

ON THE IDENTITY OF THE NEW TAXA OF GALERINA (AGARICALES),
PROVISIONALLY DESCRIBED BY J.J. BARKMAN¹

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Descriptions are presented of thirteen species and five varieties of *Galerina*, provisionally described as new by the Dutch mycologist J.J. Barkman in 1969 and 1970. The descriptions and illustrations are based on the original descriptive notes and our own study of microscopic characters. The study was hampered by the poor condition of most exsiccata. Nevertheless, the majority of the provisional taxa could be identified as belonging to species described before.

Four provisional species could not be identified with certainty, but they show so much resemblance to existing species that there is no reason to consider them as new taxa. One provisional species, *G. anomala*, is strongly deviating from other *Galerina* species and does probably not belong to that genus. Its identity remains unknown. In addition, our study revealed useful information on the taxonomic significance and variability of some diagnostic characters in *Galerina*.

Jan Barkman was a Dutch ecologist and phytosociologist with special interest for cryptogams in vegetation science. He introduced the discipline of mycosociology in the Netherlands and made it flourish (Barkman, 1976a, 1987). Together with his assistant B. de Vries he carried out extensive mycosociological studies in juniper scrubs in north-western and central Europe, of which only parts of the results have been published (Barkman, 1976b; de Vries, 1973, 1976; de Vries & Arnolds, 1994).

During this research he developed a special interest in the small brown-spored agarics of the genus *Galerina* Earle, at that time a strongly neglected group in Europe. Juniper scrubs appeared to be a particularly rich habitat for these fungi. In 1969 Barkman published a survey of the genus *Galerina* in the Netherlands in the form of a key with short descriptions and drawings of microscopical characters. Although this publication was written in Dutch, the paper has also been used and quoted by foreign European agaricologists (e.g. Bon, 1992; Watling & Gregory, 1993). In his 1969 paper Barkman described also 17 taxa as provisionally new, deliberately without a Latin diagnosis or reference to (type) collections. In 1970 he added some comments to his earlier survey and he again introduced one new provisional species without formal description. In the herbarium of the Biological Station at Wijster (WBS) several other collections are present with a provisional name on the label, which have never been published in any paper.

Barkman died unexpectedly in 1990, without having validly published any of his *Galerina* taxa. In this paper we attempt to clarify the identity of the taxa, provisionally described as new in Barkman's 1969 and 1970 papers, based on our re-examination of the collections at Wijster and the extensive notes by Barkman on the fresh sporocarps. We have not yet studied the taxa which were not described in his papers, but indicated as new on herbarium

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labels only. In some cases collections are also available, which were identified by other persons as belonging to one of Barkman's provisional species. In general we did not examine these collections either. All collections cited are preserved in WBS.

The investigation of the exsiccata of *Galerina* was hampered by two main problems. First, many collections remained after collecting in the refrigerator for some days, sometimes over one week, before they were examined (communication by B. de Vries). Therefore many sporocarps have been studied and preserved in bad condition and in some cases we observed evidently abnormal mis-shaped spores, apparently due to a long stay in the refrigerator. Secondly, the collections were dried in a closed stove without sufficient air circulation at 40°C. By this practice the sporocarps were more cooked than dried and in many exsiccata (almost) all cystidia and cells of other tissues were collapsed. It was often very difficult to find undamaged cystidia and pileipellis structures, even after boiling fragments of the tissues in KOH 5%.

The results of our studies are presented according to the names used by Barkman (1969, 1970) in alphabetical order. Each taxon is described and drawings of diagnostic features are given. The description of macroscopic characters is mainly based on Barkman's annotations on the fresh sporocarps. Four different colour codes were used by him, viz. Séguy (1936), Cailleux & Taylor (without year, in the text indicated as Expo), Kornerup & Wanscher (1978, in the text indicated as K & W) and Munsell (1954). The microscopic characters are derived from our own study of the exsiccata and, when useful, supplemented by observations made by Barkman on the fresh sporocarps. In our comments we compare the characteristics, as noted by Barkman and observed by us, and we try to find an appropriate valid name for the provisionally described taxa.

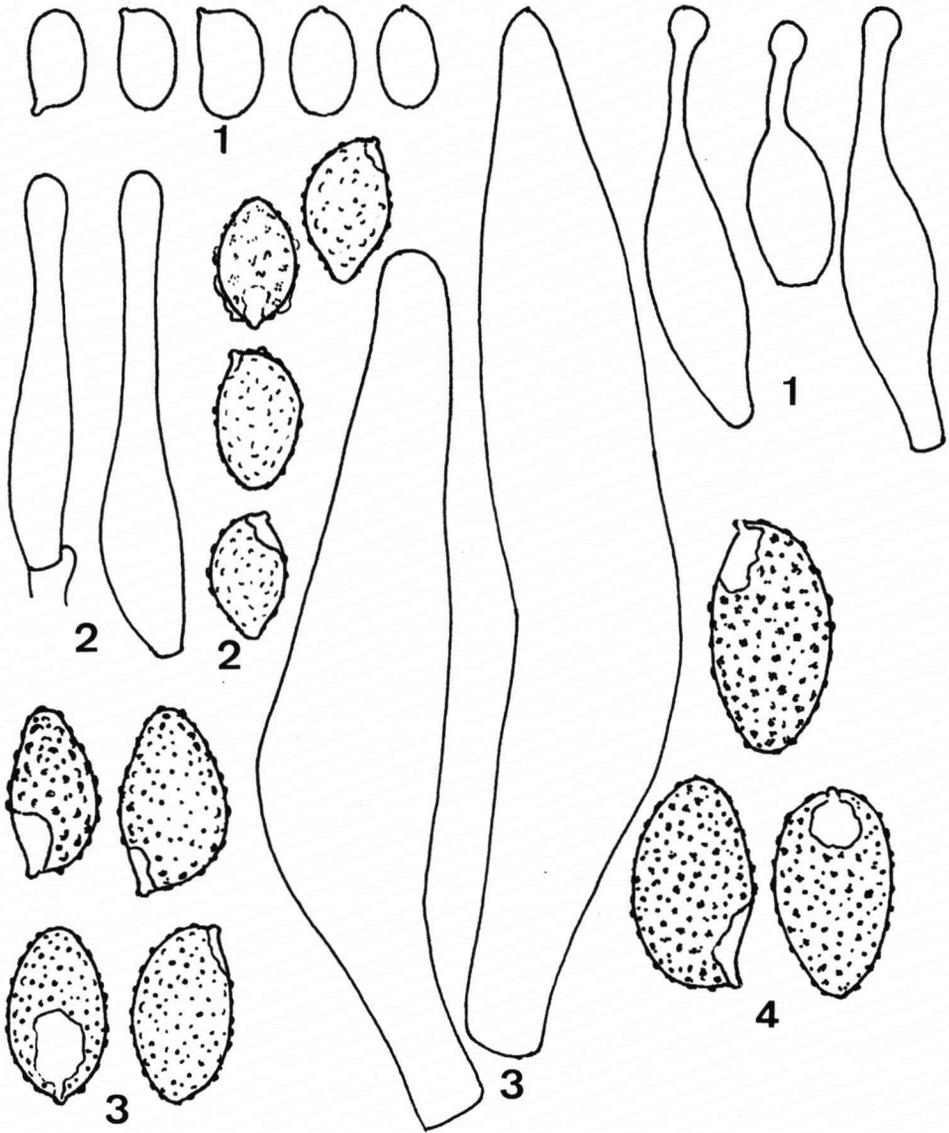
From our study it becomes evident that Barkman's species concept around 1969 was still immature. Collections, labelled with the same provisional name, appear often to belong to several species and sometimes also within a single collection more than one species was found to be present. Most newly introduced names were in our opinion given to atypical or aberrant specimens of widespread, variable species. Only two provisional names in Barkman's publications, viz. *G. dunensis* and *G. fellea*, are considered to represent new species, not described at that time. In the meantime the two species have been formally described already as *G. caulocystidiata* Arnolds and *G. beatricis* Bas, respectively. One other provisional species, *G. anomala*, is strongly deviating in many respects and does probably not belong to the genus *Galerina*. Its identity remains unsolved.

Our study of these collections has learnt us that some characters in *Galerina* are more variable or less prominent than often assumed. No less than six provisional taxa contained collections or specimens assigned by us to *G. allospora* Smith & Sing., whereas *G. hypnorum* was represented in the material of five provisional taxa.

***Galerina acuta* Barkman *nom. prov.*, Coolia 14 (1969) 62 — Fig. 1**

Identified as: *G. sideroides* (Bull.) Kühner (the collection contains also *G. calyptrata* P.D. Orton).

Pileus 6 mm broad, rather acutely conical, ochraceous yellow-brown, rather long translucently striate, without veil. Lamellae [L = 12–16, l = 1–3] adnexed, subdistant, concolorous with pileus, with white floccose edge. Stipe 45 × 1 mm, cylindrical, apex pale honey yellow, pruinose, downwards honey brown to ochraceous yellow-brown, glabrous except tomentose base (from Barkman's notes).



Figs. 1-4. — 1. '*Galerina acuta*' (= *G. sideroides*), spores and cheilocystidia. — 2. '*Galerina aimaroides*' (= *G. cf. hypnorum*), spores and cheilocystidia. — 3. '*Galerina annulata*' (= *G. atkinsoniana*), spores and cheilocystidia. — 4. '*Galerina atkinsoniana* var. *rugosocystis*' (= *G. atkinsoniana*), spores. All $\times 2000$.

Spores $6.5-7.5 \times 4.0-4.5(-5.0) \mu\text{m}$, $Q = 1.55-1.65(-1.75)$, ellipsoid to ellipsoid-oblong, sometimes laterally flattened, entirely smooth, pale yellow-brown. Basidia $15-23 \times 5-8 \mu\text{m}$, almost all collapsed, presumably 4-spored (not noted by Barkman). Cheilocystidia abundant, almost all collapsed, $17.5-28 \times 5.5-6.5 \mu\text{m}$, tibiiform with slender cylindrical

neck, c. 1.5–2.0 μm broad and globose capitulum, 2.8–3.7 μm broad (Barkman: 23–38 \times 4.5–6.5 μm , neck 1.0–2.5 μm , capitulum 2.5–3.8 μm). Pleurocystidia absent. Pileipellis according to Barkman made up of thin and smooth, gelatinized hyphae, c. 2.5 μm wide. Clamp-connections present.

Collection examined. NETHERLANDS: prov. Drenthe, Dwingeloo, 'Lheebroekerzand, Reigerplas', in dense scrub of *Juniperus communis*, 4 Nov. 1964, J.J. Barkman 8009 (WBS).

The collection comprises two sporocarps in rather bad condition. Besides the specimen described above it contains a smaller sporocarp (pileus 5 mm, stipe 20 \times 0.6 mm) with amygdaliform spores, 8.5–11.0 \times 5.5–6.5 μm , smooth with exosporal blisters near the plage area. It is strongly deviating from the microscopical characters as described by Barkman and evidently belongs to the section *Calyptrospora*, probably to *G. calyptrata* P.D. Orton. The characters of the larger specimen agreed well with the annotations by Barkman. Apparently the two species were confused in the field.

The described fungus clearly belongs to stirps *Sideroides* of subsection *Tibiicystidiae*, characterized by tibiiform cystidia and smooth spores. It comes very close to *G. sideroides* and in Barkman's paper it keys out next to that species. The common diagnostic characters are the absence of a well-developed veil (present in *G. stylifera* (Atk.) Smith & Sing.) and the presence of a viscid, gelatinized pileipellis (absent in *G. camerina* (Fr.) Kühner). Bas (1996) studied the pileipellis in this collection as well and confirmed the existence of a clearly gelatinized layer (unpublished notes on collection). The present collection is slightly deviating from typical *G. sideroides* as described by Smith & Singer (1964) in (1) small dimensions of the sporocarp, (2) more acutely umbonate pileus, and (3) slightly smaller basidia and spores than usual (according to Smith & Singer (1964) 20–40 \times 7–8 μm and 7–8.5(–9) \times 4–4.5 μm , respectively; according to Derbsch & Schmitt (1987) 25–30 \times 6.5–7.5 μm and 6.7–8.2 \times 4–4.5 μm). However, these differences are only gradual and we believe that the studied collection still falls within the variation of *G. sideroides*.

Galerina sideroides is a rare species in the Netherlands, much less common than its relatives *G. camerina* and *G. stylifera*.

Galerina aimaroides Barkman *nom. prov.*, Coolia 14 (1970) 62 — Fig. 2

Identified as: *G. cf. hypnorum* (Schrank: Fr.) Kühner.

Pileus 3 mm wide, obtusely conical, dirty dark yellow-brown (Expo E66), long translucently striate. Lamellae [$L = 9, l = 1$] broadly adnate with decurrent tooth, distant, pale yellow-brown. Stipe 13 \times 0.6 mm, cylindrical, honey brown, slightly dark brown fibrillose, apex white pruinose (from Barkman's notes).

Spores 8.5–10.5 \times (5.0–)5.5–6.5(–7.0) μm , $Q = 1.45$ –1.65, ovoid to slightly amygdaliform, minutely but distinctly warty-rugulose, a few spores with small, wrinkled exosporal blisters, plage mostly not visible, but observed in a few spores. Basidia 24.5–26 \times 7–7.5 μm , 4-spored. Cheilocystidia present, but not well reinflating, with rather slender neck, 2–3.5 μm wide, usually weakly subcapitate, apex 3–4.5 μm wide; according to Barkman 32–40 \times 3–6.5 μm , neck 1.3–2.5 μm , apex 1.3–4 μm . Hyphae in trama strongly encrusted, with clamp-connections.

Collection examined. GERMANY: Westfalen, Haltern, 'Tannenberg', on rhizome of *Dryopteris carthusiana* in dense scrub of *Juniperus communis*, 16 Nov. 1967, J.J. Barkman 8621 (WBS).

The description by Barkman was based on a single minute sporocarp. At present half of a fragmented sporocarp in bad condition remains.

In Barkman's key *G. aimaroides* keys out in a group of species without pleurocystidia and with cheilocystidia with a long, thin, often acute neck, side by side with *G. uncialis*. It would be different from the latter species in lack of an annulate veil, entirely rugulose spores (without plage), numerous hyphae without clamp-connections and special substrate. However, we were able to demonstrate the presence of a smooth plage area in some spores and found the clamps to be numerous. We also observed that the cystidia were less slender than described and depicted by Barkman, and usually subcapitate. We do not think that this fungus is closely related to *G. uncialis*, but to *G. hypnorum*. Both of us observed irregular, wrinkled exosporal blisters in a small proportion (< 10%) of the spores, a feature characteristic of this species. However, the spores are relatively broad for *G. hypnorum* and the cheilocystidia are relatively slender. Nevertheless we believe that this collection represents an extreme variant of this quite variable species. The habitat on fern rhizomes is peculiar, but *G. hypnorum* is known from wood, debris of various herbaceous plants and bryophytes (Arnolds, 1983). The identity of this collection cannot be established with certainty due to the bad condition of the extremely scanty material.

Galerina annulata Barkman *nom. prov.*, Coolia 14 (1970) 144 — Fig. 3

Identified as: *Galerina atkinsoniana* A.H. Smith, possibly an undescribed variety (= *G. annulata* sensu Sing.); also comprising a collection of *Galerina rubiginosa* var. *annulata* Favre (= *G. terrestris* Wells & Kempton).

Pileus 4–8 mm broad, campanulate to conico-convex, hygrophanous, when moist yellowish brown, orange-brown, warm brown (Expo D56, E46, E58, E68) with paler margin, translucently striate up to 3/4 of the radius, drying pale ochre yellow, margin straight, under hand lense pruinose-pubescent, in one collection (*de Vries* 793) in addition marginal zone with arachnoid white remains of veil. Lamellae [L = c. 15, l = 1] adnexed to adnate with decurrent tooth, subdistant, honey-yellow to orange-brown. Stipe 15–25 × 1.5–2.3 mm, cylindrical, orange-brown to reddish brown (Expo F44, E46, E56, E58), entirely pruinose-pubescent, in addition with small white flocks of fibrillose-arachnoid veil and/or thin annulate zone of veil on a variable position, varying from 2 mm below the apex to the lower part of the stipe. Smell and taste not recorded (from Barkman's notes).

Spores 9.5–15(–15.5) × 5.5–8.5 μm, Q = 1.55–1.85(–1.95), ovoid(–oblong) to amygdaliform, entirely verrucose except for the distinct, smooth or minutely punctate plage, yellow-brown in KOH 5%. Basidia 23–26 × 7–9 μm, 2-spored, almost all collapsed in exsiccata. Cheilocystidia numerous, most of them collapsed, 46–66 × 10.5–16 μm, lageniform, gradually tapering towards obtuse or subacute apex, 4.5–8 μm wide, occasionally with brown content or wall near apex slightly thickened. Pleurocystidia difficult to find in exsiccata, collapsed, scattered, according to Barkman and de Vries 41–64(–100) × 11–16.5(–22) μm, similar to cheilocystidia. Pileipellis made up of encrusted, more or less radial hyphae, 5–12 μm wide, in addition with numerous lageniform pileocystidia, according to Barkman measuring 40–78 × 10–16 μm, apex 5–8 μm, similar to hymenial cystidia, sometimes with brown content. Stipitipellis with numerous caulocystidia, similar to pileocystidia. Clamp-connections frequent in trama.

Collections examined. NETHERLANDS: prov. Overijssel, Ommen, 'Stegerveld', on dead grass remains and amongst the moss *Pohlia nutans* in scrub of *Juniperus communis*, 14 Nov. 1969, *B. de Vries* 295 (on label indicated as type); prov. Drenthe: Sleen, State Forest Emmen, 'Sleenerzand', in scrub of *Juniperus communis*, 21 Dec. 1970, *B. de Vries* 793; Grolloo, 'De Berenkuil', amongst the mosses *Pseudoscleropodium purum* and *Polytrichum piliferum* on northern side of *Juniperus* scrub, 10 Nov. 1977, *J. J. Barkman* 10.091 (all in WBS).

The three collections, described above, are identical in all important diagnostic characters, in particular the presence of pileo- and caulocystidia in combination with a fibrillose veil on the stipe (and in one case also at the margin of the pileus). All of them were labelled as '*G. annulata* n.p.' by Barkman. Collection *B. de Vries* 295 has provisionally been indicated as type and comprises three sporocarps in reasonable condition.

A fourth collection in WBS, identified as *G. annulata* by Barkman, is deviating in the lack of pileocystidia. A concise description of this collection reads as follows:

Pileus c. 4.5 mm broad, ochraceous yellow-brown, smooth. Stipe 28–32 × 1.0–1.3 mm, first ochraceous yellow-brown, darkening to reddish brown from the base upwards, entirely pubescent-pruinose, below apex with fugacious white annulus of white fibrils, downwards also with scattered flocks of veil. Spores 10.5–13.5 × 5.5–7.0 µm, verrucose with smooth plage. Basidia 28–30 × 6.5–7 µm, 2-spored. Cheilo- and pleurocystidia lageniform, 44–67 × 5.5–14 µm with neck 4–5.5 µm wide. Pileocystidia absent.

Collection examined. GERMANY: Westfalen, Eiffel, N. slope of Wiwelsberg, on wood of *Juniperus*, 21 Sept. 1972, *J. J. Barkman* 9552 (WBS).

The three collections, described first, are in all respects similar to the widespread 2-spored form of *G. atkinsoniana* A.H. Smith, in particular in the presence of pileo- and caulocystidia and size and ornamentation of spores. The only difference is the presence of veil remains at the stipe and occasionally along the margin of the pileus. Likewise, the fourth collection from Germany seems to be identical with *G. vittaeformis* (Fr.) Sing. except for the presence of veil remnants. *G. atkinsoniana* and *G. vittaeformis* differ only in the abundance, viz. absence or scarcity of pileocystidia. This character is, at least in some regions, intergrading (Arnolds, 1983) and therefore *G. atkinsoniana* is regarded by some authors as a subspecies (Arnolds, 1983) or variety (Krieglsteiner, 1991; Arnolds et al., 1995) of *G. vittaeformis*.

The significance of a veil in section *Galerina* is much disputed and the nomenclature of veiled taxa is extremely confused. Smith & Singer (1964) regarded this character as quite important since they divided section *Galerina* into two stirpes on this basis: stirps *Minima* with remains of veil and stirps *Vittaeformis* without veil. We do not share this point of view since the presence of a subtle veil is the only difference between several pairs of otherwise identical taxa, placed in the two stirpes.

Favre (1955) introduced the name *G. rubiginosa* var. *annulata* Favre for alpine collections with an annulate zone on the stipe, 2- or 4-spored basidia and without pileocystidia. He noticed that in typical *G. rubiginosa*, by us regarded as a synonym of *G. vittaeformis*, in very young sporocarps rarely a weakly developed veil was observed ("un vague voile cortiniforme très fugace"). Kühner (1972) described 4-spored populations with distinct veil as belonging to *G. vittaeformis* f. *vittaeformis* and discussed in extenso the significance of that character, which was thought by him to be of no importance at all. On the other hand, Gulden (1980) and Watling & Gregory (1993) treated such forms as species in their own

right and adopted the name *G. terrestris* Wells & Kempton, a species originally described from Canada with 4-spored basidia (Wells & Kempton, 1969). Collection *Barkman 9552* can be considered to belong to this taxon. A possible earlier synonym is *G. subannulata* (Sing.) Smith & Sing. (= *G. vittaeformis* var. *subannulata* Sing., 1953), which may be different, however, in the predominantly vesiculose cheilocystidia (Smith & Singer, 1964; Singer, 1974). In addition the basidia in this taxon are 2- (some 1- or 3-)spored, but we think that the numbers of sterigmata on the basidia are of little or no importance in this group. A related, but apparently distinct species is *G. caulocystidia* Arnolds, also with 2-spored basidia, a pruinose-pubescent stipe and a fibrillose veil, but characterized by the absence of pleurocystidia (Arnolds, 1983; see also discussion on *G. dunensis* in this paper).

Collections of the *G. vittaeformis* complex with both pileocystidia, caulocystidia and veil remnants on the stipe are apparently less widespread. They were unknown to Gulden (1980), and Kühner (1972: 82) included only one collection from the Swiss alps with very fine flocks at the stipe in his description of *G. atkinsoniana* f. *atkinsoniana* with 2-spored basidia. On the other hand, Singer (1974) described a similar fungus from the Swiss alps with predominantly 4-spored (some 2- and 3-spored) basidia as a separate species. He used the name *G. annulata* (Favre) Sing., based on *G. rubiginosa* var. *annulata* Favre (1955), although Favre described the pileipellis without mentioning the presence of pileocystidia, as noticed also by Kühner (1972). Singer (1974) did not indicate whether he has examined Favre's type collection with different results.

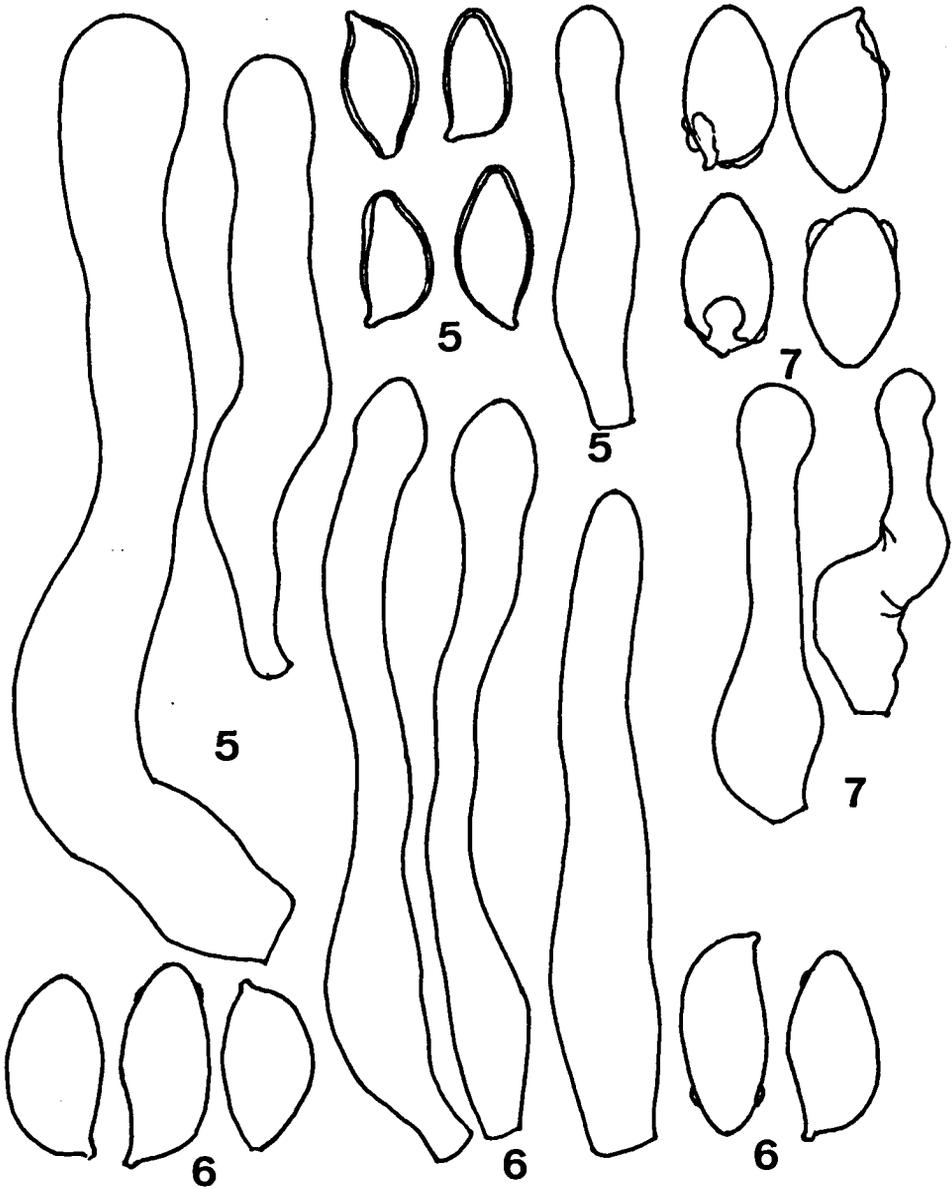
In our opinion, the taxonomic significance of the presence of a fibrillose velum in this group of fungi is very doubtful since the degree of development varies considerably. De Vries noted on the label of his collection 793 of '*G. annulata*', made in December 1970, that he found typical *G. atkinsoniana* without veil remains on exactly the same spot in December 1971. We are inclined to regard collections with veil at the most as taxa in the rank of variety. We do not consider it useful to give the described collections a formal name as long as the constancy and reliability of veil characters in this group are not elucidated and the nomenclature of the various recognized taxa is not cleared up by renewed type studies. In any case *G. annulata* Barkman nom. prov. cannot be validated since it would be a later homonym of *G. annulata* (Favre) Sing., which, completely accidentally, might refer to the same fungus.

***Galerina anomala* Barkman nom. prov., Coolia 14 (1969) 58 — Fig. 5**

Identity unknown.

Pileus 4.5 mm broad, hemispherical, very pale cream-coloured, almost white, margin weakly striate, smooth. Lamellae [L = 14, l = 1] emarginate-adnate, ascending, broad, pale yellow-brown with pubescent, white edge. Stipe 17 × 0.7 mm, cylindrical, apex cream-coloured, downwards red-brown, base blackish brown, minutely white pubescent over most of the length (from Barkman's notes).

Spores 8.5–10.5(–10.8) × 5.0–6.0 μm [according to Barkman 7.5–9.0 × 4.5–5.5 μm], Q = 1.55–1.85, ovoid, amygdaliform to limoniform, slightly thick-walled, many collapsed, apex with callus, sometimes almost a germ pore, pale yellowish sub micr. Basidia 18–23(–31) × 5–7 μm [Barkman], 4-spored. Lamella edge sterile, made up of thick-set, lageni-



Figs. 5–7. — 5. '*Galerina anomala*' (unidentified), spores, caulocystidia (left) and cheilocystidium (right). — 6. '*Galerina atrofusca*' (= *G. allospora*), spores and cheilocystidia. — 7. '*Galerina calyprata* var. *clavipila*' (= *G. calyprata*), spores and cheilocystidia. All $\times 2000$.

form cheilocystidia c. $31 \times 5 \mu\text{m}$ with thick neck c. $3.7 \mu\text{m}$ wide and subcapitate apex c. $4.7 \mu\text{m}$ wide, almost all collapsed [according to Barkman measuring $23\text{--}41 \times 5\text{--}8$, neck $3\text{--}4.5 \mu\text{m}$, and apex $4\text{--}6.5 \mu\text{m}$]. Pleurocystidia absent. Pileipellis difficult to reinflate, apparently made up of radial hyphae with elongated elements, $5\text{--}10 \mu\text{m}$ wide, not encrusted. Stipitipellis a cutis made up of parallel hyphae, $2\text{--}8 \mu\text{m}$ wide, with pale yellowish parietal pigment, near apex with small tufts of subcylindrical caulocystidia, slightly thickened to the apex, $44\text{--}65 \times 4.5\text{--}5.5 \mu\text{m}$, apex $7\text{--}8.5 \mu\text{m}$ wide. Clamp-connections frequent.

Collection examined. NETHERLANDS: prov. Drenthe, Dwingeloo, 'Lheebroekerzand', open spot in scrub of *Juniperus communis*, 11 May 1965, A. K. Masselink 8030 (WBS).

The collection consists of a single, dried sporocarp in bad condition. Barkman (1969) placed this taxon in the group of *Galerina* with an entirely pubescent stipe. However we found caulocystidia only at the upper third part of the stipe. The very pale, smooth and almost papillate spores do not fit in with the spore characters of *Galerina*. Also the cream-coloured pileus would be very unusual for this genus. These characteristics remind of the genus *Flammulaster* Earle, in particular of the group around *F. carpophilus* (Fr.) Earle (Vellinga, 1986). However, in this group the pileus is not smooth but rugulose and the pileipellis contains chains of globose to ellipsoid cells. Neither Barkman, nor we could find such elements in the studied collection. Furthermore the stipe of this fungus is pubescent and dark at the base, instead of flocculose and pale in *Flammulaster*. On our request E. Vellinga (Leiden) was so kind to study this collection as well and confirmed that it was not a *Flammulaster*.

The structure of the pileipellis and shape and colour of the spores are more similar to the genus *Tubaria* (W.G. Smith) Gillet. *Tubaria pallidospora* J. Lange was described as a small species (pileus $5\text{--}10 \text{mm}$) with pale colours and spores $9.5\text{--}10 \times 5.5 \mu\text{m}$. However this fungus has subdecurrent lamellae and clavate cheilocystidia (Lange, 1939; Bon, 1992). Consequently, the identity of '*Galerina anomala*' remains obscure for the time being.

***Galerina atkinsoniana* A.H. Smith var. *rugosocystis* Barkman nom. prov., Coolia 14 (1969)
58 — Fig. 4**

Identified as: *Galerina* cf. *atkinsoniana* var. *atkinsoniana*.

Pileus 11 mm broad, conico-convex, pale greyish yellow-brown, translucently striate up to $3/4$ of the radius, drying beige-white. Lamellae [$L = 11$, $l = 1$] broadly adnate, distant, honey-brown. Stipe $35 \times 0.75 \text{mm}$, cylindrical, rather dark honey-brown with slightly paler apex, entirely pubescent, without veil remains (from Barkman's notes).

Spores $13\text{--}16(-17) \times 7.5\text{--}8.5(-9.5) \mu\text{m}$, $Q = 1.65\text{--}1.95$, amygdaliform-oblong, strongly warty-rugulose, with smooth plage, orange-brown sub micr. Basidia collapsed, probably 2-spored (not mentioned by Barkman). Cheilocystidia numerous, mostly collapsed, $37\text{--}47 \times 12\text{--}17 \mu\text{m}$, lageniform with subcylindrical neck. Pleurocystidia not seen, but according to Barkman present, lageniform, $49\text{--}54 \times 13\text{--}17 \mu\text{m}$, with subcylindrical neck. Pileipellis a cutis of repent hyphae, $5\text{--}15 \mu\text{m}$ wide, in part with brown encrusting pigment, without pileocystidia; according to Barkman with scattered, lageniform cystidia, $48\text{--}69 \times 8\text{--}13 \mu\text{m}$, with encrusted walls. Clamp-connections present on hyphae of the pileipellis (absent according to Barkman).

Collection examined. NETHERLANDS: prov. Drenthe, Sleen, 'Sleenerzand', in scrub of *Juniperus communis*, 17 Oct. 1963, J. J. Barkman 7637 (WBS).

This collection contains only one specimen in bad condition. The pileus has been infected by a mould, which may be the reason for our inability to find pileocystidia. Otherwise the fungus is in all respects similar to *G. vittaeformis* or, if the presence of pileocystidia is accepted, to *G. atkinsoniana*. The unique feature of this collection would be, according to Barkman, the presence of encrusted pileocystidia. These structures are apparently lost in the exsiccatum. Otherwise we wonder whether the presence of encrusted pigment would be of sufficient taxonomic relevance to distinguish a variety, in particular since part of the pileocystidia in *G. atkinsoniana* often have slightly thickened, brown walls.

***Galerina atrofusca* Barkman nom. prov., Coolia 14 (1969) 63 — Fig. 6**

Identified as: *G. allospora* Smith & Sing.; also comprising a collection of *G. pumila* (Pers.: Fr.) Sing.

Pileus 5 mm broad, hemispherical, with inflexed margin, very dark brown-grey (Séguy 111–116), surface rugulose, tomentose, not translucently striate, drying beige-grey with weak olivaceous tone. Lamellae [$L = 10$] adnexed, ventricose, distant, thickish, pale greyish olive with pale fimbriate edge. Stipe 9×1.2 mm, cylindrical, dirty ochraceous brown with some white fibrils, apex white flocculose (from Barkman's notes).

Spores (11.0–)11.5–13.5(–14.0) \times (5.5–)6.0–7.5 μm , $Q = (1.6\text{--})1.8\text{--}2.0(\text{--}2.2)$, predominantly ovoid-oblong to amygdaliform, some ellipsoid-oblong, brownish orange sub micr., smooth without germ pore, in some spores with distinct plage, in a few spores with very small exospore blisters near the apex. Basidia 4-spored. Cheilocystidia numerous, (39–)41–52 \times 4–8 μm , subcylindrical, usually slightly swollen near base, with long neck (2.8–4.7 μm wide) and slightly enlarged, subglobose to ovoid apex. Pleurocystidia absent. Pileipellis difficult to examine in exsiccatum, predominantly made up of elongated hyphae, 2–6 μm wide, in addition with some shorter, elliptic elements, up to 8 μm wide, with encrusting, orange-brown pigment. Clamp-connections present.

Collection examined. NETHERLANDS: prov. Drenthe, Ruinen, 'Dwingelder Veld' near Kraloo, in scrub of *Juniperus communis*, 20 Oct. 1964, J. J. Barkman 7956 (WBS).

In the herbarium WBS are two collections, labelled *Galerina atrofusca* by Barkman. The collection described above was designated as type on the label. It consists of only one, very small sporocarp in rather bad condition. *Galerina atrofusca* was keyed out by Barkman (1969) mainly on the basis of the striking grey-brown colours of the sporocarps and the velvety pileus. However, the colour in the exsiccatum is, surprisingly, rather pale yellow-brown and the pileus has a smooth appearance. Also in microscopical studies no trace of scales or hairs on the pileus could be demonstrated. Barkman himself did describe the pileipellis as made up of normal hyphae.

In our opinion this collection represents a variant of *G. allospora* Smith & Sing. with abnormally dark pigments. It is interesting to note that Barkman described one of his collections of *G. juniperina* nom. prov. (= *G. allospora*) also as having a "dark grey-brown pileus" (see *G. juniperina*). Most spores are completely smooth, but in very few spores a minute exospore blister near the apex could be observed. In addition, the size and shape of the cheilocystidia fit in well with this species. In particular the somewhat pointed, triangular

apex of some cheilocystidia is characteristic of this species and *G. pumila* (Pers.: Fr.) M. Lange. The latter species differs, among other things, in ellipsoid spores.

Galerina allospora is a name of a species described from North-America, scarcely used in Europe. This species is better known under the name *G. luteofulva* P.D. Orton. See the notes on *G. juniperina* nom. prov.

The second collection, labelled *Galerina atrofusca*, in WBS consists of two sporocarps and has the following characteristics: Pileus 8 mm broad, dark grey-brown (Expo H64), drying pale greyish yellow-brown. Lamellae adnate, subdistant, yellow-brown with white crenulate edge. Stipe 25 × 1.5 mm, base yellow-brown, upwards with numerous white fibrils, apex pruinose. Spores (10.5–)11.0–12.5(–13.5) × 5.5–6.5 μm, Q = 1.9–2.15, ellipsoid-oblong to slightly ovoid, smooth, brownish orange. Cheilocystidia not reinflating; according to Barkman 54–59 × 5.5–7.3 μm with long, slender neck (c. 4 μm) and often slightly triangular capitulum, 4–6.5 μm wide.

Collection examined. NETHERLANDS: prov. Gelderland, Otterloo, 'Hoge Veluwe', in scrub of *Juniperus communis*, 9 Nov. 1967, *J.J. Barkman 8606* (WBS).

This collection is deviating in several respects from the one described above (*Barkman 7956*). The pileus is not described as velvety or roughened, the lamellae have a normal *Galerina* colour and the spores are predominantly ellipsoid, without any exospore blister. Barkman himself wrote in his descriptive notes on this collection that the microscopical characters are completely identical with *G. pumila*, and that only the colours of pileus and stipe are deviating. We fully agree with this opinion, but are not inclined to attach much taxonomic significance to the differences in colour. In our opinion they may be caused by frost damage. The sporocarps were collected late in the year and the exsiccatum is in a bad condition.

***Galerina calyptrata* P.D. Orton var. *clavipila* Barkman nom. prov., Coolia 14 (1969)**

59 — Fig. 7

Identified as: *G. calyptrata* P.D. Orton.

Pileus 6 mm, rather acutely conical, vividly orange-brown, translucently striate up to half way the radius, densely pubescent. Lamellae [L = 14, l = 1–3] emarginate-adnate, subdistant, dark ochraceous yellow-brown. Stipe 40 × 0.8 mm, cylindrical with swollen basis (up to 1.5 mm), shiny yellow-brown, with scattered white fibrils of veil, apex and base white pruinose. Smell and taste not noted (from Barkman's notes).

Spores 10.5–12.0(–13.0) × (5.5–)6.0–7.0(–7.5) μm, Q = (1.55–)1.65–1.75(–1.95), ovoid to subamygdaliform, in majority smooth, but some spores calyptrate with small to large, smooth or wrinkled exospore blisters near the plage area. Basidia 4-spored. Cheilocystidia collapsed, short (c. 25 μm) with thick neck (3.0–3.5 μm wide), not to strongly capitate; apex 3.5–6 μm wide (according to Barkman cheilocystidia variable, lageniform to bar-bell shaped, 25–45 × 6.5–10 μm; neck 3–4 μm; apex 4–8 μm). Pileipellis a cutis of repent hyphae, 4–9 μm wide, strongly yellow-brown encrusted, some hyphae with subclavate terminal cells but without differentiated pileocystidia (according to Barkman with clavate pileocystidia, 40–130 × 10–15 μm). Clamp-connections present.

Collection examined. NETHERLANDS: prov. Drenthe, Sleen, 'Sleenerzand', in scrub of *Juniperus communis*, 17 Oct. 1963, J. J. Barkman 7636 (WBS).

The studied exsiccatum contains a single, strongly damaged sporocarp. It has all characters of *G. calyptrata*. In particular the vividly orange tinge of the pileus is diagnostic for this species. Barkman (1987) distinguished var. *clavipila* in view of the numerous clavate cystidia on the pileus surface. We could not find these structures in the exsiccatum, although the structure of the pileipellis was quite distinct in our preparations. In our opinion terminal cells of the superficial hyphae may be considered by Barkman as pileocystidia. According to B. de Vries (oral communication) Barkman himself doubted the taxonomic value of these structures in a later period of his research. We agree with this view.

In herbarium WBS three other collections are labelled as *G. calyptrata* var. *clavipila*, but they were not reinvestigated by us. The collection, described here, was indicated on the label as type by Barkman.

See also our observations on *G. sahleri* var. *clavipila*.

Galerina cyclocystis Barkman *nom. prov.*, Coolia 14 (1969) 60 — Fig. 8

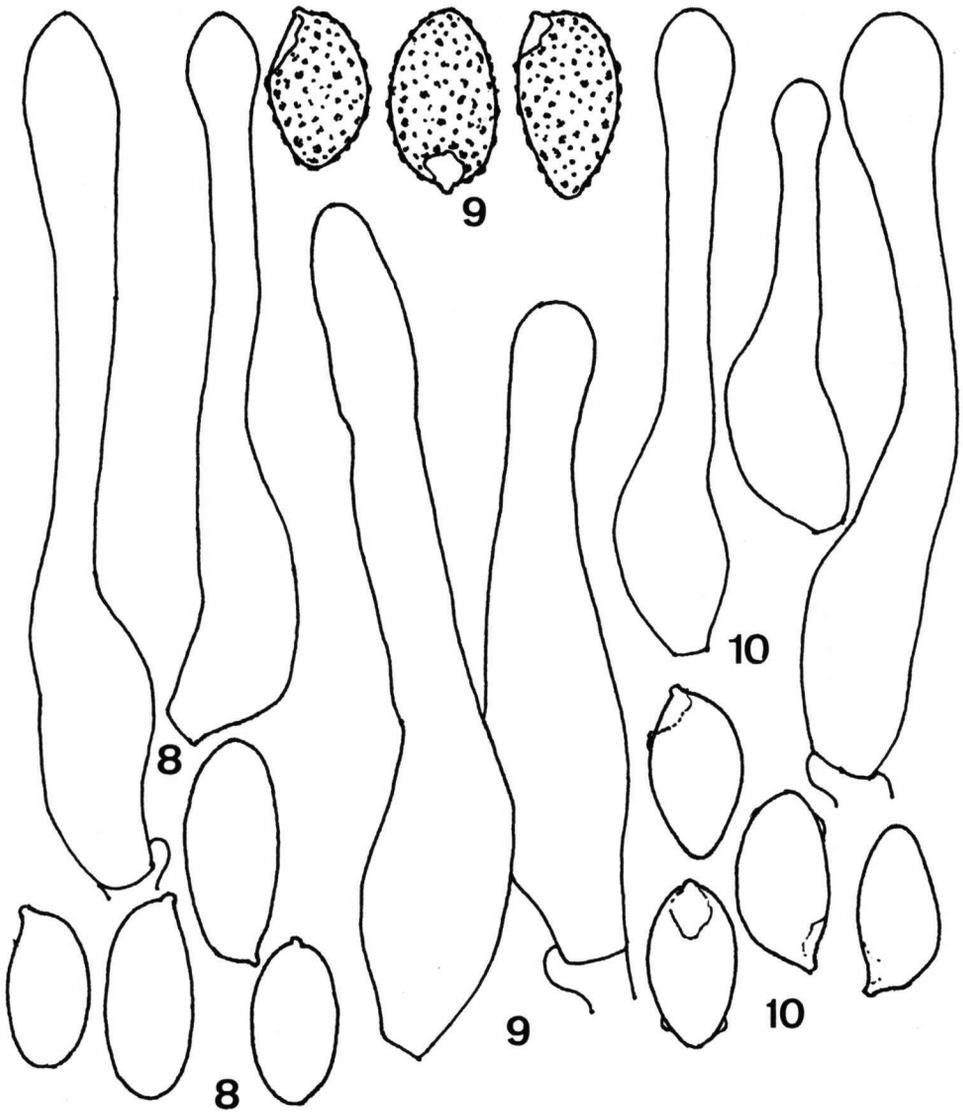
Identified as: *Galerina pumila* (Pers.: Fr.) Sing.; the collection contains also *G. allospora* Smith & Sing. and *G. hypnorum* (Schrank: Fr.) Kühner.

Macroscopical details unknown (see observations). Spores (10.0–)11.0–15.0 × 5.5–6.5 µm, Q = 1.7–2.4, ellipsoid-oblong to subcylindrical or slightly ovoid, smooth without pore or plage, brownish orange sub micr. Basidia 4-spored. Cheilocystidia in exsiccatum not reinflating, according to Barkman (descr. notes) 50–65 × 5–6 µm, subcylindrical with slightly narrower neck (4–5 µm) and swollen apex (5–9 µm), often with ovoid to triangular capitulum, often with refractive thickening of the wall in the lower half. Pleurocystidia absent.

Collection examined. NETHERLANDS: prov. Drenthe, Dwingeloo, 'Lheebroekerzand, Reigerplas', in centre of large scrub of *Juniperus communis*, 27 Oct. 1964, J. J. Barkman 7958.

Bernhard de Vries reinvestigated this collection in 1975 and concluded that it was heterogeneous. Among the ten dried sporocarps eight were identified as *G. allospora* (= *G. luteo-fulva*, see observations on *G. juniperina*); one sporocarp belonged to *G. hypnorum* (= *G. decipiens*), see observations on *G. inversa*) and only one sporocarp had the microscopical characters of *G. cyclocystis*. The notes on macroscopical characters refer to the mixture of sporocarps.

This taxon was keyed out by Barkman on the basis of a unique feature, viz. a thickening of the wall halfway the cheilocystidia, which might indicate affinity with section *Inocybeoides* (*Galerina nana* (Petri) Kühner and allies). However, in the exsiccatum no trace of a thickened wall could be found. According to Barkman it was present in part of the cystidia only and in our opinion it is very likely that the observed thickening consisted of a refractive, mucoid substance, occasionally seen in cystidia of several species of *Galerina* and in our opinion not of taxonomic importance. The large, black humps on the cystidial walls, depicted in Coolia (Barkman, 1969: 83, fig. 37) can be safely regarded as a 'poetic license'. For the rest the sporocarp could be easily identified as *G. pumila* (Pers.: Fr.) Sing. on the basis of its large, smooth, ellipsoid spores and slender cheilocystidia, often with triangular apex.



Figs. 8–10. — 8. '*Galerina cyclocystis*' (= *G. pumila*), spores and cheilocystidia. — 9. '*Galerina dunensis*' (= *G. caulocystidiata*), spores and cheilocystidia. — 10. '*Galerina glutinosa*' (= *G. allospora*), spores and cheilocystidia. All $\times 2000$.

***Galerina dunensis* Barkman *nom. prov.*, Coolia 14 (1969) 64 — Fig. 9**

Identified as: *G. caulocystidiata* Arnolds.

Pileus 5–18 mm, campanulate with flattened apex, orange-brown with yellow margin, smooth, dry, shiny, translucently striate up to halfway the radius. Lamellae [L = 10–19,

l = 3] broadly adnate with decurrent tooth, subdistant, yellow-brown with paler edge. Stipe 15–28 × 1–3 mm, orange-brown, gradually discolouring blackish brown in age, entirely densely pubescent, with narrow arachnoid-fibrillose, whitish annulus, downwards with a few additional fibrils of veil (from Barkman's notes).

Spores 10.5–13.0(–14.0) × 6.5–7.5 µm, Q = 1.5–1.8, ovoid(–oblong) to amygdaliform, entirely warty-rugulose with smooth to punctate plage, occasionally with apical callus. Basidia 2-spored, collapsed, according to Barkman 24–31 × 6.8–7.5 µm. Cheilocystidia abundant, mostly collapsed, 44–60 × 9.5–15 µm, lageniform, gradually tapering into a subcylindrical neck, 4.5–7.5 µm wide. Pleurocystidia absent. Caulocystidia numerous, similar to the cheilocystidia. Pileocystidia absent. Clamp-connections present.

Collection examined. NETHERLANDS: prov. Noord-Holland, Petten, in moist dune slack amongst grasses and moss, Nov. 1967 & Oct. 1968, *F. A. van den Bergh s.n.* (WBS).

This collection comprises twelve sporocarps of different ages in fairly good condition. The combination of a pubescent stipe, lageniform cheilocystidia and rugulose spores is characteristic of the group of *G. vittaeformis* (Fr.) Sing. It comes close to the latter species, but differs macroscopically in the presence of a fibrillose annulus. This character is probably of minor taxonomic importance; see the discussion on *G. annulata*. More fundamental is the absence of pleurocystidia, which are supposed to be present in all members of section *Galerina* (Smith & Singer, 1964; Watling & Gregory, 1993). The collection of *G. dunensis* appears to be fully identical with *G. caulocystidiata* Arnolds, described after the publication of Barkman's key (Arnolds, 1983).

***Galerina fellea* Barkman *nom. prov.*, Coolia 14 (1969) 59**

Identified as: *G. beatricis* Bas.

Description: see Bas, *Blumea* 41 (1996) 3–6.

Collection examined. NETHERLANDS: prov. Noord-Holland, 's-Graveland, on compost in orchard, 30 Oct. 1968, *J. Daams s.n.*

This species was included as '*G. fellea* n.p.' in Barkman's key. It was collected by the amateur mycologist J. Daams and recognized as an undescribed species of *Galerina* by C. Bas, but not formally described before 1996 as *G. beatricis*. We refrain from giving a description of this characteristic species, belonging to section *Naucoriopsis*, stirps *Marginata*, and refer to Bas (1996).

***Galerina glutinosa* Barkman *nom. prov.*, Coolia 14 (1969) 60 — Fig. 10**

Identified as: *G. allospora* Smith & Sing.

Pileus 5–8 mm broad, convex, pale orange-brown with dark orange-brown centre (Séguy, 1936: 191), translucently striate, radially fibrillose-tomentose, viscid, pileipellis separable. Lamellae [L = 13–15, l = 1(–3)], broadly adnate, horizontal, sometimes loosening from the stipe and forming a pseudocollarium. Stipe 7–20 × 1–1.5 mm, pale honey yellow to honey brown, subviscid, with fibrils lengthwise, apex white pruinose (after Barkman's notes).

Spores (9.5–)10.0–11.5(–12.5) \times 5.5–6.0(–7.0) μm , $Q = 1.7\text{--}2.0$, ovoid-oblong to amygdaliform, smooth with weakly delimited plage and a minority (c. 20%) with small exospore blisters below apex, rarely in addition small blisters at the edge of the plage. Basidia collapsed, 4-spored. Cheilocystidia abundant, mostly collapsed, 32–54 \times 6–8 μm , slenderly lageniform with cylindrical neck, 2.8–4.7 μm wide, and weakly to strongly swollen apex, 4–8.5 μm wide; capitulum often ellipsoid, sometimes rhomboid. Pleurocystidia absent. Pileipellis a cutis of radial, cylindrical hyphae, 2.5–8 μm wide with encrusted pigment. Clamp-connections present.

Collection examined. NETHERLANDS: prov. Drenthe, Dwingeloo, Lheebroek, 'Kliploo, near Reigerplas', on open spots in scrub of *Juniperus communis*, 11 Nov. 1964, *J.J. Barkman 7795* (WBS).

The collection comprises two young and two mature sporocarps in bad condition. The spore ornamentation is characteristic of *G. allospora* (see also *G. atrofusca*) and in Barkman's key *G. glutinosa* is placed in the same couplet as *G. allospora*. *G. glutinosa* is said to be different by (1) viscid pileus and stipe, (2) lamellae forming a pseudo-collarium and (3) shorter cheilocystidia with broader, obtuse capitulum. We could not find a trace of gelatinized hyphae in the pileipellis of the exsiccatum. Barkman described the pileipellis in his notes also as a normal cutis. Moreover the combined occurrence of 'a radially fibrillose-tomentose' surface of the pileus and viscosity is difficult to imagine. We are inclined to think that the viscosity of pileus (and stipe, not studied by us) has been an artefact, caused by accidental weather conditions, for instance frost damage. The collection was made very late in the season.

Also the occurrence of a 'pseudocollarium' is, in our opinion, accidental. This supposition is supported by the fact that in his descriptive notes Barkman wrote that the lamellae 'sometimes' form a pseudocollarium. It is evident that such a character is an accidental phenomenon of no taxonomic importance.

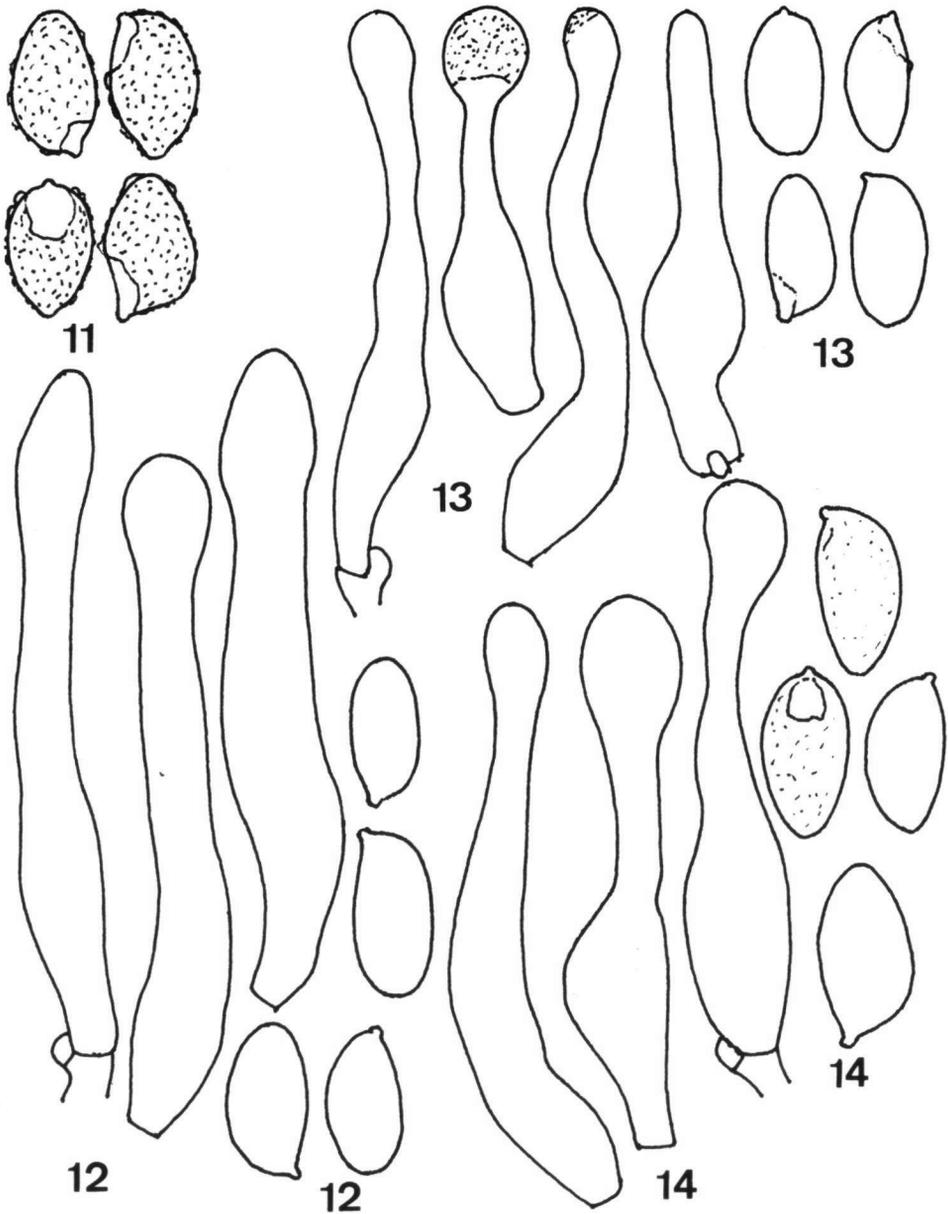
It is true that the cheilocystidia are shorter and more capitate than usual for *G. allospora*. However, this species is rather variable in this respect and the observed cystidia still fall within the variation, for instance within the dimensions given by Watling & Gregory (1993) for *G. luteofulva* (= *G. allospora*).

***Galerina hypnorum* (Schrank: Fr.) Kühner var. *clavipila* Barkman *nom. prov.*, Coolia 14 (1969) 64 — Fig. 11**

Identified as: *Galerina hypnorum* (Schrank: Fr.) Kühner; also containing *Galerina allospora* Smith & Sing.

Pileus 8–9 mm, conico-convex, pale honey brown, long translucently striate. Lamellae [$L = 12$, $l = 1$] adnate with decurrent tooth, ascending, distant, orange-brown with pale edge. Stipe 20–25 \times 1–1.5 mm, cylindrical, pale honey yellow to ochraceous yellow-brown (from Barkman's notes).

Spores 8.5–9.5(–10) \times (5.5–)6.0(–6.5) μm , $Q = 1.5\text{--}1.6(–1.7)$, ovoid, often subpapillate, weakly rugulose, in a small minority with distinct exospore blisters near the apex or plage area. Basidia 4-spored. Cheilocystidia collapsed, short and more or less lageniform with thick neck (c. 4 μm), often subcapitate (apex up to 6.5 μm); according to Barkman 30–46 \times 6.5–9 μm ; neck 3.8–5.2 μm ; apex 5.2–7.5 μm . Pleurocystidia absent. Pileipellis a cutis of brown encrusted hyphae, 3–9 μm wide, without cystidoid elements; according to Barkman covered with repent, clavate cells, 20–92 \times 7–18 μm . Clamp-connections present.



Figs. 11–14. —11. '*Galerina hypnorum* var. *clavipila*' (= *G. hypnorum*), spores. —12. '*Galerina incurvata*' pro parte (= *G. pumila*), spores and cheilocystidia. —13. '*Galerina incurvata*' pro parte (= *G. permixta*), spores and cheilocystidia. —14. '*Galerina incurvata*' pro parte (= *G. mniophila* sensu lato), spores and cheilocystidia. All $\times 2000$.

Collection examined. NETHERLANDS: prov. Drenthe, Ruinen, 'Kraloo', in open spots in scrub of *Juniperus communis*, 17 Nov. 1964, J.J. Barkman 7999 (WBS).

The collection consists of two mature and one young, badly preserved sporocarps. The spore characters of one sporocarp fit in with the descriptive notes by Barkman and are typical of *G. hypnorum* as defined in this paper (see also our remarks on *G. ramicola*). Barkman distinguished variety *clavipila* on the basis of the presence of clavate structures on the pileus surface. We were unable to confirm this observation, possibly because of the old age and bad condition of the material. However, we are inclined to consider these clavate 'pseudocystidia' as apical cells of normal hyphae of the pileipellis and to attach no taxonomic significance to this phenomenon, the more so since similar structures were observed by Barkman in *G. calyptrata* var. *clavipila* and *G. sahléri* var. *clavipila* (see there).

The second mature sporocarp of collection *Barkman 7999* has different microscopic characteristics: spores measured $10.5-12 \times 6-7 \mu\text{m}$ and were practically smooth, with the exception of a very subtle subapical wall-thickening in some spores. The cheilocystidia were more slender. This sporocarp undoubtedly belongs to *G. allospora* Smith & Sing.

The third sporocarp was quite young and not studied by us.

Galerina incurvata Barkman *nom. prov.*, *Coolia* 14 (1969) 63 — Figs. 12–14

Identified as: *G. pumila* (Pers.: Fr.) Sing.; also comprising collections of *G. permixta* (P.D. Orton) Pegler & Young and *G. mniophila* (Lasch) Kühner *sensu lato*.

Pileus 14–16 mm, conico-convex, margin slightly inflexed, orange-brown (Expo E66–68), translucently striate up to 1/4 of the radius, viscid. Lamellae adnate, ascending, moderately distant, orange-brown. Stipe 60–70 \times 3–3.5 mm, tapering to the base, orange-brown, base white tomentose (from notes R. Kramer).

Spores $9.5-11.0 \times 5.5-6.0 \mu\text{m}$, $Q = 1.7-1.9(-2.0)$, predominantly ellipsoid-oblong, some ovoid, smooth, plage not visible, rather pale orange-yellow (according to Kramer spores $8.0-10.5 \times 5.0-6.0 \mu\text{m}$, often amygdaliform). Basidia 4-spored. Lamella edge sterile, cheilocystidia $31-52 \times 5.5-8.5 \mu\text{m}$, subcylindrical to slenderly lageniform with thick neck ($4.5-5.5 \mu\text{m}$), usually subcapitate, capitulum often ellipsoid to rhomboid, $5.5-8 \mu\text{m}$ wide. Pleurocystidia absent. Pileipellis an ixocutis, made up of smooth hyphae, $1.5-4(-5) \mu\text{m}$ wide, hyaline or with orange-brown intracellular pigment. Clamp-connections present in trama.

Collection examined. NETHERLANDS: prov. Friesland, Bakkeveen, 'Duurswoude', in *Empetrum* heathland, 17 Oct. 1968, R. Kramer *s.n.* (det. J.J. Barkman) (WBS).

In WBS five collections are present, labelled as *G. incurvata*. The collection described above is the only one collected before Barkman's introduction of the name *G. incurvata* in 1969, and consequently it has to be regarded as the (provisional) type. The remaining collections belong to different taxa and are treated below.

In our opinion the type collection fits in very well with *G. pumila* as described by Kühner (1935; sub nom. *G. mycenopsis*). Diagnostic features are the relatively large sporocarps with obtuse pileus, the smooth, predominantly ellipsoid spores (according to Kühner $8.5-13(-14) \times 5-6.5 \mu\text{m}$) and the slender cystidia, often with slightly elongated capitulum, measuring according to Kühner (1935) $37-52 \times 6.2-7.2 \mu\text{m}$ with $2.5-5.5 \mu\text{m}$ wide neck.

Barkman (1969) distinguished in his key *G. incurvata* from *G. pumila* mainly on behalf of (1) dark yellow-brown pileus (instead of orange-brown); (2) encrusted hyphae of the pileipellis and (3) slightly amygdaliform, smaller spores. It is remarkable that in the original descriptive notes the pileus was indicated as 'orange-brown', whereas we found the hyphae of the pileipellis to be practically smooth and the spores predominantly ellipsoid, exactly as in *G. pumila*.

A closely related species, *Galerina viscidula*, was described by Orton (1988) from Scotland. It is said to differ from *G. pumila* mainly in a viscid pileus, smaller spores (9–11.5 × 5–6 µm) and shorter cheilocystidia (30–50 µm). According to Watling & Gregory (1993) true *G. pumila* should have spores of (9–)12(–14) × 6–8 µm and cystidia measuring 60–100 µm. Spore and cystidial characters of the collection described above are in better agreement with *G. viscidula*, but also the description of *G. mycenopsis* by Kühner (1935) is in these respects more similar to *G. viscidula* than to *G. pumila* sensu Watling & Gregory. This question deserves further study. For the time being we identify our collection as *G. pumila*, a common fungus in the Netherlands.

Two other collections, identified by Barkman as *G. incurvata*, were collected in one locality and represent a different taxon with the following characteristics.

Pileus 3.5–12 mm, obtusely conical with inflexed margin to conico-convex with obtuse umbo, centre dark chestnut brown to reddish brown (Expo J23; K&W 7D6) to the margin paler yellow-brown (K&W 5B5; Expo F28), strongly translucently striate up to halfway the radius, hygrophanous, dull, slightly rugulose-tomentose, in particular when dry. Lamellae [L = 14–18, l = 1(–3)] adnexed to emarginate, subdistant, orange- to yellow-brown (Expo C48; K&W 5A4/5B5) with whitish edge. Stipe 10–30 × 0.8–1.2 mm, slightly thickened to the base or subbulblose (up to 2 mm), yellow-brown (Expo C48-D46; K&W 4A4) with darker base, with scattered white fibrillose remains of veil. Taste weakly farinaceous (from descriptive notes by Barkman, Jalink and Nauta).

Spores 8.5–11.0(–12.0) × 5.0–6.0 µm, Q = 1.65–2.00, ellipsoid- to ovoid-oblong, smooth, in some spores plage area slightly demarcated, by exception with very small exosporal blister near plage, brownish orange sub micr. Basidia collapsed, 4-spored (according to Barkman 27–31 × 6–8 µm). Lamella edge sterile; cheilocystidia 22–39 × 4–7 µm, variable, mainly subcylindrical to slenderly lageniform with long, often more or less tortuose neck, 2.5–4.5 µm wide, apex often enlarged, up to 6 µm wide, occasionally with greyish refractive mucoid substance near the apex. Pleurocystidia absent. Pileipellis a cutis, made up of 2.5–8 µm wide, repent hyphae with strongly encrusting hyphae, not gelatinized. Clamps present in trama and pileipellis.

Collections examined. NETHERLANDS: prov. Drenthe, Dwingeloo, 'Lheebroekerzand, Kliploo', amongst *Sphagnum* and on muddy soil in wet forest of *Betula pubescens* on peaty soil, 25 Oct. 1982, L. Jalink & M. Nauta 146 (det. J. J. Barkman; WBS); same loc., 31 Oct. 1982, L. Jalink & M. Nauta 147 (det. J. J. Barkman; WBS).

The collections, described above, differ from the first collection of *G. incurvata* nom. prov. in much smaller sporocarps, shorter cystidia with thinner neck and different apex, a pileipellis with encrusted hyphae and a different habitat. They key out as *G. permixta* (P. D. Orton) Pegler & Young, a species usually associated with *Salix*. Interestingly, Jalink & Nauta

(1984: 22) published a complete vegetation relevé of the site where this collection was made. In this relevé *Salix aurita* was present in the shrub layer, a welcome argument for our identification.

It is understandable that this fungus could not be readily identified by Barkman with the relevant keys on *Galerina* since *G. permixta* has originally been described as a *Naucoria* (Orton, 1960) and was only in 1975 transferred to *Galerina* by Pegler & Young.

A collection of *G. incurvata*, collected at the same locality, and identified by Jalink & Nauta (nr. 310, 2 Nov. 1983) belongs also to *G. permixta*.

A fifth collection, present in herbarium WBS, again represents a different taxon.

Pileus 11–17(–30) mm broad, obtusely conical, remarkably dull and dark yellow-brown (Expo E58-F52). Lamellae adnate, ascending, cinnamon brown. Stipe 28–33(–35) × 2–2.5 (–5) mm, cylindrical, base subbulbose, 3–4(–6) mm wide, ochraceous yellow-brown (Expo E64), apex pruinose, downwards with scattered white fibrils (from Barkman's notes).

Spores 9.5–11.0(–12.0) × (5.0–)5.5–6.5 μm, Q = 1.6–1.95, mostly amygdaliform, some ovoid-oblong, none ellipsoid, rather pale yellow-brown sub micr., smooth in optical section, surface in most spores appearing smooth, but in some minutely marbled-punctate, some with well-delimited plage. Basidia 22.5–25 × 6.5–7.5 μm, 4-spored. Lamella edge sterile with densely packed cheilocystidia (mostly collapsed), 30–39 × 5.5–8.5 μm, lageniform to subcylindrical with cylindrical neck, 2.8–4.7 μm wide and slightly swollen to distinctly capitate apex, 4.2–7.5 μm wide. Pleurocystidia absent.

Collection examined. GERMANY: Mecklenburg, Rügen, 'Fährinsel', in centre of scrub of *Juniperus communis*, 9 Nov. 1973, J. J. Barkman 9696 (WBS).

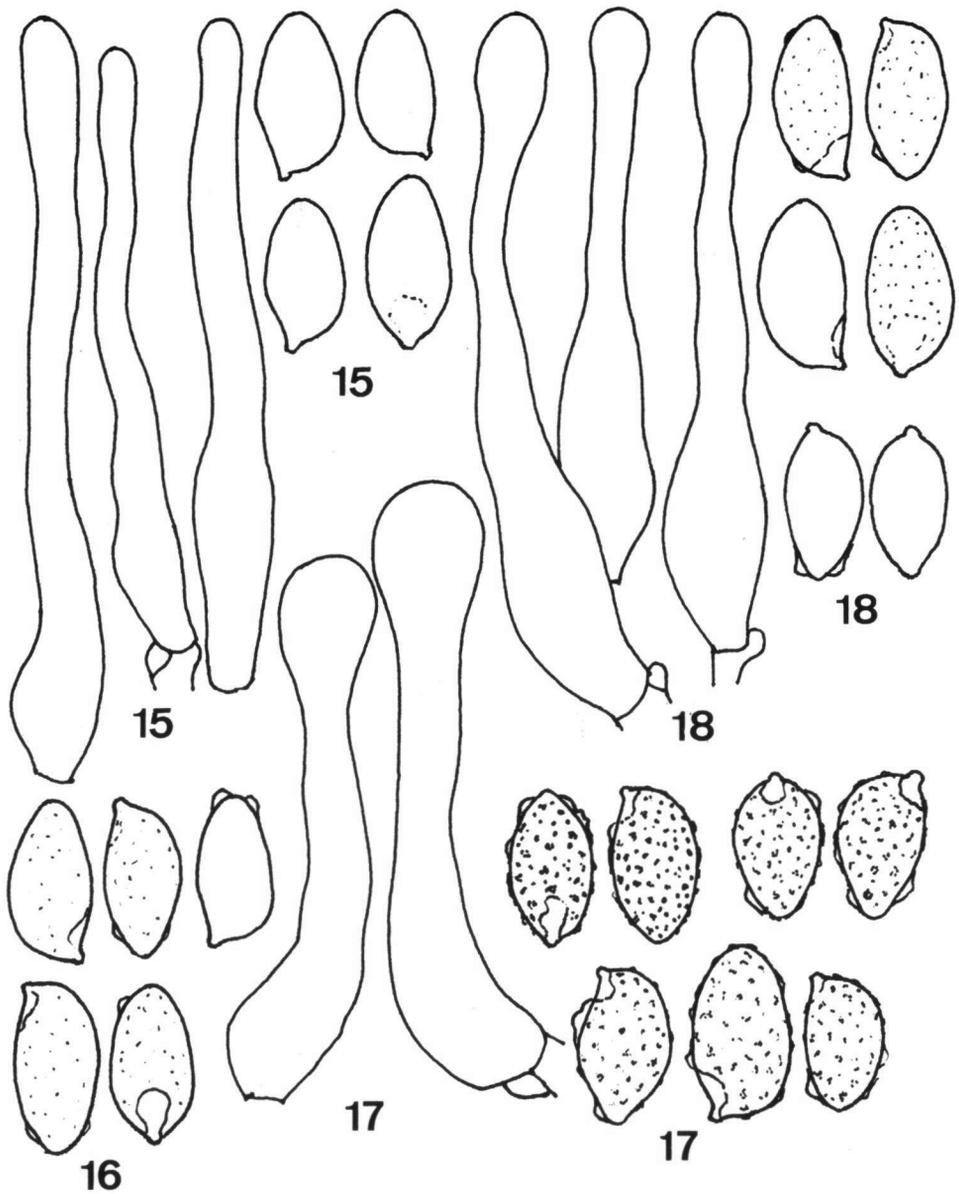
This collection comprises seven sporocarps in reasonable condition. It differs from the other collections, described in this paper under the name *G. incurvata*, among other things, in sporocarps with conical, dull coloured pileus and in amygdaliform spores. Barkman noted under his description that the colour of the pileus and spore shape were like *G. mniophila* (Lasch) Kühner, but that the colour of lamellae and spores were warmer, the pileus margin inflexed and the cheilocystidia often acute. It was apparently named *G. incurvata* mainly because of the inflexed pileus margin, which is, however, not at all unusual in *G. mniophila* and allies.

We could not observe important discrepancies between this collection and *G. mniophila* sensu lato. That species was split by Kühner (1972) into three species. When these concepts are accepted, the described collection shows most resemblance to *G. pseudomniophila* Kühner in view of the practically smooth spores and shape of cystidia. However, we are not convinced that these taxa are distinct species since the characters seem to be intergrading (Arnolds, 1983). This question deserves further study.

***Galerina incurvata* Barkman nom. prov. var. *longicystis* Barkman nom. prov., Coolia 14 (1969) 63 — Fig. 15**

Identified as: *G. cf. permixta* (P.D. Orton) Pegler & Young.

Pileus 12 mm, conico-convex, dark honey brown, smooth, slightly viscid, margin weakly translucently striate, inflexed. Lamellae pale yellow-brown. Stipe 30 × 2 mm, cylindrical, pale beige-brown, slightly striate, without veil remains. Smell and taste not recorded.



Figs. 15–18. — 15. '*Galerina incurvata* var. *longicystis*' (= *G.* cf. *permixta*), spores and cheilocystidia. — 16. '*Galerina inversa*' pro parte (= *G. allospora*), spores. — 17. '*Galerina inversa*' pro parte (= *G. hypnorum*), spores and cheilocystidia. — 18. '*Galerina juniperina*' (= *G. allospora*), spores and cheilocystidia. All $\times 2000$.

Spores (8.0–)8.5–11.0(–11.5) \times 5.5–6.0 μm , $Q = (1.5\text{--})1.6\text{--}2.0$, rather variable in shape, ellipsoid-oblong, ovoid-oblong to amygdaliform, smooth, without pore or exospore blisters, plage sometimes delimited by weak line, brownish orange. Basidia 4-spored, according to Barkman 25–30 \times 7.5–10.5 μm . Lamella edge sterile; cheilocystidia mostly 40–62 \times 4.5–6.5 μm , subcylindrical to slenderly lageniform with long, flexuose neck, 2.5–3.5 μm wide, capitate to subcapitate, apex up to 4.5 μm wide (according to Barkman measuring 72–100(–123) \times 5.0–7.5 μm , neck 3–4 μm , apex 4–5 μm wide). Pleurocystidia absent. Pileipellis made up of slightly encrusted, slender hyphae, 2.5–4 μm wide.

Collection examined. NETHERLANDS: prov. Overijssel, Marienberg, 'Beerzer Belten', among the moss *Dicranum scoparium* in scrub of *Juniperus communis*, 4 Nov. 1968, J.J. Barkman 8836 (WBS).

The preserved material consists of one old, damaged sporocarp in otherwise reasonable condition (cystidia well reinflating). The cheilocystidia were described as very long and slender by Barkman, a reason to distinguish this variety. We observed only much shorter cystidia and cannot find an explanation for the discrepancies between these values.

The collection evidently belongs to stirps *Mycenopsis*, but we were not able to identify it to species with certainty. It shows much resemblance to *G. pumila*, where also the type collection of *G. incurvata* var. *incurvata* belongs (see our description above). However, it differs in the often ovoid to amygdaliform, instead of ellipsoid spores; in the shape of the cheilocystidia which lack the prolonged capitula characteristic of *G. pumila* and in the encrusted hyphae of the pileipellis. It is more similar to *G. permixta*, also part of the species complex described by Barkman under the name *G. incurvata*. The characters are almost identical to those of the collections made by Jalink and Nauta (nrs. 146 and 147), described above. In view of the morphological characters this collection might be assigned to *G. permixta*, but the habitat is very different: *G. permixta* is known from *Salix* thickets on wet soils, whereas collection Barkman 8836 was made on dry, sandy soils where *Salix* is absent.

***Galerina inversa* Barkman nom. prov., Coolia 14 (1969) 58 — Figs. 16, 17**

Identified as: *G. allospora* Smith & Sing.; also comprising a collection of *G. hypnorum* (Schrank: Fr.) Kühner.

Pileus 6–8 mm, plano-convex, dirty yellow-brown (Expo C74), translucently striate up to centre, glabrous, with straight margin. Lamellae [$L = 9\text{--}13$, $l = 1\text{--}2\text{--}(3)$] adnate, horizontal, distant, concolorous with pileus. Stipe 10 \times 0.8 mm, cylindrical, pale honey-yellow, apex pruinose, without veil remnants.

Spores 9.5–11.5(–12.5) \times 5.0–6.0(–6.5) μm , $Q = 1.8\text{--}2.0$, (according to Barkman 12.1–13.4 \times 5.9–7.2 μm), ovoid-oblong to amygdaliform, smooth or sometimes minutely punctate, in a small minority with one or two small blisters near apex, exceptionally with large blisters, with weakly demarcated plage. Basidia collapsed, according to Barkman 4-spored, a few 2-spored. Cheilocystidia not reinflating in boiling KOH, according to Barkman 21–40 \times 5.3–8 μm , slenderly lageniform with neck 3.5–4.3 μm wide and weakly swollen to subcapitate apex, 4.3–5.9 μm wide. Pileipellis according to Barkman a cutis, made up of encrusted hyphae, 5.4–18.8 μm wide, some with clavate terminal cells. Clamp-connections present in trama.

Collection examined. NETHERLANDS: prov. Drenthe, Ruinen, 'Echtenerzand', in moist *Calluna* heathland amongst mosses, 16 Oct. 1967, R.N.A. Kramer s. n. (WBS).

The collection, described above, was indicated by Barkman on the label as type of *G. inversa*. It contains two sporocarps in very poor condition. According to Barkman (1969) this taxon is mainly characterized by the large apical exospore blisters near the apex of the spores, reminding of the blisters of *G. calyptrata* P.D. Orton and allies, but on the opposite end of the spores. We found that such spores were present indeed, although very rarely. Most spores were smooth or had small apical blisters, exactly as in typical *G. allospora* (for comments on this name, see also *G. juniperina*). The shape of the cheilocystidia, as described and depicted by Barkman, fits also well with that species, although the length, measured by Barkman, is shorter than usual. We cannot explain the considerable difference in spore size, measured by Barkman and us. We regard this collection as belonging to *G. allospora* with sometimes abnormally well-developed exospore blisters.

In WBS one additional collection was identified by Barkman as *G. inversa*. It contains only one sporocarp in reasonable condition. Barkman did not provide a description, but confined himself to remarking that habitat, colours and cystidia were of the *G. hypnorum*-type. He described the spores as roughened with two blisters near the apex. We found the following microscopical characters in the exsiccatum: spores 8.5–10.5(–11.0) × 5.0–6.5(–7.0) µm, Q = 1.6–1.8, ovoid-oblong to amygdaliform, sometimes apex papillate, almost smooth to strongly and irregularly rugulose, sometimes with distinct exospore blisters, in particular near plage and apex. Cheilocystidia dumb-bell shaped, mostly 33.5–37.5 × 6.0–6.5 µm, with short, thick neck, 3.7–4.2 µm wide and capitulum often broader than the base, 6.5–7.5 µm wide.

Collection examined. NETHERLANDS: Drenthe, Beilen, 'Terhorsterzand', in scrub of *Juniperus communis*, 6 Dec. 1967, J. J. Barkman 8638 (WBS).

This collection completely agrees with *G. hypnorum*, a species with considerable variation in the degree and place of exospore ornamentation on the spores, as described by Arnolds (1983). For remarks on the interpretation of the name *G. hypnorum*, see also *G. ramicola*.

In our herbarium thirteen other collections are preserved, identified by various collectors as *G. inversa*. We have not studied these exsiccata in detail but, judging from their descriptive notes and remarks, the majority belong to *G. hypnorum*.

***Galerina juniperina* Barkman *nom. prov.*, Coolia 14 (1969) 62 — Fig. 18**

Identified as: *G. allospora* Smith & Sing.

Pileus 5–16 mm broad, obtusely conical to conico-convex, occasionally umbonate, when moist yellow-brown to rather dark brown, in one collection grey-brown (e.g. Expo F54, H44, Munsell 5YR 3/4, 4/6), to the margin paler, more yellowish, short to long translucently striate, sometimes with white fibrils of veil along margin when young, otherwise glabrous. Lamellae [L = 15–23, l = 1–3] emarginate to adnate or with decurrent tooth, moderately distant to crowded, honey yellow to yellow-brown or dirty brown. Stipe 10–45 × 1–3 mm, cylindrical, pale beige, honey yellow, yellow-brown, base sometimes becoming reddish brown, occasionally pale grey-brown, when young with adpressed white fibrils of veil, apex pruinose. Taste in at least two collections farinaceous (from Barkman's notes).

Spores (8.0–)9.5–12.5(–13.5) × (5.0–)5.5–6.5(–7.0) μm, Q = 1.6–2.0, ovoid-oblong to amygdaliform, sometimes apex slightly papillate, yellow-brown to brownish orange, in majority or sometimes exclusively smooth to minutely marbled, with delimited plage, in almost all collections a minor proportion (< 5–25%) with subtle wall-thickening to distinct exospore blisters near the apex, occasionally a few spores with very small blisters on other parts of the spores. Basidia 4-spored, almost all collapsed. Lamella edge sterile, cheilocystidia densely packed, 32–60(–82) × (3–)4–10 μm, narrowly lageniform to subcylindrical, with long, cylindrical neck, 2–4(–5) μm wide, often gradually slightly broader to the apex or subcapitate, capitulum often ovate. Pleurocystidia absent. Pileipellis a cutis, made up of cylindrical hyphae, 5–15 μm wide, with encrusted pigment. Clamp-connections present.

Collections examined (all in WBS). NETHERLANDS: prov. Drenthe, Meppen, 'Mepperzand', on the basis of trunk of *Juniperus communis* in scrub on poor, acid sand, 27 Nov. 1963, *J.J. Barkman 7806*; Lheebroek, 'Kliploo, Reigerplas', in dense scrub of *Juniperus communis*, 4 Nov. 1964, *J.J. Barkman 7985*; same loc., on bark of the base of living *Juniperus*, 14 Sept. 1965, *A. Masselink 65-24* (det. *J.J. Barkman*); Sleen, 'Slenerzand', on N. side of *Juniperus* scrub, 27 Oct. 1965, *J.J. Barkman 8095*; prov. Overijssel, Buurse, 'Buurserzand', on dead wood of *Juniperus communis* on the soil, 2 Nov. 1963, *J.J. Barkman 7703*; Denekamp, 'Lutterzand', in scrub of *Juniperus communis* on poor, acid sand, 18 Sept. 1968, *J.J. Barkman 8718*. — GERMANY: Westfalen, Haltern, 'Tannenberg', on the base of *Juniperus* trunk, 15 Nov. 1967, *J.J. Barkman 8620*, Mecklenburg, Hiddensee, 'Fährinsel', in scrub of *Juniperus communis*, 18 Oct. 1975, *J.J. Barkman 9865*.

These collections, labelled as *G. juniperina*, apparently belong to the same taxon in spite of some variability in some characters. In Barkman's paper *G. juniperina* keys out in a small group of species with long cheilocystidia with thin, often acute neck. The spores were described as smooth or very weakly rugulose. *G. uncialis* is said to have the same type of cystidia, but at the same time strongly rugose spores.

The cheilocystidia in *G. juniperina* are remarkably slender indeed, but the neck is rarely acute, more often slightly enlarged to subcapitate. The capitulum is often not globose, but elliptical. Barkman himself noted at collection *Barkman 9865*: "cheilocystidia of the *allospora-juniperina* type", and we agree that they are similar to those of *G. allospora*.

The spores are completely smooth or slightly rugulose in two collections only. In the remaining collections after careful examination always some spores could be found with subtle apical thickening of the wall or small exospore blisters in that region, again a characteristic feature of *G. allospora*. Barkman himself noticed at collection *Barkman 7984* that the spores were "smooth, without germ pore, sometimes at the apex with annuliform wall-thickening". In six collections in addition very few spores were present with small exospore blisters in other areas of the spore, in particular near the plage.

In our opinion the collections with spores without exospore ornamentation fit in perfectly well with *G. luteofulva* P.D. Orton, the collections with spores with apical wall-thickening or blisters with *G. allospora* Smith & Sing. We are convinced that these are two variants of one and the same taxon, apparently with a weak tendency to form small blisters near the apex and occasionally elsewhere on the spores. This opinion is confirmed by an observation by C. Bas, who studied the type of *G. luteofulva* and observed spores with small apical blisters, so characteristic of *G. allospora* (communicated by Barkman, 1970: 141).

One of the studied collections (*Barkman 7806*) is slightly deviating by the relatively small, smooth spores (8–10 × 5–5.5 μm) and often subcylindrical cheilocystidia. We do not feel certain whether this collection belongs to *G. allospora* as well.

***Galerina lyophylloides* Barkman *nom. prov.*, Coolia 14 (1969) 60 — Fig. 19**

Identified as: *G. allospora* Smith & Sing.

Pileus 6–10 mm broad, convex to conico-convex, hygrophanous, when moist almost black, obscurely striate, drying beige-grey, surface rugulose-tomentose, without veil remnants. Lamellae adnate with decurrent tooth, ascending, thickish, dark olive grey with white pruinose edge. Stipe 15–25 × 1.5 mm, cylindrical, fibrillose, apex pruinose. Smell and taste not recorded (from Barkman's notes).

Spores 10.5–13.5(–14.0) × 5.5–7.0 μm, Q = (1.75–)1.85–2.0(–2.1), ovoid-oblong to amygdaliform, orange-brown, smooth with plage, sometimes with small exospore blisters near apex. Basidia 23.5–31.5 × 7.5–8.0 μm, in majority 4-spored, a few 2-spored. Lamella edge sterile; cheilocystidia 27–44 × 5.5–8.5 μm, lageniform with a slender cylindrical neck, 2–4 μm wide, mostly subcapitate, apex 3.3–6.0 μm wide, near apex sometimes with clots of greyish, refractive material. Pleurocystidia absent. Pileipellis a cutis, made up of radial hyphae, 3–8 μm wide, with yellow-brown parietal and encrusting pigments. Clamp-connections present in hymenium and trama.

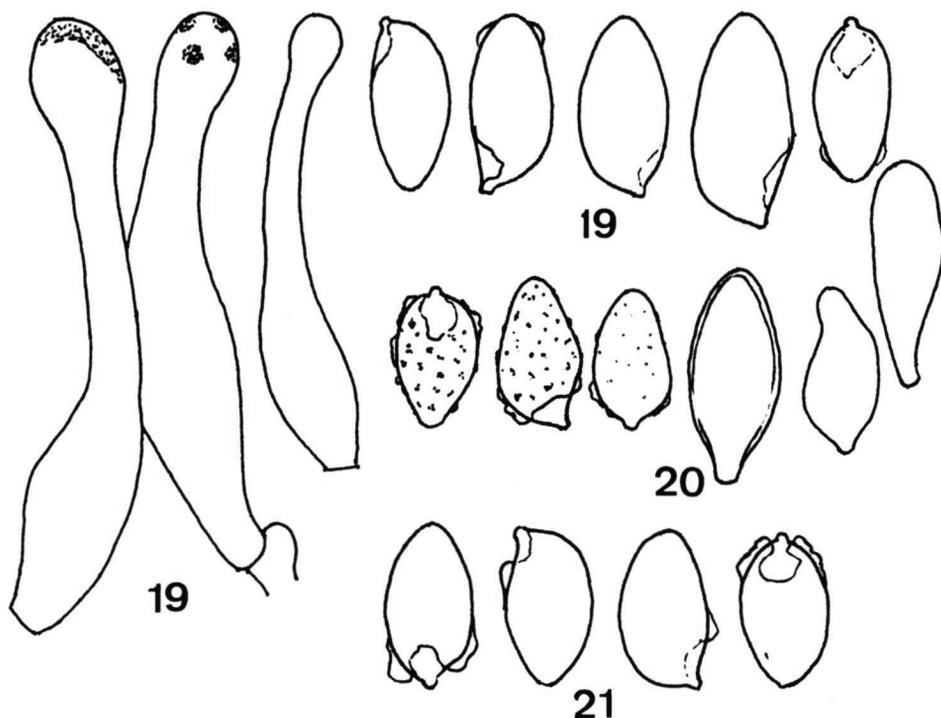
Collection examined. NETHERLANDS: Drenthe, Dwingeloo, 'Lheebroekerzand, Reigerplas', in scrub of *Juniperus communis*, 27 Oct. 1964, J. J. Barkman 7957 (WBS).

The collection, described above, was labelled as type and consists of four sporocarps in rather good condition.

Galerina lyophylloides was distinguished by Barkman (1969) mainly on the basis of (1) "spores with cap-shaped thickened apex, (2) cheilocystidia with small slime cap at apex, (3) pileus almost black, rugulose tomentose". In his own annotations, however, Barkman described the spores as "smooth . . . , sometimes with slightly loosening perispore (sometimes as small cap on apex of spores)". Thus, spores with thickened apex were rather an exception than a rule, in agreement with our observations. In fact the small apical blisters on some spores are identical to those in *G. allospora* (see also remarks on *G. juniperina*) and Barkman's original drawing of a spore is quite similar. The drawing, produced in Coolia (Barkman, 1969: 72, fig. 38) with a black cap on the spore apex, is overdone.

Instead of a slime cap on the cheilocystidia (as figured by Barkman, 1969: 83, fig. 38), we found only some small clots of greyish, refractive material, probably inside the apex of the cystidia. We do not pay much taxonomic weight to this character.

The very dark colours of pileus and lamellae, described for the fresh sporocarps, are quite unusual within *Galerina*. However, the exsiccata are dark yellow-brown, not deviating from typical collections of *G. allospora* (and many other species), which make us wonder whether the dark colours may be caused by frost damage or another external factor. It is striking that this collection shows much resemblance to the provisional type collection of *G. atrofusca* (Barkman 7956), also described in this paper and collected a week earlier in the same year 1964. We are convinced that they belong to the same taxon, close to or very probably identical with *G. allospora* Smith & Sing. In this respect it is remarkable that in his descriptive notes on a collection of *G. juniperina* (Barkman 8718), Barkman described the pileus as 'dark grey-brown' and the stipe as 'pale grey-brown'. This collection was, together with the other exsiccata of *G. juniperina*, identified by us as *G. allospora* (see notes on *G. juniperina* in this paper).



Figs. 19–21. — 19. '*Galerina lyophylloides*' (= *G. allospora*), spores and cheilocystidia. — 20. '*Galerina ramicola*' (= *G. hypnorum*), spores, to the right three abnormal spores. — 21. '*Galerina saheri* var. *clavipila*' (= *G. cf. calyptrata*), spores. All $\times 2000$.

***Galerina ramicola* Barkman *nom. prov.*, Coolia 14 (1969) 63 — Fig. 20**

Identified as: *Galerina hypnorum* (Schrank: Fr.) Kühner.

Pileus 5–9 mm broad, conical, dark dull reddish brown, fibrillose, translucently striate up to 3/4 of the radius. Lamellae [$L = 18-20$, $l = 1(-3)$] adnate with decurrent tooth, ascending, vividly reddish brown with white a floccose edge. Stipe 23–29 \times 1.0–1.2 mm, cylindrical, the apex yellow-brown, pruinose, downwards reddish brown, base sometimes very dark, below apex with a small fibrillose annulus, downwards with scattered fibrils of veil.

Spores of two types: 'normal' spores 9.0–10.0(–10.5) \times 5.0–5.5(–6.5) μm , $Q = 1.6-1.9$, ovoid-oblong to amygdaliform, smooth to roughened with irregularly loosening exospore; in addition larger and slightly thick-walled spores (10.0–)10.5–14.0 \times 5.0–6.5(–7.0) μm , $Q = 1.85-2.2$, amygdaliform or mostly of irregular shape, more or less deformed, smooth or weakly rugulose. Basidia collapsed, according to Barkman 26–33 \times 5.0–5.8 μm . Cheilocystidia hardly recognizable in exsiccatum, collapsed, according to Barkman lageniform to bar-bell shaped, 28–38 \times 6–8.5 μm with a thick, cylindrical neck, c. 5 μm wide and subcapitate apex, c. 6–6.5 μm wide. Pleurocystidia absent. Pileipellis not reinflating, according to Barkman made up of interwoven, encrusted hyphae, 2.5–13 μm wide, in addition with few lageniform pileocystidia, 46–50 \times 5–8 μm .

Collection examined. NETHERLANDS: prov. Overijssel, Buurse, 'Buurserzand', on dead twigs in scrub of *Juniperus communis*, 2 Nov. 1963, J. J. Barkman 7691 (WBS).

This collection comprises two sporocarps in very bad condition. It was initially identified by Barkman as *G. hypnorum*. Later this name has been removed by him from the label and replaced by '*G. ramicola* nov. spec.'. The main difference with *G. hypnorum* was indicated as the presence of a well-developed fibrillose annulus (Barkman, 1969). In addition he noted that the spores were larger. In our opinion *G. hypnorum* usually has a thin, fibrillose veil, leaving fugacious traces below the apex of the stipe (Arnolds, 1983). However, the development of this veil is quite variable, from almost absent to rather copious, and we consider the described fibrillose annulus as an example of a well-developed veil without taxonomic relevance.

The variability in spore size and shape is quite remarkable. The spores, described here as 'normal', are characteristic of *G. hypnorum* with their irregularly loosening exospore. The larger spores are often obviously misshaped and are considered to be abnormalities, possibly caused by long preservation of sporocarps in a refrigerator.

It should be noted that the identity of *G. hypnorum* is still disputed. We follow here the species concept by Arnolds (1983), who described it as a small *Galerina* with yellow- to orange-brown pileus and initially honey yellow stipe, characterized by spores of $7.5\text{--}11 \times 4.7\text{--}6.2 \mu\text{m}$ with quite variable ornamentation, caused by the loosening exospore on various places, in various grades and in variable proportions of the spores. The cheilocystidia are rather short with a thick, subcapitate neck. *Galerina hypnorum* is the most widespread species of *Galerina* in the Netherlands (Arnolds et al., 1995). In Barkman's key (1969) *G. hypnorum* in the above concept keys out under the names *G. decipiens* Smith & Sing. var. *decipiens* and var. *separans* Smith & Sing. The description of *G. hypnorum* by Watling & Gregory (1993) is rather similar, except for the spore size: $(9\text{--})10\text{--}12\text{--}(14) \times 5\text{--}6\text{--}(7.5) \mu\text{m}$. According to Horak & Miller (1992) *G. calyptrata* P.D. Orton is a synonym of *G. hypnorum*. In our opinion the two species are different, although often confused. *G. calyptrata* differs in a more acute, more vividly orange pileus and the slightly larger spores ($9\text{--}13 \times 5.5\text{--}7.5 \mu\text{m}$) that are always smooth except for two smooth, exospore blisters around the plage. It is usually possible to distinguish the two species already in the field.

***Galerina saheri* (Qué.) Kühner var. *clavipila* Barkman nom. prov., Coolia 14 (1969) 59 — Fig. 21**

Identified as: *Galerina* cf. *calyptrata* P.D. Orton.

Pileus 7–8 mm, campanulate, ochraceous yellow-brown, long translucently striate. Lamellae [$L = 12, l = 3$] adnate with decurrent tooth, ascending, distant, concolorous with pileus, with paler edge. Stipe 25–30 × 1 mm, cylindrical, pale yellow-brown, base reddish brown, white fibrillose, apex pruinose (from Barkman's notes).

Spores 9.5–11.0 × (5.5–)5.0–6.5 μm , $Q = 1.6\text{--}1.8$ (according to Barkman 10.5–13.0 × 6.0–7.5 μm), ovoid-oblong, in front-view slightly broader, orange-brown, smooth, in majority with two large, smooth or wrinkled, exospore blisters near plage (calyptrate). Cheilocystidia collapsed, short and with broad capitulum, according to Barkman 25–36 × 7–10 μm , neck 5 μm , apex 6.5–8 μm . Pleurocystidia absent. Pileipellis made up of repent hyphae, 3–9 μm wide, with yellow-brown encrusting pigment; structure not well visible

in exsiccata; according to Barkman with numerous clavate, smooth pileocystidia, 59–108 \times 8–14 μm , but in exsiccata impossible to detect. Clamp-connections present.

Collection examined. NETHERLANDS: prov. Overijssel, Lemele, 'Lemelerberg', in scrub of *Juniperus communis*, 2 Nov. 1963, *J. J. Barkman 7692* (WBS).

This collection comprises three mature sporocarps in reasonable condition, but the tissues were not well reinflating in KOH and therefore difficult to study. It was provisionally described as a new variety of *G. sahleri* by Barkman (1969) on the basis of the presence of clavate pileocystidia, which are said to be absent in other collections of that species. We were unable to discover such structures in the exsiccatum, but this is not amazing in view of the poor condition of the dried tissues. Barkman (1969) described also varieties with clavate pileocystidia of two related species, viz. *G. calyptrata* and *G. hypnorum*, which let us doubt the taxonomic significance of these structures. They may in fact be prolonged extensions of superficial hyphae and might even be induced by long preservation of the sporocarps in a refrigerator. The presence of moulds on the surface of the pileus suggests that this was the case in this collection. See also remarks on *G. calyptrata* var. *clavipila*.

The identification of this fungus as *Galerina sahleri* is another matter of doubt. *G. sahleri* is usually interpreted in the sense of Favre (1948). That fungus is close to *G. calyptrata* P.D. Orton and shares calyptrate spores of approximately the same size. Differences between the species are: (1) the presence of a cobwebby, fibrillose veil on the pileus in *G. sahleri*; (2) the colour of the pileus is described as rather dark honey-brown in *G. sahleri*, and more vividly orange in *G. calyptrata*; (3) absence of a farinaceous smell and taste in *G. sahleri*, which are prominent in *G. calyptrata* and (4) longer, subcylindrical cheilocystidia (42–72 μm long) in *G. sahleri*. In the descriptive notes on the present collection no mention is made of veil on the pileus; taste or smell were not recorded and the size of the cheilocystidia is characteristic of *G. calyptrata*. Only the described colour of the pileus is in better agreement with *G. sahleri*, but in our opinion it is more likely that this fungus represents a somewhat dull coloured variant of *G. calyptrata*, which is a common fungus in the Netherlands. It is doubtful whether *G. sahleri* is really indigenous.

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REFERENCES

- Arnolds, E. 1983 ('1982'). Ecology and coenology of macrofungi in grasslands and moist heathlands in Drenthe, the Netherlands. Vol. 2. *Bibliothca mycol.* 90. Vaduz.
- Arnolds, E., Th.W. Kuyper & M.E. Noordeloos (red.). 1995. *Overzicht van de paddestoelen in Nederland.* Nederlandse Mycologische Vereniging.
- Barkman, J.J. 1969. Het geslacht *Galerina* in Nederland. *Coolia* 14: 49–86.
- Barkman, J.J. 1970. Aantekeningen over *Galerina*. *Coolia* 14: 139–144.
- Barkman, J.J. 1976a. Algemene inleiding tot de oecologie en sociologie van macrofungi. *Coolia* 19: 57–66.
- Barkman, J.J. 1976b. Terrestrische fungi in jeneverbesstruwelen. *Coolia* 19: 94–110.
- Barkman, J.J. 1987. Methods and results of mycocoenological research in the Netherlands. In: G. Pacioni (ed.), *Studies on fungal communities: 7–38.* l'Aquila (Italy).

- Bas, C. 1996. *Galerina beatrix*, a new species in Agaricales. *Blumea* 41: 3–6.
- Bon, M. 1992. Clé monographique des espèces galero-naucorioïdes. *Docum. mycol.* 21 (84): 1–89.
- Cailleux, A. & G. Taylor (without year). Code expolaire. Edition N. Boubée & Cie. Paris.
- Derbsch, H. & J.A. Schmitt. 1987. Atlas der Pilze des Saarlandes, Teil 2: Nachweise, Ökologie, Vorkommen und Beschreibungen. In: Minister für Umwelt des Saarlandes (ed.), *Aus Natur und Landschaft im Saarland 3. Saarbrücken*.
- Favre, J. 1948. Les associations fongiques des hauts-marais jurassiens et de quelques régions voisines. *Beitr. KryptogFl. Schweiz* 10 (3): 1–228. Bern.
- Favre, J. 1955. Les champignons supérieurs de la zone alpine du Parc National Suisse. *Ergebn. wiss. Unters. schweiz. NatnParks* 5 (N.F.): 1–212. Liestal.
- Gulden, G. 1980. Alpine *Galerinas* (Basidiomycetes, Agaricales) with special reference to their occurrence in South Norway at Finse on Hardangervidda. *Norw. J. Bot.* 27: 219–253.
- Horak, E. & O.K. Miller. 1992. *Phaeogalera* and *Galerina* in arctic-subarctic Alaska (U.S.A.) and the Yukon Territory (Canada). *Can. J. Bot.* 70: 414–433.
- Jalink, L.M. & M.M. Nauta. 1984. *Mycosociologie van berkenbossen in Drente*. Report University of Leiden.
- Kornerup, A. & J.H. Wanscher. 1978. *Methuen handbook of colour*. London.
- Kriegelsteiner, G.J. 1991. *Verbreitungsatlas der Grossspilze Deutschlands (West), Band 1A, B*. Stuttgart.
- Kühner, R. 1935. *Le Genre Galera*. Paris.
- Kühner, R. 1972. Agaricales de la Zone alpine, Genre *Galerina* Earle. *Bull. trimest. Soc. mycol. Fr.* 88: 41–118.
- Lange, J. 1935–1940. *Flora agaricina danica*, vol. 1–5. Copenhagen.
- Munsell. 1954. *Munsell soil color charts*. Baltimore.
- Orton, P.D. 1960. New checklist of British agarics and boleti. Part III. Notes on genera and species in the list. *Trans. Br. mycol. Soc.* 43: 159–439.
- Orton, P.D. 1988. Notes on British agarics IX. *Trans. Br. mycol. Soc.* 91: 545–571.
- Pegler, D.N. & T.W.K. Young. 1975. Basidiospore form in the British species of *Galerina* and *Kuehneromyces*. *Kew Bull.* 27: 483–500.
- Séguy, E. 1936. Code universel des couleurs. *Encyclopédie pratique du Naturaliste* 30. Paris.
- Singer, R. 1953. The Agaricales of the Argentine sector of Tierra del Fuego and limitrophous regions of the Magellanes area. *Sydowia* 7: 206–265.
- Singer, R. 1974. Notes on *Galerina*. *Bull. mens. Soc. linn. Lyon, Num. spéc.* 43: 389–405.
- Smith, A.H. & R. Singer. 1964. *A monograph on the genus Galerina Earle*. New York, London.
- Vellinga, E.C. 1986. The genus *Flammulaster* (Agaricales) in the Netherlands and adjacent regions. *Persoonia* 13: 1–26.
- Vries, B.W.L. de. 1973. Schimmels op jeneverbes. *Coolia* 16: 106–109.
- Vries, B.W.L. de. 1976. Over de oecologie van houtbewonende schimmels op *Juniperus communis*. *Coolia* 19: 118–124.
- Vries, B. de & E. Arnolds. 1994. Veranderingen in de mycoflora van drie jeneverbesstruwelen. *Coolia* 37: 51–71.
- Watling, R. & N.M. Gregory. 1993. *Cortinariaceae* p.p. *Br. Fung. Fl.* 7. Edinburgh.
- Wells, V.L. & P.E. Kempton. 1969. Studies in the fleshy fungi of Alaska. III. The genus *Galerina*. *Lloydia* 32: 369–387.