

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM—XIX
A revision of *Dermoloma* (J. Lange) Sing.—1*

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The taxonomic position of *Dermoloma* is discussed. It is concluded that it is an independent genus close to *Camarophyllopsis* belonging to the tribe Hygrocybeae of the Tricholomataceae. The variability in some microscopic characters is described and compared with data from other authors. A key and descriptions are given of the indigenous taxa with inamyloid spores. *Dermoloma atrocinereum* and *D. fuscobrunneum* are reduced to synonyms of *D. cuneifolium*. A new variety of the latter species, var. *punctipes*, is described.

TAXONOMIC POSITION OF DERMOLOMA

Within the white-spored Agaricales the genus *Dermoloma* is characterized by the combination of (1) collybioid to tricholomatoid habit; (2) rather thick, brittle, emarginate to subdecurrent lamellae; (3) farinaceous smell and/or taste; (4) smooth, hyaline, amyloid or inamyloid spores; (5) the pileipellis being a pluristratous hymeniderm; (6) rather short basidia (17–36 µm long) and (7) the apparently saprophytic way of life, preferentially in grasslands.

Species of *Dermoloma* were traditionally assigned to *Tricholoma* on the basis of macroscopic characters, following Fries' classification in *Epicrisis* (1838: 37). Lange (1933: 12) recognized the groups as a 'stirps' *Dermoloma* of *Tricholoma*, with *T. cuneifolium* as only representative. Singer (1951: 250) treated *Dermoloma* provisionally as a genus, confirmed his opinion in 1955, and validated the genus name *Dermoloma* in 1956 by full reference to Lange's description, although quoted as '*Tricholoma* subgenus *Dermoloma*'. Some authors, for instance Donk (1962: 87) and Bon (1986: 51) considered this recombination as invalid because of the obscure rank of 'stirps', but the International Code of Botanical Nomenclature states explicitly that a valid recombination is sufficient to validate this name (Art. 35.2).

In recent years contrasting opinions have been given on the taxonomic status of *Dermoloma*. On the one hand, Kühner (1980: 833) continued to incorporate it in the genus *Tricholoma*; on the other hand, Bon (1979) created in the same period the family Dermolomataceae.

In my opinion *Dermoloma* is a distinctive genus, not only differing from *Tricholoma* in macroscopic appearance (small basidiocarps, strongly ventricose lamellae, brittle context), structure of pileipellis and clavate caulocystidia, but also fundamentally in ecology: *Tricholoma* species are ectomycorrhizal symbionts with woody plants, whereas *Dermoloma* is not associated with trees. However, giving it the status of family is certainly overdone since there are many relations with other genera. The Dermatolomataceae were not accepted by authors

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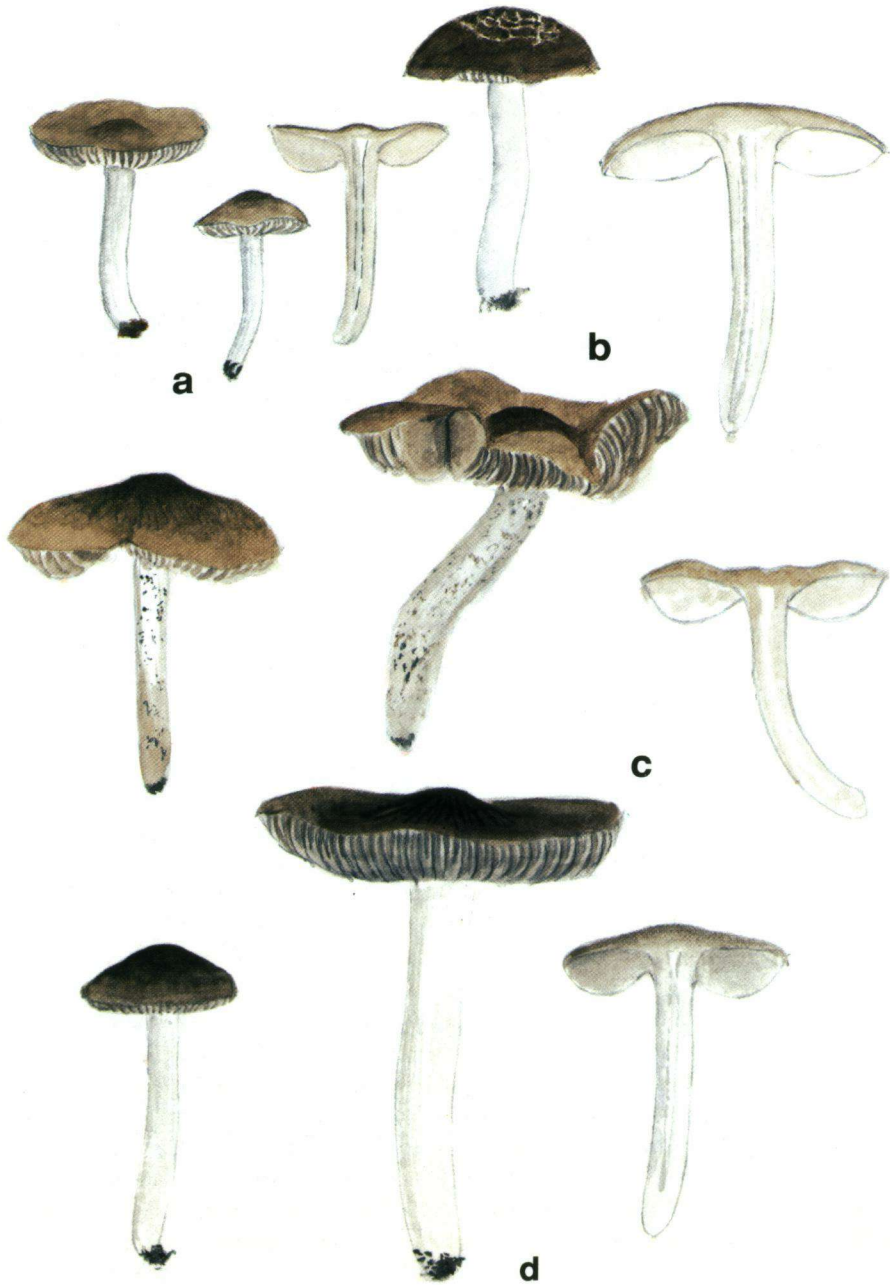


Plate 1. *Dermoloma cuneifolium*. — a, b, d: var. *cuneifolium* (a: Piepenbroek s.n., 19 Oct. 1988; b: Arnolds 6058 (2-spored variant); d: Arnolds 6086); c: var. *punctipes* (Arnolds 5337, holotype).

such as Moser (1983) and Jülich (1982). The latter author placed *Dermoloma* in the Mycenaceae, a segregate from the Tricholomataceae.

Several authors have discussed the affinity between *Dermoloma* and *Camarophylloopsis* Herink, of which subgenus *Hygrotrama* has a hymenidermal pileipellis with brown parietal pigments and subgenus *Camarophylloopsis* a more or less trichodermal pileipellis with intracellular pigments (Arnolds, 1986). *Camarophylloopsis* is usually placed in the Hygrophoraceae (e.g. Singer, 1975, as *Hygrotrama*), but Herink (1958: 62) considered *Hygrotrama* (as *Hodophilus*) as closely related with *Dermoloma* and both members of the Tricholomataceae, leaving the position of (sub)genus *Camarophylloopsis* s.str. as doubtful. On the other hand, Orton & Watling (1969: 133) treated *Hygrotrama* and *Camarophylloopsis* as sections of *Hygrocybe*, whereas *Dermoloma* was regarded as a true member of the Tricholomataceae because of (1) short basidia and (2) a more compact structure of the pileipellis.

The presence of long, slender basidia have often been regarded as an important character of the Hygrophoraceae, but it has been demonstrated that quite a few representatives of *Hygrocybe* do not possess long basidia at all, one of the arguments given by Bas (1988: 41) to reject the Hygrophoraceae as a family. The basidia in *Dermoloma* measure $17\text{--}36 \times 4.5\text{--}8 \mu\text{m}$, $Q = 3.5\text{--}5.5$, in European species of *Camarophylloopsis* subgenus *Hygrotrama* ($28\text{--}32\text{--}55\text{--}62 \times 5\text{--}8.5\text{--}9.5 \mu\text{m}$, $Q = 5\text{--}10$) (Arnolds, 1990a), but in the North American *C. dennisianum* $23\text{--}33 \times 5.5\text{--}7 \mu\text{m}$ (Singer, 1958: 221) and in subgenus *Camarophylloopsis* (*C. schulzeri*) only $22\text{--}30 \times 4.5\text{--}6 \mu\text{m}$, $Q = 4.4\text{--}6.2$ (Arnolds, 1990a).

When studying the pileipellis of various representatives of *Dermoloma* and *Camarophylloopsis* subgen. *Hygrotrama*, I was struck by the strong resemblance: in both cases it is a pluristratous hymeniderm made up of pear-shaped, clavate to globose elements, the terminal elements in *Hygrotrama* measuring $(10\text{--})20\text{--}70 \times (5\text{--})10\text{--}48 \mu\text{m}$, in *Dermoloma* $17\text{--}75 \times 7\text{--}40 \mu\text{m}$, the walls coloured by brown parietal pigment. I agree with Orton & Watling (1969) that the elements in *Dermoloma* are more densely packed and more regular, forming a continuous layer, whereas they are looser and more irregular in *Hygrotrama* (Fig. 1). However, I do not see how this can be a sufficient argument to place these genera in different families.

One may even begin to wonder what reliable differences between *Camarophylloopsis* and *Dermoloma* exist.

- 1) The lamellae in *Dermoloma* are usually less distant and strongly emarginate to sinuate, in *Camarophylloopsis* distant and subdecurrent, but in some collections of *D. pseudocuneifolium* they are broadly adnate to subdecurrent. Bon (1979) described *D. intermedium* with decurrent lamellae, considering this species as a transition to *Camarophylloopsis*.
- 2) Smell and taste are farinaceous to rancid in *Dermoloma*, usually not distinctive or foetid in *Camarophylloopsis*. However, *C. dennisianum* was described as having a farinaceous taste (Singer, 1958: 221).
- 3) Clamp-connections are in principle present in *Dermoloma* (except in 2-spored basidiocarps), absent in *Camarophylloopsis* except in sect. *Hygrotrama* (*C. dennisianum*).

In conclusion, *Dermoloma* and *Camarophylloopsis* are in my opinion closely related with *Camarophylloopsis dennisianum* and *Dermoloma intermedium* as interesting, more or less intermediate taxa. Both of them are more related to *Hygrocybe* than to genera of the other tribes of Tricholomataceae (Bas, 1990), and should consequently be placed in the tribe

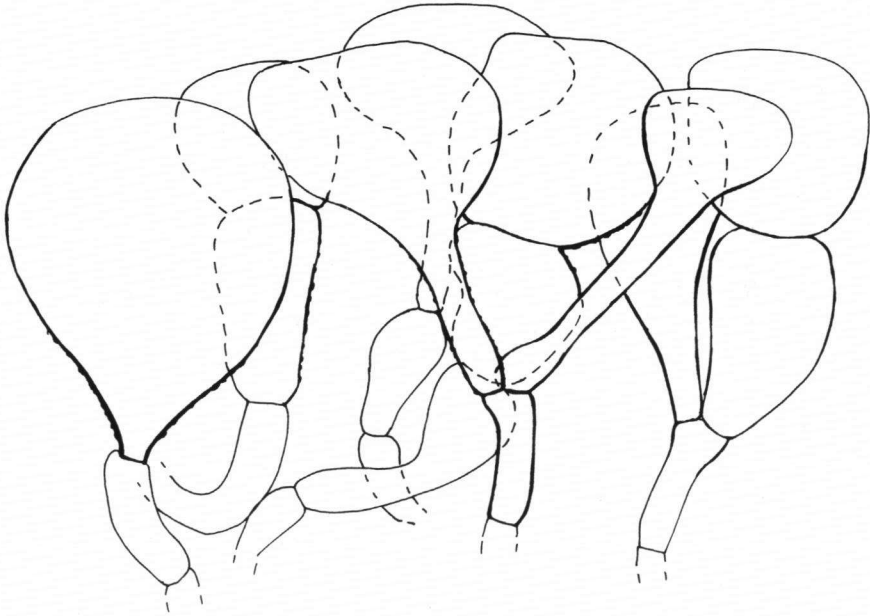


Fig. 1. *Dermoloma cuneifolium* var. *cuneifolium*, radial section through the pileipellis, $\times 1000$ (from H. & G. Piepenbroek s.n., 19 Oct. 1988).

Hygrocybeae. Additional arguments are the frequent occurrence in *Dermoloma* of 2-spored and mixed 4- and 2-spored basidiocarps, and the ecology: *Dermoloma* species are usually found in the same nutrient-poor grasslands where species of *Hygrocybe* and *Camarophylloporia* occur (e.g. Nitare, 1988).

Within the remaining Tricholomataceae most similarity seems to exist with *Hydropus*, which was assigned by Bon (1979) to the Dermolomataceae together with several other genera placed by Bas (1990) in the tribus Xeruleae. However, *Hydropus* differs in having a sarcodimitic trama, a different pileipellis with cystidioid terminal elements and many species have cheilocystidia.

VARIABILITY IN SOME CHARACTERS OF DERMOLOMA

The variation in some characters of *Dermoloma* appears to be much larger than reported in the literature, a reason to evaluate these characters.

1) The coloration of spores in Melzer's reagent is an important character in the rank of species. In addition, Singer (1975: 403) divided *Dermoloma* into sections *Dermoloma* with inamyloid and *Atrobrunnea* with amyloid spores. Orton (1980: 323) was the only one who noticed that spores are sometimes weakly dextrinoid in *D. cuneifolium* (sect. *Dermoloma*).

Among the 41 collections studied by me in this respect, 21 collections (51%) appeared to have, usually strongly, amyloid spores, but in two collections only part of the spores

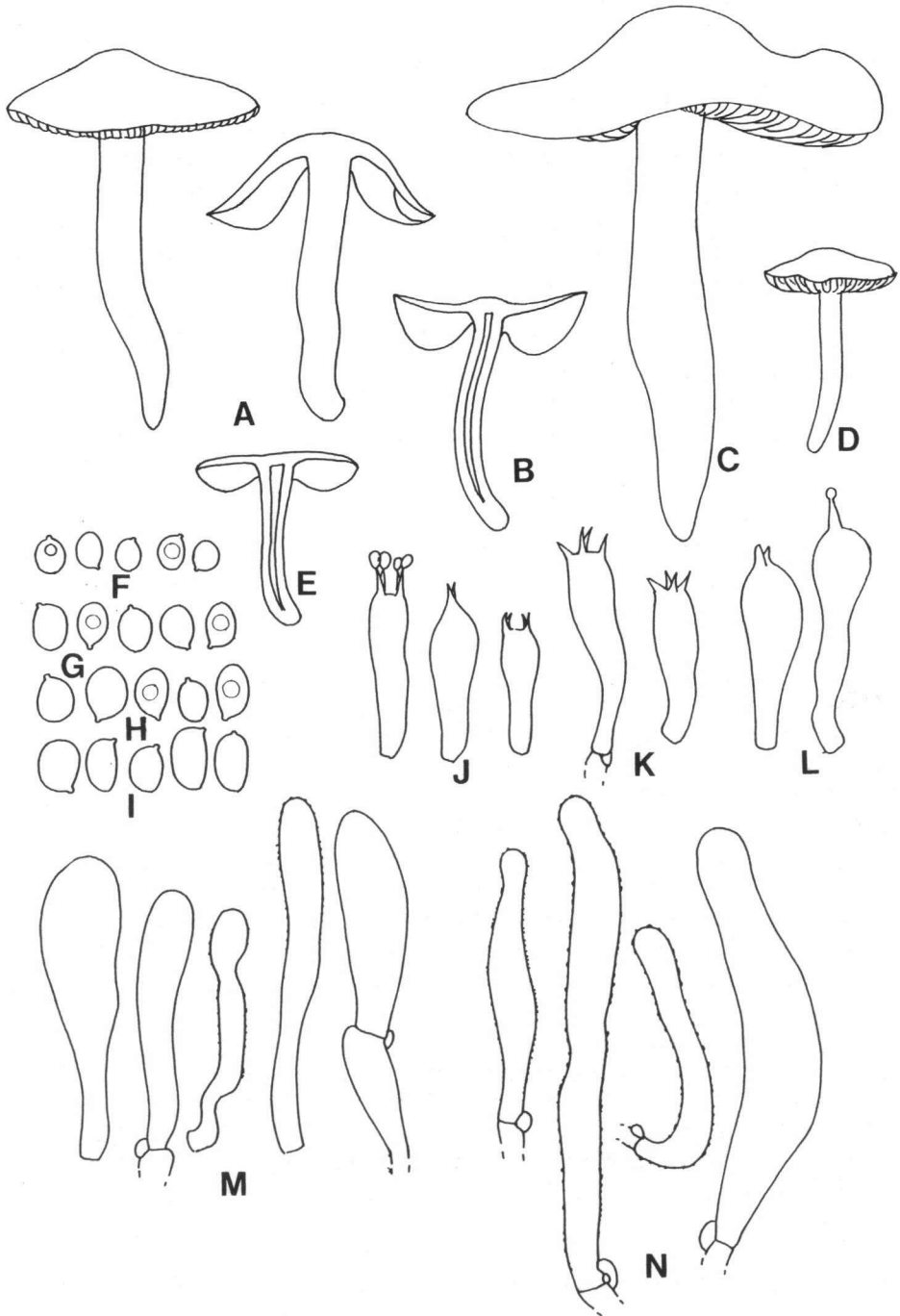
were violaceous in Melzer's (the remaining yellowish) and in three other collections the amyloid reaction was weak or even doubtful. It happened several times that spores were described by collectors as being amyloid, but observed by me as being inamyloid, and vice versa. It was more surprising that among the remaining 20 collections a majority (11, 55%) had a smaller or larger proportion of the spores dextrinoid, i.e. reddish brown in Melzer's. This reaction varied from weak to strong and was visible in only a few to all spores in a preparation. Dextrinoid spores seemed to be slightly more thick-walled than non-dextrinoid spores, so that it was supposed that the occurrence of the dextrinoid reaction had to do with ripening of spores. Indeed, discharged spores from the stipe apex showed a higher proportion of dextrinoidity and some basidiocarps appeared to have dextrinoid spores only at the stipe apex. Apparently the process and degree of ripening depends on variable, as yet unknown, ecological conditions. So far I have never observed amyloid and dextrinoid spores in a single basidiocarp. In my opinion the Melzer's reaction is not appropriate as a character for infrageneric classification.

- 2) *Dermoloma* species have almost always been described as bearing 4-spored basidia (if this character was studied at all) with exception of the type collection of *D. murinellum*, described by Horak (1987: 110) as 4-(2-)spored. I studied 41 basidiocarps (38 coll.) in this respect and found only 22 (54%) to be exclusively 4-spored, whereas 11 (27%) had a minority of 2- (and 1-)spored basidia, two were 4- and 2-(1-)spored intermixed (5%) and six basidiocarps (15%) were exclusively 2- (and 1-)spored. The 2-spored collections were always clampless and more frequent in the non-amyloid taxa (5 ×) than in the amyloid taxa (1 ×). One collection of *D. cuneifolium* (*Bas 1657*, L) contained both basidiocarps with exclusively 4- and 2-spored basidia. These results resemble the situation in many groups of *Hygrocybe*, where the number of sterigmata on basidia is of no taxonomic relevance (Arnolds, 1990b).
- 3) The ranges in spore size have been described as relatively narrow for all species of *Dermoloma* (e.g. Moser, 1983; Orton, 1980), apparently because of the limited number of collections studied by any author. However, spore size appears to be much more variable, as demonstrated in this paper for *D. cuneifolium* (Fig. 3).
- 4) Jossierand (1943: 14) was the first author who reported the presence of caulocystidia in *D. cuneifolium* ss. Joss. (= *D. pseudocuneifolium*) and later (1958) described striking, clavate caulocystidia in *D. hygrophorus*. The occurrence of such structures was occasionally used as a diagnostic character, e.g. by Ballero & Contu (1987), but they are in fact present in all investigated taxa of *Dermoloma* and extremely variable in frequency, size and shape.

A REVISION OF THE TAXA WITH INAMYLOID SPORES

On the basis of a study of 37 collections from the Netherlands and adjacent regions I have arrived at the conclusion that all of them belong to a single species which should be named *D. cuneifolium*. Arguments for this decision are given in the notes following the description of var. *cuneifolium*.¹

¹ The abbreviation K&W stands for: Kornerup, A. & Wanscher, J.H., Methuen handbook of colour.



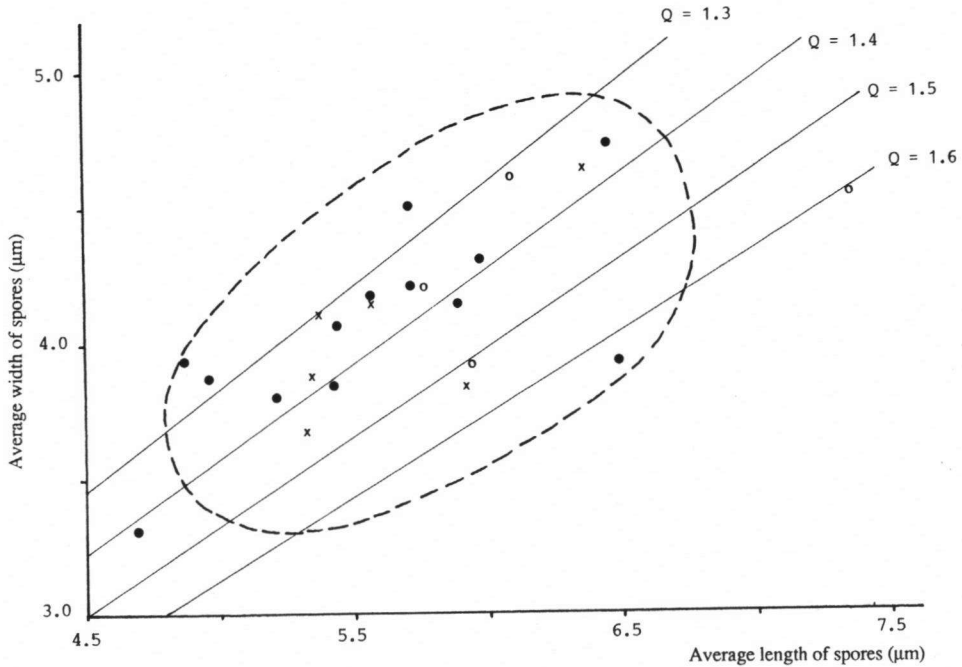


Fig. 3. Scatter diagram of the average spore size in *Dermoloma cuneifolium*. Each point represents the average size of at least 10 spores measured in a single basidiocarp (● = var. *cuneifolium*, 4-spored and 4- + 2-spored basidiocarps; ○ = var. *cuneifolium*, 2-spored basidiocarps; x = var. *punctipes*).

part subglobose or ellipsoid-oblong, with small apiculus, hyaline in water, becoming slightly thick-walled when mature, inamyloid, in Melzer's yellowish or a smaller or larger proportion pale to dark reddish brown (dextrinoid), rarely all dextrinoid. Basidia $17-36 \times 4.5-8 \mu\text{m}$, $Q = 3.2-5.0$, clavate to narrowly clavate, usually predominantly 4-spored, often a few 2- and 1-(3)-spored intermixed, rarely predominantly 2-spored. Cystidia absent. Hymenophoral trama subregular to subirregular, made up of slightly interwoven, hyaline, thin-walled hyphae with cylindrical to inflated elements, $30-150 \times 6-28 \mu\text{m}$. Pileipellis a pluristratous hymeniderm, as seen from above made up of rounded elements, in section made up of erect hyphae with short, inflated elements, broader towards pileus surface, with subglobose, pyriform or broadly clavate terminal elements, c. $23-75 \times 17-40 \mu\text{m}$, with brown parietal and encrusting pigment. Stipitipellis a cutis of repent, cylindrical hyphae, $2-6 \mu\text{m}$ wide with pale grey parietal and encrusting pigment. Caulocystidia rare to frequent, scattered or usually in clusters, $29-73 \times 4-12 \mu\text{m}$, clavate, hyaline, smooth or slightly encrusted. Clamp-connections usually present, but absent from 2-spored basidiocarps.

Habitat & distribution.—Solitary or subgregarious on the ground; widespread in Europe, but nowhere common. In the Netherlands in herb-rich grasslands on mesic to dry, nutrient-poor, neutral to basic, sandy and clayey soils (Galio-Koelerion, Arrhenatheretum, Mesobromion), rarely in deciduous forests on similar soils. In the Netherlands rare in the coastal dunes, along the big rivers and in southern Limburg but on many localities constant. Sept.—Nov.

Collections examined.—NETHERLANDS: prov. Friesland, Terschelling, Oosterend, 12 Oct. 1990, *E. Arnolds 6113* (WAG-W); prov. Overijssel, Olst, 'Hengforderwaarder', 29 Oct. 1977, *G. & H. Piepenbroek s.n.* (L); Hardenberg, 'Rheezermaten', 19 Oct. 1988, *G. & H. Piepenbroek s.n.* (WAG-W); prov. Utrecht, Bunnik, 'Fort bij Rijnauwen', 16 Oct. 1989, *E. Arnolds 6058* (WAG-W); prov. Noord-Holland, Bakkum, near 'Koningsbos', 5 Nov. 1989, *E. Arnolds 6086* (WAG-W); Idem, 5 Nov. 1989, *E. Arnolds 6087* (WAG-W); prov. Zuid-Holland, Oostvoorne, 'Weevers' Duin', 11 Nov. 1957, *C. Bas 1372* (L); Idem, 3 Nov. 1958, *C. Bas 1657* (L); Idem, 3 Nov. 1958, *C. Bas 1658* (L); Idem, 26 Nov. 1960, *E. Kits van Waveren s.n.* (L); Idem, 20 Oct. 1963, *J. van Brummelen 1758* (L); Idem, 14 Oct. 1966, *C. Bas 4813* (L); Idem, 14 Oct. 1966, *C. Bas 4814* (L); Idem, 30 Oct. 1967, *F. Benjaminsen 671034* (Herb. F. Benjaminsen); Idem, 19 Oct. 1968, *E. Arnolds s.n.* (L); Idem, 5 Nov. 1972, *Anon. s.n.* (L); Idem, 7 Oct. 1980, *Th. W. Kuyper 1523* (L); Goeree, 'Westduinen', 10 Nov. 1975, *F. Tjallingii s.n.* (L, WAG-W); prov. Noord-Brabant, Vught, 'Drongelens Kanaal', 23 Sept. 1970, *E. Arnolds 794* (L); Drunen, 'Drongelens Kanaal', 2 Nov. 1970, *F. Benjaminsen 701104* (Herb. F. Benjaminsen); Idem, 26 Oct. 1975, *E. Arnolds 3477* (WAG-W); Idem, 27 Oct. 1984, *J. Schreurs 888* (L); Helvoirt, 'Drongelens Kanaal', 6 Nov. 1978, *F. Benjaminsen 781102* (Herb. F. Benjaminsen); Idem, 1 Nov. 1982, *F. Benjaminsen 821101* (Herb. F. Benjaminsen); Dussen, 'dike along Spijkerboor', 11 Oct. 1989, *E. Arnolds 6048* (WAG-W); Idem, 11 Oct. 1989, *E. Arnolds 6049* (WAG-W); prov. Limburg, Wijlre, 11 Oct. 1970, *P. Jansen s.n.* (L); Bemelen, Bemelerberg, 3 Nov. 1984, *J. Schreurs 897* (L). — BELGIUM: prov. Liège, Canne, 30 Oct. 1978, *E. Arnolds 4151* (WAG-W); Visé, 30 Oct. 1978, *E. Arnolds 4153* (WAG-W). — GERMANY: Westfalen, Detmold, near Oeynhäusen, 6 Oct. 1976, *E. Arnolds 3625* (WAG-W). — SWEDEN: Småland, Femsjö, 'Awaberget', 19 Sept. 1948, *S. Lundell (5501)* & *G. Haglund* (UPS, Neotype, fragment in L).

It has long been disputed whether *Agaricus cuneifolius* Fr., the type species of *Dermoloma*, possesses amyloid spores or not (Josserand, 1958; Singer, 1975; Orton, 1980: 402). Josserand (1943) was the first author to describe *Tricholoma cuneifolium* with amyloid spores and he was followed by e.g. Dennis & al. (1960), Svrček (1966), Horak (1968: 219) and Kühner (1980: 833). The opposite opinion was defended by e.g. Herink (1958), who introduced for *D. cuneifolium* sensu Joss. the name *D. pseudocuneifolium*, Donk (1962), Singer (1975), Orton (1980) and Moser (1983). The original descriptions by Fries (1818, 1821) may relate to both taxa as far as size of basidiocarps, pileus colour, shape of lamellae and smell are concerned. However, Fries (l.c.) described the lamellae as white, which is often true for the taxon with non-amyloid spores, but *D. pseudocuneifolium* has always greyish or brown, often rather dark lamellae according to Josserand (1943) and my own observations.

An additional argument is that Lundell & Nannfeldt (1949) distributed an exsiccatum of *Tricholoma cuneifolium* (no. 1710), collected by them at Femsjö, which appeared to have inamyloid spores. I propose this collection as *neotype* of *Agaricus cuneifolius* Fr. (Fungi exsiccati Suecici 1710, 19 Sept. 1948, leg. S. Lundell (5501) & G. Haglund; UPS). For macroscopic characters, see Lundell & Nannfeldt (1949). Microscopic examination revealed the following details: spores 5–6(–6.5) × (3.5–)4–4.5 µm (according to Lundell & Nannfeldt 4.5–6 × 3.5–4 µm), in majority yellowish in Melzer's, but some slightly thick-walled and red-brown (dextrinoid). Basidia 21.5–26 × 6–7 µm, 4-spored. Caulocystidia 32–41 × 4–7 µm, clavate, smooth or slightly encrusted.

Within the non-amyloid taxa often two species are distinguished: *D. cuneifolium* and *D. atrocinerum*. *Agaricus atrocinerus* was described by Persoon (1801: 166) with a grey pileus with obtuse, blackish umbo and a solid, smooth stipe, c. 38 × 2 mm, found in pine woods. In 1828 (: 213) Persoon added that the pileus is 25 mm wide. Fries (1821: 117) distinguished this fungus as an intraspecific taxon ('*β spurcus*') of *Agaricus cuneifolius*, curiously enough

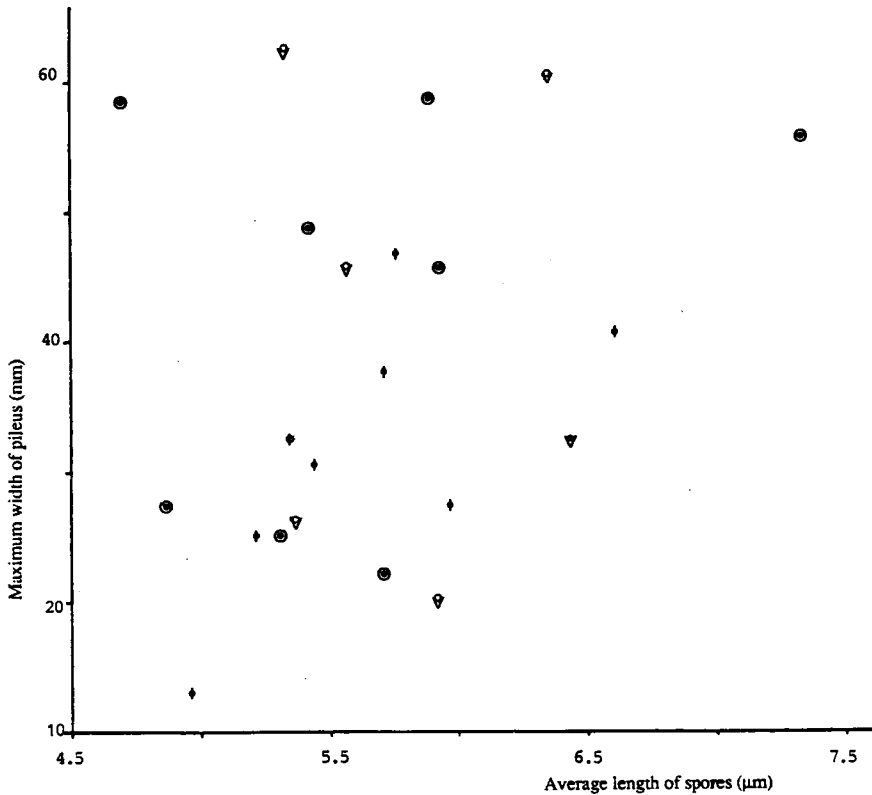


Fig. 4. The relation between the average spore length and the maximum diameter of the pileus in 22 collections of *Dermoloma cuneifolium* (● = var. *cuneifolium*; ○ = var. *punctipes*; additional marks: ◆ = pileus predominantly beige, pale (grey-)brown ('*cuneifolium*' type), e.g. K&W 6D4, 6D3, 5C4 — ⊙ = pileus predominantly dark (brownish) grey, e.g. K&W 6E3, 6E4, 6F4, 5F4 ('*atrocinereum*' type) — ▼ = pileus predominantly dark (greyish) brown, e.g. K&W 6E5, 6E6, 6F5, 6F6 ('*fusco-brunneum*' type)).

mainly based on larger basidiocarps: in *A. cuneifolius* pileus 13–25 mm, stipe 25–38 × 2–4 mm; in *β spurcus* pileus 38 mm, stipe 76 mm long. This explains the widespread supposition that *D. atrocinereum* is a larger species than *D. cuneifolium* (e.g. Moser, 1983). It is questionable whether *Agaricus atrocinereus* Pers. is a *Dermoloma* at all in view of the smooth stipe (pruinose in all available species) and occurrence in pine forests. Moreover, it should be analysed whether two taxa can be distinguished at all.

Characteristics recently used for the distinction of *D. cuneifolium* and *D. atrocinereum* *sensu auct.* are (1) colour of pileus: paler and more brown in the former species, darker and more grey in the latter; (2) size of basidiocarps (see above); (3) size of spores: which are said to be slightly smaller in *D. cuneifolium* (e.g. Orton, 1980; Moser, 1983; Ballero & Contu, 1987). A scatter diagram of the spore size of basidiocarps in *D. cuneifolium sensu lato* is

presented in Fig. 3. It appears that the variation is considerably larger than described so far for the combination of *D. cuneifolium* and *D. atrocinereum*. It is not possible to distinguish more than a single cluster. Strikingly small spores are found in *Arnolds* 6048, however combined with a dark and relatively large pileus (Fig. 4). Extraordinary large spores are found in *Arnolds* 4153 with exclusively 2- and 1-spored basidia. All 2-spored basidiocarps are found in the larger range of spore sizes.

The colour of the pileus is rather variable from rather pale ochre-brown (Pl. 1D) to dark brown-grey with almost black centre (Pl. 1A), as mentioned in the description. It is true that the colour is usually rather constant in a certain group of basidiocarps, but when all collections are compared it seems impossible to draw a borderline anywhere. In fact, most collections appear to be more or less intermediate between pale brown (*cuneifolium*) and dark grey (*atrocinereum*), in having medium dark grey-brown pilei (Pl. 1B). I regard *D. fusco-brunneum* only as a dark brown variant of this variable species. It is demonstrated that pileus colour is not correlated with either spore size or diameter of the pileus (Fig. 4).

Three other species with inamyloid spores have been described from Europe: *D. coryleti* Sing. & Cléménçon (1971) from Switzerland, with spores $7.2-9.7 \times 3.2-3.7 \mu\text{m}$; *D. intermedium* M. Bon (1979) from France with large basidiocarps (pileus 50–80 mm wide) with broadly adnate to decurrent lamellae, a smooth stipe without caulocystidia and spores $(5.5-6-7(-7.5) \times 4-5.5 \mu\text{m})$; and *D. emilii-dlouhyi* Svrček (1966) from Czechoslovakia with spores $9-12 \times 5-6 \mu\text{m}$.

***Dermoloma cuneifolium* (Fr.: Fr.) M. Bon var. *punctipes* Arnolds, var. *nov.*—
Fig. 5, Pl. 1c**

A var. *cuneifolium* differt stipite atropunctato, caulocystidiis forte incrustatis. — Holotypus: *Arnolds* 5337, 22 Oct. 1984, Herb. Biological Station Wijster (WAG-W).

Pileus 18–60 mm, convex, then plano-convex to applanate, often with low, obtuse umbo, not or weakly hygrophanous, rather pale to dark greyish brown or brown-grey (e.g. K&W 6D4, 6E5) with dark grey-brown to blackish brown centre (K&W 6F6), first smooth and dull, then often irregularly cracking around centre into small patches, showing pallid context in cracks, dry, sometimes margin short translucent-striate. Lamellae, L = 35–70, l = 1–3(–7), rather crowded to subdistant, thickish, emarginate, often with decurrent tooth, strongly ventricose, up to 14 mm broad, white to very pale grey or pale brown. Stipe 32–80 \times 4–12 mm, subcylindrical or tapering towards base, stuffed, then fistulose, white, greyish white or pale greyish ochre, silvery white striate lengthwise, at least in upper half with small, dark grey-brown to black dots sometimes arranged in \pm horizontal bands. Context in pileus pale greyish or brownish, in stipe white, brittle. Smell and taste strongly farinaceous or rancid.

Spores $4.5-7.5 \times 3.5-5.0 \mu\text{m}$, av. $5.3-6.3 \times 3.7-4.6 \mu\text{m}$, Q = (1.1–)1.2–1.8, average Q = 1.3–1.55, broadly ellipsoid or ellipsoid, sometimes in part ellipsoid-oblong, hyaline in water, often becoming slightly thick-walled when mature, inamyloid, in Melzer's yellowish or in part reddish brown (dextrinoid). Basidia 22–30 \times 6–8.5 μm , Q = 2.9–4.5, clavate or narrowly clavate, 4-spored or a minority 2-spored. Cystidia absent. Hymenophoral trama made up of cylindrical to inflated elements, c. 28–170 \times 6–32 μm . Pileipellis a pluristratous hymeniderm, in section 75–100 μm thick, made up of erect hyphae with subglobose, pyriform or spheropedunculate terminal elements with brownish parietal pigment. Stipitipellis

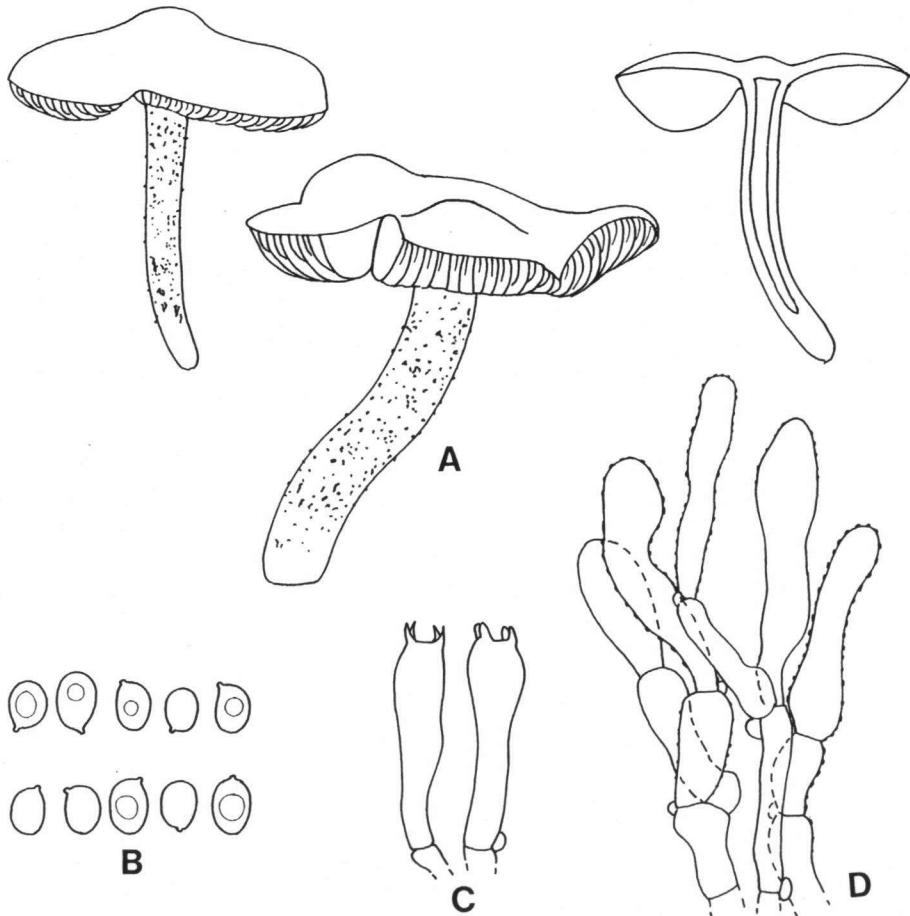


Fig. 5. *Dermoloma cuneifolium* var. *punctipes*. — A. Basidiocarps, $\times 1$. — B. Spores, $\times 1000$. — C. Basidia, $\times 1000$. — D. Caulocystidia, $\times 1000$ (all from Arnolds 5337, holotype).

made up of repent, hyaline, in part encrusted hyphae, 3–6 μm wide. Dots on stipe made up of clusters of erect, branched hyphae up to 80 μm high; terminal elements clavate, 24–66 \times 4.5–15 μm , with ochraceous to dark brown parietal pigment, in part strongly encrusted. Clamp-connections present.

Habitat & distribution.—Solitary or subgregarious on the ground; at present only known from the Netherlands and France. In herb-rich grasslands on dry, nutrient-poor, subneutral to basic sand and calcareous loam (Galio-Koelerion, Mesobromion). In the Netherlands very rare in the coastal dunes and southern Limburg. Sept.—Nov.

Collections examined.—NETHERLANDS: prov. Noord-Holland, Castricum, 'Noordhollands Duinreservaat', 2 Nov. 1968, *E. Kits van Waveren s.n.* (L); Bakkum, opposite of 'Koningshof', 2 Nov. 1968, *E. Kits van Waveren s.n.* (L); prov. Noord-Brabant: Dussen, 'Biesbosch, Spijker-

boor', 11 Oct. 1989, *E. Arnolds 6050* (WAG-W); prov. L i m b u r g, Elsloo, 'Julianakanaal', 30 Oct. 1982, *J. Schreurs s.n.* (L); Wijlre, 'Wrakelberg', 22 Oct. 1984, *E. Arnolds 5337* (type, WAG-W). — FRANCE, Velosnes, S.W. of Virton, 23 Sept. 1985, *J. Schreurs 964* (L).

This fungus is in all characters identical to *D. cuneifolium* except for the presence of striking dark dots on the stipe. The structure of these dots, however, is similar to the structure of the white pruinose stipe covering in typical *cuneifolium*. The parietal pigmentation and encrustations are more distinct and darker, but small encrustations are also present in many hyaline caulocystidia in *cuneifolium*. Finally, in one locality (Dussen, 10 Oct. 1989) basidiocarps were collected which were almost intermediate between the two taxa occurring in the same field, the stipe being white pruinose at the apex and showing grey-brown dots at the lower half (*Arnolds 6049*, WAG-W). Konrad & Maublanc (1934) described the stipe of *D. cuneifolium* as 'plus coloré à la base par quelques punctuations bistre', but these dots are not distinct on their plate. It may also represent an intermediate collection. In conclusion the taxonomic rank of variety seems the most appropriate (cf. Kuyper, 1988). The intermediate variants are assigned to var. *cuneifolium*.

The variability in most characters (e.g. colour of pileus; spore size) seems to be less than in var. *cuneifolium* (Figs. 3, 4). Exclusively 2-spored basidiocarps are not yet known at present. However, these differences are without doubt for a large part due to the smaller number of available collections.

GENERAL CONCLUSIONS

This study confirms earlier experience that taxonomic treatments based on a small number of collections may lead to too restricted, artificial species concepts (cf. Arnolds, 1985; Kuyper, 1985). This is especially true for complexes of uncommon species of which most mycologists have seen only a few collections, in groups poor in distinctive fundamental characters, such as *Dermoloma*, *Hygrocybe*, and *Clitocybe*. It is very time consuming to make an exhaustive analysis of a large number of collections in an attempt to obtain a more natural species concept. Unfortunately, it seems quite easy to describe new species on the basis of slightly aberrant characters.

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REFERENCES

- ARNOLDS, E. (1985). Notes on *Hygrophorus*-V. A critical study of *Hygrocybe fornicata* (Fr.) Sing. sensu lato. *In Agarica* 6 (12): 178–190.
— (1986). Notes on Hygrophoraceae IX. *Camarophylloopsis* Herink, an older name for *Hygrotrama* Sing. *In Mycotaxon* 25: 639–644.

- ARNOLDS, E. (1990a). *Camarophyllopsis* Herink. In C. Bas, Th. W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 2: 111–115. Rotterdam, Brookfield.
- (1990b). *Hygrocybe* (Fr.) Kumm. In C. Bas, Th. W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 2: 71–111. Rotterdam, Brookfield.
- BALLERO, M. & CONTU, M. (1987). Inquadramento delle specie del genere *Dermoloma* (Lange) Singer ex Herink presenti in Europa. In *Bol. Soc. Brot., Sér. 2*, 60: 107–116.
- BAS, C. (1988). Orders and families in agarics and boleti. In C. Bas, Th. W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 1: 40–49. Rotterdam, Brookfield.
- (1990). Tricholomataceae R. Heim ex Pouz. In C. Bas, Th. W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 2: 65–70. Rotterdam, Brookfield.
- BON, M. (1979). Taxons nouveaux. In *Docum. mycol.* 9 (35): 39–44.
- (1986). Novitates. In *Docum. mycol.* 17 (65): 51–56.
- DENNIS, R. W. G., ORTON, P. D. & HORA, F. B. (1960). New checklist of British Agarics and Boleti. In *Trans. Br. mycol. Soc.* 43, Suppl.: 1–224.
- DONK, M. A. (1962). The generic names proposed for Agaricaceae. In *Beih. Nova Hedwigia* 5.
- FRIES, E. M. (1818). *Observationes mycologicae* 2. Havniae.
- (1821). *Systema mycologicum* 1. Lundae.
- (1838). *Epicrisis systematis mycologici*. Upsaliae.
- HERINK, J. (1958). Species familiae Hygrophoracearum, collem 'Velká Hora'. In *Acta Mus. Hort. bot. Bohemiae borealis* 1: 53–86.
- HORAK, E. (1968). Synopsis generum Agaricalinum. In *Beitr. Krypt. Fl. Schweiz* 13.
- (1987). Ueber neue und systematisch interessante Agaricales aus der alpinen Zone der Alpen. In *Sydowia* 39: 104–123.
- JOSSERAND, M. (1943). Notes critiques sur quelques champignons de la région lyonnaise (3^e Série). In *Bull. trimest. Soc. mycol. Fr.* 59: 6–34, pl. 1.
- (1958). Une espèce nouvelle de Tricholomé: *Tricholoma (Dermoloma) hygrophorus*. In *Bull. trimest. Soc. mycol. Fr.* 74: 482–491.
- JÜLICH, W. (1982). Higher taxa of Basidiomycetes. In *Bibliothca mycol.* 85 ('1981').
- KONRAD, P. & MAUBLANC, A. (1924–1937). *Icones selectae Fungorum*. Vol. 1–5. Paris.
- KÜHNER, R. (1980). Les Hyménomycètes agaricoïdes. In *Bull. Soc. linn. Lyon* 49, No. spéc., 1–1027.
- KUYPER, TH. W. (1985). *Clitocybe metachroa* and the problem of the variable species. In *Agarica* 6 (12): 11–27.
- (1988). Specific and infraspecific delimitation. In C. Bas, Th. W. Kuyper, M.E. Noordeloos & E.C. Vellinga (eds.), *Flora agaricina neerlandica* 1: 30–37. Rotterdam, Brookfield.
- LANGE, J. E. (1933). Studies in the agarics of Denmark 9. In *Dansk bot. Ark.* 8 (3): 1–49.
- LUNDELL, S. & NANNFELDT, J. A. (1949). *Fungi exsiccati suecici* 35–36: 1–45. Uppsala.
- MOSER, M. (1983). Die Röhrlinge und Blätterpilze. In *Kl. Kryptog. Fl., Band II b/2* (5. Aufl.). Stuttgart-New York.
- NITARE, J. (1988). Jordtungor, en svampgrupp på tillbakegång i naturliga fodermarker. In *Svensk bot. Tidskr.* 82: 341–368.
- ORTON, P. D. (1980). Notes on British agarics: 7. In *Notes R. bot. Gdn Edinb.* 38: 315–330.
- ORTON, P. D. & WATLING, R. (1969). A reconsideration of the classification of Hygrophoraceae. In *Notes. R. bot. Gdn Edinb.* 29: 129–138.
- PERSOON, C. H. (1801). *Synopsis methodicae fungorum*. Gottingae.
- (1828). *Mycologia europaea* 3. Erlangae.
- SINGER, R. (1951). The Agaricales in modern taxonomy. In *Lilloa* 22: 1–768 ('1949').
- (1955). Type studies on Basidiomycetes 8. In *Sydowia* 9: 367–431.
- (1956). New genera of Fungi, 7. In *Mycologia* 48: 719–727.
- (1958). Fungi Mexicana, Series secunda—Agaricales. In *Sydowia* 12: 221–243.
- (1975). The Agaricales in modern taxonomy. 3rd Ed. Vaduz.
- SINGER, R. & CLÉMENÇON, H. (1971). Neue Arten von Agaricales. In *Schweiz. Z. Pilzk.* 49: 118–128.
- SVRČEK, M. (1966). Agaricales aus Böhmen. 2. In *Česká Mykol.* 20: 141–150.