PERSOONIA
Published by Rijksherbarium / Hortus Botanicus, Leiden
Volume 16, Part 3, pp. 265–333 (1997)

STUDIES IN COPRINUS IV – COPRINUS SECTION COPRINUS
Subdivision and revision of subsection Alachuani

C.B. ULJÉ[1] & M.E. NOORDELOOS[2]

Coprinus section *Coprinus* is defined and delimited to comprise four subsections: *Atramentarii*, *Coprinus*, *Lanatuli* and *Alachuani*. A key to the subsections is given as well as a key to the species of subsection *Alachuani* known from the Netherlands or to be expected in the Netherlands on account of records from neighbouring countries. Three new species, *Coprinus epichloeus*, *Coprinus fluvialis* and *Coprinus sclerotiorum* are described as well as a new variety of *C. urticicola*: var. *salicicola*. In addition the following species are fully described: *C. argenteus*, *C. echinosporus*, *C. episcopalis*, *C. filamentifer*, *C. friesii*, *C. gonophyllus*, *C. goudensis*, *C. herinkii*, *C. kimurae*, *C. kubickae*, *C. luteocephalus*, *C. phaeosporus*, *C. phlyctidosporus*, *C. picaceus*, *C. piepenbroekii*, *C. pseudofriesii*, *C. rugosobisporus*, *C. spilosporus*, *C. stanglianus*, *C. strossmayeri*, *C. tigrinellus*, *C. urticicola*, *C. vermiculifer*, *C. xantholepis*, and *C. xenobius*.

This paper is a result of our observations on *Coprinus* subsect. *Alachuani*, and is a continuation of earlier papers (Uljé & Bas, 1988, 1991; Uljé & Noordeloos, 1993), 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. To draw attention to some still undescribed species, of which insufficient good material is available at present, some taxa are described here as *Coprinus* spec. and identified with some combination of the collector's name, a collection number, a location and a date.

PRESENTATION

All collections are deposited in the Rijksherbarium, Leiden (L), unless otherwise indicated. Collections made by the first author, but without a collection number, refer to material that has not been conserved.

The information on the distribution in the Netherlands is based on the first author's observations and is not necessarily reflected in the number of collections studied.

Type studies which form the base of the present species concepts have been published in an earlier paper (Uljé & Noordeloos, 1996).

The enlargements of the drawings are × 2000 for the spores, × 800 for the other microscopical characters and × 1 for the basidiocarps, unless otherwise indicated.

Synonyms are given only when generally accepted. For practical reasons we have refrained from studying other synonyms and their types.

1) Van Dijkstraat 21, 2405 XE Alphen aan den Rijn, The Netherlands.
2) Rijksherbarium / Hortus Botanicus, P.O. Box 9514, 2300 RA Leiden, The Netherlands.

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

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

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 × B or L × B × 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

Sincere thanks are due to many colleagues, in particular H. Bender (Germany) and members of the Netherlands Mycological Society (NMV) for the loan and gift of valuable material for this study. The Directors of the herbaria of E, G, K, M and PRM are thanked for the loan of type-material, Dr. R.A. Maas Geesteranus for improving the Latin descriptions, Ms. E.C. Vellinga for critical reading and correcting the manuscript and other valuable advice and J. Lennie for correcting the English text.

INFRAGENERIC DELIMITATION OF COPRINUS WITH REGARD TO SECTION COPRINUS

In an earlier paper (Uljé & Noordeloos, 1993) the authors presented their view on the infrageneric classification of the genus *Coprinus*, resulting in a key to the sections. In this concept, three sections are recognized: sect. *Coprinus*, characterized by the presence of a filamentous veil, sect. *Pseudocoprinus*, accommodating species without a veil or a very minute veil in combination with pileocystidia, and sect. *Veliformes* for those taxa that have a veil that, at least partly, is composed of globose elements. This classification differs from that of Singer (1986), who distinguished four sections: sect. *Coprinus*, which is similar to our concept of the same name, sect. *Micacei* and sect. *Cyclodei*, which together approximate our concept of sect. *Veliformes*, and sect. *Hemerobii*, for taxa without veil or with veil in combination with setulae on the pileus, which agrees with our sect. *Pseudocoprinus*. Like Singer (l.c.) we distinguish four subsections in sect. *Coprinus*, mainly based on characters of the veil: subsect. *Coprinus* (= *Annulati* Lange, 1915), subsect. *Atramentarii* (Fr.) Konr. & Maubl. (1930), subsect. *Alachuani* Sing. (1948), and subsect. *Lanatuli* Sing. (1986).

Citerin (1992, 1994) distinguishes similar groups in the genus *Coprinus*, but treats them on subgeneric instead of sectional level. As a result Citerin has four sections in 'subgenus' *Coprinus*, which he calls *Coprinus* (= *Comati* Fr.), *Atramentarii* (Fr.) Penn. in Kf., *Lanatuli* (Fr.) "Penn. in Kf.", and *Picacei* (Fr.) Penn. in Kf. (Citerin obviously was unaware that Pennington did not use the Friesian name *Lanatuli* but called the group *Lanulati* (Kauffman, 1918: 207, 220)).

Other authors usually place the taxa with diverticulate veil (our subsect. *Alachuani*) in different sections. Pilát & Svrček (1967: 386) and Redhead & Traquair (1981) put the grass-inhabiting species around *Coprinus friesii* in section *Herbicolae*. Kühner & Romagnesi (1953, 'groupe' *Impexi*) keep the species with diverticulate veil together, forming the basis of Singer's (and our) sectional concept. Moser (1983: 253) places all species with veil made up of elongate elements, including species without diverticulate veil, in one group, but without indicating a formal taxonomic rank.

Subsect. *Lanatuli* is also considered as a distinct section by several authors (Van De Bogart, 1979; Citerin, 1992). In our concept subsection *Coprinus* is reserved for those taxa that have a narrow, loose annulus that can easily be shifted along the lower part of the stipe. So far only two taxa have been accepted in this subsection, viz. *Coprinus comatus* and *C. sterquilinus*, and the subsection needs revision.

Subsection *Atramentarii* contains species with a scarce veil, which is not easily removed from the pileus. Such taxa grow in bundles (*Coprinus atramentarius*, *C. acuminatus* and *C. insignis*). These macroscopical characters are the main reasons to keep the *Atramentarii* separate from the *Alachuani*, since there are hardly any convincing microscopical differences. Future studies will prove whether our present view must be adjusted. In connection with the nomenclatural aspect of the sectional name *Atramentarii* it is interesting to note that the authors of this name, Konrad & Maublanc (1930), erroneously indicated the presence of an annulus as character for subsect. *Atramentarii* instead of for subsect. *Volvati* in which they placed *Coprinus comatus* and *C. sterquilinus*. However this is without nomenclatural consequences.

TAXONOMIC PART

Coprinus section Coprinus

Basidiocarps small to rather large, always covered with veil, which presents itself in form of hairy-floccose covering of the basidiocarp or in patches scattered over the surface. Veil consisting of elongate, filamentous elements, which are smooth, thin-walled or diverticulate and then often thick-walled. In some species of subsection *Lanatuli* a few globose or ellipsoid cells may also be present in the veil. Pileipellis made up of repent, elongate, often inflated hyphae, which are smooth or branched and diverticulate.

Holotype: *Coprinus comatus* (Müll.: Fr.) Pers.

KEY TO THE SUBSECTIONS

1. Veil tightly adhering to surface of pileus and difficult to remove; basidiocarps medium to rather large with 6–15 mm wide stipe; pileus white, greyish, grey-brown to ochre brown below veil; if white then pileus oblong.

2. Pileus whitish, except for the centre, usually oblong, height-width ratio of pileus usually more than 1.5; annulus present on lower half of stipe; basidiocarps single or in groups; veil often reflexed ..... subsect. *Coprinus*
2. Pileus grey or brown, ovoid, or broadly ellipsoid, height-width ratio of pileus usually less than 1.5; without annulus; basidiocarps fasciculate; veil sparse, only at centre, adpressed ..... subsect. *Atramentarii*

1. Veil loosely attached and easily removable from pileus; basidiocarps very small to small, a few medium-sized to rather large; stipe 1–6(–10) mm wide; pileus white to dark grey below veil, rarely brown.
3. Veil made up of chains of smooth, thin-walled, filamentous to oblong, sometimes ellipsoid or a few almost globose elements with distinct terminal elements subsect. *Lanatuli*
3. Veil made up of branched, diverticulate hyphae; if elements in chains with distinct terminal elements, then the walls are thickened and yellow-brown subsect. *Alachuani*

Subsection Alachuani Sing.

Basidiocarps very small to medium-sized; expanded pileus 6–60 mm. Pileus with veil made up of weakly to strongly diverticulate, and then often thick-walled elements. Stipe smooth, but in most cases covered with very small velar flocks, especially at base.

Macroscopical characters

Most species very small to small with stipes less than 3 mm thick; sometimes medium-sized to rather large with up to 6 resp. 10 mm thick stipe. Veil present in all species, covering the whole pileus of young specimens in most cases, but breaking up in patches or in small, radially arranged, hairy flocks while pileus expands. Lamellae crowded, about 20 in the smallest specimens, up to 60 and more in larger ones, free with no space between place of attachment and stipe; white in very young stages, soon becoming grey, often with brown tinge, finally dark grey or black spotted in small species to black in medium-sized species. Stipe hollow in all species, whitish, equal or slightly tapering towards apex; with equal or somewhat thickened, clavate or – in a few species – more or less bulbous base; with minute remnants of velar flocks, particularly towards base. One species develops on sclerotia. Smell of pileus not specific but in *C. strossmayeri* the rhizomorphs have a distinct smell. Spore print black with a very slightly violaceous or purple tinge. This could be an additional character for the whole group, but since it is almost impossible to make a spore print from the small and fragile basidiocarps of many taxa in sect. *Alachuani*, information on the colour of the spore-print is lacking.

Microscopical characters

Characteristic for the species in subsect. *Alachuani* is the structure of the veil, as indicated in the introduction and key to the subsections. The veil is composed of filamentous hyphae that are weakly to strongly diverticulate. This means that most hyphae have wart- or finger-like excrescences. Sometimes these excrescences are branched again, which we call multiple-branched in this paper.

Pileipellis usually consisting of repent, radially arranged hyphae, made up of rather strongly inflated, partly branched and/or diverticulate elements. However, a critical anal-

ysis of the pileipellis is very difficult on (old) exsiccates, and should preferably be done on fresh material. Since in many cases good, fresh specimens have not been available, our knowledge of the exact structure of the pileipellis is still incomplete.

The colour of the spores given in the descriptions is the colour when the spores are observed in water under the microscope. Pleuro- en cheilocystidia present in all species; clamp-connections present in most species. Basidia 4-spored in most species, sometimes 2-spored. The number of pseudoparaphyses around the basidia varying from 3–6 to 5–8.

KEY TO THE SPECIES OF SUBSECT. ALACHUANI

1. Spores smooth, without ornamentation.
2. Basidia 2-spored; spores amygdaloid and truncate ..... 36. *C. piepenbroekii*
2. Basidia 4-spored; if spores amygdaloid then never truncate.
3. Average spore length > 10 µm; on dung or soil.
(If not on dung or soil: step 24)
4. Elements of veil thick-walled, with ascending terminal elements
31. *C. vermiculifer*
4. Elements of veil thin-walled; walls < 0.5 µm thick.
5. Breadth of spores < 10 µm.
6. On dung; small species.
7. Pileus white when young; average spore length > 11 µm .... 1. *C. xenobius*
7. Pileus yellow when young; average spore length < 11 µm 2. *C. luteocephalus*
6. Not on dung; medium species.
8. Length of spores > 12.5 µm
3. *Coprinus spec.* (Amsterdamse Bos 13 July 1958)
8. Length of spores < 12.5 µm ..... 4. *C. stanglianus*
5. Breadth of spores > 10 µm.
9. On dung, growing on sclerotia ..... 6. *C. sclerotiorum*
9. On soil, not on sclerotia ..... 5. *C. picaceus*
3. Average spore length < 10 µm.
10. On dung; spores cylindrical ovoid, rounded rectangular ..... 17. *C. filamentifer*
10. Not on dung; spores otherwise shaped.
11. Average spore length < 6 µm if veil thin-walled, < 6.5 µm if veil thick-walled.
12. Spores ovoid or ellipsoid; av. Q > 1.15.
13. Veil thick-walled; average spore length > 5.5 µm
22. *Coprinus spec.* (*Uljé 1160*)
13. Veil thin-walled; average spore length < 5.5 µm
16. *Coprinus spec.* (*Uljé 1170*)
12. Spores globose or the shape of a maize-kernel; av. Q < 1.15.
14. Veil thick-walled; spores globose ..... 21. *C. herinkii*
14. Veil thin-walled; spores the shape of a maize-kernel ..... 18. *C. argenteus*
11. Average spore length > 6 µm if veil thin-walled, > 6.5 µm if veil thick-walled.
15. Elements of veil thin-walled; walls < 0.5 µm thick.
16. Large species; pileus 50–100 mm when expanded ..... 9. *C. strossmayeri*
16. Smaller species; pileus 5–40 mm when expanded.
17. Spores globose or rounded quadrangular, with apical papilla.

18. Spores globose with apical papilla, av. length < 8 µm
19. *Coprinus spec.* (*Bas 5002*)
18. Spores rounded quadrangular with apical papilla, av. length > 8 µm
20. *C. episcopalis*
17. Spores subglobose to ellipsoid or ovoid, without apical papilla.
19. Terrestrial, on burned or bare soil, or in lawns.
20. Average Q of spores > 1.25.
21. Pleurocystidia up to 55 µm in length with Q c. 2 ..... 13. *C. fluvialis*
21. Pleurocystidia becoming longer with Q 2.5 and more
11. *C. urticicola* var. *urticicola*
20. Average Q of spores < 1.25.
22. Usually on burned places; expanded pileus 15–30 mm wide
14. *C. gonophyllus*
22. In lawns, often on bare soil; expanded pileus 8–15 mm wide
15. *C. epichloeus*
19. Not terrestrial, not on soil.
23. Average Q of spores < 1.2.
24. Stipe 2–6 mm wide; on straw, coconut mattings, rotting textiles and straw containing materials like ceilings in old buildings etc., in Europe usually indoors ..... 7. *C. kimurae*
24. Stipe 0.5–2 mm wide; on *Phragmites*, *Juncus*, and the like, outdoors
8. *C. kubickae*
23. Average Q of spores > 1.2.
25. Average Q of spores > 1.55; expanded pileus 10–20 mm wide; spores dark brown ..... 10. *C. goudensis*
25. Average Q of spores < 1.55; expanded pileus 6–15 mm wide; spores pale to medium brown.
26. Veil of young pileus white, at centre sometimes pale ochraceous; usually on grasses, but also on other vegetable refuse, sometimes on wood
11. *C. urticicola* var. *urticicola*
26. Veil of young pileus dark grey at centre; on dead branches of willow
12. *C. urticicola* var. *salicicola*
15. Elements of veil thick-walled; walls > 0.5 µm thick in places.
27. Veil mixed with long, brown, thick-walled hairs ..... 32. *C. spilosporus*
27. No long, brown, thick-walled hairs present.
28. Walls of velar elements up to 1.5(–2) µm thick in places.
29. Spores (sub)globose; av. Q < 1.1 ..... 23. *Coprinus spec.* (*Uljé 924*)
29. Spores subglobose to ellipsoid, ovoid or slightly rhomboid; av. Q > 1.1.
30. Spores short ovoid or subglobose, lentiform ..... 24. *C. phaeosporus*
30. Spores broadly ellipsoid, ovoid or slightly rhomboid; not distinctly lentiform.
31. Pleurocystidia 20–50 µm wide ..... 27. *C. xantholepis*
31. Pleurocystidia 10–30 µm wide.
32. Veil on pileus white or ochre-brown; excrescences (micr.) often tapering with pointed apex ..... 25. *C. pseudofriesii*

32. Veil on pileus dark brown, sepia; excrescences (micr.) often cylindrical with rounded apex ..... 26. *C. tigrinellus*

28. Walls of velar elements over 2 µm thick in places.

33. Spores ellipsoid, ovoid or rhomboid; usually on grasses ... 28. *C. friesii*

33. Spores heart-shaped, rounded triangular or submitriform.

34. Veil grey; spores heart-shaped, rounded triangular with convex to flattened base; walls of veil very pale ..... 29. *Coprinus spec. (Uljé 1262)*

34. Veil brown; spores submitriform, with conical base; walls of veil brown 30. *Coprinus spec. (Uljé 947)*

1. Spores warty.

35. Spores amygdaloid ..... 35. *C. echinosporus*

35. Spores ellipsoid, ovoid.

36. Basidia 4-spored ..... 33. *C. phlyctidosporus*

36. Basidia 2-spored ..... 34. *C. rugosobisporus*

ALTERNATIVE KEY TO THE SPECIES OF SUBSECT. ALACHUANI

1. Spores smooth, not ornamented.

2. Growing on sclerotia in dung; spores > 10 µm broad ..... 6. *C. sclerotiorum*

2. Not growing on sclerotia in dung; if on dung then spores < 10 µm broad.

3. Basidia 2-spored; spores amygdaloid and truncate ..... 36. *C. piepenbroekii*

3. Basidia 4-spored; if spores amygdaloid then never truncate.

4. Medium-sized species; stipe c. 4–10 µm wide (if spores subglobose, compare *C. kimurae*).

5. Spores rounded quadrangular with apical papilla; av. Q < 1.3 . 20. *C. episcopalis*

5. Spores ellipsoid, ovoid or slightly amygdaliform; av. Q > 1.3.

6. Spore length < 10 µm ..... 9. *C. strossmayeri*

6. Spore length > 10 µm.

7. Spore breadth > 10 µm ..... 5. *C. picaceus*

7. Spore breadth < 10 µm.

8. Spores 12.5–15.5 × 8–10 µm 3. *Coprinus* spec. (Amsterdamse Bos 13 July 1958)

8. Spores 10–12.5 × 6.5–8.5 µm ..... 4. *C. stanglianus*

4. Smaller species; stipe c. 1–4 mm wide.

9. Only on dung (not on soil enriched with dung).

10. Veil with ascending terminal elements; elements thick-walled 31. *C. vermiculifer*

10. No ascending terminal elements; veil thin-walled; walls < 0.5 µm thick.

11. Spores cylindrical ovoid, rounded rectangular ..... 17. *C. filamentifer*

11. Spores ellipsoid or ovoid.

12. Pileus white when young; average spore length > 11 µm .. 1. *C. xenobius*

12. Pileus yellow when young; average spore length < 11 µm 2. *C. luteocephalus*

9. Not on dung.

13. Average spore length < 6.0 if veil thin-walled, < 6.5 µm if veil thick-walled.

14. Spores ovoid or ellipsoid; av. Q > 1.15.
15. Velar elements thick-walled; average spore length > 5.5 µm
22. *Coprinus spec.* (*Uljé 1160*)
15. Velar elements thin-walled; average spore length < 5.5 µm
16. *Coprinus spec.* (*Uljé 1170*)
14. Spores globose or the shape of a maize-kernel; av. Q < 1.15.
16. Velar elements thick-walled; spores globose ..... 21. *C. herinkii*
16. Velar elements thin-walled; spores the shape of a maize-kernel
18. *C. argenteus*
13. Average spore length > 6.0 if veil thin-walled, > 6.5 µm if veil thick-walled.
17. Velar elements thick-walled; walls > 0.5 µm thick in places.
18. Spores ellipsoid or ovoid, often somewhat rhomboid; av. Q > 1.2.
19. Walls of velar elements only slightly coloured, over 2 µm thick in places
28. *C. friesii*
19. Walls of velar elements yellow or yellow-brown, up to 1.5(–2) µm thick.
20. Pleurocystidia 25–40 µm wide ..... 27. *C. xantholepis*
20. Pleurocystidia 10–25 µm wide.
21. Veil on pileus white or ochre-brown; excrescences (micr.) often tapering with pointed apex ..... 25. *C. pseudofriesii*
21. Veil on pileus dark brown, sepia; excrescences (micr.) often cylindrical with rounded apex ..... 26. *C. tigrinellus*
18. Spores (sub)globose, short ovoid, submitriform, heart-shaped or rounded triangular; av. Q < 1.2.
22. Spores heart-shaped, rounded triangular; walls of veil up to 2.5 µm
29. *Coprinus spec.* (*Uljé 1262*)
22. Spores (sub)globose, short ovoid or submitriform.
23. Veil with long, thick-walled, non diverticulate hairs . 32. *C. spilosporus*
23. Veil lacking such hairs.
24. Walls of velar elements dark brown in part; spores slightly mitriform
30. *Coprinus* spec. (*Uljé 947*)
24. Walls of velar elements yellowish; spores not mitriform.
25. Spores short ovoid or subglobose; spore breadth < 7 µm
24. *C. phaeosporus*
25. Spores (sub)globose; spore breadth > 7.5 µm
23. *Coprinus spec.* (*Uljé 924*)
17. Velar elements thin-walled; walls < 0.5 µm thick.
26. Average Q of spores < 1.25.
27. Young pileus ochre-brown, grey-brown or dark grey-brown.
28. Young pileus ochre-brown or grey-brown ..... 8. *C. kubickae*
28. Young pileus dark grey-brown, sepia ..... 15. *C. epichloeus*
27. Young pileus whitish.
29. Average spore breadth > 7.6 µm ..... 7. *C. kimurae*
29. Average spore breadth < 7.6 µm.
30. Pileus 15–30 mm when expanded; terrestrial, often on burned places
14. *C. gonophyllus*

30. Pileus 8–15 mm when expanded; not terrestrial
19. *Coprinus spec.* (*Bas 5002*)

26. Average Q of spores > 1.25.
31. Pleurocystidia up to 55 µm in length; on bare soil, sludge . 13. *C. fluvialis*
31. Pleurocystidia becoming > 60 µm in length; on grass or other plants or on wood.
32. Pileus small, up to 20 mm when expanded; av. Q of spores > 1.55
10. *C. goudensis*
32. Pileus very small, up to 12 (15) mm when expanded; av. Q of spores < 1.55.
33. Young pileus white, later sometimes becoming brownish
11. *C. urticicola* var. *urticicola*
33. Young pileus dark grey; later whitish with dark grey centre
12. *C. urticicola* var. *salicicola*

1. Spores warty.
34. Spores amygdaloid ..... 35. *C. echinosporus*
34. Spores ellipsoid, ovoid.
35. Basidia 4-spored ..... 33. *C. phlyctidosporus*
35. Basidia 2-spored ..... 34. *C. rugosobisporus*

1. **Coprinus xenobius** P.D. Orton — Fig. 1

Coprinus xenobius P.D. Orton, Notes R. bot. Gdn Edinb. 35 (1976) 148.
Selected icon. Cacialli, Caroti & Doveri, Schede Micol. 1 (1995) 163. Funghi Fimicola. Trento.

Pileus 2–7(–14) × 2–4(–8) mm when still closed, subglobose, ellipsoid or ovoid, white, often with clay-coloured or grey-cream centre; expanded pileus up to 8(–20) mm, greyish; veil radial hairy-floccose, whitish. Lamellae crowded, free, first whitish, then clay-coloured or greyish, finally violaceous black. Stipe up to 40 × 0.3–2(–2.5) mm, whitish, watery white, very fine floccose, more dense at base.

Spores [100, 5, 3] 9.6–14.7 × 5.0–8.2 µm, oblong, mainly rounded at apex, dark red-brown, with central, 1.5–1.8 µm wide germ pore; Q = 1.60–2.15, av. Q = 1.80–1.95; av. L = 10.9–13.5, av. B = 5.9–7.5 µm. Basidia 18–32 × 8–10 µm, 4-spored, surrounded by (3–)4–6 pseudoparaphyses. Pleurocystidia 90–125 × 20–40 µm, cylindrical, utriform or ellipsoid. Cheilocystidia 60–100 × 22–40 µm, mainly utriform, a smaller number globose to ellipsoid or cylindrical. Elements of veil thin-walled, diverticulate, c. 30–100 × 2–10(–12) µm. Clamp-connections present.

Habitat & distribution — On old cow dung, solitary or a few together. Very rare. Not known from the Netherlands. Only a few collections are known to us from Europe. Two finds from Scotland (see original description), one from Italy and the species has been recorded by Bender (1991: 12) from Germany.

Collections examined. ITALY: Livorno, Botro delle Fontanelle, 8 Dec. 1994 (herb. Cacialli, Caroti & Doveri, no. 03794); 30 Apr. 1995 (without further annotations). — GREAT BRITAIN: Scotland, Perthshire, Camghouran, on cow dung, 11 June 1972, *P.D. Orton 4504* (isotype, E).

Coprinus xenobius differs from the very closely related species *C. luteocephalus* in having slightly larger spores and smaller basidiocarps, less globose-ellipsoid but more

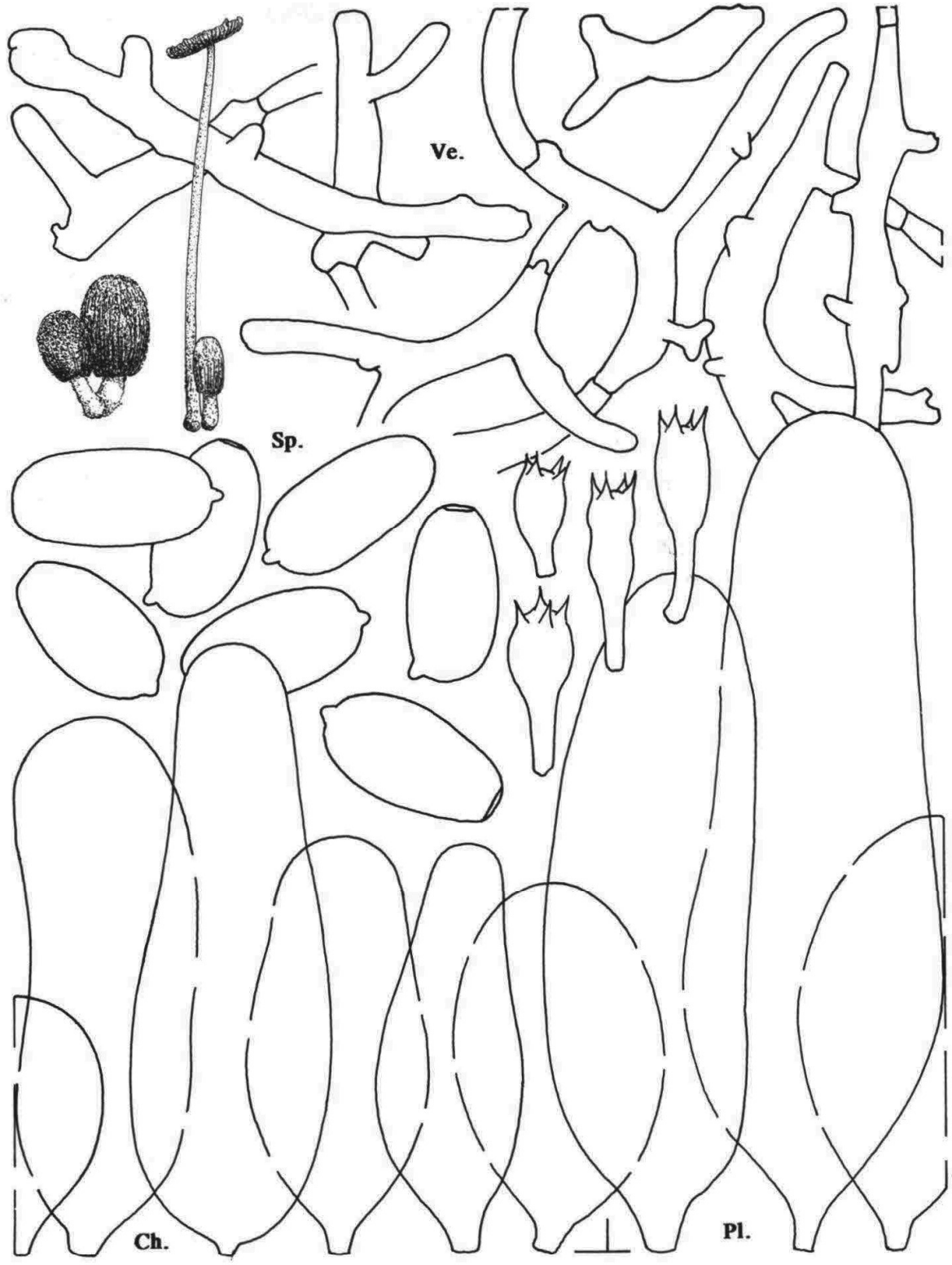

Fig. 1. *Coprinus xenobius* P.D. Orton. All figures from *P.D. Orton 4504* (isotype).

utriform cheilocystidia and lack of yellow colours. The contrast in substrate preference (horse dung in *C. luteocephalus* versus cow dung in *C. xenobius*) does not seem to represent a reliable difference between the two taxa, especially when so little material is available.

The size of the basidiocarps in the two Scottish collections mentioned in the original description (2–7 × 1–4 mm) is distinctly smaller than in the Italian material (8–14 × 5–8 mm). In addition the spores in the Italian collections are somewhat smaller and more closely resemble the spores of the type of *C. luteocephalus*. (The differences between the two species are discussed further following the description of *Coprinus luteocephalus*.)

2. **Coprinus luteocephalus** Watling — Fig. 2

Coprinus luteocephalus Watling, Notes R. bot. Gdn Edinb. 31 (1972) 359.

Pileus 8–18 × 6–16 mm when still closed, ellipsoid, ovoid or oblong, first sulphur to citrine yellow, darker and more yellow towards the centre, becoming more yellow at maturity then isabelline towards the margin; expanded pileus 8–22 mm, distinctly umbonate, fibrillose scurfy throughout or more velvety at the disk, striate then sulcate at margin. Lamellae crowded, free, first whitish, then grey, finally violaceous black, whitish floccose at margin when young. Stipe up to 60 × 1–1.5 mm, 2–3 mm at base, hyaline or slightly brownish, equal except for slightly bulbous base which is coated with sulphur or olivaceous hyphae.

Spores [40, 2, 2] 9.6–11.8 × 5.3–6.8 µm, oblong, mainly rounded at apex, dark brown, with central, c. 1.6 µm wide germ pore; Q = 1.60–2.00, av. Q = 1.65–1.85; av. L = 10.3–10.9, av. B = 5.9–6.5 µm. Basidia 14–28 × 8–10 µm, 4-spored, surrounded by (3–)4–6 pseudoparaphyses. Pleurocystidia 75–175 × 25–50 µm, utriform, cylindrical or ellipsoid. Cheilocystidia 35–100 × 25–50 µm, globose to ellipsoid or broadly utriform. Elements of veil thin-walled, sometimes slightly thick-walled (< 0.5 µm) and yellowish, diverticulate, up to c. 100 × 2–10(–12) µm. Clamp-connections present.

Habitat & distribution — On horse dung, solitary or a few together. Very rare. Not known from the Netherlands. Only known to us by the two collections cited by Watling (l.c.) and the statement by Bender (1991: 11) from Germany.

Collections examined. GERMANY: Coll. *Bender* (as *C. xenobius*, but without annotations, herb. Bender, Germany). — GREAT BRITAIN: Scotland, Midlothian, Penicuik, Glencorse, *R.F.O. Kemp, Watling 7360* (from culture, *Kemp 556 1781*, see below).

The macroscopical description is based on Watling (l.c.). *Coprinus luteocephalus* is microscopically close to *C. xenobius* (for differences, see the discussion under *C. xenobius*). In subsect. *Alachuani* the only other species with oblong spores is *C. goudensis* and that species grows on wood, the spores are distinctly smaller and the cystidia are ellipsoid or subcylindrical, never utriform.

The status of the studied material is not clear. The envelope of *Watling 7360* was empty, and the available material originates from a culture by Kemp. It seems likely that the culture was made from the holotype material, but the original description mentions another collection by Kemp (England: Cumberland, Wigton, without date), which could have been the source of the culture.

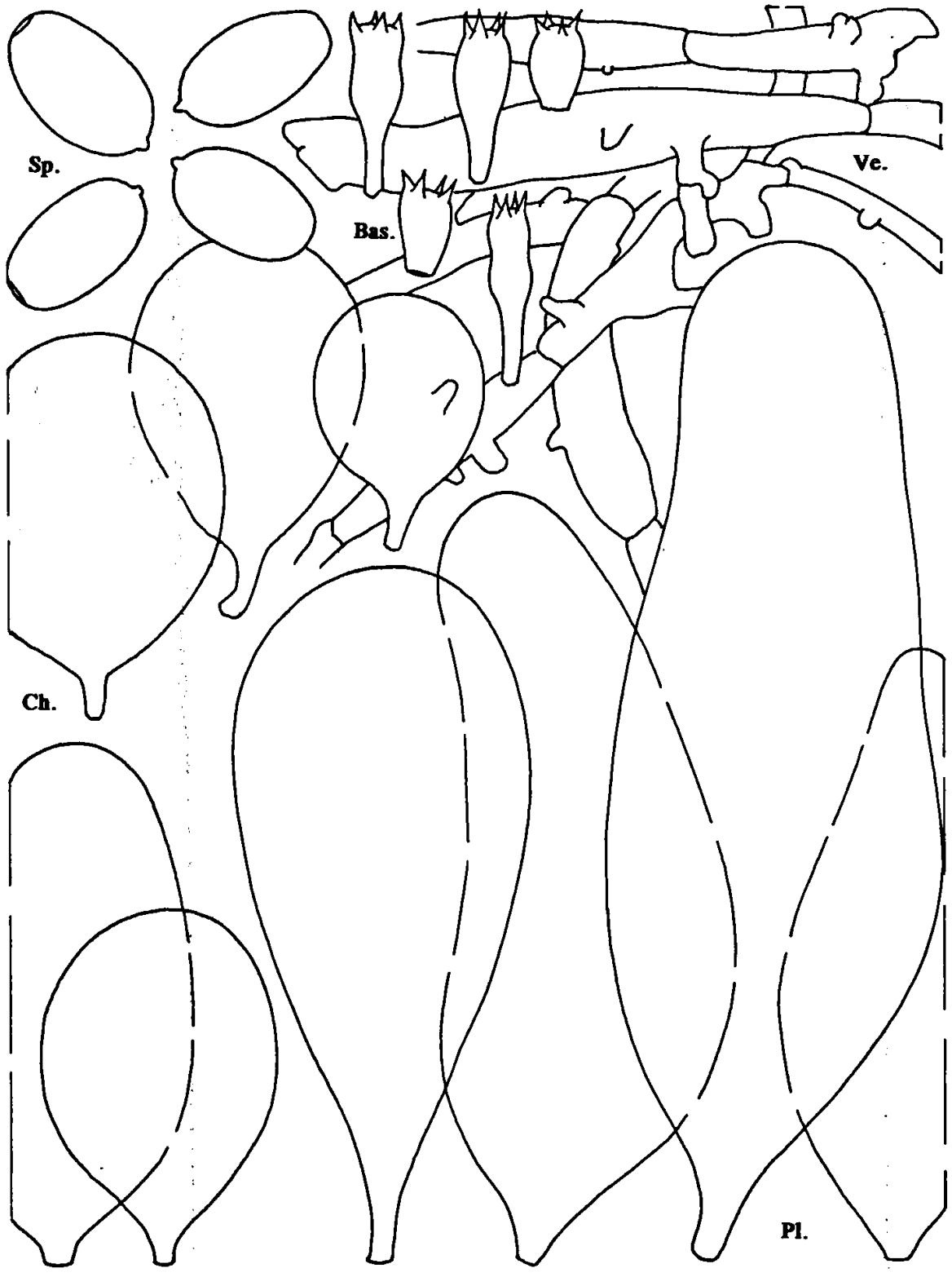

Fig. 2. *Coprinus luteocephalus* Watling. All figures from *R.F.O Kemp 556 1781* (culture from type?).

The collection from Germany (with spores 10–11.8 × 5.3–6.3 µm; Q = 1.75–2.00, av. Q = 1.85; av. L = 10.9, av. B= 5.9 µm) has been studied but is not included in the above description because of the poor macroscopical annotation. The sizes of the spores agree with those of *C. luteocephalus* but are somewhat narrower. Not noted are the colour and size of the pileus. The collection was labelled *C. xenobius* but that species has much larger spores.

The yellow colour and smaller spores should distinguish *Coprinus luteocephalus* from *C. xenobius*, but the Italian collections cited under *C. xenobius* have spores characteristic for *C. luteocephalus* while the basidiocarps lack the characteristic yellow tinges. This could mean that *Coprinus luteocephalus* may sometimes lack yellow tinges, and then only the spore-size is left to distinguish it from *C. xenobius*. It seems likely that one, variable taxon is involved but we need more material to confirm this.

3. **Coprinus spec.** (*Amsterdamse Bos 13 July 1958*) — Fig. 3

Pileus 20–40 × 15–30 mm when still closed, first white, later grey; expanded pileus up to 50 mm. Veil splitting up in small patches. Lamellae very crowded, free, first white then grey to blackish. Stipe up to 200 × 5–10 mm, white, greyish white, first covered with minute white flocks from veil, soon smooth; base bulbous, woolly-hairy.

Spores [20, 1, 1] 12.5–15.6 × 7.9–10.0 µm, ovoid or slightly amygdaliform, mainly rounded at apex, dark red-brown, with somewhat eccentric, 1.6–1.8 µm wide germ pore; Q = 1.45–1.70, av. Q = 1.55; av. L = 14.1, av. B = 9.1 µm. Elements of veil branched, weakly diverticulate with in part swollen cells, 40–200 × 4–8(–10) µm, inflated cells up to 15 µm. Clamp-connections present.

Habitat & distribution — Habitat not noted. Very rare, only known from one locality in the Netherlands.

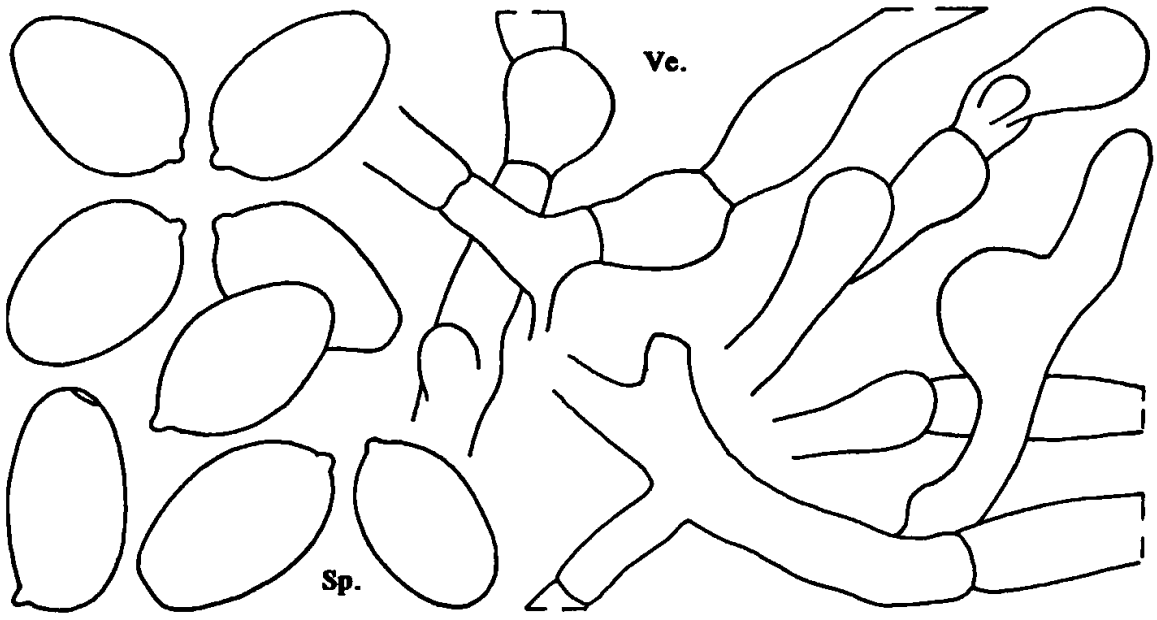

Fig. 3. *Coprinus spec.* (Amsterdamse Bos 13 July 1958). All figures from coll. *E. Kits van Waveren.*

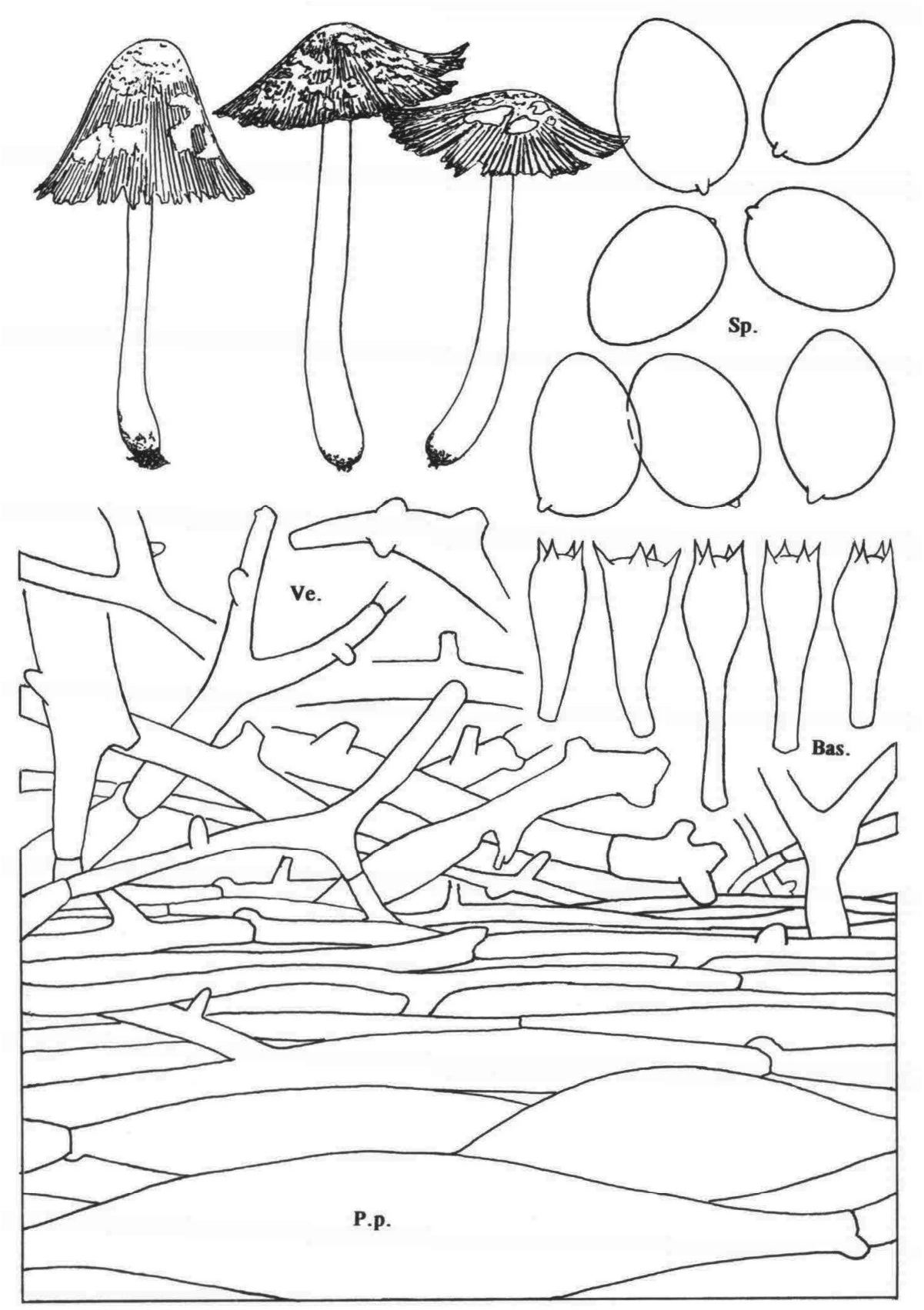

Fig. 4a. *Coprinus stanglianus* Enderle, Bender & Gröger. All figures from coll. *E. Arnolds 6478*.

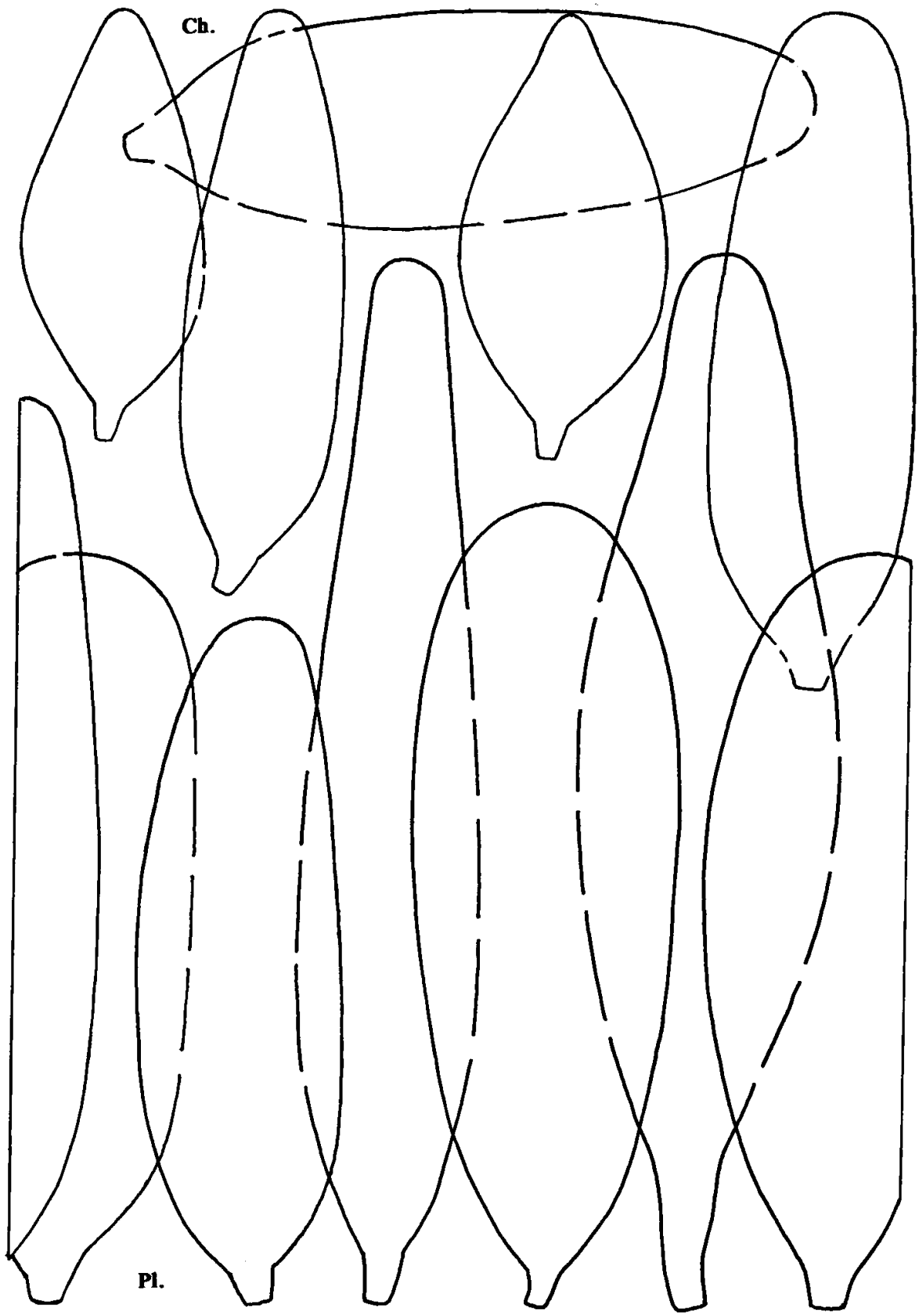

Fig. 4b. *Coprinus stanglianus* Enderle, Bender & Gröger. Pleuro- and cheilocystidia from coll. *E. Arnolds 6478.*

Collection examined. NETHERLANDS: prov. Noord-Holland, Amsterdam, Amsterdamse Bos, *E. Kits van Waveren*, 13 July 1958.

Only one specimen is present in the Rijksherbarium (L). This mature basidiocarp is in bad condition. Therefore no cystidia nor other important characters could be found in the material. Spore size of this basidiocarp, however, is clearly different from the closely related *Coprinus stanglianus* and *C. picaceus*. Therefore the description is included in this paper to draw attention to this taxon, in the hope that it will be collected again.

4. **Coprinus stanglianus** Enderle, Bender & Gröger — Fig. 4a, 4b

Coprinus stanglianus Enderle, Bender & Gröger, Z. Mykol. 54 (1988) 57–64.

Selected icons. Henrici & Læssøe, Mycologist 7 (1993) 87; Arnolds, Kuyper & Noordeloos, Overzicht Paddest. Ned. (1995) Pl. 4A; Enderle, Bender & Gröger, l.c., opposite p. 64.

Pileus 15–40 × 10–25 mm when still closed, ellipsoid or ovoid, first whitish, soon pale greyish or beige, cream-beige (Mu. 2.5 YR 7/2 to 10 YR 5/3; K. & W. 4B3 to 5D3), later with beige, greyish ochre or ochre-brown tinges. Veil at first whitish then splitting up in greyish beige to ochre-brown patches, the last particularly on disk. Lamellae very crowded, free, first whitish, then brownish, later grey-brown to dark grey, finally black. Stipe up to 120 × 3–10 mm, slightly attenuate upwards, white or grey-white, minute woolly fibrous, in particular at base.

Spores [60, 3, 3] 8.6–12.6 × 6.1–8.9 µm, ovoid or ellipsoid, rounded to somewhat acute at apex, very dark brown, with central, c. 1.5 µm wide germ pore; Q = 1.25 –1.65, av. Q = 1.40–1.50; av. L = 10.1–11.4, av. B = 6.9–8.0 µm. Basidia 18–47 × 8–13 µm, 4-spored, surrounded by (4–)5–7(–8) pseudoparaphyses. Pleurocystidia 75–165 × 21–50 µm, ellipsoid, oblong, utriform, narrowly utriform or cylindrical. Cheilocystidia 50–135 × 18–45 µm, utriform, ellipsoid, oblong or broadly conical. Elements of veil thin-walled, diverticulate, up to c. 100 × 4–8(–11) µm thick. Clamp-connections present.

Habitat & distribution — Solitary or a few together, in dry limestone grasslands. Very rare in the Netherlands and Belgium, rare in Germany. Usually found on calcareous soil. In the Netherlands mainly found in the South of prov. Limburg on chalky loam.

Collections examined. BELGIUM: Ave et Auffe, 6 Sept. 1975, *P.B. Jansen 75-344*; Rochefort, 10 Sept. 1975, *P.B. Jansen 75-343*. — NETHERLANDS: prov. Overijssel, Oldenzaal, Delden, 26 Sept. 1980, collector not noted; prov. Limburg, Maastricht, Pietersberg, 9 Oct. 1993, *E. Arnolds 6478*.

Coprinus stanglianus is rather similar to *C. picaceus*, but that species has distinctly larger spores and somewhat larger basidiocarps. Macroscopically also *C. kimurae* is close but that species has smaller spores of different shape.

5. **Coprinus picaceus** (Bull.: Fr.) S.F. Gray — Fig. 5

Coprinus picaceus (Bull.: Fr.) S.F. Gray, Nat. Arr. Br. Pl. I (1821) 634.

Agaricus picaceus Bull.: Fr., Syst. mycol. I (1821) 308.

Selected icons. Phillips, Mushr. other Fungi (1981) 178; Jamoni, Funghi Ambiente 47 (1988) between 16 and 17, pl. 118; Anonymous, Mycologist 6 (1992) 15; Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 246, pl. 297.

Pileus 20–70 × 15–40 mm when still closed, ellipsoid or ovoid, first covered with whitish, soon pale greyish or beige, cream-beige, later beige, greyish ochre or ochre-brown

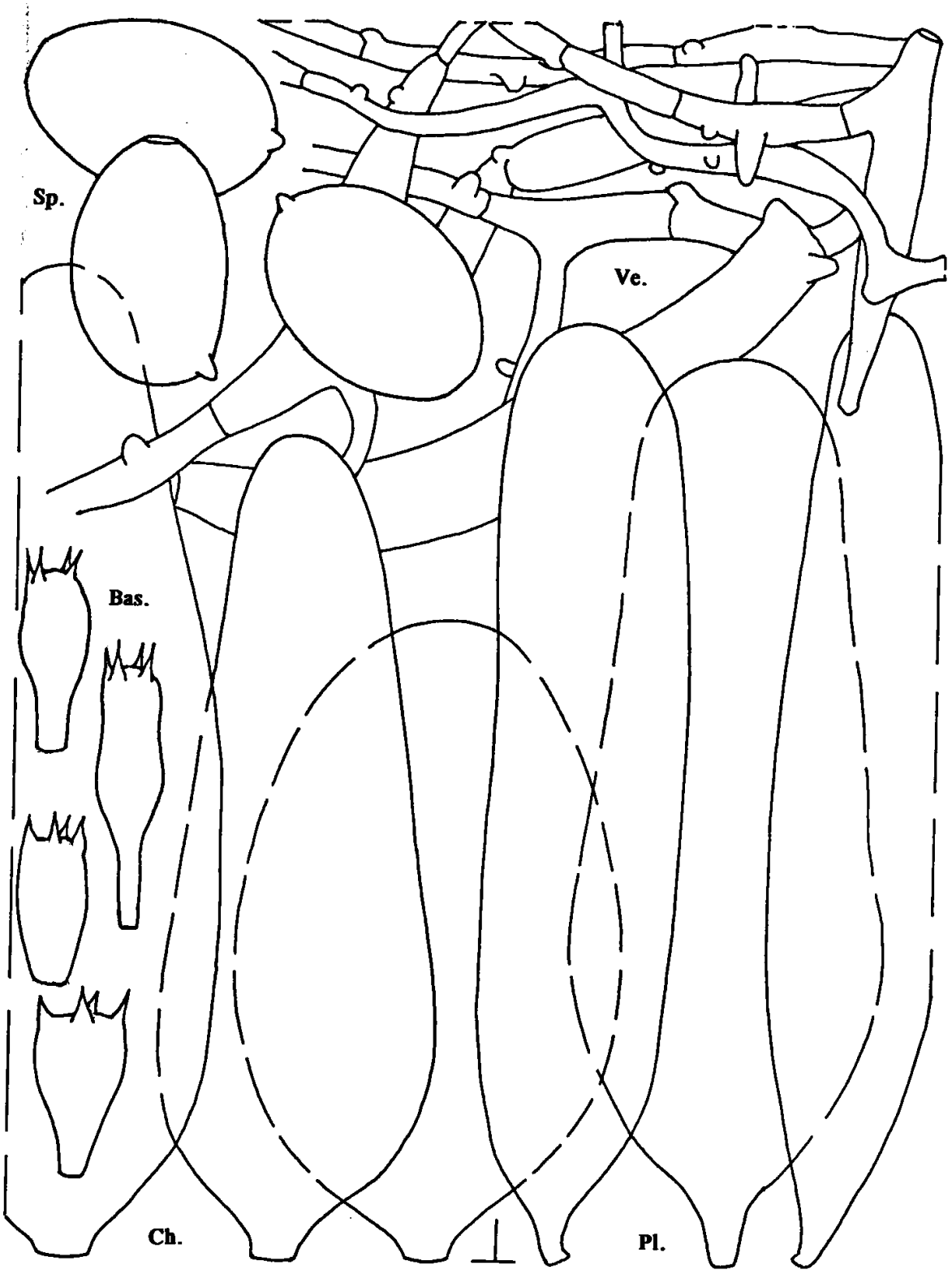

Fig. 5. *Coprinus picaceus* (Bull.: Fr.) S.F. Gray. All figures from coll *P.B. Jansen 88-152.*

veil, breaking up in patches. Lamellae very crowded, free, first whitish, then brownish, later grey-brown to dark grey, finally black. Stipe up to 300 × 6–15 mm, slightly attenuate upwards, white or grey-white, minute woolly fibrous, in particular at base.

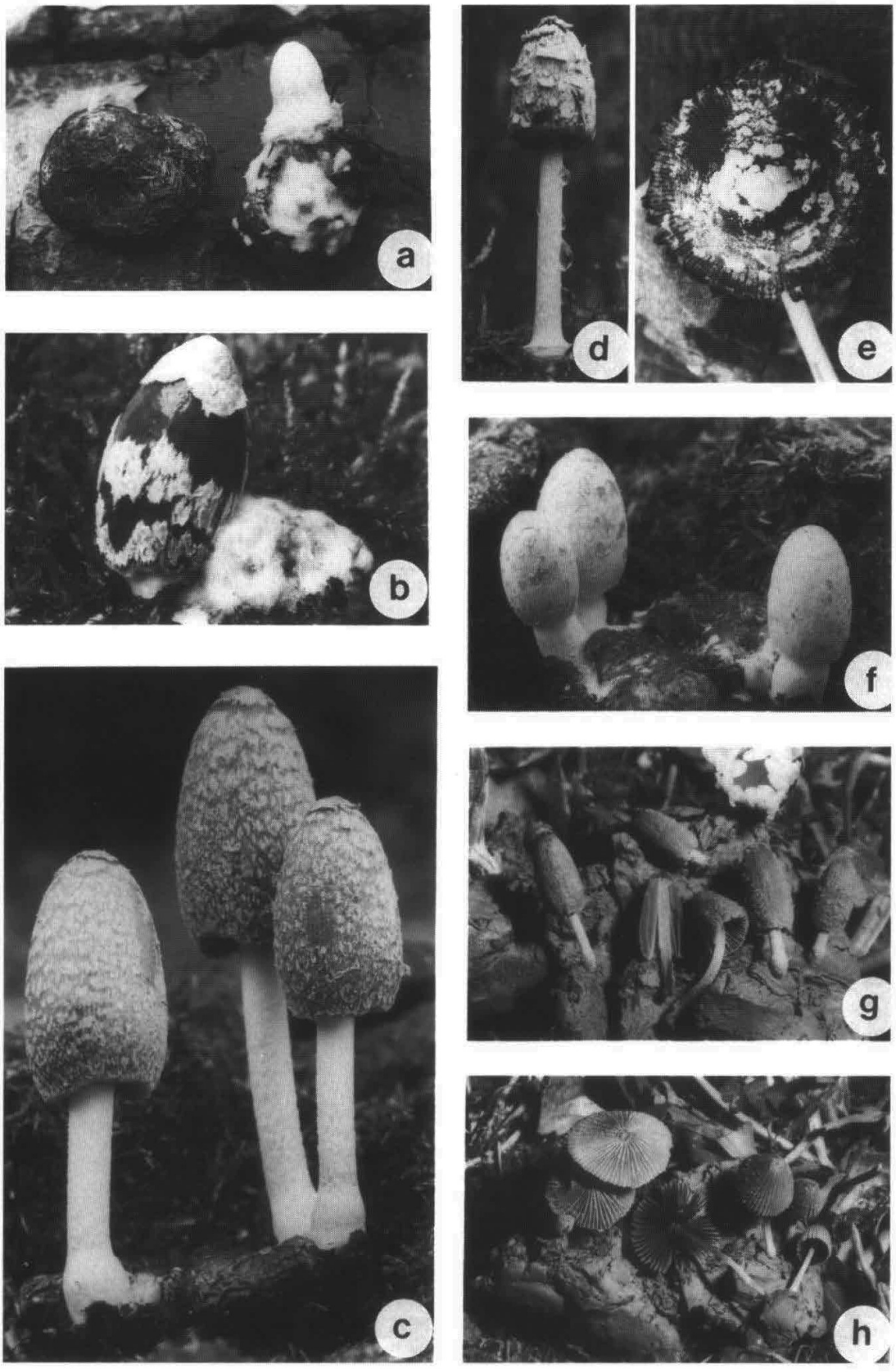

Plate 1. *Coprinus sclerotiorum*. a. Sclerotium with primordium; b, d. veil breaking up in patches; c. veil breaking up in fine scales; e. old pileus; f. young basidiocarps on sclerotium (a, b, f, × 1.6; d, e, × 1.4; c, × 4). — *Coprinus fluvialis*. g, h. basidiocarps (× 1.6).

Spores [120, 6, 4] 14.0–18.8 × 9.6–13.0 µm, ellipsoid or ovoid, rounded at apex, very dark brown, almost black, with central, c. 2.5 µm wide germ pore; Q = 1.25–1.60, av. Q = 1.35–1.50; av. L = 14.7–16.9, av. B = 10.7–11.6 µm. Basidia 16–46 × 12–15 µm, 4-spored, surrounded by 5–8 pseudoparaphyses. Pleurocystidia 100–165 × 28–50(–60) µm, utriform, cylindrical, conical or ellipsoid. Cheilocystidia 80–150 × 24–50 µm, utriform, broadly utriform, ellipsoid or conical. Elements of veil thin-walled, diverticulate, up to c. 100(–175) × (3–)5–14(–18) µm. Clamp-connections present.

Habitat & distribution — Solitary or a few together, on calcareous soil or chalky loam, mainly in *Fagus* forests. Rare but widespread in Europe. In the Netherlands only known from the valley of the river IJssel.

Collections examined. LUXEMBOURG: Hundsdorf, 29 Sept. 1988, *L. Laarman, P.B. Jansen 88-152.* — NETHERLANDS: prov. Gelderland, Zutphen, Wichmond, estate 'Zuideras', 26 Oct. 1991, *C. Bas 8806.*

The very large spores with a breadth of 10–13 µm in addition to the habitat not on dung are the salient features of *Coprinus picaceus*. All species in subsect. *Alachuani*, except for *Coprinus picaceus* and *C. sclerotiorum* (growing on sclerotia in dung), have spores whose breadth is always less than 10 µm. The macroscopically similar *Coprinus stanglianus* and *C. kimurae* can readily be distinguished on spore size.

6. **Coprinus sclerotiorum** Horvers & de Cock, *spec. nov.* — Fig. 6a, 6b and Plate 1

Pileus primo usque ad 18 mm altus, 13 mm latus subglobosus, ellipsoideus, ovoideus vel conicus, demum campanulatus vel applanatus, usque ad 25 mm latus, albus demum brunneo-griseus vel violaceo-griseus vel ater, primo totus tomentosus demum flocculosus cum velo albo. Lamellae liberae, valde confertae, ex albo nigricantes. Stipes usque ad 120 × 5-6 mm, versus basim incrassatus, albus. Sporae [40, 2, 1] 13.3-17.5 × 10.3-12.3 × c. 9-10.5 µm, in antice angulato-ovoideae, in facie ellipsoideae vel cylindrico-ellipsoideae, obscure rufo-brunneae vel atrae poro germinativo centrico obscuro lato 2.5 µm instructae. Basidia 22–40 × 12–17 µm, 4-sporigera. Pseudoparaphyses 5–8(–9). Pleurocystidia 80–125(–160) × 30–40 µm, cylindracea, subutriformia, oblonga vel ellipsoidea. Cheilocystidia 60-100 × 30–40 µm, ellipsoidea vel ovoidea, late ellipsoidea, ellipsoidea, oblonga vel utriformia. Velum e elementis diverticulatis, 2–7 µm latis, tenuitunicatis, valde incrustatis. Pileipellis cutis hyphis cylindraceis vel inflatis, tenuitunicatis. Fibulae absentes, pseudofibulae praesentes. Ad sclerotia crescens in fimo bovino.

Holotypus: The Netherlands, prov. Noord-Brabant, Tilburg, 'de Sijsten', 6–26 May 1996, *B. Horvers* (L).

Pileus up to 18 mm high and 13 mm wide when still closed, first globose (primordia), soon ellipsoid, ovoid or conical, then campanulate, flattened when fully expanded and up to 25 mm wide. Veil a thick, felty layer, white, covering the whole pileus when young, splitting up in patches during expanding; pileus first white under veil, then pale to dark grey-brown (Mu. 10 YR 5/4, 4/4, 3/3, 3/1; K. & W. 5D4, 5E6, 5E5, 5F4), finally fuscous violaceous grey to black. Surface of pileus (below veil) often covered with a very thin gelatinous layer. Lamellae very crowded, up to 3.5 mm broad, white when very young, soon grey to dark grey with white edge, later black. Stipe up to 120 × 5–6 mm, white, somewhat fibrous, with yellow-brown drops when fresh, slightly widened downwards; after margin of pileus gets loose from bulbous base, a small, volva-like margin remains, with a finely striate imprint from the lamellae. Sclerotia subglobose, somewhat irregular, c. 10 mm in diam. or finger-shaped and then up to 35 × 10 mm, very dark brown.

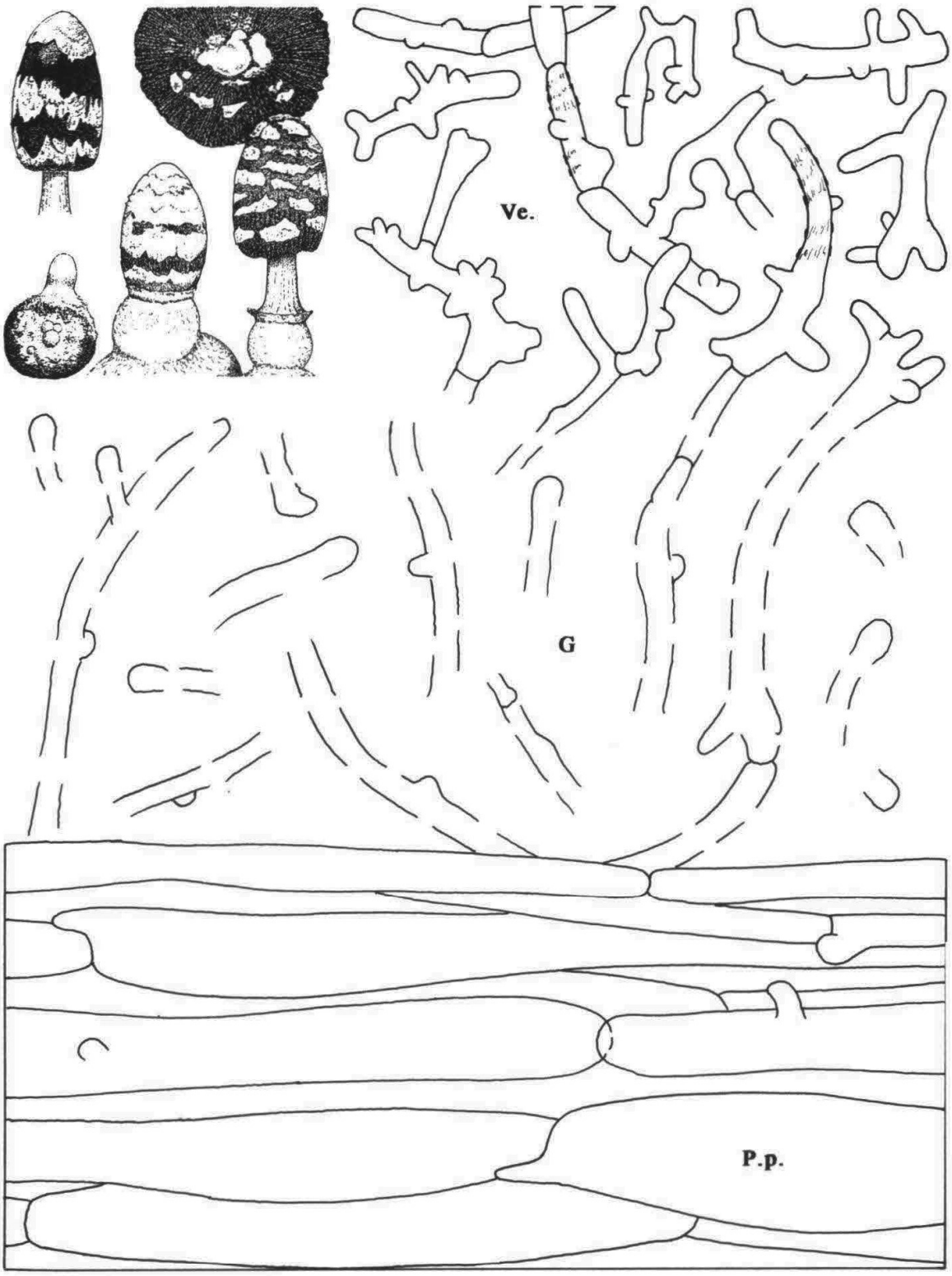

Fig. 6a. *Coprinus sclerotiorum* Horvers & de Cock. G = gelatinous layer on pileus. All figures from holotype.

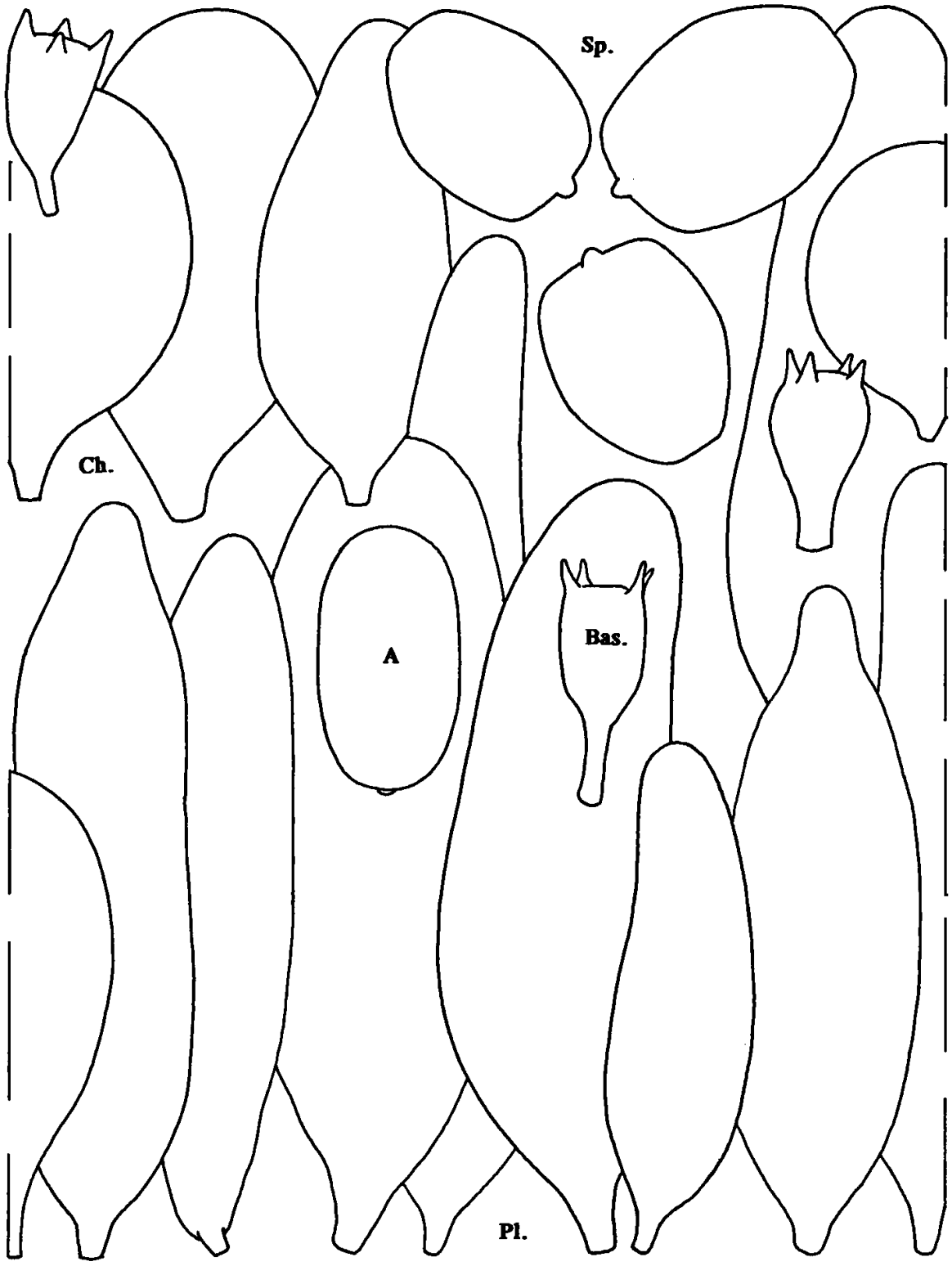

Fig. 6b. *Coprinus sclerotiorum* Horvers & de Cock. A = Spore in side view. All figures from holotype.

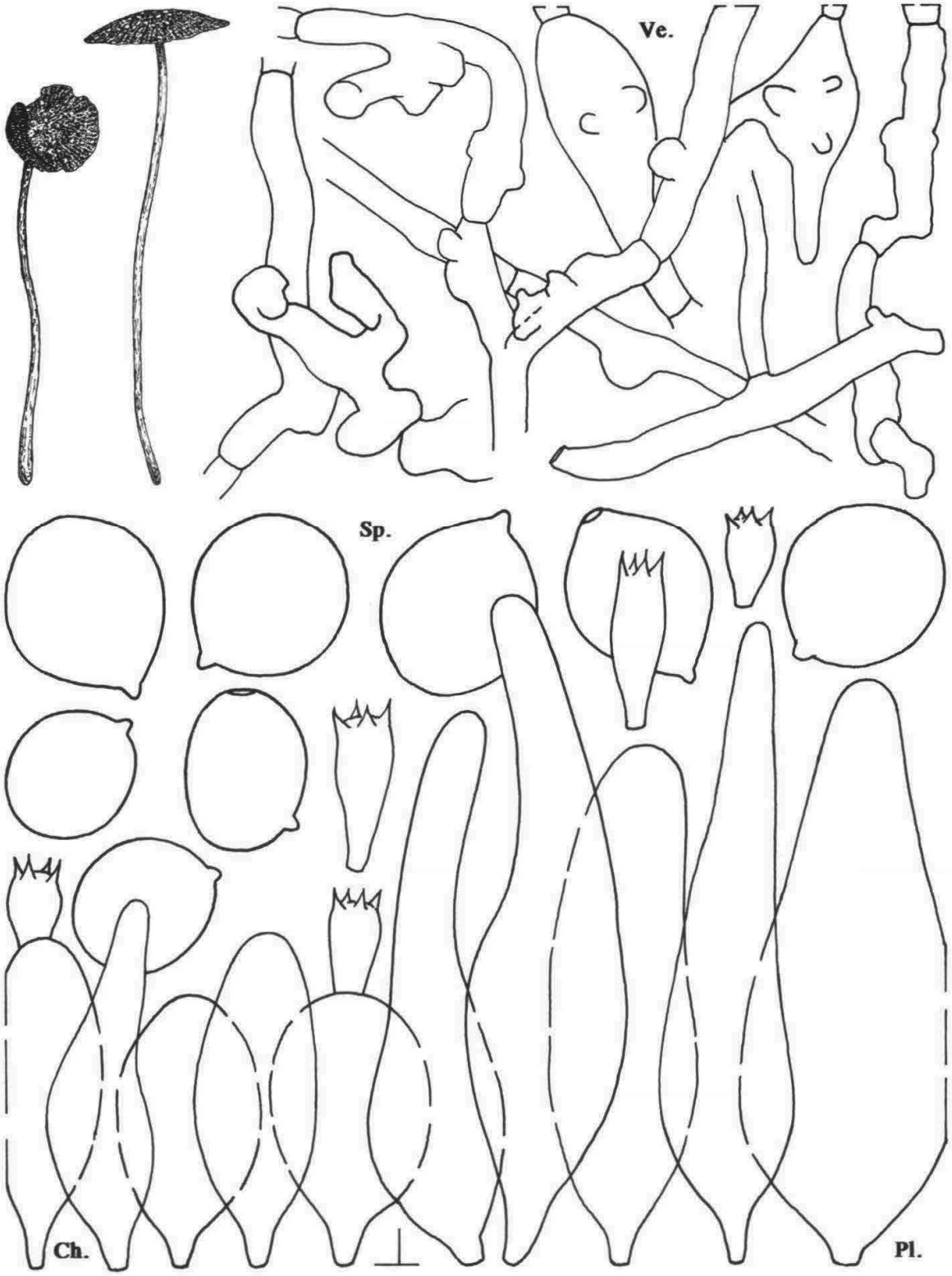

Fig. 7. *Coprinus kimurae* Hongo & Aoki. All figures from coll. *C.B. Uljé 1215*. Basidiocarps from dried material.

Spores [40, 2, 1] 13.3–17.5 × 10.3–12.3 × c. 9–10.5 µm, rounded angular ovoid in frontal view, ellipsoid to cylindrical ellipsoid in side view, lentiform, rather truncate, very dark red-brown, almost black, with central, hardly visible, c. 2.5 µm wide germ pore; Q = 1.25–1.45, av. Q = 1.35; av. L = 14.7–15.7, av. B = 11.1–11.3 µm. Basidia 22–40 × 12–17 µm, 4-spored, surrounded by 5–8(–9) pseudoparaphyses. Pleurocystidia 80–125(–160) × 25–45 µm, cylindrical, subutriform, oblong or ellipsoid. Cheilocystidia 60–100 × 30–40 µm, ellipsoid or ovoid, broadly ellipsoid, ellipsoid, oblong or utriform. Elements of veil diverticulate, thin-walled, 2–7 µm wide. Between surface of pileus and veil a slimy layer is present, 70–100 µm thick and mixed with velar elements. Pileipellis made up of filamentous, in part inflated elements. Clamp-connections not found, only pseudoclamps (Uljé & Noordeloos, 1993: 263).

Habitat & distribution — On sclerotia (see notes) in dung of cow (Limousines). Solitary. Very rare, only known from type-locality.

Collection examined. NETHERLANDS: prov. Noord-Brabant, Tilburg, 'de Sijsten', 6–26 May 1996, *B. Horvers* (holotype, L).

The specimens studied did develop in culture on the collected sclerotia which were put in a transparent synthetic box, on wet moss. The sclerotia were collected in April 1996, and basidiocarps developed on 6, 22, 24 and 26 May 1996.

On account of the diverticulate veil the species belongs to the subsect. *Alachuani*. Related species with large spores are *C. picaceus* and *C. stanglianus*, but those species never grow on dung and have ellipsoid spores.

The gelatinous layer between surface of pileus and veil is not always present, only in wet conditions. If present, it can also be found in dried specimens.

7. **Coprinus kimurae** Hongo & Aoki — Fig. 7

Coprinus kimurae Hongo & Aoki, Trans. mycol. Soc. Japan 7 (1966) 16.

Selected icons. Imazeki, Otani & Hongo, Fungi Japan (1988) 204; Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 238 (pl. 284).

Pileus 15–30 × 6–18 mm when still closed, 45 mm when expanded, oblong, often somewhat conical, first covered with a layer of white, woolly-felty veil, breaking up in patches, later often cream or ochre-brown coloured. Lamellae, L = 60–80, l = 1–5, free, first white to beige, then grey-brown to dark grey, finally black. Stipe up to 120 × 2–6 mm, white, greyish white, minutely fibrillose-floccose, later glabrous; base slightly bulbous and white felty.

Spores [80, 3, 4] 9.0–12.7 × 8.2–11.7 µm, subglobose or broadly ellipsoid, sometimes with slightly apical papilla, slightly narrower in side view (c. 0.5 µm), rounded at apex, dark red-brown, with central to slightly eccentric, c. 1.6 µm wide germ pore, which is often difficult to observe; Q = 1.00–1.25, av. Q = 1.05–1.15; av. L = 10.9–11.3, av. B = 9.5–10.7 µm. Basidia 16–32 × 9–13 µm, 4-spored, surrounded by 5–7(–8) pseudoparaphyses. Pleurocystidia 60–200 × 20–26(–40) µm, (narrowly) utriform, (sub)cylindrical, lageniform or conical. Cheilocystidia 50–120 × 20–32 µm, (narrowly) utriform, (sub)cylindrical, (narrowly) conical or sublageniform. Elements of veil thin-walled, diverticulate, 3–10(–18) µm wide. Clamp-connections absent.

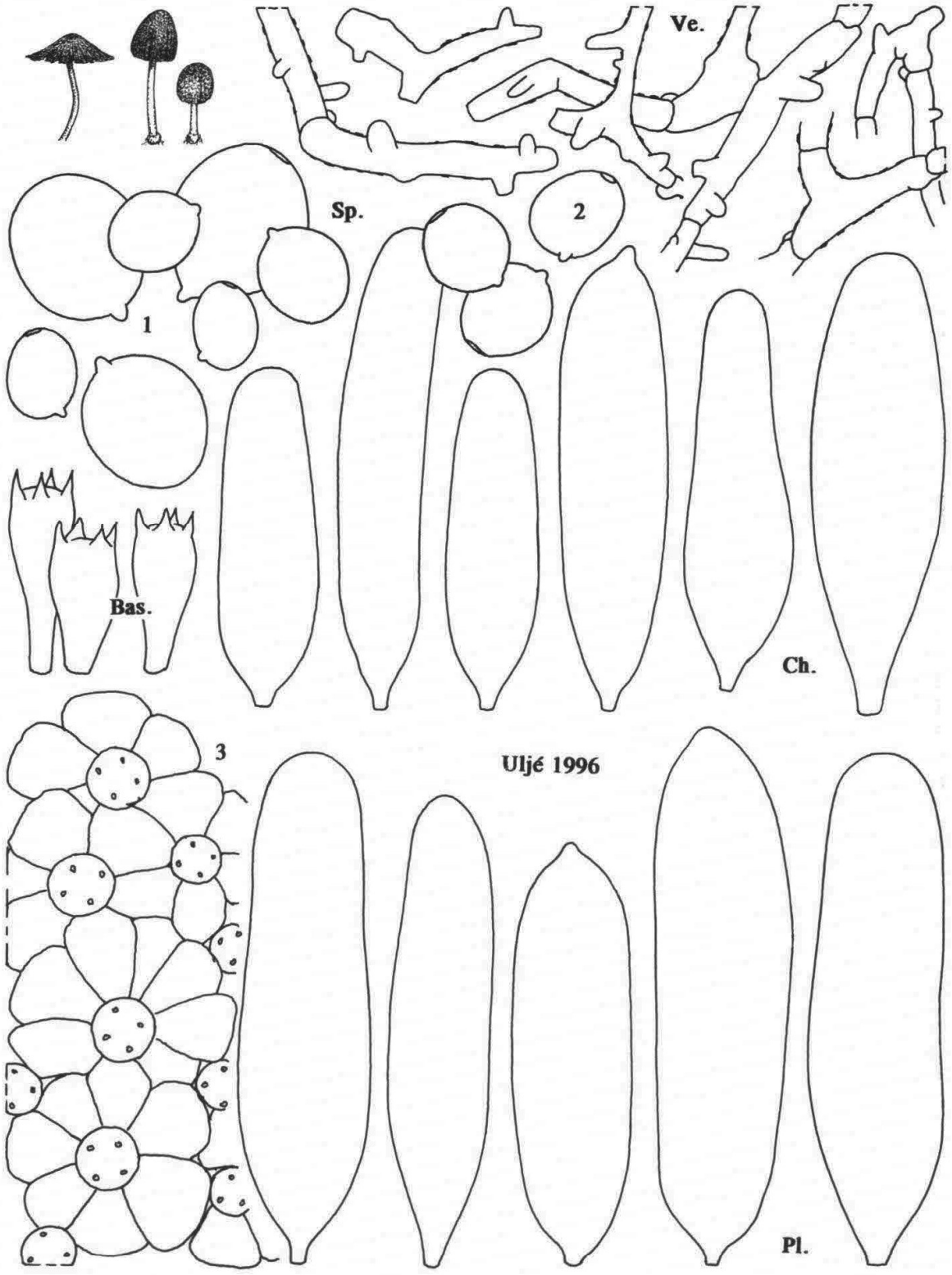

Fig. 8. *Coprinus kubickae* Pilát & Svrček. — Spores 1: × 2000, 2: × 1200. — 3. Fragment of lamella: basidia surrounded by pseudoparaphyses. All figures from coll. *Chrispijn*, 10 July 1996.

Habitat & distribution — In small groups, a few together on straw (gh), rice-straw (Japan) and on rotting material made up of natural materials like coconut mattings, lime ceilings mixed with straw, cotton textiles, etc. Rare. Europe, Canada, Japan. In Western Europe in most cases indoors and in greenhouses.

Collections examined. NETHERLANDS: prov. Utrecht, Baarn, 6 Febr. 1973, *H. v.d. Aa*, herb. *Daams 73-26* (gh); Maarsseveen, 15 Febr. 1973, *J. Daams 73-34* (gh); prov. Zuid-Holland, Leiden, 28 Oct. 1991, *E. Prous Kluit* (indoors).

Coprinus kimurae can be recognised by the subglobose to broadly ellipsoid spores, the absence of clamp-connections, the rather large basidiocarps, the veil breaking up in patches (similar to *C. picaceus*) and the habitat.

Considering the occurrence indoors in (heated) greenhouses, and outdoors in places like compost heaps and on rotten coconut-fibre fabric, it is likely that *Coprinus kimurae* is a thermophilic fungus. In the Netherlands it is found in greenhouses, although the species has been found outdoors on a coconut matting (in a sheltered garden) and there is one recording from a compost heap, which probably was in a greenhouse.

In earlier publications (Uljé, 1995a: 11 and Uljé, 1995b: 119) the first author considered that *C. kubickae* was synonymous with *C. kimurae,* but further study has indicated that this opinion was wrong. *Coprinus kubickae* is a very small species with veil breaking up in very small flocks and not in patches, with on average somewhat smaller spores, narrower elements of veil, presence of clamp-connections and a habitat which is clearly different.

8. **Coprinus kubickae** Pilát & Svrček — Fig. 8

Coprinus kubickae Pilát & Svrček, Česká Mykol. 21 (1967) 142.
Coprinus amphibius Anastasiou, Can. J. Bot. 45 (1967) 2213.

Pileus 3–6(–10) × 2.5–5(–8) mm when still closed, up to 10(–18) mm when expanded, first subglobose, ellipsoid or ovoid and ochre-brown (K. & W. 6E5) or mocha brown, soon becoming pale grey to grey, covered with minute flocculose veil. Lamellae, L = c. 34, l = 1–3, free, first white to beige, than grey-brown to dark grey, finally black. Stipe up to 30 × 0.5–1.5 mm, white, minutely fibrillose-floccose, later glabrous; base bulbous, with tomentose, basal disk.

Spores [440, 22, 19] 6.8–11.7 × 6.2–10.4 µm, subglobose or broadly ellipsoid, rounded at apex or slightly acute, medium to dark red-brown, with central to slightly eccentric, 1.3–1.6 µm wide germ pore, which is often difficult to observe; Q = 1.00–1.35, av. Q = 1.05–1.25; av. L = 8.1–10.7, av. B = 7.5–9.2 µm. Basidia 14–36 × 8–11.5 µm, 4-spored, surrounded by 5–8 pseudoparaphyses. Pleurocystidia 55–110(–200) × 12–20(–28) µm, utriform or (sub)cylindrical. Cheilocystidia 35–80(–120) × 11–20(–28) µm, (narrowly) utriform, (sub)cylindrical or conical. Elements of veil thin-walled, diverticulate, 2–6 µm wide. Clamp-connections present.

Habitat & distribution — Solitary or a few together on dead *Phragmites, Juncus* and *Carex*, in greenhouses on rich soil and rotten straw. Rare, but probably overlooked. Europe, but probably also in other regions.

Fig. 9. *Coprinus strossmayeri* (Kawam.) Hongo & K. Yokoyama. All figures from coll. *V. Coccia*.

Collections examined. NETHERLANDS: prov. Groningen, Ulrum, Lauwersmeer, 10 July 1996, *R. Chrispijn* (herb. Chrispijn); prov. Noord-Holland, 's-Graveland, 13 March 1971, *E. Kits v. Waveren* (gh); Kortenhoef, 26 Febr. 1971, *J. Daams 71-11* (gh); idem, 27 Febr. 1971, *J. Daams 71-16* (gh); idem, 1 March 1971, *J. Daams 72-21* (gh); idem, 5 March 1971, *J. Daams* (gh); idem, 8 March 1971, *J. Daams 71-24* (gh); idem, 13 March 1971, *J. Daams 71-36* (gh); idem, 8 May 1971, *J. Daams 71-124* (gh); idem, 7 March 1972, *J. Daams 72-39* (gh); idem, 9 March 1972, *J. Daams 72-25* (gh); idem, 8 Febr. 1973, *J. Daams 73-32* (gh); idem, 16 Febr. 1973, *J. Daams 73-37* (gh); idem, 6 March 1973, *J. Daams 73-51* (gh); prov. Utrecht, Maarsseveen, 31 Jan. 1973, *J. Daams 73-23* (gh); Vleuten, 25 Febr. 1972, *J. Daams 71-44* (gh); prov. Zuid-Holland, Dubbeldam, 29 Jan. 1971, *P.B. Jansen 792* (gh); Gouderak, Veerstalblok, 25 June 1981, *P.B. Jansen 81/142*. — CZECHIA: Třeboň, on *Juncus*, 8 July 1953, *J. Kubička*, coll. no. PR 626344 (holotype, PRM).

The colour, size of the basidiocarps, habitat and the subglobose spores are characters to identify *Coprinus kubickae* (for discussion see under *C. kimurae*).

In greenhouses the basidiocarps become larger (see sizes between parentheses), as do the pleuro- and cheilocystidia.

9. **Coprinus strossmayeri** S. Schulz. — Fig. 9

Coprinus strossmayeri S. Schulz., Verh. zool. bot. Ges. Wien 28 (1879) 430.

Coprinus rhizophorus Kawam., Icons Jap. Fungi 5 (1954) 559 (no Latin description); Kawam. ex Hongo & K. Yokoyama, Trans. mycol. Soc. Japan 17 (1976) 140.

Selected icon. Enderle & Bender, Z. Mykol. 56 (1990) opposite 40.

Pileus up to 40 × 25 mm when still closed, up to 45(–60) mm wide when mature, but never fully expanded; young pileus at first ellipsoid, ovoid, broadly cylindrical, then paraboloid, obtusely conical or campanulate with rounded umbo, finally subumbonate, completely covered with white veil when young, later splitting up in small, white or cream (Mu. 10 YR 8/2; K. & W. 4A2) felty patches, dirty yellow at centre (Mu. 10 YR 7/4, 7/6; K. & W. 5B3, 5B4); pileus below veil greyish to ochraceous, in particular at centre ochre-brown, paler towards margin (from centre to margin: Mu. 10 YR 6/3, 5/2, 6/2, 7/2, 8/2; K. & W. 5C3, 5D3, 5C2, 5B2, 5A2); primordia often cream coloured (Mu. 10 YR 7/6; K. & W. 5B4). Lamellae, L = more than 60, l = 3–5(–7), very crowded, free, first white, then grey-brown to dark brown, finally black. Stipe up to 120 × 4–10 mm, cylindrical, hollow, whitish, slightly yellowish (Mu. 10 YR 7/4, 8/4; K. & W. 5B3, 5D/E5) in the middle, somewhat fibrous with scattered velar remnants; base equal or slightly enlarged with mycelium remnants, finally and fleetingly hairy; stipe develops from orange-brown to dark brown rhizomorphs, 20–30 cm in length and up to 3 mm thick, densely available in upper 10 cm of bottom between and adherent to wooden remnants. Yellow-brown drops often are present on fresh specimens. Smell fungoid but rhizomorphs with strong smell of truffle or mould.

Spores [140, 7, 4] 6.9–8.9 × 4.7–6.0 × c. 4.5–5.2 µm, ovoid or ellipsoid with rounded apex, dark red-brown, with central, 1–1.3 µm wide germ pore; Q = 1.35–1.70, av. Q = 1.50–1.55; av. L = 7.7–8.2, av. B = 5.1-5.6 µm. Basidia 13–32 × 6–9 µm, 4-spored, surrounded by 3–5 pseudoparaphyses. Pleurocystidia 70–180 × 24–50 µm, ellipsoid, oblong, sublageniform or utriform. Cheilocystidia 40–170 × 15–40 µm, to a large extent utriform and then often with rather long neck (sublageniform), ellipsoid, oblong or fusiform. Elements of veil thin-walled, branched, weakly diverticulate, 50–100 × (2–)4–9

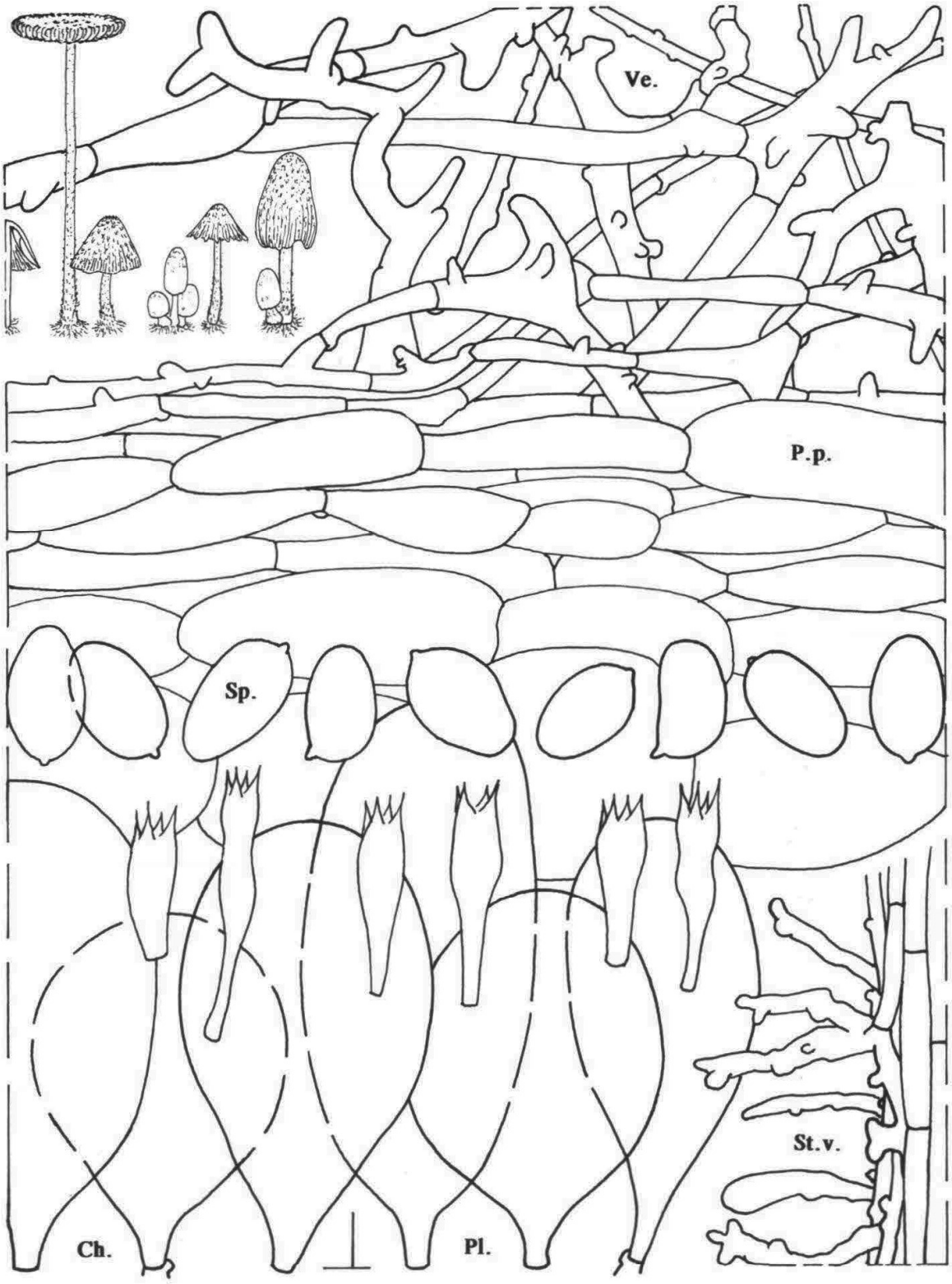

Fig. 10. *Coprinus goudensis* Uljé & Bas. All figures from coll. *C.B. Uljé 1213* (holotype).

(–14) µm wide, in part slightly thick-walled (less than 0.5 µm) and pale yellowish incrusted. Clamp-connections present.

Habitat & distribution — Fasciculate on wood or woody remnants of broad-leaved trees, often dozens of basidiocarps together. Very rare. Europe, Japan. Occurs from May to July.

Collection examined. GERMANY: Lebau, 27 May 1984, *A. Hausknecht* (herb. Bender, Germany); Heiszenheim, 3 June 1984, *Mr. Matske* (herb. Bender, Germany). — ITALY: Marlia, Lucca-Toscano, 21 May 1994, *V. Coccia* (two collections received, the second without annotations, probably representing a part of first collection). — NETHERLANDS: prov. Utrecht, Breukelen, estate 'Nijenrode', 10 June 1996, *G.J. Immerzeel* (coll. *C.B. Uljé 1290*).

Coprinus strossmayeri is recognizable in the field by the rather large basidiocarps growing in clumps like *C. atramentarius* but in contrast to that almost smooth species the young specimens of *C. strossmayeri* are covered with thick, white veil breaking up in small, felty scales when pileus expands. These scales are somewhat larger than the flocculose scales of species in subsect. *Domestici* (sect. *Micacei*) and more persistent. The basidiocarps of *C. strossmayeri* are more slender and more conical when mature. The base of the stipe in *C. strossmayeri* is connected to dense, dark orange-brown rhizomorphs with strong smell of mould. Microscopically *C. strossmayeri* is distinguished from species in subsect. *Domestici* in having diverticulate velar hyphae and distinct ovoid spores (in subsect. *Domestici* the elements of veil are in chains, globose in great part, never diverticulate and the spores are cylindrical-ellipsoid or ellipsoid).

10. **Coprinus goudensis** Uljé & Bas — Fig. 10

Coprinus goudensis Uljé & Bas, Persoonia 15 (1993) 363.

Pileus 5–12 × 4–9 mm when still closed, up to 20 mm when expanded, first ellipsoid, ovoid or conical, white, soon greyish. Veil white, breaking up in small, radial, hairy-fibrillose scales. Lamellae, L = 23–26, l = 0–3, rather crowded, free, first white, then grey-brown to blackish. Stipe up to 40 × 1–1.5 mm, white, greyish white, minutely white floccose, in particular at clavate base.

Spores [140, 6, 4] 7.0–9.8(–10.7) × 4.6–6.2(–6.9) µm, oblong, sometimes ellipsoid or ovoid with rounded apex, rather pale (dirty) red-brown and central, c. 1.3 µm wide germ pore; Q = 1.45–1.90, av. Q = 1.55–1.70; av. L = 8.4–9.1, av. B = 5.0–5.6 µm. Basidia 18–40 × 7–9 µm, 4-spored, surrounded by (3–)4–5(–6) pseudoparaphyses. Pleurocystidia 60–100 × 35–50 µm, broadly cylindrical or oblong to ellipsoid. Cheilocystidia 30–80 × 20–50 µm, (sub)globose to ellipsoid, oblong or obovoid, sometimes subutriform or subcylindrical. Elements of veil thin-walled, diverticulate, 3–10(–15) µm wide; excrescences up to c. 15 µm in length. Clamp-connections present.

Habitat & distribution — In small groups, a few together on dead wood (*Acer* and *Populus*), very rare. Only known from a few localities in the Netherlands and Germany.

Collections examined. GERMANY: Neersbroich, 7 Aug. 1987, *H. Bender* (herb. Bender, Germany); Thüringen, Remstädt, 25 May 1996, *F. Gröger* (herb. Gröger, Germany). — NETHERLANDS: prov. Zuid-Holland, Reeuwijk, Reeuwijker Hout, 20 Oct. 1991, *C.B. Uljé 1213* (holotype, L); idem, 14 Nov. 1991, *C.B. Uljé 1217*; prov. Zeeland, Hontenisse, Vogelwaarde, 21 Sept. 1981, *A. de Meijer 397*.

Coprinus goudensis can easily be recognized by the ellipsoid spores which in average are less than 10 µm long, having an average quotient of 1.6 or more, and the lignicolous habitat.

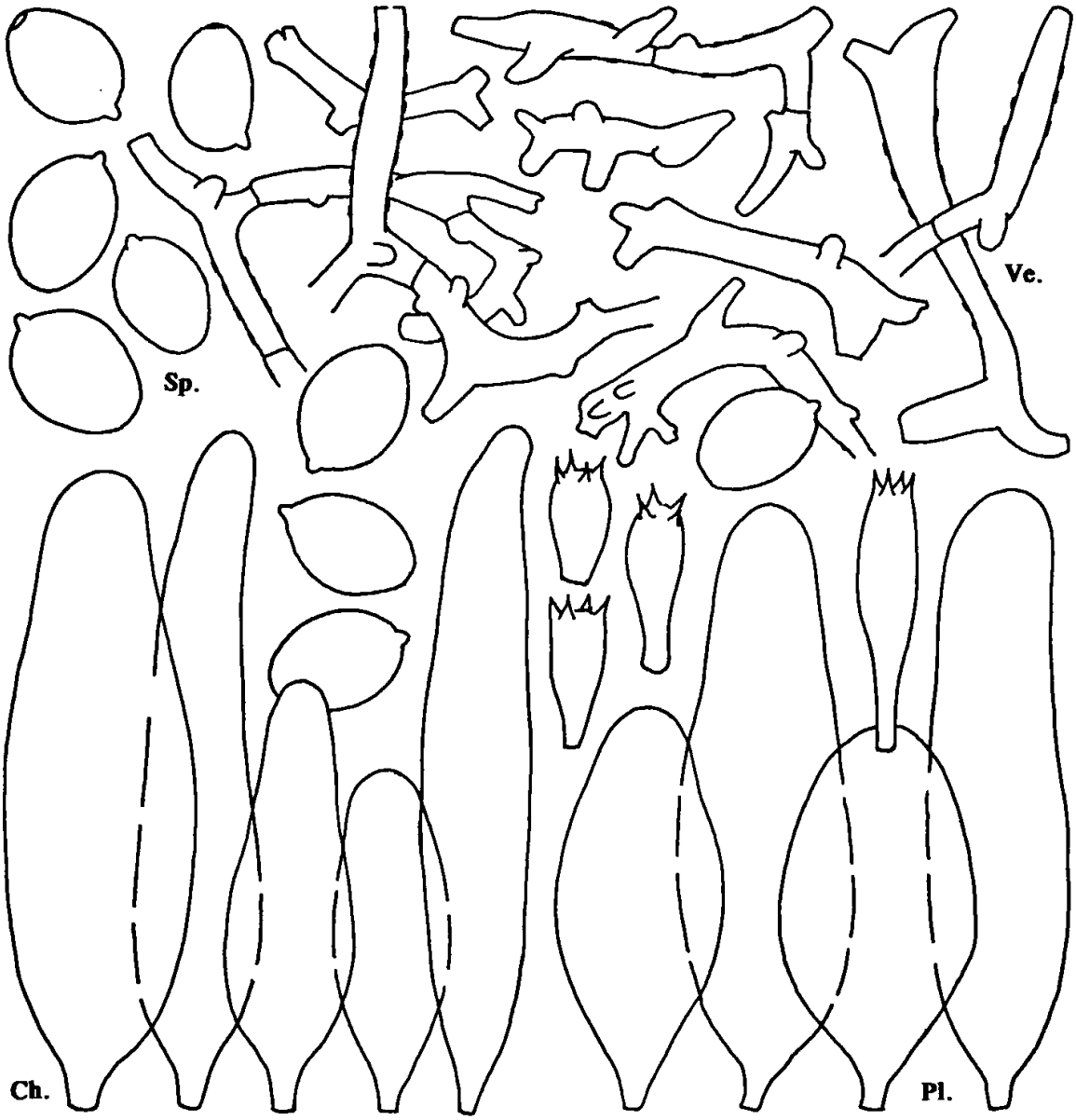

Fig. 11. *Coprinus urticicola* (B. & Br.) Buller var. *urticicola*. All figures from coll. *C.B. Uljé 1168*.

11. **Coprinus urticicola** (B. & Br.) Buller var. **urticicola** — Fig. 11

Coprinus urticicola (B. & Br.) Buller, Trans. Br. mycol. Soc. 5 (1917) 485; *Agaricus urticicola* B. & Br. (as *urticaecola*), Ann. Mag. Nat. Hist., ser. 3 (7) (1861) 376.

Coprinus brassicae Peck, Rep. N.Y. St. Mus. nat. Hist. 43 (1890) 64.

Coprinus melo J. Favre, Ass. fong. Hauts-Marais (1948) 215.

Coprinus suburticicola Pilát & Svrček, Česká Mykol. 21 (1967) 140.

Selected icons: Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 252, pl. 306; Cetto, Funghi Vero 5 (1987) pl. 1724.

Pileus 3–6(–8) × 2–4 mm when still closed, up to 13 mm when expanded, at first (sub)-globose, ellipsoid, ovoid or conical, pure white. Veil white, breaking up in small, woolly-

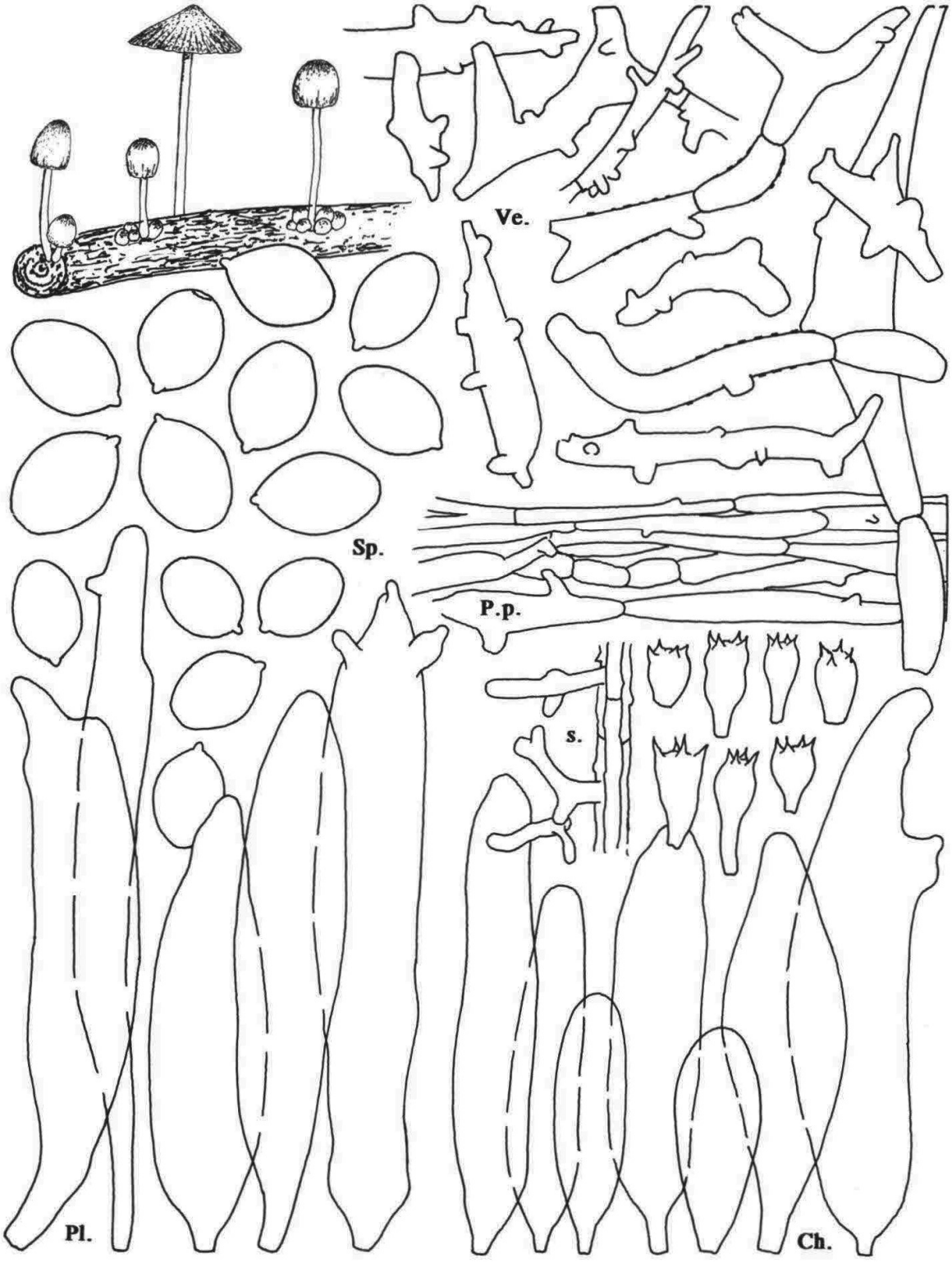

Fig. 12. *Coprinus urticicola* var. *salicicola* Uljé & Noordeloos. All figures from coll. *C.B. Uljé 1143.*

hairy scales. Lamellae, L = c. 35, l = 0–3, crowded, free, first white, then grey to blackish. Stipe up to 30 × 0.5–1 mm, white, greyish white, somewhat floccose above the slightly clavate base.

Spores [480, 24, 22] 5.3–8.9 × 4.3–6.7 µm, subglobose to ellipsoid and then often somewhat conical to base and apex, rounded at apex, rather pale red-brown, with central, 1.0–1.5 µm wide germ pore; Q = 1.10–1.65, av. Q = 1.25–1.45; av. L = 6.0–8.1, av. B = 4.8–6.0 µm. Basidia 10–23 × 6–8.5 µm, 4-spored, surrounded by (3–)4–6 pseudoparaphyses. Pleurocystidia 40–70 × 10–15 µm, (sub)cylindrical, (narrowly) utriform, oblong, ellipsoid or narrowly conical. Cheilocystidia 30–65 × 10–14 µm, similar to pleurocystidia. Elements of veil thin-walled, diverticulate, 2–8 µm wide; walls slightly to strongly incrusted. Clamp-connections absent.

Habitat & distribution — Solitary or a few together, on grasses and herbs, sometimes on wood. Common in Europe. Recorded from Canada, USA.

Collections examined. GREAT BRITAIN: England, King's Cliffe, on nettle roots, 8 Aug. 1858, *Berkeley 1304* (holotype of *Agaricus (Psathyra) urticicola* B. & Br., K). — CZECHIA: Horní Slovenicě pr. Lomnice nad Lužnicí, Bohemia merid., on stems of dead *Glyceria* species, 14 July 1962, *M. Svrček & J. Kubička 346/62*, coll. no. PR 567917 (holotype of *C. suburticicola*, PRM). — NETHERLANDS: prov. Drenthe, Holthe, 3 July 1993, *E. Arnolds 6362* (WBS); prov. Gelderland, Veenendaal, 'de Hel', 14 July 1982, *P.B. Jansen 82-114*; prov. Noord-Holland, Kortenhoef, 3 Apr. 1971, *J. Daams 71-74* (gh); idem, 8 Apr. 1971, *J. Daams 71-90* (gh); idem, 17 Apr. 1971, *J. Daams 71-99* (gh); idem, 5 May 1971, *J. Daams 71-119* (gh); 's-Graveland, 20 Apr. 1975, *J. Daams 75-14* (gh); prov. Utrecht, Maarsseveen, 6 March 1972, *J. Daams 72-36* (gh); Vleuten, 31 March 1972, *J. Daams 72-81* (gh); prov. Zuid-Holland, Boskoop, Gouwebos, 19 July 1991, *C.B. Uljé 1168*; Zegveld, 3 July 1990, *C.B. Uljé*; Alphen aan den Rijn, 15 July 1988, *C.B. Uljé 919*; idem, on stem of *Phragmites*, 22 July 1991, *C.B. Uljé 1169*; Leiden, Boerhavelaan, 27 July 1958, *C. Bas 1470*; idem, Groenoord, 20 July 1960, *A.C. v.d. Laan*; Noorden, 27 June 1957, *C. Bas 1207*; prov. Noord-Brabant, Breda, Liesbos, 13 Aug. 1971, *P.B. Jansen*; idem, on *Juncus*, 30 July 1979, *P.B. Jansen 79-155*; prov. Limburg, Tegelen, 24 Sept. 1961, *J. v. Brummelen 1348*. — SWITZERLAND: Bière, la Côte, Vallée du Joux, 28 Aug. 1939, *J. Favre GK 7762* (holotype of *C. melo*, G).

Coprinus urticicola is a common species in hay-fields with abundant dead grasses; also rather common in *Phragmites* lands. The species can be recognized by the small, pure white basidiocarps with woolly scales of veil. Microscopically the often conical, ellipsoid or ovoid, pale coloured spores and thin-walled elements of veil are good characters to identify *Coprinus urticicola*. The microscopical characters of the types of *Coprinus melo* and *C. suburticicola* are similar to those of *C. urticicola*, and these species are therefore considered synonyms. Since the description of *Coprinus brassicae* Peck (1890: 64) also agrees very well with *C. urticicola*, this species is also listed among the synonyms.

12. **Coprinus urticicola** (Berk. & Br.) Buller var. **salicicola** Uljé & Noordel., *var. nov.* — Fig. 12

A varietate typica differt pilei centro velo atro brunneo atque in ramulos *Salicis* provento. — Holotypus: '*C.B. Uljé 1143*, 21-VI-1991, Alphen aan den Rijn, prov. Zuid-Holland, Netherlands (L)'.

Pileus up to 3–6 × 2–4 mm when still closed, up to 15 mm when expanded, subglobose, ellipsoid or ovoid-conical, very dark brown (sepia coloured) at centre, around centre white. Veil dark grey-brown (Mu. 7.5 YR 3/3; K. & W. 6F7), splitting up in minute, hairy-floccose scales. Lamellae, L = c. 32, l = 0–3, rather crowded, free, first white, then grey-brown, finally blackish. Stipe up to 40 × 1–2 mm, whitish, at base somewhat clavate and tomentose.

Spores [120, 6, 5] 5.4–8.3 × 4.2–5.7 µm, ellipsoid or ovoid, often somewhat conical base and rounded apex, rather pale grey-brown (Mu. 10 YR 5/3), with central, c. 1.5 µm wide germ pore; Q = 1.20–1.75, av. Q = 1.30–1.55; av. L = 6.0–7.8, av. B = 4.5–5.3 µm. Basidia 12–30 × 7–9 µm, 4-spored, surrounded by (3–)4–6(–7) pseudoparaphyses. Pleurocystidia 60–110 × 10–30 µm, cylindrical, oblong or fusiform. Cheilocystidia 30–100 × 10–23 µm, ellipsoid, oblong, (sub)cylindrical, subutriform, fusiform or narrowly conical. Elements of veil thin- to slightly thick-walled (walls greyish brown in microscope), diverticulate, 2–7(–10) µm wide, slightly incrusted. Clamp-connections not found.

Habitat & distribution — Solitary or a few together on dead branches of *Salix*. Very rare, so far only collected from one locality.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, 28 Aug. 1988, *C.B. Uljé 962*; idem, 21 June 1991, *C.B. Uljé 1143* (holotype); idem, 2 July 1991, *C.B. Uljé 1152*; idem, 12 July 1991, *C.B. Uljé 1164*; idem, 27 July 1991, *C.B. Uljé 1172*.

Coprinus urticicola var. *salicicola* differs from the typical variety mainly by the dark colour of the veil that also becomes slightly thick-walled, the grey-brown colour of the spores and the habitat on branches of *Salix*.

13. **Coprinus fluvialis** Lanconelli & Uljé, *spec. nov.* — Fig. 13

Pileus primo 5–9 × 3–5 mm, subglobosus, ellipsoideus vel ovoideus, dein conicus, convexus vel explanatus, 10–15 mm latus, griseo-brunneus vel obscure griseus, totus flocculosus cum velo albo vel brunneo. Lamellae liberae, L = 26–30, l = 0–3, ex albo nigricantes. Stipes 20–30 × 1 mm, versus basim incrassatus, albus, flocculosus. Sporae [60, 3, 2] 6.9–10.6 × 5.3–7.8 µm, ovoideae vel obovoideae, interdum submitriformes moderate rufo-brunneae poro germinativo centrico lato 1.3 µm instructae. Basidia 14–40 × 7–9 µm, 4-sporigera. Pseudoparaphyses 3–6. Pleurocystidia 40–55 × 19–28 µm, subglobosa, ellipsoida vel late cylindracea. Cheilocystidia 30–55 × 17–32 µm, (sub)globosa, ellipsoidea, ovoidea, obovoidea vel late cylindracea. Velum e elementis diverticulatis, 20–50 × 2–7 µm, tenuitunicatis, valde incrustatis constituis. Pileipellis cutis hyphis cylindraceis, tenuitunicatis. Fibulae praesentes. Ad terram.

Holotypus: Italy, RA: Alfonsine, 5 July 1996, *L. Lanconelli 78-96* (L).

Pileus 5–9 × 3–5 mm when still closed, subglobose, ellipsoid or ovoid, then obtusely conical to convex, finally flattened and 10–15 mm wide, densely covered with white to brownish (at centre) veil when young; centre of pileus grey-brown to dark grey below veil. Lamellae L = 26–30, l = 0–3, free, white to blackish. Stipe 20–30 × 1 mm, white, flocculose; base somewhat clavate.

Spores [60, 3, 2] 6.9–10.6 × 5.3–7.8 µm, ovoid or obovoid, often conical to base (submitriform) with rounded apex, medium red-brown and central, 1.3 µm wide germ pore; Q = 1.25–1.45, av. Q = 1.30–1.35; av. L = 7.5–9.5, av. B = 5.8–7.1 µm. Basidia 14–40 × 7–9 µm, 4-spored (a few 2-spored basidia also are found) surrounded by 3–6 pseudoparaphyses. Pleurocystidia 40–55 × 19–28 µm, subglobose, ellipsoid or short broadly cylindrical. Cheilocystidia 30–55 × 17–32 µm, (sub)globose, ellipsoid, ovoid, obovoid or short broadly cylindrical. Elements of veil 20–50 × 2–7 µm, diverticulate, thin-walled, strongly incrusted. Pileipellis hyphoid, made up of cylindrical to inflate elements. Clamp-connections present, but difficult to see because of the very thin and not coloured walls.

Habitat & distribution — Solitary, in small groups, close together but not fasciculate, on bare soil, sludge. Only known from one locality.

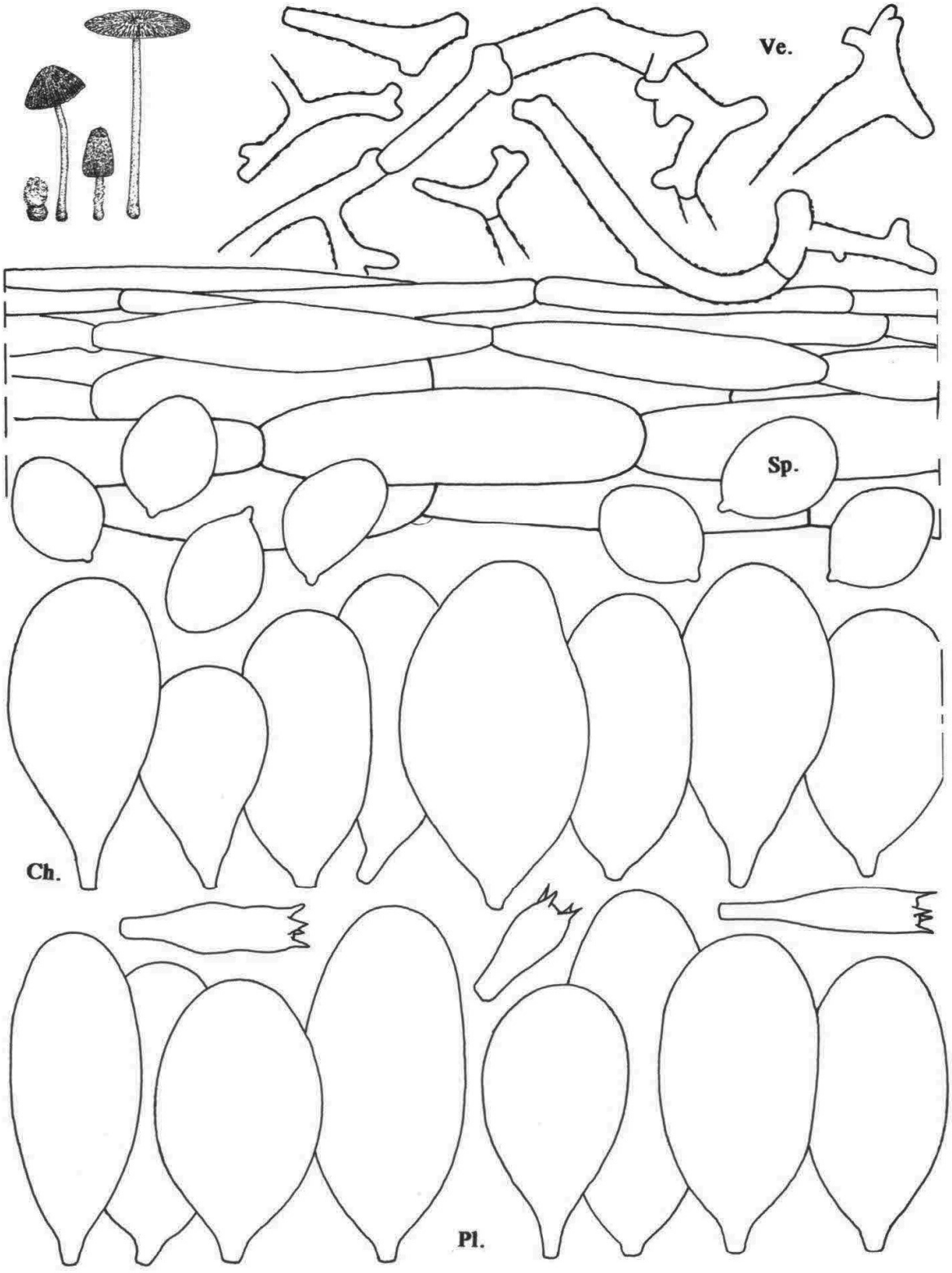

Fig. 13. *Coprinus fluvialis*. All figures from coll. *Lanconelli 78-96*.

Collections examined. ITALY: Alfonsine (RA), on the bank of a river, 2 May 1987, *L. Lanconelli 8-87* (L) and 5 July 1996, *Lanconelli 78-96* (holotype, L).

The size of the spores is very variable in these collections. The collection *8-87* consists of old basidiocarps in which the spores are smaller than in the other collection.

The material is close to *C. epichloeus* but differs in shape and quotient of the spores and sizes and shape of the cystidia.

14. **Coprinus gonophyllus** Quél. — Fig. 14

Coprinus gonophyllus Quél., Ann. Sci. Nat. Bordeaux 14, Suppl. 5 (1884) Pl. 1.

Selected icons. Jamoni, Funghi Ambiente 47 (1988) between 16 and 17, pl. 117; Migliozzi & Coccia, Boll. Assoc. m. e. Romana 16 (1989) 14; Monti, Funghi Cenosi Aree bruciate (1992) 83; Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 234, pl. 278; Cacialli, Caroti & Doveri, Funghi Fimicola, Schede Micol. 1 (1995) 133.

Pileus up to 4–15(–20) × 3–12 mm when still closed, up to 30 mm when expanded, first globose or sometimes ellipsoid, ovoid or conical, then hemispherical or obtusely conical, finally convex, white. Veil first white and covering whole pileus, then breaking up around centre in felty patches, later becoming brownish in part. Lamellae, L = 32–38, l = 0–3(–5), free, first white, then grey-brown, finally blackish. Stipe up to 60 × 1–3 (–4) mm, whitish; base somewhat clavate, up to 5 mm.

Spores [220, 11, 9] 6.2–8.7 × 5.3–8.2 × 4.8–6.5 µm, short ovoid or subglobose and truncate, lentiform, generally very dark red-brown, with central, 1.3–1.5 µm wide germ

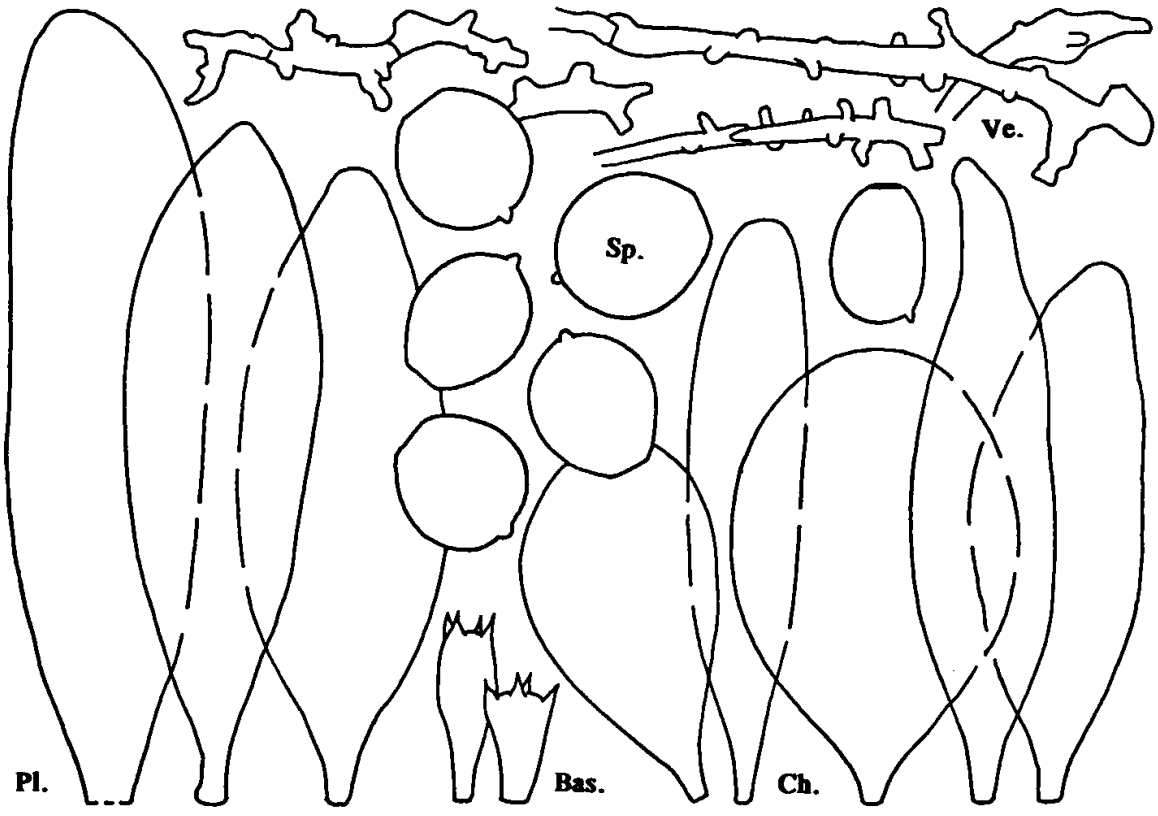

Fig. 14. *Coprinus gonophyllus* Quél. All figures from coll. *P.B. Jansen 89-243.*

pore; Q = 1.00–1.35, av. Q = 1.05–1.25; av. L = 7.0–8.0, av. B = 6.1–7.6 µm. Basidia 12–34 × 7–9 µm, 4-spored, surrounded by 4–7 pseudoparaphyses. Pleurocystidia 50–120 × 20–40 µm, subcylindrical, oblong and then often conical towards apex or fusiform. Cheilocystidia 40–85 × 25–45 µm, subcylindrical, oblong, (broadly) ellipsoid, fusiform or subutriform. Elements of veil thin-walled, diverticulate, 2–5(–7) µm wide, slightly incrusted. Clamp-connections present.

Habitat & distribution — Solitary or a few together; often on burned places but also on bare, often clayey soil. Widespread but not common in Europe.

Collections examined. GERMANY: Stetten, 18 July 1972, *P.B. Jansen 72-280.* — NETHERLANDS: prov. Flevoland, Lelystad, Visvijverbos, 20 June 1987, *P.B. Jansen 87-156a*; prov. Overijssel, Deventer, 'Het Joppe', 8 Oct. 1966, *E. Kits v. Waveren*; Delden, 24 Sept. 1969, *E. Kits v. Waveren*; prov. Gelderland, Pannerden, 'Lobberdensche Waard', 22 Oct. 1992, *E. Arnolds 6306* (WBS); prov. Noord-Holland, Kortenhoef, 27 June 1972, *J. Daams 72-223* (gh); Nederhorst ten Berg, 6 May 1973, *J. Daams 73-74*; Amsterdam, Oeverlanden, 11 Oct. 1989, *P.B. Jansen 89-243*; prov. Zeeland, Zuid-Beveland, den Inkel, 17 Apr. 1985, *W.D.J. Kuijs.*

Coprinus gonophyllus can be recognized by the rather firm, usually hemispherical basidiocarps which often grow on burnt places and the thin-walled, narrowly velar hyphae and the short, subglobose spores with truncate germ pore. The size of the spores is somewhat similar to that of *Coprinus spilosporus,* but that species has long, thick-walled hairs between the velar elements. Another taxon, named *Coprinus spec. Bas 5002* in the present paper, is close to *C. gonophyllus* but differs in smaller, (sub)globose spores with an apical papilla (limoniform). *Coprinus epichloeus* is a much smaller and fragile species with spores which are not distinctly truncate at apex.

15. **Coprinus epichloeus** Uljé & Noordel., *spec. nov.* — Fig. 15

Pileus primo 3–6 × 2–5 mm latus, subglobosus vel ovatus, demum expansus, usque ad 15 mm latus; velum hirsuto-floccosum; lamellae liberae, albae demum griseo-brunneae vel atrae; stipes usque ad 30 × 0.5–1 mm, albidus vel griseo-albidus, glaber, basim versus leviter tomentoso-hirsutus.

Sporae 7.0–10.2 × 6.7–9.0 × 6.4–7.8 µm, medio rubro-brunneae, subglobosae apice conicae, interdum leviter quadrangulatae cum poro germinativo 1.3–1.5 µm lato; basidia 16–32 × 9–11 µm, 4-sporigera, 5–7(–8) pseudoparaphysibus circumcincta; pleurocystidia 60–105 × 12–24 µm, elongato-ellipsoidea, utriformia vel subcylindracea; cheilocystidia 45–100 × 15–30 µm, elongato-ellipsoidea, ellipsoidea, utriformia vel subcylindracea; velum e hyphis tenuitunicatis, hyalinis vel pallide griseo-flavidis sparse diverticulatis; fibulae praesentes. In graminis.

Holotypus: '*C.B. Uljé 908*, 5-VI-1988, Alphen aan den Rijn, Netherlands (L)'.

Pileus 3–6 × 2–5 mm when still closed, subglobose or ovoid, veil at primordia sepia, soon paler grey to almost white when expanded; then pileus up to 15 mm wide. Veil breaking up in small, hairy flocks. Lamellae, L = c. 20, l = 1–3, free, first whitish, soon grey-brown to dark grey, finally blackish. Stipe up to 30 × 0.5–1 mm, white, greyish white, almost glabrous; base somewhat woolly hairy.

Spores [60, 3, 2] 7.0–10.2 × 6.7–9.0 × 6.4–7.8 µm, subglobose, often more or less conical to the apex, sometimes somewhat quadrangular, medium red-brown (about Mu. 2.5 YR 3/6; K. & W. 8E8) with central, c. 1.3–1.5 µm wide germ pore; Q = 1.00–1.20, av. Q = 1.10; av. L = 8.1, av. B = 7.5 µm. Basidia 16–32 × 9–11 µm, 4-spored, surrounded by 5–7(–8) pseudoparaphyses. Pleurocystidia 60–105 × 12–24 µm, oblong, (sub)cylin-

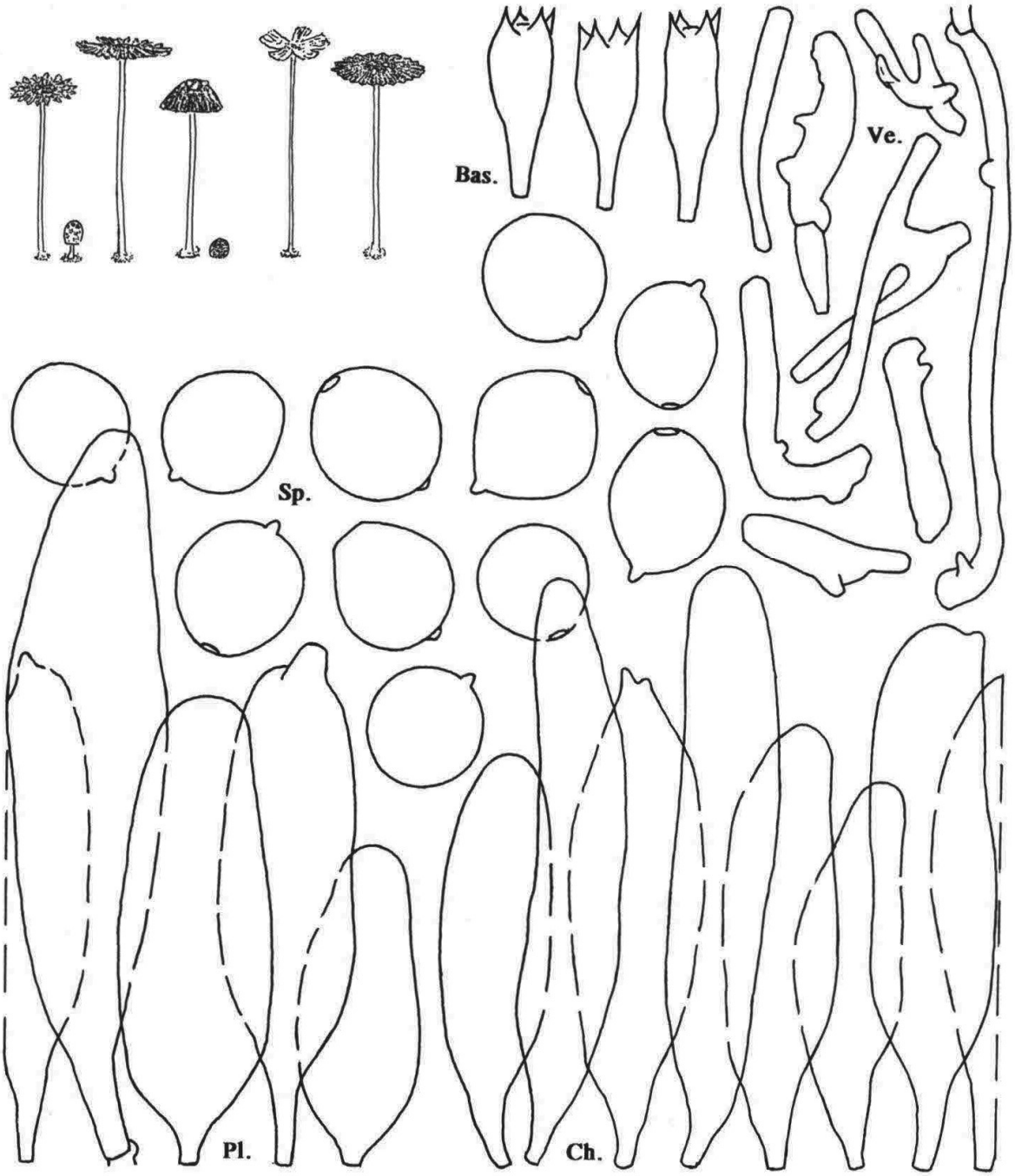

Fig. 15. *Coprinus epichloeus*. All figures from coll. *C.B. Uljé 909* (holotype).

drical or utriform. Cheilocystidia 45–100 × 15–30 µm, oblong, ellipsoid, (sub)cylindrical or (narrowly) utriform. Elements of veil thin-walled, sparsely diverticulate, 2–10 µm wide; walls hyaline or slightly greyish yellow, less than 0.3 µm thick. Clamp-connections present.

Habitat & distribution — Solitary or a few together in small groups; in lawns, often on bare places. Probably not rare; found in one locality only, but there in several places.

Collections examined. NETHERLANDS: Alphen aan den Rijn, 5 June 1988, *C.B. Uljé 908*, idem, *C.B. Uljé 909* (holotype, L).

Microscopically this species is close to *Coprinus gonophyllus* but differs in distinctly smaller, much more fragile basidiocarps and the more globose, slightly larger spores with rarely truncate apex. The habitat also is different, as it does not grow in burnt places, but in lawns among grass (though often also on bare places in the lawns). The spores of *Coprinus epichloeus* resemble somewhat those of *Coprinus phaeosporus*, but that species, like all other species in subsect. *Alachuani* with subglobose spores, has thick-walled velar elements.

16. **Coprinus spec.** (*Uljé 1170*) — Fig. 16

Pileus 2–4 × 2–3 mm when still closed, up to 8 mm when expanded, first globose, subglobose, ovoid or conical, beige. Veil beige, breaking up in small, woolly-hairy scales, becoming whitish when expanding; the beige colour staying at centre of pileus for a rather long time. Lamellae rather crowded, free, first white, then grey to blackish. Stipe up to 20 × 0.5–1 mm, white, greyish white, somewhat floccose above clavate base.

Spores [20, 1, 1] 4.0–5.6 × 3.3–4.1 µm, ellipsoid or ovoid with rounded apex, rather pale (grey-)brown and central, c. 1 µm wide germ pore; Q = 1.20–1.40, av. Q = 1.30; av. L = 4.9, av. B = 3.7 µm. Basidia 10–24 × 6–8 µm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 30–70 × 10–14 µm, (sub)cylindrical or slightly utriform. Cheilocystidia 30–60 × 10–15 µm, similar to pleurocystidia. Elements of veil thin-walled, diverticulate, 2–8 µm wide; walls slightly incrusted. Clamp-connections absent.

Habitat & distribution — On grasses. Probably not rare but overlooked.

Collection examined. NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, Sportlaan, at base of *Carex*, 20 July 1993, *C.B. Uljé 1170*.

This species differs from *Coprinus urticicola* to which it is closely related, by having distinctly smaller spores and beige coloured basidiocarps.

17. **Coprinus filamentifer** Kühn. — Fig. 17

Coprinus filamentifer Kühn., Bull. Soc. Nat. Oyonnax 10–11 (1957) 3.

Pileus 7–10 × 4–5.5 mm when still closed, up to 18 mm when expanded, subglobose, ellipsoid, ovoid, first white with somewhat greyish centre, soon more grey. Veil white to grey, radially splitting up in small, hairy floccose scales. Lamellae, L = 26–28, l = 0–3, rather crowded, free, first white, then greyish, finally blackish; Stipe up to 100 × 1–1.5 mm, whitish, at base somewhat clavate.

Spores [40, 2, 1] 6.7–8.7 × 4.8–6.3 µm, cylindrical-ovoid, rounded rectangular in most cases, rather truncate, very dark red-brown, with central, c. 1.8 µm wide germ pore; Q = 1.30–1.60, av. Q = c. 1.45; av. L = 7.9–8.3, av. B = 5.5–5.6 µm. Size of basidia not noted, 4-spored. Pleurocystidia 80–135 × 20–30 µm, subcylindrical or oblong, often conical. Cheilocystidia 50–100 × 15–25 µm, similar to pleurocystidia. Elements of veil thin-walled, diverticulate, 2–7(–10) µm wide, slightly incrusted. Clamp-connections probably present.

Habitat & distribution — In small groups on dung of herbivores. Very rare. Not known from the Netherlands. Recorded from England, Ireland and Scotland according to Orton & Watling (1979: 51).

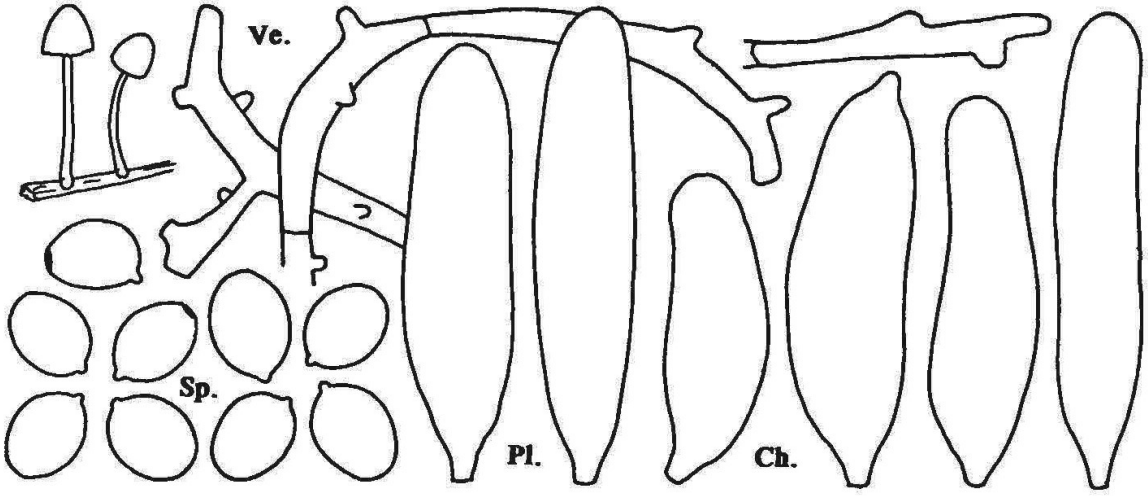

Fig. 16. *Coprinus spec.* (*Uljé 1170*). All figures from coll. *C.B. Uljé 1170.*

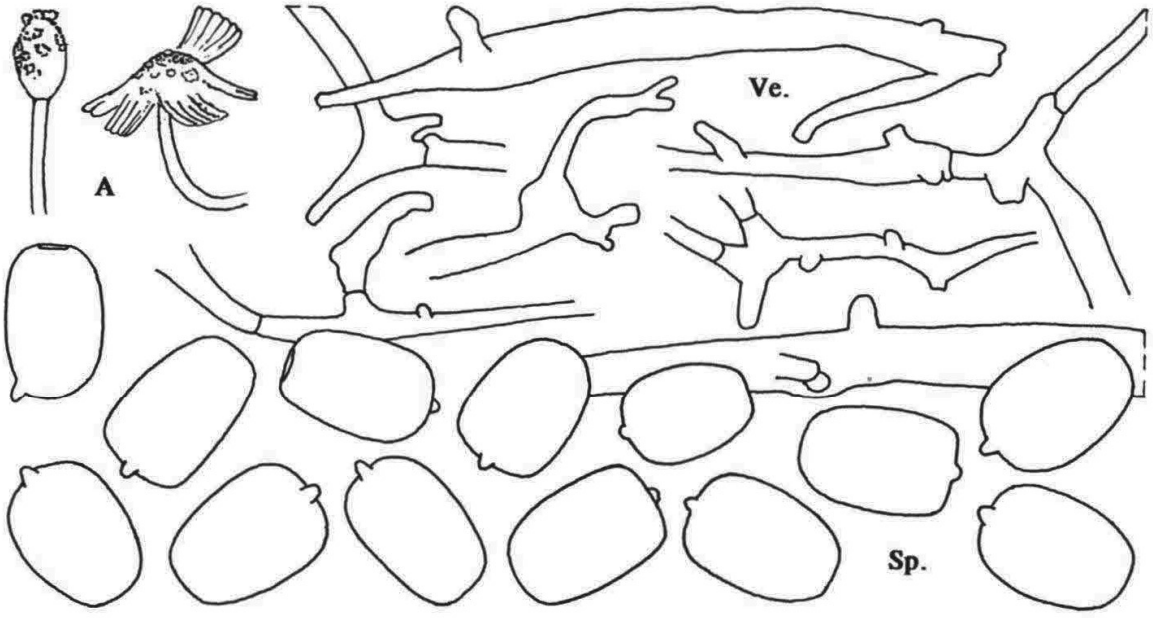

Fig. 17. *Coprinus filamentifer* Kühn. All figures from coll. *G 388191* (holotype).

Collection examined. ALGERIA: cultivated on cow dung collected in Chréa, 20 June 1932, Coll. no. 388191 (holotype, G).

The presence of clamp-connections could not be verified with certainty because of the bad condition of the type material. *Coprinus filamentifer* can readily be recognized by the subcylindrical spores and coprophilous habitat.

18. **Coprinus argenteus** P.D. Orton — Fig. 18

Coprinus argenteus P.D. Orton, Notes R. bot. Gdn Edinb. 32 (1972) 139.

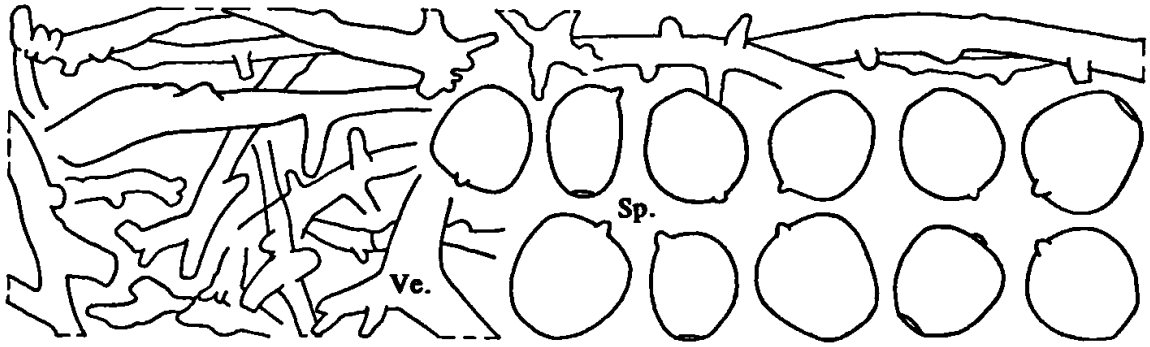

Fig. 18. *Coprinus argenteus* P.D. Orton. All figures from coll. *P.D. Orton 955* (holotype).

Pileus 10 × 4 mm when still closed, up to 15 mm when expanded, ellipsoid conical oblong or ovoid, first white, soon more greyish. Veil white, often somewhat yellow-brown at centre, breaking up in patches. Lamellae free, rather crowded, first white, then greyish, finally blackish. Stipe up to 20 × 1–2 mm, whitish, base clavate, with small, tomentose disk.

Spores [40, 2, 1] 4.5–6.7 × 4.5–6.1 × 4.3–5.8 µm, the shape of a maize-kernel, truncate, medium red-brown, with central, c. 1 µm wide germ pore; Q = 0.95–1.25, av. Q = c. 1.10; av. L = 5.6–5.9, av. B = 5.2–5.4 µm. Basidia 14–26 × 8–9 µm, 4-spored, surrounded by 4–6 pseudoparaphyses. Pleuro- and cheilocystidia not found in type-material (see note). Elements of veil thin-walled, diverticulate, 2–7(–10) µm wide, slightly incrusted. Clamp-connections present.

Habitat & distribution — Solitary or a few together. In grassland on calcareous soil. Very rare, only known from England.

Collections examined. GREAT BRITAIN: Surrey, Mickleham, Juniper Hill, 22 June 1956, *Carol Kemball, Orton 955* (holotype, K).

Coprinus argenteus can be recognized by the typical shape of the spores in combination with the thin-walled velar elements. The type-material consisted of a fragment of a pileus only, and therefore no cystidia could be studied. In the original description no cystidia were mentioned and Orton stated: 'Cystidia not noted'.

19. **Coprinus spec.** (*Bas 5002*) — Fig. 19

Pileus 3–8 × 2–5 mm when still closed, up to 15 mm when expanded, ellipsoid or ovoid, first white, soon greyish. Veil white, often somewhat yellow-brown in centre, breaking up in patches. Lamellae rather crowded, free, first white, then greyish, finally blackish. Stipe up to 30 × 1–1.5 mm, white, at base slightly bulbous.

Spores [40, 3, 3] 6.3–8.5 × 5.8–7.8 × 4.6–5.7 µm, (sub)globose with apical, rather truncate papilla, dark red-brown, and central, 1.5–1.8 µm wide germ pore; Q = 1.00–1.20, av. Q = 1.05–1.10; av. L = 6.8–7.5, av. B = 6.3–7.2 µm. Basidia 14–28 × 6–8 µm, 4-spored, surrounded by (3–)4–5(–6) pseudoparaphyses. Pleurocystidia 50–90 × 16–28 µm, utriform, cylindrical, oblong or utriform. Cheilocystidia 30–80 × 10–26 µm, (sub)globose, ellipsoid, oblong or utriform. Elements of veil thin-walled, slightly diverticulate and incrusted, 2–6 µm wide, sometimes somewhat thick-walled (walls < 0.5 µm thick). Clamp-connections present.

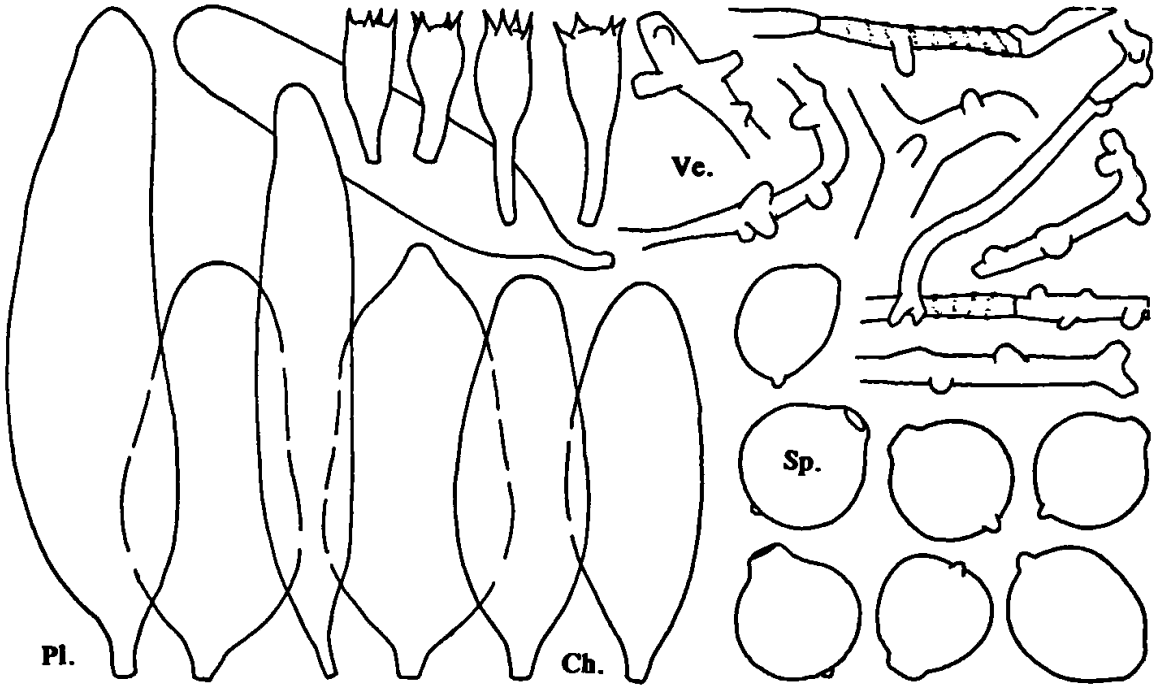

Fig. 19. *Coprinus spec.* (*Bas 5002*). All figures from coll. *C. Bas 5002.*

Habitat & distribution — Solitary or a few together. Very rare. Only known from the Netherlands (two finds) and Germany (one find). The Dutch collections were made on moist filter-paper on which seeds of *Petasites* were germinating and in a greenhouse (substrate not noted). The German collection was found on a beam in the ceiling of a cellar.

Collections examined. GERMANY: no date, no location, *Meusers* (herb. Bender, Germany). — NETHERLANDS: prov. Zuid-Holland, Leiden, 10 Nov. 1968, *C. Bas 5002*; prov. Noord-Holland, Kortenhoef, 2 Apr. 1984, *J. Daams 84-18* (gh).

This taxon differs from *Coprinus episcopalis* in the distinctly smaller and more globose spores, smaller basidiocarps and smaller cystidia, and from *C. gonophyllus* in having slightly smaller spores with an apical papilla. Another difference is the habitat within buildings.

20. **Coprinus episcopalis** P.D. Orton — Fig. 20

Coprinus episcopalis P.D. Orton, Trans. Brit. mycol. Soc. 40 (1957) 270.

Pileus 20–30 × 10–18 mm when still closed, first oblong or obtusely conical, then conical to convex, up to 55 mm when fully expanded, first white, soon more greyish. Veil white, often somewhat yellow-brown in centre, breaking up in patches. Lamellae crowded, free, first white, then greyish, finally blackish. Stipe up to 95 × 5–9 mm, white, base (8–15 mm) more or less marginate bulbous, white silky striate.

Spores [80, 4, 2] (6.7–)7.9–10.7(–11.3) × 5.8–9.0(–11.0) × 4.8–6.7 µm, rounded quadrangular with apical, rather truncate papilla, dark red-brown, with central, c. 1.5–1.8 µm wide germ pore; Q = 1.00–1.45, av. Q = 1.10–1.30; av. L = 8.1–9.8, av. B = 6.5–8.5(–8.7) µm. Basidia 17–35 × 10–11 µm, 4-spored, surrounded by 4–7(–8) pseudoparaphyses. Pleurocystidia 50–140 × 15–40 µm, (sub)cylindrical, oblong, ellipsoid or

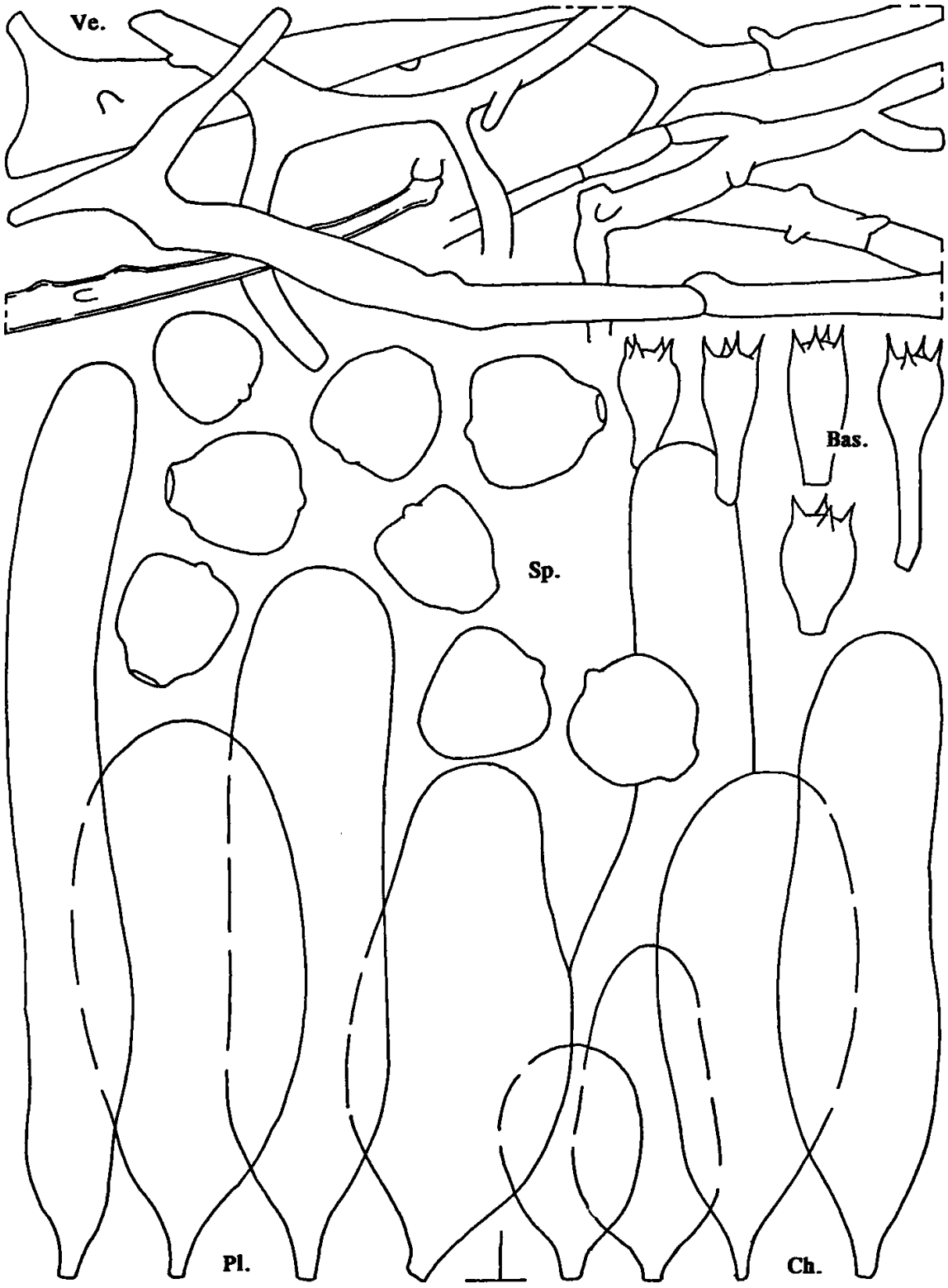

Fig. 20. *Coprinus episcopalis* P.D. Orton. All figures from coll. *P.D. Orton* 20 Nov. 1953 (holotype).

utriform. Cheilocystidia 30–120 × 10–40 µm, (sub)globose, ellipsoid, oblong, (sub)cylindrical or utriform. Elements of veil thin-walled, slightly diverticulate, 2–10(–15) µm wide, slightly incrusted; sometimes some elements are slightly thick-walled and then somewhat yellowish, less than 0.5 µm; excrescences up to c. 5 µm in length. Clamp-connections present.

Habitat & distribution — Solitary or a few together among leaves of deciduous trees (*Fagus*) on calcareous soil. Very rare in England and Germany. Not yet known from the Netherlands.

Collections examined. GREAT BRITAIN: Surrey, Mickleham downs, among leaves of *Fagus* on calcareous soil, 20 Nov. 1953, *P.D. Orton* (holotype, E). — GERMANY: Eifel, Lothar, 8 Aug. 1982, *G.J. Krieglsteiner* (Herb. Bender, Germany).

Coprinus episcopalis is a rather large species in the section *Alachuani* and easy to recognize by the characteristic shape of the spores. The American species *Coprinus maysoidisporus* (Redhead & Traquair, 1981: 381) is rather close but the spores in that species never have an apical papilla (l.c.: 380) and are somewhat smaller. Furthermore, the basidiocarps of *C. maysoidisporus* are much smaller (4.5–7 mm when still closed). *Coprinus* spec. *Bas 5002* also comes rather close, but its spores are not angled and are smaller, globose with apical papilla.

21. **Coprinus herinkii** Pilát & Svrček — Fig. 21

Coprinus herinkii Pilát & Svrček, Ceská Mykol. 21 (1967) 137.

Pileus 5–8 × 3–5 mm when still closed, ovoid or obtuse conical, whitish; expanded pileus up to 12 mm wide. Veil white, splitting up in small patches. Lamellae free, first whitish, then dark grey to blackish. Stipe up to 30 × 0.5–1 mm, white, grey-white, almost glabrous; base slightly clavate.

Spores [80, 2, 2] 4.7–6.7 × 4.8–6.6 × c. 4.7 µm, globose, a few subglobose, medium greyish red-brown, with central, c. 1.3 µm wide germ pore; Q = 0.95–1.10, av. Q = 1.00–1.05; av. L = 5.3–6.4, av. B = 5.2–6.2 µm. Basidia 16–36 × 8.5–9 µm, 4-spored, surrounded by 4–7 pseudoparaphyses. Pleurocystidia 60–100(–165) × 14–26 µm, oblong or (sub)cylindrical. Cheilocystidia 45–100 × 14–23 µm, similar to pleurocystidia. Elements of veil thick-walled, multiple-branched and diverticulate, 2–7 µm wide; walls up to 1.5 µm thick in German collection, but in type up to 3 µm in places, pale grey yellowish. Clamp-connections present.

Habitat & Distribution — Solitary on dead grasses. Very rare. Not known from the Netherlands. In addition to the type collection only one recent collection from Germany is known to us.

Collections examined. CZECHIA: Bohemia, Vodňany, 12 Aug. 1938, *J. Herink*, coll. no. PR 499700 (holotype, PRM). — GERMANY: Göttingen, Billinghausen, 6 Sept. 1995, *M.A.E. Pilot 1006* (herb. Pilot, Germany).

This species is characterized by the small, globose spores. The warty-like lumpy surface of the spores which was mentioned in the original description of the species, could not be observed in the holotype. The original description is based on only one specimen. The spores in the type specimen measure 4.7–5.7 × 4.8–5.7 µm; Q = 0.95–1.05, av. Q = 1.00; av. L = 5.3, av. B = 5.2 µm. On account of the presence of similar, small, globose spores the

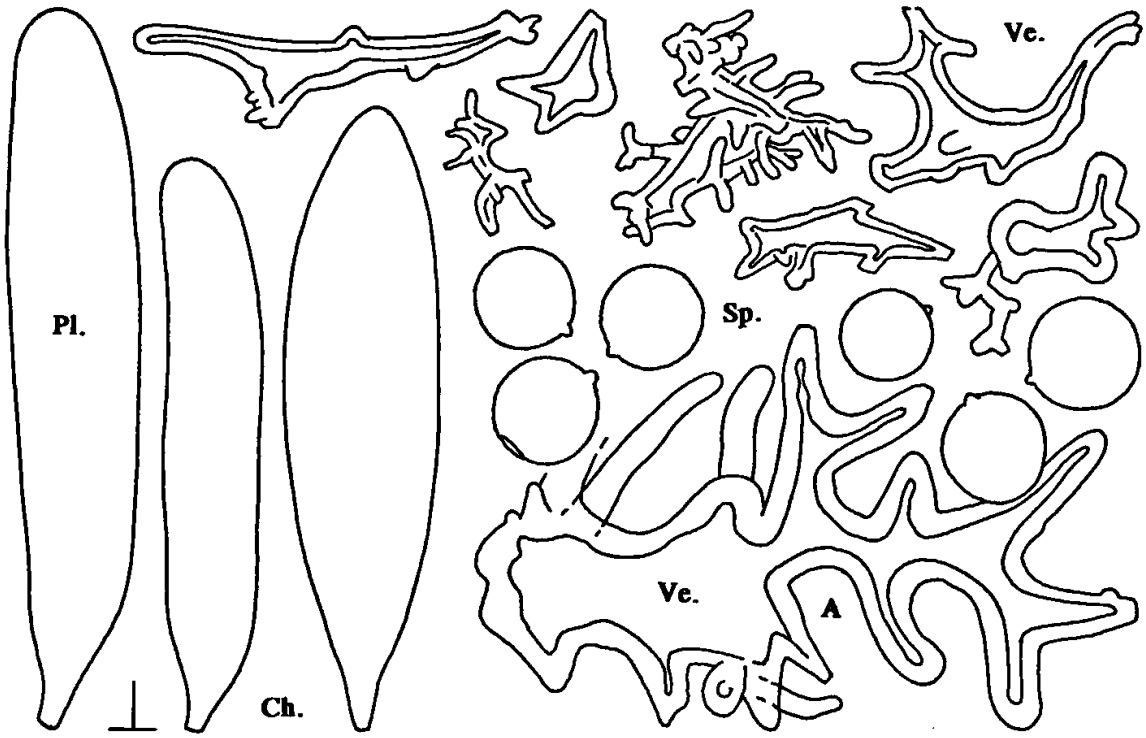

Fig. 21. *Coprinus herinkii* Pilát & Svrček. All figures from coll. *J. Herink*, coll. *PR 499700* (holotype) (A, × 2000).

German collection has been included in *C. herinkii*, although there are some differences. The German collection has somewhat larger spores and the walls of the veil are less thick.

22. **Coprinus spec.** (*Uljé 1160*) — Fig. 22

Pileus 3–7 × 2–5 mm when still closed, up to 12 mm when expanded, first conical, ovoid or ellipsoid, whitish with beige or ochre centre. Veil breaking up in white or cream to ochre patches. Lamellae, L = 32–38, l = 0–3, rather crowded, free, first white, then greyish to black. Stipe up to 30 × 0.5–1 mm, white, greyish white, somewhat floccose at clavate base.

Spores [80, 4, 2] 5.3–6.9(–7.5) × 4.4–6.3 µm, short ovoid, truncate, medium red-brown, with central, 1.0–1.3 µm wide germ pore; Q = 1.05–1.35, av. Q = 1.15–1.25; av. L = 6.1–6.5, av. B = 5.1–5.6 µm. Basidia 12–26 × 8–10 µm, 4-spored, surrounded by (4–)5–6(–7) pseudoparaphyses. Pleurocystidia 50–85 × 12–23 µm, (sub)cylindrical, oblong, narrowly conical, sublageniform or narrowly utriform. Cheilocystidia 30–75 × 10–18 µm, (sub)cylindrical, subutriform or ellipsoid. Elements of veil thick-walled, strongly multiple-branched and diverticulate, 2–8(–12) µm wide; walls more than 1.5 µm thick in places (up to 2.5 µm), pale yellow-brown. Clamp-connections present.

Habitat & distribution — Solitary or a few together in small groups on dead stems and leaves of herbs, very rare. So far only known from two collections.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, Zegersloot, 7 July 1991, on stem of herb (*Urtica*), *C.B. Uljé 1160*; prov. Noord-Brabant, Bergen op Zoom, 6 July 1974, on leaves and stems of herbs, *P.B. Jansen 74-346*.

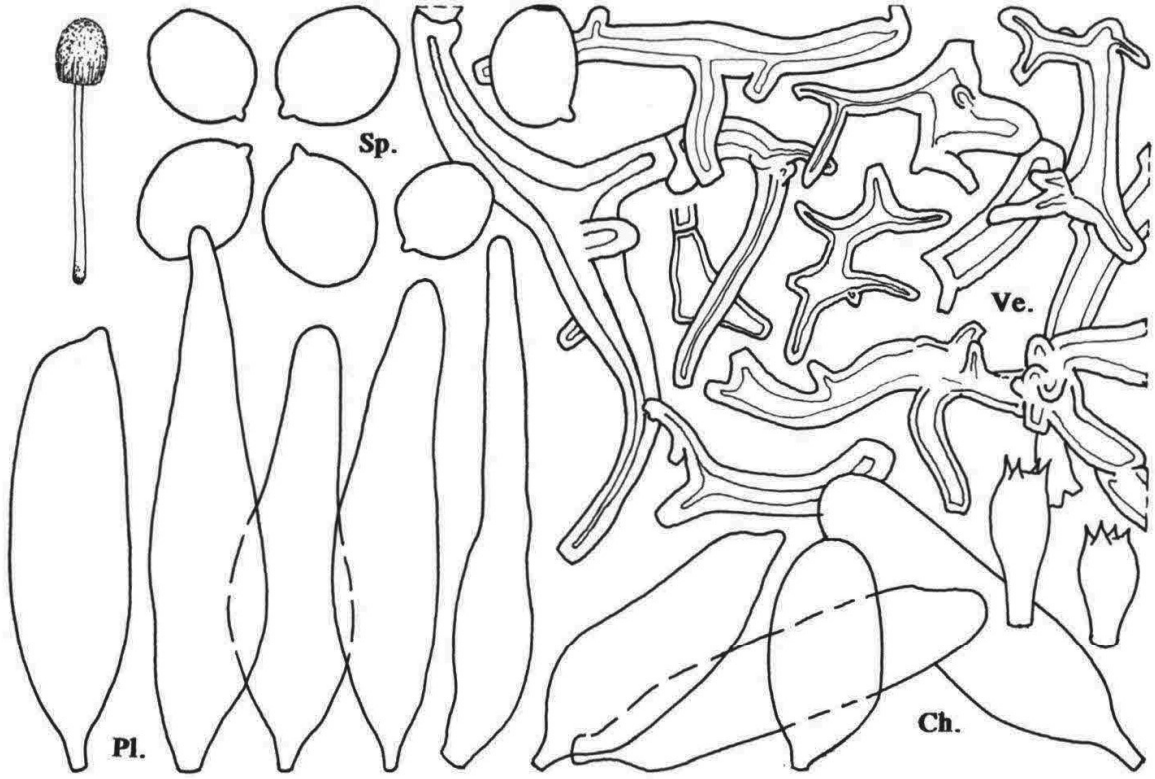

Fig. 22. *Coprinus spec.* (*Uljé 1160*). All figures from coll. *C.B. Uljé 1160.*

Coprinus spec. *Uljé 1160* differs from *C. friesii* by much smaller spores and the habitat: growing on herbaceous stems. Both species have very thick-walled velar elements, which are more than 1.5 µm thick in places.

23. **Coprinus spec.** (*Uljé 924*) — Fig. 23

Pileus 3–6 × 2–5 mm when still closed, ovoid or ellipsoid, up to 10 mm when expanded, first covered with greyish pink to pink veil, brownish pink in centre, breaking up in minute hairy flocks. Lamellae free, first white to beige, then dark grey to blackish. Stipe up to 25 × 0.5–1 mm, white, grey-white, almost glabrous; base slightly clavate.

Spores [40, 2, 1] 8.2–9.8 × 7.7–9.0 µm, subglobose to globose, dark dirty red-brown, with central to somewhat eccentric, c. 1.6 µm wide germ pore; Q = 1.00–1.10, av. Q = 1.05; av. L = 8.9, av. B = 8.5 µm. Basidia 16–32 × 11–14 µm, 4-spored. Pleurocystidia 90–150 × 24–35 µm, (sub)cylindrical, often with conical apex, narrowly conical or subutriform. Cheilocystidia 80–120 × 16–35 µm, similar to pleurocystidia. Elements of veil thick-walled, diverticulate, 2–5 µm wide, walls up to 1.5 µm thick. Clamp-connections present.

Habitat & distribution — On dead herbaceous stems. Very rare. Only known from one locality.

Collection examined. NETHERLANDS: prov. Zuid-Holland, Boskoop, Dammekade, 24 July 1988, *C.B. Uljé 924.*

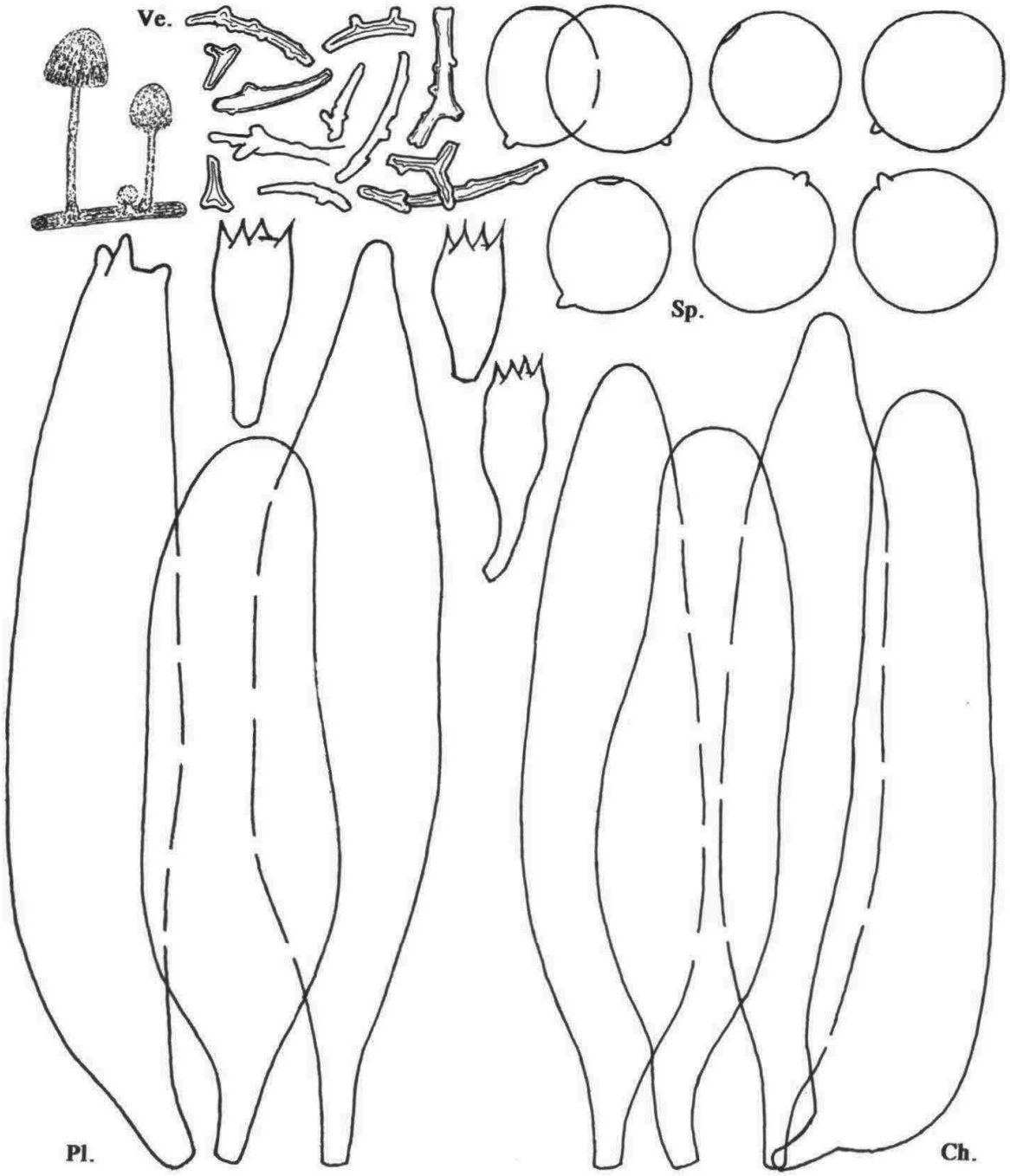

Fig. 23. *Coprinus spec.* (*Uljé 924*). All figures from coll. *C.B. Uljé 924*.

The beautiful pink colour of the basidiocarps in combination with the globose spores are distinctive for this taxon. *Coprinus herinkii* has similarly shaped spores, but smaller, and a thin-walled veil. In *Coprinus spilosporus*, another species with (sub)globose, and similarly sized spores, the veil is completely different.

24. **Coprinus phaeosporus** P. Karst. — Fig. 24

Coprinus phaeosporus P. Karst, Meddn Soc. Fauna Fl. fenn. 6 (1881) 9.
Coprinus saichiae Reid, Trans. Br. mycol. Soc. 41 (1958) 430.

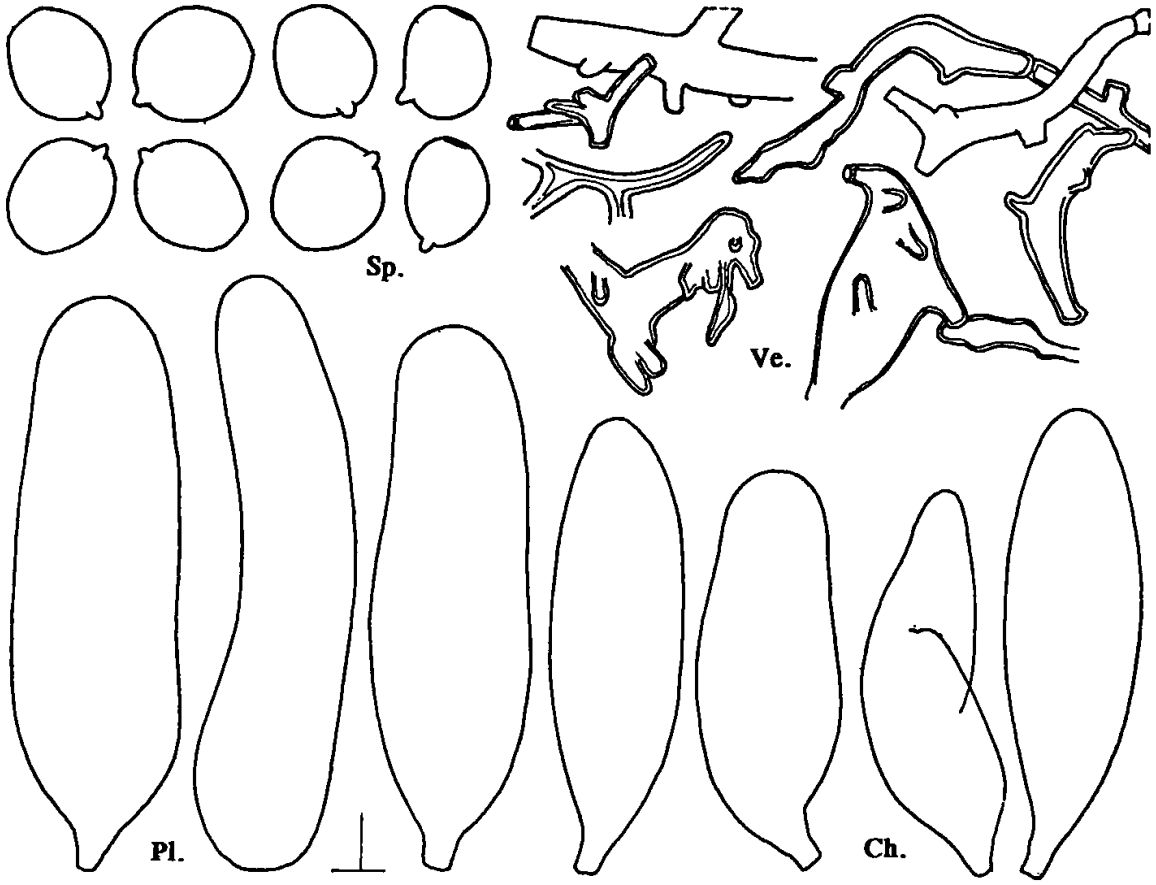

Fig. 24. *Coprinus phaeosporus* P. Karst All figures from coll. *P.A. Karsten 1602* (type).

Pileus 5–15(–20) × 3–12 mm when still closed, subglobose, ellipsoid, oval or conical, up to 30 mm when expanded, white with ochre-brown, velvety scales, especially around disk. Lamellae, L = 32–38, l = 0–3, crowded, free, first white, then dark grey to blackish. Stipe up to 120 × 0.5–2 mm, white, greyish white, almost glabrous.

Spores [140, 7, 6] 5.5–8.0 × 4.7–7.0 × 4.4–6.1 µm, subglobose or ovoid, sometimes slightly the shape of a maize-kernel, often truncate, dark red-brown, not strongly but distinctly lentiform with slightly to rather strongly eccentric, sometimes central, c. 1.0–1.3 µm wide germ pore; Q = 1.03–1.30, av. Q = 1.08–1.19; av. L = 6.1–7.1, av. B = 5.3–6.3 µm. Basidia 14–28 × 7–9 µm, 4-spored, surrounded by 4–7 pseudoparaphyses. Pleurocystidia 50–100(–150) × 10–30 µm, oblong, (sub)cylindrical or subutriform. Cheilocystidia 30–100(–120) × 10–30 µm, oblong, utriform or subcylindrical. Elements of veil thick-walled, strongly multiple-branched and diverticulate, 2–10 µm wide; walls less than 1.5 µm thick, pale yellow-brown. Clamp-connections present.

Habitat & distribution — In small groups on herbs and grasses. Rather common and widespread in Europe.

Collections examined. GREAT BRITAIN: Hertfordshire, Kings Langley, on dead grass in a lawn, 23 Sept. 1955, *R.A. Saich* (*Coprinus saichiae* Reid, holotype, K). — FINLAND: Tavastia, Tammela, Mustiala, 5 Aug. 1880, *P.A. Karsten 1602* (holotype, H). — NETHERLANDS: prov. Groningen, Robbenoord, de Marne, 1 Sept. 1992, *P.B. Jansen 92-147*; prov. Gelderland, Beuningen, 3 Aug. 1987, *N.J. Dam 87088* (herb. Dam); prov. Noord-Holland, Amsterdam, Amsterdamse Bos, 8 Aug. 1971, *E. Kits v. Waveren*; prov. Zuid-Holland: Alphen aan den Rijn, 15 Sept. 1990, *C.B. Uljé 1099*.

Type-studies have shown that *Coprinus saichiae* is very similar in all macro- and microscopical characters to *C. phaeosporus*, so they are considered synonymous.

The subglobose, rather strongly lentiform spores which have in most cases a slightly to rather strongly eccentric germ pore, distinguish *C. phaeosporus* from *C. pseudofriesii* and *C. xantholepis*, both of which have more broadly ellipsoid and somewhat larger, not distinctly lentiform spores. Only in *C. xantholepis* is the germ pore sometimes slightly lentiform.

25. **Coprinus pseudofriesii** Pilát & Svrček — Fig. 25

Coprinus pseudofriesii Pilát & Svrček, Česká Mykol. 21 (1967) 140.

Pileus 5–10 × 3–8 mm when still closed, up to 20 mm when expanded, first conical-ellipsoid or conical, rounded at apex and whitish with pale brown, ochre centre. Veil breaking up in ochre-brown patches, becoming paler with age. Lamellae, L = 32–40(–50), l = 0–3, crowded, free, first white, then grey to blackish. Stipe up to 60 × 1–2 mm, white, greyish white, somewhat floccose at base.

Spores [620, 31, 31] 6.1–10.2 × 5.0–7.9 µm, medium dirty red-brown, broadly ellipsoid, ellipsoid, ovoid or slightly rhomboid, rounded at apex with central, c. 1.5 µm wide germ pore; Q = (1.05–)1.15–1.55, av. Q = 1.25–1.40; av. L = 7.0–8.9, av. B = 5.4–6.8 µm. Basidia 18–32 × 9–11 µm, 4-spored, surrounded by 4–7 pseudoparaphyses. Pleurocystidia 60–120 × 10–27 µm, (sub)cylindrical or narrowly utriform. Cheilocystidia 30–80 × 7–22 µm, similar to pleurocystidia. Elements of veil thick-walled, multiple-branched and diverticulate, 3–8 µm wide; thickness walls up to 1.5 µm, distinctly yellow, very clear in microscope; excrescences up to c. 20 µm in length. Clamp-connections present.

Habitat & distribution — Solitary or a few together; on wood, especially dead branches, also found on herbs and grasses. Rather common. Widespread in Europe.

Collections examined. CZECHIA: Bohemia centralis, Praha-Divoká Sárka, on fragments of *Juglans regina*, 22 July 1941, *J. Herink 332/41*, coll. no. PR 626346 (holotype, PRM). — GERMANY: Gotha, Luisenthal, 9 July, 1983, *F. Gröger* (herb. Bender, Germany); Glauchau, Wernsdorf, 23 June 1992, *M. Graf* (herb. Bender, Germany). — NETHERLANDS: prov. Flevoland, Lelystad, 20 July 1988, *E.C. Vellinga 1308*; Muiderzand, 19 July 1988, *C.B. Uljé 920*; prov. Drenthe, Beilen, 'Schepping', 1 Aug. 1993, *E. Arnolds 6364*, 2 Aug. 1993, *E. Arnolds 6371* (herb. WBS); prov. Gelderland, Rhenen, 'Blauwe Kamer', 28 July 1995, *P.B. Jansen*; prov. Utrecht, Maarsseveen, 15 Febr. 1973, *J. Daams 783* (gh); Vleuten, 15 March 1972, *J. Daams 72-48* (gh); Breukelen, estate 'Sterreschans', 23 Aug. 1986, *C.B. Uljé*; idem, estate 'Over-Holland', 27 Aug. 1986, *C.B. Uljé*; idem, estate 'Nijenrode', 12 Sept. 1991, *C.B. Uljé*; prov. Noord-Holland, Texel, Oudeschild, 4/5 July 1984, *M. Groenendaal* (herb. Groenendaal); Amsterdam, Amsterdamse Bos, 16 July 1966, *E. Kits v. Waveren*; Kortenhoef, 23 March 1970, *J. Daams 70-5* (gh); idem, 13 March 1971, *J. Daams 71-25* (gh); idem 20 March 1971, *J. Daams 71-18* (gh); idem 26 March 1971, *J. Daams 71-63* (gh); idem, 19 Febr. 1972, *J. Daams 72-15* (gh); idem, 11 March 1972, *J. Daams 72-53* (gh); idem, 17 March 1972, *J. Daams 72-42* (gh); idem, 27 March 1972, *J. Daams 642* (gh); idem, 16 Apr. 1973, *J. Daams 72-64* (gh); idem, 28 Jan. 1974, *J. Daams 74-5* (gh); prov. Zuid-Holland, Alphen aan den Rijn, 5 June 1988, *C.B. Uljé*; idem, 10 June 1988, *C.B. Uljé*; idem, 4 July 1988, *C.B. Uljé*; Ter Aar, 'de Put', 18 Sept. 1986, *C.B. Uljé*; Oegstgeest, estate 'Poelgeest', 21 July 1957, *C. Bas 1220*; Warmond, near Seminarium, 28 July 1973, *C. Bas 6033*; Delft, Den Hoorn, 30 Jan. 1973, *J. Daams 73-18* (gh); Ridderkerk, estate 'Huis ten Donck', 27 Aug. 1988, *C.B. Uljé 960*; prov. Noord-Brabant, Moerdijk, 10 Oct. 1989, *E. Arnolds 6029* (WBS).

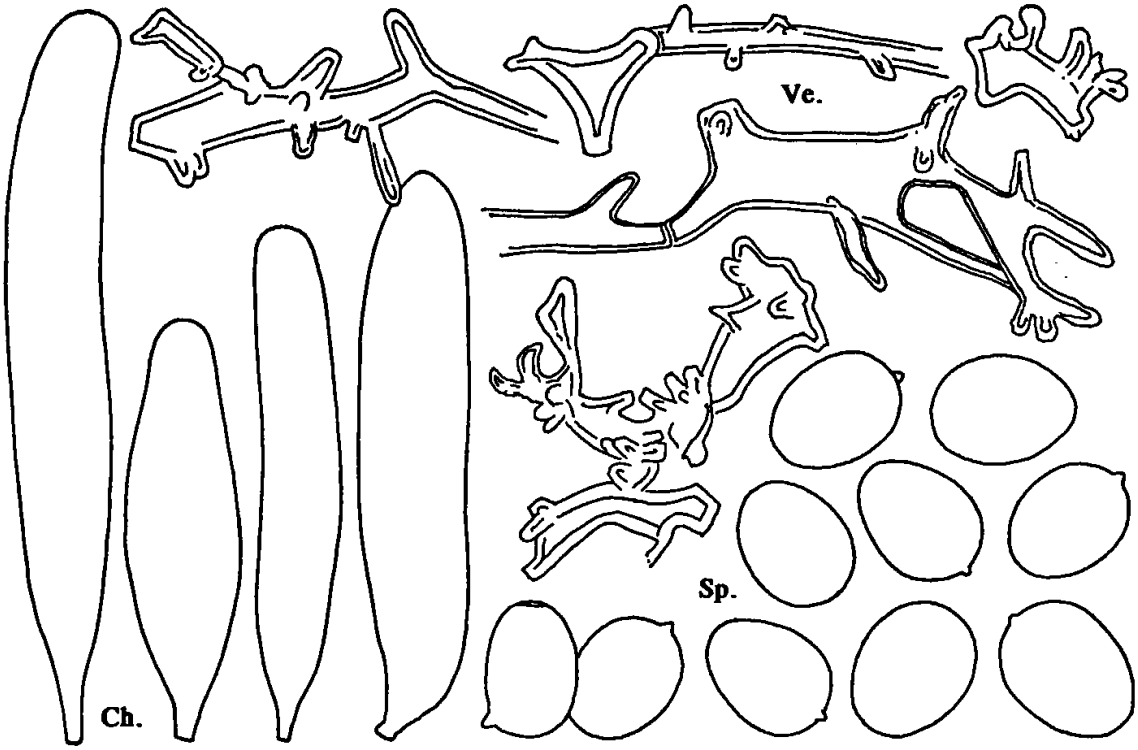

Fig. 25. *Coprinus pseudofriesii* Pilát & Svrček. All figures from coll. *J. Herink 332/41* (holotype).

Coprinus pseudofriesii is characterised by the slightly thick-walled veil (up to 1.5 µm wide), the ellipsoid, ovoid or rhomboid spores up to c. 9 or 10 µm in length and the rather large basidiocarps. *Coprinus pseudofriesii* differs from *C. friesii* by the larger basidiocarps, the generally lignicolous habitat and less thick walls of velar elements, and from *C. phaeosporus* by the not distinctly lentiform, more ellipsoid spores with central germ pore. *Coprinus xantholepis* has much larger cystidia.

26. **Coprinus tigrinellus** Boud. — Fig. 26

Coprinus tigrinellus Boud., Bull. trimest. Soc. bot. Fr. 32 (1885) 283.
Coprinus subtigrinellus Dennis, Kew Bull. 15 (1961) 122–123.
Selected icon. Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 252, pl. 304.

Pileus 5–10 × 3–6 mm when still closed, up to 14 mm when expanded, ovoid, conical or ellipsoid, whitish with dark brown, sepia centre. Veil breaking up in dark brown, woolly scales and becoming paler with drying. Lamellae, L = 32–40(–50), l = 0–3, rather crowded, free, first white, then grey to blackish. Stipe up to 60 × 1–2 mm, white, greyish white, somewhat floccose at base.

Spores [180, 9, 7] 5.3–10.6 × 4.1–8.3 µm, ovoid or ellipsoid, mainly rounded at apex, medium red-brown, with central to slightly eccentric, 1.3–1.5 µm wide germ pore; Q = 1.05–1.45, av. Q = 1.20–1.30; av. L = 6.1–10.1, av. B = 4.6–8.0 µm. Basidia 12–28 × 8–10 µm, 4-spored, surrounded by (4–)5–7(–8) pseudoparaphyses. Pleurocystidia 50–100(–120) × 16–25(–28) µm, subcylindrical, oblong and then often with tapering

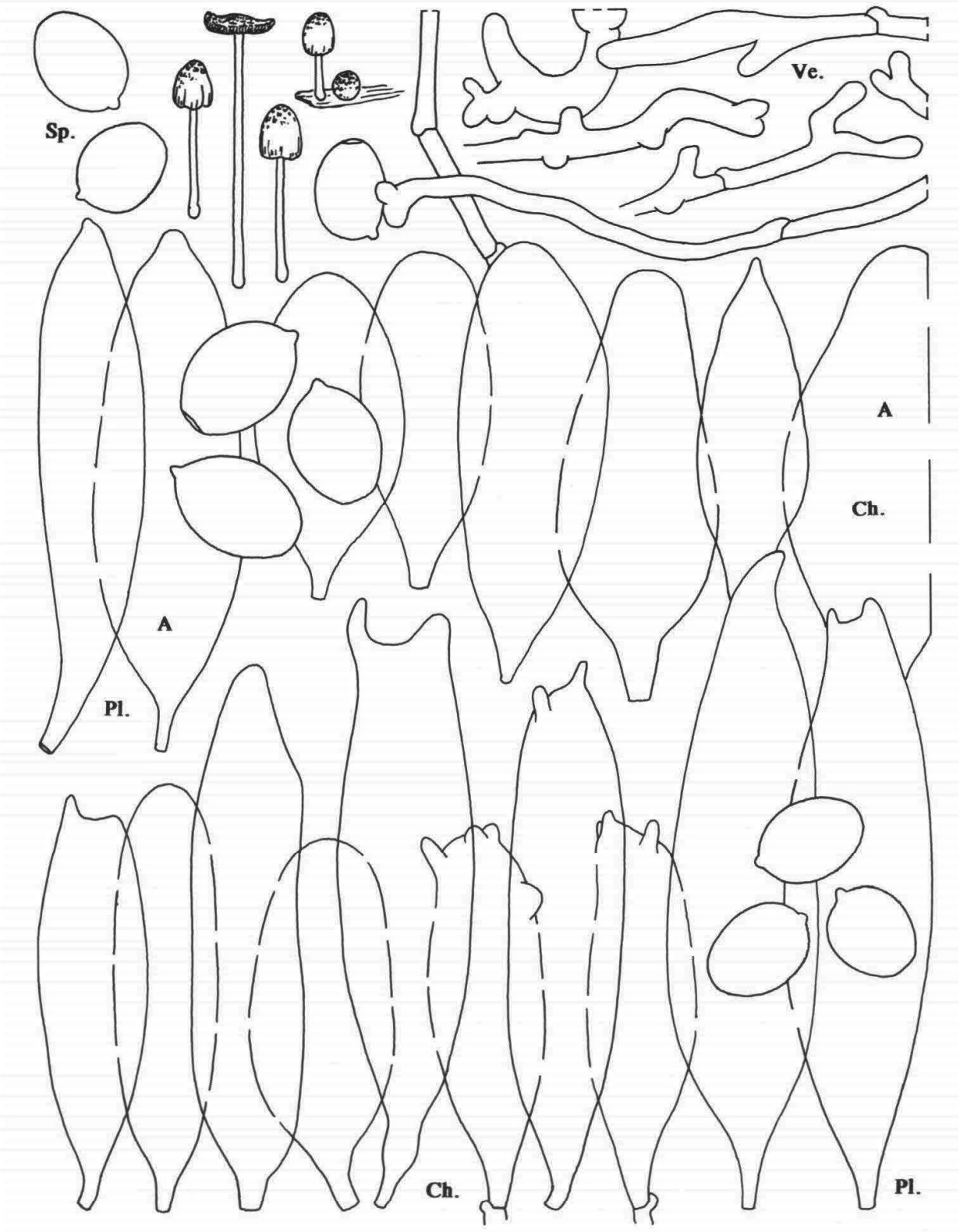

Fig. 26. *Coprinus tigrinellus* Boud. Most figures from coll. *P.B. Jansen 79-154*. — A = Pleuro- and cheilocystidia from *C.B. Uljé*, 8 Aug. 1992.

apex. Cheilocystidia 40–80(–100) × 18–28(–32) µm, (sub)cylindrical, oblong, ellipsoid, conical or utriform. Elements of veil thick-walled, multiple-branched and diverticulate, 3–7(–10) µm wide; excrescences rounded; walls up to 1.5 µm thick. Clamp-connections present.

Habitat & distribution — In small groups, solitary or a few together, on *Phragmites* and other grasses. Widespread in Europe but not common. Holotype of *C. subtigrinellus* from Venezuela, South America.

Collections examined. NETHERLANDS: prov. Flevoland, 'de Abbert', 16 June 1981, *C. Bas 7778*; prov. Noord-Holland, Naarden, Naardermeer, 22 June 1960, *C. Bas 1920*; prov. Zuid-Holland, Streefkerk, 8 Aug. 1992, *C.B. Uljé*; Reeuwijk, 29 July 1995, *C.B. Uljé*; prov. Noord-Brabant, Breda, Liesbos, 12 Aug. 1967, *C. Bas 4900*; idem, 30 July 1979, *P.B. Jansen 79-154*. — VENEZUELA: Caracas, Botanic Garden, on dead *Arundo donax*, 30 June 1958, *R.W.G. Dennis 1124* (holotype of *C. subtigrinellus*, K).

Although macroscopically *Coprinus tigrinellus* usually is fairly well characterized by the dark brown (sepia) veil on the pileus, this may be less distinctly developed. The distinctive character, however, of this species is to be found in the rounded excrescences of the elements of the veil.

Coprinus subtigrinellus is considered here a synonym of *C. tigrinellus*. A study of the holotype of *Coprinus subtigrinellus* showed that the spores are rather small for typical *C. tigrinellus* (5.3–7.2 × 4.2–5.5 µm), but the structure of the veil is similar to that of *C. tigrinellus* and, in our opinion, provides adequate reason for not maintaining *C. subtigrinellus* as a separate species.

27. **Coprinus xantholepis** P.D. Orton — Fig. 27

Coprinus xantholepis P.D. Orton, Notes R. bot. Gdn Edinb. 32 (1972) 150.

Pileus 8–10 × 4–5 mm when still closed, up to 20 mm when expanded, first cylindrical, ellipsoid, ovoid or somewhat conical, whitish with ochre centre. Veil breaking up in felty, ochre scales and becoming paler. Lamellae, L = 34–46, l = 0–3, rather crowded, free, first white, then grey to blackish. Stipe up to 60 × 1–1.5 mm, white, greyish white, somewhat floccose at clavate base.

Spores [60, 3, 3] 5.0–7.2 × 4.5–6.2 µm, short ovoid or ovoid, truncate, medium red-brown, with central, rarely slightly eccentric, 1.3–1.5 µm wide germ pore; Q = 1.00–1.30, av. Q = 1.10–1.20; av. L = 5.9–6.3, av. B = 5.4 µm. Basidia 18–44 × 8–11 µm, 4-spored, surrounded by (3–)4–6(–7) pseudoparaphyses. Pleurocystidia 80–180 × 25–40(–60) µm, (sub)cylindrical, oblong or utriform. Cheilocystidia 40–120 × 18–32(–40) µm, similar to pleurocystidia. Elements of veil thick-walled, strongly multiple-branched and diverticulate, in general with rounded protuberances, 3–7(–10) µm wide; walls up to 1 µm thick, pale brown. Clamp-connections present.

Habitat & distribution — In small groups, on grasses and herbs. Rare, recorded from Scotland and the Netherlands.

Collections examined. NETHERLANDS: prov. Noord-Holland, Kortenhoef, 26 Febr. 1971, *J. Daams 71-12* (gh); prov. Zuid-Holland, Leiden, Leidse Hout, 22 July 1953, *M. Lange*. — GREAT BRITAIN: Scotland, Aberdeenshire, Loch Skene, 19 Aug. 1964, P.D. *Orton 2567* (holotype, E).

Coprinus xantholepis differs from *C. phaeosporus*, *C. pseudofriesii* and *C. tigrinellus* particularly by the larger and broader cystidia.

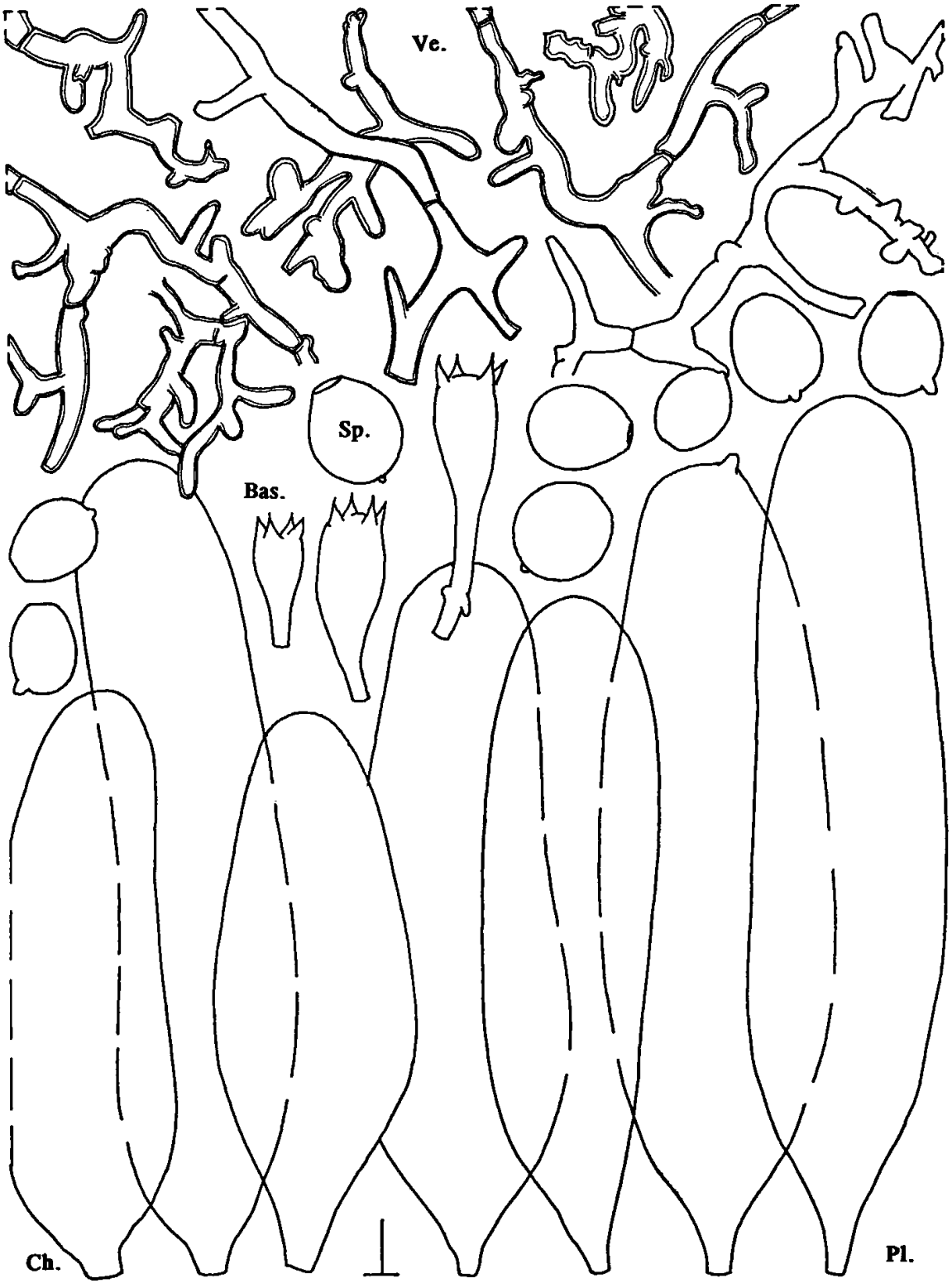

Fig. 27. *Coprinus xantholepis* P.D. Orton. All figures from coll. *P.D. Orton 2567* (holotype).

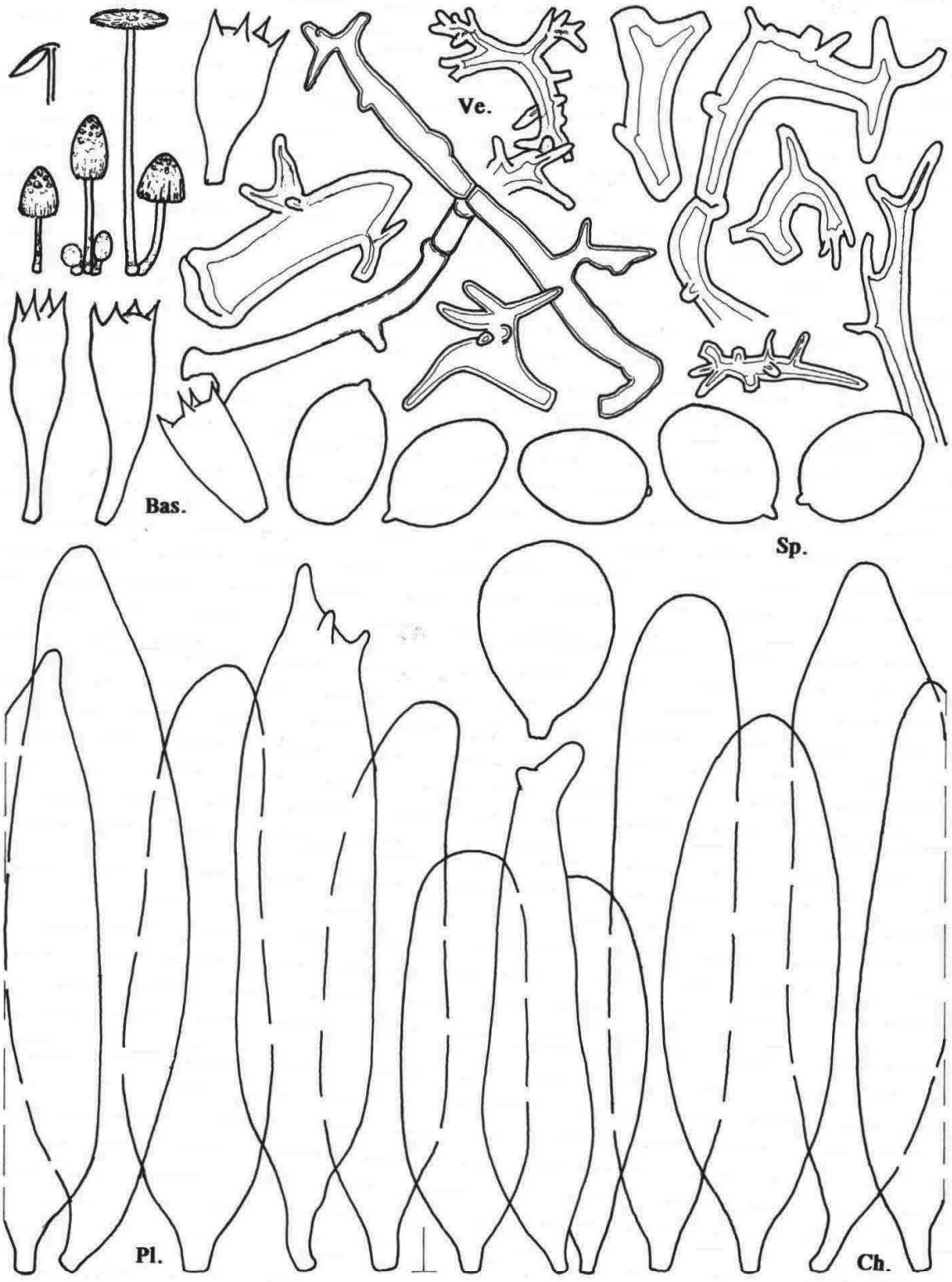

Fig. 28. *Coprinus friesii* Quél. All figures from coll. *C.B. Uljé 1165.*

28. **Coprinus friesii** Quél. — Fig. 28

Coprinus friesii Quél., Mém. Soc. Émul. Montbéliard, ser. II (5) (1872) 129.
Coprinus rhombisporus P.D. Orton, Notes R. bot. Gdn Edinb. 32 (1972) 145.

Pileus 3–8 × 2–6 mm when still closed, up to 15 mm when expanded, conical, ovoid or ellipsoid, whitish with ochre centre. Veil breaking up in cream coloured to ochre patches. Lamellae, L = c. 40, l = 0–3, rather crowded, free, first white, then grey to blackish. Stipe up to 35 × 1–1.5 mm, white, greyish white, somewhat floccose at the slightly clavate base.

Spores [180, 9, 9] 6.2–9.5(–10.8) × 5.5–7.2(–8.3) µm, ovoid to slightly rhomboid, mainly rounded at apex, medium red-brown, with central, 1.3–1.6 µm wide germ pore; Q = 1.10–1.40(–1.50), av. Q = 1.20–1.30; av. L = 7.6–8.3(–9.7), av. B = 6.0–6.8(–7.9) µm. Basidia 14–32 × 8–9 µm, 4-spored, surrounded by 5–7 pseudoparaphyses. Pleurocystidia 80–125 × 16–22 µm, (sub)cylindrical, oblong or narrowly conical. Cheilocystidia 30–100 × 14–32 µm, (sub)cylindrical, oblong, narrowly conical or ellipsoid. Elements of veil thick-walled, strongly multiple-branched and diverticulate, 2–8 µm thick; walls more than 1.5 µm thick, up to (2–)2.5–3(–4) µm in places and not or only slightly coloured. Clamp-connections present.

Habitat & distribution — In small groups, a few together, generally on grasses. Common in Europe. Recorded from Canada, South America, North Africa.

Collections examined. GREAT BRITAIN: Norfolk, Surlingham, Wheatfen Broad, 3 Aug. 1968, on grass and *Carex* debris, *P.D. Orton 3249* (holotype of *C. rhombisporus*, E). — NETHERLANDS: prov. Gelderland, Doetinchem, 20 June 1952, *H.S.C. Huijsman*; Lochem, 29 June 1967, on grass, *M. v. Vuure*; prov. Utrecht, Breukelen, estate 'Over-Holland', 20 July 1963, on grass, *E. Kits v. Waveren*; prov. Noord-Holland, 's-Graveland, 6 March 1970, *E. Kits v. Waveren* (gh); Kortenhoef, 28 June 1978, in lawn on grass, *J. Daams*; prov. Zuid-Holland, Ter Aar, 1 Aug. 1989, on dead grass, *C.B. Uljé 1013*; Alphen aan den Rijn, Sportlaan, 12 July 1991, on dead grass, *C.B. Uljé 1165*; idem, Spookverlaat, 12 Aug. 1993, on grass, *C.B. Uljé*.

Coprinus friesii can be recognized by the ovoid or rhomboid spores with average length of c. 8 µm in combination with the strongly thick-walled, not or slightly coloured veil. The type of *Coprinus rhombisporus* agrees in all characters with *C. friesii* and in is therefore considered synonymous. *Coprinus friesii* differs from the closest related *C. pseudofriesii* by smaller basidiocarps, not or only slightly coloured walls of veil which are more than 2 µm thick in places and the habitat: *Coprinus friesii* grows on grasses whereas *C. pseudofriesii* is mainly lignicolous.

29. **Coprinus spec.** (*Uljé 1262*) — Fig. 29

Pileus 2–6 × 2–4 mm when still closed, up to 15 mm when expanded, ellipsoid, ovoid or conical, greyish, beige (Mu. 7.5 YR 7/2; K. & W. 6B2). Veil greyish with pinkish tinge when young, soon greyish, breaking up in small, felty patches. Lamellae free, first white, then grey-brown to dark grey or blackish. Stipe up to 50 × 1–1.5 mm, white, greyish white, somewhat floccose at clavate base.

Spores [60, 2, 1] 6.7–8.7 × 5.5–7.7 × 4.5–5.2 µm, heart-shaped, rounded triangular with rounded apex, distinctly lentiform, medium to dark red-brown and central or slightly eccentric, c. 1.5 µm wide germ pore; Q = 0.95–1.45, av. Q = 1.00–1.20; av. L = 7.0–

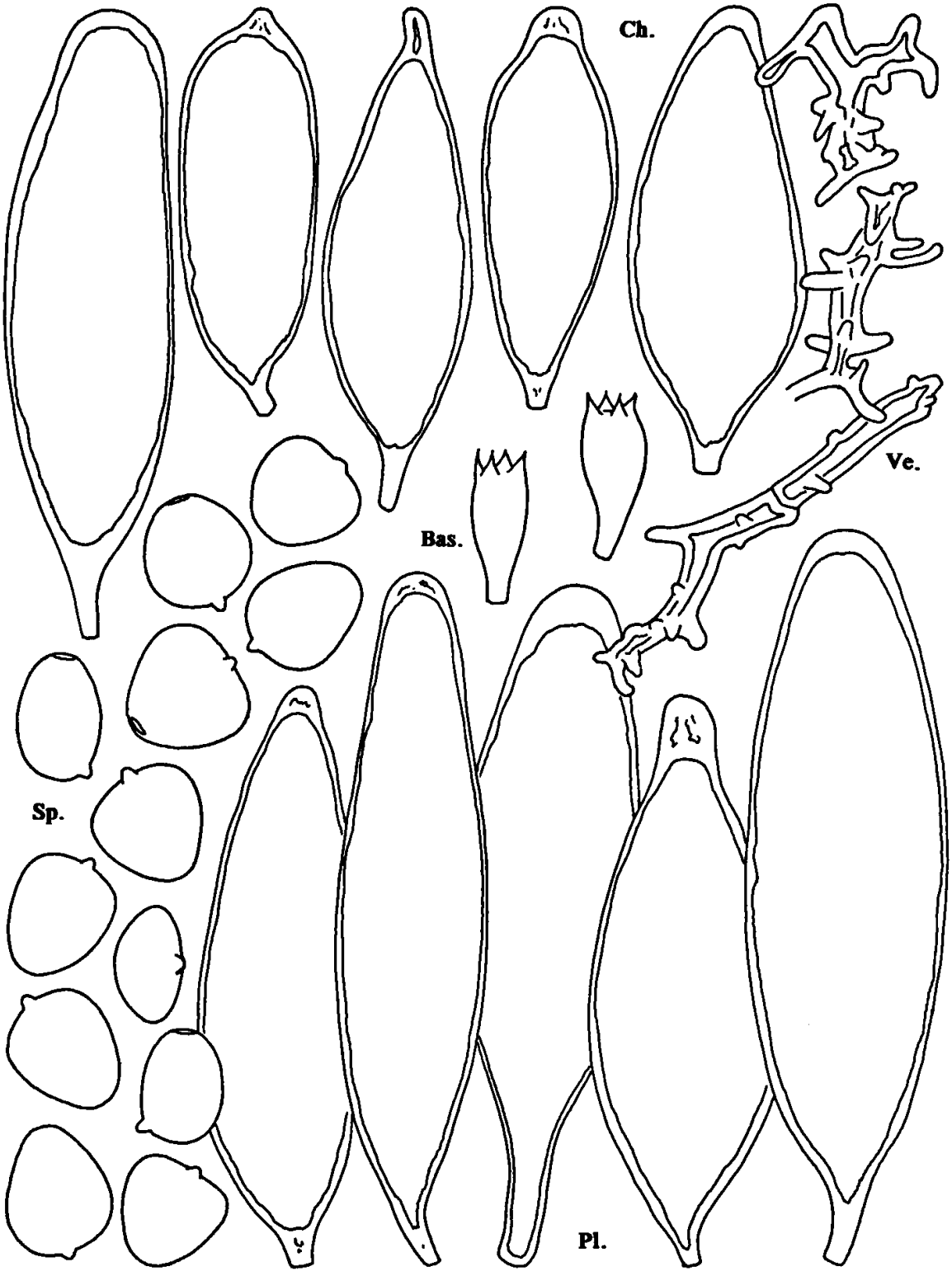

Fig. 29. *Coprinus spec.* (*Uljé 1262*). All figures from coll. *C.B. Uljé 1262.*

7.9, av. B = 6.5–7.2, av. W = 4.8–5.0 µm. Basidia 16–24 × 9–11 µm, 4-spored, surrounded by 4–7 pseudoparaphyses. Pleurocystidia 80–120 × 24–32 µm, utriform, oblong, (sub)cylindrical or conical with yellowish contents forming a layer inside the walls. Cheilocystidia 60–100 × 22–28 µm, similar to pleurocystidia. Elements of veil thick-walled, multiple-branched and diverticulate, 2–6 µm wide; walls up to 2.5 µm thick, almost colourless. Clamp-connections present.

Habitat & distribution — Solitary or a few together, on dead grasses on clay. Very rare, only known from one collection.

Collection examined. NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, 4 Sept. 1995, *C.B. Uljé 1262.*

Among the spores in *Coprinus spec. Uljé 1262* we found some ellipsoid and ovoid ones which resemble the spores of *C. friesii.* Also the structure of the veil agrees very well with that of *C. friesii* with slightly coloured and very thick-walled elements. While it is possible that this collection represents a deviating form of *C. friesii*, the spores are in greatest part distinctly triangular or heart-shaped, and for that reason a separate description is given.

30. **Coprinus spec.** (*Uljé 947*) — Fig. 30

Pileus 3 × 2 mm when still closed, up to 6 mm when expanded, ovoid, ellipsoid or conical, whitish with dark grey-brown centre. Veil breaking up in small, grey-brown, radial fibrillose, hairy scales. Colour of centre of pileus beige-brown (Mu. 7.5 YR 6/2;

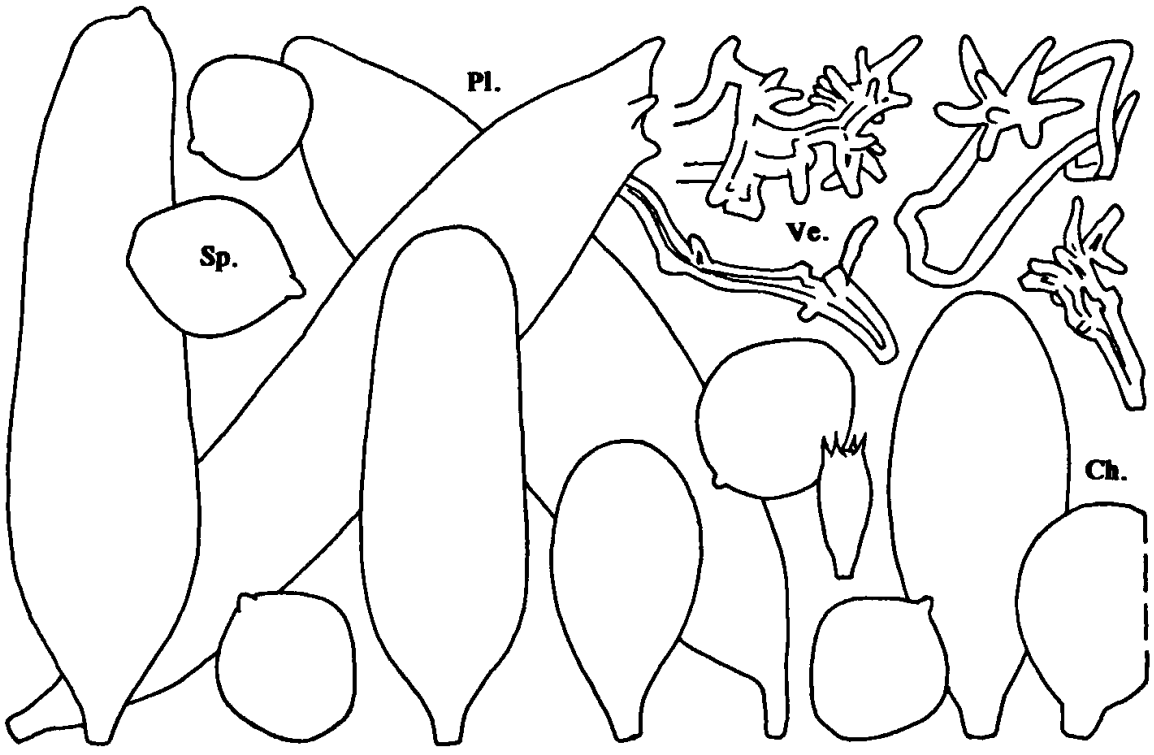

Fig. 30. *Coprinus spec.* (*Uljé 947*). All figures from coll. *C.B. Uljé 947.*

K. & W. 7C2), scales when young pale reddish-brown (Mu. 5 YR 5/3; K. & W. 8D3), later darker brown (Mu. 7.5 YR 4/2; Me 8E3). Lamellae, L = c. 24, l = 0–3, rather crowded, free, first white, then grey to blackish. Stipe up to 20 × 0.5–1 mm, white, greyish white, somewhat floccose at clavate base.

Spores [40, 2, 1] 6.7–10.3 × 6.7–8.4 µm, medium red-brown, short ovoid or mitriform, truncate, with central, 1.0–1.3 µm wide germ pore; Q = 1.00–1.35, av. Q = 1.10–1.15; av. L = 8.4–8.8, av. B = 7.6 µm. Basidia 16–25 × 7–10 µm, 4-spored, surrounded by 4–6(–7) pseudoparaphyses. Pleurocystidia 90–165 × 18–32 µm, (sub)cylindrical or oblong. Cheilocystidia 30–120 × 10–34 µm, (sub)cylindrical, oblong or (broadly) ellipsoid. Elements of veil thick-walled, strongly multiple-branched and diverticulate, 2–10 µm wide; walls more than 1.5 µm thick (up to 3 µm) in places and then dark brown. Clamp-connections present.

Habitat & distribution — Solitary or a few together on dead grass; very rare. Only found once.

Collection examined. NETHERLANDS: prov. Zuid-Holland, Alphen aan den Rijn, 9 Aug. 1988, on grasses, *C.B. Uljé 947.*

Coprinus spec. Uljé 947 differs from *C. friesii* in dark brown walls of elements of veil and short mitriform spores.

31. **Coprinus vermiculifer** Joss. ex Dennis — Fig. 31a, 31b

Coprinus vermiculifer Joss., Bull. trimest. Soc. mycol. Fr. 60 (1944) 5–9 (nomen nudum); *Coprinus vermiculifer* Joss. ex Dennis, Kew Bull. 19 (1964) 112.

Pileus 6 × 4 mm when still closed, expanded 8–16 mm, rounded conical, first entirely covered with white, felty veil, at centre often sepia-coloured and persistent there, breaking up in small, hairy-floccose scales. Lamellae crowded, free, first white, later blackish brown. Stipe up to 30 × 0,5–1 mm, whitish, minutely fibrillose-floccose, later glabrous; base slightly bulbous.

Spores [100, 4, 2] 8.5–13.7 × 6.0–9.1 µm, ellipsoid or ovoid, rounded at apex, dark red-brown, with central, c. 1.5 µm wide germ pore; Q = 1.30–1.75, gem. Q = 1.50–1.60; av. L = 10.3–12.4, av. B = 6.8–7.9 µm. Basidia 14–28 × 9–10 µm, 4-spored, surrounded by 4–6 pseudoparaphyses. Pleurocystidia 60–90 × 25–28 µm, ellipsoid, (sub) cylindrical. Cheilocystidia 35–55 × 20–32 µm, ellipsoid or (sub)globose. Elements of veil thick-walled, 3–9 µm wide, diverticulate and strongly, multiple-branched with long, thick-walled terminal elements, ascending from the pileipellis; walls up to 1.5(–2.5) µm thick. Clamp-connections present.

Habitat & distribution — In small groups on dung of deer and elephant. Very rare. Europe, Africa. Not known from the Netherlands.

Collections examined. NAMIBIA: Etoschapfanne, on elephant droppings, 11 Oct. 1988, *Ch. Claas* (herb. Bender, Germany). — GREAT BRITAIN: Scotland, Isle of Rhum, Sgor Mhor, on deer droppings, 1 Sept. 1962, *R.W.G. Dennis 236* (holotype, K).

Microscopically *C. vermiculifer* can easily be recognized by the brown, thick-walled terminal elements of the veil in combination with the large spores and the habitat on dung.

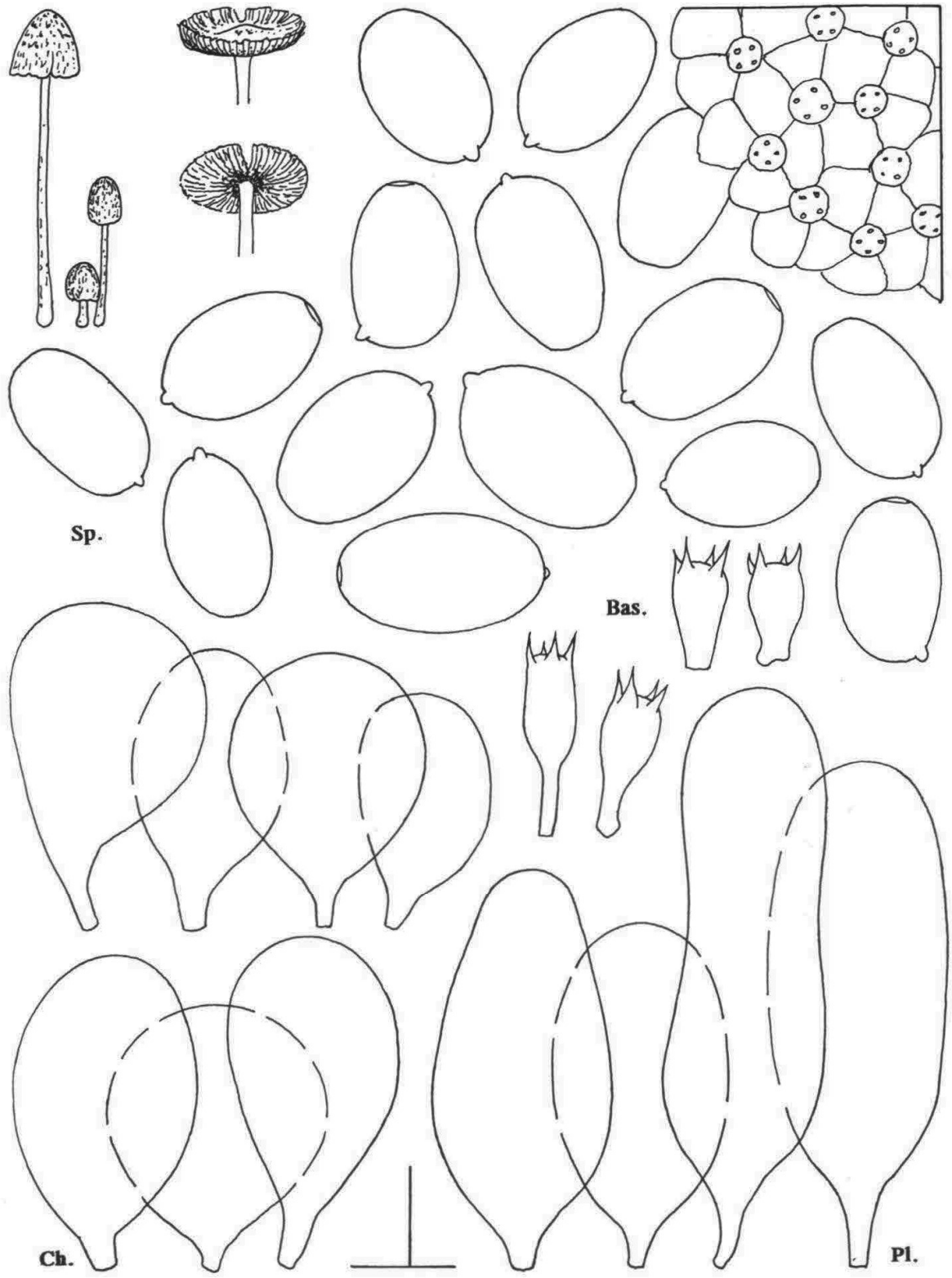

Fig. 31a. *Coprinus vermiculifer* Joss. ex Dennis. All figures from coll. *R.W.G. Dennis 236* (holotype).

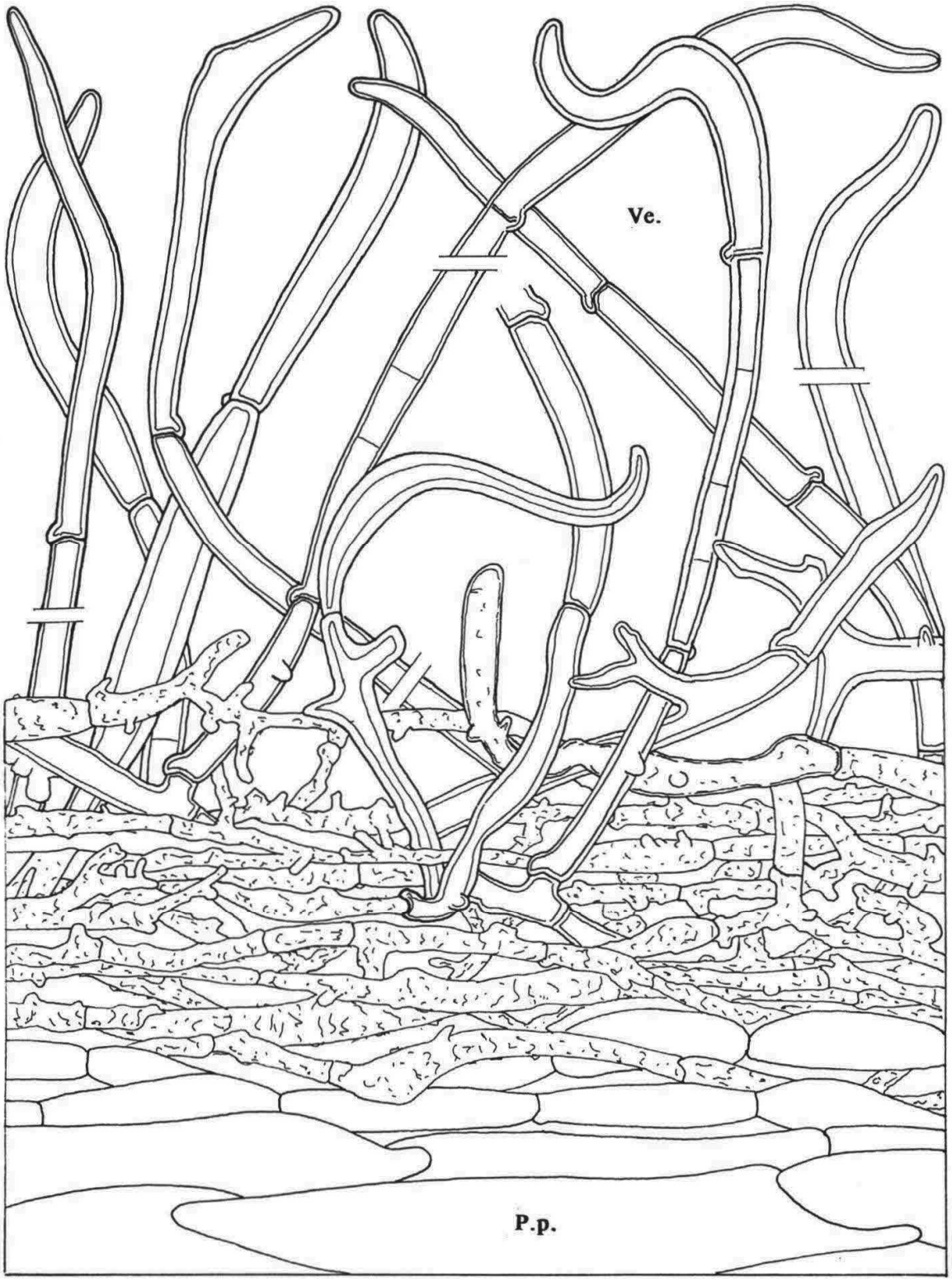

Fig. 31b. *Coprinus vermiculifer* Joss. ex Dennis. Pileipellis and veil from coll. *R.W.G. Dennis 236* (holotype).

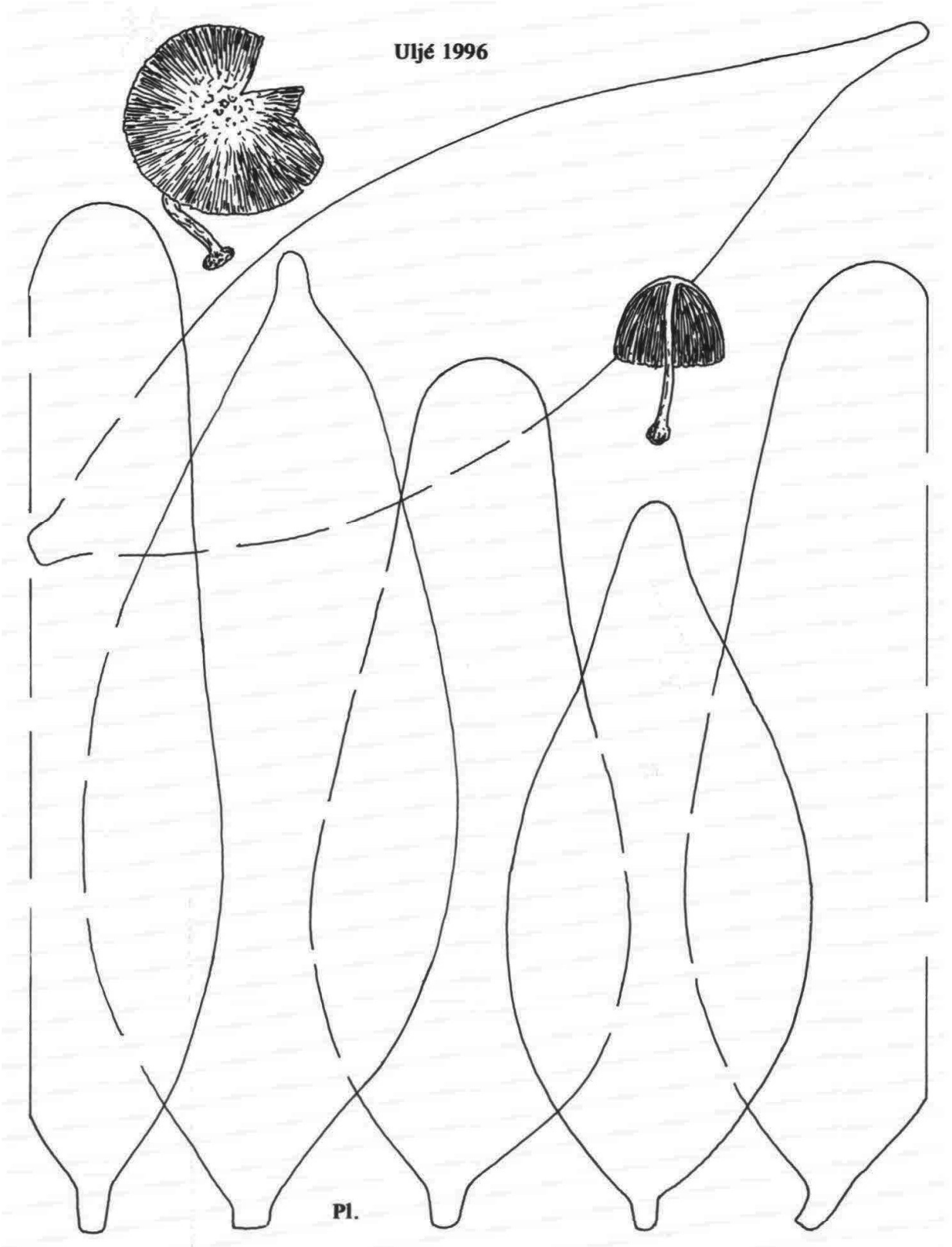

Fig. 32a. *Coprinus spilosporus* Romagn. Basidiocarps (from dried material) and pleurocystidia from coll. *H. Bender* (Dummerdorfer).

Fig. 32b. *Coprinus spilosporus* Romagn. Spores, basidia, pileipellis and veil from coll. *H. Bender* (Dummerdorfer).

32. **Coprinus spilosporus** Romagn. — Fig. 32a, 32b

Coprinus spilosporus Romagn., Rev. Mycol. 16 (1951) 127.

Selected icons. Jamoni, Funghi Ambiente 47 (1988) between 16 and 17, pl. 110; Cacialli, Caroti & Doveri, Funghi Fimicola, Schede Micol. 1 (1995) 139.

Pileus 10–20 × 8–15 mm, first subglobose, broadly ellipsoid or ovoid, then hemispherical or obtusely conical to convex when expanding and then 25–40 mm wide, very deliquescent. In young stage white, soon greying from the margin, at centre becoming pale brown to ochre. Veil at first covering the whole pileus, felty, silky fibrillose, then splitting up in small, woolly-felty, white flocks (like in *Amanita* species), at the tips and in centre becoming brownish, ochre-brown. Lamellae, L = c. 50–60, very crowded, first white, then grey-brown, finally black. Stipe 40–80 × 2.5–3.5 mm, equal or slightly tapering to the apex, snow-white at submarginate bulbous base, upwards and at maturity more watery white or slightly brownish, minutely fibrous-floccose when fresh.

Spores [160, 6, 3] 7.3–9.7 × (5.6–)6.9–9.3 µm, subglobose, globose, the shape of a maize-kernel or rounded quadrangular (some spores are elongate cylindrical-ovoid; the breadth, av. B, Q and av. Q in parentheses), truncate, red-brown (Mu. 2.5 YR 3/6–5 YR 4/6; K. & W. 8E8–8E6), with distinctly paler spot on the suprahilar plage, or with entirely pale plage, and with large, slightly eccentric to almost central, c. 3 µm wide germ pore; Q = 1.00–1.20(–1.40), av. Q = 1.05–1.10(–1.25); av. L = 7.6–8.7, av. B = (6.7–)7.2–8.2 µm. In some spores two very small apiculus-like knobs occur on the sides. When the spores germinate, the spore wall tears open with jagged edges. Basidia 22–36 × 8.5–10 µm, 4-spored, surrounded by (4–)5–6 pseudoparaphyses. Pleurocystidia 80–200 × 25–60 µm, utriform, conical or fusiform and then rather acute at apex in most cases or utriform. Cheilocystidia similar to pleurocystidia but somewhat smaller in part. Elements of veil 2–8 µm wide, strongly diverticulate, excrescences up to 20 µm in length with very thick walls, up to 3 µm thick and pale yellowish; long, up to 350 µm and 2–4 µm wide, thick-walled, hair-like terminal elements grow out of thick-walled, veil-like hyphae. Clamp-connections present.

Habitat & distribution — Solitary or a few together, on bare, gravelly-calcareous soil or in deciduous forests in mossy places; also found on burned places. Very rare. In Europe known from a few localities only. Not yet known from the Netherlands.

Collections examined. FRANCE: Corsica, 10 Oct. 1983, *H. Bender* (herb. Bender, Germany). — GERMANY: Wissen, Haldensand, 10 June 1982, *J. Häffner*; Dummerdorfer, *H. Bender* (herb. Bender, Germany), no annotations.

The paler spot on the plage or the entirely pale plage is a good character to distinguish *C. spilosporus* from *C. gonophyllus*. In addition the very thick-walled veil with elongate, hair-like terminal elements (up to 350 µm in length) and the (in great part) conical or fusiform cystidia are salient characters for this species.

33. **Coprinus phlyctidosporus** Romagn. — Fig. 33

Coprinus phlyctidosporus Romagn., Rev. Mycol. 10 (1945) 88.

Selected icons: Cetto, Funghi Vero 5: pl. 1721. 1987; Imazeki & Hongo, Coll. Ill. mushr. Japan 2 (1) (1987) 166.

Pileus 5–20 × 3–15 mm when still closed, 8–30(–40) mm when expanded, ellipsoid, ovoid, at first white, soon becoming grey, centre dark (Mu. 5 YR 2.5/2, 7.5 YR 5/2,

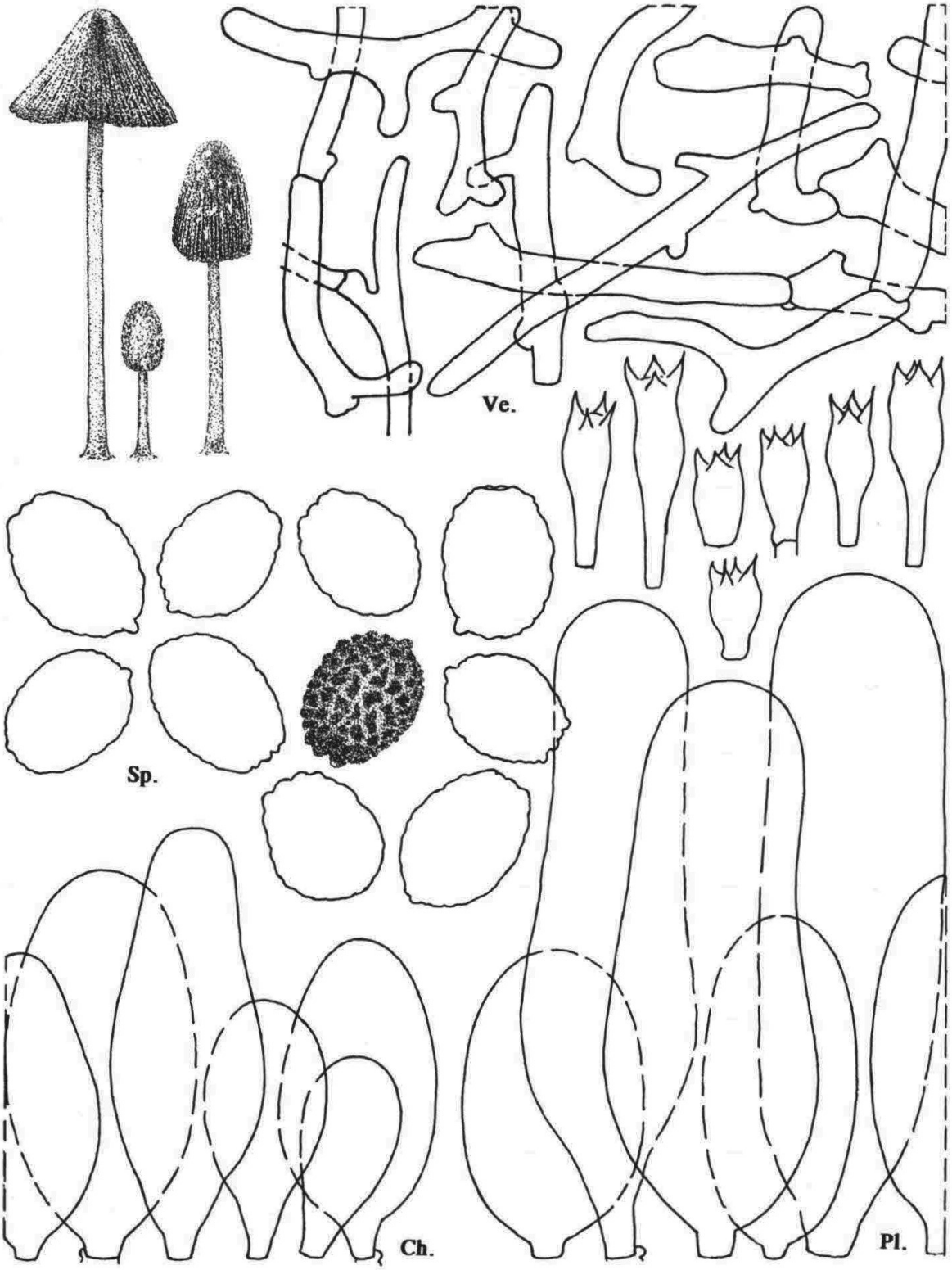

Fig. 33. *Coprinus phlyctidosporus* Romagn. All figures from coll. *C.B. Uljé 1020.*

10 YR 4/3 below veil). Veil white to grey, breaking up in small, radial hairy-fibrillose scales, not in patches. Lamellae, L = 18–42, l = 0–3, free, first white, then greyish, finally blackish. Stipe up to 80 × 1–3 mm, whitish, base slightly clavate.

Spores [80, 4, 3] 7.3–11.2 × 5.4–8.2 µm, ovoid, rather truncate, very dark red-brown, with warty ornamentation and central, 1.5–2 µm wide germ pore; Q = 1.20–1.50, av. Q = 1.30–1.40; av. L = 8.4–10.6, av. B = 6.0–7.6 µm. Basidia 20–35 × 7–9 µm, 4-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 50–110 × 20–35 µm, ellipsoid, oblong, utriform or cylindrical. Cheilocystidia 30–70 × 15–30 µm, ellipsoid, ovoid, vesiculose or utriform. Elements of veil thin-walled, diverticulate, 2–8 µm wide. Clamp-connections present.

Habitat & distribution — Subfasciculate, in small groups, a few together on wood, generally on dead branches on the ground. Also on burned places. Not common but widespread in Europe; also recorded from Japan.

Collections examined. NETHERLANDS: prov. Zuid-Holland, Ter Aar, Langeraar, 3 Sept. 1989, *C.B. Uljé 1026*; idem, 'de Put', 4 nov. 1986, *C.B. Uljé 792*; idem, 7 Sept. 1994, *C.B. Uljé.*

Coprinus phlyctidosporus resembles a small specimen of *C. lagopus*. It is microscopically clearly distinguished by the warty, ovoid spores and 4-spored basidia.

34. **Coprinus rugosobisporus** Geesink & Imler — Fig. 34

Coprinus rugosobisporus Geesink & Imler, Sterbeeckia 12 (1979) 9.

Pileus c. 15 × 10 mm when still closed, up to 30 mm when expanded, ellipsoid or ovoid when young, first white, soon greyish. Veil white to grey, breaking up in radial hairy/fibrillose flocks, not in patches. Lamellae, L = 18–42, l = 0–3, rather crowded, free, first white, then grey, finally blackish. Stipe up to 80 × 1–3 mm, whitish, base slightly clavate.

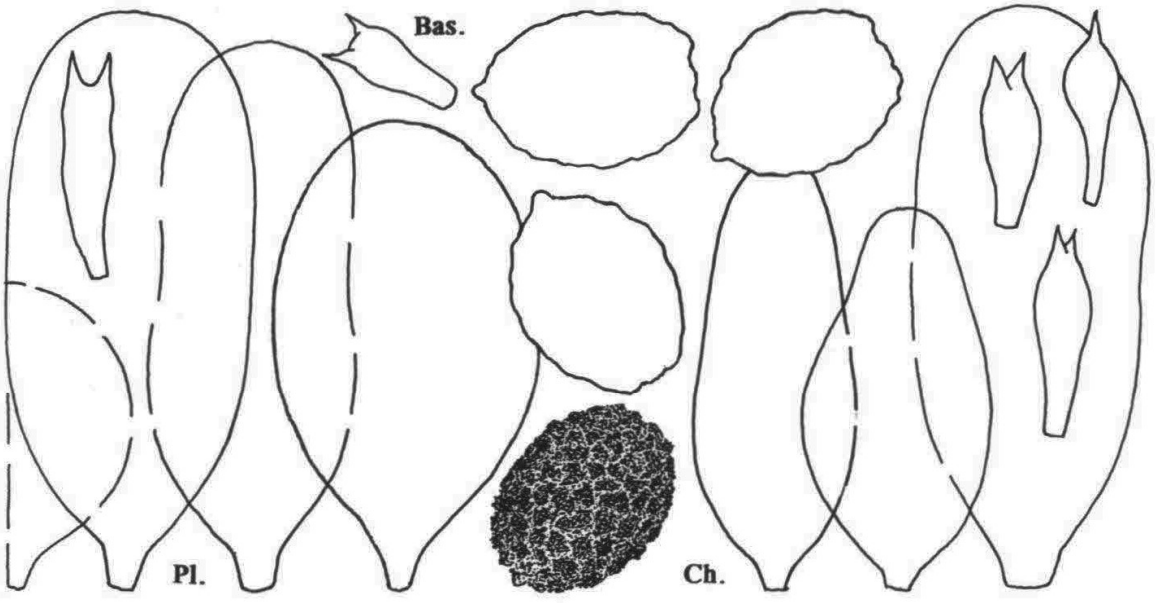

Fig. 34. *Coprinus rugosobisporus* Geesink & Imler. All figures from coll. *J. Geesink* (holotype).

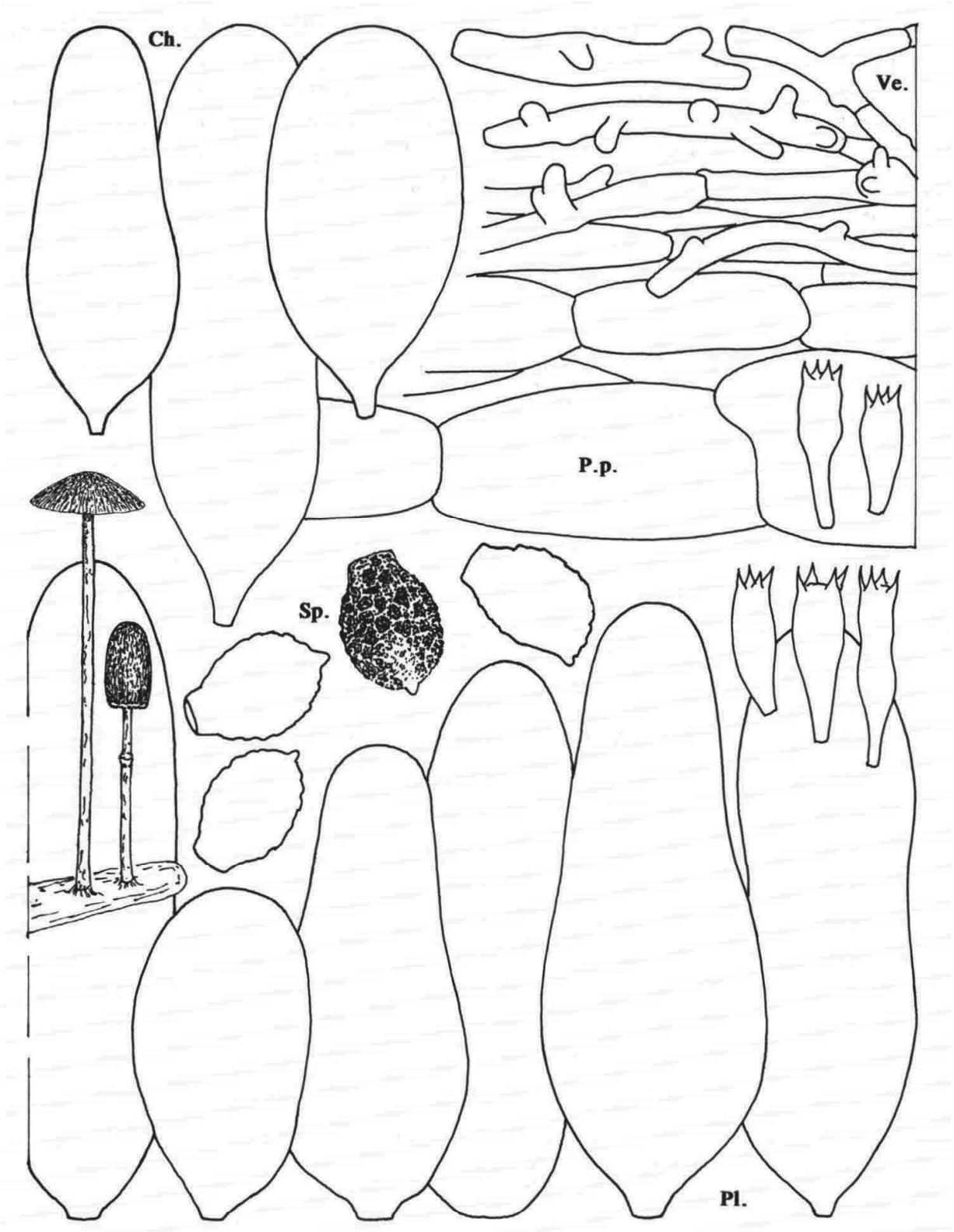

Fig. 35. *Coprinus echinosporus* Buller. All figures from coll. *H. Jonker*, Oct. 1983.

Spores [40, 2, 1] 9.0–11.8 × 7.0–9.1 µm, ovoid, rather truncate, very dark red-brown, with warty ornamentation and central, 1.5–2 µm wide germ pore; Q = 1.15–1.40, av. Q = c. 1.30; av. L = 10.3–10.6, av. B = 7.9–8.1 µm. Basidia 16–34 × 6–8 µm, 2-spored, surrounded by 3–6 pseudoparaphyses. Pleurocystidia 50–80 × 30–40 µm, ellipsoid, utriform or broadly cylindrical. Cheilocystidia 30–70 × 20–35 µm, (sub)globose, ellipsoid, narrowly ovoid, utriform or broadly cylindrical. Elements of veil thin-walled, diverticulate, 2–8 µm wide. Clamp-connections present.

Habitat & distribution — Solitary or a few together on wood, also found on charcoal. Very rare. Only known from Belgium and the Netherlands, one find each.

Collection examined. NETHERLANDS: prov. Noord-Holland, Wieringermeer, Dijkgatbos, on dead branch of *Acer*, 18 Oct. 1970, *J. Geesink* (holotype, L).

Like *Coprinus phlyctidosporus*, this species is characterized by warty, ovoid spores, which are born on 2-spored basidia. Therefore one could think it is only a 2-spored form of that species, but then one would expect the spores to be distinctly larger than in the 4-spored *C. phlyctidosporus*. For the time being we keep *Coprinus rugosobisporus* separate.

35. **Coprinus echinosporus** Buller — Fig. 35

Coprinus echinosporus A.H. Buller, Trans. Brit. mycol. Soc. 6 (1920) 363.

Coprinus giganteoporus Huijsman, Fungus 25 (1955) 19.

Selected icons. Læssøe, Svampe 20 (1989) 64; Breitenb. & Kränzl., Pilze Schweiz 4 (1995) 232, pl 274.

Pileus 10–20 × 5–10 mm when still closed, ellipsoid or ovoid, 10–30 mm when expanded, first white, soon becoming greyish; centre very dark under veil. Veil white to grey, radially splitting up in minute, hairy-fibrillose scales. Lamellae, L = 18–42, l = 0–3, rather crowded, free, first white, then greyish, finally blackish. Stipe up to 100 × 1–3 mm, whitish; base slightly clavate, up to 4 mm wide.

Spores [140, 7, 6] 8.5–12(–13) × 6.1–8.2 µm, amygdaliform with warty ornamentation, truncate, very dark red-brown in most cases, with central, 1.5–1.8 µm wide germ pore; Q = 1.25–1.80, av. Q = 1.35–1.60; av. L = 9.2–11.1, av. B = 6.8–7.4 µm. Basidia 16–38 × 8–9.5 µm, 4-spored, surrounded by 3–6(–7) pseudoparaphyses. Pleurocystidia 60–120(–150) × 20–50(–80) µm, ellipsoid, oblong, utriform or (sub)cylindrical. Cheilocystidia 25–100 × 20–55 µm, subglobose, ellipsoid, utriform or (sub)cylindrical. Elements of veil thin-walled, diverticulate, 2–8 µm thick. Clamp-connections present.

Habitat & distribution — In small groups on wood. Widespread but not common in Europe.

Collections examined. NETHERLANDS: prov. Overijssel, Boekelo, Aug.–Oct. 1983, *H. Jonker*; prov. Gelderland, Doetinchem, estate 'Slangenburch', 29 June 1954, *Mrs v. Vuure* (*C. giganteoporus*, holotype); prov. Noord-Holland, Castricum, 31 Oct. 1964, *E. Kits v. Waveren*; Aerdenhout, Naaldenveld, 11 Nov. 1976, *E. Kits v. Waveren*; prov. Zuid-Holland, Ter Aar, Langeraar, 19 Sept. 1984, *C.B. Uljé 569*; Leiden, Leidse Hout, 31 May 1984, *C.B. Uljé 537*.

Coprinus echinosporus is easily recognized by the warty, amygdaliform spores and the 4-spored basidia. The spores of *C. phlyctidosporus* and *C. rugosobisporus*, two species close to *C. echinosporus*, are ovoid.

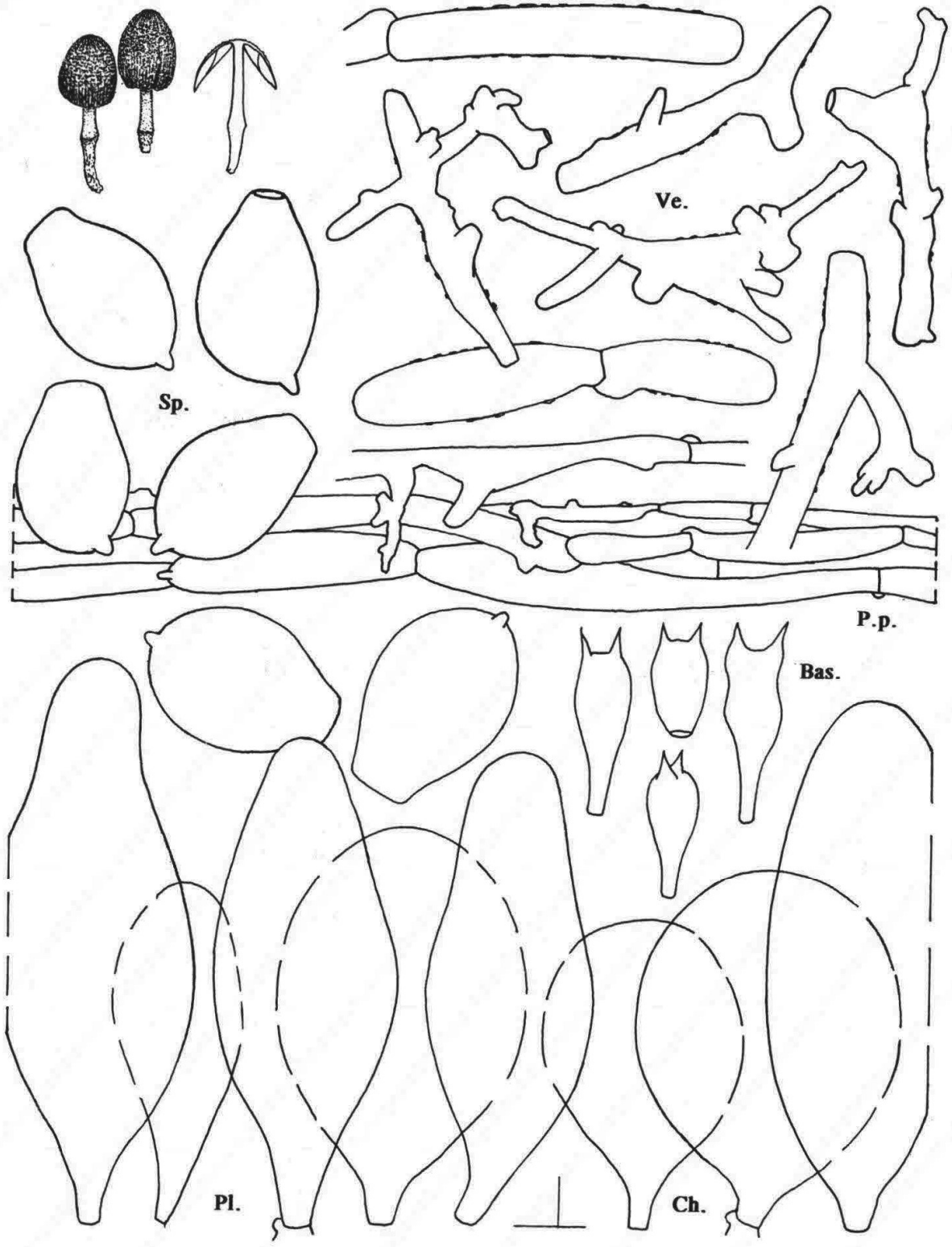

Fig. 36. *Coprinus piepenbroekii* Uljé & Bas. All figures from coll. *J.H. & G. Piepenbroek 787* (holotype).

36. **Coprinus piepenbroekii** Uljé & Bas — Fig. 36

Coprinus piepenbroekii Uljé & Bas, Persoonia 15 (1993) 365.

Pileus 10 × 7 mm when still closed, up to 20 mm when expanded, first ellipsoid or ovoid, then obtusely conical to convex, pale brown, darker in centre. Veil ochre with distinct green tinge, around centre breaking up in small, floccose scales. Lamellae rather crowded, free, first white, then grey-brown, finally black. Stipe up to 40 × 1–2 mm, whitish; base slightly clavate.

Spores [60, 3, 1] 11.9–15.3 × 7.7–10.5 µm, amygdaliform, smooth, truncate, dark red-brown, with central, c. 2.5 µm wide germ pore; Q = 1.30–1.60, av. Q = 1.45–1.50; av. L = 12.7–13.8, av. B = 8.4–9.4 µm. Basidia 15–32 × 9–12 µm, 2-spored, surrounded by 4–6 pseudoparaphyses. Pleurocystidia 55–90 × 22–40 µm, subglobose, ellipsoid or utriform. Cheilocystidia 40–85 × 25–45 µm, (sub)globose, ellipsoid, sometimes oblong. Elements of veil thin-walled, diverticulate, 3–9(–12) µm thick, rather strongly incrusted. Clamp-connections present.

Habitat & distribution — In small groups on burned places, a few together. Very rare, only known from type-locality.

Collection examined. NETHERLANDS: prov. Gelderland, Wilp, Wilpse Dijk, 22 July 1974, *J.H. & G. Piepenbroek 787* (holotype, L).

Microscopically *Coprinus piepenbroekii* is easily recognized by the smooth, large, amygdaloid spores and the 2-spored basidia. The greenish tinge of the fresh basidiocarps is characteristic for this species.

REFERENCES

Bas, C. 1971. Over halm-bewonende Coprinus-soorten (sect. Herbicolae). In Coolia 15: 43–48.
Bender, H. 1991. Artenlist der Pilze für das Stadtgebiet Mönchengladbach. Naturschutzbund Deutschland. Mönchengladbach.
Bender, H. & M. Enderle. 1988. Coprinus in der BRD. IV. In Z. Mykol. 54: 57–64.
Citerin, M. 1992. Clé analytique de genre Coprinus. In Doc. mycol. 22 (86): (3, 21) 23–27.
Citerin, M. 1994. Clé analytique de genre Coprinus. In Doc. mycol. 24 (95): 8–13.
Fries, E.M. 1838. Epicrisis. Upsaliae.
Kauffman, C.H. 1918. The gilled mushrooms of Michigan and the Great Lakes Region Part 1. Dover, New York.
Konrad, P. & A. Maublanc. 1930. Icones selectae Fungorum 6. Paris.
Kornerup, A. & J.H. Wanscher. 1978. Methuen handbook of colour. London.
Kühner, R. & H. Romagnesi. 1953. Flore analytique des champignons supérieurs. Paris.
Lange, J.E. 1915. Studies in Agarics of Denmark. II. Dansk bot. Ark. 2 (3): 32–50.
Moser, M. 1978 (4. Aufl.), 1983 (5. Aufl.). Die Röhrlinge und Blätterpilze. Kleine Kryptogamenflora IIb/2. Gustaf Fischer Verlag. Stuttgart / New York.
Orton, P.D. & R. Watling. 1979. British Fungus Flora. Agarics and Boleti 2/Coprinacae. Part 1: Coprinus. Edinburgh.
Peck, C.H. 1890. Coprinus brassicae, n. sp. Ann. Rep. N.Y. State Mus. Nat. Hist. 43.
Pilát, A. & M. Svrček. 1967. Revisio specierum sectionis Herbicolae Pil. & Svr. generis Coprinus (Pers. ex) S.F. Gray. In Česká Mykol. 21: 136–145.
Quélet, L. 1886. Enchiridion Fungorum. Lutetiæ.
Redhead, S.A. & J.A. Traquair. 1981. Coprinus sect. Herbicolae from Canada. Mycotaxon 13: 373–404.
Saccardo, P.A. 1916. Flora Italica Cryptogama part 2: Fungi. Hymeniales.
Singer, R. '1949'. 1951. The Agaricales in Modern Taxonomy. Lilloa 22: 1–830.

Singer, R. 1986. The Agaricales in Modern Taxonomy, 4rd. ed. Koelz, Koenigstein.
Uljé, C.B. 1995a. Coprinus deel 5, Sect. Coprinus subsect. Alachuani (private publ.).
Uljé, C.B. 1995b. Coprinus. In: E. Arnolds, Th.W. Kuyper & M.E. Noordeloos (eds.), Overzicht paddestoelen in Nederland: 112–127. Nederlandse Mycologische Vereniging. Wijster.
Uljé, C.B. & C. Bas. 1988. Studies in Coprinus I. Persoonia 13: 433–448.
Uljé, C.B. & C. Bas. 1991. Studies in Coprinus II. Persoonia 14: 275–339.
Uljé, C.B. & M.E. Noordeloos. 1993. Studies in Coprinus III. Persoonia 15: 257–301.
Uljé, C.B. & M.E. Noordeloos. 1996. Type studies in Coprinus subsect. Alachuani. Proc. Kon. Ned. Akad. v. Wetensch. 99 (1–2): 105–124.
Van De Bogart, F. 1979. The sections of Coprinus present in the Western United States. In Mycotaxon 9: 348–357.
Vellinga, E.C. 1988. Glossary. In: C. Bas, Th.W. Kuyper, M.E. Noordeloos & E.C. Vellinga, Flora agaricina neerlandica, vol. 1: 54–64. Balkema, Rotterdam/Brookfield.