

P E R S O O N I A

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NOTULAE AD FLORAM AGARICINAM NEERLANDICAM—XVIII
Some notes on *Cystolepiota* and *Lepiota*

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The name *Lepiota langei* Knudsen is replaced by *L. jacobi*. *Leucoagaricus pulverulentus* is placed in the genus *Cystolepiota* on account of the structure of the universal veil and shape, size, and chemical reactions of the spores. *Lepiota cortinarius* is placed in *Lepiota* sect. *Lepiota*, close to *L. ventriospora*, on account of the shape of the spores and the macroscopical characters, and a new variety, viz. *L. cortinarius* var. *flava*, is described.

1. *Lepiota jacobi* Vellinga & Knudsen, *nom. nov.*

Lepiota langei Knudsen in Bot. Tidsskr. 75: 130. 1980; non *L. langei* Locq. in Bull. mens. Soc. linn. Lyon 14: 87. 1945, *nom. nov.* for *L. rufescens* (B. & Br.) J. Lange, 1935, non *L. rufescens* Morgan, 1906.

Misapplied name.—*L. eriophora* Peck sensu auct. eur.

Selected illustration.—Candusso & Lanzoni, *Fungi eur.* 4: pl. 8a. 1990.

Selected description.—Knudsen in Bot. Tidsskr. 75: 130–131. 1980.

When choosing the name *L. langei* for the species generally known in European literature as *L. eriophora* Peck, Knudsen (1980: 130) overlooked that the name *L. langei* Locquin (1945: 87) had been validly published. To make the new change as small as possible and to honour J.E. Lange, his first name is chosen to name this well-known species.

2. *Cystolepiota pulverulenta* (Huijsman) Vellinga, *comb. nov.*—Fig. 1

Lepiota pulverulenta Huijsman in Persoonia 1: 328. 1960. — *Leucoagaricus pulverulentus* (Huijsman) M. Bon in Doc. mycol. 8 (30): 70. 1978.

Misapplied names.—*Lepiota sistrata* sensu Herink in Česká Mykol. 14: 217. 1961. — *Lepiota pseudogranulosa* sensu Dennis in Kew Bull. 7: 486. 1958; sensu Hongo in J. Jap. Bot. 32: 142. 1957.

Selected illustrations.—Partacini in Riv. Micol. 30 (3–4): front cover. 1987; D. Reid in Fung. rar. Ic. col. 2: pl. 9e and f. 1967.

Selected descriptions & figures.—Herink in Česká Mykol. 15: 217–225, figs 1–4. 1961 (as *L. sistrata*); Huijsman in Persoonia 1: 328–329. 1961; Partacini in Riv. Micol. 30: 132–133. 1987; D. Reid in Fung. rar. Ic. col. 2: 6–7, figs. 5a and b. 1967.

Pileus 11–50 mm, when young conical with rounded apex or conico-convex, with inflexed margin, expanding to plano-convex or plano-concave, with or without obtuse umbo or papilla, with straight margin, whitish or cream-coloured at first, later on and when touched pinkish brown (Mu. 7.5 YR 5/6), pink-brown (7.5 YR 7/6) or rusty brown to dark hazel-brown (7.5 YR 4/4–6/6, or 10 YR 4/4), covered with a thick, loose, flocculose layer, uniformly thick or with warts, with overhanging floccules or a rim at margin. Lamellae, L = 30–35, l = 1–7, moderately crowded to crowded, free and remote from stipe, thin, slightly

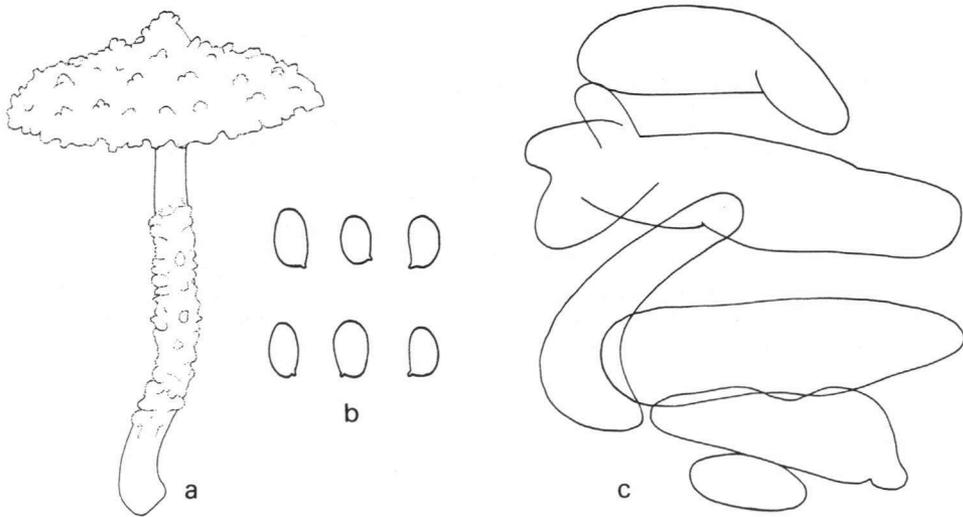


Fig. 1. *Cystolepiota pulverulenta*. — a. Basidiocarp, $\times 1$. — b. Spores, $\times 1500$. — c. Velar elements on pileus, $\times 825$. (Fig. 1a–b from *Bas 5440*, fig. 1c from *Bas 6591*.)

ventricose, rounded near stipe, 2–4.5 mm broad, cream-coloured, pale cream to cream-yellow, sometimes slightly tinged pinkish, with even, concolorous or paler edge. Stipe 30–65 \times 2–5.5 mm, cylindrical or slightly tapering towards base, sometimes with subbulbous base up to 8 mm in diameter, flexuous, fistulose, at apex cream-coloured and glabrous to slightly pruinose; rest of stipe covered with pale cream flocci, like those on pileus, with age also pink to hazel-brown (7.5 YR 5/6–6/6). Context whitish or creamish in pileus and stipe, when exposed to air discolouring orange-brown especially in base of stipe; cortex of stipe pinkish or reddish brown. Smell indistinct, unpleasant, a bit acrid-foetid. Taste not known. Spore print 'white'.

Spores in side view (3.5–)4.0–5.5(–6.0) \times (2.0–)2.5–3.5 μm , on the average 4.2–5.3 \times 2.5–2.8 μm , $Q = (1.3\text{--})1.4\text{--}2.25\text{(–}2.35)$, average $Q = 1.55\text{--}2.0$, ellipsoid to oblong with parallel or convex sides, in frontal view oblong, with small hilar appendage, often in tetrads, sometimes with slightly roughened wall, in Congo red slowly becoming pink, in Melzer's reagent, not or very slowly (e.g. after 24 hours) slightly colouring red-brown, in cresyl blue with pinkish inner wall; wall not swelling in ammonia and acetic acid. Basidia 13–25 \times 4.0–7.5 μm , 4-spored. Pleuro- and cheilocystidia absent. Elements of velar covering of pileus 60–110 \times 9–15 μm , elongate, inflated with rounded apices, catenulate, sometimes branched, with incrusting colourless or pale brownish substance. Elements of velar covering of stipe similar to those on pileus. Clamp-connections absent, but clamp-like structures between velar elements of pileus and stipe present.

Habitat & distribution.—In deciduous forests on rather rich loamy soils, in the Netherlands only known from several localities in the prov. Limburg (Cadier en Keer, Heerlen, Linne, Valkenburg). Throughout Europe, except the northern countries, but everywhere rare. August–October.

Collections examined.—NETHERLANDS: prov. Limburg, Cadier en Keer, Savelsbos, VIII.1977, H.A. Huijser (herb. Huijser); Cadier en Keer, Orenberg, 4.X.1989, E.C. Vellinga 1602 (L); Heerlen, Putberg, 27.IX.1981, H.A. Huijser (herb. Huijser); Linne, 1952, C.Ph. Verschuieren (L), 6.X.1962, C. Bas 2829 (L), 10.X.1970, C. Bas 5440 (L), and 3.X.1987, E.C. Vellinga 1211 (L). — BELGIUM: prov. Luxembourg, Halma, Ri de Couji, 10.IX.1975, G.A. de Vries (L). CZECHOSLOVAKIA: Praha-7-Bubeneč, in park, 5.IX.1960, J.A. Herink 1005/60 (L). — GERMANY: Baden-Württemberg, between Freiburg and Kaiserstuhl, Rheinauen, 5.IX.1975, C. Bas 6591 (L); Nordrheinland-Westfalen, Mönchen Gladbach, Niersbraich, 8.X.1984, 15.X.1984, and 23.X.1984, H. Bender (herb. Bender). — SWITZERLAND: canton Bern, Aneth (Ins), Schwarzgraben, 14.X.1959, H.S.C. Huijsman (holotype, L).

Bon (1978: 70) transferred *Lepiota pulverulenta* Huijsman to the genus *Leucoagaricus* on account of the metachromatic reaction of the spores in cresyl blue, the shape of the velar elements on pileus and stipe and the absence of clamp-connections. Together with *L. roseolanatus* (Huijsman) M. Bon it was placed in *Leucoagaricus* sect. *Pulverulenti* M. Bon.

The type collection of *L. roseolanatus*, unfortunately in bad condition, was studied. It is characterized by spores $4.5-5.5 \times 2.5-3.0 \mu\text{m}$, in average 5.0×2.7 , $Q = (1.6-1.75-2.1)$, average $Q = 1.85$, not dextrinoid (according to Huijsman (1962: 365) weakly dextrinoid), metachromatic in cresyl blue; cheilocystidia absent; elements of universal veil elongate to ellipsoid; clamp-connections absent. It seems very close to or even identical with *C. pulverulenta*, differing merely in pink colours and a less developed covering of the pileus (Huijsman, 1962: 365). This species is only known from the type collection. More material is needed to decide on the identity of this species.

In my opinion *L. pulverulentus* (and *L. roseolanatus*) fit best in the genus *Cystolepiota*. The genus *Leucoagaricus*, up to now very heterogeneous in macro- and microscopical characters, becomes more homogeneous by this transfer. By placing *L. pulverulentus* in *Cystolepiota*, the original idea of Huijsman (1960: 329) is followed, who placed this species in *Lepiota* sect. *Micaceae* J. Lange. The characters that are most indicative for the taxonomic position of this species, are discussed below.

Macroscopically *C. pulverulenta* resembles *C. hetieri* in habitus, flocculose covering of pileus and stipe, and the discolouring of this covering (in *C. hetieri* red-brown, in *C. pulverulenta* pink-brown). This type of covering of pileus and stipe is not found in true members of the genus *Leucoagaricus*.

Shape and size of the spores of *C. pulverulenta* are like those in *Cystolepiota*. Spores in *Leucoagaricus* species are almond- or pip-shaped, often with an acute, attenuate apex, bigger and often provided with a germ pore.

The staining of the spore wall of *C. pulverulenta* in cresyl blue is exactly the same as in *Cystolepiota bucknallii*, *C. cystidiosa*, *C. hetieri*, *C. moelleri*, and *C. seminuda*, but also in *Leucoagaricus tener* and *L. melanotrichus*. The spores of *Cystolepiota* species are not dextrinoid, except those of *C. bucknallii*, whereas the spores of the *Leucoagaricus* species are dextrinoid. Those of *C. pulverulenta* are very weakly dextrinoid. According to Bon (1976: 328) the spores of *C. pulverulenta* are binucleate, like in *Leucoagaricus*, which would be an argument to keep the species in the latter genus, as *Cystolepiota bucknallii*, *C. hetieri*, and *C. seminuda* have uninucleate spores (Kühner, 1972: 47). But data on this character are few, and in *Lepiota* s.str. both character states occur, albeit that most species have binucleate spores.

Cheilocystidia are lacking in *C. pulverulenta*, like in *C. bucknallii* and *C. seminuda*. Conspicuous cheilocystidia are present in *Leucoagaricus* species.

Cystolepiota species have a more or less thick velar covering on pileus and stipe, made up of globose elements. In *C. pulverulenta* the situation is the same except that the elements are not globose but elongate. *Leucoagaricus* species have a totally different kind of velum, made up of repent or ascending to erect, articulate hyphae.

Clamp-connections are lacking in *Leucoagaricus*, like in *C. pulverulenta*. In *Cystolepiota* clamp-connections are present. Occasionally, *C. bucknallii* is clampless.

All in all, there seem to be more important arguments for placing *Lepiota pulverulenta* in *Cystolepiota* than for placing it in *Leucoagaricus*.

3. *Lepiota cortinarius* J. Lange

Lepiota cortinarius J. Lange in Dansk bot. Ark. 2 (3): 25. 1915.

Lange (1915: 25) placed this species in sect. *Stenosporae*. Later authors followed this classification, though reluctantly (see e. g. Reid, 1968: 9), as the spores are not triangular or spurred as the spores of the other taxa of sect. *Stenosporae*, but resembling those of the taxa in sect. *Lepiota* in shape. The general habitus is also more like those of the members of that section. It seems better to include this species in sect. *Lepiota*. Unfortunately, no original material of Lange is conserved in the herbarium at Copenhagen (C).

Judging from Kühner's description of *L. dryadicola* (1983: 65–66) this taxon is very similar to or even identical with *L. cortinarius*.

KEY TO THE VARIETIES

1. Basidiocarp with yellow colours, not pinkish brown or dark brown; pileus smooth, without distinct squamules or patches. var. *flava*
1. Basidiocarp not yellow, but pinkish brown, etc. or dark brown; pileus distinctly patchy or squamulose.
 2. Pileus with covering breaking up into pinkish orange-brown, pale hazel-brown, reddish-ochraceous to pale pinkish-brownish isabella brown patches to squamules. var. *cortinarius*
 2. Pileus with covering breaking up into discrete dark brown, dark hazel-brown squamules or patches. var. *audreae*

var. *cortinarius*—Fig. 2

Selected illustrations.—Candusso & Lanzoni, *Fungi eur.* 4: pl. 19a. 1990; J. Lange in Dansk bot. Ark. 2(3): pl. 1b. 1915; J. Lange, *Fl. agar. dan.* 1: pl. 10B. 1935.

Selected descriptions & figures.—Huijsman in *Persoonia* 1: 325, figs 1–3. 1960; J. Lange in Dansk bot. Ark. 2(3): 25. 1915; G. A. de Vries in *Coolia* 12: 48–52, figs 1–5. 1966.

Pileus 40–80 mm, when young broadly and obtusely conical, rarely \pm hemispherical, with inflexed margin, expanding to \pm applanate, plano-convex, conico-convex, with broad, low or high umbo, slightly undulating, at centre tomentose, tomentose-felty; with age covering breaking up into \pm concentrically arranged patches or granulose to fibrillose-arachnoid squamules around centre, when young and later at centre only pinkish orange-brown (Mu 5 YR 4–3/4, 4/6), pale hazel-brown, reddish-ochraceous brown to pale pinkish-brownish

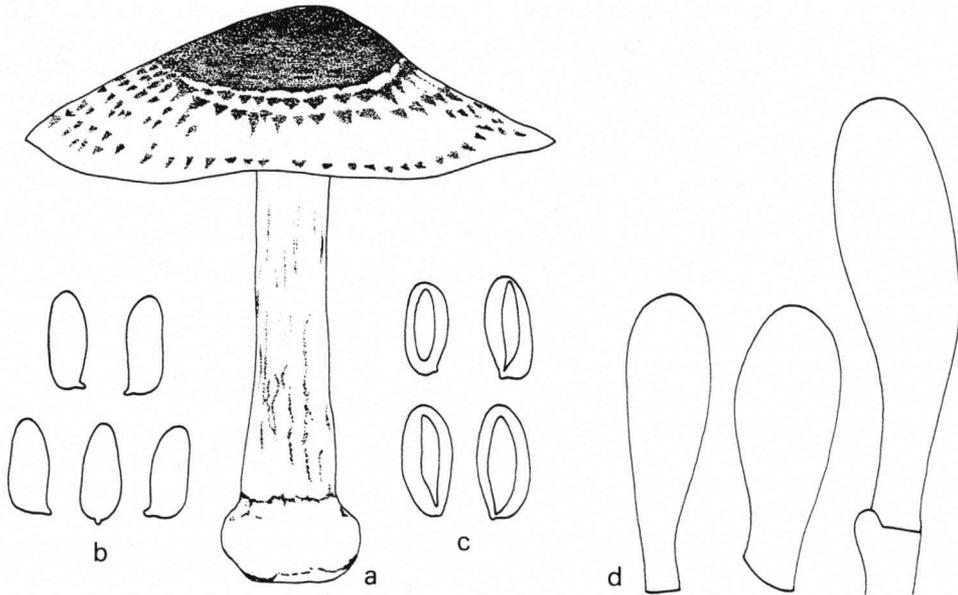


Fig. 2. *Lepiota cortinarius* var. *cortinarius*. — a. Basidiocarp, $\times 1$. — b. Spores in ammonia, $\times 1500$. — c. Spores in ammonia and acetic acid, $\times 1500$. — d. Cheilocystidia, $\times 1500$. (Fig. 2a from *Bas* 7795, fig. 2b–d from *Huyser*, 3.X.1976.)

isabella (5 YR 5/8–7.5 YR 5/8 to 7.5 YR 7/6), with squamules paler than centre on cream, pale pinkish background, when young with white lanate-floccose velar remnants at margin, with margin exceeding lamellae. Lamellae, L = c. 100, l = (1–)3, moderately crowded or crowded, free to remote from stipe, ventricose, subventricose or segementiform, up to 6 mm broad, white to cream coloured, with whitish flocculose edge. Stipe 48–90 \times 3.5–12 mm, broadened towards mostly abrupt, up to 25 mm wide bulb, hollow with age, at apex whitish, creamish-yellowish, glabrous or innately fibrillose lengthwise, lower down with lanate-floccose pinkish brown tomentum becoming more appressed with age, sometimes on bulb with squamules as on pileus. Context thick, dull and white in pileus, in stipe white, with faint yellow-brown tinges in outer parts of bulb to uniformly golden-yellow. Smell strong, fruity, sweetish or not strong and as in *L. cristata*. Taste unpleasant. Spore print whitish to cream-coloured.

Spores in side view (6.5–)7.0–9.0(–10.0) \times (2.5–)3.0–3.5(–4.0) μm , on the average 7.6–8.7 \times 3.0–3.4 μm , Q = 2.1–2.9(–3.1), average Q = 2.3–2.7, resembling those of *L. ventriospora*, but also less distinctly curved at adaxial side and more cylindrical, mostly with suprahilar depression, in frontal view cylindrical, orange-brown in general not very intensively coloured in Melzer's reagent, red in Congo red; wall thickened, not metachromatic in cresyl blue, swelling inwards and slightly outwards in ammonia and acetic acid. Basidia 18.5–29 \times 5.5–9.0 μm , 4-spored, very rarely 2-spored. Lamella edge sterile, rarely with occasional basidia; cheilocystidia 15–50 \times 6.0–13.5 μm , varying in shape and size, fusi-form, broadly utriform, narrowly clavate or clavate, colourless, rarely with yellowish refringent contents, slightly thick-walled. Pileus covered with long adnate or more erect, not or

rarely septate hairs, (50–)150–400(–800) × 10–20 µm, with parietal brownish pigment, slightly thick-walled, occasionally with basal short clavate elements, e.g. 30–35 × 14–18 µm. Stipitipellis a cutis made up of cylindrical, 3–10 µm wide hyphae, and loose, irregular, colourless, patent, cylindrical, c. 3 µm wide hyphae. Clamp-connections present in all tissues.

Habitat & distribution.—Solitary to gregarious, in fairy rings, fasciculate, in the Netherlands known from several localities scattered over the country and found there several years in succession, in deciduous, or mixed forests or plantations, on rather nutrient-rich, calcareous, humous, loamy to sandy soils, also on mine heaps. Known from Denmark, France, Germany, and Great Britain, but everywhere rare. Also known from the U.S.A., but aberrant on behalf of several microscopical characters. September–October (–beginning of December).

Collections examined.—NETHERLANDS: prov. Utrecht, Hoge Vuursche, 9.X.1965, *J. Frencken* (L) and 18.IX.1966, *G. A. de Vries* (L); prov. Zuid-Holland, Rotterdam, Kralingse Bos, 22.IX.1967, *N. P. W. Balke* (spore print, L); prov. Noord-Brabant, Eindhoven, Beatrixkanaal, 26.IX.1976, 28.IX.1976 and 3.X.1976, *H. A. Huyser* (L); Eindhoven, Ellesrijt, 11.X.1967, *F. Benjaminen* 671009 (L); prov. Limburg, 27.IX.1980, *P. H. Kelderman* 889 (L); prov. Flevoland, Noordoostpolder, Kuinderbos, IX.1975, *G. A. de Vries* (L); Oostelijk Flevoland, Bremerbergbos, 4.X.1981, *C. Bas* 7795 (L) and 2.XII.1983, *J. Daams* 82-6 (L); 't Spijk, 15.X.1980, *D. Tjallingii-Beukers* (L). — GERMANY: Rheinland-Pfalz, Daun-Waldkönigen, 1.X.1987, *E. C. Vellinga* 1208 (L). — FRANCE: dépt. Doubs, Clerval, Forêt de Lomont, col de Ferrière, 16.IX.1956, *G. Becker* (L).

var. audreae D. Reid — Fig. 3a–c

Lepiota cortinarius var. *audreae* D. Reid in Fung. rar. Ic. col. 3: 8. 1968. — *Lepiota audreae* (D. Reid) M. Bon in Doc. mycol. 11(43): 35. 1981.

Selected illustrations.—Candusso & Lanzoni in Fungi eur. 4: pl. 19b. 1990; D. Reid in Fung. rar. Ic. col. 3: pl. 19a. 1968.

Selected descriptions & figures.—W. Beyer in Z. Pilzk. 43: 193–196. 1977; Kelderman in Coolia 31: 16–17, fig. 3. 1988; D. Reid in Fung. rar. Ic. col. 3: 8–10. 1968.

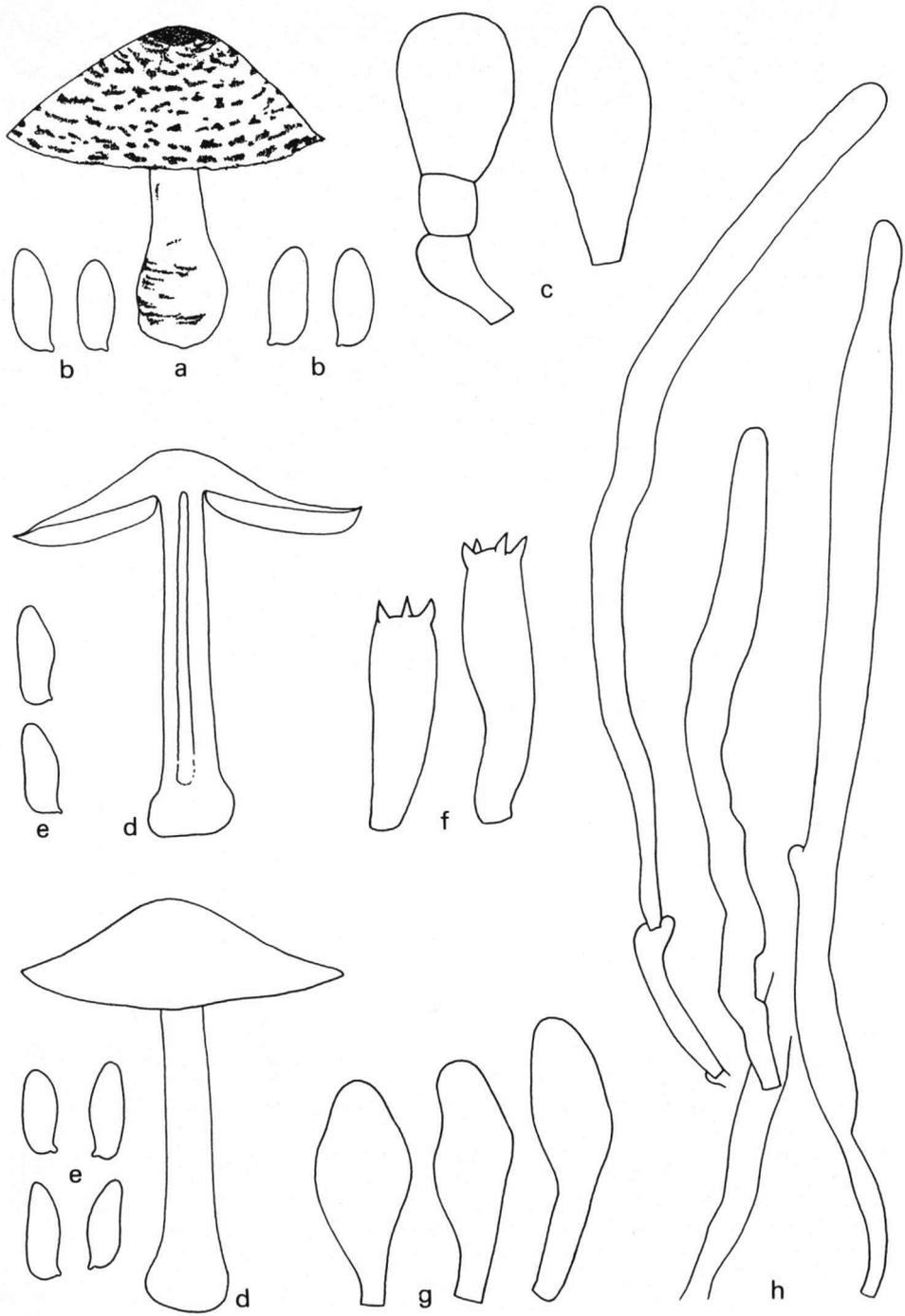
Characteristic.—Differing from the typical variety in a much darker covering of pileus and stipe breaking up into more discrete patches or squamules, dark brown at centre and there slightly squarrose-felty, with hazel-brown squamules around centre, and differing in smaller basidiocarps (pileus 35–45(–60) mm, stipe 25–50 × 6–7 mm). Spores as in var. *cortinarius*, in side view (6.5–)7.5–9.5(–10.0) × (2.5–)3.0–3.5(–4.0) µm, Q = 2.1–2.7 (–2.8), Q = 2.3–2.6; hyphae on pileus with parietal pigment.

Habitat & distribution.—Gregarious, in the Netherlands very rare, only known from mine heaps in southern Limburg (Brunssum). September–October. Known also from southern and central France, Switzerland, Germany, and Great Britain. Possibly more thermophilic than var. *cortinarius*.

Collections examined.—NETHERLANDS: prov. Limburg, Brunssum, 29.IX.1981, *P. H. Kelderman* 1519-1520 (L). — FRANCE: dépt. Puy de Dôme, Aydat, X.1971, *Bouville* (L); dépt. Var, Forêt de la Ste. Baume, 4.X.1960, *H. S. C. Huysman* (L). — SWITZERLAND: canton Bern, Tramelan (exhibition), 4.X.1969, *H. S. C. Huysman* 287 (L).

Fig. 3a–c. *Lepiota cortinarius* var. *audreae*. — a. Basidiocarp, × 1. — b. Spores, × 1500. — c. Cheilocystidia, × 1500. (All from *Kelderman 1519/1520*.)

Fig. 3d–h. *Lepiota cortinarius* var. *flava*. — d. Basidiocarps, × 1. — e. Spores, × 1500. — f. Basidia, × 1500. — g. Cheilocystidia, × 1500. — h. Elements on pileus, × 500. (All from holotype.)



The differences with var. *cortinarius* are too slight to justify the rank of species for this taxon (compare Bon, 1981: 35), but they are constant and important enough to reject the point of view of Enderle & Krieglsteiner (1989: 59) who merged this variety in var. *cortinarius*.

var. *flava* Bas & Vellinga, var. nov.—Fig. 3d–h

Differt a varietate typica in coloribus flavis et pileo glabro.

Typus: 'Netherlands, prov. Flevoland, O. Flevoland, Dronten, Spijkbos, X-1981, J. Geesink (L).'

Pileus 48 mm, plano-conical with broad and rounded apex and slightly concave sides, pale ochraceous yellow (Mu. 2.5 Y 8/6) smooth and glabrous, but on outer half with minute slightly faded granular dots somewhat darker than background (under lens). Lamellae, L = c. 100, l = 1–3, very crowded, up to 3.5 mm broad, pale cream (2.5 Y–10 YR 8/4) with white, minutely granular edge. Stipe 55 × 6 mm, with small, subtruncate bulb, up to 11 mm wide, hollow, pale straw-yellow (2.5 Y 8/6), silky in upper part, with scattered appressed, slightly darker fibrils on lower 2/3. Context buffy whitish in pileus, in cortex of stipe somewhat yellowish. Smell at first like that of *L. cristata*, later like perfumed fruits. Taste not known.

Spores like those of the type variety: in side view 7.5–8.5 × 3.0–3.5 μm, on the average 8.1 × 3.1 μm, Q = 2.45–2.8(–2.85), average Q = 2.6. Basidia 16.5–25 × 6.0–6.5(–7.5) μm, 4-spored. Lamella edge sterile; cheilocystidia 18–24 × 6.5–9.0 μm, broadly utriform to narrowly clavate, slightly thick-walled and colourless. Pileus covered with long non-septate hairs from 60 up to c. 350 × 12–18 μm, with rounded, sometimes tapering apex, with yellow, thickened walls, without short elements at base. Stipitellis a cutis of cylindrical, 6–10 μm wide hyphae, with yellow walls, occasionally with irregular, curved, loose, lying hyphae. Clamp-connections present in all tissues.

Habitat & distribution.—Gregarious and terrestrial in plantation of deciduous trees. October. Only known from the type locality.

Collection examined.—NETHERLANDS: prov. Flevoland, Oostelijk Flevoland, Dronten, Spijkbos, X.1981, J. Geesink (C. Bas 7805, holotype, L).

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