

STUDIES IN COPRINUS V – COPRINUS SECTION COPRINUS
Revision of subsection Lanatuli Sing.

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A key is given to the species of subsection *Lanatuli* known from the Netherlands or to be expected in the Netherlands on account of records from neighbouring countries. For a key to the subsections in *Coprinus* section *Coprinus* see Uljé & Noordel., Persoonia 16 (1997) 267. *Coprinus bicornis* and *C. spelaiophilus* are described as new species. In addition the following species are fully described: *C. ammophilae*, *C. calosporus*, *C. cinereus*, *C. erythrocephalus*, *C. geesterani*, *C. jonesii*, *C. krieglsteineri*, *C. lagopus*, *C. macrocephalus*, *C. ochraceolanatus*, *C. pachydermus*, *C. pseudoradiatus*, *C. radiatus* and *C. scobicola*.

This paper is a result of our observations on *Coprinus* subsect. *Lanatuli*, and is a continuation of earlier papers (Uljé & Bas, 1988, 1991; Uljé & Noordeloos, 1993, 1997), also in connection with the preparation of a manuscript for the Flora agaricina neerlandica. All species currently known from the Netherlands and neighbouring countries are fully described and some new species are added.

PRESENTATION AND ABBREVIATIONS

When not indicated otherwise, all collections are deposited in the Rijksherbarium at Leiden (L). Collections made by the first author, but without a collection number, refer to material that has not been preserved. The enlargements of the drawings are $\times 2000$ for spores, $\times 800$ for other microscopical features and $\times 1$ for basidiocarps.

In the descriptions, reference is made to the colour codes of Munsell (1975) and Kernerup & Wanscher (1978), respectively indicated as Mu. and K. & W. Other abbreviations used are:

av.	– average	l	– number of short lamellae between two lamellae (not reaching stipe).
B	– breadth of the spores in front view	l.c.	– loco citato
Bas.	– basidia	Pl.	– pleurocystidia
c.	– circa	Pp.	– pileipellis
Cau.	– caulocystidia	Q	– length divided by breadth (L : B)
Ch.	– cheilocystidia	Sp.	– spores
diam.	– diameter	St.v.	– veil of stipe
gh	– greenhouse	Ve.	– veil
L	– relating to the lamellae: number of lamellae reaching stipe	W	– width of the spores in side view
L	– relating to spores: length		

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The terminology in this paper follows the glossary in *Flora agaricina neerlandica*, vol. 1 (Vellinga, 1988).

A notation like [80, 4, 2] means: 80 spores from 4 specimens from 2 collections were measured. Spore measurements are generally based on samples of 20 spores.

The sizes of the spores as given in the key and the descriptions relate to $L \times B$ or $L \times B \times W$. The quotient of the spores (Q) relates to $L : B$.

In the species descriptions the spores are described as seen in frontal view.

The expression 'diverticulate veil' is used for a veil made up of diverticulate hyphae, while 'veil thick- or thin-walled' denotes a veil made up of thick- or thin-walled elements.

ACKNOWLEDGEMENTS

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TAXONOMIC PART

Coprinus section Coprinus subsection Lanatuli Sing.

General characteristics

Young basidiocarps cylindrical-ellipsoid, ellipsoid or ovoid, sometimes conical, during expanding becoming hemispherical, campanulate or conical, finally flat with upturned margin, covered with whitish or (silvery) grey, in some cases grey-brown, ochre-brown, ochre, yellowish or orange, hairy floccose, often dense veil. Stipe white, hollow, fragile, covered with hairy floccose veil, sometimes minute, more dense towards base. Microscopically veil made up of chains of elongate, sausage-shaped, thin-walled or rarely thick-walled and often incrustated elements with distinct, often clavate or tapering, terminal elements.

Macroscopical characters

Pileus 4–50 × 3–30 mm when still closed, 6–70 mm wide when expanded, whitish, grey or grey-brown below veil, seldom cream or ochre, and often dark at centre. Veil usually densely hairy scaly with upturned tips, less commonly hairy floccose or cobweb-like, whitish or silvery grey in most cases, sometimes cream, ochre, yellowish or orange; if whitish or grey then often darker at centre. Lamellae free but not removed from stipe, crowded. Stipe 15–150 × 0.5–10 mm, hollow, fragile, white and covered with small flocks of veil, rather dense above base; base somewhat bulbous, sometimes rooting. Smell none or indistinct.

Microscopical characters

Elements of veil in chains of narrow, elongate elements, about 6–10 µm wide, becoming broader towards the end of the chain, those elements usually up to 40(–60) µm wide. In some species elements of veil less than 25 µm wide, including terminal elements. Pileipellis a cutis, made up of cylindrical, fusiform or sausage-shaped elements up to 150 µm long and 3–35 µm wide. Pleurocystidia, cheilocystidia and clamp-connections present. Spores ellipsoid, oblong or ovoid and smooth in most of the species, rarely broadly fusiform, in one species amygdaliform and nodulose. Basidia 4-spored, 2-spored in two species. Number of pseudoparaphyses 3–6(–7).

Substrate and habitat

Growing on wood, wood-chips, heaps of (mixed) dung or compost, vegetable refuse, less frequent in lawns, on soil or old fire-places, one species on *Ammophila arenaria*, another on *Yucca*.

KEY TO THE SPECIES IN SUBSECTION LANATULI

1. Spores with rounded-conical nodules 3. *C. calosporus*
1. Spores smooth.
 2. Basidia 2-spored.
 3. On dung; veil with some ellipsoid or subglobose elements; average spore breadth < 7.8 μm 2. *C. bicornis*
 3. On compost or saw-dust; veil without ellipsoid or subglobose elements; average spore breadth > 7.8 μm 15. *C. scobicola*
 2. Basidia 4-spored.
 4. Growing on *Ammophila arenaria* in yellow dunes 1. *C. ammophilae*
 4. Habitat otherwise.
 5. Veil of centre of pileus thick-walled, wall up to 1 μm thick 16. *C. pachydermus*
 5. Veil of centre of pileus thin-walled, wall < 0.5 μm thick.
 6. Veil cream, ochre, yellow, orange or orange-red.
 7. Pileus with beautiful rust-coloured or orange-red veil, visible at least at base of stipe, soon slimy 12. *C. erythrocephalus*
 7. Veil cream, yellowish or ochre, not slimy.
 8. Veil distinct yellowish or ochre; spores ellipsoid to ovoid, $Q > 1.5$ on average; on clayey soil, mud or wood-chips; terminal elements of veil up to c. 20 μm wide, strongly pale yellowish incrustated
10. *C. ochraceolanatus*
 8. Veil cream or pale ochre; spores broadly fusiform, $Q < 1.5$ on average; on wood, often in wounds of trees; terminal elements of veil up to c. 40 μm wide, not yellowish incrustated 7. *C. spelaiophilus*
6. Veil white, silvery grey, grey or grey-brown.
 9. Average spore length < 9.2 μm .
 10. Medium species; average spore breadth > 5.8 μm ; average $Q < 1.3$
9. *C. jonesii*
 10. Small species; average spore breadth < 5.8 μm ; average $Q > 1.3$.
 11. On dung or mixed dung; average $Q > 1.6$; spores ellipsoid, tending cylindrical 6. *C. pseudoradiatus*
 11. On wood-chips, soil mixed with pieces of wood or vegetable refuse; average $Q < 1.6$; spores ellipsoid, tending rhomboid . 13. *C. geesterani*
 9. Average spore length > 9.2 μm .
 12. Average spore length < 10.8 μm .
 13. Veil whitish, greyish or grey-brown, hairy floccose; spores ovoid or ellipsoid; on dung, mixed dung or compost-heaps 4. *C. cinereus*
 13. Veil whitish, cream or pale ochre, in small flocks; spores very broadly fusiform; in wounds of – often living – trees or on stumps
7. *C. spelaiophilus*

12. Average spore length > 10.8 μm .
 14. Average spore breadth > 8.2 μm 11. *C. macrocephalus*
 14. Average spore breadth < 8.2 μm .
 15. Average spore breadth > 7.8 μm ; spores ellipsoid, tending cylindrical; on dung or mixed dung 5. *C. radiatus*
 15. Average spore breadth < 7.8 μm ; spores ellipsoid; on soil, often mixed with rotten pieces of wood, wood-chips, compost-heaps or vegetable refuse.
 16. Veil on pileus thin, cobweb-like, looking silky; average spore breadth < 6.7 μm 14. *C. krieglsteineri*
 16. Veil on pileus abundant, hairy fibrillose; average spore breadth > 6.7 μm 8. *C. lagopus*

1. *Coprinus ammophilae* Courtecuisse — Fig. 1

Coprinus ammophilae Courtecuisse, Doc. mycol. 18 (72) (1988) 76.

Selected icons. Courtecuisse, l.c. 77; Courtec. & Duhem, Guide Champ. Fr. Eur. (1994) 777.

Pileus 5–15 \times 3–13 mm when still closed, expanded up to 25 mm in diam., first ellipsoid or (broadly) ovoid, entirely covered with sordid white to pale greyish, hairy floccose veil, then campanulate to (plano-)convex, grey-brown or greyish beige (first Mu. 10 YR 4/3, then between 6/3 and 6/4 with darker centre: 5/4; clefts pale pure grey), strongly sulcate-striate; expanding pileus near margin with copious flocks of whitish, fibrillose veil, towards centre with numerous, strikingly reflexed, squamulose scales of veil, whitish, with pale ochre tips. Lamellae, L = 24–50, l = 0–1, free, up to 4.5 mm wide, crowded, first whitish, then dark reddish brown with conspicuous white edge, finally black. Stipe up to 35 \times 1.5–4 mm, usually short and solid, white, hollow, hairy floccose, slightly broadening towards not or slightly bulbous base.

Spores [100, 5, 3] 8.3–12.7 \times 6.2–9.3(–10.3) \times 6.0–7.8 μm ; Q = 1.20–1.75, av. Q = 1.30–1.55; av. L = 10–11.3, av. B = 7.2–8.1 μm , av. W = c. 7.1 μm , (broadly) ellipsoid or ovoid with rounded base and apex, dark red-brown, and central, c. 1.3 μm wide germ pore. Basidia 24–65 \times 7–12 μm , 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 55–115 \times 20–42 μm , oblong, ellipsoid, subglobose or (sub)cylindric. Cheilocystidia 20–100 \times 15–32(–40) μm , oblong, (sub)globose, ellipsoid, ovoid, broadly subcylindric or slightly utriform. Pileipellis made up of inflated, sausage-shaped elements, 20–100 \times 4–30 μm . Veil made up of long chains of inflates, cylindric, oblong to ellipsoid elements, 25–100 \times 5–40 μm . Clamp-connections present.

Habitat & distribution — In yellow dunes, subfasciculate on dead leaves of *Ammophila arenaria*. Very rare in the Netherlands and in France.

Collections examined. FRANCE: reg. Pas de Calais, Stella-Plage, 9 Nov. 1984, M. Bon, J. Vast et R. Courtecuisse, Courtecuisse 84.1109.01 (holotype, herb. Courtecuisse). — NETHERLANDS: prov. Friesland, Rottumeroog, 'Noorderstrand', 7 Oct. 1993, E. Arnolds 6473 (WBS); prov. Zuid-Holland, Goede-reede, 'Kwade Hoek', 18 Nov. 1989, M. Nauta (collection Bas 8730).

The small basidiocarps with remarkable short stipe, the rather broad spores with regard to their length and the habitat on *Ammophila arenaria* are characters to identify *Coprinus ammophilae*.

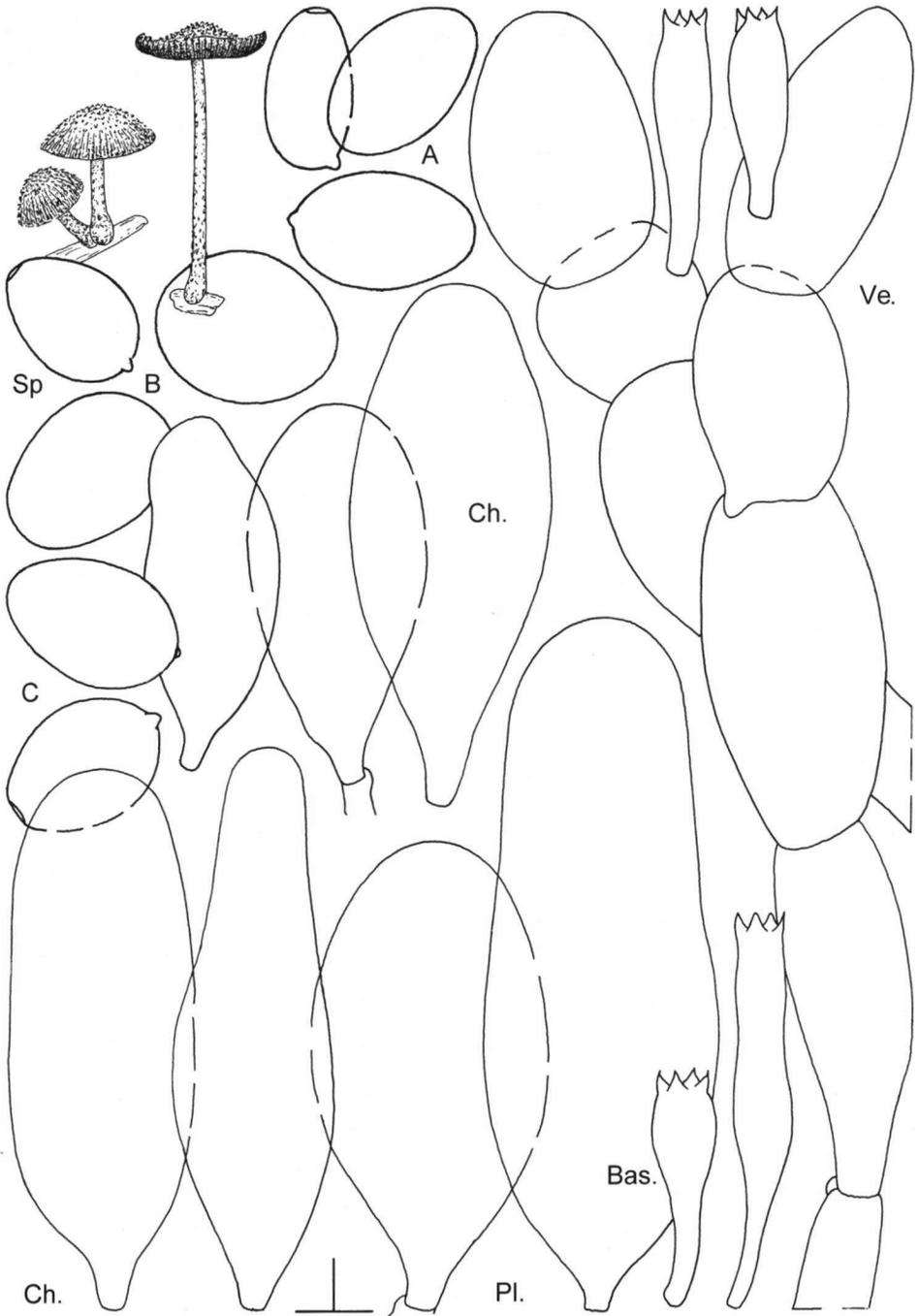


Fig. 1. *Coprinus ammophilae* Courtecuisse. A from C. Bas 8730; B from E. Arnolds 6473; C from R. Courtecuisse 84.1109.01 (holotype). Ch., Pl., Ve. & Bas. from C. Bas 8730.

The studied type-material was in bad condition. Cystidia could not be found in the material. The spores in collection *Arnolds 6473* are somewhat broader (av. $Q = 1.30-1.35$) than in the type collection (av. $Q = 1.35-1.40$). In collection *Bas 8730* the spores are oblong ($Q = 1.55$) in frontal view, the macroscopical characters either agree in most respects, as well as the habitat. The colours noted in the description are from this collection. Although the basidia, pleuro- and cheilocystidia are larger in collection *Bas 8730* and the spores narrower, we include this collection for this moment in the variability of *Coprinus ammophilae* on account of the small basidiocarps and the typical habitat on *Ammophila arenaria*.

Microscopical specifications of the collections examined:

Holotype: Spores [20, 1, 1] $9.7-12.2 \times 7.1-8.4 \mu\text{m}$; $Q = 1.30-1.50$, av. $Q = 1.40$; av. $L = 11.1$, av. $B = 8.0 \mu\text{m}$. Elements of veil $50-100 \times 20-30 \mu\text{m}$. Basidia, pleuro- and cheilocystidia collapsed.

Collection Arnolds: Spores [60, 3, 1] $8.3-12.7 \times 6.7-9.3(-10.3) \mu\text{m}$; $Q = 1.20-1.45$, av. $Q = 1.30-1.35$; av. $L = 10.0-10.6$, av. $B = 7.5-8.1 \mu\text{m}$. Basidia $26-36 \times 7-11 \mu\text{m}$. Pleurocystidia $56-72 \times 24-33 \mu\text{m}$. Cheilocystidia $20-50 \times 15-25 \mu\text{m}$. Elements of veil $8-28(-36) \mu\text{m}$ wide.

Collection Bas: Spores [20, 1, 1] $9.8-12.7 \times 6.2-8.0 \mu\text{m}$; $Q = 1.40-1.75$, av. $Q = 1.55$; av. $L = 11.3$, av. $B = 7.2 \mu\text{m}$. Basidia $24-65 \times 9-12 \mu\text{m}$. Pleurocystidia $65-115 \times 20-42 \mu\text{m}$. Cheilocystidia $30-100 \times 20-32(-40) \mu\text{m}$. Elements of veil $30-100 \times 10-40 \mu\text{m}$.

2. *Coprinus bicornis* Uljé & Horvers, *spec. nov.* — Fig. 2, Plate 11, 12

Pileus primo $8 \times 5 \text{ mm}$, ellipsoideus, cylindraco-ellipsoideus vel conicus, albus, expansus ad 15 mm latus, campanulatus demum applanatus, griseus vel griseo-brunneus margine revoluto. Velum primitus glabrum, demum fibrilloso-floccosum. Lamellae liberae, tenues, confertae, albae demum griseobrunneae vel atrae. Stipes $30-50 \times 1-1.5 \text{ mm}$, albus, velutino-fibrillosus, glabrescens. Sporae $9.1-12.6 \times 5.9-8.4 \mu\text{m}$; oblongae vel ovoideae poro germinativo obscuro, obscure rufobrunneae. Basidia $14-36 \times 7-10 \mu\text{m}$, bisporigera. Pseudoparaphyses 3-6. Pleurocystidia $40-80 \times 20-40 \mu\text{m}$, oblonga, ellipsoidea, ovoidea vel subutriformia. Cheilocystidia $30-80 \times 20-35 \mu\text{m}$, (sub)globosa vel ellipsoidea, interdum subutriformia. Pileipellis e elementis inflatis, c. $20-100 \times 4-20 \mu\text{m}$ constituitis. Velum e elementis cylindracois vel fusiformibus, incrustantibus constitutum $25-100 \times 5-40 \mu\text{m}$, elementis interdum inflatis ad $60(-70) \mu\text{m}$ latis. Fibulae presentes. Ad fimum equinum vel bovinum.

Holotypus: *C.B. Uljé 1216*, 4-X-1991, Wassenaar, the Netherlands (L).

Pileus up to $8 \times 5 \text{ mm}$ when still closed, up to 15 mm when expanded, ellipsoid, cylindrical-ellipsoid, often somewhat conical, white in very young stage, soon becoming somewhat grey or grey-brown at centre of pileus, expanding to campanulate or conical, then to convex or applanate, finally plano-concave with revolute margin, very thin. Veil in primordia smooth, mat, pure white, later greyish to grey-brown, covering entire pileus, soon radially splitting into hairy to fibrillose, often pointed and appressed or — especially at centre — recurved flocks. Lamellae, $L = c. 16$, $l = 0-3$, free, narrow, rather crowded, first white, soon grey-brown to blackish. Stipe $30-50 \times 1-1.5 \text{ mm}$, whitish, somewhat tapering towards apex, up to 2 mm wide at clavate to slightly bulbous base, hollow, hairy flocculose but particularly densely at lowest part, becoming glabrous with age.

Spores [80, 3, 2] $9.1-12.6 \times 5.9-8.4 \mu\text{m}$; $Q = 1.40-1.85$, av. $Q = 1.50-1.75$; av. $L = 10.8-11.7$, av. $B = 6.4-7.4 \mu\text{m}$, oblong or ovoid, more or less cylindrical with rounded base and apex, dark red-brown, and central, $1-1.3 \mu\text{m}$ wide germ pore (difficult to observe). Basidia $14-36 \times 7-10 \mu\text{m}$, 2-spored, surrounded by 3-6 pseudoparaphyses. Pleurocystidia

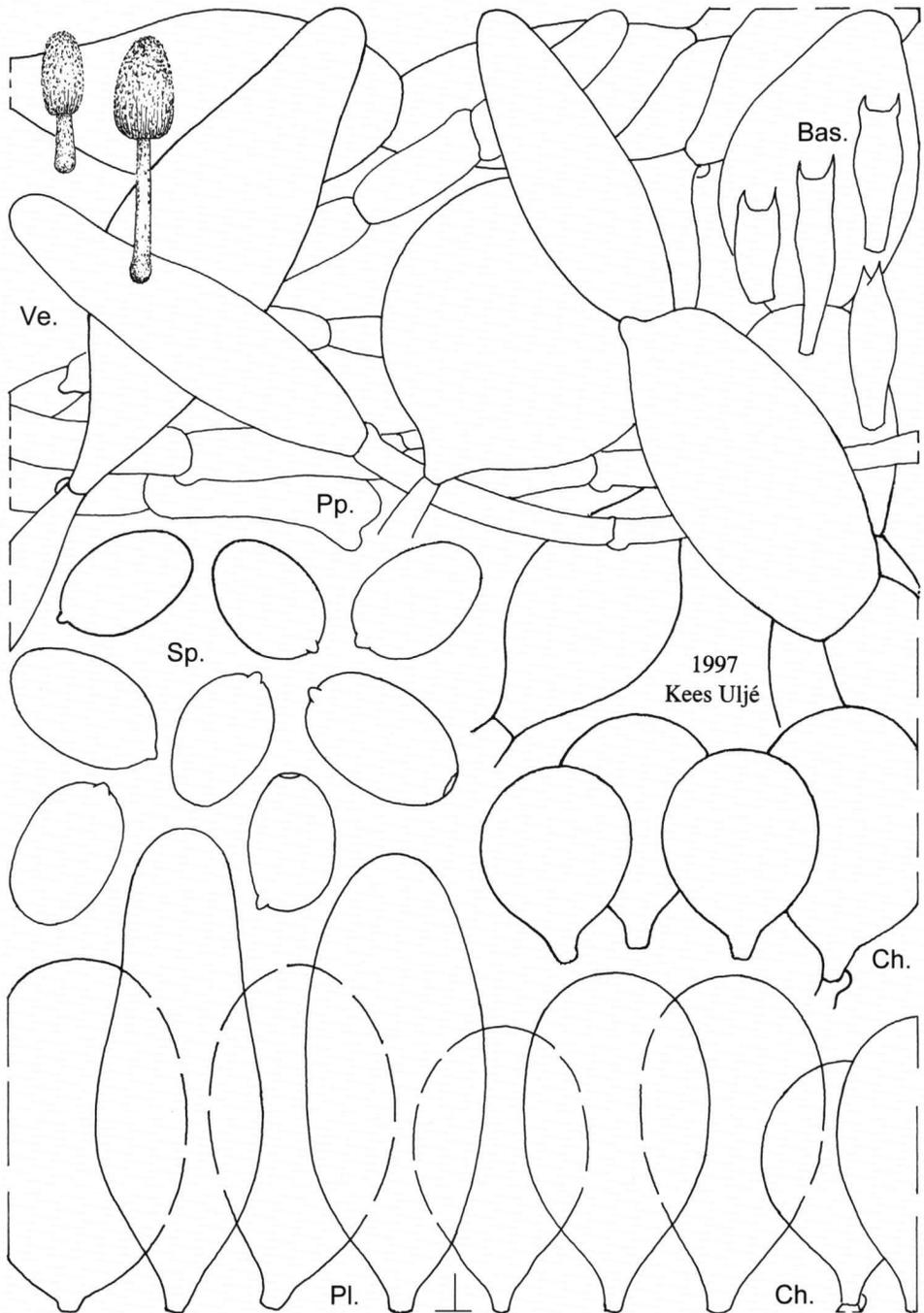


Fig. 2. *Coprinus bicornis* Horvers & Uijé. All figures from C.B. Uijé 1216 (holotype).

40–80 × 20–40 µm, oblong, ellipsoid, ovoid or subutriform. Cheilocystidia 30–80 × 20–35 µm, (sub)globose or ellipsoid, a few subutriform. Pileipellis consisting of short, inflated elements, c. 20–100 × 4–20 µm. Veil made up of cylindrical or fusiform elements, usually inflated, incrustated and constricted at septa, 25–100 × 5–40 µm, the elements in part strongly swollen, fusiform, ellipsoid or even subglobose and up to 60(–70) µm thick. Clamp-connections present.

Habitat & distribution — Solitary or (sub)fasciculate on dung of cow and horse. Very rare, only found twice in the Netherlands.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Wassenaar, 30 Oct. 1991, *C. B. Uljé 1216* (holotype, L); prov. Noord-Brabant, Tilburg, 'de Sijsten', 4 Dec. 1996 (culture from dung earlier collected), *B. Horvers* (collection *C. B. Uljé 1232*).

Coprinus bicornis can be recognized by the 2-spored basidia, the in part ellipsoid or subglobose elements in the veil and the habitat on dung.

3. *Coprinus calosporus* Bas & Uljé — Fig. 3

Coprinus calosporus Bas & Uljé, *Persoonia* 15 (1993) 359.

Pileus up to 29 × 12 mm when still closed, up to c. 30 mm when expanded, first ellipsoid, cylindric-ellipsoid, often somewhat conical, white in very young stage, soon becoming greyish or grey-brown, the darkest at centre of pileus, expanding to conical, then to convex or appanate, finally plano-concave with revolute margin. Surface of pileus beneath veil first dark brown (Mu. 10 YR 4/3), later somewhat paler (10 YR 5/4). Veil in primordia smooth, mat, pure white, later grey to grey-brown (10 YR 7/3), covering entire pileus, soon radially splitting into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved flocks. Lamellae, L = 32–46, l = 1–3(–5), free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–100 × 2–4 mm, whitish, somewhat tapering towards apex, up to 5 mm wide at clavate to slightly bulbous base, hollow, hairy flocculose but particularly dense at lower part, becoming glabrous with age; base clavate with short and narrow pseudorhiza.

Spores [60, 3, 3] 7.3–9.8 × 4.6–5.8 × 4.1–4.8 µm (without ornamentation); Q = 1.35–1.75, av. Q = 1.60; av. L = 8.0–8.4, av. B = 5.0–5.4, av. W = c. 4.4 µm, amygdaliform, towards base often slightly conical, with apical papilla and truncate at apex, covered with many short, but broad and rounded nodules, red-brown, and central, c. 1.3 µm wide germ pore. Basidia 13–24 × 6–8 µm, 4-spored, surrounded by (3–)4–5(–6) pseudoparaphyses. Pleurocystidia 30–150(–145) × 20–40 µm, ellipsoid to oblong or slightly broadly lageniform. Cheilocystidia 30–70(–90) × 20–35 µm, ellipsoid to oblong, sometimes slightly broadly utriform. Pileipellis a cutis, made up of cylindrical or fusiform, more or less parallel, repent hyphae, up to 150 µm long and 4–25 µm wide. Veil made up of inflate, sausage-like elements, 30–150(–250) × (3–)5–25(–40) µm, often somewhat inflated, usually constricted at septa. Clamp-connections present.

Habitat & distribution — Growing fasciculate on stem of *Yucca* (indoors). Only known from the type-locality.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Leiden, Rijksherbarium, 18 April 1991, *C. Bas 8795* (holotype), *C. B. Uljé 1131* (isotype); 30 April 1991, *C. Bas 8795b*.

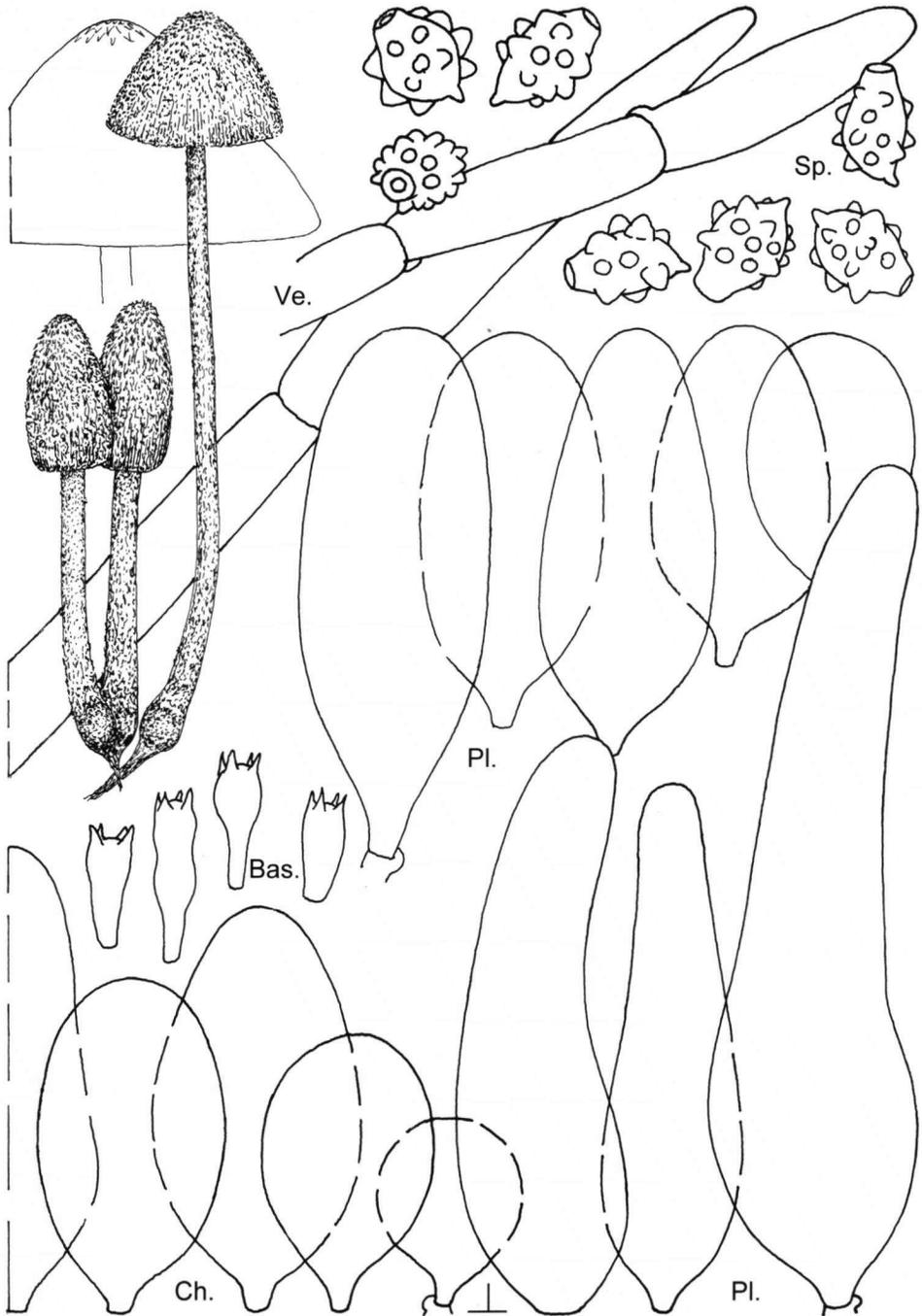


Fig. 3. *Coprinus calosporus* Bas & Uljé. All figures from Bas 8795 (holotype).

The amygdaloid spores with rounded nodules make it very easy to recognize *C. calosporus*. No other *Coprinus* has such spores. The fact that the species is found indoors, in a flowerpot, makes it probable that it is a species from warmer regions than the Netherlands.

4. *Coprinus cinereus* (Schaeff.: Fr.) Gray — Fig. 4

Agaricus cinereus Schaeff., Fung. Bavariae (1774) 100; *Agaricus cinereus* Schaeff.: Fr., Syst. mycol. I (1821) 310; *Coprinus cinereus* S.F. Gray, Nat. Arr. Br. Pl. I (1821) 634.

Selected icons. Allen & Young, Mycologist 7 (1993) 74; Courtec. & Duhem, Guide Champ. Fr. Eur. (1994) 779; Imazeki et al., Fungi Japan (1988) 203; Jamoni, Funghi e Ambiente 47 (1988) 38; M. Lange, Paddestoelengids (1964) 137 (as *C. fimetarius*); Rocabruna, Bolets Catalunya 2 (1983) 64.

Pileus up to 20 × 15 mm when still closed, up to c. 30 mm when expanded, first ellipsoid, cylindric-ellipsoid, grey-brown (Mu. 10 YR 6/3) at centre beneath the whitish to silvery grey veil, paler towards margin (10 YR 7/3 halfway pileus), expanding to conical, then to convex or appanate, finally plano-concave with revolute margin. Veil in primordia smooth, mat, pure white, later grey to grey-brown (10 YR 7/3), covering entire pileus, soon radially splitting up into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved flocks, the tips becoming brown on drying. Lamellae, L = c. 45–60, l = 3–7, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–100 × 2–6 mm, whitish, somewhat tapering towards apex, up to 9 mm wide at clavate to bulbous base, hollow, hairy flocculose, more dense at lower part, becoming glabrous with age; base clavate and often somewhat rooting.

Spores [100, 5, 4] 8.4–11.8 × 5.8–7.8 μm; Q = 1.25–1.65, av. Q = 1.35–1.55; av. L = 9.0–10.6, av. B = 6.1–7.0 μm, ellipsoid or ovoid, seldom somewhat cylindric, with rounded base and apex, dark red-brown, and central, c. 1.3–1.5 μm wide germ pore. Basidia 15–36 × 7–11 μm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 50–140 × 20–55 μm, subglobose, ellipsoid to oblong, utriform or subcylindric. Cheilocystidia 35–85 × 15–50 μm, (sub)globose, ellipsoid to oblong. Pileipellis a cutis, made up of cylindrical or inflate, more or less parallel, repent hyphae, 20–150 × 3–30 μm. Veil made up of elongate, sausage-like elements, (20–)40–250(–450) × 8–40(–50) μm, often inflated, usually constricted at septa; terminal elements cylindric to almost globose. Clamp-connections present.

Habitat & distribution — Common. Growing solitary or fasciculate on heaps of mixed dung, rotten straw or vegetable refuse. Widespread all over the world.

Collections examined. NETHERLANDS: prov. Drenthe, Beilen, 31 Aug. 1993, *E. Arnolds 6361* (WBS); prov. Zuid-Holland, Alphen a/d Rijn, 7 June 1990, *C.B. Uljé 1069*; Alphen a/d Rijn, Sportlaan, 17 July 1996, *C.B. Uljé*; Hazerswoude, Spookverlaat, 8 June 1990, *C.B. Uljé*.

The size and shape of the spores are the most significant characters to identify *Coprinus cinereus*. The spores are relatively broad with regard to the length. Rather close species are *C. lagopus* having spores more oblong, usually up to 13 μm in length with a quotient > 1.6 and usually growing terrestrial and *C. macrocephalus* with larger spores, up to 16 μm in length and up to 9.5 μm broad.

5. *Coprinus radiatus* (Bolt.: Fr.) Gray — Fig. 5

Agaricus radiatus Bolt., Hist. Fung. Halifax (1788) 39; *Agaricus radiatus* Bolt.: Fr., Syst. mycol. I (1821) 313; *Coprinus radiatus* S.F. Gray, Nat. Arr. Br. Pl. I (1821) 635.

Selected icons. Cetto, Funghi Vero 3, 1st ed., pl. 876 (1979) 49; M. Lange, Paddestoelengids (1964) 139.

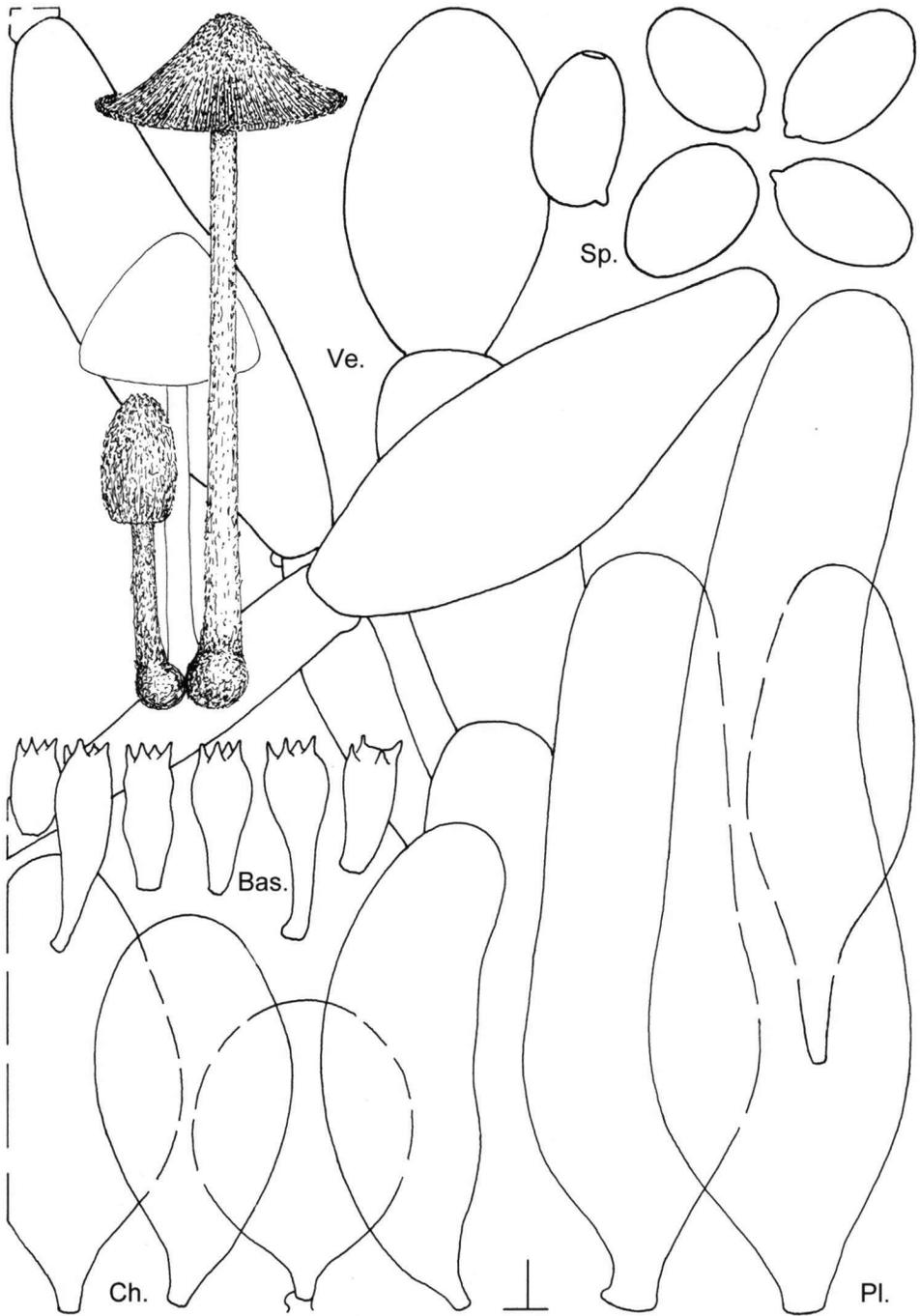


Fig. 4. *Coprinus cinereus* (Schaeff.: Fr.) Gray. All figures from C. B. Uljé 1060.

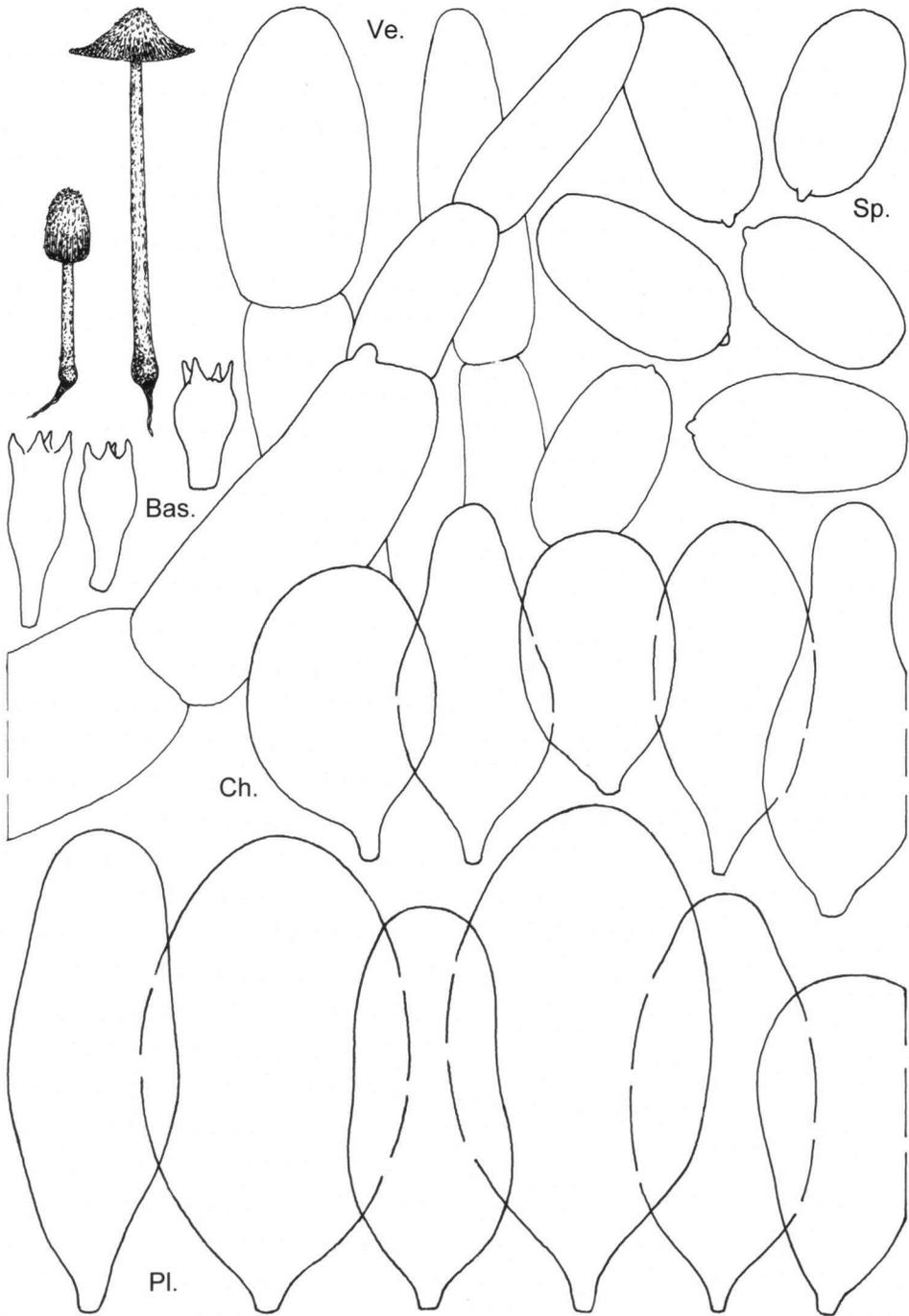


Fig. 5. *Coprinus radiatus* (Bolt.: Fr.) Gray. All figures from collection C.B. Uijé, Breukelen, Gunterstein, 26 July 1997.

Pileus up to 10 × 6 mm when still closed, up to c. 15 mm when expanded, first ellipsoid, cylindrical-ellipsoid, grey-brown at centre beneath the whitish to silvery grey veil, paler towards margin, expanding to conical, then to convex or applanate, finally plano-concave with revolute margin. Veil whitish to pale (silvery) grey, radially splitting up into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved flocks, the tips becoming brown on drying. Lamellae, L = c. 35, l = 1–5, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 20–50 × 0.5–1.5 mm, whitish, somewhat tapering towards apex, up to 2 mm wide at clavate base, hollow, minutely hairy flocculose, more dense at lower part, becoming glabrous with age; base clavate and often somewhat rooting.

Spores [40, 2, 2] 13.3–15.2 × 7.6–8.5 µm; Q = 1.65–1.90, av. Q = 1.75–1.80; av. L = 14.2–14.6, av. B = 7.8–8.0 µm, cylindrical-ellipsoid, with rounded base and apex, very dark red-brown to almost black, and central, c. 1.5–1.8 µm wide germ pore. Basidia 20–36 × 9–11.5 µm, 4-spored, surrounded by 4–6 pseudoparaphyses. Pleurocystidia 50–100 × 20–45 µm, ellipsoid to oblong, utriform or subcylindrical. Cheilocystidia 35–80 × 15–40 µm, (sub)globose, ellipsoid to oblong or (sub)utriform. Pileipellis a cutis, made up of cylindrical or fusiform, more or less parallel, repent hyphae, up to 150 long and 3–30 µm wide. Veil made up of elongate, sausage-like elements, 30–250 × 8–25(–30) µm, often inflated, usually constricted at septa; terminal elements cylindrical to almost globose. Clamp-connections present.

Habitat & distribution — Growing solitary in groups or subfasciculate on heaps of mixed dung or on pure dung. Rather rare but widespread in Europe.

Collections examined. NETHERLANDS: prov. Utrecht, Breukelen, estate 'Gunterstein', 26 July 1997, C. B. Uljé; prov. Noord-Holland, Huizen, 29 Nov. 1986, C. B. Uljé.

Coprinus radiatus can be recognized by the rather narrowly, cylindrical-ellipsoid spores with a length of 13–15 µm and the habitat on dung.

6. *Coprinus pseudoradiatus* Kühn. & Joss. ex Watl. — Fig. 6

Coprinus pseudoradiatus Kühn. & Joss., Bull. Soc. mycol. Fr. 60 (1944) 26 (invalid, no Latin description); *Coprinus pseudoradiatus* Watl., Notes R. bot. Gdn Edinb. 35 (1976) 154.

Pileus up to 6 × 4 mm when still closed, up to c. 10 mm when expanded, first ellipsoid, cylindrical-ellipsoid, grey-brown at centre beneath the whitish to silvery grey veil, paler towards margin, expanding to conical, then to convex or applanate, finally plano-concave with revolute margin. Veil whitish to pale (silvery) grey, radially splitting up into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved flocks, the tips becoming brown on drying. Lamellae, L = c. 30, l = 1–3(–5), free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 20–50 × 0.5–1 mm, whitish, somewhat tapering towards apex, up to 1.5 mm wide at clavate base, hollow, minutely hairy flocculose, particularly densely at lower part, becoming glabrous with age; base clavate.

Spores [40, 2, 2] 7.7–9.7 × 4.9–5.5 µm; Q = 1.55–1.80, av. Q = 1.70; av. L = 8.6–8.8, av. B = 5.0–5.2 µm, cylindrical-ellipsoid, with rounded base and apex, red-brown, and central, c. 1.3–1.5 µm wide germ pore. Basidia 18–32 × 8–10 µm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 30–80 × 20–30 µm, ellipsoid to oblong, utriform or subcylindrical. Cheilocystidia 25–60 × 15–28 µm, (sub)globose, ellipsoid to oblong or (sub)utriform. Pileipellis a cutis, made up of cylindrical, sausage-like or fusiform, more or less

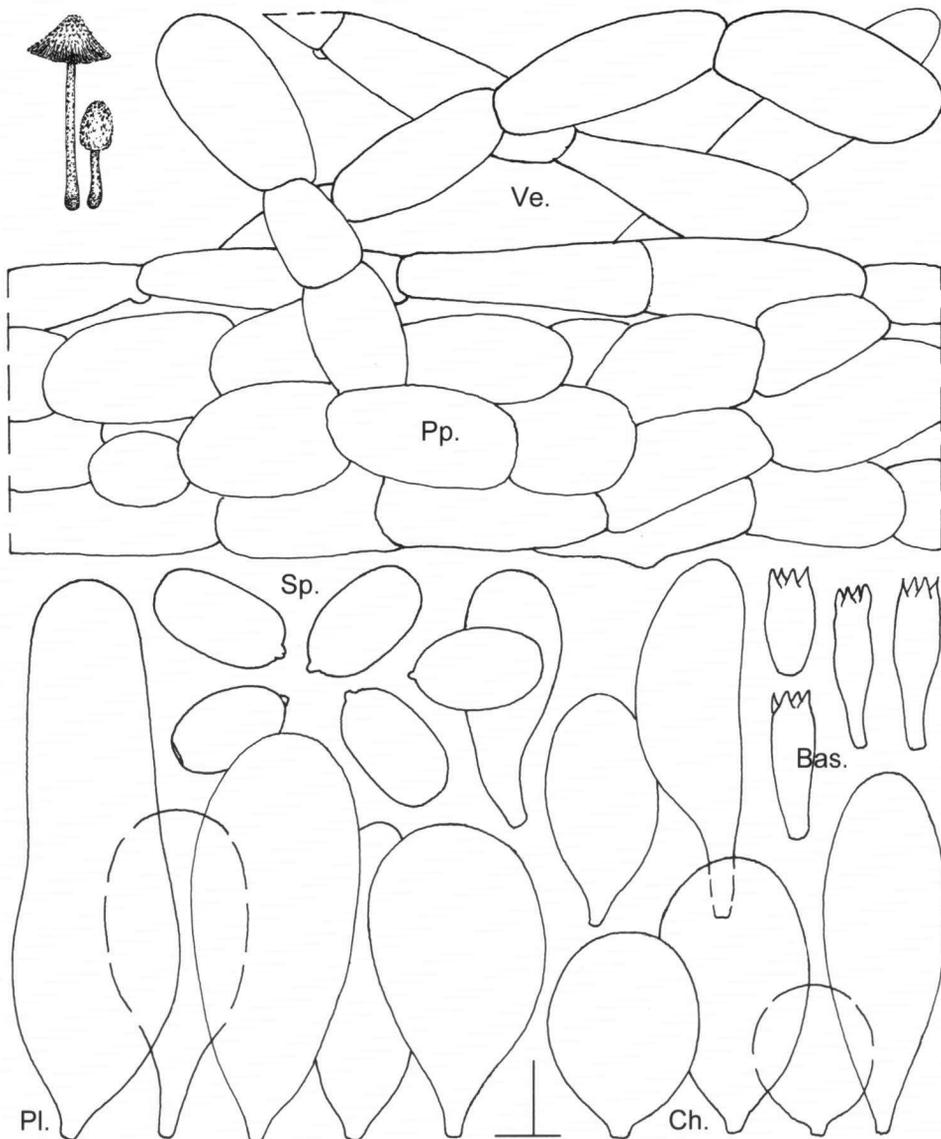


Fig. 6. *Coprinus pseudoradiatus* Kühn. & Joss. ex. Watl. All figures from C. B. Uljé 629.

parallel, repent hyphae and $15-70(-100) \times 3-25 \mu\text{m}$. Veil made up of elongate, sausage-like elements, $30-180 \times 8-25(-30) \mu\text{m}$, often inflated, usually constricted at septa; terminal elements cylindrical to almost globose. Clamp-connections present.

Habitat & distribution — Growing solitary in small groups or fasciculate on pure dung or mixed dung, rarely (seemingly) on soil. Rather rare but widespread in Europe.

Collections examined. NETHERLANDS: prov. Noord-Holland, Vogelenzang, 7 June 1986, C. B. Uljé 629; prov. Zuid-Holland, Leiden, 17 March 1971, Kits van Waveren (from cult.).

The small basidiocarps, cylindrical-ellipsoid spores less than 10 µm long and the habitat on dung are characters to identify *Coprinus pseudoradiatus*. The other 4-spored and dung-inhabiting species *C. radiatus*, *C. macrocephalus* and *C. cinereus* have larger spores and larger fruit-bodies.

7. *Coprinus spelaiophilus* Bas & Uljé, *spec. nov.* — Fig. 7

Misapplied. *Coprius extinctorius* (Bull.) Fr. sensu Romagn., *Rev. Mycol.* 6 (1941) 112; Kühn. & Romagn., *Fl. anal. Champ. sup.* (1953) 387; Mos., *Röhrlinge Blätterpilze.* 5. Aufl. (1983) 256; Orton & Watl., *Br. Fung. Fl.* 2 (1979) 39; non *Agaricus extinctorius* Bull., *Herb. France*, pl. 437. (1790) non *Coprinus extinctorius* sensu Rick.

Selected icons. Cetto, *Funghi Vero* 6, 1st ed., pl. 2175. (1989) 53 (as *C. extinctorius*); Moreno et al., *Guia Incafo Hongos Penins. Iberica I + II* (1986) no. 304 (as *C. extinctorius*).

Pileus ad 35 mm latus, initio albus vel isabellinus, postea griseus vel griseo-brunneus, velo fibrilloso vel parce squamuliformi, albo vel argenteo postea brunneo decoratus. Lamellae liberae, subconfertae, initio albae, mox griseo-brunneae vel subnigrae. Stipes 50–100 × 2–5 mm, basi clavatus vel subbulbosus ad 8 mm latus, albidus, cavus, fibrilloso-flocculosus, postea glabrescens, caro subtenacea.

Sporae 7.8–11.7 × 6.4–8.2 × 5.3–7.2 µm, late fusiformes vel rhombico-ellipsoideae, interdum subamygdaliformes, apice leviter truncatae, poro germinativo centrali, 1.5–1.8 µm lato instructae, obscure rubro-brunneae. Basidia tetraspora. Pleurocystidia 70–150 × 25–60 µm, subglobosa vel utriformia vel subcylindrica. Cheilocystidia 50–140 × 25–50 µm, utriformia vel subcylindrica. Pileipellis ex hyphis repentibus, 3–25 µm latis constans. Velum cellulis allantoideis, 25–150 × 10–40 µm, catenulatis constructum. Fibulae praesentes.

Holotypus: *C. Bas 4966*, 14-X-1967, Vogelenzang, A.W. Dunes, the Netherlands (L).

Pileus up to 25 × 20 mm and ellipsoid to cylindrical-ellipsoid when still closed, up to c. 35 mm wide when expanded, white to isabelline or pale ochraceous, becoming grey-brown with isabelline to ochre centre, radially sulcate up to centre; finally plano-concave with revolute margin, with veil in primordia smooth, mat, pure white to greyish, covering pileus entirely, but soon breaking up into scattered small, flocculose, fibrillose squamules with tips sometimes recurving and brownish. Lamellae, L = c. 45–60, l = 3–7, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–100 × 2–5 mm, whitish, somewhat tapering towards apex, up to 8 mm wide at clavate to bulbous base, hollow, hairy flocculose, and more densely so towards lower part, becoming glabrous with age. Context rather firm and somewhat tough.

Spores [100, 5, 5] 7.8–11.7 × 6.4–8.2 × 5.3–7.2 µm; Q = 1.20–1.50, av. Q = 1.35–1.40; av. L = 9.2–10.4, av. B = 6.5–7.6, av. W = 5.7–6.9 µm, very broadly fusiform or rhomboid-ellipsoid, sometimes somewhat amygdaliform, with (sub)conical or rounded base and slightly truncate apex, and central, c. 1.5–1.8 µm wide germ pore, dark red-brown. Basidia 18–38 × 8–10 µm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 70–150 × 25–60 µm, subglobose, ellipsoid to oblong, utriform or subcylindric. Cheilocystidia 50–140 × 25–50 µm, utriform, oblong or subcylindric. Pileipellis a cutis, made up of more or less parallel, repent hyphae, consisting of cylindrical to fusiform elements, 40–100 × 3–25 µm. Veil made up of elongate, sausage-like elements, 25–150 × 10–40 µm, often inflated, constricted at septa; terminal elements ellipsoid, oblong or fusiform. Clamp-connections present.

Habitat & distribution — Growing solitary or subfasciculate on wood, often in wounds of living, deciduous trees. Very rare, in the Netherlands only known from a few localities in the western and central parts of the country. In Europe under the name *C. extinctorius* furthermore recorded from England, France, Germany, Spain, Italy, and Turkey.

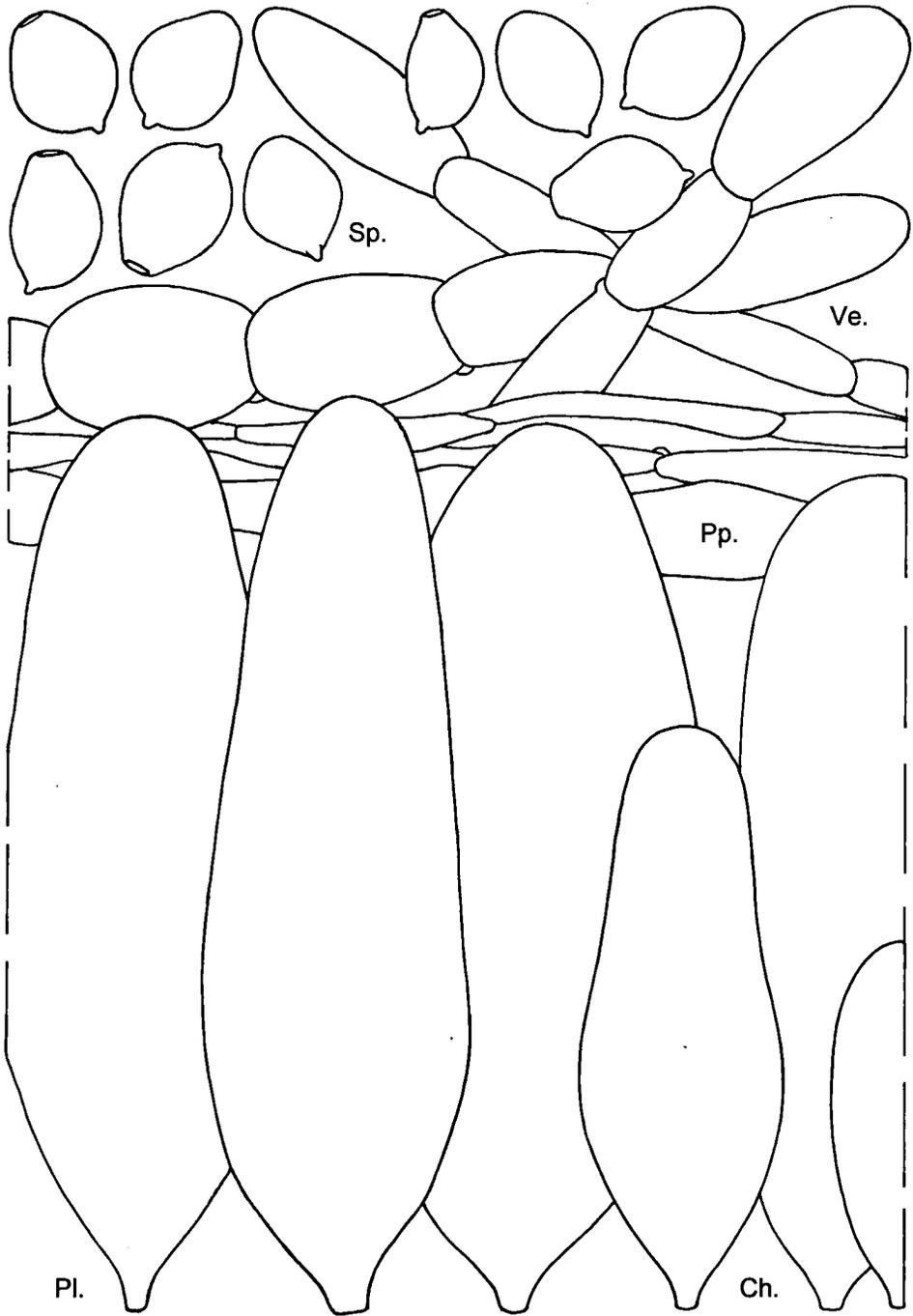


Fig. 7. *Coprinus spelaiophilus* Bas & Ujljé. All figures from C. Bas 4966 (holotype).

Collections examined. NETHERLANDS: prov. Gelderland, Wageningen-Hoog, 23 June 1957, *Ms. Veth.*; prov. Noord-Holland, Amsterdam, Hortus Botanicus, Jan. 1923, *K.B. Boedijn*; Vogelenzang, 31 Oct. 1953, *A.F.M. Reijnders*; idem, 14 Oct. 1967, *C. Bas 4966* (holotype, L); idem, 22 Sept. 1960, *C. Bas 2112*.

Macroscopically *Coprinus spelaiophilus* is a *C. domesticus*-like fungus, but it belongs to subsection *Lanatulii* on account of the structure of the veil, which consists of chains of inflated, thin-walled hyphoid elements. It can be recognized by the *C. domesticus*-like appearance, the initially white to isabelline colours of the pileus, the fairly firm context, the 'Lanatulii'-like structure of the veil, the very broad, fusiform, 8–11 μm long spores and the habitat, viz. often growing in cavities of the trunk of living, deciduous trees (*Populus*, *Ulmus*, *Aesculus*, and *Fagus*).

It is difficult to understand that the name *Coprinus extinctorius* (Bull.) Fr. has been attached to the present species as Bulliard (l.c.: pl. 437, 1792/93: 408) described *Agaricus extinctorius* as very fugacious and growing on dung ('sur les fumiers'). Therefore *C. extinctorius* sensu auct. europ. p.p. maj. is described here as a new species.

8. *Coprinus lagopus* Fr.: Fr. — Fig. 8

Agaricus lagopus Fr., Syst. mycol. 1 (1821) 312; *Coprinus lagopus* Fr., Epicrisis (1838) 250.

Selected icons. Cetto, *Funghi Vero* 5, 1st ed., pl. 1722 (1987) 55; Courtec. & Duhem, *Guide Champ.* Fr. Eur. (1994) 776; Imazeki et al., *Fungi Japan* (1988) 203; M. Lange, *Paddestoelengids* (1964) 139; Orton & Watling, *Br. Fung. Fl.* (1979) 40; R. Phillips, *Paddest.* Schimm. (1981) 179.

Pileus up to 35 \times 20 mm when still closed, up to c. 50 mm when expanded, first ellipsoid, cylindrical-ellipsoid, pale to very dark grey-brown at centre beneath the whitish to silvery grey veil, paler towards margin, expanding to conical, then to convex or applanate, finally plano-concave with revolute margin. Veil first whitish, then silvery grey or pale grey to grey-brown, covering entire pileus, splitting up into hairy fibrillose, often pointed and appressed or – especially at centre – recurved flocks, the tips becoming brown on drying. Lamellae, L = c. 60, l = 3–7, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–100 \times 2–5 mm, whitish, somewhat tapering towards apex, up to 8 mm wide at clavate to bulbous base, hollow, hairy flocculose, more dense at lower part, becoming glabrous with age.

Spores [360, 18, 16] 9.8–14.2 \times 6.2–8.3 μm ; Q = 1.40–1.95, av. Q = 1.55–1.80; av. L = 11.3–12.9, av. B = 6.8–7.8 μm , ellipsoid or ovoid, with rounded base and apex, dark red-brown, and central, c. 1.6–2.0 μm wide germ pore. Basidia 16–42 \times 8–12 μm , 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 70–150 \times 20–60 μm , ellipsoid to oblong, utriform or subcylindrical. Cheilocystidia 50–100 \times 18–40 μm , ellipsoid to oblong or subutriform. Pileipellis a cutis, made up of cylindrical, sausage-like or fusiform elements, up to 150 μm long and 4–35 μm wide. Veil made up of elongate, sausage-like elements, 40–140(–180) \times 10–40 μm , often inflated, usually constricted at septa; terminal elements ellipsoid, ovoid or fusiform. Clamp-connections present.

Habitat & distribution — Common. Growing solitary or fasciculate on wood-chips, compost-heaps or vegetable refuse; one record (*J. Daams 184*) on large burned place. Widespread all over the world.

Collections examined. NETHERLANDS: prov. Overijssel, Oldenzaal, 29 Sept. 1980, *E. Kits van Waveren*; Delden, 27 July 1968, *E. Kits van Waveren*; prov. Utrecht, Amerongen, 16 Oct. 1960, *C. Bas 2271*; 's-Graveland, 22 Sept. 1968, *J. Daams 184*; Baarn, 24 April 1968, *G.A. de Vries*; Breukelen, 23 Aug. 1986, *C.B. Uljé*; Maarseveen, 8 May 1986, *C.B. Uljé*; Zeist, Wulperhorst, 13 Sept. 1953, *A.F.M. Reijnders*;

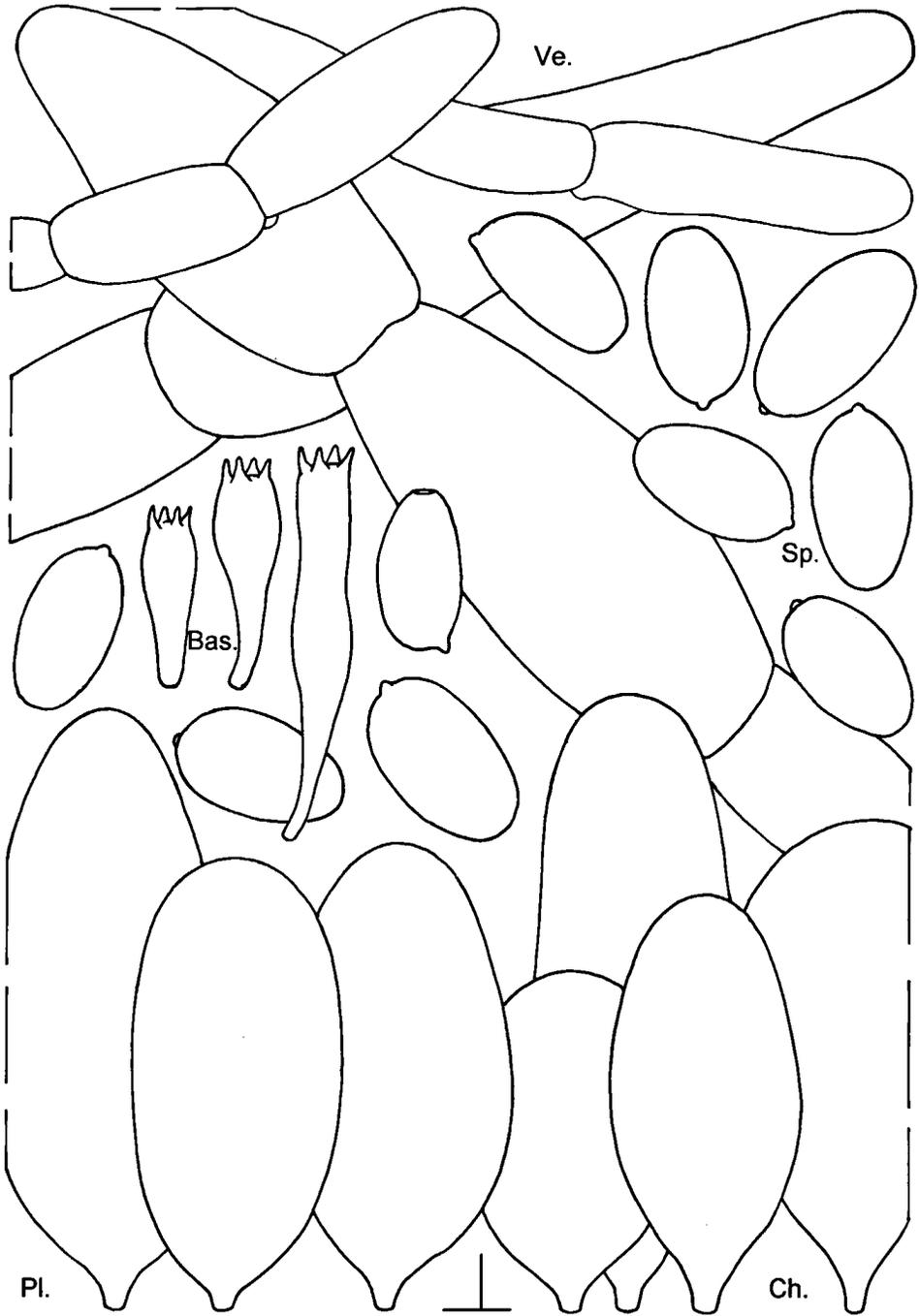


Fig. 8. *Coprinus lagopus* (Fr.: Fr.) Fr. All figures from C. B. Uljé, Alphen a/d Rijn, 16 May 1997.

prov. Noord-Holland, Amsterdam, Amsterdamse Bos, 30 April 1960, *E. Kits van Waveren*; idem, 19 May 1962, *E. Kits van Waveren*; idem, 12 Aug. 1967, *E. Kits van Waveren*; Elswout, 20 Oct. 1979, *E. Kits van Waveren*; prov. Zuid-Holland, Alphen a/d Rijn, 7 June 1988, *C.B. Uljé*; idem, 31 Aug. 1995, *C.B. Uljé*, 15 June 1996, *C.B. Uljé*; idem, 16 May 1997, *C.B. Uljé*; Leiden, 30 Aug. 1986, *C.B. Uljé*; Oostvoorne, 19 Oct. 1972, *H.S.C. Huijsman* 259.

Coprinus lagopus can be recognized by the terrestrial habitat, preferably to wood-chips or vegetable refuse, the dense, hairy fibrillose, whitish to silvery grey veil, the average spore length > 11 µm and average spore breadth > 6.7 µm, and the thin-walled veil with terminal elements up to c. 40 µm wide.

Close to *Coprinus lagopus* and exclusively growing in lawns, an aberrant form has been collected, characterized by very fragile basidiocarps that develop during the evening and night and quickly disappear the next morning, leaving only laying, silvery white stipes with collapsed caps and having somewhat larger (12–15 µm long) and very dark spores (collection *Uljé* 1264 and 1268). Also a form is known from greenhouses with larger spores (14–16 µm long), but different from *C. macrocephalus* that has spores of the same length but distinctly broader. For the time being we refrain from describing these taxa awaiting more material.

9. *Coprinus jonesii* Peck — Fig. 9

Coprinus jonesii Peck, Bull. Torrey bot. Club 22 (1895) 206.

Coprinus funariarum Métrod, Bull. Soc. mycol. Fr. 53 (1937) 348.

Coprinus lagopus var. *sphaerosporus* Kühn. & Joss., Bull. Soc. mycol. Fr. 60 (1944) 31.

Misapplied. Coprinus lagopides sensu P. Karst., Symb. Mycol. fenn. IX. Meddn Soc. Fl. Fauna fenn. 9 (1882) 48; sensu auct. eur. major. non *C. lagopides* P. Karst. 1879.

Selected icons. Brand & Pegler, Mycologist 5 (1991) 87; Courtec. & Duhem, Guide Champ. Fr. Eur. (1994) 778; Jahn, Westf. Pilzbr. 7 (1969) 84; R. Phillips, Paddest. Schimm. (1981) 179; Ryman & Holmåsén, Pilze (1992) 425 (all as *C. lagopides*).

Pileus up to 50 × 30 mm when still closed, up to c. 70 mm when expanded, first ellipsoid, cylindric-ellipsoid, pale to dark grey-brown at centre beneath the whitish to silvery grey veil, paler towards margin, expanding to conical, then to convex or applanate, finally plano-concave with revolute margin. Veil first white, later grey to grey-brown (Mu. 10 YR 4–5/3) and radially splitting up into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved floccs, the tips becoming brown on drying. Lamellae, L = c. 55–80, l = 3–7, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–130 × 3–10 mm, whitish, somewhat tapering towards apex, up to 13 mm wide at clavate to bulbous base, hollow, hairy flocculose but particularly densely at lower part, becoming glabrous with age.

Spores [120, 6, 5] 6.7–9.7 × 5.8–8.2 µm; Q = 1.05–1.35, av. Q = 1.15–1.30; av. L = 7.2–8.7, av. B = 6.2–7.3 µm, ellipsoid or ovoid, seldom somewhat cylindric, with rounded base and apex, dark red-brown, and central, c. 1.4–1.7 µm wide germ pore. Basidia 16–40 × 7–9 µm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 50–140 × 20–55 µm, subglobose, ellipsoid to oblong, utriform or subcylindric. Cheilocystidia 35–85 × 15–50 µm, (sub)globose, ellipsoid to oblong. Pileipellis a cutis, made up of cylindrical, sausage-like or fusiform elements, up to 150 µm long and 4–35 µm wide. Veil made up of elongate, sausage-like elements, 50–180 × 15–40 µm, often inflated, usually constricted at septa; terminal elements cylindric to almost globose. Clamp-connections present.

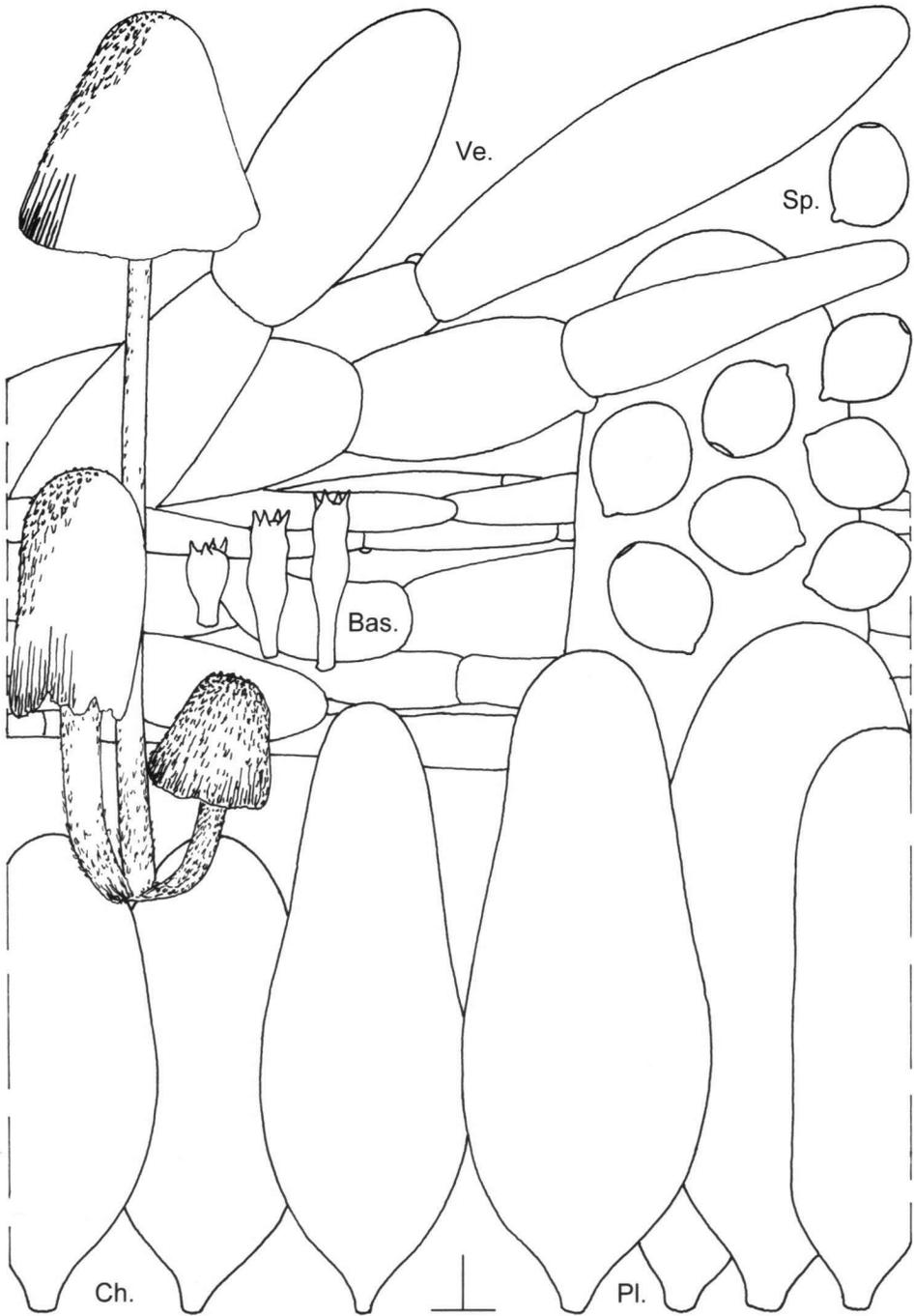


Fig. 9. *Coprinus jonesii* Peck. All figures from C. B. Ujlé 1214.

Habitat & distribution — Growing solitary or fasciculate on burned places, less frequent on wood-chips or vegetable refuse. Rather rare but widespread in Europe and America.

Collections examined. USA: Burlington, April 1891, *L. R. Jones* (holotype, NYS). — FINLAND: Tammala, Mustiala, 4 Aug. 1884, *P. Karst.* 3758 (as *C. lagopides*, H). — NETHERLANDS: prov. Utrecht, Leusden, estate 'den Treek', 2 July 1991, *J. Wisman* (herb. Wisman); prov. Zuid-Holland, Reeuwijk, Reeuwijkse Hout, 24 Oct. 1991, *C. B. Uljé 1214*; prov. Noord-Brabant, Tilburg, 15 March 1997, *B. Horvers* (L).

Additional collection examined. FINLAND: Tammala, Mustiala, 28 Oct. 1878, *P. Karst.* 3757, holotype of *C. lagopides*, H (= *C. phlyctidosporus*).

Karsten described *Coprinus lagopides* twice (Karsten, 1879, 1882). The first time he described a species with warty spores, similar to those of *C. phlyctidosporus* Romagn. (sect. *Alachuani*) for which it represents an older synonym. This synonymy is confirmed by a study of the holotype.

The second time Karsten (1882) described another collection as being *C. lagopides* which represents, however, another species with smooth spores, and it is this concept that generally has been accepted by later mycologists (Moser, 1978, 1983: 255; Orton & Watling, 1979: 41; Citerin, 1992: 23, 1994: 7).

From our studies of the original Karsten material, however, it becomes clear that the name *C. lagopides* cannot be used any more for this species. The oldest available legitimate name must then be *C. jonesii* Peck, which is confirmed by a study of the holotype.

10. *Coprinus ochraceolanatus* Bas — Fig. 10

Coprinus ochraceolanatus Bas, Persoonia 15 (1993) 362.

Coprinus citrinovelatus Ludwig & Roux, Z. Mykol. 61 (1995) 31.

Selected icon. Ludwig & Roux, l. c. 35 (as *C. citrinovelatus*).

Pileus up to 30 × 20 mm when still closed, up to 50 mm when expanded, ovoid, sometimes with truncate apex and irregular somewhat lobed margin, rather pale grey (Mu. 5 Y 6/1) at margin to somewhat darker near apex (5 Y 5/1; 2.5 Y 6/2–5/2; 7.5 YR 3/2 or 10 YR 4/3), deeply and densely sulcate at margin, sulcate striate near centre, with appressed (but in young buds suberect), long, thin, fibrillose, ochraceous to salmon-ochraceous (10 YR 7/4–7/6) velar scales, condensed to a thin felted salmon-ochraceous patch at centre, sometimes becoming yellow. Lamellae, L = 36–41, l = 1–3 (–5), crowded, free, rather narrow (up to 4 mm wide), already in young buds fairly dark chocolate-brown (7.5 YR 3/2), finally dark greyish purple-brown (5 YR 2/2) with thin, pale ochraceous subflocculose edge. Stipe up to 80 × 5.5 mm, tapering upwards, hollow, subfasciculate to fasciculate, in some specimens with thin, up to 12 mm long pseudorhiza, slightly greyish whitish, densely fibrillose, with ochraceous tinge because of rather deeply ochraceous yellow superficial fibrils (under lens), especially near base sometimes with a few incomplete, pale ochraceous, floccose girdles or many small, similarly coloured scales. Context ± chocolate brown in centre of cap, slightly more greyish purple-brown in base of stipe, and paler along cavity of stipe; rest pale. Smell unpleasant, after dung (l. c.).

Spores [160, 8, 4] 8.3–13.8 × 5.7–7.5 μm; Q = 1.45–2.10, av. Q = 1.55–1.85; av. L = 9.4–12.5, av. B = 6.1–7.1 μm, ellipsoid to ovoid with rounded base and apex, red-brown, and central, 1.5–1.8 μm wide germ pore. Basidia 15–38 × 8–11 μm, 4-spored, surrounded by (3–)4–6(–7) pseudoparaphyses. Pleurocystidia 50–140 × 20–50 μm, elongate ellipsoid, subglobose, cylindrical or broadly fusiform. Cheilocystidia 30–120 × 15–50 μm, in very

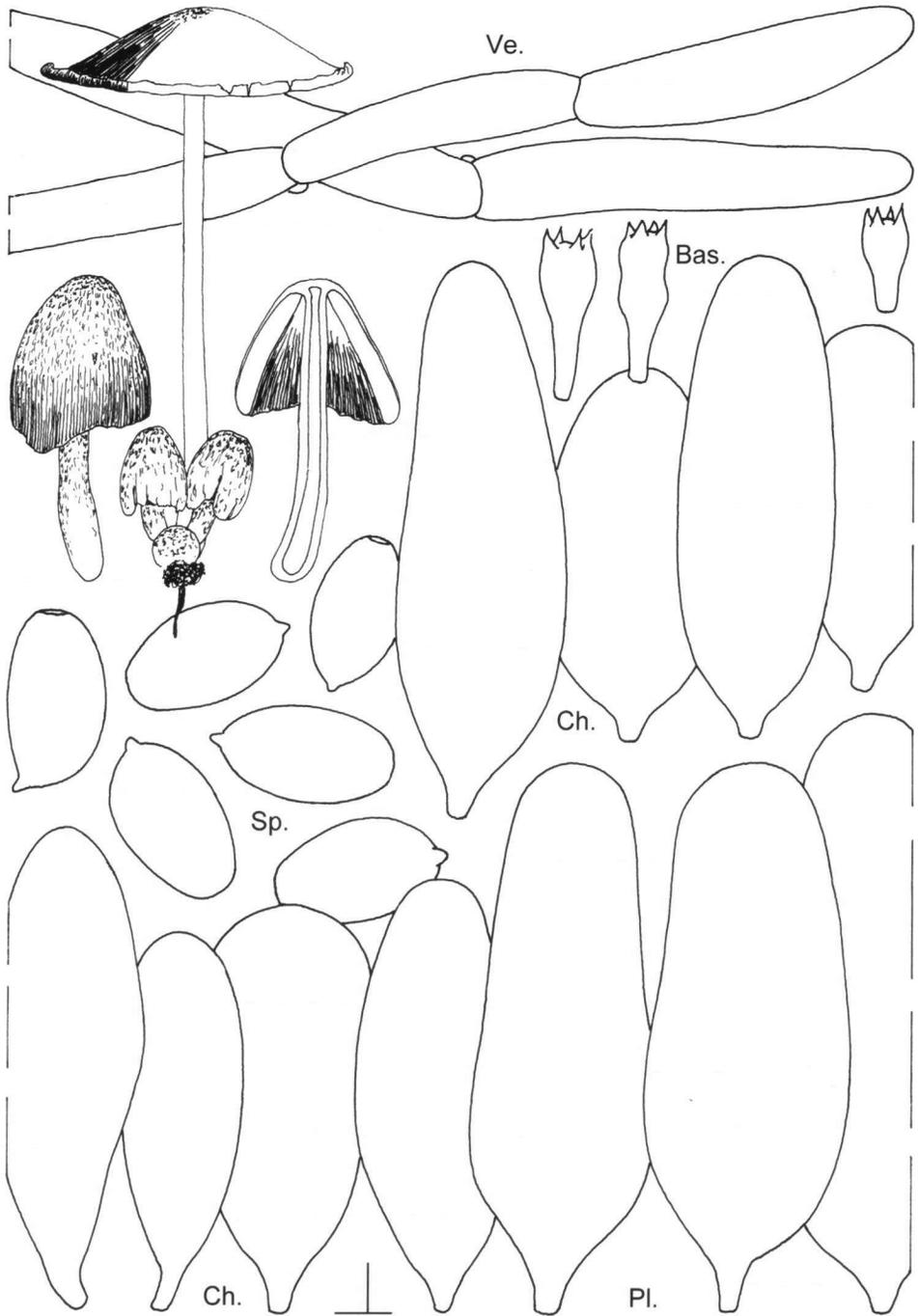


Fig. 10. *Coprinus ochraceolanatus* Bas. All figures from C. Bas 5813 (holotype).

young pileus subglobose or vesiculose, later rather more elongate or ellipsoid, clavate, oblong, vesiculose or cylindrical. Pileipellis consisting of repent radial chains of \pm cylindrical to inflated elements, up to 150 μm long and 4–25 μm wide. Veil made up of parallel, yellowish, granular-incrusted hyphae of $45\text{--}200 \times 7\text{--}20 \mu\text{m}$ large elements, often somewhat fusiform, not or only slightly constricted at septa. Incrustations on velar hyphae persistent in HCl 10% and alcohol, loosening in KOH and NH_4OH and dissolving in Melzer's reagent. Clamp-connections present.

Habitat & distribution — Fasciculate on old mud taken out of ditch one year earlier in old deciduous forest on sandy clay with much humus and forest litter; gregarious on wood-chips; near old stump of tree. Rare in Germany and the Netherlands.

Collections examined. GERMANY: Berlin-Düppel, 30 May 1982, E. Ludwig (holotype *C. citrinovelatus*, B). — NETHERLANDS: prov. Utrecht, Maarseveen, Zuidplas, 15 May 1982, C.B. Uljé 313; prov. Zuid-Holland, Voorschoten, 'Ter Wadding', 31 May 1972, C. Bas 5813 (holotype, L); Ter Aar, 'de Put', 9 May 1990, C.B. Uljé 1062.

Coprinus ochraceolanatus is rather similar to *C. lagopus*, but differs in having more slender and densely incrusted velar elements (up to 20 μm wide), whereas *C. lagopus* has smooth velar elements which are much more inflated (up to 40 μm wide). Macroscopically the colour of the veil of *C. ochraceolanatus* is yellowish ochre, in *C. lagopus* whitish or greyish, more rarely pale yellow but then the hyphal walls are not incrusted. See for extensive discussion on *C. ochraceolanatus* Uljé & Bas (1993: 363).

The macroscopical characters like the colour of the veil, the size of the basidiocarps, and the substrate of wood suggested that *C. citrinovelatus* is identical to *C. ochraceolanatus*. Therefore we studied the type-material of *C. citrinovelatus*. The microscopical features agree very well with those of *C. ochraceolanatus*. In particular the yellow incrusted elements of the veil, less than 20 μm thick [most species in subsect. *Lanatulii* have veil up to 40(–50) μm wide] is a significant character in our opinion. We could not find in the type material the more or less branched veil as depicted in the original description, but only typical '*Lanatulii*'-veil. Therefore we consider *C. citrinovelatus* a synonym of *C. ochraceolanatus*.

Our observations on the holo- and isotype of *C. citrinovelatus*: spores [100, 2, 1] 11.0–13.8 \times 6.5–7.5 μm ; Q = 1.60–1.95, av. Q = 1.70–1.85; av. L = 11.7–12.5, av. B = 6.7–7.1 μm , with central, c. 1.8 μm wide germ pore, dark red-brown. Basidia 18–34 \times 8–10 μm , surrounded by 4–6 pseudoparaphyses. Pleurocystidia not found (poor material) but noticed in original description. Cheilocystidia 50–90 \times 18–32 μm , ellipsoid, oblong, subcylindrical or subutriform. Veil made up of chains of hyphoid elements, 60–150 \times 8–14 μm , yellowish incrusted. Clamp-connections present.

11. *Coprinus macrocephalus* (Berk.) Berk. — Fig. 11

Agaricus macrocephalus Berk., Hooker's British Flora 5 (1836) 122; *Coprinus macrocephalus* (Berk.) Berk., Outl. Brit. Fung. (1860) 180.

Selected icons. Cetto, *Funghi Vero* 6, 1st ed., pl. 2173 (1989) 49; Elfström, *Jordstjärnan* 13 (3) (1992) front cover; Kriegelsteiner et al., *Z. Mykol.* 48 (1982) opposite 73; R. Phillips, *Paddest. Schimm.* (1981) 176.

Pileus up to 30 \times 18 mm when still closed, up to c. 40 mm when expanded, first ellipsoid or cylindrical-ellipsoid, pale grey-brown to dark grey-brown at centre beneath the whitish to

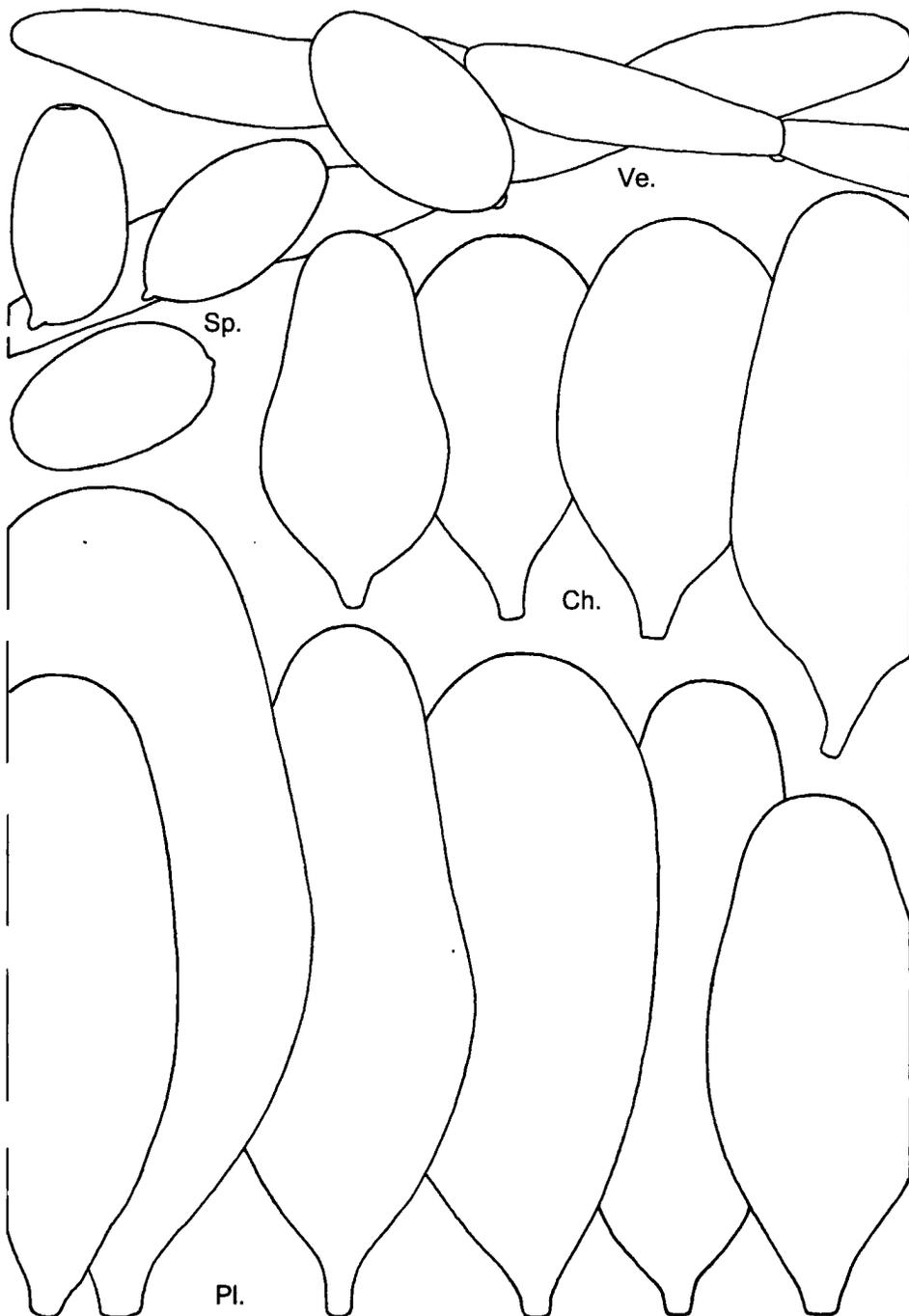


Fig. 11. *Coprinus macrocephalus* (Berk.) Berk. All figures from collection C.B. Uljé, Alphen a/d Rijn, 22 May 1985.

silvery grey veil, paler towards margin, expanding to conical, then to convex or applanate, finally plano-concave with revolute margin. Veil pale grey, silvery grey or grey-brown, covering entire pileus, splitting up into hairy to fibrillose, often pointed and appressed or recurved flocks, the tips becoming brown on drying. Lamellae, L = c. 60, l = 3–7, free, narrow, rather crowded, first white, soon greyish brown to blackish. Stipe 50–150 × 2–6 mm, whitish, somewhat tapering towards apex, up to 8 mm wide at clavate to bulbous base, hollow, hairy flocculose but particularly densely at lower part, becoming glabrous with age; base clavate and sometimes somewhat rooting.

Spores [100, 5, 5] 12.2–16.8 × 8.2–9.8 μm; Q = 1.45–1.80, av. Q = 1.55–1.75; av. L = 13.0–14.9, av. B = 8.4–9.3 μm, ellipsoid or ovoid, seldom somewhat cylindrical, with rounded base and apex, dark red-brown, and central, c. 2 μm wide germ pore. Basidia 16–36 × 9–11 μm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 70–150 × 20–60 μm, utriform, ellipsoid, oblong or subcylindrical. Cheilocystidia 50–120 × 20–50 μm, utriform, ellipsoid or oblong. Pileipellis consisting of repent radial chains of ± cylindrical to inflate elements, up to 150 μm long and 4–35 μm wide. Veil made up of elongate, sausage-like elements, 40–180 × 10–35 μm, often inflated, usually constricted at septa; terminal elements oblong or fusiform. Clamp-connections present.

Habitat & distribution — Growing solitary or fasciculate on mixed dung, rotten hay or vegetable refuse. Widespread but rare.

Collections examined. NETHERLANDS: prov. Utrecht, Baarn, Feb. 1984, *K. Seaford*; prov. Noord-Holland, Amsterdam, Artis, 3 Dec. 1968, *H. v.d. Aa 1042*; prov. Zuid-Holland, Alphen a/d Rijn, 22 May 1985, *C.B. Uljé*; Ter Aar, Langeraar, 13 May 1982, *C.B. Uljé*; prov. Zeeland, Terneuzen, Driewegen, 25 May 1981, *A. de Meyer 289*.

Coprinus macrocephalus is close to *C. lagopus*, *C. cinereus* and *C. radiatus*. It differs from *C. lagopus* in the habitat on dung, mixed dung or rotten hay and the larger spores. From *C. cinereus* and *C. radiatus* it differs in the larger and broader spores.

12. *Coprinus erythrocephalus* (Lév.) Fr. — Fig. 12

Agaricus erythrocephalus Lév., Ann. Sci. Nat., Series 2, 16 (1841) 237; *Coprinus erythrocephalus* Fr., Hymenomyc. eur. (1874) 327.

Misapplied. *Coprinus dilectus* s. J. Lange, Dansk bot. Ark. 2 (3) (1915) 36, 40 and Fl. agar. Dan. 4 (1939) 109.

Selected icons. Bender & Enderle, Z. Mykol. 54 (1988) between 48 and 49; Cetto, Funghi Vero 6, 1st ed., pl. 2170 (1989) 45; Donelli & Simonini, Riv. Mycol. 2 (1995) 126; J. Lange, Fl. agar. Dan. 4 (1939) pl. 157A.

Pileus 10–20 (–25) × 5–10 when still closed, up to 30 (–40) mm when expanded, first ellipsoid or ovoid, then campanulate to convex, finally flat, brown (Mu. 7.5 YR 4/2–5/2) beneath the rust-coloured or orange-red veil (Mu. 5 YR 5/8, 7.5 YR 5/8–4/6), that disappears soon and often forms a slimy layer in wet conditions. Lamellae (number of lamellae not noted) first whitish with rust-coloured edge, soon brown to blackish. Stipe up to 100 × 2–4 mm, white, hollow, sometimes with pinkish tinge, upper part white floccose, lower part covered with orange, rust-coloured veil, dense at base; base up to 5 mm, somewhat rooting and with white mycelium. Smell weak, indistinct or somewhat after apricot (collection *v.d. Aa 10161*).

Spores [300, 15, 15] 7.7–13.2 × 5.0–7.8 μm; Q = 1.45–1.90, av. Q = 1.55–1.70; av. L = 8.7–12.0, av. B = 5.3–7.6 μm, ellipsoid or ovoid with conical or (sometimes) rounded base

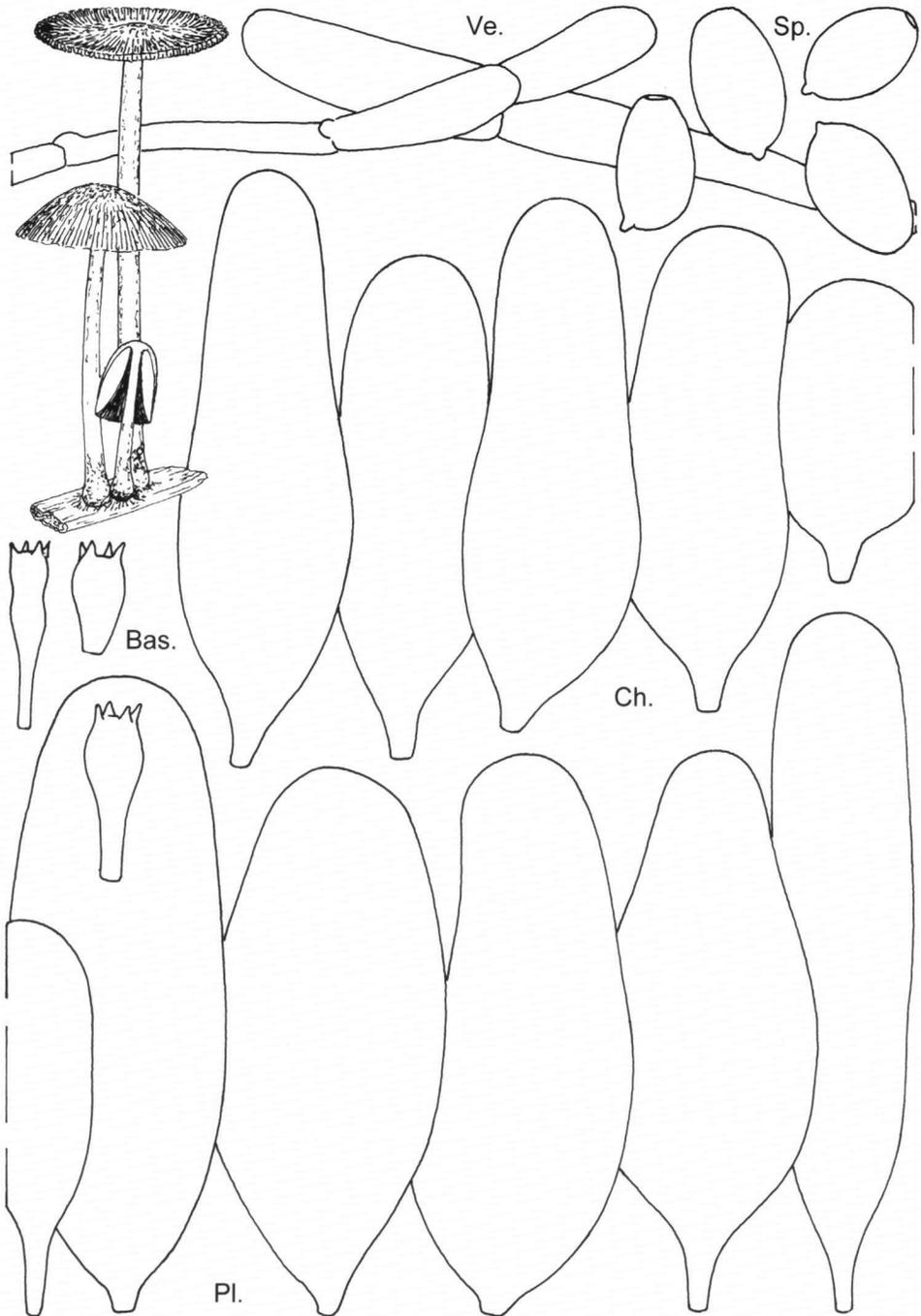


Fig. 12. *Coprinus erythrocephalus* (Lév.) Fr. All figures from collection W.D.J. Kuijs, Middelharnis, 26 Nov. 1988.

and rounded or somewhat truncate apex, dark red-brown, and central, c. 1.8 μm wide germ pore. Basidia 16–34 \times 8–10 μm , 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 80–130 \times 25–40 μm , ellipsoid, oblong, subcylindric or (sub)utriform. Cheilocystidia 30–50 \times 15–25 μm , subglobose, ellipsoid, less frequent oblong, subcylindric or (sub)utriform. Pileipellis a cutis, made up of cylindrical, more or less parallel, repent hyphae. Veil made up of cylindrical, 3–20 μm wide elements and strongly incrustated. Incrustations of veil and cystidia yellowish or orange-brown pigmented. Clamp-connections present.

Habitat & distribution — Not common, usually gregarious on heaps of wood-chips or vegetable refuse, often at pieces of wood or in grass amidst *Urtica*.

Collections examined. NETHERLANDS: prov. Flevoland, Almere-Nijkerk, 30 Oct. 1976, *J. Daams* 76-23; Muiderzand, 22 Nov. 1976, *H. v.d. Aa* 5541/*J. Daams* 76-57; prov. Gelderland, Neerijnen, 13 Aug. 1977, *P. Jansen* 77-368; prov. Utrecht, Haarzuilens, 8 Aug. 1987, *J. Daams* (*H. v.d. Aa* 10161); Neerijnen, estate 'Neerijnen', 29 Sept. 1981, *J. Schreurs*; prov. Noord-Holland, Enkhuizen, 17 Oct. 1989, *J. Schreurs* & *E. C. Vellinga* (*ECV* 1643); Amsterdam, Vondelpark, 22 Oct. 1958, *E. Kits van Waveren*; idem, Nov. 1958; idem Oct.–Dec. 1958; prov. Zuid-Holland, Alphen a/d Rijn, 16 Sept. 1995, *C. B. Uljé*; Leiden, Leidse Hout, 20 Oct. 1983, *C. B. Uljé*; Leiderdorp, 17 Sept. 1967, *P. W. Leenhouts* 1713; Goeree-Overflakkee, Middelhamis, 26 Nov. 1991, *R. Chrispijn*; Schouwen-Duiveland, Westerschouwen, Verklikkersduin, 26 Oct. 1988, *W. D. J. Kuijs*; Hontenisse, 'Den Doolhof', 6 Nov. 1982, *A. de Meijer* 672.

Coprinus erythrocephalus can easily be recognized by the beautiful, orange veil, that, however, quickly disappears, but remains visible at the base of the stipe for a rather long time.

13. *Coprinus geesterani* Uljé — Fig. 13

Coprinus geesterani Uljé, *Persoonia* 14 (1992) 565.

Pileus up to 9 \times 8 mm when still closed, up to 18(–27) mm when expanded, first ellipsoid, cylindric-ellipsoid, ovoid or (sub)globose, expanding to campanulate or conical, then to convex or applanate, finally plano-concave with revolute margin, very thin, soon wilting, white in very young stage, soon becoming grey or grey-brown, the darkest (Mu. 5 YR 2.5/1, 3/2; 10 YR 3/2) at centre of pileus. Veil in primordia smooth, mat, pure white, later grey to grey-brown, covering entire pileus, soon radially splitting into hairy to fibrillose, often pointed and appressed or – especially at centre – recurved flocks. Lamellae, L = 34–40, l = 0–3, free, narrow, rather crowded, first white, soon grey to blackish. Stipe 15–45 \times 1–2 mm, whitish, somewhat tapering towards apex, up to 3 mm wide at clavate to slightly bulbous base, hollow, hairy flocculose but particularly densely at lower part, becoming glabrous with age.

Spores [240, 12, 8] 5.6–8.8(–10.6) \times 4.3–5.8(–7.1) μm ; Q = 1.15–1.70, av. Q = 1.35–1.45; av. L = 6.6–7.8(–9.2), av. B = 4.8–5.4(–6.5) μm , ellipsoid to ovoid tending to mitriform or rhomboid, with rounded or slightly conical base and rounded apex, dark red-brown, and central, 1–1.5 μm wide germ pore. Basidia 18–32 \times 7–11 μm , 4-spored, surrounded by (3–)4–5(–6) pseudoparaphyses. Pleurocystidia 70–125 \times 22–33 μm , ellipsoid to ovoid, oblong or narrowly utriform, the latter 7–13 μm wide below apex. Cheilocystidia in very young pileus broadly utriform, then rather elongate and ellipsoid, clavate, narrowly (conico-)utriform or oblong, 25–105 \times 12–40 μm , the narrowly utriform ones 7–12 μm in diam. below apex. Pileipellis consisting of short, inflated elements, covered

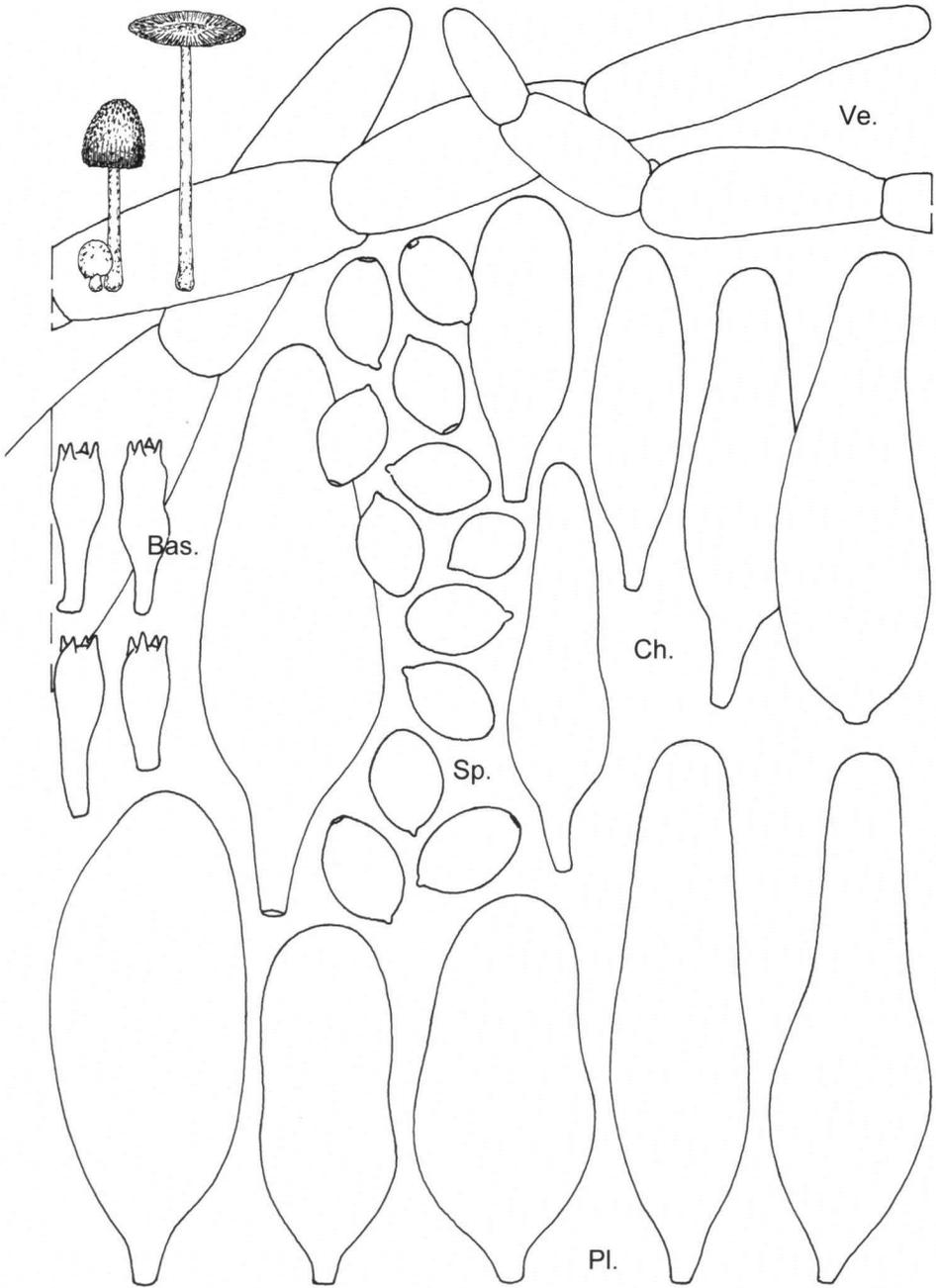


Fig. 13. *Coprinus geesterani* Uljé. All figures from C.B. Uljé 1078 (holotype).

with a thin layer of filamentous hyphae. Veil made up of hyphae consisting of sausage-like elements, $20\text{--}150 \times 5\text{--}40 \mu\text{m}$, often somewhat inflated, usually constricted at septa. Clamp-connections present.

Habitat & distribution — Solitary or (sub)fasciculate on soil mixed with pieces of wood, on very decayed wood-chips and on composted vegetable refuse. Rare. Only known from the Netherlands.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Alphen a/d Rijn, 22 May 1988, C.B. Uljé 902; 17 May 1990, C.B. Uljé 1065; 7 June 1990, C.B. Uljé 1069; 4 July 1990, C.B. Uljé 1078 (type); 10 July 1990, C.B. Uljé 1087; Ter Aar, 24 Oct. 1986, C.B. Uljé 804; 3 Sept. 1986, C.B. Uljé 830; Boskoop, 12 June 1990, C.B. Uljé 1074.

Coprinus geesterani is characterized by the small fruit-bodies and ellipsoid to ovoid spores tending to mitriform or rhomboid, on average less than $9 \mu\text{m}$ long.

The closest species *C. pseudoradiatus* often grows on dung, less frequent on naked soil (probably mixed with dung) and has more ellipsoid or oblong and usually cylindrical spores with a rounded, never somewhat conical base and a quotient more than 1.45. *Coprinus jonesii* has spores similar in shape and size to those of *C. geesterani* (although usually slightly broader), but that species has much larger fruit-bodies and grows generally on burnt ground or on more fresh wood-chips.

14. *Coprinus krieglsteineri* Bender — Fig. 14

Coprinus krieglsteineri Bender, Beitr. Kenntn. Pilze Mitteleur. III (1987) 215.
Selected icon. Bender l.c. between 216 and 217.

Pileus up to $8\text{--}20 \times 4\text{--}7 \text{ mm}$ when still closed, up to $15\text{--}30\text{--}(40) \text{ mm}$ when expanded, first ellipsoid or cylindrical-ellipsoid, whitish to pale grey with hazel- to dark brown centre (Mu. 7.5 YR 3/2; K. & W. 7F8), and covered with very thin, cobweb-like, silky veil (veil more dense at margin), then becoming campanulate or conical and grey-brown, dark at centre (Mu. 10 YR 4/2; K. & W. 6D3), paler towards margin (Mu. 10 YR 6/2; K. & W. 5D3). Lamellae, L = c. 40, l = 0–3, free, first white, then brown, finally black. Stipe up to $80 \times 1\text{--}2 \text{ mm}$, white, hollow, minute hairy floccose but more densely at equal to clavate, often somewhat rooting base.

Spores [100, 5, 4] $9.7\text{--}14.1 \times 5.8\text{--}7.2 \mu\text{m}$; Q = 1.65–2.05, av. Q = 1.80–1.95; av. L = 11.0–12.8, av. B = 6.1–6.6 μm , oblong, ellipsoid or ovoid with rounded base and apex, dark red-brown, and central, c. 1.4 μm wide germ pore. Basidia $22\text{--}43 \times 9\text{--}11 \mu\text{m}$, 4-spored, surrounded by 4–6(–7) pseudoparaphyses. Pleurocystidia $70\text{--}160 \times 28\text{--}55 \mu\text{m}$, utriform, subcylindric or oblong. Cheilocystidia $35\text{--}115 \times 18\text{--}45\text{--}(55) \mu\text{m}$, ellipsoid (often conical), subglobose, (broadly) utriform, or subcylindric. Pileipellis a cutis, made up of cylindrical or fusiform, in part inflate, more or less parallel, repent hyphae. Veil $50\text{--}150\text{--}(200) \times 9\text{--}18 \mu\text{m}$, made up of short chains, up to 4 cylindrical elements; terminal elements often somewhat fusiform; veil elements on stipe often diverticulate. Clamp-connections present.

Habitat & distribution — Growing solitary or a few together (subfasciculate). Very rare on paths with wood-chips. Known only from Germany (3 localities) and the Netherlands (1 locality).

Collections examined. GERMANY: Neersbroich, 24 Aug. 1982, H. Bender; Mönchengladbach, Volksgarten, 8 Aug. 1984, H. Bender; idem, 6 Sept. 1990, (all collection herb. Bender). — NETHERLANDS: prov. Utrecht, Breukelen, estate Nijenrode, 16 July 1996, C.B. Uljé 1296/1298.

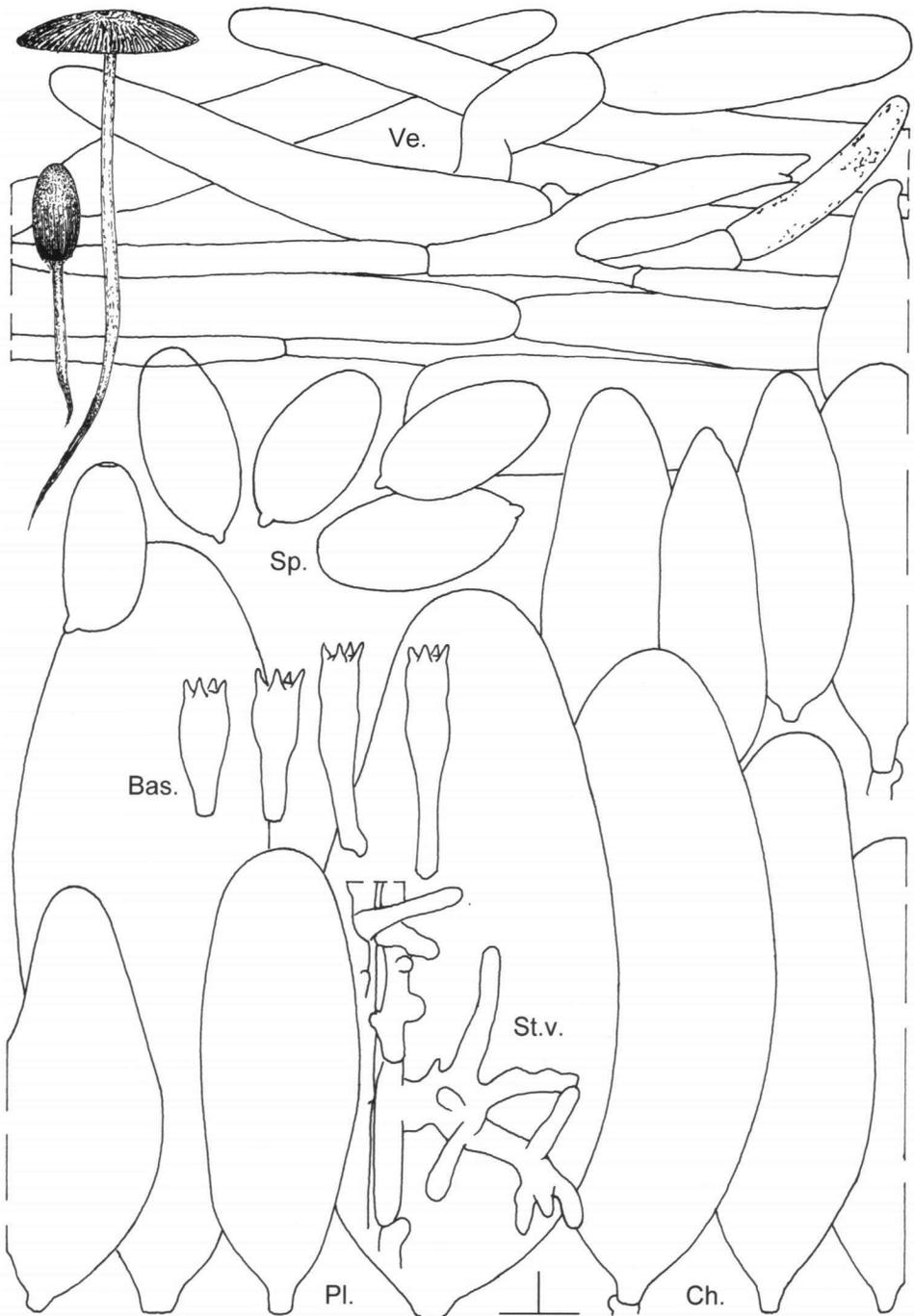


Fig. 14. *Coprinus krieglsteineri* Bender. All figures from C. B. Ulić 1296.

Coprinus krieglsteineri can be recognized by the thin, cobweb-like veil on the pileus, which gives the young basidiocarps a silky gloss. The veil soon disappears but remains visible for a long time at margin.

15. *Coprinus scobicola* P.D. Orton — Fig. 15

Coprinus scobicola P.D. Orton, Notes R. bot. Gdn Edinb. 32 (1972) 147.

Coprinus bilanatus Kemp (nom. prov.), Trans. Br. mycol. Soc. 65 (1975) 380 [invalid].

Pileus 5–20 × 3–14 mm when still closed, expanded up to 35 mm in diam., first grey to grey-brown, later at centre becoming pale and greyish or yellowish grey-brown. Lamellae (number not noted) very crowded, white to dark grey-brown, finally black. Stipe up to 100 × 2–5 mm, white, hollow, hairy floccose, especially in lower part, and slightly broadening towards somewhat bulbous base.

Spores [160, 8, 7] (9.0–)9.7–14.0(–16.3) × 7.1–9.8(–10.4) μm; Q = 1.25–1.60, av. Q = 1.30–1.50; av. L = 10.6–13.3, av. B = 8.1–9.1 μm, broadly ellipsoid or ovoid with rounded base and apex, medium to dark red-brown, and central, c. 1.3 μm wide germ pore. Basidia 14–38 × 7–10 μm, 2-spored, surrounded by (3–)4–5(–6) pseudoparaphyses. Pleurocystidia 70–110 × 26–37 μm, elongate ellipsoid, ellipsoid or (sub)cylindric. Cheilocystidia 35–75 × 17–38 μm, (sub)globose, ellipsoid, ovoid, broadly subcylindric or slightly utriform. Veil made up of cylindrical, often inflate or fusoid elements, 40–280 × 4–40(–70) μm. Clamp-connections present.

Habitat & distribution — Growing subfasciculate on sawdust and compost. Very rare. In the Netherlands only known from greenhouses.

Collections examined. UNITED KINGDOM: England, Devon, Plym Bridge, on sawdust, 29 Aug. 1956, Orton 964 (holotype, E); Scotland, Edinburgh (gh, culture from collection Daams 71-81), 3 Febr. 1973, R. F. O. Kemp 777 (culture). — NETHERLANDS: prov. Gelderland, Huissen, 8 March 1976, H. F. v. d. Laan (gh); prov. Utrecht, Maarseeveen, 7 Apr. 1971, J. Daams 71-81 (gh); prov. Noord-Holland, Kortenhoeft, 29 March 1972, J. Daams 72-72 (gh); idem, 25 April 1972, J. Daams 72-104 (gh); idem, 4 April 1973, J. Daams 789 (gh); prov. Zuid-Holland, Leidschendam, 31 Dec. 1973, H. v. d. Laan (gh).

The 2-spored basidia, hyphoid veil and its habitat on sawdust or compost make *Coprinus scobicola* easily to recognize. The only other species in subsect. *Lanatuli* with 2-spored basidia, *C. bicornis*, differs by having a mixed veil with ellipsoid to subglobose elements, much smaller basidiocarps and growth on dung.

The collections of J. Daams are labelled with the name *C. bilanatus* Kemp nom. prov. (Kemp 1975: 380) but these collections fit well with the type-material of *C. scobicola*.

16. *Coprinus pachydermus* Bogart — Fig. 16

Coprinus pachydermus Bogart, Mycotaxon 8 (1979) 274.

Pileus up to 15 × 8 mm when still closed, 18–25(–30) mm when expanded, cylindrical-ellipsoid at first, later campanulate, finally applanate or even revolute at deliquescence, greyish white at first, with a grey or grey-brown disc, covered with hairy fibrillose, greyish veil, brownish at the centre, split up toward the periphery in small upturned browning scales. Lamellae (number not noted) fully deliquescent, ascending, free, narrow, very crowded, 2–5 mm high, white at first, then grey and finally blackish, with a lighter, whitish but turning to pink, scurfy edge. Stipe 40–80 × 1–3 mm, white, up to 4 mm at the base, slightly tapering

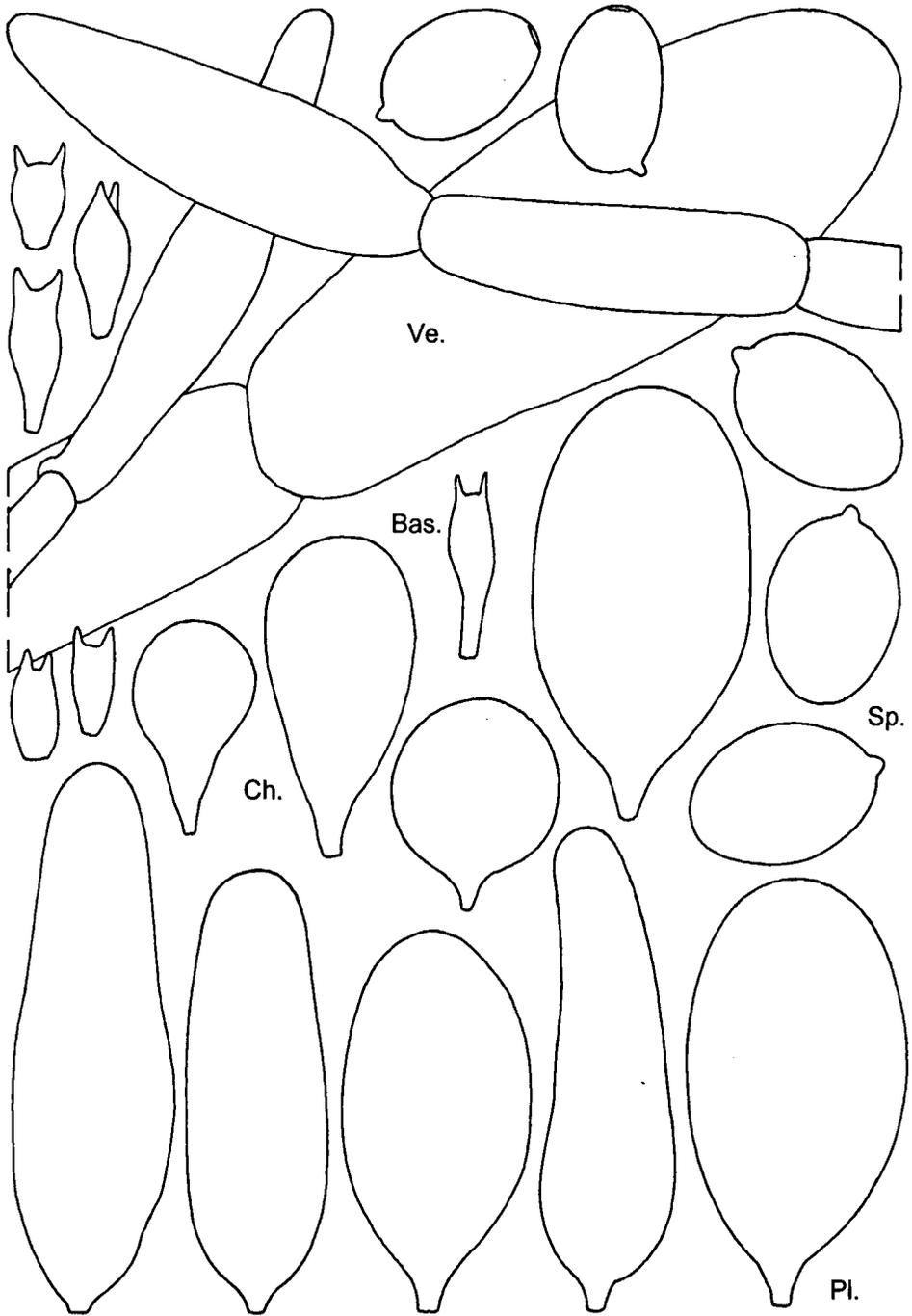


Fig. 15. *Coprinus scobicola* P.D. Orton. All figures from *P.D. Orton 964* (holotype).

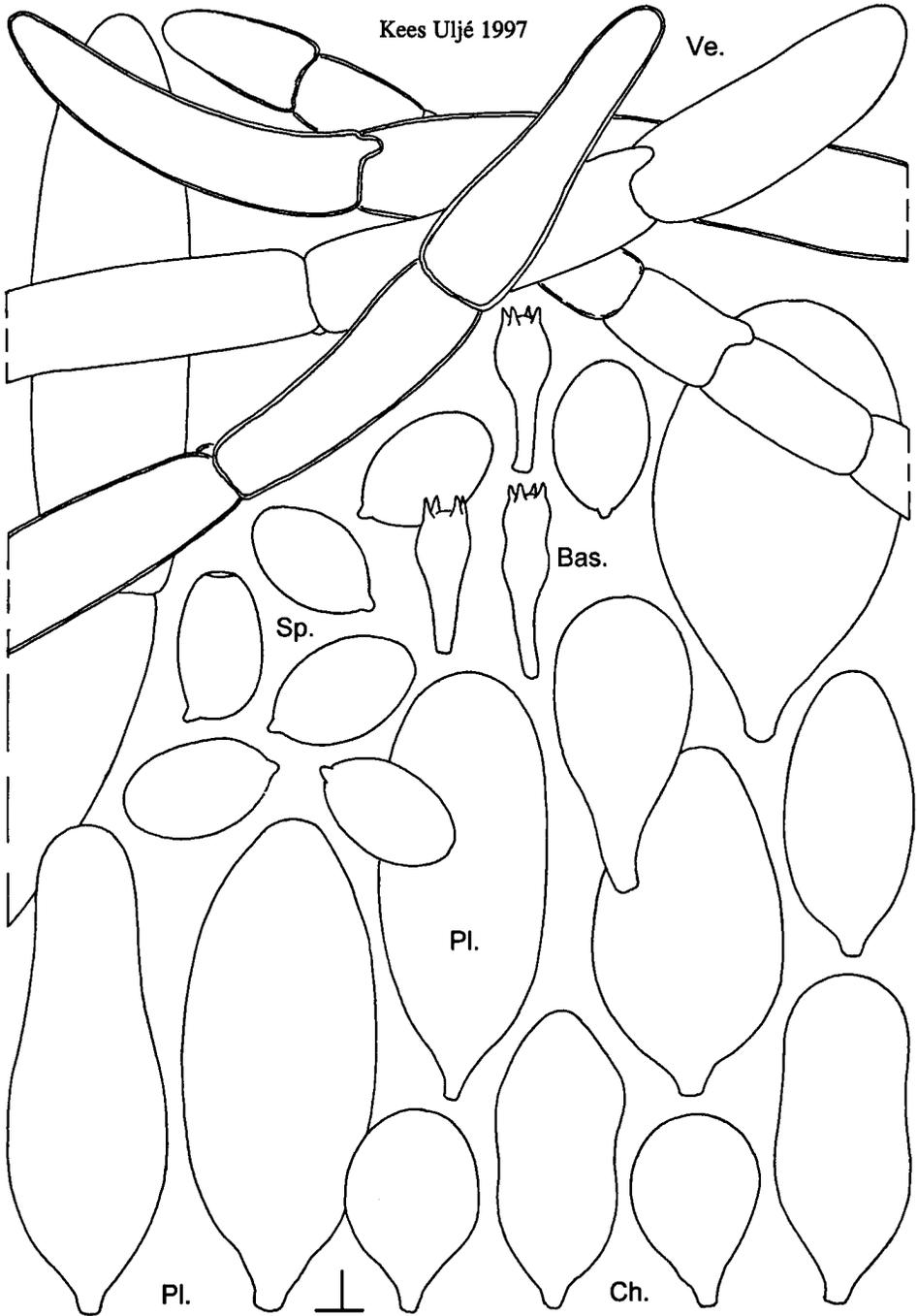


Fig. 16. *Coprinus pachydermus* Bogart. All figures from *F. Van De Bogart* 237 (holotype).

towards the apex, at base clavate or slightly bulbous, hollow, vaguely flocculose, more densely towards base.

Spores [50, 3, 2] $9.3-12.7(-13.1) \times 5.7-8.3 \mu\text{m}$; $Q = 1.40-1.75$; av. $Q = 1.55-1.60$; av. $L = 10.1-11.6$, av. $B = 6.5-7.5 \mu\text{m}$, ovoid or ellipsoid with slightly conical or (less frequent) rounded base and rounded or somewhat truncate apex, dark red-brown, and central or slightly eccentric, $1.5-1.8 \mu\text{m}$ wide germ pore. Basidia $24-34 \times 6-9 \mu\text{m}$, 4-spored, surrounded by 3-5 pseudoparaphyses. Pleurocystidia $60-90 \times 24-35 \mu\text{m}$, oblong, subcylindric or utriform. Cheilocystidia $30-50 \times 18-25 \mu\text{m}$, (sub)globose, ovoid, ellipsoid, oblong, utriform or subcylindric. Pileipellis a cutis, made up of cylindrical, more or less parallel, repent hyphae. Veil made up of elongate elements in chains, cylindrical or somewhat inflated, often constricted at septum, $20-180 \times 6-40 \mu\text{m}$, with fusiform, ellipsoid, oblong, ovoid or cylindrical terminal elements, slightly but distinctly thick-walled, walls up to $1 \mu\text{m}$ thick. Clamp-connections present.

Habitat & distribution — Solitary, fasciculate or gregarious on rotting wood chips. Very rare. Only known from the type locality (State of Washington, USA) and one find from Europe (England).

Collections examined. USA: State of Washington, Unvers. Washington, Lewis, Cispus Centre, 5 Oct. 1971, *F. Van De Bogart 237* (holotype, WTU). — UNITED KINGDOM: England, Chichester, 30 June 1998, *D. Reid* (collection *C. B. Uljé 1273*).

Coprinus pachydermus can be recognized by the rather broad spores with slightly conical base and the thick-walled and pale yellow-brown elements of the veil. The spores in the type-collection are somewhat smaller than in the material of Dr. D. Reid.

Microscopical observations:

Type-collection: sp. [20, 1, 1] $9.3-11.0 \times 5.7-7.2 \mu\text{m}$; $Q = 1.40-1.75$, av. $Q = 1.55$; av. $L = 10.1$, av. $B = 6.5 \mu\text{m}$.

Collection Reid: sp. [30, 2, 1] $9.6-12.7(-13.1) \times 6.2-8.3 \mu\text{m}$; $Q = 1.45-1.75$, av. $Q = 1.55-1.60$; av. $L = 11.5-11.6$, av. $B = 7.2-7.5 \mu\text{m}$.

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