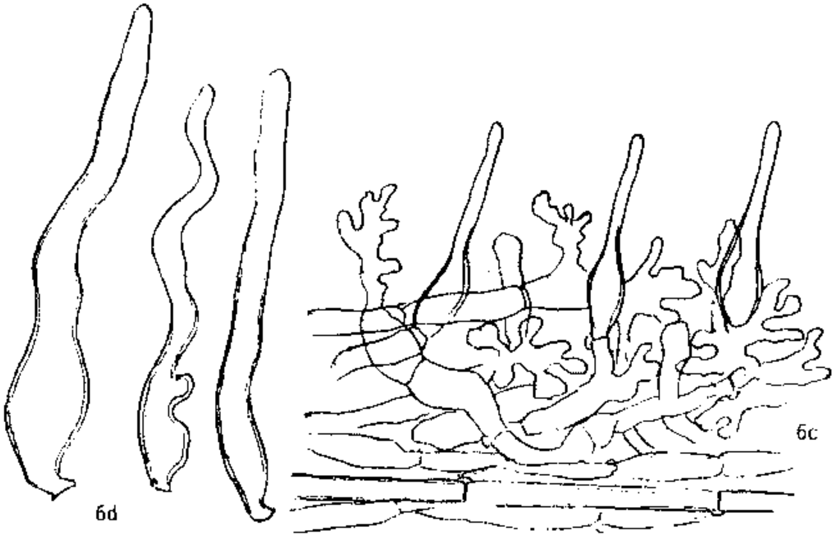


Fig.5: *Mycenella bryophila* (Vogl.)Singer; habit - Fig.6: id.; microscopic features of the collections from North of France; 6a. Spores, 6b. Cystidia, 6c. Cuticular structure.

Cheilocystidia identical or broader and shorter. Edge non sterile. Subhymenium very tortuose, made up with thin hyphae.

Hymenophoral trama more or less interwoven, some hyphae being branched. Lactifers not seen.

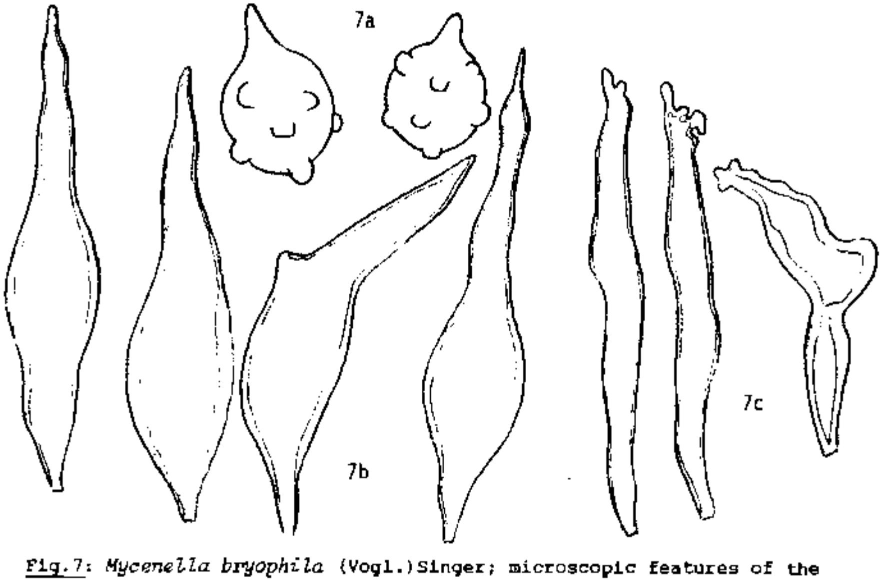
Cuticle with a dense brush-like, short and thin epicutis, in wich we were unable to find any dermatocystidia. Subcutis interwoven, hyphae reaching 8 um. in diameter. Hypocutis and flesh with thick-walled hyphae. Caulocystidia with very thick-wall, to 3 um., very stiff, scattered, often diverticulate at apex (45)-75-90 X 5-10-(25) µm. Superficial hyphae thin-walled, some diverticulate in a rather thin brush-like surface. Deep hyphae with the wall 2.5 µm. thick. (fig.7c: caulocystidia)

<u>Habitat and collection</u>

- Penbrom (Loire-Atlantique) Sandy, mossy pine-wood. 10.11.81. Leg. and Det.: Courtecuisse. n°81.11.10.18bis.

The species belonging to the genus *Mycenella* (Lange)Singer seem to be rare, or even very rare. That may account for this abundant synonymy as a foresaid, and the apparent confusion existing in this genus and in the present species.

We prefered to describe separately the microscopic characters of the collections from Cote d'Opale (Stella-Plage) and those of the Vendean specimen (Penbrom) because of perceptible differences (spore-size, number of sterigmata, repartition of clamps - those three characters being more probably bound - cuticular structure, structure of the caulocutis and cystidia). It is possible to accept Kühner's opinion (1938:613) as made MaasGeesteranus (1982b:382) from which comes the above synonymy, but it must be admitted that such a plain heterogeneity in the microscopic features of our two gatherings may urge on a new critical study of this group. We keep, in the meantime, the name *Mycenella bryophila* (Voglino)



<u>Fig.7</u>: *Mycenella bryophila* (Vogl.)Singer; microscopic features of the vendean collection: 7a. Spores, 7b. Pleurocystidia, 7c. Caulocystidia.

Singer, waiting for other specimens which could confirm the synonymy proposed by Kühner.

Mycenella bryophila is noted from France by Kühner, in "Bois de Vincennes", Ozoir-la-Ferrière, Marais de Presles for parisian area, in Isere and in Savoie (1938:617) and near Samoens (1957:67); by Romagnesi in bois de la Grance (1937:147) and by Remy near Briançon (1964:499). So it seems to be new for the North of France, and especially for Pas-de-Calais.

It is also mentioned from Switzerland by Favre (1948:92; 1960:406), from Poland by Bujakiewicz (1973:73) in the Wielkopolska province, from Germany by Einhellinger (1977:106) in Bavaria, from England by Dennis, Orton and Hora (1960:115), from Czechoslovakia by Smarda (1960:113) in Moravia, and also from the United States by A.H.Smith (1948:447) and from India by Natarajan and Raman (1980:227). It is then widely distributed.

Corner (1966:148) emphasizes the occurence of the sarcodimitic structure in the flesh of this species, structure that we could recognize in our specimens. The phylogenic and taxonomic significance of this character doesn't seem to be unanimously accepted (cf.Singer 1975:346)

5. *Mycenella margaritispora* (Lange)Singer
= *Mycena margaritispora* Lange 1914 Dansk Bot.Ark. 5:37
= *Agaricus lineatus var. atrocinereus* Saccardo 1873 Atti Soc.veneto-trent.Sci.Nat.Padova 2(2):67
= *Mycena lineata var. atrocinerea* (Sacc.)Saccardo 1915 Fl.Ital.Cr. 1(1):261

Macroscopic characters (fig.8)

Cap 2-12 mm. in diameter, at first hemispherical, then expanded, keeping a more or less acute papilla. Colour almost black when young, to grey-brown with a black umbo even when old. Margin striate to 2/3 of the radius (somewhat sulcate) somewhat everted when full-grown. Cuticle mat, more or less pruinose.

Gills distant, but intermediate gills present, strongly anastomosing near the cap, ventricose ascending, nearly free, with a concolorous, entire edge, and micaceous grey avellaneous sides.

Stipe 8-20 X 1-3 mm., cylindrical, lacking a pseudorhiza and filamentose mycelium at base, greyish-cinereous to greyish-avellaneous, densely pruinose or even almost velvety, mat.

Flesh none. Smell weak of cultivated mushroom (*Agaricus bisporus*) Taste not tested.

Microscopic characters (fig.9)

Spore subspherical, X 5.5-6.5 µm., with coarse low, rather numerous warts, and prominent apiculus. (fig.9a).

Basidia 4-spored, mixed with some 2-spored ones.

Pleurocystidia large, fusiform to lageniform with apex topped by a digitiform diverticulate shrubby appendix (not constant), 60-75 X 5-15 µm. (fig.9b).

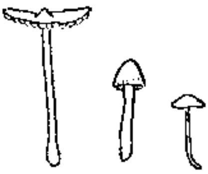
Cheilocystidia identical, scattered. Gill edge non sterile.

Subhymenium confuse.

Trama interwoven.

Lactifers not seen.

Cuticle: Epicutis with thin hyphae, diverticulate in rather thin and dense brush-like surface. Subcutis made up with broader, smooth hyphae, lying subparallel. Dermatocystidia numerous, resembling the pleurocystidia but more lageniform and less often diverticulate at apex, smaller. Vacuolar pigment in the subcutis. (fig.9c).



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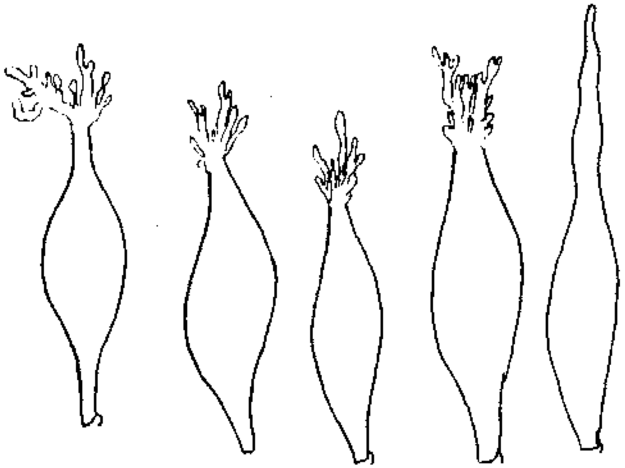
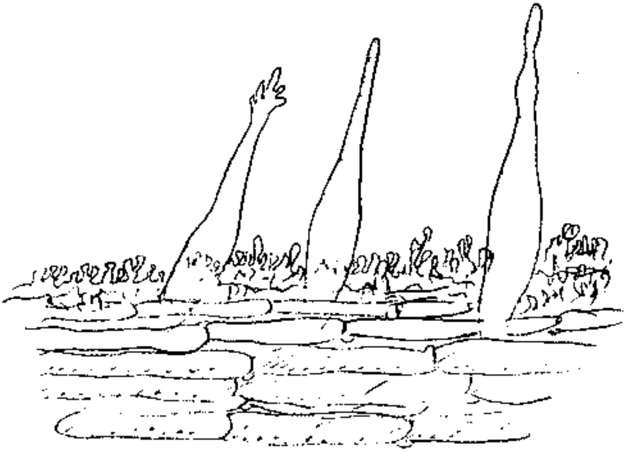
9a



9b



9c

Fig.8: *Mycenella margaritispora* (Lange)Singer; habit - Fig.9: microscopic features: 9a. Spores, 9b. Pleurocystidia, 9c. Cuticular structure.

Clamps constant or very frequent.

Habitat and collections

- Marchiennes (Nord) Mossy and decaying stump of *Salix* on the bank of a pool.

Now, the problems set by this collection are once more interesting and complex. Some authors synonymise *Mycenella margaritispora* (Lange)Singer with *Mycenella lasiosperma* (Bres.)Singer, so does Kühner (1938:612), Huijsman (1953:70), Horak (1968:392), whereas others consider them as two different entities, like A.H.Smith (1947:443), MaasGeesteranus (1982b:386), Moser (1978:157) or Kühner and Romagnesi (1953:111)

The distinguishing features between these two taxa first refer to their morphology (size of the fruit-bodies, occurence of a pseudorhiza, cespitose habit). With its small size, its non radicant stipe and gregarious habit, our collection fits well in *Mycenella margaritispora* (Lange)Singer. The descriptions of this species all note 2-spored basidia, exept the study of *Agaricus lineatus var. atrocinereus* by MaasGeesteranus (1983:391) who gives 4-spored basidia.

Moreover, the descriptions of *Mycenella lasiosperma* (Bres.)Singer are nearly unanimous about that too, the basidia being typically 2-spored. Only Locquin (1943:3) mentions some 4-spored basidia mixed together with the 2-spored ones of his *fo.minor* and Huijsman (1953:70) while describing a 4-spored form of this taxon.

So, the number of sterigmata could not be a useful distinguishing character between the two species. Anyway, our collection is worth marking for several reasons: that 4-spored form of *Mycenella margaritispora* seems much more uncommon than the 2-spored one. On the other hand, it is a new species for the North of France.

Considering the taxonomic confusion about the two binomials abovementioned, it is extremely difficult to make inquiries about their respective geographical distribution. One must be satisfied with their collective repartition. In France Kühner (1938:612)mentions it in the Bois de Vincennes, near Paris, Locquin (1943:3) near Lyon (*s.n.lasiosperma fo.minor* Locquin). In Great Britain, Reid (1957:234) mentions it from Hertfordshire (*s.n.lasiosperma*). In Holland, Huijsman (1953:70) *s.n.lasiosperma* forme tétrasporique, MaasGeesteranus (1981:436, 1982b:386) *s.n.margaritispora*; in Switzerland: Favre (1960:410) *s.n.lasiosperma*, Horak (1968:392); In Germany: Winterhoff (1977:74) at Sandhausen (*s.n. margaritispora*), Winterhoff and all. (1978) as a "potentiell gefährt" species, and Einhellinger (1977:106) in Bavaria (*s.n.margaritispora*); Italy: MaasGeesteranus (1983:391) *s.n.lineata var.atrocinerea*, and Bresadola; Czechoslovakia: Smarda (1960:112) in Moravia (*s.n.lasiosperma*) and Velenovsky (1947:21); In Poland, Bujakiewicz (1979:268) at Mt.Babia Gora (*s.n.margaritispora*); In USSR, Kalamees (1978:58) in Estonia, and Urbonas, Kalamees and Lukinas (1974:36) *s.n.margaritispora*.
Out of Europe, it is marked by A.H.Smith (1947:443) in the USA, and Canada (*s.n.margaritispora*), and by Horak (1979:156) in Argentina and Chile.

Further investigations seem necessary to state the individuality of the two species precisely, and their correct distribution.

6. *Mycenella salicina* (Velenovsky)Singer 1951 Lilloa 22:291
= *Mycena salicina* Velenovsky 1920 Ceske Houby:306

Macroscopic characters (fig.10)

Cap 5-15 mm. in diameter, conico-campanulate, obtuse, greyish-brown round the brim, warmer brown in the center and blackish-brown at the disk. Margin slightly pellucid-striate. Cuticle smooth, mate.

Gills white, ascending, nearly free, moderately distant, with a concolorous edge.

Stipe 25-30 X 1 mm., thin, equal, horn-grey at apex, white pruinose then becoming dirty, avellaneous ocraceous downwards.

Flesh nearly none. Smell and taste none.

This short description refers to n°81.11.01.05, 4-spored. Unfortunately, we made no description of the collection n°84.10.32.05, but we must point out that we recognized it, in the field at first sight; so we can think that the description of the 1982 specimen suits to the one collected in 1984.

Microscopic characters of the tetrasporic form (n°81.11.02.05)(fig.11)

Spores subisodiametrical, but with an outline not throughly regular (a tendancy to be slightly angular or showing beginnings of warts ?) X 5-6.5 µm., with a large prominent apiculus, to 2 µm. in lengh.(fig.11a)

Basidia 4-spored clavate, narrow.

Clamps present but very small, difficult to see and maybe inconstant. Subhymenium thin, confuse and tortuose.

Hymenophoral trama subregular, with the middle almost subcellular, with sausage-like hyphae, short, for example 25-30 X 10-15 um.

Pleurocystidia rather numerous, slender, lageniform, with a long cylindrical neck, more or less irregular, obtuse with slightly thickened walls near the buldge.

Cheilocystidia identical or shorter, scattered (edge non sterile), often coated with a resinose mass, yellowish and refringent (fig. 11b). Cuticle with a gelatinous epicutis, thin (up to 15 µm.), made up with thin hyphae X 3µm., tortuose, more or less erected, rarely branched. Hypocutis interwoven, with wider and shorter hyphae X 5-10 µm. With an obvious and abundant vacuolar pigment, greyish-brown.

Flesh with interwoven hyphae, some of which have slightly thickened walls. Some thin lactifers present. Dermatocystidia slender, cylindrical, thinwalled, fragile, very difficult to see (not figured)(fig. 11c). Stipe with superficial hyphae gelatinous. Caulocystidia rare, looking like the pleuro- and cheilocystidia mixed together with clusters of hyaline hyphae.

Microscopic characters of the bisporic form (n°84.10.31.05)(fig.11)

Characters identical. The only differences are:

Spores X (4.8)-5-6.5-(7) µm. Apiculus up to 3.5 µm. in lengh.

Basidia always 2-spored, narrowly clavate, 20-25 X 6.5-(7) µm. with 2 sterigmata, acute, slender, up to 6-(8) µm. in lengh.(fig.11d).

Clamps none.

No embedded cheilocystidia was seen. (fig.11e).

Habitat and collections

- Brighton (Somme) Cayeux; sandy pine wood. 1.11.81; Leg. and Det.: Courtecuisse and Bon. n°81.11.01.05 (4-spored)
- Brighton (Somme) Cayeux; in moss and young grasses on sand, under *Pinus*. 31.10.84; Leg. and Det.: Courtecuisse; n°84.10.31.05 (2-spored).

Other collections in North of France: Bon and VanHaluwyn (1982: 52): Estrées-Blanche (P.-de-C.) in a lawn on calcareous shists and shrubs (*Prunion mahaleb*); Herb.Bon: Gorenflos (Somme) calcareous lawn (phosphates). Oct.70, n°70779 (2-spored).

Mycenella salicina (Vel.)Singer is probably the species in this genus involving the fewest problems. In fact, it is the only species whith smooth

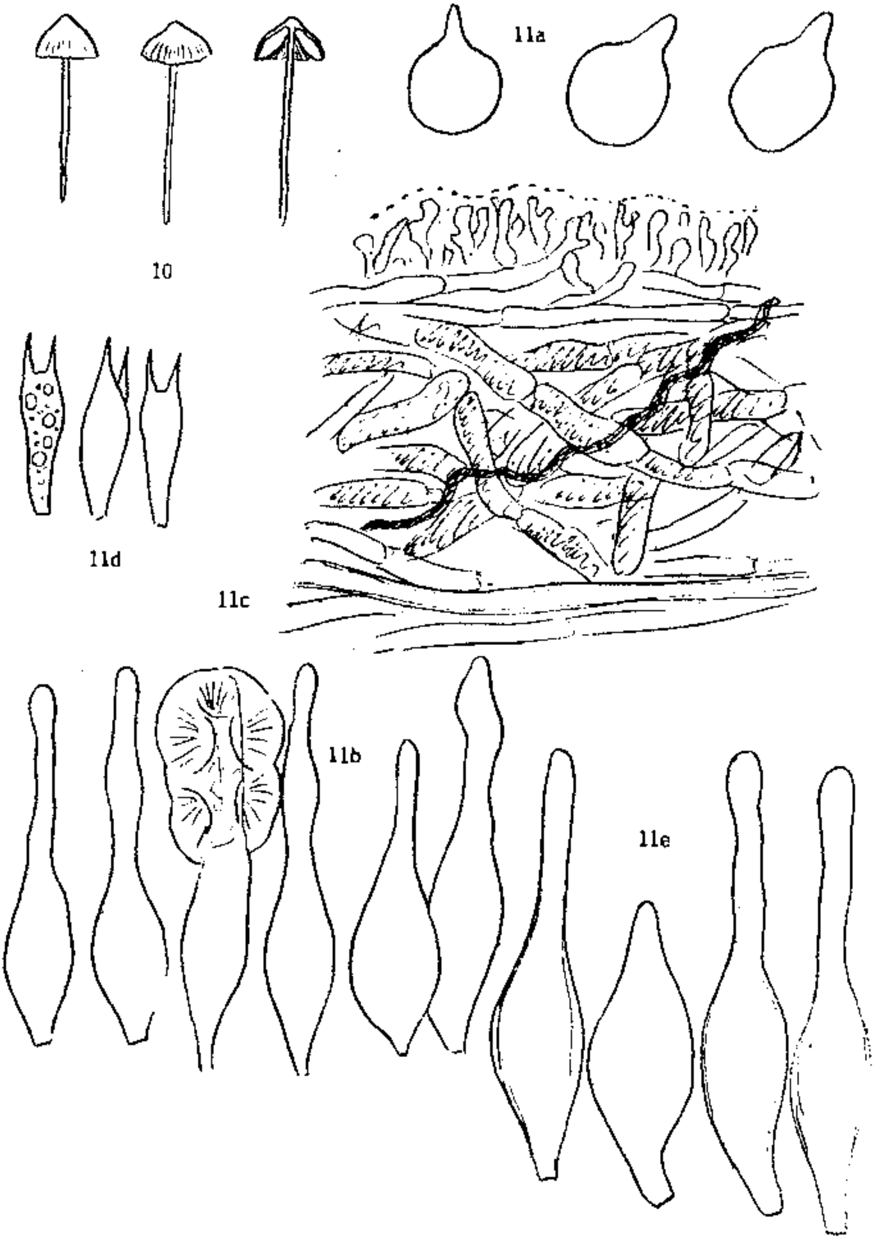


Fig.10: *Mycenella salicina* (Vel.)Singer; habit - Fig.11: microscopic features: 11a. Spores, 11b. Cheilocystidia, 11c. cuticular structure d-e: *Mycenella salicina fo.bispora* Court.: 11d. Basidia, 11e. Cheilocystidia.

spores and dark coloured pileus occuring in temperate areas. Nevertheless, as far as we know, it is the first time that it is noted in a 2-spored form. Indeed, we have found no mention of that peculiarity in the descriptions consulted for that well-characterised species. So, we present this form as new:

Mycenella salicina fo. bispora fo.nov.

A typo differt basidiis bisporis. Sporae subisodiametricae X (4.8)-5-6.5-(7) um. Apiculus usque ad 3.5 um. Fibulis nullis. Typus in herbario RC n°84103105, prope Cayeux (Somme) lectus.

Other collections: Bon 70779 (see above) and Bon 780104 (Lannion - Côtes du Nord - Grasses and pines - Jan.1978 - Leg.: François; Det.:Bon)

The forma-level seems enough since it is frequent in the genera *Mycena* and related that species can be seen under the 2- or 4-spored forms (or races) in other respects exactly similar. Moreover, the two collections described above were found in the same place at 3 years interval !

The other collections of this species are, for France: Near StBon (La Praz- Savoie) and Achères (near Paris)(Kühner; 1938:620). In Germany: Steinsee in Bavaria (Einhellinger; 1976:119 and 1977:107), In England, Dennis, Orton and Hora (1960:121); In Czechoslovakia, in the Belanske Tatry mountains (Kubicka; 1963:85), and Velenovsky (1920:306); In Morocco: Malençon and Bertault (1975:298). According to these authors, it might be mainly of temperate and septentrional distribution.

Aknowlegements

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AGARICA

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SOME FUNGI FROM ARGENTINA OCCURING ON NOTHOFAGUS PUMILIO LEAF LITTER.

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As a previous stage to the study of fungal succesion on *Nothofagus pumilio* leaf litter, a critical taxonomic study is essential. So, as the fungi appear on the leaves taken from the forest to the laboratory, a careful inspection through the dissecting microscope is made to detect the tiny inhabitants. Afterwards, the organism are examined as a routine with a taxonomic purpose. Sometimes common fungi appear, but otherwise curious ones not previously recorded for Argentina or new species are present. Fungi described here belong to this category.

MICROTHECIUM Corda, Icon. Myc., *5*:30.1842.

Microthecium ryvardenianum n. sp.

Perithecium in principio immersum deinde superficiale et erumpens in maturitatem, luteum vel luteum ochraceum, globosum vel subglobosum, sine ostiolo, 260-280 um diametri. Peridium hyalinum, semitranslucidum, membranaceum, constitutum magnis cellulis polyedricis hyalinis, 3-4 strati crassitudinis in maturitate. Asci ordinati hymeniiformi,in centro aparaphysato; late clavati in abovatum, sessiles aut cum pedicello, parietum tenuum 65-80 x 26-30 um, evanescentes cuncte in maturitatem, cum ascoporis liberatis in cavitate lisigena. Ascoporae fusiformes in asco, ellipsoideae, deinde hialinae, forte amyloideae prior maturatis, multiguttulatis, leve striatis; in aetate maturitatis, atrobrunneae leve striatis et cum 2 poris germinalibus conspicuis, 40-52 x 20-26 um.
Habitat: foliae *Nothofagus pumili*.

Perithecia initially immersed, becoming superficial and erumpent at maturity, taking-off the cuticle; yellow to pale brown, globose to subglobose, not ostiolate, 260-280 um diam. Peridium hyaline, semitransparent, membranaceous built up by large, hyaline, poliedrical cells, three or four layer thick at maturity. Fig. 1, D-E.
Asci arranged in a hymenium without paraphysis, broadly clavate to obovate, sessile or with a short foot, thin-walled, deliquescent, 65-80 x 26-30 um, leaving the spores free in a lisigenous cavity. Fig. 1, A-B.
Ascospores fusoid inside the asci, hyaline, ellipsoi-

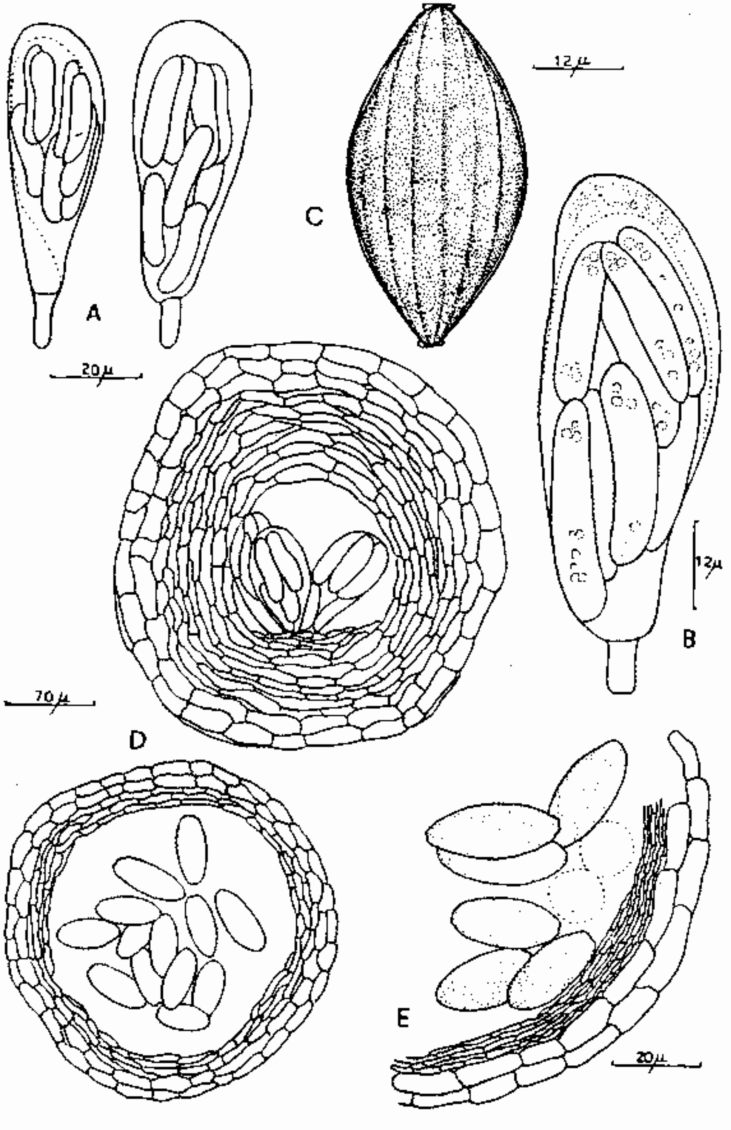

FIG. 1 MICROTHECIUM RYVARDENIANUM

dal, strongly amyloid before maturity, finally striated and guttulated; when fully mature(outside the ascus) dark brown with fine striations and two germinative pores,40-52 x 12-26 um. Fig. 1, C
Substrate: on fallen leaves of *Nothofagus pumilio*.
Material examined: Argentina, Neuquén, Parque Nacional Lanín, Co. Chapelco(1300 m. a.s.l.), leg. M.Gentili, 11-X-1984, LPS 43831, HOLOTYPUS.
Observation: The asci are typically arranged in a hymenium lining a small cavity surrounded by a pseudotissue formed by thin walled cells which desintegrate during the spore maturation process. The ascospores are permanently hyaline and strongly amyloid inside the cavity, turning dark after liberation. For these features, the size of the ascospores and the type of substrate, the material does not fit any species described in the Genus. The material can not be placed in the Genus *Petrellidium* Malloch (1970) because the asci never form here a hymenium and are typically globose although in both cases spores are amyloid.
Geographical distribution: ARGENTINA, Neuquén.

GNOMONIELLA Sacc., Michelia 2: 312.1881

Gnomoniella nothofagi n. sp.

Perithecia globosa, atrobrunnea, immersa, in cuncto mesophyllo foliarum in sicco, 180-250 um diametri cum longo collo erumpente 350-500 um longi; ostiolo parvo,circumnexo cellulis hyalinis; paries perithecii tenua, constituta 2-3 stratis cellularum isodiametricarum cum parietibus irregulare crassis atrobrunnearum; collo constituto stratis cellularum cylindricarum cum parietibus tenuis. Asci unitunicati, octospori, fusiformes, annullo conspicuo, 37-48 x 8-11 um. Ascoporae hyalinae, non septatae, leves, falcatae, 13-16 x 3-4 um.
Habitat: foliae *Nothofagi pumili*.

Perithecia globose, dark brown, immersed, occupying the entire mesophile, 180-250 u diam.; neck very long, erumpent 350-500 u; ostiole small, surrounded by hyaline cells; perithecium wall thin, built up by 2-3 layers of isodiammetric cells; cells dark brown, with irregularly thickened walls; neck formed by several layers of thin walled, cylindric cells. Fig. 2, A.
Asci 8- spored, unitunicate, fusoid, with a conspicuous quitinoid ring, 37-48 x 8-11 um. Fig. 2, B-C.
Ascospores hyaline, aseptate, smooth, falcate, 13-16 x 3-4 um. Fig. 2, D-E.
Substrate: on fallen leaves of *Nothofagus pumilio*, particu-

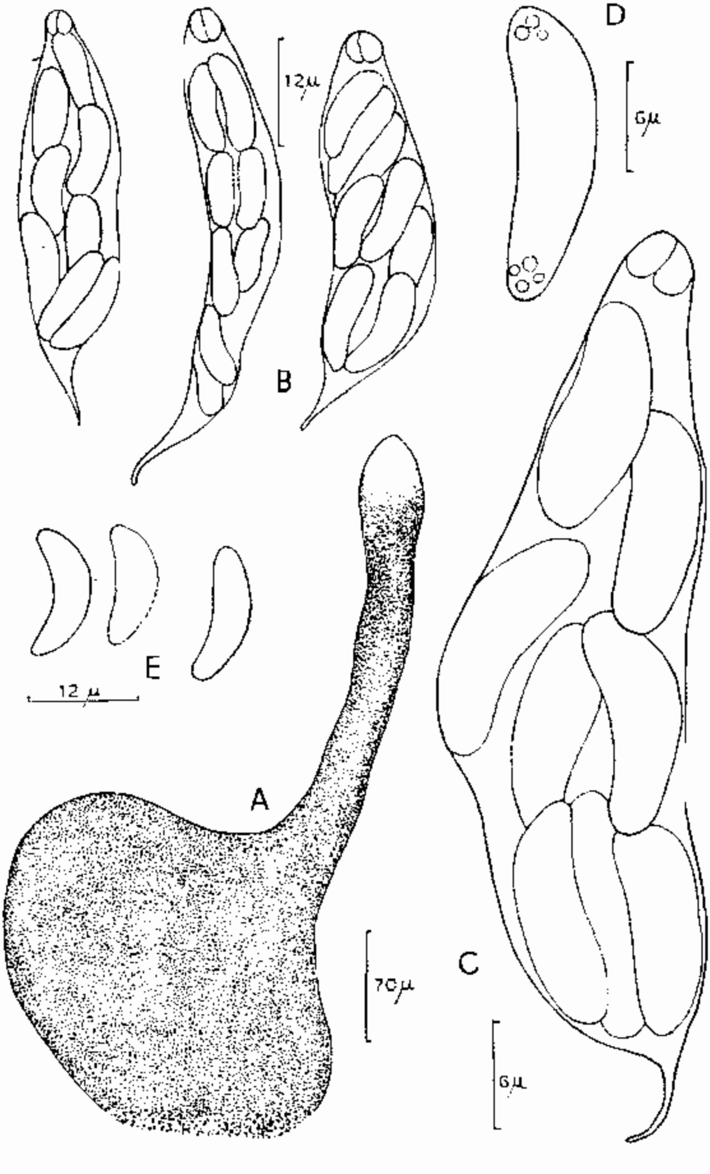

FIG.2 GNOMONIELLA NOTHOFAGI

larly in spring and summer.
Material examined: Argentina, Neuquén, Parque Nacional Lanín, Co. Chapelco, leg. M. Gentili, 11-X-1984, LPS 43830, HOLOTYPUS.
Observations: the closest species to *G. nothofagi* are *G. nana* Rehm and *G. tabaeformis* (Fries)Sacc. From *G. nana* differs in having a shorter neck and larger asci. From *G. tabaeformis* in the arrangement of perithecia on the substrate, in a "calotte" in this species and scattered in *G. nothofagi*.
Geographical distribution: ARGENTINA, Neuquén.

PLEOSPORA Rabh. sensu Crivelli, Diss. ETH N°7318.1983

Pleospora leontopodii (Cruchet)Muller, Sydowia *5*:285.1951
=*Pleospora helvetica* Niessl. var. *leontopodii* Cruchet.Bull. Soc.Sc.Nat. Vaud, *40*:25-31.1904.

Ascostroma dark, superficial, isolated, 180-150 um diam, neck short, covered by brown, stiff, pluriseptate, non branched setae, 100-150 x 3-5 um. Pseudothecium wall build up by isodiammetric cells, elongated at the ostiole, thick-walled, dark brown to black. Fig. 3, A-B.
Asci bitunicate, cylindric-clavate, 95-115 x 20-26 um.Fig. 3, C.
Ascospores yellow brown, ovoid to ellipsoidal, asymmetrical, uniseriate, 7-septate, with a median-primary septum which divides the spores in two unequal parts, each one with 1-2 longitudinal septa, 25-30 x 12-14 um. Fig. 3, D.
Substrate: on leaves of *Leontopodium alpinum*, *Aster alpinus*, *Erigeron uniflorum*, *Leontodon incanus*, *Sempervivum montanum*, *Silene nutans*, *Arnica alpina*, *Campanula uniflora*, *Erigeron eriocephalus*; fallen leaves of *Nothofagus pumilio*.
Material examined: Argentina, Neuquén, Parque Nacional Lanín, Co. Chapelco, leg. M. Gentili, 8-VIII-1984, LPS 40832.
Observations: argentine collection agrees with Crivelli's (op.cit.:85, Fig. 15, K.) and Müller's (op.cit.,loc.cit.) descriptions of *P. leontopodii* (Cruchet)Müller, which has been found on herbaceous plants, mostly *Compositae*. It is on this regard that our collection differs from the european ones, since it grows on dead leaves of a deciduous tree: *Nothofagus pumilio* (*Fagaceae*). However, we consider that this unique difference is not enough to segregate the argentine material in a new species. Moreover, *P. leontopodii* has been found in mountainous, cold places; in the same situation our sample was collected.

Wehmeyer(1961:196) states that *P. leontopodii* (Cruchet) Müller is a synonyme of *P. helvetica* Niessl.var. *helveti-*

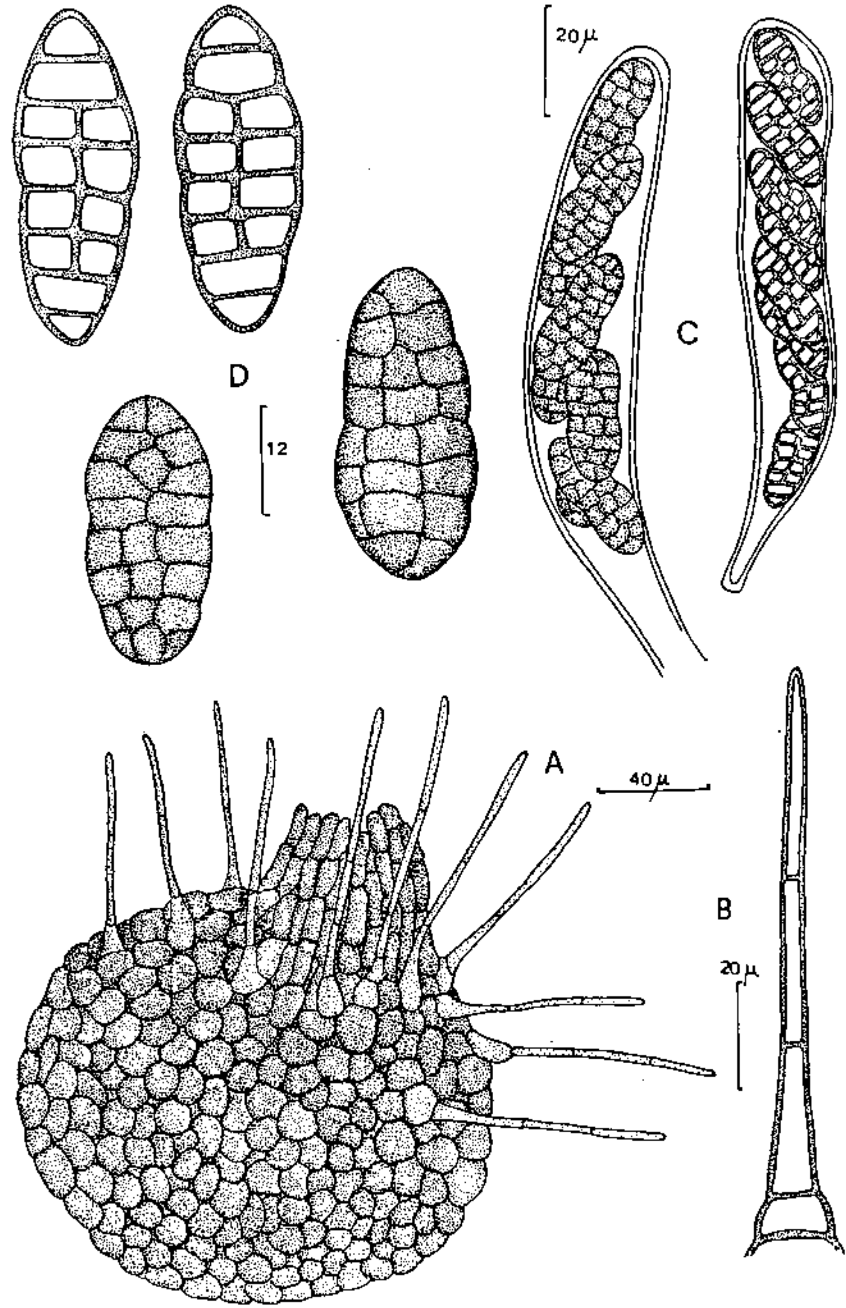

FIG.3 PLEOSPORA LEONTOPODII

ca, including in the same list of synonymes an argentine species: *P. ushuwaiensis* Speg. (1924:475). We have examined Spegazzini's type collection (LPS 2195) and found that perithecia are tomentose not setose, immerse in the substrate; ascospores have a larger number of cells than those of *P. leontopodii*. In all respect *P. ushuwaiensis* Speg. agrees with *P. helvetica* var. *helvetica* Niessl but is neatly different of *P. leontopodii* (Cruchet)Muller.

It is the first record of the species for Argentina.

Geographical distribution: Argentina, Artico, Francia, Suiza.

CERATELLOPSIS Konr. et Maubl., Ic.Sel.Fung, 6:1502.1937.

Ceratellopsis acuminata (Fuck.) Corner, A Mon. Clavaria and all.Gen.: 202.1950.
=*Pistillaria acuminata* Fuck., Symb.Myc.:31, t. 4 fig.39. 1869.
=*Ceratella acuminata*(Fuck.) Pat., Hym.Eur.:157.1887.

Fruitbody filiform, ivory colour, 0.4-0.5 mm long. x 0.1-0.2 mm diam., built up by monomictic hyphae, 2-3 um diam., parallele, not agglutinated, thinwalled and with clamp connections. Apical portion pointed,hyaline, conspicuous, sterile. Stipe very short, glabrous, 0.1-0.3 mm long. Fig. 4, A-B-C.

Hymenium, continuous not thickening, without subhymenium or cystidia.

Basidia usually 4-spored, 6.3-8.3 x 2.5-4.2 um. Fig. 4, E.

Basidiospores white, obovate, smooth, 4.3-4.5 x 2-2.5 um. Fig. 4, F.

Substrate: on rotten wood of *Salix viminalis*; on bark of *Catalpa*; on needles of *Pinus sylvestris*; on fallen leaves of *Nothofagus pumilio*.

Material examined: Argentina, Neuquén, Parque Nacional Lanín, Co. Chapelco, leg. M. Gentili, 15-IV-1982, LPS 43833.

Observations: our collection agrees well with Corner's description (op.cit.). Perhaps the fruit body is more elongated in the argentine collection but other features also agree with Corner's conception of the species. This is the first record for Argentina.

Geographical distribution: Argentina, France, Germany.

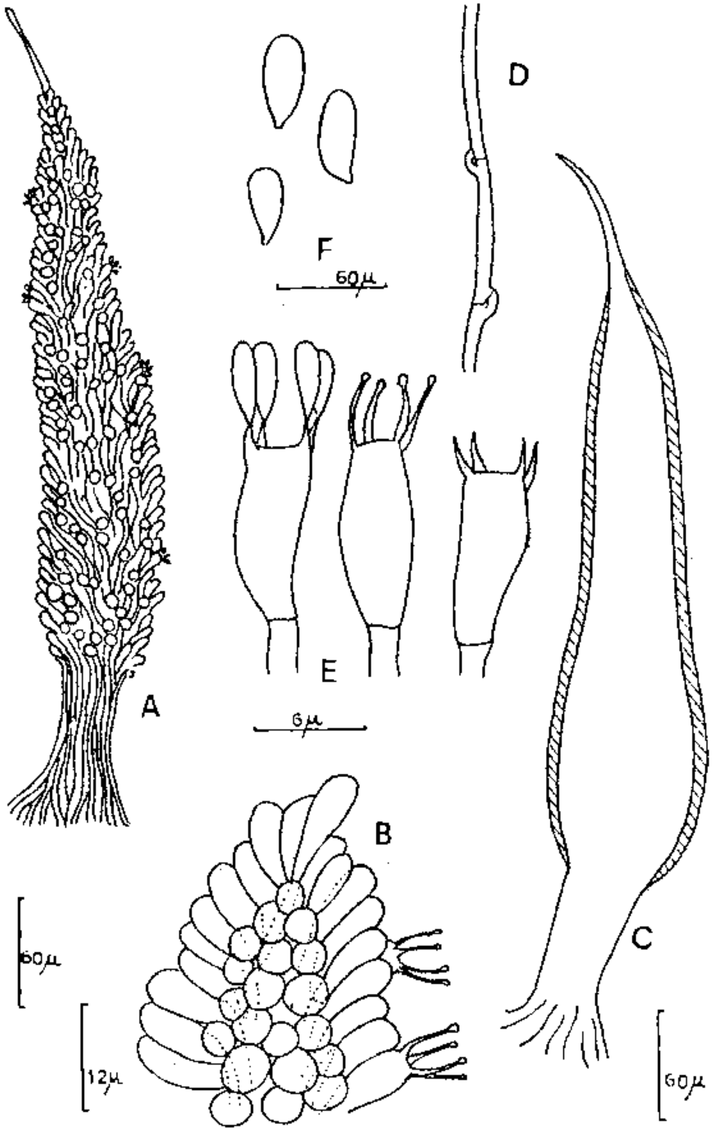

FIG.4 CERATELLOPSIS ACUMINATA

ACKNOWLEDGEMENTS

We thank to Lic. Nélida C. Arriaga who provided the latin translations of the species descriptions and to Mr. Jorge Chayle for typing the manuscript.

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AGARICA

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A PORTRAIT OF MYCENA MACULATA.

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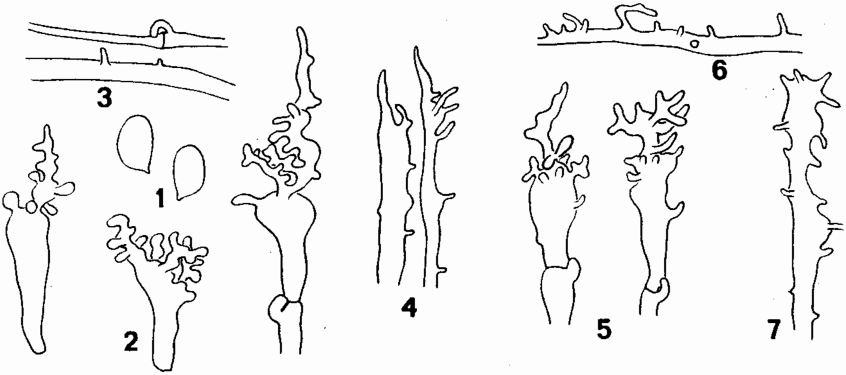
Mycena maculata P. Karst. is widely distributed in Europe and known to occur in North Africa (Malençon & Bertault, 1975: 274) and the United States (Smith, 1947: 341). It does not seem to be an easy species to identify and maybe its specific epithet is to blame. The epithet '*maculata*' may induce people to think that to find this species all one has to do is to look for blotched specimens but red-brown stains have comparatively little specific value in the genus *Mycena*. The result is that identifications based solely on the presence of reddish spots are liable to be erroneous. Recognition becomes even more uncertain if the specimens are not old enough to have developed any spots. The question therefore is how to make sure an unspotted specimen actually belongs to *Mycena maculata*?
Karsten (1890: 89) said that his species was related to *M. galericulata* (Scop.: Fr.) S.F. Gray, and this may have prompted Kühner (1938: 334) to introduce the following chemical test which entails: "Plonger le champignon pendant quelques jours au moins dans la solution aqueuse saturée d'*acide picrique* ..."

This would result in turning the lamellae of *M. maculata* a bright orange or orange-red, whereas those of *M. galericulata* would remain unstained (p. 326: "ne devenant pas orangées par l'acide picrique"). Although skilfully contrived, the method appears somewhat cumbrous, and any other way to facilitate the identification would be welcome. My personal impression is that Kühner did not seem to be particularly troubled by the difficulty of identifying *M. maculata* since in his key (p. 320) he simply took for granted that there would always be lamellae of the right age to show red-brown spots.

In much the same way *M. maculata* in Smith's work (1947: 231) keys out by duly following the couplet: "57. Gills soon stained with sordid-reddish stains ...," and dismissing the difficulty of judgment of the word "soon". To show that identification along these lines is by no means that easy, I may point out that whereas collection A.H. Smith 3366 (MICH) represents true *M. maculata*, A.H. Smith 17540 (MICH) does not. (I am not at all sure that Smith's description of *M. maculata* is free from alien elements.)

With the staining of various parts of the basidiome left out as a key character, the following enumeration of features is offered for the recognition of *M. maculata*.

(1) Basidiomata fasciculate and (2) growing on decaying wood. (3) Colour of the pileus dark to very dark. (4) Flesh firm to tough. (5) Odour absent or faintly spermatic (unknown in any other species of section *Mycena*). (6) Lamellae pliant-tough, like bacon rind. (7) Stipe cartilaginous. (8) Basidia 4-spored and clamped. (9) Spores amyloid. (10) Cheilocystidia not forming a continuous, sterile band (an exception in section *Mycena*) but instead occurring in intermittent groups; (11) covered with



Figs. 1-4. *Mycena maculata* (Weholt M61/82; L). — 1. Spores. — 2. Cheilocystidia. — 3. Hyphae of the pileipellis. — 4. Terminal cells of hyphae of the cortical layer of the stipe.

Figs. 5-7. *Mycena maculata* (Østmoe, 9 Nov. 1975; O). — 5. Cheilocystidia. — 6. Hypha of the pileipellis. — 7. Terminal cell.

few, coarse excrescences, a conspicuous feature of which is that (12) usually one or two are much inflated or elongated, tortuous to even somewhat torulose, and branched. (13) Narrower hyphae of the pileipellis smooth (but not infrequently uneven to rugulose) or very sparsely diverticulate, while the excrescences sprouting from the wider hyphae are only slightly more numerous. (14) Hyphae of the cortical layer of the stipe smooth to sparsely diverticulate, (15) their terminal cells (to be found near the apex of the stipe) more or less inflated, variously shaped and diverticulate.

Mycena galericulata which may be equally dark differs from M. maculata in that even the smaller spores (of the 4-spored forms) are bigger than those of M. maculata, the cheilocystidia have differently shaped excrescences, the hyphae of the pileipellis are more densely diverticulate, and the terminal cells of the hyphae of the cortical layer of the stipe are either absent or very difficult to find.

Mycena hemisphaerica Peck, also a very dark species and sharing with M. maculata the smooth narrower hyphae of the pileipellis, differs in the perfectly sterile lamellar edge, the differently shaped excrescences of the cheilocystidia, and the lack of terminal cells in the cortical layer of the stipe.

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AGARICA

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THE ARCTO-ALPINE SPECIES OF THE HYALOSCYPHACEAE.

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The interest towards arcto-alpine mycology has considerably increased among discomycetologists in last years. There has been a set of FISAM papers on Discomycetes and several other scattered ones, among them the mapping of arcto-alpine distribution of *Helvella aestivalis* (Dissing, 1983). The last-mentioned study stimulated the author to collect all available data on the arcto-alpine species of the Hyaloscyphaceae and to publish his personal experinece on them.

There are approximately 250 known species of the Hyaloscyphaceae in boreal Eurasia, but only 5 of them have distinct arcto-alpine (including subarcto-subalpine) distribution. There is, of course, a significant number of alpine and sub-alpine members of the family but they are a special topic and discussing them here would take too much space.

The most outstanding feature of the arcto-alpine Hyaloscyphaceae and probably all arcto-alpine Discomycetes is their wide distribution in the high mountains of Middle Asia and South-West Siberia: in the Tien-Shan, the Pamiro-Alai and the Altai Mountains. So the alpine part of their distribution extends far outside of the Alps as it could be seen from the map of the summed up distribution of the arcto-alpine Hyaloscyphaceae (Fig. 1). This fact is generally unknown among the mycologists but the author has seen in his field works during last twenty years that the alpine and subalpine flora of Discomycetes is extremely rich and abundant in the high mountains of Middle Asia and South

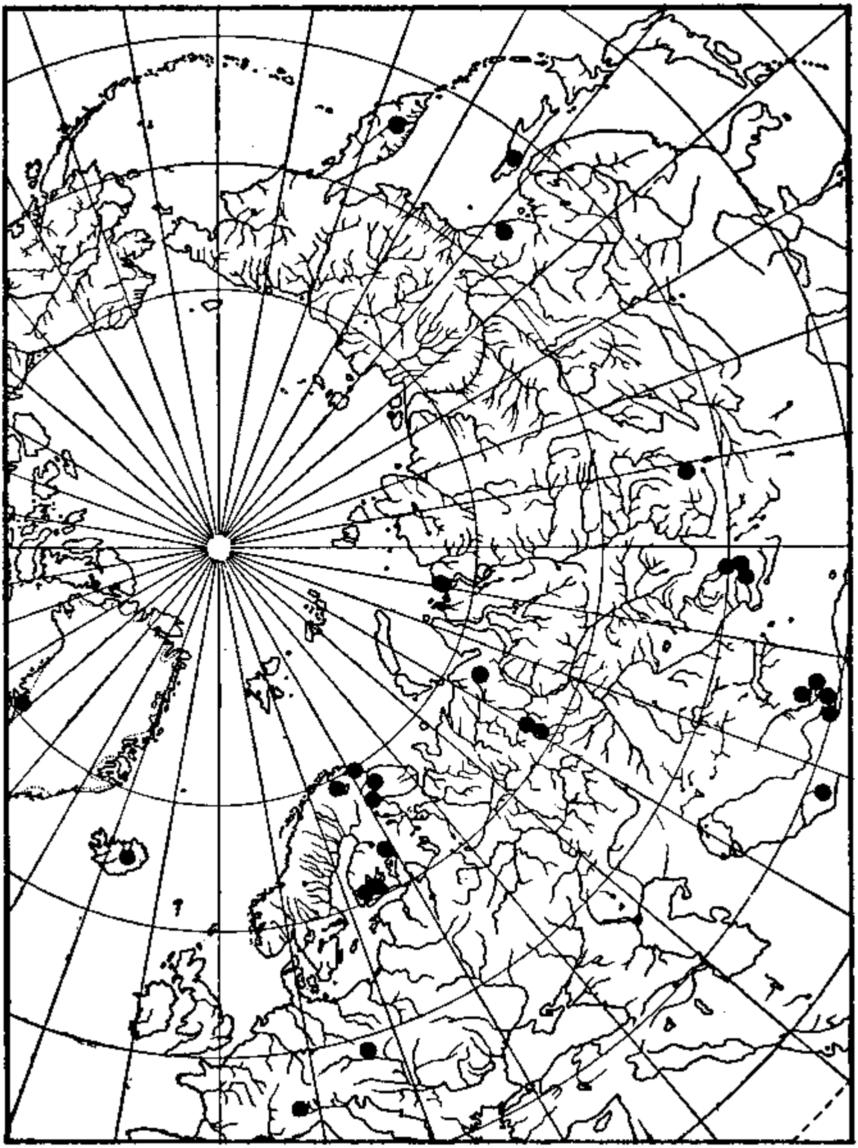

Fig. 1. The summed up geographical distribution of the arcto-alpine species of the Hyaloscyphaceae.

Siberia. It is equally remarkable that there are no arcto-alpine species of the Hyaloscyphaceae known from the Caucasus and that the typical alpine species of the family are rather innumerous and rare there.

The list of arcto-alpine species of the Hyaloscyphaceae follows.

1) *Belonidium elegantulum* (Karst.) Raitv. It is the most common and widely distributed arcto-alpine species of the Hyaloscyphaceae (Fig. 2). It seems to be fairly common in Finland and also in the Ural Mountains. Eastwards its distribution extends to Kamtschatka. In the Middle Asia mountains it is not rare on dead stems of large herbaceous stems in the altitudes 1500-2500 m in the Tien-Shan Mountains. In the Pamiro-Alai Mountains it is a rare species.
The locality in Iceland is reported by Holm and Holm (1984) and I have not seen their collection. *B. elegantulum* could easily be confused with *B. leucostomum*. The differences between them are discussed under following species.

2) *Belonidium leucostomum* (Rehm) Raitv. It is a much rarer species than *B. elegantulum* (Fig. 3). Huhtinen (1984) has reported it from Canada and Finland. He stressed the importance of white marginal fringe as a key character of this species. It is true that the type specimen of *B. leucostomum* has white marginal fringe and it is lacking in the type specimen of *B. elegantulum*, but seeing numerous collections of both species I can assure that in both species the specimens with white fringe are present as well as specimens without it. The only reliable key character is the ascus length. *B. elegantulum* has asci shorter than 70 µm and *B. leucostomum* has asci longer than 70 µm (expressed in mean values per apothecium). Of two collections mentioned by Huhtinen the Canadian one is *B. leucostomum*, but the Finnish one is *B. elegantulum*.

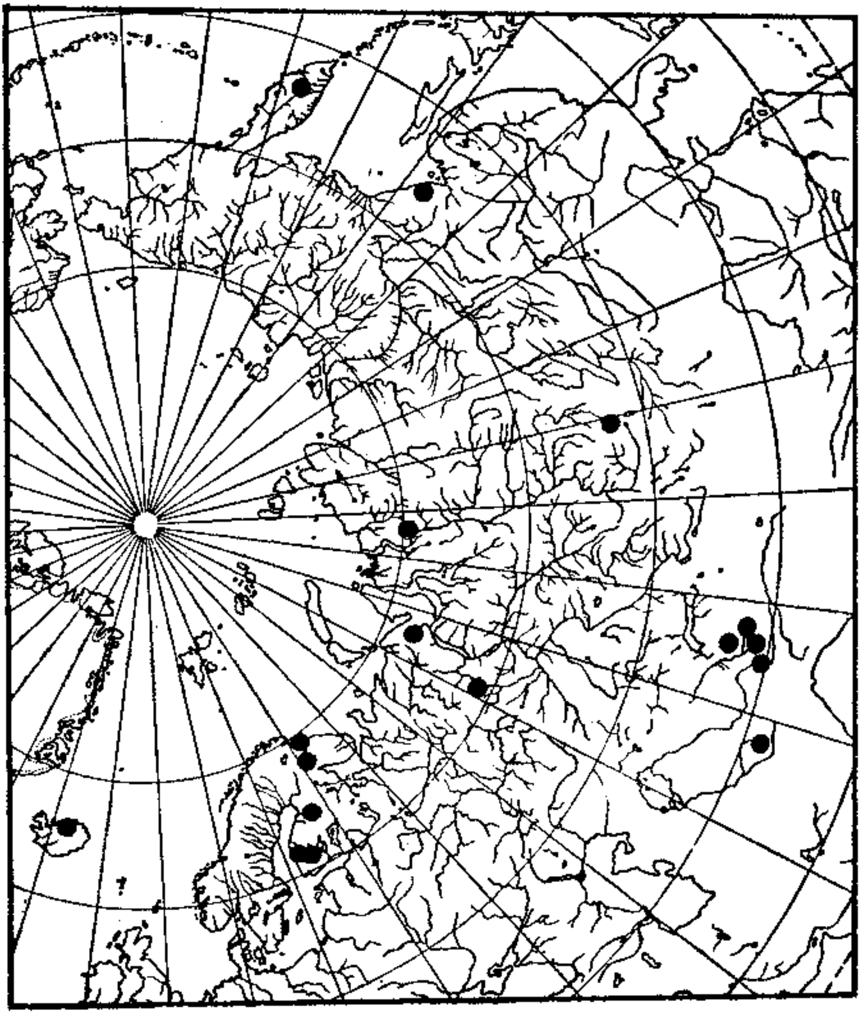

Fig. 2. Geographical distribution of *Belonidium elegantulum*.

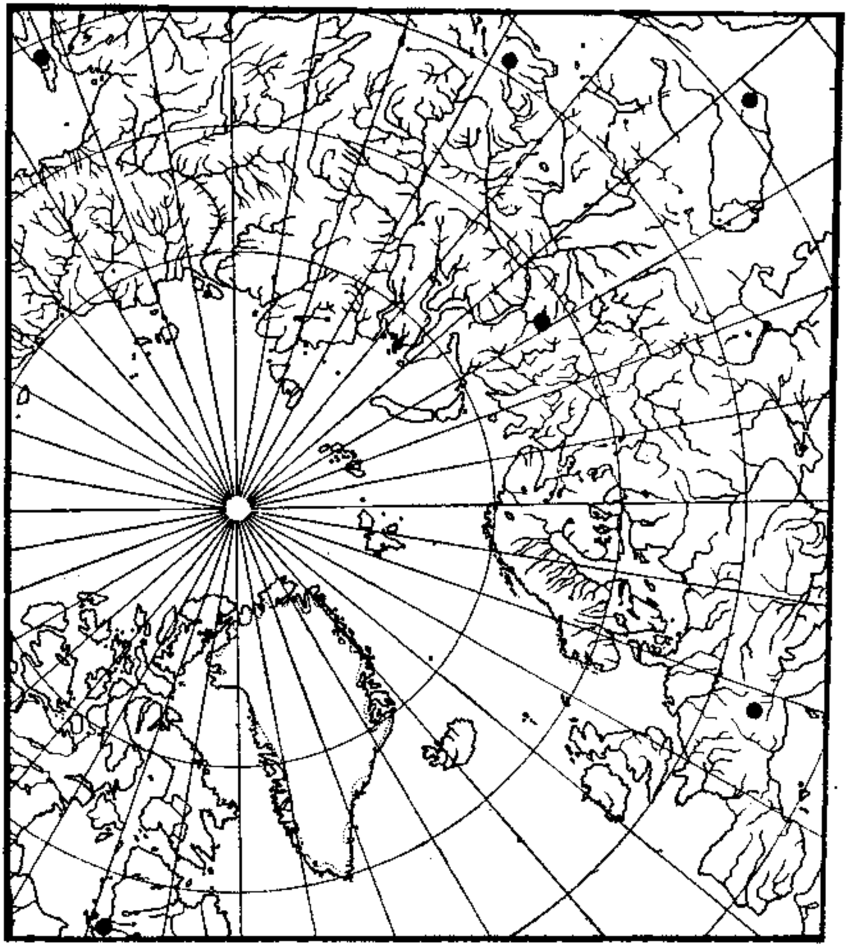

Fig. 3. Geographical distribution of *Belonidium leucostomum*.

3) *Cistella pediformis* Raitv. This recently described species (Raitviir, 1981) is not rare in the Pamiro-Alai Mountains, growing on various dead herbaceous stems. Curiously enough it was also collected by Dr. K.Kalamees in Bolshoi Ainov ostrov (S.-Heinassaari) - an island near the coast of the Kola peninsula (Fig. 4).

4) *Lachnum virtembergense* (Matheis) Raitv. Matheis (1977) lists several localities of this species. In Kamtschatka it was collected on fallen leaves of *Vaccinium uliginosum*, July 30, 1978, B.Kullman (TAA-115216), and a beautiful Finnish material was sent by Mr. Unto Söderholm: Finland, Ta, Lempäälä, Kortejärvi, Aug. 5, 1982, on fallen leaves of *Vaccinium uliginosum*, U.Söderholm nr.847 (Fig. 4).

5) *Lasiobelonium belanense* (Svrček) Raitv. This species is discussed in detail by the author (Raitviir, 1980). It should be added that it is common in the Pamiro-Alai Mountains on fallen sticks of deciduous trees in the altitudes 1800-3200 m (Fig. 5).

6) *Unguiculella rehmii* Müller. This species is very common in the Tien-Shan Mountains and not rare in the Pamiro-Alai and the Altai Mountains, growing on dead herbaceous stems in the altitudes 1500-3000 m (Fig. 6). It was collected in North Finland by Dr. K.Kalamees and in Canada by Dr. S.Huhtinen (personal communication).

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The author is greatly indebted to Dr. S.Huhtinen (Turku) for specimens and valuable information and Mr. U.Söderholm (Tampere) for specimens. He is thankful to his wife Mrs Malle Raitviir for drawing the distribution maps and to Mrs Urve Martinson for help in preparing the manuscript.

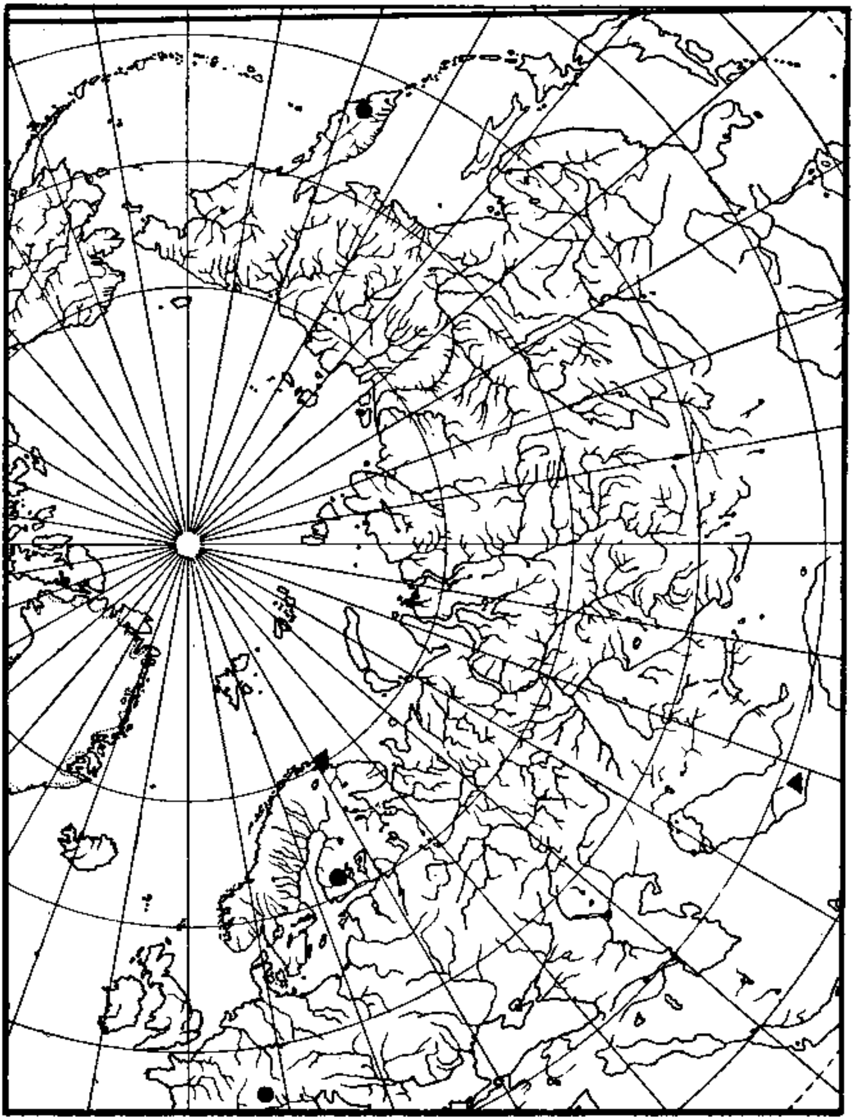

Fig. 4. Geographical distribution of *Cistella pediformis* (▲) and *Lachnum virtembergense* (●).

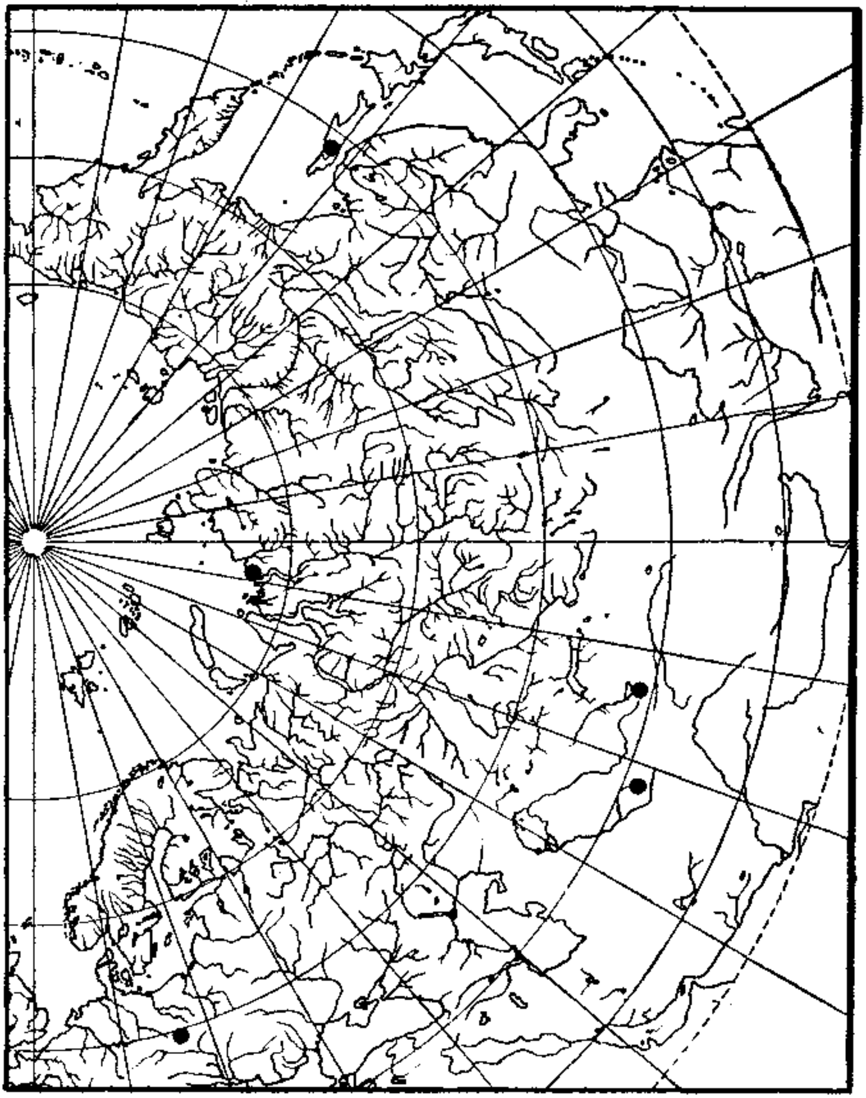

Fig. 5. Geographical distribution of *Lasiobelonium belanense*.

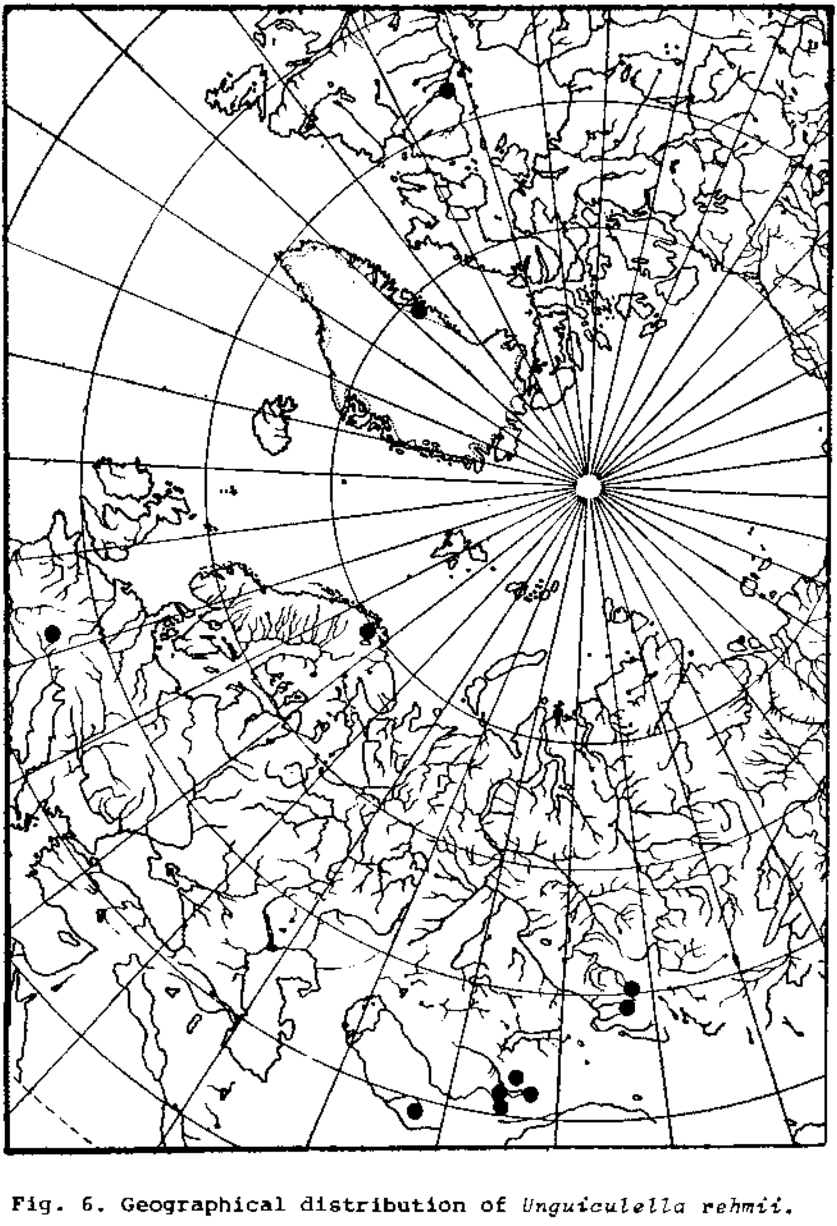

Fig. 6. Geographical distribution of *Unguiculella rehmii*.

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AGARICA

VOL. 6 NO. 12 pp. 147 - 157 August 1985

BIDRAG TIL HEBELOMA. II.
Sacchariolens-gruppen i Norge.

CONTRIBUTION TO HEBELOMA. II. The Sacchariolens-group in Norway.

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INNLEDNING.

"Sacchariolens-gruppen" omfatter en gruppe arter innen Hebeloma som har en særegen lukt, ofte betegnet som "søtlig, aromatisk", men også som "billig parfymert såpe".

Gruppen tilhører seksjon Denudata (Fr.)Sacc, men har i motsetning til artene rundt Hebeloma crustuliniforme (vanlig reddiksopp), ikke dråper på skivene. Artene får således ikke de karakteristiske mørke dråpeflekkene.

Gruppen er nylig bearbeidet og revidert av Gröger og Zschieschang (1981), noe som har resultert i at den er blitt supplert med tre nye arter. H.sacchariolens har vært det eneste "kjente" navn inntil for få år siden, en art som ble beskrevet av Quelet i 1879. H.fusipes har av mange vært ansett å ligge innenfor variasjonen av denne, men synes idag å være en art som skiller seg klart ut fra de øvrige, bl.a på sporenes form og størrelse. Gröger og Zschieschang (l.c) har studert Bresadolas typemateriale av H.fusipes, men vil ikke ta en klar stilling til artens identitet da materialet mangler vesentlige karakterer (cystider).

Et funn som klart synes å være Bresadolas art er imidlertid nylig omtalt fra Frankrike av Courtecuisse (1984).

Først i 1970 dukket det opp en ny Hebeloma med søtlig lukt, beskrevet dengang av Moser under navnet H.sacchariolens var.tomentosum (Moser 1970). Denne arten skilte seg ut ved sin filtete, delvis småskjellete hatt. Arten ble senere opphøyd til egen art (Gröger og Zschieschang 1981).

Etter supplementet fra Gröger og Zschieschang omfatter nå gruppen følgende kjente arter:

H.sacchariolens Quelet ss.str.
H.fusipes Bres.
H.tomentosum (Moser)Gröger & Zschieschang
H.latifolium Gröger & Zschieschang (=H.pallidoluctuosum)

H.gigaspermum Gröger & Zschieschang
H.fusisporum Gröger & Zschieschang

Alle disse, bortsett fra H.gigaspermum, er nå opptatt i Mosers siste nøkkelbind (1983).

Vi legger merke til at H.latifolium nå skal hete H.pallidulucutosum (Gröger & Zschieschang i Hirsch 1984). Da det tidligere navnet fremdeles er mest kjent har jeg valgt å beholde dette i artikkelen.

Gruppen kan ennå ikke anses som ferdigbehandlet, og det eksisterer ytterligere funn med søtlig lukt som ikke synes å kunne plasseres blant de hittil beskrevne arter. En av disse er funnet i Norge, og er omtalt senere i denne artikkel. For øvrig skal det foreligge funn fra Danmark og Øst-Tyskland av ukjente sacchariolens-arter.

Til tross for den solide avgrensning som nå foreligger, er det også fremdeles usikkert hvor stor variasjonsbredden kan være for de enkelte arter. Dette gjør at bestemmelsene ikke alltid er enkle.

NORSKE FUNN.

I det følgende er en undersøkelse av sacchariolens-gruppen i Norge referert. Undersøkelsen er basert på eksisterende herbariemateriale i Norge, samt funn jeg selv har gjort eller mottatt. Dessverre er ikke herbariematerialet ledsaget av makrobeskrivelser, noe som har gjort at beskrivelsene i stor grad har måttet basere seg på litteraturbeskrivelser fra Gröger & Zschieschang (l.c).

Hjelp til flere av bestemmelsene, samt diskusjoner av artene og eksikkatmateriale, har jeg fått av Frieder Gröger. Dessuten er typemateriale og eksikkater av enkelte arter utlånt fra Herbarium Hausknecht ved Friedrich Schiller-universitetet i Jena, Øst-Tyskland. Uten den velvillighet og hjelp som her er vist ville en revisjon av det norske materialet vært umulig.

Resultatet av undersøkelsen er at bare to av de kjente arter er funnet i Norge. En art synes ikke å kunne tilpasses kjent materiale, noe som også er bekreftet av Gröger.

Tre belegg av H.fusipes viste seg å være en Naucoria-art nær N.bohemica (bjørkebrunhatt), men med større sporer. Trolig er dette N.spadicea Reid (N.langei). Denne slekten skilles lett på hattens oppbygning som har mer cellulære-globulære elementer. De oppgitte funn av H.fusipes hadde heller ikke bøyler, noe som ikke er i overenstemmelse med Hebeloma-slekten.

Det eneste funn fra sacchariolens-gruppen som er omtalt, men ikke beskrevet i norsk litteratur synes å være hos Kristoffersen (1981).

Da antall kjente funn i Norge fra sacchariolens-gruppen er få, skal de alle nevnes i det følgende:

1.	H.latifolium	leg. J.Egeland	Sognsvann, Oslo	10.09.16
2.	H.sacchariolens	leg. Ø.Michelsen	Asker, Akershus	30.09.66
3.	H.sp	leg. S.Sivertsen	Farsund, V-Agder	28.09.69
4.	H.sacchariolens	leg. G.Gulden	Aremark, Østfold	14.09.75
5.	H.sacchariolens	leg. S.Kristoffersen	Hurum, Buskerud	29.08.73
6.	H.latifolium	leg. S.Aase	Sem, Vestfold	26.09.82
7.	H.latifolium	leg. Ø.Weholt	Halden, Østfold	
8.	H.latifolium	leg. A.Aronsen	Sem, Vestfold	28.09.84
9.	H.latifolium	leg. N.N.	Kråkerøy, Østfold ?	09.84

I tillegg har Wilhelm Ramm for noen år siden fortalt meg at han hadde funn fra Kråkerøy, men disse er ikke tatt vare på. Det er således ikke mulig å si hvilke arter det har vært, men det synes trolig å ha vært H.latifolium.

Funnene fra Norge bekrefter også det som er erfaringen fra andre land, at H.sacchariolens ss.str. og H.latifolium er de desidert vanligste arter i gruppen. Av disse igjen er trolig H.latifolium den art som man hyppigst vil møte.

Antall funn viser imidlertid at ingen av artene kan anses som vanlige.

Et utbredelseskart for de norske funn er vist i fig.1.

Det funnsom er gjort av Ø.Michelsen er angitt som H.sacchariolens. Jeg antar således at både lukt og manglende dråpeflekker har vært tydelig. Cystidene skiller seg imidlertid noe ut fra andre funn ved sin relativt slanke form, mer som for crustuliniforme-gruppen. Jeg har - etter å ha konferert med Gröger - allikevel valgt å plassere funnet innen variasjonen av H.sacchariolens ss str.

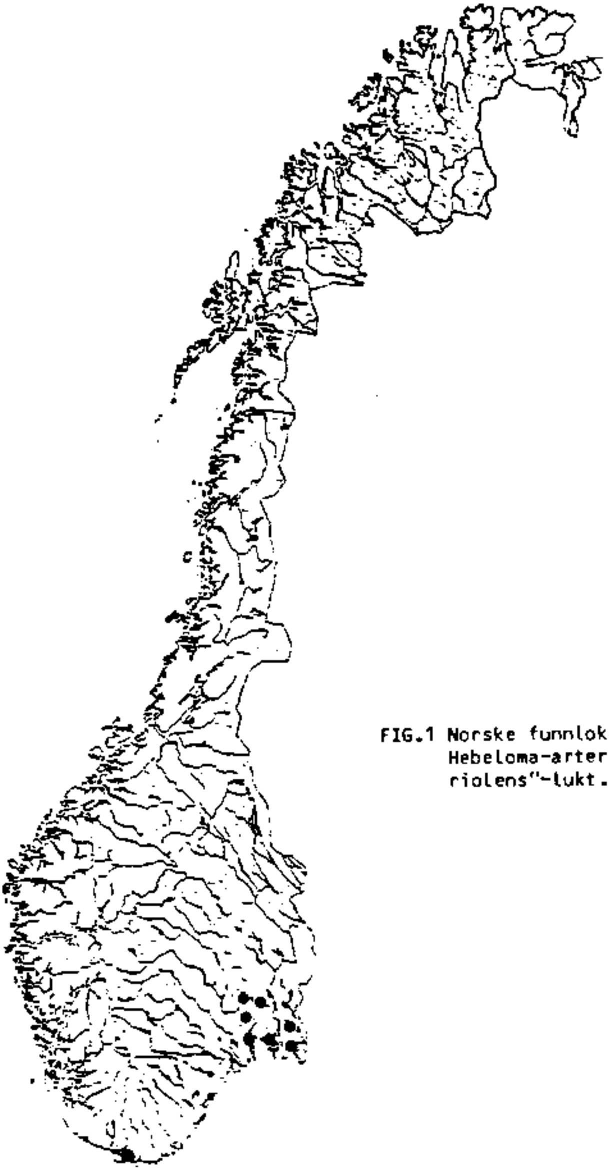

FIG.1 Norske funnlokaliteter for Hebeloma-arter med "sacchariolens"-lukt.

BESKRIVELSER.

1. Hebeloma sacchariolens Quelet Fig.2.

Hatt konveks, avrundet til noe klokkeformet, ofte bredt puklet, eldre med oppbøyd kant, blekoker, blass, noe mørkere i midten, dels tydelig klebrig, opptil 5 cm.
Lameller tette til middels tette, bredere enn tykkelse på kjøtt i hatten, noe avrundet mot stilken, smalt tilvokst, blekbrune ("kaffe m/melk") til okerbrune, egg fint takket, uten dråpeflekker.
Stilk hvitrimet ved spissen eller fint skjellet, mer skjellet-trådet mot basis, eldre noe hul, bare svakt brunende, basis kølleformet eller noe fortykket, -5,5/0,6/1,0 cm.
Kjøtt hvitt, svakt farget i stilkkanten.
Smak mild til svakt bitter.
Lukt søtlig eller parfymert, såpeaktig.
Eksikkat lyse, beholder godt fargen.
Sporer varierende, i norsk materiale:
1. 11,5-13,3(15,3) x 6,3-7,0 µm
2. 10,7-14,9(17,0) x 5,5-7,2(8,1) µm
3. 11,5-14,8 x 5,9-7,4 m
4. 10,7-14,9(17,0) x 5,5-7,4(8,1) µm
+ papillaktige, svakt sitronformet til mandelformet, lys gulbrune i KOH (lysere enn H.latifolium), svakt vortet.
Basidier 4-sp. 30-35 x 8,5-9 µm.
Cheilocystider tette, 40-62,5 x 4-10 µm, klubbeformet, ikke tydelige hoder, men kan være fortykket.

Undersøkt materiale: Akershus, mellom Sem og Heggedal, 30.09.66, 0.Michelsen. Buskerud, Hurum, Holtnesdalen, 29.08.78, S.Kristoffersen 222/78. Østfold, Aremark, Aremarksjøen ved Arebrekke pensjonat, 14.09.75, fuktig løvskogkratt ved bekkedrag, G.Gulden 323/75. DDR, Bräunsdorf, Folge, 3.10.44, P.Ebert 4429.

2. Hebeloma latifolium Gröger & Zschieschang Fig.3.

Hatt ung bredt konveks, avrundet til nesten halvkuleformet, bredt puklet, klebrig, blekt okerbeige, noe skittenoker, bare svakt eller ikke mørkere mot sentrum, eldre med oppbøyd hattkant, opptil 5 cm.
Lameller skittenbrune ("dark fulvous") eller "melk m/kaffe", mørkere brun når eldre, tydelig fjerne, avrundet til nesten loddrett tilvokst, relativt brede, ikke alle når stilken mellom hver "hele" skive, heller ikke hattkant, mest 5 lamelluller, uten dråpeflekker.
Stilk lys som ung, etterhvert omtrent samme farge som hatt, noe trådet, flosset, men ikke sterkt, mørkner svakt fra basis, jevntykk til svakt kølleformet, også med noe tilspisset basis, -4/0,75 cm.
Kjøtt skittent brunt, lyst som ung.
Smak svakt bittert, noe reddikaktig etterhvert.
Lukt søtlig, behagelig, prfymert såpeaktig.
Sporer varierende i norsk materiale:
1. 11,7-13,8(15,6) x 6,5-7,3(7,8) µm
2. 11,0-13,8 x 6,0-7,3 µm
3. 10,6-13,4 x 6,3-7,3(8,4) µm
4. 10,7-12,6 x (5,5)6,1-7,0 µm
5. 10,6-13,8(15,6) x (5,5)6,1-7,3(8,4) µm
bredt mandelformige til sitronformet, tydelig gulbrune i KOH, dobbeltsjiktig sporevegg og tydelig vortet.
Basidier 4-sp., 30-40 x 8-10 µm, sterigmer opptil 7,5 µm.
Cheilocystider forsvinner lett ved aldring, flaskeformet til svakt kølleformet, sylindriske, 20-45 x 5-10 µm.

Undersøkt materiale: Oslo, Sognsvann, 10.sept.1916, på gressbakke, J.Egeland. Vestfold, Sem; Gullkrona, 26.09.82, i løv under eik og bøk, S.Aase. Vestfold, Sem; Gullkrona, 28.09.84, i kanten av fuktig grøft, i utkanten av takrørområde, løvskog, A.Aronsen. Østfold, Kråkerøy, sept.84, løvtrær, NN.

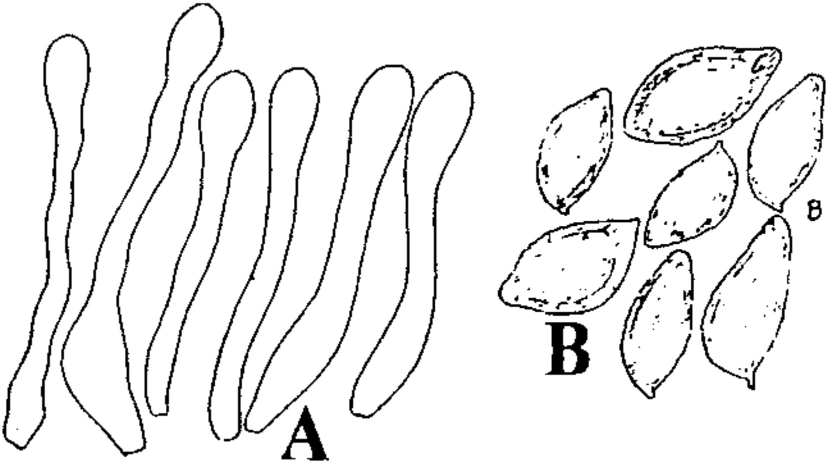

FIG.2A. H.SACCHARIOLENS SS.STR.
A. CHEILOCYSTIDER
B. SPORER
(KOLLEKT: Ø.MICHELSEN)

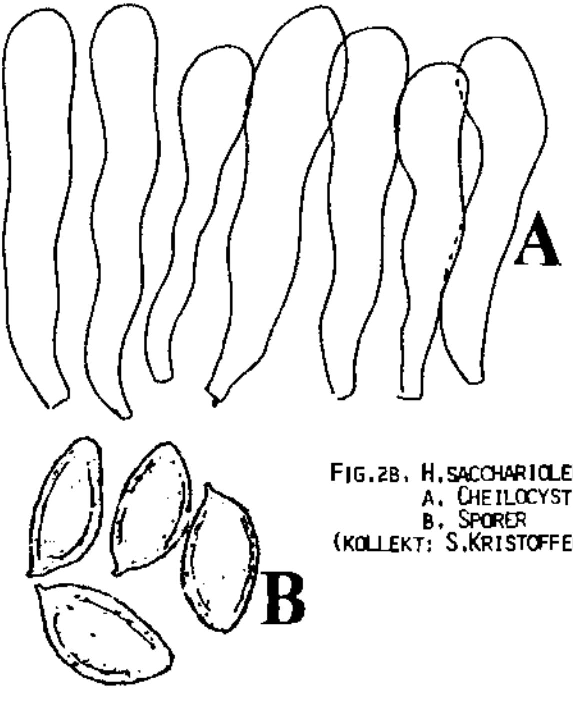

FIG.2B. H.SACCHARIOLENS SS.STR.
A. CHEILOCYSTIDER
B. SPORER
(KOLLEKT: S.KRISTOFFERSEN)

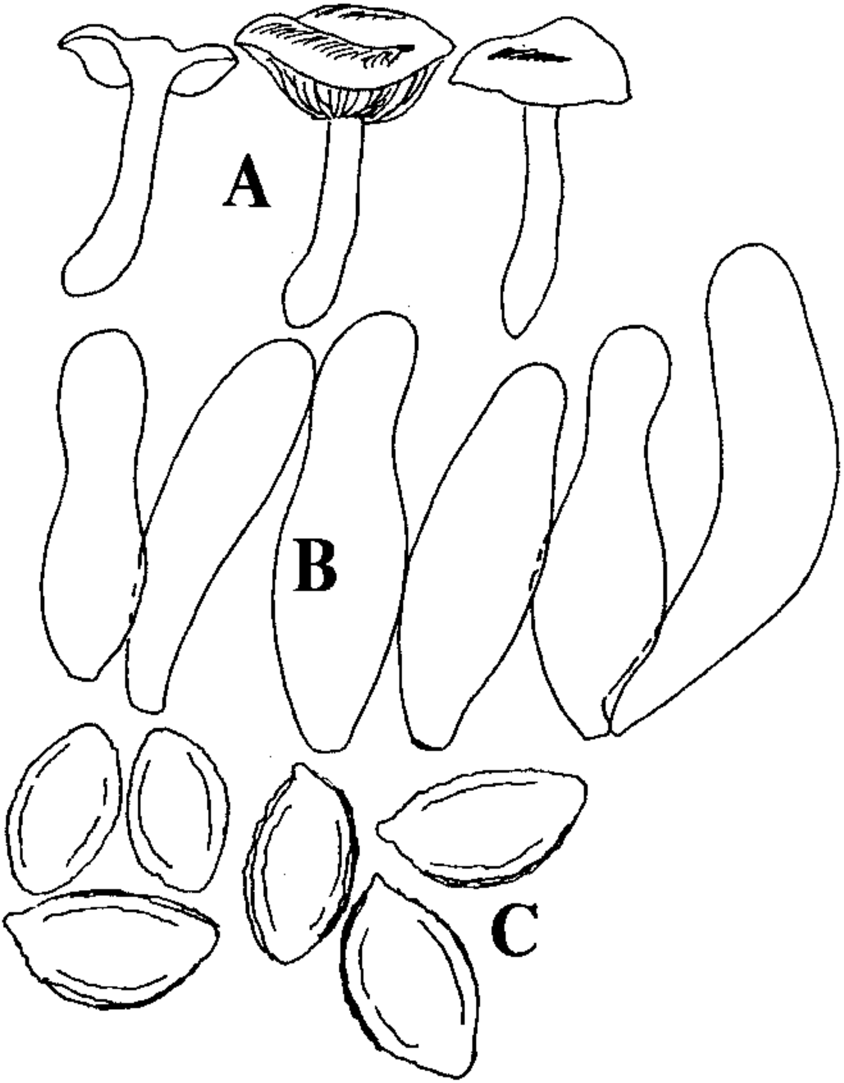

FIG.3. H.LATIFOLIUM GRÖGER & ZSCHIESCHANG
= H.PALLIDOLUCTUOSUM.
A.FRUKTLEGEMER
B. CHEILOCYSTIDER
C. SPORER

3.Hebeloma sp. Fig.4.

Det foreligger ingen fullstendig beskrivelse av funnet, noe som gjør at det ikke er funnet riktig å beskrive denne som ny art.
De mikroskopiske kjennetegn samt voksested er imidlertid så spesielle at funnet utvilsomt ikke kan henføres til noen av de øvrige arter i sacchariolens-gruppen.
Eksikkatet omfatter et eksemplar hvor hatten er sterkt forurenset av sand. Arten synes ikke å brune spesielt.
I det følgende er finnerens (S.Sivertsen) notater om funnet gjengitt:

> " Noen få eks. funnet i fuktigere senkning mellom dynene. Eksemplarene var sterkt inkrustrert av sand, så finere mikroskopiske karakterer er vanskelige å finne, men den milde lukten og de store sporene synes å fastlegge arten. Sporer 12,5-19 x 6,5-8,5 µm, limoniforme. Hattdiameter 3-4 cm, Dråpedannelse i lamelleggen ikke påvist".

I tillegg skal følgende mikroskopiske karakterer detaljeres:
Sporer 12,5-19 x 6,5-8,5 µm, bare svakt vortede, ru, uten dobbeltsjikt, langstrakte, mandel- til tydelig sitronformede, nesten fusiforme.
Basidier 4-sp., 23-35 x 7-9 µm, sterigmer opptil 5 µm.
Cheilocystider korte, flaskeformete, oppsvulmet, 25-35 x 8-10 µm.

Til tross for at ikke finneren har presisert lukten som "søtlig", men "mild", må vi anta at dette er en art i sacchariolens-gruppen.
For å sammenligne med de kjente arter i gruppen, er materiale innlånt fra Øst-Tyskland (se foran). Sporene kan minne noe om H.fusisporum, men sistnevnte har sporer med tydelig dobbeltsjikt. Cheilocystidene er dessuten lange og slanke, opptil 80 µm, og den vokser i sumpige Salix-kratt. H.gigaspermum har også store, men tydelige vortede sporer og lange cystider.
Cystidene for H.sp. har stor likhet med H.tomentosum, og sporene har samme størrelse. Også denne arten skal imidlertid ha tydelig vortede sporer med dobbeltsjikt. Hattens makrostruktur skal dessuten være så spesiell at det sikkert ville ha vært bemerket i finnerens beskrivelse.

Materiale undersøkt: Vest-Agder, Farsund, Lomsesand, 28.09.69, senkning mellom dynene. S.Sivertsen, LK 6938.

SAMMENLIGNING MELLOM H.SACCHARIOLENS OG H.LATIFOLIUM.

De to artene skal ha skillekarakterer som skulle gjøre det relativt enkelt å bestemme dem i felt. Makroskopisk synes skiveavstand å være en viktig karakter, da H.sacchariolens i motsetning til H.latifolium har tette skiver.
Kjøttet bruner noe hos H.latifolium, mens dette på det nærmeste ikke skal skje hos H.sacchariolens.

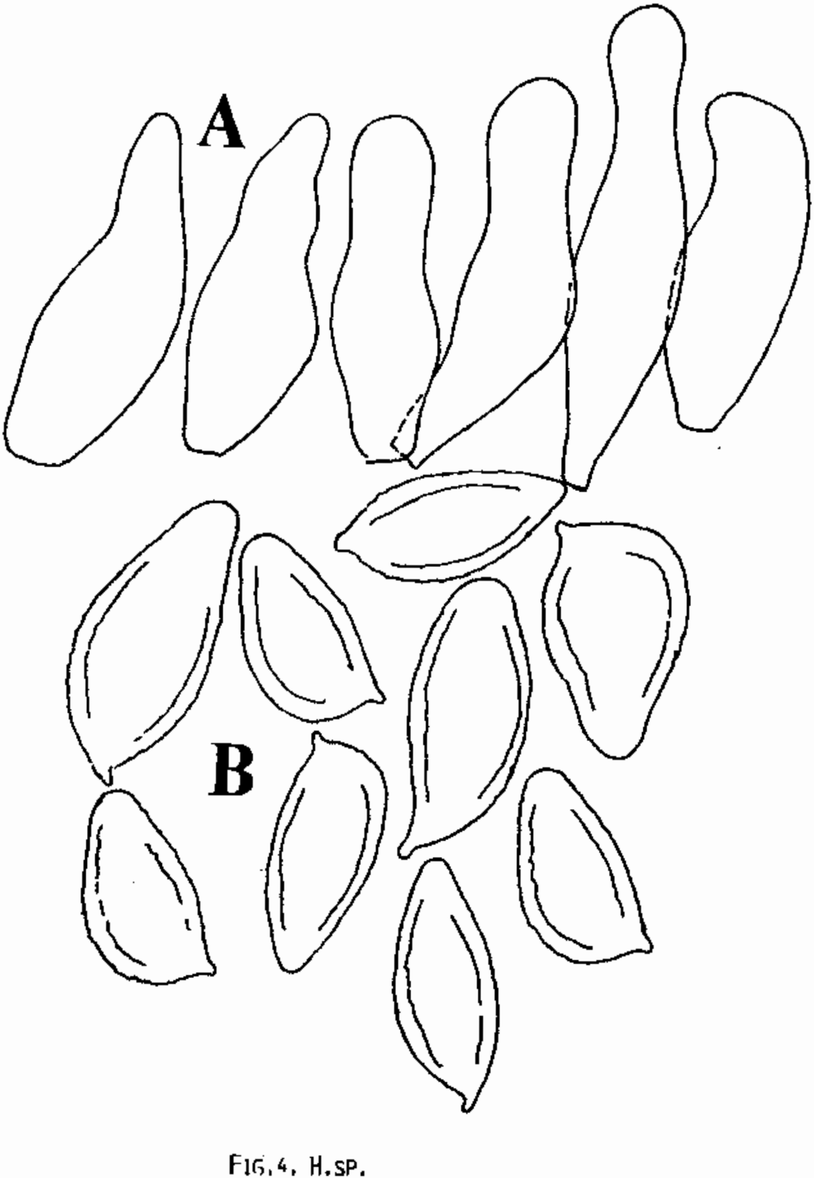

FIG.4. H.SP.
A. CHEILOCYSTIDER
B. SPORER

Mikroskopisk kan de lyse, bare svakt vortede sporene hos *H.sacchariolens* være en god karakter. Denne arten har også lengre og annerledes cystider.

Ut fra disse karakterer synes det også klart at den art som Lange (1935-40) benevner *H.sacchariolens* i virkeligheten er *H.latifolium*.

Tabell 1 gir et sammendrag av enkelte karakterer som til sammen skulle være tilstrekkelig til å adskille de to artene.

For ytterligere omtale av disse henvises til diskusjonen hos Gröger og Zschieschang (l.c).

	H.sacchariolens	*H.latifolium*
Hatt:	*Tydelig klebrig *Noe mørkere mot sentrum	* Svakt klebrig * Ikke heller bare svakt mørkere mot sentrum
Lameller:	*Tette, lyse	* Fjerne, mørkere
Stilk:	*Blek, bruner neppe	* Bruner svakt
Sporer:	*Lyse *Svakt vortede	* Relativt mørke * Tydelig vortede
Cystider:	*Opptil 80 µm	* Mest under 50 µm
Voksested:	*Surt til nøytralt	* Basisk til nøytralt

Tabell 1. Skillekarakterer mellom H.sacchariolens og H.latifolium.

Nøkkel til norske arter i H.sacchariolens-gruppen:

1. Sporer sterkt vortede, fjerne skiver, bare svakt klebrig hatt

H.latifolium

2. Sporer relativt glatte, skiver tette eller i sandyner 3

3. Cystider under 50µm, i dynesand

H.sp.

3. Cystider over 50µm, skiver tette, fuktig voksested

H.sacchariolens

FOTOGRAFIER AV ARTENE.

Det er ikke mulig med sikkerhet å anføre hvilken av de to kjente arter som er avbildet i litteraturen da de alltid har benevnelsen *H.sacchariolens.*

Gröger og Zschieschang (l.c) hevder at bildet av *H.sacchariolens* hos Dähncke & Dähncke (1979) er *H.gigaspermum*. Også bildet hos Cetto (1979) synes å være denne art.

Ryman og Holmåsen (1984) har tydligvis avbildet *H.latifolium*, noe som fremgår av både farge, skiver og stilkform.

ACKNOWLEDGEMENTS.

I am greatly indebted to Frieder Gröger for giving me important information and sending me exsiccata of several species in the Hebeloma sacchariolens group. This is also true for Herbarium Hausknecht at the Friedrich Schiller University in Jena.
My sincere thanks also to Sigmund Sivertsen for allowing me to report his find of H.sp, and to Gro Gulden for loan of exsiccata from Herb(O).
Great thanks go to the several people bringing me Hebeloma-material both useful and not for this study. I hope this will continue.

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SUMMARY.

The Norwegian herbarium material of Hebeloma in the group with "sacchariolens smell" and collects received elsewhere by the author are examined. From this study it is concluded that only two species from the all together six species known in the group at the present time are known from Norway.
These are H.sacchariolens ss.str. and H.pallidoluctuosum (= H.latifolium Gröger & Zschieschang). Probably H.pallidoluctuosum will turn out to be the more common one of these taxa.
Former collects labelled H.fusipes appeared to be a Naucoria, probably N.spadicea Reid.
An additional collect was discovered, not complying with any known taxon in the sacchariolens group. This species is found among sand dunes.
The spores were shaped somewhat like H.fusisporum, but were only moderately verruculose with no perisporal layer, and size were 12,5-19 x 6,5-8,5 µm.
The cheilocystidia were short, 25-35 x 8-10 µm, scarcely protruding the basidia.
Only about 10 collects from the sacchariolens group from Norway are known to the author.
A tabulated comparison between H.sacchariolens and H.pallidoluctuosum is given, as well as a key to the Norwegian species.

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HEBELOMA SECT. HEBELOMA IN SCANDINAVIA

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INTRODUCTION

Hebeloma belongs to the less explored agaric genera. Even advanced mycologists are often reticent to name the species of this genus, and a temporary research of Hebeloma-material from the Scandinavian museums shows, that less than 25 % of the collections are correctly determined.

Although it does happen, that a whitespored fungus is placed with the label Hebeloma, it is not the determination of the genus, that is giving the greatest problems. The grey-brown colours and the more or less viscid cap is usually sufficient to ensure a proper identification this far.

The problems arise when it comes to the determination of the species. This is understandable, partly because several species look rather alike, partly because the same species can have a wide variability . Therefore, it is important to point to the fact, that a proper identification can only be made if one is very familiar with the species or by using a microscope.

Hebeloma is traditionally divided into two sections. The cortinate species are placed in Sect. Hebeloma, and those without cortina belong to Sect. Denudata. This division is supported by the fact, that the species in Sect. Hebeloma as a rule have cheilocystidia, which are ventricose, and spores, that are only slightly ornamented, and where the perispore is not loosening. In Sect. Denudata this combination of characters apparently does not exist.

In Scandinavian literature there are only few veiled species represented. The most common species of the section - Hebeloma mesophaeum - is often registered, while deviating forms of this are noted under different epithets, such as H.holophaeum, H.strophosum and H.fastibile.

Beyond this Lange (1938) has recorded H.testaceum and described a new taxon, H.pumilum, and quite recently some of Bruchets alpine species have been recorded from Northscandinavia.

Although there in recent Scandinavian literature only are very few species reported from this section, the proper number is hardly under 15.

This exposition of the section does not attempt to be exhaustive. Careful studies of the Hebeloma-material from the Scandinavian herbaria, which are now being carried out, reveal, that a great number of the collections cannot immediately be referred to any of the known species. More detailed studies and further collecting is necessary, if the section is to be revised firmly.

The purpose of this article is to give a survey of the "known" species of the section, and at the same time it can be seen as a request from the authors to look for and report findings of the species, which are not mentioned in this article, or species whose area of distribution is not fully known.

KEY TO HEBELOMA SECT. HEBELOMA

1. With pseudorhiza; cheilocystidia short cylindrical-irregular; spores very rough with a somewhat loosening perispore. 1. H.pumilum Lange

1. Without pseudorhiza; cheilocystidia ventricose; spores not very rough, perispore never loosening 2

2. Spores ellipsoidal 3

2. Spores almond-shaped 6

3. In dunes under Salix repens or S.arenaria; quite stout, stipe 6-15 mm wide; spores lo-14(-15½) x 6-7½ µ. 2. H.psammophilum Bon

3. Not this combination of characters 4

4. Spores 8-10½ x 5-6½ μ; cap with distinct epicutis (25-120 μ), usually with paler margin; ubiquitous.
3. H.mesophaeum (Pers.ex Fr.)Quél.

4. Spores larger and cap dark brown, alomst to the margin or epicutis almost missing and cap rather pale; in North Scandinavia associated with dwarf-Salix.

5. Cap rather pale, concolourous; incrustation of cuticle yellowish; dried material usually fragile (cap!)
4. H.repandum Bruchet

5. Cap dark brown; incrustation of cuticle dark brown; dried material not fragile.
5. H.marginatulum (Favre)Bruchet

6. Spores 10-12½ x 5-6½ μ, under immersion clearly, but not strongly rough; stipe whitish at first, then very rapidly turning brown from below; dried specimens usually very poor. On moist ground under Betula.
6. H.testaceum (Batsch ex Fr.)Quél. ss. Lange

6. Spores 10-15 x 6-7½ μ, ornamentation only just visible under immersion; stipe and dried specimens not conspicuously brown. North Scandinavia with Salix between mosses on very moist ground.
7. H.remyi Bruchet

Note

The presentation of the species here is entirely based on the quoted collections with the exception of H.mesophaeum, where the mentioned intervals are compiled from more than 100 collections.

1. Hebeloma pumilum Lange - Fig. 1

Cap 10-40 mm, first hemisphaerical, then expanded or even somewhat depressed in the centre, very glutinous, yellowish brown or honeybrown, occasionally paler and more greyish near the margin. Velar remnants on cap surface are sometimes found.

Gills very crowded, at first pale greyish brown, dirty cinnamon when mature, adnate or slightly emarginate.

Stipe 20-70 x 2-6 mm with somewhat bulbous base and/or distinctly rooting, fibrous, first whitish, becoming brown when old or bruised.

Cortina fugacious, but distinct on very young specimens.

Smell indistinct or somewhat sweetish, not of radish.

Spores 8-9½ x 4½-5½ μ, almond-shaped and almost truncate, yellow under microscope and very rough. Perispore more or less loosening.

FIG.1

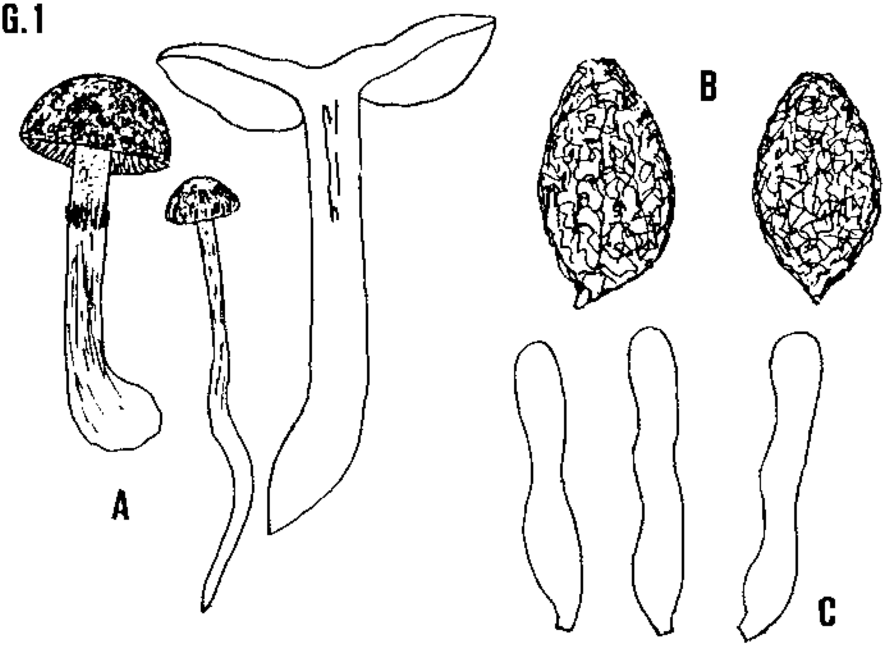


Figure 1 Hebeloma pumilum Lange - Coll. ØW H5/84
A: Carpophores (natural size) - B: Spores - C: Cheilocystidia

Basidia 4-spored, rarely with a few 2-spored basidia.

Cheilocystidia short and cylindrical to irregular 2o-35(-5o) x 3-7 µ, often i bundles. On dried material they can be very hard to find, as they often collapse. Caulocystidia similar but often longer and more irregular.

Cuticle formed of oblong hyphae with membranal pigmentation covered by a very distinct epicutis, consisting of rather thin, hyaline hyphae, which often are partly gelatinized.

Ecology and distribution This fungus seems to be widespread in Scandinavia, but it is rare. It has been found Norway, Sweden, Finland and Denmark, but the number of collections is very limited. It has a certain preferance for woods of Fagus, but the presence of this tree does not seem so be crucial.

Collections. Norway, Østfold, Rygge, Kajalunden, with Fagus, 29.IX.1984, leg Ø.Weholt (ØW H5/84) - Finland Pirkkala, Sorkkala, mixed forest, 5.IX.1979, leg U.Söderholm (TUR-o62854) - Denmark, Fyn, Kværndrup, Fagus-wood on naked ground, 29.IX.1937, leg. J. E.Lange (sporeprint only)

Illustration references : J.E.Lange 119 B - M.Lange p.161.

Discussion and related species : The species in Section Hebeloma have a large number of characters in common, but H.pumilum is clearly deviating from these by having pseudorhiza, different cystidia, different spores and different smell. On all these characters, however, it is very similar to Hebeloma radicosum (Bull. ex Fr.)Ricken. H.radicosum is placed in a subgenus of its own - Subgenus Myxocybe - due to the membranous ring and the strongly developed pseudorhiza. H.pumilum and H.radicosum are mainly to be separated by their dimensions and the structure of the velum, and as H.pumilum does not fit into Sekt. Hebeloma, it should be natural to regard this species as a Myxocybe.

The preliminary studies of the Scandinavian material reveal, that there are a number of different species presenting features similar to those of H.pumilum. Gröger has just published a new species in Myk.Mitt.Blatt. - H.hermanniae Gröger - and the description is partly based on a Norwegian collection by Ø.Weholt (ØW H3/83). H.hermanniae has also been recorded from Sweden, but it belongs to a complex, that is not yet completely disentangled.

It can be noted that the Norwegian collection of *H.pumilum* was made on acidulous ground between old leaves in a Fagus-forest. The measured pH-values showed 5,2-5,4. It was remarkable, that some of the specimens showed a very distinct pseudorhiza, while others obviously lacked this. Therefore this must be considered a character, which requires a high degree of attention, already when collecting. It can be noted that the collection was made only 2o-3o meters away from *H.spoliatum ss. Lange* (collection referred in Weholt 1983), which appears to by very similar, but the spores are longer and more brownish, and it consequently lacks cortina.

2. Hebeloma psammophilum Bon - Fig.2

Syn.: H.fastibile fo. ammophila Bon
Syn.: H.ammophilum (Bon)Bon non Bohus

Cap 25-7o mm, at first convex, then expanded, usually with a broad umbo and wawy margin, viscid, hazel-brown, often to the margin, with fine, innate radiating fibrils giving the cap a somewhat inocyboid appearance.

Gills crowded, first pale greyish, then clay-brown as the spores mature, broadly adnate or emarginate.

Stipe 4o-7o x 6-15 mm, cylindrical, on young specimens pale straw-coloured and almost shining, with age fibrillose and turning brown, with a conspicuous sand-bulb.

Cortina distinct on young specimens, leaving traces on the cap and stipe as expanding.

Smell weak, of radish.

Spores 1o-14(-15½) x 6-7½ µ, ellipsoidal, pale yellowish under microscope, only inconspicuously roughened, perispore never loosening.

Basidia both 2-spored and 4-spored, which explains the variety in the size of the spores.

Cheilocystidia ventricose or sometimes catinulate, 35-6o x 4½-6½ µ, base often inflated to 1o µ pr more.

FIG.2

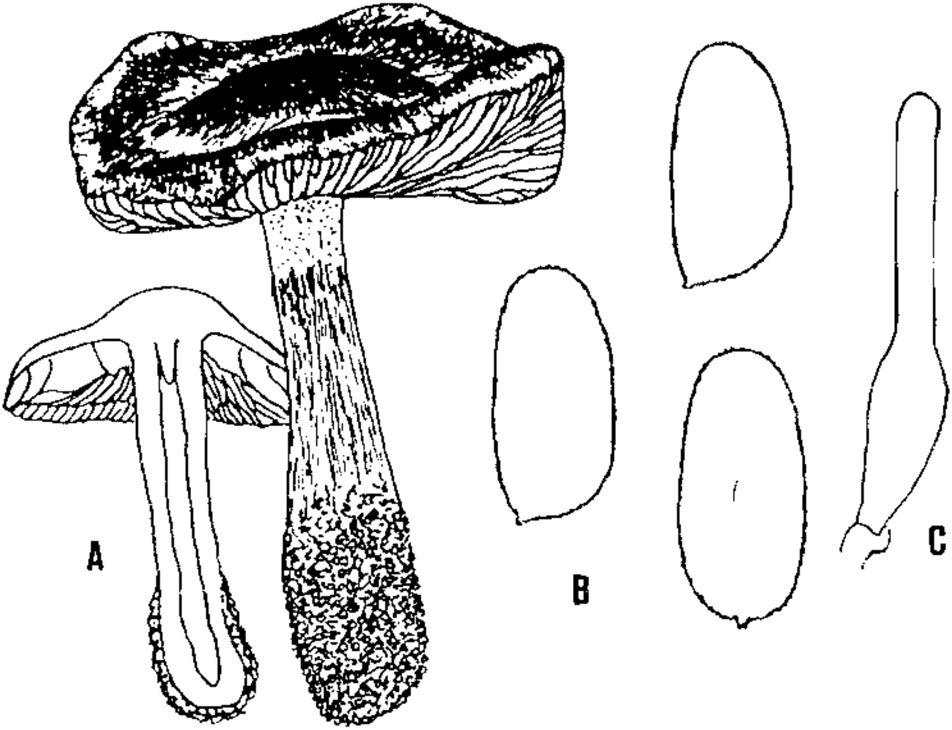


Figure 2· Hebeloma psammophilum Bon - Coll. SAE-c527
A: Carpophores redrawn from drawings and photos by S.Elborne. (left specimen is coll. SAE-1171) -
B: Spores - C: Cheilocystidia

Cuticle formed of oblong hyphae with membranal pigmentation covered by a distinct epicutis, consisting of hyaline, rather thin hyphae.

Ecology and distribution. This charcteristical species is only found in dunes, where it is living in association with Salix repens or S.arenaria. In Scandinavia this species until now only has been recorded from Denmark, but on the west-coast of Jylland it appears to be rather frequent.

Collections. Denmark, N-Jylland, Pælebakke klit, 3o.IX.1982-25.X.1983, all leg. S.Elborne (SAE-o527, SAE-o541, SAE-o64o and SAE-1171) - Denmark, N-Jylland, Tversted Strand, 13.X.1983, leg. S.Elborne (SAE-o953) - Denmark, N-Jylland, Kjærsgård Strand, leg. S.Elborne (SAE-o982)

Illustration references : None

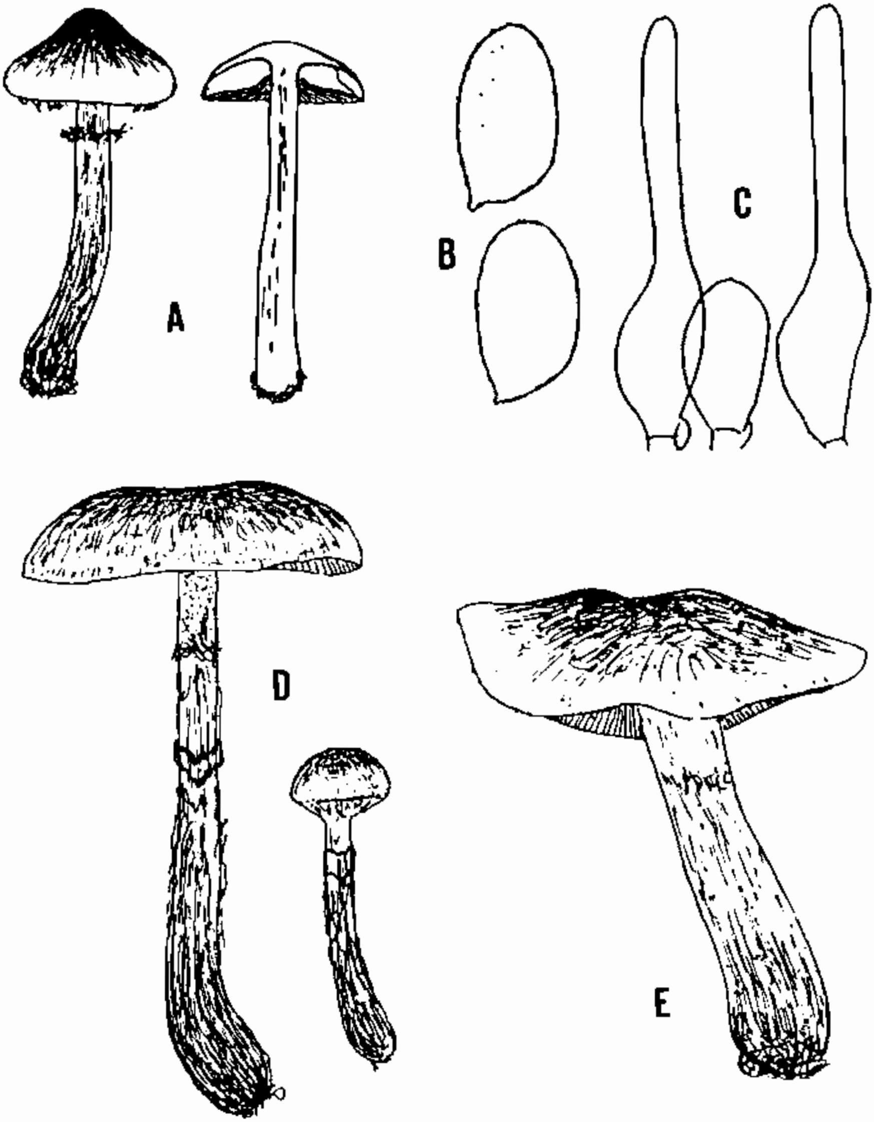
Discussion and related species : This species should hardly be confused, but it is not the only psammocol species of the section. *H.mesophaeum* is also found in dunes, and *H.dunense Corb.& Heim* and *H.subcaespitosum Bon* are described from similar localities. *H.dunense* is not recorded from Scandinavia, but some Danish collections resemble *H.subcaespitosum*, having the same size as *H.mesophaeum*, but somewhat larger spores. *H.psammocolum Bohus* is very similar to *H.subcaespitosum*, and Bohus now merely regards it as a varity of this species (Bohus 1982). Also *H.aprile Romagnesi* and *H.collariatum Bruchet* belong to this complex, and as there still remains many unanswered questions here, we are not able to find the proper epithets for the Scandinavian collections of this group.

3. Hebeloma mesophaeum (Pers. ex Fr.)Quél. - Fig. 3

Cap 15-45(-7o) mm, convex or campanulate, then expanded, usually more or less umbonate, centre often dark brown or reddish brown, margin pale grey or pale greyish brown, cap rarely concolourous; viscid, usually with velar remnants.

Figure 3. Hebeloma mesophaeum (Pers. ex Fr.) Quél. - Coll. TBP-735
A: Carpophores redrawn from drawings by T.Brandt-Pedersen - B: Spores - C: Cheilocystidia - D: Carpophores coll. O.Terney 19.IX.1981, drawn from freeze-dried material - E: Carpophore coll. J.Pedersen 2o.X.198o. (all carpophores in natural size)

FIG.3



Gills rather crowded, pale grey, turning clay-brown as the spores mature, emarginate or adnate.

Stipe 25-7o(-1oo) x (2-)3-7(-13) mm, clavate, fibrillose, sometimes even woolly or with membranous belts below the distinct cortina-zone, brownish grey, turning brown from below.

Cortina usually abundant, recognizable even on old specimens.

Smell faint, of radish, stronger when cut.

Spores (8-)8½-1o½(-11) x 5-6(-6½) μ, ellipsoidal, pale yellowish under microscope, only inconspicuously roughened, perispore never loosening.

Basidia 4-spored, 2-spored basidia rare.

Cheilocystidia ventricose, 3o-6o(-7o) x 4-6(-7) μ apically, at base often inflated to 11 (15) μ. Caulocystidia similar, but more irregular.

Cuticle formed of oblong hyphae with brown membranal pigmentation covered by a distinct epicutis (25-12o μ wide) consisting of rather thin, hyaline hyphae.

Ecology and distribution . This species is very common everywhere in Scandinavia. It is often found under, Pinus, Picea, Salix and Betula, there are few reports from Fagus, Quercus Tilia, Populus and even form burnt ground (mycorhizal host here unknown). In Denmark it has not been found earlier than the 9th of september, but further north - especially from the salicies - there are earlier reports.

Collections (figured). Denmark, E-Jylland, Langå, Skovlyst, u. Fagus, 28.IX.1981, leg. T.Brandt-Pedersen (TBP 735) - Denmark, Langeland, Stigtehave, 19.IX.1981, leg. O.Terney - Denmark, N-Jylland, Nystrup Plantage, 2o.X.198o, leg. J.Pedersen.

Illustration references : J.E.Lange 119C (118D & 118F) - M.Lange p.161 - Ryman p.478 - Phillips p.147 - Cetto 458 - Dähncke & Dähncke 399 - Michael & Hennig IV 28

Discussion and related species. This species is very common and very variable. Forms with a strongly developed cortina are often referred to as H.strophosum, and if H.strophosum is the right name for such forms, Quadraccia (1984) is justified to reduce H.strophosum to be a variety of H.mesophaeum. Maybe the reduction should have gone even further.

In Flora Agaricina Danica J.E.Lange presents H.fastibile. This species, however, should according to Fries have droplets on the gilledge, and Langes specimens are missing these. Therefore Langes H.fastibile is apparently only to be considered a very stout form of H.mesophaeum.

From Sweden a collection (ØW H4/82 - leg. J.Johnsen) also shows remarkable dimensions. The cap is up to 75 mm, and the stipe is 15 mm wide and up to 95 mm long. The spores are small, 7½-9 x 4½-6 µ, and it was found under Quercus in a decidous forest, but also here, we have no better propositions than H.mesophaeum

We are not able to report Scandinavian findings of H.fastibile, and this indicates a problem, as H.fastibile not only is type for the section and the genus, but also is the species, H.mesopaheum initially was described as a variety of. Collections of the "true" H.fastibile could settle these problems.

As mentioned H.mesophaeum is recorded from burnt sites in Scandinavia, and these collections might lead one to think of H.pyrophilum Moreno & Moser. The latter is having the same microscopical features as H.mesophaeum, but Moreno and Moser have not been able to find cortina in any of the two collections, their description was based on. The Scandinavian collections all have distinct cortina and must therefore be confined to H.mesophaeum, but these species might not be so easy to keep seperated.

In Agarica 8 (Weholt, 1983) H.claviceps (Fr.) Kummer was reported from Norway. Now we are not sure, that this was the true H.claviceps as we cannot decide, whether it is within the range of H.mesopaheum. It was characterized by its very pale colours, similar to those presented by H.crustuliniforme.

4. Hebeloma repandum Bruchet

Cap lo-35 convex, then expanded, pale brown, almost concolorous, not viscid (this means that the cap on dried material is very fragile compared to H.mesophaeum), sometimes with velar remnants near the margin.

Gills claybrown as the spores mature, rather crowded.

Stipe 25-45 x 3-5 mm, pale brown, fibrillose.

Cortina visible, at least on younger specimens

Smell no observations

Spores 9-11½ x 5½-6½ μ, ellipsoidal, under microscope pale yellowish, ornamentation only just visible under immersion. Perispore not loosening. Spores very similar to those presented by H.mesophaeum - Fig.3B - but they might be sligthly larger.

Basidia 4-spored, 2-spored basidia are not common.

Cheilocystidia ventricose, 3o-7o x 4-6 μ, base often inflated to lo μ or more. Caulocystida similar, but more irregular.

Cuticle formed of oblong hyphae with a yellow membranal pigmentation the epicutis is almost missing, only very few sporadical hyaline hyphae can be observed on the cap-surface.

Ecology and distribution. This species is most likely to be found in the dwarf-salicies in northern part of Scandinavia, but the distribution is not yet fully known, as it is often confused with H.mesophaeum.

Collections: Norway, Finnmark, Alta, Kviby, hard ground, 24.VIII. 1968, leg. O.Skifte (OS 216/68), Norway, Troms, Tromsøya, 2.X.196o, leg. O.Skifte (OS 1686)

Illustration references : None

Discussion and related species : This species is without any doubt very closely related to H.mesophaeum. Bruchet (197o) seperates it from this species referring to the paler colours and association with Salix herbacea in alpine regions. However, H.mesophaeum is also found on such localities - at least in Scandinavia - and bearing in mind the variability of this species, the pale colours hardly be sufficient to justify a separation.

What might be more important is, that Bruchet describes H.repandum as being "peu visqueux", and this statement is underlined by the fact, that the type-material almost lacks epicutis. This is also the case with the Northscandivian collections, and these are furthermore characterized by having a rahter short stipe and the same pale colours.

H.repandum is maybe easiest to recognize when dry, on the fragile, crispy consistensy, that comes from the lack of distinct epicutis. H.mesophaeum, on the contrary, is usually quite tough when dry.

FIG.4

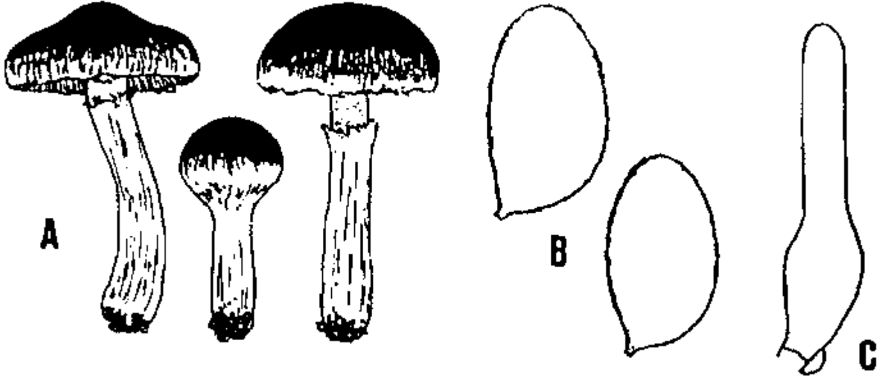


Figure 4- Hebeloma marginatulum (Favre) Bruchet -
Coll. S.Huhtinen, 27.VII.198o
A: Carpophores (natural size) drawn from photo by
S.Huhtinen - B: Spores - C: Cheilocystidia

5. Hebeloma marginatulum (Favre) Bruchet - Fig. 4

Syn.: Hebeloma versipelle (Fr.) Kumm. var. marginatulum Favre

Cap lo-35 mm, convex, often with broad umbo, dark brown almost to the margin, not viscid.

Gills rather crowded, pale greyish, then claybrown as mature, emarginate.

Stipe 2o-4o x 4-6 mm, whitish, then turning brown from below.

Cortina visible, at least on younger specimens, can form a white coating near the cap margin.

Smell no observations

Spores lo-14 x 6-7½ u, ellipsoidal, pale yellowish under microscope and the ornamentation is only just visible under immersion, perispore not loosening.

Basidia 4-spored.

Cheilocystidia ventricose, 3o-65 x 4-6 μ, base often inflated up to 12 u. Caulocystidia similar, but often irregular.

Cuticle formed of oblong hyphae with a brown membranal pigmentation. The epicutis is consisting of hyaline, thin hyphae, but it appears to be quite reduced and with a certain habit of loosening from the cutis, and that makes it difficult to measure.

Ecologi and distribution. This species is from Scandinavia noted from the northern part of Norway from the dwarf-Salicies.

Collections : Norway, Svalbard, Longyearbyen (many collections, among these) 27.VII.198o, leg. S.Huhtinen (SH 149) - Norway, Troms, Tromsdalen, Dalheim-Fløyfjellet, 8oo m. att., 25.VIII. 1965, leg. H.Lange & O.Skifte.

Illustration references : Favre (1955), Pl.IX, fig.1.

Discussion : This species is easy to recognize due to its dark cap and the rather large, ellipsoidical spores. H.repandum is close, but is easily identified with its pale colours and its fragility as dry.

Typestudies of H.marginatulum have not yet been carried out, so for the moment it is not finally verified, that this is the species Favre had in mind.

6. Hebeloma testaceum (Batsch ex Fr.) Quél. ss. J.E.Lange - fig.5

Cap (15-)25-5o mm, convex then expanded, sometimes with umbo, centre hazelbrown, margin white or whitish.

Gills crowded, white, then clay-brown with maturity, emarginate.

Stipe (25-)3o-8o(-9o) x 4-7(-8) mm, clavate base inflated to 1o (-13) mm., white, but soon strongly discolouring from below, on older specimens the stipe will be totally brown.

Cortina fugacious, only visible on young specimens.

Smell of radish.

Spores (9½-)1o-11½(-12) μ, almondshaped, sometimes papillate, slightly rough, under microscope yellowish with a reddish tinge, containing a drop, that is visible in KOH. In Melzer the spore takes a darker colour, and the drop will not be visible. Perispore not loosening.

Basidia generally 4-spored, but 2-spored basidia can be present.

FIG.5

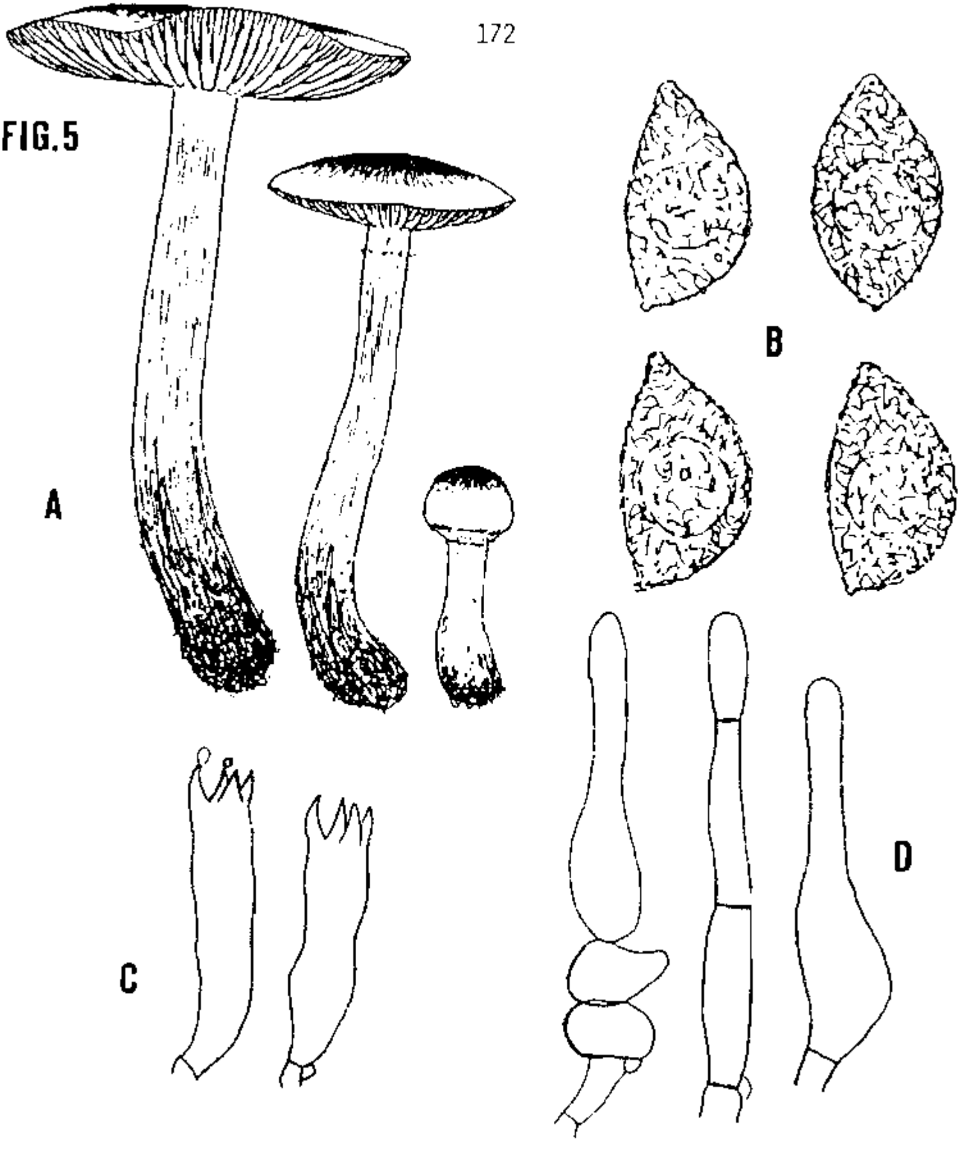


Figure 5 Hebeloma testaceum (Batsch ex Fr.) Quél.
ss. J.E.Lange - Coll JV 84-1371
A: Carpophores (natural size) - B: Spores -
C: Basidia - D:Cheilocystidia

Cheilocystidia ventricose or catinulate, 4o-7o(-9o) x 4-5½ μ, base inflated to 6-1o(-12) μ, caulocystidia similar, but generally more irregular.

Cuticle formed of oblong hyphae with pale membranal pigmentation covered by a distinct (approximately 3o μ) epicutis, consisting of very thin, not gelatinized hyphae.

Ecology and distribution : This species is apparently rare, and should be looked for in humid places, where it lives in association with Betula. It seems to have a southern distribution in Scandinavia.

Collections - Denmark, Amager, Kongelunden, u. Betula etc., 29. IX.1984, leg. J.Vesterholt (JV84-1371) - Denmark, Copenhagen, Damhusengen, u.Betula, 21.IX.1984, leg. J.Vesterholt (JV84-1278 & 1279) - Denmark, N-Sjælland, Tokkekøb hegn, u.Betula, 3.X.1984, leg. J.Vesterholt (JV84-1461) - Norway, Vestfold, Sem, Essoskogen, u. Betula & Quercus, 7.X.1984, leg. A.Aas (ØW H15/84) - Norway, Nordland, Saltdal, Rognan, 5.IX.198o, leg. S.D.& A.Granmo - Finland, Turku, Ruissalo, 29.IX.198o, leg. S.Huhtinen

Illustration references - J.E.Lange 118 E

Discussion and related species : Here we have decided to bring this species under the name H.testaceum ss.Lange, as we can not be sure that this is the species, Batsch had in mind.

It is,due to the distinct ornamention of the spores and the remarkable habit of discolouring,very easy to seperate from the other cortinate Hebelomas. Romagnesi has described a very similar species - H.clavulipes - that is supposed to be smaller and to have slightly larger spores (and the presence of Betula is not mentioned). However we would not exclude , that these two might be identical, and that H.clavulipes even might be the correct name for this species.

7. Hebeloma remyi Bruchet - Fig.6

Syn.: Hebeloma mesophaeum (Pers.ex Fr.) Quél. var macrosporum Remy.

Cap 1o-35 mm,convex, then expanded, claybrown colours, margin usually paler.

Gills rather crowded, clay-brown by maturity.

FIG.6

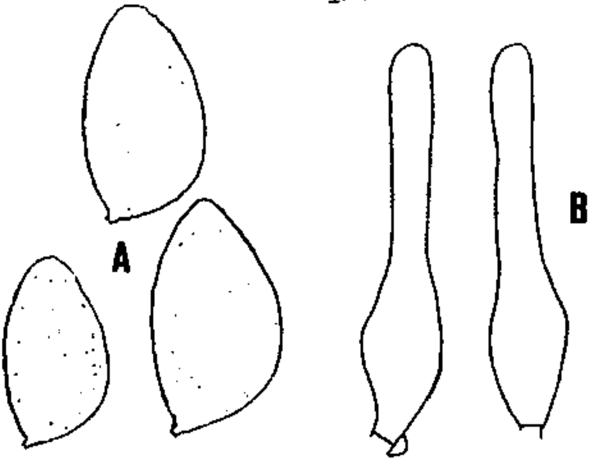


Figure 6- Hebeloma remyi Bruchet - Coll. Romell 9953
A: Spores - B: Cheilocystidia

<u>Stipe</u> 25-6o x 2-6 mm, pale, then discolouring from the base upwards.

<u>Cortina</u> present but not abundant.

<u>Smell</u>. No observations.

<u>Spores</u> lo-14 ½ x 6-7½ μ, almond-shaped, pale yellowish - pale ocre under microscope, ornamentation only visible under immersion, perispore not loosening.

<u>Basidia</u> generally 4-spored, but 2-spored basidia are also common, which explains the variability in the size of the spores.

<u>Cheilocystidia</u> ventricose 3o-6o x 4-6 μ, base inflated to lo u or more, often difficult to find on dried material (possibly due to an inclination to collapse). Caulocystidia similar, but often more irregular.

<u>Cuticle</u> formed of isodiametrical or oblong elements with membranal pigmentation, covered by a very distinct epicutis (5o-loo μ), consisting of thin, hyaline hyphae.

<u>Ecology and distribution</u> : This species is recorded from the northern part of Scandinavia, where it can be found in association with dwarf-Salix (and Betula ??).

Collections : Sweden, Torne Lappmark, Jukkajärvi, Abisko, 21. VIII.1915, leg. L.Romell - Sweden, Torne Lappmark, Jukkasjärvi, Abisko, 17.VIII.1915, leg. L.Romell - Norway, Troms, Tromsøya, in Sphagnum, 6.IX.1975, leg. O.Skifte

Discussion and related species : As the notes on the known Scandinavian collections are very few, the macroscopical description of this species is rather superficial.

Typematerial of H.mesopaheum var. macrosporum has not yet been studied, so we can not be sure, that it is our fungus, but the likenesses are striking.

Apparently this species is very hard to seperate from H.mesophaeum on macroscopical characters alone, but H.remyi has a preference for humid places with mosses, and by using microscopical characters no confusion should be possible.

There are several other Hebeloma-species with cortina and almond-shaped spores. Most of these are to be found in asssociation with Salix, but they all appear to be rare, and further studies are required before a survey can be presented.

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FURTHER STUDIES

As mentioned in the introduction, we are not able to give any exhaustive presentation of the cortinate Hebeloma's in Scandinavia. Many studies are still to be done, but one of us (JV) is working on a revision of Scandinavian Hebelomas with cortina and those with pseudorhiza (loosening perispore, short cystidia etc. - not exclusively veiled species).

Collections of such species would be very welcome, in fact H. mesophaeum is probably the only of these, in which we are not very interested. The most interesting species are those with a pseudorhiza and those recorded from the salicies.

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NOTES ON HYGROPHORUS. V.
A critical study of Hygrocybe fornicata (Fr.) Sing. sensu lato.

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1. Introduction.

Konrad & Maublanc (1937: pl.376) described and depicted Hygrophorus fornicatus as a rather variable, but characteristic species with a pileus up to 60 mm, ranging from whitish grey to grey-brown; the lamellae ventricose, emarginate, white or pale greyish; the stipe white, faintly striate; the context white, not discolouring, with an earth-like smell and the spores 7-8.5 x 4.5-5.5 µm. Hygrophorus streptopus, clivialis and distans were listed among the synonyms. This concept has been followed by e.g. Kühner & Romagnesi (1953:53) and Arnolds (1974:161).

However, Orton (1960:257) distinguished besides Hygrophorus fornicatus two related species, noticing that these species, H.clivialis (Fr.) Sacc. and H.lepidopus Rea, were in need of modern descriptions. Moser (1978:84) made another division into Hygrocybe fornicata and H.streptopus (Fr.) Sing. & Kuthan. Bon (1976:19) keyed-out four species in this group, in addition Hygrocybe distans (Berk.) M.Bon & Chevassut and H.clivialis (Fr.) P.D. Orton & Watl. H.lepidopus (Rea) P.D.Orton & Watl. was briefly mentioned as fifth species. Printz (1980:65) described from Denmark Hygrocybe clivialis, streptopus and fornicata, following Bon's taxonomic concepts. These concepts were also copied by Henze (1982:9), but he added a sixth species to this group: Camarophyllus fornicatus P.Karst. (besides Hygrocybe fornicata!).

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The aim of the present study is to evaluate the various taxonomic concepts. My own observations are mainly compared with the data given by Bon (l.c.), because his descriptions are, at least in part, based on original observations.

2. Material and methods.

In order to study the variability in this species complex and the validity of published taxonomic concepts I studied the most important diagnostic characters in basidiocarps belonging to twelve collections from the Netherlands, one from Belgium and five from Denmark. In one collection (Arnolds 480) two basidiocarps have been investigated. Colour codes are according to Kornerup & Wanscher (1967).

I wish to express my gratitude to the Curator of the Botanical Museum of the University at Kopenhagen for the loan of the Danish collections.

3. Variation in spore size.

a. Observations: Table 1 gives the results of my measurements of 10 to 20 spores in each of the studied basidiocarps. In Fig. 1. the average values are plotted in a diagram. It is clear that the spore size varies considerably, but that it is impossible to distinguish two or more clusters. Consequently spore size cannot be a criterion of taxonomic importance unless perhaps it appears to be correlated with other characters.

The spore size of the studied collections can be summarized as: 5.5-8.5 x 3.5-6 µm, Q = 1.2-1.9 (-2.1), on the average 6.3-7.7 x 4.2-5.2 µm., $\bar{Q}$ = 1.35-1.65.

b. Discussion: Bon (l.c.) attributed great importance to spore size in his species concepts: for H.fornicata he reported 7-8.5 x 4.5-5.5 µm (Q ± 1.7), H.clivialis 6-8 x 4-5.5 µm (Q = 1.4-1.6), H.streptopus 6-9 x 3.5-4.5 µm (Q = 1.8-2), and H.distans 7-8 x 5-6.5 µm (Q = 1.3-1.5). Henze (l.c.) copied these data and added for Camarophyllus fornicatus a spore size of 6.5-9 x 4-6 µm. Printz (l.c.) mentioned for H.fornicata spores of 7-8.5 x 4-5 µm, for H.streptopus 7-9 x 4-5 µm, and for H.clivialis 5.5-7 x 3.5-5 µm.

Table 1.

Variation in spore characters in 18 collection of Hygrocybe fornicata sensu lato, arranged according to increasing spore length.

Herb. = Herbarium; K = Botanisk Museum, Kopenhagen; L = Rijksherbarium, Leiden; W = Herbarium Biologisch Station Wijster.

Coll.	Herb.	range of spore size per basidiocarp (n=10-20)	average spore size	range of Q-values	$\overline{Q}$
Arnolds 4438	W	5.6-6.7(-7.5) x (3.9-)4.2-4.7(-4.8)	6.31 x 4.49	(1.2-)1.3-1.5(-1.6)	1.41
Arnolds 4082	W	(6.1-)6.5-7.4(-7.7) x 4.0-5.0(-5.1)	6.60 x 4.49	(1.2-)1.3-1.6	1.47
Arnolds 4478	W	6.2-7.0(-7.3) x 4.2-4.7(-4.8)	6.61 x 4.50	(1.3-)1.4-1.6	1.47
Klug-A 11 X 81	K	(5.9-)6.1-7.3(-8.4) x (3.9-)4.2-4.7(-4.8)	6.66 x 4.51	1.3-1.8	1.53
Rabenborg 29 IX 77	K	(5.8-)6.3-7.5(-7.7) x 3.7-4.5	6.70 x 4.18	1.4-1.8(-1.9)	1.60
Tjallingii 27 X 73	W	(6.1-)6.2-7.5(-7.7) x (3.6-)3.7-4.8	6.85 x 4.25	(1.4-)1.5-1.8	1.61
Arnolds 4422	W	(5.8-)6.1-7.5 x (4.0-)4.2-5.1(-5.6)	6.85 x 4.66	1.3-1.7	1.47
M.Lange 6 X 54	K	6.3-7.7 x (3.9-)4.0-5.1(-5.4)	6.90 x 4.65	1.3-1.7	1.48
Arnolds 4470	W	6.1-8.1 x 4.2-4.7(-4.9)	6.92 x 4.52	(1.3-)1.4-1.8	1.53
Arnolds 486 (1)	L	(6.1-)6.4-8.0(-8.3) x (4.5-)4.8-5.9(-6.1)	7.09 x 5.19	(1.2-)1.3-1.5	1.37
Arnolds 460	L	(6.2-)6.3-7.7(-8.2) x 4.9-5.6	7.10 x 5.19	1.2-1.5	1.37
Arnolds 486 (2)	L	6.4-8.0(-8.2) x 4.6-5.1(-5.6)	7.15 x 4.93	1.3-1.5(-1.7)	1.45
Møller 23 IX 62	K	6.3-7.7 x 4.5-5.6	7.20 x 5.06	1.3-1.6(-1.7)	1.42
Arnolds 4091	W	6.7-7.7(-8.4) x (4.0-)4.3-4.7(-4.8)	7.22 x 4.52	1.4-1.7(-1.8)	1.60
Rald 1 XI 77	K	6.3-7.9(-8.2) x (3.7-)4.0-4.8(-4.9)	7.28 x 4.46	1.4-1.8(-2.0)	1.63
Groenendaal 7 XI 82	W	6.5-7.7(-8.4) x 4.0-4.9(-5.0)	7.32 x 4.46	1.5-1.8	1.64
Arnolds 478	L	(6.4-)6.7-8.0 x (4.3-)4.5-5.3(-5.4)	7.35 x 4.89	(1.2-)1.4-1.6(-1.7)	1.50
Arnolds 4125	W	(6.3-)6.9-7.7(-8.4) x 4.4-5.3	7.38 x 4.81	1.4-1.7	1.54
Arnolds 431	L	(6.3-)6.9-8.6 x (3.8-)4.4-5.0	7.67 x 4.72	(1.3-)1.5-1.9(-2.1)	1.63

All data fall completely or almost completely within the variation of my measurements. Special attention deserve the very narrow spores, reported by Bon (l.c.) for H.streptopus. Assuming that his measurements are correct there is still hardly any reason to describe a different species on the basis of this character only. In this connection it is difficult to understand why Bon (l.c.) quotes a description of H.streptopus by Singer & Kuthan (1976:7) with spores 6.5-8.5 x 4-5 µm.

4. Variation in colour of the pileus.

a. Observations: In most of the studied collections the pileus is beige, ochraceous, pale greyish brown or pale brownish to olivaceous grey, (e.g. Methuen 5B3, C4, D4, D5; 6D4; 4D3), often with paler, whitish margin and/or darker centre. Less often the pileus is entirely whitish to pale ochre (Methuen 4A2, A3, B3) or predominantly dark grey brown (e.g. Methuen 5E4, E5; 6E5, F5). The variability usually increases with the size of the population. In the Netherlands the richest locality for H.fornicata is on the grassy banks of the "Drongelens Kanaal", near Den Bosch. Within the hundreds to thousands of basidiocarps present there each year almost the complete range can be found from pale ochre to dark grey-brown.

Some collections only comprise whitish basidiocarps. The discrepancy between this pale form and the more pigmented forms seems to be more pronounced than between pale and dark greyish forms which are very often intermixed. Therefore it may be acceptable to distinguish the pale and darker collections in the rank of variety, but certainly not as species.

For the aim of this study the collections listed in Table 1 were divided into three classes: (1) collections with whitish to pale ochraceous pileus, (2) with predominantly ochre-brown to pale brownish grey pileus, (3) with predominantly greyish brown to dark grey-brown pileus. These classes are plotted against spore size in Fig. 1. It appears that no correlation exists with the spore size at all.

b. Discussion: The colour of the pileus is for Bon (1976) the key character to distinguish on the one hand the whitish H.fornicata and H.clivialis, on the other hand the greyish or brownish H.streptopus and H.distans. In this context it is remarkable that Bon (l.c.) refers under H.streptopus to his description of that

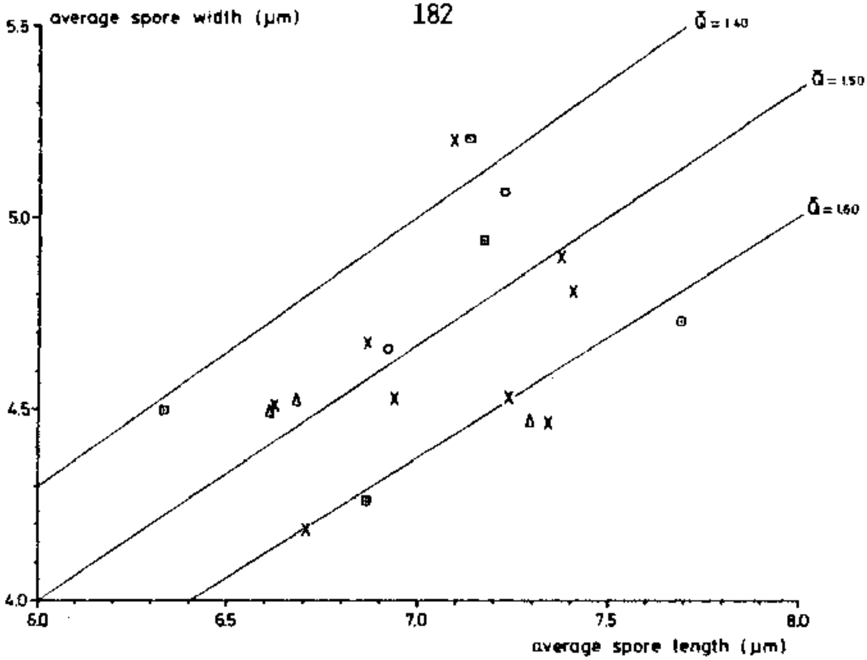

Fig. 1. Scatter diagram of average length and width of basidiospores of Hygrocybe fornicata sensu lato and the relation to the colour of the pileus in the studied collections.

o = colour of pileus unknown
Δ = pileus whitish or pale ochre
X = pileus mainly pale ochre brown to brownish grey
□ = pileus at least at centre dark grey brown

species from 1970(:174). In that paper H.streptopus was described as a fungus with a pale, whitish pileus and even characterized as resembling a small Tricholoma columbetta. The spores were reported as 6-7.5 x 3-4 µm, consequently in accordance with his data from 1976. On the other hand Moser (1978:84) described the pileus of H.fornicata as'grau, olivgrau oder braûnlich', H.streptopus as 'beige bis blass russbraun'. Printz (1980:65) keyed-out H.clivialis on the basis of its whitish pileus with ivory centre against pale greyish to brownish H.streptopus and H.fornicata.

In my opinion species cannot be based on the character of pileus colour, even not in combination with spore size.

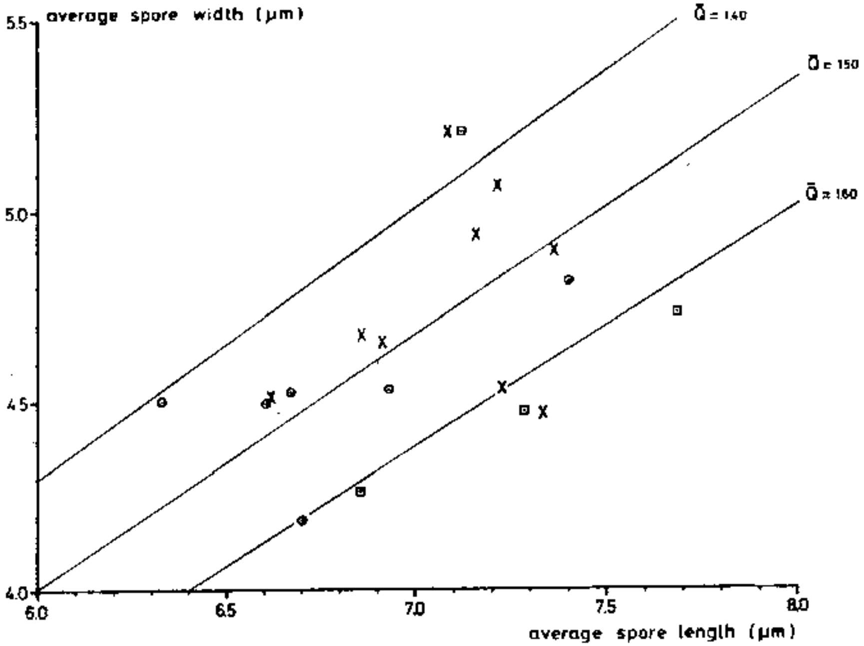

Fig. 2. Scatter diagram of average length and width of basidiospores of Hygrocybe fornicata sensu lato and the relation to the size of the pileus in the studied collections.

⊙ = pileus rather small, up to 35 mm
X = pileus medium, ± 30-50 mm
⊡ = pileus large, up to 70 mm

5. Variation in size of the basidiocarps.

a. Observations. In the 18 collections studied the diameter of the pileus ranges in mature basidiocarps from (14-) 20 to 67 mm, the size of the stipe from 30x3 to 100x15 mm. The variation in size of basidiocarps is considerable, but not unusual within Hygrocybe. In order to study possible correlations with spore size the collections were divided into three classes: (1) pileus up to 35 mm wide; (2) pileus predominantly 30-50 mm wide; (3) pileus up to more than 50 mm wide (Fig. 2.) There seems to be a weak tendency for small basidiocarps to have smaller spores, but this correlation is by no means significant.

By comparison with Fig. 1 it is also evident that the colour and the size of the pileus are not correlated.

b. Discussion: Bon (1976:19) used the size of the pileus as an additional character to distinguish H.fornicata (30-70 mm) from H.clivialis (20-40 mm). The size of basidiocarps was not mentioned for H.streptopus and H.distans.

In the original descriptions Fries mentioned for H.fornicata (1838:328) a pileus of 2 unc. (52 mm) wide, for var. clivalis 1) (1851:134) of 1.5 unc (39 mm), a minor difference only. In my opinion size of basidiocarps is a useless character within this group.

6. Variation in other characters.

Bon (l.c.) used in his key several other characters, e.g. the appearance of the surface of the pileus, the shape of the pileus, the shape and spacing of the lamellae and the smell. Some of these characters are difficult to quantify. A study of the collections listed in Table 1 has revealed that also in these characters a continuous variation exists and that the extreme ends of this variation are not correlated with other characters. Consequently these characters are not diagnostic within this group.

7. Taxonomic conclusions.

In my opinion it is inevitable to recognize only one species within the investigated taxonomic group. Within this species a distinction may be useful in the rank of varieties between collections with white to pale ochre pileus and collections with a darker pileus. Even this distinction remains doubtful.

Possibly H.lepidopus Rea appears to be another good species, characterised by the pileus and basal 3/4 of the stipe, being covered with minute, adpressed, sepiascales. At the moment no sufficient data are available: since the original description by Rea (1927:214) no additional records have been reported.

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1) Fries (1851) originally spelled the epithet as 'clivalis'. Many later authors wrongly used the spelling 'clivialis'.

From table 1 it can be concluded that the majority of the collections has a ± pale grey-brown pileus, ± 30-50 mm broad, and spores measuring ± 6.5-8 x 4-5 µm (Q ± 1.4-1.6) It is most remarkable that it is impossible to identify this form with the "monographic key" by Bon (l.c.) since the two brownish species, H.streptopus and H.distans, should be clearly different in their spore size, 6-9 x 3.5-4.5 (Q = 1.8-2) and 7-8 x 5-6.5 (Q= 1.3-1.5), respectively. One cannot avoid the impression that the differences were exagerrated to stress the distinction between these "species". On the other hand it may be regarded as an invitation to fill this gap by introduction of yet another species name. In fact this has been practiced by Henze (1982:9), who copied in his key (without reference) the description of Camarophyllus fornicatus by Kühner (1977:141,143) indicating a spore size of 6.5-9 x 4-6 µm.

8. Nomenclatorial considerations.

Fries (1838:327,328) introduced simultaneously the names Hygrophorus fornicatus and H.streptopus. If these names are regarded as synonyms the name H.fornicatus has to be used since Bataille (1910:45) united both species and described streptopus as a variety of H.fornicatus.
According to Article 57 of the Code of Nomenclature the latter name has to be selected.Fortunately this choice agrees with current use among mycologists.

In the original description Fries (l.c.) described H.fornicatus with a smooth, viscid pileus ("leavi-glabro viscido") and emarginate lamellae ("sinuato-adnexis"). In most of the studied collections of H. fornicata the pileus is dry and minutely innate-fibrillose. For some authors, e.g. Favre (1960:388), this was a reason to reject the epithet fornicatus for the present species. Indeed it remains debatable whether Fries' concept of this species is really the same as the present one. However I prefer to retain the epithet fornicatus because of the following reasons: (1) the appearance of the surface of the pileus is described differently by various authors, although they evidently mean the same taxon, e.g. by Kühner (1977:141) as "très glabre, mais distinctement fibrilleuse radialement sous la loupe", (2) the pileus in older basidiocarps sometimes feels greasy to slightly viscid (own observations; Konrad & Maublanc, 1937:pl.376: "chapeau...... humide ou à peine visqueux", Bresadola, 1928: pl. 333 ("H.fornicatus var. clivialis:

"pileus...... subviscidus"), (3) within Hygrophorus sensu lato the emarginate lamellae are very characteristic of H. fornicata, (4) alternative names, such as H.streptopus and H.distans are even more doubtful (see below).

H.streptopus was originally described by Fries (1838:328) referring to the description by Secretan of "Agaricus sinensis longipes". This is the nomenclatorial type, although all names published by Secretan are invalid (ICBN Art. 23, Ex. 10). Fries himself did not know this species. It is doubtful whether that species is identical to H.fornicata var. streptopus in the present concept. Differences are mainly the thin, rather crowded lamellae and the habitat in mossy pine forests. For the time being I prefer to maintain the name streptopus rather than to introduce a new name, since no blameless alternative is at hand.

If one prefers to distinguish two varieties on the basis of pileus colour the correct names are Hygrocybe fornicata (Fr.) Sing. var. fornicata for the pale collections and H.fornicata var. streptopus (Fr.) Arnolds (1985) for greyish and brownish collections. Most authors have attributed the epithet fornicatus to the darker taxon, whereas they named the whitish taxon H. (fornicatus var.) clivalis, e.g. Orton (1960:257) and Printz (1980:65). This is not correct.
The pileus of H.fornicatus was originally described as "albolividoque" (Fries, 1838). Since the pileus of H.streptopus was originally described (l.c.) as "fusco-lutescente" that name can be used for the -more widespread- darker variety.

H. clivalis was originally described by Fries (1851:134) as a slender variety of H.fornicatus. I regard it merely as a small form of that species (var. fornicatus) without taxonomic value.

Hygrophorus distans Berk. (1860:200) is in my opinion not close to H.fornicata since the lamellae were described as decurrent. Dennis & al. (1960:184) regard it as a nomen dubium, possibly identical to Hygrocybe (Camarophyllus) virginea. I agree with that point of view.

The simultaneous use by Henze (1981:9) of the names "Hygrocybe fornicata (Fr.) Sing" and "Camarophyllus fornicatus P.Karst". for two different taxa is not allowed since the two names have the same nomenclatorial type, viz. Hygrophorus fornicatus Fr. (1838).

Singer & Kuthan (1976:7) intended to describe a new species, Hygrocybe streptopus, with as basionym Hygrophorus streptopus Fr.

(1851:134) and with a reference to the latin diagnosis in Monographia. However, Fries gave a direct reference in 1851 to his description in Epicrisis (1838:328), so that it is in nomenclatorial respect the same species with the same type. Since Hygrocybe streptopus Sing.& Kuthan excludes the type of Hygrophorus streptopus Fr. it is a new species indeed (Art. 48.1), but it was not validly published (Art. 37). H.streptopus sensu Sing. & Kuthan falls within the variation of H.fornicata.

9. General discussion.

It is inherent to nature that some species are more variable than others, in other words that there is variation in variability. Some mycologists seem to have great problems with the acceptance of this phenomenon in fungi. The temptation is strong to split diverse taxa into a number of more narrowly defined species. It is true that some traditional species have appeared to be in reality complexes of well-defined species, e.g. recently Armillaria mellea (e.g. Korhonen, 1978, Marxmüller & Printz, 1981) and Flammulina velutipes (Bas, 1983).

In these cases the new species concepts have been thoroughly described and discussed. However in many cases the splitting is rather based on wishful-thinking than on critical studies, and results of other investigations, not confirming the hypothesis of the author, may be even consciously neglected.

In this context I give another example in the genus Hygrocybe. In the group of blackening taxa around H.conica Bon (1976) distinguished 8 species, whereas I recognised only one species with four varieties, covering the same variation of characters (Arnolds, 1974).

This difference may be "only" based on a different species concept, but it is more difficult to explain why Bon (l.c.) continued to distinguish e.g. H.conica and H.nigrescens on the base of small basidiocarps with 2-spored basidia and large basidiocarps with 4-spored basidia, respectively. In my study, that he knows well, it was demonstrated that many basidiocarps exist with intermixed 4- and 2-spored basidia, and that no correlation exists between the number of spores and size of basidiocarps.

It is not amazing that ideas with small, artificial species concepts spread easily: most individual basidiocarps can be assigned to one taxon or another, even if the distincton is completely artificial.

It is much more work to demonstrate that such concepts are incorrect because so-called distinctive characters are linked by intermediates and/or not correlated with other characters.

If this tendency of uncritical splitting continues agaricology will become a chaotic game rather than a science.

Acknowledgements.

Many thanks are due to Thom Kuyper (Leiden) for his critical comments and his aid in solving some nomenclatorial questions, and to the curators of the herbaria at Leiden and Kopenhagen for sending me valuable collections.

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Summary: A study is made of the variability in critical characters of H.fornicata sensu lato, including spore size, colour and size of pileus. It is concluded that only one species can be distinguished, viz. H.fornicata, possibly with two varieties: var. fornicata with a whitish pileus and var. streptopus with a greyish to brownish pileus. H.clivialis and H.distans sensu Bon are reduced to synonyms. The increasing tendency in agaricology to split variable species into several artificial species is discussed in a more general context.

AGARICA

VOL.6 NO.12 pp. 191 - 196 August 1985

FØRSTE FUNN AV ALEURIA RHENANA FUCK. (PEZIZALES) I SKANDINAVIA.

First finding of Aleuria rhenana Fuck. in Scandinavia.

Roy Kristiansen, Postboks 19, 1652 Torp.
Per Marstad, Postmannsv.7, 3109 Lofts-Eik.

Slekten Aleuria Fuckel omfatter i dag 11-12 arter på verdensbasis, hvorav 7 finnes i Europa (Benkert 1984).

Aleuria aurantia (oransjebeger) er desidert den vanligste, og kosmopolitisk, men synes å unngå ekstremt arktisk-alpine områder (Schumacher 1979).

I Skandinavia er to arter beskrevet, A. aurantia og A. bicucullata (Boud.)Gill., sistnevnte bare kjent fra Danmark og Norge (Dissing 1983, Kristiansen 1985).

Dissing (1982) angir fire Aleuria-arter fra Danmark , uten å nevne hvilke (men de to ovennevnte er med).

Under et sopptreff i Stavern 21.- 23.september 1984 fant en av oss (P.M.) en gulrosransje stilkformet begersopp, som overfladisk kunne påminne om en Sowerbyella (kantarellbeger) ,en slekt vi ikke har sett i Norge siden 1950. En påfølgende mikroskopering viste imidlertid en annen anatomi, såvel som sporer med et retikulert mønster, og hyaline hår på utsiden.

Dette passet i alle deler med Aleuria rhenana Fuck.,- første funn i Skandinavia.

Aleuria rhenana Fuck.

Syn. Aleuria splendens Quel.

Beskrivelse:

Apothecier (fig.1) ,tuevoksende, 1,5 - 3,0 cm diam.,dypt begerformet,små umodne eksemplarer nærmest kølleformet, litt uregelmessig bølget og noe oppslittet kant på store eksemplarer.

Hymenium guloransje til gul ,utsiden blekere, svakt lodden.

Stilk 1 - 3 cm lang, noe furet-grubet, blek guloransje til nesten hvit mot basis, - filtet.

Total høyde ca. 5 cm, ganske skjør/sprø konsistens.

Asci , sylindriske,8-sporet,280 - 320 x 12,5 - 15,0 um .

Sporer (fig.2), enradet,ellipsoide til avlangt ellipsoide,hyaline med to store oljedråper,først glatte(umodne), senere med et retikulert mønster, maskene 2 - 4 um breie,nærmest 6-kantete eller uregelmessige, 20,5 - 22,0 x 10,0 - 11,6 um, uten ornament.

Benkert (1984) har avbildet sporer fotografert under scanningmikroskop.

Parafyser,buede eller hockey-formet i toppen,opp til 8 um breie øverst (fig.3), med gule dråper.

Hår,ytre eksipulum (fig.4),tynn-veggede,opp til 15 um i diam., sparsomt septerte,bølget/buede, butte i spissen, opp til 200 um lange.

Voksested:Blant gress og nålestrø i kalkfuruskog med innslag av gran.

Telemark,Bamble,Gjømle,22.september 1984. Leg.Per Marstad.(O).

Fargeillustrasjoner:

Boudier II (1907) plansje 314

Imazeki & Hongo (1979) plansje 59,fig.326

Breitenbach & Kränzlin (1981)pl.99 (som A.splendens)

UTBREDELSE.

A.rhenana er utvilsomt en sjelden art, men ser ut til å være kosmopolitisk, og den nest vanligste Aleuria-art etter de mange funn å dømme.Benkert (1984) nevner flere funn i Europa,såvel som Australia,India,Mexico og Nord-Amerika.

Den er også kjent fra Ukraina i Sovjet (Smitskaja 1980),likeledes Japan (Imazeki & Hongo 1979) og Chile (Gamundi 1971).

Det mest oppsiktsvekkende er imidlertid et avvikende funn fra Barrow i Alaska (Laursen & Ammirati 1982), hvor den når inn i ekstremt arktisk område, og temperaturen er omtrent som i Longyearbyen !

1

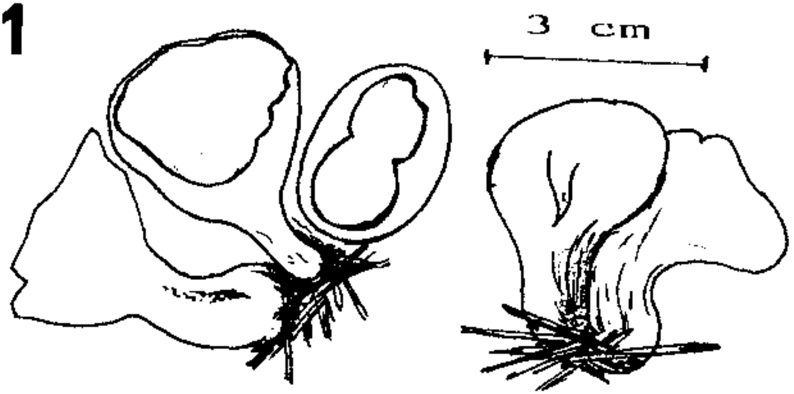

Fig. 1 Fruktlegemer Aleuria rhenana Fuck.
fra Telemark.

4

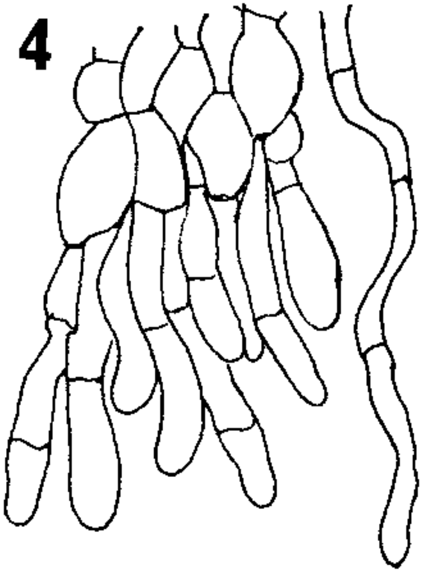

Fig. 4 Hår, ytre eksipulum.

3

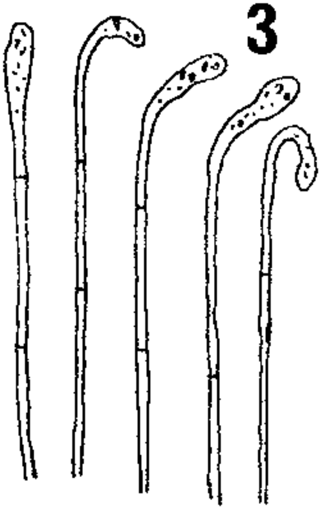

Fig. 3 Parafyser.

Fig.2 Sporer A.rhenana.

Dette er i såfall første og hittil eneste funn av Aleuria fra arktisk område, men det foreligger ingen beskrivelse av materiale, eller dens økologi.

Alldeles nylig er arten rapportert fra Sichuan i sydvestre Kina (Korf & Zhuang 1985).

A.rhenana er funnet både i nåle- og edelløvskog. Benkert (1984) har spesifisert en del moser fra de øst-tyske funn.

De kjente funn av A.rhenana er markert på utbredelseskartet, figur 5.

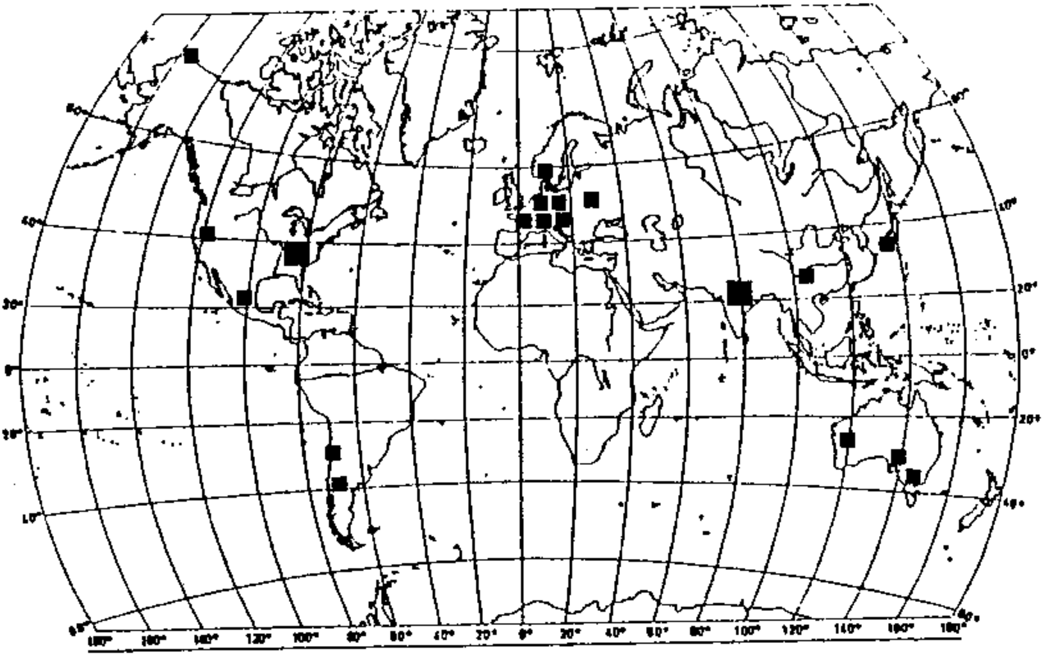

Fig.5 Utbredelseskart for Aleuria rhenana.

Distribution of Aleuria rhenana.

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SUMMARY.

This is the first record of Aleuria rhenana Fuck. in Scandinavia, and it conforms with other findings reported.It grows cespitose in grass and needlebed in calcareous pineforest in the county of Telemark,Southern Norway.Additional locations from less known literature are provided, and especially interesting is the record by Laursen & Ammirati (1982) from Barrow,Alaska,which shows the species goes in to an extreme arctic area,and it is the first record of an Aleuria in the Arctic.

AGARICA

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Studies on Hungarian Lepiota s.l. species. VI. Glasshouse species.

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ABSTRACT

Lepiota s.l. materials occurring in the large glasshouses of horticultural farms and botanical gardens are being collected and studied since 5 years in Hungary. So far 11 species have been found (Cystolepiota luteicystidiata, Lepiota bettinae, Leucoagaricus brunneolilacinus, L. melanotrichus, Leucocoprinus birnbaumii, L. brebissonii, L. denudatus, L. lilacinogranulosus, L. medioflavus, Macrolepiota rhacodes var. hortensis, Melanophyllum echinatum).

INTRODUCTION

Fungi appearing in glasshouses, principally in those of botanical gardens, attracted the attention of mycologists already in the nineteenth century. Their publications state that in "regulated" sites the number of Lepiota s.l. species is strikingly large.

In the available literature I found the first data concerning thermophilous "Lepiota" species in Sowerby's (1797, 1799) work. It appears from the descriptions of systematic works and atlases published in the nineteenth and the first half of the twentieth centuries (Fries, Cooke, Rea, Gillet, Quélet, Boudier, Konrad & Maublanc, Bresadola, Lange, etc.) that certain species occur in Europe regularly in glasshouses or in sites offering similar habitat conditions.

These statements were supported by mycofloristic investigations made in glasshouses already by the end of the nineteenth centuri in several countries of Western Europe. Cooke (1888), Cooke & Massee in Cooke (1888, 1890), Massee (1897) and Wakefield (1918, 1920) published new "Lepiota" species from the glasshouses of the Royal Botanic Gardens (Kew). Dennis (1948, 1949) carried on these studies. On the basis of his own collections and earlier observations extending to nearly eighty years, Pegler (1966) demonstrated 13 Lepiota s.l. species from the glasshouses (Palm House, Temperate House, Tropical Pits, Fern House, Aroid House, Nephentes House, Waterlily House) of the Kew Gardens. Reid, too, discussed the glasshouse species of Kew Gardens; he reassigned the species described by Wakefield in 1918 to the genus Amanita in 1966, discussed it in details, and also described a new species in 1967.

Hennings (1898) treated 17 "Lepiota" species from the glasshouses of the Botanical Garden in Berlin, describing seven new species, and leaving one diagnosis to Bresadola. Michael & Hennig (1967) publish their species list based on Hennings's observations in their book "Pilze in Gewächshäusern". Straus (1967) published one species from Berlin-Dahlem. Kreisel (1967) made observations in the glasshouses of the Botanical Garden at Greifswald, GDR. He published a new species also from there, simultaneously with Reid (1967); Bon (1981) later established their distinct specificity, or their distinctness at least at the subspecific level based on minor differences, relegating them at the same time to the genus Cystolepiota. Dörfelt (1982) diagnosed a new glasshouse species from the Botanical Garden of Halle/Saale, GDR. We found the same species simultaneously also in Hungary.

Bresadola (1927) published partly the Berlin material received from Hennings, partly those deriving from Italy and some other countries or, indeed, continents.

Kauffman (1924) recorded 18 species from North American and European glasshouses in his "List of Lepiotas occurring in hothouses, etc., apparently introduced from the tropics".

In countries where collections had been made only sporadically, one to three -- mainly Leucocoprinus -- species were published (Soviet Union: Wasser, 1977, 1980; Urbonas, Kalamees & Lukin, 1974; Roumania: Sălăgeanu, A. 1968; Czecho-Slovakia: Cejp, 1948; Herink, 1959; Melzer, 1959; Wichanský, 1964; Pilát, 1969; Switzerland: Haller, 1951; Haller & Schärer-Bider, 1951; Portugalia: Camara, 1956; Japan: Imazeki & Hongo, 1962; etc.).

Literature data revealed that, owing to taxonomic and ecological points of interest, this theme deserved attention in the frame of our Lepiota s.l. research in Hungary. This studium is continuing in framework of "man-made-ment localities" thema in Botanical Department.

Our present investigations differ in so far from the earlier observations outlined above that they are conducted in mainly the large glasshouses -- where strictly regulated conditions obtain -- of farms growing ornamental plants. In these monocultures the saprophytic mushroom flora proved to be similarly rich to that prevailing in the tropical to subtropical glasshouses harbouring many kinds of plants.

My best collections derive from the "Kertész MTSZ" at Szombathely, W-Hungary. This cooperative produces potted ornamental plants on 80.000 m^2 glasshouse surface. They cultivate about 100 different species and varieties, of which I found Lepiota s.l. species in the following ones: Dracaena 5.000 m^2, Saintpaulia ioantha 4.500 m^2, Bromelias 12.000 m^2, Codiaeum variegatum 3.500 m^2, Phalaenopsis 200 m^2. In the hothouses temperatures 18-20 C^o prevail during the winter and 24-28 C^o during summer; relative humidity content is 60-90 %. Soil mixtures contain "Novobalt" (Sphagnum) Soviet peat, Hungarian fen peat (from

Osli in the Hanság), pine bark, and in some cultures also cattle dung soil substrate. The pH values of the divers soil are as follows: Dracaena 6-6.5; Saintpaulia 5-5.5; Bromelias 4.5-5; Codiaeum 6.5-7; Phalaenopsis 4.5-5 pH.

It is manifest therefore that culture conditions are invariably optimal for the fungus species occurring there. There is, however, a single factor which might inhibit their appearance. According to information received from M. Déri, horticultural engineer, a mixture of pesti- and fungicides is applied once monthly in the glasshouses at Szombathely. His observations indicate, however, that this practice has no detrimental influence on the growth of the mushrooms. I had the same experience in the course of my collectings. The mushroom species appeared locally in masses, like weeds, but they cause problems only among the cuttings and, for instance, in the propagation of ferns, because by their mass occurrences they may eventually suppress the small plants. In such sites the gardener responsible for the glasshouse simply and regularly "weeds out" the fruitbodies. Mushrooms appearing in the neighbourhood of the mother stock and under the benches cause no trouble. My observations were made in the spring, summer, early and late autumn, and I succeeded on every occasion to gather rich materials of these species considered as rare. Some species produced fruitbodies by the thousands.

In the large glasshouses of the"Rozmaring MTSZ" in Budapest Gerbera and carnation taxa are grown. I found no "Lepiota" species in these cultures. Leucocoprinus species fructified mainly among Saintpaulia cuttings in the potted ornamental plants.

I received an interesting material from the Botanical Garden of the University of Horticulture, Budapest: Soroksár. A new species fructified on a bench of the Strelitzia House (Babos, 1980), but other interesting "Lepiota" species were also found in that Garden. Some collections were received also from the glasshouses of the Botanical Research Institute, Hungarian Academy of Sciences, Vácrátót, or collected in the Anthurium House of the Zoological Garden, Budapest. I found one species in the Bromelia House of the Eötvös Loránd University of Sciences, Budapest, but no "Lepiota" species were observed, according to the gardeners, in the divers glasshouses of the József Attila University of Sciences, Szeged.

I asked for information also from Gy. Makara, orchid grower. He stated (verbal communication) that he usually observed 2-3 "Lepiota" species in his glasshouse, but never tried to identify them.

Some species are designated in literature as "an alien". I have therefore obtained the following information relevant to this remark: the propagation material of the cultures is produced in situ by the "Kertész MTSZ" in Szombathely, but they have also imported some from the Netherlands, Belgium, Denmark, and the USA. The imported soil substrate ("Novobalt" peat) or mixtures are sterilized by heat treatment.

By using imported propagation material it may happen that the species appearing in the glasshouses are "introduced" and that they can be further disseminated by the exported wares. This is indeed possible, but it was demonstrated, in the course of the mycological investigation of industrial sawdust dumps, that the spores arrive mainly by aerial routes into the glasshouses.

I propose to make only brief remarks with regard to observations of well-known glasshouse species. However, I submit the diagnoses and illustrations of Hungarian specimens of recently described or still insufficiently known species. These latter were identified by recourse to the works of Reid (1967), Malençon & Bertault (1970), Dörfelt (1982), Boudier (1894), Bon (1981). Nomenclature follows Bon (1981). The herbarial material is preserved in the Botanical Department, Hungarian Natural History Museum (BP).

TAXONOMICAL PART

Cystolepiota luteicystidiata (Reid) Bon FIGS.1, 2, 15.

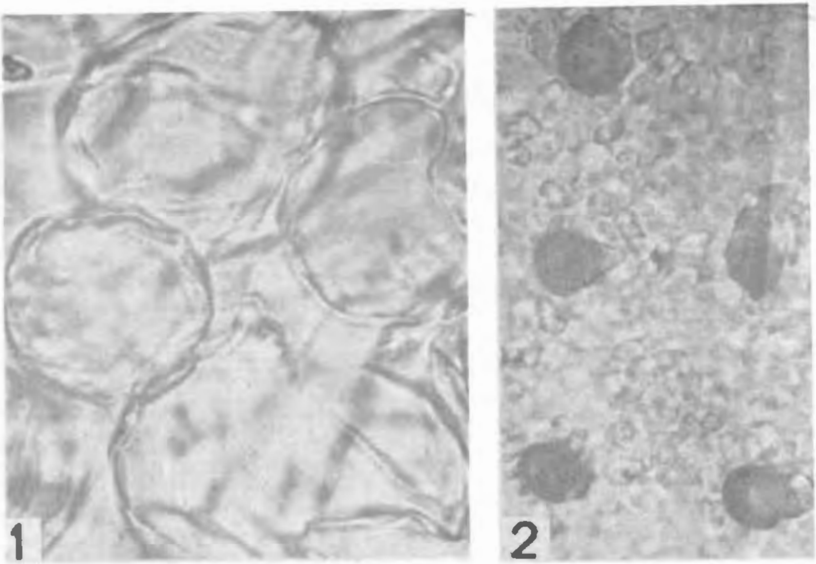
The most frequent species in the glasshouses of the "Kertész MTSZ" at Szombathely. It fructified regularly in three cultures (Codiaeum, Bromelia, Dracaena), among the plants and on the soil below the benches.

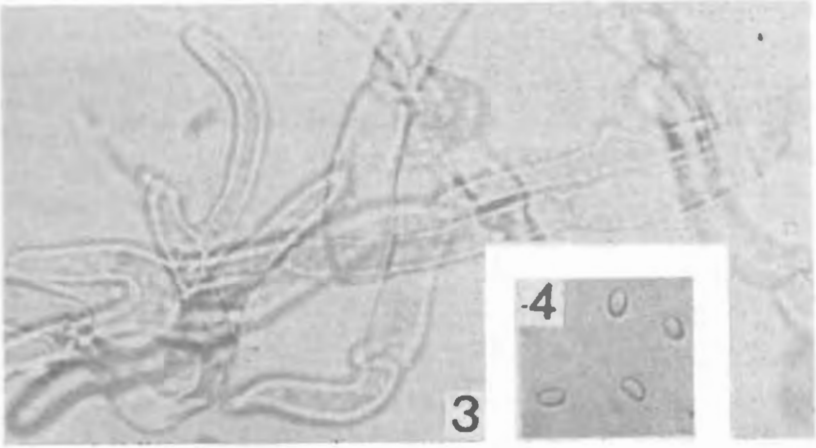
Pileus: 1-5 cm in diam.; hemisphaerical then campanulate or convex, finally flat; when young white, covered with white or brown erect and pyramidal floccose scales, later with the darkened brown pyramidal spines and scales observable mainly centrally while marginad lanate,floccose and squamose, disclosing white basic colour of cap. Caps of fruitbodies growing in groups often whitish farinose owing to masses of liberated spores. Lamellae: crowded, free; white, creamy white; darkening in herbaria to pale café au lait or darker brown. Stipe: 1.5-5.5-(7) x 0.2-0.5-(1) cm; shape divers, stout or elongate, cylindrical, often slightly incrassate basad, also often curved in specimens growing in groups; white, then covered with abrading floccoso-lanate indument turning brown. Velum white, mealy. Flesh: very fragile; white in cap, brownish or brown in outer part of stem, inner part whitish, tubulose, cottony filamentose; when cut browning (I found no reddening). No special smell.

Spores: 3.6-4.5 x 2-2.5 µm; elliptical or subcylindrical, thin-walled, with or without guttules. Cheilocystidia: shape from fusiform to broadly fusiform, 7-10 µm wide, with or without short appendix. Pleurocystidia: with yellowish-brownish content, 7.8-10 µm wide. Scales of the pileus of sphaerocysts, 23-55 µm in diam., thin-walled, hyalin or brownish.

Herbarial data:

Szombathely, "Kertész MTSZ", Bromelia-, Codiaeum- and
Dracaena House, 24 Sept. 1981, leg.:M. Babos & Z. Sarkadi
11 May 1983, leg.:M. Babos
30 Aug. 1983, leg.:M. Babos
10 Nov. 1983, leg.:M. Babos





FIGS.1–2. Cystolepiota luteicystidiata
sphaerocysts and pleurocystidia
FIGS.3–4. Lepiota bettinae .
elements forming the scales of
the pileus and spores
X 900 Photo: by Gönczöl & Révay

Lepiota bettinae Dörfelt FIGS. 3, 4, 16.

Kieler and Dörfelt collected it first in a glasshouse of the Botanical Garden of Halle/Saale, on 17 March, 1981. The species grows on the roots of the fern Phlebodium aureum. They published it therefore as a pteridophilous fungus. Half a year later (autumn 1981), we found it on the soil of Codiaeum variegatum mother stocks in Hungary, and subsequently also in other glasshouse cultures (Dracaena, Bromelias, Anthurium). Masses fructified in the spring and autumn, but essentially less were found during the hot summer and late autumnel collectings.

Pileus: 0.3-0.9-(1.2) cm in diam.; convex, flattening, finally slightly impressed centrally; when young purple-vinous, felty, a layer disintegrating into very fine scales and filaments. Pallescent, only medially and scales vinous, browny vine red; also some light yellow spots found in several caps. Margin of pileus not or only slightly ribbed, often villous owing to velum flocci. Lamellae: sinuste, free; first white then pale creme yellowish, when touched and during desiccation with a lemon yellow discolouration in a number of collections. Stipe: 0.6-1.5-(2) x 0.05-0.12 cm; straight, or curved owing to fructification in groups; first light vinous, later covered with brownish red minute flocci. Ring discernible only in quite young specimens, white, marginally ornamented vine red, soon evanescent. Base of stipe with white mycelial rhizoids. Flesh: very thin and white in cap, brownish vinous in stipe. No characteristic smell.

Spores: 4.5-5 x 2.5-3 µm (sensu Dörfelt: 6.2-7.6 x 3.1-3.8 µm); elliptical. Cheilocystidia: hyalin, clavate, 6-8 µm wide, very thin-walled. Hyphae forming scales on surface of pileus: cylindrical, thick-walled, with purpur-brownish membranpigment, oft with clamp connections; in tufted.

Herbarial data:
Szombathely, "Kertész MTSZ"
Codiaeum House, 24 Sept. 1981, leg. M. Babos & Z. Sarkadi

Dracaena-, Bromelia House, 11 May 1983, leg.:M.Babos
Codiaeum House, 30 Aug. 1983, leg.:M.Babos
Dracaena House, 10 Nov. 1983, leg.:M.Babos

Budapest: Zoological Garden, Anthurium House
20 March 1983, leg.:L.Albert, det.:L.Albert
22 March 1983, leg.:M.Babos

Leucoagaricus brunneolilacinus Babos FIGS. 8, 17.

The detailed description of the species was published in the previous communication (Babos, 1980). Stature medium high (pileus 3-12 cm). Cap and stem brownish lilac, brownish purplish lilac, lanato-floccoso-squamose. Velum universale wooly-felty, originally white (observable only on very young specimens). Velum partiale fugaceous, membranaceous, whitish then brownish lilac. Lamellae: crowded; white, creamy white, discolouring in spots, finely oil brown, tobacco brown, edge locally whitish. Base of stipe with mycelial rhizoids. Flesh: orange to red, turning brown.

Spores: 4-5-(5.4) x 2.4-3.2 µm; elliptical; discolouring metachromatically in cresyl-blue. Cheilocystidia: cylindrical to clavate; 13.2-24 x 3.2-7.8 µm. Velum universale: cells of hyphae purple lilac, smooth or with a granular -- occasionally spirally arranged -- incrustation. Pileus of quite young specimens occasionally with sphaerocysts, 6-14 µm in diam.

Herbarial data:

Budapest: Soroksár, Botanical Garden, University of Horticulture, Strelitzia House
16 July 1975, leg.:I.Rimóczi, det.:M.Babos
27 April 1976, leg.:I.Rimóczi, det.:M.Babos
27 March 1979, leg.:L.Albert & M.Babos
13 June 1979, leg.:L.Albert, det. L.Albert

Leucoagaricus melanotrichus (Mal.: Mal. et Bert.) Trimb.
FIGS. 5, 6, 7, 18.

Malençon & Bertault (1970) published it as a new species; it was collected in montane shrubberies and woods on the Plateau Central, Moyen Atlas, Rif in Morocco. Bon (1981) considers it a "méditerranéo-atlantique acidophile" species. Its occurrence in glasshouses was rather astonishing. I succeeded to collect it first not in Hungary, but in the glasshouse of the Botanical Garden of Helsinki, on 12 August, 1981.

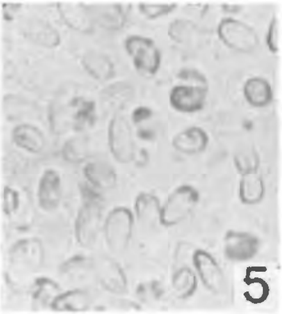
Pileus: 1.2–2.8 cm in diam.; hemisphaerical, campanulate, flattening, medially slightly gibbous; when young entirely covered with a matt, greyish black filamentoso-floccose layer of a slight violet sheen; simultaneously with growth and flattening process of cap cover disintegrating into filements and scales, thereby turning lighter and only medially retaining its contiguous greyish black hue. Margin finally very finely ribbed (according to Malençon & Bertault: "haud striato"). Lamellae: free; white, pale creamy, when dry creamy. Stipe: 1.8–3.5 x 0.2–0.35 cm; slightly incrassate basad or of even thickness; white; base of stipe with white mycelial rhizoids. Ring: erect; marginally blackish. Flesh: thin, white. No special smell.

Spores: 6.2–7–(7.8) x (3)–3.2–3.9 µm, (narrower than dimensions by Malençon & Bertault: 6–7.5 x 3.8–5 µm, and by Bon: 6.5–7.5–(8) x 4–4.5 µm); elliptical – subcylindrical; without germ-pore; discolouring metachromatically in cresyl-blue. Cheilocystidia: clavate or subfusiform, width 7.8–12 µm. Hyphae the scales on the surface of the pileus: cylindrical, hyalin or with brownish grey vacuolar pigment or with brown necropigment.

Herbarial data:

Szombathely, "Kertész MTSZ", Dracaena House, Bromelia House, 11 May, 1983, leg.: M.Babos

Finland: Helsinki, Botanical Garden, in glasshouse
12 Aug. 1981, leg.: M.Babos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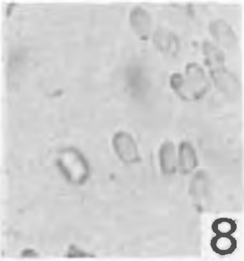
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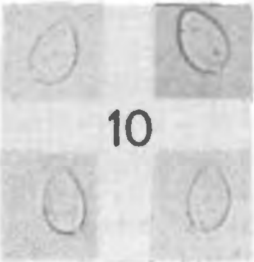
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FIGS.5-7. *Leucoagaricus melanotrichus*
spores and hyphae of scales
FIG.8. *Leucoagaricus brunneolilacinus*
spores
FIG.9. *Leucocoprinus birnbaumii*
spores
FIG.10. *Leucocoprinus brebissonii*
spores
X 900 Photo: by Gönczöl & Révay

Leucocoprinus birnbaumii (Cord.) Sing. FIG. 9.

A widely distributed and common glasshouse species. Fruitbody vivid lemon yellow, sulphur yellow. Cap ornamented with vivid yellow or brownish scales, often quite minute, margin heavily ribbed. Stem floccose. Ring erect, yellow. Sclerotium whitish.

Spores: (6.2)-7-10.1 x (5)-5.4-6.2 µm; ovoid or more or less almond-shaped; with germ-pore; discolouring metachromatically in cresyl-blue. Cheilocystidia: slightly swollen. Pseudoparaphyses: roundish. Scales on pileus consisting of oblong, cylindrical, clavate, puzzle-shaped, more or less branching cells and sphaerocysts.

Herbarial data:

Vácrátót, Botanical Research Institute, Hungarian Academy of Sciences, Bromelia House, 27 Apr. 1974, leg.:I.Rimóczi, det.:M.Babos

Budapest, "Rozmaring MTSZ", Saintpaulia House, 5 Oct.1981, leg.:Cs.Tusnádi, det.:M.Babos

Budapest: Botanical Garden of the Eötvös Loránd University of Sciences, Bromelia House, 29 March 1985, leg.:M.Babos, 19 Apr. 1985, leg.:M.Babos

Szombathely, "Kertész MTSZ", Phalaenopsis House, 25 Apr. 1977, leg.:G.Lányi, det.:M.Babos, Dracaena House, 24 Sept. 1981, leg.:M.Babos & Z.Sarkadi, Phalaenopsis House, 30 Aug. 1983, leg.:M.Babos, Saintpaulia House, 10 Nov. 1983, leg.:M.Babos

Leucocoprinus brebissonii (God.) Locq. FIG. 10.

According to literature (Lange, 1935; Kühner 1936; Phillips, 1981; Moser, 1983) the species fructifies in forests. Also Bon (1981) stated as follows: "Feuillus divers, hétraies, c'est une des espèces réellement ""sauvages"" dans toute la France." Pegler (1966) collected it on several occasions in the glasshouses of Kew Gardens (Fern House, Temperate House, Tropical Pits), while earlier it was found free in the arboretum (Massee

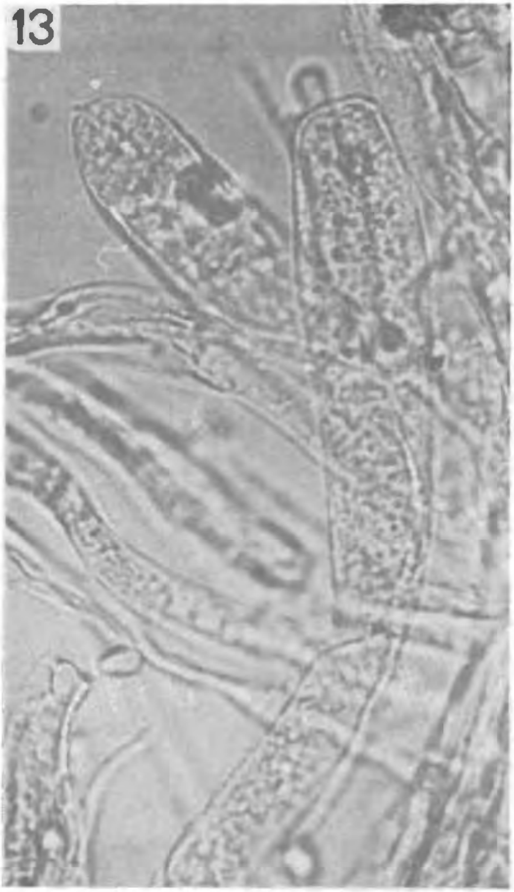

FIG.11. *Leucocoprinus denudatus*
spores
FIGS.12-13. *Leucocoprinus medioflavus*
spores and hyphae on surface
of the pileus
FIG.14. *Leucocoprinus lilacino-granulosus*
spores
X 900 Photo: by Gönczöl & Révay

1897, s.n. L. felina). So far not found in woods in Hungary, but L. Albert collected a specimen each in glasshouses in 1983.

Pileus: 4 cm in diam.; white, discus and scales fuscous, fumose; more roughly squamose than illustrated in literature (Gillet, 1874; Lange, 1935; Phillips, 1981); cap margin ribbed. Lamellae: free; collarium absent; white, creme coloured. Stipe: 4.5-5.5 x 0.3-0.4 cm; slightly incrassate basad; white. Ring: white, more or less disintegrating. Smell not observed.

Spores: (8.5)-9.3-11.7-(12.4) x 5.4-7-(7.8) µm; almond-shaped, subcitriform or ovoid; germ-pore protruding; discolouring metachromatically in cresyil-blue. Cheilocystidia: brownish or hyalin, clavate, ventricose or lageniform with longer or shorter neck; 23-54 x 7-17 µm. Pseudoparaphysis: frequent; isodiametric.

Herbarial data:
Budapest: Soroksár, Botanical Garden, University of Horticulture, Strelitzia House, 27 May 1983, leg. et det.:L. Albert, in glasshouse, under Asparagus plumosus, 3 June 1983, leg. et det.:L.Albert

Leucocoprinus denudatus (Rabenh.) Sing. FIG. 11.

A rather well-known glasshouse mushroom. Distributed in the whole of Europe, or rather cosmopolitan (Bresadola, 1927; Herink, 1959; Imazeki & Hongo, 1962; Wasser, 1979; etc.). At Szombathely it fructified regularly, and occasionally in large numbers, among the Saintpaulia ioantha cuttings.

Pileus: 1-2.8 cm in diam.; thin-fleshy; in young specimens more or less ovate-subconical, then campanulate, finally explanate with an umbo; pale sulphur yellow, yellowish creamy, umbo ochraceous; when young cottony-floccose, later -- especially umbo -- glabrescent; margin finely ribbed. Lamellae: crowded, free, distant from stem; pale sulphur yellowish, creamy. Stipe: 1.5-5 x 0.15-0.3 cm; cylindrical, gradually becoming slightly thickened

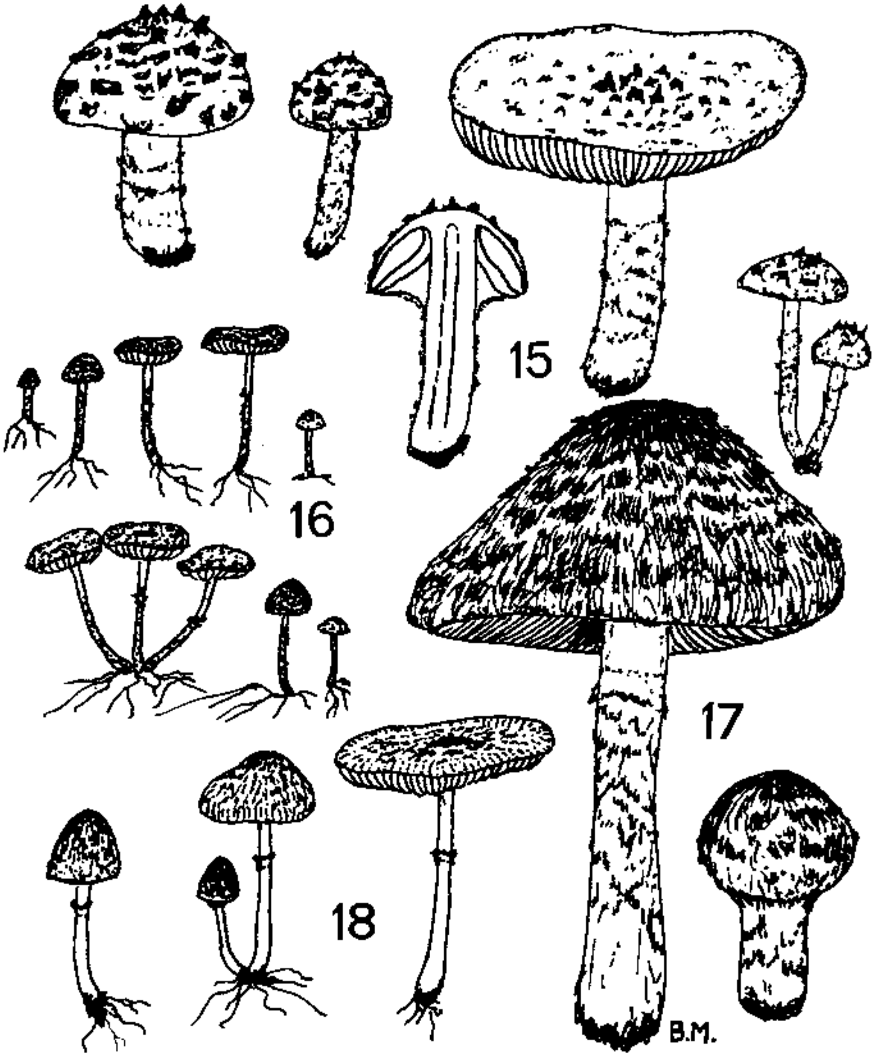

FIG.15. *Cystolepiota luteicystidiata*

FIG.16. *Lepiota bettinae*

FIG.17. *Leucoagaricus brunneolilacinus*

FIG.18. *Leucoagaricus melanotrichus*

X 1

basad; concolorous with cap; when young cottony-floccose, later floccose, finally more or less glabrescent; fistulose. Ring: about middle of stipe in wholly developed specimens, more or less funnel-shaped; yellowish creamy, cottony-fibrillose-pruinose, later membranaceous, sometimes evanescent. Flesh: pale sulphur yellow. No special smell.

Spores: 5-6-(7) x 4-4.7-(5) µm; short elliptical or roundish; without germ-pore; discolouring metachromatically in cresyl-blue. Cheilocystidia: short clavate or ampullaceous (width 8.5-15 µm), with shorter or longer neck (width 2.3-5.4 µm). Cells of cap with hymeniform elements and sphaerocysts (width to 39 µm).

Herbarial data:

Szombathely, "Kertész MTSZ", Saintpaulia House, 24 Sept. 1981, leg.: M.Babos & Z.Sarkadi, 11 May 1983, leg.:M. Babos, 30 Aug. 1983, leg.:M.Babos, 10 Nov. 1983, leg.:M.Babos

<u>Leucocoprinus</u> <u>lilacino-granulosus</u> (Hennings) Locq.

FIG. 14.

Of small stature, dimensions of fruitbodies agreeing with Hennings's (1898) description; those of some specimens, however, considerably exceeding them (cap to 5 cm; length of stem to 7 cm). Pileus: initially an elongated oval, then subconical, finally explanate; when young wholly covered by a dark rosaceous purple floccose indument, but with growth of cap this layer disintegrating into flocci and minute filaments, only discus remaining entirely purple brown; basic colour of cap rosaceous ochreous; flattened caps heavily ribbed, ribs extending to 1/2, 2/3 or nearly to discus. Lamellae: distant from stem; whitish, pale rosaceous. Stipe: incrassate basad; below ring covered with rosaceous purple flocci, finally these flocci persisting only at base; stipe whitish pruinose above ring. Ring: white, evanescent. No sclerotium observed.

Spores: 8-10.9-(11.7-14) x 5.4-7.8-(8.5) µm; ovoid, elliptical; slightly rose tinted; with germ-pore; discolouring metachromatically in cresyl-blue. Cheilocystidia not observed. Cap cover consisting of divers, pale purple brown or hyaline, cylindrical, clavate, ellipsoid, or branching cells and sphaerocysts.

Herbarial data:

Budapest, "Rozmaring MTSZ", Saintpaulia House, 27 May 1981, leg.:M.Babos

Szombathely, "Kertész MTSZ", Phalaenopsis House, 25 Apr. 1977, leg.:G. Lányi, det.:M.Babos, Saintpaulia House, 24 Sept. 1981, leg.:M.Babos & Z.Sarkadi, 11 May 1983, leg.: M.Babos, 30 Aug. 1983, leg.:M.Babos, 10 Nov. 1983, leg.: M.Babos

Leucocoprinus medioflavus (Boud.) Bon FIG. 12, 13.

Boudier (1894) published the description and a good figure. Later also Rea (1922) observed it in glasshouses.

A rare species, usually absent from identification books, and only Bon (1981) discussed it. I had no opportunity for a detailed study, not having collected it myself, but rely on the observation of seven exsiccated specimens received on two occasions.

Resembling Leucocoprinus denudatus, but not yellowish, only white, slightly creamy, merely discus of cap ochreous. Explanate cap 1–2.8 cm in diam.; margin finely ribbed; surface finely pubescent-floccose. Lamellae: crowded, free; white. Stipe: 2.5–4.5 x 0.15–0.2 cm; white, base of one specimen ochreous; minutely mealy above ring, tomentose at bulbous or subclavate base. Ring: white, erect, at median height. No smell observed.

Spores: 5.4–6.5–(7) x 3.2–3.9–(4.7) µm; elliptical; uniguttulatae; without germ-pore; with cresyl-blue slightly metachromatically discolouring. On edge of gills with subisodiametric cells (11–25 µm in diam.). Cells forming flocci on surface of pileus: elongate cylindrical or clavate; width 7–20 µm.

Herbarial data:
Budapest: Soroksár, Botanical Garden, University of Horticulture, in glasshouse, 29 July 1980, leg.:L.Albert, det.: M.Babos, 10 Sept. 1980, leg.:L.Albert, det.:M.Babos

Macrolepiota rhacodes (Vitt.) Sing. var. hortensis Pilát

I found on one occasion some typical but very small specimens. The diameter of the cap was 5 cm, the lenght of the stem the same, while the bulb of the stem messured 2 cm. Despite their dwarf stature, the fruitbodies were stout, fleshy.

Under the name Lepiota rhacodes forma vaporaria P. Henn., Hennings (1898) mentions a taxon collected in a "Cycadeen-Haus" which was observed also in mushroom cultivation. I am not familiar with its description, but, on the basis of the growth site, it may be identical with var. hortensis.

Herbarial data:
Szombathely, "Kertész MTSZ", Dracaena House, 10 Nov. 1983, leg.: M.Babos

Melanophyllum echinatum (Roth: Fr.) Sing.

Frequent in some years on forest humus, mainly among paths. It was collected only twice in glasshouses. According to Michael, Hennig & Kreisel (1977) and Bon (1981) it lives in soils rich in nitrogen. We found only one specimen each; their macro- and microscopic features agree with literature data.

Herbarial data:
Budapest: Soroksár, Botanical Garden, University of Horticulture, in glasshouse, 3 May 1983, leg. et det.:L.Albert. Szombathely, "Kertész MTSZ", Codiaeum House, 10 Aug. 1983, leg.:M.Babos

- - -

Leucoagaricus *bresadolae* (Schulz.) Bon
Leucoagaricus *meleagris* (Sow.: Fr.) Sing.
Leucocoprinus *cepaestipes* (Sow.: Fr.) Pat.

According to literature, these species had been observed in glasshouses, hot beds and in sawdust heaps. In Hungary, we have collected them so far on decaying sawdust heaps only (Babos, 1981). Leucoagaricus meleagris has the greatest heat requirements, it occurred only on heated sawdust.

The Lepiota s.l. species discussed above may be grouped according to their fructifying sites as follows:

1. Species occurring only in glasshouses (or in similar conditions, e.g. hot-beds):
    - Cystolepiota luteicystidiata
    - Lepiota bettinae
    - Leucoagaricus brunneolilacinus
    - Leucocoprinus birnbaumii
    - Leucocoprinus denudatus
    - Leucocoprinus lilacino-granulosus
    - Leucocoprinus medioflavus
2. Occurring both in glasshouses and on decaying sawdust, heaps of tree-bark:
    - a./ thermophilous species:
        - Leucoagaricus meleagris
        - Leucocoprinus cepaestipes
    - b./ species with lower heat requirements:
        - Leucoagaricus bresadolae
3. Species occurring in glasshouses and in disturbed sites, on compost heaps, etc.:
    - Macrolepiota rhacodes var. hortensis
    - Melanophyllum echinatum
4. Forest species, but occurring also in glasshouses:
    - Leucoagaricus melanotrichus
    - Leucocoprinus brebissonii
    - Melanophyllum echinatum

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AGARICA

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Problèmes morphologiques et taxonomiques relatifs à Xerocomus badius (Fr.:Fr.)Gilbert.

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Le complexe des Bolets semble à première vue n'être particulièrement difficile à interpréter et à connaître, autant en sont les différences visives que l'on rencontre entre un ensemble et l'autre.

Pourtant, il suffit de profondiser soit-il peu l'analyse - et cela est bien connu par les experts - pour devoir constater combien de difficultés en bien des cas s'entremêlent pour une détermination correcte de chaque récolte et surtout pour être à même de la distinguer avec assurance des autres, seules apparemment semblables.

Justement, à confirmation d'une telle constatation, je m'occuperai ici d'un cas aux aspects surprenants et plutôt intriqué pour une solution inéquivocable.

Elias Fries tint à baptême dans son oeuvre plus juvénile, en 1818 un *Boletus badius* qu'il confirma dans ses travaux succéssifs, déjà à partir du Systema Mycologicum de 1821, par une diagnose qui peut être exposé dans ces termes:

- bolet à chapeau presque rouilleux, plus sombre au centre et à couleur plus vive vers le bord, convexe-applané, pubescent et sec; avec tubes et pores en peu irrégulièrement anguleux, avant blanchâtres et puis jaunes; à pied d'épaisseur quasi uniforme dans son extension, avec chair assez épaisse, molle, jaunâtre, virant à la fraction à peine à un bleu pâle; croissant dans les pinèdes.

Fries lui-même, peu de temps après (Fries I838) appela aussi en vie au côté de B. badius un Boletus vaccinus décrit en ces termes :

- bolet à chapeau un peu villeux, de teint châtain, pulviné-enlargé, avec des tubules libres, menus, avant blancs puis jaunes; à pied fusiforme ou bulbeux, presque lisse et à chair blanche, immuable; champignon parfois cespiteux, croissant en hêtraie, rare.

Ainsi qu'il paraît clairement des deux descriptions fournies tout-à-l'heure, entre les deux champignons il y a une indoutable et remarquable affinité, chose d'ailleurs déjà notée par Fries lui-même dans sa diagnose originale pour le deuxième des deux.

Justement pour cela, la doctrine mycologique, après Fries, s'est posée plusieurs fois le problème : sont effectivement B. badius et B. vaccinus les représentants de deux espèces autonomes et donc les deux bien valables ou ne sont-elles plutôt pas deux aspects (chacun relatif à un moment ou à un environnement particulier) d'un taxon unique ?

Les réponses données à un tel interrogatif n'ont pas été toutes acheminées sur une seule interpretation, mais l'on peut dire que deux gros partis se soient formés, chacun avec des idées différentes.

Le premier juge que B. badius et B. vaccinus soient des champignons bien distincts, à tenir séparés sur la base des caractères suivants :

B. badius	*B. vaccinus*
- chapeau pas toujours terse ou sec, parfois humide ou même un peu viscide, a surface presque toujours glabre ou, au moins, beaucoup peu pubescente;	- chapeau toujours terse et sec, à surface beaucoup plus tomenteuse, avec feutrosité ou velour bien évident;
- couleur, toujours dans le chapeau, sur le marron-brun non vif et, par-là, sans de particulières tonalités rousses;	- teinte du chapeau substantiellement sur le fauve (couleur "vaccine") et, par-là, avec une composante rousse qui donne plus de vivacité aux tons prédominants;
- pied d'épaisseur presque uniforme et, par-là, pratiquement cylindrique, seulement un peu renforcé en bas;	- pied bulbeux et donc d'épaisseur bien plus relevant dans la partie inferieure;
- chair virante, soit-il seulement à un bleu fort pâle, en partant d'un teinte jaunâtre.	- chair à teinte immuable, constamment sur des tons presque blanchâtres.

La thèse prospectée ci-haut est, entre autres, supportée par Gillet, Saccardo, Bataille, Ricken.
A ceux s'opposent Gilbert, Kallenbach, Konrad & Maublanc, Pearson, Imler (et beaucoup d'autres) qui jugent *B. vaccinus* un simple synonyme de *B. badius*, duquel il reflète des aspects particuliers, dûs à des récoltes faites en des circonstances

météorologiques différentes. Les partisans de cette opinion en substance disent :

- Fries et ceux de son courant se réfèrent à un seul champignon vu en deux situations différentes; la première relative à des conditions atmosphériques telles à provoquer dans les échantillons une plus réduite pubescence piléique à laquelle s'accompagne une plus basse vivacité des teintes pour le chapeau qui demeure coloré d'un brun moyen ou même foncé, sans une particulière apparition de composantes rougeâtres : et celui-ci est l'aspect de B. badius; la seconde relative à un temps plus sec et chaud, déterminant la naissance de carpophores à chapeau fort velouté, avec des couleurs plus évidentes et vives, avec l'apparition de tons rougeâtres : est celui-ci l'aspect de B. vaccinus.
- La présence ou non d'un virage dans les carpophores à la coupure ou bien à la pression est un caractère quelque variable d'un cas à l'autre, surtout dans le secteur auquel le champignon en discussion appartient, ainsi qu'il est donné de voir en bien d'autres espèces; il n'y a donc de raison, à ce que cela n'arrive aussi pour celle en question; comme preuve d'une telle affirmation, que l'on pense à ce qu'il arrive pour X. subtomentosus, dont tout le monde connaît l'alternant comportement à la coupure : parfois la chair passe à un bleu plus ou moins net, parfois elle ne change carrément pas de couleur. Or, si cela est admis pour ce taxon, pourquoi ne concède-t-on pas une analogue possibilité dans le badius? Il est puis nécessaire ne pas oublier que même Fries n'a pas été cohérent dans ses indications, puisque , si bien qu'il ait donné son vaccinus à chair immuable, il nous a puis laissé du champignon une icone (Fries 1860) dans laquelle la chair bleute d'une

façon inequivocable.

Il resterait encore à discuter sur l'habitat. Pour quelques-uns des Auteurs *B. badius* naîtrait exclusivement sous conifères (pour la plupart sous essences de pins), tandis que *B. vaccinus* serait lié seulement à des feuillus (hêtres ou chataigniers). Pourtant, aussi les souteneurs de la distinction spécifique entre ces deux bolets ne sont pas toujours d'accord sur une telle différence d'habitat. En effet, cela est démenti par les témoignages de ceux qui ont trouvé soit le premier que le deuxième champignon en un environnement qui n'en devrait point permettre la naissance.

Enfin, toujours de la part de ceux qui penchent pour une identité entre les deux bolets, on avance encore cette observation.

Les différences invoquées pour une séparation spécifique sont bien peu de chose et ne reflètent même pas ce que nous a laissé écrit Fries. Celui-ci a dit que *badius* autant que *vaccinus* ont une cuticule du chapeau sèche et veloutée. Les différences, en outre, de couleur du chapeau rentrent dans ce champ de variabilités que chaque espèce présente et qui ne peut être supprimé. Que l'on pense à ce qui arrive, par exemple, pour d'autres représentants du Genre *Xerocomus*, dans lequel le champignons en question doit être sans doute rangé.

Que l'on prenne le cas de *X. chrysenteron*. Parfois, selon la saison ou bien même en promiscuité de récoltes, on peut trouver des carpophores avec chapeau d'un brun-gris-olivacé, à tons point foncés, avec cuticule piléique toute gercée, ou bien avec chapeau d'un brun-noirâtre très sombre, presque noir, à dense tomentosité et à surface parfaitement unie, sans la moindre trace de gercures. Les Auteurs ramènent les deux formes à une seule espèce. Pourquoi ne fait-on pas la même chose pour le "soi-disant" *B. vaccinus* ?

On pourrait continuer pour de long sur ces discussions; je crois pourtant qu'il soit bien d'arrêter ici.

Plutôt une ultérieure hypothèse pourrait être portée à intégration du sujet.

Sommes-nous vraiment bien sûrs que *B. vaccinus* doive être relié à *B. badius* ou pas plutôt à un autre bolet, soit du même secteur ? À un tel propos prend consistence le cas de *B. moravicus* Vacek, publié tout justement après le deuxième conflit mondial (Vacek 1946).

B. moravicus présente un chapeau quelque feutré (même nettement squamuleux !), pied à cortex bien sillonée et en haut de couleur rougeâtre (son Auteur parle carrément de "rouge venitien"), avec chair immuable à la coupure. Les restantes caractéristiques morphologiques (y-compris certaine bulbosité au pied) sont tels à conduire à penser qu'il est fort proche de *B. vaccinus* sensu Act. pl.

A renforcer une conviction semblable travaille ce qui est paru tout récemment sur une publication préparée par un groupe mycologique espagnol (Iberduero 1985), qui chaque année édite un calendrier illustré et commenté, relatif aux champignons. Justement dans la livraison pour l'année en cours on présente un *B. vaccinus* (que l'on veut bien distinct de *badius*), en qui il est possible d'apercevoir une surprenante concordance avec *moravicus*, ainsi que celui-ci est reproduit dans une planche de Prochazka (Prochazka 1964) et dans la successive, due a Dermek,(imprimée dans une monographie sur les Bolets (Pilat & Dermek 1974).

Je laisse cette hypothèse à la considération des savants intéressés à la question.

Mais les problèmes du bolet en discussion ne finissent nullement ici. A ceux définissables comme morphologiques, ceux relatifs à sa taxonomie se relient.

Fries dans son impostation initiale (I8I8) déjà rappelée, considéra *badius* à niveau d'une simple variété de *B. castaneus* Bull. La chose fut confirmée en I82I dans Systema Mycologicum (Fries I82I); pourtant déjà en Elenchus (Fries I828)(qui fut publié en I828 mais dont la date virtuelle d'apparition a été portée à I82I d'après les dispositions du Code International de Nomenclature Botanique - ICBN -), toujours Fries considéra le bolet au rang d'espèce à soi-même.

De telle façon, il annula la précédente intervention de Persoon de I825, dans laquelle l'Auteur hollandais avait textuellement dit :"*B. badius* Fries est une espèce différente (de *B. castaneus*) pour le pied furfuracé et pour la chair bleuissante....." (Persoon I825).

Jusque-là nous avons considéré le bolet en parole comme faisant partie du Genre *Boletus*. Mais avec la création du Genre *Xerocomus*, due à Quélet, il est nécessaire de reconduire le champignon à un tel deuxième Genre, au moins de la part de ceux qui supportent la validité du taxon *Xerocomus*.

Ceci fu opéré par Gilbert (Gilbert I93I), faisant appel pourtant à une précédente analogue intervention de Kühner.

Mais - et ici réside tout l'étrange de la question - celui-ci n'a jamais effectué aucune intervention de la sorte, de plus est-il de l'avis que *badius* devrait être nommé *Boletus badius* puisqu'il juge - et avec lui concordent beaucoup d'autres mycologues, par exemple ceux de l'école britannique à la suite de Watling - que *Xerocomus* soit tout simplement une Section du Genre *Boletus*, dont les caractères distinctifs ne sont tels à justifier la mise en vie d'un taxon autonome au niveau de

Genre.

Tout ceci m'a été communiqué de la part du prof. Kühner dans une lettre de voilà quelques mois, en réponse à ma requête d'informations au sujet.

Kühner, avant I93I, a parlé de *B. badius* une seule fois, dans sa thèse de doctorat (Kühner I926), se bornant à dire que le bolet ne devait être placé parmi *Ixocomus* pour d'évidentes divergences structurelles avec les autres bolets du secteur. Aucune réference de sa part, ni à l'époque ni par la suite, à *Xerocomus* à propos de *badius*.

Ainsi l'illustre Auteur français que le soussigné ne savent s'expliquer pourquoi Gilbert ait jugé bon de rapporter à lui le passage de *badius* de *Boletus* à *Xerocomus*. Evidemment, il y eut alors une équivoque, mais la doctrine mycologique a continué de suivre une telle direction, n'allant pas au fond de la question. Même dans les publications plus préstigeuses et plus modernes - que l'on regarde au sujet Moser (Moser I983) - le bolet continue d'être ainsi indiqué : *Xerocomus badius* (Fr.) Kühner *ex* Gilbert, tandis qu'il devrait être présenté, toujours pour ceux qui suivent la thèse de considérer *Xerocomus* un Genre valide, pour : *Xerocomus badius* (Fr. I8I8 : Fr. I82I) Gilbert I93I.

Il demeure hors discussion que pour ceux qui jugent valide seulement le Genre *Boletus* dans lequel insérer *Xerocomus* en tant que Sousgenre ou Section, la référence taxonomique sera : *Boletus badius* Fr. : Fr.

SUMMARY

Two Boleti are considered, both created by Fries, *B. badius* and *B. vaccinus*, for which a doctrinal trend thinks of an

absolute identity, whereas another trend is favourable to a mutual autonomy. The hypothesis is then advanced that *B. vaccinus*, more than being reconnected to *B. badius*, may be referred to *B. moravicus* Vacek.
Eventually news are given on the performed research about the taxonomical attribution of *Xerocomus badius* to Kühner - on the wake of Gilbert - what is wrong, since Kühner, so as from a very recent communication to the author of the present paper, never dealt with *badius* outside Genus *Boletus*, to which he thinks same must be integrated.

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Notes on the genus Mycocalia (Basidiomycetes, Nidulariales) in Scandinavia.

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INTRODUCTION

The Nidulariales or the bird's nest fungi belong to the gasteromycetous Basidiomycetes. They are characterized by their small cup-shaped fruitbodies containing lenticular diaspores (peridioles) internally lined with a hymenium. Their fruitbodies resemble in a way a bird's nest with the peridioles as eggs and the cup (peridium) as the nest, hence their curious English name. My attention was drawn to this fascinating group of fungi some ten years ago when I came across an excellent book on the subject by Professor Harold J. Brodie (Canada) (Brodie 1975). The facts he gave about the "Nids" intrigued me and inspired me to take an interest in these diminutive creatures so seldom noticed but literally speaking to be found all around us.

The bird's nest fungi occur most abundantly in the tropics, the number of species there being about twice that of the northern temperate region. The European flora counts four genera with altogether eleven species. Eight of these species are met with in Scandinavia.

The most evolved genera of the Nidulariales show a peculiar and highly specialized way of disseminating their spores by means of diaspores. Thus the peridioles of the genera **Crucibulum** Tul., **Cyathus** Haller, **Nidula** White (tropical genus) and to some extent of **Nidularia** Fr. are splashed out of the fruitbody with the help of falling raindrops. This splash cup mechanism was extensively described by Buller (1942) and Brodie (1951, 1975).

The most primitive genus, **Mycocalia** J.T. Palmer, does not develop a splash cup mechanism. The peridioles (or peridiole, as some species only produce one) are sticky and adheres easily to vegetable material in the vicinity to which they are probably transported by running water. The species of **Mycocalia** found in Scandinavia all seem to occur in more or less submerged situations. All bird's nest fungi are supposedly saprophytes.

Mycocalia was established by Palmer (1961). It contains the smallest species of the Nidulariales, originally described as members of the **Sorosia** section of the genus **Nidularia** Fr. **Mycocalia** is, however, separated from the closely related **Nidularia** by the monomitic structure of the peridium. According to Palmer (1963) and Brodie (1975, 1984) **Mycocalia** contains five species, all characterized by inconspicuous fruitbodies with a thin, whitish, evanescent peridium which by rupturing exposes the peridioles (only one single peridiole in two species). Two species of **Mycocalia** were previously known to Scandinavia (**M. denudata** (Fr.) J.T. Palmer and **M. sphagneti** J.T. Palmer).

A third one is here reported from Sweden, **M. minutissima** (J.T. Palmer) J.T. Palmer. A key inspired by that of Palmer (1963) to the species of **Mycocalia** is provided along with descriptions of the Scandinavian species. Notes on their ecology in Sweden are given. All collections are deposited in the author's herbarium unless otherwise stated.

KEY TO THE EUROPEAN SPECIES OF MYCOCALIA

1. Cortex of peridiole homogeneous, of labyrinthiform elements; spores pale yellow to yellowish brown, 10-16 x 4-6 um, sometimes somewhat ventricose. Fruitbody with one blood-red to blackish peridiole, about 500 um in diametre.
M. sphagneti

1. Cortex of peridiole with two layers of labyrinthiform elements; spores hyaline, ovoid. 2

2. Fruitbody with only one brick-red to brown peridiole, 200-500 um in diametre; metamorphosed basidia with truncate base.
M. minutissima

2. Fruitbody with several peridioles. 3

3. Peridioles about 300-400 um in diametre, yellowish to tan, when dry biconcave; exocortex loosely arranged, endocortex compacted; spores about 7 x 5 um, metamorphosed basidia ellipsoid to pyriform.
M. denudata

3. Peridioles of similar size or somewhat smaller, dark red to blackish, rarely becoming biconcave; endocortex only a thin layer, exocortex closely compacted; spores somewhat broader than in **M. denudata.** On culms of **Ammophila arenaria** (L.) Link., fallen branches of **Pinus** and **Populus** as well as on rabbit pellets etc in coastal sand-dunes, but also in inland localities. (Great Britain, Czechoslovakia, the Netherlands, Algeria, Tasmania and USA).
M. duriaeana

A fifth species, **M. reticulata** (Petch) J.T. Palmer is distributed in the tropics and subtropics (Ceylon, Panama, Lousiana (USA), Hawaiian Islands). It was once recorded growing adventitiously in a green-house in France (Palmer 1958). It differs from the other members of **Mycocalia** in having branched, tapering, thickwalled hyphae in the cortex of its peridioles.

NOTES ON THE SCANDINAVIAN SPECIES

M. denudata (Fr.) J.T. Palmer (Figs. 1,4)

Fruitbodies solitary or gregarious, rounded, up to 1.5 mm in diametre, with several lenticular peridioles of a light brown colour, 300-400 um in diametre. The cortex of the peridiole consists of an outer layer of a loosely interwoven structure and an inner layer of closely compacted hyphal elements. The spores are hyaline, ellipsoid, about 7 x 5 um and the metamorphosed basidia are typically rounded or pyriform, about 12 x 7 um.

The original description of **M. denudata** was made by Fries (1817), who recorded it as **Nidularia denudata** from the Femsjö region in SW Sweden. Towards the end of the 19:th centuary it was found again in Sweden, this time in Stockholm (cfr Fries 1921, Palmer 1964).

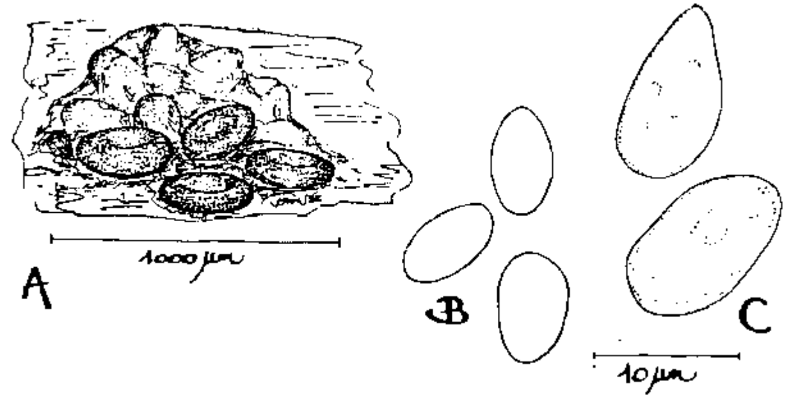

Fig. 1 **Mycocalia denudata** (Fr.) J.T. Palmer
A. Fruitbody B. Spores C. Metamorphosed basidia

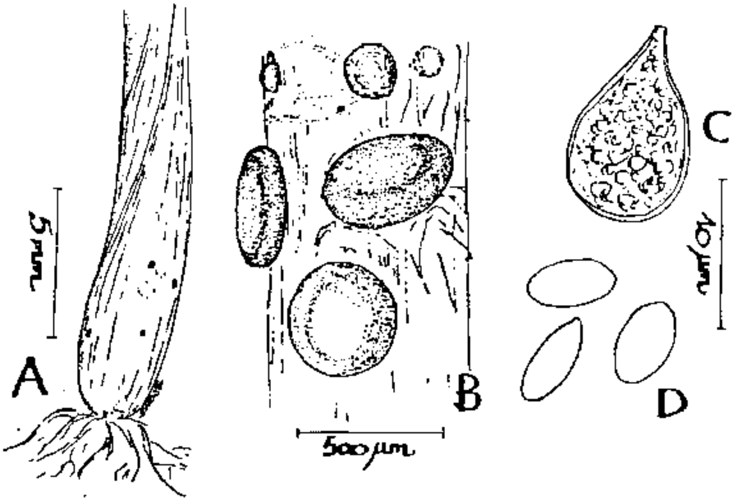

Fig. 2 **Mycocalia minutissima** (J.T. Palmer) J.T. Palmer
A. Fruitbodies on leaf sheath of **Juncus effusus** **B.** Fruitbodies
C. Metamorphosed basidium **D.** Spores

Only two additional collections of **M. denudata** seem to have been made in Sweden since. In England it has proved to be rather a common species on debris of Mat-grass (**Nardus stricta** L.), Soft Rush (**Juncus effusus** L.) and other vegetable material in wet, acid woods as well as in open areas. It is also reported from rabbit pellets and sheep droppings. The two recent Swedish finds were made in damp situations 1) in coniferous wood on debris of **Juncus effusus** (Dalsland, Skållerud) and 2) on stems of the bryophyte **Drepanocladus schultzei** Roth. in a marsh (Västerbotten, Sävar - at the moment the northernmost locality for any species of **Mycocalia**). Palmer (1964) reports two Norwegian finds of **M. denudata** (provinces of Akershus and Vestagder, S. Norway) on worked wood and horse dung and Elborne (1983) recently published data of a find in Denmark, where it fructificated on plant debris in association with **Juncus.** In central Europe this species seems to have a wide distribution. Its extra-European distribution comprises Canada, Chile and Australia according to Brodie (1975).

Material studied:

Sweden: Dalsland, Skållerud, Ranneberget, 1977-09-03, leg. M. Jeppson 1060.
Västerbotten, Sävar, Sjöboden, 1971-09-26, leg. L. Eriksson, det. O. Eriksson (UME 26601).
England: Cheshire, Wybunbury, Wybunbury Moss National Nature Reserve, 1966-03-23, leg. et det. J.T. Palmer (ex herb. J.T.P.).

M. minutissima (J.T. Palmer) J.T. Palmer (Figs. 2,5)

Fruitbodies solitary or gregarious with only one brick-red to yellowish brown peridiole, 200-500 um in diametre. Peridium whitish, evanescing. Cortex of peridiole with two layers. Spores ellipsoid, about 6 x 4 um. Metamorphosed basidia rounded with truncate base.

M. minutissima was first found in Sweden in September 1976 and has since been collected almost every year. Palmer (1958) reports this species from several localities in north and central England. It is also known in Czechoslovakia, Germany and Ireland (Cejp & Palmer 1963, Palmer 1963, Muskett & Malone 1978). In England **M. minutissima** is generally met with in wet and acid situations, growing on root stocks and leaf sheaths of Soft Rush (**Juncus effusus**). Among other substrates reported are graminicolous debris, dead leaves of **Betula,** a decorticated branch of **Pinus** in a dried-up moorland stream bed, stems of mosses etc. The habitats of the Czech an German findings are more or less similar. The Swedish localities are all situated in the southwestern part of the country from the town of Vänersborg in the north to the village of Skepplanda in the south, a distance of appr. 60 kms along the valley or the river Göta älv. The altitude in the localities ranges from 60-100 m above see level. **M. minutissima** is here found in wet areas in oligotrophic coniferous woods (**Picea abies** predominant) in association with Soft Rush (possibly also with **J. conglomeratus** L.). Ditches and little streams as well as wheel-tracks made by forestry vehicles seem to provide the right conditions for the growth of **J. effusus** and some **Sphagnum**-species and have proved very fruitful in the search for **M. minutissima.** The fungus occurs on the more or less submerged leaf sheaths of **Juncus.** Sometimes fruitbodies are found on stems of **Sphagnum** and on needles or twigs of **Picea** embedded in **Sphagnum.** At the moment, it is not known whether **M. minutissima** is present also outside the distribution area of **Juncus effusus.** This can however be expected, since it does not in its choice of substrate seem to be restricted to **Juncus** alone.

Material studied:

Sweden:	Västergötland, Gärdhem, Velanda, 1976-09-29, leg. M. Jeppson 874. Västergötland, Trollhättan, Munkebo, 1978-08-13, leg. M. Jeppson 1114. Västergötland, Trollhättan, Myrtuvan, 1982-08-, leg. M. Jeppson 1774. Västergötland, Trollhättan, Hult, 1984-08-06, leg. M. Jeppson 1624. Västergötland, Vassända-Naglum, Möjered, 1984-08-07, leg. M. Jeppson 1625. Bohuslän, Forshälla, Ivarsbo, 1984-08-09, leg. A. & I. Stridvall, M. Jeppson 1623.
England:	Derbyshire, Kinder Scout, William Clough, 1959-07-05, leg. et det. J.T. Palmer (ex herb. J.T.P.).

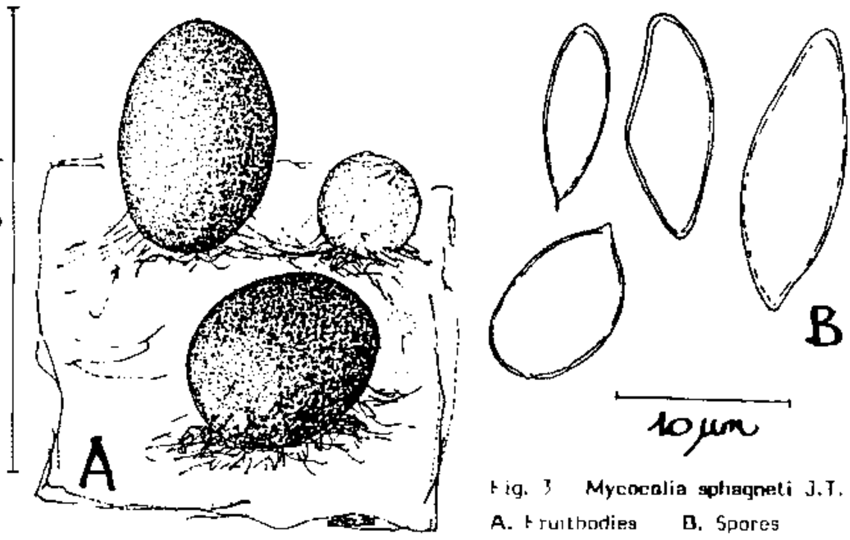

Fig. 3 **Mycocalia sphagneti** J.T. Palmer
A. Fruitbodies B. Spores

M. sphagneti J.T. Palmer (Figs. 3,6)

Fruitbody with only one blood-red to blackish peridiole, about 500 um in diametre. Peridium whitish, thin, evanescent. Peridioles at different angles to the substrate, sometimes supported by minute mycelial strands. Cortex of peridiole homogeneous. Spores variable, ellipsoid, sometimes somewhat ventricose, pale yellowish, 10-16 x 4-6 um. Metamorphosed basidia not observed in Swedish material but reported by Cejp & Palmer (1963) to be ellipsoid to pyriform with truncate base, 12 x 10 um.

This species was described from a geographically limited area in the Pennine Moor´s District in central England (Peak National Park). It was said to occur on decaying culms of Soft Rush and other plant debris in sphagneta at stream heads in treeless moorland (Cejp & Palmer 1963). In the autumn of 1976 a few fruitbodies of this species were found in SW Sweden, a few kilometres south of Trollhättan at an altitude of 70 m above sea level. The locality was not open moorland but a boggy, oligotrophic, acid spruce wood (**Picea**) with scattered birches and rowans (**Betula, Sorbus**). Later visits to the locality have not been fruitful, nor has the species been met with again in habitats of a similar kind despite careful searching (cfr Jeppson 1978). The locality at Trollhättan is now destroyed by clear-felling. Except for England and Sweden there seem to be no records of this species from other parts of the world.

Material studied:

Sweden:	Västergötland, Gärdhem, Velanda, 1976-09-26, leg. M. Jeppson 873.
England:	Derbyshire, Kinder Scout, William Clough, 1961-06-04, leg. J.T. Palmer (ex herb. J.T.P).

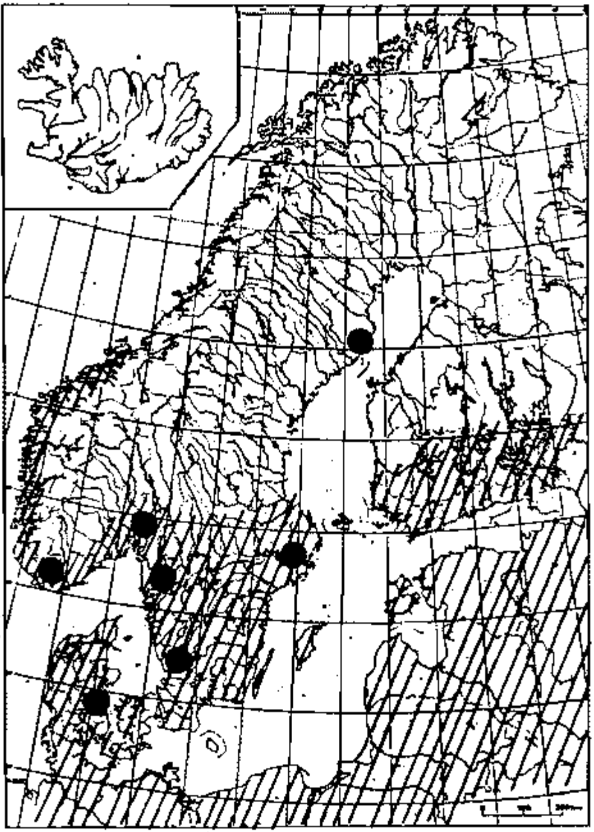

Fig. 4 Distribution of **Mycocalia denudata** in Scandinavia (dots) compared with that of **Juncus effusus** (hatched area).

DISCUSSION

In Sweden **M. denudata, M. minutissima** and **M. sphagneti** seem to be species of wet, oligotrophic woods. In England **M. denudata** and **M. minutissima** are likewise species of wooded habitats whereas **M. sphagneti** is met with in treeless moorland. There is so far no Swedish investigation of the latter habitat with regard to nidulariaceous fungi but when such a study is undertaken it might bring rewarding results. According to Palmer (1958) **M. denudata** is a species of less acid habitats than is **M. minutissima.** The pH in one of the Swedish localities for **M. minutissima** (Västergötland, Trollhättan, Hult) measured 6.3 but since this kind of data is scarce no conclusions can be drawn as far as Sweden is concerned. The most common substrate for these three species are the more or less submerged leaf sheaths and root stocks of **Juncus effusus** and other plant debris embedded in mosses (e.g. **Sphagnum**) in close association with **Juncus.** This arouses the question whether there is some kind of connexion between the Mycocalias and the Rush or if they are merely species of the same habitat. **M. denudata,** having been found some 400 kms north of the northernmost localities for **J. effusus/conglomeratus,** indicate that this species at least is only a facultative associate of **Juncus.** Future finds of **M. minutissima** and **M. sphagneti** might point in the same direction (figs. 4,5,6).

Palmer (1958) wanted his own collecting to be as unbiased as possible with regard to the substrates and habitats. My collecting however, has been concentrated to **Juncus**-associations and might therefor give somewhat misleading conclusions about the habitat preferences of the Mycocalias in Scandinavia. The fruitbodies are as mentioned before extremely small and are only with difficulty detected by the naked eye. Collecting them therefor is most easily done by the somewhat violent method of pulling the tussocks of **Juncus** up by their roots and bringing them to the laboratory where a stereomicroscopic examination reveals the presumptive presence of fruitbodies.

J. **effusus** and the closely related J. **conglomeratus** are distributed in grasslands, marshes and along stream-beds and beaches, where they are said to prefer moist, acid upland soils and swamps. They are both highly favoured by human activity and occur frequently as weeds in meadows and pastures as well as along drainage ditches (Korsmo et al. 1981). Malmgren (1982) notes that J. **effusus** is a species often present in wheel-tracks of tractors. According to my own experience, it quickly colonizes the wheel-tracks made by forestry vehicles and machines, a habitat apparently providing suitable conditions for species of **Mycocalia** as well.

Climatically the Swedish localities for **M. minutissima** and **M. sphagneti** are under maritime influence with a yearly precipitaion of at least 700 mm. The production of fruitbodies is in **M. sphagneti** dependent on warm weather according to Cejp & Palmer (1963), who found it only during the summer months. The Swedish finds of the same species were made by the end of September after an unusually warm summer. In England **M. denudata** has been collected from March to December but is supposed to produce fruitbodies all year round. Fresh fruitbodies of **M. minutissima** have in England been observed in March and from June to October. In Sweden **M. minutissima** has been found in spring as well as from July till the end of September. Collecting in late autumn and early spring just after thawing of snow has always been unsuccessful.

The three species of **Mycocalia** known to Scandinavia seem to be well defined species, easily distinguishable from one another. A systematic study of habitats not previously investigated with regard to Nidulariales is likely to result in the finding of hitherto unknown species. Accordingly, a careful scrutiny of the sand-dunes along the Scandinavian coast will probably lead to the finding of **M. duriaeana** growing on e.g. culms of **Ammophila arenaria.**

Future studies of **Juncus**-associations as well as other wet and acid habitats might also show that the three species already known in Scandinavia are in fact widely distributed there.

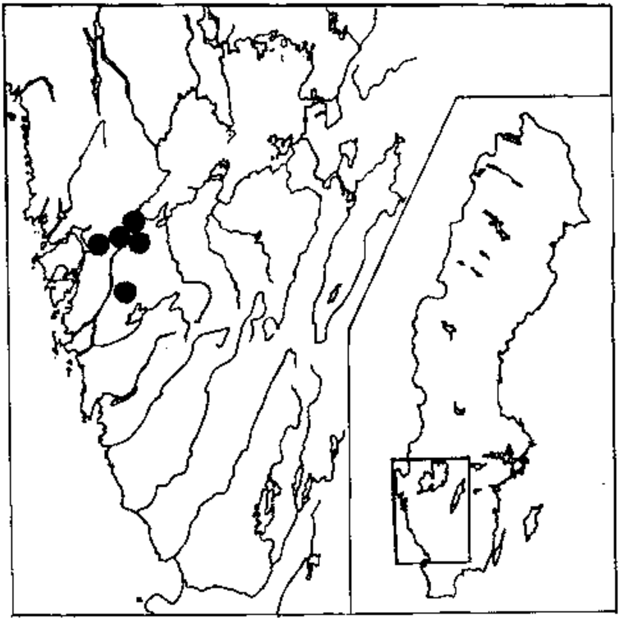

Fig. 5 Distribution of **Mycocalia minutissima** in Scandinavia.

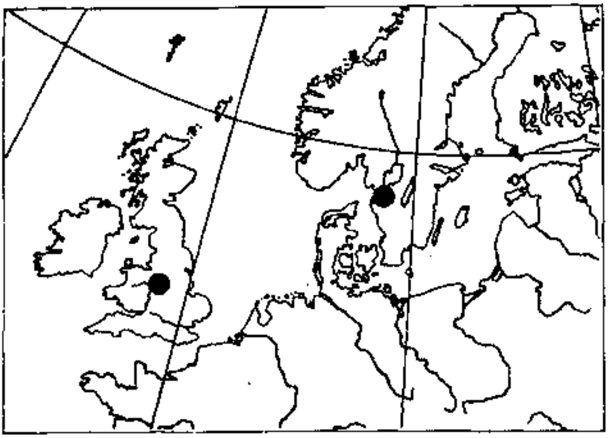

Fig. 6 World distribution of **Mycocalia sphagneti**.

ACKNOWLEDGEMENTS.

I would like to express my sincere thanks to Mr. J.T. Palmer (Sutton Weaver, England) for providing valuable information on the genus **Mycocalia** and for sending me reference material from his personal herbarium. I am also indebted to Mr. J. Hall (British Centre, Trollhättan) for checking the English text and to Miss B. Lundqvist (Ericsson City, Trollhättan) for her assistance with layout and typing.

SUMMARY

A short survey of the genus **Mycocalia** (Basidiomycetes, Nidulariales) is presented. The genus contains five species, three of which are found in Scandinavia, viz. **M. denudata, M. minutissima** and **M. sphagneti.** These species seem to occur in wet and acid situations and are often found on debris of **Juncus effusus.** A key to the European species is given. Distribution maps and a discussion on habitat preferences of the Scandinavian species are presented.

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ENTOLOMA SPEC.NOV.

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INTRODUCTION.

Thanks to the extensive works of Drs.Machiel Noordeloos and Eef Arnolds several new species have for the last years been added to the genus Entoloma.

However the genus has few and often no distinct characters that could be of any help for in situ determinations. Even macroscopical problems may arise concerning segregation on specific rank.

This means too, that it is a fair possibility of finding specimens of Entoloma that scarcely could be identified from up-to-dated keys.

Until the variation of differnt species is sufficiently known, it is not always appropriate to create new names for these collections. Still we think they should not be kept away from publication, as this information may attract the attention of mycologists in possession of similar finds. This could certainly be an enrichment of the knowledge of the fungus flora.

In 1983 the 9 year old son of one of us (Ø.W) found an Entoloma which, after examination, could not with reasonable certainty be positioned in any of the familiar species concepts. This was later confirmed by Dr.Noorderloos.

This species is described in the following, and we should appreciate any information from persons who think they have found a species reminding of the desribed collect.

MACROSCOPICAL CHARACTERISTICS.

Pileus up to 24 mm broad, conical when young, then expanding to conoco-convex, with or without distinct umbo, margin slightly involute when young, undulating with age ("often like a capsulae of a lemonade bottle"), strongly hygrophanous, translucently striate up to 2/3 of the radius, dark greyish brown at centre (Cailleux T71), distincly paler at margin (Cilleux S71), dull but becoming distincly shining on drying.

Gills l=1(-3), moderately crowded, deeply emarginate to almost free, slightly ventricose, never white, greyish brown when young, later on brownish colours dominating, also old specimens without reddish tinge, with entire and paler edge.

Stipe up to 5,5cm long and 35mm broad, cylindrical, greyish brown, same colour shades as pileus but paler, without silvery-white striation, but with a fugaceous, almost obsolete whitish-pruinose-tomentose layer, fragile, ditincly fistulose.

Smell somewhat spermatic, not mealy.

Taste somewhat earthy, mild.

Habitat in grass, short moss, verge of wood, by Pinus, Picea and Betula, lawny.

MICROSCOPICAL CHARACTERS.

Spores (8,1-)8,9-10,6(11,4) x 6,4-7,9 m, Q=1,25-1,5 (average 1,4), l-d=2-3,5 m, weakly to distinctly heterodiametrical, 5-7 angled in sideview, with blunt dihedral base, strongly rounded angular.

Basidia 33-46 x 9,5-13,7 m, 4-spored, clavate.

Cystidia absent.

Hymenophoral trama regular, made up of cylindrical cells, 180-400 x 5-35 m.

Pileitrama regular, made up of inflated cells, 180-430 x 6-27 m.

Pileipellis a simple thin cutis of radially arranged 2-11 m wide cylindrical hyphae, up to 350 um long.

Subpellis well differentiated, consisting of broad cylindrical cells, 55-110 x 6-27 um.

Pigmentation minutely to coarsly encrusting the narrow cells of pileipellis and trama and in addition very pale brown diffuse intracellular (easy to overlook).

Clamp connections at the base of basidia, elsewhere rare.

Leg. Sigbjørn Weholt. Date 1983 07 23.

Collection examined: Norway, Sør-Trøndelag, Melhus, Lundamo. 1983 07 23, Sigbjørn Weholt (E36/83).

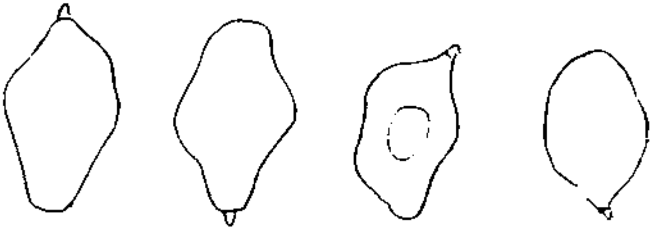
Herb. Wolfel.

REMARKS.

Macroscopically this supposedly unknown species resembles Entoloma cetratum (Fr.)Moser and related taxa from section Endochromonema (Largent & Thiers)Noordeloos very much. However this does not conform with the microscopical details. Especially the type of pigmentation makes it a member of section Papillata (Romagn.)Noordeloos.

Using the keys given by Noordeloos (1980) we could not find any taxon which applies satisfactorily to our collection. We think the obtusely rounded-angular and distinctly heterodiametrical spores merit it as a species in its own right.

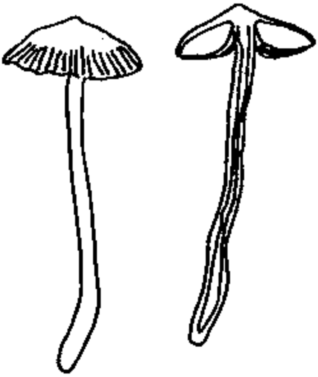
On the other hand we know a lot of species in the genus Entoloma which demonstrates considerable variation. So for the moment we think it is better not to create a new name. Further collections must prove the con-



spores

pileipellis and trama

basidia



From Weholt 36/83

stancy of the described characters.

With this publication however, we try to call the attention of mycologists to the lot of problems which are still remaining in the genus Entoloma.

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SUMMARY.

A description of an Entoloma presumed to be a new species is described from Norway. The species is macroscopically of great similarity to a member of Sect.Endochromonema, but microscopical details (pigmentation) show it as belonging to Sect.Papillata.

A new name is not created as it is still to observe the variation of the important characters separating the specimens from other known taxa.

AGARICA

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The genera Scabropezia and Plicaria in the German Democratic Republic.

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Summary: The genera Scabropezia and Plicaria (Pezizaceae; Pezizales) are treated with respect to their occurence in the German Democratic Republic. Scabropezia flavovirens, Plicaria carbonaria, Pl. endocarpoides and Pl. trachycarpa are species hitherto known from the territory of the G.D.R. Full descriptions and some comments to taxonomy, ecology and geography of these species are given. A key to eight spherical spored European taxa is provided, and some remarks to these and a few insufficiently known species are added.

Zusammenfassung: Das Vorkommen der Gattungen Scabropezia und Plicaria in der Deutschen Demokratischen Republik wird behandelt. Scabropezia flavovirens, Plicaria carbonaria, Pl. endocarpoides und Pl. trachycarpa sind die bisher nachgewiesenen Arten, die ausführlich beschrieben und mit Bemerkungen zu ihrer Taxonomie, Ökologie und Verbreitung versehen werden. Acht europäische Arten werden aufgeschlüsselt, die nicht aus der DDR bekannten Sippen sowie einige kritische Taxa werden kurz kommentiert.

The spherical spored Pezizaceae were subject of interest of different mycologists during the last 20 years. Especially Dissing and co-authors have contributed a great deal to the knowledge about this group. A greater part of genera and species is well circumscribed, and even some phylogenetic considerations can prudently be done now (e.g. Dissing & Korf 1982). It is the intention of this article to give a report on the occurence of the genera Scabropezia and Plicaria in the G.D.R. The species are described in detail, furthermore some illustrations are provided. A few comments are added to taxonomy, ecology, geographical distribution etc. of the treated species. Finally a key to the European species of the genera Scabropezia and Plicaria is presented.

A new character for taxonomy of the Pezizales was brought into use by Donadini (1984), viz. the colour of the spore print. A final evaluation of this feature can not be presented yet. Simple taking over of methods of Agaricales taxonomy on Pezizales can, however, not be adequate for resolving the taxonomical problems in the latter. I must express my strong doubts on the reliability of this method, when I read, that species, which show a distinct pigmentation in every individual mature ascospore are said to have produced a white spore print.

There remain a lot of problems in the taxonomy of the spherical spored Pezizaceae. Careful studies in the anatomy of fruitbodies from all over the world may especially be valuable for future work. Also such characters as spore ornamentation and -size, shape and chemical reactions of asci, and paraphysal features have to be taken into consideration further on.

Scabropezia Dissing & Pfister, *Nordic J. Bot. 1: 102*. 1981.

The genus *Scabropezia* was introduced by Dissing & Pfister with two species, viz. *S. scabrosa* (Cooke) Diss. & Pfister and *S. flavovirens* (Fuckel) Diss. & Pfister. It was segregated from other spherical spored Pezizaceae mainly by its anatomical peculiarities. The excipulum consists of two distinct layers, an inner (medullary) layer of textura intricata and an outer layer of textura angularis-globulosa. On the outside of the apothecium there are prominent brownish pustules, which are built up like the ectal excipulum.

The genus was also mentioned by Dissing & Korf (1982), who place it in a transitional position between *Plicaria* Fuck. and the hypogeous genus *Pachyphloeus* Tul. On the other hand, Donadini (1983) - realizing his extremely broad generic concept - has included *Scabropezia* in a giant genus *Peziza* as a subgenus. After having seen a greater number of spherical spored Pezizaceae from different parts of the world (e.g. Hirsch 1984; 1985), I consider the genus *Scabropezia* as well justified. It does certainly represent a small, phylogenetic unit. Since its erection some years ago the number of species has not increased yet. *S. scabrosa*, the type species, has a strict North American distribution, whereas *S. flavovirens* occurs in Europe, too. Dissing & Pfister (l.c.) mention only three European countries, from which they have seen material of this species (Switzerland, Denmark, Sweden). During my studies I came across a collection from the G.D.R., and Mr. Roy Kristiansen (Fredrikstad, Norway) has kindly placed material of the first Norwegian finding of this species at my disposal.

The following description of *S. flavovirens* is mainly based on the Norwegian material. The German collection consists of a single apothecium only, which seemingly was overmature and occupied by bacteria when collected.

Scabropezia flavovirens (Fuckel) Dissing & Pfister, Nordic J. Bot. **1**: 104. 1981.

= *Plicaria flavovirens* Fuckel, Symb. Myc. Nachtr. **2**: 64. 1873.

For further synonyms, see Dissing & Pfister (1981: 104).

Apothecia up to 20 mm diam., sessile. Hymenium brown with olivaceous tints, when dried almost black. External surface dark brown or reddish brown, covered with very coarse pyramidal warts or pustules. Shape at first deeply cupulate, later nearly flat.

Immature ascospores hyaline, later they become light brown. The spores are spherical, 12,3 - 14,8 µm (excl. ornamentation), with one or more oil drops, but without De Bary bubbles. Ornamentation cyanophilous, consisting of strongly isolated, regularly distributed warts. In some immature spores the warts are conical and up to 1,3 µm high (fig. 1 a-e).

Asci operculate, colourless or light yellowish, mature ones with a characteristic shape in most cases: spore - bearing part cylindrical, 20 - 23 µm wide, middle part somewhat inflated up to 30 µm, lower part constricted but with a broad pleurorhynchous base. Length 300 - 360 µm. Amyloid reaction strong in the uppermost part, less strong but distinct in lower parts of the ascus, absent at the base. No dextrinoid reaction of the content of immature asci observed. Walls slightly thickened especially near the apex (fig. 1g), double-layered under the light microscope. Asci eight-spored, not protruding at maturity.

Paraphyses thick cylindrical, 4 - 6 µm wide, slightly clavate, at their tops 6 - 9 µm. Besides a vacuolar pigment in the cells there occurs a great amount of brownish amorphous or granular matrix in the hymenium, which covers the apices of asci and paraphyses. The paraphyses are unbranched, equally cyanophilous on their whole length, straight, septate, with 0 - 1 septa in the upper 100 µm. Length of the uppermost cell (52,5-) 82,5 - 132,5 (-158!) µm.

Hymenium 360 - 380 µm. Subhymenium distinct, of a small celled textura angularia. Medullary excipulum composed of ± parallel, compact, non-inflated hyphae (textura intricata-porrecta). With many strong cyanophilous laticiferae in subhymenium and medulla. Ectal excipulum (fig. 1f) of reddish-brown walled, isodiametric, slightly thick walled cells up to 50 µm (textura globulosa-angularis). The marginal region and the pustules on the outside of the apothecium are built up in the same way as the ectal excipulum.

Specimens examined:

(1) 27. IX. 1977; G.D.R., distr. Halle, Nebra, Borntal near Laucha; along roadside in forest with broadleafed trees; leg. D. Benkert; BHU.

(2) 27. VIII. 1984; Norway, Østfold, Tune, Sølvstufossen; on almost bare soil, along a narrow track in spruce wood (*Picea abies*), together with *Pindara terrestris* Vel.; leg. R. Kristiansen & I. Johnsen; JE.

The description agrees in nearly every respect with that given by Dissing & Pfister (l.c.). Besides the generic characters mentioned above before the description was given, the species of *Scabropezia* show some more unique features. Olivaceous colours, lack of De Bary bubbles, thick paraphyses and especially the peculiar, almost spindle-like, slightly thick walled asci support the generic separation of *Scabropezia* from *Plicaria* and other genera.

According to their descriptions, *Plicaria papillosa* Batra (in Mycologia 52: 665. 1961, "1960") from India, and perhaps also *Peziza echinophora* Donadini (in Doc. Myc. 12 [46] : 6. 1982) from France may be further valid species of the genus *Scabropezia*, too.

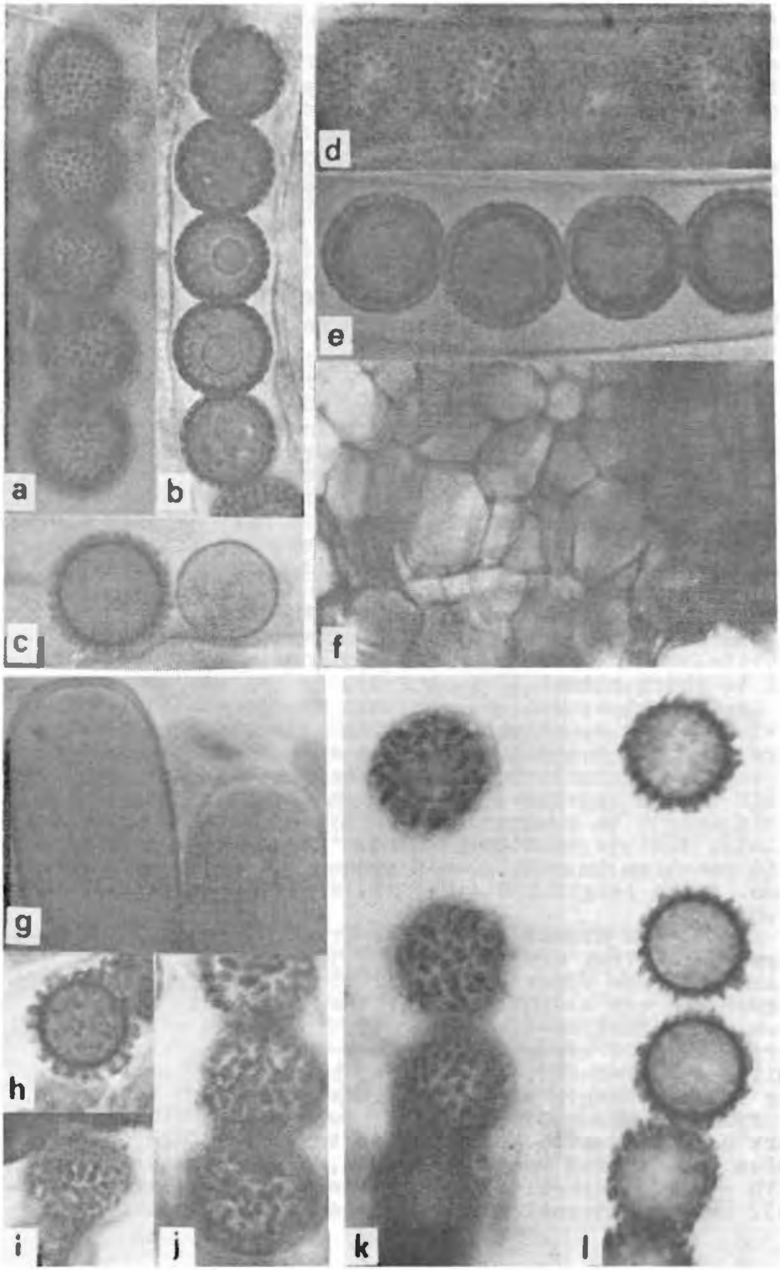
Not too much is known about the ecology of *Scabropezia flavovirens* in Europe. The species mostly occurs on the ground in woods under deciduous trees, but also under conifers. Roadsides over calcareous soil seem to be the most preferred places for its growing.

Plicaria Fuckel,
Symb. Myc. 325. 1870.
emend. Boudier, Bull. Soc. Myc. France 1: 102. 1885.

The nomenclature for this generic name has been discussed in detail by Korf (1961). The genus is treated here in the sense of Dissing & Korf (1982) for spherical spored members of the Pezizaceae, which have dark hymenial colours in their disc-shaped or cupulate apothecia, an external surface without prominent pustules composed of aggregates of globose cells, and are mostly growing on burnt places.

The question, whether *Plicaria* should be merged with *Peziza* or not is still under discussion. Today most authors keep the genus apart from *Peziza*, but a few ones advocate the opposite standpoint. The known arguments shall not be repeated on this occasion. It seems to me, that one feature was overlooked by all authors, which probably can serve as a further argument for separation of *Plicaria* from *Peziza*: the pigmentation of the asci. We can find pigmented asci in the genus *Peziza* in many cases, but here the pigmentation is always light and faint. On the other hand, in the examined species of *Plicaria* especially the walls of old, empty, collapsing asci are places of pigment accumulation. In section, we can find the old, emptied asci as dark brown ropes between the other hymenial elements. So they are essentially responsible for darkening

FIGURE 1. a-g *Scabropezia flavovirens*. a,b coll. (1), mature spores. c-g coll. (2), c immature spores. d,e mature spores. f ectal excipulum. g ascus apices. h-l *Plicaria carbonaria*. h,i coll. (1), mature spores. j-l coll. (3), mature spores. All in Cotton Blue. a,b,h,i x 900. c-e, g,j-l x 1050. f x 400.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of the aging apotheoium. I don't know any species of Peziza which shows this behaviour. On the other hand all three indigenous Plicaria species (and others!) have this character. A comparable pattern of pigment storage in old ascus walls was observed by Benkert (in litt., unpubl.) in species of the genus Pulparia P. Karst., what gives new evidence for a possible relationship of this genus to spherical spored Pezizaceae.

Three Plicaria species are known from the G.D.R., which are extensively described below. Moreover some further taxa are shortly discussed, and a key to eight species will close the article.

Plicaria carbonaria (Fuckel) Fuckel,
Symb. Myc. 326. 1870.

= Peziza anthracina Cooke, Mycographia 235. 1878.
For further synonyms, see Maas Geesteranus (1967: 420).

Apothecia up to 15 mm diam. Thecium blackish brown or dark violaceous brown, external surface concolorous, granulate. Fruitbody discoid, margins undulate, recurved.

Spores at first hyaline, after formation of the spore ornamentation storage of a yellow-brownish pigment in the spore walls begins, individual spores finally brown. The spherical spores have oil drops, which are, however, hardly detectable in the mature state. De Bary bubbles visible in some mature spores only after treatment with Cotton Blue + lactic acid. Spore size (excl. ornamentation) 10,9 - 13,5 µm. Ornamentation up to 2,5 µm high, cyanophilous, coarse, consisting of isolated, cylindrical or conical warts, rarely pointed, mostly truncate or even slightly clavate. Their outline is angular, often slightly elongated to short ridges. (fig. 1 h-l).

Asci eight-spored, colourless, at spore maturity yellowish, after spore releasing the pigmentation becomes more and more intensive, at last dark brown and collapsed. Ascus shape subcylindrical to nearly subclavate, greatest width in the uppermost part, slightly contracted at the whole length to a broad, pleurorhynchous base. Apex operculate, flat to broadly rounded. The moderate to weak amyloid reaction is nearly only present in the operculum region. Ascus length 250 - 285 µm, striking wide: (16-) 18 - 23,8 µm !

Paraphyses almost colourless or light brownish in the upper part. They are filiform, 3,5 - 4 µm thick, strongly clavate in the upper part until 10 µm, mostly curved. The paraphyses are slightly longer than the asci, their apices form an epithecium-like layer together with an abundant, striking, dark brown matrix. They are moderately cyanophilous, unbranched, septate, with 2 - 3 septa in the upper 100 µm. Length of the uppermost cell 30,0 - 54,1 µm.

Hymenium about 250 µm thick. Subhymenium distinct, dark coloured, of a small celled textura angularis. Excipulum two-layered near the margin, of a medullary layer with ± surface-parallel hyphae (textura intricata-porrecta), and an external layer of isodiametric, mostly globular cells up to 80 µm diam. In the middle of the apothecium the excipulum is more differentiated. Below the subhymenium there is a layer of textura inflata (for terminology, see Benkert 1984!) rich of hyphae, inflated elements and globular cells. This is separated from the ectal layer by a mediostratum of intertwined hyphae, which are strongly darker than the neighbouring layers. Ectal excipulum about 150 µm thick, for the most part consisting of large, globular or angular cells intermixed with a few hyphae. Marginal region narrow, not very prominent. Hymenium separated from the margin by a thin layer of paraphyse-like cells, which are moniliform in the lower parts and constitute a fairly abrupt transition to the marginal cells. The latter are principally like the cells of the ectal excipulum. The structure of the margin is the same as in *Pl. trachycarpa*.

Specimens examined:
(1) Fuckel, Fungi rhenani 1137; HAL (isolectotype!).
(2) 15. VIII. 1942; Germany (today: G.D.R.), Zwickau, Waldenburg near Glauchau; in a park between burnt trunks; leg. P. Ebert 4119; JE.
(3) 7. VI. 1984; G.D.R., distr. Dresden, Freital, Lockwitzgrund near Kreischa, Hummel-Mühle; on burnt place; leg. H.-J. Hardtke; JE.

The description given above is mainly based on the collection (3). *Pl. carbonaria* has many features in common with *Pl. trachycarpa*. The main distinguishing character is the different spore ornamentation, besides some less important characters as macrofeatures, ascus shape etc. The spore difference was very conspicious and clear in every specimen examined by me. However, Maas Geesteranus (1967: 423) illustrates two spores from the lectotype of *Bulgaria carbonaria* Fuckel in K, of which the upper one shows a more or less transitional spore ornamentation to *Pl. trachycarpa*. I have not seen such spores whilst studying the isolectotype of *Bulgaria carbonaria* from HAL (fig. 1 h,i), which also otherwise fits the current concept of *Plicaria carbonaria* in every regard. The coloured photo in Breitenbach & Kränzlin (1981: 65) gives a good impression of this species.

Pl. carbonaria grows exclusively on fire places. It is possible, that the species prefers burnt wood of deciduous trees, at least in Central Europe. In its distribution *Pl. carbonaria* is seemingly restricted to Europe. The identity of the Indian collections described and illustrated by Waraitch (1977) and named *Plicaria carbonaria* is uncertain. In the G.D.R. it is a rare species, but in other parts of Europe it seems to be more abundant. According to Breitenbach & Kränzlin (l.c.) it is the only *Plicaria* species known from Switzerland.

Plicaria endocarpoides (Berk.) Rifai,
Verhand. Koninkl. Nederl. Akad. Wetensch., afd. Natuurk. 2, 57(3): 255. 1968.

= Plicaria leiocarpa (Currey) Boud., Icon. Mycol. 2: pl. 304. 1906.
= Plicaria fuliginea (Schum.) sensu Moser (1963).
For further synonyms, see Rifai (1968: 255).

Apothecia gregarious or subfasciculate, thecium reddish brown, chestnutbrown to dark brown, rarely with violaceous tint. External surface concolourous, slightly paler than the disc, beset with small, somewhat darker pustules. The shape of the stipeless apothecia varies from cupulate to discoid. Flesh macroscopically unlayered, without true latex, but the section surface stains weakly yellowish after some minutes. Largest apothecium seen 65 mm diam., by a depth of 20 mm.

Immature ascospores colourless, mature ones (fig. 4a) only slightly yellowish, spherical, without oil drops, even not in the younger state, but with a great De Bary bubble (fig. 4b) when treated with Cotton Blue + lactic acid (a portion of ascospores only). Size 8,3 - 10,3 µm. Spore wall absolutely smooth.

Asci in the young state hyaline, at maturity with a yellow-brownish pigmentation, after spore releasing and collapsing the asci become dark brown ropes because of intensive storage of pigments and certainly have a great share in colouring of the apothecium. Shape of asci cylindrical, with a flat rounded, operculate apex, constricted at the base but very distinctive pleurorhynchous. Asci eight-spored, of equal length as the paraphyses. Amyloid reaction weak but distinct, extending on the whole ascus wall, slightly stronger at the ascus apices in some cases only. Size 190 - 240 x 10,9 - 14,6 µm.

Paraphyses in the lower parts colourless, at their tops with yellow pigments, but colouring not very intensive. Lower parts filiform, 3 - 3,5 µm thick, upper parts equal or slightly clavate up to 5,7 µm. The paraphyses are not equally distributed in the hymenium but are bundled in a nosegay-like manner with their apices somewhat curved in most cases. Upper region of the hymenium with an amorphous, pale matrix, which glues the paraphysal tips. The paraphyses are unbranched, septate, with 1 - 3 septa in the upper 100 µm. Length of the uppermost cell 35 - 60 µm.

Hymenium 200 - 230 µm. Subhymenium distinct, consisting of small, isodiametric or short hyphoid cells. Medullary excipulum very thick (up to 1500 µm!), consisting of normal and inflated hyphae and globular cells up to 65 µm diam. Ectal excipulum not clearly separated from the medulla, composed of textura inflata, too, but the majority of cells isodiametric. Near the margin the distinction between ectal and medullary excipulum becomes more obvious, ectal excipulum here composed of a textura globulosa. The margin itself (fig. 2) consists in its greater part of large, globular cells. The transition to the hymenium is formed by a thin layer of paraphyse-like cells, which are moniliform in their lower parts and turn over into the marginal cells. In radial section there is another layer with many cross-sectioned hyphae visible below the textura globulosa layer. This "circle hyphae layer", which is interspersed with a few globular cells, could not be observed in other Plicaria species. The whole margin is covered by an amorphous, brownish substance.

Specimens examined:

(1) Nov. 1863; England, Ascot, Com. Surrey; J. Currey Mss.; Rabenhorst, Fungi europaei, Edit. nov., Ser. II, Cent. VII, No. 622; HAL (presumably isotype of Peziza leiocarpa Currey).

(2) 12. XI. 1939; Germany (today: G.D.R.), Zwickau, Waldenburg near Glauchau, Hellmannsgrund; on burnt place; leg. P. Ebert 3372; JE.

(3) 20. VIII. 1958; G.D.R., distr. Karl-Marx-Stadt, Marienberg, near Pobershau/Gelobtland; on burnt place; leg. P. Ebert 6102c; JE.

(4) 23. V. 1970; G.D.R., distr. Potsdam, gravel-pit near Langerwisch 8 km S Potsdam; on sand; leg. D. Benkert; BHU.

(5) 13. VI. 1971; G.D.R., distr. Potsdam, Parforce - Heide near Potsdam, Butterberge; between rubbish; leg. D. Benkert; BHU.

(6) 1. X. 1972; G.D.R., distr. Potsdam, Neuruppin, Krangener Forst SW Zippelsförde; on a forest fire place; leg. D. Benkert; BHU.

(7) Oct. 1972; G.D.R., distr. Frankfurt/Oder, Strausberg, Buckow, burnt place W Krugberg; leg. E. Paechnatz; BHU.

(8) 9. V. 1973; G.D.R., distr. Potsdam, Beelitz, on roadside in a dump N Stücken; leg. D. Benkert; BHU.

(9) 11. XI. 1973; G.D.R., distr. Potsdam, Belzig, 1 km S Lehnsdorf; on burnt places; leg. G. Hirsch; JE.

(10) 18. I. 1975; G.D.R., distr. Potsdam, Oranienburg, Briesetal near Birkenwerder; on burnt place; leg. E. Paechnatz; BHU.

(11) 23. II. 1975; G.D.R., distr. Gera, Jena, forest fire place near the Lobdeburg ruin; leg. G. Hirsch; JE.

(12) 14. X. 1975; G.D.R., distr. Rostock, island Hiddensee, Dornbusch; on naked loamy soil; leg. D. Benkert; BHU.

(13) 9. IV. 1976; G.D.R., distr. Neubrandenburg, Neustrelitz, Zwenzow, near the lake "Krummer See"; on roadside in gravel-pit; leg. D. Benkert; BHU.

(14) 20. VIII. 1976; G.D.R., distr. Karl-Marx-Stadt, Plauen, 1 km SE Kornbach; on burnt place; leg. H. Dörfelt & G. Hirsch; JE.

(15) 2. IV. 1977; G.D.R., distr. Halle, Wittenberg, sand-pit near Dobien; on moist sand; leg. K.-F. Günther; BHU.

(16) 23. X. 1977; G.D.R., distr. Potsdam, Beelitz, between Kähnsdorf and Stücken; on burnt place; leg. P. Sammler; BHU.

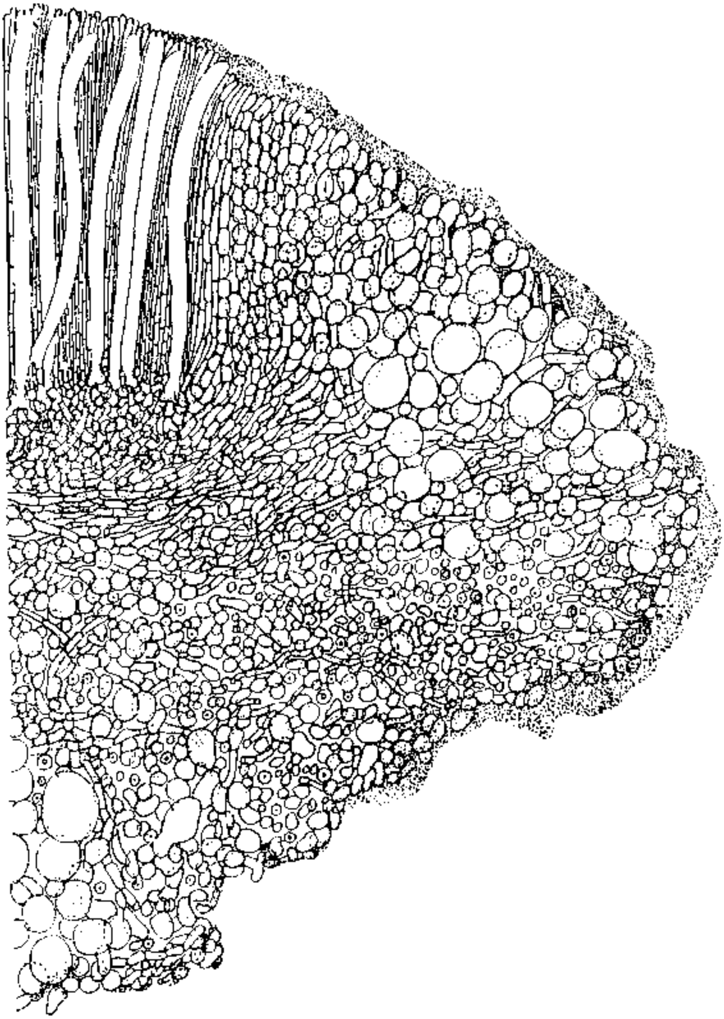


FIGURE 2. Plicaria endocarpoides, coll. (22), margin. x 250. (Del. O. Hirsch)

(17) 22. VIII. 1978; G.D.R., distr. Karl-Marx-Stadt, Oelsnitz, Kapellenberg N Schönberg; on burnt place; leg. R. Rauschert; JE.

(18) 15. V. 1980; G.D.R., distr. Erfurt, Jonastal SW Arnstadt; on burnt place; leg. K.-F. Günther; JE.

(19) 9. X. 1980; G.D.R., distr. Gera, Rosental 3 km NW Jena, on burnt place; leg. G. Hirsch; JE.

(20) 21. X. 1981; G.D.R., distr. Karl-Marx-Stadt, Klingenthal, Kärrnerstraße SSE Schöneck; on burnt place; leg. G. Hirsch; JE.

(21) 22. X. 1981; G.D.R., distr. Karl-Marx-Stadt, between Goldberg and Schneckenstein 5 km N Klingenthal; on burnt place; leg. G. Hirsch; JE.

(22) 29. I. 1983; G.D.R., distr. Potsdam, near Feroh - Mittelbusch; Pinus forest with fresh deposits of sand and burns; leg. E. Paechnatz; JE.

(23) 22. IX. 1983; G.D.R., distr. Gera, Rudolstadt, valley "Dreckige Gasse" 1,5 km WNW Paulinzella; on burnt place; leg. G. Hirsch; JE.

(24) 19. X. 1984; G.D.R., distr. Karl-Marx-Stadt, Klingenthal, Bärenwinkelweg NE Morgenröthe-Rautenkranz; on burnt place; leg. D. Benkert & H.-J. Hardtke; JE.

(25) 20. IV. 1985; G.D.R., distr. Dresden, Krebs-Mühle NE Radeburg; on burnt place; leg. H.-J. Hardtke; JE.

At present there is only known one well circumscribed smooth spored Plicaria worldwide, if one recognizes the synonymy of Plicaria endocarpoides with Pl. leiocarpa. Otherwise there exist some names in the literature relating to smooth and spherical spored, Plicaria-like fungi, which are very insufficiently known. Such cases are, for instance, Plicaria arenaria (Osbeck) Boud., Plicaria fuliginea (Schum.), Plicaria foveata Fuckel and Plicaria rouastiana Boud.

Pl. endocarpoides is the most common Plicaria species in our country. It occurs in the lowlands as well as in the mountainous region, and is here a common member of the Geopyxidetum carbonariae Ebert. Although it clearly prefers burnt places, its occurence is not restricted to these habitats. The collection no. (22) cited above was found on naked, virginal sand mixed with beton rests and plaster, but probably originated from nearby scattered burns. Other samples like (4), (5), (8), (12), (13) and (15) were collected without connection to fire places.

The geographical distribution of Pl. endocarpoides extends from Europe to North America. At present I only know one record from Asia (Israel), but its occurence in Australia and New Zealand suggests a presence in other parts of this continent, too.

Plicaria trachycarpa (Currey) Boudier,
Bull. Soc. Myc. France 1: 102. 1885.

= Galactinia trachycarpa (Currey) Le Gal, Bull. Soc. Myc. France 78: 212. 1962.

For further synonyms, see Eckblad (1968: 78).

Apothecia up to 20 mm diam. or more, thecium reddish brown, violaceous brown or dark brown, external surface similar. Margin darker, with little squamules. Shape of apothecia cupulate to discoid, without stipe.

Ascospores at first hyaline, at maturity light brown, spherical, with one or a few oil drops. KOH or Cotton Blue + lactic acid treatment initiates development of De Bary bubbles in a portion of mature ascospores. Size (9,6-) 10,4 - 12,2 (-13,5) µm (excl. ornamentation). The cyanophilous ornamentation consists of discrete coarse warts, with an angular outline, up to 1,0 µm high, sometimes slightly elongated to form very short ridges (fig. 3 a,b).

Asci eight-spored, operculate, at first hyaline, at maturity they become light brown, after spore releasing and collapsing with a strong brownish pigmentation. Their shape is cylindrical with a blunt apex, at base slightly constricted and pleurorhynchous (fig. 3 d,e). Some immature asci are somewhat clavate, but mature ones are always cylindrical, shorter, equal or slightly longer than the paraphyses. Amyloidity very weak, only detectable as a faint blue reaction in the region around the operculum. Size 210 - 275 x 12 - 20 µm.

Paraphyses filiform, 2,5 - 3,5 µm thick, above always clavate up to 9,4 µm. Walls hyaline or light brown, tips encrusted and adhered together by a great amount of amorphous brownish excrete. Paraphysal tips often slightly curved. The paraphyses are moderately cyanophilous, unbranched, septate, with 2 or mostly 3 septa in the upper 100 µm. Length of the uppermost cell 18,7 - 41,6 (-70,7!) µm.

Hymenium 220 - 260 µm. Subhymenium distinct, textura angularis, cells 7 - 13 µm. Medullary excipulum thick, consisting of a textura inflata composed of short, isodiametric cells about 10 µm, normal hyphae and great, spherical cells up to 50 µm. Medullary and ectal excipulum separated by a mediostratum of intertwined darker hyphae, running ± parallel to the hymenial surface. This layer is only traceable in central parts of the apothecium. Ectal excipulum 100 - 130 µm thick, built up of isodiametric, angular or spherical cells up to 60 µm (textura globulosa-angularis), which have brownish pigments in their thickened walls (fig. 3f). Marginal region not very prominent, narrow, composed like the ectal excipulum, separated from the hymenium by a layer of brownish cells, which are clavate at their uppermost parts and slightly moniliform in the lower parts (fig. 3c).

Specimens examined:

(1) Nov. 1863; England , "from Mr. Broome"; K (presumably holotype of *Peziza trachycarpa* Currey).

(2) Nov. 1863; England, Ascot, Com. Surrey; J. Currey Mss.; Rabenhorst, Fungi europaei, Edit. nov., Ser. II, Cent. VII, No. 620; HAL (presumably isotype of *Peziza trachycarpa* Currey).

(3) 12. VIII. 1941; Germany (today: G.D.R.), Chemnitz (today: Karl-Marx-Stadt), Oberwald near Hohenstein-Ernstthal, Salzleckenweg; on burnt place; leg. P. Ebert 3793; JE.

(4) 7. XI. 1976; G.D.R., distr. Halle, Naumburg, "Gespensterbuche" SE Bad Kösen; on burnt place; leg. R. Rauschert; JE.

(5) 10. X. 1984; G.D.R., distr. Erfurt, Weimar, München near Bad Berka; on burnt places (charred spruce wood); leg. R. Rauschert; JE.

(6) 19. X. 1984; G.D.R., distr. Karl-Marx-Stadt, Klingenthal, NE Morgenröthe-Rautenkranz; on burnt places (conifer wood); leg. D. Benkert & H.-J. Hardtke; JE.

(7) 20. X. 1984; G.D.R., distr. Karl-Marx-Stadt, Reichenbach, near Waldkirchen; on burnt place (conifer wood); leg. H.-J. Hardtke; JE.

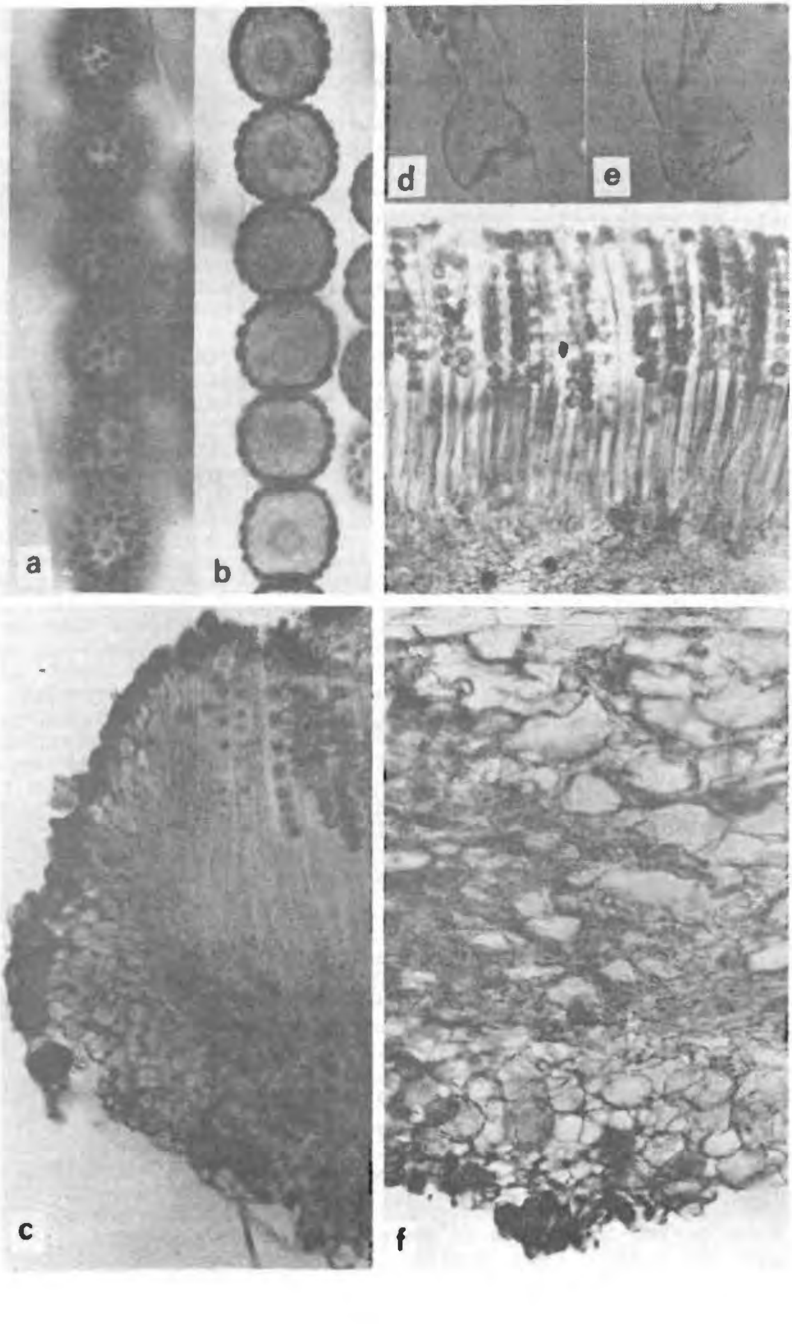
Unfortunately I have only seen dried material of this species. That's why the macroscopical and anatomical characters are not yet fully understood in the description given above. Besides the difference to Plicaria carbonaria in spore ornamentation there also seems to exist a difference in the shape of the fruitbody. Pl. carbonaria always has flat discoid apothecia, whereas some of the studied specimens of Pl. trachycarpa have distinct cupulate apothecia even in the dried state.

Pl. trachycarpa is an uncommon species. Three of the four recent collections from our country were traced last autumn, when apparently favourable conditions existed for growing of this species. It occurs exclusively on burnt places. Its distribution ranges from Europe to North America and India. Records from the southern hemisphere are not known yet. The very similar Plicaria recurva (Berk.) Rifai occurs in Australia (and perhaps in North America, too). I have examined the holotype of the latter species from K and can confirm the characters mentioned in the description of Rifai (1968: 258). The most distinguishing features are the spore ornamentation, which consists of wavy ridges instead of angular warts (fig. 4 e,f), and the stronger amyloid reaction of the ascus wall.

Plicaria acanthodictya

Pl. acanthodictya Dissing & Hauerbach in Dissing (1974: 139) can easily be distinguished from other European taxa because of its reticulate spore ornamentation. Other spherical spored Pezizaceae with cupulate apothecia and reticulate spores are seemingly restricted to Australia (Hirsch 1985). Since its description no further collections of this species came to light. So its occurence on

FIGURE 3. Plicaria trachycarpa. a,b coll. (2), mature spores. c coll. (5), margin. d-f coll. (6), d,e ascus bases, f cross-section through a dried apothecium. a-c, f in Cotton Blue, d,e in water. a,b,d,e x 1050, c x 190, f x 175. (next page!)


a
b
c
d
e
f

some burns in Denmark from 1970 till 1972, where it was described from, remains a peculiarity.

Peziza echinophora Donadini,
Doc. Myc. *12*(46): 6. 1982.

This recently described taxon with spherical spores can not remain in the genus *Peziza*. Donadini (1983) places it in his subgenus *Scabropezia* and compares it with *Scabropezia flavovirens* and *S. scabrosa*. From the short descriptions given it seems possible, that a relation to these species can indeed be true, but the reader can hardly get a well-founded imagine. The author states, that he has some additional collections than the type collection. Unfortunately I haven't seen yet neighter some specimens nor the detailed description of *Peziza echinophora* in Donadini (1981).

Plicaria ferruginea

There exists much confusion about the application of the name *Plicaria ferruginea* Fuckel. Many authors, including Fuckel himself, have described a spherical spored pezizaceous fungus under this name. However, e.g. Maas Geesteranus (1969) has shown, that the type collection (Fungi rhenani no. 1224) represents a species with ellipsoid spores, the correct name of which is *Peziza atrospora* Fuckel. It is not the place here to clear up, what *Plicaria ferruginea* in the sense of the different authors is.

Peziza lundellii Donadini

Recently Donadini (1976; 1982) has described *Peziza lundellii*, which actually is a *Plicaria* in my sense. From the descriptions only, the differences between this and *Pl. trachycarpa* are not very clear. According to the presented illustrations (Donadini 1976: Pl. II f,g) the kind of spore ornamentation of *P. lundellii* (which is known from one collection only) seems to be slightly different from that of *Pl. trachycarpa*. A more recent SEM-photo of a spore of *P. lundellii* (Donadini 1983: Pl. I, fig. 6) does not, however, support this opinion. The paraphyses are described as more gracile than those of *Pl. trachycarpa*. I have not yet seen material of *P. lundellii* and can not offer a definite conclusion.

Peziza pseudoanthracina Donadini

P. pseudoanthracina is a recently (Donadini 1982: 6) established name for the fungus commonly known as *Plicaria anthracina* (Cooke) Boud. sensu Boudier. Surprisingly enough Donadini describes amyloid asci for this fungus, whereas Boudier (Icon. Myc. *4*: 170) himself and later Maas Geesteranus (1967: 422) clearly indicate, that the asci of the type specimen are non-amyloid. I assume, that re-examination of the specimen in PC will reveal the error. I had the opportunity to study a collection of this rare fungus from our territory (14. VII. 1978; G.D.R., Berlin,

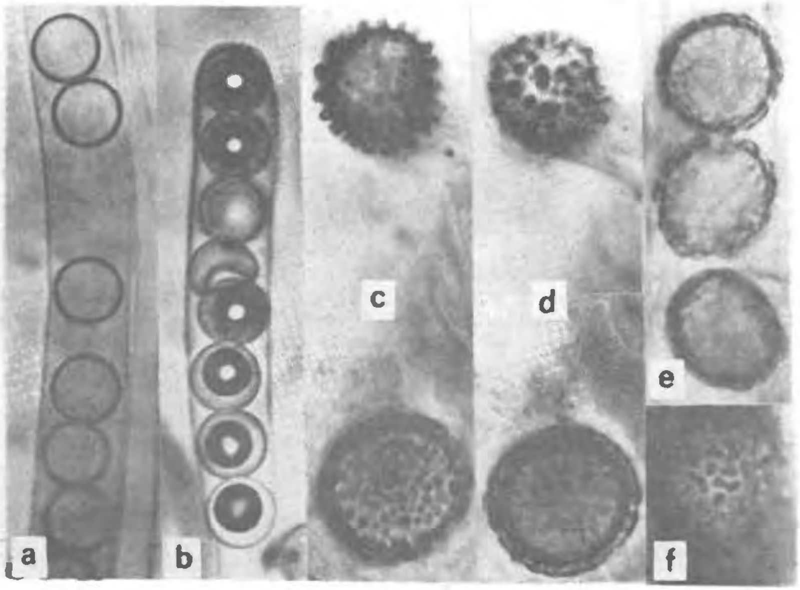


FIGURE 4. a,b *Plicaria endocarpoides*, coll. (24), mature spores. c,d *Peziza (Plicaria) radula*, from "neotype", two different types of spores. e,f *Peziza* (*Plicaria*) *recurva*, from holotype, mature spores. All in Cotton Blue. All x 1050.

Bernau, gravel-pit Schwanebeck-Alpenberge; on naked sand between mosses; leg. E. Paechnatz; BHU), and I can confirm the non-amyloidity of asci. The genus *Pulparia* P. Karst. seems to be a proper place for this fungus. It will have to be checked, whether *Peziza pseudoanthracina* Donadini must be formally transferred to that genus, or falls into the synonymy of *Pulparia rickii* (Rehm) "Donadini" (comb. inval.!), as Graddon (1976: 170) has suggested.

Plicaria radula

It was impossible to key out *Plicaria radula* (Berk. & Broome) Sacc. I have examined the specimen from herbarium K, which Eckblad (1968: 79) has selected as "neotype". The identity of this material is far from being clear. It contains broad, cylindrical asci with ± strong amyloid apices. There are spores of two different kinds present outside of the asci, what Dissing & Pfister (1981: 107) probably led to the conclusion, that the material is "a fragment of one apothecium from a mixed collection". The two kinds of spores, which are similar but hardly identical (fig. 4 c,d), do not belong to any *Plicaria* species known to me. Since there still exists a part of the original collection in NY, on which the name *Peziza radula* Berk. & Broome was based, the neotypification of Eckblad must be abandoned. The identity of the NY material could not be fully established by Dissing & Pfister. They compare it with the hypogeous genus *Pachyphloeus* Tul. So at present it remains obscure, if *Peziza radula* is a true pezizoid fungus at all.

The spore measurements (25 - 28 µm) given by Moser (1963) for *Plicaria radula* are quite wrong. The source for this error is the description by Rehm (1896: 997), which was based on a collection of Krieger from Nossen in Saxony, Germany. From Rehm's description it is quite obvious, that he really had a species of *Boudiera* in his hands!

Key to the European species of *Scabropezia* and *Plicaria*

1\. Spores smooth .... *Pl. endocarpoides* (Berk.) Rifai
1\. Spores sculptured by a cyanophilous ornamentation ...2

2\. Spore ornamentation in form of a complete reticulum .. .. *Pl. acanthodictya* Diss. & Hauerbach
2\. Spore ornamentation not as a reticulum 3

3\. Spore size (excl. ornamentation) less than 9 µm .... *Peziza pseudoanthracina* Donadini
3\. Spore size more than 10 µm 4

4\. Ascus length more than 300 µm. Hymenium with olivaceous colours. External surface covered by striking protuberances.......................................5
4\. Asci less than 300 µm long. Hymenial colours not olivaceous. External surface nearly smooth 6

5\. Spore ornamentation consists of 0,8 - 1,0 high warts. Ascus width 20 - 30 µm. Paraphyses agglutinated at their tips .... *Scabropezia flavovirens* (Fuckel)Diss. & Pfister
5\. Spore ornamentation consists of 1,0 - 1,5 µm high, truncate spines or pustules. Ascus width 16 - 18 µm. Paraphyses in general not agglutinated .... *Peziza* (*Scabropezia*? *Plicaria*?) *echinophora* Donadini

6\. Spore ornamentation consists of cylindrical or conical, truncate or even slightly clavate warts or spines up to 2,5 µm high .... *Pl. carbonaria* (Fuckel) Fuckel
6\. Spore ornamentation not higher than 1 µm 7

7\. Warts rather irregular in size and scattering. Paraphyses gracile, 2 µm thick, enlarged above up to 4 µm .... *Peziza* (*Plicaria*!) *lundellii* Donadini
7\. Warts fairly regularly sized and distributed on the spore surface. Paraphyses more compact, 2,5 - 3,5 µm thick, above clavate up to 9 - 10 µm .... *Pl. trachycarpa* (Currey) Boud.

Acknowledgements

Many thanks are due to the curators of the herbaria BHU, HAL and K, who have kindly placed valuable material at my disposal. The same applies to (Mrs.) Dr. R. Rauschert (Halle), Dr. H.-J. Hardtke (Dresden), Mr. R. Kristiansen (Fredrikstad) and Mr. E. Paechnatz (Berlin), who have supported the work by providing me with material from their private collections. Mrs. M. Wisniewski has kindly corrected parts of the English manuscript. My wife has carried out the drawing and gave further valuable help.

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AGARICA

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CORTINARIOMANIA.
(Première série)

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Résumé

Dans cette note l'auteur étudie quatre cortinaires peu connus : C. Privignoides Hry, C. licinipes Fr, C. seminagnitus Hry et C. cystidifer Vel. Deux espèces nouvelles sont créés : C. albomaculatus ad int,étudié sur une seule récolte,et C. leptosporus,affine à C. laniger Fr,mais à petites spores remarquablement étroites.

Key-words : Basidiomycetes,Cortinarius : Hydrotelamonia,Telamonia and Hydrocybe.

Summary

In this note,the author studies for rare or little known taxa.In the Privignoides group : C. privignoides Hry.In the fuscopallens group : C. licinipes Fr. In the Ferruginascens group : C. seminagnitus Hry.

C. cystidifer Vel.is proposed as a new combination for Hydrocybe cystidifera Vel.

Two new taxa are created : C.albomaculatus ad int,with typical spores and cystidias,studied on one collection,and C. leptosporus,similar with C. lanige Fr , except for its small and remarkably narrow spores.

C. privivignoides Hry

Henry : BSMF, 1948 p. 40

Chapeau 5-8 cm,assez charnu,d'abord obtusément convexe puis convexe-plan, à mamelon net,parfois à une ou deux zones gibbeuses autour du mamelon.Marge d'abord infléchie et le restant longtemps,puis droite.Marginelle se retroussant tout autour à la fin.

Cuticule par le sec uniformément jaune ocracé,jaune fauve (Seguy 20I, 202 très dilué,I74 en plus jaune) d'un fauve un peu plus soutenu au mamelon qui est parfois aréolé,plus pâle vers la marge (I99 en plus soutenu) d'aspect mat,à la loupe parcourue par un fin chevelu inné,d'aspect micacé par places,avec près de la marge quelques débris d'un voile paraissant jaunâtre.

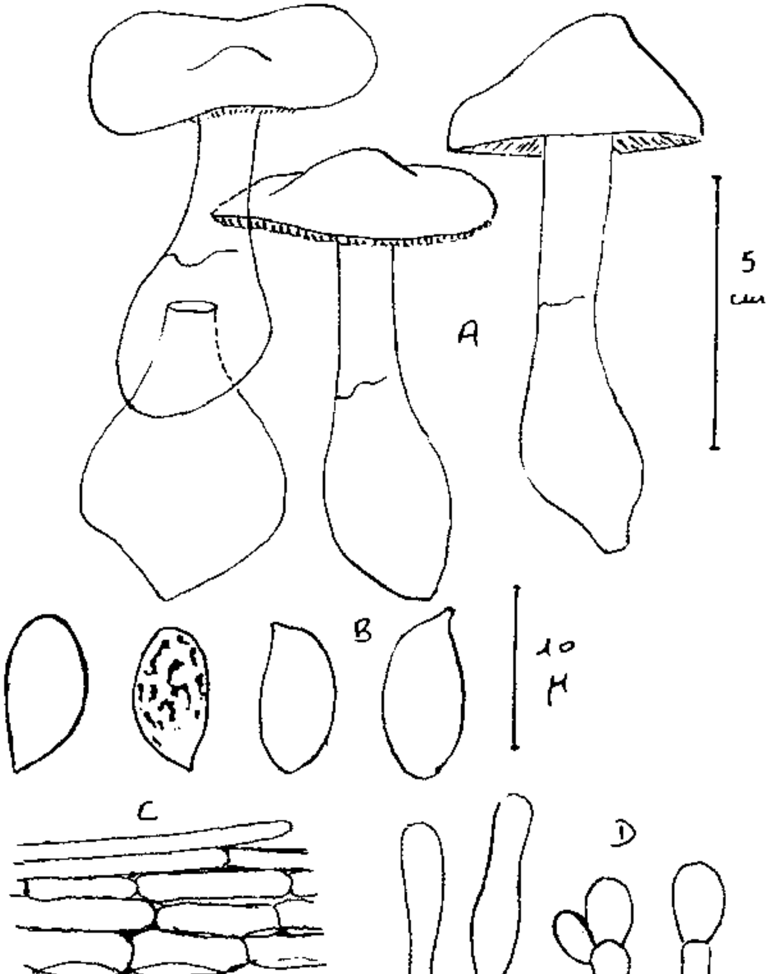
Pied 7-IO x I,5-2 cm au sommet,à peu près égal au diamètre du chapeau mais pouvant être beaucoup plus long,parfois comprimé au sommet (section ovalaire) fibrillo-strié en haut,remarquablement dilaté à la base en un bulbe en oignon - parfois en gourde - qui peut atteindre une largeur spectaculaire (3,5 cm),blanc puis s'ocracant,subconcolore au chapeau mais plus pâle,tapissé sur le bulbe d'un tomentum blanc formant une gaine laissant à mi hauteur une trace annulaire incomplète.

Lamelles larges de 0,5-0,6 cm,plutôt aigües en avant,assez serrées,adnées-sinuées ou émarginées,ayant tendance à se séparer du stipe à la fin,d'un beau fauve (Seg. 20I) puis fauve ocracé,à arête plus ou moins crénelée (caractère non frappant) et plus pâle.

Chair blanchâtre dans le chapeau et le stipe,un peu plus foncée,jaunâtre à jaune ocracé safrané dans le bulbe.Odeur non notée.Réaction négative au gaiac.Positive au NO3Ag : immédiatement bistre ardoisé passant au rosâtre puis au rose vineux.KOH : beau brun roux dans le bulbe.

Figure I

C. privignoides Hry



A. Carpophores B. Spores C. Coupe radiale de la cuticule

D. Cellules steriles

Cuticule filamenteuse d'hyphes couchées,bouclées,à extrémités libres banales,les superficielles de 5,5-8 µm,en segments parfois très courts (20-25 µm),les sous-jacentes épaissies jusqu'à I2-I5 µm.Hypoderme nettement pavimenteux-subcelluleux (x 20-30 µm).Paroi des hyphes colorée en jaune par un pigment de membrane en pointillé.On trouve en outre des masses d'un pigment brun-jaune,qui parait extra-cellulaire et qui n'est sans doute qu'un nécro-pigment.

Arête homomorphe.Basides 4 sp à stérigmates longs de 4 µm environ,très souvent à contenu granuleux noirâtre, 35-45 x 8-IO µm.Cellules stériles clavées,banales 20-25 x 7-8 µm,quelques unes (rares) septées,à article terminal court (I5 x IO µm) obovoide ou en raquette d'opuntia.

Spores dominantes ellipsoides,à apicule court et obtus,parfois recourbé, moyennement verruqueuses,à verrues ne dépassant pas le profil,d'aspect un peu crêtées ou caténulées,mesurant (7) 8-9,5 (IO,5) x 5 - 5,5 (6) µm.

Habitat : Peu commun dans les Ardennes.Bois du Vivier,Forêt du Mont Dieu. Parait lié aux bouleaux.Récolte décrite : Bois du Vivier (Chênes,bouleaux, sur sol plus ou moins acide) 2 oct.I98I.

Observations.

Ce taxon est pour nous reconnaissable à son gros bulbe mou (très typique) et à sa réaction rapide (fauve-ardoisé) au NO_3Ag.Nous pensons qu'il en est de C.privignoides comme de C. triformis FRIES,c'est à dire qu'il en existe trois formes affines. Une forme peu hygrophane,liée aux bouleaux - qui est celle ici décrite - très caractéristique ;- que l'on peut difficilement confondre avec autre chose,et dont on peut voir une excellente planche photographique (Pl 773) dans le petit livre de MARCHAND. Une forme des conifères,plus hygrophane,se deshydratant en cocarde comme K. mutabilis (également photographiée par MARCHAND- Pl. 772 - et décrite sous le nom à notre sens erroné de C. triformis FRIES) et qui parait être, au moins pro parte,le C. triformis au sens de MOSER.Enfin une forme des bois feuillus (charmes dominants) que nous avons trouvé dans la forêt de Montargis en compagnie de Guy REDHEUIL,forme plus pâle,à marge plus grisaillante,affine,semble -t -il, au triformis var. Schaefferi,c'est à dire au triformis des hêtres,qui est l'espèce de LANGE.

L'ensemble de ces trois formes,toutes les trois munies de ce gros bulbe ovoide caractéristique et réagissant toutes les trois fortement et rapidement au nitrate d'argent,constitue ce que nous pensons être le C. privignoides HENRY.La détermination de la forme ici décrite et publiée nous a été confirmée par le dr. R. Henry.

La microscopie -spores,cuticule,pigment - est tout à fait banale et n'offre,in se,aucun trait distinctif. HENRY (BSMF loc. cit.) a fait de C. privignoides l'espèce-type d'une stirpe (I) privignoides (non validée) fortement définie macroscopiquement : Nous renvoyons aux observations de l'auteur.

(I) Nous préférons le terme stirpe au terme sous-section,à connotations trop militaires.

C. licinipes Fries

Fries : Epicr. p 293. Monogr. p 83.Hymenom. p 376

Chapeau 4-8 cm,mince et fragile,obtusément convexe puis convexe-plan, à marge d'abord infléchie puis droite,vite incisée.Marginelle remarquablement retroussée à la fin.

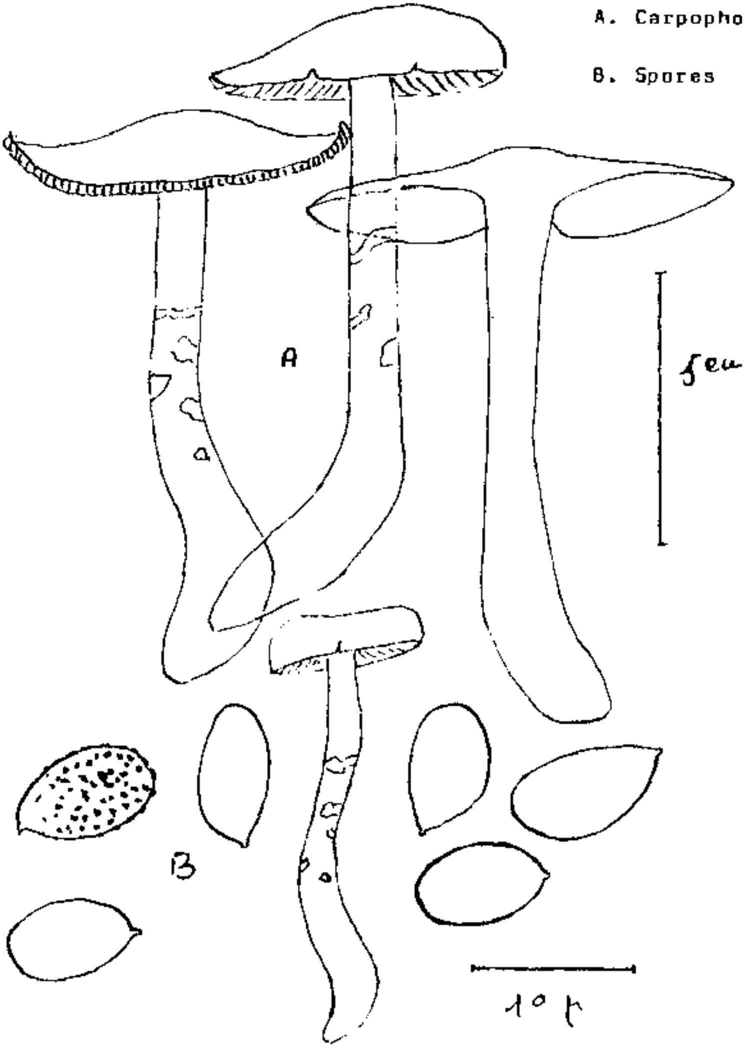
Cuticule luisante,givrée par le voile au centre étant imbue,à marge lutée de blanc au début,recouverte d'une fine grisaille innée,d'un brun roux assez sombre par imbibition (Seg. I62 + I46) avec des nuances palissandre (I26),se deshydratant en cocarde comme K. mutabilis,passant au roux fauve (I92 dilué,I93-202) avec çà et là quelques flammèches d'imbibition sur les bords,puis prenant des tons jaune fauve ou fauve ocracé assez vifs (I74-203),la marge restant longemps plus sombre et contrastant ton sur ton,uniformément jaune ocracé hinnuloide à la fin.

Pied pouvant être très long,atteignant jusque I2 x I - I,5 cm au sommet (2 cm dans le bulbe) plein puis se creusant,fistuleux,mou,très fibrilleux, fibrillostrié à l'oeil nu,hyalin ou jaunâtre ocracé étant imbu,blanchâtre à la base,mais toujours beaucoup plus pâle que le chapeau . A long bulbe oblong déjeté de côté - mais pouvant être également plus ou moins atténué à la base comme les duracini - chaussé par un voile blanc qui laisse une trace annulaire complète apprimée au tiers supérieur,bord supérieur d'une gaine qui se fragmente en squames apprimées très nettes ressemblant à de faux bracelets.

Lames assez serrées,larges,atteignant I,3 cm,obtuses en avant,largement adnées ou uncinées,decurrentes par un crochet,d'abord jaune ocracé puis fauve rouillé,à arête peu évidemment crénelée et un peu plus pâle.

Chair fauve ocracé étant imbue,pâlissant beaucoup,blanchâtre par le sec douce,inodore ou à odeur vaguement d'eau savonneuse.Réactions négatives au gaiac,à la phénaniline,au metol et au TL4.Peu probantes à KOH (brunâtre sur la chair) et au NO3Ag (lentement brunâtre.)

Figure 2. C. licinipes Fries


A. Carpophores

B. Spores

Cuticule filamenteuse à hypoderme non subcelluleux.Hyphes superficielles larges de 3,5– 8 µm,à boucles abondantes,très emmêlées – rappelant un peu l'épicutis des phlegmacia – à extrémités libres hombreuses,parfois très minces (x 3,5 µm) la plupart égales,mais pouvant être aussi un peu épaissies au sommet et même bifides.Hyphes sous-jacentes colorées par un pigment de membrane nettement incrustant.Hypoderme semblablement pigmenté,bien différencié mais non subcelluleux,formé d'hyphes épaissies jusqu'à 30 µm environ, souvent en forme de grosse massue,on segments parfois très longs (I50 µm).

Arête banale,homomorphe,sans particularité.Basides 4 sp,plus ou moins cylindracées,25–30 x 6,7 µm,à longs stérigmates.Spores ellipsoides, la plupart courtement elliptiques (ovoides vues de face),comprises entre 7 et 8 µm,assez fortement verruqueuses,à verrues maculiformes dépassant légèrement le profil sur les spores les plus ornées,mesurant 7 – 8,5 (IO) x 4,5 – 5,5 µm.

Habitat : Pins et bouleaux sur sol sablonneux (Ile de France). Deux récoltes I6 oct et 23 oct I980 (Leg MICHEL).

Observations

Nous rapportons ces deux récoltes de l'Ile de France au C. licinipes FRIES,qui parait rare ou peu connu.Notons macroscopiquement la fragilité du chapeau,la largeur des lames,l'ornementation tout à fait particulière du stipe (voile presque squamiforme) qui signe l'espèce et que l'on ne retrouve pas chez les autres taxons de la stirpe (fuscopallens).Microscopiquement,une nette tendance microsporée et un épicutis (voile apprimé ?) à hyphes emmêlées rappelant l'épicutis des phlegmacia.Notre taxon correspond très vraisemblablement au C. licinipes de VELENOVSKY (CH p.456) à spores de 7–9 µm.L'espèce décrite par MOSER (KK,ed. anglaise p.404) semble avoir des spores un peu plus grandes et un peu plus larges.

Les principaux caractères que nous avons notés comme differentiels correspondent très bien aux descriptions Friesiennes (particulièrement à celle de la Monographia,qui est la plus détaillée) auxquelles nous renvoyons le lecteur.

Le C. licinipes var. robustior figuré par COOKE (planche 792 (8I9)) n'est pas cette espèce,mais très varisemblablement C. privignus FRIES (= C. euprivignus HENRY).

C. seminagmitus Hry. nomen subnudum.

Henry : BSMF,I955,p. 226-227.

Chapeau 6-7 cm,convexe-plan,peu mamelonné,un peu déprimé autour du mamelon.Marge incisée à la fin,un peu sinueuse,se redressant.

Cuticule peu hygrophane,ocre roux pâle (Seguy 249 + I74 ou Cailleux N49,P49 très dilué) lisse au mamelon,furfuracée ou squamuleuse à la marge qui peut être plus ou moins fibrilleuse.

Pied 8-9 x I cm au sommet,très fibrilleux,fibrillostrié à l'oeil nu,droit, non bulbeux,un peu tordu à la base qui peut être pointue ou subradicante, fistuleux,se creusant à la fin,ocracé pâle,subconcolore au chapeau,tapissé d'un tomentum blanc agglutinant les débris végétaux,brunissant au toucher à partir de la base.

Lames larges ou très larges,atteignant I ou I,2 cm,moyennement serrées ou assez espacées,certaines fourchues,rougeoyantes,à reflets sanglants en faisant varier l'incidence de la lumière,ferrugineuses (Cailleux S 33,T 29) vues de face.

Chair crème dans le chapeau (M 7I) marbrée,crème brunâtre dans le pied (R 53) Odeur subnulle,de crudité ou un peu iodée. KOH : bistre noir (chair et cutis) . Gaiac,NO3AG,tournesol,acide phénique = 0.

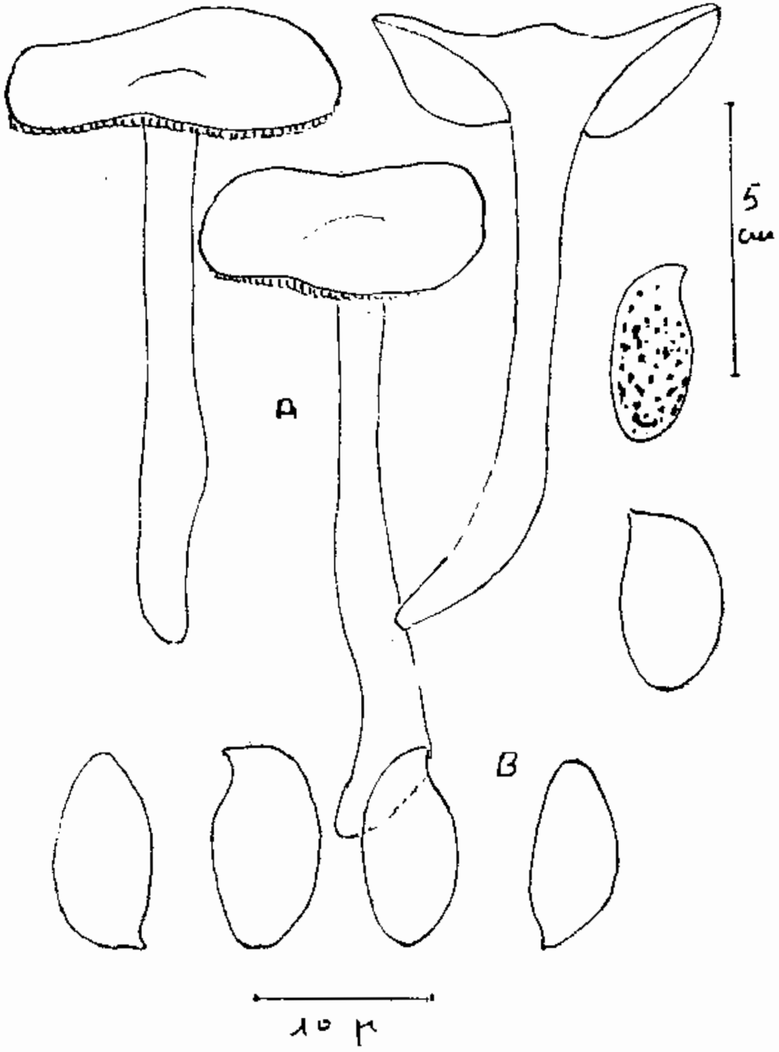
Cuticule filamenteuse d'hyphes couchées,à petites boucles,les superficielles de 5,5 - 8 µm à extrémités libres banales,les sous-jacentes épaissies jusqu'à I2- I5 - 20 µm,à pigment de membrane brun,finement incrustant.Hypoderme à tendance subcelluleuse.

Arête des lames homomorphe,sans particularité. Basides 4 sp 30-40 x 7- 9 µm. Spores largement elliptiques ou subamygdaliformes,ces dernières à sommet subogival,fortement verruqueuses,à face interne brusquement déprimée (presque concave) au dessus du hile,mesurant IO-II,5- I3,5 x 5,5 - 6 - 7 µm. Spores atypiques très larges,plus courtes,à tendance ovoide très nette.

Habitat : Sous chataîgners,en lisière d'une jeune plantation d'épiceas,sur sol lourd,argilo-calcaire. Bois de Vandy (Ardennes). Une seule récolte (6 exemplaires) le I novembre I983.

Figure 3.

C. seminagnitus Hry



A. Carpophores B. Spores

Observations

Nous n'avons fait qu'une seule récolte de ce taxon décrit par HENRY en I955 et jamais retrouvé depuis sa création. Macroscopiquement, l'allure élancée, l'aspect furfuracé de la cuticule à la marge, les lames à reflets rougeâtres (sanglants en faisant varier l'incidence de la lumière) sont caractéristiques. Microscopiquement, la forme particulière des spores, fortement déprimées au dessus du hile (semine-agnitus = reconnu par la graine) ne laisse place à aucun doute. Nous nous sommes aperçus - après coup - que nos croquis correspondaient très exactement à ceux d'HENRY à qui nous avons envoyé un exsiccatum de ce taxon et qui a confirmé notre détermination.

HENRY classe son espèce dans la stirpe ferruginascens (non validée) proche de la stirpe subferrugineus. Voir sur ce point les observations de l'auteur (BSMF loc cit. p.224-225.) Les espèces appartenant au Ferruginascentes sont restées peu connues. C. stremuipes Hry, qui en fait partie, n'est pas l'espèce figurée par MARCHAND (Pl. 789) dont la détermination est erronée.

C. cystidifer Vel nov. comb.

(Basionyme : Hydrocybe cystidifera Ceske Houby I92I p.487)

Ier lot (à voile blanc jaunâtre)

Chapeau atteignant péniblement 2 cm, évidemment mince, de forme assez irrégulière, conique ou conico-campanulé, puis s'applanissant et pouvant devenir obtusément convexe ou convexe-plan. Mamelon presque toujours bien marqué, verruciforme, plus ou moins aigu, plus rarement en dôme. Marge d'abord infléchie-brisée ou enroulée contre le stipe, souvent irrégulière, sinueuse-lobée, fragile, devenant fimbriée, striolée parimbitionn.

Cuticule hygrophane, brun chatain sombre étant imbue (S 33 , T33 dilué) unicolore ou un peu plus sombre au mamelon, plus claire vers les bords, finement fibrilleuse ce qui rend la marge grisaillante, se deshydratant par stries d'imbibition radiales, pâlissant dans les tons brun-roux (R 47,S47) ou coque de noisette (couleur de gland sec), jaune ocracé hinnuloide par le sec (P 57,N 57 ; M 60,N 60 pour les tons les plus jaunes).

Stipe en général assez long, 3 - 4,5 x 0,I - 0,3 cm au sommet, rarement droit, souvent d'allure flexueuse ou curvulée, égal ou un peu atténué à la base, jaunâtre, brunissant-noircissant à partir de la base à la manipulation, franchement jaune au sommet, assez dur ou dur puis fistuleux, fibrillostrié, très fibrilleux, plus ou moins nettement moucheté de fibrilles blanc-jaunâtre apprimées.

Lamelles adnées ou sublibres,larges de 0,2-0,3 cm,parfois très ventrues chez l'adulte et très rétrécies à leur insertion sur le stipe,relativement espacées,assez épaisses,souvent crispées,jaune ocracé (contrastant avec la couleur du chapeau imbu) puis fauve (R 55 vues de face).

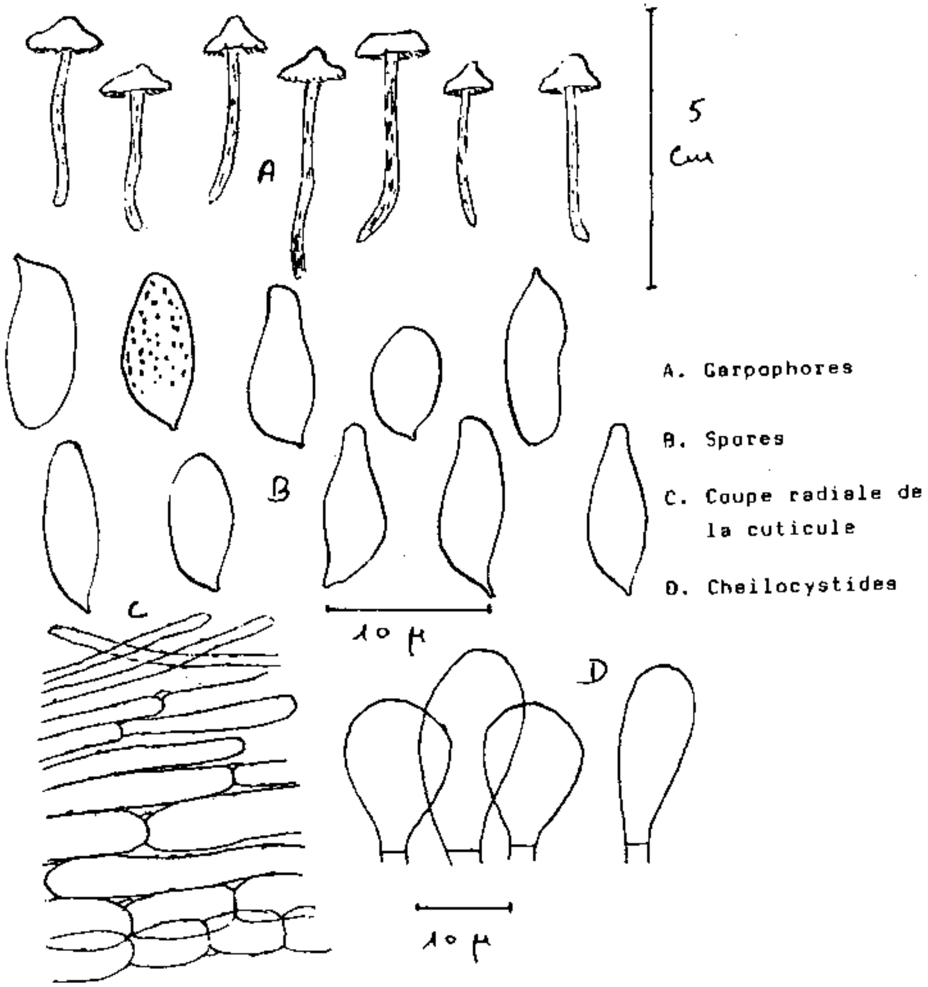
Chair jaunâtre étant imbue,crème jaunâtre (L 67,M 69) en séchant,plus foncée (brunâtre) dans la moitié inférieure du stipe,odorante,à odeur d'iodoforme virant à une faible odeur de C. hinnuleus.Réactions nulles au métol et au TL4. subnulle au gaiac (très lentement bleu). Positive à KOH : violacé sombre,puis noir (chair) atroprupurin puis noir (cutis).

Figure 4.

<u>2ième lot</u> (à voile blanchâtre.)

<u>C. cystidifer Vel</u>

(4.06.1984)



A. Carpophores

B. Spores

C. Coupe radiale de la cuticule

D. Cheilocystides

Chapeau I-2 cm (2,5 cm sur les exemplaires luxuriants) mince mais non fragile,de forme irrégulière,pouvant être d'abord conique mais aussi obtusément convexe.Mamelon saillant plus ou moins conique,ou obtus,en dôme, parfois à peine marqué.Marge d'abord infléchie-brisée,parfois nettement contractée,souvent irrégulière,sinueuse-lobée,à la fin incisée-fimbriée.

Cuticule subveloutée à la loupe par un voile apprimé très fin,plus visible sur la marge,brun de chataigne étant imbue (S 47,S 53) pâlissant dans les tons coque de noisette (R 49 dil ,R 55 dil , P 57 dil)

Stipe polymorphe,atteignant 5 x 0,2 cm au sommet,parfois beaucoup plus long que le diamètre du chapeau,égal ou nettement atténué à la base,rarement droit,presque toujours tordu,d'allure flexueuse ou curvulée,souvent très nettement torsadé,fibrillo-strié (parfois grossièrement) à l'oeil nu, à voile blanchâtre d'hydrocybe télamonioide laissant des mouchetures,subconcolore au chapeau deshydraté jaune fauve,plus nettement jaune,jaunâtre paille au sommet,brunissant à partir de la base.

Lames franchement espacées,épaisses,très ventrues sur les exemplaires adultes,adnées-sinuées ou subdécurrentes (haut du stipe longuement marqué par les unci) larges de 0,3-0,5 cm,de teinte vive,fauve ocracé à effet safrané,à arête plus ou moins nettement crénelée et concolore.

Chair jaunâtre ou crème jaunâtre,souvent plus foncée à la base du stipe, à odeur un peu iodée. Réactions chimiques identiques à celles du lot précédent.

Microscopie (identique sur les deux lots)

Epicutis d'hyphes grèles de 3,5 - 5 µm,un peu emmêlées,à parois nettement incrustées.Cuticule d'hyphes de 7 à I2 µm,à extrémités libres plutôt en masque,à segment terminal assez court (40-60 µm)Pigment de membrane brun, incrustant,en gros grains.Hypoderme bien différentié,vésiculeux-pseudoparenchymatique,semblablement coloré.Hyphes élargies jusqu'à 30 µm. Boucles présentes partout,y compris aux grosses hyphes.

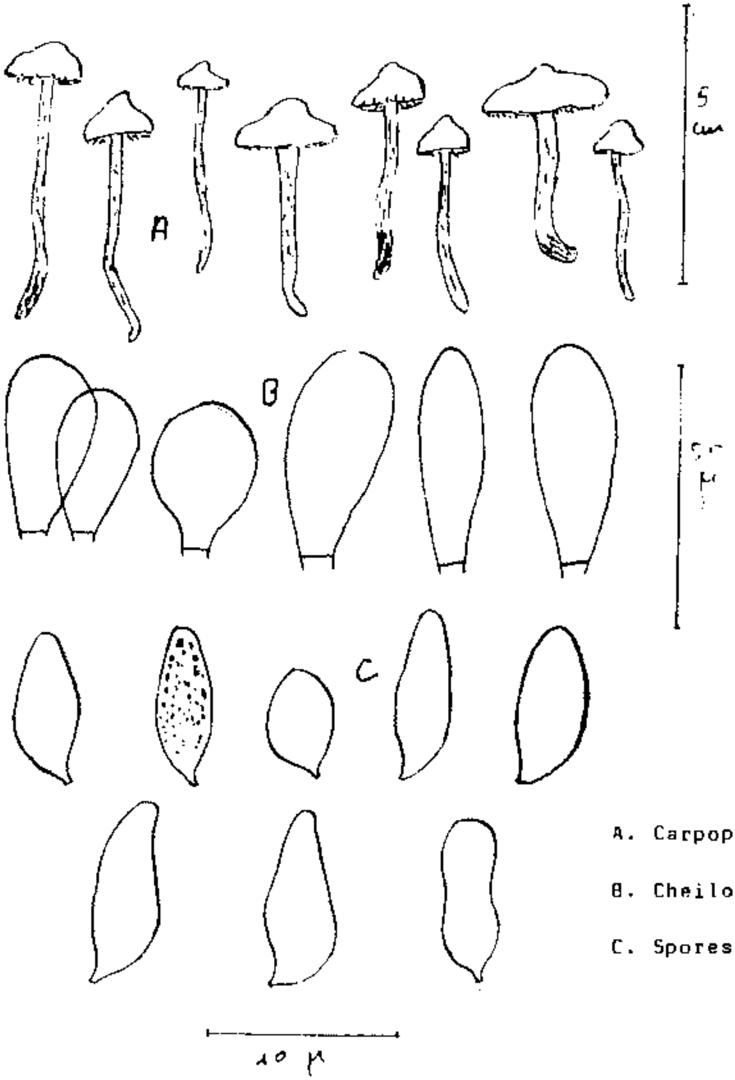
Arête des lames hétéromorphe. Cheilocystides de deux types : Les unes sphéropedunculées de 20-25 x I5-20 µm,les autres obovoides ou claviformes, de 30-40 x I2-I5-I8 µm. Ces poils stériles manquent sur certains exemplaires, par ailleurs rigoureusement identiques aux autres. Basides 4 sp de 30-40 x I0- I2 µm. Stérigmates parfois très longs (8 µm)

Spores hétéromorphes et inégales : Spores dominantes ellipsoides-subamygdaliformes ou à tendance nettement subfusiforme,finement ou moyennent verruqueuses,à verrues plutôt maculiformes ne dépassant pas le profil.

Apicule bien visible,parfois très allongé. Les spores à tendance subfusiforme ont un sommet souvent subétiréet présentent une forte dépression suppahilaire. Quelques unes sont subétranglées ou à contour franchement irrégulier,l'ensemble mesurant 10,5-12,5(13,5) x (5) 5,5-7 µm. Minorité de spores ovoides de 8-8,5 x 5-6 m. Quelques macrospores atteignant 14,5 x 7 µm.

Habitat: Sous peupliers blancs(populus alba),en troupes denses,dans l'herbe,dans les sables alluvionnaires de la Seine.Les Mureaux(Ile de France).Deux récoltes de GUY REDHEUIL les 4 et 12 juin 1984.

Figure 5 C. cystidifer Vel (12 04 84)



A. Carpophores

B. Cheilocystides

C. Spores

Observations

Nous avons examiné deux récoltes (en tout une quarantaine d'exemplaires) de ce taxon découvert par G. REDHEUIL en Ile de France. Nous le rapportons à l'Hydrocybe cystidifera VELENOVSKY en raison des nombreux points de convergence entre la diagnose de l'auteur tchèque et la nôtre.

Macroscopiquement : chapeau à umbo sombre (umbone nigrofusco) marge brisée froncée (margine deflexo et undulato) stipe ferme,elastique,dur,curvulé (stipite firmo,elastico,solido,curvulato) moucheté par le voile (albo-sericeo fibrilloso),lames larges et espacées (subdistantibus,crasse carnosis) de teinte vive (pallide ferrugineis).

Microscopiquement : cystides polymorphes,sphéropedunculées ou en massue (cystidiis filiformibus,vel columniformibus,rotundatis vel capitatis) spores à tendance subfusoide (sporis Inocybae lacerae similis) ressemblance indéniable - notée à la récolte par G. REDHEUIL - avec C. saniosus (in affinitatem Hydrocybae saniosae Fr. pertinet)

L'habitat,enfin est superposable : lieux clairs des bois sablonneux (in silvis arenosis,locis claris) sables alluvionnaires de la Seine,station ensoleillée sous populus alba.

Certes,nous n'avons pas noté une deshydratation évidente en gris brun (griseo-fuscidulo) encore que cette teinte ne soit pas étrangère à la gamme "coque de noisette" et la cuticule ne nous a pas parue particulièrement ridée (radialiter sulcato).En outre,les spores ne sont pas lisses (laevibus).Elles sont cependant "basi attenuatis",comme l'auteur tchèque le signale dans sa diagnose de I939 (Novitates I,p.II5).

Les convergences nous paraissant l'emporter de loin sur les divergences,nous pensons que l'assimilation de notre taxon à celui de VELENOVSKY est raisonnable, au moins comme forme.S'il existe un holotype de l'espèce originale et que les caractères microscopiques (l'ornementation des spores notamment) se révèlent par trop divergents,il sera toujours temps de donner un nom nouveau à l'espèce ci-dessus décrite qui appartient,nous semble-t-il,au groupe de C. Junghuhnii,espèce collective dont nous connaissons trois formes : Une forme microsporée décrite par HENRY (BSMF 93,3,77) et dont il existe une très belle planche inédite de M. Pierre MOENNE-LOCCOZ, une forme à cheilocystides en ballon, venant sousfeuillus, qui est celle de LANGE et de la Flore Analytique, une forme enfin des conifères humides décrite par MOSER dans la Kleine Kryptogamenflora, à cystides de forme différente.

L'ensemble de ces formes, y compris peut-être l'hydrocybe cystidifera de VELENOVSKY constitue probablement le cortinaire que Fries a nommé en l'honneur de Junghuhn.

C. albomaculatus nov. sp. ad int.

Chapeau 2-5 cm, charnu, régulier, d'abord en calotte de sphère, puis convexe-plan. Mamelon peu marqué ou nul. Marge d'abord enroulée-paxilloide et restant longtemps infléchie.

Cuticule remarquablement recouverte par un voile blanchâtre apprimé masquant d'abord la teinte initiale qui est d'un beau brun roux assez chaud (P. 55 H 55) très fragile, se rompant par le sec et donnant au chapeau un aspect rimeux, sur certains exemplaires rompue en écailles sur la marge.

Cortine blanche, abondante au début.

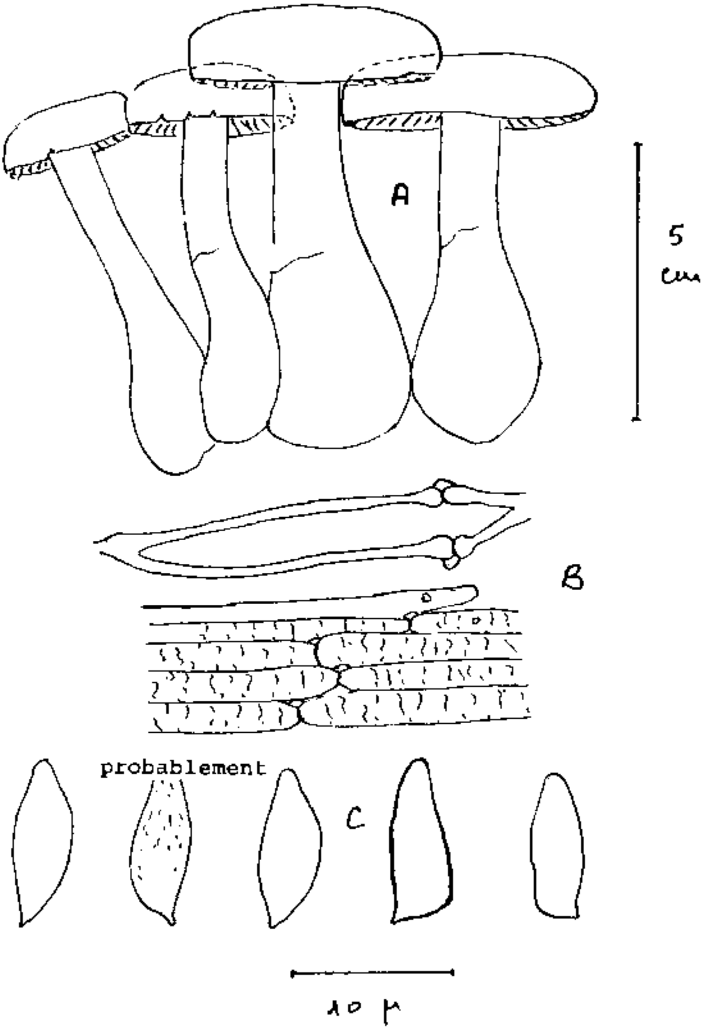
Pied 6-7 x I cm au sommet, très fibrilleux, cortiné au tiers supérieur, à reflet violacé douteux en haut sur les jeunes exemplaires, subconcolore au chapeau, bulbeux (bulbe parfois en gourde) souvent blanc tomenteux à la base, chaussé par le voile qui laisse une trace annulaire incomplète, plus rarement un véritable anneau.

Lamelles moyennement serrées, larges de 0,8-I cm, adnées-sinuées, assez épaisses, laissant un sillon périapical autour du stipe, moyennement ventrues, d'un fauve ocracé assez vif, brun ferrugineuses à la fin, à arête crénelée et plus pâle.

Chair blanche dans le chapeau et le stipe, un peu marbrée de roussâtre dans le bulbe, à faible odeur camphrée-raphanoide. Réaction nulle au TL4, subnulle au gaiac (bleuissement faible et lent). Positive au NO_3Ag bistre violacé ou brun rougeâtre noircissant et à KOH : gris (chair du chapeau) atropurpurin (cutis).

Figure 6

C. albomaculatus nov.sp.ad int.



A. Carpophores B. Coupe radiale de la cuticule C. Spores

Hyphes du voile incolores, larges de 3,5 µm,à grosses boucles,ramifiées, d'aspect souvent flexueux (en chaînette)

Hyphes de la cuticule a extrémités libres banales de 7 à I2 µm,plus ou moins fasciculées,colorées en brun.Pigment intra cellulaire,probablement d'origine cytoplasmique (?) et pigment membranaire d'aspect zébrant.

Arête fortement hétéromorphe par de nombreux poils stériles et des cheilocystides protéiformes,souvent en ballon de (25) 30-50 (70) x I2-I8-20 µm. Basides 4 sp. de 30-35 x 7-8 µm.

Spores sublisses,subfusoides,à sommet conique ou subétiré,à contour souvent irrégulier ce qui leur donne de profil une allure parfois subéperonnée ,mesurant 7-8 x 4 - 5 µm.

Habitat : Ile de France sous chataîgners.Une seule récolte le 3 oct I983. Récolteur non connu.

Observations.

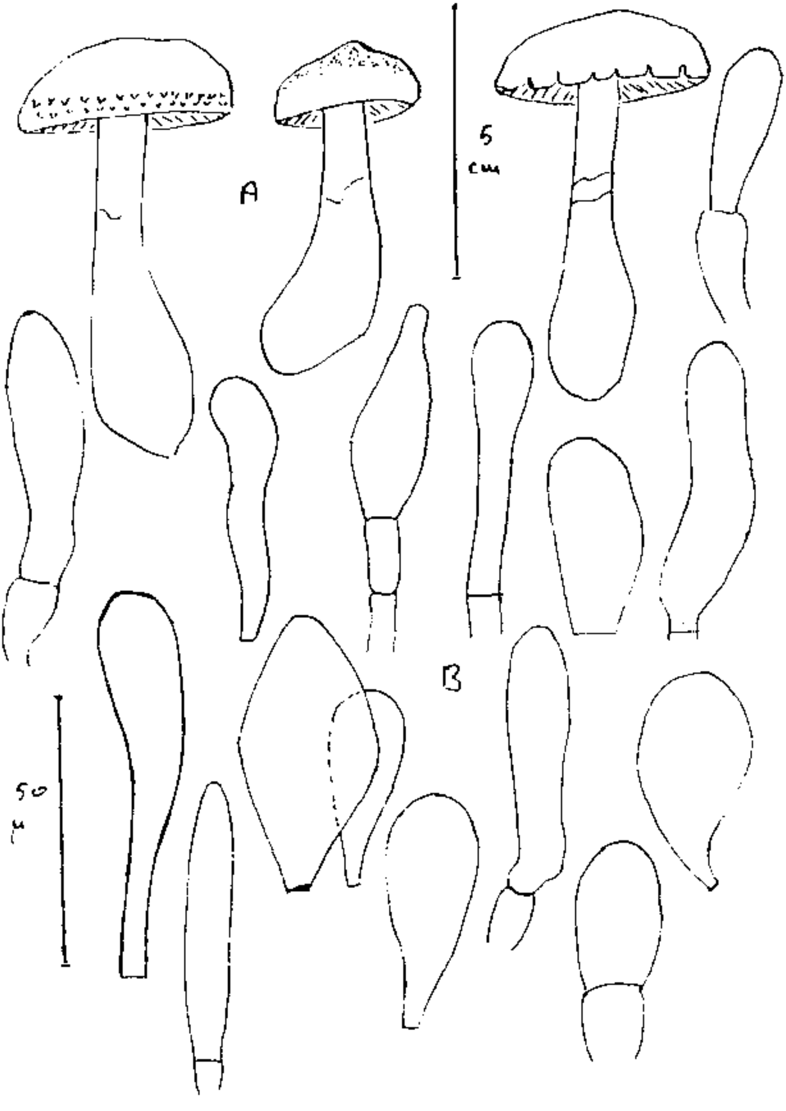
Nous n'avons étudié qu'un lot (une dizaine d'exemplaires en parfait état) de ce taxon récolté dans l'Ile de France sous chataîgners.Nous le plaçons au voisinage de C. alborufescens IMLER et de C. Hillieri HENRY.Nous avons pensé à un moment qu'il pouvait s'agir d'une forme de C. alborufescens,mais la réponse de l'auteur,qui a examiné un de nos exsiccata,est catégorique : "Ce n'est pas C. alborufescens.Les spores de votre cortinaire sont plus étroites,plus colorées et contiennent une grosse guttule.Si on met les deux dans une même préparation, on les distingue facilement. L'odeur est différente,etc"(IMLER,in litt. 4 Mai I984).

L'aspect macroscopique (immédiatement reconnaissble) ainsi que les traits du paysage microscopique (cheilocystides volumineuses,spores étroites) caractérisent très fortement ce taxon et en font une espèce "évidente".

La prudence exige cependant d'attendre quêil soit retrouvé,par nous ou par d'autres,avant d'être validé.

Figure 7

C. albomaculatus nov. sp. ad int.



A. Carpophores B. Cheilocystides

C. leptosporus nov. sp.

Chapeau 5-I0 cm,charnu,convexe-plan . Marge paxilloide,restant longtemps remarquablement enroulée,sinueuse-lobée,se relevant à la fin.

Cuticule d'un très beau fauve orangé (plus lumineuse que Cailleux P 57, plus rabattue que Seguy 247-248),passant au fauve roussâtre briqueté (vers Seg I86) à la fin ruguleuse sur les bords,fibrilleuse ou parfois fibrillo-tomenteuse,à la loupe recouverte par un voile étroitement apprimé qui laisse des plages laineuses blanchâtres remarquables sur la marge.

Stipe 8-I0 x I cm au sommet,souvent égal ou plus court que le diamètre du chapeau,très nettement bulbeux,à bulbe ovoide ou en oignon un peu déjeté de côté,tapissé sur le bulbe d'un tomentum blanc ou s'agglutinent les mousses,très fibrilleux,donnant parfois l'impression d'être fibrillo-laineux,blanchâtre puis s'ocracant,toujours plus pâle que le chapeau,chaussé par le voile qui laisse un anneau ou une trace annulaire apprimée,blanche, à mi hauteur environ.

Lames de moyennement serrées à très serrées,largement adnées ou sinuées,larges de 0,6 - 0,7 cm (atteignant I,5 cm à la fin) peu ou moyennement ventrues, chatoyantes,rappelant les lamelles des orellani,fauve orangé briqueté (P 57 R 55 vues de face,mais à reflets beaucoup plus chatoyants) fauve rougeâtre à la fin (Seg 20I) à arête plus ou moins nettement crénelée et un peu plus pâle.

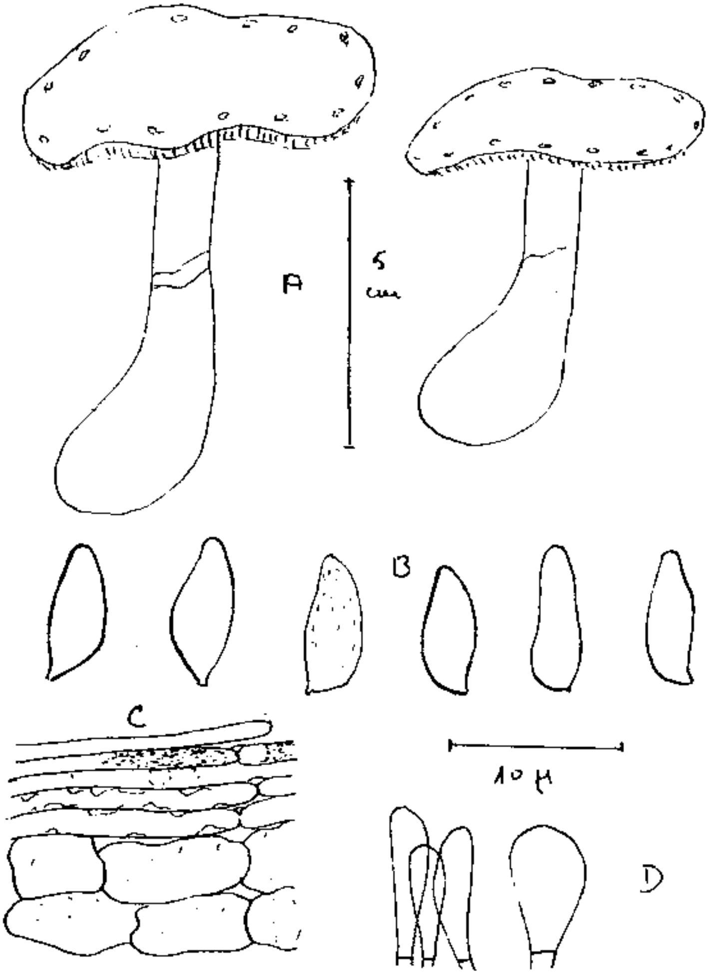
Chair souvent fistuleuse et creusée par les vers,crème roussâtre sale dans le chapeau (L 70) marbrée de blanc roussâtre dans le stipe,plus foncée,ocracé safranée dans le bulbe (P 45, R 45 dilué). Faible odeur iodée à la coupe.Réactions négatives au gaiac et au TL4.Positive au NO3Ag : bistre violacé noirâtre. KOH : gris (chair) bistre noir (cutis).

Figure 8

Cuticule d'hyphes couchées de 6 à I0 µm,peu abondamment bouclées,en segments parfois courts (50 µm) Hypoderme nettement subcelluleux.Hyphes atteignant 30 µm de large. Pigment interhyphique jaune d'or,colorant la cuticule comme l'hypoderme,nettement incrustant dans les hyphes superficielles où il a l'aspect d'un manchon ou une allure marbrante.

Figure 8

C. leptosporus nov. sp.



A. Carpophores B. Spores C. Coupe radiale de la cuticule

D. Polis stériles

Arête homomorphe.Basides plus ou moins cylindracées, 30-35 x 7-8 µm.Cellules stériles banales,en point d'exclamation,quelques unes clavées,plus ou moins vésiculeuses,courtes (I8 x I0 µm). Trame des lames régulière,par endroits à gros éléments (hyphes larges de 25-30 µm).

Spores légèrement apiculées,sublisses,très étroites,subfusoides,quelques unes à sommet subétiré et à profil un peu irrégulier,mesurant 7 -8 (9) x 3,5 - 4,5 µm.

Habitat : Normandie (forêt d'Evreux).Ile de France. Région de Montargis.

Espèce d'apparition tardive (fin octobre-début novembre) liée aux conifères (Epicea).

Observations :

Voilà une espèce que nous connaissons depuis plus de dix ans.Nous l'avons trouvée pour la première fois,sous epiceas,dans la forêt d'Evreux,en Normandie,à la Toussaint,et revue presque tous les ans aux expositions de la SMF,le lundi.Elle existe aussi dans la région de Montargis (Leg POIRIER,exemplaires décrits) toujours sous conifères et avec une époque de poussée tardive (fin octobre et début novembre jusqu'aux gelées).

Espèce commune,donc,que nous nous attendions à trouver décrite par un auteur ou un autre.N'ayant,à notre surprise,rien trouvé,nous nous décidons à la publier.

Macroscopiquement,il s'agit d'un laniger passe-partout.Microscopiquement, on ne passe plus nulle part (si on peut dire) : Les spores très particulières de ce taxon lui confèrent,dans ce groupe,une infalsifiable identité.

En voici la diagnose latine : C. leptosporus nov sp : Pileo 5-I0 cm,carnoso, convexo-plano.Margine udo deflexa,sinuosa-lobata. Cute e fulvo-aurantia (Cailleux P.57 , Seguy 247-248 dilutis) fulvo-rufa vel subtestacea (Seg. I86) aetate rugulosa,fibrillosa vel fibrilloso-tomentosa,velo albo lancto in margine maculata,Cortinarium lanigerem in mentem revocante.

Stipite 8-I0 x I,5 cm,pileo aequali vel curtiore,ex albo-ochraceo,ovoideo-bulboso,in bulbo albo-tomentoso,velo albo cingulato.

Lamellis confertis vel confertissimis,0,6-0,7 cm latis,adnatis-sinuatis, modice ventricosis, lamellas C. orellani revocantibus, fulvo-aurantiis (P.57, R. 55) aetate rufescentis (Seg 201)

Carne fistulosa, in pileo cremeo-rufescente (L 70) in bulbo subcrocea (P. 45 R. 45)

Cute ex hyphis fibulatis, 6-10 µm latis. Hypodermo subcelluloso. Pigmento flavo, in epicutis hyphis granuloso. Acie lamellarum homomorpha. Sporis subfusoideis, sublaevibus, 7-8 (9) x 3,5 - 4, 5 µm. In silvis acerosis (Picea). Holotypus in herbario nostro n° 900.

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AGARICA

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TWO INTERESTING "LEPIOTEAE" FROM NORWAY.

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KEY WORDS:BASIDIOMYCETES,AGARICACEAE,LEPIOTEAE,LEPIOTA,AND LEUCOAGARICUS.

ABSTRACT.Lepiota clypelarioides Rea is described in the authors strict sense.Leucoagaricus cinerascens (Quel.)Bon & Boiff.var. riparius v.nov. is distinguished from type variety by ecology, spore print and some anatomic features.

LEPIOTA CLYPEOLARIOIDES Rea 1922 (ss. stricto Rea non Huijsman ?)

Macroscopical description. PLATE 4

Cap 2-3,5 cm, convex or obtusely umbonate, finely scaled all over, reddish brown on ochraceous ground but for the disc which remains felty and darker; margin slightly appendiculate or woolly.

Gills white then cream or yellowing when drying, free, fairly crowded.

Stem 3-5 x 0,5-0,8 cm, slightly clavate or attenuated above, at last hollow, whitish or subconcolorous to the cap under a narrow darker greyish lilaceous ring; base slightly scaly or felty, sometimes with some inconspicuous garlands.

Flesh white or slightly greyish towards the base; smell and taste none.

Microscopical description.

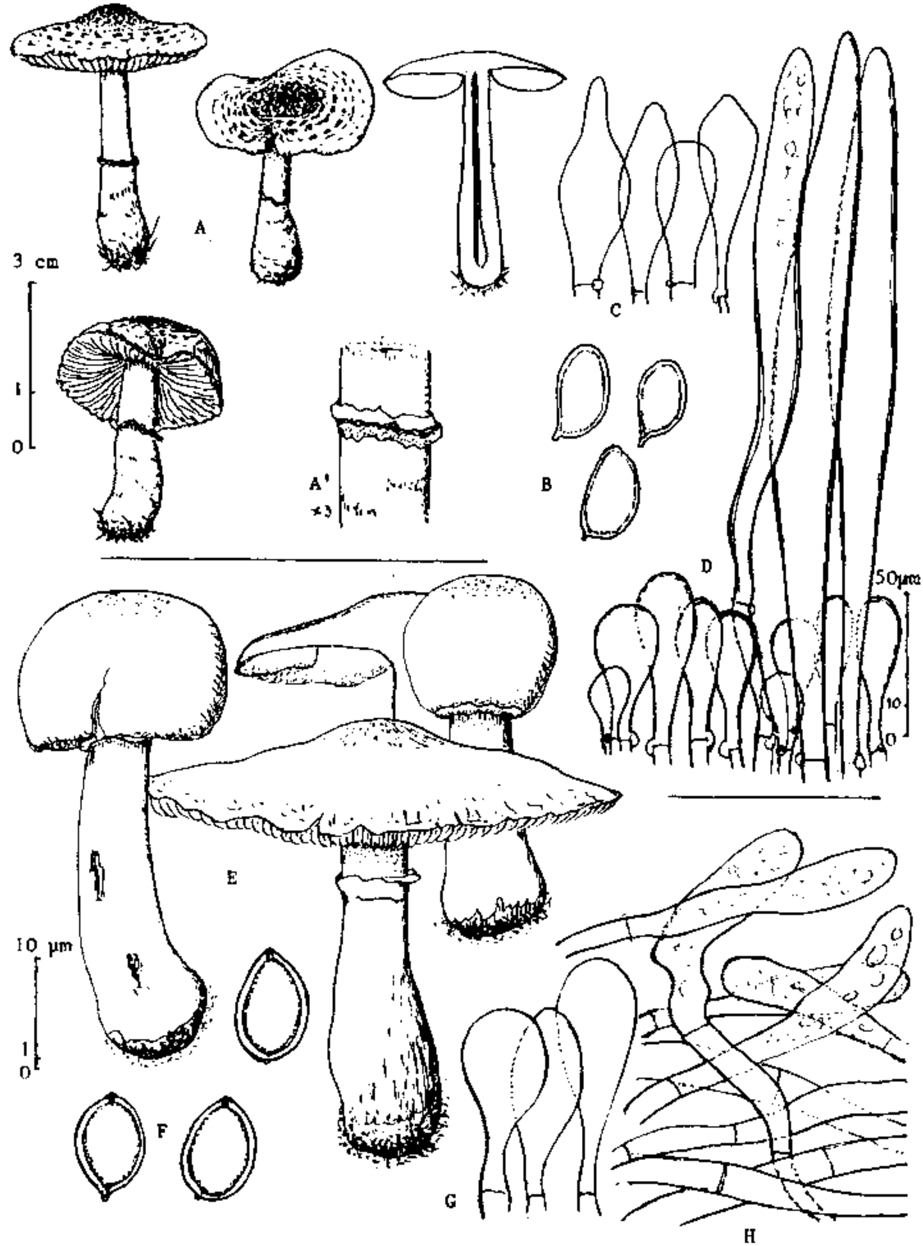
Spores (6,5)7,5-8,5(9) x 3,5-5 µm, elliptical or subovoid.

Basidia 25-35 x 5-8 µm , clavate, tetrasporic. Cheilocystidia 25-40 x 6-10 µm clavate or subfusoïd, with ogival apex or somewhat attenuated to slightly appendiculate.

Cuticle with hairs 150-200 (250) x 10-15(20) µm, subequal or slightly fusoïd, with membranal or mixed pigment; underlayer +o- regularly palissadic with short hairs 20-55 x 10-15 µm, clavate or spheropedonculate. Clamps numerous.

Ecology and records.

On calcareous soil among needles of Pinus sylvestris,together with Macro lepiota procera, on lawn in a garden close to a cabin. Legit. R. Kristiansen. Close to the main road, near Geitvika, Asmaløy, Hvaler community, Østfold, S.-Norway.I6th and I8th Oct. I98I. Two records from West of France.



Lepiota clypeolarioides A: carpophores (A' detail of ring), B: spores, C: cheilocystidia, D.: epicutis.

Leucoagaricus cinerascens var. riparius E: carpophores, F: spores, G: cheilocystidia, H: epicutis.

Bibliography and discussion.

Rea 1922, Brit. Basid. : 69 - Huijsman 1943, Med. Ned. Myc. Ver. 28:25 - Kühner 1983 Crypto(Myco) 4(1):67 (non 1965 cf = L.Kühneri)

Norwegian and French records seem to conform exactly .. to Rea's description:"Tan colour, covered with reddish brown scales and fibrils...St. slightly attenuated upwards...ring concolorous, narrow...gills whitish then yellowish..etc"; unfortunately we do not know the anatomic features (cuticle and cheilocystidia ?). Huijsman's and Kühner's description (the latter ss.Huijsm.) seem to differ by the lack of reddish colours, a weak but sweet smell (Kühner) and occurence of shorter hairs in the cuticle (up to 100µm, Huijsman, or 138 ,Kühner) and smaller spores sec.Huijsman,i.e. 6-7 x 4-4,6 µm. If a new forma had to be created (See Bon in Doc.Mycol. 43:43 §17 a') it should be according to Huijsman's interpretation (= Bon l.c. §17a)

LEUCOAGARICUS CINERASCENS (Quél.) Bon et Boiffard var. RIPARIUS Bon v.nov.

Macroscopical description.

Cap 5-9(12) cm subglobose in youth then convex or +o- umbonate, with inrolled margin soon expanded; cuticle mat or slightly granulose, pale "pigeon blue" in youth, then dark brownish grey towards the disc, being more ash gray and +o- cracked towards the margin or paler all over when old.

Gills at first whitish with pinkish reflex but soon turning greyish pink, fairly narrow compared to the fleshy cap; spore print pale lilaceous pinkish cream.

Stem 5-6 x 0,8-1,2 cm clavate or subbulbous with base up to 1,5-2 cm, at first yellowish white, soon somewhat pale browning when handled; apex slightly pruinose. Ring loosely membranous, brittle, thin, white or soon brownish

Flesh whitish, sometimes slightly reddening, especially under the cuticle little yellowing towards the base or when bruised.

Microscopical description.

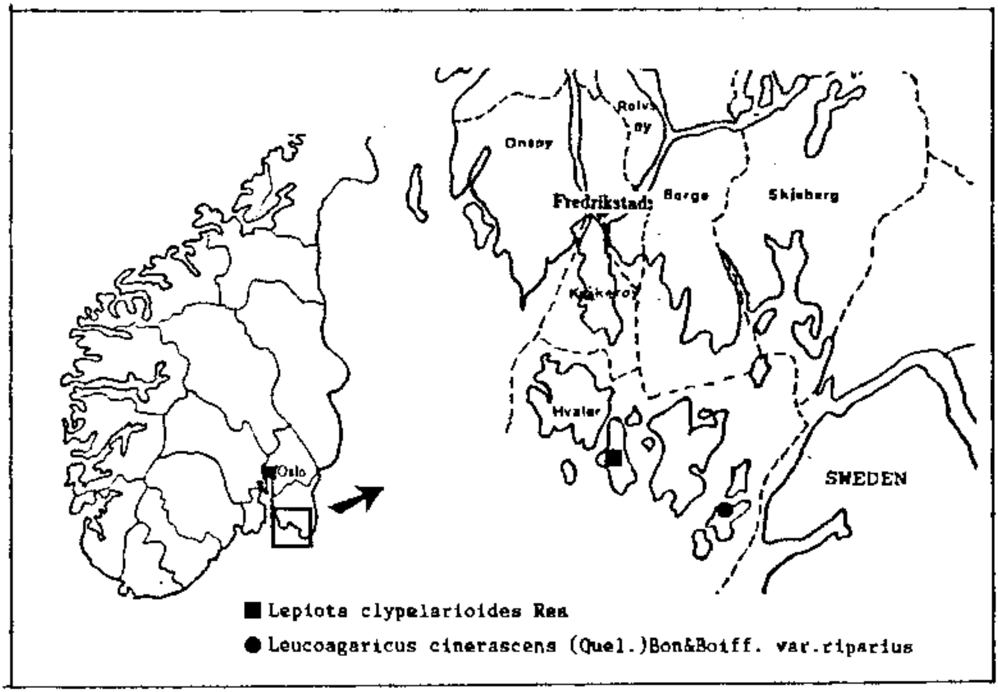
Spores 7,5-9(10) x 6-7 µm, ovoid with germ pore and medulla metachromatic in cresyl blue ("Annulati" type)

Basidia 35-45 x 8-10 µm clavate, tetrasporic; cheilocystidia 20-35 x 10-12(15) µm, shortly clavate or spheropedunculate.

Suprapellis with prostrate or entangled hyphae x 6-12(15) µm, clavate or subequal, with vacuolar pigment . Mediopellis banal with similar hyphae or more crowded. No differentiated subpellis. Clamps none.

Ecology and records.

On beaches of sand, among Elymus arenarius and Phragmites communis, some even under high water level (one∼10 cm below sea level); seems to grow best in a substrate of debris, consisting of crushed sea-shells, sea-weed and the two plants above; also one specimen of Volvariella speciosa var. gloiocephala. Legit. R.Kristiansen. Bakkevika, Søndre Sandøy, Hvaler community, Østfold, S.-Norway. October 1980, 1981 and 1984.



Notes.

This taxon, close to *L. cinerascens* (Quél.) Bon-Boiff. (DM.43:64) differs only by the following features:

Spore print more lilaceous pinkish
Flesh more weakly yellowing
Cuticle +o- scaly with age, without palissadic arrangement
More characteristic ecology (*Cakiletea* level)

The principal differential feature seems to be the peculiar ecology, hence the varietal name, perhaps the basal cuticle too (micro.), the colour of the spore print seems to be only an increased character of the palerbut not white colour of the "typic" spore print (var. *cinerascens*).

Leucoagaricus cinerascens (Quél.) Bon et Boiff. var.riparius Bon v.nov.:

A typo differt sporarum pallide roseo-ochraceis, carne leviter lutescenti, cuticula demum excoriata epicute haud paliforme habitationeque ad limitatem superiorem maris . Holotypus n° 81101304 in herbario MB, legit R.Kristiansen.

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AGARICA

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Results of studies on the family Agaricaceae (Fr.)Cohn of the Soviet Union.

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The family Agaricaceae (Fr.) Cohn (the order Agaricales s. str., the class Basidiomycetes) is of great scientific interest due to its extraordinary specificity and diversity of morphology, anatomy, ontogenesis, geography, ecology. The family Agaricaceae was not revised till now and differentiation of species and other taxonomic units of the species, as elucidation of phyllogenesis, is complicated because of polymorphism, phenomena of parallelism and convergence typical of them.

The results of a thorough critical study on agarics of the USSR are given below, which will be elucidated in detail in the monograph "Agaricaceae (Fr.) Cohn Family of the USSR". The monograph will be published in 1985 in Naukova dumka Publishers (Kiev). The book generalizes the original and available in literature data on Agaricaceae of the Soviet Union; their phyllogenetic relations and origin are discussed. The evidence are presented on morphology, anatomy, systematics, ecological and biochemical peculiarities, geometrical peculiarities of basidia, macro- and microchemical reactions of carpophores and microstructures of Agaricaceae. Criteria of species are considered and new ones are suggested. The original system of the Agaricaceae family is substantiated. The geographical analysis of species, their significance in nature and national economy are given. 158 species, 29 varieties and 7 forms of Agaricaceae are characterized in detail. Out of them 9 taxons are new for science, 42 - new for mycoflora of the USSR. Synonyms, iconography, ecology, distribution in regions of the USSR flora, terrestrial globe and critical notes are presented.

158 species, 29 varieties and seven forms of Agaricaceae referring to 14 genera of four tribes are detected in the Soviet Union: out of them nine species and intraspecies taxons are described by us as new for science; new for science taxonomic combinations are suggested for 23 species and intraspecies taxons; 42 species and intraspecies taxons as well as one genus (Chlorophyllum) are presented as new for mycoflora of the Soviet Union (Tables 1-2). The studies conducted made it possible to specify the difference between 28 related critical species and varieties of Agaricaceae, to confirm the species independence of eight species, six species and intraspecies taxons, to transfer six species and intraspecies taxons into synonyms (Wasser, 1970, 1972, 1973, 1975, 1976, 1977, 1978, 1979, 1980, 1985; Vasil'eva, 1973; Urbonas, Kalamees, Lukin 1974; Vasil'kov, 1974; Herink, Wasser, 1976; Zerova, Sosin, Rozhenko, 1979 and others).

Table 1

Taxonomic Composition of Flora of the Family Agaricaceae of the Soviet Union

Tribe, genus	Quantity of		
	species	varieties	forms
Agaricaceae			
Melanophyllum	2	2	-
Agaricus	59	18	2
Gyrophragmium	1	-	-
Endoptychum	1	-	-
Cystodermateae			
Phaeolepiota	1	-	-
Cystoderma	10	2	1
Squamanita	1	-	-
Lepioteae			
Pseudobaeospora	2	-	-
Lepiota	54	3	2
Chamaemyces	1	-	-
Leucocoprineae			
Chlorophyllum	1	-	-
Leucocoprinus	29	2	-
Leucoagaricus	5	-	2
Macrolepiota	11	2	-
In all	158	29	7

Table 2

Taxons of the Family Agaricaceae of the Species and Intraspecies Ranks New for Science, the USSR and Taxonomic Combinations New for Science

Species or Intraspecies Taxon	Species or Intraspecies New for Science	Taxonomic Combination New for Science	Species or Intraspecies New for Science
1	2	3	4
Agaricus romagnesii S. Wasser	+	-	+
A. amanitaeformis S. Wasser	+	-	+
A. longicaudus S. Wasser	+	-	+
A. moelleri S. Wasser	+	-	-
A. langei var. mediofuscus (Moell.) S. Wasser	-	+	-
A. gennadii var. microsporus (Bohus) S. Wasser	-	+	+
A. semotus var. minimus (Rick.) S. Wasser	-	+	+
A. pseudopratensis (Bohus) S. Wasser	-	+	+
A. aestivalis var. veneris (Heim et Becker) S. Wasser	-	+	+
A. haemorrhoidarius f. fagetorum (Pil.) S. Wasser	-	+	-
A. bresadolianus Bohus	-	-	+
A. spissicaulis (Moell.) Moell.	-	-	+
A. cupreobrunneus (J. Schaeff. et Steer) Pil.	-	-	+
A. porphyrocephalus Moell.	-	-	+
A. benesii Pil.	-	-	+
A. deylii Pil.	-	-	+
A. bitorquis var. validus (Moell.) Moell.	-	-	+
A. maleolens Moell.	-	-	+
A. kuehnerianus Heinem.	-	-	+

1	2	3	4
A. stramineus (Moell. et J.Schaeff.) Moell.	-	-	+
A. maskae Pil.	-	-	+
A. subfloccosus (J. Lge) Pil.	-	-	+
A. fissuratus (Moell.) Moell.	-	-	+
A. nivescens (Moell.) Moell.	-	-	+
A. leucotrichus (Moell.) Moell.	-	-	+
A. chionodermus Pil.	-	-	+
A. osecanus Pil.	-	-	+
A. xanthodermus var. lepiotoides R. Mre	-	-	+
A. phaeolepidotus (Moell.) Moell.	-	-	+
A. brunneolus (J. Lge) Pil.	-	-	+
A. lutosus (Moell.) Moell.	-	-	+
Lepiota subgracilis Kühn. ex S. Wasser	+	-	-
L. clypeolaris var. latispora Kühn. ex S. Wasser	+	-	-
L. bucknallii (Berk. et Br.) Sacc.	+	-	+
L. pallida Locq.	-	-	+
L. wichanskyi Pil.	-	-	+
L. echinella Quél.	-	-	+
L. cygneoaffinis Pil.	-	-	+
Pseudobaeospora pillodii (Quél.) S. Wasser	-	+	-
Cystoderma rugosoreticulata (Lorensier) S. Wasser	-	+	+
C. amianthina var. longispora Kühn. ex S. Wasser	+	-	+
Chlorophyllum molybdites (Fr.) Mass.	-	-	+
Leucocoprinus bohusi S. Wasser	+	-	-
L. badhamii (Berk. et Br.) S. Wasser	-	+	-
L. pilatianus var. pilatianus (Demoulin) S. Wasser	-	+	+
L. pilatianus var. subrubens (Wich.) S. Wasser	-	+	+
L. bresadolae (Schulz.) S. Wasser	-	+	+
L. georgineae (W. G. Sm.) S.Wasser	-	+	+

Table 2, continuation

1	2	3	4
Leucoagaricus moseri (S. Wasser) S. Wasser	+	+	-
L. carneifolius (Gill.) S. Wasser	-	+	+
L. leucothitus f. leucothitus (Vitt.) S. Wasser	-	+	-
L. leucothitus f. cinereolilacina (Joss.) S. Wasser	-	+	+
Macrolepiota permixta (Barla) S. Wasser	-	+	-
M. nympharum (Kalchbr.) S. Wasser	-	+	-
M. olivieri (Barla) S. Wasser	-	+	+
M. excoriata var. excoriata (Fr.) S.Wasser	-	+	-
M. excoriata var. squarrosa (R. Mre) S. Wasser	-	+	+
M. gracilenta (Fr.) S. Wasser	-	+	-
In all	9	23	42

Based on the original material, a thorough study of types and paratypes of Agaricaceae critical species of 13 home and 11 foreign herbaria, as well as on data available in literature a synopsis is compiled of the known at the contemporary level of knowledge Agaricaceae species of the Soviet Union. It includes 194 taxons of species and intraspecies ranks taking account of new for science taxons and combinations which we have suggested. The synopsis is illustrated by the atlas of black-and-white pictures of carpophores and microstructures, by the atlas of Agaricaceae spores studied under the scanning electron microscopy (Wasser, 1985).

The analysis of taxonomic units of Agaricaceae within the rank of a tribe shows prevalence of Agariceae (63 species) and Lepioteae (57 species) over Leucocoprineae (26 species) and Cystodermateae (12 species). The largest genera are: Agaricus (59 species), Lepiota (54), Macrolepiota (11), Cystoderma (10), Leucocoprimus (9 species). The rest genera have less than nine species. For families containing 15-20 genera (to which Agaricaceae belongs as well) we suggest to use five leading genera for determining the "face" of the flora systematic structure. Really, there are 154 species in ten leading genera of Agaricaceae of the Soviet Union, that is 97.5%. Similar results are obtained for the areas of the USSR flora.

Due to establishment of the species composition of Agaricaceae of the Soviet Union as well as to systematic and structural-and-comparative analysis with the use of the Stugren-Radulesku and Candel coefficients the species and generic specificity of the fungi of the family under study is detected by the flora areas and certain most oompletely studied regions. The quantity of species and intraspecies taxons is presented in the following order: the European part of the USSR - 149, the Far East - 72, the Caucasus - 56, Eastern Siberia - 47, Western Siberia - 42, Middle Asia - 32, the Arctic - 11. The species composition of Agaricaceae of main typological units of the plant cover of the areas of the USSR flora is given with indications of the typical and indifferent species, peculiarities of the altitudinal distribution, seasonal aspects of the cover and ecological groups.

The analysis of different interpretations both of the general scheme and particular problems on Agaricales s.l. systematics have shown that there is a tendency to isolate a number of new orders (up to 9), because comparatively remote groups of fungi combine Agaricales s.l. phyllogenetically. By the present time the process of distinguishing the orders have not been completed, and boundaries and volume of most of them have not yet been established. We described a new for science order Hygrophorales S. Wasser and a new for science family Catathelasmataceae S. Wasser of the order Tricholomatales (Wasser, 1985). At the contemporary stage of science development we consider it necessary the system of Agaricales s.l. be mainly based on the anatomical-and-morphological and with available large material - on ontogenetic criteria. At the same time one cannot but take into consideration the ecological and biological, geographical and physiological-and-biochemical characters. The systems of H. Kreisel (1969), R. Singer (1975), partially of M.Ya. Zerova, P.E. Sosin, G.L. Rozhenko (1979), R. Kühner (1980) with our supplements and changes correspond most of all to these requirements. The system of Agaricaceae adopted by us includes eight orders (Polyporales s.str., Boletales, Strobiolmycetales, Hygrophorales, Tricholomatales, Amanitales, Agaricales s. str., Russulales), having 23 families.

Our standpoint as to the place of Basidiomycetes in the system of fungi is given below with a list-scheme of the order and intraorder (up to family) system of Agaricales s.l. The list is compiled on the basis of the analysis of known higher Basidiomycetes including some changes, supplements associated with our views on systematics of Agaricales s.l.

Kingdom Mycetalia (Fungi)
  Division Chytridiomycota
  - " - Eumycota
    Class Zygomycetes
    - " - Endomycetes
    - " - Ustomycetes
    - " - Ascomycetes
    - " - Basidiomycetes
      Subclass Homobasidiomycetidae
        Order Polyporales s. str.
          Polyporaceae
        Order Boletales
          Boletaceae
          Gyrodontaceae
          Xerocomaceae
          Paxillaceae
          Gomphidiaceae
        Order Strobilomycetales
          Strobilomycetaceae
        Order Hygrophorales
          Hygrophoraceae
        Order Tricholomatales
          Pleurotaceae
          Tricholomataceae
          Catathelasmataceae
        Order Amanitales
          Amanitaceae
        Order Agaricales s. str. (incl. Podaxales)
          Agaricaceae
          Coprinaceae
          Bolbitiaceae

Strophariaceae
Crepidotaceae
Cortinariaceae
Pluteaceae
Entolomataceae
Order Russulales (incl. Asterogastraceae)
Russulaceae
Bondarzewiaceae
Elasmomycetaceae

The analysis of the family Agaricaceae position in contemporary systems of higher Basidiomycetes made it possible to determine their place in the system of Agaricales s. str. From standpoint of the present-day notion genera in Agaricaceae have arisen from some families of the order Agaricales s.l., having different colouration of the spore print. Due to the consideration of main taxon criteria, to the analysis of Agaricaceae systems, to various interpretations of the systematic positions of the family genera we consider it necessary at the contemporary stage to extend notions on the "monofamily" structure of Agaricaceae with four tribes (Agariceae, Cystodermateae, Lepioteae, Leucocoprineae) without breaking its "boundaries". We have subjected to argumentative criticism the attepmts to divide the family by giving one or a small group characters of the family taxonomic rank. This tendency may result in distinguishing many new families with a new set of characters. The analysis conducted of the taxonomic estimation of Agaricaceae characters for their stability and evolution significance permitted isolating a set of macro- and microscopic characters typical of the family, tribe, genus and intrageneric, species and intraspecies taxons.

The comprehensive complex analysis of about 35 generic taxons of Agaricaceae has shown that less than a half of them are well-substantiated genera. This is explained by the fact that the isolation of genera in the family is often based on giving them one of the characters of the generic taxonomic rank taking no account the pragmatic "rules" of taxonomy (Mayr, 1971) as to the value of hiatus between taxons and the taxon value. The rest generic taxons of the family Agaricaceae are synonyms, nomina nuda, nomina superfluum and nomina dubia. The following genera are well- substantiated: Agaricus, Melanophyllum, Gyrophragmium, Endoptychum, Micropsalliota, Lepiota, Chamaemyces, Pseudobaeospora, Smitiomyces, Hiatulopsis, Cystoderma, Squamanita, Phaeolepiota, Clarkeinda, Chlorophyllum, Macrolepiota, Leucoagaricus, Leucocoprinus, Volvolepiota. The rest genera referred to the family Agaricaceae (Crucispora, Cystoagaricus, Ripartitella, Verrucospora, Leucocortinarius, Chlorolepiota, Catathelasma, Floccularia, Armillaria) are excluded from it. Comprehensive studies of Agaricaceae taking into account the existed earlier systems and their critical and systematic analysis made it possible to suggest an original system of the main generic taxons of Agaricaceae (Wasser, Garibova, Mokeeva, 1976; Wasser, 1978, 1980). The intrageneric significance of characters is revised in the following genera: Agaricus, Lepiota, Leucocoprinus, Cystoderma.

Review of the Family Agaricaceae System (Wasser, 1980 with supplements).

Family Agaricacea (Fr.) Cohn
Tribe Agariceae Pat.
Genus Melanophyllum Vel.
-"- Micropsalliota Höhn.
-"- Agaricus L.: Fr. emend. Karst.
Subgenus Agaricus
Section Agaricus
Subsection Agaricus
-"- Sanguinolentae (J.Schaeff.et Moell) S. Wasser
Section Duploannulatae S. Wasser
Subgenus Flavoagaricus S. Wasser
Section Majores Fr.
Subsection Flavescentes (J.Schaeff. et Moell.) S. Wasser
-"- Xantodermatae (Sing.) S. Wasser
Section Minores Fr.
Subgenus Lanagaricus Heinem.
Section Olivacei Heinem.
-"- Lanosi Heinem.
-"- Trisulphurati Heinem.
Subgenus Conioagaricus Heinem.
Section Intermedii Heinem.
-"- Pulverotecti Heinem.
-"- Striati Heinem.

Genus Gyrophragmium Mont.
-"- Endoptychum Czern.
Tribe Cystodermateae Sing.
Genus Phaeolepiota R. Mre ex Konr. et Maubl.
-"- Cystoderma Fay.
Subgenus Cystoderma
Section Cystoderma
-"- Superba Heinem. et Thoen
Subgenus Granulosa (Fr.) S. Wasser
Section Granulosa (Fr.) Locq. emend. Locq.
-"- Cinnabarina Heinem. et Thoen
Genus Squamanita Imbach
Tribe Lepioteae Fay.
Genus Pseudobaeospora Sing.
-"- Lepiota (Pers. ex) S.F. Gray
Subgenus Sphaerocystis S. Wasser
Section Micaceae J.Lge
-"- Echinatae Fay.
-"- Amyloideae Sing.
Subgenus Lepiota
Section Stenospora (J.Lge) Kühn.
-"- Cristatae Kühn. ex S. Wasser
-"- Lepiota
-"- Ovisporae (J.Lge) Kühn.
-"- Sericellae Kühn. ex S. Wasser
-"- Anomalae Locq.
Genus Chamaemyces Batt. ex Earle
-"- Smithiomyces Sing.
-"- Hiatulopsis Sing. et Grinling
Tribe Leucocoprineae Sing.
Genus Leucocoprinus Pat.
Subgenus Leucocoprinus
-"- Rubescentes S. Wasser
Genus Leucoagaricus (Locq.)Sing.
Section Leucoagaricus
-"- Annulati (Fr.) Sing.
Genus Macrolepiota Sing.
-"- Chlorophyllum Mass.
-"- Clarkeinda O. Kuntze
-"- Volvolepiota Sing.

The debatable systematic position of certain taxons within the rank of species, genera, families, orders of higher Basidiomycetes, including many taxons of the family Agaricaceae evidences for an acute necessity of estimating the existing and searching for new, safety, objective criteria which establish the characters of the leading significance which are typical of each rank taxons. We have made an attempt to use the geometrical dependences of basidium, macro- and microscopic colour reactions of carpophores and microstructures, cultural and morphological peculiarities of Agaricaceae as additional criteria of different rank taxons.

The analysis of basidium on the basis of geometrical dependences resulted in new possibilities in systematics of higher Basidiomycetes. It consists in studies of the end- and side-views of basidia with spores. Due to formulas derived by us and introduced coefficients (Wasser, Berger, 1980, 1983; Wasser, 1980) we have revealed properties of "ideal" basidium which were not taken into account earlier in the systematics of higher Basidiomycetes. A close interrelation is shown between sizes and shape of spores, sterigmata and basidia having species and, possibly, generic trend. The calculations suggested by us permit determining a series of parametres (M, m, δ, θ, α) which are difficult to observe and practically impossible to measure. The practical use of the methods suggested, derived formulas, established ratios and their accuracy obtained for the "ideal" basidium is checked up for 17 critical taxons of Agaricaceae belonging to five genera (Agaricus, Cystoderma, Macrolepiota, Leucoagaricus, Leucoprinus). Their efficacy as an additional taxonomic criterion is shown at the species and intraspecies levels. The quick-action of a thorough characteristic of geometric peculiarities of basidia is examplified by 17 taxons of Agaricaceae using the table-nomogram and graphic methods (Wasser, Berger, 1983).

The studies conducted of the macro- and microscopic chemical colour reactions of the USSR Agaricaceae species have shown that many of them (for instance, the reaction with the Melzer reagent in species of the genera Cystoderma, Lepiota s. str., Macrolepiota, Clarkeinda, Pseudobaeospora, Micropsalliota; with the Schaeffer reagent, with α-naphthol in species of the genera Agaricus and Gyrophragmium; with cresol blue in species of the genera Macrolepiota, Leucoagaricus, Leucocoprinus, Volvolepiota, etc.) should be used as a reliable additional taxonomic criterion. The criterion permits differentiating generic, intrageneric and species taxons.

Comparative studies of 12 species (19 strains) of Agaricaceae in the pure culture in five nutrient media permitted establishing their most important cultural peculiarities. First Agaricus maskae, A. bernardii, A. bernardiiformis, A. cupreobrunneus, Leucocoprinus bresadolae, Macrolepiota puellaris are studied under culture conditions. The wort-agar media proved to be the most effective for all studied Agaricaceae and the Molish medium - for some strains. The growth dynamics in the definite nutrient medium is specific for each species and even of the strain. The character of the mycelium growth (colouration, morphology of colonies, the presence of the vegetative or asexual sporulations) in different nutrient media, is mainly, constant and may serve as additional taxonomic criteria. The investigation of the Agaricaceae behaviour in the mixed culture has shown species independence of certain fungi of the studied genera (for instance, Agaricus bernardii and A. bernardiiformis, A. campestris and A. cupreobrunneus) and has determined their culture activity.

The geographical element of flora, which is characterized by definite types of the area of distribution, is considered to be the main unit of the arealogical analysis of the fubgi of the family Agaricaceae of the USSR. Due to the arealogical analysis of the Agaricaceae flora of the USSR seven geographical elements are distinguished: euryholarctic (57 species), multiregional (33), nemorose (25), boreal (17), xeromeridional (11), montane (3), alpine (1). They are characterized by 12 types of area of distribution: European (24 species), Eurasian (35 species), Eurasian-American (16), Eurasian-African (19), Eurasian-American-African (19), cosmopolitan (19), Eurafrican (5), Euramerican (4), Euroamerican-African (3), the Ukrainian conditional endemic (3), Far Eastern conditional-endemic (1) and north Caucasian conditional-endemic (1). 11 species are referred to a group with indefinite areas of distribution. Five species (Leucocoprinus bohusii, Agaricus amanitaeformis, A. longicaudus, Cystoderma caucasicum, Lepiota lateritopurpurea) and one variety (Melanophyllum eyrei var. macrosporus) of Agaricaceae are referred to the narrow-area neoendemics. Endemism in the Agaricaceae flora as well as in the moss and lichen floras is characterized by the fact that the percentage of endemic species is always lower than the percentage of endemic species of higher plants of the same territory.

The lack of paleomycological data makes it impossible to establish exactly the time of the Agaricaceae origin, though individual primitive Basidiomycetes with fibulae are known from the Upper Carboniferous period (Dennis, 1976; Singer, 1977). Taking into account the fact that fungi referring to the family Agaricaceae are obligately nonmycorrhizal, the area of distribution of most of them are limited by the southern hemisphere and coming from the admission of the standpoint on the saprotrophism primary nature an assumption is advanced on the origin of primitive Agaricaceae in the Lower Carboniferous or Permian periods. Since the Chalk period the fungi of the family Agaricaceae are at the stage of prosperity playing the role of destructors decomposing plant remains of higher plants in phytocenoses of different types.

It is supposed that the main centre of higher Basidiomycetes origin as well as in flowering plants (Bailey, 1949; Takhtadzhyan, 1970) should be searched for in the countries which were parts of the Gondwana Paleozoic continent. The analysis of the contemporary areas of distribution of higher Basidiomycetes permits supposing the primary centre of the origin and later on their distribution to be in that part of the Earth which is occupied by South-Eastern Asia now. It is in countries of south-eastern Asia and Melanesia that the most primitive, initial, extinguishing representatives of Secotiaceae which, in our opinion, have given at the highest levels birth to Agaricales s.l., are concentrated. The analysis of distribution of fungi of the family Agaricaceae has shown that all its genera are met in low latitudes, the most primitive, endemic (Clarkeinda, Hiatulopsis, Micropsalliota, Volvolepiota, etc.) being grown only here and not met in high latitudes. The presence of a considerable amount of endemic, primitive higher Basidiomycetes, not known from high latitudes in Africa and South America, being previously the parts of the Gondwana Paleozoic continent, permits supposing that centres of the origin and, evidently, of only their distribution are in these continents.

* * *

Recently a new for science species Cystolepiota pusilla Nezd. was described from the territory of the Soviet Union (Krasnoyarsk Territory, Turukhan Region, the Yenisei left bank near settl. Mir-noe, birch-cedar forest, on plant remains among mosses, August 6, 1979) (Nezdojminogo, 1981). According to the author (Nezdojminogo) a new species differs from the rest species of the section Floccosae in sensu H. Knudsen (1978) in small sizes and carpophore colouration as well as in spore sizes. As our standpoint relative to the systematic position of sections Floccosae, Amyloide is different (Wasser, 1978, 1980) and we have referred them to the subgenus Sphaerocystis S. Wasser, it is expedient to transfer the new species into the genus Lepiota - L. pusilla (Nezd.) S. Wasser (Wasser, 1985).

Recently I determined the material on fungi of the genus Lepiota which was collected in the Irkutsk Region (the Baikal southern coast) by A.N. Petrov. In this material two varieties Lepiota cristata - L. cristata var. felinoides Bon and L. cristata var. pallidior Boud. ex Bon described in 1981 from the territory of France proved to be new for the USSR mycoflora.

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AGARICA

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ON THREE AUTUMNAL SPECIES OF BISPORELLA (DISCOMYCETES) IN NEW YORK

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ABSTRACT

Among the junior author's collections near Ithaca, New York are two unusual and characteristic species of **Bisporella** (= **Calycella** Auct.). A new species, **B. iodocyanescens**, is reported on the stromata of **Melanomma pulvis-pyrius** on a hardwood log, differing from other species of the genus in having pyriform to globose cells in chains making up the glassy ectal excipulum, and from nearly all other species in having the ectal layer turning blue in Melzer's Reagent. A large, stipitate species, probaby quite common, long confused with **B. citrina**, but with a much thinner excipular layer and larger spores, is shown to have been described first by Schweinitz from North America as **Peziza confluens**, a later homonym. It should now be called **B. confluens** (Sacc.) Korf & Bujakiewicz. A third species of the genus, infrequently collected in North America, with 4-spored asci and nearly white apothecia, variously assigned to **Helotium**, **Dasyscyphus**, **Hymenoscyphus**, and **Belonioscypha**, has always been cited with incorrect author citations. Its author citation is corrected to **Bisporella lactea** (Sacc.) Stadelmann.

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I. A NEW BISPORELLA WITH AN UNUSUAL EXCIPULAR STRUCTURE

Among her collections of Discomycetes for an ecological study of floodplain fungi, the junior author collected a very small, thin species on stromata of **Melanomma pulvis-pyrius** (Pers. : Fr.) Fuckel that, on drying, looks very like a species of **Orbilia**, but has asci, ascospores and structure of the Leotiaceae, not Orbiliaceae. The ectal layer is composed of hyphae in which the individual cells round up to nearly globose or pyriform shapes, at a high angle or nearly perpendicular to the surface, with glassy walls, immersed in a cementing gel. Except for the more or less globose elements of the excipular layer, this would be a typical member of the genus Bisporella Fuckel (Korf & Carpenter, 1974). It has nonseptate ascospores, but there are other species of Bisporella that share this character. An additional feature of major interest is the reaction to Melzer's Reagent, which turns the tissues of some ectal, the medullary tissues and the subhymenium distinctly blue in sections mounted from water rehydration. A similar blue reaction is known to us in another apparently undescribed species of Bisporella, also with nonseptate spores, issued in an exsiccati collection, William Phillips's Elvellacei Britannici #41, as Helotium citrinum Fr. Possibly that specimen is referable to B. subpallida (Rehm in Rabenh.) Dennis. The blue reaction of the North American species is (unexpectedly) not enhanced by pretreatment with KOH (Kohn and Korf, 1975), but becomes scarcely visible. On the other hand, the ascus pore channel is not blue in water hydration mounts, but strongly blue in Melzer's Reagent when pretreated with 10% KOH. Clearly the chemical or physical factors responsible for the blue reaction differ here between those in the excipular layers and in the ascus pore channel. This North American material seems so distinctive that we describe it here, recognizing that its inclusion in Bisporella might well argue for creation of a new subgenus to accommodate it. Since this genus is currently the subject of a monographic study by Dr. Steven E. Carpenter, we await his decision on infrageneric groupings before making such a formal proposal. A fungicolous habit is a common feature for many species of the genus, as already noted by several authors.

BISPORELLA IODOCYANESCENS Korf & Bujakiewicz, sp. nov. (FIGURE 1)

Ab Bisporellae *speciebus aliis cellulis excipuli ectalis subsphaericis vel pyriformibus differens.*

HOLOTYPE: NEW YORK: On stromata of Melanomma pulvis-pyrius on a hardwood log, plot #1, Ulmus-Fraxinus-Carya floodplain, Fall Creek, near Varna, leg. A. Bujakiewicz (#402), 8.x.1982 (CUP 60633).

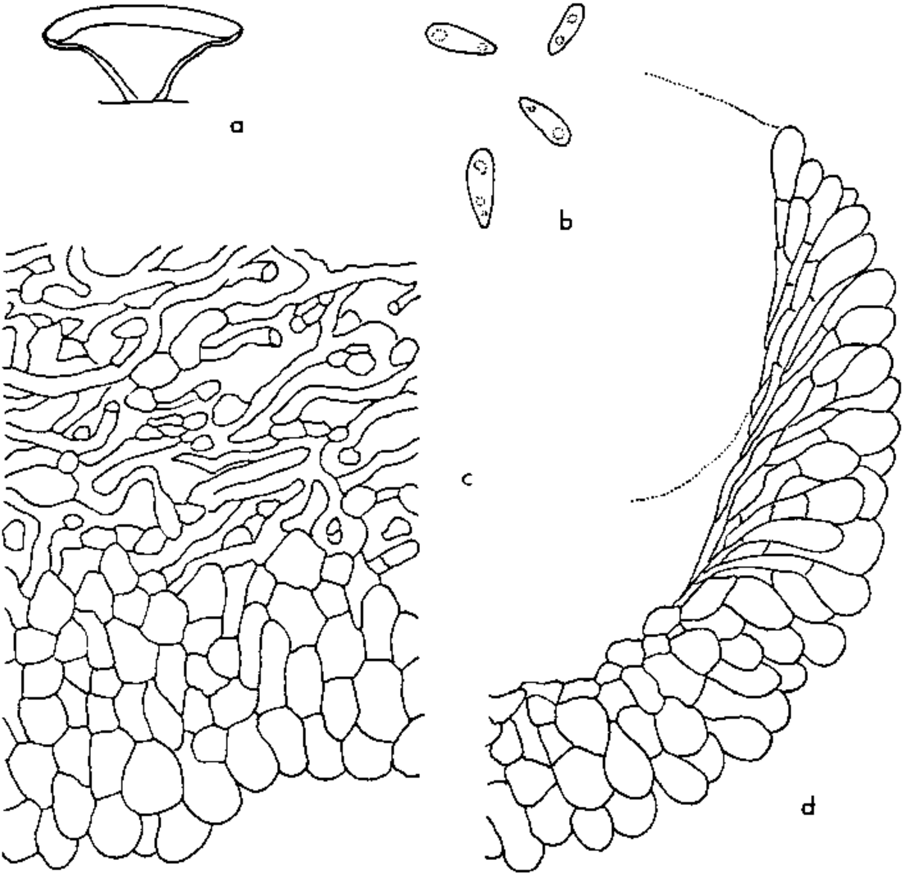

FIG. 1. Bisporella iodocyanescens, holotype. a, diagram of apothecial tissues, x 25; b, four ascospores x 1500; c, ectal and part of medullary excipulum from flanks, x 1000; d, ectal excipulum from margin, x 1000.

Apothecia gregarious, coalescent, sessile, discoid to somewhat flattened, up to 1.3 mm diam (or even larger) when rehydrated, 0.5-1.0 mm diam when dried, hymenium yellowish-orange, semitranslucent, receptacle concolorous when dry. In section: ectal excipulum of textura angularis to textura globulosa, about 36-44 µm thick, cells arranged in rows perpendicular to outer surface or nearly so, spherical to pyriform, hyaline, 5.5-11.0 µm in diam, cells walls somewhat glassy-gelatinous; medullary excipulum of textura intricata, not immersed in a gel, thin near the margin, thicker below, hyphae hyaline, 3.5-4.5 µm broad; subhymenium of textura intricata, ca. 14 µm thick, hyphae densely interwoven; Melzer's Reagent causing blue reaction in subhymenium, medullary excipulum (especially near the ectal excipulum) and ectal excipulum (except for outermost cells) in mounts from water, but reaction very slight or none after 10% KOH pretreatment. Asci cylindrical, 8-spored, 55-66 x 3.6-4.0 µm, arising from repeating croziers, ascus pore wall J- without KOH pretreatment, strongly blue after 10% KOH pretreatment. Ascospores uniseriate, mostly biguttulate, unicellular, ellipsoid with one end broader, 4.5-6.3 x 1.5-2.0 µm. Paraphyses filiform, 0.8-1.0 µm wide, scarcely or not exceeding the asci.

II. A FORGOTTEN, LARGE SPECIES OF BISPORELLA

In the Ithaca area and as far south as Tennessee there occurs, with relatively great frequency, a wood-inhabiting, autumnal species of Bisporella that has been assumed to be merely a large or robust form of Bisporella citrina (Batsch : Fr.) Korf & Carpenter. It differs markedly from that species, however, in having a much thinner ectal excipulum, and in its very much larger apothecia (often 6 mm in diam, reported to 3 cm in diam), that are provided with a delicate central point of attachment instead of the broad base and turbinate shape of typical collections of B. citrina. Its ascospores, too, are appreciably larger than those of B. citrina, though as in that species (and many others in the genus), they are predominantly 1-septate.

L. D. de Schweinitz (1832) was apparently the first to describe this species, as Peziza confluens Schw., the epithet derived from the strong tendency of the apothecia to coalesce at the margins (as, of course, may such species as B. citrina). Schweinitz's name is a later homonym of P. confluens Persoon (1799), and had no nomenclatural standing until fifty-seven years later when it was finally picked up by Saccardo (1889), who transferred it to Dasyscypha and thereby gave new status to the epithet (International Code of Botanical Nomenclature, Art. 72.1 Note). We are instructed by the Code to cite the name as H. confluens Sacc., not H. confluens (Schw.) Sacc.[1] Schweinitz's species (or, according to the Code, Saccardo's species!) has been either ignored by succeeding workers, or placed in synonymy with the very different B. citrina (Seaver, 1951). We provide the following new combination, the synonymy, and a description of the species here:

BISPORELLA CONFLUENS (Sacc.) Korf & Bujakiewicz, comb. nov. (FIGURE 2)

≡ [Peziza confluens Schw., Trans. Amer. Philos. Soc., n.s. 4: 176. 1832, non P. confluens Pers., Obs. Mycol. 2: 81. 1799 (Later homonym)].

≡ Helotium confluens Sacc., Syll. Fung. 8: 222. 1889 (ut "Schw.") (new name, ICBN Art. 72.1 Note) (Basionym).

Apothecia gregarious, often coalescing at the undulating margins, 3–6 (–30) mm in diam when fresh, centrally short-stipitate, hymenium bright orange to fulvus to sienna when dry, receptacle pale yellow when fresh and when dry. In section: ectal excipulum of textura angularis, tissues highly gelatinous, (15–) 30–50 (–75) µm thick, cells glassy-walled, 6.6–8.5 x 4.5–6 µm, marginal cells forming nearly a textura prismatica; medullary excipulum of textura intricata, not immersed in gel, hyphae 3.5–5.2 µm broad; subhymenium not easy

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[1]. Art. 72.1 Note destroys a major purpose of author citation by advocating elimination of the name of the author whose type specimen is involved! In this instance, Saccardo becomes the author of record, but the type specimen in still that of Schweinitz. I would much prefer to cite this species as Bisporella confluens (Schw. ex Sacc.) Korf & Bujakiewicz, but as presently written the Code makes no such recommendation.

to distinguish from the medullary excipulum, ca. 25 µm thick. Asci subcylindrical, 8-spored, wall fairly thick, pore wall channel J+ (very slightly blue in Melzer's Reagent, enhanced by KOH pretreatment), 125-135 x 7.5-8.8 µm, croziers not seen. Ascospores uniseriate, ellipsoid, 2-4-guttulate, 1-septate, (9.5-) 11.3-14.2 (-16.5) x 3.3-4.4 (-4.7) µm. Paraphyses filiform, 1.5-2.2 µm wide, not exceeding the asci.

EXSICCATI:

Ellis, North American Fungi #1316 (**Helotium confluens**): probably a mixed collection: "collected in various places, mostly by Mr. Everhart, at West Chester, Pa."

CRITICAL SPECIMENS EXAMINED:

New Jersey: Newfield, rotten wood, 1886, Ellis (CUP-D 8429, 84-177).

New York: Buffalo, G.W. Clinton (CUP-D 5437, 84-123); Karner, Oct., Dr. Peck (CUP-D 5940, 84-175); Ringwood, Lloyd-Cornell Preserve, on wood, 29.ix.1958, R.P. Korf (R.P.K. 58-15); Varna, upland forest along Fall Creek, 9.ix.1982, A. Bujakiewicz (#620) (CUP-59856).

Pennsylvania: [Bethlehem], Syn. N. Am. 903, isotype (CUP-D 3887, 84-172); ? West Chester, Ellis's N. Am. F. 1316 (CUP-A).

Tennessee: Whitewater Falls, Jackson County, 29.ix.1955, A.J. Sharp (TENN 22282); Great Smoky Mts. National Park, Roaring Fork, Mt. LeConto, 3500-4000 ft., 16.ix.1955, A.J. Sharp & H. Robinson (TENN 22188).

III. CORRECT AUTHOR CITATION FOR THE WHITE, 4-SPORED SPECIES OF BISPORELLA

An infrequently collected, but unmistakable species of **Bisporella** is milk-white in color, and possesses 4-spored asci with 1- to 3-septate ascospores. The apo-

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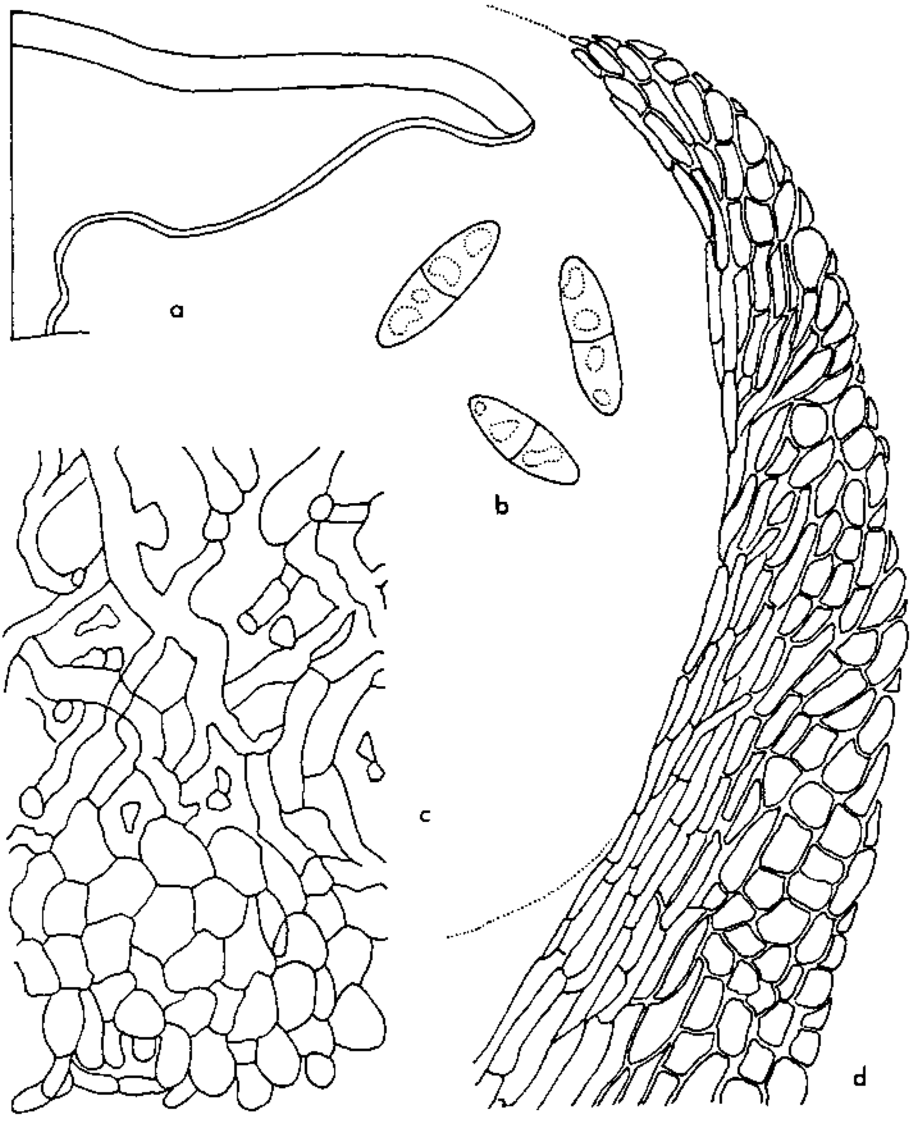
FIG. 2. **Bisporella confluens**, from CUP 59856. a, diagram of apothecial tissues, x 25; b, three ascospores, x 1500; c, ectal and part of medullary excipulum from flanks, x 1000; d, ectal excipulum from margin, x 1000.


a
b
c
d

thecia occur in great troops upon decorticated wood, sometimes at the bases of trees. The species has had a turbulent taxonomic history. It was first described as **Helotium lacteum** Ellis & Everhart (1888) based on a specimen from Cazenovia, New York, collected in October, 1887. Two collectors were mentioned: Prof. L. M. Underwood and O. F. Cook, Jr. Five years later the species was again published as new, with the same name, **Helotium lacteum** Ellis & Everhart (1893), and a somewhat differing description, but this time the Cazenovia specimen was noted as "O. F. Cook, No. 201" and a second collection was mentioned, from Marcellus, N.Y., "Nov. 1889. (Underwood, No. 66)." Without doubt Dennis (1964) was correct in designating the Cazenovia specimen as "typus." Saccardo (1889) picked up the first description and transferred the epithet to **Dasyscypha**, presumably because the original diagnosis refers to cup and stem as "tomentose." When Saccardo (1895) encountered the republication of the name, he thought it to be new and transferred it to **Helotiella**, perhaps because there the cup was referred to as "glandular-pruinose" and the stem as "pruinose." Seaver (1951) transferred the species to **Belonioscypha**, and provided diagnostic drawings and a good photograph of the gregarious apothecia. Dennis (1964) placed the species in **Hymenoscyphus**, but because there already was a **H. lacteus** (Cooke) Kuntze he was forced to provide a new name for it, **H. ellisii**. Matheis (1972) accepted Dennis's placement of the species, and again provided an excellent habit photograph and diagnostic line drawings. Stadelmann (1979) monographed **Belonioscypha**, and correctly excluded this species, recognizing for the first time that it belongs in **Bisporella**. The combination provided by Stadelmann is incorrect, however, since technically Ellis and Everhart are not the publishing authors, again because of the application of Art. 72.1 Note of the Code. The species, and its several synonyms, should be correctly cited as:

BISPORELLA LACTEA (Sacc.) Stadelmann, Nova Hedwigia 30: 830. 1979 ('1978') (ut "(Ell. & Ev.) Stadelmann").

≡ [**Helotium lacteum** Ell. & Everh., J. Mycol. 4: 56. 1888; republished as **H. lacteum** Ell. & Everh., Proc. Acad. Nat. Sci. Philadelphia 1893: 145. 1893 (non **H. lacteum** Cooke, Grevillea 8: 63. 1879) (Later homonym)].

≡ **Dasyscyphus lacteus** Sacc., Syll. Fung. 8: 436. 1889 [ut "Dasyscypha lactea (E. & E.) Sacc."] (new name: ICBN Art. 72.1 Note) (Basionym).

≡ **Helotiella lactea** (Sacc.) Sacc., Syll. Fung. **11**: 415. 1895 (ut "E. & E.").

≡ **Belonioscypha lactea** (Sacc.) Seaver, N. Am. Cup-Fungi (Inop.) p. 177. 1951 [ut "(Ellis & Ev.) Seaver"].

≡ **Hymenoscyphus ellisii** Dennis, Persoonia **3**: 48. 1964 [nom. nov., non **H. lacteus** (Cooke) Kuntze].

RECENT COLLECTION: On decorticated buttress roots of a dead **Acer**, Lloyd-Cornell Preserve, Slaterville Springs, NY, 18.ix.1979, D. Florini, J. Yuen & R.P. Korf (CUP 58155).

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We thank the Brethren Service/Polish Agricultural Exchange Program for financial assistance in making Dr. Bujakiewicz's travel to the United States possible, and her home institution, the Adam Mickiewicz University, Poznań, for permitting her to accept the Anna E. Jenkins Fellowship at Cornell. Miss Wen-ying Zhuang, a graduate student at Cornell University, has kindly provided the drawings and much technical help.

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SOPP I STEIN.

OM ET HELLERISTNINGSFUNN I ØST-SIBIR.

THOR DYBHAVN,OREDALSÅSEN 11,N-1600 FREDRIKSTAD.

Innledning. Historikk.

Helt siden første halvdel av det attende århundre har det kommet sporadiske meddelelser til Vesten om kulturen hos visse folkeslag med tilhold i Sibirs midtre og østlige deler. Et særtrekk ved en rekke av disse skrifter er deres omtale av disse folkeslags bruk av sopp, i første rekke rød fluesopp, som et berusende og/eller narkotisk middel. Således utgav svensken Strahlenberg i Stockholm alt i 1730 en beretning om sitt krigsfangenskap i Sibir, hvor han kommer inn på denne skikk hos korjakkene som holdt til i nordøst. I 1755 kommer så Krasheninnikovs "Beskrivelse av Kamtsjatka", utgitt i St. Petersburg, etter en ekspedisjon han hadde foretatt i området like i forveien. Både han og en annen ekspedisjonsdeltager, Steller (Leipzig 1774), omtaler likeledes bruk av fluesopp ("mukhomor") som rusmiddel hos korjakker, kosakker, kamchadaler og andre folkegrupper i området. Georgi (St. Petersburg 1776-80) trekker også inn jakutenes og ostjakkenes kjennskap til fluesoppens hemmelighet. Senere har en rekke andre forfattere kunnet bekrefte og utdype de første beretninger. Ifølge R. Gordon Wasson (1967) er den aller første kjente omtale av dette etno-mykologiske fenomen gitt av en polsk krigsfange allerede i 1658, men hans fortelling ble ikke publisert av Kamienski før i 1874 i Poznan, Polen. Ogloblins omtale av de første japanere i Russland i 1701-1705, hvor også opplysninger om bruk av sopp på Kamtsjatka inngår, ble offentliggjort først i 1891. -

Den svenske teolog Samuel Lorenzo Ødman (1784), som er den sannsynlige opphavsmann til påstanden om at de gamle norrøne berserker spiste fluesopp for å oppnå den tilsiktede villhet og styrke i kamp, bygget helt og holdent på datidens beretninger fra Sibir som ovenfor anført, og overførte erfaringene derfra uten videre til Skandinavia (Wasson). Alle relevante skrifter angående de sibirske folkestammers bruk av sopp som rusmiddel, utgitt helt frem til våre dager, (den siste referanse fra 1967), er på en forbilledlig måte presentert av R. Gordon Wasson i hans verk "Soma. Divine Mushroom of Immortality" (New York 1968.)

Alt materiale hittil nevnt i sammenheng med soppkulten i Øst-Sibir skriver seg fra hva man har sett og hørt. Det har aldri foreligget noen kjente, håndgripelige bevis for disse påstander om de innfødtes bruk av sopp i hverdag og fest. Fra rundt midten av vårt århundre og fremover ble det etter hvert kjent blant russiske geologer og arkeologer at det befant seg et helt spesielt helleristningsfelt i Nordøst-Sibir, ved kysten av Ishavet og nord for polarsirkelen, som bl.a. inneholdt avbildninger av sopp- . Men det var først i 1967-68, under en arkeologisk ekspedisjon til stedet iverksatt av det sovjetrussiske vitenskapsakademis sibirske avdeling i Magadan, at man fikk nærmere anledning til en systematisk utforskning av feltene med helleristninger eller petroglyffer. Foruten av jaktscener med reinsdyr, sel, småhval etc. besto disse felter også av figurer med åpenbar tilknytning til en meget tidlig soppkult eller mykolatri. Da nevnte ekspedisjon og dens funn etter alt å dømme er lite kjent blant vestlige mykologer, vil denne artikkel gi en presentasjon av endel av funnene, basert på ekspedisjonsdeltageren Nikolai Dikovs bok "Naskalnie zagadki drevnei Chukotki." ("Helleristningsgåter fra det gamle Chukotka"), utgitt i Moskva 1971. Såvidt vites er ikke denne bok oversatt til noe vestlig språk, selv om Dikov har publisert en artikkel på fransk om Sibirs generelle petrografi, (N.N. Dikov: "La pétrographie en Sibérie du Nord-Est." Inter-Nord no. 12, Paris 1971. Dikovs navn som arkeolog er forsåvidt også kjent i vest fra hans artikkel "The Stone Age of Kamchatka and the Chukchi Peninsula in the light of new archeological date " i tidsskriftet "Arctic Anthropology" III-I, 1965.

Beretningene om soppkulten blant de østsibirske folkestammer skriver seg fra hele det området som kalles Chukotka (jfr. nedenstående kart). Dette omfatter den helt nordøstlige spiss av det sibirske fastland, inklusiv Kamchatkahalvøya. Mens denne halvøy gjennom lange tidsrom var befolket med forskjellige stammer (korjakker, kamchadal), holdt de såkalte Chukchi til i de nordligste egner mot ishavet (se kartet). I det aktuelle utgravningsområdet - angitt med et kvadrat på det store kartet og nærmere spesifisert på det lille (fig.2), levde altså chukcki-stam-

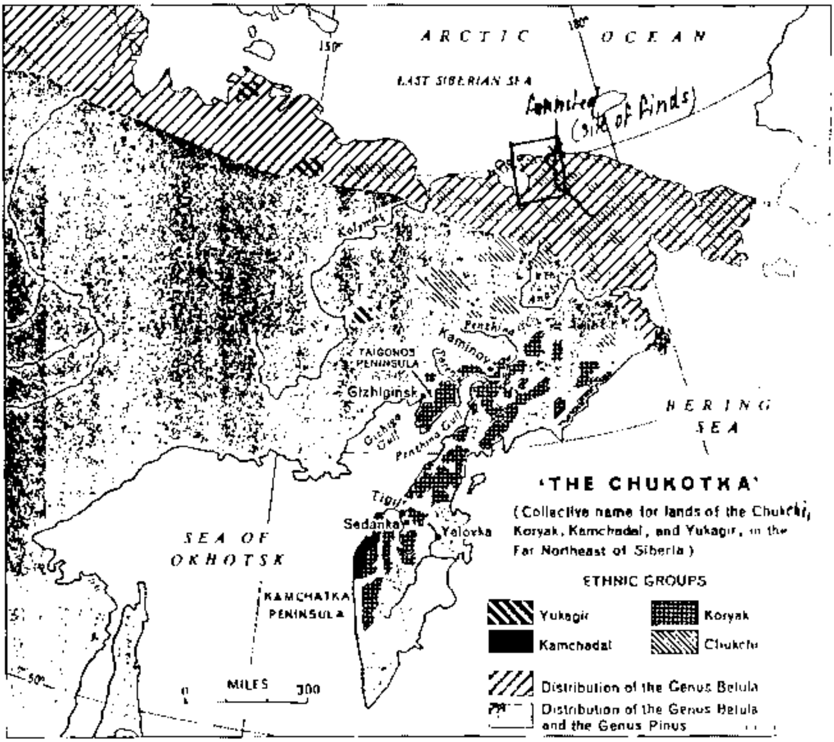


Fig. 1. Kart over Nordøst-Sibir. Funnstedet i kvadrat øverst. (fra Wasson: "Soma. Divine Mushroom of Immortality.")

-mene. I og med at dette folkeslag er nevnt i flere beretninger (bl.a. av Enderli, Gotha 1903) i sammenheng med soppkult, tyder meget på at disse tradisjoner har vær utbredt i hele Nordøst-Sibir gjennom lange tidsrom. Det er heller ingen tvil om (Dikov, Wasson) at det er rød fluesopp (Amanita muscaria) det dreier seg om. Det henvises gjentatte ganger til soppbenevnelsen mukhomor, og Dikov sier rett ut krasnyi mukhomor, russisk for nettopp rød fluesopp. Denne art er og har vært utbredt i Nordøst-Sibir meget lenge, og passer godt overens med forekomsten av bjerk (Betula) i områdene mot Nordishavet, og den blandede bjerk/furu-vegetasjon lenger syd (jfr. fig.1) i Chukotka. Som kjent danner jo A.muscaria oftest mykorrhiza med bjerk, men sopprot med furu (Pinus) forekommer også i nordlige strøk på det eur-

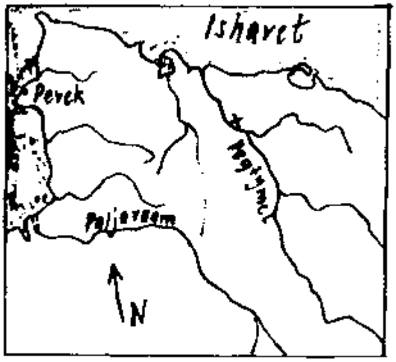
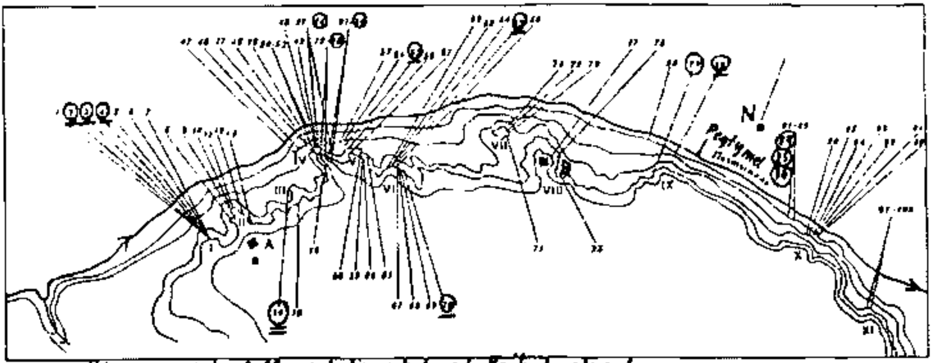


Fig. 2. Nærkart. Funn ved X.



Skjema over petroglyffenes beliggenhet ved Kaikol-stupet

Рис. 50. Схема расположения петроглифов Кайкуульского обрыва
А — раскоп первой стоянки и погребения; Б — раскоп второй стоянки

A - utgravning av første bo- og grav-plass.

B - utgravning av den andre boplass.

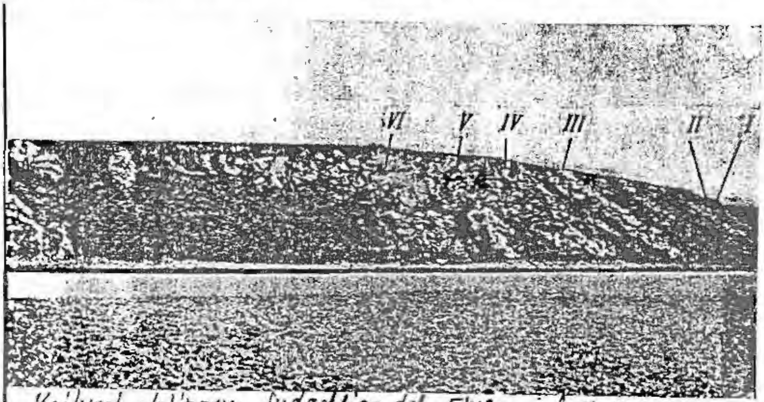
Tall i cirkel angir motiver med antropomorfe soppfigurer. Streker under cirkler angir de fineste motivene.

Fig.3. Detaljkart fra Kaikol-klippen med helleristn.Fra Dikov.

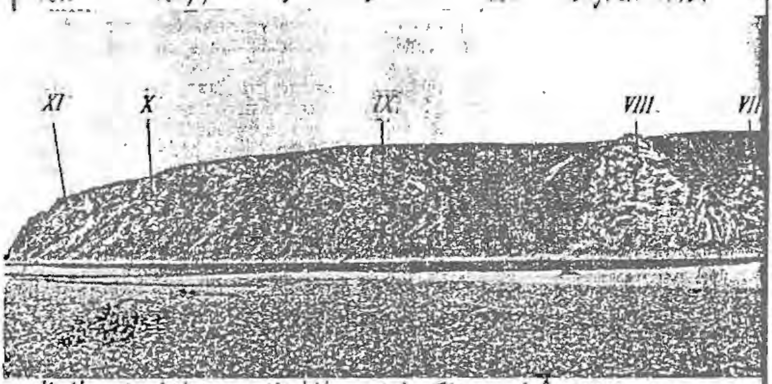
-asiatiske kontinent.

Funnstedet og funnene.

Nevnte ekspedisjon utforsket en rekke helleristningsfelter på den steile sydveggen av et klippeplatå ved navn Kaikol eller Kaikuul ved bredden av elven Pegtymel som renner nord-nordvestover og munner ut i det østsibirske hav, en del av Ishavet mot nord. På denne stedvis loddrette klippevegg,ca. 50 m høy, som ligger på elvens nordside omtrent 60 km fra kysten, avdekket man i alt 11 felter eller grupper med ristninger, med samlet 103 motiver. Oppe på selve platået ble



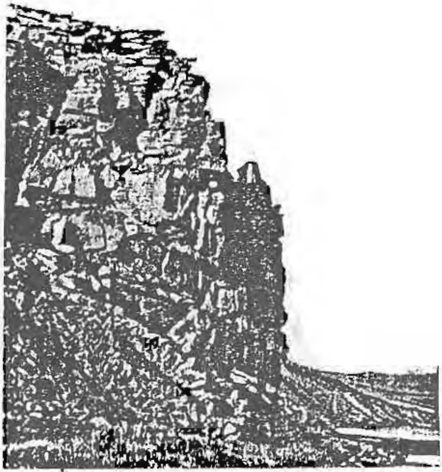
Kaikuul - klippen. Sydøstlige del. Elven i forgrunnen.



Kaikuul - klippen. Vestlige del. Elven i forgrunnen.

Fig.4. Helleristningsfeltene markert med romertall.

det gravet ut to boplasser, (A og B på kartet), hvorav den ene (A) også omfattet en gravplass.



Utsikt over klippeveggen med petroglyffer, avdekket i 1968. Elven Pegtymel til høyre.

Fig.5. Det bratte stupet.

Motivene.

Generelt sett består de fleste motivene av et fåtall forskjellige figurer, vesentlig reinsdyr, sel, fisk og småhval, samt menneskefigurer i forskjellig størrelse, gjerne arrangert som jaktscener hvor det også er fremstilt fangstredskaper og båter, hvorav flere kajakker og padleårer. Viltet jaktes til lands og fra kajakk. Figurene er på størrelse fra noen få cm og opptil 50 cm (de største reinsdyrene). De fleste er utført som silhuetter. På ca. 15 av motivene fremstår menneskelignende (antropomorfe) skikkelser med sopp på hodet (Dikovs tolkning), enkelte endog utstyrt med en dobbelthattet sopp. Soppene er forsåvidt lette å identifisere som hattsopper, idet flere av dem viser tydelig hatt, stilk og fortykket basis. Både manns- og kvinnefigurer bærer sopp på hodet, men den største og finest utpenlede er uten tvil en kvinne. Hun

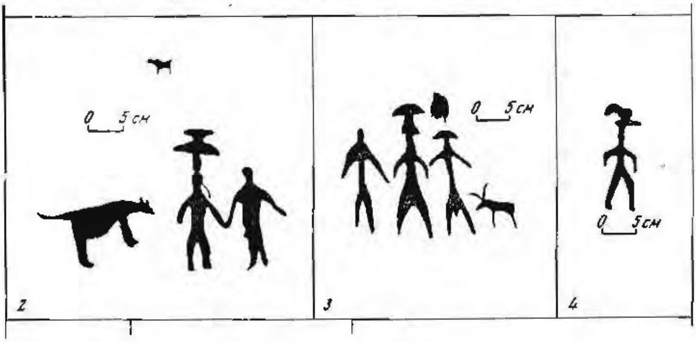
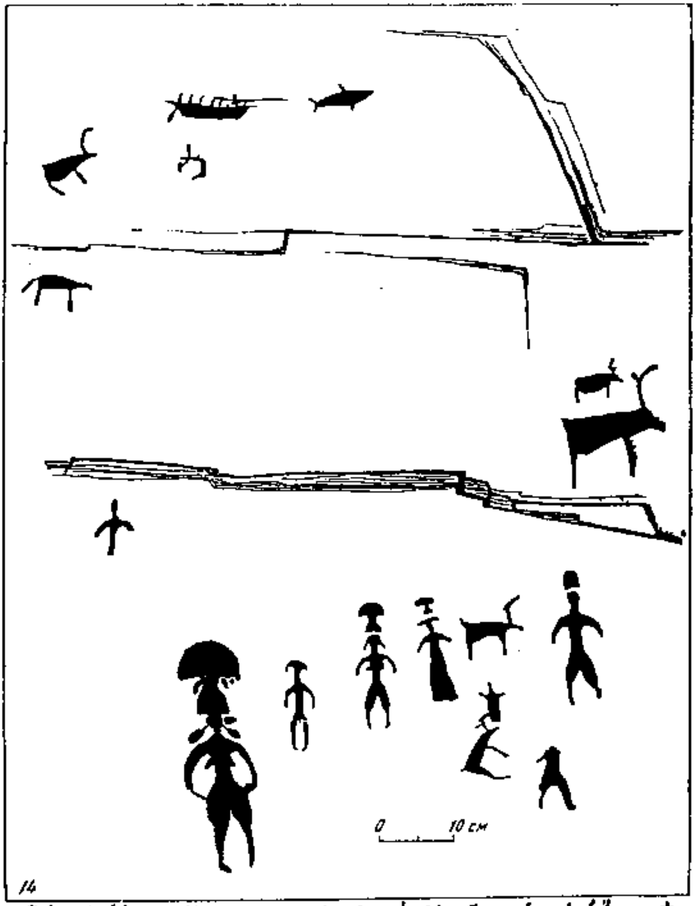


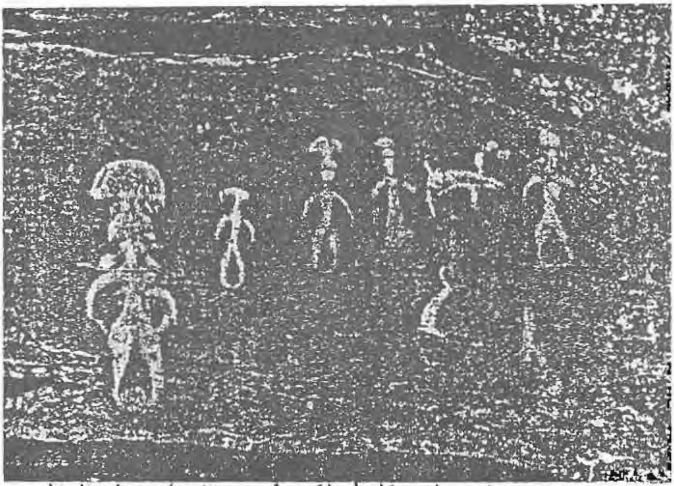
Fig.5. Stilisert gjengivelse av motiv nr. 2,3 og 4.(I).



Petroglyff nr. 14. „Venus fra Chukotka" nederst til venstre.

Fig.6. Motiv nr. 14 fra felt nr. III. Etter Dikov.

tilhører motiv nr.14 i gruppe III (fig.6), og fremstår som en 32 cm høy skikkelse. Hennes store hodepryd i form av en sopps fruktlegeme utgjør herav 10 cm. "Damen" har tydelig ørepynt eller spesielle fletter, og hennes figur er ellers rikt feminint utstyrt. Vi foreslår av den grunn å kalle henne "Venus fra Chukotka". En tilsvarende, men mindre kvinnefigur (14 cm høy, og med en 7 cm stor sopp på hodet) er fremstilt i felt nr. IX, motiv nr. 78, og likeledes i felt nr. V, motiv nr. 55 befinner det seg en lignende skikkelse.



Motivet med „Venus fra Chukotka", petroglyff nr. 14

Fig.7. Motiv nr. 14 fotografert direkte på fjellveggen. Bemerk at den store soppen har mulig ring på stilken.

De aller fleste menneskelignende skikkelser er utført sett forfra, slik at alle lemmer samt selve torsoen trer klart frem fra fjellveggen. Det er formelig som de står og ser rett på tilskueren. På enkelte motiver som nr.2 og nr.79 holder to personer hverandre tydelig i hånden, hvorav den venstre i begge tilfelle har sopp på hodet. På ett og samme motiv kan opptil 4

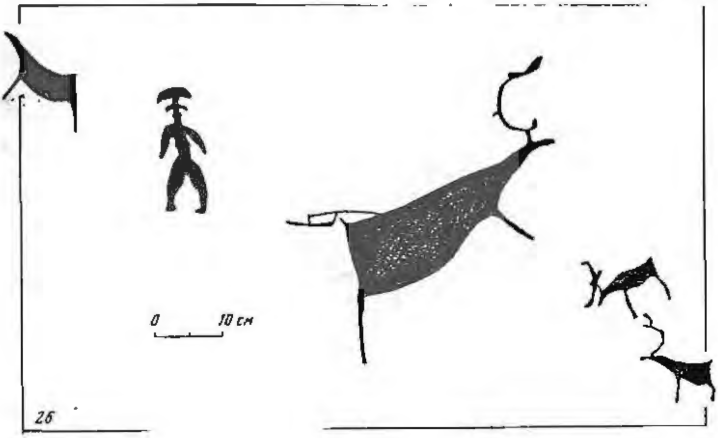


Fig.8. Motiv nr.26. Reinsdyr og figur m/ dobbel sopp.

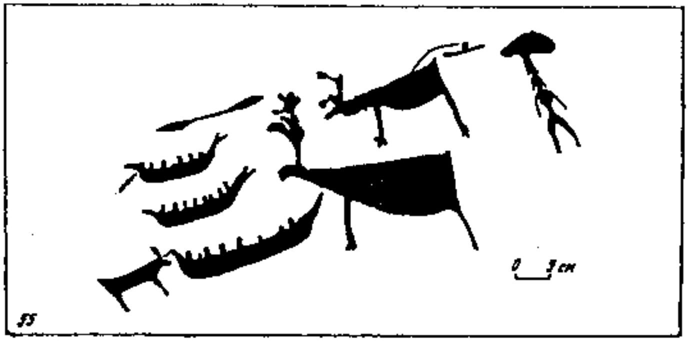


Fig.9. Motiv nr.55. Bemerk figuren til høyre.

eller 5 personer bære sopp (motiv 14 og 70), mens noen har 3 (som 78) og resten færre. Hunder, reinsdyr, en båt (78) kan også inngå i disse motiver. I alt på samtlige helleristninger er ca. 32 figurer utstyrt med sopp, enten like over hodet eller direkte på dette. Såvidt man kan se er alle disse voksne personer.

Identifikasjon og forslag til tolkning.

Som antydet i det foregående er særlig soppen på hodet av den såkalte "Venus fra Chukotka" tydelig fremstilt. På et foto av motivet på selve klippeveggen kan det endog se ut som om det er forsøkt utført en ring rundt stilken(fig.7). Sett i sammenheng med de rike litterære vitnesbyrd om de østsibirske stammers bruk (og misbruk !) av rød fluesopp rituelt og i hverdagslivet, kan det vel herske liten tvil om at det er nettopp denne art hattsopp vi ser fremstilt på motivene.

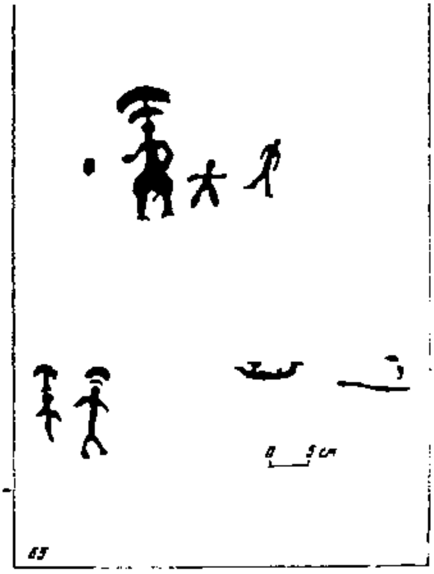
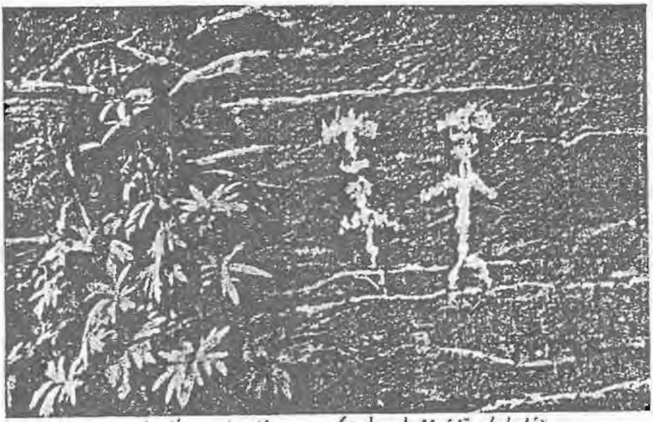
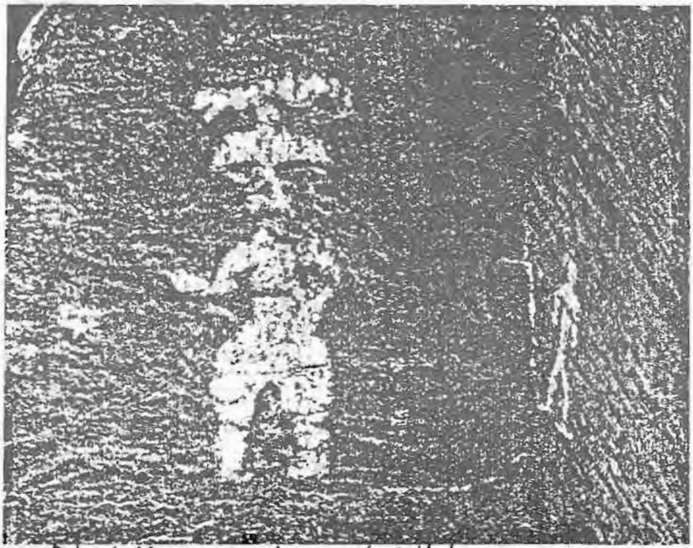


Fig.10. Motiv nr. 65.



Menneskelignende fluesopp (petroglyff 65, detalj)



Petroglyff nr. 65, figur med dobbel sopp.

Fig.11 og 12. Figurer fotografert fra selve fjellveggen.

Plaseringen oppå hodet, eller nærmest som en forlengelse av dette, gir - synes det meg - et slående uttrykk for den berusende/narkotiske virkning som den sibirske utgave av rød fluesopp påførte brukerne. Det vil føre alt for langt i denne artikkel å komme inn på rusvirkningens karakter og diverse aspekter. Det henvises her igjen til Wassons tidligere nevnte bok. Men én side vil bli viet noe oppmerksomhet i det følgende. La oss da først antyde en tolkning av disse soppfigurer. Etter en foreløpig vurdering synes fire muligheter å foreligge:

70

Fig.13. Motiv nr.70.

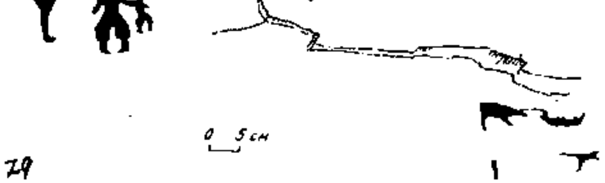
1) De formfagre kvinnefigurene representerer fruktbarhetsgudinner. Figurenes størrelse og detaljerte utførelse kan antyde dette. Soppen på hodet kan antyde at denne gudinne ble påkalt under sopprus, og at den antatte kommunikasjon med henne kun fant sted i påvirket tilstand.

78

Fig.14. Motiv nr.78.

2) De samme figurer forestiller kvinnelige sjamaner eller prester. Dette ville i så fall fordre en matriarkalsk samfunnsform, et forhold som såvidt vites er lite klarlagt i denne forbindelse.

3) Alle figurer med sopp, også de store "kvinner", forestiller stammemedlemmer som mer eller mindre regelmessig har inntatt



79

Fig. 15. Utsnitt av motiv nr. 79.

rød fluesopp.

4) De menneskelignende soppfigurer, eller noen av dem, forestiller de "sopp-ånder" som beretningene forteller om. Disse såkalte "wapaq" er også kjent fra mykolatrien i Mellom-Amerika, hvor de gikk under navn av "duendes" (= dverger). Det er slik å forstå at soppbrukeren under rusen ofte opplever at små, menneskelignende vesener på størrelse med den angjeldende sopp synes å fremstå av denne etter at den er fortært. Disse "ånder" tar da mer eller mindre kontroll over vedkommendes psyke for det tidsrom rusen varer. Muligheten for at disse "wapaq" er fremstilt i petroglyffene kan neppe utelukkes.

Kommentar.

Det er helt åpenbart at når de innfødte stammer har tatt seg det bryderi å riste inn fruktlegemer av sopp på klippeveggene, kan det ikke bety annet enn at disse soppene må ha spilt en betydelig rolle i deres kultur. De andre gjengitte vesener og gjenstander representerte det aller vesentligste i deres liv og levnet: reinsdyr, sel og andre sjødyr som næringsgrunnlag, hunder som deltagere i jakt og hjemmeliv, båter og fangstredskap - alt av vital betydning for deres eksistens. Soppfigurene gir en helt konkret bakgrunn for oppfatningen av bruk av rød fluesopp blant nevnte folkestammer (Dikov). I hvilken grad ristningene var tillagt magisk betydning er noe usikkert, men sannsynligheten er meget stor (jfr. nordiske helleristningsfunn)

Datering.

Etter grundige undersøkelser mener den russiske ekspedisjon å kunne fastslå at de aktuelle ristninger er gjort i tidsrommet ca.1000 f.Kr. til 1000 e.Kr. De eldste er trolig individuelle petroglyffer av reinsdyr (fig.16), mens de aller fleste gjengitt i denne artikkel skriver seg fra begynnelsen av vår tidsregning og frem mot år 1000. Dette var før bofast reinsdyrhold var utviklet, men mens de lokale stammer, vesentlig nomader, kjente kunsten å jakte på sel, småhval og svømmende reinsdyr fra båt og kajakk. Dette innebærer m.a.o. at kjennskapet til den stedlige røde fluesopps virkninger ved inntak har meget lange tradisjoner i det nordøstlige Sibir. Før har vi kunnet lese beretninger om dette i diverse litterære fremstillinger. Nå kan vi også lese budskapet direkte ut av klippeveggen ved Pegtymel i Chukotka.

Eks. på ristning av den eldste type.

Fig. 16.

Samtlige illustrasjoner fra Dikovs bok "Naskalnye zagadki -" bortsett fra fig. 1, som er gjengitt etter Wasson.

Litteratur.

N.N. Dikov : "Naskalnye zagadki drevnei Chukotki". Utgitt på Izdatelstvo "Naoka", Moskva K-62, 1971.

R.G. Wasson : "Soma. Divine Mushroom of Immortality." New York 1968.

R.G. Wasson : "The Wondrous Mushroom. Mycolatry in Mesoamerica." New York 1980.

English Summary.

The author draws attention to the discovery and later exploration of a site containing rock carvings in the far North-East region of Siberia, the socalled Chukotka. A number of the motifs hewn in stone here evidently depict mushroom silhuettes on top of the heads of anthropomorphic figures, and it seems plausible to correlate these finds to the narratives

from Siberia throughout almost 300 years, speaking of the native habit of ingesting fly agarics as a means of inebriation. - First, a brief historical survey is given as to the literary sources on mycolatry in the area, based on the exhibits in R.Gordon Wasson's work, "Soma. Divine Mushroom of Immortality.", New York 1968. Then, a Soviet archeological expedition to Chukotka in 1967-68, little known among mycologists in the West, is brought into focus. This expedition explored the recently discovered rock carvings at the right hand bank of the Pegtymel river, 50 km from the coast of the Arctic Ocean, north of the Polar circle. Its results and conclusions are presented by one of the expedition leaders, mr. N.N.Dikov, in a book whose English translation reads, "Rocky Enigmas of Ancient Chukotka", Moscow 1971. - The images carved in rock were found on the steep southern wall of the precipice of a relatively small mountain plateau (50 m high) near the river bank. They consisted of eleven distinct groups, totalling in all 103 motifs. On the flat top of the rock two hunters' camps were detected (A and B on the map, fig.3). The area has for many centuries been inhabited by the socalled Chukchi tribes (fig. 1). The scenes depicted were chiefly consisting of reindeer, seals, small whales and fish being hunted by persons with hunting equipment. However, among the anthropomorphic figures present there were 32 carved out with unmistakable mushrooms on their heads (Dikov). These mushrooms can be clearly identified as hymenomycetes, several of them possessing each a distinct pileus,[1] stem and a bulbous base. Even traces of an annulus may possibly be identified in one of the mushrooms, viz. the one belonging to the voluptuous female of petroglyph no. 14, tentatively called the "Venus from Chukotka" by me. - A brief systematic description of the mycophorous figures is offered, attention being drawn to the fact that all of them are depicted in frontal view, two couples are holding hands, and obviously only adult persons are wearing mushrooms (or should we say toadstools ?). This description is solely based on the illustations of Dikov's book. Moreover, a contribution to an interpretation of the

[1] or a double one,

mushroom carvings is given, stressing the following possibilities ,

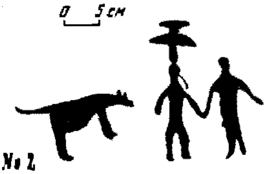
1) The richly ornamented female figures represent godesses of fecundity, indicated by their size and attributes. If so, the mushrooms on their heads may suggest that connection with them was mainly attained in a state of fly agaric inebriation.

2) The same female figures may be recognized as tribe priests or shamans. In that case, a sort of matriarchy must be presupposed in the Chukchi society.

3) The mycophorous figures are ordinary tribe members, more or less regularly ingesting fly agarics to attain a level of intoxication. Their importance for game hunting seems not to be present, but cannot be totally excluded.

4) The anthropomorphic figures adorned with fungi, or at least some of them, possibly depict the socalled "mushroom spirits" ("wapaq" in native tongue), which are often mentioned in the literature of ancient Siberia. This phenomenon is also known from the mycolatry of Mesoamerica (Wasson 1968 and 1980). The alleged spirits, being the same size as the mushrooms ingested, and having a manlike shape, seem to emerge from the fruitbodies and take command of the minds of the inebriated persons for the duration of their intoxication.

Eventually, the author emphasizes that as the mushrooms are carved together with other vital items of the local tribes (reindeer, seals, small whales, boats, kayaks, dogs etc.), they must necessarily have played an important part in their culture. The carvings have been dated to the first millennium A.D. This indicates the long tradition of mycolatry, based with a relatively great certainty on the <u>Amanita muscaria</u>, in North East Siberia. - All illustrations are taken from Dikov's book, save fig.no. 1, which belongs to Wasson's "Soma. Divine Mushroom of Immortality."



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AGARICA

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Observations of Amanita nivalis Greville.

ROY WATLING,ROYAL BOTANIC GARDEN,EDINBURGH EH3 5LR, SCOTLAND,

Whilst carrying out a survey of Scottish mountain fungi it was soon realised that although Amanita nivalis Grev. had been described from Scandinavia and the Alps (Favre, 1955; Kühner, 1972) under the synonym Amanita vaginata forma oreina Favre and a misdetermination of A. hypoborea (P. Karst.) Fayod respectively, it has not been redescribed from the British Isles since the original description in 1822.

A. nivalis was described by Greville (1822) 'on the summits of the highest mountains in the Grampian range; as Brae Riach, Ben-ne-Bourd*, Cairngorm, &c.'. He also describes it as 'the most alpine species of fungus I am acquainted with' and later 'it grows on the bleak summits of the loftiest Grampians, and really enlivens the few turfy spots which occur in those desert regions, by its symmetry and extreme whiteness'.

A. nivalis is still seen today on these same mountain summits and has been found on several neighbouring, and some more isolated mountains in Scotland. Although it is consistently found on the schistose rock systems outcropping a little further south than the Cairngorms, in the type locality it fruits rather sporadically. Fourteen collections are housed in Edinburgh (E) and one in Kew (K) and the fungus is known from at least three additional sites not covered by this material. It ranges from the Central Massif of the Cairngorms and Breadalbanes, where it occurs over 975 m to the Northwest at Sgurr a'Chaorachaan

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*Beinn a'Bhuird.

(731 m) and Beinn Bhan (896 m) in Ross and Cromarty. It is associated exclusively with Salix herbacea and although this willow is to be found at lower altitudes no records of A. nivalis are available below 730 m.

Unfortunately no type material of A. nivalis exists in Edinburgh (E) where Greville's fungal material is housed nor did Greville appear to send material to Klotzsch or Hooker, both then in Glasgow, as none is to be found in the latter's herbarium; Klotzsch was employed to curate Hooker's herbarium from 1830-32. Although it has been found on Breariach (1296 m) since (Reid in K; Roger, pers. comm.), insufficient numbers of basidiomata have been collected to distribute as neo-type material. Field notes are not available with their collections so an effort was made in 1984 to obtain material in good condition. Material (Wat. 17489) was found on 'The Cairnwell' and a description is offered herein. Colours are adopted from Henderson, Orton and Watling (1969).

Macroscopic characters:

Pileus 30 mm, convex-campanulate then convex to plano-convex, 'D' slightly tinged 'F' at the centre, sulcate striate at margin for 1/3rd way to disc, with edge plicate-striate, smooth, slightly greasy. Stipe 60 x 9 mm, exannulate cylindric or slightly swollen downwards, seated in a loose flaccid volva, white throughout minutely pubescent at apex, outer surface becoming separated downwards to form close narrow bands producing zig-zag pattern, stuffed; volva prominent, persistent white on outer surface except for pink tinge of 'F & G' at very edge and about base where buried in substrate, faint pinkish buff tinge on non-striate inner surface, inner limb absent. Gills white, very narrow, subcrowded, narrower towards stipe, adnate, with margin minutely floccose. Flesh white throughout, rather narrower at pileus-margin. Odour pleasant, not distinctive.

Microscopic characters (Fig. 1):

Basidiospores (9.5)10-11 x 9-10µm, globose (Q = 1-1.1), hyaline, thin-walled, with small to medium rather abrupt apiculus and single large guttule more rarely with one or two smaller accompanying guttules, inamyloid, lacking germ-pore. Basidia 65-71 x 15-17.5 µm, very narrowly clavate with long pedicel, hyaline, 4-spored; sterigmata < 5.5 µm long. Cheilocystidia forming a sterile edge to gill composed of thin-walled subclavate to broadly clavate cells, 27.5-100 x 11-33 µm, often apical to short chains of much smaller brick-like cells, intermixed or overlaid by thin-walled, hyaline hyphae 4-15 µm broad; pleurocystidia absent. Subhymenium of shortened, somewhat inflated, closely packed, hyaline cells forming a zone 27.5-35 µm broad of ramose hyphae. Hymenophoral trama distinctly bilateral, of inflated, shortened elements 3.5-18.5 µm broad. Pileipellis 2-layered, the outer a narrow ixocutis ≤ 25 µm thick and of interwoven, hyaline hyphae 1.5-3 µm broad seated on a layer ≤ 50 µm thick of hyaline hyphae some swollen to 12.5 µm broad. Pileus trama abruptly demarcated from pileipellis of hyaline hyphae, some inflated 27.5-33 x 7-20 µm, lacking vascular elements. Stipe trama acrophysalidic (Bas, 1982); acrophysalides abundant, hyaline, broad, 80-150/25-45 µm, lacking vascular hyphae. Volva limb at outer surface composed of loosely interwoven, flexuous hyphae 4.5-9 µm intermixed with rare inflated cells, sometimes absent in some fields of view, and at inner surface similar in structure but far more compacted nature.

Fig. 1.

A. Basidiospores. B. Five cheilocystidia. C. Three hyphal elements overlying cheilocystidia. D. Outer surface of volva limb (scalp). E. Four basidia, one just developing or sterile (basidiole) containing refracture material, two mature, and one with developing basidiospores.

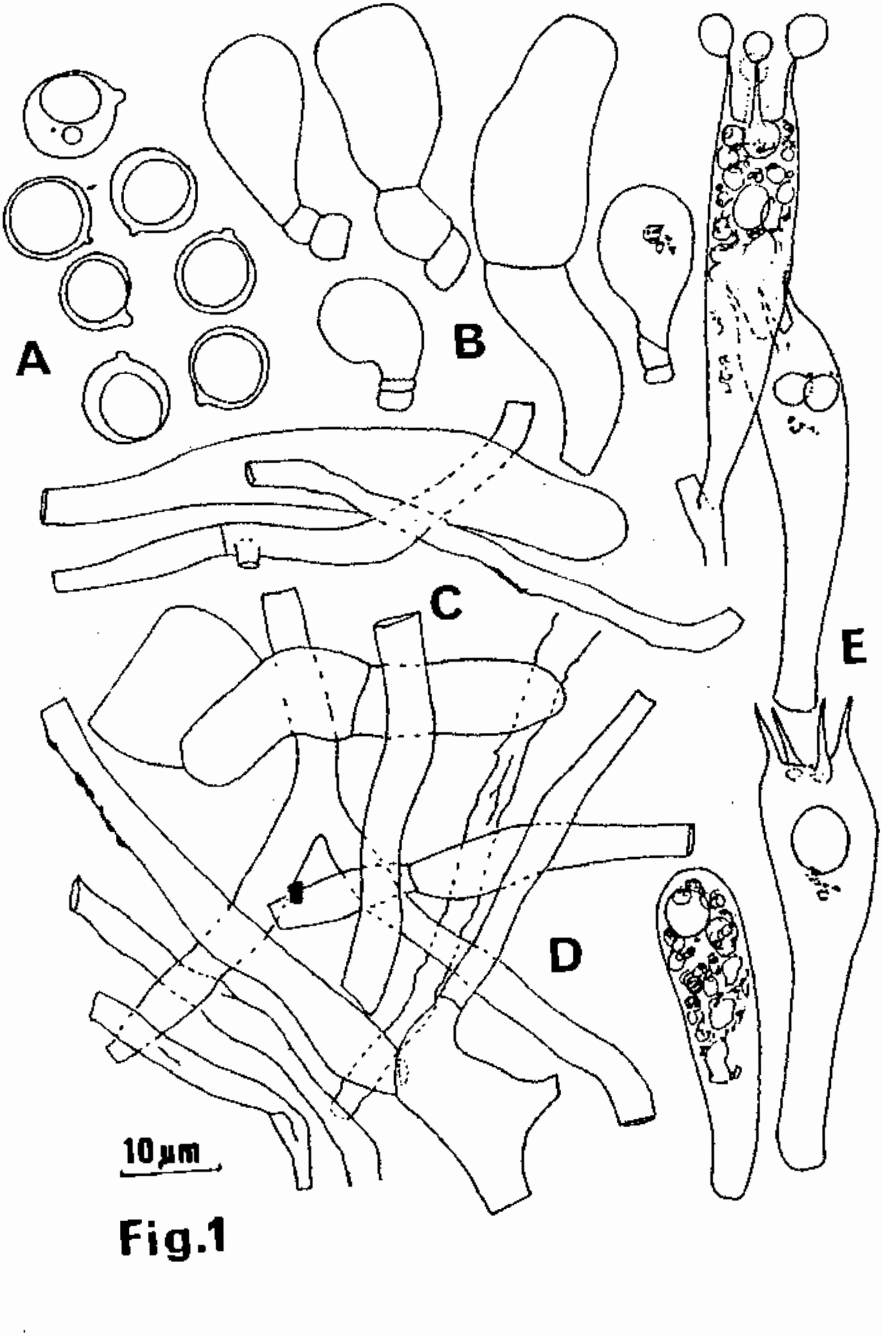
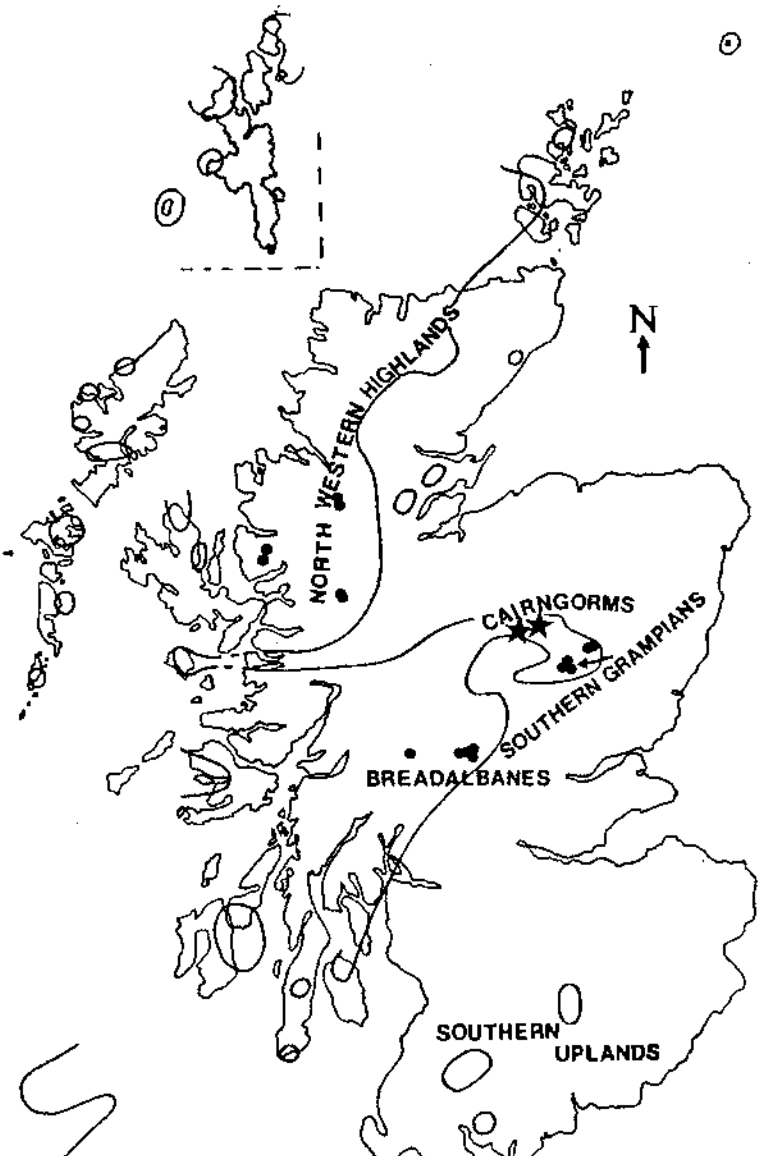


Fig.1

Habitat: on bare peaty soil or on *Rhacomitrium* heath with *Salix herbacea*, or on mountain turf with *S. herbacea* on podsolic or skeletal soils which have a pH of 4.2-5.9 (McVean & Ratcliffe, 1962). It is a snow-bed agaric associated with such plants as *Carex bigelowii* Torr., *Galium* and *Polytrichum*, a character from which no doubt Greville coined the epithet 'nivalis'! The microscopic data offered above agrees in all ways with that gleaned from the type material of Favre's *Amanita vaginata* forma *oreina* (Bas, 1982). A 1984 collection (Wat. 17489) from Cairnwell is proposed as neotype. Material is deposited in Edinburgh (E) and a part collection is deposited in Leiden (L.).

The map (Fig. 2) shows the distribution of *A. nivalis* as known to date, ranging from the Breadalbanes (Ben Lawers (1214 m), viii 1958, *Henderson* 4308; Carn Creag (975 m), ridge running southwest from summit of Meall nar Tarmachan, legit D. Minter and A.P. Bennell, 5 ix 1976, *Wat*. 11819; Meall nar Tarmachan, legit J.G. Roger, 12 ix 1981, *Wat*. 14178, and Coire Odhar, west of Ben Lawers, vii 1983, Wat. - unpubl. data), through the Cairngorms (Breariach (1296 m), mentioned earlier and *Reid* in K; Ben Macdhui (1309 m), legit M.E.D. Poore, ix 1955, *Henderson* 2266, and J.G. Roger (no voucher material)), Central Grampian (Cairnwell (933 m), 22 viii 1978, *Wat*. 12835; ditto, legit Miller & Watling, ix 1978, O.K. Miller 17850 in *VPI*; ditto, 8 ix 1984, *Wat*. 17489; Lochnagar, south west of summit (1097 m), legit D.W. Minter, 4 viii 1976, *Wat*. 11767; ditto, north east of summit, W. Baird (no voucher material)), Glen Affric Forest, (Mom Sodhail (1181 m), 23 viii 1955, *Orton* 418; Ciste Dhubh (982 m), 28 viii 1963, *Orton* 2542) and Western Highlands in Ross and Cromarty (Sgur a'Chaorachaan (731 m), 13 ix 1963, *Henderson* 7145; Bheinn Bhan (731 m), 11 x 1969, *Henderson* 9464) to

Fig. 2. Map of Scotland (Shetland 60° north, NNE of Orkney in box) showing known distribution of *Amanita nivalis*. Stars indicate Greville's original sightings; arrow locality of neotype.



Distribution of SALIX HERBACEA

west of lines only

Fig.2

Ben Achaladar (1037 m), legit A.P. Bennell, 6 ix 1979, Wat. 13466, and A'Chailleach (914 m), legit A.P. Bennell, 15 ix 1982, BH 698 and Druim Reidh Sgurr Breac, Fannich Forest (800 m), A.P. Bennell (no voucher material), 18 ix 1982, both near Dundonnell.

Greville insisted that this mountain agaric was 'truly a noble fungus in the genus Amanita'. Indeed he questioned even Fries, the great Father of Mycology, in saying 'It is rather surprising that FRIES should have united so distinct a genus as Amanita to Agaricus, already overwhelmed by sections, divisions and subdivisions, and containing about 800 species!'

Greville's description in the Scottish Cryptogamic Flora is accompanied, in common with all the fungi he discussed, by a coloured plate. It is a beautiful portrayal of the fungus and the Cairnwell basidiome paralleled the illustration exactly in all its stages of development. The latter was observed in the laboratory when the Cairnwell material was maintained in a damp-chamber with its base surrounded by damp moss. The basidiome was totally white at first and the pileus concealed by the white volva. On splitting the volva left no warts on the pileus but specimens have been seen in the field with some volval material on the pileus. When present, however, this is soon lost, being washed off by rain; indeed, the fungus is more frequently seen rather water soaked from autumnal storms and it then appears drab greyish.

Unfortunately Greville's publication is difficult to obtain so the opportunity is taken to reproduce his short description.

SPECIFIC CHARACTER

AMANITA nivalis; tota alba. Pileus planus vel subumbonatus, centro saepe diluto-ochraceo, margine striato-pectinato. Lamellis subdistantibus. Stipite nudo, bulboso. Volva laxa.

A. whole plant white. Cap plane, or slightly umbonate, the centre often pale-ochraceous, margin striato-pectinate. Lamellae (gills) somewhat distant. Stem naked, bulbous. Volva lax.

Hab. On the summits of the highest mountains in the Grampian range; as Brae Riach, Ben-ne-Bourd, Cairngorm, &c.

Stevenson (1879) in his account of Scottish fungi placed this mountain agaric under *Amanita vaginata* as '12. _A. vaginatus_* Bull. var. _albida_*' recording it from the 'bleak summits' and from Hunter's Hill Glamis (121.50 m). The latter is probably a record of the true var. *alba* Gillet (= *fungites* (Batsch) J. Lge.) a tall elegant fungus much the same in stature as *A. vaginata*. Stevenson reports 'except in colour, which is snow white, it does not differ from *A. vaginatus* more than the common variety, fulvus'. Variety *albida*, which had been introduced by Fries (1838) under *Agaricus*, is simply a new name for *A. nivalis* Grev. Bas (1982) gives a full synonymy.

In Scotland four white species of *Amanita* are to be found, viz. *A. virosa* Secr. with its shaggy-scaly stipe and distinct annulus common in northern birchwoods, *A. vaginata* var. *alba*, mentioned above, *A. nivalis* Grev., and a rather more robust member of the *Amanitopsis* group found with *Salix repens* in maritime turf and currently being studied by C. Bas. *A. hypoborea* often confused with members of the *A. vaginata* group, especially *A. nivalis* is apparently a different fungus (Bas, 1982). *A. nivalis* is a relatively small agaric; the range of dimensions found are: pileus 22-55 mm and stipe 38-60 x 6-8 (7.5-10 at base) mm.

The intermediates between *A. nivalis* and *A. fulva* (Schaeff.) Secr. observed by Lange (1955) and Kühner (1972) have not been seen in Scotland, although a collection (*Wat*. 1967) from the SW summit of Lochnagar (1155 m) was pale drab cinnamon buff. In fact many collections commence white but soon discolour pale brownish or ochraceous, especially towards the centre, from extreme weather conditions, and particularly when sun-scorched.

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AGARICA

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Helvella aestivalis - with notes on its edaphic conditions in Arctic Canada.

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Helvella aestivalis is reported to be a common species in Ellesmere Island in Arctic Canada. Notes are provided on a few edaphic characters, viz. pH, conductivity and loss on ignition.

A description of *Helvella aestivalis* (Heim & Remy) Diss. & Raitv., based on fresh material seen from Greenland, Norway and Switzerland, and a map showing the known, world-wide distribution, which is considered to be arctic-alpine-subalpine, was given by Dissing (1983).

During four weeks in July-August in 1984 the author had the opportunity to collect Operculate Discomycetes (order Pezizales) at Alexandra Fjord, Ellesmere Island in Arctic Canada (78°53'N 75°55'W) together with dr. Linda Kohn, University of Toronto.

The studied area at Alexandra Fjord is approximately 12 km^2. It is a postglacial plain which is characterized as a lowland oasis (Freedman et al., 1982). A total of about 20 species of Operculate Discomycets were found.

Among these *H. aestivalis*, with nine different localities, was one of the most common species. One additional collection was made by Linda Kohn at Sverdrup Pass (79°09'N 79°39'W). The localities for *H. aestivalis* were all found along river banks, or in the bed of creeks intermittently flooded, or along steep brooklets on the western cliffs bordering the lowland. In all localitites *H. aestivalis* was growing together with *Dryas integrifolia*. In order to characterize the localities in some detail, floristic notes were made for one locality along a river and one locality in a creek. Soil samples were made from the same localities in order to illustrate some edaphic conditions, viz. pH, conductivity and loss on ignition.

Collecting of the samples as well as measurements of pH and conductivity in the samples follows the methods described by Petersen (1967:313-314). The results are summarized in Table 1.

Table 1. Edaphic factors for *Helvella aestivalis*. Organic matter was determined as loss on ignition after 6 h at 400°C. Methods for measurements of pH and conductivity, see Petersen (l.c.)

Collection number	pH	Lt(µm)	Loss on ignition (% of dry weight)
EI 84.48	7.6	218	4.54
EI 84.59	7.5	126	1.53

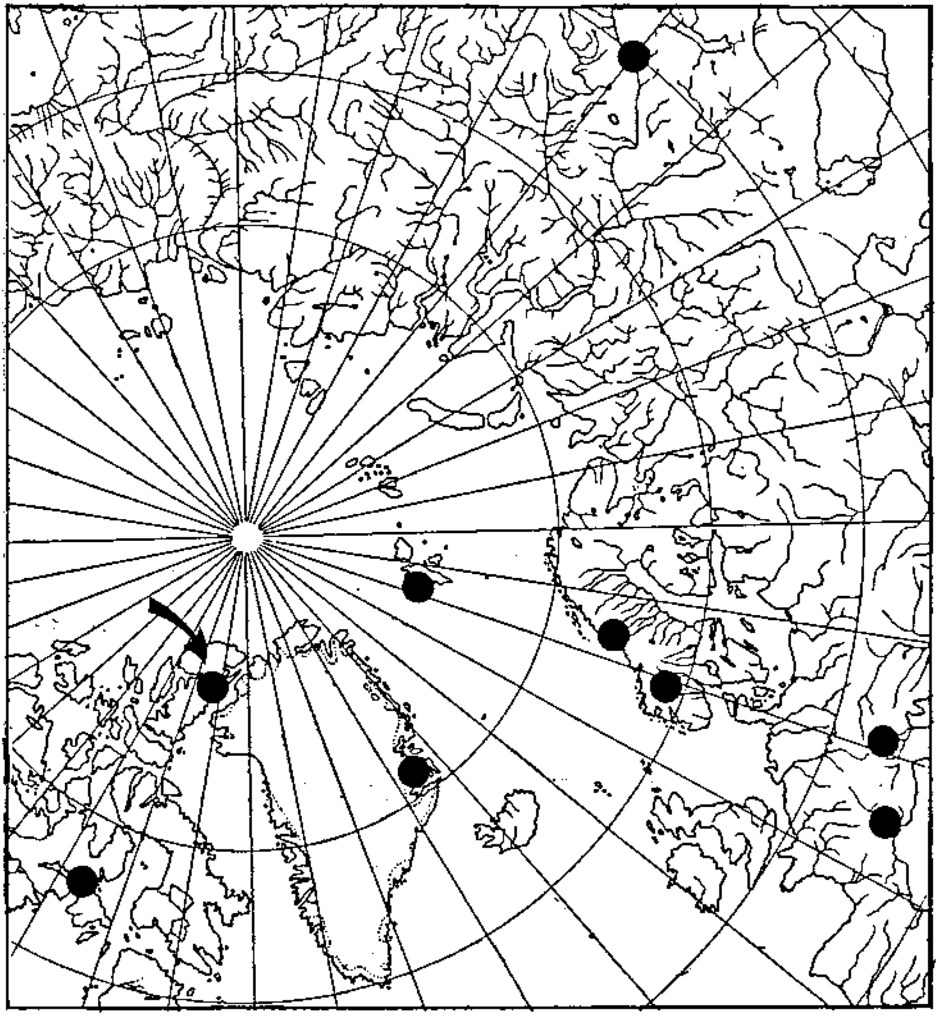
The material studied:

Canada: Ellesmere Island, Alexandra Fjord, EI 84.15, EI 84. 16, EI 84.24, EI 84.25, EI 84.35, EI 84.40, EI 84.47, EI 84.48, EI 84.59; - Sverdrup Pass, LK 84.41. The collections will be deposited at the University of Toronto, with duplicates in the Botanical Museum, University of Copenhagen (C).

Floristic:

EI 84.48: More than 100 apothecia of *H. aestivalis* were found on naked moist soil behind a low embankment along a river, together with *Dryas integrifolia*, *Salix arctica* and scattered plants of *Carex membranacea*, *Cassiope tetragone*, *Oxyria digyna*, *Papaver lapponica*, *Pedicularis capitata*, *Pesiza alaskana*, *Polygonum viviparum* and *Saxifraga oppositifolia*.

EI 84.59: About 42 apothecia in the stony bed of a creek on a small "island" in the middle, together with *Dryas integrifolia* and *Salix arctica* and scattered plants of *Carex nardina*, *Chamaenerion latifolium*, *Draba* cf *lactea* and *Saxifraga oppositifolia*.



FIGUR 1. Known distribution of Helvella aestivalis (Dissing 1983) including the findings at Ellesmere Island.

Acknowledgements:

Field work expenses as well as laboratory facilities at Alexandra Fjord were provided by professor J. Svoboda, University of Toronto. Travel expenses to Canada were granted by the Danish Natural Science Foundation. Analyses of the soil samples were made at Institut for Økologisk Botanik, University of Copenhagen. O. Lansø typed the manuscript. The co-operation is greatly appreciated.

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The role of ectomycorrhiza in a situation of air pollution and forest death.

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Introduction

The ectomycorrhizal association is a symbiosis between trees and fungi, where the tree delivers assimilates via transformed roots (ectotrophs) and receives mineral nutrients and water from the fungus. Most forest trees of temperate, boreal and subarctic areas (e.g. conifers as pine, spruce, larch and fir and amentiferous deciduous trees (*Betulaceae*, *Corylaceae*, *Fagaceae*, and *Salicaceae*) have mycorrhiza. Mycorrhizal symbiosis is so common in the plant kingdom that mycorrhizal roots are probably more common as nutrient-absorbing organs than uninfected roots (Harley 1984).

There is almost general agreement that air pollutants play an important role in forest damage in Central Europe but natural stress factors (e.g. drought, frost) probably have enhanced the problem. In general several pollutants are present and there is no consensus on the mechanisms of the damage or the relative importance of different pollutants.

This paper is focused on the following questions: What happens to the mycorrhizal fungi when the trees loose vitality and eventually die? And what happens to the trees if the fungi and the mycorrhizal symbioses are destroyed, for instance by changes in soil conditions from polluted rain?

The ectomycorrhizal association

Ectomycorrhizal roots (or ectotrophs) are characterized by a fungal sheath or mantle which encloses the root in a compact fungal tissue, and a Hartig net which is a plexus of fungal hyphae between the epidermal and cortical cells of the root. The hyphae do not normally penetrate the cells. In the ectotrophs the root cells are not in direct contact with the surrounding soil. Fungal mycelium or rhizomorphs lead from the sheath into the soil. If the hyphae normally penetrate the root cells, but the mycorrhizal roots otherwise exhibit ectomycorrhizal features, the association is called ectendo-mycorrhiza. This is mainly observed in trees which live under unfavourable conditions (Meyer 1984).

In contrast to the wood-inhabiting and wood-decomposing fungi, the ectomycorrhizal fungi have no or very limited ability to decompose lignin and cellulose. Most of them can only use sugars, mainly the disaccharide sucrose but also the monosaccharides glucose and fructose. These substances are produced by the photosynthesis of the tree, transported to the roots, and absorbed by the hyphae of the Hartig net and the fungal sheath. In the fungal sheath the assimilates are rapidly converted to other compounds: trehalose, mannitol, and glycogen. Since these fungal-substances are only very slowly absorbed by the roots, they apparently constitute a sink where the carbohydrates are accumulated in a form not readily available to the tree.

On the other hand, the mycorrhizal fungi provide the trees with mineral nutrition such as nitrogen, phosphorus, potassium, calcium, and magnesium, and trace elements such as manganese, boron, and molybdenum. As nitrogen source the ectomycorrhizal fungi can use ammonium, some amino acids and other simple and complex organic nitrogen compounds, but normally not nitrate. Especially, the fungus can provide nitrogen from sources otherwise not available to the tree.

The mycorrhizal fungi are effective absorbers of phosphate. The fungal hyphae produce high amounts of phosphatase, and as shown in laboratory experiments, in amounts related to available phosphate: The poorer the substratum in phosphate, the more phosphatase is produced by the fungus (Flick 1984). In the fungal sheath phosphorus is to a large extent accumulated and stored as polyphosphate. When phosphate supplies are deficient, the phosphate stored as polyphosphate is remobilised and transferred to the host tissue, thus providing a steady rate of transfer to the tree (Harley & Smith 1983). Higher amounts of P and N are found in leaves and needles of trees with mycorrhiza than in trees under otherwise the same conditions, without this association (Flick 1984, Reid et al. 1983).

The mycorrhizal association leads to increased water uptake and drought resistance of the trees (Mikola 1969, Harley & Smith 1983, Last & al. 1983).

Young roots are tender structures and in absence of true ectomycorrhizal fungi they are easily invaded by other fungi. They respond to such infections by no longer forming root hairs and by secreting antibiotic compounds like tannins on the cell walls. So-called pseudomycorrhizae with reduced absorbing capacity are formed (Meyer 1974). The mycorrhizal association forms an effective biological barrier against parasites and toxins in the soils. Several mycorrhizal fungi produce bacteriostatic and fungistatic substances (Harley & Smith 1983). In natural forests ectotrophs also function as transport organs of assimilates from larger trees to young seedlings hampered by light deficiency in the forest floor (Flick 1984).

Occurrence of ectomycorrhiza

Whatever the physiological function and ecological importance of the ectomycorrhiza, the plain fact is that tree roots in natural forests are almost invariably mycorrhizal, at least in cool and temperate zones (Mikola 1969). The absorption of nitrogen, phosphorus, potassium, etc. depends upon oxygen supply, is energy consuming, and inhibited by metabolic inhibitors (Harley & Smith 1983). Therefore active mycorrhizal roots are most frequent in well-drained soils with a constant air supply. The mycorrhizal activity is higher in soils with high microbial activity and a good, balanced nutrient content Meyer (1984). However, in marginal sites, e.g., where drought or low temperatures limit forest growth, or in very poor or acid soils, trees are almost exclusively ectotrophic. Under such marginal conditions the ectotrophic structure is very successful and superior to the non-ectotrophic roots (Moser 1967, Meyer 1984). Moser (1967) coined the term ectotrophic to the cold climate type of forest in opposition to the anectotrophic forest types dominating in subtropical and tropical zones. He estimated that the world's forested areas would have been reduced with at least 20-30% if the ectotrophic forests did not exist and that the treelimit would lie some hundred meters lower.

In man-made forests trees are often grown far from their natural range and even on other continents, where the appropriate mycorrhizal fungi may be lacking. The history of introduction of exotic pines to many countries begins with a long succession of failures, until mycorrhizal infection of seedlings was brought in (Mikola 1969). Also afforestation in higher altitudes, in prairies and steppes, drained bogs, *Calluna* heaths, on coal spoils, strip-mined coal wastes, and other similar adverse conditions depends on ectomycorrhiza (Meyer 1984, Marx & Artman 1979, Marx & Bryan 1975).

Forest death and pollution – the main hypotheses

The pollutants of air and rain water from industry, house warming, vehicles etc. are classified into three groups (Ulrich 1983): Nutrients (Ca, Mg, NH_4^+, NO_3^-), acids (H_2SO_4, HNO_3, HCL), and toxins (SO_2, O_3, NO_x, HF, heavy metals, organic compounds). Four main hypotheses have been proposed to explain forest death (Nihlgård 1985):

1) The acid hypothesis: The acids alter the chemical composition of soils and plants. The nutrients Mg, K, Ca, Mn, etc. are leached from the upper soil horizons and increased amounts of soluble aluminium and other metals reach toxic concentrations, damaging the root systems, decreasing its ability to absorb nutrients and water. Especially Al has been suspected to cause serious damage to the roots (Haug 1984). The effects appear most notably during dry periods when there is an overall increase in concentration of acids and Al.

2) The ozone hypothesis: This hypothesis attributes most of the observed leaf damage to ozone (O_3) and other oxydants damageing leaves, causing the cell membranes to weaken and

nutrients to be lost from the damaged cells. The leaves may become yellow from Mg-deficency. The photosynthesis and water uptake is in turn disturbed, and the trees will also become more sensitive to attacks from fungi and insects.

3) The nitrogen hypothesis: An important part of the air pollution is nitrogen compounds (particularely NH_{4+} and NO_3^-). Too much nitrogen compounds in the soils cause the trees to grow too fast, producing large cells with a high volume. They are easily destroyed by wind and drought or attacked by parasites. The inner hormone balance is disturbed. High NH_4^+ concentrations in the soil compete with the uptake of Mg and may promote Mg-deficency (chlorotic leaves). The nitrogen compounds will be stored in the leaves, and toxic concentrations might be reached. One way the tree might get rid of this poison is to shed the leaves. In spite of a sudden increase in tree growth, the long time effect is an overall damage of the forests.

4) The stress hypothesis: This hypothesis states that none of the above mentioned pollutants are responsible alone. Is is SO_2, nitrogen compounds, acids, O3 and other oxydants, organic compounds, and heavy metals in combination that damage the trees. Taken separately, these pollutants are usually not found in concentrations sufficient to cause the damage observed in Central Europe, South Sweden and parts of North America. Forests influenced by toxic emissions can suddenly be damaged if exposed to natural environmental stress such as drought or frost.

The ectomycorrhizal association and pollution

Several investigations show that the fine roots of the trees are poorly developed or dying in areas exposed to air pollutants (Keller 1979, Blaschke 1980, 1981a,b,c, Courtois 1983, Hüttermann & Ulrich 1983, Liss et al. 1984). Moreover, these and other investigations demonstrate a simultaneous decrease of the mycorrhizal activity and plant growth (Miller & McBride 1975, Keller 1979, Mejstrik 1980, De Witt & Dobben 1983, Weigner 1983, Last et al. 1983, Liss et al. 1984).

There is a clear difference in the fine-root system in healthy and damaged white fir (*Abies alba*). In damaged trees the mycorrhiza-symbiosis is disturbed and a pathological "wet core" is formed, starting in the fine roots and spreading upwards into the stem. This hampers and or eventually destroys the water uptake of the tree. Supposedly the destruction of the tree starts in the root system where fine-roots die and do not regenerate. Possibly the start of this fatal developement is a destruction of the mycorrhiza (Schütt 1981).

Remarkably some of the commonest observed symptoms in forests exposed to emission look like drought damage (in its widest sense) (Ulrich 1980, 1983, Weiger 1983, Nihlgård 1985, Svensson 1985). Wind falls are commonly seen in dying forests, and might be ascribed to a poorly developed fine root and mycorrhizal system; the hyphae of the fungi in close contact with soil particles virtually "glue" the trees to the ground (Ulrich 1980, Keller 1979, Meyer 1984).

Ectomorph frequency is seriously decreased and pseudomycorrhizae formed at the expence of ectotrophs in areas of forest death. Also a rich ectendomychorrizal developement is seen (Meyer 1984). This type of association is otherwise prevalent in seedlings in nurseries with fertilized, fumigated, chemically treated or watersaturated soils and in plants on old agriculture land, but rarely found in natural forests. The ectendo-mycorrhiza represents a state where the balance between the partners is not yet established (seedlings) or the partnership no longer is possible (older trees in unfavourable sites) or when one of the partners for some reason is weakened. Obviously the production of ectendomycorrhiza plays an important role in the causal complex of the tree death (Meyer 1984).

In polluted forests an increase of root patogens are observed, which may be due to damage of the ectotrophs (Blaschke 1980, 1981b,c, Courtois 1983, Flick 1984, Liss et al. 1984, Meyer 1984). Ausmus et al. (1978) found that the activity of the mycorrhizal fungi decreased in soils treated with contaminated litter and smelter emissions.

There are some indications that mycorrhizal fungi can protect the roots against toxic effects of O_3 and SO_2 (Barrett et al. 1982), against heavy metals from pollutant emissions (McCreight & Schroeder 1982), and against mobilized Al from acidified soil (perhaps by formation of metal-organic complexes) (Meyer 1984, Stroo & Alexander 1985).

Mycorrhizal destruction – two hypotheses

There are two main hypotheses why the ectomycorrhizal structure is damaged by air pollution:

1) The first hypothesis gives an indirect explanation to the damage of the fungal partner: The photosynthesis decreases as a result of noxious gases acting on the chloroplasts and cell membranes. The production of sugars hence decreases and the fungi

become short of nutrients from the trees. Thereby the mycorrhizal activity decreases (which in turn has negative effects on the already weakened tree etc.) (Blaschke 1980, 1981a Courtois 1983, Flick 1984, Keller 1979, Liss et al. 1984, Meyer 1984, Nihlgård 1985).

2) The second hypothesis states that the fungus partner is directly damaged by some of the pollutants.

(a) Nitrogen. Since long it has been well established knowledge that a high nitrogen content in the soil suppresses the formation of ectomycorrhiza (Moser 1959). Nitrate usually inhibits the activity and growth of ectomycorrhizal fungi (Richards 1965, Alexander 1983, Eriksson et al. 1984). High concentrations of easily available nitrogen in the substrate tend to decrease fungal production of growth substances, thus retarding the short root formation and mycorrhizal infection of the roots (Moser 1959, Slankis 1971, Meyer 1974, 1984). Fertilizing experiments and estimates of fungal production in areas of forest fertilization show that fruitbody production of mycorrhizal species and production of ectotrophs are significantly decreased under most nitrogen fertilizing regimes, except in soils poor in nitrogen where an enhanced mycorrhizal growth could bee seen until a normal and balanced nutrient content was reached (Richards 1965, Marx et al. 1977, Menge & Grand 1977, Alexander & Fairley 1983, Alexander 1983, Eriksson et a. 1984, Meyer 1962, 1974, 1984, Reid et al. 1983, Flick 1984). The increasing amount of nitrogen in polluted areas might inhibit mycorrhizal formation. In polluted sites in South Norway estimated yearly nitrogen pollution amounts to the optimal dosage by forest fertilization within a 6-year's period. The deposition in Central Europe may be 3 to 4 times higher. Although the trees receive enough nitrogen, they will suffer from lack of other nutrients, such as P, K, Ca, Mg, Mn, B, Mo, etc., which are provided by the mycorrhizal fungi and again we are in the evil circle.

(b) pH. Since most mycorrhizal fungi have low pH-optima, increased acidity of the soils will hardly hurt the mycorrhizal production in general, but probably other species will succeed when the pH gets too low for the normally occurring species. Hung & Trappe (1983) demonstrated that the response to pH changes varied between different species of ectomycorrhizal fungi and between isolates of the same species. Some mycorrhizal fungi are confined to calcareous or neutral soils (e.g. *Suillus granulatus, Cortinarius* species of subgenus *Phlegmacium*) and might possibly suffer by acidification.

(c) Pollutant gases as SO_2 and O3 have deleterious effects on mycorrhizal fungi in large concentrations, although some of them are able to sustain moderate concentrations (Garrett et al. 1982).

(d) Air born or mobilized heavy metals, such as Cu, Pb, Ni, and Cd might damage the mycorhizal fungi, but the susceptibility against such pollutants varies between fungus species (McCreight et al. 1982, Ausmus et al. 1978, Statens Naturvårdsverk 1984).

(e) Al mobilized in the soil due to acidification is suspected to damage the ectotrophs (Meyer 1984, James et al. 1978). However, the various fungal species may react differently to Al, perhaps reflecting their ability to form harmless metal-organic complexes (chelates).

Concluding remarks

The vitality of a forest is generally estimated from canopy symptoms. The early signs of forest death from air pollution are not clear and conspicuous. Good diagnostic characters distinguishing between this condition and normal injures from frost, drought, mineral deficiency etc., are still lacking. Generally microorganisms are sensitive indicators of environmental conditions. With their short life span and rapid turn over, they also effectively reflect environemental changes. The "hidden" mycorrhiza does not naturally lend itself for diagnostic purposes. However, during a short season each year the mycorrhizal fungi, which are common mushrooms, display themselves. For several years the Continental European mushroom hunters have complained that the common chantarel no longer is common. In the Netherlands the disappearance of the species is correlated with high pollution levels (van Dobben et al. 1983). Changes in the composition of the mycoflora with increasing pollution is very likely to occur. In plots artificially "rained" with strong acids under the Norwegian SNSF project we recently observed that the moss cover had totally disappeared in plots watered with rain of pH = 2.5. Thereby a microclimatologically far less favourable situation for mushrooms has been established. Areas of pollution and reference areas should be monitored and compared. Presence of new mushroom species in an area or forest type or relative increase/decline in frequency of common species could bring early signs of forest damage.

A Dutch research team in Wageningen synthesizes ectomycorrhiza between the gasteromycete *Pisolithus tinctorius* and fir seedlings in order to get plants that can thrive in sites with high levels of acidity and metals (The Economist, April 1984).

This very effective mycorrhizal partner has only once been found in Norway and probably favours warmer and drier climate. But monitoring of the mycoflora could help us to find effective mycorrhizal partners among our naturally occurring mushrooms. Research work of this kind could greatly benefit from cooperation between field and laboratory research workers.

Forests are highly complex structures and various organisms, mechanisms, treshold values, and feed-back systems are acting in the process of forest death from air pollution. Certainly many other kinds of organisms than trees are dying, however, of less (or apparently less) importance to us. The complexity of the system indicates a causality complex where several main factors are involved rather than a single cause. To search for <u>the</u> death reason for a dying tree or forest has no meaning (and could be a common, occasional parasite) when the underlying reason is that the general vitality is low and the whole ecosystem is out of balance due to prolonged adverse environemental changes with stress conditions for the trees. But some main systems are certainly acting and the four hypotheses presently launched for forest death can certainly be supplemented with a fifth involving mychorriza.

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AGARICA

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Pseudorhizina sphaerospora - a rare, beautiful fungus of early summer.

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Once seen, - always remembered. Of Pseudorhizina sphaerospora this is not an exaggerated saying because the species is one of the most fascinating among lorels and morels appearing in early summer. The contrast between the brownish cap and the white stipe with the strikingly pinkish to peach-coloured tinge attracts attention.

At first glance it looks like a Helvella- species but a microscopic examination unveils the sphaerical form of the spores which separates this species from species of the genera Helvella, Gyromitra and Discina.

"Trollmorkel" the Norwegian name for P. sphaerospora describes the species very well - something turning out differently from what it seems to be, - besides hiding away and very seldom seen.

Pseudorhizina sphaerospora (Peck)Pouz. - Fig. 1,2

syn. Helvella sphaerospora Peck, Gyromitra sphaerospora (Peck)Sacc., Helvellella sphaerospora (Peck)Imai.

Ascocarp stipitate, irregular to almost globose, coarsely convoluted, margin free from stipe, brown, underside considerable paler, 8-10 (-23) cm in diam. Stipe 6-12 (-28)cm, stout, furfuraceous throughout its length, with prominent, longitudinal ribs continuing to the cap. Below densely tomentose, whitish with a clearly pinkish tinge mostly at the base. The coloured areas can also be seen in dried specimens. Spores globose 8 - 10 um in diam., with one or several oil drops.

For detailed informations on hyphal characters and spore structures, see Huhtinen 1983. He also reports the reddish stipe to be strongly fluorescent in UV light.

The genus Pseudorhizina was in the first place put in the family Helvellaceae until Harmaja (1974) erected the monotypic family Pseudorhizinaceae separated from Helvellaceae and Rhizinaceae mostly by differences in spore and exipulum characters.

Fig. 1. Pseudorhizina sphaerospora (D. Hansen,O). Ascocarp. Nat.size. Photo: P. Aas.

ECOLOGY

In Fennoscandia P. sphaerospora has always been found in places influenced by man like depots for timber, saw-mills and even close to refuse-heaps. From Central Europe it is also reported from coniferous forests.

DISTRIBUTION

In the Nordic countries P. sphaerospora is known from Norway, (Eckblad (1956), Sweden (Ryman 1978, Gilsenius 1981, Muskos 1984) and Finland (Huhtinen 1983).The species is hitherto not known from Denmark (H.Dissing pers.comm.). The distribution in Fennoscandia is mapped in Fig. 2.

P. sphaerospora is known from scattered localities in Fennoscandia, the northernmost one is in Finland, Kemi, Pajusaari ($65^{0}50'$N).

P. sphaerospora was reported as new to Finland by Huhtinen (1983) and found for the first time as early as 1904 in June and then found again in 1980 and 81, The two last years in July and in the same place.

According to Eckblad (1956) this species was found in Norway in the vicinity of Oslo for the first time in 1941. The collector Mr. S. G. Sundbye discovered some specimens that year and since then he found the species to fructificate almost every year. He first brought the species to the Botanical Museum in 1948. In 1949 and 1953 he happened to find the species in a different place but not very far from the first one.

Not before thirty years later the species was found again in our country. Then Mr. D. Hansen in June 1983 found one specimen in Kongsvinger near an old saw-mill and even in the year after, approximately on the same date, he found the species in the same place.

The striking feature is that this same pattern of appearance for P. sphaerospora is known from Sweden as well, found in the 1940-ies and 1980-ies. According to Muskos (1984) the fungus was found in 1942,1945 and 1948 and then again in 1979 and 1984. In both countries it was found in June and July and in Sweden also once in the last part of May. P. sphaerospora appears usually a little later than Helvella, Discina and Gyromitra- species already appearing in April and most frequently in May.

As can be seen from collections brought to the herbaria the fungus has been completely lacking for more than thirty years in both Norway and Sweden. Will it take another thirty-forty years before P. sphaerospora again appears in Fennoscandia?

The reasons why *P. sphaerospora* is rare in the Nordic countries and are found with such great intervals are difficult to explain. It is suggested that the species is dependant on very special weather conditions in order to produce ascocarps. The remarkable fruitbodies are developed at the same time as several species of *Helvella* and *Gyromitra* and should not be overlooked more than them. Even the ecology of *P. sphaerospora* does not seem special or requiring. There are many old saw-mills and wooden litter in Fennoscandia.

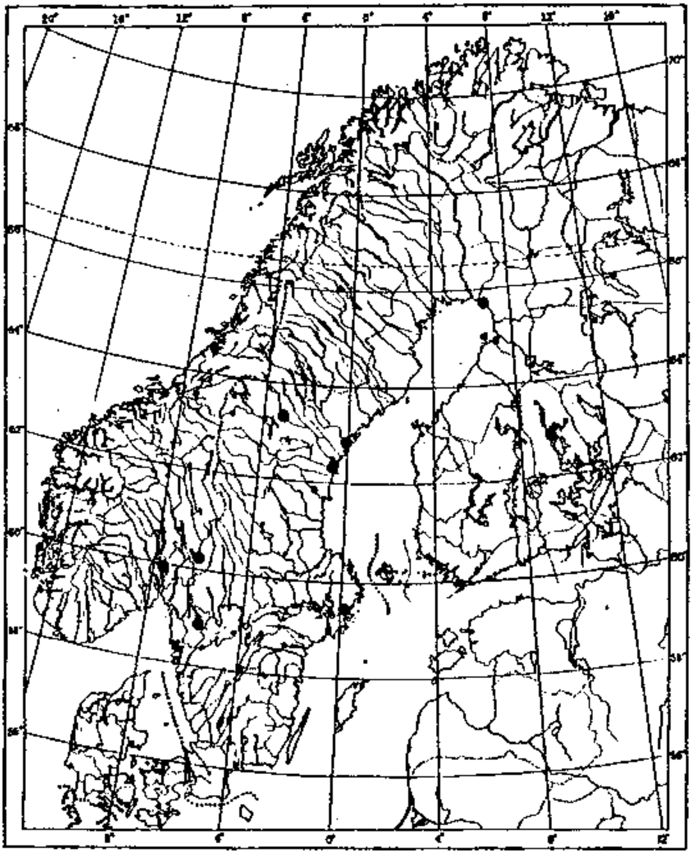

Fig. 2. *Pseudorhizina sphaerospora*. Known distribution in Fennoscandia.

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Summary: The distribution of Pseudorhizina sphaerospora in Fennoscandia is mapped. The phenology and ecology of the species is shortly discussed.

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Phellinus ferreus and P.punctatus, two complimentary species.

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Phellinus ferreus (Pers.) Bourd. & Galz. and Ph. punctatus (Fr. ex Karst.) Pil. are both resupinate and macroscopically they can easily be confused as both are smallpored and of a variable shape. However, microscopically they are very different, Ph. ferreus has setae and non-amyloid cylindrical spores, while the other lacks setae and has globose, dextrinoid spores.

Their distribution in Norway is interesting and is shown on fig. 1. Ph. ferreus is a typical oceanic species, restricted to the coast and in Norway exclusively to Quercus. The latter host is known all the way up the coast to Oslo and inland to Mjøsa, but Ph. ferreus has never been found here in spite of extensive collecting on Quercus in this area. Ph. punctatus, on the other hand, is a weak continental south-eastern species being restricted to the areas with rather warm summer-climate and colder and longer winter than along the coast. Its distribution is almost similar to that of the blue anemone Hepatica nobilis. In Norway Ph. punctatus is usually found on Corylus, Salix and Prunus, but there are also scattered records from other hosts. All these hosts have a much wider distribution than that of Ph. punctatus, so again, the availability of suitable hosts is not the restricting factor for this species.

One may wonder what sort of causes are behind the pattern shown on fig. 1. For P. ferreus it is natural to think of the winter temperature as the crucial factor. It could also be the length of the period with frost, which for an exposed species like P. ferreus, would be a drought period. When it comes to P. punctatus, the summer temperature seems to be the decisive factor. The species is restricted to the areas in Norway with the highest summer temperature. It avoids the north-eastern part where the summer could be rather warm, but relatively short because of the altitude. The distribution in Norway is a reflection of the distribution in North-West Europe. Both species are mapped by Jahn (1967), and their distribution is shown on fig. 2 and 3 respectively.

It is obvious that the pattern shown so prominently in Norway, repeats itself in the adjacent countries although with some modification . To the maps shown on fig. 2 and 3 can be added that P. ferreus is very common in Great Britain wherever there is oak, and that P. punctatus has never been recorded. The latter species is very common in Eastern Sweden and further to the east. From the fig. 2 and 3 it is apparent that the two species are partly overlapping each other in North-West Germany, but that P. punctatus is far rarer than P. ferreus.

This type of pattern is not rare, because many organisms when they comes close to their limit, becomes far more discriminatory as the ecological demands than in the centre of their distribution. The winter in North-West Germany is not so severe that P. ferreus is excluded while the summer climate is sufficient warm to mature the basidiocarps of P. punctatus at the same time.

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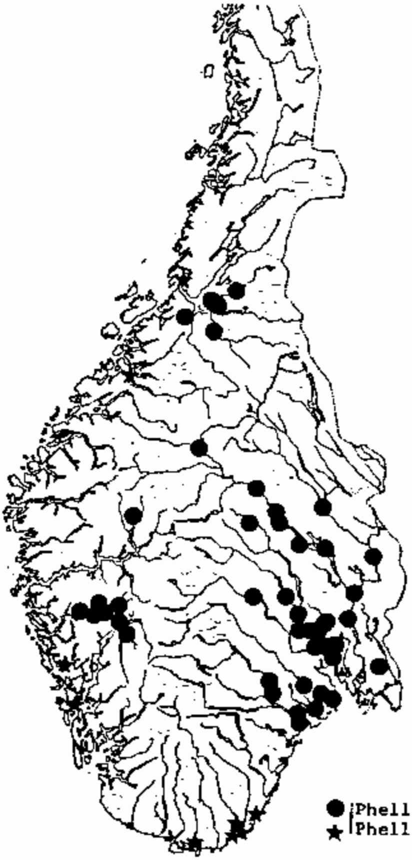

● Phellinus punctatus
★ Phellinus ferreus

Fig.1. The distribution of Phellinus ferreus and Ph. punctatus in Norway.

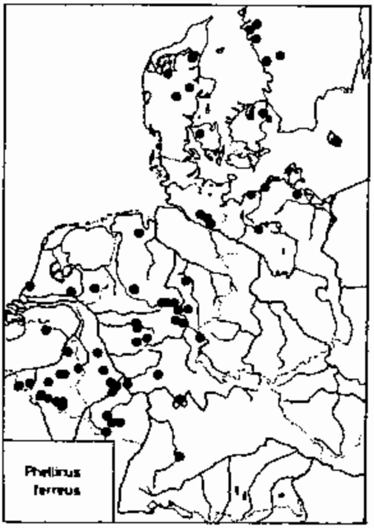

Fig.2. The distribution of Phellinus ferreus in NW Europe. After Jahn 1967.

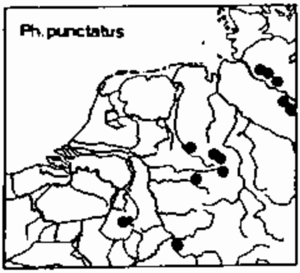

Fig. 3. The distribution of Phellinus punctatus in NW Europe. After Jahn 1967.

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De la mesure des spores et de son expression.

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Summary. - Methods of spore measurement are reviewed. The precision depends largely on a perfect calibration and standardisation. The readings have to be as accurate as possible, to 0,1 or at least to 0,2 µm. In the case of basidiospores, a number of 20 spores is considered a minimum from which averages ($\bar{x}$) of length (L) and breadth (ℓ), as well as of the ratio (L/ℓ) and their corresponding standard deviations ($\hat{s}$) have to be calculated. The traditional way of indicating spore dimensions coincides with the proposed one in which the values lower or higher than $\bar{x} \pm 2\hat{s}$, are put between brackets; a numerical example is given (§8).

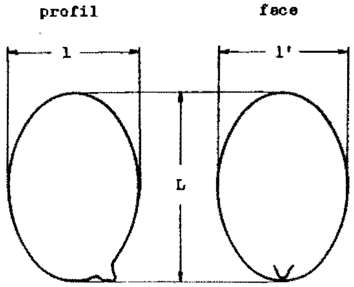
0. A peu d'exceptions près, les mycologues contemporains sont convaincus de la grande valeur spécifique des dimensions sporiques. On peut cependant affirmer que beaucoup de mycologues mesurent les spores avec peu de précision et surtout expriment leurs mesures de façon inadéquate.

Le but de cette note - qui ne se veut nullement révolutionnaire - est d'envisager les modalités de mesure des spores, de préciser les précautions à prendre pour obtenir des mesures aussi exactes que possible et enfin de déterminer la façon optimale d'exprimer les mesures.

Nous ne cacherons pas que l'idée de cette mise au point nous est venue à la lecture d'un article de ARNOLDS (1980) dans lequel il montre que, pour un même carpophore, les dimensions données par différents mycologues, tant amateurs que professionnels, sont étonnamment différentes.

L'expérience que nous avons acquise lors de l'élaboration de la "Flore illustrée des champignons d'Afrique centrale", nous a conduit à un système de mesures, et d'expression de celles-ci, qui optimalise les observations. A cette occasion, nous avons constaté que, même en utilisant des méthodes différentes, on obtient des résultats concordants, à peu de dixièmes de µm près, pour les moyennes, à condition de travailler de façon rigoureusement standardisée.

Précisons que, dans nos exemples, nous nous limiterons au cas le plus simple des basidiospores dont le volume s'approche ± d'un ellipsoïde.



L = longueur
l = largeur de profil (ou épaisseur)
l' = largeur de face (ou largeur s. str.)

1. Le schéma ci-contre explicite les différents paramètres d'une basidiospore assimilée à un ellipsoïde de révolution. Mais les spores ne sont jamais des ellipsoïdes parfaits et aussi lira-t-on avec grand intérêt les considérations de JOSSERAND (1952 : 305-312) sur les difficultés de définir les paramètres sporaux dans tous les cas. Nous sommes d'accord avec les définitions de JOSSERAND à une restriction près : comme pratiquement tous les mycologues - et sans que cela porte à conséquence - nous utilisons le mot "largeur" pour la deuxième dimension d'une spore et nous parlerons de largeur de profil et de largeur de face quand il y a lieu de distinguer entre l'épaisseur et la largeur, les dimensions étant alors données comme L x l x l'.

2.1. La préparation doit être faite au départ d'une sporée ou à défaut d'un fragment d'hyménium; des spores chues naturellement peuvent aussi être trouvées sur le haut du stipe ou sur l'anneau quand il existe. Il y en a aussi souvent sur le chapeau mais, là, le risque de pollution par des carpophores étrangers doit être envisagé.

Le milieu de montage sera de l'eau, de l'ammoniaque diluée, une solution d'hydrate de chloral, du Melzer...; on évitera les milieux pouvant donner une forte augmentation de volume (KOH, H_2SO_4 ...). Par exemple, DEMOULIN (1968) a constaté que les spores de Scleroderma citrinum sont plus grandes de 5% dans KOH par rapport à leurs dimensions dans l'eau ou le lactophénol.

La préparation sera aussi mince que possible pour éviter les courants et les superpositions. Il faudra cependant éviter une compression des spores ce qui peut arriver - uniquement dans le cas de spores suffisamment grosses - si la préparation sèche et que l'espace entre la lame et le couvre-objet devient plus petit que le diamètre de la spore.

Pour que les spores libres dans la préparation ne bougent pas trop (mouvement brownien, évaporation du milieu), on peut ajouter un peu de gélatine (MOSER, cité dans GROSS, 1976).

Une pression trop forte sur le couvre-objet (squash d'un bout de lamelle) peut casser localement des spores. Celles se trouvant dans leur voisinage pouvant être déformées, il faut évidemment choisir un autre endroit ou refaire la préparation.

2.2. La position des spores mesurées n'est pas indifférente. On ne considérera que les spores exactement de profil ou exactement de face et on notera séparément leurs dimensions.

Dans le cas de spores fortement aplaties, cas qui ne se présente qu'exceptionnellement, presque toutes les spores se trouveront orientées de même façon (voir §5).

2.3. Pour une résolution optimale, les objectifs et les oculaires sont calculés pour une longueur déterminée du tube microscopique (170 mm par ex.); sur les microscopes anciens, il est important de "tirer" le tube à la valeur recommandée et de le faire chaque fois exactement de la même façon, éventuellement au moyen d'une bague servant de butée. Ce problème n'existe plus pour les microscopes modernes.

Il est très important de régler l'éclairage du microscope de façon correcte (éclairage de KÖHLER) et éviter de diaphragmer de façon excessive, ce qui peut provoquer des halos de diffraction et mener à des mesures peu exactes.

Signalons aussi qu'il convient d'effectuer les mesures dans la partie centrale du champ optique; l'image des spores se trouvant à la périphérie pouvant être plus ou moins déformée.

2.4. On utilisera l'objectif le plus fort, c'est-à-dire un objectif à immersion (x 100 env.). L'oculaire sera assez fort (x 8 au moins). Un oculaire plus fort permet souvent des mesures plus aisées sans pour cela ajouter à la qualité de l'image.

3.1. La mesure directe par micromètre oculaire, c'est-à- dire au moyen d'une lame graduée introduite dans l'oculaire est assez courante mais peu précise. C'est le système le plus employé par les amateurs. En général, il permet d'obtenir des résultats suffisamment précis pour permettre la comparaison avec les données de la littérature, mais nous croyons qu'il faut le remplacer par l'une des méthodes suivantes chaque fois que cela est possible et que l'on désire des mesures plus valables.

Le micromètre oculaire doit être étalonné au moyen d'un micromètre objectif et ce pour chaque objectif du microscope. Il est très important que les conditions de l'étalonnage soient identiques à celles de la mesure, notamment en ce qui concerne la longueur du tube microscopique (2.3).

Dans le cas d'un tube à dessiner non monté en permanence, il faut faire deux étalonnages du micromètre oculaire : un avec le tube à dessiner monté et un sans ce dernier.

3.2. La mesure par un micromètre à tambour, dans lequel un fil mobile est situé dans l'oculaire, permet de diviser la distance entre deux traits du micromètre en cent parties égales. Les mesures effectuées par ce système sont très précises mais représentent un travail assez fastidieux, chaque valeur devant être notée manuellement, puis convertie en µm par calcul.

3.3. La mesure à l'aide d'un tube à dessin et d'un coordinomètre, relié à un ordinateur de bureau, allie une grande précision à une très grande facilité de travail et de calcul.

Le système adopté par l'un de nous (J.R.) a été développé par EMPAIN (1985). Il permet de mesurer un grand nombre de spores en peu de temps et donne ensuite les paramètres sporaux, les calculs statistiques et la distribution des paramètres ainsi qu'un contrôle de l'étalonnage. On a pu montrer la reproductibilité des résultats, les moyennes obtenues par diverses personnes ne s'écartant que d'un ou deux dixièmes de µm, dans le cas de mesure de 50 spores de la même préparation.

3.4. La mesure sur dessins, faits à la chambre claire ou au tube à dessiner, est certainement fort usitée. On comprend qu'elle est souvent imprécise car les conditions à respecter sont nombreuses et l'étalonnage difficile. Les spores dessinées doivent être bien centrées, le miroir doit être incliné à 45° exactement et la table parallèle à la platine du microscope. En ne respectant pas ces précautions, non seulement les dimensions sont faussées, mais les formes sont modifiées.

Pour obtenir, avec ces méthodes, des grossissements "entiers", 1000 ou 2000 par ex., on peut agir sur la hauteur de la table de dessin et sur l'oculaire employé.

Dans le cas du tube à dessiner, il existe des types d'appareil permettant un réglage du grossissement incorporé dans le tube même.

Dans d'autres cas, divers oculaires peuvent être introduits dans le tube à dessin pour obtenir des grossissements différents. Pour les oculaires forts on ne peut dessiner qu'au centre de l'image, les déformations étant trop fortes vers la périphérie.

Très souvent, l'utilisateur peu averti, dessine à des grossissements peu constants car il ne contrôle pas régulièrement l'étalonnage.

3.5. La mesure sur photos est un procédé de grande précision et, comme dans le procédé précédent, il permet en outre, de garder un document donnant la forme et l'aspect précis des spores.

Ici aussi le procédé ne vaut que si on standardise avec rigueur toutes les opérations. L'agrandissement du négatif peut être réglé pour obtenir des grossissements finaux "entiers" par exemple 3000. Les spores sont mesurées sur photo au moyen d'une réglette graduée dont les divisions correspondent à 0,1 ou 0,2 µm. On peut aisément fabriquer une telle réglette par photographie.

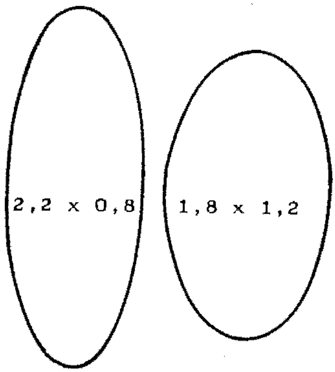
L'essai de mesure, des mêmes spores par des observateurs différents, a montré la reproductibilité du procédé, quoique les dimensions pour une même spore puissent être légèrement différentes d'un observateur à l'autre.

4.0. Sauf dans les systèmes cités sous 3.2 et 3.3, la mesure se fait en faisant coïncider une extrémité de l'objet avec une graduation de l'échelle; l'autre extrémité de l'objet tombant le plus souvent entre deux graduations. Dans ce cas, on a tendance à ne considérer que la graduation la plus proche alors qu'il est très possible d'évaluer en dixièmes ou en cinquièmes la portion de l'objet qui dépasse la graduation inférieure; on obtient alors une mesure exprimée par deux chiffres significatifs au moins. L'évaluation à 0,1-0,2 µm peut sembler inutile voire ridicule et pourtant, si on la néglige, on fait des erreurs souvent inadmissibles, comme nous le montrons dans le paragraphe suivant.

4.1. Traditionnellement - de moins en moins cependant chez les mycologues contemporains - on mesure un petit nombre de spores et on arrondit les mesures au 1/2 µm. Cette façon de faire entraîne des erreurs d'autant plus grandes que les spores sont plus petites. Par exemple, une lecture de 2,2 arrondie à 2 sera de 9% trop petite. Une dimension donnée de 2 - dont on ignore si elle a été obtenue par arrondissement de 1,8 ou de 2,2 - comporte une imprécision de 0,4 µm soit de 20%.

Ces erreurs affectent évidemment les deux dimensions d'une spore et se répercutent donc sur le rapport que l'on peut établir et qui donne une idée de la forme. Par exemple, une petite spore dont les dimensions seraient de 1,8 x 1,2, dimensions qui auraient été arrondies à 2 x 1, a en réalité un rapport L/l de 1,5 alors que les dimensions arrondies donnent L/l = 2 soit 33% de trop.

Si on considère l'exemple inverse, 2,2 x 0,8 arrondi à 2 x 1, le rapport est ici de 2,75 au lieu de 2 qui comporte donc une erreur de 27% par défaut. On peut en déduire que des dimensions de 2 x 1 comportent - au maximum il est vrai - une imprécision d'environ 60%. Bien entendu, ces erreurs et ces imprécisions diminuent quand la taille augmente comme en témoigne le tableau suivant:



Erreurs et imprécisions maximales pour quelques spores ellipsoïdes de 2 à 7 µm de long et dont les dimensions ont été arrondies au demi-micromètre.

1	2	3	4
2 x 1	10	33,3	60
3 x 2	6,7	18,0	33,5
3,5 x 2	5,7	16,7	31,0
4 x 2	5,0	15,6	30
5 x 3,5	4,0	12,3	22,5
6 x 3	3,3	11,1	21,0
7 x 4	2,9	8,0	15,5
7 x 4,5	2,9	7,6	14,0

1. Valeurs arrondies au demi-micromètre
2. Erreur maximale sur la longueur en % de L.
3. Erreur maximale sur le rapport L/l en % de L/l.
4. Imprécision maximale sur le rapport L/l, en % de L/l.

On voit que, si l'erreur sur la longueur devient négligeable pour des spores dont L > 4 µm, l'imprécision sur L/l, inacceptable pour les petites spores, reste importante pour les spores plus grandes.

4.2. Dans un travail de détermination routinière, il suffit généralement de mesurer un petit nombre de spores et de donner les limites observées. Tandis que dans un travail de description des espèces, il est très utile de faire mieux et notamment de donner la moyenne arithmétique des mesures effectuées. Quel que soit le procédé de mesure, il nous semble recommandable de mesurer au moins 20 spores.

On admet généralement que la mesure de 30 spores est nécessaire pour tester une moyenne dans une population dont la loi de distribution est inconnue.

Dans le système de mesure par le coordinomètre relié à l'ordinateur de bureau, nous avons toujours mesuré une cinquantaine de spores, la mesure étant rapide et aisée, tandis que pour les autres méthodes nous mesurons généralement entre 20 et 30 spores.

Pour chaque spore, on calculera le rapport L/l qui donne une bonne idée de la forme. Pour chaque grandeur : L, l et L/l, on fera la moyenne arithmétique et on calculera l'écart-type estimé (Standard deviation) ainsi que le coefficient de variation estimé :

$$\hat{s} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}} \qquad \hat{v} = \frac{100.\ \hat{s}}{\bar{x}}$$

4.3. On peut donner les paramètres sporaux d'une récolte sous la forme suivante :

$L \pm \hat{s} \times l \pm \hat{s}$ µm ($L/l \pm \hat{s}$; n)

n étant le nombre de spores mesurées.

Quand il s'agit de la description d'une espèce, où plusieurs carpophores de plusieurs récoltes ont été examinés, on peut introduire ces derniers renseignements entre parenthèses, comme le fait BAS (1969). Ce procédé ne nous paraît cependant valable que pour des espèces bien connues. Dès qu'il y a doute - et cela n'est pas rare - il vaut mieux décrire une seule récolte "typique" quitte à compléter la description, entre crochets, d'après les autres récoltes ou traiter de ces dernières en observation.

L'indication des moyennes, accompagnées de l'écart-type, ne donne cependant pas, de façon immédiate, une idée de l'amplitude des dimensions, car elle ne concerne que 67% environ des spores.

Si nous revenons à la tradition "classique", les limites de dimensions données sont celles que l'observateur juge normales; s'il a observé des spores qui lui semblent s'écarter de cette normalité, il met leurs dimensions entre parenthèses. Notre expérience nous a montré que la "normalité classique" correspondait sensiblement aux dimensions ± 2 $\hat{s}$ (voir exemple : §8).

Notons que si une distribution est normale, l'espace ± 2$\hat{s}$ englobe 95% de l'échantillon.

Pour les spores, ce serait une erreur de donner des limites basées uniquement sur l'écart-type car la distribution d'une population de spores n'est pas nécessairement normale. Il faut donc aussi tenir compte des valeurs limites observées (voir exemple : §8).

5. L'aplatissement dorsi-ventral peut se définir comme le rapport de la largeur à l'épaisseur d'une spore, mais la distinction entre largeur et épaisseur étant probablématique (voir à ce sujet JOSSERAND, 1952 : 308), il est préférable de définir l'aplatissement comme le rapport de la largeur mesurée sur la vue de face (l^F) à la largeur mesurée sur la vue de profil (l^P). Ce rapport est supérieur à 1 lorsqu'il y a aplatissement dorsiventral, c'est-à-dire quand la vue de face est plus large que la vue de profil et inférieur à 1 quand la vue de face est plus étroite que la vue de profil (compression latérale).

L'observation de l'aplatissement d'une spore n'est possible que lorsqu'il est important et, dans ce cas, il est utile de le mesurer ou de l'évaluer, ces opérations pouvant être faites même si l'aplatissement semble nul ou négligeable.

La mesure directe peut se faire en mesurant les deux largeurs en question sur la même spore, opération à répéter un certain nombre de fois pour pouvoir calculer une moyenne. La technique, qui consiste à toucher très légèrement le bord du couvre-objet et de suivre le mouvement de la spore dans le champ microscopique demande une grande expérience et ne peut certainement pas être considérée comme une technique de routine.

Plus commodément, l'aplatissement dorsi-ventral peut être déduit des moyennes de deux séries de mesures, l'une de face, l'autre de profil, appartenant au même échantillon. Il suffit de faire le rapport l^F/l^P, à condition de pondérer ces valeurs par rapport à la longueur moyenne déterminée sur l'ensemble des spores mesurées. Il est cependant plus simple de faire le rapport entre l'indice de forme de profil et celui de face soit :

aplatissement dorsiventral = $(L/l)^P/(L/l)^F$

Notre expérience actuelle - encore restreinte à ce point de vue - semble indiquer que cette valeur est souvent si proche de l'unité que son utilité est probablement très limitée.

6. La variabilité est mesurée par le coefficient de variation ($\hat{V} = 100\ \hat{s}/\bar{x}$). L'expérience nous a montré que, dans le cas général, ce coefficient avoisinne les 5% et qu'il est très généralement inférieur à 10%. Les sporées donnent très généralement des coefficients de variation plus faibles que les spores prises sur lamelles. La longueur semble la dimension la plus variable.

7.0. Quand $\hat{v}$ dépasse 10%, il y a lieu de mesurer un plus grand nombre de spores et d'analyser leur courbe de distribution.

Une courbe très étalée, étirée asymétriquement vers les grandes valeurs, mais ne présentant qu'un sommet, traduit la présence de spores anormalement grandes. Ces cas, qui peuvent souvent être qualifiés de tératologiques, s'observent quand les conditions de croissance, de transport ou de séchage ont été perturbées (notamment conservation au réfrigérateur *). Nous avons observé ce phénomène pour des carpophores croissant dans des endroits arides où les variations de température et d'humidité peuvent être très grandes. Dans cet ordre d'idées, CLEMENÇON (1979) a mis en évidence l'influence de certains facteurs sur les dimensions sporales, notamment l'âge du carpophore, l'action désséchante du vent, le fait de la cueillette et les dimensions du carpophore.

Au contraire, une courbe à plusieurs sommets indique de l'hétérosporie dont nous envisageons ci-après trois modalités.

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* Il est bien connu qu'une température basse peut bloquer la décharge des spores : les carpophores ayant séjourné au réfrigérateur ne forment plus que des sporées maigres ou nulles.

7.1. Le cas de la variabilité dans le nombre de spores par baside est relativement rare. On peut le détecter directement par l'observation des basides mais on peut aussi le déduire de l'aspect de la courbe de distribution d'une dimension des spores – la longueur par exemple. Quand cette courbe présente plusieurs sommets, on peut rechercher les rapports, qui existent entre eux, et les comparer aux valeurs théoriques, que l'on peut calculer en partant de l'hypothèse, que le volume total des spores produit par une baside est le même, quel que soit le nombre de spores par baside :

la longueur d'une spore de baside 3-sporique = L x 1,10
2-sporique = L x 1,26
1-sporique = L x 1,59

où L est la longueur des spores d'une baside 4-sporique. Si la conoordance est bonne, on peut déduire l'importance probable de chaque catégorie de spores en appliquant un coefficient de variation de 5%.

Notons cependant que l'hétérosporie provenant du nombre de spores par baside, ne peut être prouvée, indiscutablement, que par l'observation des basides elles-mêmes. Dans beaucoup de cas, les spores des basides "anormales" sont du reste trop peu nombreuses pour que la courbe de distribution indique leur présence, par des sommets bien nets, sauf bien entendu si on l'établit sur un nombre suffisant de mesures.

7.2. Il nous faut évoquer ici la notion de protérospores (NUSS, 1975). Il s'agit de spores, produites en début de sporulation, et différant des spores normales par des caractères morphologiques et physiologiques : elles seraient généralement plus petites et germeraient plus facilememt. Sans mettre en doute la réalité du phénomène, il nous semble que sa mise en évidence ne peut résulter que d'une étude approfondie au cours de laquelle la précision des mesures est particulièrement importante.

7.3. Dans de très rares cas[Hygrocybe firma (BERK. & BR.) SING. et espèces voisines] on observe des basides de deux tailles très différentes, les plus grandes produisant des spores beaucoup plus grandes que les petites (CORNER, 1936; HEINEMANN, 1963). La différence de taille est tellement grande qu'elle saute aux yeux dans le cas de l'espèce citée. On peut cependant imaginer que chez d'autres champi-

Hymenagaricus nom alphitochrous	récolte D. Thoen 5233	GBx herbier	83.252 photo
sur photo x 3000	~~micromètre~~	de ~~sporée~~, d'hyménium, ~~sur stipe~~	

F	L	l	L/l	P	L	l	L/l	F+P	L	l	L/l
1	6,2	5,0	1,24	16	6,2	4,9	1,27	31			
2	6,4	5,1	1,25	17	6,2	4,5	1,38	32			
3	6,0	4,8	1,25	18	6,0	4,6	1,30	33			
4	6,0	5,1	1,18	19	6,5	5,0	1,30	34			
5	6,1	4,9	1,24	20	5,9	4,8	1,23	35			
6	6,2	5,1	1,22	21	5,9	4,7	1,26	36			
7	6,3	5,0	1,26	22	6,7	4,9	1,37	37			
8	6,3	5,2	1,21	23	6,5	5,0	1,30	38			
9	6,8	5,1	1,33	24	6,4	4,9	1,31	39			
10	6,0	5,1	1,18	25	6,0	4,2	1,43	40			
11	6,1	4,8	1,27	26	6,5	4,9	1,33	41			
12	6,3	5,0	1,26	27	6,1	4,7	1,30	42			
13	6,1	4,9	1,24	28	6,1	4,8	1,27	43			
14	5,7	4,5	1,27	29	7,3	5,3	1,38	44			
15	6,8	5,1	1,33	30	5,5	4,4	1,25	45			
$\bar{x}$	6,220	4,980	1,249		6,253	4,773	1,310		6,237	4,877	1,280
$\hat{s}$	0,29	0,18	0,045		0,42	0,27	0,056		0,36	0,25	0,058
$\hat{v}$	4,7	3,6	3,6		6,8	5,7	4,3		5,7	5,1	4,6

a L x l 5,5 – 7,3 × 4,2 - 5,3 µm L/l 1,18 – 1,43

b $\bar{x} \pm 2\hat{s}$ 5,5 – 7,0 × 4,4 – 5,4 µm L/l 1,16 – 1,40 n

c L x l 5,5 – 6,24 – 7,0 (7,3) × (4,2) 4,4 – 4,88 – 5,3 µm 30
   L/l 1,18 – 1,28 – 1,40 (1,43) n

aplatissement dorsi-ventral = $(L/l)_P : (L/l)_F$ 1,049 30

milieux d'observation: eau [✓ Am] Melzer

F: spores de face. P: spores de profil. L: longueur. l: largeur. $\bar{x}$: moyenne arithmétique. $\hat{s}$: écart moyen type estimé. $\hat{v}$: coefficient de variation estimé. n: nombre de spores prises en considération. a: limites observées. b: moyennes ± 2 écarts-types. c: données élaborées.

gnons, une hétérosporie de ce type ne pourrait être mise en évidence que par des mesures précises et nombreuses.

Comme le suggère NUSS (loc. cit.), il s'agit peut-être d'un cas limite du phénomène de protérosporie, traité au paragraphe précédent.

8.1. Une disposition pratique des calculs est donnée par l'exemple ci-contre. Il s'agit d'une mesure sur photos agrandies à 3000 x. Toutes les spores en bonne position ont été numérotées sur les photos : de 1 à 15, spores de face (F), de 16 à 30, spores de profil (P). Dans le 3e tiers du tableau, il reste de la place pour 15 autres spores, face et profil mélangés, même en position batarde si la longueur est mesurable (et dans le cas où épaisseur = largeur). Les 3 paramètres sporaux sont déterminés séparément pour les vues de face, pour les vues de profil, ainsi que pour l'ensemble, figurant dans le 3e tiers (encadré). Ces dernières valeurs, arrondies à 2 décimales donnent les moyennes et permettent de calculer $\bar{x} \pm 2\,\hat{s}$. Les données élaborées (c) sont celles que l'on publie éventuellement, les valeurs entre parenthèses sont celles qui dépassent $\pm 2\,\hat{s}$ et, dans ce cas, la valeur limite (hors parenthèses) est celle donnée par b. Les résultats séparés des vues de face et de profil, permettent de calculer l'aplatissement dorsi-ventral qui avoisine ici les 5%.

8.2. Dans le cas de mesures au coordinomètre les spores de face et de profil doivent aussi être mesurées dans des séries séparées. La présentation des données lors de la publication est la même que dans le §8.1.

Conclusions

9. Des mesures précises, entourées de toutes les précautions nécessaires, permettent de donner les dimensions sporales (paramètres sporaux) de façon fiable et reproductible. Les auteurs de la présente note, utilisant deux méthodes différentes (3.5 pour P.H., 3.3 pour J.R.), obtiennent des résultats concordants à 5% près environ comme en témoigne le tableau ci-après où seules les moyennes sont données.

	Mesures P.H.	Mesures J.R.
Rammeloo 6077 (BR) - Paxillus crassifolius ined.	7,02 x 4,72	6,82 x 4,22
Piearce GD. FP 470(K) - Paxillus fasciculatus Pegler	5,21 x 3,70 5,40 x 3,87	5.26 x 3,66
Rammeloo 6634 (BR) - Paxillus piperatus ined.	9,44 x 5,25	9,56 x 5,15
Rammeloo Z 241 (BR) - Phylloporus testaceus Heinem. & Gooss.	10,84 x 5,32	10,62 x 5,42

La détermination précise des paramètres sporaux peut paraître fastidieuse et inutilement longue. En fait, elle ne s'impose que lors d'études exhaustives, comme, dans notre cas, pour la Flore illustrée des champignons d'Afrique centrale. Dans la routine de détermination, la mesure d'un petit nombre de spores, choisies comme "normales", permet une valeur très suffisante à condition de faire les mesures avec le maximum de précision. En voici un exemple [Rubinoboletus luteopurpureus (BEELI) HEINEM. & RAMMELOO, GOOSSENS-FONTANA 738].

	Lxl	L/l
Mesure sur dessin de 3 spores (P.H. en 1950) - chambre claire	7.33 x 4.33	1.70
Mesure de 18 spores - photos (P.H. en 1982)	7.61 x 4.41	1.73

Même quand on ne mesure qu'un petit nombre de spores, il faut calculer les moyennes qui sont plus significatives que les limites observées.

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AGARICA

VOL.6 NO.12 pp. 381 - 386 August 1985

Tricholoma sectio Iorigida Sing. in Europe and North-Africa.

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ABSTRACT

The very rare T.cossonianum, the rather infrequent T. goniospermum and T.nodulosporum, described in 1982 , are discussed.

INTRODUCTION

The caracterisation of the sectio Iorigida Singer,1945, is as follows: Pileus,stipe, or lamellae, or all of them with a purplish, or violet or lilac-vinaceous tint, spores pure white or pale creme color/not pink/ in print, with very thin walls walls, cross-shaped or subangular.

Three species are known in the area ,in faraway lands also the T.pseudosordidum sing. and the T.porphyrophyllum Imai.

LITERATURE

Singer, R./1975/ The Agaricales in modern taxonomy. Vaduz, p. 255.

TAXONOMICAL PART

Tricholoma cossonianum R. Maire 1926

Lyophyllum cossonianum R. Maire/ Kühn & Romagn.

Maire records it from two localites only in Algeria. Subsequently only Vassilieva listed it, at least as far as I know, my remark see later.

Description according to Maire.

Pileus 4.5-8 cm in diam., convex then expanded, often undulate-difforme, thick fragile fleshy, gray, cuticle more or less separable, smooth, margin at first incurved.
Lamellae very crowded, thin, to 7mm wide, emarginate-adnate, whitish with a lilac tint or enterily lilac, then grayish, browning.
Stipe 3-5 cm high, 10-15 mm wide, subegal or somewhat thickened at the apex, whitish, then brownish towards the base, downwards fibrillose-striate-subsquamulose, pruinate upwards.
Flesh white. Taste mild. Smell strong, like Cortinarius purpurascens.
Spores white-creme coloured in print.
Spore subangular, 5-5.5 x4-4.5 x 3.7-4 um /Fig.1/.
Basidia clavate, 27-32 x 5.5-6 um.
Cheilocystidia lageniform, 38-45 x 8-10 um /Fig.1/.
Habitat: Maire: "in dumetis et nemoribus, Mauretaniae, sub Oleis, Phillyreis, Quercubus croceiferis, etc., autumno
Remark to Vassilieva's diagnosis: The gray cap and the violet lamellae refer to this species. However, the croceate spores and the blackening of the fruit-body during desiccation is contradictory.
Kühner et Romagnesi remark that "La position systématique du cette espèce est encore un peu incertaine...Des deux échantillons par Maire, et que nous avons examinées, l'un a montrée des basides bourrées de granulations purpre-noir après traitement au carmin acétique bouillant, l'autre /le type!/ n'a pas donné cette réaction. Si la réaction negative notée sur celui-cine doit par être attribuée à un état de conservation défectueux des spécimens examinées, T. cossonianum devra, comme goniospermum, être expulsé des Lyophyllum."

Literature

Kühner, R. & Romagnesi, H. /1953/. Flore analytique des champignons supérieures. Paris, p, 163, 168.

It is interesting to note that on Maire's table the pileus is ochre, grayish ochre.

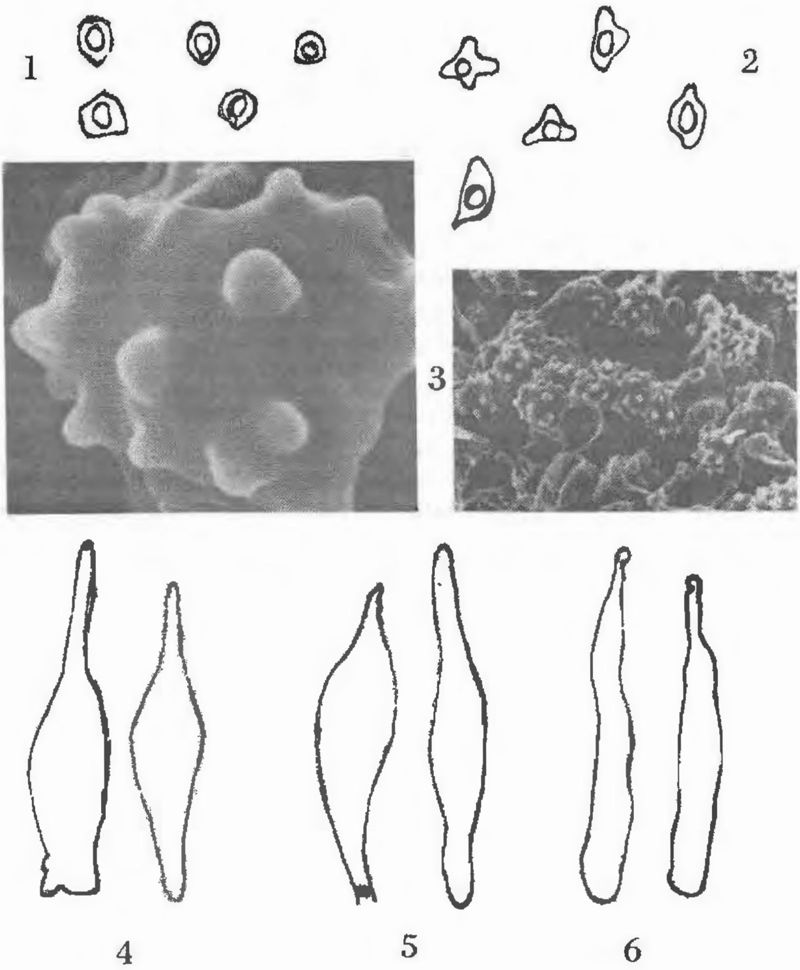

Fig.1.Spores:T.cossonianum 1,goniospermum 2,
nodulosporum 3.Cheilocystidia:cossonianum 4,
goniospermum 5,nodulosporum 6. 1000 x

Maire,R./1926/.Études mycologiques.Bull.Soc.Myc.France 40, p.300,301,tab.22.

Vassilieva,L.N./1973/.Die Blätterpilze und Röhrlinge /Agaricales/von Primorsky region.Leningrad,p.118.

Tricholoma goniospermum Bresadola 1892

=T.tetragonosporum R.Maire - Bull.Soc.Hist.nat.Afr.Nord XXXVI,24,1945

Rather rare or infrequent,recorded from few North African or European countries;among these from some localities in Italy and from ten ones in Hungary.

Description according to a rich gathering/Budapest - Kamaraerdő,2.6.1984,leg.Z.Nehéz/:

Pileus 6-11 cm in diam.,semiglobate then expanded,compact, fleshy,whitish,cream-coloured,more or less ochre or yellowish ochre,here or there yellow or lemon yellow,browning when touched,naked,on the margin sometimes short and distant ribbed,margin at first incurved-inflexed.

Lamellae 3-5 mm wide,very crowded,sinuate and with a denticle decurrent,white or grayish white with a lilac tint, browning when touched.

Stipe 4-9 cm high,8-20 mm wide,equal,sometimes bulbous, white,browning when touched,at the apex sometimes mealy, downwards with a fibrillose structure -, but not always -, hard.

Flesh whitish.Taste not distinctive.Smell agreeably or unagreeably meal-like.

Spores white in print.

Spores cross-shaped or subangular,in profile triangular, 6.2-7.8 x 4.8-6 um /Fig.1/.

Basidia clavate,25-35 x 6-8 um.

Cheilocystidia fusiform,lageniform,30-50 x 6-8 um,rather numerous /Fig.1/.

Habitat:in deciduous woods,May,June,rarely July; Bresadola:"in dumetis,vere et autumno";Josserand:"dans garrigue, sous Quercus ilex, Juniperus communis, J. oxycedrus, octobre".

Variability, on the basis of descriptions by Bresadola, Josserand, and Bon, and on collections made in Hungary:
Pileus: Josserand: " d'abord jaune ocracé assez vif", "marge d'abord très incurvée".
Lamellae: Bresadola: "griseo-fuligineae, lilacino-roseae, demum lutescentes"; cream-coloured, pale ochre, bluish lilac, light lilac.
Stipe: Bresadola: "sursum lilacino-violaceus"; Bon: "plutot court, 3.5 cm x 15-20 mm, subconcolore, à sommet + ou - violet, à sommet + ou - flocconeux-scabre, lisse or pruineux".
Taste: Bresadola: "dulcidulus". Smell: not distinctive, like of Agaricus bisporus.
Spores: Bresadola, Fungi Tridentini: "8-10 x 5-7 vel 7-8 x 5-6 um; Bon: /6/7-8/9/ x/4/5-5.5 um; Josserand: "8-8.5 x 6-6.5 um".
Hungarian gatherings: 5.5-9.3 x 4-6.2 um.
Basidia : Bresadola: "35-40 x 8-9 um; Josserand: "32-38 x 7-7.5 um".
Cheilocystidia: Bon: "lagéniformes ou tortueuses, parfois clavées ogivales"; Josserand: "nulles".

Remark : T. tetragonosporum R. Maire according to Josserand: "Peut-être même /T. goniospermum/ n'en est-il qu'une simple forme". Maire's remark: "Ce remarquable Tricholome est affine au T. goniospermum Bres., espèce rarissime qui n'est connue que d'une seule localité de la région insubrienne et possède des spores du meme type. Il en diffère toutefois par les spores plus petites, par le pied squamuleux et par l'absence d'odeur de farine". These features, together with the fact that the lamellae of tetragonosporum lack any violet-lilac colour, all appear among the characteristics listed in the frame of variability. Accordingly, T. tetragonosporum can be regarded as a synonym.

Literature

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Pilát,A./1951/.Agaricales,Praha,p.157.

Tricholoma nodulosporum Babos & Bohus 1982

Collected on one occasion in Hungary.

Description:

Pileus 4-6.5 cm in diam.,convex then expanded,compact,fleshy, dirty whitish or dirty violetbrowning,somewhat silvery shining,somewhat viscid,pubescent-shortfibrillose,margin at first incurved.

Lamellae more or less crowded,sinuate and with a denticle decurrent,violet or lilac violet,dirty browning when touched.

Stipe 2.5-4cm high,10-20 mm wide,ventricose or somewhat bulbous,metallic violet or lilac violet,browning especially when touched.

Flesh whitish or violet,somewhat browning.Taste not distinctive.Smell none.

Spores white in print.

Spores nodulose,as in Inocybe praetervisa Quél.,on the outline with 5-8 coarse obtuse warts,7.8-9.5 x 6-8.5 um /Fig.1/.

Basidia clavate,30-40 x 6-8.5 um.

Cheilocystidia fusiform,30-40 x 5-6 um/Fig.1/.

Habitat:in frondose wood on leaf litter.

Literature

Bohus,G./1982/.Some results of systematical and ecological research on Agaricales IX.Studia bot.Hung.16,p.41.fig.1-2.

AGARICA

VOL. 6 NO. 12 pp. 387 - 453 August 1985

SJELDNE OG INTERESSANTE DISCOMYCETER (PEZIZALES) FRA SYD-NORGE. *

RARE AND INTERESTING DISCOMYCETES (PEZIZALES) FROM SOUTHERN NORWAY.

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INNLEDNING.

Innsamling og registrering av "nye" operkulate discomyceter i Østfold har stagnert noe, -ikke overraskende , siden majoriteten av arter sannsynligvis er funnet.

I 1984 ble det registrert ca 20 nye arter for Østfold, og det totale antall operkulater er nå ca 225, deri inkludert en del ikke-artsbestemte Peziza og Scutellinia.

Vi har såvidt begynt å bevege oss til områder i indre Østfold, -særlig langs vassdrag , og dette har gitt lovende indikasjoner. Både slekten Boudiera og Scabropezia er registrert, sistnevnte ny for Norge.

I det følgende beskrives noen spesielle arter fra Østfold,- supplert med funn fra enkelte andre fylker.

Dette er en fortsettelse av serien om Ascomyceter i Østfold (Kristiansen 1982, 1983 a).

Aller først vil vi få nevne at den lenge ettersøkte skarlagen vårbeger nå er funnet for første gang i Østfold,nærmere bestemt Alby på Jeløya ved Moss, 8. mai 1985, av Ingar Johnsen og undertegnede.Funnet ble gjort i utkanten av et selje-ask-slåpetorn område, like ved en åker, og besto av tre fruktlegemer. Med Baral's (1984) nylige inndeling av Sarcoscypha-komplekset i fem arter , har vi bestemt Jeløya-funnet til Sarcoscypha austriaca, og foreløpig ser det ut til at det er denne arten som er utbredt i Norge, men som tidligere er kalt S.coccinea.Sistnevnte er foreløpig ikke kjent med sikkerhet i Norge (iflg.Baral's nomenklatur).

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* Bidrag til Østfold's Ascomycetflora.III.

To inoperkulater fortjener også og nevnes: Rutstroemia rhenana (Kirsch.)Dennis funnet i snøsmeltesone på døde pinner av steinnype (Rosa canina), Skipstad,Asmaløy,Hvaler kommune,Østfold, 13.april. 1985.
Dette skulle kunne være det tredje funn gjennom alle tider (Dennis 1978)

Ingar Johnsen gjorde 16.mai (85) et nytt funn av den ørsmå blågrønne Mniæcia jungermanniae på levermose, ved Skihytta,Fredrikstadmarka. Tidligere beskrevet fra Østfold av Haraldsen og Gravningen (1984) fra Veum-traktene. Senere funnet i Ellingårdskogen,Onsøy kommune.

MORCHELLACEAE.

I 1982 (Kristiansen) nevnes og beskrives overfladisk en del arter og varianter av slekten Morchella, alle funnet i Østfold.
Disse er nå illustrert i farger og utførlig beskrevet i den lenge etterlengtede Morchella-monografi av Emile Jacquetant (1984).Interessert kan konsultere dette verk, hvor følgende norske arter og varianter er beskrevet:

Morchella distans (Fr.)Boudier
Morchella elata (Fr.)Boudier
Morchella eximia f.shizocostata Jct.
Morchella rielana Boudier
Morchella pseudoumbrina Jct.
• Morchella conicopapyracea Jct.

Morchella costata (Vent)Boud.
Morchella purpurascens Jct.
Morchella conica (Pers.)Boud.
Morchella pseudoviridis Jct.
• Morchella norvegiensis Jct.
• Morchella eximioides Jct.

De tre siste er kun kjent fra Fredrikstad-distriktet.

PEZIZACEAE.

Scabropezia Dissing & Pfister.

Slekten Scabropezia er nylig opprettet av Dissing & Pfister (1981) , og omfatter to arter, S.scabrosa (Cooke)Diss.&Pfist., og S.flavovirens (Fuck.) Diss.& Pfist..
Den er utskilt fra andre rundsporede Pezizaceae med sin helt spesielle anatomi, bl.a. med den utpregede vortete utsiden.
S.scabrosa er bare kjent fra Nord-Amerika, mens S.flavovirens, foruten Nord-Amerika, er kjent fra Sveits,Danmark og Sverige.
Hirsch (1985) har dessuten et sparsomt funn fra Øst-Tyskland, hvor han også i sitt arbeide har undersøkt og anvendt norsk materiale (RK 84.131), i sin omfattende artikkel om Scabropezia og Plicaria (Agarica Nr.12/85).

Under Fredrikstad Soppforening's første sopptur på høsten 1984 fant både Ingar Johnsen og undertegnede, uavhengig av hverandre, en iøyenfallende begersopp på nord- og sydsiden av Sølvstufossen i Tune kommune.
Like i forveien ble den og funnet i Hafslundsparken ved Sarpsborg.
En påfølgende mikroskopisk undersøkelse viste at dette var *Scabropezia flavovirens*, - første funn i Norge.

Scabropezia flavovirens (Fuck.)Diss.& Pfist. Fig.1

Beskrivelse:

Apothecier opp til 20 mm diam., ca 8 mm høye,stilkløs.Først med langsgående smal åpning, som senere blir ovaloid til nesten rund.Kanten alltid innrullet. Hymenium brunlig oliven til nesten svart på tørket materiale.Utsiden er mørkbrunlig eller rødlig brun , dekket av utpregede pyramidale vorter (pustuler) ,fig. 2.
Vortene på utsiden er ca 500 um breie og høye, og består av tykkveggede brunlige globulære eller angulære celler, opp til ca 50 um diam..
Asci: sylindriske, gradvis avsmalende til en bred basis.Sterkt amyloide i toppen, svakere nedover, ingen reaksjon ved basis, utpreget fortykket i toppen (innsiden),ca 300 - 380 x 20 - 23 um, 8-sporet, men 4-sporede asci er observert.
Parafyser: tykke, 5 - 6 um breie,svakt fortykket til 8 - 9 um i toppen, med sammenflytende små brunlige dråper.Rette,sjeldnere litt buet,septerte. Parafysene ofte sammenklebet i toppen p.g.a. en brunlig substans, som dekker spissene på asciene og parafysene.
Sporer: runde (globulære),13,6 - 14,7 um (ekskl. ornament.), med ca 1,5 um høye cyanofile vorter, regelmessig fordelt, blek-brunlige, en-radet på modent materiale. deBary bobler ikke sett, men med en eller flere oljedråper. (fig.3).

Undersøkt materiale.

Østfold,Tune kommune,sydsiden av Sølvstufossen,på bar sandjord, smal sti i granskog (Picea abies), ca 50 m o.h., 35 - 40 apothecier sammen med *Pindara terrestris* Velen., 27.august 1984 (RK 84.131).Herb.JENA,J.Mor.

Østfold,Tune kommune,nordsiden av Sølvstufossen,på sandjord, stikant med selje,rogn og gran, sammen med *Peziza sp.*, 26.august 1984.

Østfold,Skjeberg kommune,Hafslundsparken, på svart mulljord med gras og moser under eiketrær (Quercus robur).Sparsomt, og bare delvis modent. 17.august 1984 (RK 84.110).

For utbredelse i Østfold, se kart side 404.

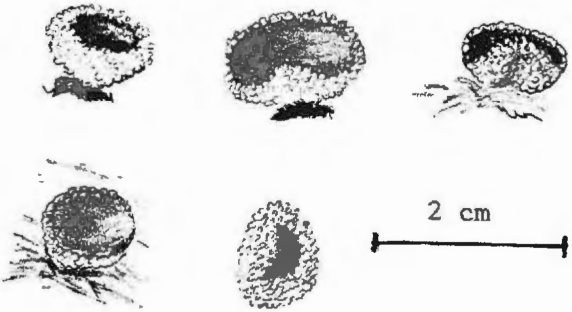


Fig.1 Scabropezia flavovirens,fruktlegemer.

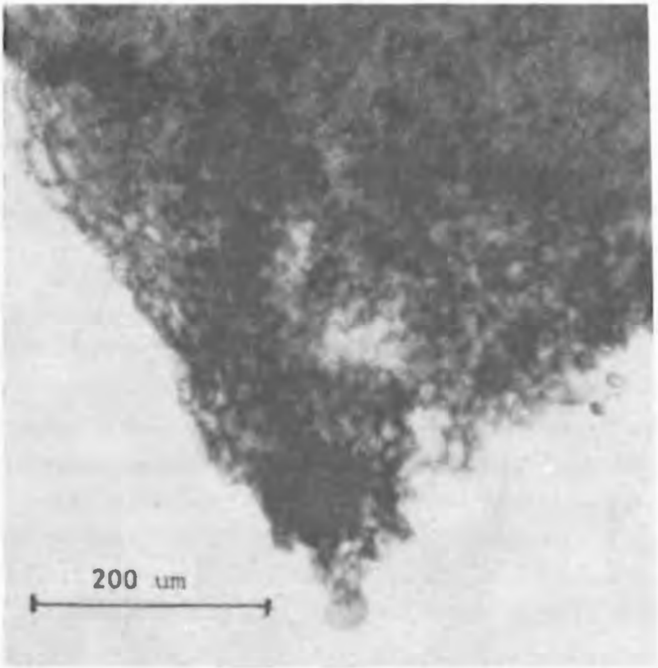


Fig.2 Pyramidal vorte på utsiden av fruktlegeme.

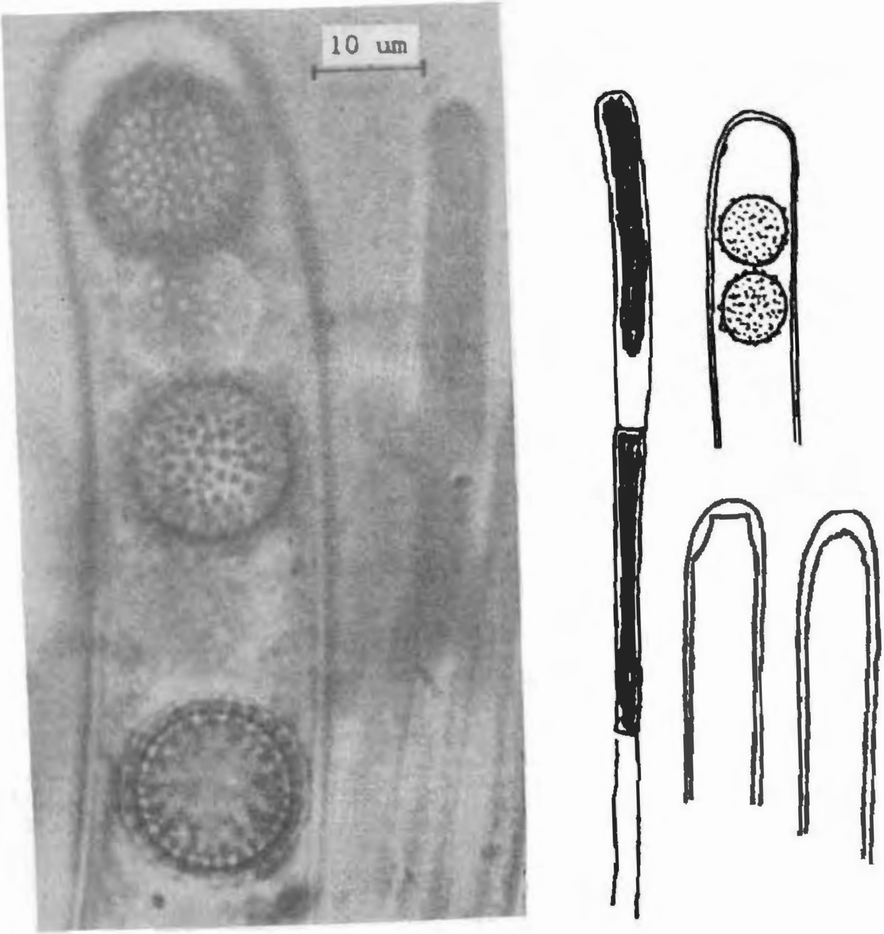


Fig.3 Asci med sporer,parafyser, og ascustopper med fortykkelse på innsiden.

Østfold,Rakkestad kommune,Nord for Osa kirke,Røsægevja, på slam og leirjord i flomsonen på Glomma's østbredde, ca 50 m o.h..
Posisjon: 59°28'15'' N 11°14'08''E., 28.juli og 16.august 1983 (RK 83.200).
Totalt ca 35 fruktlegemer, men flere umodne. (O).

Fruktlegemene befant seg i en sone , ca 20 m fra daværende vannstand (og ca 1 - 1,5 m over elvenivå), sammen med Lamprospora macracantha, Peziza sp., Scutellinia sp., Inocybe lacera og Laccaria tortilis.
I den aktuelle profilen - fra elvebredden til ca 2 m innenfor voksestedet er følgende vekster identifisert:
Juncus bufonius - Juncus effusus - Scirpus mammilatus - Carex leporina - Carex acuta - Carex vesicaria - Salix pentandra - Equisetum silvaticum - Ranunculus repens - Taraxacum vulgare - Trifolium repens - Myosotis palustris - Galium trifidum - Rumex aquaticus - Scutellaria galericulata - Deschampsia caespitosa , samt enkelte mose- og grasvekster.

2.Dette funn ble gjort like ved den forannevnte lokalitet.
Disse fruktlegemene var opp til 5 mm i diam., mer uregelmessig i form (se fig 4 b),men ellers helt identiske med foregående i mikroskopiske karakterer.

Østfold,Rakkestad kommune,Nord for Osa kirke,Røsægevja, på nesten bar leire i flomsonen på Glomma's østbredde, posisjon som ovenfor.
16.august 1983 (RK 83.222) (O).
Rikelig med fruktlegemer i en bakevje , ca 20 - 25 m øst for funn 1.(ovenfor), sammen med Lamprospora ovalispora.
Det aktuelle voksestedet var sparsomt bevokst, men følgende vekster er identifisert: Alopicunis geniculatus - Juncus bufonius - Carex acuta - og Equisetum arvense. Meget sparsomt med moser.

3.Apothecier opp til 4 mm diam., 2 mm høye, først subglobulære, senere puteformet, med noe ujevn overflate, og uregelmessig habitus/ikke runde (se fig.4 c).Som små, dypt purpurbrune, mørk fiolettbrune, ved modning brune til dypbrune.Asci oppstikkende på modent materiale. Ofte 5 - 6 apothecier tett sammen eller klyngevoksende i grupper, men også enkeltvis. Mer klyngevoksende i selskap med moser.
Mikrokarakterer sammenfallende med de andre funn (fig.4 e sporer i CB).
Østfold,Hvaler kommune,Søndre Sandøy,nær Kasa, i gammelt fuktig hjulspor på sandjord med moser, < 5 m over havnivå.

Posisjon: 59°00'16'' N 11°04'54'' E . 29.juli 1984 (RK 84.70) .

BOUDIERA COOKE.

Interessen for slekten Boudiera ser ut til å ha tatt seg opp betydelig etter Dissing & Schumacher's arbeide 1979. Det har vist seg etter hvert at de sist beskrevende artene ikke nødvendigvis behøver å være begrenset til elvebredder, men i alle fall på steder som oversvømmes av vann, grøfter, hjulspor, sølepytter o.likn..

De siste funn av Boudiera i Skandinavia er sammenfattet allerede (Kristiansen 1983b), men i 1983 og 1984 har vi ytterligere funn, som vil kaste nytt lys over slektens utbredelse i Norge.

Hirsch (1983) har kommet til at Boudiera omfatter 10 arter globalt, med reservasjon for ytterligere 3 arter, - en oppfatning som nok vil være gjenstand for diskusjon. Häffner (1985) har meget detaljert beskrevet to Boudiera-arter fra Vest-Tyskland, B.areolata og B.acanthospora, sistnevnte første funn utenfor Skandinavia.

Siden oversikten 1983b(Kristiansen) har Aas (1983) funnet B.echinulata (Seav.) Seav. på Vestlandet, første funn utenom typelokaliteten i USA.

I 1983 var Ingar Johnsen og undertegnede på søking etter Boudiera langs Glomma i Østfold, og senere i Setesdal. Begge steder ga resultater, hvor resp. B.acanthospora og B.dennisii ble funnet. I 1984 ble B.acanthospora funnet på en av Hvaler-øyene i ytre Oslofjord, og B.purpurea (tredje funn) ble funnet i Fredrikstad-marka.

I det følgende gis en beskrivelse av disse funn med hovedvekt på deres økologi.

Boudiera acanthospora Diss.& Schum.

1.Apothecier 2 - 3 mm diam., halvkule-eller puteformet, uten kant, ofte klyngevoksende. Hymenium lillabrun til matt lilla, undersiden grålilla til rosalilla. (fig.4 a).

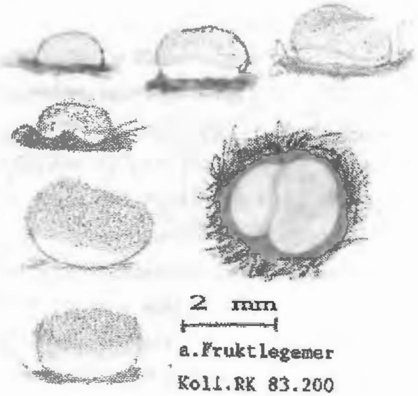
Ytre eksipulum består av subglobulære celler, ca 30 - 40 x 20 - 30 um, og farges sterkt i Cotton Blue (heretter forkortet CB).

Asci: sylindriske, store, med bred basis, overveiende rundt 450 - 470 x 35 - 45 um, 8-sporet, tydelig amyloide i hele sin lengde, oppstikkende ved modning.

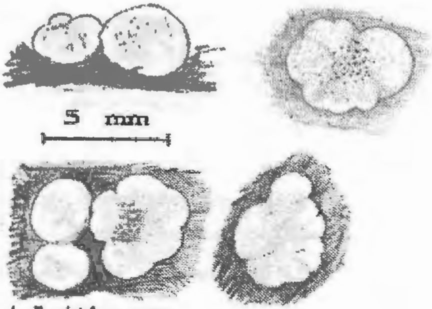
Parafyser: rette, septerte, gradvis fortykket i toppen til 12 - 15 um. Det brunlige pigmentet i de øvre cellene farges i CB.

Sporer: runde, lys brunlige som modne, 20 - 22 um i diam., uten ornamentering, som består av 3 - 5 um høye, cyanofile, spisse eller butte, rette eller svakt buede pigger, 1,5 - 3,0 um breie ved basis. En-radet på modent materiale. (fig.4 d).

Fig.4 Boudiera acanthospora

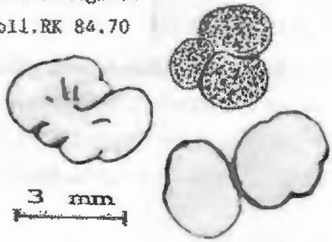


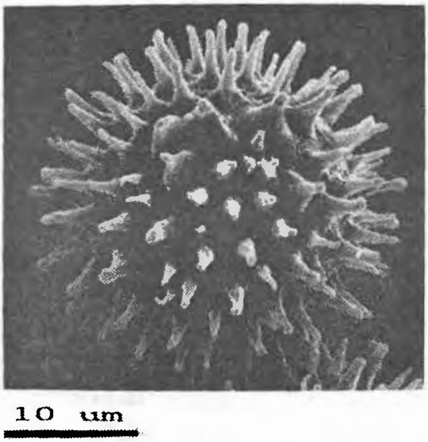
a.Fruktlegemer
Koll.RK 83.200



b.Fruktlegemer
Koll.RK 83.222

c.Fruktlegemer
Koll.RK 84.70





d.Spore SEM T.Schumacher
Koll.RK 83.200

e.Sporer i CB.
Koll.RK 84.70

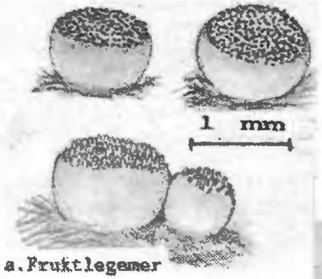
B.acanthospora vokste rikelig (> 150 apothecier) i en utstrekning på 20-25 m, og bare i det minst bevokste hjulsporet. Parallelt med hjulsporet, på utsiden, befinner det seg en stor åker med Filipendula ulmaris. Langs veikanten vokser Quercus robur,Juniperus communis,Sambucus racemosa, Malus silvestris,Rosa canina, og Pinus sylvestris.I selve hjulsporet vokser spesielt mye Juncus gerardii, samt enkelte moser.
Andre discomyceter: Lamprospora cf.macracantha,Melastiza flavorubens, Trichophaea woolhopeia,Ascobolus denudatus og Scutellinia sp..
Agaricales: Clitopilus cretatus, Entoloma sp. og Pluteus sp.

4.Boudiera acanthospora forma albida f.nov.Kristiansen
= Boudiera walkerae Seaver ?
A TYPO DIFFERT COLORE ALBIDA .

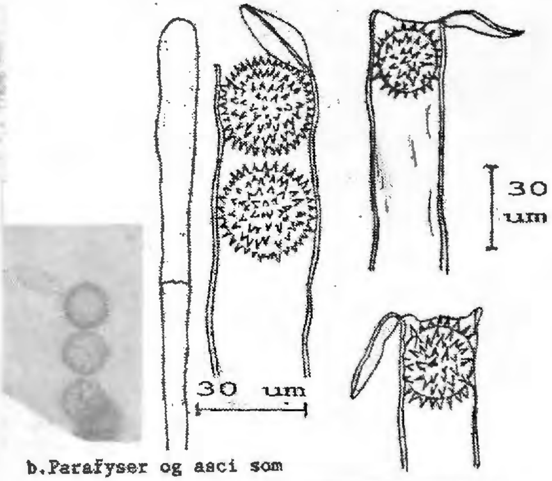
Ved Glomma's østbredde på samme sted som funn 1. ovenfor, ble det funnet 12 fruktlegemer av en helt hvit - hyalin art, som allerede i felt ble antatt å være den hvite Boudiera walkerae Seav., bare kjent fra USA (Seaver 1939) og Argentina (Gamundi 1975).Begge disse kollektene er funnet på slamaktig jord i laboratorier, - altså ikke ute i naturen !
Det foreliggende funn fra Østfold er således det første naturlige.
Fruktlegemene vokste enkeltvis innen et område på ca 30 x 30 cm, på leirjord,godt skjult i de omgivende gras- og sivvekster, nevnt tidligere.
< 1 m bortenfor vokste "vanlige" fargede (og større) eksemplarer av B. acanthospora.Men , ingen fargede blant de hvite.

Beskrivelse:
Apothecier, 1 - 1,5 mm diam., 0,5 - 1,0 mm høye,stutt sylindriske med avrundet kant,hyaline,ved uttørring mer hvite, gulige eller gulig hvite på tørket materiale.
Ytre eksipulum består av globulære til subglobulære celler, ca 30 - 35 um i diam., som farges kraftig i CB. Ved basis finnes sparsomt med hyaline forankringshyfer, ca 200 x 10 um. Fig.5 c.
Asci: sylindriske,8-sporet,sterkest amyloide i toppen, men amyloide i hele lengden,- <380 x 35 um. Mindre utpreget oppstikkende enn andre Boudiera-arter.
Parafyser:rette,hyaline,septerte, øvre septa ca 100 um, sjeldnere 120 - 150 um, bare svakt fortykket i toppen, 8 - 12 um breie; farges bare svakt i CB.

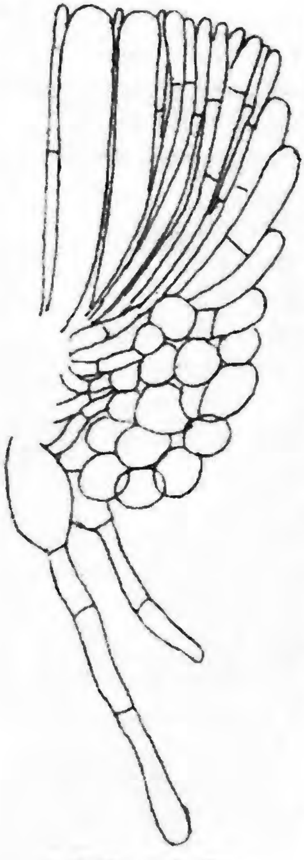
Fig.5 Boudiera acanthospora f.albida



a.Fruktlegemer
Koll.RK 83,220



b.Parafyser og asci som
viser operculum.



c.Snitt av kanten.
Skjematisk.

d.Sporer i CB.

Sporer:runde,hyaline, 20 - 25 um i diam., uten ornamentering, som består av 3,0 - 4,5 um høye, cyanofile,spisse eller butte, rette eller noe bøyde pigger, opp til 3 um breie ved basis.Sporene farges gulbrune i Melzer.Enkelte med deBary boble.

Østfold,Rakkestad kommune, Nord for Osa kirke, på leirjord i flomsonen på Glomma's østbredde, blant Calliergon cordifolium (pjusktjønnmose). Ca 50 m o.h.,16.august 1983 (RK 83.222). Herb. LPS,O,J.Mor..

Det foreliggende funn avviker fra B.acanthospora (hovedform) ved sine små apothecier - høyst 1,5 mm - formen er heller stutt sylindrisk enn puteformet.Mikroskopisk er det imidlertid ingen store forskjeller, bortsett fra asci-dimensjoner, men det alene er neppe kriterium godt nok for å skille den ut som egen art.
Dissing og Schumacher (1979) antyder at B.walkerae (uten å ha sett materiale)synes meget lik B.tracheia. Gamundi (1975) er den eneste nålevende som har sett en hvit Boudiera, og det er fremsendt norsk materiale til henne.Som det fremgår av hennes svar har det argentinske materiale tynnere og lengere pigger, og store variasjoner i sporedimensjoner. Ellers er asci,parafyser, og andre karakterer like. Antydningsvis, -vårt materiale kan være B.walkerae, tross forskjellen i piggene.
Her følger hennes kommentar:

" Regarding your Boudiera I must say that I examined the material,B.walkerae from Argentina.Your material is very similar to this one,except in the ascospores; in the argentine collections the spines are thinner and longer (3,8 - 5,8 µm x 1 - 1,5 µm) being the diameter (without ornaments) 13,4 µm x 28,2 µm. In your material spores are 20 - 25 µm (a bit more regular in diameter), but spines are shorter and thicker (4,5 x 3,0 µm). Asci and parafyses, as well as other features are the same .You must know from my paper on Boudiera and Sphaerosoma that I could not get B.walkerae Seav., type, but description is so coincident with our material that I did'nt doubt to put the name.They both appears in the laboratory on muddy soil.
One can not argue about distributional pattern in most cases in discomycetes, so it could be probable that yours is also B.walkerae, despite the form of the spines.
Seaver's measures for spores are coincident with yours (25 - 30 µm)."

Følgende tabellariske oversikt over hvite Boudiera-funn kan være nyttig:

Tabell 1.

	B.walkerae U S A	B.walkerae Argentina	B.acanthospora f.albida,Norge
Apothecier	1 mm	640 - 960 um	1 - 1,5 mm
Asci	225 x 40 um	265-315x32,4-40 um	< 380 x 35 um
Parafyser	15 um	4,5 - 8,5 um	8 - 12 um
Sporer m/ornam.	25 - 30 um	22 - 27 um	25 - 30 um
Sporer u/ornam.	18 - 20 um	13,4 - 28,2 um	19 - 25 um
Pigger	3,5 - 5,0 x 7	3,8-5,8x1-1,5 um	3,0-4,5x3,0 um

Gamundi (1975) tillegger ikke forskjellene i spore- og ascidimensjoner noe stor betydning, og anser B.walkerae "un taxon distinto". Tykkelsen på parafysene i argentinsk materiale er imidlertid vesentlig smalere enn det norske og amerikanske. Som nevnt innledningsvis, både den amerikanske og argentinske ble funnet på jordprøver i laboratorier. Seaver (1939): " ...who (Dr.Leva B.Walker) found these beautiful plants growing on a pan of soil on which she was testing the growth of some other organism."
Gamundi (1975): " sobre suelo argilloso, inundado, aparecido en cámera humeda en el laboratorio."

Vårt funn er gjort i naturen.Kan dette være forklaringen på forskjellen i mikrokarakterene ? Man vet at utviklingen av fruktlegemer i kultur/ laboratorier kan avvike vesentlig fra en naturlig vekst, ute i det fri.

Gamundi sier videre (pers.medd.): " ...probably that yours is also B. walkerae, despite the form of the spines."
Nettopp forskjellen i piggene er av betydning, og en av de viktigste skillekarakterene i Dissing & Schumacher (1979). Dessverre foreligger ennå ikke SEM-bilder av den hvite norske Boudiera, for direkte sammenlikning med hovedformen. Siden det er en faktisk forskjell i piggene på norsk og argentinsk materiale velger jeg å karakterisere det norske kun som en albinoform av B.acanthospora, -inntil nye data eventuelt foreligger.

Etter de nye funn av B.acanthospora kan vi konstatere at den når helt ut til skjærgården i ytre Oslofjord, og således på ingen måte noen alpin art. Den er ikke nødvendigvis begrenset til elvebredder, men absolutt til steder som oversvømmes, og gradvis tørker inn/fordamper, og som holder på fuktigheten en tid.

Tidspunktet for fruktifisering er slutten av juli til siste del av august; de fleste funn er gjort omkring midten av august.

Boudiera dennisii Diss.& Siv.

Tidligere var B.dennisii kjent syd til Koppang i Hedmark (Kristiansen 1983). De øvrige funn, nord for Koppang , er indikert av Dissing & Schumacher (1979), og i tillegg har T.Schumacher (pers.medd. 1984) gjort ytterligere funn i Grimsdalen og nærliggende steder.
I 1983 foretok Ingar Johnsen og undertegnede en befaring av diverse elvebanker i Telemark,Aust-Agder og Vest-Agder, men bare et sted ble B. dennisii funnet, nemlig Setesdal.
En omfattende beskrivelse er allerede gitt av Dissing (1976), og funnet ved Koppang er omtalt av Kristiansen (1983).

Her følger noen observasjoner fra funnet i Setesdal.

Apothecier opp til 7 mm i diam., flate,puteformet, oftest enkeltvis eller tre-fire sammenvokste, dyp fiolettbrun, asci oppstikkende ved modning.
Sporer: 19 - 21 um i diam. (uten ornamentering),med ca 1,5 - 2,5 um lange, cyanofile, nesten butte pigger.
Parafyser opp til 12 um breie i toppen.
Asci ca 400 - 500 x 30 -35 um, amyloide i hele lengden.

Vest-Agder,Setesdal, ca 5 km syd for Valle kirke, ved Sandnes, på østsiden av Flåren , ca 275 m o.h.
Posisjon: 59^{o}.09' 45'' N 7^{o}31'44'' E . 14.august 1983.

Anslagsvis 40 fruktlegemer på grov sand i flomsonen på elvebredden.
På det aktuelle voksestedet er følgende vekster identifisert:
Potentilla erecta - Deschampsia caespitosa - Molinia caerulea - Juncus alpinus - Polytrichum juniperinum - Salix nigricans og Alnus incana.
På innsiden (østsiden) av flomsonen (ca 50 m) står granskogen tett langs riksveien.
B.dennisii's sydlige utbredelse er dermed flyttet betydelig, fra ca 61^{o}33' N til ca 59^{o}10' N, og fra ca 350 til ca 275 m o.h..
Arten er tidligere henført til det arktisk-alpine floraelement, men kan vel nå sies å være subalpin. Det er lite sannsynlig at den finnes i lavlandet/kyststrøkene. Her kan det se ut som B.dennisii "avløses" av B.acanthospora.

Boudiera purpurea Eckbl. Fig.6 a.

B.purpurea er originalbeskrevet av Eckblad (1968), og funnet ved elvebredden på Nesbyen 1960.

En gammel kollekt fra Polen (funnet 1907), beskrevet under navnet Sphaerosoma echinulata Seaver, er re-eksaminert av Dissing & Schumacher (1979), og funnet å være identisk med B.purpurea.

Dette er de eneste funn av arten.

I 1984 fant Ingar Johnsen B.purpurea i Fredrikstad-marka.

Beskrivelse:

Apothecier 1 -2 mm diam.,halvkuleformet,puteformet,enkeltvis eller få sammenvokste, uten kant. Hymenium purpurbrun, undersiden blek gråfiolett. Eksipulum meget dårlig utviklet, og farges svakt i CB, - i overensstemmelse med Dissing & Schumacher's observasjoner. (fig. 6 c).

Asci: kølleformet,variable i dimensjoner, ca 350 - 400 x 35 - 50 um, 8-sporet, amyloide i hele lengden, oppstikkende ved modning.

Parafyser: septerte, oftest buede i toppen, sjeldnere rette, tynne og hyaline nedenfor, 6 - 8 um ,gradvis fortykkede mot toppen til 12 - 14 um.

Det fiolettgrålige pigmentet i toppen farges meget kraftig i CB.(fig.6 b).

Sporer: runde, svakt brunlige som modne, 18,8 - 21,0 um i diam., uten ornamentering, som består av 2,0 - 2,5 um høye, cyanofile,rette eller noe bøyde, spisse eller litt butte pigger. deBary bobler ikke uvanlig (se fig. 6 d). Enkelte sporer har en noe unormal/abnorm utvikling, med mangelfull eller annerledes ornamentering (se fig.6 e), som kan minne om Boudiera caucasica Mor. (Moravec 1981).

Østfold,Fredrikstad kommune, nær Evenrød skole, på gruslagt skogsvei i gammel granskog, < 50 m o. h. . RK 84.85 Herb.C,J.Mor.

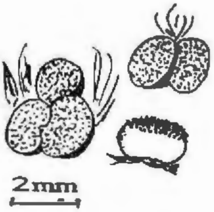
Posisjon: 59° 16'55'' N 10° 56' 24'' E .Sparsomt (10 apothecier) på sand og grus i veikanten på fremsiden av en paralleltgående grøft. Følgende vekster er identifisert:Juncus filiformis - Juncus bulbosus -Juncus bufonius-Potentilla erecta - Anthoxanthum odoratum - Equisetum sylvaticum - Polytrichum commune -, samt islett av selje, rogn og bregner.

Like ved vokste også Lamprospora macracantha og Octospora humosa.

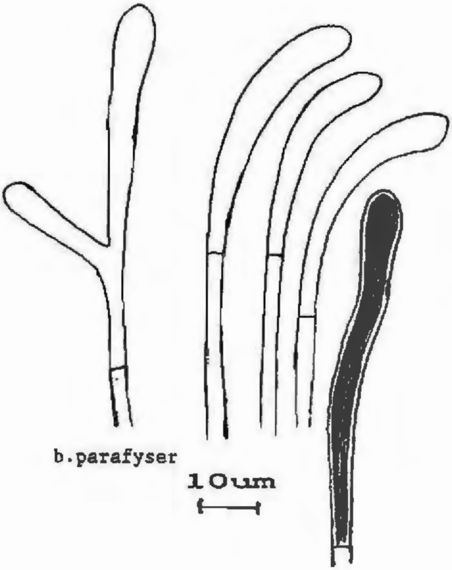
Funnet i Fredrikstad-marka synes å avvike noe fra typematerialet ved å ha større asci og buede parafyser, men dette kan ligge innenfor variasjonsbredden; det er tross alt to funn tidligere.

Det dårlige utviklede eksipulum og sporekarakterene synes å særprege B.purpurea.

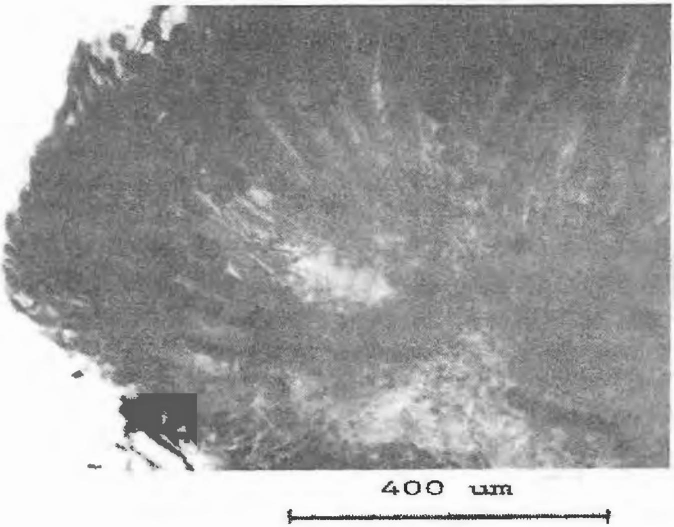
Fig.6 Boudiera purpurea



a. Fruktlegemer
Koll.RK 84.95

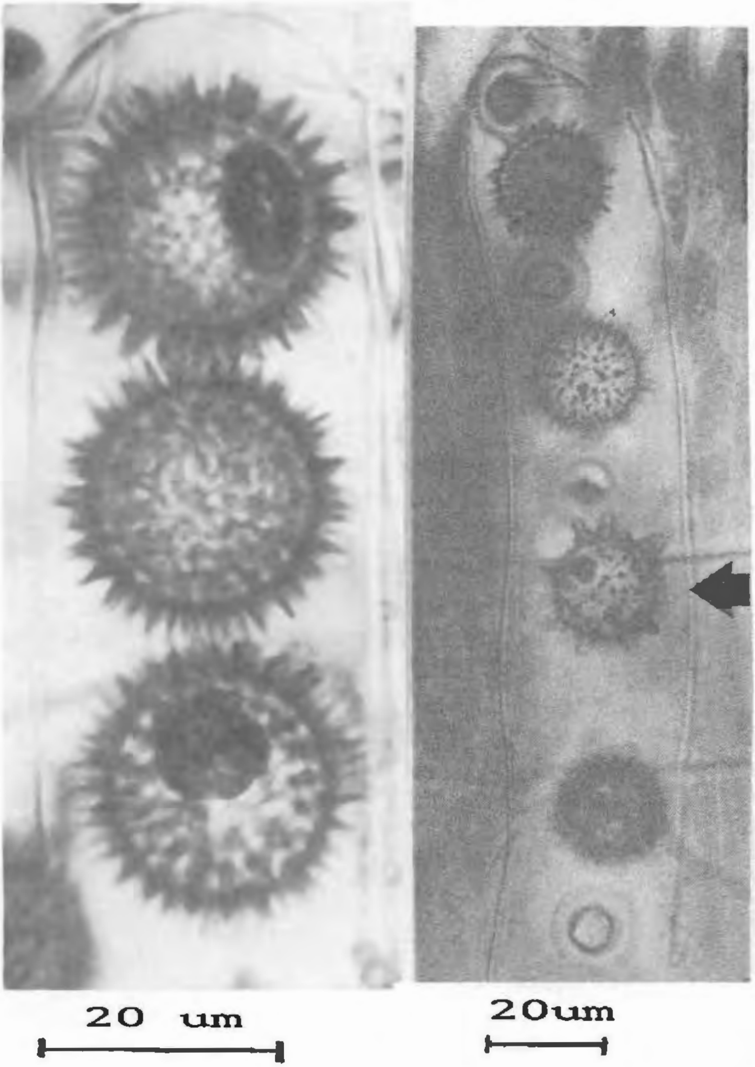


b.parafyser



c.Snitt av fruktlegeme, parafysene farges intens i CB.Dårlig utviklet eksipulum.

Fig.6 B.purpurea



d.Sporer i CB,
med deBary boble.

e.Ascus med en unormal
spore (pil).

Artene innen slekten Boudiera kan nå synes vanligere enn tidligere antatt, men forklaringen er heller at disse relativt små begersoppene har blitt viet for liten oppmerksomhet tidligere.
Utvilsomt, har Dissing & Schumacher (1979) bidratt vesentlig til økt interesse.

Et lite apropos:den av Caillet & Moyne (1982) beskrevende B.echinulata , og illustrert, fra Doubs i Frankrike, er muligens B.acanthospora eller B.tracheia. Den har i alle fall ingen ting med B.echinulata å gjøre !

Våre feltobservasjoner styrker de økologiske data som tidligere er publisert av Schumacher (D.&S.1979), fordi det er tydelig at Boudiera-artene, i det minste i Skandinavia, ofte finnes i selskap med Juncus, Carex og Equisetum spp., - " Its apparent affinity with stands of Equisetum and Juncus spp. ..... probably caused by the accumulation of fine-grained material and organic debris in such habitats, giving a moist enriched soil which is favourable ......"

På alle våre funn-steder har vi tatt med jord- og sandprøver, og i tabellen nedenfor (tabell 2) presenteres noen edafiske faktorer av substratene.

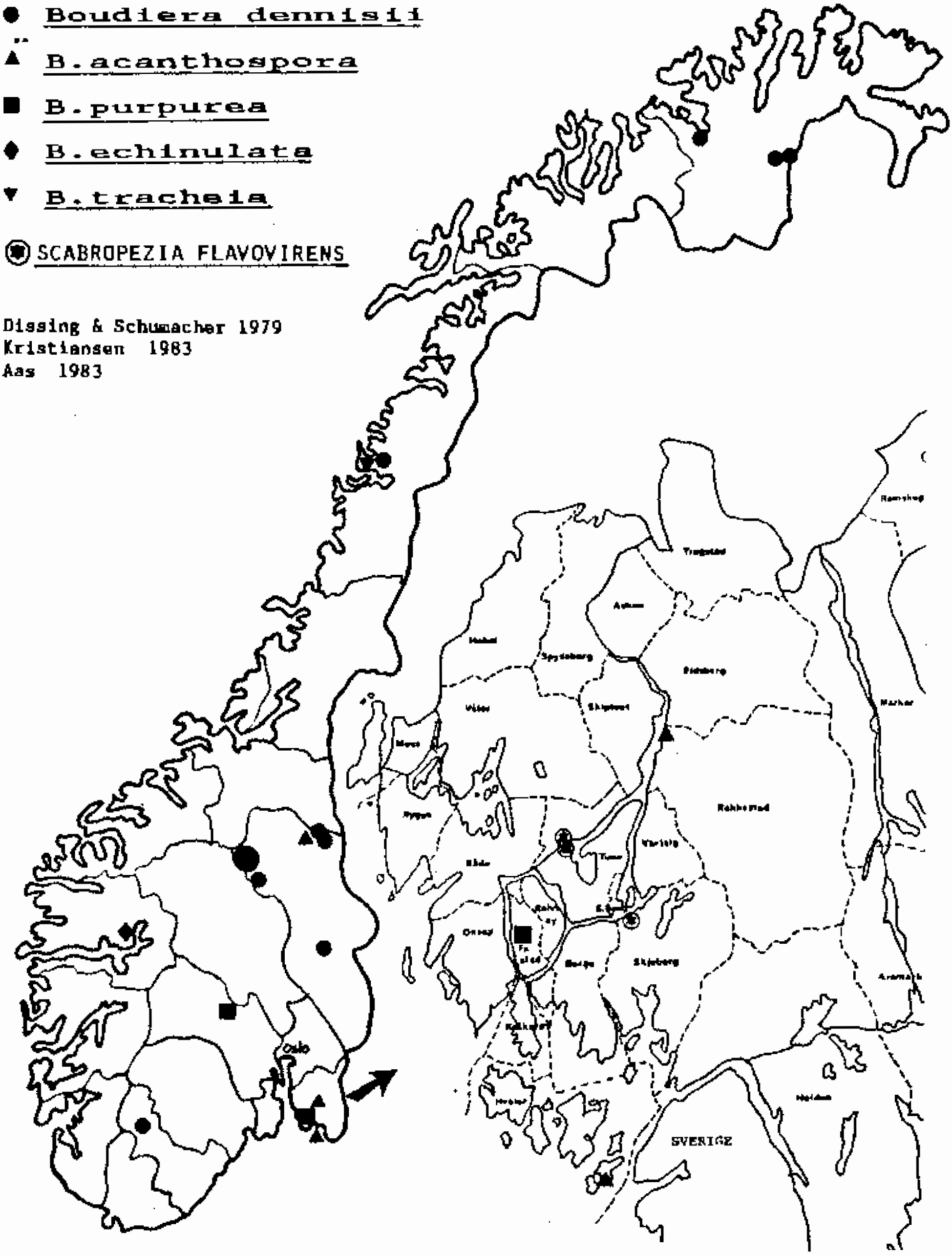
Tabell 2. Noen edafiske faktorer for Boudiera-innsamlinger

Kolleksjon	Substrat	pH	Organisk materiale % av tørr vekt *	% uløsl.i varm HCl (av glødet materiale)
B.dennisii,Koppang-82	silt/sand	7,1	2,1	93,6
B.dennisii,Setesdal-83	grov sand	6,1	2,2	95,8
B.acanthospora,Finland	leirjord	6,6	5,2	91,4
B.acanthospora,Sverige	leire	6,7	3,2	97,8
B.acanthospora,RK83.222	leire	7,1	2,5	96,4
B.acanthospora,RK83.200	slam/leirjord	5,7	5,0	97,1
B.acanthospora,RK84.70	sandjord	7,4	14,8 **	93,7
B.acanth.f.albida,RK83.220	leirjord	5,0	6,8	93,6
B.purpurea,Fredrikstad	sand/grus	5,5	5,0	98,2

* som glødetap ** substratet inneholder mye skjellrester, dette gir stort vekttap ved gløding.

Fig.7 viser utbredelsen av Boudiera og Scabropezia i Norge.

UTBREDELSEN AV BOUDIERA OG SCABROPEZIA I NORGE. Figur 7



- ● Boudiera dennisii
- ▲ B.acanthospora
- ■ B.purpurea
- ◆ B.echinulata
- ▼ B.tracheia
- ⊛ SCABROPEZIA FLAVOVIRENS

Dissing & Schumacher 1979
Kristiansen 1983
Aas 1983

HUMARIACEAE.

Leucoscypha leucotricha (Alb.&Schw.ex.Fr.)Boud.

L.leucotricha kjennetegnes i hovedsak på sine helt hvite fruktlegemer, tett besatt med hyaline hår, og store fusoide, fint vortete sporer. Arten er tidligere beskrevet fra Østfold av Weholt (1981). Siden dengang er det gjort ytterligere funn i flere kommuner i Østfold. L.leucotricha er ellers kjent fra Dunderlandsdalen (S.Sivertsen,pers.medd.) Vestfold (Aase 1982),og nå nylig funnet på Vestlandet (Sigurd Olsen, pers.medd.1985).

I 1981/1982 ble det gjort et meget rikt funn i Borge kommune, og materiale er sendt til Prof.R.P.Korf, Cornell University,Ithaca,N.Y., for hans "Discomycetes Exsiccati".

Beskrivelse:

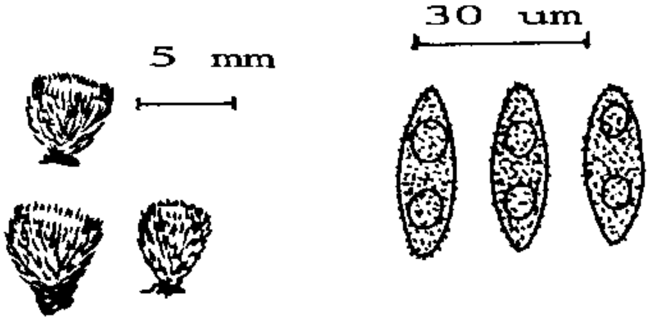
Apothecier (fig.8 a) opp til 5 mm diam.,og 4 mm høye,bredt stilkløs. Grundt begerformet, melisgrå til hvit, tett besatt med lange avsmalende hvite hår.Hårene langs kanten er hvite, septerte, tykk-veggede, rette eller bøyde, opp til 800 (1000) um lange, og 10 - 13 um breie ved basis, gradvis avsmalende mot den mer eller mindre butte spissen.
Hårene på eksipulum < 300 um lange.(fig.8 b).
Asci: 8-sporet, lange sylindriske, svakt avsmalende ved basis, < 350 x 18 um.
Sporer:en-radet, hyaline med to store oljedråper, subfusoide - elliptisk-fusoide, ofte asymmetriske, ved modning tett dekket av ørsmå (0,5 um) runde eller uregelmessige vorter, som fremtrer i scanning elektron mikroskopi som et , mer eller mindre, sammenhengende vakkert stjerneliknende mønster (fig.9)(.se også fig.8 c), 27,3 - 33,6 x 11,5 - 12,6 (15,0) um.
Parafyser: slanke, svakt klubbeformet,sparsomt, septerte,3,0 - 3,5 um tykke, i toppen noe breiere, 4,0 - 5,0 um .

UNDERSØKT MATERIALE:
Alle Østfold fylke.

Onsøy kommune,Engalsvik,Storesandvik,på mosebevokst liggende grein av or i sumporeskog med innslag av gran. 15.august 1981.
Borge kommune,Kjølbergskogen,på leirjord under eikeblader i eikelund, 25.august 1981.

Borge kommune,Torsnes,Grimstad, på løs svart jord langs dikekant med gran, or,bjørk og eik. 20.september 1981 og 24.juli 1982 (RK 82.195). CUP,C.

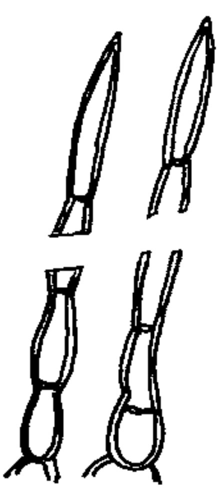
Borge kommune, Torp, på råtnende trerester etter rogn ? i Sphagnum,granskog. 17.juni 1982 (RK 82.133).



C c.sporer i CB.

a.Fruktlegemer

Fig.8 Leucoscypha leucotricha



d.parafyser

b.hår

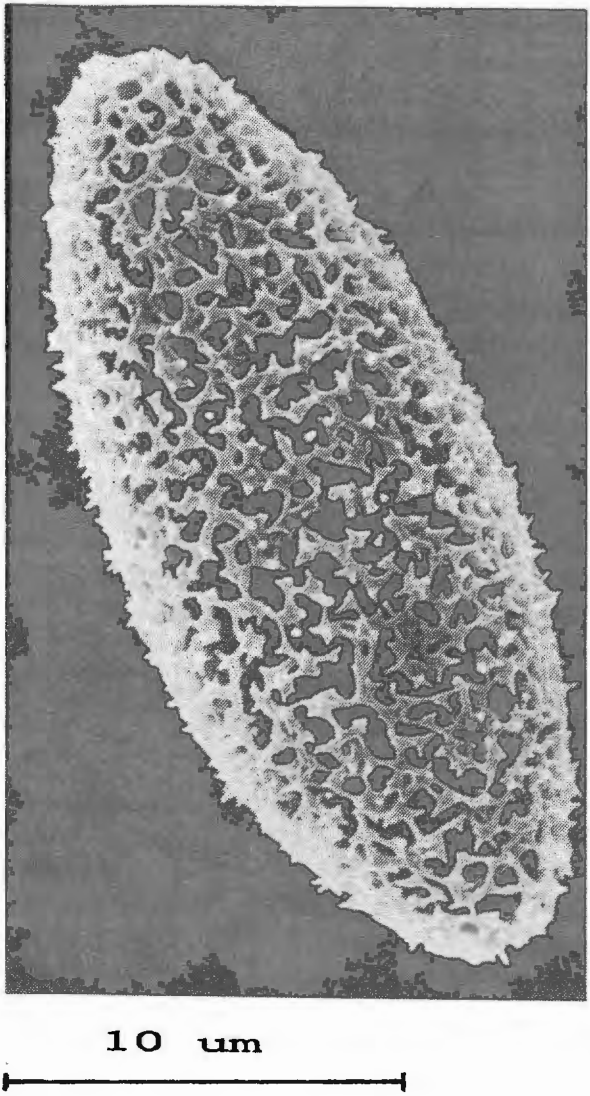


Fig.9 Leucoscypha leucotricha
Spore.SEM T.Schumacher
Vestfold 20/8-81 Leg.S.Aase

Hvaler kommune,Kirkøy,Arekilen, på råtnende bladavfall under or og selje. September 1982 (leg. Ø.Weholt).

Fredrikstad kommune,Borredalsvannet,på jord,skogsvei, i granskog. 5.august 1984 (leg.Ingar Johnsen) RK 84.90.

Fredrikstad kommune, Veum, på jord,Skogssti, i granskog, 9.august 1984, (leg. Ingar Johnsen) RK 84.96.

Tune kommune, Sølvstufossen, på jord, mosebevokst sti med Microglossum cf.olivaceum, i granskog. 27.august 1984 (RK 84.133).

Fargeillustrasjoner:

Breitenbach & Kränzlin 1981 pl.69 (meget bra bilde).
Boudier II (1907) pl.346.

L.leucotricha ser ut til å være begrenset til Europa, men regnes overalt å være en sjelden art.
Den er rapportert fra Tsjekkoslovakia,Tyskland,Sveits,England,Frankrike, og Danmark.
Den nærstående L.erminea (Bomm.& Rouss.)Boud. har mindre og ikke så utpreget fusoide sporer, og med noe annerledes ornamentering (mindre tett) (LeGal 1957, Svrček & Kubička 1968).

Økologisk kan det se ut som L.leucotricha tolererer forholdsvis sur mark, idet den ved flere anledninger er funnet i blåbær-granskog, og ellers på dødt plantemateriale.

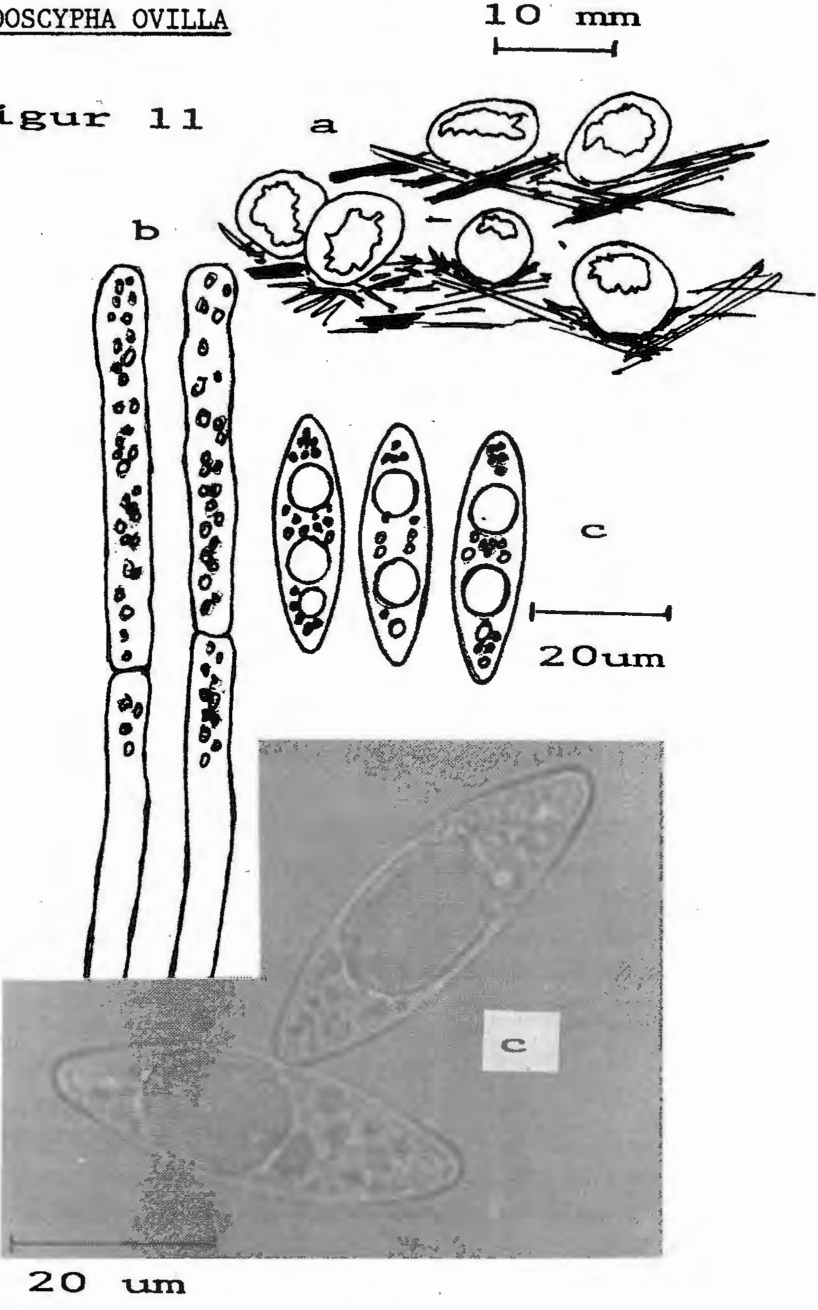
De mange funn i Østfold kan tyde på at arten er langt vanligere enn tidligere antatt.
Se utbredelseskart for Østfold, fig.10.

Rhodoscypha ovilla (Peck) Dissing & Sivertsen
Syn. Leucoscypha ovilla(Peck)Harmaja
Leucoscypha rhodoleuca (Bres)Svrcek

Slekten Rhodoscypha er nylig opprettet og utskilt fra Leucoscypha av Dissing&Sivertsen 1983a , hovedsakelig på grunn av de spesielle cytokjemiske egenskaper, såvel som andre karakterer: hår,parafyser,sporer og habitat, og således ganske forskjellig fra de nærstående slektene Leucoscypha og Neottiella.
Dette er diskutert meget detaljert av Dissing & Sivertsen (1983 a).
R.ovilla er en kalk-krevende montan til subarktisk art , og er kjent fra flere steder i Norge,Sverige,Finland,Estland,Vest-Tyskland,Sveits,Frankrike,Tsjekkoslovakia,Italia,Østerrike,India, og Nord-Amerika (Dissing& Sivertsen 1983 a, Lohmeyer 1984).

RHODOSCYPHA OVILLA

Figur 11



Fram til 1983 var den bare kjent fra noen få lokaliteter i Rana-distriktet i Nordland, d.v.s. i Norge.
I 1983 fant Ø.Weholt R.ovilla i Melhus kommune i Sør-Trøndelag, og i 1984 ble den funnet i Hvaler kommune,Østfold, ytterst i skjærgården.

Beskrivelse:

Apothecier 0,5 - 1,0 cm i diam.(fig.11 a), 0,5 - 0,7 cm høye, enkeltvis eller to-tre sammen; først nesten kulerunde med en tannet uregelmessig splitt-liknende åpning. Etter hvert skål-formet eller grundt begerformet. Hymenium rosa, med tydelig uregelmessig tannet hvit kant. Utsiden nesten hvit, stilkløs.
Hår på ytre eksipulum opp til 200 um lange, ca 15um breie, butte,bøyde, mer eller mindre forgrenede, med tykke 2-delte vegger,hvite.Overflaten ujevn. Den ytre veggen ca 5 um tykk, ikke cyanofil.Den indre veggen, tynn, cyanofil, med få septeringer.Carminofil kjerne.
Asci: sylindriske,kortstilket,8-sporet, ca 260 - 300 x 12 - 16 um, tykk-veggede.
Parafyser (fig.11 b), septerte,øvre septering 80 - 150 um, med små blek rødlige dråper, opp til 8 um breie i toppen; carminofil kjerne.
Sporer: (fig.11 c) fusoide, med få store og mange små dråper,sammenflytende til en stor dråpe på rehydrert materiale,
40.0 - 43,5 x 13,8 - 14,5 um (RK 84.60), glatte i lysmikroskop, men meget fint vortet i SEM (Dissing & Sivertsen 1983a).Carminofil kjerne.

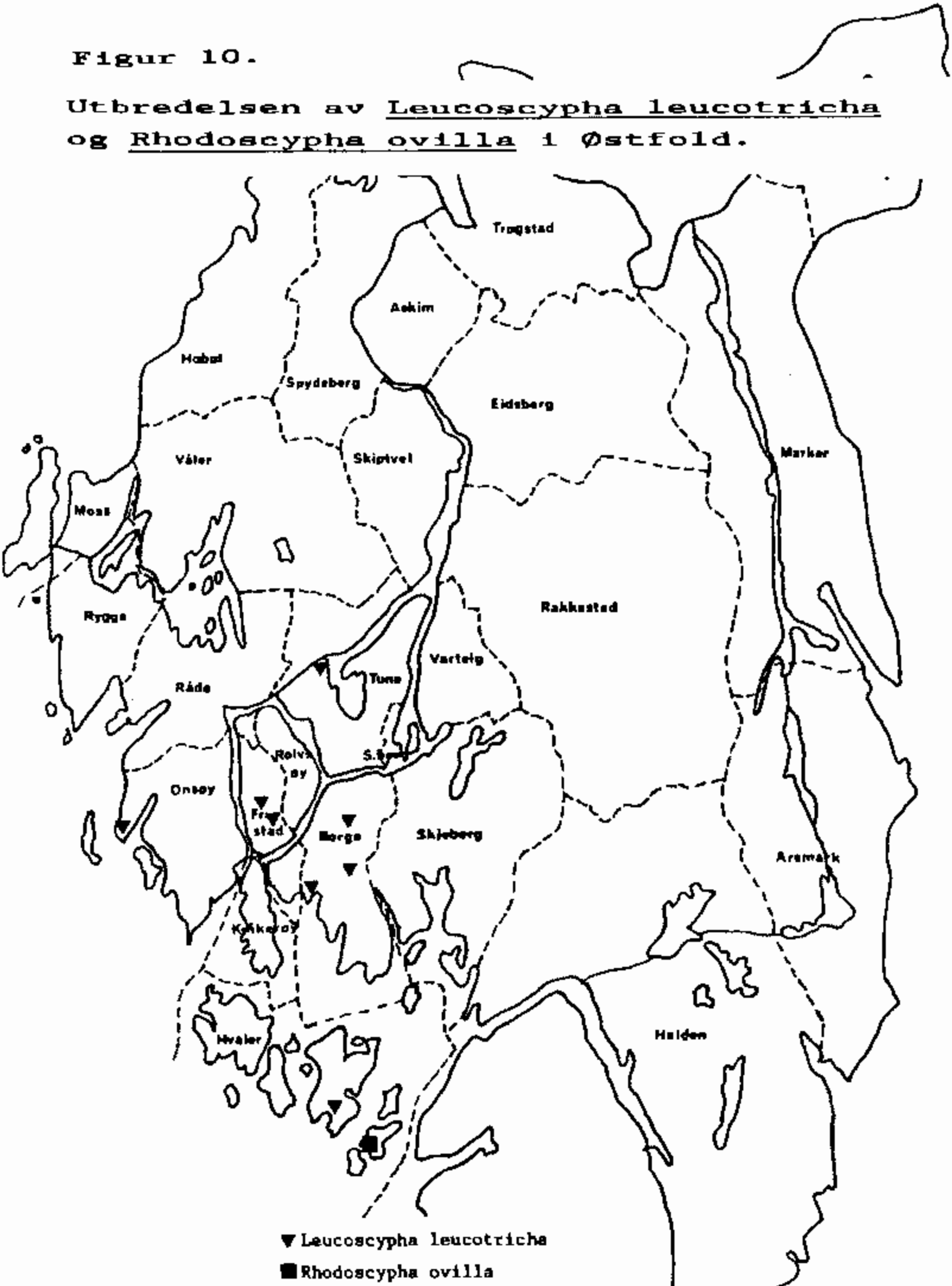
Østfold,Hvaler kommune,Søndre Sandøy,like syd for Nedgården,Sauholmen, i havnivå, på svart kalkholdig jord (pH 6,1), blant nålestrø (Pinus og Picea), delvis under og langs med en uthusvegg (ved hytte); flest apothecier hvor jernstenger ligger og ruster ! Ca 30 apothecier, 28. - 31. juli 1984, (RK 84.60) Herb.J.Mor..

Sør-Trøndelag,Melhus kommune,Lundamo, nær Løkken gård, på jord med nålestrø; langs med traktor/tømmervei i overveiende granskogsterreng, ca 200 m o.h., ca 15 apothecier. Leg.Ø.Weholt ,20.juli 1983.

Som nevnt tidligere , er R.ovilla karakterisert som en montan til subarktisk art, og er i Europa funnet helt opp til 1600 m, - i India over 3000 ! I Rana er den tatt på ca 200 m.
Funnet fra Hvaler i Østfold, i havnivå, skulle tilsi at den ikke er "strict" montan eller subarktisk.

Figur 10.

Utbredelsen av *Leucoscypha leucotricha* og *Rhodoscypha ovilla* i Østfold.



Trichophaea paludosa Boud.

Slekten Trichophaea Boud. omfatter små grålige , fløyelslodne arter med flate apothecier, og med brune hår langs kanten. Globalt kjennes 12 -14 arter.
I Norge synes T.gregaria (småfløyelsbeger) å være den vanligste. Likeledes kjenner vi en rekke funn av T.haemisphaeroides (på bål) og T. woolhopeia.
Alle arter må mikroskoperes for og bestemmes, da de makroskopisk ofte er like.
En fjerde art, T.paludosa , er tidligere ikke rapportert fra Norge. Den er meget lettkjennelig på sine sporer med store halvkuleformede vorter.

Beskrivelse:

Apothecier (fig.12 a), 1 - 2 mm diam., stilkløs, grundt begerformet til flat, tett besatt med brune hår langs kanten og utsiden .
Hymenium hvit - gulig hvit, utsiden blek brunlig. Eksipulum langs kanten består av parallelle "ruter" av små avlange lys brunlige celler, som ender opp i brun-veggede subglobulære celler. Den nedre delen av eksipulum består av store uregelmessig-formede blek brune celler. De gylden brune hårene langs kanten (fig.12 b) vokser ut fra små mørk-veggede celler , enten enkeltvis eller i bunter, - 200 - 500 x 10 - 20 um, tykkveggede, sparsomt septerte.Hårene på utsiden, lenger nede, er gjerne kortere og mindre.
Asci: sylindriske, 8-sporet, 250 - 280 x 15 - 17 um.
Parafyser (fig 12 c) tynne, septerte, 2 - 3 um tykke, brått fortykket i toppen til 5 - 6 um.
Sporer (fig.12 d og 13): bredt elliptiske, 21 - 25 x 15 - 16 um, uten ornament, dekket av store utpregede halvkule-formede vorter, 3 - 5 um breie og 3 - 4 um høye, 1 -2 oljedråper.
Ornamenteringen forsvinner (løses) øyeblikkelig i 3%-ig KOH, og sporen sveller opp til det dobbelte i dimensjoner. Denne reaksjonen er diskutert av Kanouse (1958).

Østfold,Borge kommune, Torp, syd for Torp Bruk,på fuktig jord, under or, selje og osp, sammen med Trichophaeopsis bicuspis,Pulvinula constellatio, og Chalazion helveticum. 3.juli 1982 (RK 82.145A) og 25.juli 1983 (RK 83.188) Herb.C

T.paludosa er funnet i Danmark (Dissing,pers.medd.)Originalbeskrevet fra Frankrike av Boudier (1894) .Den er beskrevet av Kanouse (1958) fra (Michigan) USA.

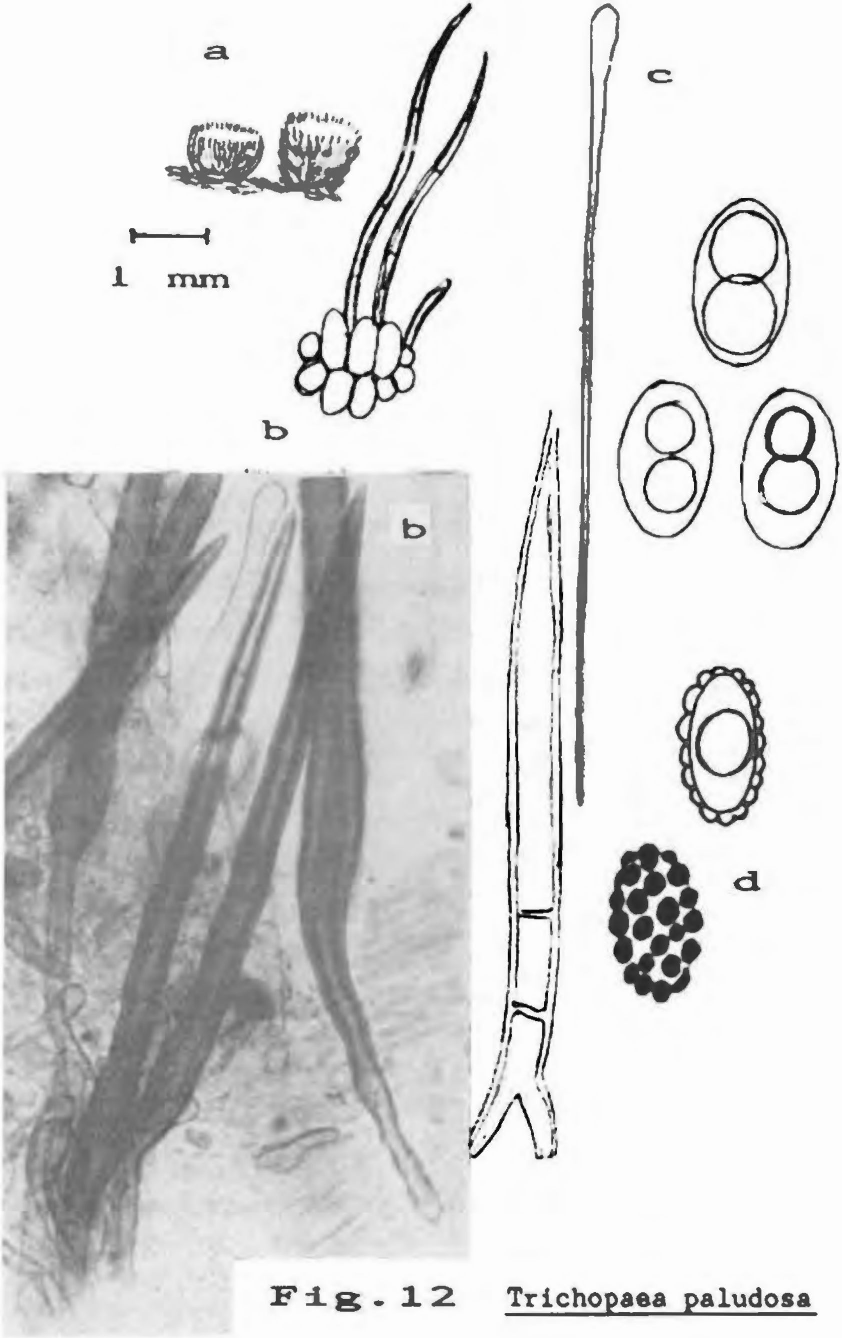


Fig. 12 Trichopaea paludosa

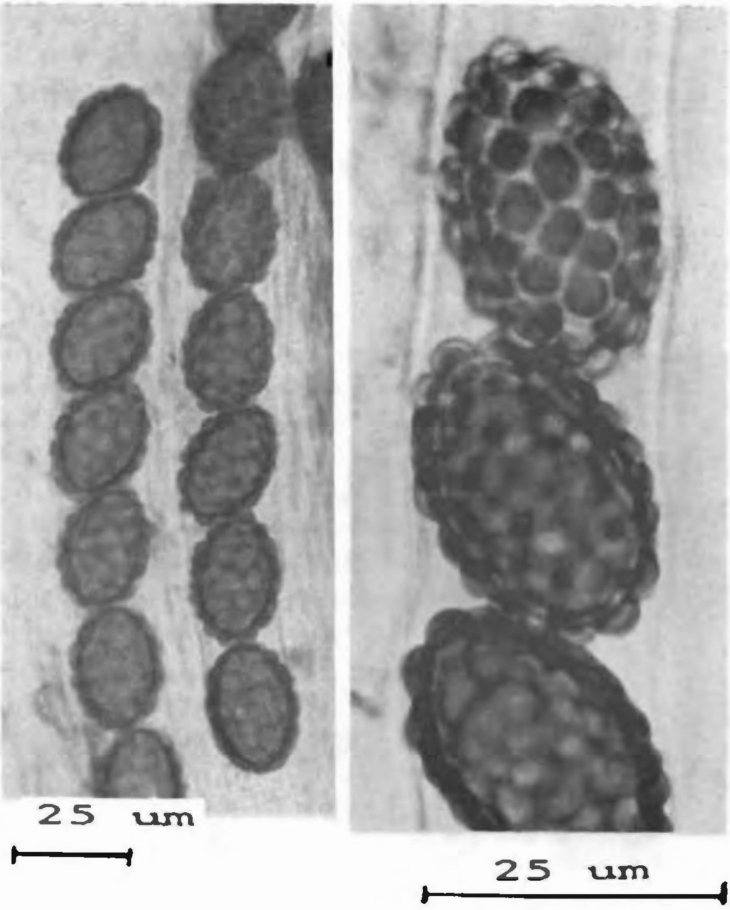


Fig. 13 T.paludosa

Det norske (og danske) stemmer godt overens med disse beskrivelsene. T.paludosa er også funnet i Tsjekkoslovakia (Kubička 1960).
Maas Geesteranus (1969) og Matheis (1979) har beskrevet T.paludosa fra resp. Nederland og Sveits, men deres sporemål stemmer dårlig overens med de ovennevnte, - vesentlig mindre.

Trichophaeopsis bicuspis (Boud.)Korf & Erb.

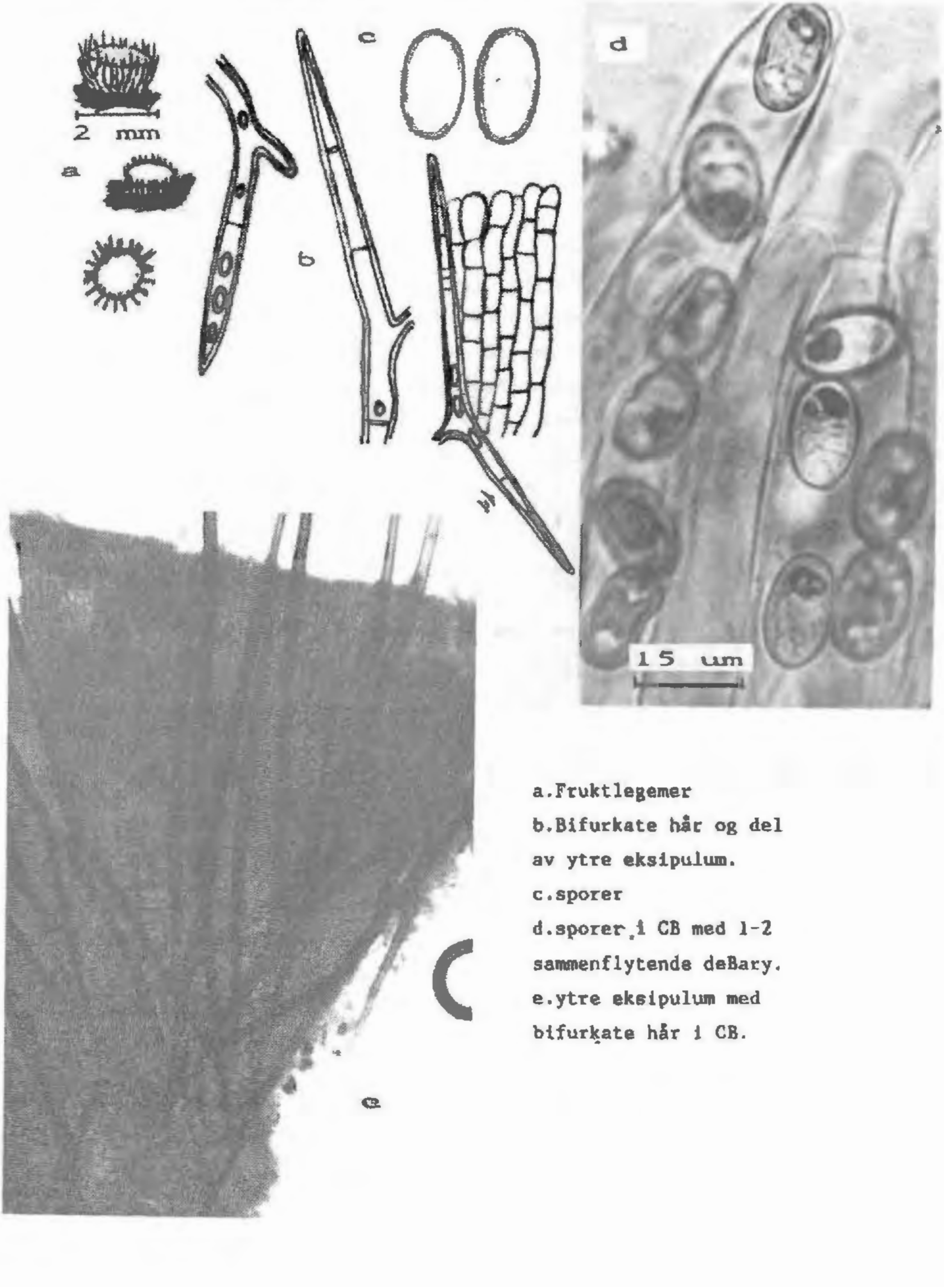
Slekten Trichophaeopsis er utskilt fra Trichophaea av Korf & Erb (1972) p.g.a. sin spesielle eksipulum-struktur, og de lange, tykk-veggede bifurkate hårene på apotheciets utside.
Trichophaeopsis omfatter tre arter, T.bicuspis, T.latispora og T. tetraspora (Moravec 1979, Dissing & Paulsen 1976).
T.bicuspis er kjent fra fire lokaliteter i USA (Korf 1977), i Europa fra Frankrike, Sveits, Tsjekkoslovakia, England, Vest-Tyskland, Nederland og Danmark. Også kjent fra Asia (Dissing & Raitviir 1973). De to andre er bare kjent fra typelokaliteten.

I 1982 ble T.bicuspis funnet i Borge kommune, Østfold, i store mengder, - første funn i Norge.

Beskrivelse:

Apothecier (fig.14 a) 1 - 2 mm diam., omvendt kjegleformet, etter hvert avflatet og konveks; kanten jevn.
Hymenium hvitaktig eller svak grålig hvit.
Utsiden brunlig, øvre del dekket av jevnt fordelte stive brune hår, hvor noen er forgrenet og peker/vender nedover.
Ytre eksipulum er bygd opp av vertikale ruter (som er spesielt for Trichophaeopsis), og illustrert av f.eks., Dissing & Paulsen 1976, og Dissing & Raitviir 1973. Veggene er brunlige, og farges kraftig i CB.
Hårene vokser fra celler i ytre eksipulum, og er brune, tykk-veggede (4 - 5 um), septerte; den opprettstående delen av de bifurkate hårene er opp til 700 - 900 um lange, og 14 - 18 um breie, spisse, med opp til 13 septa; - den nedadpekende delen opp til 330 um lang, - tilspisset i begge ender. Hårene er festet, - ca halvveis-, til små hyaline celler på eksipulum. (Se fig.14 b og 14 e).
Asci: 8-sporet, sylindriske, 200 - 220 x 12 - 15 um.
Parafyser: filiforme, septerte, opp til 3 um tykke, omtrent jamntykke.
Sporer (fig. 14 c), ovaloide, glatte, 13,7 - 15,8 x 9,5 - 10,0 um, enradet, uten oljedråper. Enkelte sporer med en eller to (tre?) sammenflytende deBary bobler (fig. 14 d).

Fig. 14 Trichophaeopsis bicuspis



a. Fruktlegemer
b. Bifurkate hår og del av ytre eksipulum.
c. sporer
d. sporer i CB med 1-2 sammenflytende deBary.
e. ytre eksipulum med bifurkate hår i CB.

T.bicuspis

Figur 15. SEM T.Schumacher

Koll.RK Østfold 1982 x3200

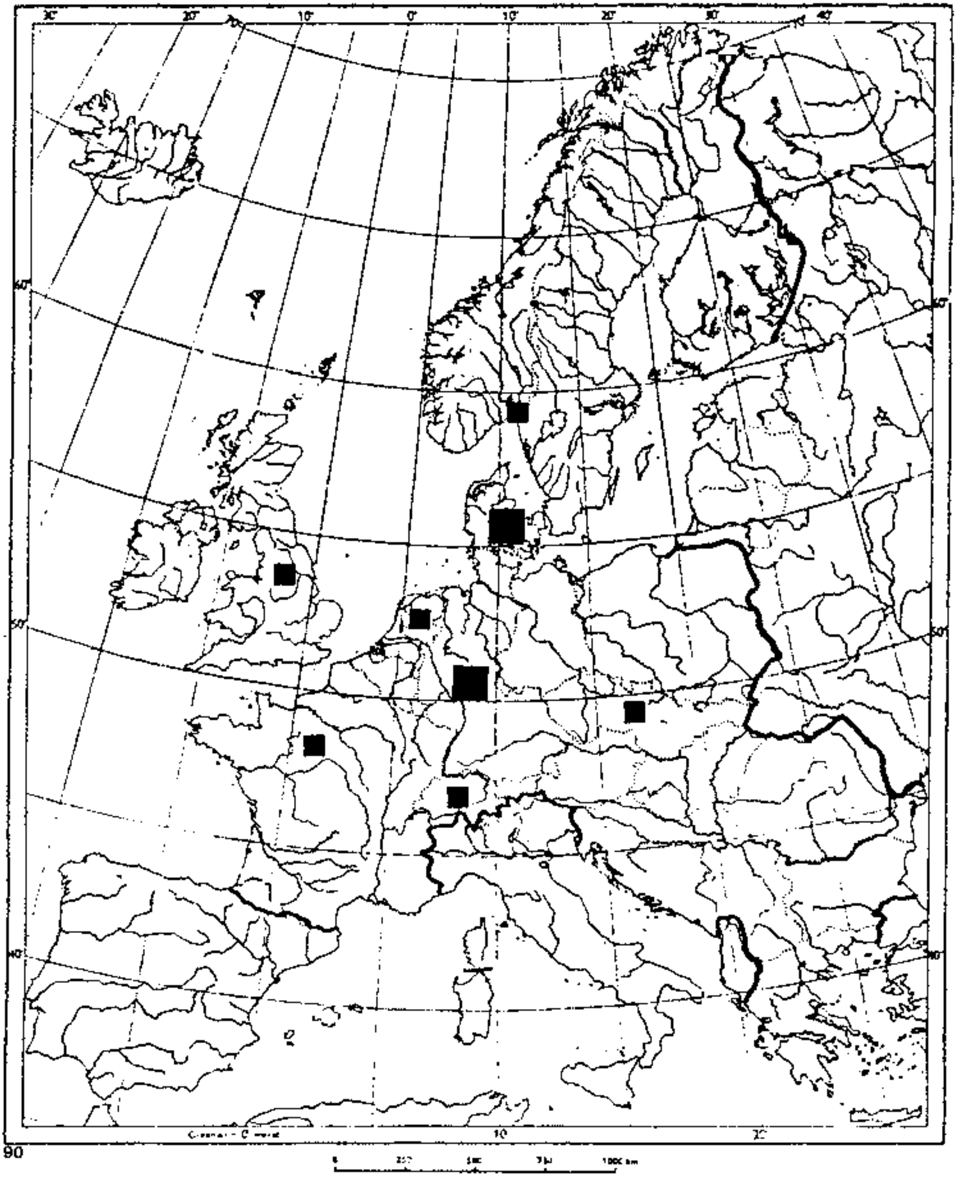


Fig.16 Utbredelseskart for <u>Trichophaeopsis bicuspis</u> i Europa.

Figur 15 viser sporer ved scanning elektron mikroskopi. Enkelte sporer har en ru overflate, spesielt sporen nederst til høyre. Legg også merke til at dette er den eneste spore hvor sporeveggen ikke har falt sammen. Sporene på T.tetraspora er ved SEM absolutt glatte, og diskutert av Dissing & Paulsen (1976).

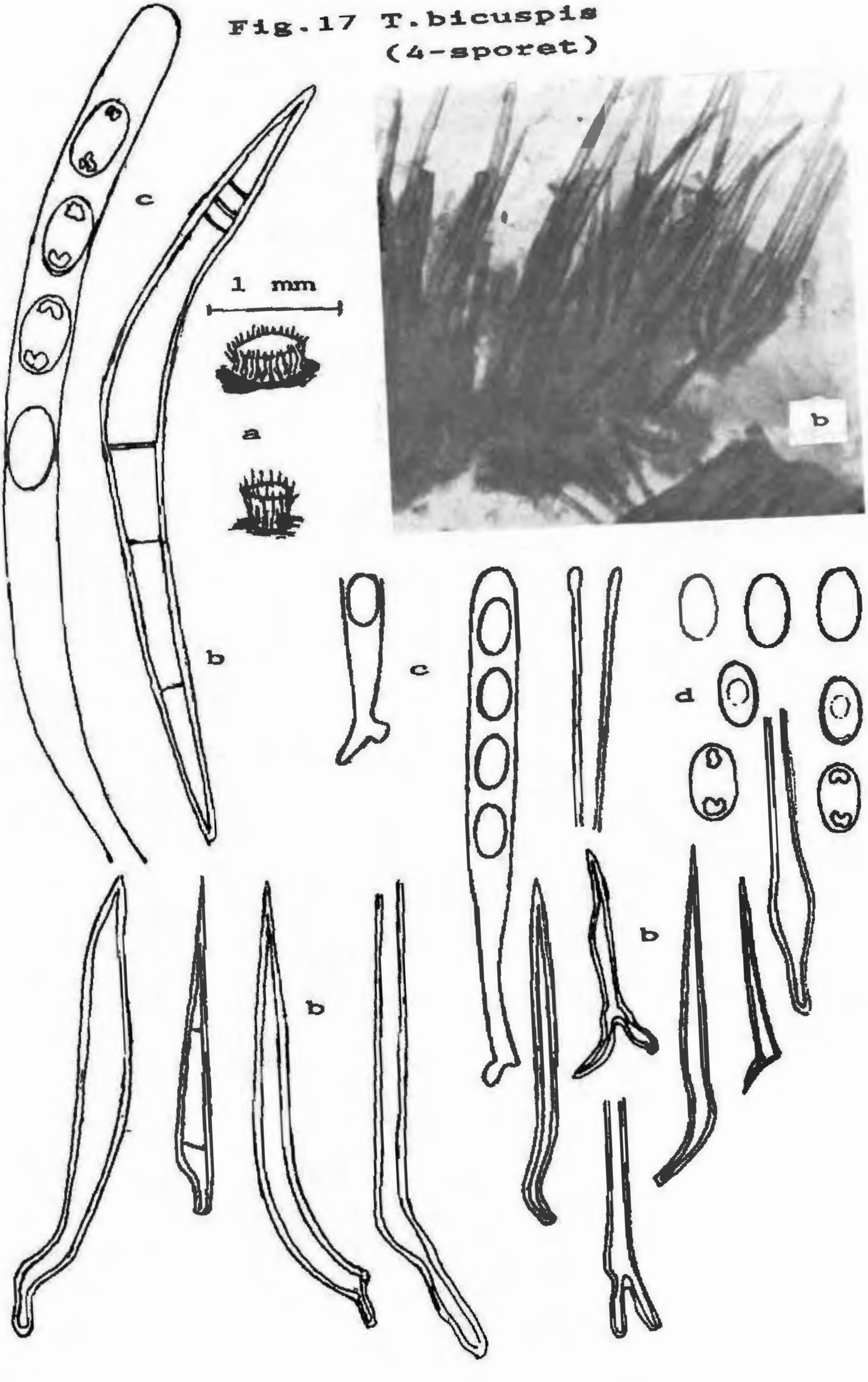
Østfold,Borge kommune, Torp, syd for Torp Bruk (nedlagt), på bark-,blad- og kvistavfall fra osp,poppel,og selje i tett bestand av nesle (Urtica dioeca) under osp,poppel og selje, sammen med Pulvinula constellatio.
Ca 200 apothecier. 3.juli 1982 (RK 82.145)Herb.C; 11.september 1982, 16. oktober,23.oktober og 7.november 1982.
11.juni 1983 (RK 83.134) Herb.LPS,J.Mor.,C,O,TRH.

Fargeillustrasjoner:
Boudier II (1907) pl.366
Breitenbach & Kränzlin (1981) pl.77

Tilstedeværelsen av oljedråper og deBary bobler er gjentatte ganger diskutert,- spesielt Korf (1977), som anser at Gamundi's Trichophaea eguttulispora (Gamundi 1973), kun er en geografisk form, og gjør kombinasjonen: Trichophaeopsis bicuspis (Boud.)Korf & Erb, subsp. eguttulispora(Gamundi) Korf.
Det ligger utenfor rammen av denne artikkelen å diskutere oljedråper og deBary bobler.
Figur 16 viser utbredelsen av T.bicuspis i Europa.

I 1983 ble det gjort funn av en Trichophaeopsis i et avfallsområde,< 100 m fra den foran beskrevende.
Apotheciene (fig.17 a) vokste meget tett sammen, og var betydelig mindre enn tidligere funn, < 0,5 mm i diam.,dypt nede i substratet,på jord.
Den påminner i mange karakterer om T.bicuspis, men adskiller seg først og fremst ved å være 4-sporet (men ikke identisk med T.tetraspora, som bl.a. er koprofil).
Hårene er avvikende ved å være sjelden septerte, og breiere, total lengde på 400 - 700 (900) um, og 15 - 30 um breie.Den nedadvendte delen er sjelden spiss (se fig.17 b).
Asci, 4-sporet, sylindriske, 200 - 250(270) x 12 - 13 um (fig.17 c).
Parafyser: slanke, knapt fortykket i toppen, 3 - 4 um tykke.
Sporer (fig.17 d),ovaloide,glatte, 16,3 - 20,0 x 9,5 - 10,5 um,en-radet, enkelte med en oljeliknende dråpe ved hver pol. deBary bobler ikke sett.
Østfold,Borge kommune,Torp,på avfallsplass, på jord,sammen med Peziza subisabellina og Scutellinia sp.,5.juni 1983 (RK 83.125).Herb.C,J.Mor..

Fig.17 T.bicuspis (4-sporet)



Jeg tør foreløpig ikke ha noen formening om dette kun dreier seg om en 4-sporet, atypisk form av T.bicuspis, eller et nytt taxon. Sporene er større enn for T.bicuspis, hvilket er naturlig dersom det er en 4-sporet T.bicuspis.

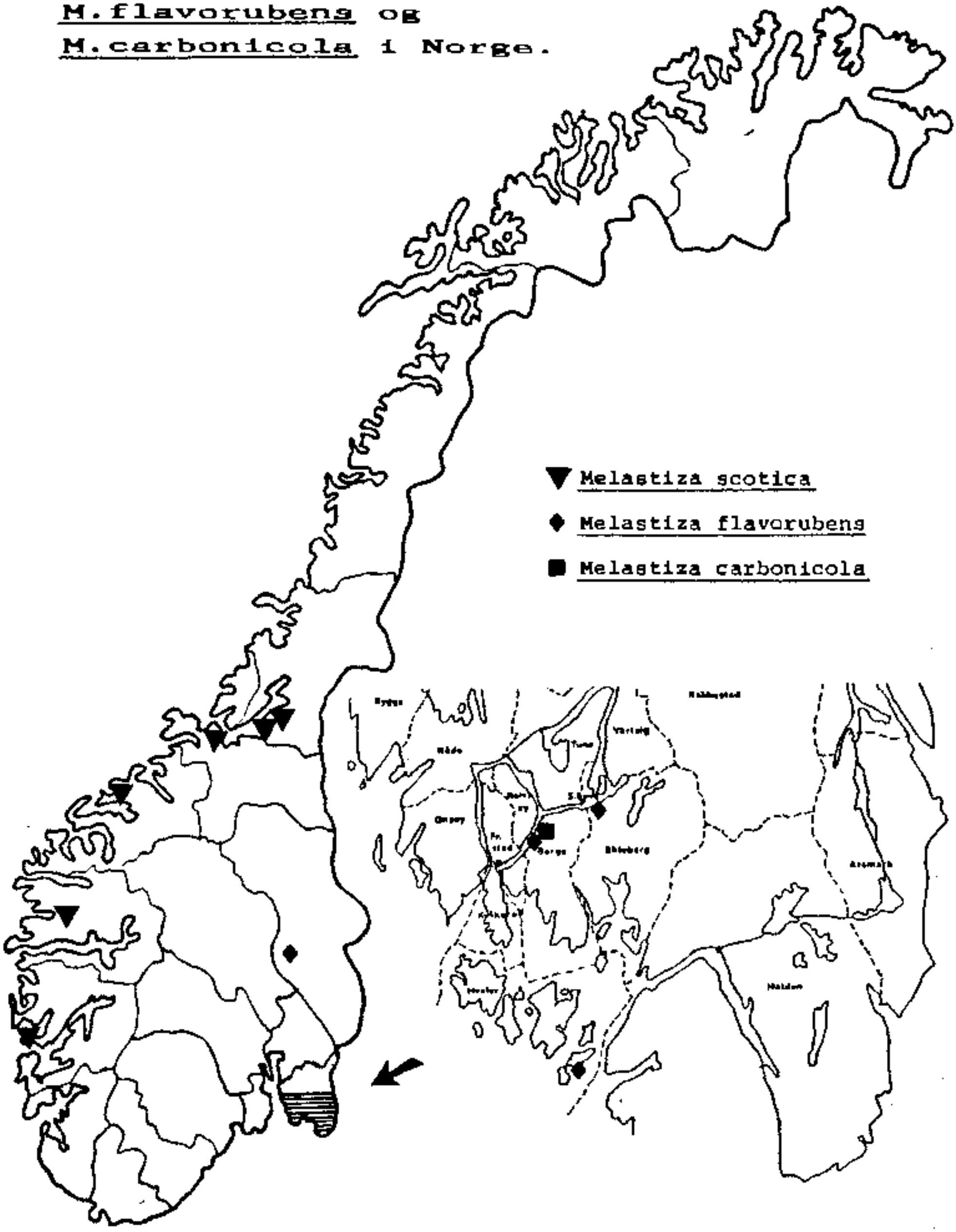
Melastiza Boud.

Melastiza kjennetegnes på på sine stilkløse livlige rødetil oransje fruktlegemer (5 - 30 mm) med en mer eller mindre tydelig brunlig kant av tiltrykte hår. Mikroskopisk er den meget lettkjennelig på de vakkert ornamenterte sporene , og de brune hårene langs kanten.
Melastiza står meget nær Aleuria-slekten, og den vesentligste forskjellen mellom dem ligger i fargen på hårene på utsiden ; Melastiza har brune - Aleuria hyaline/fargeløse.
Enkelte forfattere mener dette ikke er kriterium godt nok for å holde de adskilt, f.eks. Moravec (1972).
Melastiza har tilsynelatende sin hovedutbredelse i Europa, hvor vi har minst 6 arter (Lassueur 1980,Spooner 1981):M.chateri,M.scotica,M. flavorubens,M.boudieri,M.carbonicola og M.asperula.Breitenbach & Kränzlin (1981) har avbildet og beskrevet nok en art, uten navn.
Utenfor Europa er det meget sparsomt med funn, men Seaver (1928) beskriver M.chateri fra Nord-Amerika (inkl.Kanada), mens Gamundi (1975) har den fra Ildlandet (Tierra del Fuego).
Fra India har Maas Geesteranus (1967) beskrevet M.rubra (Batra)Maas G.. Den er ikke kjent fra Europa.

Dissing (1980) har gitt en fin oversikt og innføring over Melastiza-arter i Danmark, - den eneste på et nordisk språk.
Den vanligste overalt er M.chateri (småoransjebeger).I Norge første gang beskrevet av Eckblad(1956).Schumacher (1979) har kartlagt utbredelsen. Selv om det helt mangler funn fra de sydligste fylkene , og helt nordpå (Finnmark) er den sikkert oversett/ikke samlet i disse områdene.
Aas (1983) har registrert den på Vestlandet. Den er og kjent fra Vestfold. Fra Østfold har vi minst et dusin funn fra flere kommuner(Tune, Fredrikstad,Halden,Borge o.fl.)
Jeg har også funn fra Flåmsdalen,Strandavatn og Geiteryggen ved Hallingskarvet. Funnene ved Geiteryggen (ca 1200 m o.h.) og Strandavatn (ca 1000 m o.h.) viser at den også er utbredt i alpine områder. Funnet fra Geiteryggen er foreløpig det høyest beliggende en kjenner til (leg.Ebba Kristiansen) Herb.TRH.

For nærmere beskrivelse av M.chateri , se Dissing (1980).

Fig.18 Utbredelsen av <u>Melastiza scotica</u>, <u>M.flavorubens</u> og <u>M.carbonicola</u> i Norge.



En annen art, M.scotica, er første gang i Norge nevnt av Sivertsen (1975). Senere er den funnet flere ganger på Vestlandet og nordover til Nord-Trøndelag (Aas 1983, Jordal 1983, herb.B,TRH,O).
Det er ingen funn fra Østlandsområdet (inkl.Østfold), ei heller Sørlandet, og det kan se ut som M.scotica har en påfallende vestlig utbredelse i Norge (jfr. utbredelseskartet for Norge, fig. 18).
Hovedsakelig en barskogsart, også på sur mark i Vaccinio-Piceetum, men Dissing (1980) angir funn under bøk (Fagus) fra Danmark.
Breitenbach & Kränzlin (1981) har tatt i Sveits på 1450 m (!), og den har dermed en vid topografisk amplitude(Danmark versus Sveits).
M.scotica er meget lettkjennelig med sine rel. store fruktlegemer,livlige oransje farge, og særdeles store,kraftige ornamenterte sporer (se Dissing 1980).Det er ellers sparsomt med rapporterte funn.Den er originalbeskrevet fra Skottland (Graddon 1961).
I tillegg til forannevnte Melastiza-arter er det funnet ytterligere to arter i Norge, begge i Østfold.

Melastiza flavorubens (Rehm)Pfister & Korf.

Syn.M.greletii LeGal

Tidligere ikke publisert for Norge.

Meget påfallende, som i Danmark (Dissing 1980) , voksende i gamle hjulspor, men neppe alene godt nok for å bestemme den til art !
Den likner i det ytre på M.chateri, men skilles lett på de karakteristiske sporene (se nedenfor), og hårene langs kanten.

Beskrivelse: (fig. 19 a , fruktlegemer)

Apothecier opp til 10 mm diam.,grundt skålformet, ofte noe uregelmessig p.g.a. sammenvoksninger av flere, med tydelig mørk brun kant.Gruppevis.
Hymenium skarlagenrød til oransjerød, utsiden mørk brunlig p.g.a. de tykke hårene, som er 2 - 6 cellede, og opp til 130 um lange.(fig.19 c).
Cellene i ytre eksipulum tykkveggede og brunfargede.
Asci: sylindriske, 8-sporet,opp til 230 x 10 - 12 um.
Parafyser (fig.19 b) slanke, 3 um, utvidet i toppen til ca 5 um.Innholdet farges grønt i Melzer reagens.
Sporer: ellipsoide, 15,0 - 19,0 x 7,0 - 9,0 um, uten ornamentering,som består av 1 - 2 um høye uregelmessige vorter,mer eller mindre sammenbundet av smale/tynne lister (se fig.19 d og e, samt SEM fig.20).

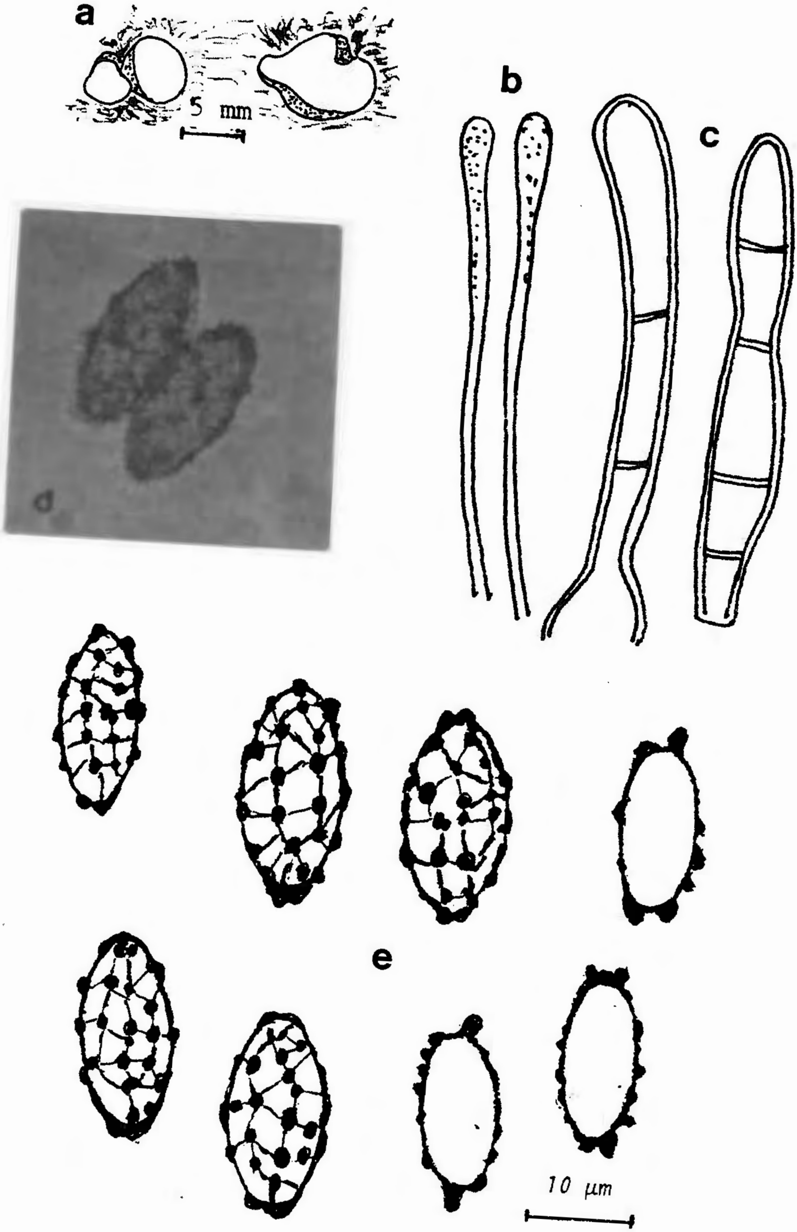


Fig.19 *Melastiza flavorubens*

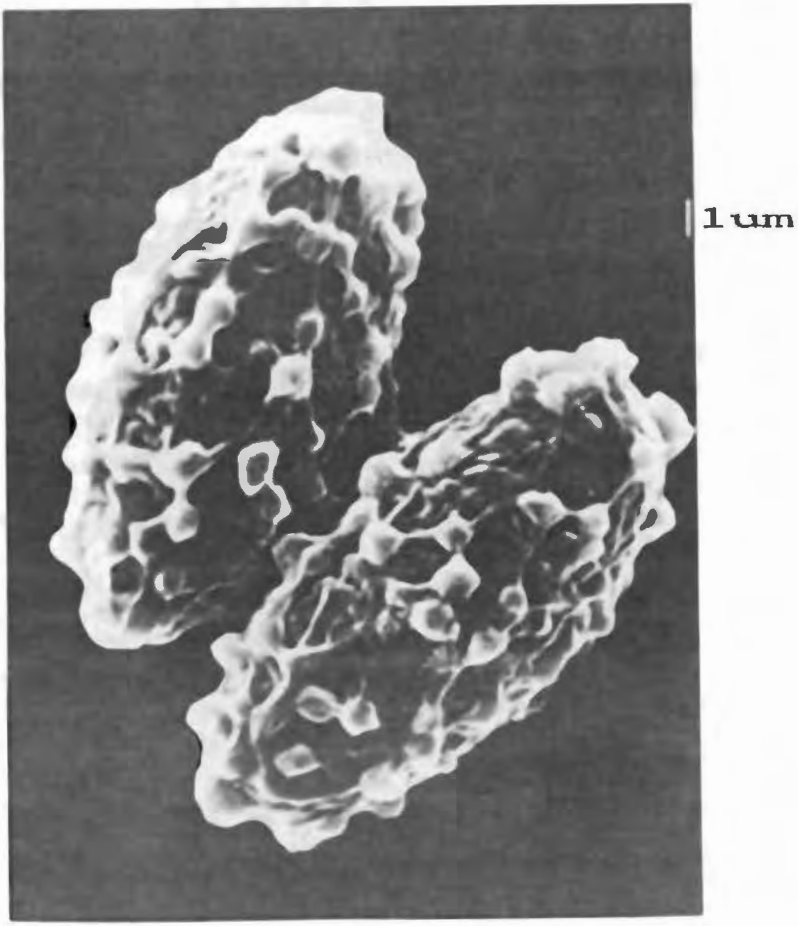
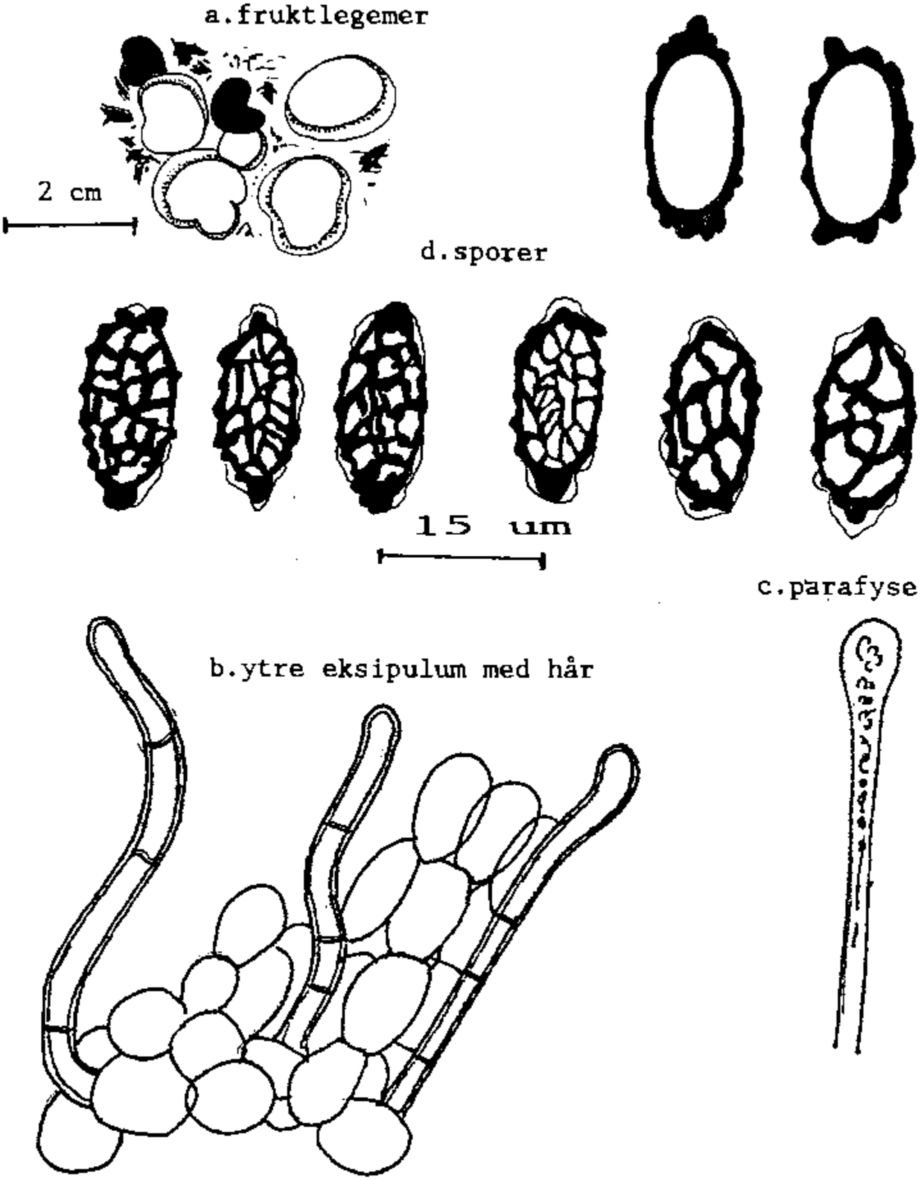


Fig.20 M.flavorubens
SEM T.Schumacher
Koll.Nannestad,Hurdal.
x4400

Fig.21



Melastiza carbonicola

Østfold,Borge kommune,Sandem, ca 20 m fra Glomma's bredde.På leirjord i gammelt fuktig hjulspor, sparsomt mosebevokst, noe Tussilago farfara,Urtica dioeca og Filipendula ulmaris i Salix-Alnus vegetasjon.
Sammen med Tarzetta cupularis og "Peziza"pseudoanthracina (Boud.)Don.
19. og 21.august,2.september 1982,20.juni 1983 (RK 83.150) Herb.C

Østfold,Skjeberg kommune,Hafslundsparken.På svart mulljord i gammelt fuktig hjulspor under Fagus og Quercus, sammen Lamprospora macracantha.
28.august 1983 (RK 83.233).

Østfold,Hvaler kommune,Søndre Sandøy, nær Kasa. På svart jord i mosebevokst hjulspor med Juncus gerardi, sammen med Boudiera acanthospora og Lamprospora macracantha. 30.juli 1984 (RK 84.75).

M.flavorubens er óg kjent fra Nannestad,Hurdal, ca 1980 (pers.medd. T.Schumacher 1985).

Arten er begrenset til noen få funn i Europa, f.eks.Tsjekkoslovakia (Moravec 1972),Jugoslavia (Moravec 1971),Nederland (Maas Geesteranus 1975), Frankrike (LeGal 1958) og Danmark (Dissing 1980).

Melastiza carbonicola Moravec.

Hittil bare kjent fra Tsjekkoslovakia, og beskrevet av Moravec (1972).
Den likner i mange henseende på M.chateri, men skilles lett på sporene.
M.carbonicola er opprinnelig funnet på brent mark (derav navnet), men Moravec (pers.medd. 1985) har senere også gjort funn på jord uten spor av brann-/bålrester.
Ornamenteringen på sporene er mye grovere og uregelmessig enn M.chateri, og har dessuten mer utpregede utvekster/vinger ved polene.
I 1983 ble det funnet en Melastiza-art på bål i Borge kommune,Østfold.
Dette er M.carbonicola - det første funn utenfor Tsjekkoslovakia.
J.Moravec har bekreftet min bestemmelse.

Beskrivelse:

Apothecier (fig.21 a) 5 - 20 mm diam.,grundt skålformet, oransjerød med rosa skjær; kanten er sparsomt dekket av brunlige hår. Hårene er opp til 200 um lange, 8 - 12 um breie, ofte bøyde, 2 - 4 septerte, med butte ender (fig.21 b).
Eksipulum består av globulære eller angulære celler, 30 - 50 um i diam..
Asci.:8-sporet, sylindriske,250 - 270 x 8 - 11 um.
Parafyser (fig.21 c) ,tynne, ca 4 um tykke, fortykket i toppen til 8 um.
Det oransjefargede innholdet farges grønt i Melzer reagens.

Sporer (fig.21 d),ellipsoide, 14 - 17 x 7 - 9 um, uten ornamentering, som består av et grovt uregelmessig reticulum med store butte eller spisse utvekster/hetter/vinger på polene (ca 20 - 24 x 8 - 10,5 um med ornament).

Østfold,Borge kommune,Torp, like syd for parkanlegget til Torp Bruk (nedlagt), bålrester i veikant blant Filipendula ulmaris og Urtica dioeca, under alm (Ulmus glabra).
28.mai 1983 (RK 83.117) Herb.C, J.Mor..

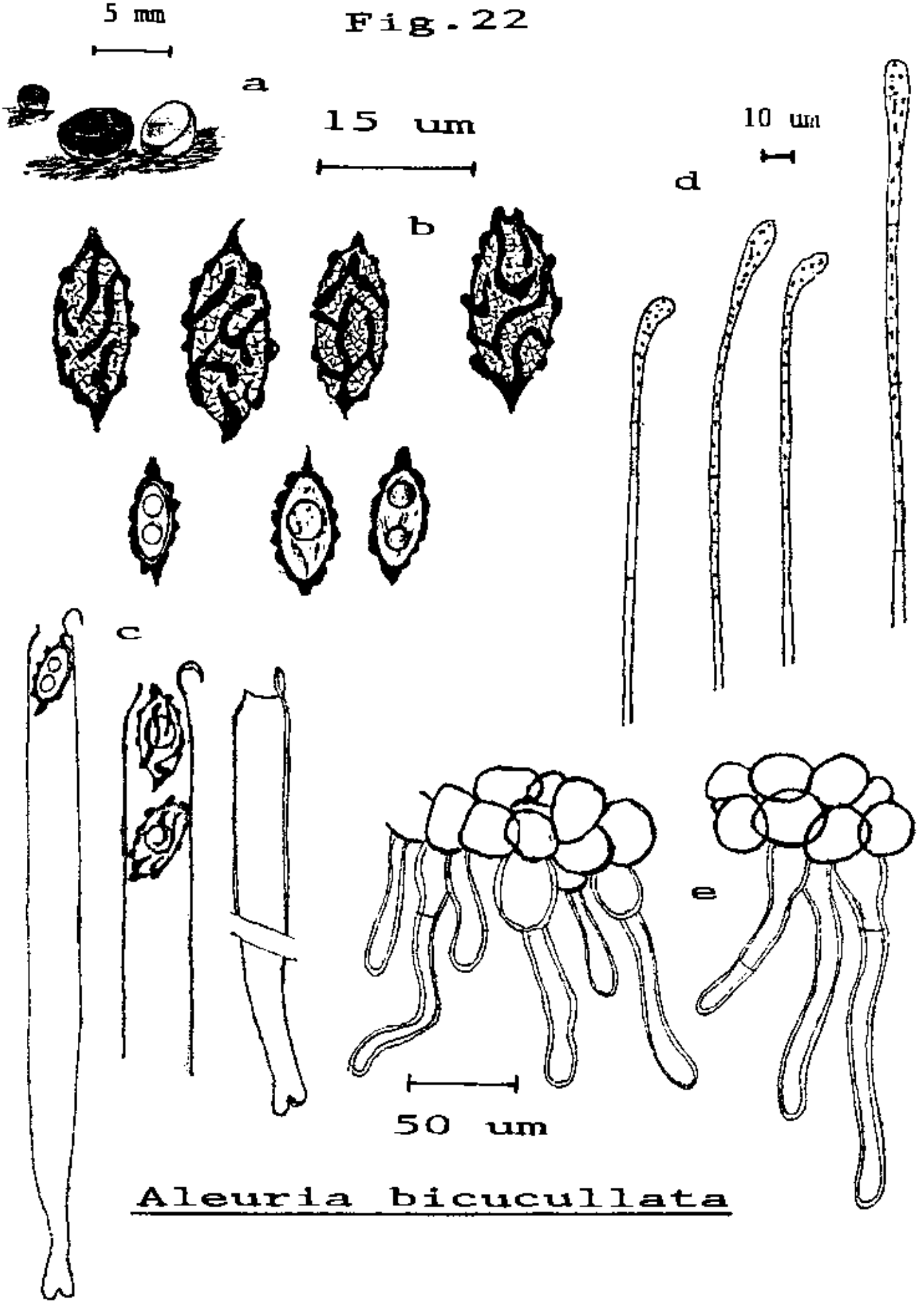
Aleuria bicucullata (Boud.)Gill.

Foruten oransjebeger (Aleuria aurantia), som er meget vanlig, kjenner vi to andre meget sjeldne Aleuria-arter i Norge, A.rhenana Fuck. (Kristiansen & Marstad 1985) og A.bicucullata (Dissing 1983).
Mens A.aurantia og A.rhenana (Kristiansen & Marstad 1985) har en kosmopolitisk utbredelse, synes A.bicucullata å være begrenset til noen få lokaliteter i Europa (Frankrike,Tsjekkoslovakia,Øst- og Vest-Tyskland ?,Sovjet, og Danmark) og Nord-Amerika (Wisconsin og Ontario).
Det norske funnet er gjort på Hvaler i Østfold, og er såvidt nevnt av Dissing (1983).Her følger en beskrivelse av materialet:

Apothecier (fig.22 a) stilkløse, 2 - 5 mm i diam.,grundt skålformet til helt flat,med lav, men tydelig kant.Enkeltvis eller gruppevis.
Hymenium guloransje til oransje/aprikosfarget.Utsiden blekere, noe melet, med hyaline forankringshyfer, 100 - 200(300) x 8 - 20 um (fig.22 e).
Ytre eksipulum består av subglobulære/angulære fargeløse celler 25 - 50 um i diam..(fig.24).
Asci (fig.22 c),8-sporet,sylindriske, 200 - 210(230) x 11 - 13 um.
Parafyser:(fig.22 d) ,slanke ,septerte, ca 3 um tykke, rette eller krumme i toppen, og 5 - 7 um tykke.
Det oransje pigmentet farges grønt i Melzer reagens.
Sporer : ellipsoide, med to store dråper, en-radet, 15 - 16(17) x 7 - 8,5 um uten ornamentering, som består av 3 - 5 um høye, cyanofile, uregelmessige ribber/åser , og mer eller mindre spisse vinger/utvekster ved polene (se fig.22 b). Mellom ribbene kan man ane , med stor forstørrelse (i lysmikroskop) , et fin-masket nett. I scanning elektron-mikroskopi (SEM) fremtrer dette som små fordypninger blant ribbene , se fig.23.

Østfold,Hvaler kommune,Asmaløy, ved Svarteberget, på svart jord blant Polytrichum sp. og kumøkk, lite beitemarksområde nær sjøen, sammen med store mengder Neottiella rutilans. Ca 50 apothecier,6.november 1982.
Herb.C,J.Mor. Fargeillustrasjoner: Boudier II (1907) pl.318.

Fig.22



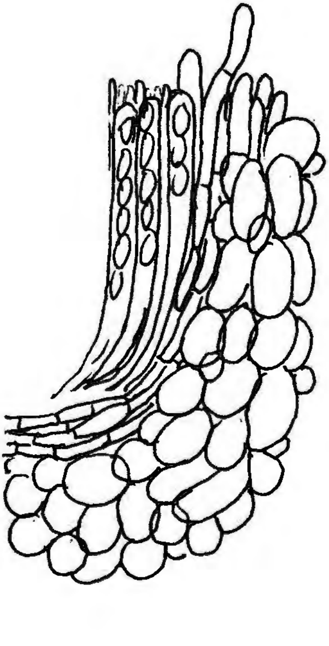
Aleuria bicucullata

Fig.23 SEM T.Schumacher Koll.Asmaløy,6.11.82
x5400

Aleuria bicucullata

Fig.24

Snitt av kanten
Skjematisk



Som allerede antydet av Dissing(1983) vokser A.bicucullata på samme helt spesielle lokalitetstype både i Danmark,Tsjekkoslovakia og Norge, - nær kumøkk med Polytrichum-mose.
Moravec (1972) har antydet at Octospora pleurozii Eckbl. (Eckblad 1968) muligens kan være identisk med A.bicucullata. Likheten i sporeornamentering, og andre makro- og mikrokarakterer kan synes påfallende lik, men O.pleurozii har bl.a. mindre/lavere ribber, og jeg kan vanskelig tro at Eckblad har oversett et eventuelt fint retikulert mønster slik A.bicucullata har (jfr. hans Leucoscypha borealis).
Bare en direkte sammenlikning av begge arter kan avgjøre dette.

Octospora wrightii (Berk.& Curtis) Moravec.

Denne art er nylig omtalt av Dissing & Sivertsen (1983b) i forbindelse med deres beskrivelse og undersøkelse av noen vortet-sporede Octospora-arter i Norge. O.wrightii var, - på det tidspunkt de skrev, - ikke kjent i Skandinavia. Den er overalt en meget sjelden art , som bare er kjent fra England (typelokalitet),Vest-Tyskland,Øst-Tyskland,Frankrike,Østerrike (se Dissing & Sivertsen 1983b for referanser) og Sveits (pers.medd.H.Dissing 1985).
O.wrightii vokser utelukkende på mosen Amblystegia serpens (Hedw.)B.S.G..
Tidlig i juli 1982 ble O.wrightii funnet i Borge kommune i Østfold, og den er senere funnet hvert år, vinter/vår/forsommer, i hundrevis av eksemplarer (kanskje tusener totalt).
Professor R.P.Korf, Cornell Univ.,Ithaca,N.Y., har blant annet fått en rik kolleksjon for hans "Discomycetes Exsiccati".
Herb. CUP,C,TRH,LPS,PRM,J.Mor..

Beskrivelse:

Apothecier (fig.25 a) opp til 2 mm i diam.,først kuleformet, senere utvidet, grundt begerformet, med opprettstående frynset/tannet kant, stilkløs eller med en bred stilkliknende basis på helt utvokste eksemplarer.
Hymenium oransje til guloransje, mer intens oransje på små umodne .
Utsiden likefarget, eller noe lysere/blekere; den frynsete kanten oftest blek guloransje til nesten hvit i tørrvær.
Enkeltvis eller tett sammenvokste i store kolonier.
Asci (fig.25 b & c), 8-sporet, sylindriske, avsmalende mot basis, 170 - 220 x 15 - 20 um, tomme asci opp til 250 um lange.
Parafyser (fig.25 d) , rette eller svakt bøyde, slanke,1 - 2 septerte, ofte forgrenet ved basis, 4 - 6 um breie, svakt fortykket i toppen til 7 - 8 um.
Det oransje innholdet farges grønt i Melzer reagens.

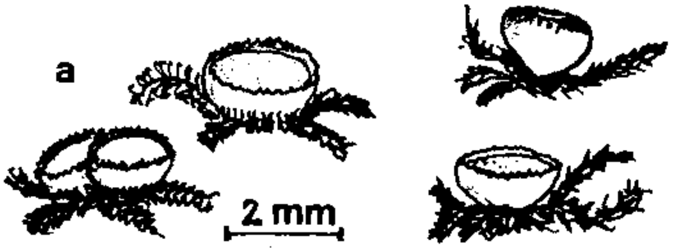


Fig.25 O.wrightii

a.fruktlegemer

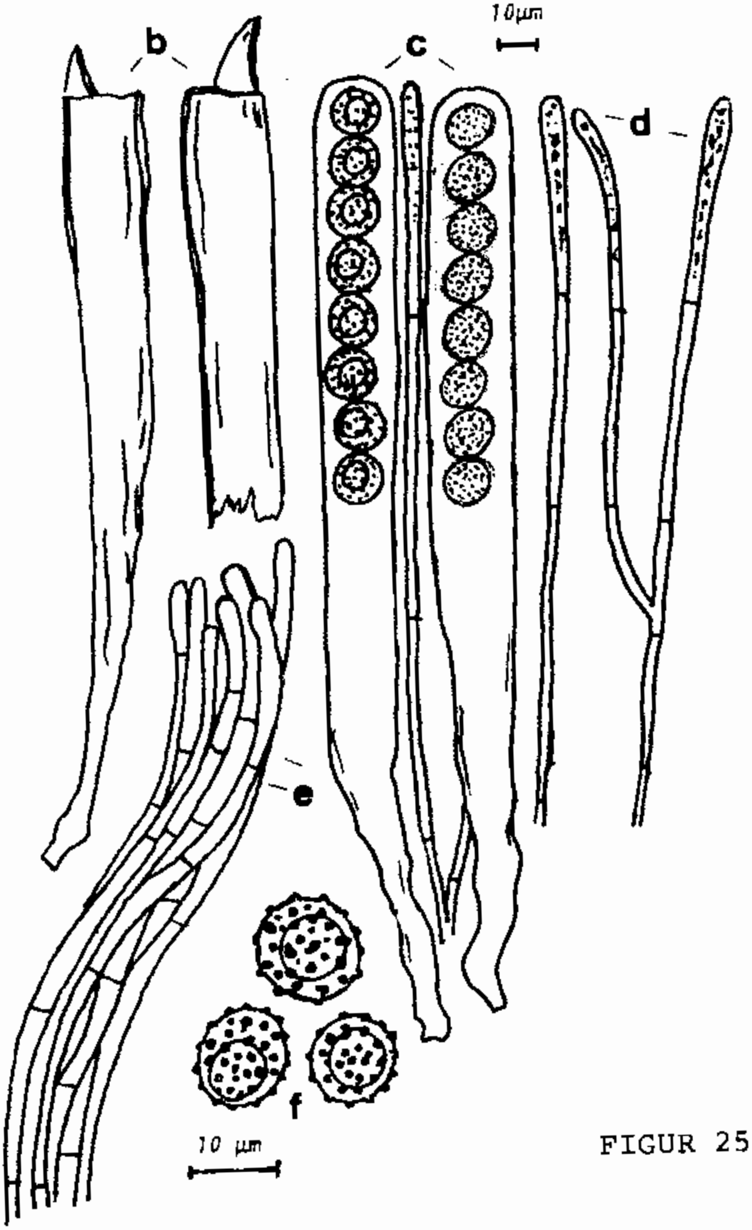
b.tomme asci med operculum

c.asci m/sporer og parafyser.

d.parafyser

e.ytre eksipulum

f.sporer i vann m/oljedråpe



FIGUR 25

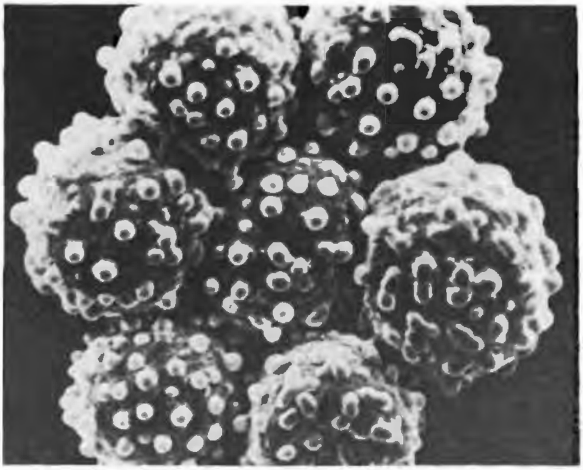
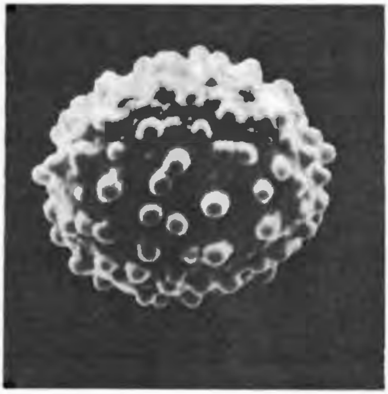


Fig.26 O.wrightii
SEM H.Dissing Koll.RK. Nov.-82
x2000 (Østfold,Norway) (C)



Ditto. x3000

Sporer (fig.25 f) globulære,subglobulære til bredt ellipsoide, variable i dimensjoner, fra 11,6 - 13,5 um diam.(runde), 10,5 x 11,5, til 9,5 - 11,5 x 12,5 - 13,5 um, ornamentert med isolerte, halvkuleformede vorter, 0,5 - 1,2 um høye og breie, sjeldnere sees 2 - 4 vorter sammenvokste, med en eksentrisk oljedråpe, 7 - 8 um i diam., en-radet.
Se også SEM-bilder av sporer, fig. 26 og 27.
Den opprettstående ytre kanten består av tykk-veggede ,septerte, butte hår, av textura porrecta (fig.25 e), 7 - 12 um breie.

Materiale.

Østfold,Borge kommune, Torp, på sydsiden av nedlagte Torp Bruk(papirfabrikk). På / blant murfotmose (Amblystegia serpens), på kulturpåvirket, sterkt kalkholdig slam og jord, eller på liggende døde kvister og greiner av selje (Salix), sjeldnere ved foten av levende selje og or.
8.juli 1982 (RK 82.165),november 1982; 8.januar 1983 (RK 83.10); 23.mars 1983 (RK 83.51);28.mai 1983;11.juni 1983; 7.juli 1984 (RK 84.36); 16.mars - 27.april 1985 (RK 85.01).

I samme område finnes ellers et rikt utvalg av andre interessante eller sjeldne discomyceter, som Chalazion helveticum,Boubovia luteola,Helvella corium,Marcelleina persoonii og rickii?, store mengder Pulvinula constellatio, og andre,-men svært lite Agaricales.Den hypogeiske Tuber foetidum Vitt. opptrer rikelig.

De avbildede SEM-fotos av sporer fra Sveits stammer fra et funn , gjort av S.Sivertsen.Følgende opplysninger foreligger fra H.Dissing,København: "Switzerland,Graubünden,Pradella,Schulz,alt.1170 m, on Amblystegia, growing on moist sand and trunk og Salix close to a small stream,September 1, 1984 (coll.Sch.84.60,C,TRH).

Fargeillustrasjoner:
Boudier II (1907) pl.399

Det tidligere rapporterte funn av O.wrightii fra Tsjekkoslovakia (Moravec 1969) har vist seg å være en annen art, beskrevet av Khare (1976) under navnet O.moravecii. Den har ikke en opprettstående kant, annerledes anatomi, og større sporer (ikke mindre , som angitt av Khare 1976).
Materiale av (angivelig) O.wrightii fra Texas,USA er undersøkt av Dissing & Sivertsen (1983b), og funnet å være et annet ukjent taxon. De andre funn fra Alabama,Nebraska og Kuba (Seaver 1928) synes likeså suspekte.

O.wrightii synes derfor å være begrenset til noen få lokaliteter i Europa.
Se utbredelseskart fig.28.

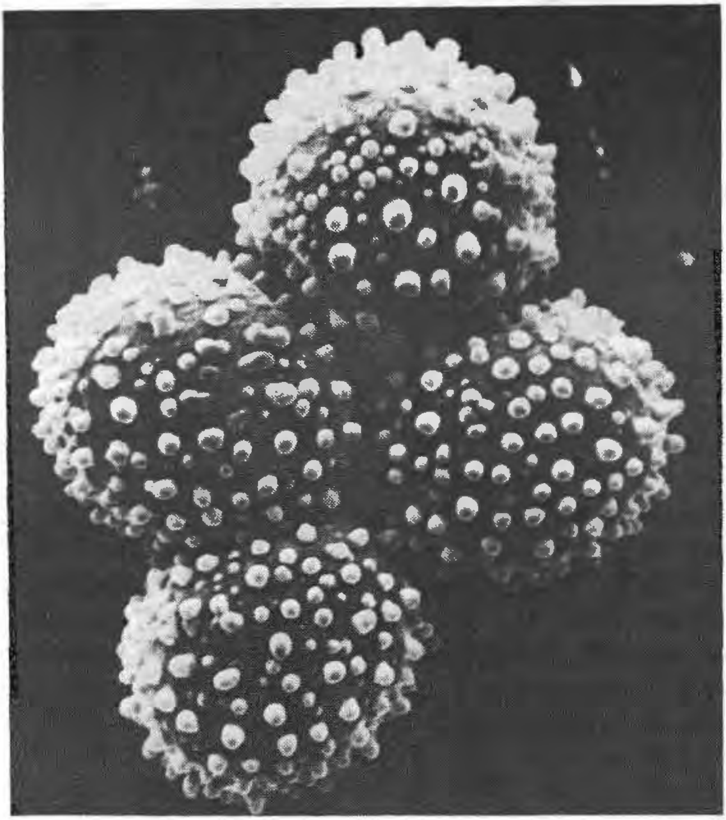


Fig.27 <u>O.wrightii</u>
SEM H.Dissing Koll.Sch.84.60
x 3000 (C)

O.wrightii forekommer i lavlandet , såvel som i alpine områder (Sveits 1170 m, Østerrike 7). Amblystegia serpens er en svært vanlig lavlandsmose i hele Norge, f.eks. ved foten av murer, i komposthauger og neslekratt. Flere funn av O.wrightii bør kunne forventes.

Døbbeler (1979) har meget detaljert beskrevet og illustrert infeksjonsapparatet, hvor O.wrightii forårsaker rhizoide galler, d.v.s. en unormal vekst som skyldes et "angrep" av en parasitt, som påminner om knoppene / spirene på A.serpens.

De fleste funn i Sentral-Europa er gjort i vinter-månedene - det norske og sveitsiske er gjort på våren/forsommeren og tidlig høst, - naturlig nok siden disse to land har en annen fenologi.

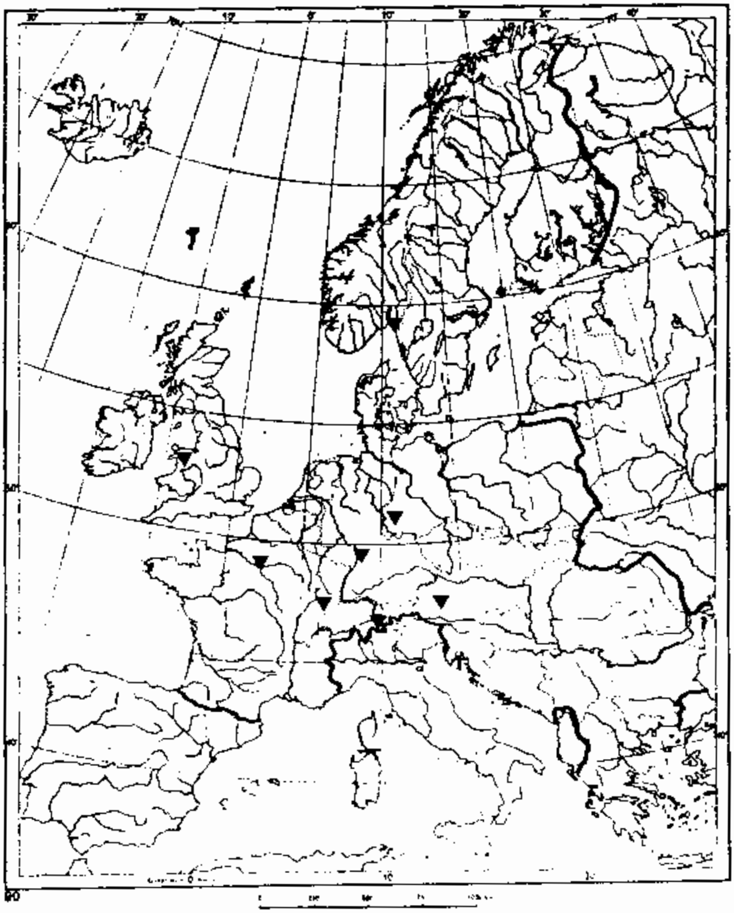


Fig. 28 Utbredelsen av Octospora wrightii i Europa.

Octospora melina (Velen.)Dennis & Itzerott.

Beskrevet og presentert for første gang i Norge av Dissing & Sivertsen (1983 B), - alle funn fra Rana i Nordland.
Itzerott (1983) har nevnt funn fra Østfold i forbindelse med beskrivelse av infeksjons-apparatet,rhizoide galler, på Bryaceae.
I 1982 ble O.melina funnet i store mengder i Hvaler og Borge kommune, Østfold, og i 1983 tatt i Buskerud.

Beskrivelse:

Apothecier (fig.A) 1,5 - 2,5(<3,0) mm i diam.,halvt nedsenket i jorda, halvkuleformet eller turbinate, med en konkav overflate, med en tydelig blek gulig kant, fin-tannet, bestående av parallelle butte hyaline hyfer, ca 10 um breie. Hymenium oransje,blek/lys oransje til guloransje, - utsiden likefarget eller noe lysere.
Asci (fig.B) 8- eller 4-sporet,sylindriske ,210 - 270 x 15 - 18 um.
Parafyser (fig.C) , tydelig/utpreget krumme i toppen (hocey-liknende), septerte, 5 - 6 um tykke,gradvis tykkere mot toppen til ca 8 um, med oransje små dråper.
Sporer (fig.D) bredt elliptiske, 15 - 18 x 11 - 13 um; sporer fra 4-sporige asci større, 17 - 20 x 12- 14 um, tett dekket av cyanofile ca 1 um høye og breie regelmessige vorter, med en eller to store oljedråper, en-radet.

Materiale.

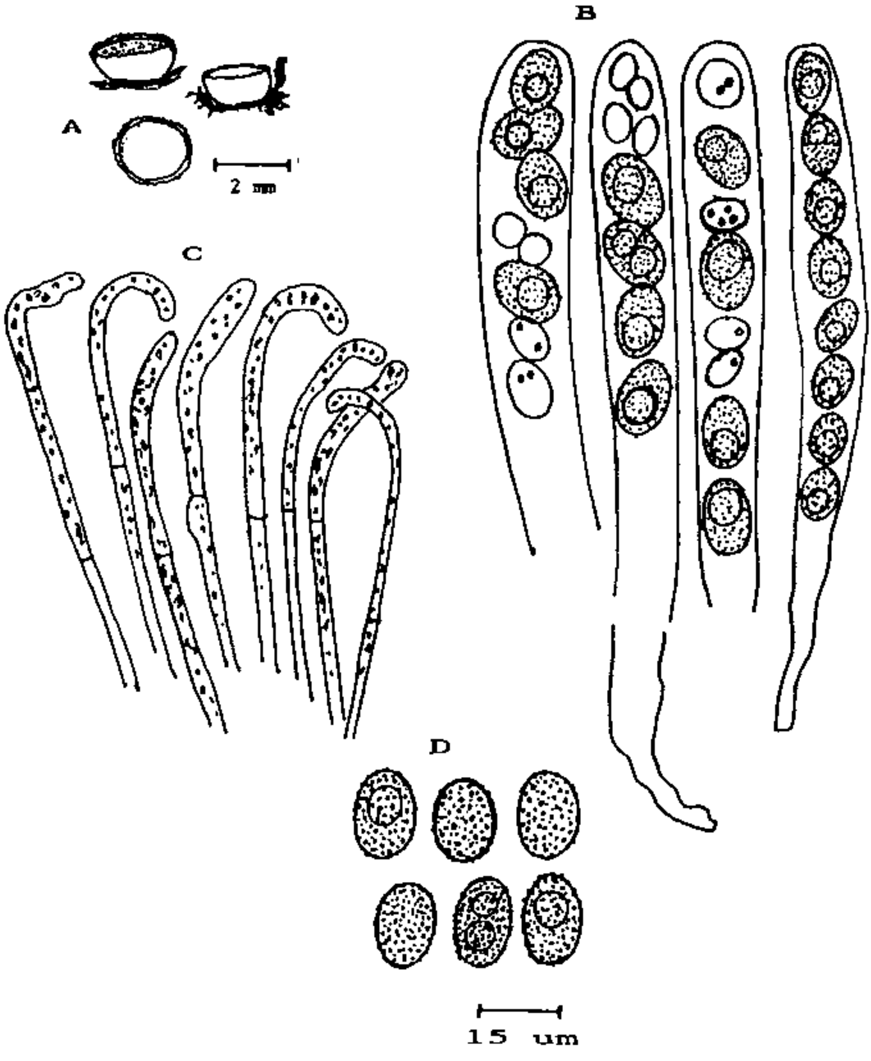
Østfold,Borge kommune,nær Torp Stadion, på avfallsplass blant Ceratodon purpureus, 23. og 31.oktober 1982.

Østfold,Borge kommune,Sandem, på avfallsplass blant moser,7.november 1982.

Østfold,Hvaler kommune,Asmaløy, nær Brattestø, rikelig (hundrevis)blant mosene Bryum caespiticium,Bryum argentum,Barbula convoluta,Ceratodon purpureus og Syntrichia cf.norvegica.På campingplass,30.oktober 1982.

Buskerud,nord for Hol,Hovet,på vestsiden av Aani,i mose, blant gress, i kanten av en åker. 14.juli 1983.

Det synes å være få rapporterte funn av O.melina, originalbeskrevet fra Tsjekkoslovakia (Velenovský 1934, som Humaria melina),senere i England (Dennis 1978) og Vest-Tyskland (Itzerott 1981,1983).
O.melina står nær O.hygrohypnophila (Dissing & Sivertsen 1983 b) og O.meslinii (Itzerott 1981).Skilles på sporene og habitat.



Figur A. Fruktlegemer
B.Asci med 4 sporer og aborterte,
samt 8-sporig.
C.Parafyser
D.Sporer

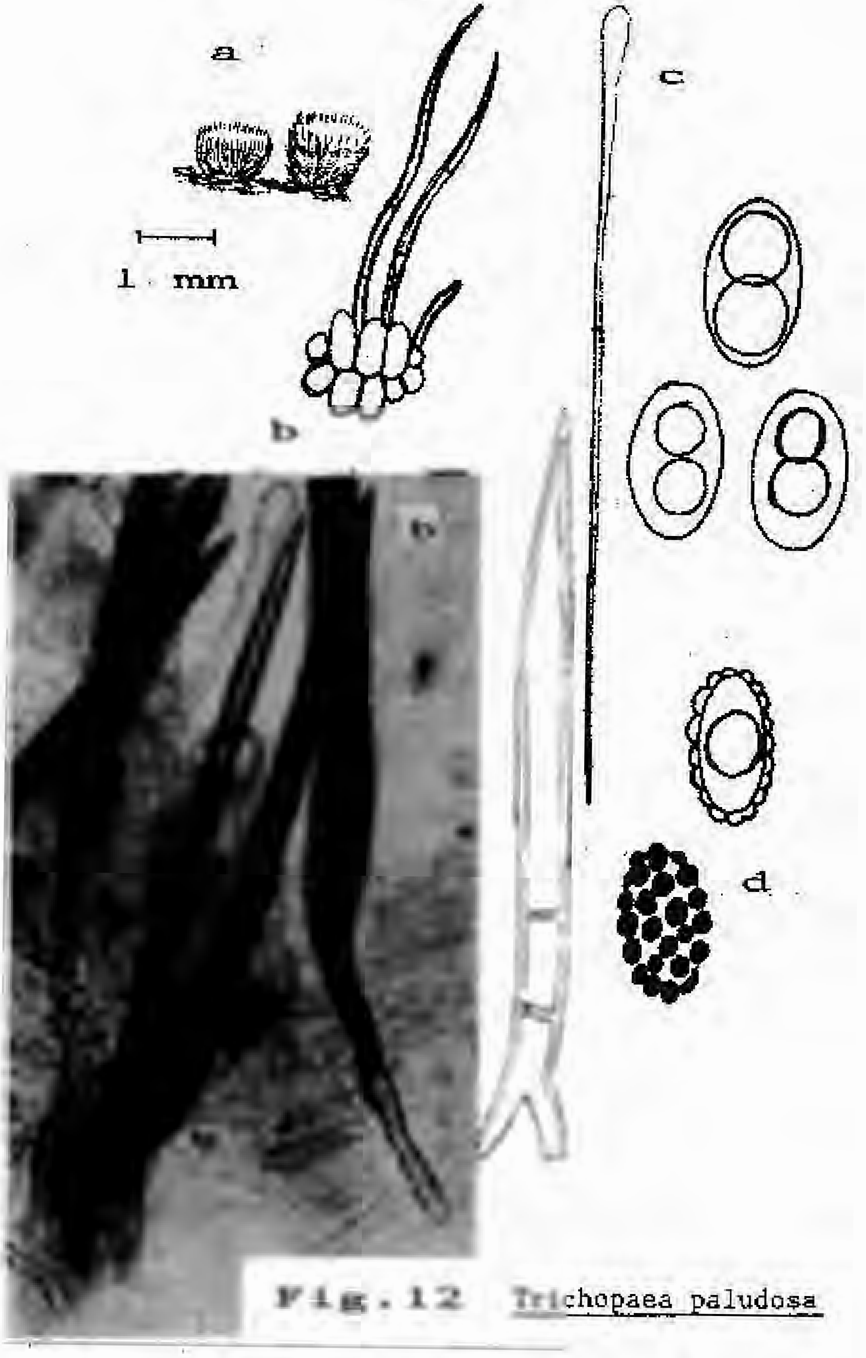


Fig.12 Trichopaea paludosa

Pulvinula ovalispora Boudier.

Slekten Pulvinula består alt overveiende av rundsporede arter (Pfister 1976), ca 25 arter i alt, samt flere ubeskrevende taxa. Inntil ganske nylig kjente man bare en eneste ellipsoid-sporet art, P.ovalispora (Boudier 1917), tidligere bare kjent fra type-lokaliteten i Algeria, funnet 1912.
I tiden 1948 til 1976 er det imidlertid gjort fire funn i Nord-Amerika (deriblant et fra Jamaica) og et funn på Kanariøyene (Korf & Zhuang 1984).
Dessuten er det beskrevet en ny ellipsoid-sporet art, P.ascoboloides, fra Kina (Korf & Zhuang 1984).
Dette er de eneste ellipsoid-sporede arter pr.i dag , som er beskrevet.

I 1984 ble P.ovalispora Boud. funnet i Borge kommune,Østfold, første funn i Europa.
De fleste Pulvinula-arter er små, 1 - 5 mm i diam., og er makroskopisk ganske like, med farger i hvitt,rødt og gult; mikroskopisk kjennetegnes spesielt på sine slanke, vanligvis hockey-liknende parafyser og generelt avsmalende asci med en karakteristisk gaffel-liknende basis.

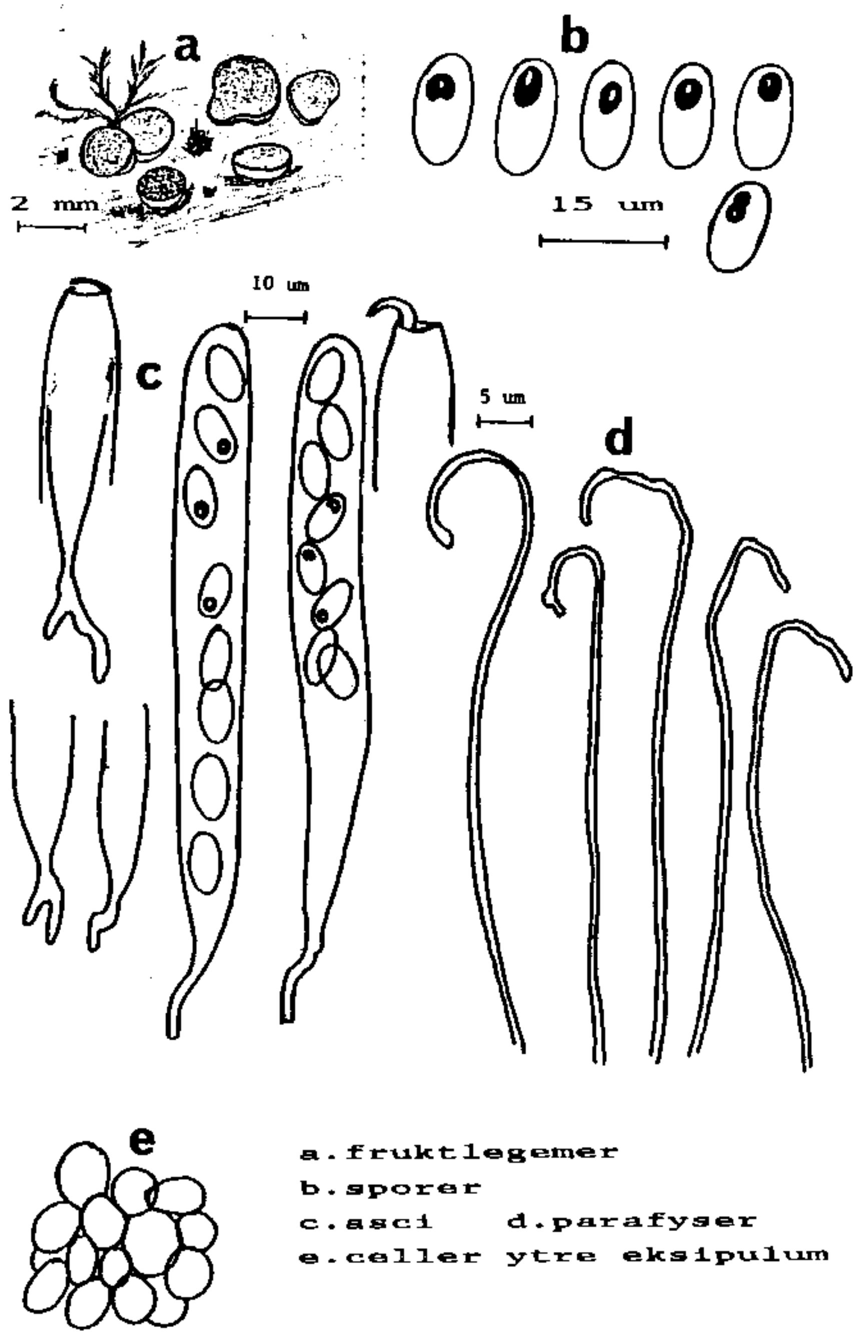
Beskrivelse:

Apothecier (fig.29 a) 1 - 2 mm diam., ca 1 mm høye, tydelig runde eller noe uregelmessige p.g.a. tett sammenvokste eksemplarer, flate,skiveformet, eller sjeldnere turbinate, tydelig kant.
Hymenium grålig oransje,matt rødgule til gulrosa. utsiden blekere.
Asci (fig.29 c) ,8-sporet,klubbeformet,tydelig avsmalende til en tynnere basis,ofte gaffel-delt, 130 - 160 x 12,0 - 12,5 um, oppstikkende på modent materiale.
Sporer Fig.29 b og 30) ,en-radet, bredt ellipsoide, noe ulikesidet, glatte (i CB oljeimm.) , ofte med uregelmessig deBary boble (eller 2 -3 bobler sammenflytende ?) ; granulert innhold ved polene,på innsiden.
12,6 - 14,4 x 7,4 - 8,8 um.
Parafyser (fig.29 d) , slanke, trådaktige, sterkt krummet i toppen, jamntykke,1,0 - 1,5 um .
Ytre eksipulum består av globulære - subglobulære (textura globulosa-angularis) celler 7 x 8 til 12 x 14 um i diam., fig.29 e.

Materiale:

Rikelig på nesten bar kalkholdig leirslam/leire (pH 7,5) , sparsomt med moser, blant tett bestand av Melilotus officinalis,Tussilago farfara, og Vicia sp., sammen med Lamprospora sp. (nettsporet).
Østfold,Borge kommune,Torp,nær Kreutzgate, 7.juli 1984 (RK 84.40) og 11. august 1984 (RK 84.99). Herb.CUP,TRH,J.Mor..

Fig.29 <u>Pulvinula ovalispora</u>



a.fruktlegemer
b.sporer
c.asci d.parafyser
e.celler ytre eksipulum

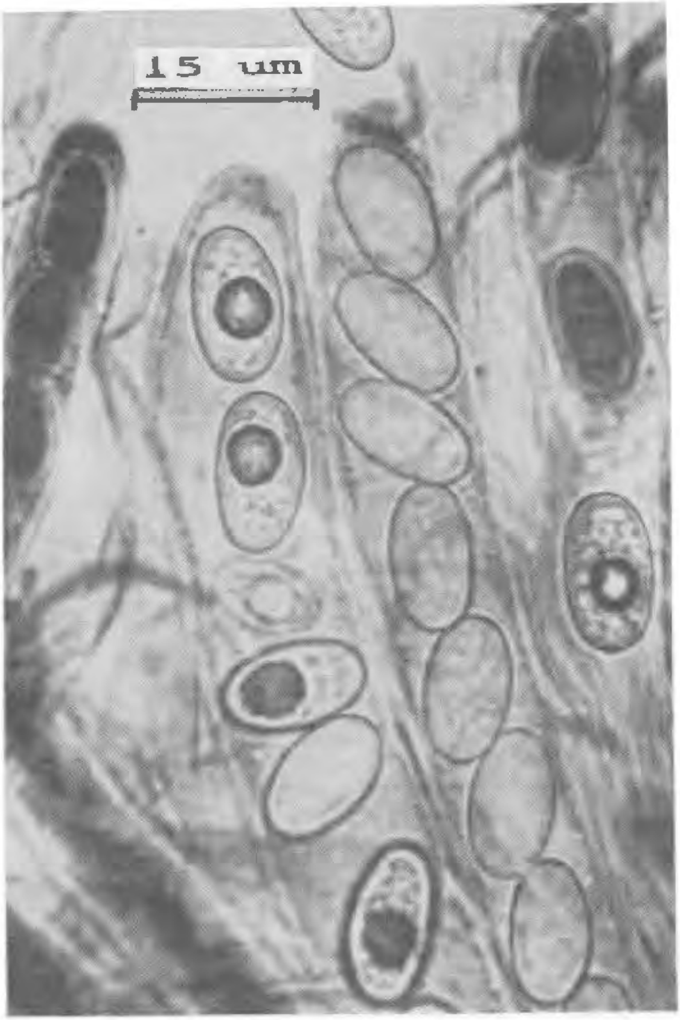


Fig.30 <u>P.ovalispora</u>
Asci m/sporer i CB,
med deBary boble.

Jeg har hatt materiale av P.ovalispora fra USA for sammenlikning,velvillig fremsendt av Prof.R.P.Korf.
USA,New York,Stone Quarry,Road,Ithaca,on leaf of Populus sp.,30.5.1964, R.P.K. 4065 (CUP).

Fargeillustrasjoner: Boudier (1917) pl.V fig.III

Det hersker ingen tvil om at det norske materiale er P.ovalispora, og Prof.Korf sier (pers.med.1984): "We are quite certain your "Boubovia sp.3" with the smooth spores is indeed Pulvinula ovalispora Boud..The structure is quite like our material."

P.ovalispora skilles fra P.ascoboloides ved at sistnevnte har noe større apothecier, grønlige farger, større asci og sporer, og sporene har dessuten et løsnende cyanofilt lag, som kollaberer og blir liggende rundt på utsiden av sporene (se Korf & Zhuang 1984).

Alle funn av P.ovalispora utenfor Europa er gjort i tiden januar til juli,- de fra varmere strøk(Jamaica, Kanariøyene og Algeria) i jan.-febr. -, de amerikanske i mai - juli.
Det norske er gjort i juli - august, ikke så overraskende, siden sopp fruktifiserer senere her nord.
Funnet fra Jamaica er tatt på kumøkk, de amerikanske på døde blader av Populus sp. (osp); de fra Kanariøyene og Algeria på jord.
Det norske er funnet på leirslam , men under stereolupe er det observert at enkelte apothecier vokser på døde bladrester av , sannsynligvis, selje (Salix), etter som dette er eneste tresort i nærmeste omgivelser.

De to artene (ellipsoid.sporede) Octospora spaniosa Khare og Octospora decalvata Khare , beskrevet fra India (Khare 1975) er høyst suspekte. Spesielt førstnevnte med tykk-veggede unge sporer får oss til å å tro at den hører hjemme blant Pulvinula (?), tross nettsporet mønster på modne sporer.Den vokser dessuten på råtnende blader. Begge de to nevnte har dessuten tydelig krumme og/eller forgrenede parafyser i toppen.
Forøvrig skal det bemerkes at ingen av de fire artene , beskrevet som Octospora (Khare 1975),vokser sammen med moser. I europeisk sammenheng er det vel utbredt oppfatning at alle Octospora-arter er bryofile.
Khare (l.c.) sier."decaying woods and leaves", "rotten leaves","on soil", og "on decaying leaves".
Figur 31 viser den globale utbredelsen av Pulvinula ovalispora.

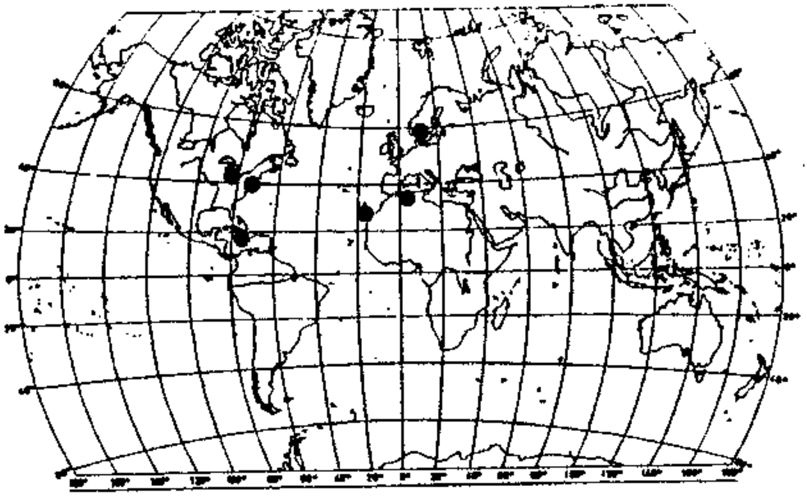


Fig.31 Utbredelsen for P.ovalispora.

Pulvinula ovalispora Boud. ? 4-sporet.

Samtidig med funn av P.ovalispora fra Borge i Østfold ble det, ca 50 m bortenfor, funnet fruktlegemer av en habituelt liknende art, men av rødlig oransje farge. En påfølgende mikroskopering viste . imidlertid at disse har 4-sporede asci,med ellipsoide sporer.

Fra litteraturen (Pfister 1976) kjennes to rundsporede Pulvinula-arter med 4-sporede asci.

Her følger en beskrivelse av den 4-sporede med ellipsoide sporer.

Apothecier (fig.32 a) opp til 1,5 mm diam., flate ,skiveformede,sjeldnere turbinate.Hymenium rødlig oransje, utsiden noe blekere, tydelig kant.

Asci (fig.32 b og 34) , 4-sporet,enkelte med 2 aborterte i tillegg, klubbeformet, avsmalende til en tynnere basis, sjelden gaffel-delt, 142,5 - 157,5 x 12,0 - 13,7(15,0) um, oppstikkende på modent materiale, ca 25 - 30 um over hymeniet.

Sporer (fig.33) ,en-radet, bredt ellipsoide, glatte, meget sjeldent med deBary boble, 12,6 - 13,7 x 7,6 - 8,4 um,

Parafyser (fig.32 b) , slanke,trådaktige, mer eller mindre krummet/bøyde i toppen(ikke så utpreget som P.ovalispora 8-sporet),1,0 - 1,5 um,jamntykke.

Ytre eksipulum består av subglobulære til angulære celler 5 x 7 - 10 x 15 um (fig.32 d).(fig.35)

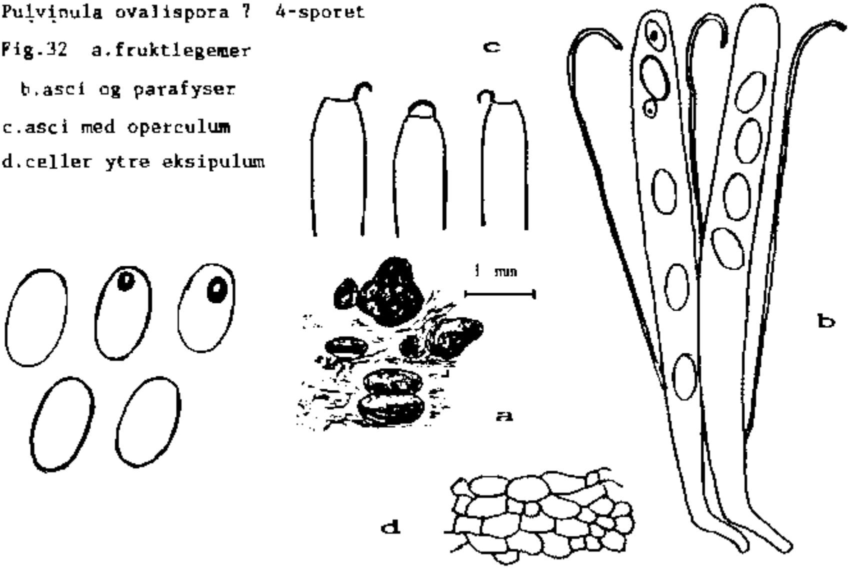
Østfold,Borge kommune,Torp, nær Kreutzgate, 11.august 1984 (RK 84.100). På bar kalkslam ("mesa"), blant noe Tussilago farfára.

Tabell 3.

Sammenlikning av spore- og ascusdimensjoner på 8-og 4-sporet P.ovalispora.

		ASCUS(um)	SPORER (um)	
		lengde x bredde	lengde x bredde	gj.snitt
8-sporet	RK 84.40	130-160 x 12,0-12,5	12,6-14,4x 7,4-8,8	13,7x8,1
4-sporet	RK 84.100	143-157 x 12,0-13,7	12,6-13,7x 7,6-8,4	13,5x8,1

Det er en kjent sak at arter med 4-sporede asci får større sporer enn en 8-sporet, dersom det dreier seg om samme taxon, og at disse ikke skilles ut som egne arter, men bare blir å betrakte som en 4-sporet form.
Som det fremgår av tabell 3 er både asci og sporer av samme størrelsesorden, og dette kan indikere at den 4-sporede arten virkelig er et nytt taxon. Dessuten er fargen på fruktlegemene annerledes (mer intens),parafysene er mindre utpreget krumme , og den avviker også anatomisk. Forhåpentlig vil studier av nytt friskt materiale kunne fastslå med større sikkerhet om dette er en ny art.



Pulvinula ovalispora ? 4-sporet
Fig.32 a.fruktlegemer
b.asci og parafyser
c.asci med operculum
d.celler ytre eksipulum

Fig.33 P.ovalispora ? 4-sporet
Sporer i asci

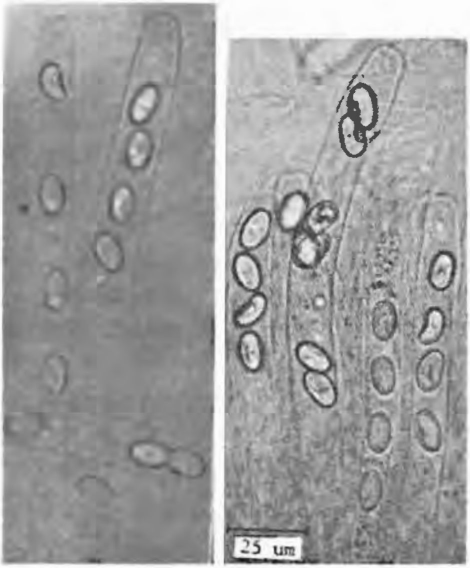


Fig 34 P.ovalispora ? 4-sporet
4-sporede asci i CB.

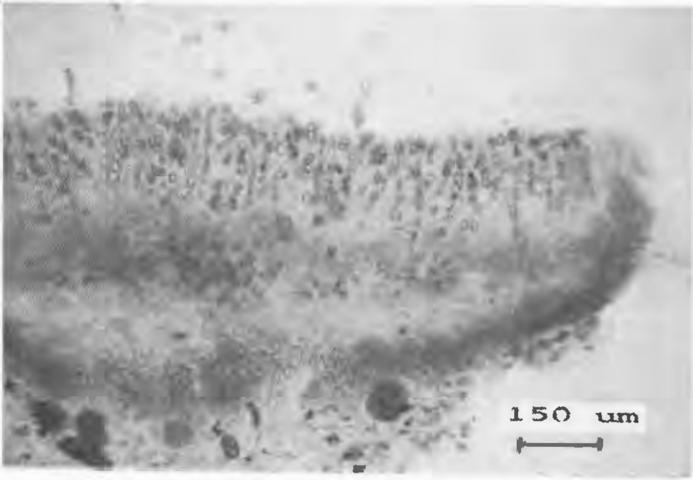


Fig.35 Snitt av fruktlegeme. i CB.

SARCOSOMATACEAE

Pindara terrestris Velen.

De to første funn av Pindara terrestris (fig.36 a) i Norge er nylig beskrevet av Kristiansen (1984).
I august 1984 ble det første funn gjort i Østfold, og dermed har vi tre funn i Norge med forholdsvis stor geografisk spredning.
P.terrestris er ellers bare kjent fra Tsjekkoslovakia på noen få lokaliteter (Svrček 1979).

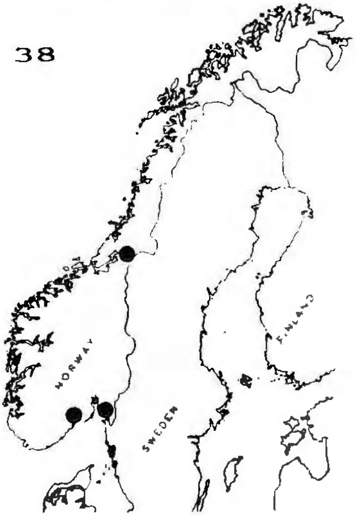
Materialet fra Østfold er riktignok meget sparsomt, bestående av et eneste umodent apothecium, men helt typisk med sine store glatte fusoide sporer (fig.36 b og 37), og små grå-gråsvarte kort-stilkede apothecier.
For beskrivelse og nærmere omtale, jfr. Kristiansen 1984.

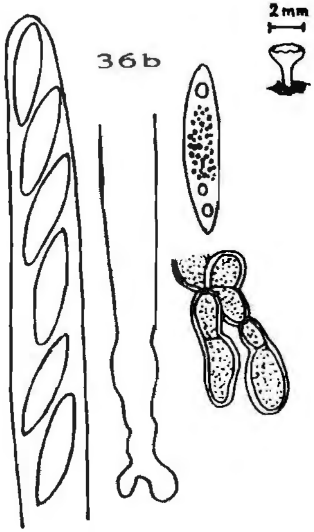
ØSTFOLD, Tune kommune , Sølvstufossen (sydsiden), på jord, skogssti, i granskog, sammen med Scabropezia flavovirens Diss. & Pfist.,27.august 1984.

Figur 38 viser utbredelsen i Norge.

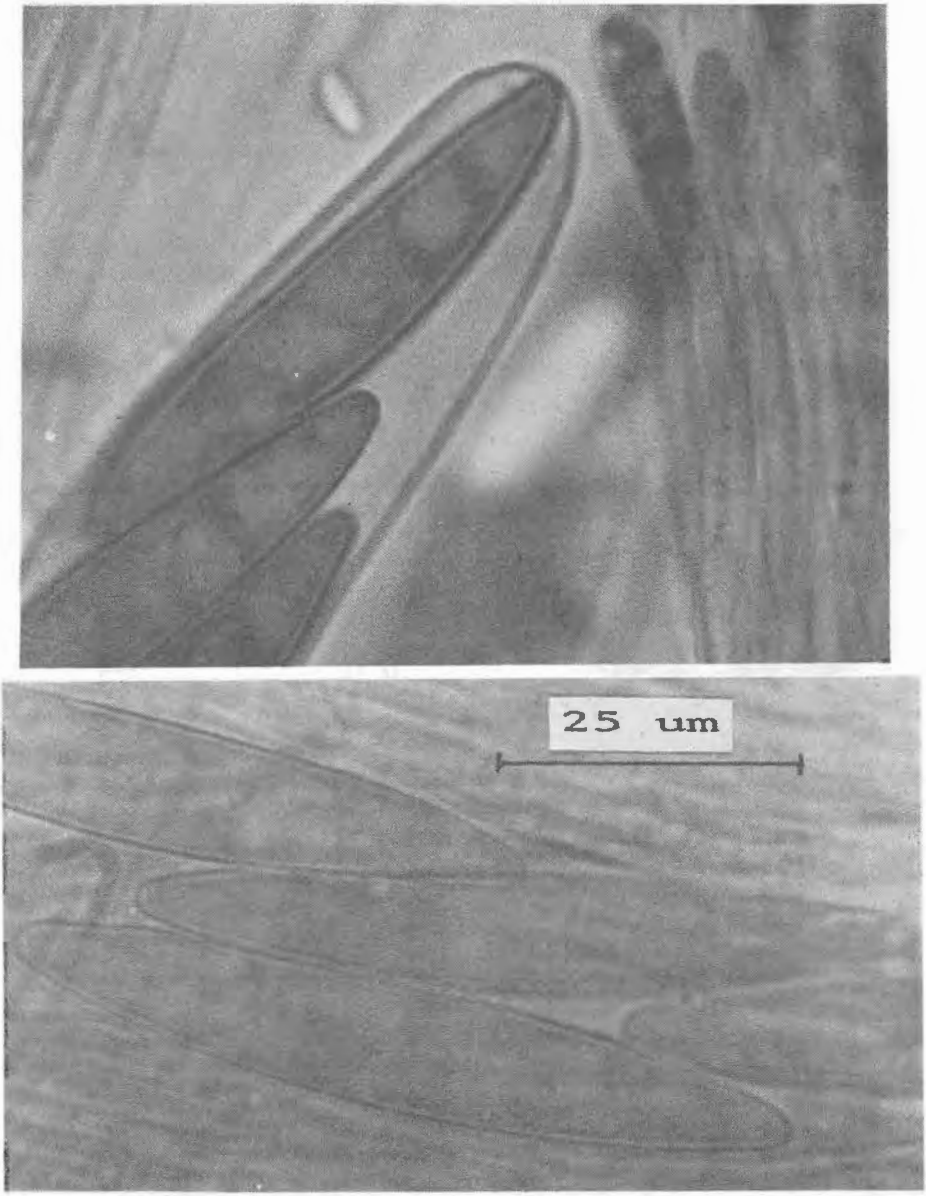

36a Pindara terrestris
RK 82.200,Telemark

38





36b. Asci med umodne sporer, umoden spore,celler ytre eksipulum og apothecium, Østfold,27.08.1984(RK).



Figur 37 <u>Pindara terrestris</u>,
RK 82.200,Telemark,Bamble

Takk.

Jeg er Sigmund Sivertsen, DKNVS-museet, Trondheim, og Trond Schumacher, Biol. Inst., Universitetet i Oslo, stor takk skyldig for bestemmelse av en rekke planter.

T. Schumacher og Henry Dissing, København Universitet har aller vennligst bidratt med SEM-bilder.

Alle tre takkes for stor imøtekommenhet og inspirerende samtaler og korrespondanse.

Takk også til Ingar Johnsen, Fredrikstad, for hyggelig selskap i felt.

I am indebted to Richard P. Korf, Cornell University, Ithaca, USA, for the verification of Pulvinula ovalispora from Norway.

Summary.

The author present descriptions and illustrations of 17 species of rare and interesting operculate discomycetes from Southern Norway, mainly from the county of Østfold. Most of them are new , either to Norway or Fennoscandia.

The following species are treated: Scabropezia flavovirens, Boudiera acanthospora, B.acanthospora f.albida, B.dennisii,B.purpurea,Leucoscypha leucotricha,Rhodoscypha ovilla,Trichophaga paludosa,Trichophaeopsis bicuspis, T.bicuspis ? 4-spored, Melastiza flavorubens,M.carbonicola, Aleuria bicucullata, Octospora wrightii, Pulvinula ovalispora, P.ovalispora ? 4-spored, and Pindara terrestris.

Their distribution and ecology are discussed.

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Doktorgrader i mykologi.

I Agarica hefte 10 står det at Klaus Høilands doktorgrad var kun den tredje doktorgrad i mykologi gjennom alle tider i Norge. Dette er imidlertid en sannhet med betydelige modifikasjoner.

Dersom det bare dreidde seg om avhandlinger som utelukkende bygger på sopp slik en finner dem i skog og mark, - ja da kan Høilands sies å være den tredje. Men det finnes også en anden type soppavhandlinger, nemlig de som bygger på dyrking av sopp i laboratoriet. Ingen vil benekte at dette også er mykologi.

Da blir den første norske doktorgrad på et mykologisk emne, den som Olav Johan Olsen Sopp fikk i 1893 på avhandlingen "Om Sop paa levende Jordbund". En merkelig tittel og merkelig avhandling, - men likefullt 41 år før Ivar Jørstads doktorarbeide om rustsoppene på Kamtsjatka.

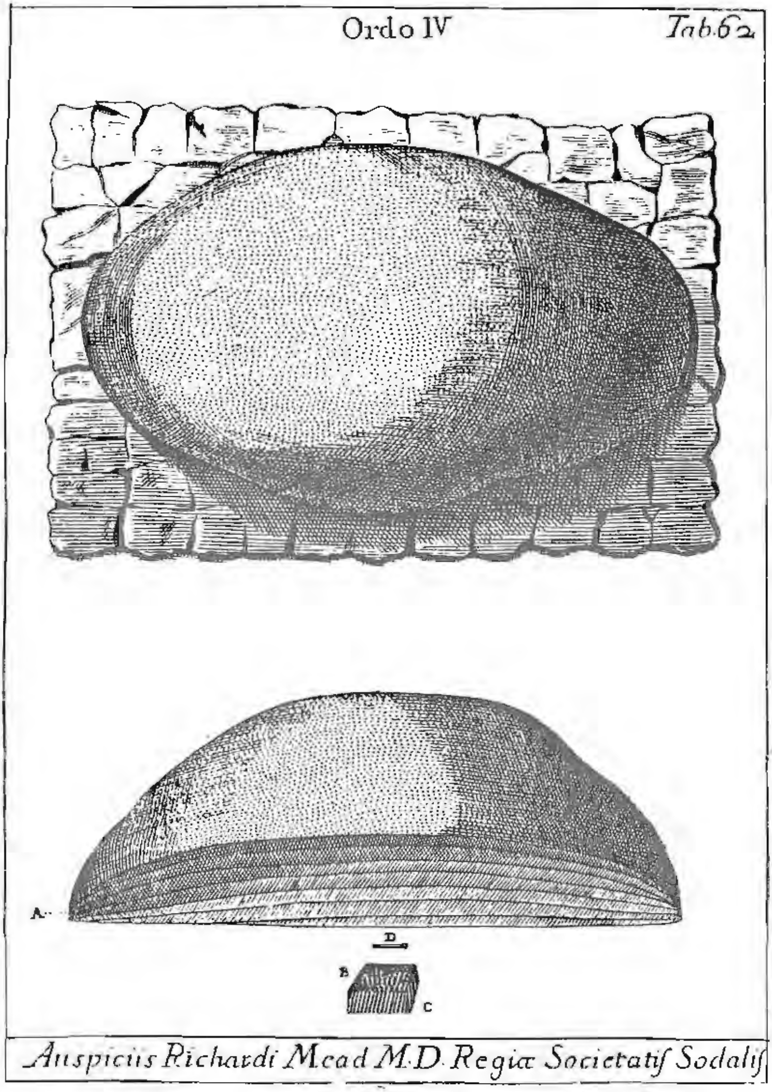
Deretter fungte Håkon Robak som disputerte i 1943 på en avhandling om dyrkningsstudier av forskjellige sopp som bryter ned ved.

Sigurd Funder var den neste med en studie over de viktigste muggsopp i gammelost i 1946.

I 1963 var det Tor Arve Pedersens tur. Han hadde studert forskjellige fysiologiske sider ved en spesiell gjærsopp.

I tillegg finnes det nok enkelte medisinske og biokjemiske doktoravhandlinger med et visst mykologisk preg.

Finn-Egil Eckblad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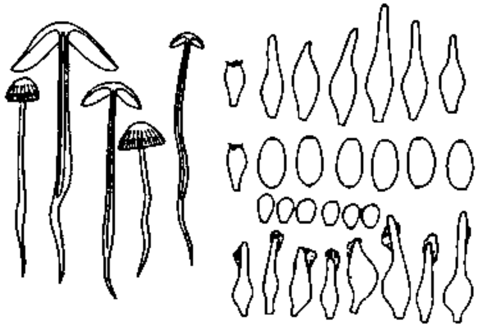

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We remind you that dead-line for the next special issue of Agarica (No.14,1986) is May 15th 1986.

Errata - Corrigenda

Page 392 and 393 should be reversed.