

NOTULAE AD FLORAM AGARICINAM NEERLANDICAM – XLI
Conocybe and Pholiotina

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Four interesting species of *Conocybe* and one species of *Pholiotina*, recently recorded from western Europe, are described and illustrated. *Conocybe merdaria*, related to *C. pubescens*, is described as a new coprophytic species with the type locality in Westfalen, Germany. Another coprophytic species, *C. magnispora*, was found in the Netherlands and had not been reported from Europe before. The collections of *C. farinacea* in the Netherlands represent the first records of this species in continental Europe. It is demonstrated that the European records under the name *C. fragilis*, originally described from North America, in fact belong to a different species, viz. *Galerella incarnata*. The new combination *Conocybe incarnata* is made. The species, known in Europe under the name of *Conocybe plicatella* or *Galerella plicatella*, appears to be different from the original description of *Agaricus plicatellus* from North America and to belong to the genus *Pholiotina*. The new name *Pholiotina sulcata* is introduced.

In volume 6 of Flora agaricina neerlandica the *Bolbitiaceae* will be treated, including the genera *Conocybe* and *Pholiotina* (Arnolds, in prep.). During the revision of fresh and dried collections of the Netherlands by the first author a number of taxonomic and nomenclatural problems were encountered that were studied and discussed in close cooperation with the second author, who is preparing a monographic treatment of *Conocybe* and *Pholiotina* in Europe.

In this paper we present descriptions of five new or critical species, including one new species, *Conocybe merdaria*, and two species that had not been recorded before from continental Europe. A new name is proposed for *Galerella plicatella* sensu auct. Eur., viz. *Pholiotina sulcata*.

1. *Conocybe merdaria* Arnolds & Hauskn., *spec. nov.* — Fig. 1

Pileus 15–18 mm latus, 12–16 mm altus, conico-campanulatus, hygrophanus, aurantio-brunneus, margine translucido-striatus, in sicco pallide aurantiacus, pubescens. Lamellae subconfertae, adnexae, pallide luteae demum ochraceo-brunneae vel aurantio-brunneae. Stipes 50–75 × 1–1.5 mm, cylindraceus, haud radicans, pallide ochraceus demum incarnato-brunneus, pruinosis-striatus, pubescens. Odore saporeque indistincto. Sporae (11.0–)12.0–15.0(–17.0) × (6.5–)7.5–9.5 μm, ellipsoideae-oblongae vel ovoideae-oblongae, aurantio-brunneae, crassitunicatae, poro germinativo prae-ditus. Basidia 16–22 × 10–11 μm, bisporigera. Cheilocystidia 14–19 × 6.0–10.5 μm, lecythiformia, capitulo 3.5–4.5 μm. Pleurocystidia nulla. Pileipellis hymeniformis, cellulis clavatis, 18–47 × 12–30 μm. Pileocystidia rara, lecythiformia, 26–33 × 7.5–9.5 μm, capitulo 3.5–4.5 μm, vel filiformia, 40 × 2.0–3.0 μm. Caulocystidia pro parte lecythiformia, 15–20 × 6.0–9.0 μm, capitulo 2.5–4.5 μm, pro parte subglobosa vel lageniformia, 10–17 × 8–14 μm, pro parte filiformia, 30–130 × 2.0–4.0 μm. Fibulae nullae. Ad firmam.

- 1) Holthe 21, NL-9411 TN Beilen, The Netherlands.
- 2) Sonndorferstrasse 22, A-3712 Maissau, Austria.

Holotypus: Germany, Nordrhein-Westfalen, Teutoburgerwald, Brochterbeck S. of Ibbenbüren, 5.X.2001, *E. Arnolds* (*Arnolds 01-147*) (L).

Pileus 15–18 mm broad, 12–16 mm high, conico-campanulate, hygrophanous, when moist and fresh orange-brown, on drying becoming pale orange (K. & W. 5B5) at centre, ochraceous orange (5B4) towards the margin, pubescent under a hand-lens. Lamellae, L = 20–22, l = 3, crowded, adnexed, ventricose, up to 4 mm broad, rusty brown when mature, with white flocculose edge. Stipe 50–75 × 1–1.5 mm, cylindrical, slightly thickened towards base, not rooting, pale ochre yellow at first, then becoming flesh-coloured brown in lower half from base upwards, entirely pruinose-striate and pubescent. Context fragile, concolorous with surface. Smell and taste weak, not distinctive. Spore-print not recorded.

Spores (11.0–)12.0–15.0(–17.0) × (6.5–)7.5–9.5 μm, av. 13.7–14.1(–15.3) × 8.1–8.4 μm, Q = 1.5–2.0, Q av. = 1.6–1.85, not or slightly flattened, ellipsoid-oblong to ovoid-oblong, orange-brown in ammonia, moderately thick-walled (0.5–1.0 μm) with apical germ pore, 2.0–2.5 μm wide. Basidia 16–22 × 10–11 μm, 2-spored, in two collections very few 4-spored basidia present (less than 4 %). Lamella edge sterile. Cheilocystidia 14–19 × 6.0–10.5 μm, lecythiform with ellipsoid to clavate basal part, short neck (1.0–3.0 × 1.0–2.0 μm) and small capitulum, 3.0–5.0 μm broad, hyaline; pleurocystidia

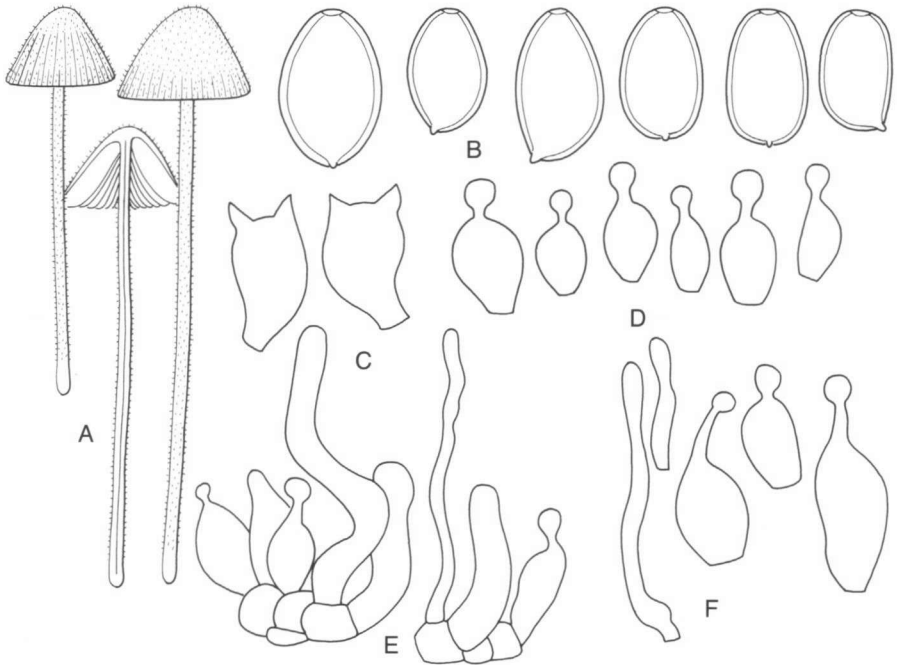


Fig. 1. *Conocybe merdaria*. A. Basidiocarps (× 1); B. spores (× 1500); C. basidia; D. cheilocystidia; E. caulocystidia; F. pleurocystidia (all × 1000). (A–F from *E. Arnolds* 01–147, holotype.)

absent. Hymenophoral trama made up of cylindrical and inflated elements, 4.0–18 μm broad. Pileipellis an epithelioid hymeniderm, made up of spheropedunculate and clavate elements, 18–47 \times 12–30 μm , often with yellowish pedicel. Pileocystidia scarce, lecythiform like cheilocystidia but larger, 26–33 \times 7.5–9.5 μm with neck 4.5–7.5 \times 1.0–2.0 μm and capitulum 3.5–4.5 μm broad, in addition some cylindrical hairs up to 40 \times 2.0–3.0 μm . Stipitipellis a cutis, made up of repent hyphae, 2.0–6.0 μm broad. Caulocystidia a mixture of (1) numerous lecythiform cystidia, 15–20 \times 6.0–9.0 μm with neck 1.5–4.0 \times 1.0–2.0 μm and capitulum 2.5–4.5 μm broad, (2) numerous globose and ellipsoid to lageniform elements, 10–17 \times 8–14 μm , (3) cylindrical hairs, 30–130 \times 2.0–4.0 μm , often with brown content. Clamp-connections not seen. Chemical reactions: no needle-like crystals on fragments of lamellae in ammonia.

Habitat & distribution — Saprotrophic, solitary or in small groups on old dung of horse, cattle or deer or on a mixture of dung and litter in semi-natural grasslands and forests. May–Oct. Not yet recorded from the Netherlands. Type collection made in Germany, Teutoburgerwald, close to the eastern border of the Netherlands. Also known from various other localities in Austria, Germany and Spain.

Collections examined. AUSTRIA: Niederösterreich, Hainfeld, Michelbach (MTB 7960/2), 26 May 1984, *W. Klofac* (WU 3363); Niederösterreich, Hohenberg, Lahnsattel (MTB 8259/1), 1 July 2001, *T. Bardorf* (Herbarium *Hausknecht* S3347); same loc., 22 July 2001, *T. Bardorf* (WU 21278). — GERMANY: Nordrhein-Westfalen, Teutoburgerwald, Brochterbeck S. of Ibbenbüren, 5 Oct. 2001, *E. Arnolds* (*Arnolds* 01-147) (L, holotype); Bavaria, Tutzing, Hartschimmel-Gelände (MTB 8033/3), 5 Sept. 2001, *P. Karasch* (WU 21902). — SPAIN: Madrid, Canencia, Puerto de Canencia, 5 Oct. 1990, *M. Blanco et al.* (AH 28399).

The Latin diagnosis of *C. merdaria* is exclusively based on the type collection. The English description includes also data of other collections of this species, made by the second author.

Conocybe merdaria is close to *C. pubescens* (Gillet) Kühner in its coprophytic habitat, macroscopical appearance and stipe covering of lecythiform cystidia and hairs, characteristic of section *Mixtae* (Watling, 1982; Arnolds, in prep.). It differs from that species mainly in the predominantly 2-spored basidia. In addition the spores are smaller than in the 4-spored *C. pubescens* (in collections from the Netherlands (13.0–)14.0–18.5(–20.0) \times (7.0–)7.5–10.0 μm , on average (14.6–)15.8–17.0 \times 8.2–9.2 μm). Therefore we think that *C. merdaria* is not merely a 2-spored form of *C. pubescens*. In that case one would expect that the spores in 2-spored basidiocarps are larger than in 4-spored basidiocarps. Moreover, it seems that in the genus *Conocybe* 2-spored and 4-spored populations usually belong to different species, as is the case in *Coprinus*.

Within sect. *Mixtae*, *Conocybe ambigua* Watling is another 2-spored species with spores in the same size range. However, that species differs from *C. merdaria* in the terrestrial habitat and narrower spores (in collections from the Netherlands (10.0–)10.5–15.5(–16.5) \times 5.5–7.5(–8.5) μm , on average 12.5–14.0 \times 6.3–7.0 μm) which are moreover subamygdaliform in side-view. The related *C. rubiginosa* Watling has considerably longer spores and also grows on soil.

2. *Conocybe magnispora* (Murrill) Singer — Fig. 2

Galerula magnispora Murrill, *Mycologia* 35 (1943) 530; *Conocybe magnispora* (Murrill) Singer, *Sydowia* 4 (1950) 135.

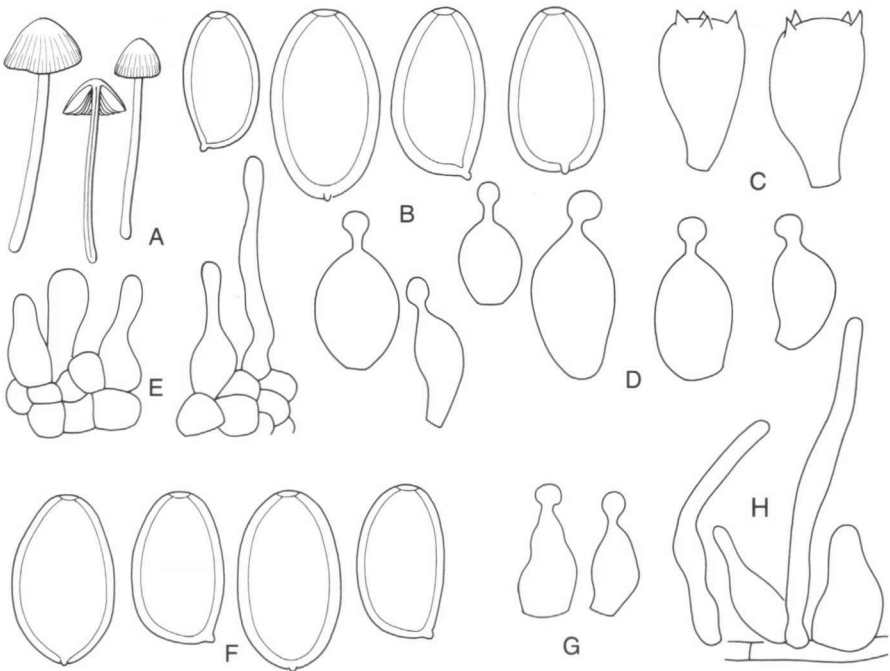


Fig. 2. *Conocybe magnispora*. A. Basidiocarps ($\times 1$); B, F. spores ($\times 1500$); C. basidia; D, G. cheilocystidia; E, H. caulocystidia (all $\times 1000$). (A–E from E. Arnolds 01-58; F–H from W.A. Murrill, 8 March 1942, holotype.)

Pileus 5–12 mm broad, 4–8 mm high, conico-campanulate to hemispherical, only slightly expanding, hygrophanous, when moist and fresh at centre greyish ochre-brown to orangey brown (K. & W. 5D5, 5E6, 6E7), only slightly paler towards margin, translucently striate up to 3/4 of the radius, on drying pale ochraceous, pubescent at first, then glabrous. Lamellae, L = 14–17, l = 3, fairly crowded, adnexed, slightly ventricose, ochraceous at first, then rusty brown, with concolorous fimbriate edge. Stipe 18–30 \times 0.8–1.5 mm, cylindrical, at base not bulbous, not rooting, whitish at first, then pale straw-yellow to ochraceous, pubescent at least at apex. Context concolorous with surface. Smell and taste weak, not distinctive. Spore print not recorded.

Spores 13.5–20.5 \times 7.5–10.5 (–11.0) μm , av. 14.5–17.0 \times 8.3–9.6 μm , Q = (1.5–)1.6–2.0, Q av. = 1.65–1.85, not flattened, ellipsoid-oblong to ovoid-oblong in frontal view, ellipsoid-oblong to subamygdaliform in side-view, ochre-brown, brownish orange to orange-brown in ammonia, thick-walled (0.5–2.0 μm) with large, apical pore, 1.8–2.5 μm wide. Basidia 20–28 \times 12–14 μm , 4-spored. Lamella edge sterile. Cheilocystidia 17–28 \times 6.0–13 μm , lecythiform with subglobose, ellipsoid or clavate basal part, short to moderately long neck (1.0–4.0 \times 1.0–1.5 μm) and small capitulum, 3.0–4.0 (–5.0) μm . Hymenophoral trama made up of cylindrical hyphae and inflated, globose elements, 6.0–20 μm broad. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate cells, 29–51 \times 11–30 μm . Pileocystidia not seen in exsiccata. Stipitipellis a cutis, made up of parallel hyphae, 2.0–5.0 μm broad, with clusters of caulocystidia.

Caulocystidia predominantly clavate to lageniform, $16\text{--}22 \times 4.0\text{--}7.0 \mu\text{m}$, intermixed with numerous subglobose elements, $5.0\text{--}10.0 \times 4.5\text{--}9.0 \mu\text{m}$ and scattered cylindrical hairs up to $70 \times 2 \mu\text{m}$; lecythiform cystidia absent. Clamp-connections present. Chemical reactions: Ammonia reaction negative.

Habitat & distribution — Saprotrophic, solitary or in small groups on dung of horse and cow. In the Netherlands so far only in poor habitats, such as heathland and forest on acidic, sandy soil. Originally described from North America; also recorded from France and Sweden. Febr.–Oct.

Collections examined. FRANCE: Dep. Rhône, Lyon, sur un crottin, 22 Feb. 1945, *M. Josserand* (det. *R. Kühner*) (G, as *Conocybe siliginea* var. *neoantipus*). — THE NETHERLANDS: prov. Drenthe, Emmen, Bargerbos, on horse dung, 2 Oct. 1999, *R. Chrispijn* (L); Westerbork, Orvelte, 'Orvelterzand', on dung of Scottish highland cattle, 12 Sept. 2001, *E. Arnolds* (*Arnolds 01-58*) (L). — SWEDEN: Västmannland, Sala, Skuggan, on horse dung, 3 Aug. 1947, *R. Morander* (UPS, as *Conocybe pubescens*) — USA: Florida, Levy County, Gulf Hammock, on cow dung, 8 March 1942, *W. A. Murrill* (holotype, FLAS); Florida, Alachua County, Gainesville, on cow dung, 8 July 1943, *R. Singer* (F); Tennessee, Knox County, Knoxville, University of Tennessee campus, on horse dung, 24 Feb. 1941, *S. L. Meyer* (det. *L. R. Hesler*) (MICH, as *Conocybe pubescens*).

This is the first report of *Conocybe magnispora* in Europe. This species has originally been described from North America and was later also recorded from South America (Singer, 1950). It is characterized by the very large spores in combination with 4-spored basidia and stipe covering exclusively with cylindrical hairs and clavate to lageniform elements, without lecythiform cystidia.

The second author investigated the holotype and two other collections from the southeastern USA and found no essential differences with the European collections. The spores in the holotype, collected by Murrill, were orange-brown, thick-walled and measured $15.0\text{--}16.5 \times 8.5\text{--}10.5 \mu\text{m}$, on the average $15.6 \times 9.6 \mu\text{m}$ (Fig. 2F). The stipe was only covered with clavate, lageniform and filiform cystidia (Fig. 2H). In Meyer's collection the spores were intensely ochre-brown, averaging $15.1 \times 8.7 \mu\text{m}$, in Singer's collection they were pale reddish brown and measured on the average $16.0 \times 8.8 \mu\text{m}$.

Conocybe magnispora belongs to section *Pilosellae*. In that section two other species combine very large spores with 4-spored basidia. *Conocybe singeriana* Hauskn. grows also on dung, but differs in much larger basidiocarps with the pileus 10–40 mm and the stipe (45–)60–90(–110) mm with a distinctly bulbous base (Hausknecht & Krisai-Greilhuber, 1997; Arnolds, in prep.). *Conocybe watlingii* Hauskn. is another coprophytic species in this group with very large spores ($14.5\text{--}18.0 \times 7.5\text{--}9.5 \mu\text{m}$, on average $16.0\text{--}16.7 \times 8.5\text{--}9.0 \mu\text{m}$), but it has a rooting stipe base and the stipe covering is intermixed with some scattered lecythiform cystidia (Hausknecht, 1996).

Conocybe magnispora may also be easily confused with *C. pubescens*, a much more common coprophytic species with similar habit and comparable spore size, viz. (13.0–) $14.0\text{--}18.5(–20.0) \times (7.0\text{--})7.5\text{--}10.0 \mu\text{m}$, on average (14.6–) $15.8\text{--}17.0 \times 8.2\text{--}9.2 \mu\text{m}$. However, the latter species always has a considerable proportion of lecythiform cystidia among the caulocystidia and therefore belongs to section *Mixtae*.

3. *Conocybe farinacea* Watling — Fig. 3

Conocybe farinacea Watling, Notes R. bot. Gdn Edinb. 25 (1964) 309.

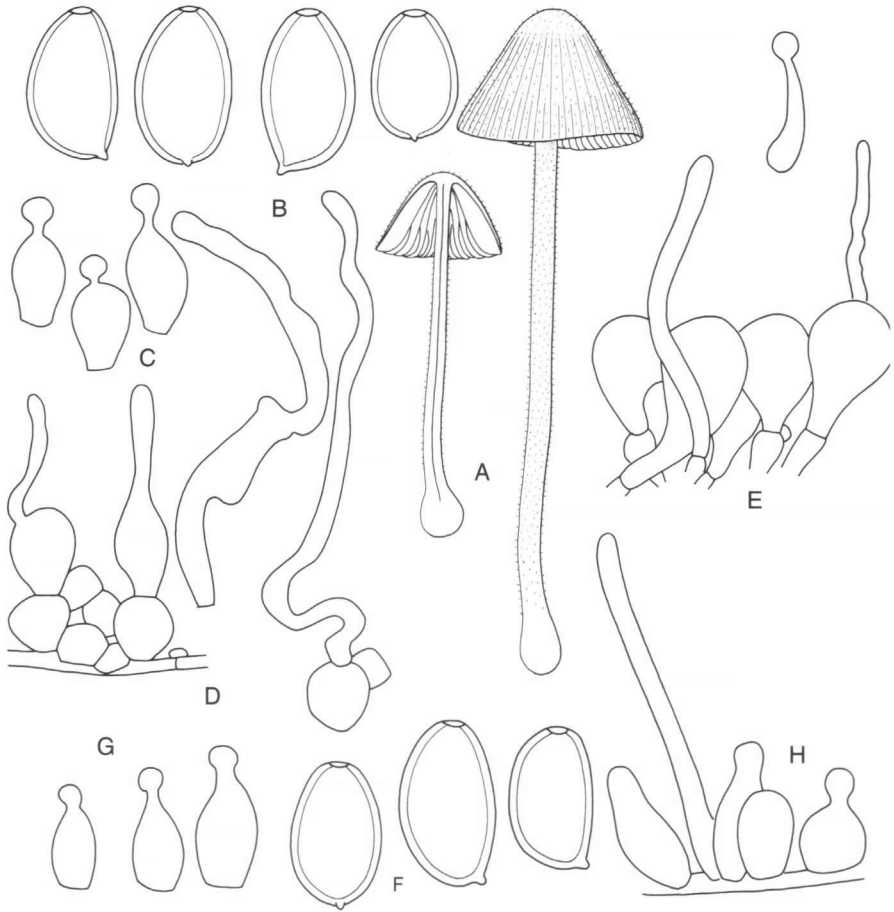


Fig. 3. *Conocybe farineacea*. A. Basidiocarp ($\times 1$); B, F. spores ($\times 1500$); C, G. cheilocystidia; D, H. caulocystidia; E. pileipellis (all $\times 1000$). (A–E from *E. Arnolds 02-18*, F–H from *P.D. Orton*, 6 Oct. 1960, holotype.)

Pileus 18–27 mm broad, 10–20 mm high, conico-campanulate to hemispherical, hygrophanous, when moist at centre rusty brown (K. & W. 7D8), towards the margin paler orange-brown (6D8), translucently striate up to $3/4$ of the radius, on drying fading to pale orange-brown or slightly greyish orange (5B4, 6C7), pubescent at first, then glabrous, at centre smooth or slightly wrinkled. Lamellae, $L = 28-33$, $l = 3$, fairly crowded, adnexed, segmentiform, yellow-brown at first, then orange-brown, with slightly paler fimbriate edge. Stipe 35–78 \times 2–4 mm, cylindrical, at base slightly thickened to subbulbous, up to 7 mm thick, not rooting, pale orange (5A5, 5B5), at first pubescent, slightly striate lengthwise, then becoming glabrous. Context concolorous with surface. Smell of entire basidiocarp weak and not distinctive, but readily farinaceous when crushed or cut; taste strongly farinaceous. Spore print not recorded.

Spores 12.0–15.0(–17.0) × 7.0–9.5(–10.5) μm , av. 13.0–14.1(–15.6) × 7.7–8.4 μm , $Q = 1.6\text{--}1.9$, $Q\text{ av.} = 1.65\text{--}1.7$, not or weakly flattened, ellipsoid-oblong to ovoid-oblong in frontal view, ellipsoid-oblong to slightly phaseoliform in side-view, brownish orange to rusty brown (5C7, 6D8, 7D8) in ammonia, thick-walled (0.5–2.0 μm), with large, apical pore, 1.8–2.5 μm wide. Basidia 20–29 × 12–14 μm , 4-spored. Lamella edge sterile. Cheilocystidia 18–25 × 6.0–10.0 μm , lecythiform with ellipsoid or clavate basal part, moderately long neck (2.5–4.5 × 1.5–2.0 μm) and small capitulum, 3.0–4.5 μm broad. Hymenophoral trama made up of cylindrical hyphae and inflated, globose elements, 4.0–18 μm broad, often with yellow-brown wall. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate cells, 20–47 × 10–20 μm , often with pale brown pedicel, intermixed with scattered cystidia. Pileocystidia rare to scattered, mainly filiform, up to 60 μm long and 2.5–4.0 μm wide, often tortuous, hyaline or with yellow content; occasionally with few capitate cystidia, c. 23 × 4.5 μm with neck 2.0 μm and capitulum 4.5 μm broad. Stipitipellis a cutis, made up of parallel hyphae, 2.0–6.0 μm broad, with clusters of caulocystidia. Caulocystidia predominantly subglobose and ellipsoid, often in chains, 7.0–14 × 5.0–11 μm , intermixed with clavate and lageniform elements, 16–33 × 4.5–11 μm and scattered cylindrical hairs, 18–160 × 2.0–5.5 μm ; lecythiform cystidia absent or very rare. Clamp-connections present. Chemical reactions: Ammonia reaction negative or weak.

Habitat & distribution — Saprotrophic, solitary or in small groups, in the Netherlands on dung of horse and donkey in woodlands. Also recorded from Great Britain and Iceland. Aug.–Sept.

Collections examined. THE NETHERLANDS: prov. Drenthe, Vledder, 'Vledderhof', on horse dung, 2 Aug. 1998, *R. Christijn s.n.* (L); Vledder, 'Boschoord', on decayed heap of manure of donkey in forest, 24 Aug. 2002, *R. Christijn (Arnolds 02-18)* (L) — UNITED KINGDOM: Scotland, Perthshire, Rannoch, Dall Wood, 6 Oct. 1960, *P.D. Orton* (E, holotype); laboratory cultures grown from holotype, Nov. 1960 (L, MICH, NY, UPS); in pure culture on paper pulp, 10 Aug. 1961 (E).

Conocybe farinacea was originally described from three localities in Scotland (Watling, 1964) and later collected in the New Forest in England (Watling, 1982). Outside Great Britain it was recorded from Iceland (Watling, 1985), but not from continental Europe. The species is characterized in the first place by the farinaceous smell and taste, a unique feature in the genus *Conocybe*. It should be noticed that in the collection from the Netherlands this smell was absent or weak in undamaged basidiocarps. It became much more apparent when basidiocarps were crushed or cut.

The microscopic characters of the quoted collection were compared with those of the holotype and dried basidiocarps from cultures of the type collection, harvested in 1960 and 1961. All essential characters were similar. The spores in the holotype measured 13.5–17.0 × 7.0–9.5 μm , on the average 15.6 × 8.2 μm (Fig. 3F); the spores in the cultured collection from the holotype in L measured (12.0–)13.0–15.0 × 7.5–9.0 μm , on average 14.1 × 8.3 μm .

In the original description of *C. farinacea*, Watling (1964) stated: "The stipe has long narrow hairs, 1.5–2.5 μm in diameter, as well as similar cells to those on the gill edge and/or elliptical, subglobose, non-capitate and slightly capitate cells". Therefore the species was placed by Watling (1982) in section *Mixtae*. In the collection from the Netherlands lecythiform cystidia were absent on the stipe. In the type collection, the second author found only two slightly capitate caulocystidia (Fig. 3H) and such cells

could not be found at all in the cultured type collections. Therefore we place *C. farinacea* in section *Pilosellae*.

Conocybe farinacea may be confused at first sight with the common coprophytic species *C. pubescens*. The latter species differs not only in the absence of the farinaceous smell, but also in the larger spores, measuring (13.0–)14.0–18.5(–20.0) × (7.0–)7.5–10.0 μm, on average 15.8–17.0 × 8.3–9.2 μm, and the frequent occurrence of lecythiform caulocystidia. Watling (1964) demonstrated that cultures of *C. farinacea* are incompatible with cultures of *C. pubescens*, as well with two non-coprophytic species of section *Mixtae*, viz. *C. pseudopilosella* Kühner & Watling (= *C. pulchella* (Velen.) Hauskn. & Svrček) and *C. subpubescens* P.D. Orton (= *C. digitalina* (Velen.) Singer).

Within section *Pilosellae*, *Conocybe singeriana* Hauskn. shows much resemblance to *C. farinacea*. *Conocybe singeriana* is also a coprophytic species with rather robust basidiocarps. It differs in the absence of a mealy smell, a strongly bulbous stipe base, 5–12 mm broad, and broader spores, measuring (12.0–)13.0–17.0(–18.5) × (7.0–)8.0–11.0 μm, on average 14.0–16.5 × 8.2–9.7 μm (Hausknecht & Krisai-Greilhuber, 1997; Arnolds, in press).

4. *Conocybe incarnata* (Schaeff.) Hauskn. & Arnolds, *comb. nov.* — Fig. 4, 5

Basionym: *Galera incarnata* Schaeff., Z. Pilzk. 9 (1930) 165.

Misapplied names. *Conocybe siliginea* var. *fragilis* sensu Kühner, Genre Galera (1935) 112; *Conocybe fragilis* sensu Watling, Br. Fung. Fl. 3 (1982) 76, sensu Mos., Röhrlinge Blätterpilze 5. Aufl. (1983) 282, sensu auct. Eur.

Pileus 7–20 mm broad, 5–12 mm high, obtusely conical to campanulate, then conico-convex, hygrophanous, when fresh and moist pinkish red to wine red or brick red at first, then discolouring to brown-red or flesh-coloured brown, finally loosing all red colour, translucently striate up to half of the radius or more, rapidly drying and becoming non-striate, pallescent to flesh-coloured or ochraceous-vinaceous, dull, glabrous. Lamellae, L = 18–28, l = 3, fairly crowded to crowded, slightly ventricose, ochraceous at first, then orange-brown to rusty brown, with slightly paler, fimbriate edge. Stipe 25–50 × 0.7–1.5 mm, cylindrical with base tapering into a pseudorhiza up to 30 mm long, fistulose, pink to vinaceous, then becoming brown-red from the base upwards, minutely pruinose-striate and pubescent, in particular near apex. Context concolorous with surface, fragile. Smell and taste weak, not distinctive. Spore print orange-brown.

Spores (7.0–)7.5–10.0 × 4.0–5.5(–6.0) μm, av. 7.9–9.0 × 4.5–5.8 μm, Q = 1.6–1.9, Q av. = 1.65–1.8, not or weakly flattened, ellipsoid- to ovoid-oblong, in side-view occasionally slightly amygdaliform, yellow-brown to pale orange-brown (5C7, 6B6/C6, 6C7) in ammonia, slightly thick-walled (± 0.5 μm), with central germ pore, 1.0–1.5 μm wide. Basidia 14–20(–25) × 6.0–9.0 μm, clavate, 4-spored. Lamella edge sterile or heterogeneous. Cheilocystidia 13–20(–25) × 5.0–9.0 μm, lecythiform with subglobose to clavate basal part, rather short neck (1.0–3.5 × 1.0–1.5 μm) and small capitulum, 3.0–4.5 μm broad. Pleurocystidia absent. Hymenophoral trama made up of cylindrical and inflated elements, 4.0–20 μm broad, with hyaline or pale yellow wall. Pileipellis an epithelioid hymeniderm, made up of clavate and spheropedunculate elements, 23–50 × 10–32 μm, some with brownish, slightly thick-walled pedicel, in fresh basidiocarps with reddish intracellular pigment. Pileocystidia absent. Stipitipellis a cutis of cylindri-

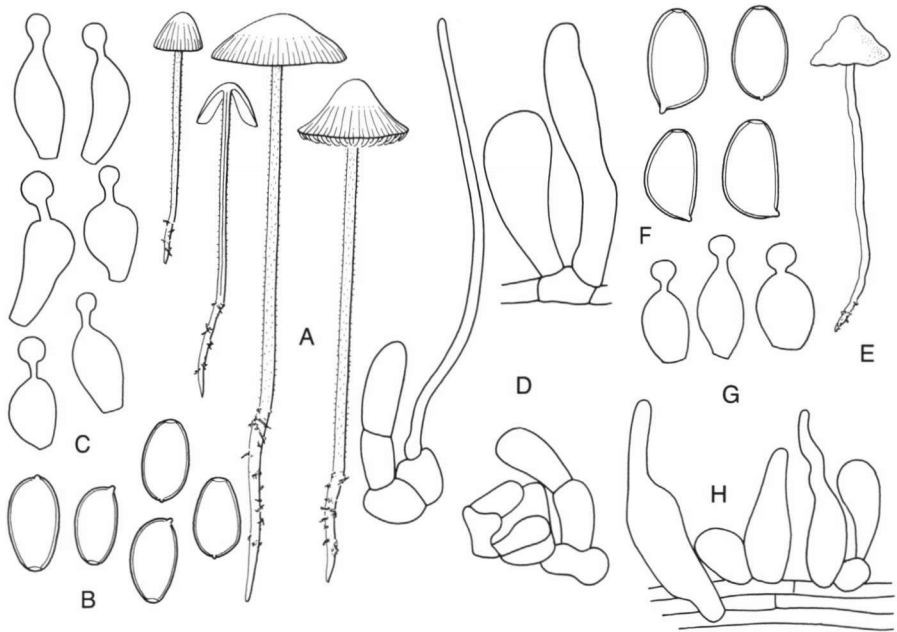


Fig. 4. *Conocybe incarnata*. A. Basidiocarps ($\times 1$); B, F. spores ($\times 1500$); C, G. cheilocystidia; D, H. caulocystidia (all $\times 1000$); E. dried basidiocarp ($\times 1$). (A–D from *J. Daams 520*; E–H from *J. Schäffer, 1929*, holotype.)

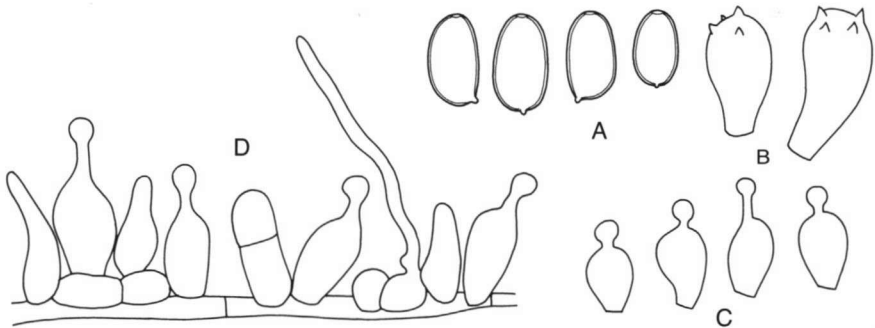


Fig. 5. *Conocybe fragilis*. A. spores ($\times 1500$); B. basidia; C. cheilocystidia; D. caulocystidia; (all $\times 1000$). (A–D from *E. Bartholomew 2313*, holotype.)

cal hyphae, $2.0\text{--}7.0\ \mu\text{m}$ broad, with hyaline or pale yellow wall, with clusters of caulocystidia. Caulocystidia predominantly globose to broadly clavate, $6.0\text{--}18 \times 5.0\text{--}10\ \mu\text{m}$, also with longer, narrowly clavate and subcylindrical elements, $20\text{--}38 \times 6.0\text{--}10\ \mu\text{m}$, and with thin, cylindrical hairs up to $120\ \mu\text{m}$ long, $1.0\text{--}2.0\ \mu\text{m}$ broad; lecythiform cystidia lacking. Clamp-connections present but scarce and difficult to find. Chemical reactions: Ammonia reaction negative.

Habitat & distribution — Saprotrophic, solitary or gregarious to subfasciculate, on compost or humus-rich soil, also when mixed with wood chips, in disturbed places very rich in nutrients, such as gardens, orchards, fields, lawns and flower-beds. Also in unheated glasshouses with e.g. cucumber. In the Netherlands very rare. Also recorded from Austria, Germany and Finland. Outside buildings Aug.–Oct., in glasshouses the entire year.

Collections examined. AUSTRIA: Niederösterreich, Krems-Land, Dross (MTB 7559/1), 5 Aug. 1989, A. Hausknecht (WU 22743). — FINLAND: Etelä-Häme, Jämsä, Lokalahti, 9 Sept. 2001, L. Kosonen et al. (WU 21897). — GERMANY: Brandenburg, Potsdam, Ruinenbergerstrasse 25, 1929, J. Schäffer (UPS, holotype). — THE NETHERLANDS: prov. Noord-Holland, 's Graveland, 'Boekensteijn', 9 Oct. 1967, J. Daams s. n. (L); Idem, 20 Sept. 1969, J. Daams 520 (L); Idem, 13 Aug. 1971, J. Daams 71-204 (L); Kortenhoef, glasshouse 'Steenvoorde', 26.III.1971, J. Daams 71-62 (L).

Conocybe incarnata is a striking and beautiful species with its pink to vinaceous pileus. Another important diagnostic character is the clearly rooting base of the stipe. Schäffer (1930) supposed that his *Galera incarnata* could be identical with *Galera fragilis* Peck, described from North America. This hypothesis was accepted by Kühner (1935), who therefore named the European collections *Conocybe fragilis* (Peck) Singer. That name was also adopted by Watling & Gregory (1981), Watling (1982), Moser (1983) and other European authors, although nobody compared the European collections with the type of *C. fragilis* from North America. The American mycologist Hesler indicated already in unpublished notes that the stipe in the holotype of *Galera fragilis* is covered with numerous lecythiform cystidia, intermixed with few non-lecythiform cystidia and cylindrical hairs. Recent examination of the type collection [USA, Kansas, Rooks County, on ground in short grass, *E. Bartholomew 2313* (NYS)] by the second author confirmed this observation (Fig. 5D). In addition, three specimens in this collection had a slightly bulbous stipe base without pseudorhiza.

In the well-preserved holotype of *Conocybe incarnata*, lecythiform caulocystidia are completely lacking. The stipe covering is a mixture of non-lecythiform elements and hairs (Fig. 4H). In addition, at least two out of six type specimens show a distinct, although broken, pseudorhiza (Fig. 4E). This character of great taxonomic significance was neither mentioned in the original description, nor noticed by other authors. Also the studied collections from the Netherlands, Austria and Finland show a stipe without lecythiform cystidia and a pseudorhiza up to 30 mm long. The spores in the type collection of *C. incarnata* measured $7.0\text{--}9.5 \times 4.5\text{--}6.0 \mu\text{m}$, on the average $8.7 \times 5.2 \mu\text{m}$ (Fig. 4F). The size of the spores in the type of *Galera fragilis* was almost identical, measuring $8.5\text{--}10.0 \times 5.0\text{--}6.0 \mu\text{m}$, on the average $9.1 \times 5.4 \mu\text{m}$ (Fig. 5A). However, the spores of *C. incarnata* have a considerably larger germ pore ($1.0\text{--}1.5 \mu\text{m}$) than the spores of *C. fragilis* ($0.5\text{--}0.8 \mu\text{m}$).

It is evident that *C. fragilis* and *C. incarnata* are distinct species that are probably not even closely related: In view of the stipe covering the former species belongs to section *Mixtae* whereas *C. incarnata* is a member of section *Pilosellae*.

6. *Pholiotina sulcata* Arnolds & Hauskn., *spec. nov.* — Fig. 6, 7

Pileus 6–18 mm latus, plane convexus, distincte umbonatus, centro cinnamomeus, castaneus, margine pallidior flavo-brunneus, ochraceo-brunneus, hygrophanus, margine ad medium pilei striatus et undulate sulcatus, partim incisus, margo leviter inflexus. Lamellae anguste adnatae,

aliquantum distantes, ventricosae, flavo-brunnescentes, demum pallide brunneae, acies lamellarum indistincte, leviter inaequalis. Stipes 25–35 mm longus, 1–1.2 mm latus, filiformis, cylindraceus, basi leviter inflata, stramineus, pallide ochraceo-brunnescens, parte superiore pruinatus, cetera glaber. Caro concolor, odore infirme *Pelargonio* simile. Sporae 6.8–8.7 × 4.2–5.2 μm, in medio 7.8 × 4.8 μm, Q = 1.4–1.9, Q av. = 1.6, ellipsoideae, interdum leviter phaseoliformes, pallide brunneo-aurantiacae in potassio hydroxydico, pariete leviter incrassata et distincte poro germinativo ca. 1.0 μm lato. Basidia 17.5–24 × 7.0–9.0 μm, tetrasporigera, clavata. Acies lamellarum sterilis vel heterogenea. Cheilocystidia 26–45 × 6.5–11.5 μm, lageniformia rostro longo cylindraceo 3–5 μm lato, nonnullis elementis sphaeropedunculatis –15 × 10 μm immixtis. Pleurocystidia nulla. Caulocystidia 17–50 × 5.0–12 μm, amplitudine formaque admodum variabilia. Pileipellis hymeniformis elementis pyriformibus ad sphaero-pedunculatis 12–22 μm lato consistens, basi pigmento incrustato. Pileocystidia nulla. Fibulae adsunt sed rarissimae. Saprophyticus, gregarius, in pratis macilentis calcareis.

Holotypus: Germany, Bayern, Weissenburg-Gunzenhausen, 'Kmenathen', 14.IX.1993, A. Hausknecht et al. (WU 22742).

Misapplied names. *Conocybe plicatella* sensu Kühner, Genre Galera (1935) 137, Watling in Br. Fung. Fl. 3 (1982) 84, sensu auct. eur.; *Galerella plicatella* sensu Mos., Röhrlinge Blätterpilze 5. Aufl. (1983) 282, sensu auct. eur. — *Bolbitius luteolus* sensu Rick., Blätterpilze (1915) 69.

Pileus 6–18 mm broad, convex to plano-convex with obtuse umbo; margin strongly and irregularly plicate-sulcate up to 3/4 of the radius, splitting in places; hygrophalous, when moist orangey brown or pale reddish brown (K. & W. 7D6, 8D5) with red-brown centre (8E8, 9E6), on drying ochraceous to flesh-coloured brown. Lamellae, L = 16–25, l = 1–3, moderately crowded, adnexed, slightly ventricose, yellow-brown, then pale brown to rusty brown with slightly paler, flocculose edge. Stipe 25–37 × 1–2.5 mm, cylindrical with slightly swollen base, fistulose, pale ochre-yellow to pale flesh-coloured, minutely white striate lengthwise, minutely pruinose at apex. Context concolorous. Smell weak, not distinctive or reminding *Pelargonium* leaves. Taste not recorded. Spore print not recorded.

Spores (6.5–)7.5–10.0(–10.5) × 4.0–5.5 μm, av. 7.3–8.9 × 4.7–5.1 μm, Q = 1.4–2.0, Q av. = 1.45–1.85, not flattened, ellipsoid, ellipsoid-oblong to subamygdaliform or sometimes slightly phaseoliform in side-view; ellipsoid to ovoid or oblong in frontal view, brownish orange to orange-brown (5C7, 6D8) in ammonia, slightly thick-walled with small, central to slightly eccentric germ pore, 1.0–1.3 μm wide. Basidia 16–24 × 7.0–10.5 μm, clavate, 4-spored, 2-(1)-spored or 4- and 2-(1)-spored intermixed. Lamella edge almost sterile. Cheilocystidia 24–56 × 6.5–14 μm, lageniform, strongly variable in shape and size, mostly with long, cylindrical neck, 2.5–4.0 μm broad, often subcapitate, apex up to 7.0 μm broad, also with short thick neck, intermixed with some pyriform and spheropedunculate cells, 14–25 × 8.0–12 μm and scattered basidia. Pleurocystidia absent. Hymenophoral trama made up of cylindrical and inflated elements, 3.0–30 μm broad, with hyaline to yellow-brown encrusted wall. Pileipellis an epithelioid hymeniderm made up of pyriform and spheropedunculate cells, 17–42 × 10–26 μm with pale brown walls; stalk often with brown encrusted pigment. Pileocystidia absent. Stipitipellis a cutis of hyaline or pale yellow, repent hyphae, 2.0–6.0 μm broad with scattered to clustered caulocystidia. Caulocystidia 17–53 × 5.0–14 μm, quite variable in size and shape, mainly lageniform with short long neck, 3.0–6.5 μm broad, not capitate, also sub-cylindrical and clavate; in addition many small, subglobose cells up to 10 μm broad. Clamp-connections absent.

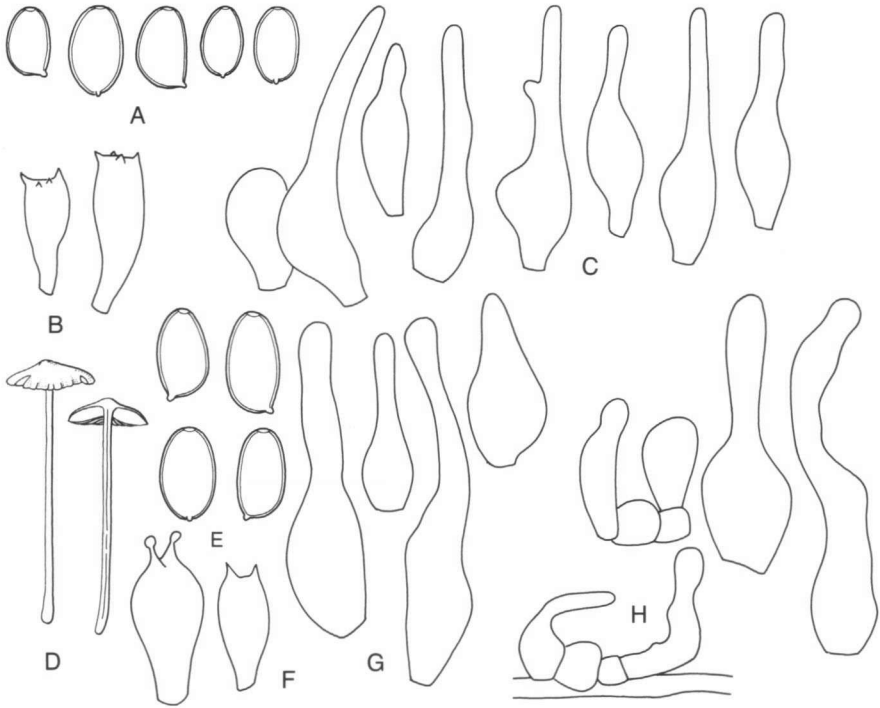


Fig. 6. *Pholiotina sulcata*. A, E. spores ($\times 1500$); B, F. basidia; C, G. cheilocystidia ($\times 1000$); D. basidiocarps ($\times 1$). (H. caulocystidia ($\times 1000$)); A–C from *Hausknecht et al.*, 14 Sept. 1993, holotype; D–H from *E. Arnolds 6708*.)

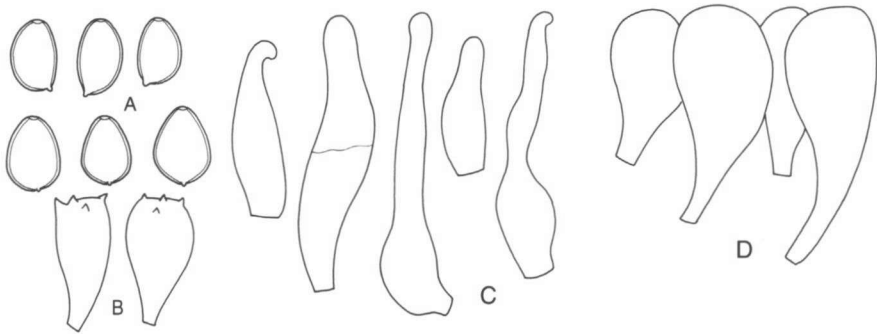


Fig. 7. *Agaricus plicatellus* ('*coprinoides*'). A. Spores ($\times 1500$); B. basidia; C. cheilocystidia; D. pileipellis (all $\times 1000$). (A–D from *C.H. Peck s.n.*, holotype.)

Habitat & distribution — Saprotrophic, solitary or in small groups in unfertilized pastures on dry, weakly acid to basic, often calcareous loam. In the Netherlands very rare in southern Limburg. Sept.–Oct. Widespread in Central Europe but rare.

Collections examined. AUSTRIA: Niederösterreich, Horn, Sonndorf (MTB7460/2), 6 Oct. 1984, A. Hausknecht (WU 8415). — GERMANY: Bavaria, Weissenburg-Gunzenhausen, Kemnathen, 14 Sept. 1993, A. Hausknecht et al. (WU 22742, holotype); same loc., 27 Sept. 1995, A. Hausknecht & F. Reinwald (WU 14468). — HUNGARY: Mátra Mountains, near Paráđ, 25 Sept. 1968, M. Babos et al. (HUN 44194, HUN 44195); Hajdu-Bihar, Hortobágy, Ujszentmargita, 6 Oct. 1976, M. Babos et al. (HUN 56042). — THE NETHERLANDS: prov. Limburg, Wittem, Nijswiller, 22 Oct. 1995, Arnolds 6708 (L); Epen, Cottessen, 27 Oct. 2001, Arnolds 01-170 (L).

The Latin diagnosis is based on the type collection (also Fig. 6A–C). The English description is a compilation of data of all collections studied by us.

Pholiotina sulcata is a characteristic species with its soon expanding pileus that is irregularly sulcate-plicate, often also split at the margin in places. In view of the absence of any veil it belongs to *Pholiotina* section *Piliferae* (Kühner) Singer. The collections from the Netherlands differ from most earlier descriptions in the presence of exclusively 2-spored or mixed 4- and 2-spored basidia. This variation explains the large range in spore size in this species (Fig. 6A, E). Also Kühner (1935: 139) described a collection (as *Conocybe plicatella*) with partially 2-spored basidia. The exclusively 4-spored and 2-spored collections do not deserve a taxonomic status since many basidiocarps combine variable proportions of the two types of basidia. It is a notable exception within the Bolbitiaceae where usually 4- and 2-spored taxa are clearly separated and distinguished in the rank of species.

Pholiotina sulcata has been synonymised by European authors with the North American species *Agaricus plicatellus* Peck in the past. That name was introduced by Peck in 1878 in order to replace the name *Agaricus coprinoides* Peck (1873), a later homonym of *Agaricus coprinoides* Corda 1831, representing a quite different fungus. *Agaricus coprinoides* was originally described by Peck (1873) as a small agaric with “membranaceous, soon expanded pileus, often split on the margin, plicate-sulcate to the small even disk, yellowish inclining to ochre ... the appearance of the pileus is suggestive of some of the smaller Coprini”. The aberrant appearance of the basidiocarps was reason for Earle (1909) to erect the genus *Galerella*, typified by *Agaricus coprinoides* Peck. Singer (1951) accepted this genus in his world wide survey of Agaricales.

The second author studied the holotype (New York State, Cayuga County, Sterling, C.H. Peck, NYS) and concluded that the pileus surface in *Galerella plicatella*, as well as in other tropical species assigned to *Galerella*, is in fact completely different from that of *Pholiotina sulcata*. In *Galerella* the pileus margin is minutely and regularly crenulate and the pileus is deeply and densely sulcate-striate up to the centre, as in *Coprinus plicatilis* and allies (see also Thomas et al., 2001; Horak & Hausknecht, 2002). In *Pholiotina sulcata* the pileus margin is irregularly wavy-lobed and sulcate only in places up to a variable proportion of the radius. It does not remind to *Coprinus* spp. at all. Watling & Gregory (1981) already noticed that the European collections, named *Conocybe* or *Galerella plicatella*, are ‘doubtfully the same’ as the North American species. Watling studied also the type collection of *Agaricus coprinoides* Peck and added a note to the exsiccatum, reading: “After examining European material attributed to this species I doubt

whether this fungus has even been seen in Europe". More extensive research is needed to evaluate whether *Galerella* deserves the status of an independent genus.

Pholiotina sulcata and *Galerella plicatella* differ also in some microscopic characters. The spores in the latter species are clearly flattened and in part slightly rhomboid to slightly hexagonal in frontal view, measuring $7.0\text{--}8.5 \times 5.0\text{--}6.0 \times 4.5\text{--}5.0 \mu\text{m}$, on the average $7.4 \times 5.5 \times 4.6 \mu\text{m}$ in the type collection (Fig. 7A). The cheilocystidia are rather similar. In the type of *G. plicatella* they are lageniform and measure $20\text{--}50 \times 7.0\text{--}10 \mu\text{m}$ with a neck $3.0\text{--}5.0 \mu\text{m}$ broad (Fig. 7C).

ACKNOWLEDGEMENT

This study has been carried out for the project Flora agaricina neerlandica with financial support by the Rijksherbariumfonds Dr. Kits van Waveren.

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