

**STUDIES ON THE GENUS ENTOLOMA
(BASIDIOMYCETES, AGARICALES) IN KERALA STATE, INDIA**

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Fifteen new taxa are described from Kerala State, India, based on collections made by the first author. Three taxa fit subgenus *Pouzarella* (*E. testaceostrigosum*, *E. violaceovillosum*, and *E. dysthales* var. *keralense*). Four species are described as having cuboid spores (*E. albidoquadratum*, *E. brunneoquadratum*, *E. keralense*, and *E. perinfundibuliforme*). *Entoloma indoviolaceum* is a typical *Leptonia*, close to *E. tjallingiorum* from Europe. Two species belong to sect. *Cyanula*: *E. calliviolaceum* and *E. griseoviolascens*. The velutinous pileus of *E. griseolazulinum* is representative for sect. *Calliderma*. Rather enigmatic is *E. allocybesimilis* with affinities to *E. excentricum* in subgenus *Allocybe*, and *E. perflavidum* and *E. tectonicola* probably must be placed in the mainly tropical subgenus *Inocephalus*. Finally, *E. pruinocutis* represents a new *Alboleptonia*. A new name, *Entoloma indocarneau*, is introduced for *E. carneum* Manim., Leelav. & Noordel. A key and checklist are presented to all species known so far from Kerala State.

The genus *Entoloma* (Basidiomycota, Agaricales, Entolomataceae) seems to be particularly rich in Kerala State, India. Two earlier publications (Manimohan et al., 1995, 2002) documented 24 species. In this account we describe 15 new taxa. Methods adopted are given in Manimohan et al., 1995. Colour notations refer to Kornerup & Wanscher (1978). All collections cited are deposited in the Nationaal Herbarium Nederland, Leiden (L).

An attempt has been made to classify all species in the current infrageneric framework (Table I), but in some cases this appeared to be rather difficult. A current phylogenetic study using molecular markers being performed in Leiden by Delia Co, PhD student under supervision of the second author, will hopefully throw more light on the taxonomic position of many taxa. In some cases we have used preliminary results of this research in the discussions.

KEY TO THE SPECIES KNOWN FROM KERALA

- 1a. Basidiomata mycenoid with strigose, often incrustated hairs on pileus and stipe (subgenus *Pouzarella*) 2
- b. Basidiomata different 5
- 2a. Cheilocystidia absent 1. *E. testaceostrigosum*
- b. Cheilocystidia present 3
- 3a. Pileus with distinct violaceous tinge 2. *E. violaceovillosum*
- b. Pileus some shade of brown 4

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- 4a. Odour distinct, unpleasant 3. *E. lomapadum*
 b. Odour none 3. *E. dysthalis* var. *keralense*
- 5a. Basidiomata small, pleurotoid (subgenus *Claudopus*) 6
 b. Basidiomata different 7
- 6a. Basidiomata incarnate-pink *E. indocarneum*
 b. Basidiomata ink blue *E. nubilum*
- 7a. Spores cuboid, rarely 5-sided 8
 b. Spores 5–many-angled, iso- to heterodiametrical 15
- 8a. Basidiomata white or very pale coloured 9
 b. Basidiomata distinctly pigmented 11
- 9a. Habit robust, tricholomatoid; pileus smooth, glabrous, spores 6–8 × 6–7 μm
E. brihadum
 b. Habit slender, mycenoid or collybioid; spores larger 10
- 10a. Pileus convex with depressed centre, translucently striate; white with a pink tinge;
 lamellae adnate to slightly decurrent; cheilocystidia and pleurocystidia absent
E. vanajum
 b. Pileus conico-convex to convex, not translucently striate, yellowish white; lamellae
 adnate; cheilocystidia and pleurocystidia present, 46–98 × 11–14 μm , versiform
 4. *E. albidouadratum*
- 11a. Habit more or less collybioid; lamellae free to adnate 12
 b. Habit omphalioid; lamellae decurrent 13
- 12a. Pileus translucently striate, glabrous 5. *E. brunneoquadratum*
 b. Pileus sulcate-striate, finely squamulose at centre 6. *E. keralense*
- 13a. Basidiomata bright red or blood-red *E. haematinum*
 b. Basidiomata brownish 14
- 14a. Pileus squamulose with small, dark squamules; cheilocystidia with brown intra-
 cellular pigment *E. infundibuliforme*
 b. Pileus glabrous; cheilocystidia not pigmented 7. *E. perinfundibuliforme*
- 15a. Basidiomata with a blue or violaceous tinge in pileus and/or stipe 16
 b. Basidiomata without blue or violaceous tinges 23
- 16a. Surface of pileus velutinous, often cracked with age; pileipellis hymenidermal 17
 b. Surface of pileus (almost) smooth, fibrillose to squamulose; pileipellis a cutis or
 trichoderm 18
- 17a. Spores 9–11 × 6.5–8 μm ; clamp-connections absent *E. rugosopruinatum*
 b. Spores 10–13 × 7–9 μm ; clamp-connections present 11. *E. griseolazulinum*
- 18a. Clamp-connections present and cheilocystidia irregularly shaped with nodulose or
 diverticulate apex 13. *E. indoviolaceum*
 b. Clamp-connections absent and cheilocystidia, if present, different 19
- 19a. Lamella edge fimbriate, blue-black *E. serrulatum*
 b. Lamella edge even, or, if fimbriate, then concolorous with sides 20
- 20a. Spores less than 10 μm long 21
 b. Spores longer than 10 μm 22
- 21a. Basidiomata small and delicate; pileus not squamulose at centre; pileipellis a cutis
E. mridulum
 b. Basidiomata medium-sized; pileus squamulose at centre; pileipellis a trichoderm
E. niranjanum

- 22a. Pileus greyish ruby, fading to greyish brown; stipe violet-grey; lamella edge fertile, cystidia absent 9. *E. griseoviolascens*
 b. Pileus and stipe violet grey to dark greyish violet; lamella edge sterile with abundant cheilocystidia 12. *E. calliviolaceum*
- 23a. Basidiomata white, occasionally with some shade of yellow, grey or brown at centre of pileus (subgenus *Alboleptonia*) 24
 b. Basidiomata distinctly coloured 31
- 24a. Pileus and stipe pruinose 10. *E. pruinocutis*
 b. Pileus and stipe silky shining or more or less fibrillose to minutely squamulose 25
- 25a. Basidiomata white, at most with a pink tinge at maturity 26
 b. Basidiomata with yellowish, brownish, or greyish tinges at centre of pileus at maturity 29
- 26a. Basidiomata relatively robust, pileus more than 20 mm in diam 27
 b. Basidiomata small; pileus less than 20 mm in diam 28
- 27a. Pileus translucently striate; odour unpleasant; staining yellow on bruising; spores 8–10 × 7–10 μm, quadrate to pentagonal *E. theekshnagandhum*
 b. Pileus not translucently striate; odour pleasant; not changing colour on bruising; spores 9–12 × 6–9 μm, heterodiametrical, 5–6-angled in side view *E. shwethum*
- 28a. Cheilocystidia absent; with pleasant odour; spores 8–11 × 6–7 μm, heterodiametrical, 5–6-angled in side view *E. maleolens*
 b. Cheilocystidia present; odour none; spores 8–10 × 5–7 μm, heterodiametrical, 5–7-angled in side view *E. proprium*
- 29a. Centre of pileus with an acute umbo in a shallow depression; cheilocystidia present *E. stylophorum*
 b. Centre of pileus depressed to infundibuliform; cheilocystidia absent 30
- 30a. Spores 5-angled; clamp-connections absent *E. hyalodepas*
 b. Spores 7–8-angled; clamp-connections present *E. anamikum*
- 31a. Basidiomata bright orange *E. aurantium*
 b. Basidiomata with some shades of yellow, brown, or grey 32
- 32a. Basidiomata robust, more or less tricholomatoid; pileus glabrous 33
 b. Basidiomata small to medium-sized; pileus not smooth, but densely pruinose, radially fibrillose, squamulose, or granulose 35
- 33a. Pileus with prominent umbo, leather-brown; lamella greyish brown becoming yellowish brown; cheilocystidia broadly clavate to subglobose, 10–40 × 8–20 μm
 14. *E. allocybesimilis*
 b. Pileus shallowly to distinctly depressed at centre; lamella yellowish white then with pink tinge; cheilocystidia cylindrical to clavate 34
- 34a. Spores 8–10 × 6–7 μm; cheilocystidia 4–6 μm wide; pileus yellowish *E. flavidum*
 b. Spores 9.5–12.5 × 6.5–8 μm; cheilocystidia up to 10 μm wide; pileus orange-yellow 8. *E. perflavidum*
- 35a. Pileus granulose; pileipellis a palisade of fusiform to ovoid elements
E. pervelutinum
 b. Pileus densely pruinose, fibrillose, or minutely squamulose; pileipellis a cutis or trichoderm 36
- 36a. Lamella-edge often brown; odour strong and somewhat peppery . *E. nirupamum*
 b. Lamella-edge concolorous with sides or paler; odour none or different 37

- 37a. Pileus radially fibrillose *E. tectonicola*
 b. Pileus densely pruinose 38
 38a. Pileus translucently striate; pleurocystidia occasionally present; spores 9–11 × 7–8
 μm , heterodiametrical, 5–6-angled in side view *E. gnophodes*
 b. Pileus not translucently striate; pleurocystidia absent; spores 9.5–11 × 7–9 μm ;
 more or less isodiametrical, 5-angled in side-view *E. gnaphalodes*

Table I. Tentative infrageneric position of the *Entoloma* species known from Kerala.

Subgenus	Species	Subgenus	Species
Alboleptonia	<i>E. anamikum</i>	Leptonia	<i>E. aurantium</i>
	<i>E. hyalodepas</i>		<i>E. calliviolaceum</i>
	<i>E. maleolens</i>		<i>E. gnaphalodes</i>
	<i>E. proprium</i>		<i>E. gnophodes</i>
	<i>E. pruinocutis</i>		<i>E. griseoviolascens</i>
	<i>E. shwethum</i>		<i>E. indoviolaceum</i>
	<i>E. stylophorum</i>		<i>E. mridulum</i>
	<i>E. theekshnagandum</i>		<i>E. niranjanum</i>
	<i>E. vanajum</i> (?)		<i>E. nirupamum</i>
			<i>E. serrulatum</i>
Allocybe	<i>E. allocybesimilis</i>		
Claudopus	<i>E. indocarneum</i> (?)	Nolanea	<i>E. brunneoquadratum</i>
	<i>E. nubilum</i> (?)		
Entoloma	<i>E. brihadum</i>	Omphaliopsis	<i>E. haematinum</i> (?)
	<i>E. flavidum</i>		
Inocephalus	<i>E. albidoquadratum</i>	Pouzarella	<i>E. dysthales</i> var. <i>keralense</i>
	<i>E. griseolazulinum</i>		<i>E. lomapadum</i>
	<i>E. infundibuliforme</i> (?)		<i>E. testaceostrigosum</i>
	<i>E. keralense</i>		<i>E. violaceovillosum</i>
	<i>E. perflavidum</i> (?)		
	<i>E. perinfundibuliforme</i> (?)		
	<i>E. pervelutinum</i>		
	<i>E. rugosopruinatum</i>		
<i>E. tectonicola</i>			

CHECKLIST OF THE GENUS ENTOLOMA IN KERALA STATE, INDIA
 (Species in bold are described as new in the present paper)

- albidoquadratum — *Entoloma albidoquadratum* Manim. & Noordel.
 allocybesimilis — *Entoloma allocybesimilis* Manim. & Noordel.
 anamikum — *Entoloma anamikum* Manimohan et al., Mycol. Res. 99 (1995) 1091.
 aurantium — *Entoloma aurantium* Manimohan et al., Mycol. Res. 99 (1995) 1092.
 brihadum — *Entoloma brihadum* Manimohan et al., Mycol. Res. 99 (1995) 1084.
 brunneoquadratum — *Entoloma brunneoquadratum* Manim. & Noordel.
 calliviolaceum — *Entoloma calliviolaceum* Manim. & Noordel.

- flavidum — *Entoloma flavidum* (Masse) Corner & Horak, Beih. Nova Hedwigia 65 (1980) 108 (Manimohan et al. (1995) 1084).
- gnaphalodes — *Entoloma gnaphalodes* (Berk. & Broome) Horak, Beih. Nova Hedwigia 65 (1980) 157 (Manimohan et al. (1995) 1093).
- gnophodes — *Entoloma gnophodes* (Berk. & Broome) Horak, Beih. Nova Hedwigia 65 (1980) 207 (Manimohan et al. (1995) 1092).
- griseolazulinum — *Entoloma griseolazulinum* Manim. & Noordel.
- griseoviolascens — *Entoloma griseoviolascens* Manim. & Noordel.
- haematinum — *Entoloma haematinum* Manimohan et al., Persoonia 17 (2002) 625.
- hyalodepas — *Entoloma hyalodepas* (Berk. & Broome) Horak, Beih. Nova Hedwigia 65 (1980) 157 (Manimohan et al. (1995) 1092).
- indoviolaceum — *Entoloma indoviolaceum* Manim. & Noordel.
- indocarneum — *Entoloma indocarneum* Manim. & Noordel., *nom. nov.* Basionym: *Entoloma carneum* Manimohan et al., Persoonia 17 (2002) 629 non *Entoloma carneum* Z.S. Bi, in Bi, Zheng & Li, Acta Mycol. Sin. 5 (3) (1986) 162.
- infundibuliforme — *Entoloma infundibuliforme* Petch, Annl. Roy. Bot. Gard. Peradenya 6 (1979) 307 (Manimohan et al. (1995) 1087).
- keralense — *Entoloma dysthalis* var. *keralense* Manim. & Noordel.
- keralense — *Entoloma keralense* Manim. & Noordel., *spec. nov.*
- lomapadum — *Entoloma lomapadum* Manimohan et al., Mycol. Res. 99 (1995) 1085.
- maleolens — *Entoloma maleolens* Horak, Beih. Nova Hedwigia 65 (1980) 70 (Manimohan et al. (1999) 1089).
- mridulum — *Entoloma mridulum* Manimohan et al., Mycol. Res. 99 (1995) 1094.
- niranjanum — *Entoloma niranjanum* Manimohan et al., Mycol. Res. 99 (1995) 1095.
- nirupamum — *Entoloma nirupamum* Manimohan et al., Mycol. Res. 99 (1995) 1093.
- nubilum — *Entoloma nubilum* Manimohan et al., Persoonia 17 (2002) 626.
- perinfundibuliforme — *Entoloma perinfundibuliforme* Manim. & Noordel.
- perflavidum — *Entoloma perflavidum* Manim. & Noordel.
- pervelutinum — *Entoloma pervelutinum* Horak, Beih. Nova Hedwigia 65 (1980) 157 (Manimohan et al. (1999) 1086).
- proprium — *Entoloma proprium* Horak, Beih. Nova Hedwigia 65 (1980) 68 (Manimohan et al. (1995) 1090).
- pruinocutis — *Entoloma pruinocutis* Manim. & Noordel.
- rugosopruinatum — *Entoloma rugosopruinatum* Corner & Horak, Beih. Nova Hedwigia 91 (1980) 261 (Manimohan et al. (1995) 1085–1086).
- serrulatum — *Entoloma serrulatum* (Fr.) Hesl., Beih. Nova Hedwigia 23 (1967) 140 (Manimohan et al. (1999) 109).
- shwethum — *Entoloma shwethum* Manimohan et al., Mycol. Res. 99 (1995) 1088.
- stylophorum — *Entoloma stylophorum* (Berk. & Broome) Sacc., Syll. Fung. 5 (1887) 687 (Manimohan et al. (1999) 1090).
- tectoncola — *Entoloma tectoncola* Manim. & Noordel.
- testaceostrigosum — *Entoloma testaceostrigosum* Manim. & Noordel.
- theekshnagandhum — *Entoloma theekshnagandhum* Manimohan et al., Mycol. Res. 99 (1995) 1088.
- vanajum — *Entoloma vanajum* Manimohan et al., Mycol. Res. 99 (1995) 1087.
- violaceovillosum — *Entoloma violaceovillosum* Manim. & Noordel.

DESCRIPTIONS OF THE NEW TAXA

1. *Entoloma testaceostrigosum* Manim. & Noordel., *spec. nov.* — Fig. 1, Plate 1

Basidiomata minuta. Pileus 5–8 mm, convexus, intense rufobrunneus, toto villosus. Lamellae sinuatae, brunneae. Stipes 12.5–27.5 × 1.5–2 mm, rufobrunneus, toto villosus. Sporae 12.5–17 × 7–10 μm , 7–9-angulatae. Basidia 29–40 × 14.5–20 μm , 4-sporigera, efibulata. Cystidiis nullis. Pileipellis stipitipellisque trochoderma e elementis septatis pigmentis brunneis parietalis constituitis. Fibulae desunt.

Holotypus: India, Kerala State, Wayanad District, Meppadi, 27.XI.1997, *P. Manimohan M746* (L).

Basidiomata very small; pileus 5–8 mm in diameter, convex with entire, decurved margin, not hygrophanous, not translucently striate, deep orange to brown (6A6/7C7/7D7), densely hairy. Lamellae sinuate, subcrowded, up to 1 mm wide, with lamellulae of three lengths; ‘sunburn’ (6D5), with concolorous, in part fimbriate edges. Stipe 12.5–27.5 × 1.5–2 mm, central, terete, tapering apically, solid; surface brownish orange (7C7), densely hairy; context up to 0.5 mm thick, dark brown.

Spores 12.5–17 × 7–10 μm , $Q = 1.2\text{--}1.7$, heterodiametrical, 7–9-angled in side view with 7–9 concave or flat facets. Basidia 29–40 × 14.5–20 μm , clavate, 4-spored with up to 5 μm long sterigmata. Lamella-edge fertile; cheilocystidia and pleurocystidia absent. Hymenophoral trama subregular; hyphae 2–12 μm wide, thin-walled with yellowish parietal pigment, with some incrustations. Pileipellis a trichoderm of erect or ascending bundles of 8–16 μm wide, thick-walled (–3 μm) hyphae with internally uneven (wavy) walls; terminal elements tapering or obtuse; with a strong yellowish brown parietal pigment and slightly uneven walls, but not truly incrustated. Pileitrama parallel-interwoven; hyphae 2.5–22 μm wide, thin-walled, yellow-incrustated. Stipitipellis a loose trichoderm of entangled hair-like hyphae, 2–12 μm wide with up to 2 μm thick yellowish or yellowish brown, not distinctly incrustated walls; with tapering or obtuse terminal elements. Clamp-connections absent in whole basidiocarp.

Habitat — On the ground, scattered, December.

Specimen examined: INDIA, Kerala State, Wayanad District, Meppadi, 27.XII.1997, *P. Manimohan M746*.

Entoloma testaceostrigosum belongs to subgenus *Pouzarella* on account of the coloured, septate hairs on pileus and stipe, elongate, somewhat nodulose spores, and clampless hyphae. It is distinctive on account of the lack of true incrustation in the covering layers of pileus and stipe, and lack of hymenial cystidia. A *Pouzarella* species has already been described from Kerala State (Manimohan et al., 1995), viz. *E. lomapodum* Manimohan et al. which differs by the distinct odour, presence of cheilocystidia, and strongly incrustated hyphae of pilei- and stipitipellis. Horak (1980) describes some similar species: *Pouzarella debilis* E. Horak has smaller spores, and distinctly incrustated hyphae in the pileipellis, *E. lasius* E. Horak has narrower spores and incrustated stipe hyphae, *Pouzaromyces aureocrinitus* E. Horak has golden brown covering of pileus and stipe, and differs microscopically by the presence of incrustated hyphae on pileipellis and narrower spores. Noordeloos (1979, 2004) recognized a few European species with weakly incrustated hairs on the pileus and stipe, but both *E. romagnesii* and *E. hirtum* differ by having a more greyish tinged basidiocarp, much smaller spores, and presence of cheilocystidia.

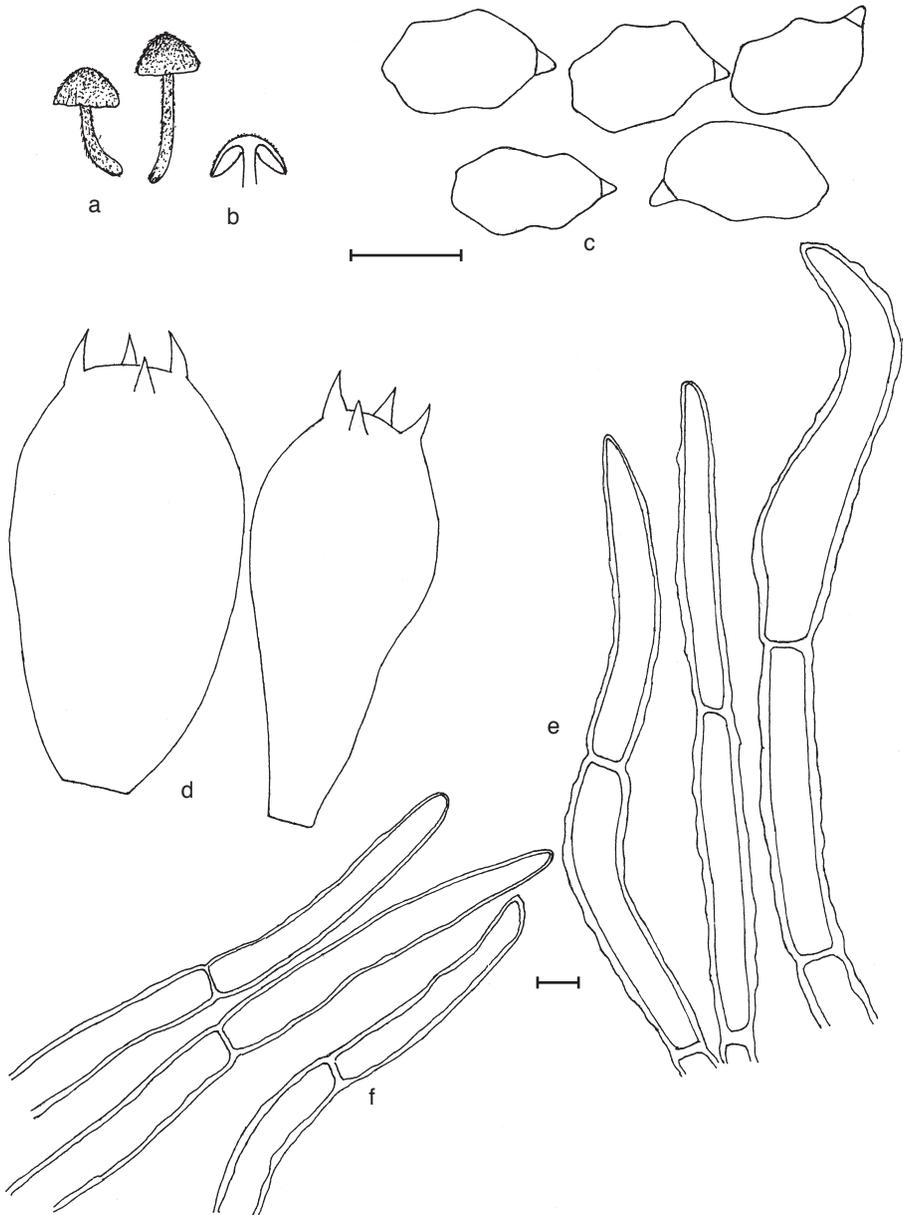


Fig. 1. *Entoloma testaceostrigosum*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. hairs on pileus; f. hairs on stipe. Scale bars: 1 cm, resp. 10 μ m.

2. *Entoloma violaceovillosum* Manim. & Noordel., *spec. nov.* — Fig. 2, Plate 2

Basidiomata minuta. Pileus 8–13 mm, plano-convexus, griseobrunneus violaceo-tinctus, toto villosus. Lamellae adnato-decurrentes, griseobrunneae. Stipes 15–40 × 1.5–2.5 mm, griseobrunneus, pubescentus. Sporae 12–16 × 8.5–11 μm , 6–7 angulatae. Basidia 31–48 × 12–19 μm , 4-sporigera, efibulata. Acies lamellarum heterogeneus. Cheilocystidia 34–65 × 11–23 μm , clavata vel fusioidea, tenuitunicata, hyalina. Pileipellis stipitipellisque cutis vel trichoderma e elementis cylindraceutis, 4–17 μm latis, incrustantibus constituitis. Fibulae desunt.

Holotypus: India, Kerala State, Wayanad District, Meppadi, 31.XII.1997, *P. Manimohan M745*.

Basidiomata small. Pileus 8–13 mm in diameter, plano-convex with plane finely fissile margin, not hygrophanous, not translucently striate, greyish red (10D4) to violet brown (10E4), becoming darker (10F4) after collection, appressed-hairy to almost woolly-tomentose, denser towards the centre, not striate. Lamellae adnate with a decurrent tooth, subcrowded, up to 1 mm wide, with lamellulae of 2–3 lengths, greyish brown (10D3). Stipe 15–40 × 1.5–2.5 mm, central, terete, almost equal or slightly broader towards base, hollow; greyish red to greyish brown (10D4–10D3), finely pubescent, glabrescent. Odour not distinctive.

Spores 12–16 × 8.5–11 μm , heterodiametrical-ovate, 6–7-angled, sides not very concave. Basidia 31–48 × 12–19 μm , clavate, 4-spored; sterigmata up to 5 μm long; thick-walled crassobasidia 45–50 × 13–16.5 μm , sometimes up to 78 × 26 μm , frequent towards lamella-edge. Lamella-edge heteromorphous; cheilocystidia 34–65 × 11–23 μm , clavate or fusoid, thin-walled, hyaline. Lamellar trama regular; hyphae 1.5–18 μm wide, thin-walled, hyaline, without clamp-connections; subhymenium not well-developed. Pileal trama parallel-interwoven; hyphae 1.5–17 μm wide, thin-walled, hyaline or with a pale brown intracellular pigment, rarely faintly incrustated with a hyaline material. Pileipellis a cutis disrupted by ascending bundles of hyphae; hyphae 4–17 μm wide, thin- to slightly thick-walled, with a brownish intracellular pigment and coarse hyaline incrustation; terminal elements with obtuse or tapering apex; clamp-connections absent. Stipitipellis a disrupted cutis with trichodermial patches; hyphae 3–14 μm wide, thin- to slightly thick-walled, hyaline, frequently with hyaline incrustation; terminal elements with obtuse ends, not tapering; clamp-connections absent.

Habitat — On the ground, scattered, December.

Specimen examined: INDIA, Kerala State, Wayanad District, Meppadi, 31.XII.1997, *P. Manimohan M745*.

Entoloma violaceovillosum is a small *Pouzarella* species distinctive by its colours, relatively large and broad spores and hyaline, poorly incrustated hyphae of pileipellis and stipitipellis.

3. *Entoloma dysthalis* var. *keralense* Manim. & Noordel., *var. nov.* — Fig. 3, Plate 3

A varietate typica caulocystidiis haud incrustatis differt.

Holotypus: India, Kerala State, Palakkad District, Nelliampathy, Karappara forest, 13.VIII.1999, *P. Manimohan M755*.

Basidiomata small. Pileus 5–15 mm in diameter, 5–10 mm high, mostly conico-convex, sometimes convex, becoming somewhat appanate, with or without a very slight depression at the centre, margin slightly incurved when young, becoming faintly

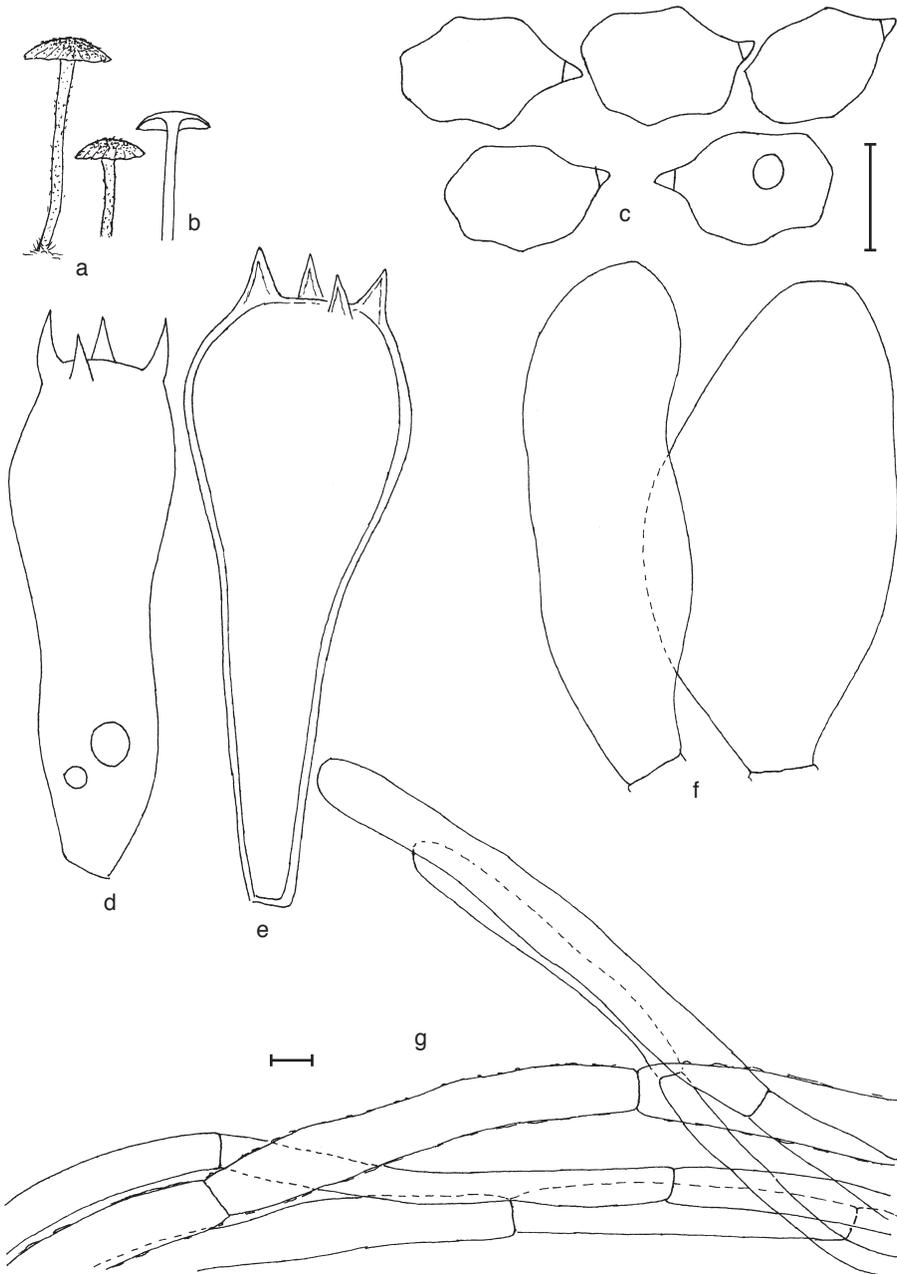


Fig. 2. *Entoloma violaceovillosum*. a. Habit; b. longitudinal section; c. spores; d, e. basidia; f. cheilocystidia; g. pileipellis. Scale bars: 10 μ m, resp. 1 cm.

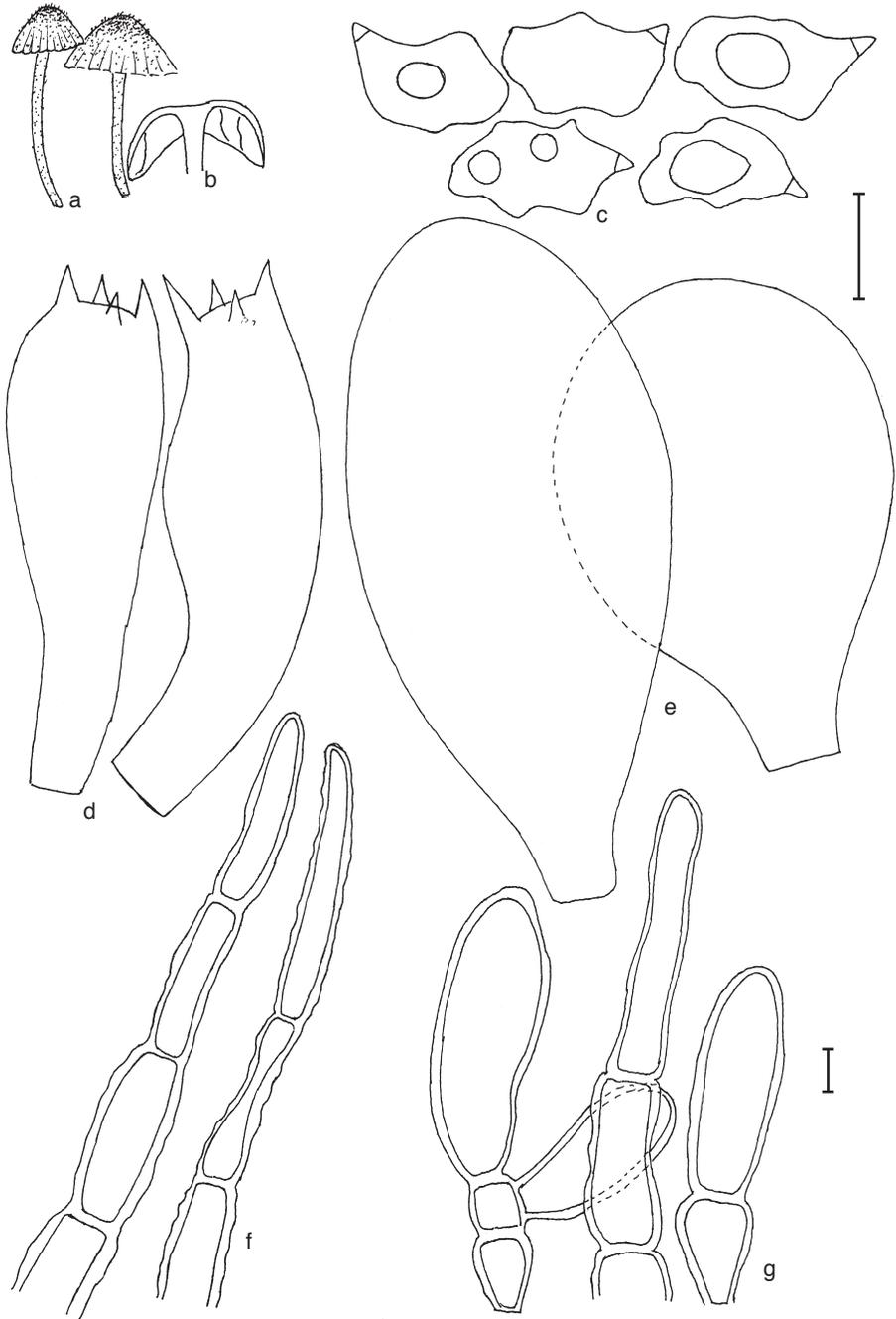


Fig. 3. *Entoloma dysthalis* var. *keralense*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia; f. hairs on pileipellis; g. hairs on stiptipellis. Scale bars: 10 μ m, resp. 1 cm.

sulcate with age finally becoming straight and fissile; greyish brown to brown (6E3, 6E4, 6F4), densely squamulose at the centre, sparsely so or almost none towards margin; faintly pellucid-striate when young. Lamellae adnate, crowded with lamellulae, up to 3 mm wide, brown with entire, concolorous edge. Stipe 15–30 × 1–2 mm, central, terete, almost equal, hollow; concolorous with pileus, densely pruinose. Odour none.

Spores 12–15 × 7–10 μm , heterodiametrical-ovate 5–6-angled with concave facets. Basidia 23–42 × 9–13 μm , clavate or cylindrical, hyaline or sometimes containing a brownish intracellular pigment, 4-spored; sterigmata up to 6 μm long. Lamella-edge heteromorphous; cheilocystidia scattered or in clusters, 25–60 × 13–27 μm , versiform, mostly inflated-clavate, sometimes ventricose, lageniform or fusoid, thin-walled, hyaline. Pleurocystidia none. Lamellar trama subregular; hyphae 2–10 μm , wide, thin-walled with yellowish brown wall pigment and incrustation. Pileipellis a trichodermium of ascending bundles of closely septate hyphae, gradually tapering towards apex, 8–19 μm wide, with thick yellowish brown wall and incrusting pigment; terminal elements devoid of incrustation. Stipitipellis a cutis disrupted by scattered or clustered hyphae, 2–17 μm wide, thin-walled, with yellowish brown incrustation; caulocystidia septate, hair-like, 3–17 μm wide, of varying lengths, gradually tapering towards apex, thick-walled, not incrustated. Clamp-connections absent in all tissues. Oleiferous hyphae absent.

Habitat — On the ground, scattered, August.

Specimen examined: INDIA, Kerala State, Palakkad District, Nelliampathy, Karappara forest, 13.VIII.1999, P. Manimohan M755.

The present collection fits well with *E. dysthales*, a widespread species occurring in temperate Northern Hemisphere (Mazzer, 1976; Noordeloos, 1979, 2004). However, the material from India differs slightly by the clavate, septate, thick-walled, but not incrustated caulocystidia.

4. *Entoloma albidoquadratum* Manim. & Noordel., *spec. nov.* — Fig. 4, Plate 4

Pileus conico-convexus vel convexus, haud hygrophanous, haud striatus, albidoflavus, radialiter fissuratus. Lamellae adnatae, pallide aurantiae, irregulariter marginatae. Stipes 60–70 × 3–4 mm, cylindraceus, albidoflavus, leviter pruinosis. Sporae 11–16.5 × 9–14 μm , cuboideae. Basidia 45–60 × 11–16 μm , 1- ad 4-sporigera. Acies lamellarum steriles. Cheilocystidia pleurocystidiaque 46–98 × 11–14 μm , versiformia, clavata vel acuminata. Pileipellis cutis e hyphis 3–13 μm latis, tenuitunicatis, haud pigmentatis. Fibulae abundantes.

Holotypus: India, Kerala State, Wayanad District, Muthanga, 8.VIII.1996, P. Manimohan M667.

Basidiomata medium-sized, brittle. Pileus 20–25 mm in diameter, conico-convex to convex with small central umbo or a hollow lumen continuous with that of stipe; not hygrophanous, not translucently striate, yellowish white (4A2) to pale yellow (4A3), dry, with numerous radial cracks; margin straight, highly eroded and irregular. Lamellae adnate, crowded, up to 6 mm wide, with lamellulae in 2 or 3 tiers, ventricose; pale orange (6A3), with paler, whitish, fimbriate edge (lens). Stipe 60–70 × 3–4 mm, central, terete, slightly tapering towards base, hollow; surface yellowish white (4A2) to pale yellow (4A3), finely pruinose under a lens; basal mycelium not observed. Odour none.

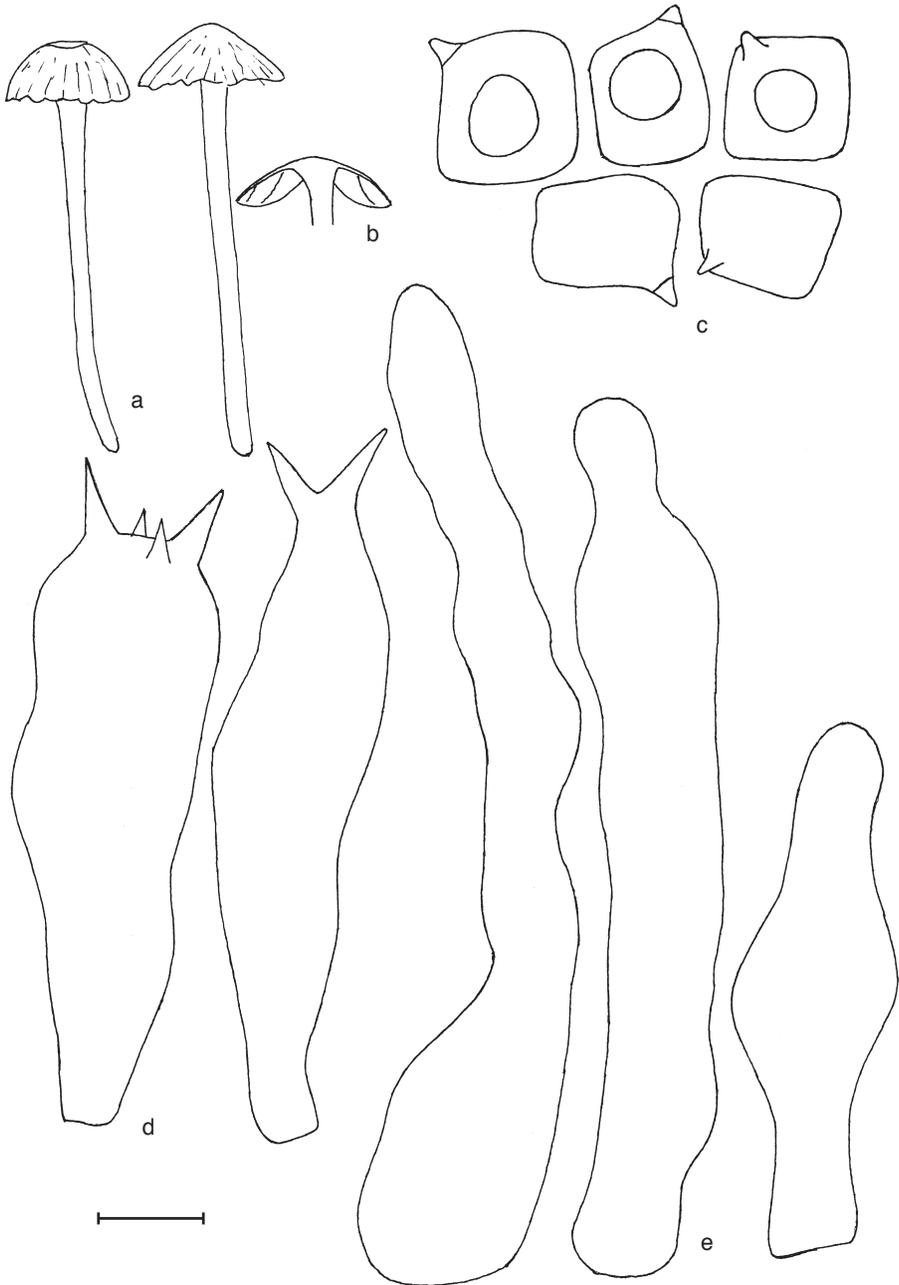


Fig. 4. *Entoloma albidoquadratum*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia. Scale bar: 10 μ m, resp. 1 cm.

Spores $11-16.5 \times 9-14 \mu\text{m}$, cuboid-quadrate in profile. Basidia $45-60 \times 11-16 \mu\text{m}$, mostly clavate, sometimes obclavate or fusoid, 1- to 4-spored; sterigmata up to $6.5 \mu\text{m}$ long; occasionally thick-walled crassobasidia seen. Lamella-edge sterile. Cheilocystidia $46-98 \times 11-14 \mu\text{m}$, versiform, mostly flexuous-cylindrical with tapering apex, thin-walled, hyaline. Pleurocystidia occasional, protruding well beyond the hymenium, similar to cheilocystidia in all aspects. Hymenophoral trama subregular; hyphae $1.5-15 \mu\text{m}$ wide, thin-walled, hyaline, with clamp-connections; subhymenium poorly developed. Pileal trama parallel-interwoven; hyphae similar to those of lamellar trama. Pileipellis a cutis; hyphae $3-13 \mu\text{m}$ wide, thin-walled, hyaline or pale yellowish, without any incrustation. Stipitipellis a disrupted cutis; hyphae $2-13 \mu\text{m}$, thin-walled, hyaline or pale yellowish, forming ascending or erect bundles of mostly clavate or rarely cylindrical hyphal ends; hyphae $7-8.5 \mu\text{m}$ wide at the tip. Clamp-connections present in all tissues. Oleiferous hyphae present in all tissues.

Habitat — On the ground, scattered, August.

Specimen examined: INDIA, Kerala State, Wayanad District, Muthanga, 8.VIII.1996, P. Manimohan M667.

Entoloma albidoquadratum is a typical member of subgenus *Inocephalus* with its non-hygrophanous, non-striate pileus and quadrate spores. Only a few white or whitish species with cuboid spores have been described in literature. *Entoloma albogracile* E. Horak, *E. pallideflavum* (Hannings & Newman) E. Horak, and *E. gracilius* E. Horak all differ among other things by having consistently smaller spores. *Entoloma brihadum* Manim. et al., another whitish species from Kerala State with cuboid spores, has a tricholomatoid appearance with glabrous, pinkish white, slightly translucently striate pileus, and belongs to subgenus *Entoloma*.

5. *Entoloma brunneoquadratum* Manim. & Noordel., *spec. nov.* — Fig. 5, Plate 5

Pileus 25–50 mm latus, convexus, leviter depressus, hygrophanus, translucido-striatus, brunneus, glabrus. Lamellae liberae, brunneae. Stipes $40-60 \times 4-7$ mm, cylindraceus, brunneus, glabrus. Sporae $8-11.5 \times 7.5-9 \mu\text{m}$, quadratae. Basidia $21-33 \times 7.5-9.5 \mu\text{m}$, 1- ad 4-sporigera; efibulata. Acies lamellarum fertilis. Cystidia nulla. Pileipellis cutis hyphis $2-30 \mu\text{m}$ latis pigmentis intracellulosis. Caulocystidia absentes. Fibulae desunt.

Holotypus: India, Kerala State, Wayanad District, Ponkuzhi, 1.VIII.1999, P. Manimohan M753.

Basidiomata medium-sized. Pileus 25–50 mm in diameter, convex, with or without a very small depression at the centre; with straight, fissile margin, not distinctly hygrophanous, translucently striate, brown (7E5-8E5), smooth, glabrous. Lamellae free, with lamellulae, crowded, up to 6 mm wide, brown (7D5), with entire, concolorous edge. Stipe $40-60 \times 4-7$ mm, central, terete, hollow; concolourous with the pileus, smooth, glabrous.

Spores $8-11.5 \times 7.5-9 \mu\text{m}$, cuboid-quadrate in profile. Basidia $21-33 \times 7.5-9.5 \mu\text{m}$, cylindric or clavate, 1- to 4-spored; sterigmata up to $3 \mu\text{m}$ long; clampless. Lamella-edge fertile; cheilocystidia and pleurocystidia not observed. Lamellar trama subregular; hyphae $1-35 \mu\text{m}$ wide, hyaline, with a very thin wall. Pileal trama parallel-interwoven; hyphae $1.5-30 \mu\text{m}$ wide, thin-walled, with yellowish brown pigment;

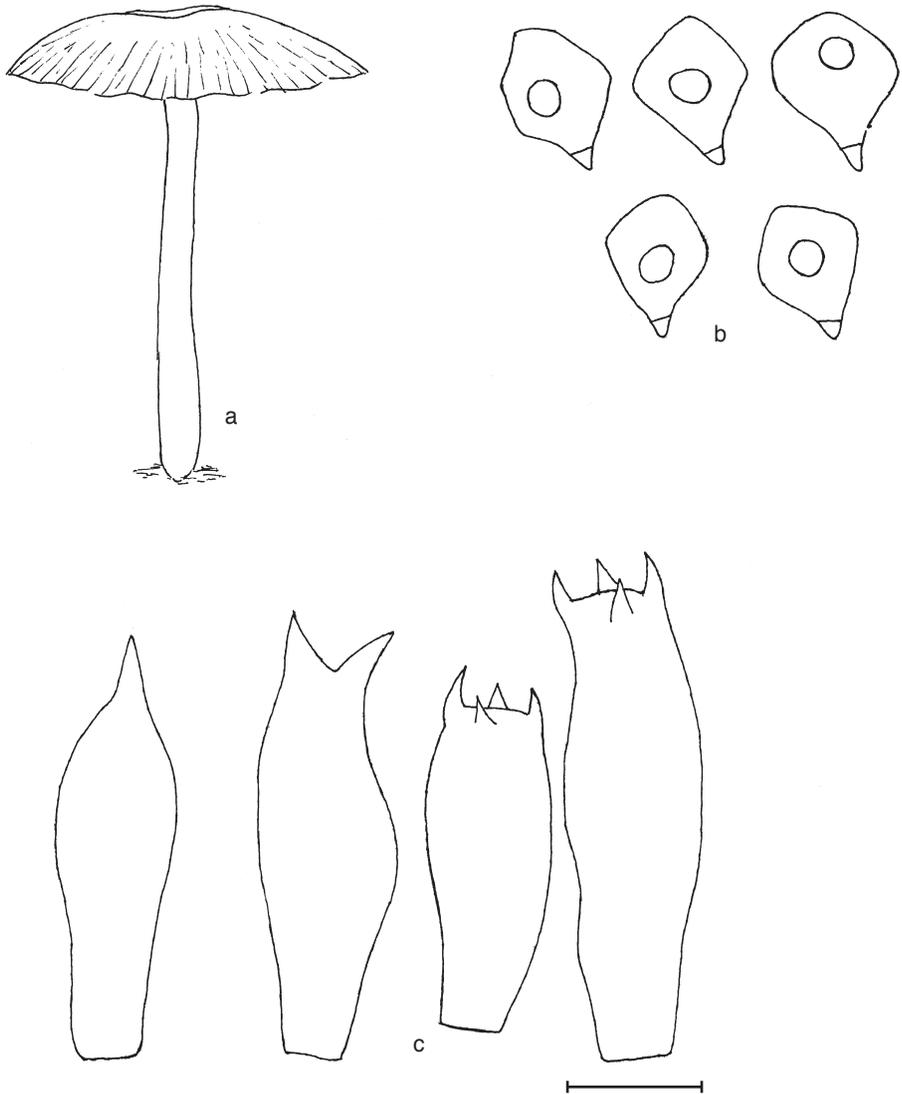


Fig. 5. *Entoloma brunneoquadratum*. a. Habit; b. spores; c. basidia. Scale bar: 10 μm , resp. 1 cm.

clamp-connections not observed. Pileipellis an undifferentiated cutis; hyphae 2–30 μm wide, thin-walled, with brownish intracellular pigment. Stipitipellis a cutis; hyphae 1.5–33 μm wide, thin- to slightly thick-walled, with yellowish pigment. Caulocystidia none. Clamp-connections not observed.

Habitat — On the ground, scattered, August.

Specimen examined: INDIA, Kerala State, Wayanad District, Ponkuzhi, 1.VIII.1999, P. Manimohan M753.

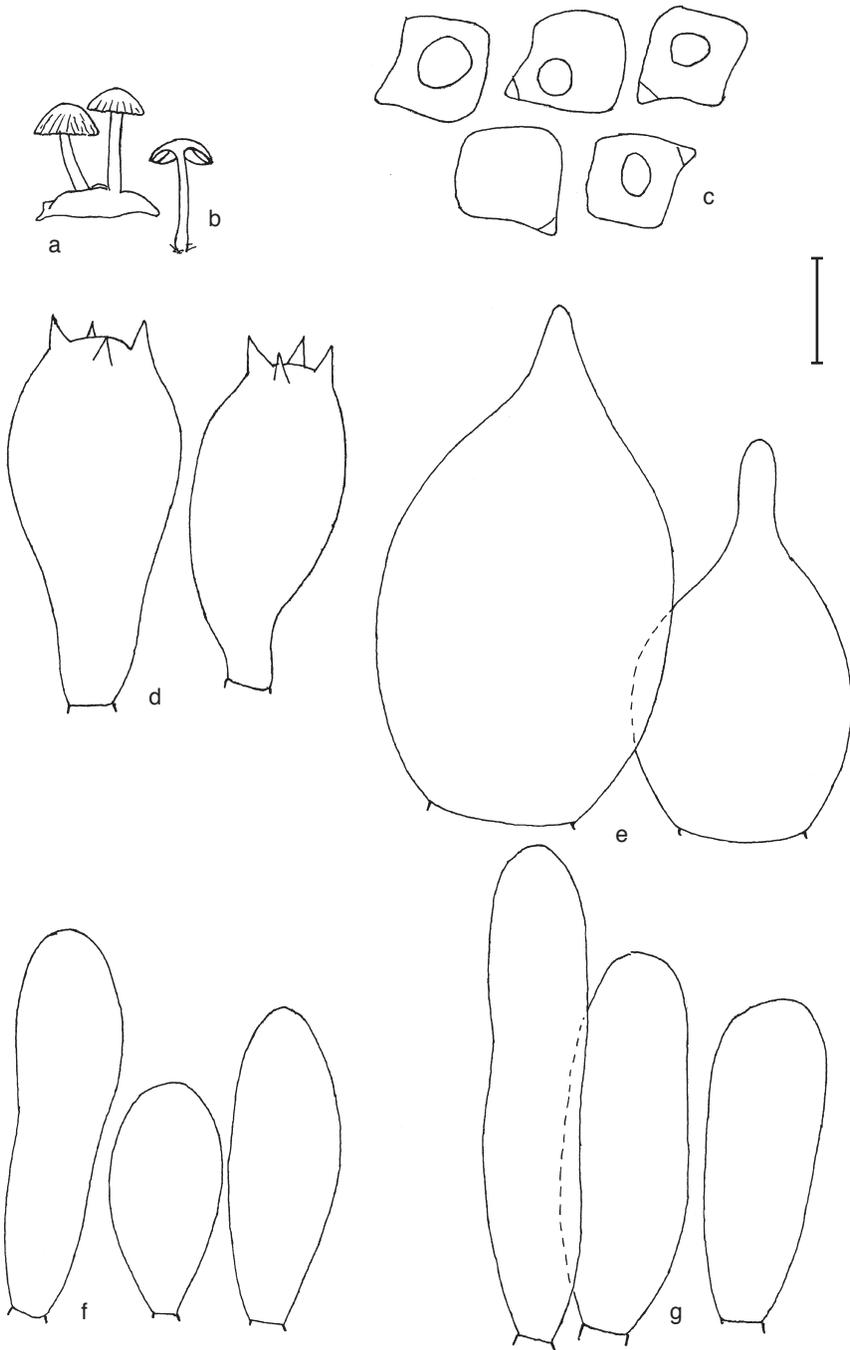


Fig. 6. *Entoloma keralense*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia; f. elements of pileipellis; g. caulocystidia. Scale bar: 10 μ m, resp. 1 cm.

Entoloma brunneoquadratum is a small brown species with cuboid spores, which could not be identified with the current literature (Horak, 1976, 1977; Pegler, 1986; Noordeloos, 2004). Distinctive are the glabrous pileus and stipe, and lack of cystidia, which may place it in *Nolanea* rather than in *Incocephalus*. *Entoloma brunneum*, known from Sri Lanka, Madagascar, Malay Peninsula, Sarawak, and Papua New Guinea (Horak, 1976; Pegler, 1986) differs among other things by the distinctly squamulose pileus and presence of cheilocystidia.

6. *Entoloma keralense* Manim. & Noordel., *spec. nov.* — Fig. 6, Plate 6

Pileus 6–8 mm latus, convexus, leviter depressus, toto villosus-fibrilosus centro squamulosus, haud hygrophanus, haud striatus, obscure brunneus. Lamellae adnatae, pallide brunneae. Stipes 10–15 × 0.5–1.5 mm, cylindraceus, rufo-griseus vel rufobrunneus, plus-minusve glaber. Sporae 8–11 × 7.5–9.5 μm, quadratae, interdum pentagonales. Basidia 25–32 × 10–14 μm, 4-sporigera, fibulata. Acies lamellarum heteromorpha. Cheilocystidia 32–42 × 15–25 μm, late clavata vel ventricos-rostrata, hyalina. Pleurocystidia similes, infrequentes. Pileipellis cutis ex hyphis 2–11 μm latis, tenuitunicatis pigmentis intracellulosis. Caulocystidia 37–75 × 10–25 μm, clavata vel fusioidea. Fibulae presentes.

Holotypus: India, Kerala State, Malappuram District, Calicut University Campus, 29.VIII.1997, P. Manimohan M731.

Basidiomata small, delicate. Pileus 6–8 mm in diameter, convex with a slight central depression; sulcate, with straight, fissile margin, not hygrophanous, not translucently striate, dark brown (8F4) at centre and on striae, reddish brown (8E4) elsewhere, finely squamulose towards the centre, appressed-fibrillose to rivulose towards the margin, moist. Lamellae adnate, subdistant, up to 2 mm wide, with a single lamellula between two lamellae; pale brown (8B2/8C2) with entire, concolorous edge. Stipe 10–15 × 0.5–1.5 mm, central, terete, almost equal, hollow; surface more or less glabrous, pale brown, reddish grey, or brownish grey (8B2/8C2); basal mycelium scanty. Odour not distinct.

Spores 8–11 × 7.5–9.5 μm, cuboid-quadrate or rarely pentagonal in profile. Basidia 25–32 × 10–14 μm, clavate, 4-spored; sterigmata up to 3.5 μm long. Lamella-edge heteromorphous. Cheilocystidia 32–42 × 15–25 μm, thin-walled, ovoid or ventricose-rostrate, hyaline. Pleurocystidia infrequent, similar to cheilocystidia in size and shape. Lamellar trama subregular; hyphae 2–10 μm wide, thin-walled, hyaline. Pileal trama parallel-interwoven; hyphae 2–11 μm wide, thin-walled, hyaline to pale yellowish, with clamp-connections. Pileipellis a cutis; hyphae 2–11 μm wide, thin-walled, containing a yellowish brown intracellular pigment, without incrusting pigments. Stipitipellis a cutis; hyphae 1.5–15 μm wide, thin- to slightly thick-walled, pale yellow or almost hyaline, with clamp-connections; caulocystidia in clusters, 37–75 × 10–25 μm, clavate or fusoid, thin-walled. Clamp-connections present.

Habitat — On moss-covered root of a tree, 3 close-by specimens, September.

Specimen examined: INDIA, Kerala State, Malappuram District, Calicut University Campus, 29.VIII.1997, P. Manimohan M731.

None of the species with quadrate spores described by Horak (1976, 1977) fit with *E. keralense*, which is characterized by the brown, fibrillose-squamulose pileus, glabrous stipe, and conspicuous cheilo- and pleurocystidia. It will fit nicely in the current concept of subgenus *Inocephalus*.

7. *Entoloma perinfundibuliforme* Manim. & Noordel., *spec. nov.* — Fig. 7, Plate 7

Basidiomata omphaloidea. Pileus 30–65 mm latus, convexus centro depressus vel infundibuliformis, leviter hygrophanous, marginae striatus, brunneo-griseus, pallescens, glabrus. Lamellae adnexae, pallide roseae. Stipes 25–40 × 4–7 mm, cylindraceus, albidus, innate fibrillosus. Sporae 9.5–12 × 8–10 μm , quadratae vel pentagonalis. Basidia 31–38 × 9.5–14 μm , 4-sporigera. Acies lamellarum sterilis. Cheilocystidia 32–99 × 12–22 μm , tenuitucata, cylindracea, clavata vel fusioidea. Pleurocystidia desunt. Pileipellis cutis elementis cystidioidea, 10–100 × 2–15 μm constituis pigmentis parietalis. Caulocystidia desunt. Fibulae presentes.

Holotypus: India, Kerala State, Wayanad District, Ponkuzhi, 17.VII.1997, *P. Manimohan M705*.

Basidiomata small to medium-sized. Pileus 30–65 mm in diameter, convex with a slight central depression becoming deeply depressed to infundibuliform with age; finely sulcate towards the margin, with straight, entire margin becoming irregularly lobate with age, hygrophanous, translucently striate in marginal zone when moist, brownish grey (6F8) at the centre, fading to ‘camel’ (6D4) or brownish orange (6C3), glabrous. Lamellae adnexed, very crowded, with lamellulae in 2–5 tiers, up to 5 mm wide; orange white (6A2), with finely eroded, brown edge. Stipe 25–40 × 4–7 mm, whitish, central, slightly compressed, almost equal, hollow, finely appressed-fibrillose, glabrescent. Odour strong, somewhat like that of garlic.

Spores 9.5–12 × 8–10 μm , cuboid-quadrate or pentagonal in profile. Basidia 31–38 × 9.5–14 μm , clavate or pedicellate-clavate, 4-spored; sterigmata up to 4 μm long. Lamella-edge made up of a dense strand of hyphae with free terminal elements, not true cheilocystidia, 32–99 × 12–22 μm , thin-walled, hyaline. Pleurocystidia not observed. Lamellar trama subregular; hyphae 1–25 μm wide, thin-walled, hyaline; subhymenium not well-developed. Pileal trama parallel-interwoven; hyphae 2–30 μm wide, thin-walled, with yellowish or yellowish brown wall pigment. Pileipellis a disrupted cutis of repent or suberect hyphae with cystidioid terminal elements, 10–100 × 2–15 μm , cylindric, fusoid or clavate, with obtuse or mucronate apex, thin-walled, with yellowish or yellowish brown parietal pigment, without incrustations. Stipitipellis a cutis; hyphae 2–10 μm wide, thin-walled, without incrustation, with yellowish to yellowish brown wall pigment. Clamp-connections present in all tissues.

Habitat — On the ground, scattered, July.

Specimen examined: INDIA, Kerala State, Wayanad District, Ponkuzhi, 17.VII.1997, *P. Manimohan M705*.

Entoloma perinfundibuliforme has a remarkable set of characters with its deeply depressed, practically glabrous, hygrophanous pileus, cuboid spores, and sterile lamellae edge, which consists of cystidiform elements which originate from tramal hyphae, reminiscent the structure found in *E. serrulatum*, but lacking the typical intracellular pigment found in that species. *Entoloma infundibuliforme* Petch as described by Manimohan et al. (1995) from Kerala State has similar omphalioid basidiocarps, but differs clearly by the more conspicuously squamulose pileus, pigmented cheilocystidia and smaller spores. The preliminary results of molecular and phylogenetic studies (Co et al., in prep.) suggest affinities of *E. perinfundibuliforme* with section *Griseorubida*.

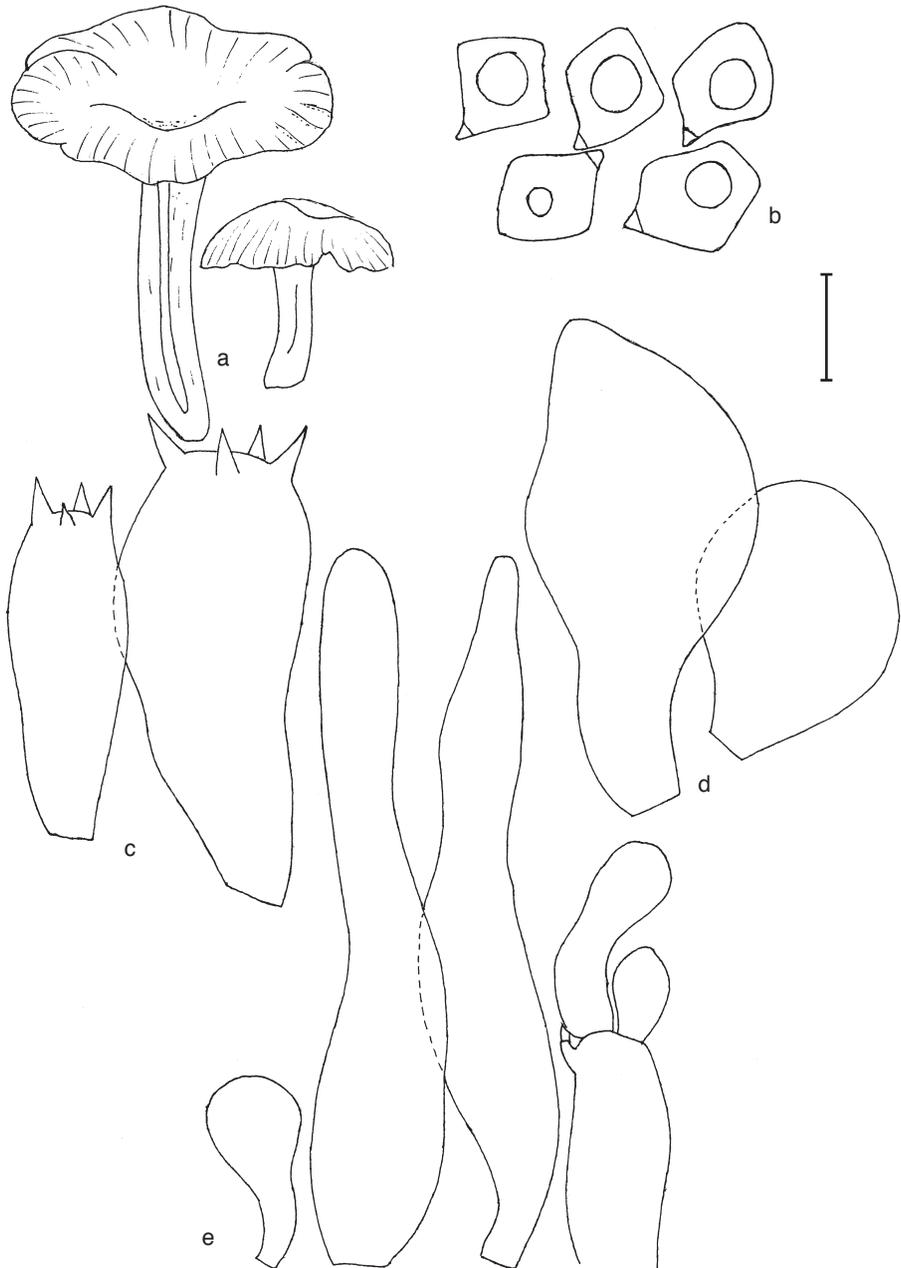


Fig. 7. *Entoloma perinfundibuliforme*. a. Habit; b. spores; c. basidia; d. cheilocystidia; e. elements of pileipellis. Scale bar: 10 μ m, resp. 1 cm.

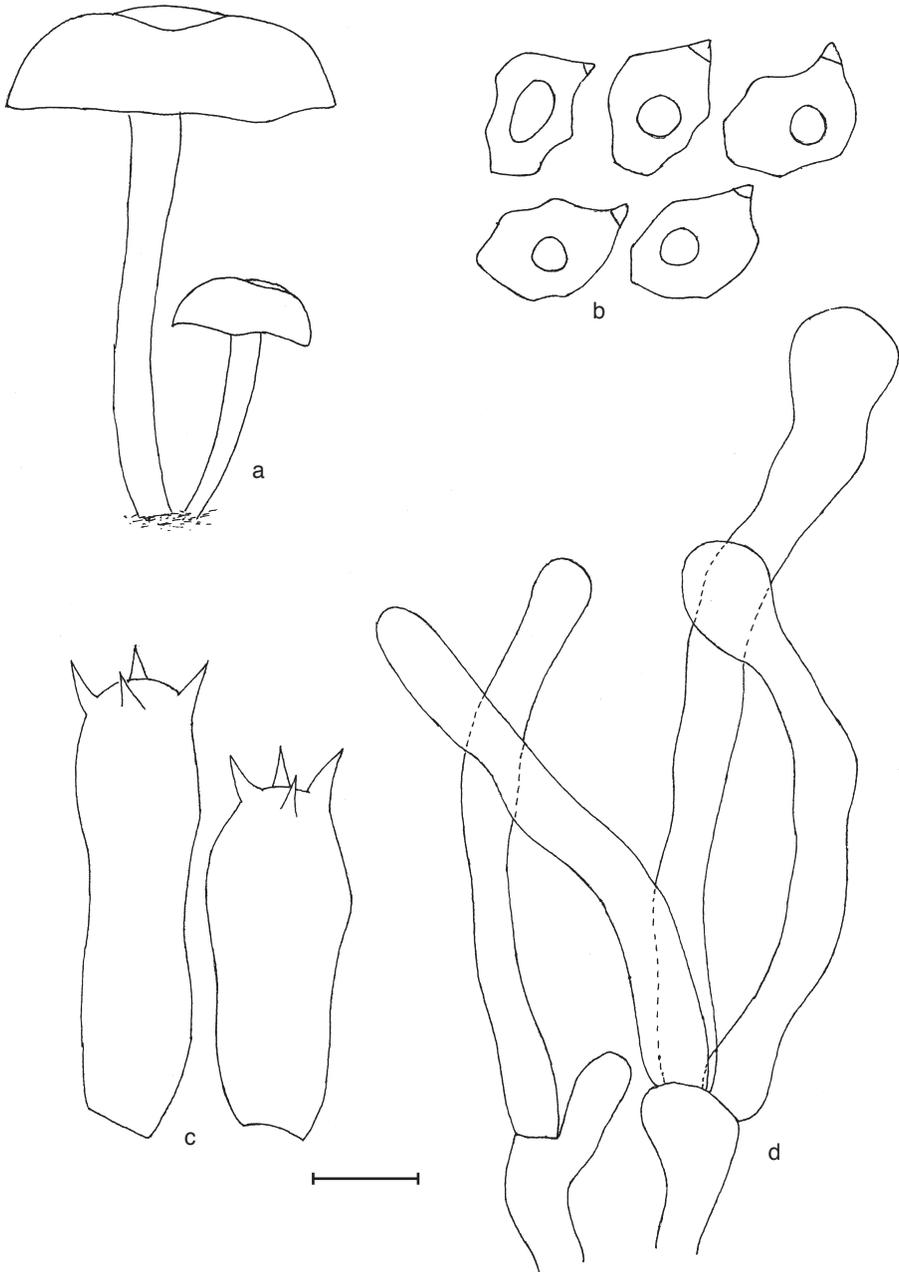


Fig. 8. *Entoloma perflavidum*. a. Habit; b. spores; c. basidia; d. cheilocystidia. Scale bar: 10 μ m, resp. 1 cm.

8. *Entoloma perflavidum* Manim. & Noordel., *spec. nov.* — Fig. 8, Plate 8

Pileus 20–80 mm, convexus vel hemisphericus, depressus, haud hygrophanus, peralbidus centro pallide aurantiacus, glaber. Lamellae adnatae-subdecurrentes, confertae. Stipes 50–80 × 6–13 mm, cylindraceus, albide-flavus, glaber, innate fibrillosus. Sporae 9.5–12.5 × 6.5–8 μm, heterodiametricae 5–7-angulatae. Basidia 21–34 × 7–12.5 μm, 4-sporigera. Acies lamellarum sterilis. Cheilocystidia 16–66 × 6–9 μm, subcylindracea apice inflata, hyalina. Pileipellis cutis hyphis cylindraceis, 4–12 μm latis pigmentis parietalibus. Fibulae absentes.

Holotypus: India, Kerala State, Kasaragode District, Adhoor, 17.VI.2001, *P. Manimohan M762a*.

Basidiomata medium-sized to somewhat large and robust, clitocyboid. Pileus 20–80 mm in diameter, initially convex to hemispherical, finally often with a small but distinct central depression with straight, entire finally fissile margin, not hygrophanous, not translucently striate; pale orange (5A3) towards the centre, yellowish white (4A2) elsewhere, smooth and glabrous. Lamellae adnate to subdecurrent, very crowded, up to 9 mm broad; with lamellulae of several lengths, initially whitish, becoming 'flesh' (6B3) at maturity. Stipe 50–80 × 6–13 mm, central, terete, solid, becoming slightly fistulose, fleshy-fibrous, slightly broader towards apex, sometimes with a slightly swollen base, yellowish white, glabrous, finely longitudinally striate. Odour mild, somewhat pleasant.

Spores 9.5–12.5 × 6.5–8 μm, heterodiametrical-ovate, 5–7-angled with (5–)6–7 flat or concave facets. Basidia 21–34 × 7–12.5 μm, cylindrico-clavate, 4-spored; sterigmata up to 4 μm long. Lamella-edge sterile; cheilocystidia in dense clusters, hyphoid, septate, branched; terminal elements 16–66 × 6–9 μm, almost cylindrical with a slightly swollen apex, thin-walled, hyaline. Lamellar trama subregular to almost regular; hyphae 2–12 μm wide, thin-walled, hyaline. Pileipellis a cutis of 2–15 μm wide, cylindrical hyphae. Pileal trama parallel-interwoven; hyphae 2–15 μm wide, thin-walled, with pale yellowish brown parietal pigment, without any incrustation. Stipitipellis a cutis; hyphae 2–12 μm wide, thin-walled, with pale yellowish brown wall pigment, without incrustation. Clamp-connections absent in all tissues. Oleiferous hyphae present.

Habitat — On the ground, scattered or in groups, in cashew plantations, June.

Specimens examined: INDIA, Kerala State, Kasaragode District, Adhoor, 17.VI.2001, *P. Manimohan M762a*; 19.VI.2001, *P. Manimohan M762b*.

Entoloma perflavidum has much in common with *E. flavidum* (Masse) Corner & E. Horak as described from Kerala State by Manimohan et al. (1995) with regard to general basidiocarp morphology, size and shape of spores, and the sterile lamella edge with filamentous cheilocystidia. It differs by the slightly darker colour of the pileus, presence of clamp-connections, and distinct incrusting pigment in the pileipellis.

9. *Entoloma griseoviolascens* Manim. & Noordel., *spec. nov.* — Fig. 9, Plate 9

Pileus 15–30 mm, applanatus, umbilicatus, hygrophanus, distincte translucido-striatus, griseorubidus, pallescens, velutinus, aereolatus. Lamellae adnate-decurrentes, pallide griseus demum roseotinctus. Stipes 25–50 × 2–4 mm, cylindraceus, griseoviolascens, minute pruinosis. Sporae 9–12.5 × 7–9 μm, heterodimetriae, 5–6-angulatae. Basidia 29–46 × 10.5–13 μm, 4-sporigera, efibulata. Acies lamellarum fertilis. Cystidia nulla. Pileipellis trichoderma e elementis cystidiformis, 33–150 × 7–26 μm, pigmentis intracellulosis constituitis. Fibulae absentes.

Holotypus: India, Kerala State, Malappuram District, Calicut University Campus, 25.VIII.1997, P. Manimohan M723.

Basidiomata small to somewhat medium-sized. Pileus 15–30 mm in diameter, applanate with a sharply delineated umbilicus at the centre becoming very finely sulcate with age, with straight, entire margin, strongly hygrophanus, distinctly translucently striate up to the umbilicus, initially uniformly greyish ruby (12F3), soon fading to greyish brown (6D3), finely velutinate, with fine areolate cracking. Lamellae adnate with a decurrent tooth or almost subdecurrent, very crowded, with lamellulae in 3 or 4 tiers, up to 4 mm wide, initially pale grey (1B1), becoming orange grey (6B2), with an entire, under lens finely fimbriate, concolorous edge. Stipe 25–50 × 2–4 mm, central, terete or compressed with a longitudinal furrow running the entire length of the stipe, almost equal, hollow; violet grey (18F2), finely pruinose towards the upper half, densely coated with a white pruina towards base; basal mycelium well-developed, white, cottony. Odour not distinctive.

Spores 9–12.5 × 7–9 μm, heterodimetric-ovate, 5–6-angled with flat or concave facets. Basidia 29–46 × 10.5–13 μm, clavate, 4-spored; sterigmata up to 3.5 μm long. Lamella-edge fertile; cheilocystidia and pleurocystidia absent. Lamellar trama subregular to almost regular; hyphae 2–30 μm wide, thin-walled, hyaline. Pileipellis a trichoderm composed of erect or ascending bundles of cystidioid terminal elements, 33–150 × 7–26 μm, mostly fusoid, thin-walled, with brownish intracellular pigment. Stipitipellis mostly a cutis, disrupted to form a trichoderm towards base; hyphae 1–12 μm wide, thin- to slightly thick-walled, hyaline to pale yellowish brown, without incrustation. Clamp-connections absent.

Habitat — On the ground, scattered, August.

Specimen examined: INDIA, Kerala State, Malappuram District, Calicut University Campus, 25.VIII.1997, P. Manimohan M723.

Entoloma griseoviolascens is a typical member of subgenus *Leptonia* section *Cyanula* with its collybioid habit and violaceous tinges in the stipe, as well as the clamped hyphae.

10. *Entoloma pruinocutis* Manim. & Noordel., *spec. nov.* — Fig. 10, Plate 10

Pileus 10 mm, convexus, umbonatus, haud hygrophanus, haud striatus, albidus leviter brunneotinctus, subtiliter pruinosis. Lamellae adnatae-decurrentes, albae. Stipe 20 × 2–3.5 mm, cylindraceus, albus, pruinosis. Sporae 10–12 × 7–9 μm, heterodimetricae, 5-angulatae. Basidia 37–56 × 10–14.5 μm, 4-sporigera. Acies lamellarum fertilis. Cystidia nulla. Pileipellis trichoderma e elementis cylindraceis, 50–100 × 7.5–9.5 μm constituitis. Fibulae presentes.

Holotypus: India, Kerala State, Malappuram District, Calicut University Campus, 19.VII.1996, P. Manimohan M697.

Basidioma small. Pileus 10 mm in diameter, convex with a somewhat umbonate centre; whitish with a tint of brown, neither striate nor zonate, finely pruinose. Lamellae adnate with a decurrent tooth, crowded, up to 1.5 mm wide, with lamellulae in 1 or 2 tiers, whitish with entire, concolorous edge. Stipe 20 × 2 mm, broader towards base (–3.5 mm), central, terete, solid, whitish, finely pruinose; basal mycelium not conspicuous. Odour mild, somewhat fragrant.

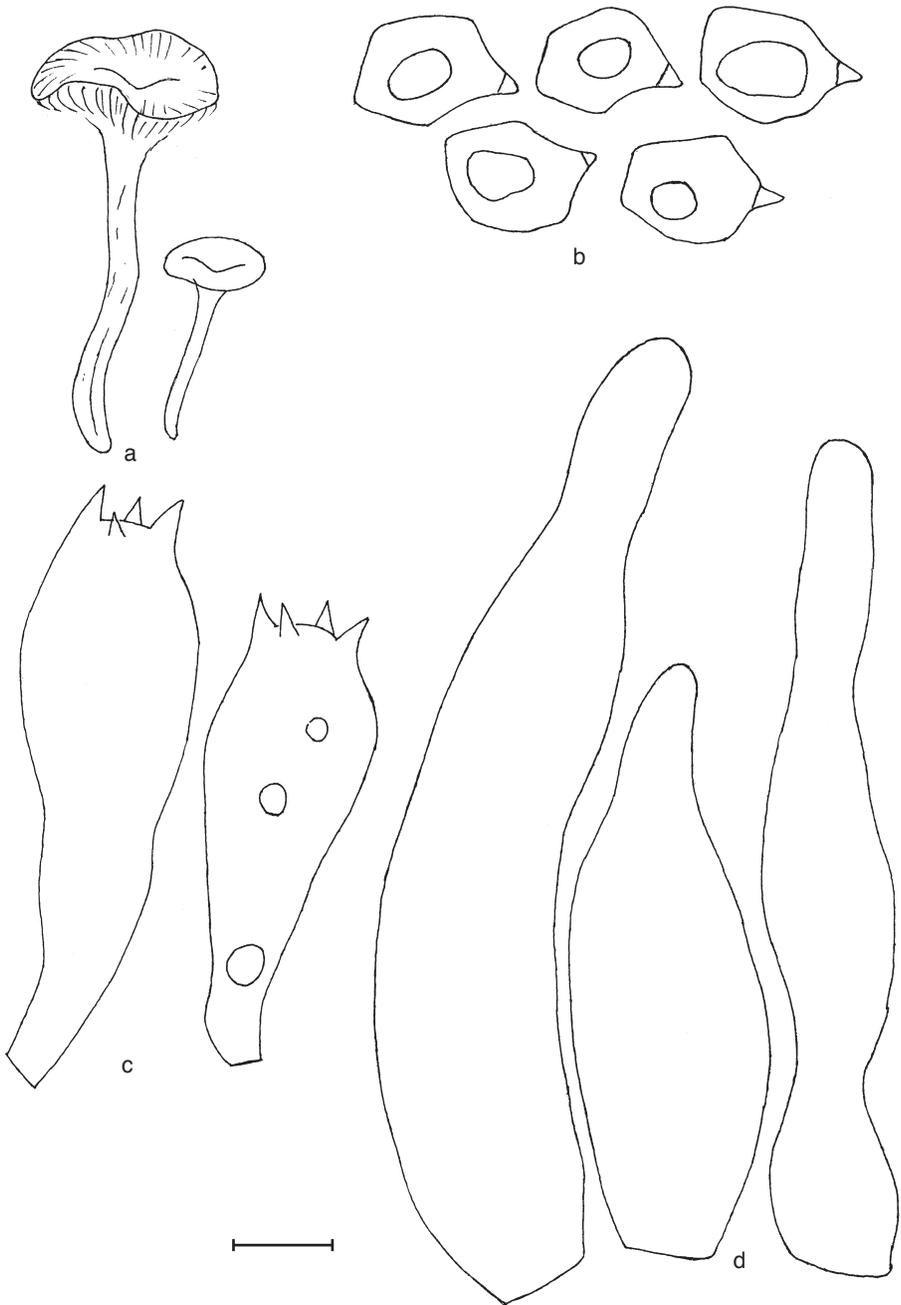


Fig. 9. *Entoloma griseoviolascens*. a. Habit; b. spores; c. basidia; d. cheilocystidia. Scale bar: 10 μm , resp. 1 cm.

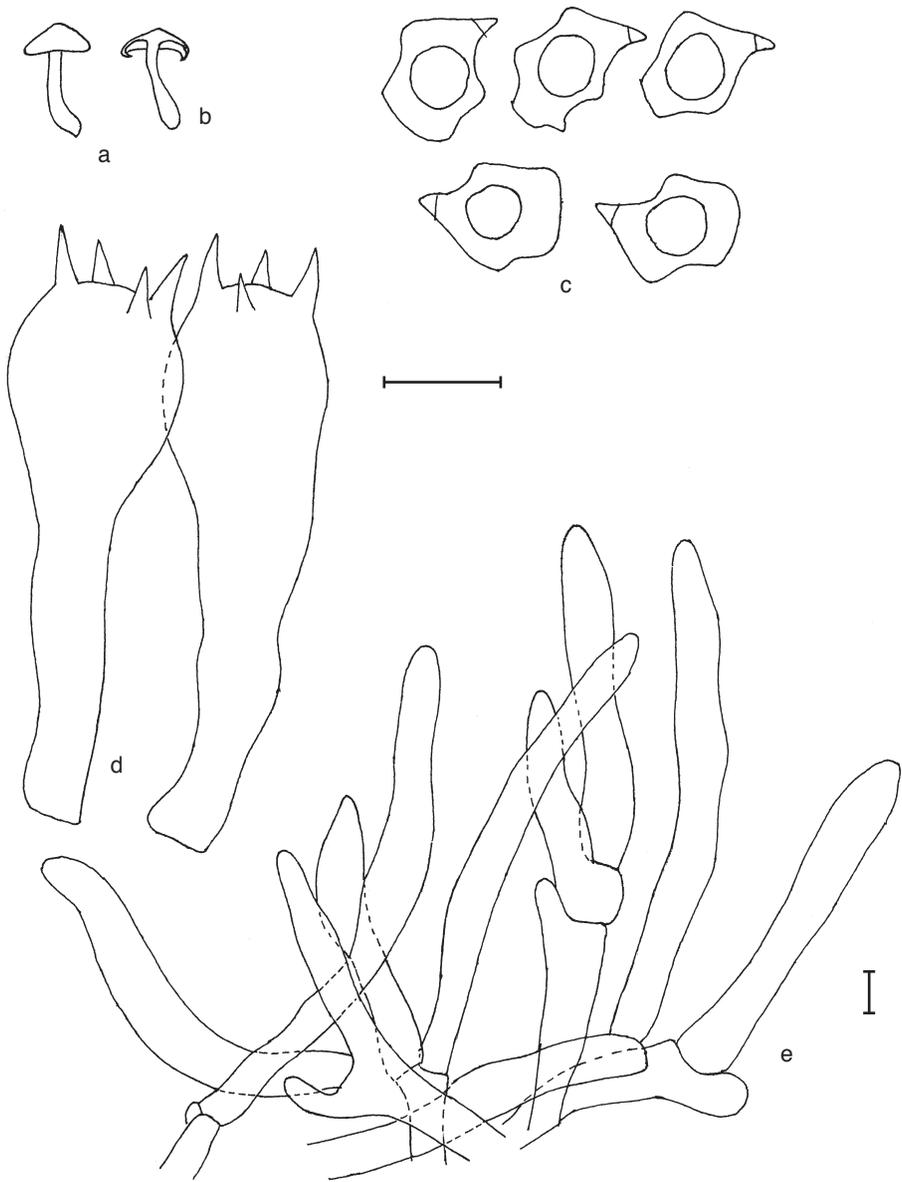


Fig. 10. *Entoloma pruinocutis*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia. Scale bars: 10 μ m, resp. 1 cm.

Spores $10\text{--}12 \times 7\text{--}9 \mu\text{m}$, heterodiametrical-ovate, 5-angled with concave facets. Basidia $37\text{--}56 \times 10\text{--}14.5 \mu\text{m}$, clavate, 4-spored; sterigmata up to $5.5 \mu\text{m}$ long. Lamella-edge fertile; cheilocystidia and pleurocystidia absent. Lamellar trama subregular; hyphae $2\text{--}10 \mu\text{m}$ wide, thin-walled, hyaline. Pileal trama parallel-interwoven; hyphae $3\text{--}18 \mu\text{m}$ wide, thin-walled, hyaline, without incrustation. Pileipellis a trichoderm; terminal elements $50\text{--}100 \times 7.5\text{--}9.5 \mu\text{m}$, cylindrical with obtuse ends, thin-walled, hyaline to pale yellowish. Stipitipellis a cutis; hyphae $1.5\text{--}11 \mu\text{m}$ wide, thin-walled, hyaline. Oleiferous hyphae absent. Clamp-connections present in all tissues.

Habitat — On the ground, solitary, July.

Specimen examined: INDIA, Kerala State, Malappuram District, Calicut University Campus, 9.VII.1997, P. Manimohan M697.

Entoloma pruinocutis has the appearance of a small *Alboleptonia* with its tiny, whitish basidiocarps. Although a number of *Alboleptonia* species have previously been recorded from Kerala State (Manimohan et al., 1995), our new species is distinctive because of the pruinose surface of pileus and stipe. *Entoloma sericellum* has a silky-fibrillose cap surface and large cheilocystidia. *Entoloma stylophorum* (Berk. & Broome) Sacc., recorded from Sri Lanka (Pegler, 1986) and Kerala (Manimohan et al., 1995) has a silky fibrillose covering of pileus and stipe, formed by cutis-like structure composed of narrow hyphae.

11. *Entoloma griseolazulinum* Manim. & Noordel., *spec. nov.* — Fig. 11, Plate 11

Pileus $40\text{--}50$ mm, convexus, umbonatus, haud hygrophanus, haud striatus, griseolazulinus, velutinus. Lamellae liberae, cremeae demum bruneae, roseo-tinctae. Stipes $40\text{--}90 \times 5\text{--}8$ mm, cylindraceus, pallide griseolazulinus, fibrilosus. Sporae $10\text{--}13 \times 7\text{--}9 \mu\text{m}$, heterodiametricae, $5\text{--}6$ -angulatae. Basidia $47\text{--}71 \times 11\text{--}16 \mu\text{m}$, 4-sporigera, fibulata. Acies lamellarum fertilis. Cystidia nulla. Pileipellis hymenoderma e elementis variabilis, cystidiformes, $29\text{--}51 \times 12\text{--}24 \mu\text{m}$ pigmentis intracellulosis constituitis. Fibulae presentes.

Holotypus: India, Kerala State, Kannur District, Morazha, 9.XI.1997, P. Manimohan M738.

Basidiomata medium-sized, robust, tricholomatoid. Pileus $40\text{--}50$ mm in diameter, convex with a conspicuous obtuse umbo, with straight, finally fissile margin, not hygrophanous, not translucently striate, not zonate, dark greyish blue (22F4) at the centre, greyish blue (22E4) in the middle part, light greyish blue (22D4) towards margin, uniformly finely velutinate, irregularly rugulose at centre. Lamellae free, very crowded, with lamellulae of 4–5 lengths; up to 6 mm wide, cream-coloured, becoming brownish, with finely torn, concolorous edge. Stipe $40\text{--}90 \times 5\text{--}8$ mm, central, terete, slightly tapering towards apex, solid; pale greyish blue (20D4), with fine longitudinal striations, finely pruinose. Odour not distinctive.

Spores $10\text{--}13 \times 7\text{--}9 \mu\text{m}$, heterodiametrical-ovate, 5–6-angled with plane or concave facets. Basidia $47\text{--}71 \times 11\text{--}16 \mu\text{m}$, clavate or subfusoid, 4-spored; sterigmata up to $4 \mu\text{m}$ long. Lamella-edge fertile; cheilocystidia and pleurocystidia absent. Lamellar trama subregular; hyphae $2\text{--}25 \mu\text{m}$ wide, thin-walled, hyaline, without incrustation. Pileipellis a pluristratous hymeniform layer composed of branched closely-septate chains of elements; apical elements $29\text{--}51 \times 12\text{--}24 \mu\text{m}$, versiform, ventricose-rostrate, fusoid, obclavate, lageniform, cylindric, or clavate, thin-walled, with greyish to dark blue intracellular pigment, without incrusting pigments. Stipitipellis a cutis disrupted by

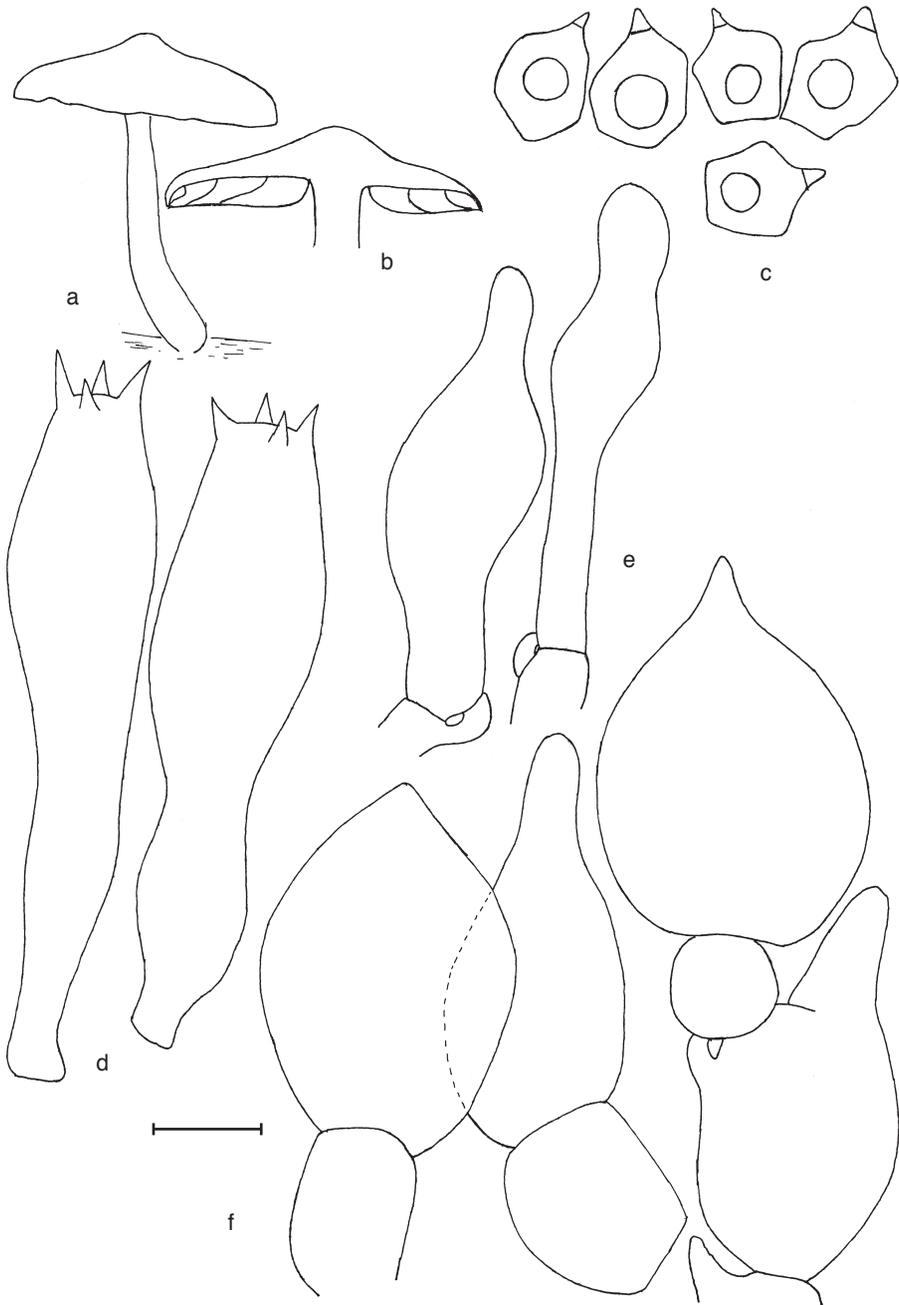


Fig. 11. *Entoloma griseolazulinum*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia; f. pileipellis. Scale bar: 10 μ m, resp. 1 cm.

ascending or erect hyphal ends with cystidioid terminal elements; hyphae 2–10 μm wide, thin-walled, with greyish to dark blue intracellular pigment, without incrustation; terminal elements 25–40 \times 8–13 μm , versiform; clavate, mucronate-clavate or sinuous-cylindric. Clamp-connections observed in all parts of the basidioma. Oleiferous hyphae present.

Habitat — Gregarious on soil, November.

Specimen examined: INDIA, Kerala State, Kannur District, Morazha, 9.XI.1997, *P. Manimohan M738*.

Entoloma griseolazulinum belongs to section *Calliderma* of subgenus *Inocephalus* on account of the velutinous cap surface, which becomes fissile toward margin with age and the multi-layered, hymeniform pileipellis. *Entoloma rugosopruinatum* Corner & E. Horak, recorded from Kerala State by Manimohan et al. (1995) and from Sabah (Horak, 1980) differs by having smaller, differently shaped spores and clampless hyphae. A number of similar species (*E. calliderma* Romagn. from Africa, *E. divum* Corn. & E. Horak from Sabah, *E. simillimum* Corner & E. Horak and *E. marinum* Corner & E. Horak from Malaysia) differ by the presence of cheilocystidia and differently shaped, smaller spores. *Entoloma purpureum* Petch from Sri Lanka also has similar dark blue fruit-bodies, but its pileipellis is a cutis with transitions to a trichoderm, which place it in section *Cyanula*.

12. *Entoloma calliviolaceum* Manim. & Noordel., *spec. nov.* — Fig. 12, Plate 12

Basidiomata collybioidea. Pileus 20–50 mm latus, convexus demum applanatus, subumbonatus, violaceo-griseus vel obscure violaceo-griseus, adpresse squamulosus, haud hygrophanous, haud striatus. Lamellae adnexae vel subliberae, rufobrunneae. Stipes 30–80 \times 3–8 mm, violaceo-griseus vel obscure violaceus, fibrillosus. Sporae 10–13 \times 6.5–9.5 μm , heterodiametricae, 5–7-angulatae. Basidia 32–45 \times 8–13 μm , 4-sporigera, efibulata. Acies lamellarum steriles. Cheilocystidia fasciculata, cylindraceo-clavata, 15–46 \times 6–10 μm , hyalina. Pleurocystidia desunt. Pileipellis cutis vel trichoderma e elementis clavatis, 3.5–15 μm latis constituis pigmentis intracellulosis. Fibulae desunt.

Holotypus: India, Kerala State, Wayanad District, Muthanga, 30.VI.1998, *P. Manimohan M749*; Ponkuzhi, 1.XI.1999, *P. Manimohan M758*.

Basidiomata medium-sized to large, collybioid. Pileus 20–50 mm in diameter, initially convex and slightly umbonate, expanding to applanate with a slightly depressed centre, with incurved then straight, entire then fissile margin and undulating marginal zone, not hygrophanous, not translucently striate, violet grey to dark greyish violet (15F3/16F2/16F3), finely appressed-squamulose with squamules coarser and bigger towards centre. Lamellae adnexed or free, crowded to very crowded, with lamellulae of 3–5 lengths, up to 5 mm wide, orange grey, pale orange or orange white (6A2/6A3/6B2), with entire, concolorous or brown edge. Stipe 30–80 \times 3–8 mm, central, terete or compressed, almost equal, hollow, fistulose; violet grey or dull violet (15E2/15E3/16E2/16E3), finely appressed-fibrillose, whitish towards base, with white cottony mycelium. Odour mild, not distinctive.

Spores 10–13 \times 6.5–9.5 μm , heterodiametrical-ovate, 5–7-angled with concave facets. Basidia 32–45 \times 8–13 μm , clavate, with oily contents, 4-spored; sterigmata up to 5 μm long. Lamella-edge sterile. Cheilocystidia 15–46 \times 6–10 μm , clavate, rarely in branched chains, hyaline, thin-walled. Pleurocystidia not observed. Lamellar

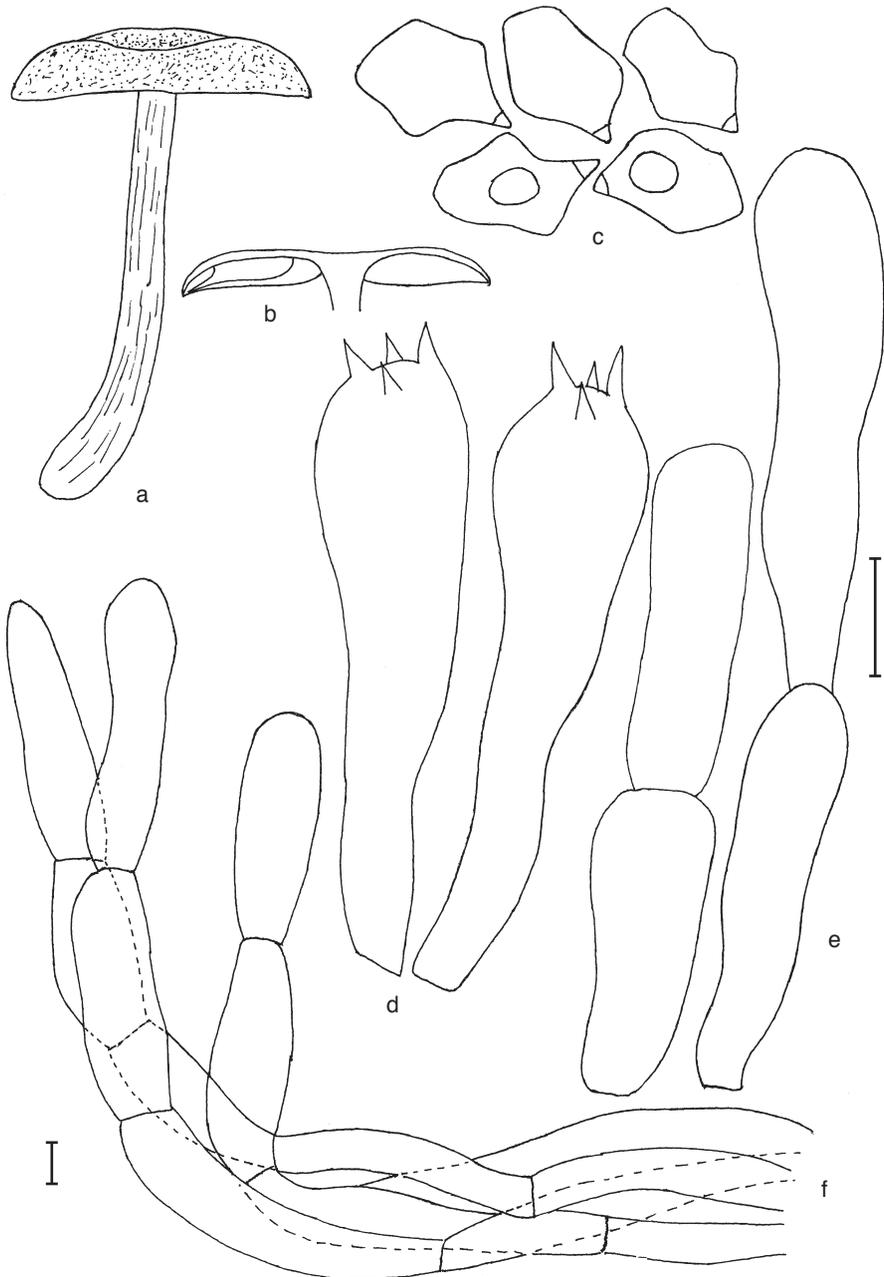


Fig. 12. *Entoloma calliviolaceum*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia; f. pileipellis. Scale bars: 10 μ m, resp. 1cm.

trama regular; hyphae 1.5–10 μm wide, thin-walled, hyaline to pale yellow, with oily contents; sub-hymenium not well-developed. Pileal trama parallel-interwoven; hyphae 4–18 μm wide, thin-walled, hyaline to pale yellow, without incrustation. Pileipellis a cutis disrupted by trichodermal tufts of clavate terminal elements, 3.5–15 μm wide; with greyish violet intracellular pigment; without pigment incrustation; terminal elements cylindrical with round elements. Stipitipellis a disrupted cutis of loosely arranged hyphae with cystidioid hyphal ends projecting out; hyphae 5–24 μm wide, thin-walled, frequently incrustated, often constricted at septa, with a brownish or greyish violet intracellular pigment. Clamp-connections not observed in any tissue; oleiferous hyphae present.

Habitat — On the ground, scattered around bamboo stands, June–November.

Specimens examined: INDIA, Kerala State, Wayanad District, Muthanga, 30.VI.1998, *P. Manimohan M749*; Ponkuzhi, 1.XI.1999, *P. Manimohan M758*.

Entoloma calliviolaceum is a nice violaceous-grey coloured member of subgenus *Leptonia* section *Cyanula*. It has some resemblance to the European species *E. nigrovio-laceum*, which has similar large spores, but lacks cheilocystidia. *Entoloma decolorans* E. Horak from New Zealand is more intensely blue coloured, and has slightly smaller spores. *Entoloma purpureum* Petch from Sri Lanka differs by a fertile lamella edge and darker colours of the squamules of the pileus.

13. *Entoloma indoviolaceum* Manim. & Noordel., *spec. nov.* — Fig. 13, Plate 13

Pileus 10–35 mm latus, convexus, interdum demum subumbonatus, obscure cyaneus vel atro-cyaneus, haud hygrophanus, haud translucido striatus, velutinus demum squamulosus. Lamellae confertae, cremeae. Stipes 45–55 \times 2–4 (apex) \times 8–10 (basis) mm, cyaneo-fibrillosus. Sporae 11–14 \times 6.5–9.0 μm , heterodiametricae, 5–7 angulatae. Basidia 25–51 \times 9–12 μm , 4-sporigera. Acies lamellarum sterilis. Cheilocystidia 15–59 \times 7–15 μm , clavata, interdum nodulosa. Pleurocystidia desunt. Pileipellis trichoderma, e elementis clavatis, 3.5–15 μm latis constituit pigmentis intracel-lulosis. Fibulae abundantes.

Holotypus: India, Kerala State, Malappuram District, Nilambur, KFRI subcentre campus, 11.VII.1997, *P. Manimohan M700*.

Basidiome small to medium-sized. Pileus 10–35 mm in diameter, convex, with or without an obtusely umbonate centre, with incurved, not expanding margin, not hygrophanous, not translucently striate, dark blue to blackish blue (19F6/19F5/19E6/19E5), initially finely velutinate, cracking with age to become finely squamulose. Lamellae adnexed to narrowly adnate, very crowded, with lamellulae in 3–5 tiers, up to 5 mm wide, cream-coloured (3A2); with entire, concolorous edge. Stipe 45–55 \times 2–4 mm (apex) \times 8–10 mm (base), central, terete, broader towards the base; fistulose; with dark blue or blackish blue (19F5/19F6/19E5/19E6) appressed fibrils on whitish background. Odour not distinctive.

Spores 11–14 \times 6.5–9 μm , heterodiametrical-ovate, 5–7-angled with mostly concave facets. Basidia 25–51 \times 9–12 μm , clavate, 4-spored; sterigmata up to 4 μm long. Lamella-edge sterile. Cheilocystidia 15–59 \times 7–15 μm ; versiform, mostly clavate or clavate with a nodulose or diverticulate apex, or sinuous-cylindric, thin-walled, hyaline; cheilocystidial layer frequently disrupted by bundles of branched tramal hyphae, projecting beyond the cystidial layer, with mostly cylindrical terminal elements with obtuse

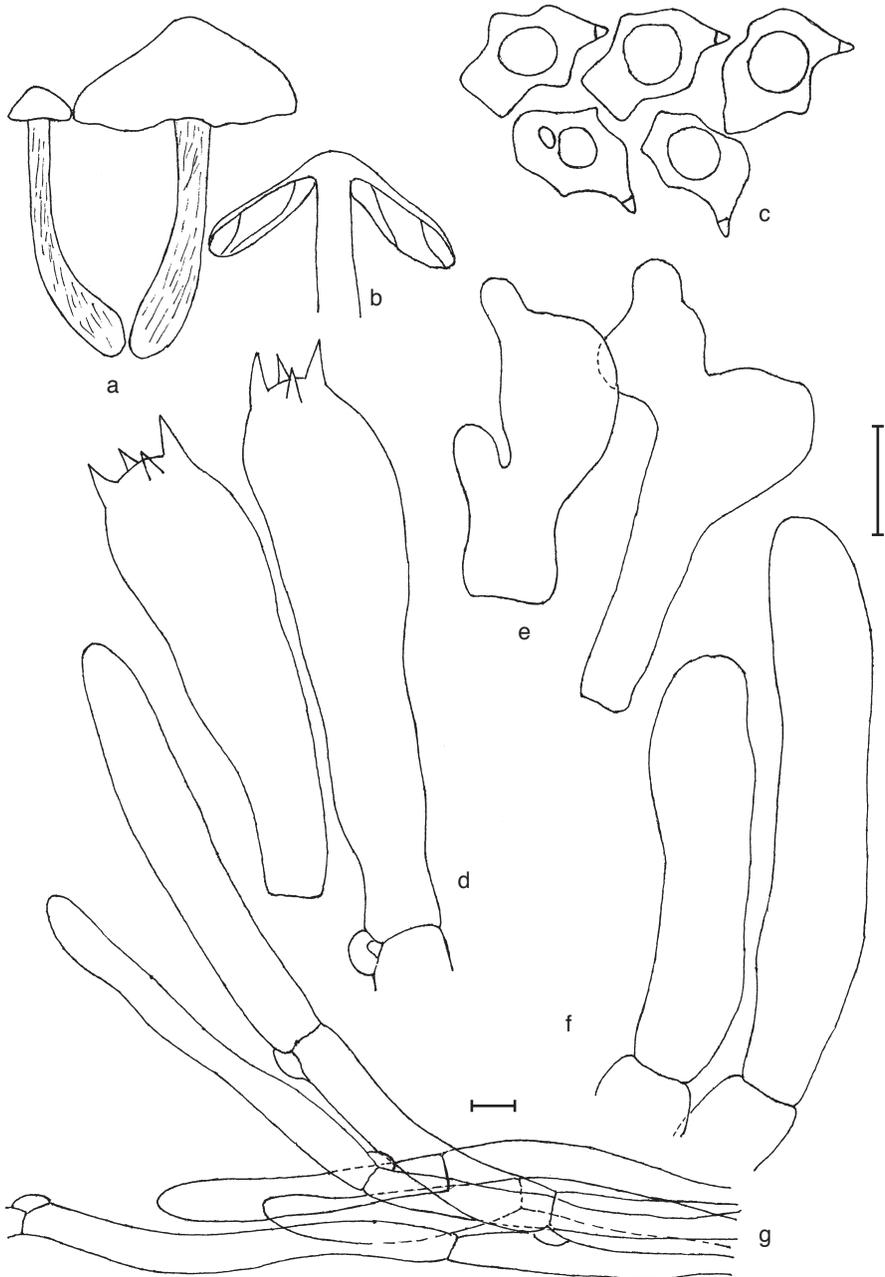


Fig. 13. *Entoloma indoviaceum*. a. Habit; b. longitudinal section; c. spores; d. basidia; e. cheilocystidia; f. caulocystidia; g. pileipellis. Scale bars: 10 μm , resp. 1 cm.

ends. Pleurocystidia absent. Lamellar trama, subregular; hyphae 2.5–16 μm wide, thin-walled, hyaline, without incrustation. Pileal trama parallel-interwoven; hyphae 2–21 μm wide, thin-walled, hyaline, constricted at septa. Pileipellis a trichoderm; hyphae 3.5–15 μm wide, thin-walled, with violet intracellular pigment, frequently constricted at septa. Stipitipellis a cutis disrupted by trichodermial bundles; hyphae of cutis 2–10 μm wide, thin-walled, with a violet or bluish violet intracellular pigment, with incrustations, terminal elements of trichodermial patches 40–100 \times 5–15 μm , mostly cylindrical with obtuse ends, thin-walled, hyaline, without incrustation. Clamp-connections abundant in all tissues.

Habitat — On the ground, 2 close-by specimens, July.

Specimen examined: INDIA, Kerala State, Malappuram District, Nilambur, KFRI subcentre campus, 11.VII.1997, P. Manimohan, M700.

Entoloma indoviolaceum fits well in the concept of section *Leptonia* with its trichodermal pileipellis with intracellular pigment and incrustated walls, coralloid cheilocystidia and clamped hyphae. *Entoloma egregium* E. Horak from New Guinea has some resemblance, but differs by having smaller spores and fusoid cheilocystidia. In Europe, similar species have been described as well: *E. tjallingiorum* may have similar colours, but has spores which are differently shaped; *E. dichroum* lacks incrusting pigment and usually is more brightly coloured.

14. *Entoloma allocybesimilis* Manim. & Noordel., *spec. nov.* — Fig. 14, Plate 14

Basidiomata tricholomatoidea. Pileus 15–70 mm latus, convexus demum applanatus, umbonatus, hygrophanus, haud striatus, pallide brunneus, glabrus demum fissuratus. Lamellae sordide-brunneae. Stipes pileo concolorus, innate longitudinaliter striatus. Sporae 10–14 \times 7.5–10.5 μm , 5 vel 6-angulatae, heterodiametricae. Basidia 25–39 \times 10–13 μm , 4-sporigera. Acies lamellarum steriles. Cheilocystidia 10–40 \times 8–20 μm , subglobose vel clavata, hyalina. Pileipellis cutis ex hyphis 2–26 μm latis, haud incrustatis. Caulocystidia 12–33 μm , versiformia, turgida, hyaline. Fibulae desunt.

Holotypus: India, Kerala State, Wayanad District, Muthanga, 18.VI.1997, P. Manimohan M674; 4.VII.1997, P. Manimohan, M693.

Basidiomata small to large and robust, tricholomatoid. Pileus 15–70 mm in diameter, 15–40 mm high, initially conical, convex or conico-convex, becoming applanate but still with a prominent umbo, with initially slightly incurved then straight or plane margin, marginal zone entire, becoming deeply fissile with age; hygrophanus, not translucently striate, ‘leather brown’ (6E6) when moist, fading to orange grey (5B2), through brownish orange (5C3), smooth and glabrous, with a silky sheen when dry. Lamellae adnexed to almost free, crowded, with lamellulae in 4–7 tiers, up to 15 mm wide, greyish brown (5D3), becoming yellowish brown (5D4/5D5/6D4), with finely eroded, concolorous edge. Stipe 30–140 \times 3–12 mm, central, terete, fleshy-fibrous, fistulose, gradually tapering towards apex; concolorous and changing colour-like pileus, with fine longitudinal striations, glabrous with a silky sheen. Odour mild, not distinct.

Spores 10–14 \times 7.5–10.5 μm , heterodiametrical-ovate, 5–6-angled. Basidia 25–39 \times 10–13 μm , clavate or almost cylindrical, 4-spored, sterigmata up to 5 μm long; occasionally thick-walled crassobasidia seen. Lamella-edge sterile. Cheilocystidia 10–40 \times 8–20 μm , subglobose to clavate, thin-walled, hyaline. Lamellar trama regular; hyphae 2–27 μm wide, thin-walled, hyaline; subhymenium not well-developed. Pileal trama

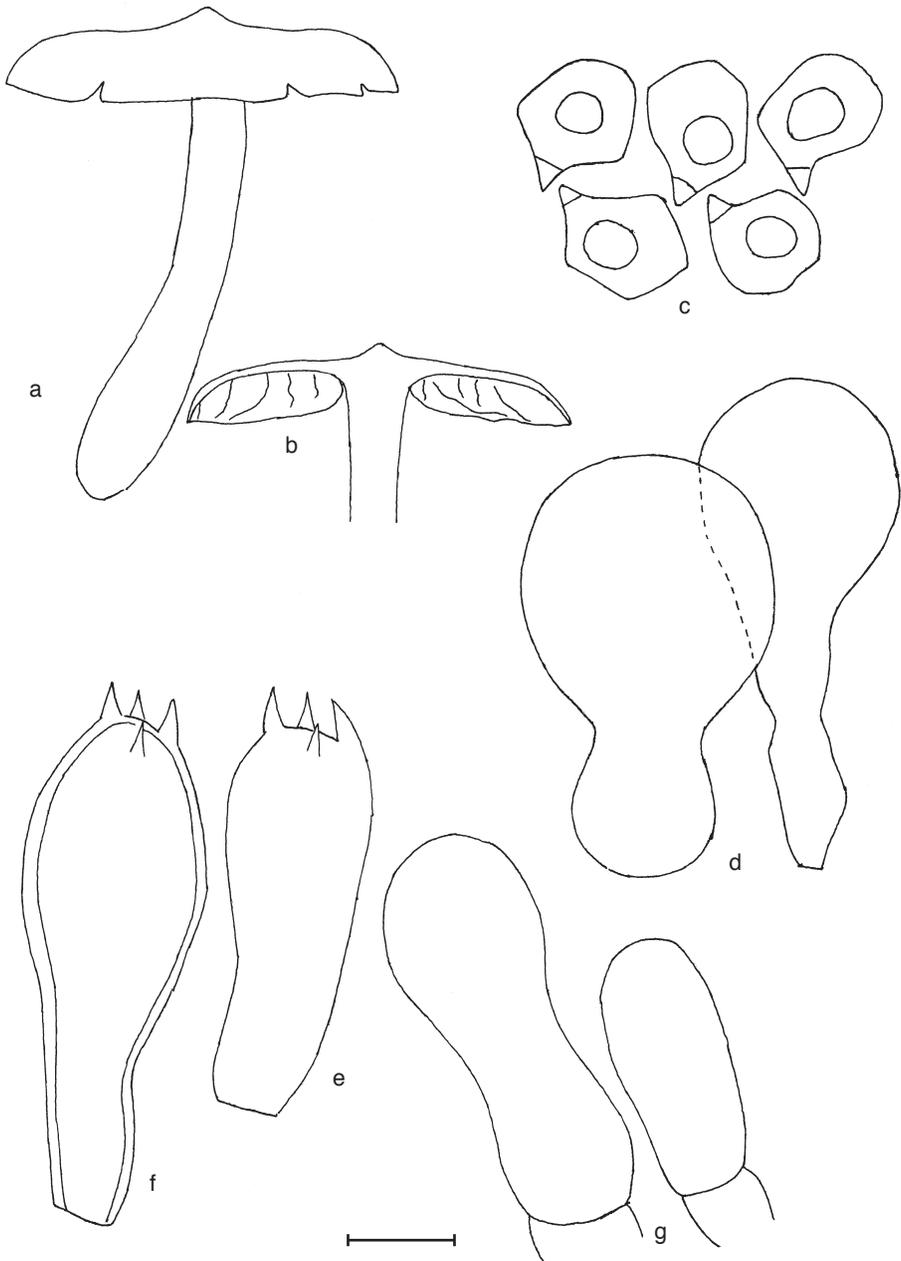


Fig. 14. *Entoloma allocybesimilis*. a. Habit; b. longitudinal section; c. spores; d. cheilocystidia; e. basidium; f. thick-walled basidium; g. caulocystidia. Scale bar: 10 μ m, resp. 1 cm.

parallel-interwoven; hyphae 3–15 μm wide, thin-walled, with a brownish pigment. Pileipellis a cutis; hyphae 2–26 μm wide, thin-walled, hyaline, without incrustation. Stipitipellis a cutis of somewhat loosely-arranged hyphae; hyphae 2–15 μm wide, thin-walled, with yellowish brown intracellular pigment, with cystidioid end-elements, often with tapering apices and with a coarse incrustation at the apical part; caulocystidia scattered or in clusters, 12–33 μm , versiform, mostly inflated-clavate, thin-walled, hyaline. All hyphae without clamp-connections; oleiferous hyphae present in lamellar and pileal trama. Clamp-connections absent.

Habitat — On the ground, scattered on forest floor, June–July.

Specimens examined: INDIA, Kerala State, Wayanad District, Muthanga, 18.VI.1997, *P. Manimohan M674*; 4.VII.1997, *P. Manimohan M693*.

Entoloma allocybesimilis has much in common with the European species *E. ex-centricum* considering the hygrophanous, not striate, pale pileus, and brown lamellae. Microscopically the large spores, presence of voluminous cheilocystidia, presence of thick-walled basidia, and lack of clamp-connections are confirming that this species should be placed in subgenus *Allocybe*. Only a few species of this group are known world-wide: *Rhodophyllus gigaspermus* Romagn. & Gilles from Ivory Coast, Africa, differs by the lack of cheilocystidia and paler lamellae. *Entoloma megacystidiosum* Hesler from Tennessee, USA, differs by the size and shape of the cystidia and presence of clamp-connections.

15. *Entoloma tectonicola* Manim. & Noordel., *spec. nov.* — Fig. 15, Plate 15

Basidiomata tricholomatoidea. Pileus 40 mm latus, convexus, haud hygrophanus, haud striatus, brunneus, innato-fibrillosus. Lamellae sinuato-adnatae, brunneoaurantiae. Stipes 35 \times 5 mm, pallide brunneus, glabrus, innate longitudinaliter fibrillosus. Sporae 8–12 \times 7–9 μm , 5–8-angulatae. Basidia 29–39 \times 11–14.5 μm , 4-sporigera, efibulata. Acies lamellarum heteromorpha. Cheilocystidia 40–80 \times 12–18 μm , fusiformia. Pileipellis trichoderma elementis 7–20 μm latis pigmentis brunneis intracellulosis constituis. Fibulae desunt.

Holotypus: India, Kerala State, Malappuram District, Nilambur Teak Plantations, 14.XI.1997, *P. Manimohan M741*.

Basidiome medium-sized, tricholomatoid. Pileus 40 mm in diameter, convex; with straight, entire margin, not hygrophanous, not translucently striate, not zonate, entirely finely and uniformly appressed-fibrillose with dark brown (6F4) fibers on a paler background. Lamellae sinuate-adnate, crowded, with lamellulae of several lengths; up to 7 mm wide, brownish orange (6C5), with paler, entire edge. Stipe 35 \times 5 mm, central, terete, tapering towards base, solid; pale brownish, glabrous, with fine longitudinal striations.

Spores 8–12 \times 7–9 μm , heterodiametrical-ovate, 5–8-angled with flat or concave facets. Basidia 29–39 \times 11–14.5 μm , clavate, 4-spored; sterigmata up to 4 μm long; occasionally thick-walled crassobasidia seen. Lamella-edge heteromorphous. Cheilocystidia 40–80 \times 12–18 μm , mostly fusoid, rarely ventricose-rostrate, rarely septate, thin-walled, hyaline, often with basal clamp-connections. Pleurocystidia 35–62 \times 14–21 μm , fusoid, thin-walled, hyaline. Lamellar trama subregular; hyphae 2–28 μm wide, thin-walled, hyaline, without clamp-connections; subhymenium poorly developed, with

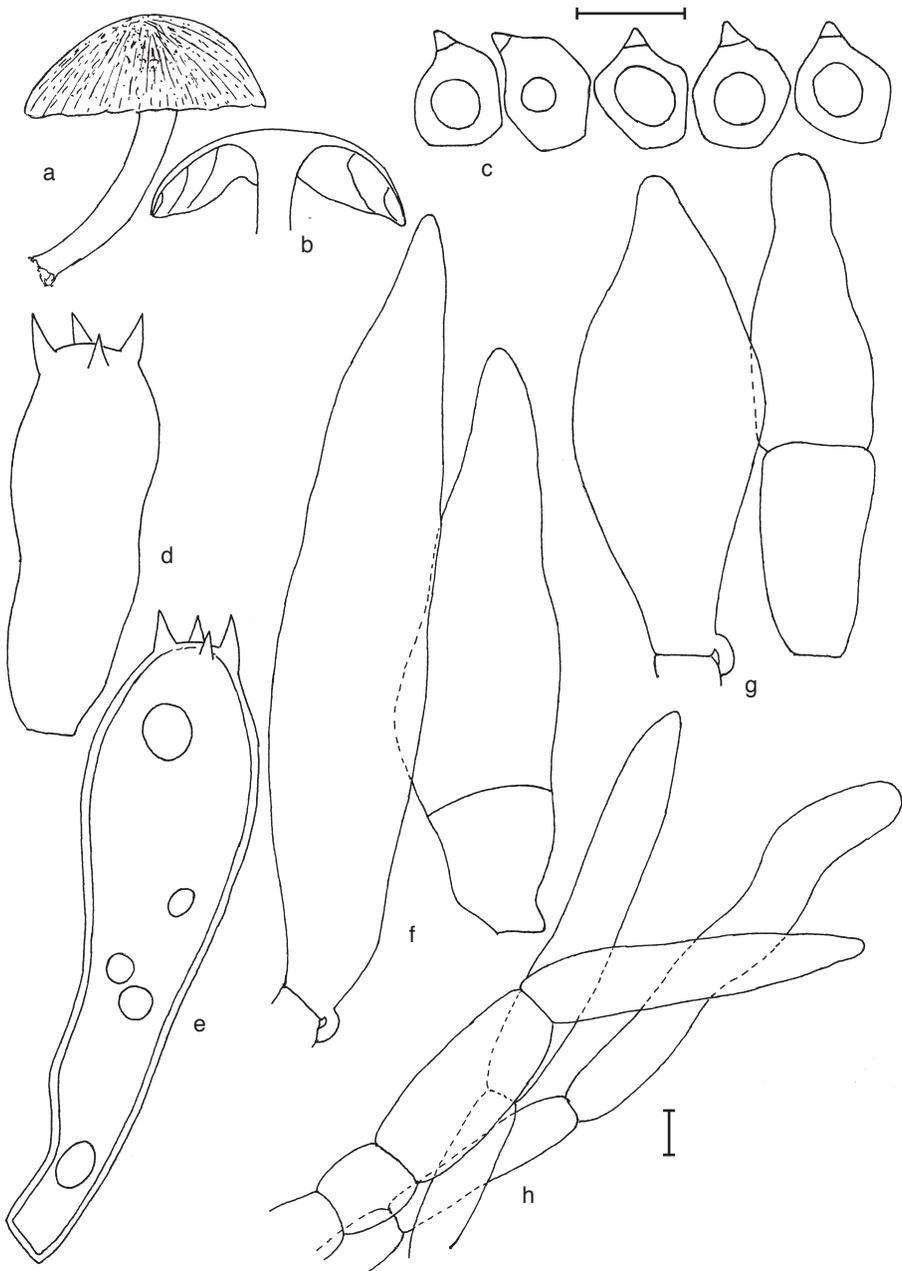


Fig. 15. *Entoloma tectonicola*. a. Habit; b. longitudinal section; c. spores; d. basidium; e. thick-walled basidium; f. pleurocystidia; g. cheilocystidia; h. pileipellis. Scale bars: 10 μ m, resp. 1 cm.

numerous clamp-connections. Pileal trama parallel-interwoven; hyphae 2–30 μm wide, thin-walled, hyaline, without clamp-connections. Pileipellis a trichoderm; hyphae 7–20 μm wide, thin-walled, constricted at septa, without clamp-connections, with a dark brown intracellular pigment; terminal elements sometimes more than 100 μm long, slightly tapering towards apex. Stipitipellis mostly a cutis but disrupted by trichodermal patches towards apex; hyphae 2–11 μm wide, with obtuse tips, thin-walled or tip of hyphae sometimes slightly thick-walled, containing a yellowish brown intracellular pigment, with clamp-connections; caulocystidia absent. Oleiferous hyphae present in pileal trama.

Habitat — On the ground, solitary, November.

Specimen examined: INDIA, Kerala State, Malappuram District, Nilambur Teak Plantations, 14.XI.1997, P. Manimohan, M741.

Entoloma tectonicola belongs to a small group of species within subgenus *Inocephalus* sharing the character of a non hygrophanous, fibrillose to squamulose pileus and large, fusiform cheilo- and pleurocystidia with an acute apex. Horak (1980) describes a number of similar species. *Entoloma fumatopunctum* E. Horak comes close, differing by the more pronouncedly squamulose pileus, pruinose stipe and the presence of clamp-connections in the pileipellis.

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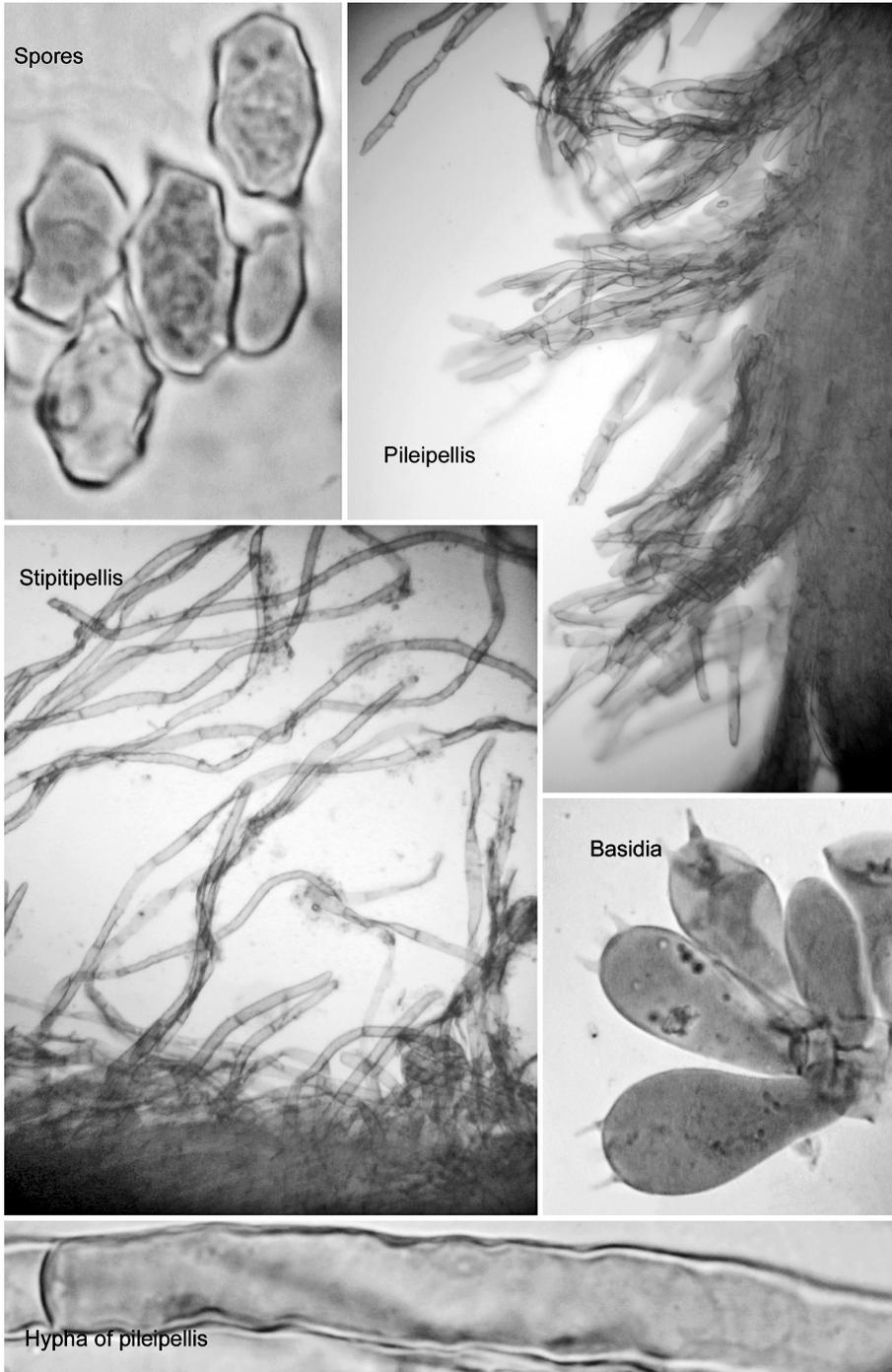


Plate 1. *Entoloma testaceostrigosum*. Microscopic structures.

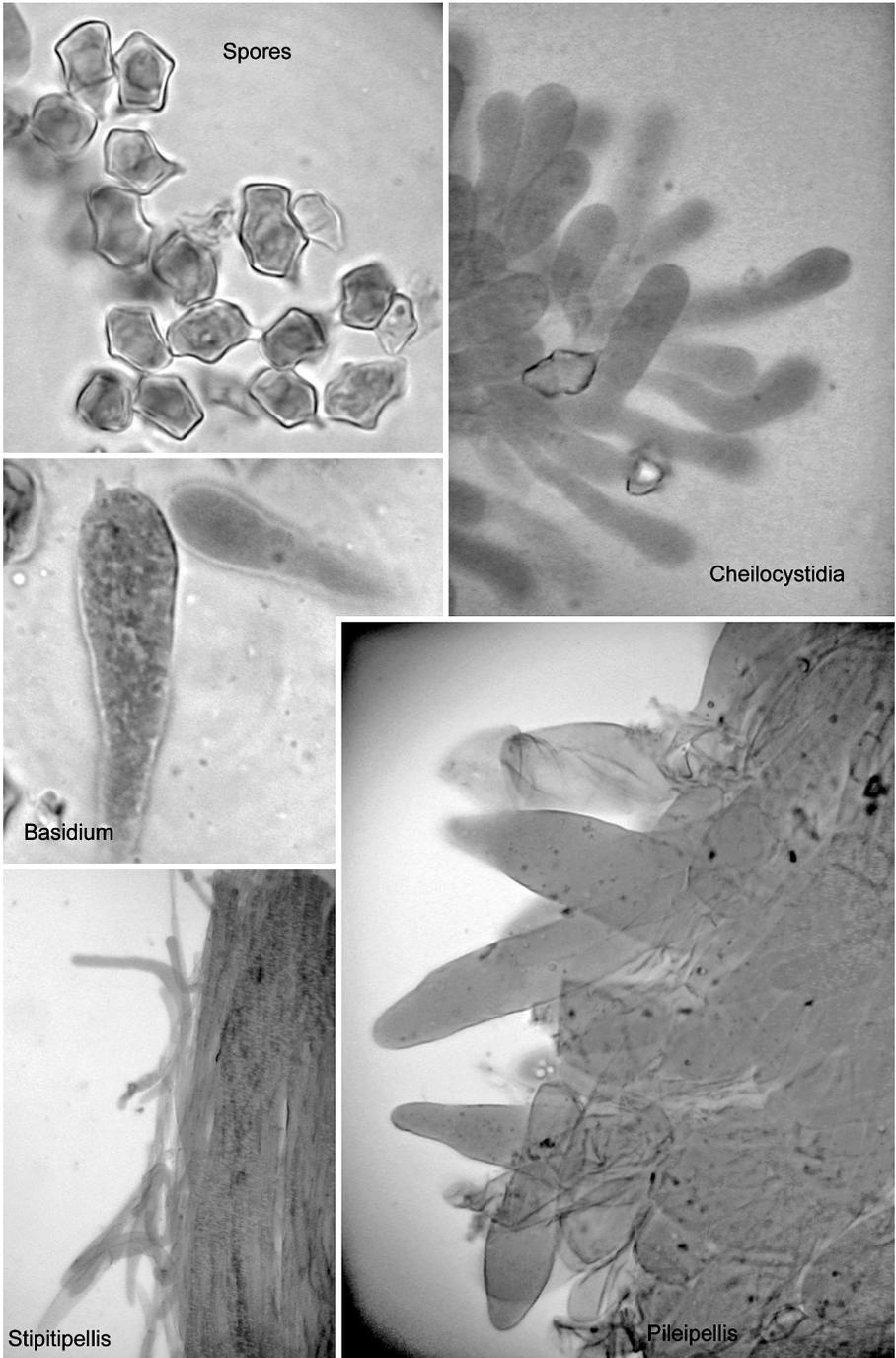


Plate 2. *Entoloma violaceovillosum*. Microscopical structures.

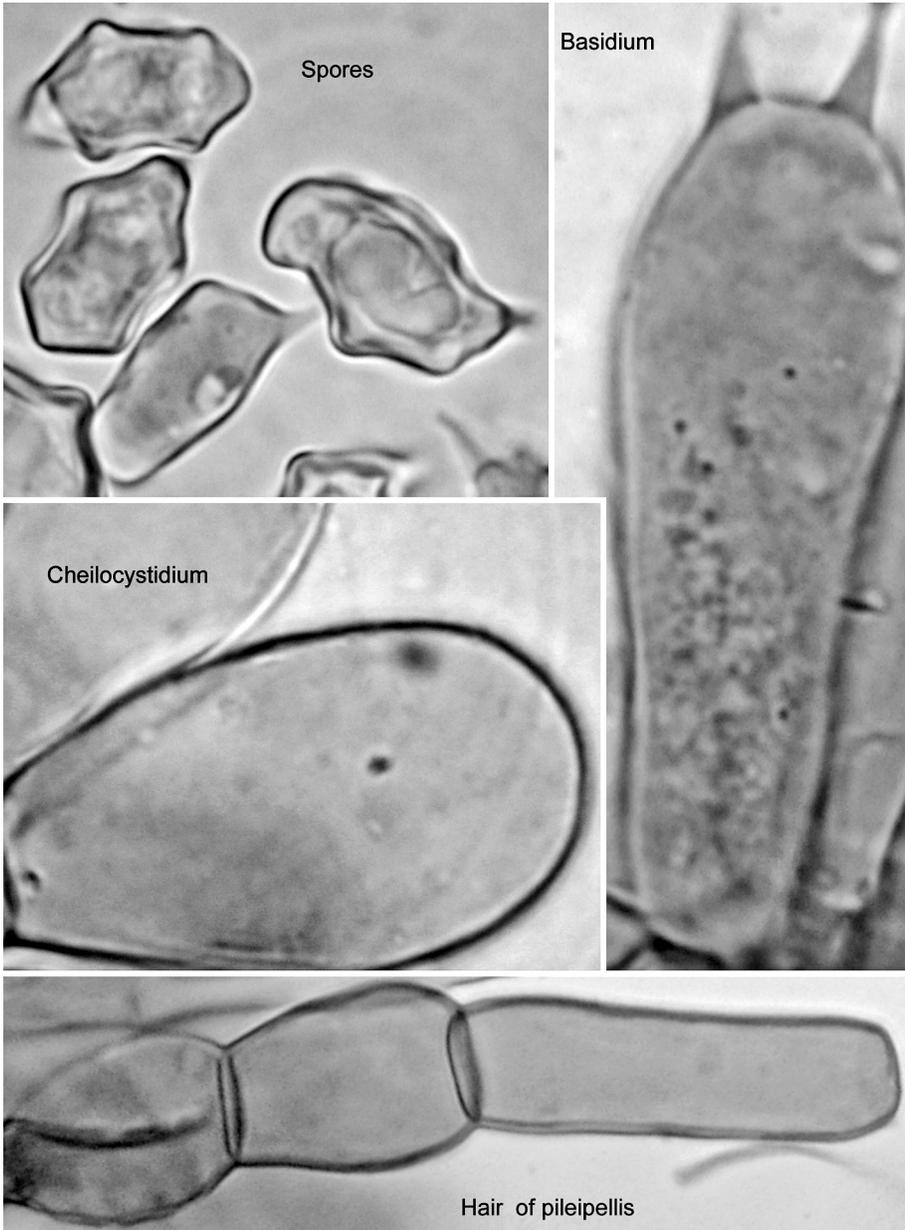


Plate 3. *Entoloma dysthalis* var. *keralense*. Microscopical structures.



Plate 4. *Entoloma albidoquadratum*. Microscopical structures.

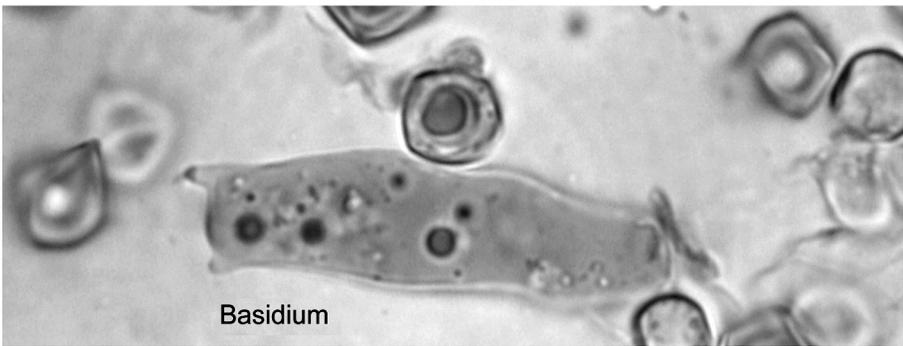
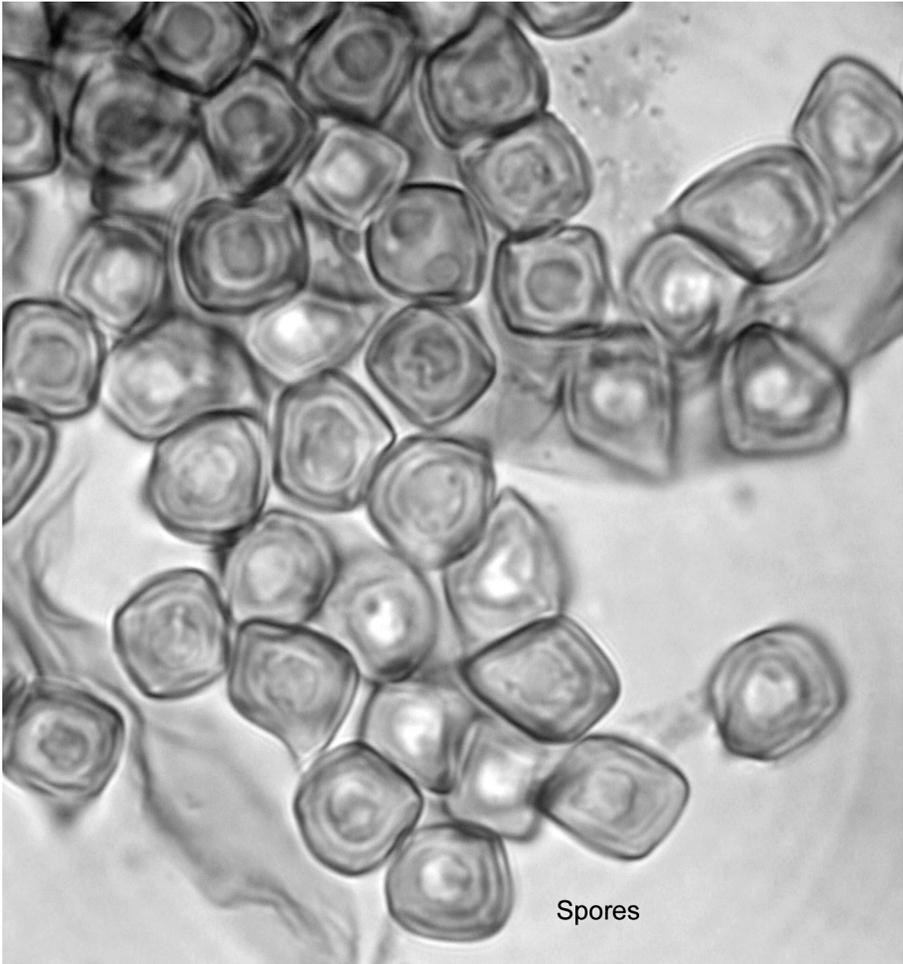


Plate 5. *Entoloma brunneoquadratum*. Microscopical structures.

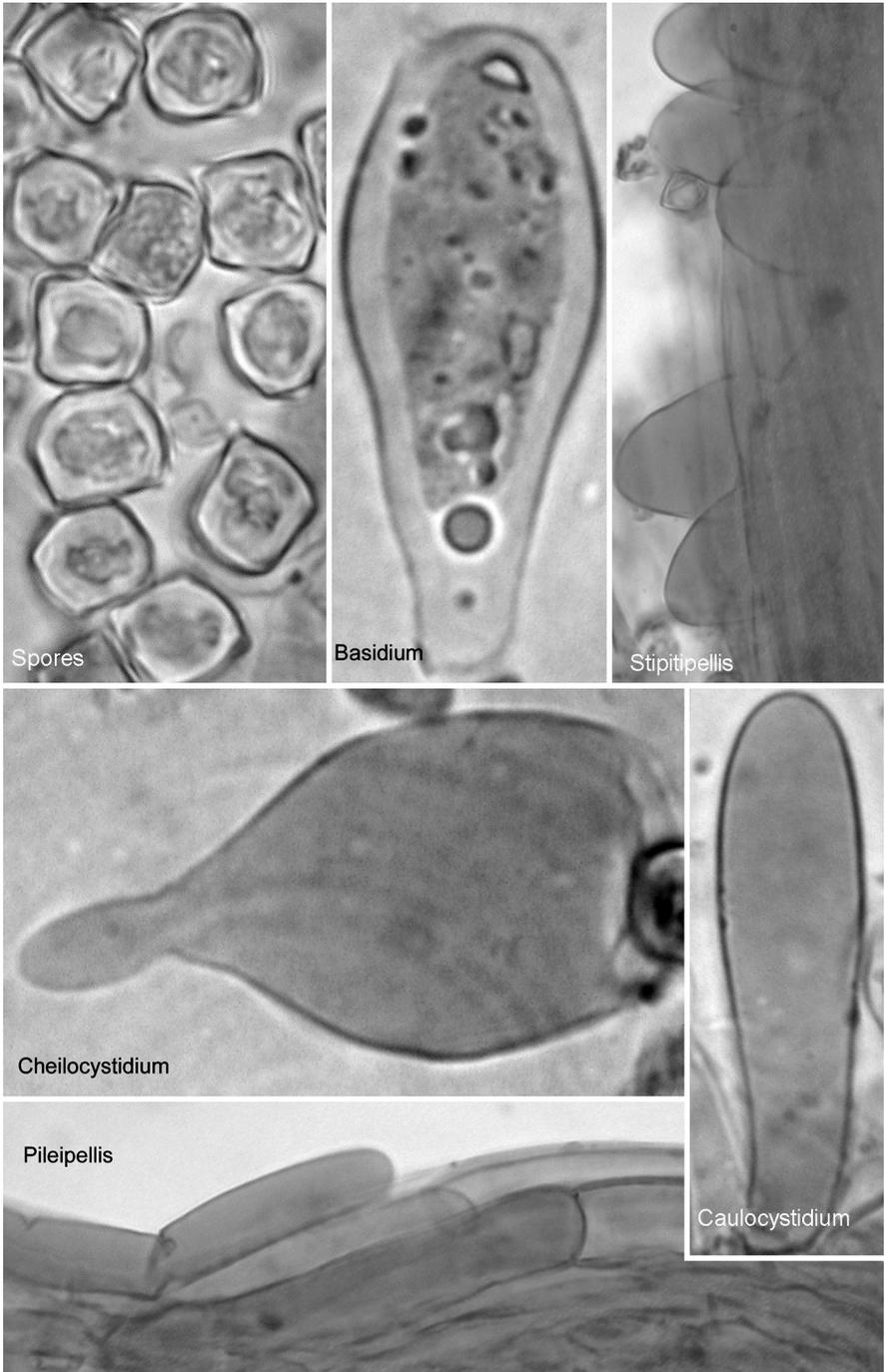


Plate 6. *Entoloma keralense*. Microscopical structures.



Plate 7. *Entoloma perinfundibuliforme*. Microscopical structures.

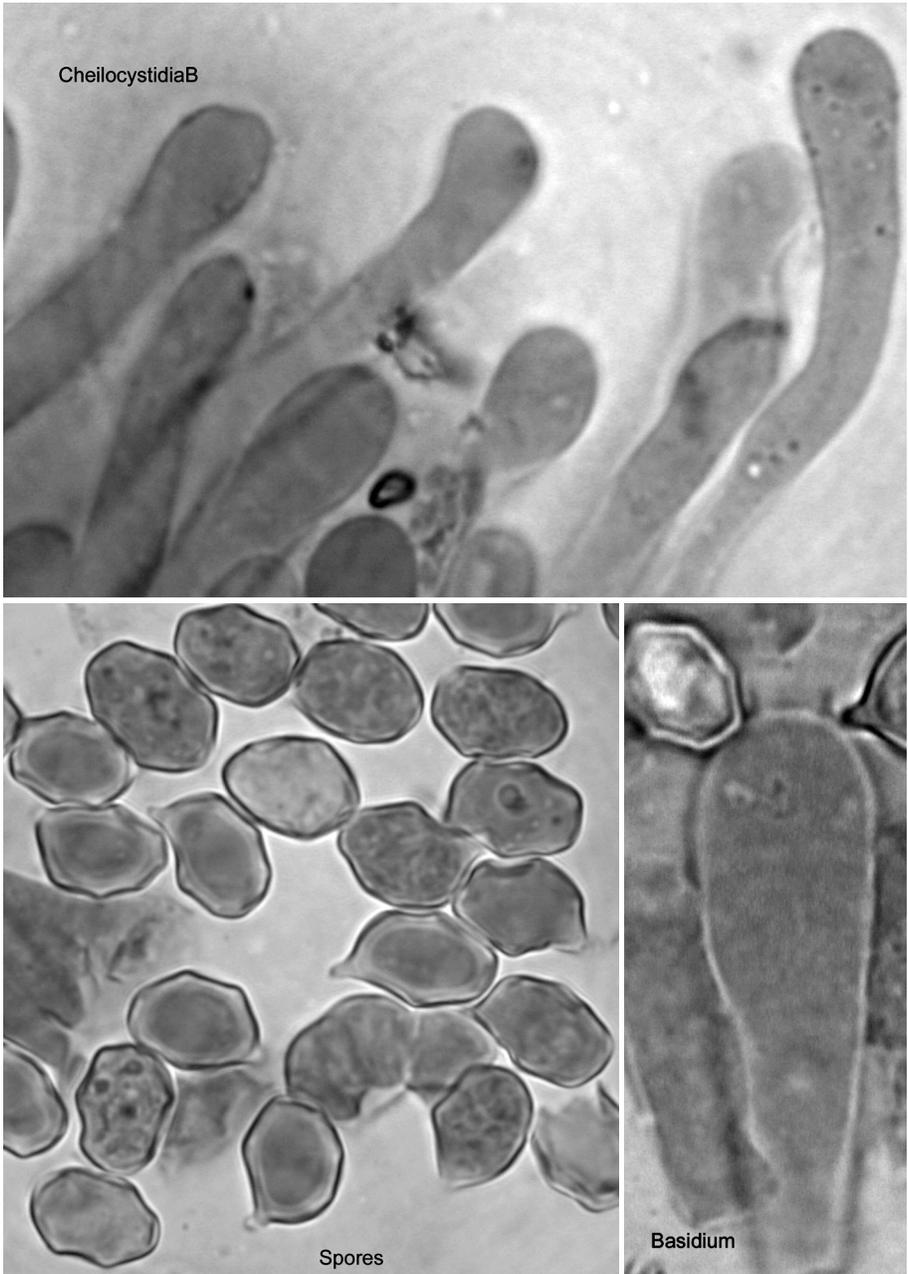


Plate 8. *Entoloma perflavidum*. Microscopical structures.

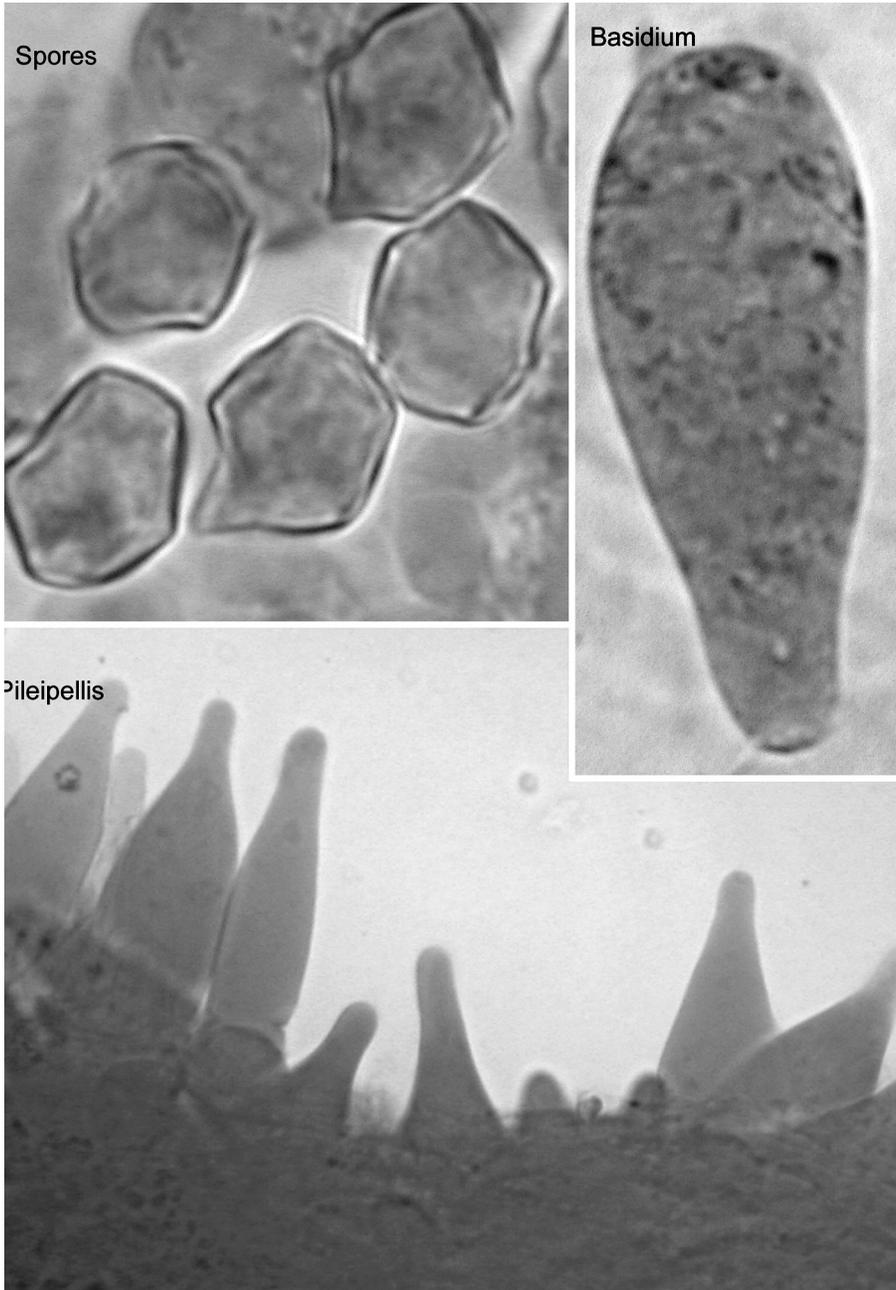


Plate 9. *Entoloma griseoviolascens*. Microscopical structures.

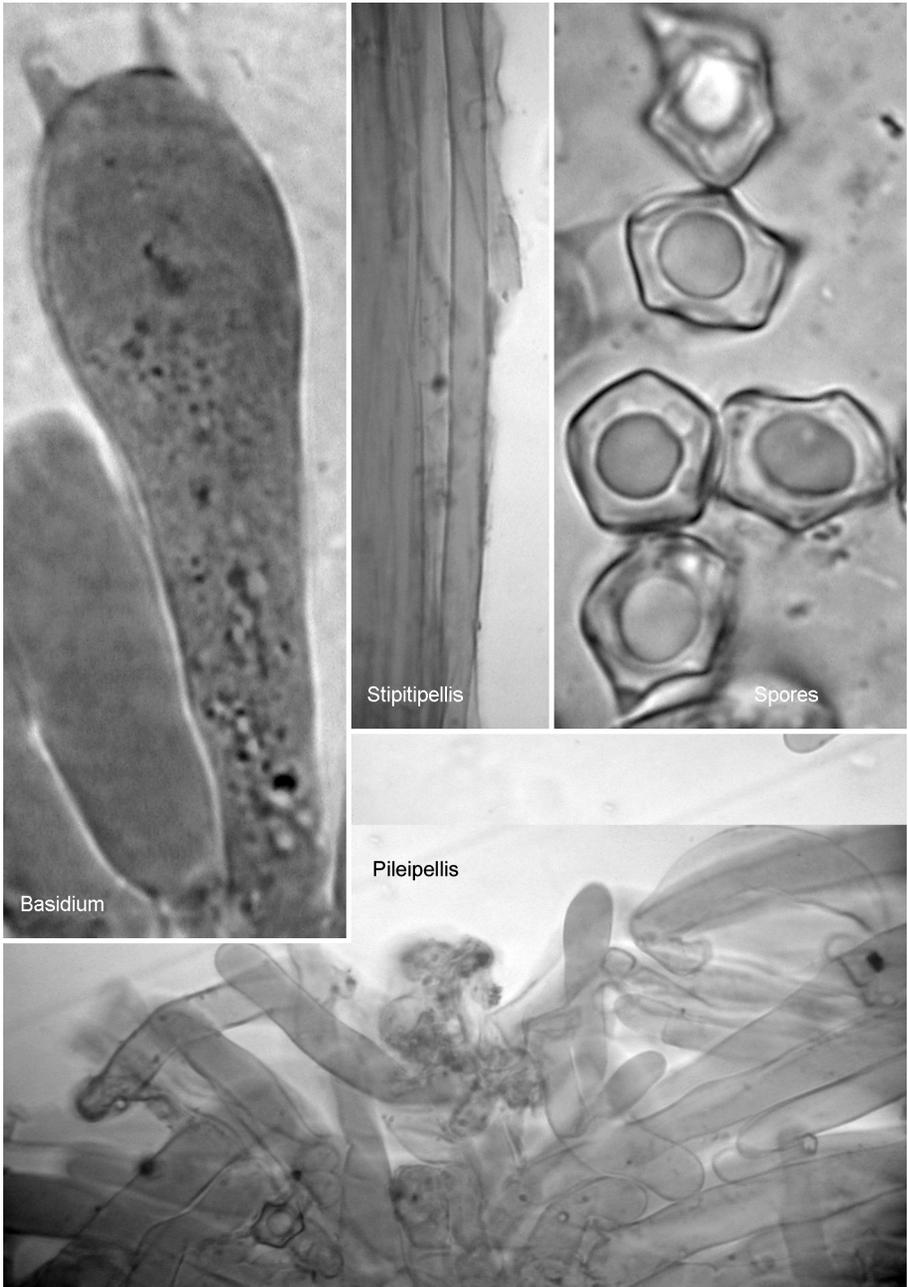


Plate 10. *Entoloma pruinosocutis*. Microscopic structures.

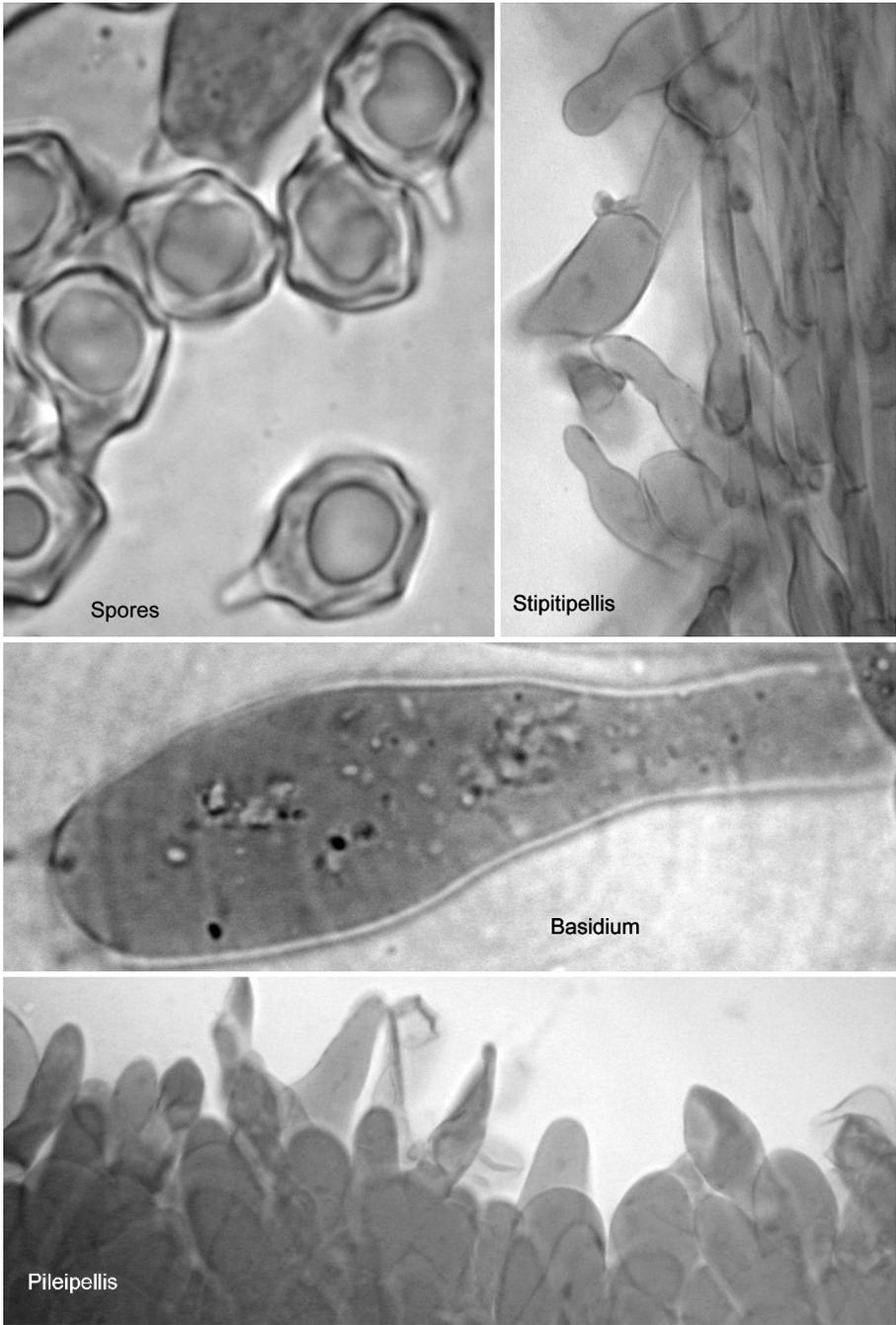


Plate 11. *Entoloma griseolazulinum*. Microscopical structures.

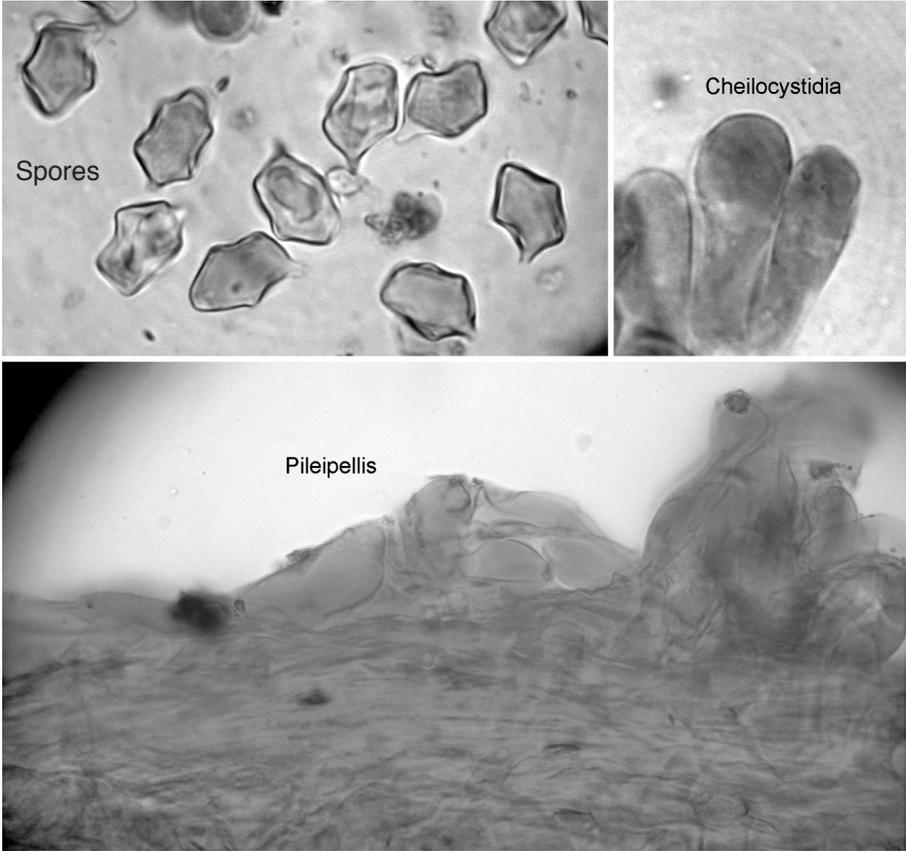


Plate 12. *Entoloma calliviolaceum*. Microscopical structures.

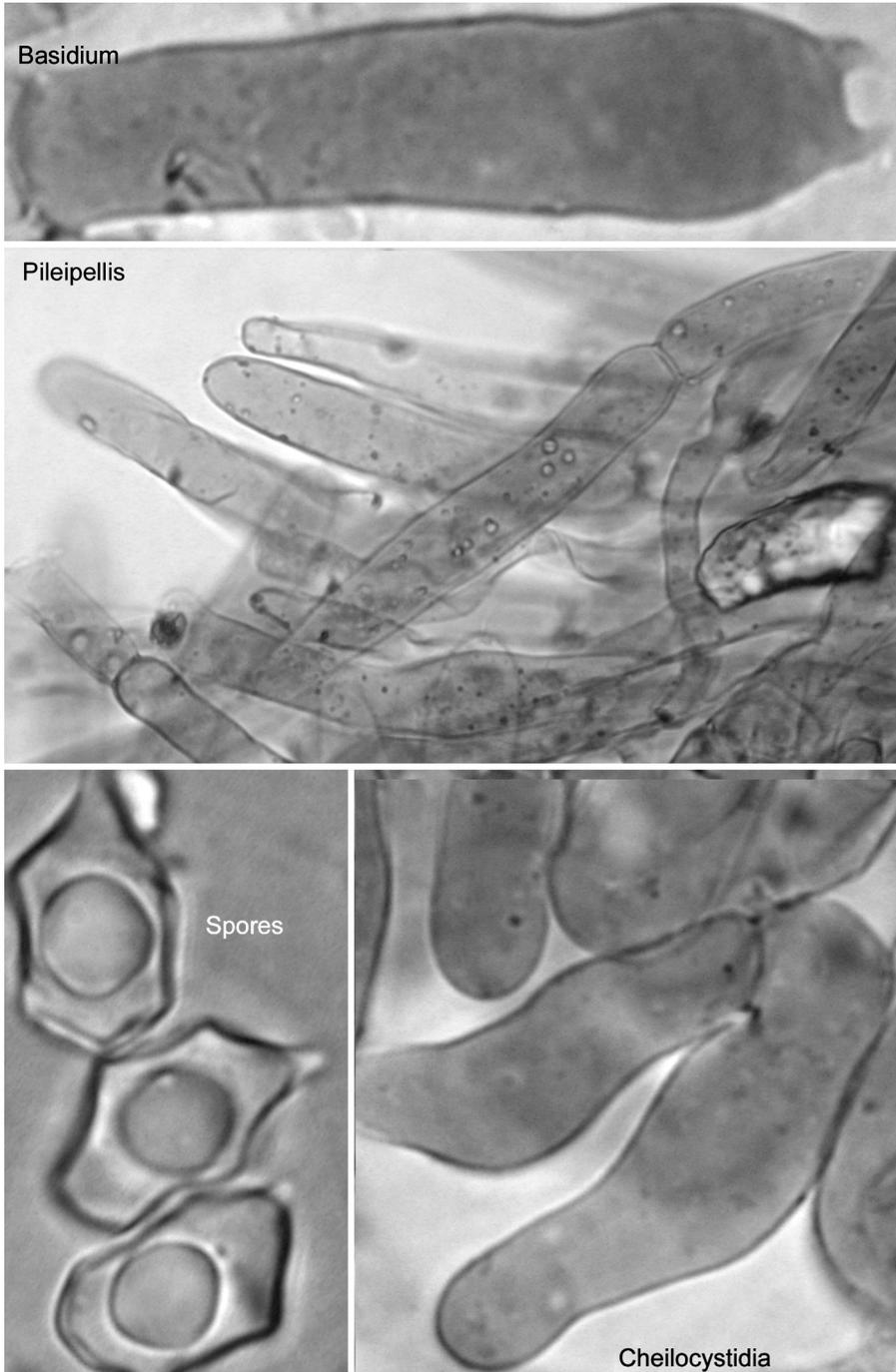


Plate 13. *Entoloma indoviolaceum*. Microscopical structures.

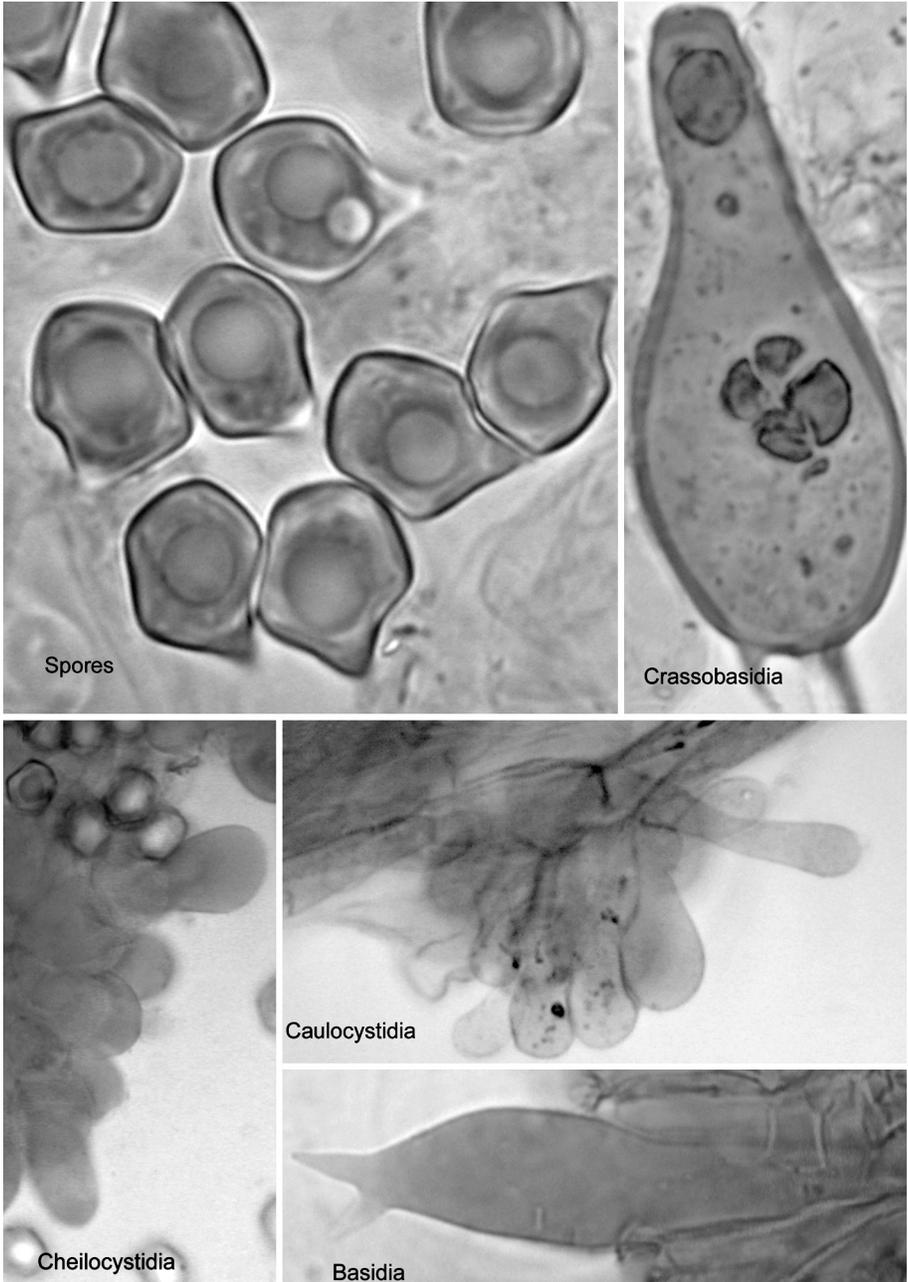


Plate 14. *Entoloma allocybesimilis*. Microscopical structures.

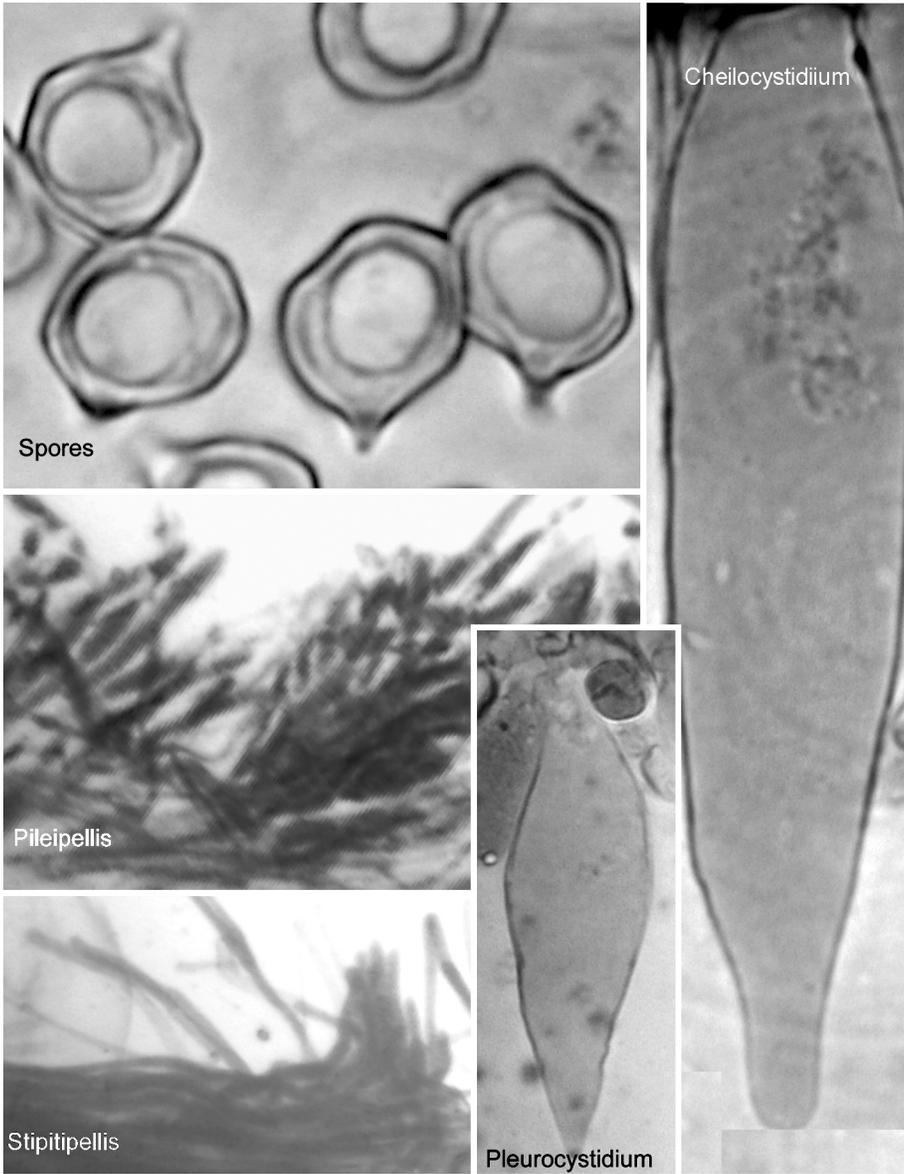


Plate. 15. *Entoloma tectonicola*. Microscopical structures.