

FOUR NEW SPECIES OF COPRINUS FROM THE NETHERLANDS

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Three species of *Coprinus* belonging to the *C. niveus*-*C. cortinatus* group are newly described, viz. *C. bellulus*, *C. candidatus*, and *C. iocularis*. For purposes of comparison a description of *C. cortinatus* is given also. In addition *C. singularis*, belonging to subsection *Setulosi*, is introduced as a new species.

As three of the four new species described in this paper are rather closely related to *C. cortinatus* J. Lange it seemed important first to establish a clear concept of that species. Type material does not seem to exist, but authentic material was kindly sent on loan from Copenhagen. The following description is based on that material.

Coprinus cortinatus J. Lange — Figs. 1E–H

Coprinus cortinatus J. Lange in Dansk bot. Ark. 2(3): 45. 1915.

Pileus up to 15 mm wide when expanded, white but in young stages and with age at centre somewhat cream coloured, powdery. Stipe up to about 40×0.5 –1 mm, with subbulbous base.

Spores 7.0 – 9.7×4.4 – $5.9 \mu\text{m}$, ellipsoid to ovoid, with central germ pore, $Q = 1.35$ – 1.85 , $\bar{L} = 8.4 \mu\text{m}$, $\bar{B} = 5.2 \mu\text{m}$. Basidia 13 – 32×7 – $8 \mu\text{m}$, 4-spored. Pleuro- and cheilocystidia absent. Clamp-connections present.

Collection examined. — DENMARK: (exact locality unknown), 20 Jan. 1939, J. E. Lange, on mull in *Fagus-Ulmus* forest (C).

In Lange's description too no cystidia are mentioned. This is in agreement with my collections of *C. cortinatus*. In a few other collections, however, which are macroscopically and microscopically indistinguishable from typical *C. cortinatus*, very distinct subglobose to sack-shaped cheilocystidia are present and cover the lamella edge completely.

For the moment it seems to me that the presence of distinct cheilocystidia is such an important character that it prevents the subordination of these collections under *C. cortinatus*. The more so, as I have another collection with the typical ellipsoid *C. cortinatus*-spores, be it somewhat smaller than usual ($1 \leq 7 \mu\text{m}$), which has utriform cheilocystidia. It should be mentioned, however, that also in my *C. cortinatus* collections without cheilocystidia the length of the spores varies considerable from collection to collection, viz. from 6 – $8 \mu\text{m}$ to 8 – $10.5 \mu\text{m}$.

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Examination of many more collections is necessary to find out whether we are dealing here with several taxa or with just one highly variable species.

For the moment only the collections without cheilocystidia are accepted here as representing true *C. cortinatus*. The spore-sizes found in these collections are:

Spores [100/5/5] $6.0-10.2 \times 4.2-6.0 \mu\text{m}$, $Q = 1.30-1.95$, $Q = 1.53-1.81$; $L = 7.9-9.1 \mu\text{m}$, $B = 5.1-5.7 \mu\text{m}$.

Collections examined. — NETHERLANDS: prov. Utrecht: Breukelen, estate 'Sterreschans', 9 Sept. 1986, *Uljé 811*; prov. Noord-Holland: Amsterdam, Amsterdamse Bos, 7 Sept. 1985, *Uljé 608* & 27 Sept. 1986, *Uljé 828*; prov. Zuid-Holland: Leiden, Leidse Hout, 9 Oct. 1985, *Uljé 652* & 10 Sept. 1986, *Uljé 810*. (All collections in herb. *Uljé*.)

On the following pages three new species undoubtedly belonging to the *Coprinus cortinatus/niveus* group, are described, all three with terrestrial basidiocarps and small spores ($\leq 11 \mu\text{m}$).

In current literature (Kühner & Romagnesi, 1953; Moser, 1983; Orton & Watling, 1979) besides *C. cortinatus* three of such species are to be found, viz. *C. filiformis* Berk. & Br. (1861: 379), *C. patouillardii* Qué. in Pat. (1883: 107), and *C. coniophorus* Romagn. (1941: 115).

Coprinus filiformis as described by Orton & Watling (1979: 115), apparently the only recent authors knowing this species, is strongly characterized by the presence of thick-walled hyphae among the globose velar cells.

The original description of *C. filiformis* by Berkeley & Broome deviates somewhat from the one given by Orton & Watling. Berkeley & Broome describe and depict a very small species: basidiocarps less than 10 mm high; pileus about 1 mm in diam. (Orton & Watling: pileus $4-7 \times 2-6$ mm before expanding and stipe 15–40 mm long); moreover in the enlarged drawing of a basidiocarp distinct erect hairs are to be seen on the stipe which remind of species in subsection *Setulosi*. In addition the strongly cylindrical young pileus is somewhat aberrant in the *C. cortinatus*-group where the closed pileus usually is more roundish. It should be mentioned, however, that Berkeley & Broome indicate the presence of white velar flocculi on the pileus.

Altogether it seems possible that the interpretation of *C. filiformis* by Orton & Watling is incorrect. Unfortunately type material seems to be lacking (Orton, 1957: 275).

However that may be, none of the interpretations of *C. filiformis* mentioned agree with one of the three following new species.

Coprinus patouillardii Qué. is fully characterized by rounded-angular spores and occurs besides on earth also on dung. I am not convinced that *C. cordisporus* Gibbs (1908: 100) with the same microscopical characters but with smaller basidiocarps on dung (cf. Orton & Watling, 1979: 66) is a different species.

Coprinus coniophorus Romagnesi is easily distinguished by the dark grey to olivaceous grey velar squamules on its pileus and its narrowly amygdaliform spores with somewhat attenuate apex.

Fimicolous species with small spores in the *Coprinus cortinatus/niveus*-group are *C. ephemeroides* (Bull.: Fr.) Fr. (1838: 250), *C. cordisporus* Gibbs, *C. poliommallus* Romagn. (1945: 81), and *C. luteocephalus* Watling (1972: 359).

Coprinus ephemeroides and *C. cordisporus* (see above) have rounded-angular spores like *C. patouillardii*.

Coprinus poliommallus is a very small species with cylindrico-ellipsoid spores combined with roundish cheilocystidia.

Coprinus luteocephalus shows yellowish tinges, has 10–12.5 μm long spores, and velar cells on the pileus that are not globose. Its position in the *C. cortinatus/niveus* complex is uncertain.

Two more taxa belonging to the species-complex concerned but not treated in the works mentioned above are *C. pseudocortinatus* Locq. (1947: 81) and the recently described *C. cardiasporus* Bender (in Enderle, Krieglsteiner & Bender, 1986: 102). The former is a fimicolous species with very tiny basidiocarps (only a few millimeters high) and very small spores (up to 7 μm long) and the latter is the only species in this group with truly heart-shaped spores.

None of the species discussed above agrees with one of the following three, which are therefore described as new.

***Coprinus bellulus* Uljé, *spec. nov.* — Figs. 1A–D**

Pileus ad 27 mm latus, sulcatus, initio albo- vel cremeo-pulverulentus, postea sordide albidus. Lamellae 22–36, liberae, primo albae, dein cinereae vel atro-maculateae. Stipes ad 65 \times 2.5 mm, albo-flocculosus, basi subbulbosus saepe brunneolus. Sporae 7.3–10.6 \times 5.8–8.0 \times 5.0–7.1 μm , late ellipsoideae, interdum latere leviter applanatae, obscure rubro-brunneae, poro germinale centricono praeditae. Basidia bisporea. Cystidia nulla. Velum pilei constans ex cellulis globosis, ad 50 μm latis, hyalinis vel flavidulis tenuitunicatis, granulosis (granula in HCl dissoluta). Fibulae adsunt. — Typus: 'Netherlands, prov. Zuid-Holland: Langeraar, 16 X 1986, *C. B. Uljé 777* (L).'

Etymology: *bellulus*, pretty.

Closed pileus subglobose to ellipsoid, up to 11 mm high and 9 mm wide, completely covered with powdery white veil, but very young buds and centre of pileus of more advanced stages often cream to pale ochraceous; veil at margin, particularly in early stages somewhat more hairy-floccose; expanded pileus up to 27 mm wide, convex to flat with slightly deflexed margin, rarely totally flat; with age veil on pileus greying. Lamellae ($L = 22\text{--}36$, $l = 1\text{--}3$) free, up to 2 mm wide, at first white, later greyish to grey with blackish spots. Stipe up to 65 \times 2.5 mm, attenuate upwards, at apex up to 1.5 mm wide, white but at apex often somewhat hyaline and at subbulbous, up to 3.5 mm wide base often brownish, with white velar flocks. Smell absent. Spore print dark chocolate brown (Munsell 5 YR 2/1).

Spores [160/8/8] 7.3–10.6 \times 5.8–8.0 \times 5.0–7.1 μm , $Q = 1.20\text{--}1.65$, $\bar{Q} = 1.38\text{--}1.50$, $L = 9.6\text{--}9.9$, $B = 6.6\text{--}7.1$ μm , in face view broadly ellipsoid, sometimes with slightly flattened side, but often somewhat irregularly shaped, with central germ pore and apex somewhat attenuate, dark red-brown. Basidia 15–32 \times 7–9 μm , 2-spored, surrounded by 3–5 pseudoparaphyses. Cheilo- and pleurocystidia absent but here and there sterile cells (probably somewhat enlarged basidioles) projecting from lamellae

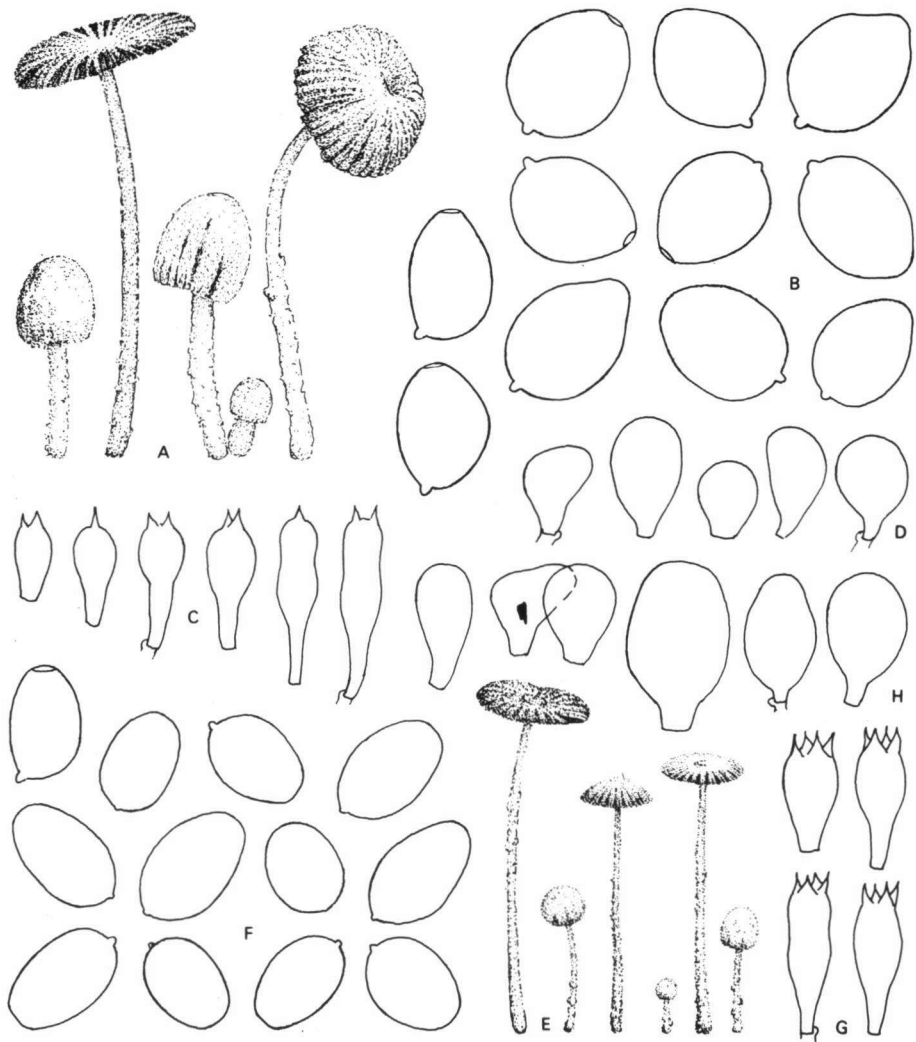


Fig. 1A–D. *Coprinus bellulus*. — A. Basidiocarps $\times 1$. — B. Spores $\times 2000$. — C. Basidia $\times 800$. — D. Strongly developed pseudoparaphyses at lamella edge $\times 800$.

Fig. 1E–H. *Coprinus cortinatus*. — E. Basidiocarps $\times 1$. — F. Spores $\times 2000$. — G. Basidia $\times 800$. — H. Strongly developed pseudoparaphyses at lamella edge $\times 800$.

(Figs. 1D and 1H) and sometimes velar remnants sticking to lamella edge. Pileipellis made up of ventricose, ellipsoid and subglobose cells covered by about $7\ \mu\text{m}$ wide hyphae consisting of oblong-ventricose cells and these upwards passing into thin-walled, colourless to slightly yellowish, smooth to granular, up to $50\ \mu\text{m}$ wide, globose velar cells; granules on surface of velar cells disappearing in HCl. Clamp-connections present.

Habitat & distribution. — Mostly in small groups, more rarely in bundles of up to 40 specimens, but sometimes also solitary. Usually on bare soil, but sometimes also at grassy-mossy places, always under shrub or trees. Not rare in the Netherlands.

Collections examined. — NETHERLANDS: prov. Flevoland: Oostelijk Flevoland, Bremerbergbos, 4 Oct. 1986, *G. Tjallingii* (herb. Tjallingii); prov. Zuid-Holland: Alphen a/d Rijn, 26 June 1984, *Uljé 320*, 1 Aug. 1985, *Uljé 530* & 11 Sept. 1987, *Uljé 827* (L); Leiden 28 Aug. 1986, *Uljé 648* & 31 May 1987, *Uljé 849* (L); Ter Aar, Langeraar, 10 Nov. 1983, *Uljé 308* & 16 Oct. 1986, *Uljé 777* (type; L). (All collections in herb. *Uljé* unless otherwise mentioned.)

Coprinus bellulus is easily distinguished from the other members of the *C. cortinatus*-group by the 2-spored basidia, lacking pleuro- and cheilocystidia, and the often somewhat irregular, broadly ellipsoid spores.

***Coprinus candidatus* Uljé, spec. nov. — Figs. 2A–F**

Pileus ad 16(–20) mm latus, sulcatus, initio albo- vel cremeo-pulverulentus, postea sordide albidus. Lamellae 21–28, liberae, primo albae, dein cinerae vel atro-maculatae, albo-marginatae. Stipes c. 50 × 1.5 mm, albo-flocculosus, basi subbulbosus. Sporae 7.5–11.5 × 4.5–6.0 μ m, cylindrico-ellipsoideae, rubro-brunneae, poro germinali centrico, ad 2 μ m lato praeditae. Basidia tetraspora. Pleurocystidia nulla. Cheilocystidia 20–40(–50) × 7–15(–25) μ m, utriformia, interdum lageniformia vel vesiculosa. Velum in pileo constans ex cellulis globosis, ad 50 μ m latis, hyalinis vel flavidulis, tenuitunicatis, granulosis (granula in HCl dissoluta). Fibulae adsunt. Terrestres, interdum ad ramulos dejectos. — Typus: 'Netherlands, prov. Noord-Holland: Amsterdam, Amsterdamse Bos, 2 IX 1986, *C. B. Uljé 812*' (L).

Etymology: *candidatus*, dressed in white.

Pileus ovoid to subglobose and up to 8 × 6 mm when still closed, expanding up to 16(–20) mm, white to cream, becoming sordid with age, entirely powdery but at margin somewhat hairy-floccose. Lamellae $L = 21-28$, $l = 0-3$, free, first white but soon grey to spotted blackish, with white edge. Stipe c. 50 × 1.5 mm, attenuate upwards, subbulbous at base, white-flocculose. Smell absent.

Spores [140/7/4] 7.3–11.5 × 4.6–6.0 μ m, $Q = 1.60-2.05$, $\bar{Q} = 1.72-1.88$, $\bar{L} = 8.6-10.9$, $B = 5.0-5.8$, cylindrico-ellipsoid, but somewhat conical towards apiculus, W about equal to B , red-brown under microscope, with central, up to 2 μ m wide germ-pore. Basidia 15–35 × 7–10 μ m, 4-spored, surrounded by 3–5 pseudoparaphyses. Cheilocystidia up to 40(–50) μ m long, with 7–15(–25) μ m wide ventricose part and 4–10(–15) μ m wide neck, utriform to more rarely lageniform or vesiculose, with more or less cylindrical neck and rounded apex. Pleurocystidia absent. Pileipellis consisting of roundish cells covered by narrow hyphae upwards passing into velar tissue. Velar cells (Fig. 2D) (sub)globose, up to 50 μ m wide, colourless to yellowish, thin-walled, granular; granulae dissolving in HCl. Velum at margin of pileus and on stipe made up of cylindrical to fusiform or clavate elements. Clamp-connections present.

Habitat. — Terrestrial on bare soil, sometimes against fallen branchlets.

Collections examined. — NETHERLANDS: prov. Utrecht: Breukelen, estate 'Over-Holland', 19 Sept. 1986, *Uljé 807*; prov. Noord-Holland: Amsterdam, Amsterdamse Bos, 2 Sept. 1986, *Uljé 812* (type, L); ditto, 20 Sept. 1987, *Uljé 852*; prov. Zuid-Holland: Leiden, 26 March 1985, *Uljé 486*. (All in herb. *Uljé* unless mentioned otherwise.)

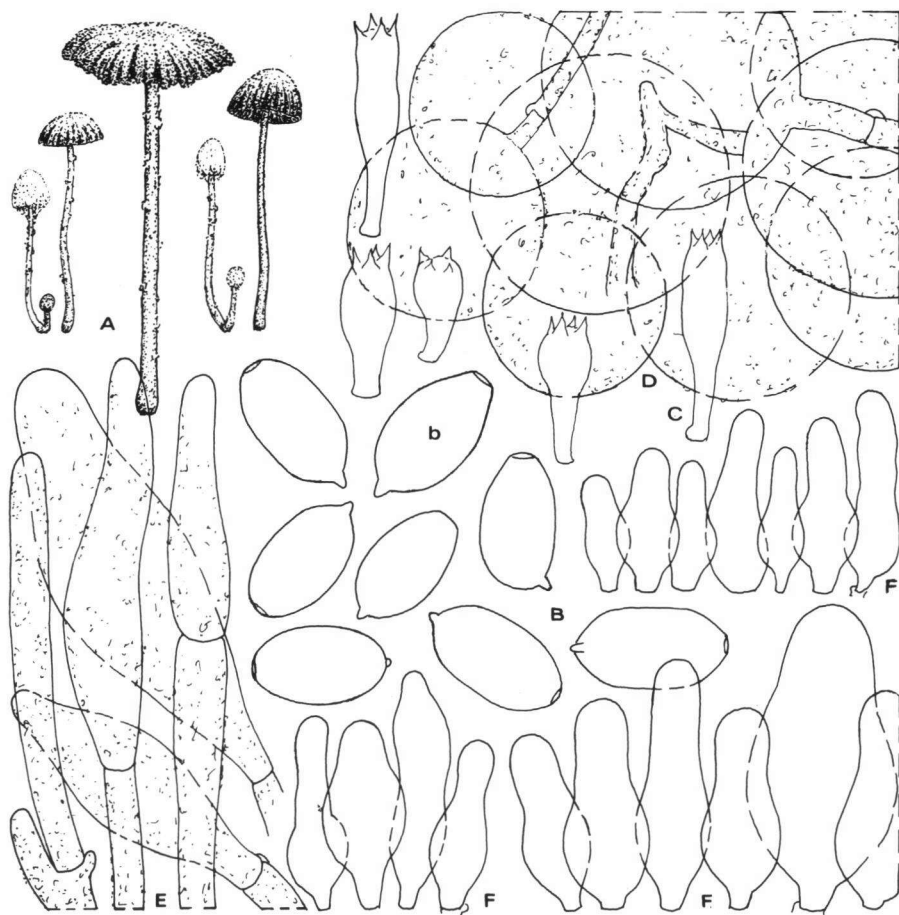


Fig. 2A–F. *Coprinus candidatus*. — A. Basidiocarps $\times 1$. — B. Spores $\times 2000$. — C. Basidia $\times 800$. — D. Elements of veil on pileus $\times 800$. — E. Elements of veil on stipe $\times 800$. — F. Cheilocystidia $\times 800$ (from 3 collections).

Among the species of the *C. cortinatus*-group, *C. candidatus* is easily recognized by its utriform cheilocystidia and by its usually cylindrico-ellipsoid spores. The subcylindrical shape of the spores, however, is not always very distinct, e.g. in the collection cited from Breukelen and in a collection described by Gröger (1986: 37) from East Germany (as *C. cf. cortinatus* Lange). In these two collections the spores are also somewhat longer and somewhat stronger attenuate towards the germ-pore than usually (Fig. 2Bb). But also in these cases the subcylindrical shape is perceptible in at least some of the spores. Shape and size of the cheilocystidia, however, are the most important indications that these collections with slightly aberrant spores belong to *C. candidatus*.

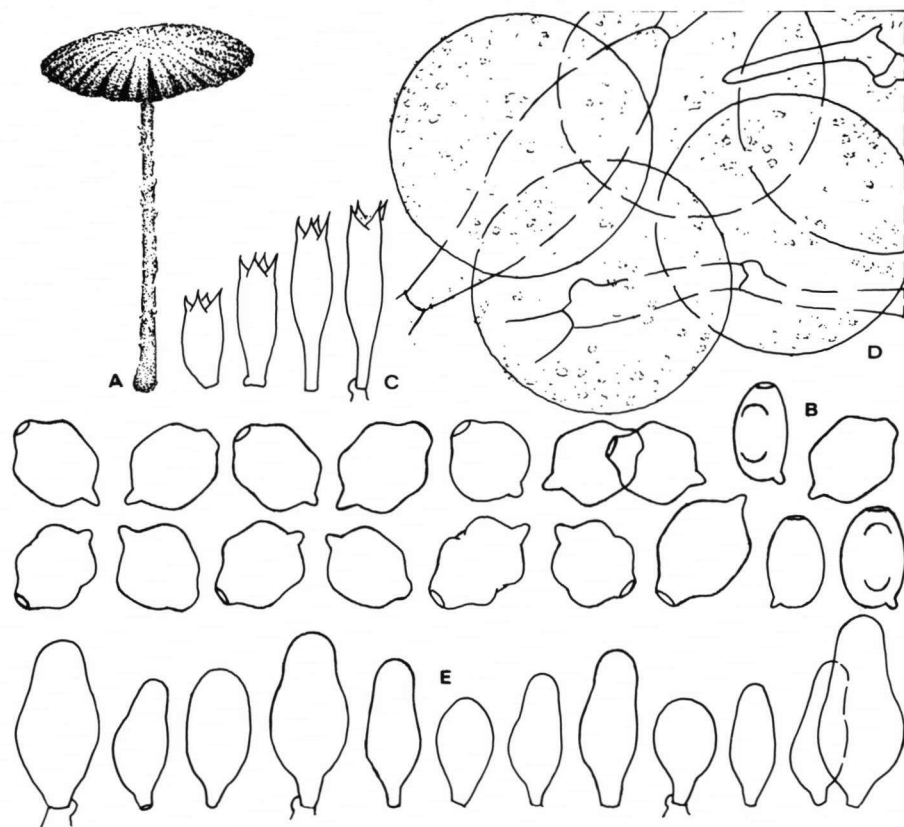


Fig. 3A–E. *Coprinus iocularis*. — A. Basidiocarp $\times 1$. — B. Spores $\times 2000$. — C. Basidia $\times 800$. — D. Elements of veil on pileus $\times 800$. — E. Cheilocystidia $\times 800$. (All Figs. from type.)

Coprinus iocularis Uljé, *spec. nov.* — Figs. 3A–E

Pileus expansus 27 mm latus, sulcatus, albo-pulverulentus. Lamellae 26, liberae, primo albae, dein cinereae vel atro-maculatae. Stipes 45×1 –1.5 mm, subbulbosus, albido-hyalinus, albo-flocculosus. Sporae 5.9 – 7.1 (– 7.9) \times 4.9 – 5.8×4.0 – 4.3 μm , hexagonae, saepe lateraliter depressae quare plus minusve nodulosae, rubro-brunneae, poro germinali centrico praeditae Basidia tetraspora. Cheilocystidia 20 – 35×8.5 – 15.5 μm , pro maxima parte utriformia, collo 6 – 9.5 μm lato. Pleurocystidia nulla. Velum in pileo constans ex cellulis globosis, ad 50 μm latis, laevibus vel subgranulosis et hyphis ramosis surculisque praeditis. Fibulae adsunt. Terrestis, in locis graminosis. — Typus: 'Netherlands, prov. Zuid-Holland, Alphen a/d Rijn, 23 VIII 1987, C. B. Uljé 851 (L).

Etyymology: iocularis, funny; because of the shape of the spores.

Pileus 27 mm wide, plano-convex, completely white-powdery. Lamellae $L = 26$, $l = 1$ – 3 , free, first white, then grey to blackish spotted. Stipe 45×1.5 mm, with subbulbous base, whitish-hyaline, covered with white velar flocculi. Smell absent.

Spores [40/1/1] $5.9-7.1(-7.9) \times 4.9-5.8 \times 4.0-4.3 \mu\text{m}$, $Q = 1.05-1.40$, $\bar{Q} = 1.26$, $\bar{L} = 6.7 \mu\text{m}$, $\bar{B} = 5.3 \mu\text{m}$, in face view more or less hexagonal but frequently with two rounded lateral nodules at each side because of slightly depressed lateral faces, red-brown, with central germ pore. Basidia $13-32 \times 6-8 \mu\text{m}$, 4-spored, surrounded by 3-5 pseudoparaphyses. Cheilocystidia $20-35 \times 8.5-15.5 \mu\text{m}$, mostly utriform; neck $6-9.5 \mu\text{m}$ wide. Pleurocystidia absent. Veil on pileus consisting of up to $50 \mu\text{m}$ wide, smooth or somewhat granular globose cells (granules dissolving in HCl) mixed with frequently branching, colourless, thin-walled hyphae with processes. Clamp-connections present.

Habitat. — Terrestrial on lawn.

Collection examined. — NETHERLANDS: prov. Zuid-Holland: Alphen a/d Rijn, near Zegerplas, 23 Aug. 1987, *Uljé 851* (type; L).

Coprinus iocularis can be recognized immediately by the characteristic shape of its spores. Therefore it was decided to describe it as a new species, in spite of the fact that only one specimen was found.

Coprinus singularis Uljé, *spec. nov.* — Figs. 4A–F

Pileus fortiter plicatus, initio subglobosus vel ovoideus, ad $3 \times 2 \text{ mm}$, pallide brunneus, striis parum obscurioribus; postea expansus, ad $8(-11) \text{ mm}$ latus, cinerascens sed centro color brunneus persistens, sub lente subpubescens. Lamellae 8–16, anguste adnatae, primo albae, dein cinereae vel atro-maculatae. Stipes ad $35 \times 0.7 \text{ mm}$, basi subbulbosus, hyalinus, sparsim pubescens. Sporae $9.5-17 \times 6.5-11 \mu\text{m}$, ellipsoideae vel cylindrico-ellipsoideae, obscure rubro-brunneae, poro germinali centrico indistincto praeditae. Basidia $15-34 \times 8-10 \mu\text{m}$, bispore, pro parte unispore. Cheilocystidia $30-50 \times 12-17 \mu\text{m}$, lageniformia, collo $3-5 \mu\text{m}$ lato. Pleurocystidia nulla. Pileipellis constans ex cellulis ovoideis vel globosis et pileocystidiis $50-85 \times 11-18 \mu\text{m}$, collo $3.5-8 \mu\text{m}$ lato, lageniformibus. Caulocystidia $30-90 \times 11-20 \mu\text{m}$ lageniformia, collo $3.5-9.5 \mu\text{m}$ lato. Fibulae adsunt. — Typus: 'Netherlands, prov. Zuid-Holland: Alphen a/d Rijn, Zegerplas, 21 VIII 1987, C. B. *Uljé 850*' (L).

Etymology: singularis, solitary.

Closed pileus up to $3 \times 2 \text{ mm}$, subglobose to ovoid, pale brown (Mu. 10 YR 7/3; K. & W. 4A3) with somewhat darker striation; expanded pileus up to $8(-11) \text{ mm}$ wide, soon becoming very thin and greyish to almost hyaline but remaining brownish at centre particularly when dehydrated (Mu. 7.5 YR 5/6); rather strongly sulcate already in early stages, seemingly glabrous but under lens subpruinose. Lamellae $L = 8-16$, $l = 0-3$, narrowly adnate, white at first then grey to blackish spotted. Stipe up to $35 \times 0.7 \text{ mm}$, subbulbous at base, hyaline, sparsely pubescent. Smell absent.

Spores [120/6/4] $9.7-17 \times 6.8-10.9 \mu\text{m}$, $Q = 1.20-1.70$, $\bar{Q} = 1.35-1.47$, $\bar{L} = 11.4-14.4$, $\bar{B} = 8.5-9.1$, ellipsoid to cylindrico-ellipsoid, in frontal view often slightly flattened at both sides of apiculus, dark red-brown, with central, rather indistinct germ pore. Basidia $15-34 \times 8-10 \mu\text{m}$, 2-spored but also rather frequently 1-spored, surrounded by 4-6 pseudoparaphyses. Pleurocystidia absent. Cheilocystidia $30-50 \times 12-17 \mu\text{m}$, with tapering $3-5 \mu\text{m}$ wide neck and rounded apex, lageniform, colourless, thin-walled. Pileipellis consisting of globose to ovoid cells up to $30 \times 25 \mu\text{m}$ (in grooves slightly larger) and lageniform pileocystidia $50-85 \times 11-18 \mu\text{m}$, with tapering to cylindrical $3.5-8 \mu\text{m}$ wide neck and thin, colourless walls. Caulocystidia $30-90 \times 11-20 \mu\text{m}$ with rather cylindrical, $3.5-9.5 \mu\text{m}$ wide neck, colourless, thin-walled. Clamp-connections present.

Habitat. — Solitary on lawns, particularly at bare spots.

Collections examined. — NETHERLANDS: prov. Zuid-Holland: Alphen a/d Rijn, Edelsteensingel, 28 July 1985, *Ulje* 671; ditto, near Zegerplas, 3 Sept. 1985, *Ulje* 503, 21 Aug. 1987, *Ulje* 850 (type; L) & 22 Sept. 1987, *Ulje* 853, and several other collections from same area. (All collections in herb. *Ulje* unless otherwise mentioned.)

Within subsection *Setulosi*, *Coprinus singularis* is highly characterized by its large cylindrico-ellipsoid spores with central germ pore on 2-spored basidia. In all collections,

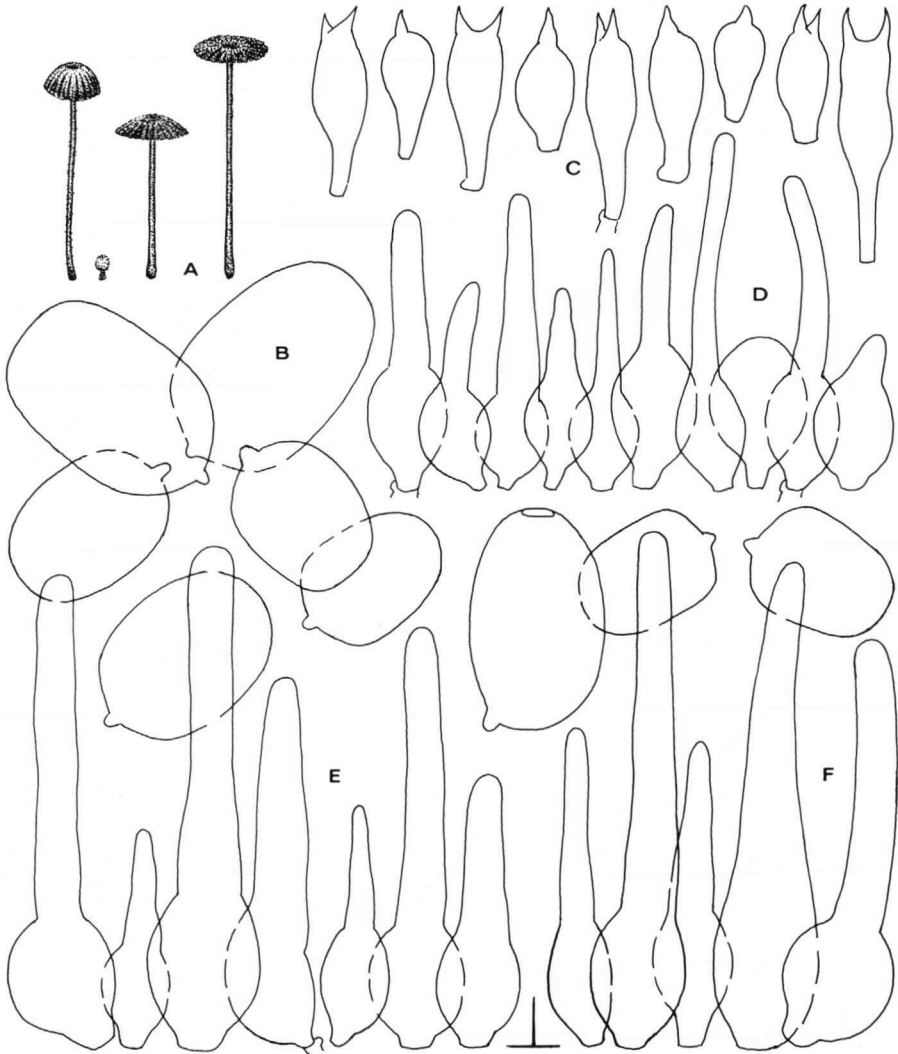


Fig. 4A–F. *Coprinus singularis*. — A. Basidiocarps $\times 1$. — B. Spores $\times 2000$. — C. Basidia $\times 800$. — D. Cheilocystidia $\times 800$. — E. Caulocystidia $\times 800$. — F. Pileocystidia $\times 800$.

of which some were found more than one kilometer apart, there is a limited number of 1-spored basidia intermixed with the 2-spored ones, which explains the great range of spore-sizes given above.

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