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# TAXONOMICAL NOTES ON MACROFUNGI IN ROADSIDE VERGES PLANTED WITH TREES IN DRENTHE (THE NETHERLANDS) – I

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In this study descriptions, drawings and observations are presented of rare, critical or less well-known macromycetes that were encountered during mycocoenological investigations carried out in roadside verges planted with *Quercus robur* L. (53 plots) or *Fagus sylvatica* L. (23 plots). In this first part, special attention is paid to the genus *Cortinarius* S.F. Gray emend. Fr.

During the years 1986, 1987 and 1988, mycocoenological research has been carried out in 76 plots, situated in roadside verges planted with *Quercus robur* L. (53 plots) or *Fagus sylvatica* L. (23 plots), further referred to as *Quercus* or *Fagus*. The plots varied with respect to exposition, age of trees, vegetation type and vegetation management. Most of the plots were situated in the province of Drenthe, and a few in an adjacent region in the province of Friesland, all in the phytogeographical Drenthian District (Weeda, 1983), in the northern part of the Netherlands (Table I). The area of research lies 10–20 m above sea-level and consists of weakly undulating glacial cover sands. A layer of boulder clay is often present at variable depths. However, in the roadside verge verges the soil horizons are always mixed up to a depth of 0.5–1 m, due to the road construction and maintenance works.

The herb layer in the plots belongs to different grassland communities. Productivity and species composition vary with the exposition and nutrient availability from poor grassland with a relatively high moss cover (Thero-Airion and Lolio-Cynosuretum, Westhoff & Den Held, 1969) to highly productive, dense, grass-dominated communities (Agropyro-Rumicion crispi). The vegetation is rather sparse to almost absent in some dark, shady plots along roads in woods. The management of the vegetation in roadside verges outside forests consists mostly of mowing without removal of the hay two (or more) times a year, sometimes of mowing with subsequent removal of the hay. Shaded roadside verges (in woods) are only incidentally managed. In addition the top soil and vegetation are removed in many places with intervals of c. 5–10 years for reasons of traffic safety and road surface maintenance (to prevent water stagnating on and along the road).

A description of the plant communities, soil parameters and the results of the mycocoenological research will be published elsewhere (Keizer, 1994a, 1994b).

1) Comm. no. 445 of the Biological Station, Centre of Soil Ecology, Wijster, The Netherlands.

Table I. List of plots.

Survey of the plots where the described species originate. All plots are situated in the province Drenthe, the Netherlands, except the plots F15 and Q5, which lie in the province Friesland.
F = roadside verge planted with Beech; Q = roadside verge planted with Common Oaks; Age = age of trees (in 1988); Exp. means exposition of the plot: + = in open landscape, ± = half shady, – = shady; Pav. refers to the pavement of the roads: A = asphalt, B = bricks, N = no pavement.

| Plot | Municipality | Near village | Coordinates on the topographic map | Local name | Age of trees | Exp. | Pav. | Description of the vegetation |
|---|---|---|---|---|---|---|---|---|
| F11 | Peize | Altena | 227,3–571,6 | Lieverseweg | 58 | + | B | poor grassland |
| F12 | Rolde | Deurze | 237,5–556,7 | Rolder Hoofdweg | 78 | + | A | mod. poor grassl. |
| F13 | Beilen | Wijster | 232,2–537,1 | Bruntingerweg | 37 | + | A | mod. poor grassl. |
| F14 | Beilen | Bruntinge | 234,7–536,5 | Hamweg | 37 | + | A | poor grassland |
| F15 | Ooststellingwerf | Wateren | 219,7–548,2 | Bosweg | 51 | + | A | poor grassland |
| F16 | Diever | Wateren | 217,4–546,3 | Oude Willem | 51 | + | A | mod. poor grassl. |
| F17 | Anloo | Annen | 244,7–563,7 | Anlooerweg | 54 | + | A | poor grassland |
| F21 | Vries | Rhee | 234,4–561,4 | N 870 | 66 | + | A | mod. rich grassl. |
| F22 | Sleen | 't Haantje | 252,6–537,5 | Slenerweg | 63 | + | A | mod. rich grassl. |
| F23 | Anloo | Annen | 244,8–563,7 | Eexterweg | 61 | + | A | rich grassland |
| F24 | Peize | Peize | 229,5–573,5 | Zuurse weg | 57 | + | B | mod. rich grassl. |
| F25 | Odoorn | Klijndijk | 253,1–539,1 | Odoornerzijtak | 41 | + | A | rich grassland |
| F31 | Havelte | Havelte | 211,7–531,2 | Linthorst-Homanlaan | 140 | – | B | poor woodland |
| F32 | Diever | Diever | 217,9–542,1 | Bosweg | 55 | – | B | poor woodland |
| F33 | Gasselte | Gieten | 246,3–555,5 | Houtvester Jansenweg | 66 | – | A | ± absent |
| F34 | Anloo | Eext | 245,6–561,6 | Annerweg | 81 | – | A | poor woodland |
| F35 | Eelde | Eelde | 235,7–572,5 | Hooghullen | 70 | – | A | rich woodland |
| F36 | Odoorn | Klijndijk | 253,4–539,3 | Odoornerzijtak | 41 | – | A | rich woodland |
| F40 | Ruinen | Hoogeveen | 228,6–529,7 | Spaarbankbos | 44 | – | N | poor woodland |
| F41 | Gasselte | Gieten | 245,3–557,6 | Gieterveld | 69 | – | N | poor woodland |
| F42 | Havelte | Havelte | 211,7–531,2 | | 72 | – | N | ± absent |
| F43 | Eelde | Eelde | 245,2–557,4 | Hooghullen | 82 | – | N | mod. rich woodl. |
| F44 | Roden | Roden | 225,1–571,1 | Mensingebosch | 81 | – | N | ± absent |
| Q1 | Sleen | Schoonoord | 247,8–541,2 | Oranjekanaal Z.Z. | 100 | + | A | poor grassland |
| Q2 | Westerbork | Zwiggelte | 235,5–545,0 | Oranjekanaal N.Z. | 100 | + | A | poor grassland |
| Q3 | Westerbork | Zwiggelte | 236,2–545,0 | Oranjekanaal Z.Z. | 100 | + | A | poor grassland |
| Q4 | Anloo | Gieten | 243,5–557,2 | Gieterstraat | 110 | + | A | poor grassland |
| Q5 | Ooststellingwerf | Wateren | 219,7–548,0 | Oude Willem | 55 | + | A | poor grassland |
| Q6 | Vledder | Frederiksoord | 209,0–540,1 | Vledderweg | 91 | + | A | poor grassland |
| Q11 | Assen | Deurze | 236,9–556,6 | Rolder Hoofdweg | 113 | + | A | poor grassland |
| Q12 | Diever | Wateren | 215,4–547,2 | Waterenweg | 130 | + | B | mod. poor grassl. |
| Q13 | Roden | Foxwolde | 226.3–574,7 | Roderwolderweg | 114 | + | B | mod. poor grassl. |
| Q14 | Vledder | Vledder | 209,9–541,1 | Vledderweg | 91 | + | A | poor grassland |

| Plot | Municipality | Near village | Coordinates on the topographic map | Local name | Age of trees | Exp. | Pav. | Description of the vegetation |
|---|---|---|---|---|---|---|---|---|
| Q21 | Assen | Deurze | 236,6–556,6 | Rolder Hoofdweg | 113 | + | A | rich grassland |
| Q22 | Westerbork | Westerbork | 236,5–541,5 | Zwiggelterstraat | 98 | + | A | mod. rich grassl. |
| Q23 | Ruinen | Pesse | 225,3–532,2 | Eursinge | 112 | + | A | rich grassland |
| Q24 | Ruinen | Kraloo | 225,5–533,8 | Kralooerweg | 70 | + | A | rich grassland |
| Q26 | Sleen | 't Haantje | 252,5–537,5 | Oranjekanaal Z.Z. | 116 | + | A | rich grassland |
| Q31 | Beilen | Ter Horst | 230,9–540,1 | Ter Horst | 41 | + | B | poor grassland |
| Q32 | Odoorn | Odoornerveen | 251,9–538,5 | Odoornerzijtak | 68 | + | A | poor grassland |
| Q33 | Beilen | Drijber | 234,0–534,5 | De Hullen | 25 | + | A | mod. poor grassl. |
| Q34 | Odoorn | 't Haantje | 252,6–537,5 | Oranjekanaal N.Z. | 26 | + | N | mod. poor grassl. |
| Q35 | Peize | Altena | 227,8–572,6 | Hooghaar | 47 | + | B | poor grassland |
| Q36 | Beilen | Klatering | 232,9–543,5 | Klatering | 15 | + | A | mod. poor grassl. |
| Q37 | Beilen | Klatering | 233,0–543,5 | Klatering | 15 | + | A | mod. poor grassl. |
| Q38 | Diever | Dieverbrug | 218,6–540,6 | Dieverbrug | 10 | + | A | poor grassland |
| Q39 | Beilen | Beilen | 234,6–544,0 | Eursing | 12 | + | A | mod. rich grassl. |
| Q41 | Beilen | Wijster | 231,6–538,8 | Beilerweg | 48 | + | A | mod. poor grassl. |
| Q42 | Odoorn | Odoornerveen | 248,8–540,8 | Oranjekanaal N.Z. | 32 | + | A | mod. poor grassl. |
| Q43 | Beilen | Wijster | 230,5–537,6 | Looveen | 32 | + | N | poor grassland |
| Q44 | Beilen | Hooghalen | 232,6–548,2 | Stationsstraat | 34 | + | A | mod. poor grassl. |
| Q45 | Beilen | Wijster | 231,3–537,1 | Boerkoelweg | 35 | + | B | mod. rich grassl. |
| Q46 | Beilen | Wijster | 231,8–536,9 | Marsweg | 35 | + | B | mod. rich grassl. |
| Q51 | Zweeloo | Witteveen | 241,5–536,0 | Bosweg | 48 | + | B | mod. poor grassl. |
| Q52 | Odoorn | Odoornerveen | 251,5–538,9 | Torenweg | 23 | + | A | rich grassland |
| Q53 | Sleen | Noordsleen | 249,9–534,8 | Middelesweg | 28 | + | A | rich grassland |
| Q54 | Dwingeloo | Dwingeloo | 222,3–538,1 | Lheeweg | 15 | + | A | rich grassland |
| Q61 | Zweeloo | Schoonoord | 246,3–540,2 | Oranjekanaal Z.Z. | 116 | – | B | rich grassland |
| Q62 | Dwingeloo | Lheebroek | 226,5–539,8 | Lheebroek | 76 | – | B | mod. poor grassl. |
| Q63 | Havelte | Havelte | 210,9–531,3 | Busselterweg | 146 | – | B | rich grassland |
| Q64 | Havelte | Havelte | 212,1–531,6 | Overcingelaan | 85 | – | B | rich grassland |
| Q65 | Anloo | Gieten | 243,9–557,4 | Gieterstraat | 110 | – | A | mod. poor grassl. |
| Q71 | Zweeloo | Schoonoord | 245,9–540,0 | Oranjekanaal N.Z. | 116 | – | A | rich grassland |
| Q72 | Westerbork | Zwiggelte | 236,8–545,0 | Oranjekanaal N.Z. | 100 | – | A | mod. poor grassl. |
| Q73 | Havelte | Havelte | 210,6–531,3 | Busselterweg | 125 | – | B | mod. rich grassl. |
| Q74 | Roden | Alteveer | 225,3–570,3 | Melkweg | 106 | – | A | mod. poor grassl. |
| Q81 | Ruinen | Pesse | 224,9–532,1 | Leeuwte | 110 | – | A | ruderal |
| Q82 | Assen | Assen | 235,4–556,9 | Steendijk | 110 | – | B | mod. rich grassl. |
| Q83 | Roden | Roden | 225,6–571,6 | Mensingeweg | 97 | – | A | mod. rich woodl. |
| Q84 | Anloo | Gieten | 243,6–557,3 | Gieterstraat | 100 | – | A | poor woodland |
| Q85 | Havelte | Havelte | 212,1–531,3 | Van Helomaweg | 140 | – | A | rich grassland |
| Q87 | Havelte | Havelte | 212,1–530,8 | Boskampsbrugweg | 143 | – | B | mod. rich woodl. |
| Q88 | Ruinen | Rheebruggen | 216,9–553,2 | Rheebruggen | 114 | – | B | mod. poor woodl. |
| Q92 | Havelte | Havelte | 211,6–530,0 | | 144 | – | N | poor woodland |
| Q93 | Ruinen | Hoogeveen | 228,6–529,9 | Spaarbankbos | 105 | – | N | poor woodland |
| Q94 | Roden | Roden | 225,4–571,5 | Mensingebosch | 102 | – | N | poor woodland |

The fungi dealt with in this study comprise the Macrofungi. Groups with relatively small or hidden fruit-bodies (e.g. the majority of the Helotiales, resupinate Aphyllophorales) have been omitted because a complete inventory would require a much more time consuming search strategy. The following groups have been included: Basidiomycetes: Agaricales; Gasteromycetes; non-resupinate Aphyllophorales and Heterobasidiomycetes. Ascomycetes: Clavicipitales: *Cordyceps*; Elaphomycetales: *Elaphomyces*; Helotiales: *Geoglossum, Leotia*; Pezizales: *Helvellaceae, Pezizaceae, Tuberaceae*; Deuteromycetes: *Paecilomyces.*

The nomenclature of the Basidiomycetes is mainly after Kreisel (1987) or Arnolds (1984) if species are not mentioned in the former work. The nomenclature of the smooth spored species of the genus *Inocybe* is after Kuyper (1986) and of the genus *Psathyrella* after Kits van Waveren (1985). Ascomycetes are after Cannon et al. (1985) and Deuteromycetes after Arnolds (l.c.).

Full understanding of mycocoenological studies is often hampered by the absence or incompleteness of descriptions of critical taxa. Therefore, descriptions and/or critical notes are given in this paper of rare and critical taxa and of collections, which disagreed with descriptions in literature. This criterion has been taken in a rather broad sense. The reason for this is in the first place to provide a reference for some names used in the mycocoenological work and secondly to present the rate of disagreement with the current literature of some names that were accepted.

In the descriptions the following abbreviations of colour-codes have been used: Expo for Cailleux & Taylor (1958), K. & W. for Kornerup & Wanscher (1978) and Mu for Munsell Color Company (1954).

In the microscopic descriptions Q indicates the length/width ratio of the spores and av. Q the average of Q usually based on 10 spores per collection. In the figures the habit sketches are 0.8 × the natural size; in the microscopic drawings the bar always represents 10 µm. All collections mentioned below are made in the selected plots and deposited in the herbarium of the Biological Station in Wijster (WBS), part of the Agricultural University Wageningen. For each collection the plot number is given, where it originates. This refers to Table I, where the exact place and some brief ecological notes of the plots are listed.

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## I. AGARICALES

### **Clitocybe albofragrans** (Harm.) Kuyp.

Pileus 25 mm, expanded, with centre depressed and margin involute, not hygrophanous, white, slightly pruinose; surface somewhat cracked with pale brownish cracks, margin not striate. Lamellae narrow, c. 2.5 mm broad, crowded, very shortly decurrent, light pinkish, with slightly crenulate, concolorous edge. Stipe 32 × 2 mm, cylindrical, pale beige with white fibrillum, therefore white-silky shining. Flesh in pileus and stipe pale brown, white on drying. Smell strong, anise-like.

Spores 4.6–5.5(–6.1) × 2.8–3.2(–3.7) µm, ellipsoid, thin-walled, smooth, in exsiccata often in tetrads.

*Habitat.* Between grass in roadside verge planted with *Quercus robur.*

*Collections examined.* Plot Q51, 31 Aug. 1987, *Keizer 87063*; Plot Q31, 17 Oct. 1988, *Keizer 88115.*

This species is little-known, and apparently often overlooked. It is well-characterized by the combination of a white, non-hygrophanous pileus and anise-like smell. It differs from pale forms of *C. odora* in smaller basidiocarps and smaller spores. According to Kuyper (1981) it is not uncommon in the Netherlands.

**Clitocybe marginella** Harm.

Pileus 27–34 mm, expanded with somewhat depressed centre, when moist at centre orange-brown (K. & W. 5C5 but more greyish), towards the margin orange-beige (5C4), at extreme margin even paler; centre contrastingly darker than the remaining parts of the pileus; margin translucently striate up to 1/3 of the radius, on drying very pale beige. Lamellae crowded, shortly decurrent, pale pinkish-beige-whitish with concolorous edge. Stipe up to 25 × 3.5 mm, cylindrical, somewhat flexuose, concolorous with centre of pileus, glabrous. Smell sweetish anise-like.

Spores 4.6–5.5 × (2.8–)2.9–3.7 µm, shortly ellipsoid.

*Habitat.* Terrestrial on dead organic matter in a roadside verges planted with *Quercus* on nutrient-poor sandy soil.

*Collection examined.* Plot Q3, 21 Dec. 1988, *Keizer 88342.*

*Clitocybe marginella* is related to both *C. agrestis* and *C. diatreta.* According to Kuyper (1982) the former has a more uniformly coloured pale pileus and the latter differs in a darker orange-brown cap, which is not translucently striate, and in pink lamellae.

**Conocybe pygmaeoaffinis** (Fr.) Kühner — Fig. 1

Pileus 20 mm, plano-convex with rather prominent umbo, hygrophanous, when moist rusty brown (Expo between F52 and F54), translucently striate up to 0.5 of the radius, on drying ochraceous yellow-brown (D68). Lamellae c. 3 mm broad, rather crowded, concolourous with cap (F54) or slightly paler, edge white-flocculose. Stipe 43 × 1.3 mm, cylindrical, at base somewhat swollen, ochraceous yellow-brown, covered with yellowish brown, shiny fibrillum, near apex powdered-flocculose (caulocystidia), darkening on handling. Context in pileus and stipe concolorous with pileus, in base of stipe dark red-brown (J42). Smell and taste not recorded.

Spores 8.5–9.1 × 4.6–5.2 µm, Q = 1.7–1.9, av. Q = 1.80, narrowly ellipsoid, ochraceous yellow-brown in $NH_4OH$, with distinct germ-pore. Cheilocystidia 30–40 × 7–9 µm, narrowly lageniform or narrowly fusiform.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* on nutrient-poor sandy soil.

*Collection examined.* Plot Q81, 19 Sept. 1988, *Keizer 88315.*

This collection differs from the description by Watling (1982) of *C. pygmaeoaffinis* by the more slender habit, the slightly narrower spores (Watling: 8.5–10 × 5–5.5 µm), and the narrowly fusiform cheilocystidia, not gradually tapering from a broad base. Spore size and shape of cheilocystidia are in better agreement with Maire's descriptions (in Kühner, 1935: 135, 8–9 × 4.5–5.5 µm). *Conocybe striaepes* (Cooke) Lundell differs in smaller spores (7–8 × 4–4.5 µm) and lanceolate cheilocystida.

**Coprinus sclerocystidiosus** M. Lange & A.H. Smith — Fig. 2

Pileus 20 mm, expanded, red-brown, covered with short hairs (setae), especially near the margin, partly withered. Lamellae black, for the greater part withered. Stipe 40 × 15 mm, cylindrical, somewhat swollen near the base, pale yellowish-hyaline, covered with small hairs, base somewhat tomentose.

Spores 12.5–15.0 × 7.3–8.5 µm, Q = 1.6–1.9, av. Q = 1.77, ellipsoid, with excentric germ-pore, dark brown in $NH_4OH$. Pileocystidia narrowly lageniform, thick-walled, 65–88 × 7.5–10.0 µm.

*Habitat.* On organic debris in a roadside verge planted with *Fagus* on nutrient-poor sandy soil.

*Collection examined*: Plot F32, 18 Sept. 1988, *Keizer 88063*.

Mr. C.B. Uljé kindly identified this collection. *Coprinus sclerocystidiosus* is a rare species in the Netherlands.

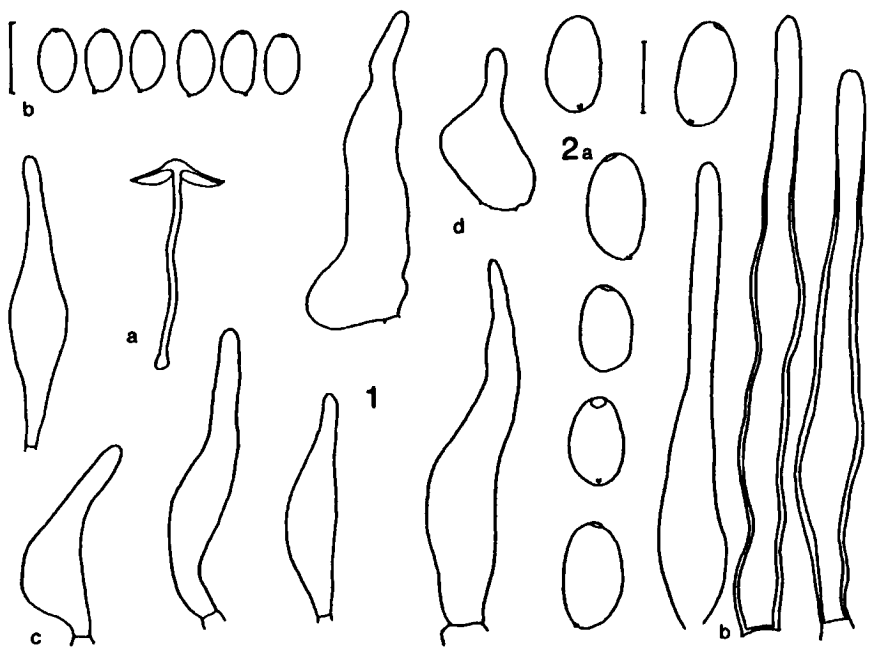


Fig. 1. *Conocybe pygmaeoaffinis.* a. habit; b. spores; c. cheilocystidia; d. caulocystidia (*88315*). — Fig. 2. *Coprinus sclerocystidiosus.* a. spores; b. pileocystidia (*88063*). — Bar represents 10 µm.

**Coprinus subimpatiens** M. Lange & A.H. Smith — Fig. 3

Pileus when young 3–4 × 6 mm, ovoid, soon expanding, 10–20 mm broad, broadly campanulate, with margin occasionally splitting radially, often soon desintegrating (within half a day after collecting), greyish brown (Expo C63), chestnut-brown or ochrish brown (H42, H43, F43) in centre; covered with small setae. Lamellae narrow, c. 1.5 mm broad, moderately crowded, at first pale grey-brown, then dark grey-brown, with white-flocculose edge, soon brownish black and desintegrating. Stipe 25–50 × 1.5–3 mm, cylindrical or slightly broader towards the base, white-hyaline or pale cream coloured, in one collection (*Keizer 87234*) pink (B32) at apex and greyish pink near base (C10), pruinose. Smell and taste unknown.

Spores (9.0–)9.5–15.0 × (5.9–)6.0–7.5(–7.7) µm, Q = 1.4–1.9 and av. Q = 1.53–1.71, not or hardly lentiform, smooth, with excentric germ-pore, dark purplish under microscope. Cheilocystidia of two types: vesiculose or ovoid, 35–65 × 25 µm, and lageniform, 30–40 × 10 µm. Pleurocystidia vesiculose, 40–50 × 30–35 µm.

*Habitat.* Terrestrial in roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

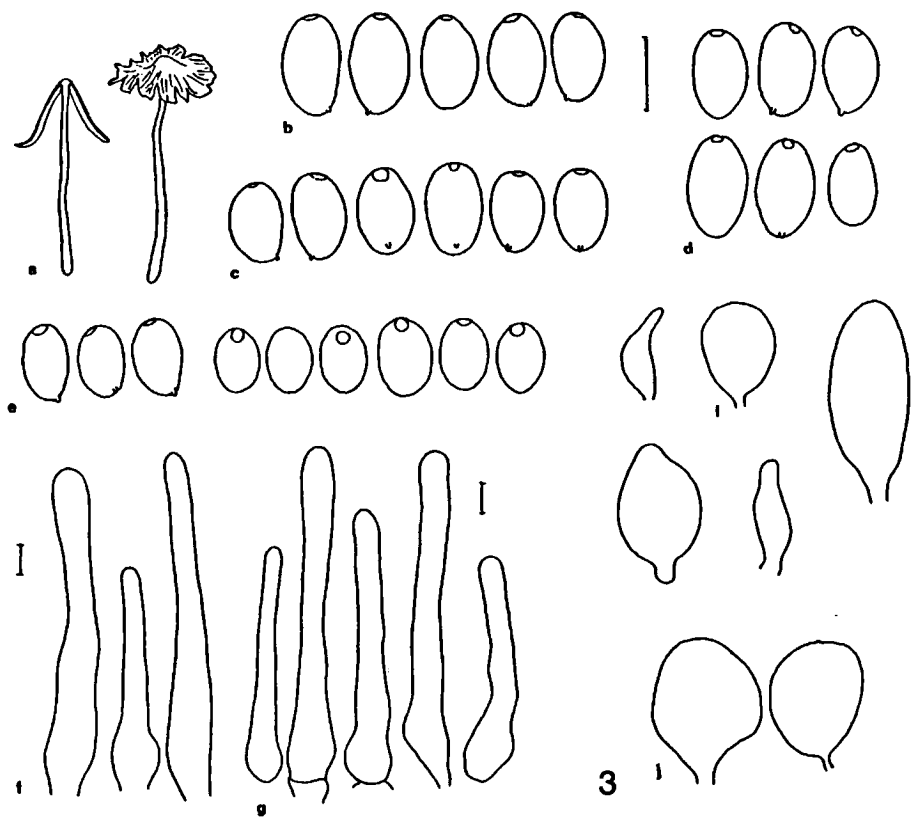


Fig. 3. *Coprinus subimpatiens.* a. habit; b–e. spores; f, g. pileocystidia; i. cheilocystidia; j. pleurocystidia (a, d, g. *88234*; b. 88319; c, f. *88231*; e, i, j. *87038*). — Bar represents 10 µm.

*Collections examined.* Plot F21, 30 Oct. 1986, *Keizer 86187*; Plot F32, 1 Sept. 1987, *Keizer 87038*; Plot Q22, 13 Oct. 1987, *Keizer 87234*; Anloo, Anderen, 29 July 1988, *Keizer 88045*; Plot F22, 17 Sept. 1988, *Keizer 88154*; Plot F43, 6 Oct. 1988, *Keizer 88231*; Plot F22, 16 Nov. 1988, *Keizer 88319*.

The material is heterogeneous with respect to spore size: collection *87234* has small, slightly lentiform spores, 8.6–10.8 × 5.8–8.0 µm, Q = 1.4–1.5 in front- and av. Q = 1.6–1.7 in side-view. The remaining collections are more homogeneous with respect to spore size: 11–13 × 6.5–7.7 µm. Cheilo- and pleurocystidia could exclusively be studied in immature carpophores, which were only present in collection *87234*. Because the characters of the pleuro- and cheilocystidia could not be studied in other collections, the spore size had to be used to identify this species of the *C. hiascens* group. All species except *C. subimpatiens* have narrower spores (Orton & Watling, 1979; Uljé, 1989). Collection *87234* is deviating by the pink colour in the stipe and in having smaller spores than the remaining collections. Yet, it is assigned to *C. subimpatiens*, which is confirmed by Mr. C.B. Uljé.

### **Coprinus xantholepis** P.D. Orton

Pileus ovoid when young, c. 3 × 4 mm, white to cream-coloured, translucently striate, covered with a thick veil consisting of orange-brown scales, giving the pileus an orange-brown spotted appearance. Lamellae when young white, with age purplish-black and deliquescent. Stipe white, in maturity c. 25 × 1 mm, at base somewhat enlarged and with a zone of veil remnants. Smell and taste unknown.

Spores 6.0–6.8(–7.2) × 4.5–5.5 × 5.3–6.0 µm, lentiform, in front view broadly ellipsoid to subglobose (Q = 1.0–1.3, av. Q = 1.16), in side view ellipsoid (Q = 1.2–1.4, av. Q = 1.30), with central germ-pore. Hyphae of veil irregularly diverticulate, 3–5 µm thick, with walls of 1 µm thick, under microscope ochre-brown.

*Habitat.* On dead grass remains in a roadside verge planted with *Quercus* on nutrient-poor sandy soil.

*Collection examined.* Plot Q54, 1 Sept. 1987, *Keizer 87062*.

Our material fits well with the original description of *Coprinus xantholepis* by Orton (1972: 150) except for the slightly larger spores in front-view. It was not recorded before from the Netherlands (Arnolds, 1984).

### **Cortinarius** Fr.

In the Netherlands few taxonomical studies are carried out concerning this genus and modern descriptions are scanty. Moreover, most of the species are critical in some respect. Therefore we have included descriptions of most species observed in this genus.

### **Cortinarius anomalus** (Fr.: Fr.) Fr.

Pileus 32–42 mm, expanded, with broad, indistinct umbo, hygrophanous, when moist pale red-brown (Expo D56) at centre, towards the margin brownish grey (D52), on drying paler, beige, surface covered with white, shiny fibrils (silky). Lamellae up to

6 mm broad, moderately crowded, adnate, emarginate, ventricose, pale brown ('caramel-coloured') with violaceous tinge, with concolorous edge. Stipe 40–50 × 6–8 mm, cylindrical, thickened at base (up to 13 mm), hollow, beige, greyish at apex, covered with white fibrillum, with rather inconspicuous, pale yellow velar zones in lower part of stipe and remains of cortina, brown by adhering spores. Context white in pileus with a grey zone near the lamellae; beige in stipe. Smell none or faintly fungoid.

Spores 7.2–8.0 × 6.0–6.7 µm, broad ellipsoid to subglobose, Q = 1.2, coarsely verrucose with small roundish or irregular warts. Cystidia absent.

*Habitat.* Terrestrial in a roadside verge planted with *Fagus* on nutrient-poor sandy soil, but outside the plots in a wide variety of other habitats.

*Collection examined.* Plot F44, 10 Oct. 1988, *Keizer 88066*.

In old state *Cortinarius anomalus* resembles *C. valgus* which lacks, however, any violet coloration and differs in spore form.

**Cortinarius balteatoalbus** R. Henry — Fig. 4

Pileus 50–85 mm, expanded, with somewhat depressed or umbonate centre, tobacco-brown (Expo D54, E54) or somewhat paler, at margin concolorous, with innate, darker fibrils, in young stage viscid, later dry but with adhering leaves etc. Lamellae up to 8 mm broad, crowded, adnate, emarginate, not ventricose, when young rather pale brown, later cinnamon-brown, with paler, sometimes serrulate edge (edge sometimes with clumps of spores like in some *Hebeloma* species). Stipe 40–65 × 7–13 mm, cylindrical with slightly swollen base, usually solid, pale brownish or beige, covered with pale fibrillum and appressed brown fibrils in lower 2/3 part, with some thin velar remains and near the base with one more conspicuous belt of veil. Smell weak, fruity or sweetish. Context in pileus and stipe whitish with faint brown or pink hue. Chemical spot tests of pileus: KOH 5% pale brown with yellow margin; $NH_4OH$ 10% bright yellow; in context of stipe KOH and $NH_4OH$ yellow.

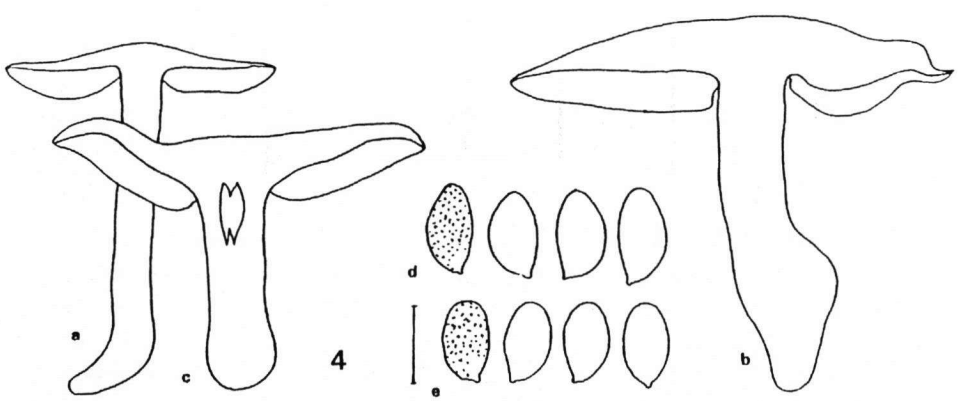


Fig. 4. *Cortinarius balteatoalbus.* a–c. habit; d, e. spores (a, d. *87284*; b. *88127*, c. *87138*). — Bar represents 10 µm.

Spores (9.0–)10.0–12.0(–12.4) × (5.3–)6.0–6.5(–6.8) µm, ellipsoid or subamygdaliform, Q = 1.5–2.2, av. Q = 1.80, ornamented with fine roundish, oval or irregular warts, the area just above the hilar appendix mostly smooth. No cheilocystidia observed.

*Habitat.* Terrestrial in a roadside verge planted with old *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot Q2, 15 Sept. 1987, *Keizer 87138*; 13 Oct. 1988, *Keizer 88127*.

The size of the spores and the absence of cheilocystidia point towards *C. balteatoalbus*. The collection differs from the original description by Henry (1958) in slightly smaller basidiocarps and less involute margin of the pileus.

**Cortinarius casimiri** (Velen.) Huijsman — Fig. 5

Pileus 7–42 mm, narrowly campanulate, then plano-convex with distinct umbo; hygrophanous, when moist dark brown or dark red-brown (Expo J42, J12 (in centre), E-F22, H63-64), slightly or not translucently striate, on drying grey-brown to dark grey-brown (D-E62, E43, F62), covered with white, fibrillose scales or fibres, giving the surface a delicate, silvery appearance, stronger so towards the margin. Lamellae up to 6 mm broad, subdistant to distant, adnate, sometimes broadly adnate, emarginate, pale brown ('café-au-lait') when young, without pink or violet colours, later rusty brown, with paler edge. Stipe 20–60 × 2–6 mm, cylindrical or sometimes broader towards the base, solid or fistulose, pinkish brown to pale lilac brown, covered with white, silky, shining fibrillum, giving the stipe a pale pinkish appearance; a white annular zone and a few white floccose remnants of the veil may be present but these disappear with age. Context when moist in pileus dark brown and in the stipe pinkish brown, on drying in pileus pale beige and in the stipe pale pinkish. Smell usually indistinct, in one case earth-like and in one case sweetish.

Spores (9.7–)10.5–12.6(–13.2) × (5.0–)6.0–7.0(–7.4) µm, Q = 1.5–2.1, av. Q = 1.56–2.07, ovoid, base of spore remarkably rounded (in one case spores tapering towards the base), with ornamentation of fine punctiform or slightly irregular warts. Brown basidia present. Cystidia absent.

*Habitat.* In roadside verges planted with *Quercus* or *Fagus*, with poor grassy vegetation on sandy soil.

*Collections examined.* Plot Q32, 18 Sept. 1986, *Keizer 86148*; Plot Q2, 28 Oct. 1986, *Keizer 86178*; 18 Nov. 1986, *Keizer 86249*; 19 Aug. 1987, *Keizer 87106*; 15 Oct. 1987, *Keizer 87242*; 13 Oct. 1988, *Keizer 88130*; 15 Sept. 1988, *Keizer 88138*; Plot Q83, 24 Oct. 1986, *Keizer 86181*; 24 Aug. 1987, *Keizer 87131*; 22 Sept. 1987, *Keizer 87193*; *Keizer 87200*; 10 Oct. 1988, *Keizer 88087; Keizer 88280*. Plot F34, 19 Nov. 1986, *Keizer 86256a*; Plot F35, 6 Oct. 1988, *Keizer 88101*.

This species is characterized by the combination of the dark brown pileus, pink to pale lilac tinge at the stipe and especially by the large spores. The collections are in good agreement with the descriptions by Velenovský (1921: 464) and Huijsman (1955: 20). We consider *Cortinarius subsertipes* Romagn. a synonym, although Moser (1983a) placed that species in the group of *Telamonia* with a violet stipe apex and *C. casimiri* in the group without violet colours. However, Moser (l.c.) described the stipe in the latter species as: "Stiel-Spitze blaß lila ...".

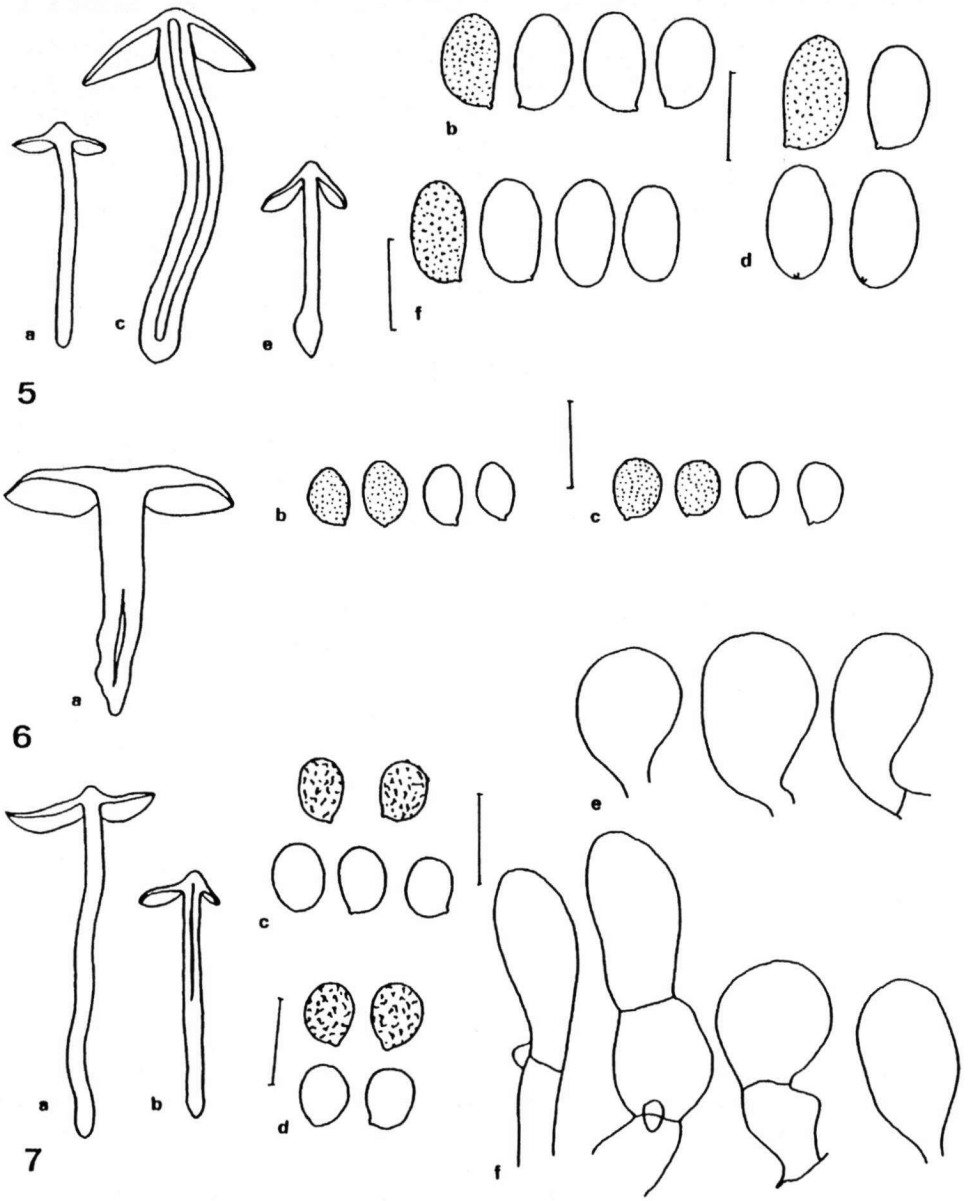


Fig. 5. *Cortinarius casimiri*. a, c, e. habit; b, d, f. spores (a, b. *87193*; c, d. *87200*; e, f. *87290*). — Fig. 6. *Cortinarius causticus*. a. habit; b, c. spores (a, b. *88124*; c. *88103*). — Fig. 7. *Cortinarius comptulus*. a, b. habit; c, d. spores; e, f. sterile cells in lamella edge (a, c, e. *88249*; b, d, f. *87348*). — Bar represents 10 μm.

**Cortinarius causticus** Fr. — Fig. 6

Pileus 17–70 mm diam., plano-convex without umbo, when moist whitish with pink-brown tinge (Expo B63, B64), in old specimens warm brown (more or less like *C. obtusus*), translucently striate, paler on drying, viscid. Lamellae up to 6 mm broad, moderately crowded, emarginate-adnate, pale ochre-brown, then more rusty brown, with paler edge. Stipe 40–45 × 3–7 mm, cylindrical, somewhat tapering towards the base, white, pale ochraceous-yellow with age, with brownish (due to spores) cortina-zone, viscid when moist. Smell sweetish or strongly fungoid; taste of pileipellis very bitter, in the other parts strongly fungoid.

Spores (6.2–)6.4–7.3(–7.9) × (3.9–)4.0–5.4(–5.5) µm, Q = 1.3–1.7 and av. Q = 1.35–1.58; pale yellowish brown under microscope, minutely punctate.

*Habitat.* Terrestrial in roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot F24, 7 Oct. 1988, *Keizer 88103*; 8 Sept. 1988, *Keizer 88348*; Plot Q2, 14 Oct. 1988, *Keizer 88124*.

The three collections studied show some differences: the fruit-bodies of collections *88103* and *88348* are small: pileus 17–22 mm broad and stipe c. 40 × 3 mm, pale ochre-yellow (old specimens) and with sweetish smell. In the other collection (*88124*) the fruit-bodies are larger: pileus 40–70 mm broad, stipe 45 × 7 mm, white and the smell is strongly fungoid. The spores of the collections *88124* and *88348* are narrower (4.0–4.8(–5.0) µm) than in collection *88103* (4.8–5.5 µm). The small variant was collected under *Fagus*, the other under *Quercus*. Kühner & Romagnesi (1953: 253) and Moser (1983: 392) described *C. causticus* with pileus 30–60 mm wide and with considerably narrower spores, 6–9 × 3–4 µm. The spore size reported by Konrad & Maublanc (1932: 137, 6.5–8 × 4–4.5 µm) agrees with the small-spored specimen, described above. In spite of the observed differences, the three collections are called *C. causticus* because of the distinctive bitter taste being present only in the pileipellis. This species is accepted here in this broad sense because the observed differences between the three collections did not correlate whith each other.

**Cortinarius comptulus** Mos. — Fig. 7

Pileus 15–28 mm, campanulate wnen young, soon expanding, with umbo, hygrophanous, when moist red-brown (colours like *C. hemitrichus)*, only short-translucently striate, on drying paler, beginning around the centre (colours like *C. striaepilus*), surface covered with numerous white, hairy-fibrillose scales, densely fibrillose towards the margin, producing a dirty-white zone of about 3 mm broad. Lamellae up to 3 mm broad, moderately distant, adnate, emarginate, weakly ventricose, when young pale brown, later darker brown, with white-flocculose edge. Stipe 40–60 × 3 mm, cylindrical, flesh-coloured brown, towards the base of the stipe dark brown, covered with shiny white fibrillum, total impression pale brown, with some white floccose velar remnants. Context in apex of stipe greyish, downwards brown dark brown. Smell indistinct.

Spores (6.4–)6.5–7.2(–7.5) × (4.5–)4.8–5.5(–5.6) µm, Q = 1.2–1.4(–1.5), av. Q = 1.35, broadly ellipsoid with ornamentation consisting of rather coarse, roundish to

elongate or irregular warts, somewhat stronger towards the apex, brown under microscope. Edge of the lamellae with hyaline, vesiculose sterile cells originating from the trama.

*Habitat.* Terrestrial in roadside verges planted with *Quercus robur* on nutrient-poor sandy soil.

*Collections examined.* Plot Q2, 15 Sept. 1987, *Keizer 87348*; Plot Q74, 10 Oct. 1988, *Keizer 88249*.

*Cortinarius comptulus* is in macroscopic characters almost identical with *C. hemitrichus*, but readily distinguished by the smaller spores.

**Cortinarius erythrinus** (Fr.) Fr. — Fig. 8

Pileus 9–45 mm, conical, then expanding with more or less prominent umbo; hygrophanous, when moist very dark brown with purplish hue (Expo J62, H42, J10), towards the margin slightly paler due to greyish, silky remnants of veil, on drying greyish brown (E52, E52/54, F21, F41) with centre much darker (J21, H61), not translucently striate. Lamellae up to 8 mm broad, moderately crowded to subdistant, emarginate-adnate, in old specimens ventricose, when young brownish, later rusty brown, with concolorous or slightly paler edge. Stipe 20–40 × 2–7 mm, cylindrical, stuffed, greyish lilac or pink-lilac (C41, C21, B21), with shiny fibrillum and often ± halfway a concolorous velar zone. Context in pileus greyish beige, in stipe pink-lilac-brownish, somewhat browner than surface of stipe. Smell indistinct.

Spores (7.0–)7.2–8.0(–8.3) × (5.0–)5.2–5.8(–6.0) µm, ellipsoid, Q = 1.3–1.6, av. Q = 1.38–1.50, strongly ornamented with coarse, irregular, elongate warts, coarser towards the apex. Cystidia not observed.

*Habitat.* Terrestrial in roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot F17, 19 Nov. 1986; *Keizer 86248*; Plot F24, 10 Nov. 1986, *Keizer 86235*; Plot Q1, 18 Sept. 1986, *Keizer 86152*; Plot Q2, 15 Sept. 1988, *Keizer 88140*; Plot Q31, 20 Oct. 1986, *Keizer 86176*; Plot Q31, 19 Aug. 1987, *Keizer 87075*; Plot Q32, 18 Sept. 1986, *Keizer 86153*; 5 Nov. 1986, *Keizer 86237*; 18 Aug. 1987, *Keizer 87096*.

All well-developed carpophores of this species had clearly visible, pinkish velar zones on the stipe, although Moser (1978) states that the stipe is mostly glabrous, with grey-brown veil present only in one (unnamed) variety. In the field this species is easily recognisable by the very dark cap (when moist) and the pink-lilac stipe with concolorous context. Microscopically, the relatively small spores with strong ornamentation are characteristic.

The species presented here is *Cortinarius erythrinus* (Fr.) Fr. sensu Ricken (1915), Lange (1935) and Bohus (1979; as *C. erythrinus* var. *russulaesporus* Bohus.). Lange (l.c.) described the spores as "pale and smooth" which indicates that he probably has studied deviating or unripe specimens. The macroscopic description and the plate agree well with this species. *Cortinarius erythrinus* sensu Henry and Favre possibly represents another taxon with narrower spores (7.5–9 × 4–5.5 µm, Kühner & Romagnesi, 1953: 305). Although *C. erythrinus* is stated to be a vernal species (Ricken, 1915; Kühner & Romagnesi (1953), the species is during this study only encountered in the autumn and not in other periods.

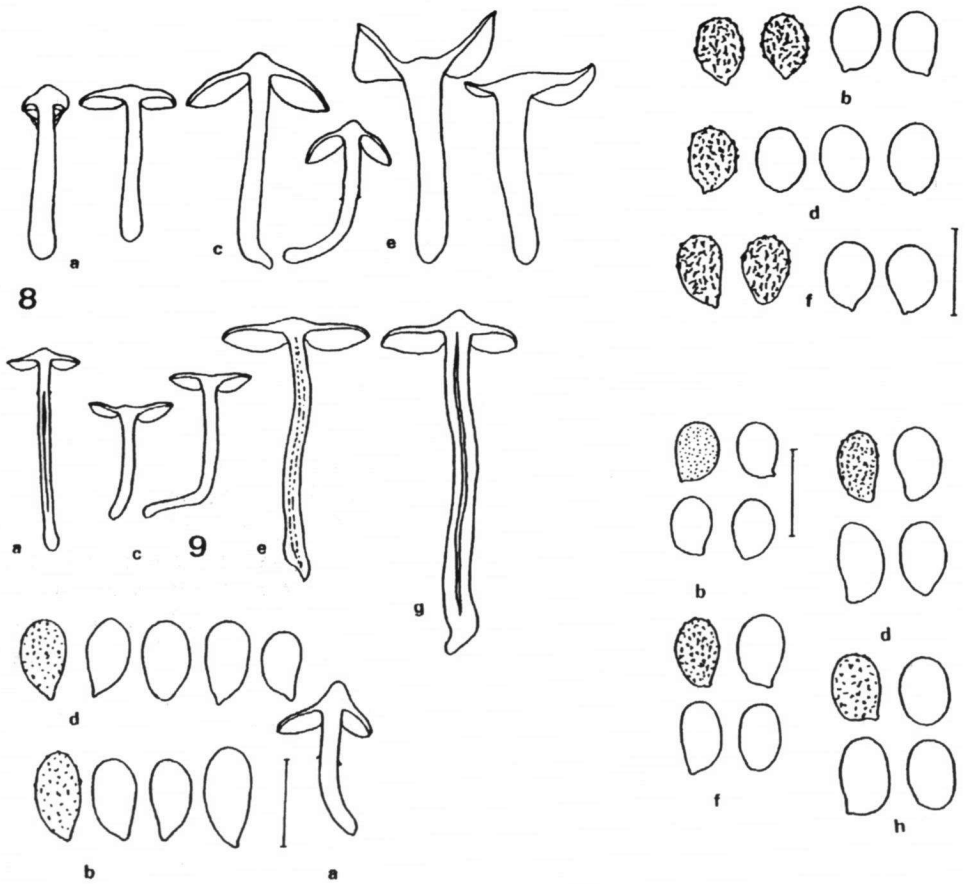


Fig. 8. *Cortinarius erythrinus*. a, c, e. habit; b, d, f. spores (a, b. *86152*; c, d. *88140*; e, f. *86237*). — Fig. 9. *Cortinarius flexipes*. a, c, e, g. habit; b, d, f, h. spores (a, b. *86184*; c, d. *87295*; e, f. *87165*; g, h. *88121*). — Bar represents 10 µm.

**Cortinarius flexipes** (Pers.: Fr.) Fr. sensu Kühner (1961) — Fig. 9

Pileus 12–35 mm, when young conical or convex, soon expanding, often with well-developed umbo, hygrophanous, when moist dark reddish grey-brown (Expo D34, E34, F23, F43, F52, H42, H52, J21, J42), towards the margin slightly paler (C43, E52, J22, H43), translucently striate up to 1/3 of the radius, on drying slightly paler, more greyish red-brown (E43, E54, somewhat paler than H42), with darker centre, when young covered by sparse, thin, white fibrils, soon disappearing and then ± shiny, at margin frequently covered by concentrically arranged pink-greyish velar remnants. Lamellae up to 3–4.5 mm broad, moderately crowded, in old specimens somewhat ventricose, when young pink (e.g. D42), soon only pink on the edge, finally entirely pale brown to rusty brown. Stipe 20–60 × 2–4 mm, cylindrical, sometimes with swollen base, usually

becoming fistulose, pink-brown, covered by white or violaceous white fibrillum, general impression pale pink (A41), veil usually present in form of a white annuliform zone and scattered flocks that disappear with age.

Spores (6.7–)7.0–9.2(–10.0) × (4.4–)4.6–5.2(–5.5) µm, Q = 1.3–1.8, av. Q = 1.41–1.82, ellipsoid to oblong with small to coarse warts, often coarser towards the apex. Basidia with brown content present. Cystidia absent.

*Habitat.* Terrestrial in the grassy vegetation in roadside verges planted with *Fagus* or *Quercus*.

*Collections examined.* Plot F24, 24 Aug. 1987, *Keizer 87084*; Plot F34, 30 Oct. 1986, *Keizer 86186*; 28 Oct. 1988, *Keizer 88284*; Plot F43, 7 Oct. 1988, *Keizer 88102*; Plot Q1, 5 Nov. 1986, *Keizer 86236*; 18 Aug. 1987, *Keizer 87082*; Plot Q2, 13 Oct. 1988, *Keizer 88253*; 14 Oct. 1988, *Keizer 88121*; *Keizer 88240*; Plot Q32, 17 Sept. 1987, *Keizer 87165*; 13 Oct. 1987, *Keizer 87295*; Plot Q83, 24 Oct. 1986, *Keizer 86184*; 10 Oct. 1988, *Keizer 88279*; Plot Q84, 30 Oct. 1986, *Keizer 86182*.

This species is above all characterized by the pale pinkish (and not violaceous) colour of the stipe and the arrangement of the velum on the cap (only visible in material in good condition). The dark greyish red-brown colour of the cap is also distinctive. Macroscopically it is very similar to *Cortinarius casimiri*, which differs in the larger spores. The mere presence of violaceous colours in the young carpophore (in the lamellae and/or in the apex of the stipe) is considered the most important distinguishing character in this group of *Telamonia*. A closely related species with violaceous colours is *C. sertipes* Kühn. 1955 (syn.: *C. flexipes* forma *sertipes* Kühn. 1961, *C. contrarius* Geesink 1976). The species without violaceous but with (pale) pink colour in the stipe is referred to as *C. flexipes*.

*Cortinarius decipiens* (Pers.: Fr.) Fr. is very close, but may differ in a less-developed veil and lack of a pink tinge in the young lamellae (Persoon, 1801: 298; Fries, 1821: 236). However, *C. decipiens* sensu J. Lange (1938: 47; pl. 103D) is in our opinion identical with *C. flexipes*.

On the other hand, the description by Jansen (1984: 80) of *C. decipiens* refers to *C. casimiri*.

**Cortinarius fusisporus** Kühn. — Fig. 11

Pileus 12–13 mm, expanded with incurved margin, hygrophanous, when moist brown to yellowish brown (Expo E64), at centre darker, margin paler and somewhat fibrillose, on drying paler brownish. Lamellae moderately crowded, adnexed, emarginate, pale brown ('caramel-coloured') with paler edge. Stipe cylindrical, brown with yellow-brown fibrillum, in lower half with a few dirty white velar remains. Smell indistinct.

Spores (9.2–)9.5–11.5(–11.6) × 4.4–5.0(–5.1) µm, Q = 1.9–2.6, av. Q = 2.21, subcylindrical-fusiform, ornamentation consisting of fine punctiform warts. Cystidia absent.

*Habitat.* Terrestrial in roadside verge planted with *Quercus robur*.

*Collection examined.* Odoorn, Odoomerveen, 31 Oct. 1989, *Keizer 89104*.

The long and narrow spores are distinctive for this species, but *Cortinarius semivestitus* Mos. seems to be very close to *C. fusisporus*, if not identical. *C. semivestitus* has yellowish brown velar remnants on the stipe; these are dirty white in *C. fusisporus*. *Cortinarius incisus* Pers.: Fr. sensu Moser (1983b) is considered a synonym of *C. fusisporus*.

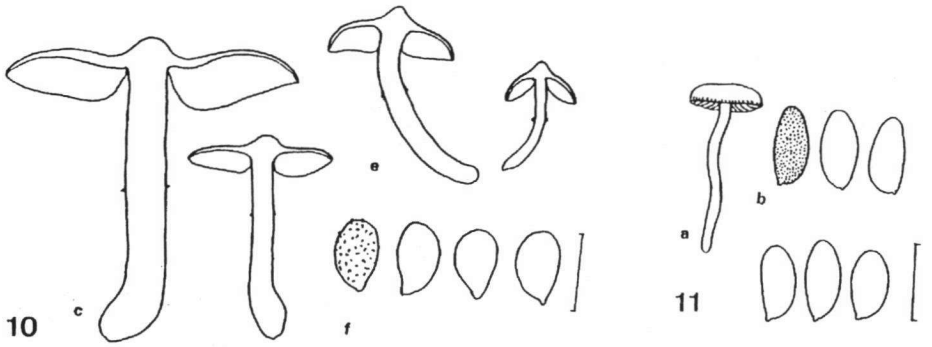


Fig. 10. *Cortinarius helveolus*. a, c, e. habit; b, d, f. spores (a, b. *87308*; c, d. *87207*; e, f. *88146*). — Fig. 11. *Cortinarius fusisporus*. a. habit; b. spores (*89104*). — Bar represents 10 µm.

**Cortinarius helveolus** (Bull.) Fr. — Fig. 10

Synonym: *Cortinarius basililaceus* Pearson ex P.D. Orton.

Pileus 15–60 mm, campanulate or conical, then plano-convex, with prominent, acute umbo, hygrophanous, when moist ochraceous yellow-brown or warm orange-brown (Expo E56, E58 (mostly), F54), in centre more intensely coloured, the margin slightly paler due to the presence of thin, silky fibrils, not or slightly and shortly translucently striate, on drying pale ochre-brown to yellow-brown or straw-coloured (B66, C58, C66, D58, E56), in centre more intensely brown (C58, D58, E56). Lamellae up to 10 mm broad, very distant (6–9 per 10 mm at margin of pileus), often interveined, thickish, adnate, emarginate, distinctly ventricose, when young violet in most cases, soon fading to pale brown ('caramel-brown'), finally (purplish-)rusty brown, with concolorous or paler edge. Stipe 20–70 × 2–8 mm, cylindrical or slightly enlarged at the base, fistulose or stuffed, ground colour like moist pileus, covered by shiny, pale brown fibrils, causing a somewhat paler appearance, in young specimens with violet apex and base, fading with age, approximately halfway the stipe with a distinct, yellowish white, almost membranaceous annulus, downwards with some additional velar zones or flocci. Context in pileus concolorous with surface, in stipe violaceous in top and base of young specimens, later ochre-brown. Smell weak or distinct, musty or sweetish.

Spores (8.2–)8.8–10.2(–11.3) × (4.5–)4.7–5.6(–6.5) µm, Q = 1.6–2.1 and av. Q = 1.64–1.92, oblong, often tapering towards the base, with small, subglobose or oval warts, stronger developed towards the apex. Basidia with brown or golden-brown content present; brown extracellular pigment present in the hymenophoral trama. No sterile cells have been found in the hymenium.

*Habitat.* In poor, grassy vegetation of roadside verges planted with *Fagus* or *Quercus*. Often on moist places.

*Collections examined.* Plot F24, 3 Nov. 1987, *Keizer 87254*; Plot Q2, 15 Oct. 1987, *Keizer 87277*; 15 Sept. 1988, *Keizer 88146*; Plot Q74, 23 July 1988, *Keizer 88038*; 10 Oct. 1988, *Keizer 88199*; Plot Q82, 1 Oct. 1987, *Keizer 87207*.

The rather robust habit, the distant lamellae and the warm (yellowish) brown colours indicate that this species is related to *Cortinarius hinnuleus* Fr. Some characters separate it clearly from *C. hinnuleus*, viz. the prominent, almost pointed umbo, the (often) violaceous colours of the young lamellae and stipe, the warm, more yellowish brown colour of the pileus and the persistent, almost membranaceous annular zone on the stipe. Microscopically, the spores are slightly longer, more slender and often tapering towards the base.

The descriptions of '*C. helveolus* Fr. ss. Bresadola' by Kühner & Romagnesi (1953: 301) and Moser (1978: 408) differ in a number of characters from the material presented here, especially in the lack of violet colours. Nevertheless, we consider these interpretations as probably conspecific with our material, on account of the well-developed annulus and distant lamellae. Both descriptions refer to plate 653 by Bresadola (1929) (although Kühner & Romagnesi (1953) expressed their doubt with a question mark), which does neither show the bright yellow-brown pileus, nor any violaceous hue in lamellae or stipe.

*Cortinarius quadricolor* Fries (1874: 378) is rather similar, but the stipe of that species was described as violaceous white without brown colours. Of this species no recent records seem to exist.

The picture of *Cortinarius hinnuleus* by Phillips (1981: 138) is a misapplication of *C. helveolus*.

Orton (1984) presented *Cortinarius basililaceus* Pearson ex P.D. Orton, which was said to differ from *C. helveolus* Fr. by the non-coniferous habitat, the smell (not inodorous), yellowish veil, striate pileus, more slender stature and more elongate spores and from *C. helveolus* sensu Kühner & Romagnesi (1953) by the presence of violet colours. Except for the veil (*zona annulari ferrugineo-marginata*) Fries (1874) did not mention these characters and the violet colour in the young lamellae and near the base of the stipe of *C. basililaceus* was described as very variable. It is concluded that the description of *C. basililaceus* agrees with the description of *C. helveolus* Fr. and the interpretations of Kühner & Romagnesi (l.c.) and Moser (1978). Consequently, *C. basililaceus* is considered as a synonym of *C. helveolus*. Moreover, it seems unlikely that this species, which apparently is wide spread in at least the UK and the Netherlands, would not have been noticed before the forties of this century.

**Cortinarius hinnuleus** Fr. — Fig. 12

Pileus 20–65 mm, when young convex, later expanding, usually with broad and blunt umbo, finally applanate to concave and then umbo not conspicuous, hygrophanous, when moist warm ochre-brown to red-brown (Expo H42, H43, D54, D64, E52, E54, E56, E58, F54, H52, H64, J34), with usually more intensely coloured centre (e.g. H52, H64, F52, H32), often paler and more greyish at margin due to a fibrillose layer, not translucently striate, often with a pattern of radial dark streaks, on drying ochre-brown, greyish ochre-brown or straw-coloured (B64, B72, C56, C63, C64, D56, D66, E58, E66, E68, F48). Lamellae up to 10–14 mm broad, distant, sometimes veined on the sides and interveined, in old specimens strongly ventricose, rather narrowly adnate, first pale brown, older darker brown because of ripening of the spores, with whitish edge, especially when young, without violet or pink colours. Stipe 35–70 × 4–14 mm, cylindrical, tapering towards the

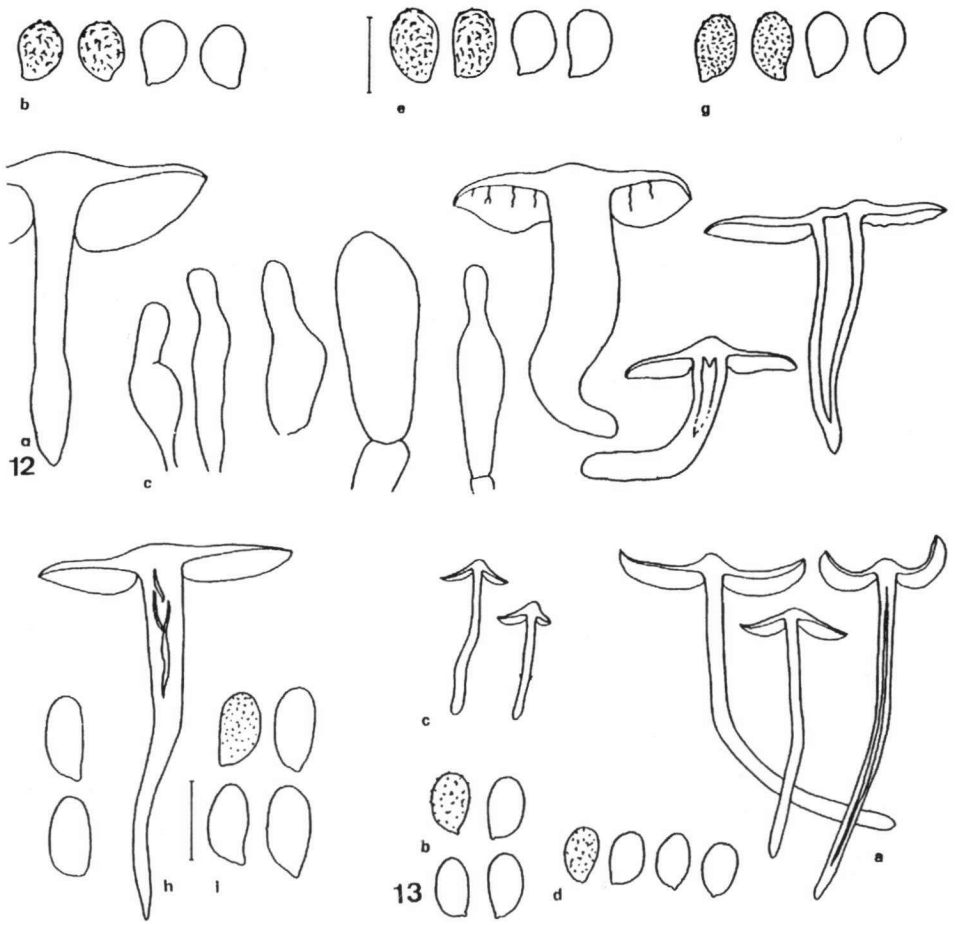


Fig. 12 a–g. *Cortinarius hinnuleus*. a. habit; b. spores; c. sterile cells in lamella edge (*87143*); d, f. habit; e, g. spores. — Fig. 12 h, i. *C. hinnuleus* var. *griseascens*. h. habit; i. spores (d, e. *87312*; f, g. *88126*; h, i. *86238*). — Fig. 13. *Cortinarius lanatus*. a, c. habit; b, d. spores (a, b. *88195*; c, d. *87051*). — Bar represents 10 µm.

base or basal part somewhat enlarged, fistulose or solid, brown, concolorous with moist pileus, covered by shiny, pale brown fibrillum, giving the stipe a pale brown appearance, darker brown towards the base, with one or several white, annuliform velar zones which may fade with age, basal part often white tomentose ('sock'). Context in stipe concolorous with surface of pileus, on drying cork-coloured, finally dark brown in basal part of the stipe. Smell distinctly musty, dusty or sweetish, but sometimes indistinct.

Spores (6.6–)7.0–9.0(–9.8) × (4.9–)5.1–6.1(–6.5) µm, Q = 1.3–1.8, av. Q = 1.40–1.60, ellipsoid to oblong, with oval to irregular, moderately coarse warts; ornamentation stronger developed at the apex of the spore. In one collection sterile cells were present at the edge of the lamellae (Fig. 12c.). Brown basidia present.

*Habitat.* Terrestrial in the poor, grassy vegetation of roadside verges planted with *Fagus* or *Quercus*.

*Collections examined.* Plot F35, 6 Oct. 1988, *Keizer 88092*; Plot Q2, 28 Oct. 1986, *Keizer 86179*; 18 Nov. 1986, *Keizer 86247*; 15 Sept. 1987, *Keizer 87143*; 15 Oct. 1987, *Keizer 87339*; 15 Oct. 1988, *Keizer 88136*; Plot Q6, 8 Nov. 1987, *Keizer 87312*; *Keizer 87316*; Plot Q32, 14 Oct. 1987, *Keizer 87236*; Plot Q83, 1 Oct. 1986, *Keizer 86176*; Odoorn, Odoornerveen, 13 Oct. 1987, *Keizer 87294*; 22 Sept. 1988, *Keizer 88126*.

*Cortinarius hinnuleus* is known as a variable species (e.g. Dähncke & Dähncke, 1979), which is confirmed by our observations. In the present concept variants with a slender fusiform stipe have been united with variants with a thick-set to (slightly) bulbous stipe. Small and slender forms may be confused with *C. striaepilus* but the lamellae of the latter are more crowded and the pileus is usually translucently striate. In one collection (*87143*) sterile cells were observed at the edge of the lamellae. These seem to originate from the lamellar trama and are therefore not true cheilocystidia. As this collection fits otherwise well into the adopted concept of *C. hinnuleus*, no taxonomic importance has been assigned to this character. This feature can be found occasionally among other species of *Cortinarius* as well and may be explained by the observation that the edge of the lamellae is the last part becoming fertile, and some basidia may fail to ripen. A closely related taxon is *C. helveolus* (see there).

**Cortinarius lanatus** (Mos.) Mos. — Fig. 13

Pileus 7–38 mm, when young campanulate or conical, then expanding usually with a prominent umbo, hygrophanous, with centre of pileus drying first in an irregular pattern, when moist warm red-brown to dark red-brown (Expo H44, H42, H52, H43, J22, F52, F62), translucently striate up to 1/3 of the radius, at margin yellowish due to presence of a fibrillose layer, on drying ochre-brown, straw-coloured (C56, D56, C63, E56, C66), with small, yellow-brown, fibrillose hairy scales. Lamellae up to 4 mm broad, moderately crowded to subdistant, emarginate-adnate, somewhat ventricose, when young pale brown, later rusty brown, with concolorous edge. Stipe 13–70 × 2–4(–5) mm, cylindrical, narrowly fistulose, ground colour rather dark brown, darker towards the base, covered by yellow-brown to straw-coloured, shining fibrils and with a woolly, brown annular zone, downwards with several more brownish floccose velar remains. Context in all parts rusty brown, black-brown in base of stipe. Smell weak, fungoid or sweetish.

Spores (6.2–)6.9–8.3(–8.8) × (4.2–)4.4–5.0 µm, Q = (1.4–)1.5–1.9, av. Q = 1.56–1.67, ellipsoid, pale yellowish brown under microscope, minutely punctate, somewhat stronger so towards the apex. Cystidia absent.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* or *Fagus*.

*Collections examined.* Plot F34, 10 Nov. 1987, *Keizer 87325*; Plot F43, 7 Oct. 1988, *Keizer 88073*; Plot Q65, 24 Sept. 1988, *Keizer 88266*; Plot Q82, 4 Sept. 1987, *Keizer 87051*; Plot Q93, 30 Oct. 1987, *Keizer 87302*; 21 Sept. 1988, *Keizer 88056*; Odoorn, Odoornerveen, 18 Nov. 1987, *Keizer 87297*; 1 Nov. 1988, *Keizer 88195*.

Among the small *Telamonia* species with brown veil and squamulose pileus three names come into consideration for our taxon, viz. *Cortinarius psammocephalus* Fr., *C. strobilaceus* Mos. and *C. lanatus* (Mos.) Mos. Moser (1978) quoted the plate of

*C. psammocephalus* by Lange (1935: 99F) under *C. strobilaceus* and apparently considered these names as synonyms. This plate shows a more squamulose pileus than our collections, and Lange observed larger spores. The description of *C. lanatus* ("pileus brown, scaly") by Moser (1978) fits better than that of *C. strobilaceus* ("pileus ... grey-fibrillose or fine scaly") although the differences are small. Therefore the former name has been chosen.

*Cortinarius psammocephalus*, a closely related species, occurs in the Netherlands along lanes on clay mainly along the river Rhine and its affluents. This species differs in having more prominently developed squarrulose scales on the pileus, more abundant remains of the veil on the stipe and a slightly less slender habit. The question whether *C. psammocephalus* and *C. strobilaceus* are synonyms remains to be solved.

**Cortinarius paleaceus** (Fr. in Weinm.) Fr. — Fig. 14

Pileus 8–22 mm, campanulate, later expanded, usually with well developed umbo but umbo sometimes almost absent, hygrophanous, when moist dark red-brown (Expo J32, E62, F62), towards the margin more greyish due to fibrillose veil remains, on drying pale pinkish brown, greyish beige (B61, D63), darker brown (E52) at centre, whitish-fibrillose margin, covered with white hairy scales, which may disappear with age. Lamellae up to 3 mm broad, moderately crowded but sometimes more distant, emarginate-adnate, when young pale brown without lilac colours, later rusty brown, with concolorous edge. Stipe 15–40 × 1–3 mm, cylindrical, sometimes attenuate at the base, middle brown, covered with dirty-white or pale brownish, shiny fibrils, giving a shiny pale brown appearance, in one collection with weak lilac hue, usually with a white annular zone and several floccose veil remains below, which may disappear with age. Context in pileus and stipe pale beige when dry, reddish brown when wet. Smell usually distinct like crushed leaves of *Pelargonium zonale* (L.) Ait., sometimes more like the lemon-smell of *P. radens* H.E. Moore.

Spores (7.0–)7.5–8.7(–9.5) × (4.5–)5.0–5.7(–5.9) µm, Q = 1.4–1.9, av. Q = 1.48–1.86, ellipsoid, with small punctiform warts or with stronger developed and elongate to irregular warts, usually stronger at the apex of the spore, under the microscope brown to rather dark brown. No cystidia observed.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* or *Fagus* on nutrient-poor soil.

*Collections examined.* Plot F34, 19 Nov. 1986, *Keizer 86256b*; Plot Q2, 28 Oct. 1986, *Keizer 86183*; 15 Sept. 1987, *Keizer 87152*; 15 Oct. 1987, *Keizer 87293*; *Keizer 87306*; Plot Q33, 30 Oct. 1987, *Keizer 87314*; Plot Q74, 22 Sept. 1987, *Keizer 87178*; Plot Q82, 4 Sept. 1987, *Keizer 87098*; Plot Q83, 22 Sept. 1987, *Keizer 87194*; Odoorn, Odoornerveen, 13 Oct. 1987, *Keizer 87331*.

A description of this species is given to enable a comparison with the closely related *C. paleiferus*.

**Cortinarius paleiferus** Svrček — Fig. 18

Pileus 20–30 mm, convex, without umbo, hygrophanous, when moist reddish brown (Expo F44-F46), towards the margin more grey due to a fibrillose layer of dirty-white veil

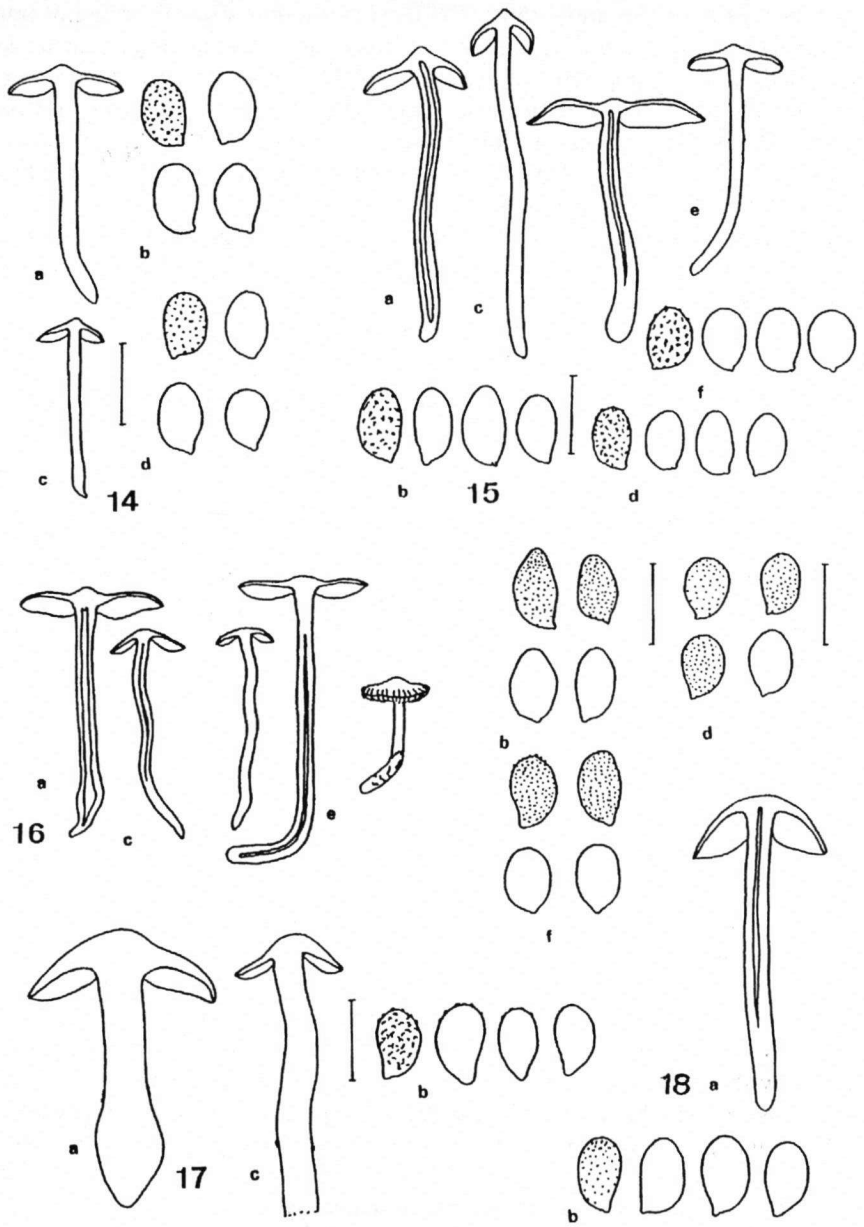


Fig. 14. *Cortinarius paleaceus.* a, c. habit; b, d. spores (a, b. *87306*; c, d. *87194*). — Fig. 15. *Cortinarius parvannulatus.* a, c, e. habit; b, d, f. spores (a, b. *87197*; c, d. *87239*; e, f. *88131*). — Fig. 16. *Cortinarius striaepilus.* a, c, e. habit; b, d, f. spores (a, b. *87168*; c, d. *88142*; e, f. *87252*). — Fig. 17. *Cortinarius privignus.* a, c. habit; b. spores (a, b. *86147*; c. *86151*). — Fig. 18. *Cortinarius paleiferus.* a. habit; b. spores (*86246*). — Bar represents 10 µm.

remains; on drying pinkish grey-brown (E22), pale greyish towards the margin, covered with white hairy scales. Lamellae up to 5 mm broad, distant, emarginate-adnate, somewhat ventricose, sinuose and venose, rusty brown with violet hue, with concolorous edge. Stipe 55–60 × 6 mm, cylindrical, fistulose, concolorous with pileus, but with violet apex, covered with white shiny fibrils, in addition with some white velar remains, violaceously tomentose at base (K. & W. 18D4). Context in stipe and pileus slightly darker coloured than surface, with smell like *Pelargonium zonale*.

Spores (8.2–)8.3–9.0(–9.2) × (5.2–)5.4–5.6(–6.0) µm, Q = 1.5–1.9, av. Q = 1.58–1.85, ellipsoid to oblong, faintly verrucose, rather dark brown under microscope. No cys-tidia observed.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* or *Fagus* on nutrient-poor soil.

*Collections examined.* Plot F17, 19 Nov. 1986, *Keizer 86246*; Plot Q31, 17 Oct. 1988, *Keizer 88214*; Odoorn, Odoornerveen, 1 Nov. 1988, *Keizer 88184*.

*Cortinarius paleiferus* is distinct from the related *C. paleaceus* because of the violaceous young lamellae, apex and basal tomentum of the stipe and the distant lamellae. Jansen (1984) considered these names as synonyms. However, in the present material a satisfactory distinction could be made between the two species. If old material is studied the violaceous coulors may disappear and then the distinction between the species becomes difficult. Yet, future research on more extensive material might prove that the species are identical.

**Cortinarius parvannulatus** Kühner — Fig. 15

Pileus 10–35 mm, campanulate, then expanding, mostly with obvious umbo, when moist warm brown to chestnut-brown (K. & W. 6E7, 6E8, Expo between F34-36 and E58), somewhat darker at centre, in one case more ochre-brown (between D54 and D56), translucently striate, covered with small whitish hairs, towards the margin with whitish fibrillose veil, on drying yellowish brown (C56, C63). Lamellae up to 4–5 mm broad, moderately crowded to subdistant, emarginate-adnate, not ventricose, when young pale ('caramel'-)brown, often with pink-lilac hue, later darker rusty brown, edge concolorous or slightly paler. Stipe 25–65 × 1.5–3.5 mm, cylindrical, usually fistulose, flesh-coloured brown, covered with pale yellow-brown, shiny fibrils, (e.g. D58, C61), giving the stipe a pale yellowish brown appearance, apex lilac, fading with age, not or hardly darker towards the base, often with a conspicuous, white annular zone, and additional white floccose veil remnants may be present in the lower part of the stipe. Context in pileus and stipe concolorous with surface to slightly darker, in base of stipe dark brown. Smell of cedar-wood or as *Camarophyllus russocoriaceus* but weaker.

Spores (7.0–)7.5–9.0(–11.9) × (4.3–)4.8–5.3(–5.5) µm, Q = 1.5–2.0(–2.1), av. Q = 1.60–1.73, ellipsoid to oblong, ornamentation consisting of moderately coarse, roundish, elongate or irregular warts, slightly stronger at the apex of the spore. No cystidia observed.

*Habitat.* Terrestrial in roadside verges planted with *Fagus* or *Quercus*.

*Collections examined.* Plot F33, 24 Sept. 1988, *Keizer 88273*; Plot Q2, 15 Oct. 1987, *Keizer 87239*; Plot Q31, 28 Oct. 1987, *Keizer 87267*; Odoorn, Odoornerveen, 3 Oct. 1989, *Keizer 89036*.

Collection *Keizer 88131,* 13 Oct. 1988, Plot Q2, which agrees macroscopically with the above description, differs in the size and shape of the spores (6.8–)6.9–7.5(–7.9) × 5.1–5.6(–5.7) with Q = 1.3–1.5 and av. Q = 1.36, and in the ornamentation consisting of coarser warts.

*Cortinarius cedriolens* (Mos.) Mos. with the same smell, is said to differ by the absence of an annular veil-zone (but velar zones often present (Moser, 1978)) and absence of violaceous tinges in the top of the stipe. Both characters can vary considerably in subgenus *Telamonia.* Therefore, Lindström & Brandrud (1987: 9), Grünert (1989: 141) and Brandrud et al. (1990) consider these taxa as synonyms, with which view we agree.

**Cortinarius privignus** Fr. sensu lato — Fig. 17

Pileus 21–36 mm, convex, later plano-convex with rather weak, obtuse, broad umbo, hygrophanous, when moist warm orange-brown (Expo E58) with paler margin, not translucently striate, on drying ochre-brown (D68); margin white-silky fibrillose by remains of white veil. Lamellae up to 4 mm broad, moderately distant, not or slightly ventricose, narrowly and somewhat emarginate-adnate, rather pale brown, with white edge, without a trace of violet. Stipe 25–50 × 5–8 mm, cylindrical with clavate base, up to 13 mm broad, stuffed, pale brown, covered by white-silky fibrils, causing a pale beige appearance with white annuliform veil remnants in lower half of stipe. Smell none; taste not known.

Spores 7.5–8.5(–10.0) × 5.0–5.5(–6.0) µm, Q = 1.4–1.7(–1.8), av. Q = 1.60–1.64, ± amygdaliform, with rather coarse, elongate or irregular warts, more prominent towards the apex. Brown basidia present. No cystidia observed.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* on nutrient-poor soil.

*Collections examined.* Plot Q2, 15 Sept. 1988, *Keizer 88134*; Plot Q32, 18 Sept. 1986, *Keizer 86147*; *Keizer 86151.*

The species under consideration here is named *Cortinarius privignus.* In literature (Kühner & Romagnesi (1953), Moser (1978)) several similar taxa have been distinguished (*C. privignofulvus* R. Henry, *C. privignus* Fr., *C. privignorum* R. Henry, *C. privignoides* R. Henry, *C. pseudoprivignus* R. Henry) based on (slight) differences in colour of and degree of hygrophaneity of the pileus, and the shape of the stipe. The characters mentioned appear to be gradual and since representatives of this group seem to be rare in the Netherlands, critical comparison and evaluation of the given differences could not be made. However, to our opinion the distinction of so many taxa based upon these characters, does not seem justified. The ornamentation of the spores in our collections differs from that given by Marchand (1983: 152), where punctiform warts are shown.

**Cortinarius rigens** (Pers.: Fr.) Fr. — Fig. 19

Pileus 44–60 mm, plano-convex or applanate, without or with low umbo and with somewhat involute margin; hygrophanous, when moist wood-coloured brown to grey-brown (Expo B-E54) or (orange-red-)brown (E46-E58), margin not translucently striate, on drying straw-coloured ochraceous yellow-brown (B56, C64), at centre darker (C56); surface radially silky or slightly fibrillose, towards the margin with white velar fibrils.

Lamellae up to 8 mm broad, somewhat crowded to somewhat distant, not ventricose, crenulate, emarginate-adnate, rusty brown, with paler, yellow-brown edge. Stipe 78–80 × 9–16 mm, cylindrical or irregularly inflated, gradually tapering into pointed, rooting base; hollow or solid, pale ochre-beige mixed with white, covered with white fibrillum and a few indistinct fibrillose remnants of the veil, on drying white or whitish. Smell distinct, like jodoform.

Spores (6.5–)7.0–8.7(–9.0) × (4.2–)4.9–5.6(–5.9) µm, Q = (1.4–)1.5–1.6(–1.7), av. Q = 1.53–1.61; ellipsoid, ornamentation verrucose with punctiform, sometimes elongate or irregular warts, ornamentation often stronger towards the apex of the spore.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* on nutrient-poor soil.

*Collections examined.* Plot Q2, 15 Sept. 1988, *Keizer 88139*; Odoorn, Odoornerveen, 18 Nov. 1987, *Keizer 87291*; 9 Nov. 1989, *Keizer 89113*.

*Cortinarius rigens* as depicted by Lange (1938: 100C) with stipe 4–9 mm broad fits these collections well, but is somewhat different from the description by Moser (1978) with a stipe only 3–5 mm broad. Nevertheless, Moser quoted Lange's plate for his *C. rigens*. Persoon (1801: 288) originally described *Agaricus rigens* with a stipe 6.3–8.5 mm thick. He did not mention any characteristic smell. Two species are related to *C. rigens*, viz. *C. velenovskyi* R. Henry and *C. duracinus* Fr. The former is smaller and darker and the latter is more robust and inodorous according to Ricken (1915), Konrad & Maublanc (1924–1937), Bresadola (1927–1933), Marchand (1983) and Moser (1978). However, Bon (1988) reported a iodoform-like smell but a stipe 15 mm broad for *C. duracinus*, so that the identity of his plate remains uncertain.

**Cortinarius striaepilus** J. Favre — Fig. 16

Pileus 7–25(–40) mm, convex or conical, rather soon expanding, mostly umbonate with inconspicuous and blunt to prominent, almost papilla-like umbo, hygrophanous, when moist dark reddish brown or dark yellowish brown (Expo F44, H44, H43, E54, H52, F54, F46), towards the margin paler by fibrillose covering, translucently striate up to 1/3 to 1/2 radius, sometimes more, on drying pale yellowish brown or straw-coloured (C63, C64, C62, B56 (darker), between E56 and E63, C56), slightly more reddish brown (E56) at centre, when young covered with very thin pale-whitish hairy remains of velum, disappearing with age, margin split and fringed in old specimens. Lamellae (L = 20–30), up to 3–6 mm broad, more or less distant (8–10 per 10 mm at cap margin), in old specimens ventricose, emarginate, first pale brown, ('caramel-coloured'), later more rusty brown with pale edge, sometimes edge with a very faint and soon disappearing pink flush. Stipe (20–)30–50 × 1.5–3 mm, cylindrical or sometimes slightly swollen at the base, hollow; apex very pale, almost hyaline, towards base darker brown, more or less concolorous with pileus, with shiny pale brown to whitish fibrillum, in addition with an annuliform velar zone and some floccose veil-remnants, base frequently white-tomentose. Flesh in drying pileus and upper part of stipe pale cork-coloured, in lower part of stem dark brown. Smell none or weakly fungoid, in one collection *Pelargonium*-like.

Spores (6.2–)7.0–9.0(–11.0) × 4.5–5.5 µm, Q = 1.3–1.9, av. Q = 1.45–1.75, ellipsoid or ellipsoid-oblong, with small round or elongate warts, often slightly stronger warty at the apex. Basidia present with brown content. No cystidia observed.

*Habitat.* In roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil, especially on the steep side of ditches.

*Collections examined.* Plot F24, 10 Nov. 1986, *Keizer 86226*; *Keizer 86229*; 7 Oct. 1988, *Keizer 88090*; Plot F33, 1 Oct. 1987, *Keizer 87201*; Plot F34, 30 Oct. 1986, *Keizer 86180*; *Keizer 86185*; 19 Nov. 1986, *Keizer 86243*; *Keizer 86255*; 10 Nov. 1987, *Keizer 87329*; 28 Sept. 1988, *Keizer 88236*; Plot F35, 22 Sept. 1987, *Keizer 87199*; Plot F41, 15 Sept. 1986, *Keizer 86143*; 10 Nov. 1987, *Keizer 87323*; Plot Q1, 6 Oct. 1986, *Keizer 86170*; 3 Oct. 1988, *Keizer 88074*; Plot Q2, 18 Nov. 1986, *Keizer 86253*; 19 Aug. 1987, *Keizer 87121*; 15 Sept. 1987, *Keizer 87148*; 15 Oct. 1987, *Keizer 87240*; 15 Sept. 1988, *Keizer 88142*; Plot Q13, 22 Sept. 1987, *Keizer 87184*; 3 Nov. 1987, *Keizer 87263*; Plot Q35, 6 Oct. 1988, *Keizer 88091*; Plot Q81, 3 Nov. 1986, *Keizer 86242*; Plot Q82, 24 Sept. 1988, *Keizer 88083*; Plot Q83, 1 Oct. 1986, *Keizer 86175*; 10 Nov. 1986, *Keizer 86224*; 24 Aug. 1987, *Keizer 87068*; 4 Nov. 1987, *Keizer 87252*; 8 Sept. 1988, *Keizer 88161*; *Keizer 88174*; *Keizer 88317*; *Keizer 88354*; Plot Q84, 19 Nov. 1986, *Keizer 86252*; Plot Q93, 29 Sept. 1986, *Keizer 86177*; Odoorn, Odoornerveen, 17 Sept. 1987, *Keizer 87168*; 22 Sept. 1988; *Keizer 88267*; *Keizer 88112*.

*Cortinarius striaepilus* is conceived here in a rather wide sense with 1) colours varying from warm dark red-brown to dark yellowish brown, 2) small to medium-sized sporocarps and 3) spores with av. Q = 1.45 to 1.75. All three characters are intergrading. The colour of the pileus depends on the thickness of the pale fibrillose layer, which is subject to individual variation and which tends to wear off with age. The habit of the carpophores ranges from slender to rather thick-set with rounded or umbonate cap and with base of stipe enlarged or not, but this character varies independently from the other characters studied. The spore shape varies from rather broadly ellipsoid to oblong-ellipsoid (Fig. 19 b, d). All intermediate shapes do exist (Fig. 19 f), and spore shape does not not correlate with other characters. The smell is usually insignificant but in some specimens of one collection it was obviously *Pelargonium*-like (as in *C. paleaceus*). The other characters and the fact that in the same group many odourless sporocarps were present are indicative of *C. striaepilus*.

*Cortinarius striaepilus* J. Favre has been considered the correct name for this taxon. The description and plates match fairly well the material collected during this study. Minor differences are 1) the lamellae which were described by Favre (1948: 119) as "rather crowded", whilst the lamellae of our collections are subdistant, 2) the stipe which is frequently hollow and (slightly) swollen towards the base, unlike the specimens depicted by Favre, and 3) Favre (l.c.) described the habitat as wet coniferous forest.

A species that comes close to *C. striaepilus* with respect to habit and which is known to many authors is *C. incisus* (Pers.) Fr.; Moser (1978); Kühner & Romagnesi (1953); Bresadola (1930); Michael-Hennig-Kreisel (1985). This species differs from the present material by the not translucently striate and more fibrillose pileus and by the stipe which is not darkening towards the base. In the original description by Persoon (1801: 310) no reference was made to a striation of the pileus in *Agaricus incisus*. It was described as a small species with a squamulose pileus and was considered by Persoon (l.c.) closely related to *A. psammocephalus* Bull. Consequently, this name will not be used for the present taxon. However, it remains unlikely that such a common species was not described earlier than 1948.

The plate of '*C. incisus* forma' by Lange (1938: 99C) lacks the darkening stipe, but the pileus is of the right colour and distinctly striate. Consequently, this plate probably represents *C. striaepilus*.

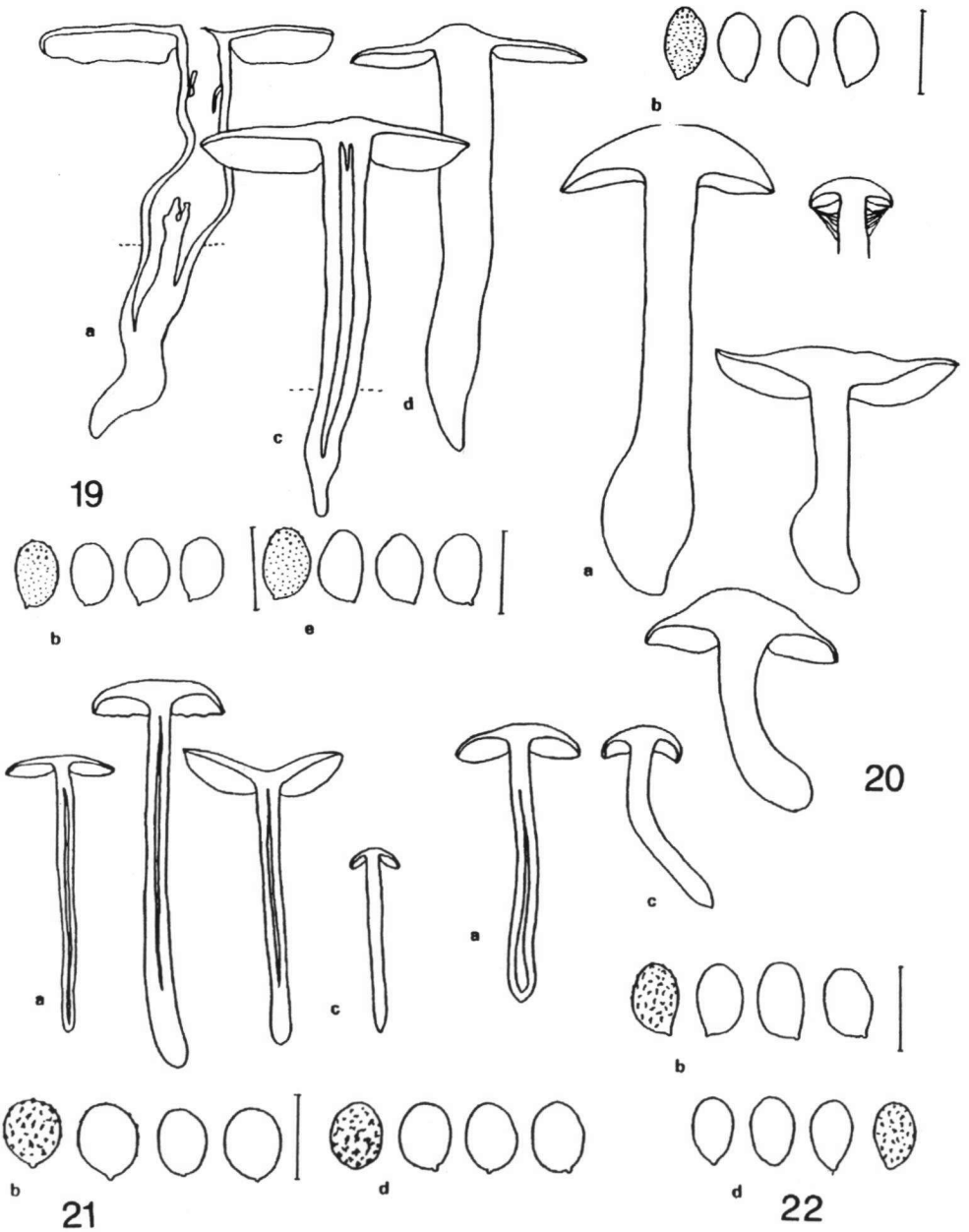


Fig. 19. *Cortinarius rigens*. a, c, d. habit; b, e. spores (a–c. *87291*; d, e. *88139*). — Fig. 20. *Cortinarius subbalaustinus*. a, c. habit; b. spores (a, b. *87183*; c. *88094*). — Fig. 21. *Cortinarius tabularis*. a, c. habit; b, d. spores (a, b. *88192*; c, d. *88135*). — Fig. 22. *Cortinarius valgus*. a, c. habit; b, d. spores (a, b. *88235*; c, d. *87241*). — Bar represents 10 µm.

*Cortinarius incisus* Pers.: Fr. sensu Moser (1983b) deviates from previous concepts of this species by the long and narrow spores. This taxon is considered by us as identical with *C. fusisporus* Kühner.

*Cortinarius helobius* Romagn. is similar, but differs by the complete absence of veil on the stipe and its occurrence in marshy habitats.

*Cortinarius striaepilus*, although listed as very rare in the Netherlands (Arnolds, 1984), is a rather common species in the studied plots. It has probably frequently been overlooked or confused with other similar taxa.

**Cortinarius subbalaustinus** R. Henry — Fig. 20

Pileus 15–45 mm, convex, then expanded, umbo low and broad or absent, strongly hygrophanous, when moist warm orange- or red-brown (Expo F46), not translucently striate, on drying pale orange-brown (D48) to almost straw-coloured (Expo C56, B56), margin covered by a 2 mm broad, pale, fibrillose layer. Lamellae up to 6 mm broad, moderately crowded, not ventricose, emarginate-adnate, when young pale brown (C64), soon rusty brown, edge paler. Stipe 35–80 × 6–10 mm, cylindrical with bulbous base, up to 17 mm wide, pale brown, covered by thick, cream-coloured fibrillum, thus appearance of stipe pale beige and shiny, over the lower half some white, floccose veil remnants, bulb white-tomentose, entire stipe darkening with age. Context in pileus when moist beige, on drying white, in stipe when moist with darker and paler parts. Smell indistinct.

Spores (8.0–)8.2–9.0(–9.6) × (4.5–)4.9–5.0(–5.4) µm, Q = 1.6–1.9, av. Q = 1.75, oblong, with ornamentation of fine, punctiform warts, stronger at the apex. Cystidia absent.

*Habitat.* Terrestrial in a roadside verge planted with *Quercus robur* on nutrient-poor sandy soil.

*Collections examined.* Plot Q35, 22 Sept. 1987, *Keizer 87183*; 3 Nov. 1987, *Keizer 87247*; 7 Oct. 1988, *Keizer 88094*.

**Cortinarius tabularis** (Bull.) Fr. — Fig. 21

Pileus 9–40 mm, convex, soon plano-convex, finally centre somewhat depressed, hardly hygrophanous, when moist greyish or ochraceous red-brown (Expo D54, D56, E56, E58), towards margin more greyish (D52), due to greyish fibrillose veil remnants, in the smallest specimen the margin weakly translucently striate, surface somewhat micaceous, not viscid. Lamellae up to 4 mm broad, moderately crowded, emarginate-adnate, pale ('caramel'-) or ochre-brown, later rusty brown, with serrulate edge, sometimes paler than the sides. Stipe 33–70 × 2.5–6(–9) mm, cylindrical or enlarged at the base, very pale greyish white, covered by white fibrillum and in the lower 2/3 of the stipe with pale beige or cream-coloured zones of veil, therefore general appearance white. Context when moist in pileus watery grey, in stipe pale brown; on drying in pileus white, in stipe very pale beige. Smell indistinct.

Spores (7.2–)7.5–8.6(–8.8) × (4.9–)5.6–6.5(–6.8) µm, Q = 1.2–1.4, av. Q = 1.31, broadly ellipsoid to ellipsoid; ornamentation consisting of rather coarse, round or irregular warts. Cystidia not observed.

*Habitat.* Terrestrial in a roadside verge planted with old *Quercus robur*, in the presence of low, mown *Betula* spec., on nutrient-poor sandy soil.

*Collections examined.* Plot Q2, 15 Sept. 1988, *Keizer 88135*; 13 Oct. 1988, *Keizer 88192*.

*Cortinarius tabularis* is a rarely reported species (Arnolds, 1984) and close to *C. anomalus*, mainly differing by the lack of violaceous lamellae in young specimens. However, according to Lange (1938: 31) intermediate forms occur and are even more common than typical carpophores. This is not confirmed by our observations. *Cortinarius tabularis* and *C. decoloratus* are very similar and Geesink (1972) therefore suggested that they should be considered as synonyms. The two species are said to differ in the surface of the pileus which is dry in the former and viscid in the latter species (Moser, 1978). Whether this difference warrants a distinction on specific level cannot be decided here. The specimens found during this study had dry pilei and are therefore named *C. tabularis*.

**Cortinarius umbrinolens** P.D. Orton — Fig. 23

*Misapplied name*: *Cortinarius rigidus* (Scop. Fr.) ss. J. Lange

Pileus 12–36 mm, campanulate, then expanding with distinct umbo, hygrophanous, when moist dark brown, dark grey-brown or dark reddish brown (Expo H42, J42, H52, H64, F62), on drying pallescent to grey-brown (F62, E54), covered with scattered, small, silky hairs, more densely so towards the margin, disappearing with age. Lamellae up to 7 mm broad, distant, emarginately adnate, when young pale brown, soon dark rusty brown, with pale brown or whitish edge (but no cheilocystidia present). Stipe 30–70 × 3–7 mm, cylindrical or sometimes slightly swollen at the base, fistulose or solid, rather dark brown (as surface of pileus), covered with beige or whitish, shiny fibrillum giving the stipe a pale brown, shiny appearance, when old without fibrils and therefore darker, usually with a dirty white annular zone and some floccose veil remains. Context in pileus pale brown or cork-coloured; in stipe brown to rather dark brown, in base black-brown. Smell usually strong, dusty, like *Cystoderma amianthinum*.

Spores 6.8–10.5(–10.8) × (4.0–)4.5–6.0 µm, Q = 1.4–1.9(–2.0), av. Q = 1.51–1.74, ellipsoid, ornamentation moderately verrucose. Cystidia absent.

*Habitat.* Terrestrial in roadside verges planted with *Quercus robur* on nutrient-poor sandy soil.

*Collections examined.* Plot Q1, 3 Oct. 1988, *Keizer 88093*; Plot Q43, 11 Oct. 1988, *Keizer 88202*; Plot Q45, 21 Sept. 1988, *Keizer 88169*.

The collections can be divided into two groups concerning spore size: collection *88169* with spores (8.8–)9.2–10.5(–10.8) × (5.0–)5.3–6.0 µm, Q = 1.7–1.9(–2.0); collections *88093* and *88202* with spores 6.8–8.0 × (4.0–)4.5–5.0(–5.5) µm, Q = 1.4–1.8. The small-spored variant has spores with coarser and more irregular warts. These microscopic differences do not correlate with variation in macroscopic characters. Several other studied collections from the herbarium at Wijster (WAG-W) appeared to have intermediate spores sizes. Therefore *C. umbrinolens* is accepted here as a separate species with an unusually big variation in spore size.

**Cortinarius valgus** Fr. — Fig. 22

Pileus 15–24 mm, convex to plano-convex, not or weakly hygrophanous, at centre reddish brown (Expo F52), towards the margin paler, greyish red-brown (D52, D54), surface with white shiny fibrils and with radially oriented, very thin, dark brown fibrillose covering, at extreme margin greyish by velar covering. Lamellae up to 3–4 mm broad, moderately crowded to subdistant, rather narrow, emarginate, at first loam-coloured grey-brown with violaceous tinge, later rusty brown with paler edge. Stipe 33–45 × 4–5 mm, cylindrical or slightly broadened towards the base, hollow with age, pale beige-brown, paler than pileus, indistinct violaceous greyish colour sometimes present at apex, covered with pale beige fibrillum, and in the lower half some dirty-whitish velar zones. Context in pileus cork-coloured, in the apex of the stipe greyish or greyish with lilac flush; downwards pale brown, slightly darkening towards the base. Smell absent or slightly raphanoid when cut.

Spores 7.2–8.8(–9.0) × 4.8–5.6(–5.7) µm, Q = 1.4–1.6, av. Q = 1.49–1.52, ellipsoid to oblong, with rather fine verrucose ornamentation. Cystidia absent.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* or *Fagus* on nutrient-poor sandy soil.

*Collections examined.* Plot Q2, 15 Oct. 1987, *Keizer 87241*; 14 Oct. 1988, *Keizer 88225*.

Our description agrees well with the description in Moser & Keller-Dilitz (1983). However, in the present material no cheilocystidia were found, although Moser (l.c.) mentions them as "often frequent". The spore size is rather variable, although the two collections studied come from the same place: in collection *87241*: 7.2–7.7(–7.8) × 4.8–5.0 µm, av. Q = 1.49 and in collection *88225*: 8.0–8.8(–9.0) × (5.3–)5.4–5.6(–5.7) µm, av. Q = 1.52. These values fall within the variation reported by Moser (1983: 350) and Moser & Keller-Dilitz (1983: 45). The species was also observed in a roadside verge outside the studied plots on nutrient-poor sandy soil with *Fagus* and there the carpophores were considerably larger: pileus 20–50 mm and stipe 50–70 × 3–8 mm.

*Cortinarius valgus* is a little-known species and has probably often been overlooked. It was not recorded before from the Netherlands (Arnolds, 1984; Arnolds et al., 1989) but has been found several times since.

**Cortinarius velenovskyi** R. Henry — Fig. 26

Pileus 11–45 mm, convex, then plano-convex, usually without, but sometimes with indistinct low umbo, with margin often incurved, hygrophanous, when moist dark red-brown or chestnut-brown (Expo F-H52, H42, H34-36, F23, F48), towards the margin sometimes somewhat paler (E44-46), only short translucently striate, up to 1/4 of the radius, on drying ochraceous yellow-brown, orange yellow-brown (Expo E58, D56, F42), paler towards the margin (C66, D56, C58-68), surface with greyish bloom caused by a fine white fibrillose layer which fades with age but remains visible for a long time especially at the margin; pattern of drying irregularly centripetal, i.e. margin dries first. Lamellae up to 6 mm broad, subdistant, emarginate, at first pale brown ('café-au-lait') with yellowish edge, when older rusty brown and ventricose. Stipe 20–60 × 4–9 mm, cylindrical, often tapering towards the base and rooting, the root sometimes short and

indistinct, solid or fistulose, when moist pale beige (Expo A62), covered with white fibrillum, on drying white; few white, soon disappearing veil remains may be present. Context in pileus pale brownish, in stipe beige, paler towards the base. Smell usually iodoform-like but sometimes with rancid or cedar wood component.

Spores (7.0–)7.5–9.0(–9.7) × (4.2–)4.8–5.5(–6.0) µm, Q = 1.4–1.8(–1.9), av. Q = 1.47–1.76, ellipsoid, ornamentation finely verrucose with mostly punctiform warts; no cystidia observed; few brown basidia present; trama with brown incrusting pigment.

*Habitat.* Terrestrial in roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

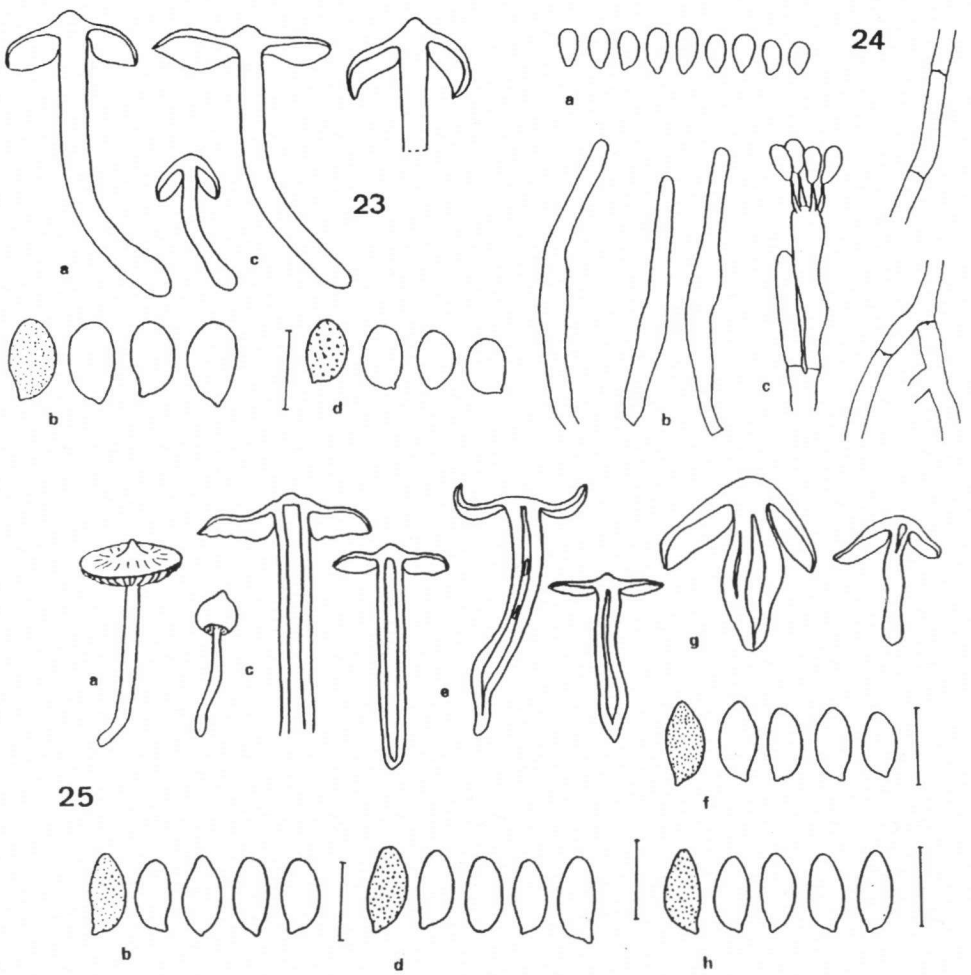


Fig. 23. *Cortinarius umbrinolens* a, c. habit; b, d. spores (a, b. *88169*; c, d. *88203*). — Fig. 24. *Cyphellostereum laeve*. a. spores; b. cystidia; c. basidium; d. hyphae (*87303*). — Fig. 25. *Cortinarius violilamellatus*. a, c, e, g. habit; b, d, f, h. spores (a, b. *88080*; c, d. *87233*; e, f. *87179*; g, h. *86225*). — Bar represents 10 µm.

*Collections examined.* Plot F34, 28 Sept. 1988, *Keizer 88123*; 28 Oct. 1988, *Keizer 88188*; Plot Q82, 24 Sept. 1988, *Keizer 88084*; Odoorn, Odoornerveen, 18 Nov. 1987, *Keizer 87256; Keizer 87296*; 22 Sept. 1988, *Keizer 88100; Keizer 88113*; 1 Nov. 1988, *Keizer 88182*.

*Cortinarius velenovskyi* differs from *C. rigens* and *C. obtusus* (both with iodoform-like smell) in the relatively dark colours and grey-fibrillose layer on the pileus. In addition, *C. obtusus* has a striate cap when moist. *Cortinarius velenovskyi* is a little-known species, not reported before from the Netherlands (Arnolds, 1984; Arnolds et al., 1989).

*Cortinarius velenovskyi* was described two times by Henry (1940, 1967). The first description refers directly to the description by Velenovský (1921) of *C. obtusus*. The second description is an extension of the first, but differs in the description of the smell, which is 'weak' in the first and "of cedar-wood, like that of *Camarophyllus russocoriaceus* (Berk. & Miller) Lange", sometimes mixed with iodoform or radish, in the second description. The plate of *C. velenovskyi* in the publication of 1967 shows rather pale (dried out?) specimens. In our opinion the two descriptions do not differ substantially and therefore we do not agree with Gaugé (1974, 1977) who created a new name (*C. fragrantior* Gaugé) for the species described by Henry (1967).

The specimens studied here deviate from the description by Henry (1967) in having a smell which is predominantly iodoform-like, without other components.

**Cortinarius violilamellatus** Pearson ex P.D. Orton — Fig. 25

Carpophores often (sub)cespitose, growing in clusters of (1–)3–10. Pileus 13–35 mm, campanulate, soon expanding with broad to pointed umbo, hygrophanous, when moist dark reddish grey-brown or red-brown (Expo H22-J22(-J26), H52, H12, F52), centre slightly darker, margin translucently striate, when dry wood- to straw-coloured, ochraceous yellow-brown (C63-C64, B56, somewhat yellower than E46), paler towards the margin, surface slightly innately fibrillose, especially so at the margin, sometimes with sparse whitish hairy scales, more distinct towards the margin. Lamellae 3–6 mm broad, distant, sometimes irregularly veined, emarginate, not or slightly ventricose, at first pinkish violet or purplish, with edge remaining violet for some time, later entirely rusty brown with paler edge. Stipe 35–60 × (2–)3–6 mm, cylindrical, sometimes slightly enlarged and tapering towards the base, hollow, concolorous with pileus, but appearance somewhat paler due to shiny pale brown fibrillum, darker to the base, the apex sometimes showing a violet hue, with whitish floccose velar remnants in lower half. Context in pileus coloured like surface, in the stipe yellowish brown, downwards dark brown. Smell distinct, as *Pelargonium zonale* or *Cortinarius paleaceus*.

Spores (8.0–)8.9–10.3(–11.0) × (4.0–)4.3–5.0(–5.1) µm, Q = (1.8–)1.9–2.3 (–2.5), av. Q = 1.85–2.44, narrowly amygdaliform or slightly fusiform, frequently with small depression just above the hilar appendix, minutely punctate or verruculose. No cystidia observed. Basidia with brown content present; brown extracellular pigment present in the hymenophoral trama.

*Habitat.* Terrestrial in the grassy vegetation of roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot F24, 10 Nov. 1986, *Keizer 86228*; 7 Oct. 1988, *Keizer 88095*; Plot F34, 19 Nov. 1986, *Keizer 86254*; 1 Oct. 1987, *Keizer 87289*; 28 Oct. 1988, *Keizer 88286*; Plot Q32, 18 Sept. 1986, *Keizer 86149*; Plot Q35, 10 Nov. 1986, *Keizer 86225*; 22 Sept. 1987, *Keizer 87189; Keizer*

*87197*; 3 Nov. 1987, *Keizer 87260*; 7 Oct. 1988, *Keizer 88080*; Odoorn, Odoornerveen, 13 Oct. 1987, *Keizer 87233; Keizer 87311*; 19 Nov. 1987, *Keizer 87304*; Assen, Kloosterveen, 13 Oct. 1988, *Keizer 88335* (leg. E. Arnolds).

The combination of *Pelargonium*-like smell, violaceous colours in the young lamellae, rather small size, sparse whitish velar remnants on the cap and especially the more or less fusiform spores are characteristic for this species. Besides, the (sub)cespitose growth of the carpophores in open grassy vegetation on nutrient-poor sandy soil seems to be characteristic as well.

*Cortinarius violilamellatus* clearly differs from *C. sertipes* and *C. pulchripes* in much narrower spores and the *Pelargonium*-like smell. *Cortinarius fusisporus* Kühner may be related but the smell is absent, the veil is dirty whitish and the spores are longer with av. Q = 2.1-2.5 while most spores have av. Q = 2.3. Moser (1983) mentions three species with Pelargonium-smell, viz. *C. paleaceus*, *C. paleiferus* and *C. rigidus* Fr. ss. Kühn. & Romagn. The first species has more abundant white hairy scales on the pileus and no violaceous colours in the lamellae when young which are also morer crowded. The second has more distant (Marchand, 1983) and violaceous lamellae when young like in the present species, but the spores are broader and the pileus is covered with white hairy scales. *Cortinarius rigidus* ss. Kühn. & Romagn. has crowded lamellae without violaceous colours and smaller spores (7.2–9.5 × 4.2–5.7 µm).

Orton (1984) described *C. violilamellatus* as occurring in coniferous forests. In our opinion, no taxonomic value can be ascribed to ecological preferences. The morphological characters of the specimens found during this study fit sufficiently well the description in Orton (l.c).

**Cyphellostereum laeve** (Fr.: Fr.) D. Reid — Fig. 24

Fruit-body c. 5–10 mm long, irregularly ear-shaped, outer surface whitish, inner surface (hymenium) cream-coloured, dorsally attached to bryophytes: *Dicranella heteromalla*, *Isopterygium elegans*, *Mnium hornum*.

Spores (4.0–)4.5–5.2(–6.2) × (1.8–)2.0–2.5(–2.7) µm, Q = (1.8–)2.0–2.7, av. Q = 2.27, pip-shaped, often in tetrads. Cystidia 30–40 × 3.5 µm, narrowly fusiform with blunt apex, thin-walled, hyaline. Basidia 4-spored. Hyphae 2–2.5 µm broad, septa without clamp-connections.

*Habitat*. Terrestrial in roadside verges planted with *Fagus* or *Quercus* on nutrient-poor sandy soil.

*Collection examined*. Plot Q93, 21 Sept. 1987, *Keizer 87303*.

Macroscopically this species is rather similar to *Mniopetalum globisporum*, which differs among other things in the globose spores.

*Cyphellostereum laeve* has been recorded only a few times in the Netherlands (Arnolds, 1984).

**Entoloma lividoalbum** (Kühn. & Romagn.) Kubička — Fig. 27

Pileus 45–65 mm, convex to plano-convex without prominent umbo; hygrophanous, when moist yellowish grey-brown (Expo E64) or more greyish brown, shortly trans-

lucently striate (c. 5 mm), on drying paler (C72-74). Lamellae distant, moderately to strongly ventricose, crenulate, pink, with concolorous edge. Stipe 40–55 × 10–15 mm, cylindrical or slightly broader towards the base, yellowish white to white, silvery white striate. Context in all parts greyish white. Smell indistinct; taste somewhat farinaceous with bitter after-taste.

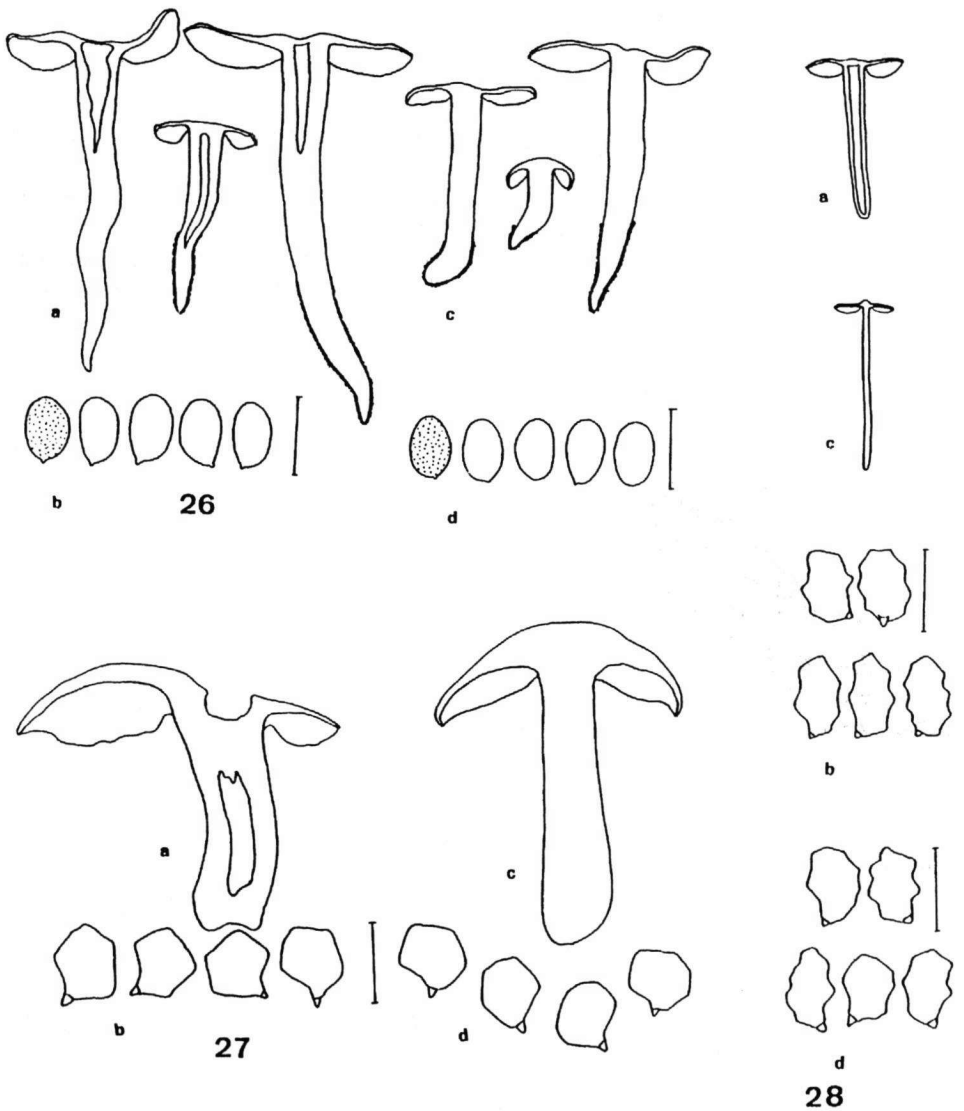


Fig. 26. *Cortinarius velenovskyi*. a, c. habit; b, d. spores (a, b. *88182*; c, d. *88100*). — Fig. 27. *Entoloma lividoalbum*. a, c. habit; b, d. spores (a, b. *88088*; c, d. *87164*). — Fig. 28. *Entoloma undulatosporum*. a, c. habit; b, d. spores (a, b. *87011*; c, d. *87177*). — Bar represents 10 µm.

Spores (7.5–)8.0–9.0 × 6.5–8.0 µm, isodiametrical to slightly oblong, Q = (0.9–)1.1–1.3, av. Q = 1.17–1.23, mostly 5-angled. No cystidia observed. Pigment in pileipellis light greyish brown, diffuse, intracellular; clamp-connections present.

*Habitat.* Terrestrial in roadside verges planted with *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot Q82, 24 Sept. 1988, *Keizer 88088*; Odoorn, Odoornerveen, 17 Sept. 1987, *Keizer 87164*.

*Entoloma lividoalbum* is very rare in the Netherlands. It was reported by Noordeloos (1988: 102) from two localities only. Our collections differ in slightly narrower spores.

**Entoloma undulatosporum** Arnolds & Noordel. — Fig. 28

Pileus 9–19 mm, plano-convex with weak or small, pointed umbo, hygrophanous, when moist dark grey-brown (Expo E41, F41), translucently striate, on drying somewhat paler, then silvery silky shining, sometimes radially splitting. Lamellae up to 3.5 mm broad, distant, ventricose, dark grey-brown like pileus or slightly paler (between D61 and D63), with paler edge, crenulate. Stipe 25–32 × 1–4 mm, cylindrical, grey-brown, at apex paler and with minuscule white squamules, downwards glabrous or somewhat silver-white, striate, fistulose or solid. Smell absent or weakly farinaceous.

Spores (8.0–)8.2–10.0(–10.5) × 5.0–6.5(–7.0) µm, 6–8 angled in side-view, Q = 1.3–1.7(–2.0), av. Q = 1.43–1.61. Basidia 4–(2-)spored. Cheilocystidia absent. Pigment in pileipellis diffuse, intracellular. Clamp-connections present.

*Habitat.* Terrestrial in roadside verges planted with old *Quercus* on nutrient-poor sandy soil.

*Collections examined.* Plot Q74, 22 Sept. 1987, *Keizer 87177*; Plot Q83, 29 June 1987, *Keizer 87011*; 8 Sept. 21988, *Keizer 88318*.

The described collections differ in some respects from the description by Noordeloos (1988), viz. in the silvery striate stipe and relatively narrow spores. The undulate outline of the spores is regarded as distinctive for this species.

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