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## The genus *Entoloma* (Basidiomycetes, Agaricales) of the Mascarenes and Seychelles

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Eighteen *Entoloma* species are described from the Mascarenes and Seychelles, of which 14 are new to science. Most of the species have been recorded in the remaining natural rain forest. The new species are compared with similar taxa in the literature.

**Key words:** *Agaricales*, *Entoloma*, Mascarenes, Mauritius, new species, Reunion, Seychelles, taxonomy

### Introduction

The Mascarenes and Seychelles form an isolated group of islands in the Indian Ocean that have never been connected to the mainland. Except for the larger granite islands of the Seychelles they are of volcanic origin and are a source of great biodiversity. It is generally thought that the flora and fauna of these islands originate from the mainland of Africa and Madagascar. Due to their isolated position, the islands are known for their relatively high number of endemic plants and animals. The wide range of biotopes, from lowland marshes through rainforest to montane heathlands provides a wealth of different habitats, and may well be the cause of the high diversity. The arrival of man in the 17<sup>th</sup> Century has unfortunately led to a marked reduction in the natural vegetation, and an introduction of alien plants and animals. Contrary to the phanerogam flora, the knowledge of macrofungi from this region is very limited. The second author had the chance to collect agarics during a number of visits between 1993 and 2006. Some of his findings have been published (Maas Geesteranus and Hausknecht 1995, 1996, 1998, 1999; Watling and Hausknecht 1997; Robich and Hausknecht, 2001; Horak and Hausknecht 2002; Kreisel and Hausknecht 2002, 2006; Antonín and Buyck 2006; Ryvarden *et al.* 2006).

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The present paper is the first account of the genus *Entoloma* from this part of the world. The only available information on the genus from the wider region is the monograph of Madagascar by Romagnesi (1941) who recorded ca. 45 taxa, most of them new to science. Eyssartier *et al.* (2001) published a paper on the cuboid-spored *Entoloma* species from Madagascar, adding a few new species. The present paper deals with 18 species from the Mascarenes and Seychelles, of which 14 are new to science. *Entoloma speciosum* (Romagn.) Putzke & M. Putzke is also found in Madagascar, and furthermore, the widespread, pantropical species *Entoloma* cf. *virescens* (Berk. & M.A. Curtis) E. Horak ex Courtec., *E. quadratum* (Berk. & M.A. Curtis) E. Horak and *E. stylophorum* (Berk. & Broome) Sacc. have been encountered.

Other studies of Agarics in the region are those of Nuytinck *et al.* (2006), Tan *et al.* (2007), Pradeep *et al.* (2006). Ontrary to other Agaric genera with a world wide distribution, such as *Hygrocybe* (Pegler, 1986; Leelavathy *et al.*, 2006; Robich, 2006), the *Entoloma* flora of the Mascarenes and Seychelles can be characterized as typically tropical. The species composition consists mainly of Leptonioid and Inocephaloid taxa, frequently with brilliant granules in the trama, and with cuboid spores. This pattern is also encountered in Kerala, India (Manimohan *et al.*, 1995, 2006), Sri Lanka (Pegler, 1986), and Asia (Horak, 1980), and also in the Neotropics (Pegler and Fiard, 1983). Representatives of Nolaneoid and Entolomatoid groups within the genus with a glabrous, hygrophanous pileus and simple pileipellis structure, widespread in temperate and boreal regions of the Northern Hemisphere, form only a very minor part of the species composition.

## Material and Methods.

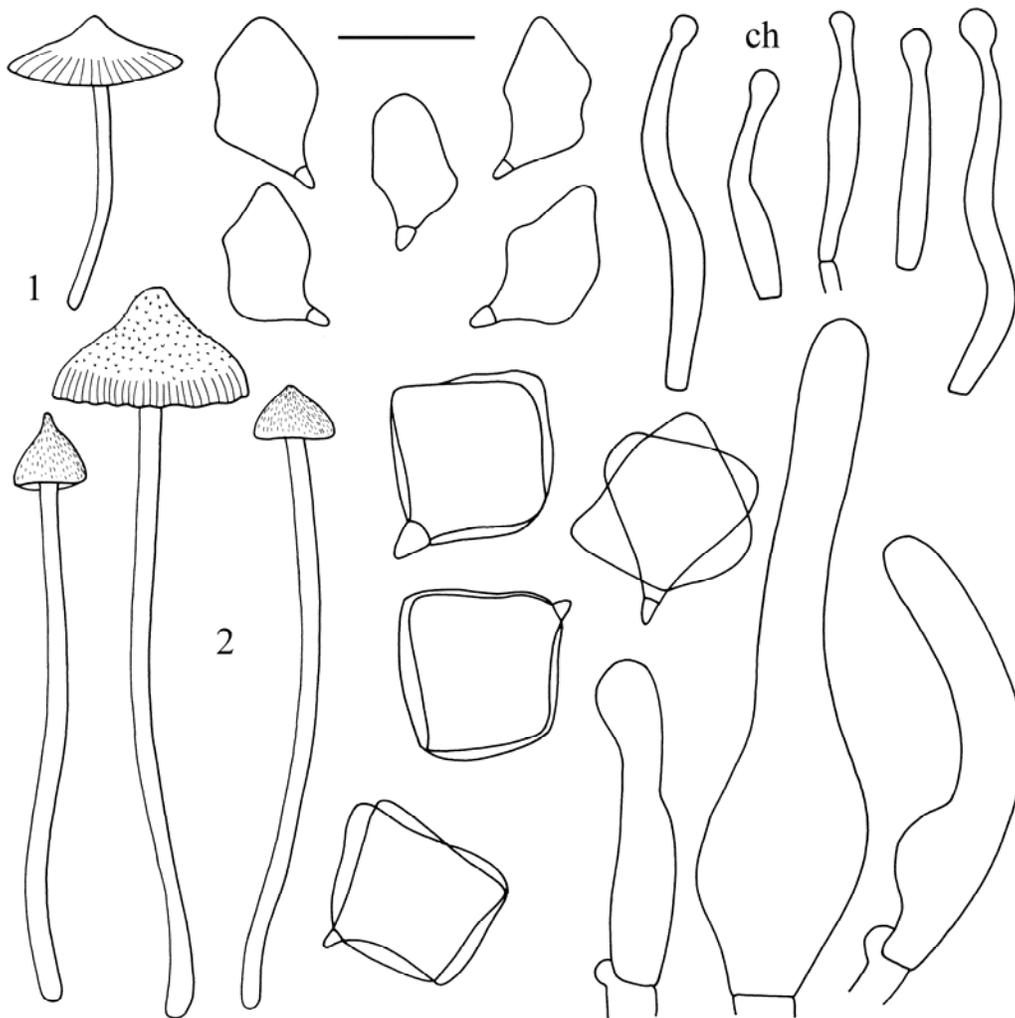
The collections have been made by the second author during his visits to the island between 1993 and 2006. The material was photographed in the field, using a Nikon F-301 camera, and extensive notes were made from the fresh fruit bodies before they were dried. Colours were matched with the Methuen Handbook of Colour (Kornerup and Wanscher, 1975). Microscopic analysis was performed using an Olympus microscope BH-2, employing standard techniques. All herbarium material is kept in WU, except for some isotypes or fragments in L.

## Taxonomy

*Entoloma belouvense* Noordel. & Hauskn., **sp. nov.** (Fig. 1, Pl. 1.1)

MycoBank: 511109

*Etymology*: named after the type locality.



**Figs. 1-2.** 1. *Entoloma belowvense*. Habit, spores, and cheilocystidia (ch). 2. *Entoloma borbonicum*. Habit, spores, and cheilocystidia. Bar = 10  $\mu\text{m}$  (spores), 20  $\mu\text{m}$  (cheilocystidia).

*Pileus* 21-28 mm latus, conico-convexus, umbonatus, hygrophanus, valde translucido-striatus, flavobrunneus, brunneus vel griseobrunneus, glaber vel leviter radialiter fibrillosus. *Lamellae* subliberae, confertae, roseae griseo-tinctae. *Stipes* 32-40  $\times$  1.5-2.5 mm, griseobrunneus, politus. *Odore* saporeque farinaceo-rancidis. *Sporae* 10-12  $\times$  6-7.5  $\mu\text{m}$ , 5-angulatae. *Acies lamellarum* heterogeneae. *Cheilocystidia* 45-75  $\times$  5-7  $\mu\text{m}$ , cylindrico-capitata vel lecythiformia. *Pileipellis* cutis hyphis cylindraceutis, 6-9  $\mu\text{m}$  latis, pigmentis intracellulosis. *Fibulae* praesentes.

**Holotypus:** La Réunion, Saint-Benoît, Forêt de Belouve, on decaying, mossy wood of broadleaf tree in tropical highland rainforest, 28 March 2005, leg. A. Hausknecht (WU 27132).

*Pileus* 21-28 mm broad, conico-convex with very pronounced, papillate umbo, hygrophanous, translucently striate to centre when moist, yellow-brown,

bronze-brown or greyish brown, (5EF4, 5EF5, 5EF6), paler, greyish orange to golden-yellow towards margin (5BC4 to 5B3, 5BC3) with smooth or somewhat radially fibrillose surface. *Lamellae* almost free to free, ventricose, crowded, greyish with pink tinge, with entire, concolorous edge. *Stipe* 32-40 × 1.5-2.5 mm, cylindrical, only slightly broadened towards base, greyish beige to light brownish beige towards base with grey tinge, glabrous, polished. Context brittle, grey-beige, with distinct farinaceous-rancid smell and taste.

*Spores* 10-12 × 6-7.5 μm, average 10.7 × 6.8 μm, Q = 1.4-1.75, mostly 5-angled, with very pronounced angles. *Basidia* 28-44 × 10-13 μm, 4-spored, clamped. *Lamella edge* heterogeneous. *Cheilocystidia* 45-75 × 5-7 μm, cylindrical-lecythiform with distinct, to 7 μm broad capitulum, very scattered between basidia. Hymenial trama with long fusoid elements (nolaneoid) e.g., to 270 × 14 μm. *Pileipellis* a cutis of 6-9 μm wide hyphae with intracellular pigment. *Brilliant granules* absent. Vascular hyphae not observed. *Clamp connections* present in all tissues.

*Habitat*: on decaying, mossy wood of broadleaf tree in tropical highland rainforest (1500 m alt.).

*Material examined*: (besides type): La Réunion, Saint-Benoît, Forêt de Belouve, 28 March 2005, A. Hausknecht (WU 27133).

*Entoloma belouvense* has a mycenoid habit, smooth to slightly fibrillose, hygrophanous pileus, and polished stipe, which are distinctive for the species of subgenus *Nolanea* sect. *Endochromonema* subsect. *Cheilocystidiata* (Noordeloos, 1980). Only a few European species have some morphological resemblance, viz. *E. pratulense* Noordel., and *E. langei* Noordel. & T. Borgen, both of which differ in the shape of the cheilocystidia, and occurrence in alpine or arctic habitats. Romagnesi and Gilles (1979) described two species from Gabon with more or less similar capitate cheilocystidia, viz. *Rhodophyllus euteles* Romagn. & Gilles, which has slightly narrower spores, and *R. hypochlorus* Romagn. & Gilles, with distinct green tinges. Both West African species lack clamp connections, which are present in our species. Neither Pegler (1977) nor Horak (1980) recorded similar species from Eastern Africa or South-east Asia, respectively.

***Entoloma borbonicum* Noordel. & Hauskn., sp. nov.** (Fig. 2, Pl. 1.2)  
Mycobank: 511110

*Etymology*: Named after “Île Bourbon”, former french name of the island La Réunion.

*Pileus* 10-25 mm latus, acute conicus, umbonatus, hygrophanus, leviter translucido-striatus, flavobrunneus vel rufobrunneus, leviter radialiter rugulosus vel squamulosus. *Lamellae* adnatae, moderate distantes, brunneo-roseae. *Stipes* 60-95 × 2.5-3.5 mm, brunneus, valde fibrilloso-striatus. *Odore* saporeque nullis. *Sporae* 13-17.5 × 12.5-16.5 μm, cuboideae vel cruciformes. *Acies lamellarum* sterilis. *Cheilocystidia* 50-85 × 7.5-10 μm, subcylindracea vel

clavata pigmentis intracellulosis. *Pileipellis* cutis vel trichoderma hyphis inflatis ad 15  $\mu\text{m}$  latis, pigmentis intracellulosis. *Fibulae* praesentes.

**Holotypus:** La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, on grassy path in tropical rain forest, 17 Feb. 2000, leg. A. Hausknecht (WU 21097).

*Pileus* 10-25 mm broad, to 20 mm high, acutely conical when young, with thin, acute papilla at centre, expanding with age, with involute margin, hygrophanous, slightly translucently striate when moist, yellow-brown, rusty brown to reddish chestnut-brown at centre (5-6E8, 6E7, 6E8, 6EF8) when young, paler towards margin, more like yellow-brown or golden brown to light orange (5D8, 5CD6 to 5B4), with age more or less uniformly coloured with at most a paler margin. *Pileus* surface minutely radially wrinkled, later finely appressedly squamulose. *Lamellae* narrowly adnate, moderately distant, ventricose, creamy white in youth, becoming incarnate, with pale to dark brown, entire edge. *Stipe* 60-95  $\times$  2.5-3.5 mm, cylindrical, slightly broadened towards base, pale ochraceous at apex, becoming moderately dark brown to dark brown at base, pronounced longitudinally fibrillose-striate. Context pale ochre, without noticeable smell or taste.

*Spores* 13-17.5  $\times$  12.5-16.5  $\mu\text{m}$ , on average 15.1  $\times$  14.5  $\mu\text{m}$ , Q = 1-1.1, cuboid, rarely irregularly cruciform. *Basidia* 40-50  $\times$  15-18  $\mu\text{m}$ , 2- and 4-spored, clamped. *Lamella edge* entirely sterile. *Cheilocystidia* 50-85  $\times$  7.5-10  $\mu\text{m}$ , subcylindrical to narrowly clavate with brown granular pigment. Hymenial trama with very long elements, >350  $\times$  12-20  $\mu\text{m}$ , with clamp connections, with few brilliant granules. *Pileipellis* a cutis with transitions to a trichoderm, of cylindrical hyphae with cylindrical to slightly inflated terminal elements to 15  $\mu\text{m}$  diam. with dark brown intracellular pigment. *Pileitrama* regular, consisting of long, fusiform elements, > 250  $\times$  10-17  $\mu\text{m}$ . Vascular hyphae present in trama of lamellae and pileus. *Clamp connections* present.

**Habitat:** in groups in grassy roadside in tropical rain forest, together with *E. visrescens* s.l.

**Material examined** (besides type): La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, in tropical rain forest, on soil, 8 Feb. 2001, leg. A. Hausknecht (WU 27121); 9 Feb. 2001, leg. A. Hausknecht (WU 27122).

The striking features of *Entoloma borbonicum* are the brown coloured lamella edge with pigmented cheilocystidia, and the large, cuboid spores. Only a few similar species combining these characters have been described in the literature. *Entoloma cuboidosporum* var. *chromostomum* (Romagn. & Gilles) Eyssart. Buyck & Courtec., known from Zaire and Madagascar (Eyssartier *et al.*, 2001), and *E. brunneum* Petch from Sri Lanka (Horak, 1976) differ by their considerably smaller spores [8.5-10(-10.5)  $\times$  7-8.5  $\mu\text{m}$ , and 7.5-12  $\mu\text{m}$  in diam, respectively]. *Entoloma procerum* G. Stev. from New Zealand and Australia, has predominantly cruciform spores, 7.5-12  $\mu\text{m}$  in diam. Compare also with *Entoloma umbraphilum* (see below).

***Entoloma candidogranulosum* Noordel. & Hauskn., sp. nov.**

(Fig. 3, Pl. 1.3.)

MycoBank: 511111

*Etymology*: candidus = white, granulosum = granular, referring to the surface of the pileus.

*Pileus* 12-18 mm latus, conicus vel campanulatus, haud hygrophanus, haud translucido-striatus, sub lente leviter rugulosus, granulatus, candidus. *Lamellae* adnatae, valde confertae, albidae demum roseae. *Stipes* 20-22 × 2-2.5 mm, cylindraceus, candidus, politus. *Odore* saporeque nullis. *Sporae* 6.5-8 × 5-7 μm, (sub-)isodiametricae, 5-6-angulatae. *Acies lamellarum* sterilis. *Cheilocystidia* 23-45 × 4,5-10 μm, cylindracea vel clavata. *Pileipellis* hymenidermum ex elementis haud pigmentatis, inflatis, 32-62 × 15-32 μm constituta. *Fibulae* praesentes.

*Holotypus*: La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, on somewhat mossy soil in tropical rain forest, 8 Feb. 2000, leg. A. Hausknecht (WU 21104).

*Pileus* 12-18 mm broad, to 10 mm high, conical to conico-campanulate, not hygrophanous, not translucently striate, white, appearing smooth but slightly rugulose to granulose under lens, dull. *Lamellae* narrowly adnate, very crowded, thin, white becoming pale pink at maturity with entire, concolorous edge. *Stipe* 20- 22 × 2-2.5 mm, cylindrical, pure white, glabrous, polished. *Smell* indistinct, taste not determined.

*Spores* 6.5-8 × 5-7 μm, on average 7.1 × 6.2 μm, Q = 1.05-1.25, isodiametrical to subisodiametrical, 5-6-angled. *Basidia* 4-spored, 20-26 × 8-11 μm. *Lamella* edge sterile. *Cheilocystidia* 23-45 × 4.5-10 μm, cylindrical to clavate, rarely subfusiform. *Pileipellis* a hymeniderm or epithelium of very large, torpedo-shaped elements (32-62 × 15-32 μm). *Pigment* absent. *Pileitrama* regular, consisting of cylindrical to inflated hyphae, to 20 μm wide, brilliant granules absent. *Stipitipellis* a thin cutis of narrow, cylindrical, 2-7 μm wide hyphae. *Caulocystidia* absent. *Clamp connections* only seen in stipe cutis and trama.

*Habitat*: in small group on bare somewhat mossy soil in tropical rainforest at 200 m above sea level.

The distinctive features of this tiny white *Entoloma* are the hymeniform pileipellis and very small isodiametrical spores. No similar species have been described in the works of Romagnesi (1941) and Romagnesi and Gilles (1979) from Madagascar and Western Africa respectively, nor in Horak (1980). *Entoloma albogranulosum* Noordel. & Hauskn. from Italy is similar in the white fruit bodies and pileipellis structure, but has definitely larger, heterodiametrical spores (Noordeloos, 2004).

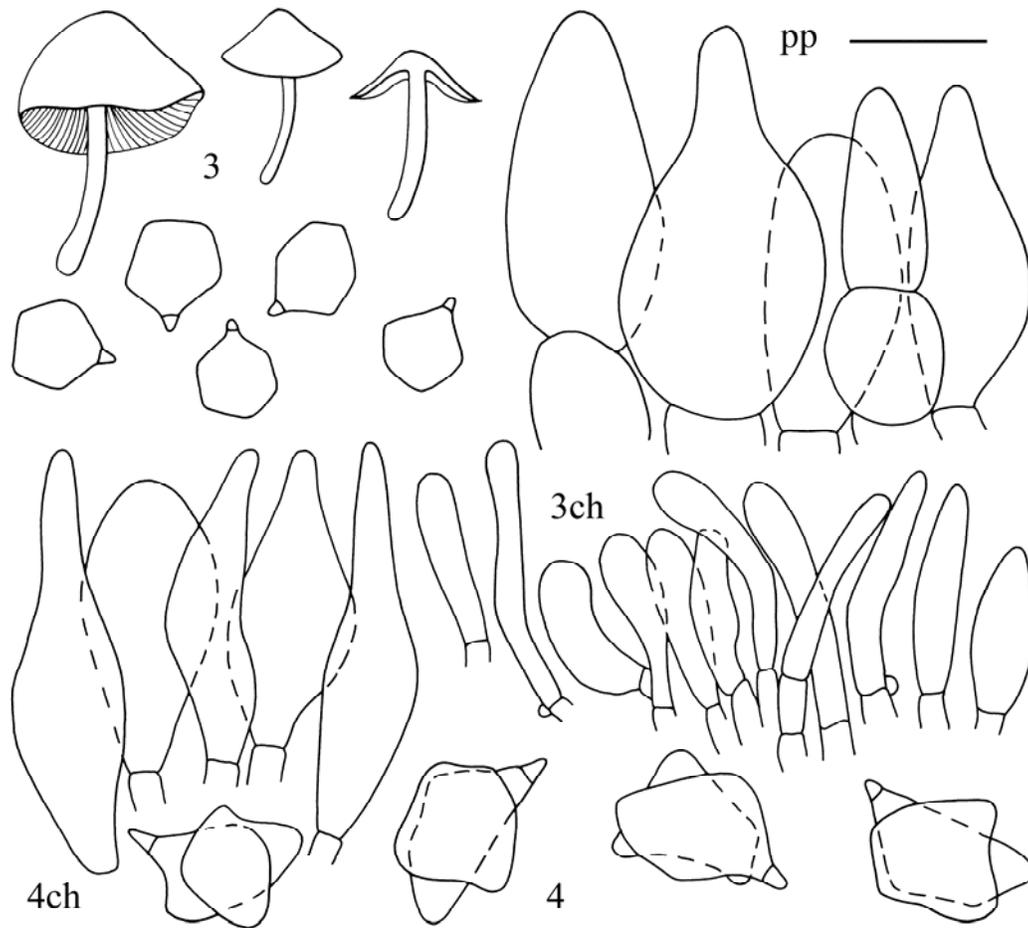
***Entoloma contortisporum* Noordel. & Hauskn., sp. nov.**

(Fig.4, Pl. 3.3)

MycoBank: 511112

*Etymology*: contortus = twisted, referring to the contorted spores.

*Pileus* 9-12 mm latus, plano-convexus, depressus, hygrophanus, translucido-striatus, griseo-brunneus, glaber. *Lamellae* late adnatae, moderate distantes, ochro-incarnatae, acies



**Figs. 3-4.** 3. *Entoloma candidogranulosum*. Habit, spores, pileipellis (pp), and cheilocystidia (3ch). 4. *Entoloma contortisporum*, spores, and cheilocystidia (4ch). Bar = 10  $\mu$ m (spores), 20  $\mu$ m (cheilocystidia).

lamellarum brunneotinctae. *Stipes* 10-15  $\times$  1-1.5 mm, cylindraceus, pallide ochro-brunneus, politus. *Odore* saporeque nullis. *Sporae* 10.5-14  $\times$  8.5-10.5  $\mu$ m, contortae. *Acies lamellarum* sterilis. *Cheilocystidia* 55-85  $\times$  15-27  $\mu$ m, lageniformia vel clavata. *Pileipellis* cutis vel trichoderma ex elementis cylindraceis, 6-12  $\mu$ m latis pigmentis intracellulosi constituta. *Fibulae* praesentes.

**Holotypus:** La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, on soil in tropical rain forest, 2 April 2005, leg. A. Hausknecht (WU 27137).

*Pileus* 9-12 mm broad, plano-convex with slightly depressed centre, hygrophanous, distinctly translucently striate when moist, grey-brown (6F6) at centre, brown, dark brown or greyish orange (5BC5, 5BC4) at margin, glabrous, smooth. *Lamellae* broadly adnate to distinctly decurrent, moderately distant, narrowly ventricose, ochraceous-incarnate with brown margin. *Stipe*

10-15 × 1-1.5 mm, cylindrical, slightly broadened at base, pale ochraceous brown, glabrous, sub-polished. *Smell* and *taste* indistinct.

*Spores* 10.5-14 × 8.5-10.5 μm, on average 12.7 × 9.5 μm, Q = 1.15-1.6, 5-7-angled, remarkably contorted, but not cruciform. *Basidia* 20-29 × 10-13 μm, 4-spored. *Lamellar edge* sterile. *Cheilocystidia* 55-85 × 15-27 μm, lageniform with long neck and pointed top, some also broadly clavate. *Pileipellis* a cutis with transition to a trichoderm of cylindrical hyphae, 6-12 μm wide with scattered inflated terminal hyphae to 18 μm wide, with brown intracellular pigment. *Clamp connections* present in hymenium, not seen in other tissues.

*Habitat*: in groups on bare soil in rain forest at about 200-250 m alt.

*Entoloma contortisporum* fits rather well in the European and African section *Griseorubida*, on account of the collybioid habit, clamped hyphae and presence of voluminous cheilocystidia. None of the known species, however, have contorted spores. *Entoloma gnophodes* (Berk. & Broome) E. Horak, a poorly known species from Sri Lanka (Pegler, 1977) and Papua New Guinea (Horak, 1980) differs by having non-contorted spores, and lacks clamp connections.

***Entoloma gibbosporum* Noordel. & Hauskn., sp. nov.** (Fig 5, Pl. 1.4)

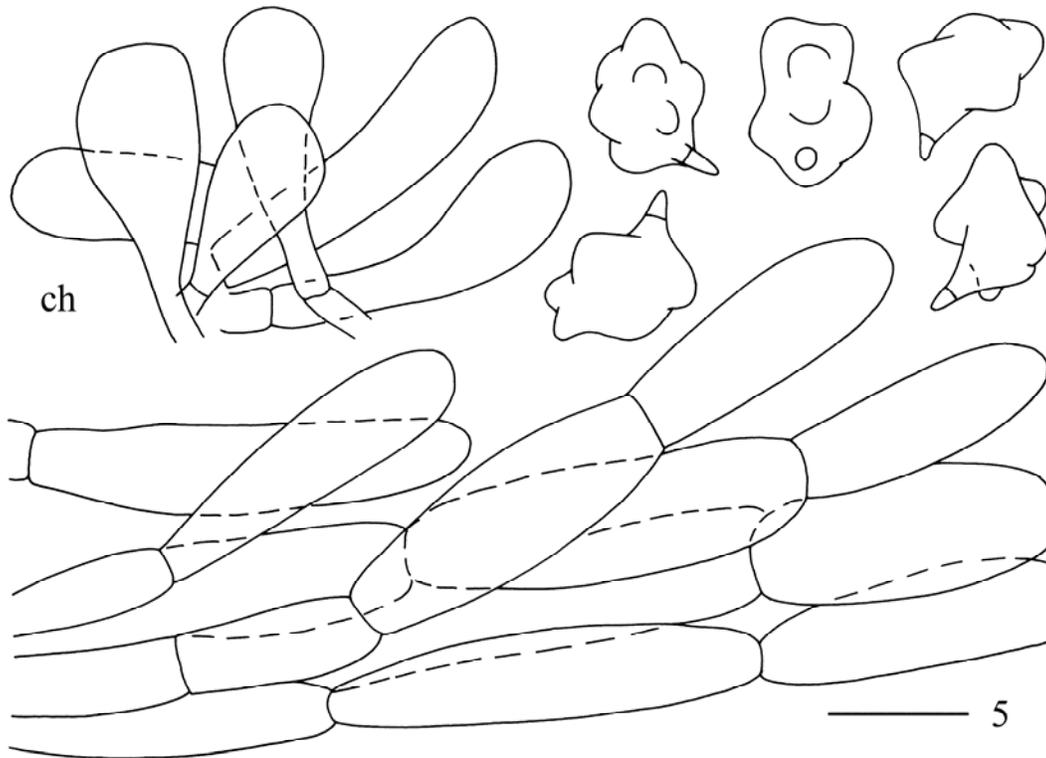
Mycobank: 511116

*Etymology*: gibbus – gibbous, referring to the shape of the spores.

*Pileus* ad 30 mm latus, convexus, depressus vel infundibuliformis, haud hygrophanus, valde translucido-striatus, griseo-brunneus violaceo- vel coeruleo tinctus, granulosus vel fibrillosus. *Lamellae* late adnatae, confertae, griseo-roseae, acies lamellarum coeruleo-tinctae. *Stipes* 20-30 × 2-3 mm, cylindraceus, violaceo vel coeruleo-tinctus, politus. *Odore* saporeque nullis. *Sporae* 9.5-12.5 × 7-10 μm, gibbosae, 5-7 angulatae. *Acies lamellarum* sterilis. *Cheilocystidia* 18-45 × 6-14 μm, clavata vel late clavata pigmentis intracellulosis. *Pileipellis* cutis vel trichoderma, ex elementis inflatis, 25-75 × 10-17 μm constituta pigmentis intracellulosis. *Granulae brilliantes* abundantes. *Fibulae* absentes.

***Holotypus***: Seychelles, Mahé, path from Salazie to Fairview, on decayed trunk of a tropical broadleaf tree, 16 Mar. 2006, leg. A. Hausknecht (WU 27139).

*Pileus* to 30 mm, convex with depressed to infundibuliform centre, not distinctly hygrophanous, strongly translucent striate, purplish grey to violaceous grey (14-16F2) at centre, the remainder grey-brown (7DE3), finely granulose in central part, glabrous towards margin. *Lamellae* broadly adnate, crowded, subventricose, greyish pink with darker, blue-grey edge. *Stipe* 20-30 × 2-3 mm, cylindrical to slightly compressed with groove, violaceous-grey at apex (17E2), downwards bluish grey (20E2), finely pruinose at apex, downwards glabrous, polished. *Context* greyish blue. *Smell* and *taste* indistinct.



**Fig. 5.** *Entoloma gibbosporum*. Spores, cheilocystidia, and pileipellis. Bar = 10  $\mu\text{m}$  (spores), 20  $\mu\text{m}$  (cheilocystidia).

*Spores* 9.5-12.5  $\times$  7-10  $\mu\text{m}$ , on average 11.1  $\times$  8.3  $\mu\text{m}$ , Q = 1.15-1.4, irregularly nodulose (similar to an *Inocybe* species), with 5-7 nodulose-angles. *Basidia* 4-spored, 20-25  $\times$  8-12  $\mu\text{m}$ .

Lamella edge sterile. *Cheilocystidia* 18-45  $\times$  6-14  $\mu\text{m}$ , clavate to broadly clavate, in clusters, with brown intracellular pigment. *Tramal hyphae* composed of cylindrical elements (120-250  $\times$  12-19  $\mu\text{m}$ ) with abundant brilliant granules and abundant, very irregularly shaped vascular hyphae. *Pileipellis* a cutis with transition to a trichoderm, consisting of inflated elements (25-75  $\times$  10-17  $\mu\text{m}$ ), with brown intracellular pigment. *Clamp connections* absent.

*Habitat*: In groups on very rotten wood in a rain forest at ca. 400 m above sea level.

*Entoloma gibbosporum* has the general features of the group around *Entoloma serrulatum* (Pers.) Hesler in subgenus *Cyanula*, in particular with regard to the structure of the lamella edge with dense clusters of pigmented cheilocystidia. Species of this group are common and abundant, both in

temperate and tropical regions, but none of the known taxa has such remarkable, nodulose spores.

***Entoloma hoyafragrans*** Noordel. & Hauskn., **sp. nov.** (Fig. 6, Pl. 1.6)

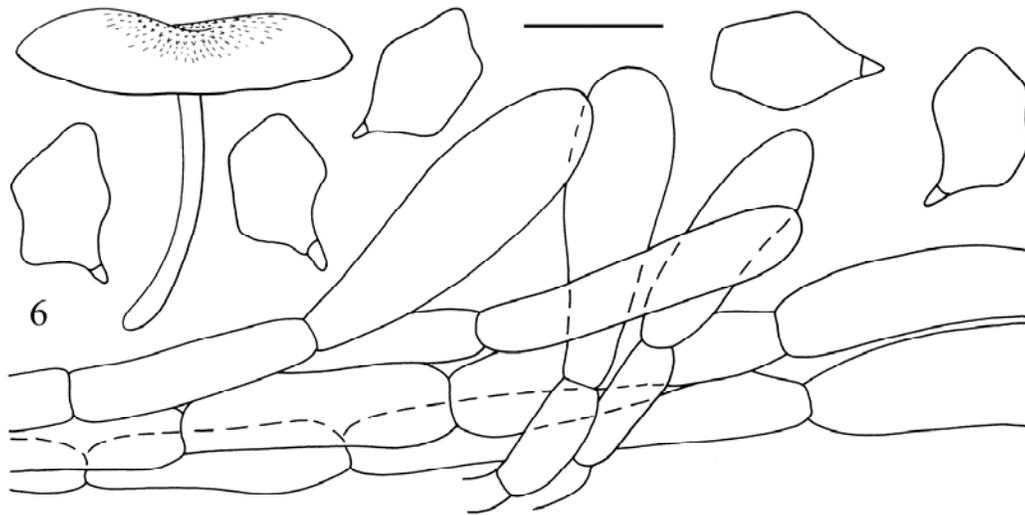
Mycobank: 511117

*Etymology:* hoyafragrans = smelling like the flowers of Hoya, referring to the smell of the fruit bodies.

*Pileus* 12-16 mm latus, plano-convexus, depressus, hygrophanus, translucido-striatus, obscure fuliginosus, centro minute squamulosus. *Lamellae* late adnatae vel leviter decurrentes, confertae, pallide griseo-ferrugineae. *Stipes* 20-25 × 1-1.5 mm, cylindraceus, pallide brunneus, politus. *Odore* valde fortis, Hoya revocans. *Sporae* 8.5-10.5 × 6.5-8 μm, 5-6-angulatae. *Acies lamellarum* fertilis. *Cystidia* nulla. *Pileipellis cutis* vel trichoderma ex elementis inflatis, 34-70 × 12-20 μm, constituis pigmentis intracellulosis. *Fibulae* absentes.

*Holotypus:* MAURITIUS, Plaines Willems, Macchabee Forest, on mossy trunk of tropical broadleaf tree, 24 Feb. 2000, leg. A. Hausknecht (WU 21106).

*Pileus* 12-16 mm broad, plano-convex with depressed centre, translucently striate, hygrophanous, dark reddish brown at centre (6F5, 6F6, 6F7), paler brown towards margin (6DE4), minutely squamulose at centre, finely granulose to almost glabrous towards margin. *Lamellae* broadly adnate to somewhat decurrent, crowded, narrow, pale greyish ferruginous, with entire, concolorous edge. *Stipe* 20-25 × 1-1.5 mm, cylindrical, pale brown (6D3), darker, slightly more greyish brown towards base, minutely pruinose at apex, downwards glabrous, polished, context thin. *Odour* strong, intensely aromatical, reminiscent of the flowers of *Hoya carnosa* (*Apocynaceae*).



**Fig. 6.** *Entoloma hoyafragrans*. Habit, spores, and pileipellis (Bar = 10 μm (spores), 20 μm (pileipellis)).

*Spores* 8.5-10.5 × 6.5-8 µm, on average 9.7 × 7.1 µm, Q = 1.25-1.5, 5-6-angled, with rather pronounced angles. *Basidia* 22-30 × 8-11 µm, 4-spored, clampless. *Lamella edge* fertile. *Cheilocystidia* absent. *Pileipellis* a cutis with transition to a trichoderm of clavate elements, 34-70 × 12-20 µm, with brown, granular intracellular pigment. *Pileitrama* regular, consisting of cylindrical to slightly inflated elements 80-110 × 7-20 µm. *Brilliant granules* abundant. *Clamp connections* absent.

*Habitat*: on mossy trunk in rain forest, at ca. 500 m above sea level.

*Entoloma hoyafragrans* belongs to subgenus *Cyanula* on account of the collybioid habit, clampless hyphae, and abundant brilliant granules. The brown pileus and polished, pale brown, stipe with a greyish hue in the basal part are reminiscent of the species complex of *Entoloma longistriatum* (Peck) Noordel., widespread in the boreal and temperate regions of the Northern Hemisphere. The lack of cheilocystidia and in particular the strong, aromatic smell make it a good species.

***Entoloma maheense*** Noordel. & Hauskn., **sp. nov.** (Fig. 7, Pl. 1.5)  
MycoBank: 511118

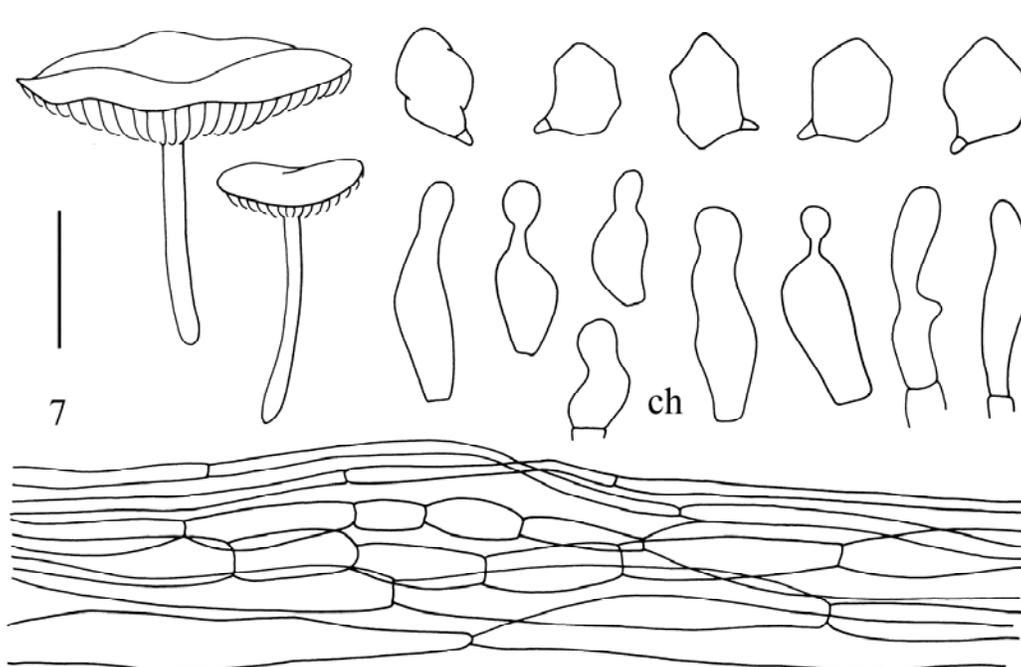
*Etymology*: named after the island Mahé (Seychelles).

*Pileus* 8-33 mm, plano-convexus, depressus vel infundibuliformis, hygrophanus, translucido-striatus, brunneus, centro minute fibrilloso-squamulosus. *Lamellae* late adnatae vel decurrentes, brunneo tinctae. *Stipes* 12-18 × 1-1.5 mm, cylindraceus, albidus vel hyalino-griseus, minute fibrilloso-tomentosus. *Odore* saporeque valde farinaceo-rancidis. *Sporae* 7-8 × 5-6.5 µm, 4-6-angulatae. *Acies lamellarum* heterogeneis. *Cheilocystidia* 21-36 × 9-11 µm, lecythiformia, paulisper vel distincte capitata. *Granulae brilliantes* sparsa. *Pileipellis* cutis hyphis 3-7 µm latis constitutis pigmentis intracellulosis. *Fibulae* abundantes.

***Holotypus***: Seychelles, Mahé, Anse La Mouche, in flowerbed in garden, 13 Feb. 2001, leg. A. Hausknecht (WU 27126, **holotype**).

*Pileus* 8-33 mm broad, plano-convex with infundibuliform centre, and wavy marginal zone, translucently striate, hygrophanous, brown at centre (5-6F3, 5-6F4), paler beige-brown or reddish brown (5D3, 5DE3) towards margin, minutely arachnoid-fibrillose to squamulose with appressed to erect squamules. *Lamellae* broadly adnate to decurrent, distant, ventricose, pale greyish orange (5AB2), then brownish blond (5D3-4), with concolorous, entire edge. *Stipe* 12-18 × 1-1.5 mm, cylindrical, whitish to hyaline grey, minutely fibrillose-tomentose. *Context* thin. *Smell* and *taste* strongly farinaceous.

*Spores* 7-8 × 5-6.5 µm, on average 7.3 × 5.9 µm, Q = 1.1-1.35, 4-6-angled. *Basidia* 30-36 × 8.5-12 µm, 4-spored, many with thick, congophilous wall (sclerobasidia). *Lamella edge* heterogeneous. *Cheilocystidia* 21-36 × 9-11 µm, lecythiform with weak to well-differentiated capitulum, difficult to find in dried material. *Hymenophoral trama* with few brilliant granules.



**Fig. 7.** *Entoloma maheense*. Habit, spores, cheilocystidia and pileipellis Bar = 10  $\mu\text{m}$  (spores), 20  $\mu\text{m}$  (cheilocystidia, pileipellis).

*Pileipellis* a thin cutis of very narrow, cylindrical hyphae, 3-7  $\mu\text{m}$  wide; subpellis of short elements, 25-70  $\times$  12-17  $\mu\text{m}$ , trama of long, fusiform elements, 120-200  $\times$  12-25  $\mu\text{m}$ ; pigment pale brown, intracellular. *Brilliant granules* present but not abundant. *Clamp connections* abundant in hymenium.

*Habitat*: in groups in flowerbed in garden.

*Material examined* (besides type): Seychelles, Mahé, Anse La Mouche, in flowerbed, 10 Feb. 2001, leg. A. Hausknecht (WU 27125); - - 17 Feb. 2001, leg. A. Hausknecht (WU 27127).

*Entoloma maheense* is distinctive because of its omphalioid habit, small spores and lecythiform cheilocystidia. Several similar species have been described from Western Africa in section *Lecithioophori* Romagn. (Romagnesi & Gilles, 1979). *Rhodophyllus modicus* Romagn. & Gilles is the only species with similar small spores, but it differs by the paler coloured fruit bodies and much larger cheilocystidia. *Rhodophyllus tenebrosus* Romagn. & Gilles has much larger spores and differently shaped cheilocystidia with a relatively long, slender neck.

***Entoloma mascarense*** Noordel. & Hauskn., **sp. nov.**

(Fig. 8, Pl. 3.4)

Mycobank: 511119

*Etymology*: named after the Mascarene Islands.

*Pileus* 6-25 mm latus, plano-convexus, depressus, hygrophanus, haud translucido-striatus, pallide brunneus, tomentosus, demum obscure brunneo squamulosus. *Lamellae* late adnatae, distantes, albae demum roseae griseo-tinctae. *Stipes* 12-30 × 1.5-3 mm, cylindraceus, griseus vel griseo-brunneus, leviter fibrillosus. *Odore* saporeque nullis. *Sporae* 7-9 × 6-9 μm, (sub-)isodiametricae, 4-6-angulatae. *Acies lamellarum* fertilis. *Cystidia* nulla. *Pileipellis* cutis vel trichoderma ex elementis clavatis, 20-55 × 10-25 μm constituta pigmentis intracellulosis. *Fibulae* absentes.

**Holotypus:** MAURITIUS, Black River, Piton de la Petite Rivière Noire, on soil and living roots of tropical broadleaf tree, 29 Jan. 2003, leg. A. Hausknecht (WU 27129).

*Pileus* 6-25 mm broad, to 9 mm high, plano-convex with flattened to slightly depressed centre, not translucently striate, hygrophanous, pale brown and tomentose when young, pale brown to greyish brown with strongly contrasting, dark grey-brown to blackish squamules at maturity. *Lamellae* broadly adnate, moderately distant to distant, whitish in youth, becoming greyish pink with concolorous, eroded edge. *Stipe* 12-30 × 1.5-3 mm, cylindrical, grey when young then cream-coloured with greyish brown hue, slightly fibrillose striate, context thin. Smell indistinct, taste not known.

*Spores* 7-9 × 6-9 μm, on average 7.8-7.9 × 7-7.6 μm, Q = 1-1.25, isodiametrical to subisodiametrical, 4-6 angled. *Basidia* 30-33 × 10-12 μm, 4-spored, with basal clamp. *Lamella edge* fertile. *Cystidia* absent. *Pileipellis* a cutis with transition to a trichoderm of cylindrical, septate, clamped hyphae with subclavate terminal elements (20-55 × 10-25 μm), containing very dark brown granulate intracellular pigment. *Brilliant granules* absent. *Clamp connections* absent.

**Habitat:** in groups on living roots of forest trees in rain forest at 250-800 m above sea level.

**Material examined** (besides type): La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, in tropical rain forest, 2 April 2005, leg. A. Hausknecht (WU 27136).

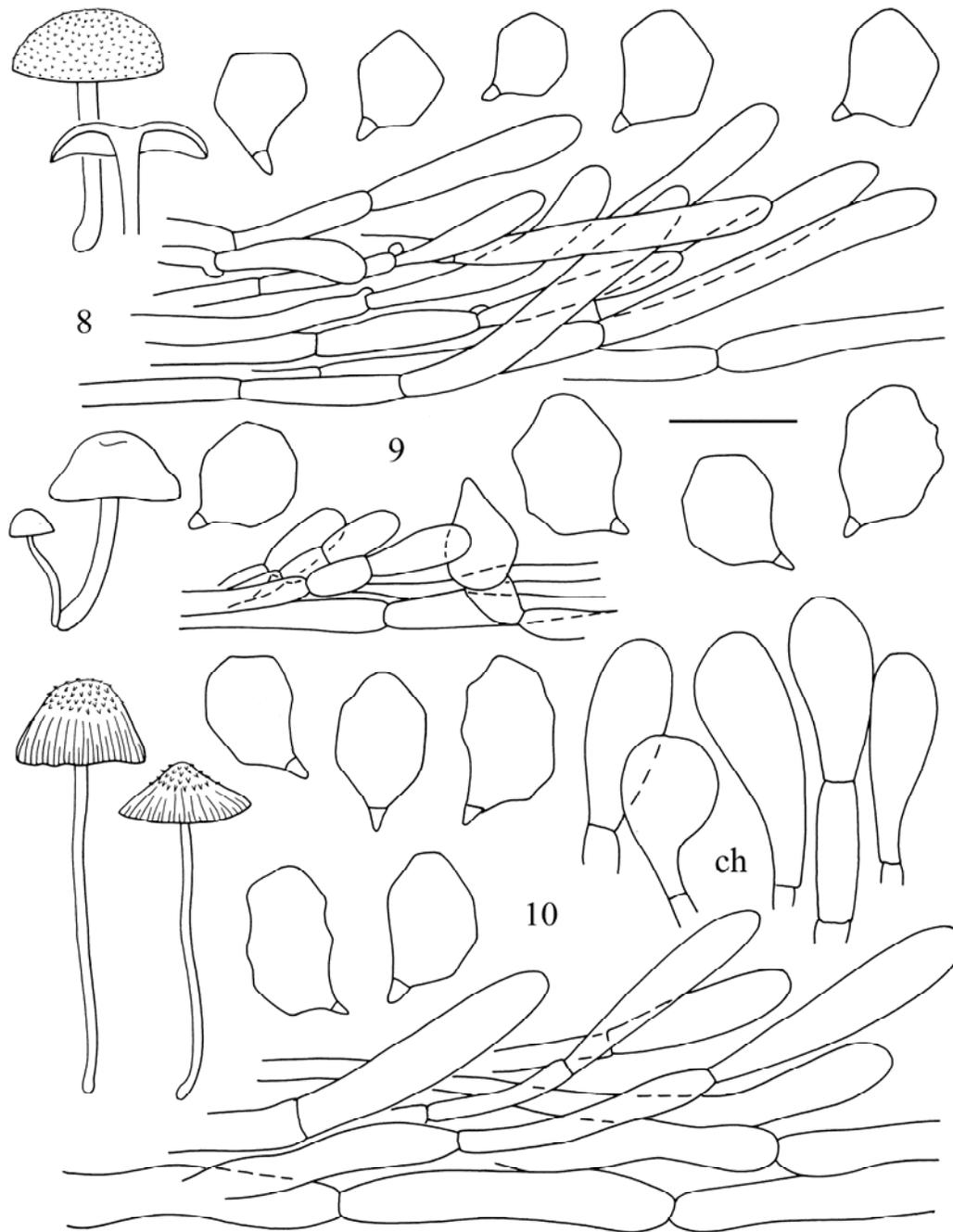
*Entoloma mascarense* is a striking small species from section *Cyanula* with its dark brown, nearly squamulose pileus and small, iso- to subisodiametrical spores. Within *Cyanula*, most species have distinctly heterodiametrical spores. It is in other respects somewhat similar to *Rhodophyllus hirtellus* Romagn. from Madagascar (Romagnesi, 1941), but that species has heterodiametrical spores and abundant cheilo- as well as pleurocystidia. *Entoloma lepiotoides* G. Gates & Noordel. from temperate rain forests in Tasmania is similar in having small, almost isodiametrical spores, which are, however, also differently shaped (Gates and Noordeloos, 2007).

***Entoloma mauritianum* Noordel. & Hauskn., sp. nov.** (Fig. 9, Pl. 3.1)

MycoBank:511120

**Etymology:** named after the island of Mauritius.

*Pileus* 6-17 mm latus, ad 10 mm altus, campanulatus vel convexus, centro truncatus, haud hygrophanus, haud translucido striatus, albus demum cremeus, innate fibrillosus centro



**Figs. 8-10.** **8.** *Entoloma mascarense*. Habit, spores, and pileipellis. **9.** *Entoloma mauritanum*, Habit, spores, and pileipellis. **10.** *Entoloma pallideviolaceum*. Habit, spores, cheilocystidia, and pileipellis. Bar = 10  $\mu$ m (spores), 20  $\mu$ m (cheilocystidia, pileipellis).

squamulosus. *Lamellae* decurrentes, distantes, albae demum roseae; *Stipes* 15-25 × 1-2 mm, cylindraceus, albus, politus. *Odore* saporeque valde farinaceo-rancidis. *Sporae* 9-10 × 6.5-8.5 µm, (5-)6-8-noduloso-angulatae. *Acies lamellarum* fertilis. *Cystidia* absentes. *Pileipellis* cutis vel trichoderma, ex elementis inflatis, ad 12 µm latis, epigmentatis constituta. *Granulae brilliantes* absentes. *Fibulae* praesentes.

**Holotypus:** MAURITIUS, Savanne, L'Escalier, Savanne Sugar Mill, subfasciculate on decaying cabasse, 31 Jan. 2003, leg. A. Hausknecht (WU 27130).

*Pileus* 6-17 mm broad, to 10 mm high, campanulate to convex with somewhat truncate centre and undulating marginal zone, not translucently striate, not hygrophanous, white then creamy white, innately fibrillose, slightly squamulose at centre. *Lamellae* decurrent, distant, narrow, thickish, white in youth, becoming pink at maturity with entire, concolorous edge. *Stipe* 15-25 × 1-2 cm, cylindrical, slightly compressed, curved, pure white, slightly pruinose at apex, glabrous towards base, polished, very stiff. *Context* thin, tough. *Smell* and *taste* strong, farinaceous-rancid.

*Spores* 9-10 × 6.5-8.5 µm, on average 9.8 × 7.3 µm, Q = 1.2-1.5, nodulose, (5-)6-8-angled with rather weak angles, thin-walled. *Basidia* 20-30 × 10-15 µm, clamped. *Lamella edge* fertile. *Cystidia* absent. *Hymenophoral trama* regular, of long, inflated hyphae to 35 µm wide. *Pileipellis* a cutis with some trichodermal tufts of ± ascending clavate terminal elements to 12 µm wide. *Pigment* not observed. *Brilliant granules* absent. *Clamp connections* present.

**Habitat:** In groups, subfasciculate on decaying cabasse from a sugar mill.

This remarkable little chalky white species with its thin-walled, nodulose-angular spores fits well in sect. *Cancrini* of subgenus *Paraleptonia* (Romagnesi and Gilles, 1979; Noordeloos, 1981, 2004). *Rhodophyllus tortilis* Romagn. from Madagascar, and *Rhodophyllus candicans* Romagn. & Gilles from the Ivory Coast are similar in habit, but have more elongate, heterodiametrical spores with pronounced, sharp angles.

***Entoloma pallideviolaceum*** Noordel. & Hauskn., **sp. nov.** (Fig. 10, Pl. 2.1)

Mycobank: 511121

**Etymology:** pallide = pale, violaceus = violaceous, referring to the colours of the fruit body.

*Pileus* 12-22 mm latus, ad 12 mm altus, conicus, hemisphaericus vel convexus, umbonatus, hygrophanus, translucido striatus, violaceo-griseus, minute squamulosus. *Lamellae* adnatae, distantes, albae demum incarnatae, acies lamellarum flocculoso-violaceae. *Stipes* 40-65 × 1-1.5 mm, cylindraceus, albidus violaceo tinctus, politus. *Odore* saporeque nullis. *Sporae* 8-12 × 6.5-7.5 µm, 7-9-angulatae. *Acies lamellarum* heterogeneae. *Cheilocystidia* 19-35 × 7-20 µm, clavata, violaceo pigmentata. *Pileipellis* cutis vel trichoderma, ex elementis inflatis, 35-70(-90) × 8-16 µm, pigmentis intracellulosis constituta. *Granulae brilliantes* praesentes. *Fibulae* absentes.

**Holotypus:** La Réunion, Saint-Pierre, Saint-Philippe, Basse Vallée, in tropical rain forest (broadleaf trees mixed with some *Casuarina*), 19 Feb. 2000, leg. A. Hausknecht (WU 21100).

*Pileus* 12-22 mm broad, to 12 mm high, conical, hemispherical to convex, slightly umbonate, deeply translucently striate, hygrophanous, dull violaceous at centre (16E3), elsewhere purplish grey (14B2, 16C3), when old minutely squamulose with reddish brown squamules (7B2-3) on dull violaceous background (16E2-3) at centre, innately radially fibrillose towards margin. *Lamellae* narrowly adnate, distant, ventricose, whitish in youth, becoming pinkish incarnate, with darker, purplish grey, flocculose edge. *Stipe* 40-65 × 1-1.5 mm, cylindrical with broadened base, in youth almost white with slight violaceous tinge, becoming dull violaceous at maturity (15AB2), glabrous, polished. *Context* with slight violaceous tinge in cortex of pileus and stipe. *Smell* and *taste* indistinct.

*Spores* 8-12 × 6.5-7.5 μm, on average 10 × 7.1 μm, Q = 1.3-1.7, heterodiametrical, 7-9-angled in side view. *Basidia* 25-30 × 8.5-10.5 μm, 2- (3-, 4-) spored, clampless. *Lamella edge* heterogeneous. *Cheilocystidia* 19-35 × 7-20 μm, clavate, with intracellular pigment, in clusters among basidia. *Hymenophoral trama* regular, of ± cylindrical to slightly inflated elements, 20-75 × 8-22 μm with brilliant granules. *Pileipellis* a cutis with transition to a trichoderm of ± cylindrical hyphae with slightly inflated terminal elements, 35-70(-90) × 8-16 μm, with pale intracellular pigment. *Clamp connections* absent.

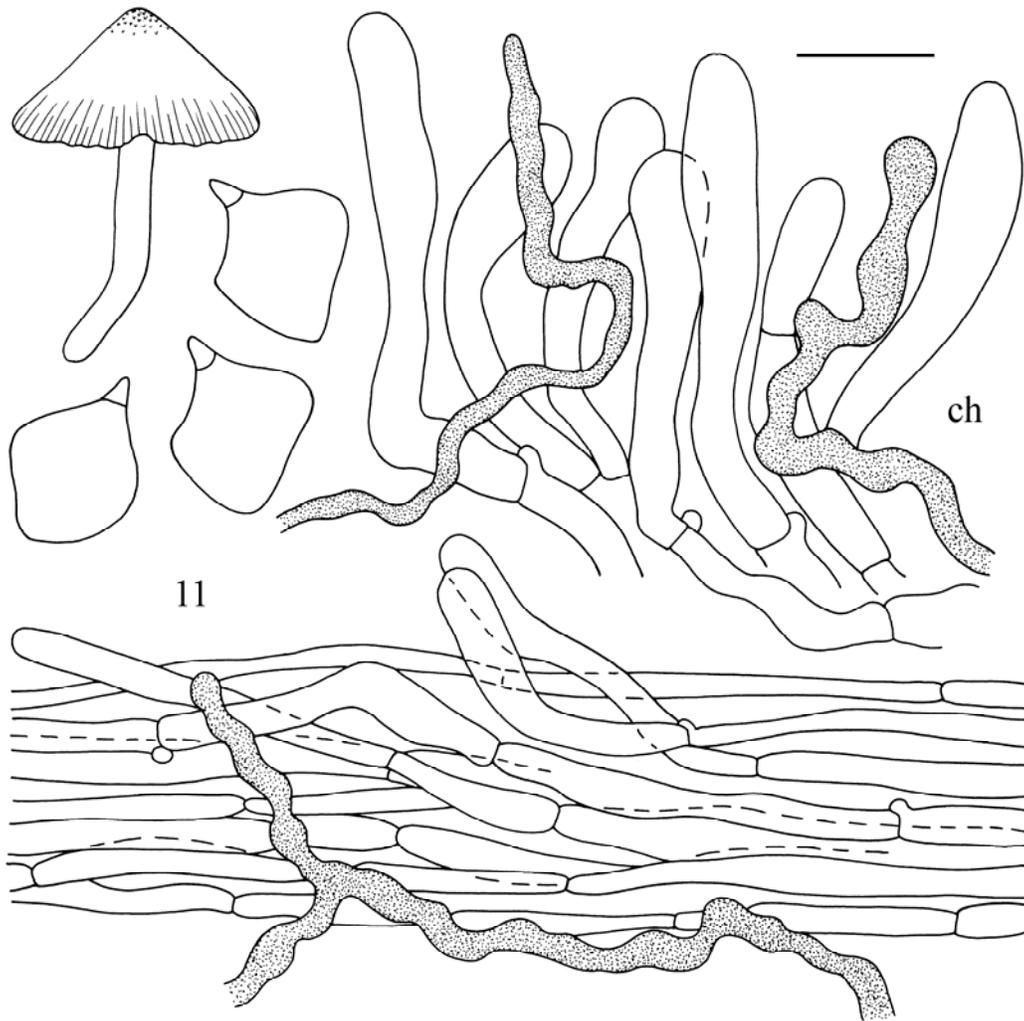
*Habitat*: in groups on soil in tropical rain forest (mostly broadleaf trees with a single *Casuarina*), ca. 250 m above sea level.

*Entoloma pallideviolaceum* belongs to section *Cyanula* on account of the collybioid habit, presence of brilliant granules and clampless hyphae. It is characterised by its relatively pale pileus with delicate violaceous grey hue, deeply translucently striate pileus, purplish grey, flocculose lamella edge, and very pale violaceous, almost white, polished stipe. Although the macroscopy suggest affinity with the group of *Entoloma serrulatum* (Noordeloos, 1987), the microscopic structure of the lamella edge is very different, being heterogeneous, with cystidia mixed with basidia. No similar species have been described from Madagascar. *Rhodophyllus ionocyanus* Romagn. & Gilles from Gabon has a more intense colour, and smaller spores; *Rh. sclerobasidiatum* Romagn. & Gilles from the Ivory Coast has similar pale fruit bodies, but completely lacks violaceous tinges. Although Horak (1980) described a number of species with a coloured lamella, such as *E. atrellum* E. Horak and *E. granuliferum* E. Horak, both differ by having dark blue-black fruiting bodies, and a serrulatum-type lamella edge.

***Entoloma quadratum*** (Berk. & M. A. Curtis) E. Horak (Fig. 11)

Syn.: *E. salmoneum* (Peck) Sacc.; *Rhodophyllus lactifluus* R. Heim

*Pileus* 32 mm broad, 17 mm high, conical with broad umbo and straight margin, hygrophanous, deeply translucently striate, reddish brown to burnt



**Fig. 11.** *Entoloma quadratum*. Habit, spores, cheilocystidia, and pileipellis. Bar = 10  $\mu$ m (spores), 20  $\mu$ m (cheilocystidia, pileipellis).

sienna at centre (7DE8, 7D8), paler brown-red towards margin (6-7D6, 6-7D7, 6-7D8), finely tomentose-squamulose at centre, remainder glabrous. *Lamellae* narrowly adnate, moderately distant, ventricose, reddish pink (6-7B8, 6-7C8), with strongly serrate, concolorous edge. *Stipe* 40  $\times$  4 mm, cylindrical, somewhat curved, salmon-pink to reddish orange (6A4, 6AB4), almost glabrous, sub-polished, with basal tomentum. *Context* orange-red. *Smell* and *taste* indistinct.

*Spores* 10.5-11.5  $\times$  9.5-11  $\mu$ m, average 10.7  $\times$  10.4  $\mu$ m, Q = 1-1.1, cuboid, with slightly thickened wall. *Basidia* 35-60  $\times$  7-14  $\mu$ m, slender clavate

with yellowish granular pigment, 4-spored, clamped, with basal clamp connection. *Lamella edge* entirely sterile. *Cheilocystidia* 50-85 × 8-15 µm, clavate, with granulose yellowish content, in dense clusters along edge. *Pseudocystidia* present as endings of vascular hyphae 5-8 µm wide with refringent yellow oily content. *Pileipellis* a cutis of cylindrical hyphae 6-15 µm wide with scattered ascending clavate terminal elements 12-18 µm wide, with granular pale brown, intracellular pigment. *Vascular hyphae* abundant, sometimes reaching the surface of the pileus. *Pileitrama* regular, consisting of cylindrical hyphae 5-15(-18) µm wide with very abundant brilliant granules. *Clamp connections* present.

*Habitat*: In groups on soil in tropical rain forest.

*Material examined*: La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, 12 Feb. 2000, leg. A. Hausknecht (WU 21098).

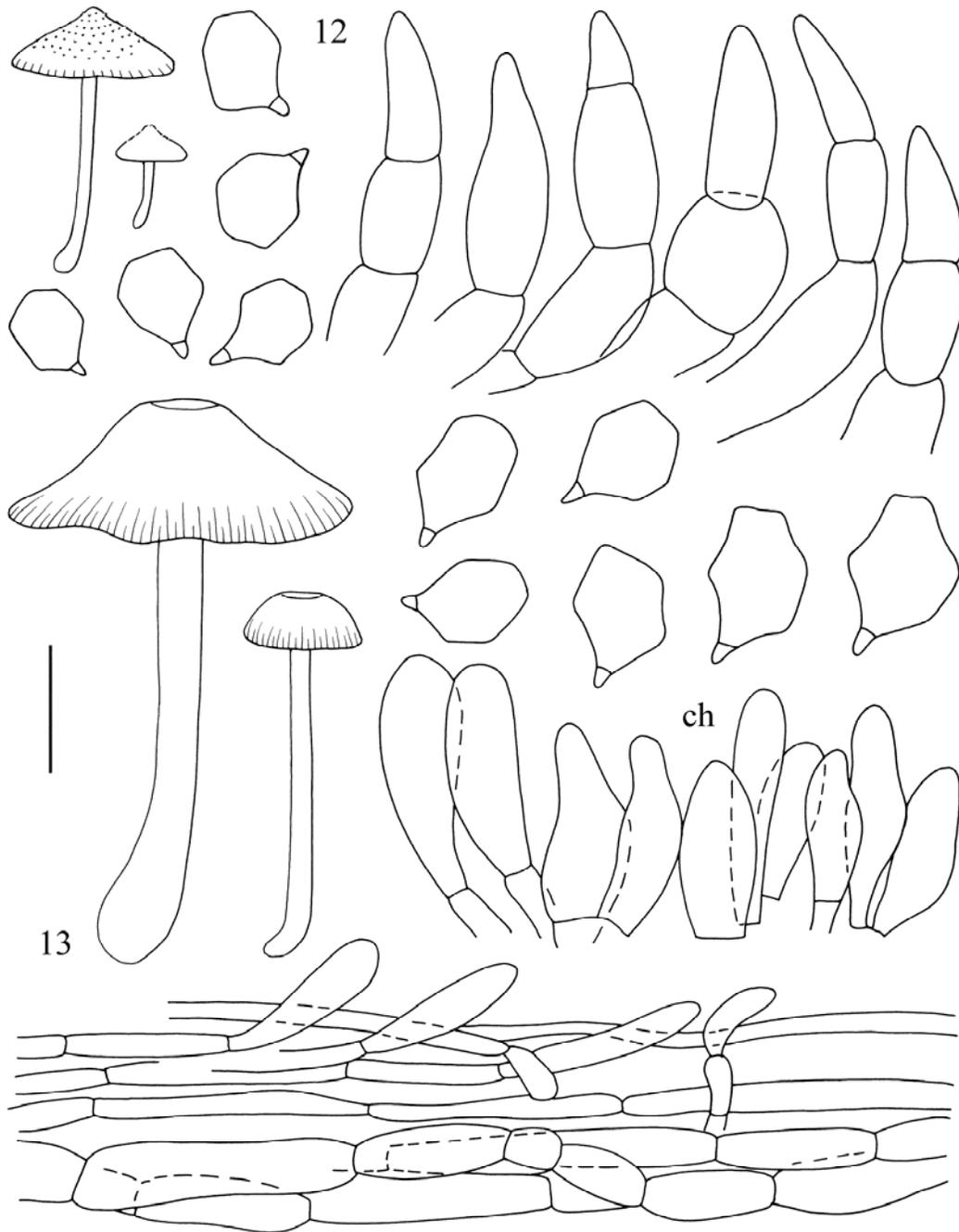
*Entoloma quadratum* is a very distinctive species with its bright reddish orange colour and cuboid spores. Our collection comes close to the description of *Rhodophyllus lactifluus* R. Heim from Madagascar (Romagnesi, 1941), which is primarily based on the original description of Heim (1936). Interestingly, Heim described the presence of latex exuding from the fruit bodies, which was not observed by us. But, all species in this group possess numerous gloeoplerous (or lactiferous, or vascular) hyphae producing an abundant granular exudate when bruised. It has also been observed in the related, blue coloured *E. virescens* (see below), and can be considered a very typical character for subgenus *Inocephalus* sensu stricto. The synonymy of *Rh. lactifluus* with *E. quadratum* and *E. salmoneum* is accepted here, both on the evidence provided by Horak (1976) and our own observations on the type and additional material of *E. salmoneum* collected in the USA and Canada. *Entoloma quadratum* has a very wide geographical distribution from the temperate zones of the Northern Hemisphere (USA, Eastern Asia, Japan, S.E. Asia, and Madagascar) into tropical regions (Horak, l.c.).

***Entoloma reunionense* Noordel. & Hauskn., sp. nov.** (Fig. 12, Pl. 2.2)  
Mycobank: 511122

*Etymology*: named after the island La Réunion.

*Pileus* 10-23 latus, conicus, umbonatus, haud hygrophanus, haud translucido-striatus, griseo-rufus vel violaceo-brunneus, squamulosus, versus marginem floccosus vel granulosus. Lamellae adnatae, griseo-roseae. Stipes 12-35 × 1.5-2 mm, cylindraceus, griseo-lilacinus vel griseo-rufus, leniter fibrillosus. *Odore* nullo. *Sporae* 7.5-9 × 6-7.5 µm, 5-6-angulatae. *Acies lamellarum* heterogeneae. *Cheilocystidia* 25-32 × 6-8 µm, cylindracea. *Pileipellis* trichoderma ex elementis inflatis, 35-60 × 16-20 µm, pigmentis intracellulosis. *Granulae brilliantes* sparsae. *Fibulae* absentes.

*Holotypus*: La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, in tropical rain forest, on soil and decayed wood, 12 Feb. 2000, leg. A. Hausknecht (WU 21101).



**Figs 12-13.** 12. *Entoloma reunionense*. Habit, spores, and pileipellis. 13. *Entoloma roseotransparens*. Habit, spores, cheilocystidia, and pileipellis. Bar = 10  $\mu$ m (spores), 20  $\mu$ m (cheilocystidia, pileipellis).

*Pileus* 10-23 mm broad, to 13 mm high, conical with distinct umbo, not translucently striate, weakly hygrophanous, greyish red to violaceous brown at centre (10E4, 10DE4), with paler reddish grey marginal zone (11AB2) when young, becoming greyish brown with reddish tinge or pale reddish brown (8D3-4, 8CD3 to 8D3) with more intensely coloured reddish brown squamules at centre with maturity, towards margin finely flocculose or granulose. *Lamellae* narrowly adnate, crowded, ventricose, white in youth, becoming pale greyish pink at maturity, with strikingly granulose flocculose, whitish edge. *Stipe* 12-35 × 1.5-2 mm, cylindrical, slightly broadened towards base, greyish lilac or dull greyish red (11C2, 11C3), towards base somewhat paler to almost white, finely longitudinally fibrillose, glabrescent. *Context* pale greyish pink. *Smell* none.

*Spores* 7.5-9 × 6-7.5 μm, on average 8 × 6.8 μm, Q = 1.1-1.35, subisodiametrical, 5-6-angled. *Basidia* 20-30 × 10-12 μm, 4-spored, clampless. *Lamella* edge heteromorphous. *Cheilocystidia* 25-32 × 6-8 μm, cylindrical, basidiole-like, small. *Pileipellis* a trichoderm with pointed terminal cells, subpellis with rather short, broad elements, e.g. 35-60 × 16-20 μm, with brown intracellular pigment. Brilliant granules sparse. *Clamp connections* absent.

*Habitat*: In groups in soil and on rotten wood in tropical rain forest.

*Entoloma reunionense* is a very striking species with its non-striate, opaque, minutely umbonate pileus, small, subisodiametrical spores, trichodermal pileipellis with septate elements, and clampless hyphae. As such it can be placed in subgenus *Inocephalus* sect. *Rigiduli* Romagn. (Romagnesi and Gilles, 1979). *Rhodophyllus eudermus* Romagn. & Gilles from Gabon has a similar pileipellis structure and habit, but a very differently coloured fruit body, resembling *Megacollybia platyphylla* (Pers.) Kotl. & Pouzar, and also slightly larger and more heterodiametrical spores.

***Entoloma roseotransparens* Noordel. & Hauskn., sp. nov.** (Fig. 13, Pl. 2.3)  
Mycobank: 511123

*Etymology*: roseus = pink, transparens = transparent, referring to the pink, translucent pileus.

*Pileus* 8-50 mm, conico-convexus, truncatus demum leviter depressus, haud hygrophanus, leviter translucido-striatus, albus demum roseo-transparens, paulisper haud radialiter rugulosus. *Lamellae* moderate distantes, adnatae, emarginatae, albae demum roseae. *Stipes* 35-65 × 1.5-6 mm, cylindraceus, albus, politus. *Odore* saporeque nullis. *Sporae* 8.5-11 × 6.5-8 μm, 6-angulatae. *Acies lamellarum* sterilis. *Cheilocystidia* 24-40(-50) × 8-12.5 μm, clavata. *Pileipellis* cutis hyphis cylindraceis, 3-10 μm latis vel trichoderma ex elementis clavatis, ad 17 μm latis constituta pigmentis intracellulosis. *Granulae brilliantes* abundantes. *Fibulae* absentes.

*Holotypus*: La Réunion, Saint-Pierre, Saint-Philippe, Basse Vallée, in tropical rain forest, on leaf litter, decayed wood and soil, 1 April 2005. leg. A. Hausknecht (WU 27134).

*Pileus* 8-50 mm broad, 4-17 mm high, conical to conico-convex with truncated apex, which may become slightly depressed, with deflexed margin, not hygrophanous, pure white in youth, developing a slightly yellowish tinge, slightly translucently striate, showing the pinkish tinge of the lamellae with age, smooth to slightly radially rugulose, silky with a sheen. *Lamellae* moderately distant, adnate-emarginate, narrow, white in youth, then pink to incarnate at maturity with slightly floccose, concolorous edge. *Stipe* 35-65 × 1.5-6 mm, cylindrical with a subbulbous base to 10 mm wide, white, when young pruinose at apex only, downwards glabrous, polished, stiff, fistulose when old. *Context* white, firm. *Smell* and *taste* indistinct.

*Spores* 8.5-11 × 6.5-8 μm, on average 9.6 × 7.2 μm, Q = 1.25-1.5, mostly 6-angled. *Basidia* 30-33 × 10-14 μm, 4-spored, clampless. *Lamella edge* sterile. *Cheilocystidia* 24-40(-50) × 8-12.5 μm, clavate. *Hymenophoral trama* regular, consisting of relatively short, inflated elements, 40-120 × 8-18 μm. *Pileipellis* a cutis of cylindrical hyphae, 3-10 μm wide with scattered ascending, clavate terminal elements to 17 μm wide, sometimes in clusters forming the squamules with almost invisible intracellular pigment. *Pileitrama* consisting of cylindrical to inflated elements, to 20 μm wide and 60-120 μm long. *Vascular hyphae* abundant. *Brilliant granules* abundant in hymenophoral and pileitrama. *Clamp connections* absent from all tissues.

*Habitat:* In forest litter and on rotten wood in tropical rainforest.

*Material examined* (besides type): La Réunion, Saint-Pierre, Saint-Philippe, Basse Vallée, in tropical rain forest, 19 Feb. 2000, leg. A. Hausknecht (WU 21105).

*Entoloma roseotransparens* is a rather stout species with purely white to pale creamy-yellow fruit bodies. *Entoloma* species with white or whitish, more or less collybioid fruit bodies are often placed in subgenus *Alboleptonia*. Such species are encountered particularly in the warmer regions of the world (Horak, 1980, Manimohan *et al.*, 1995, 2007). However, the white colour, due to the lack of pigment, may well be a non-reliable character for classification. This is confirmed by currently ongoing phylogenetic research with the help of molecular markers. *Entoloma roseotransparens* is such a white species, of which the affinities lie probably more in *Leptonia* sect. *Cyanula*, than in *Alboleptonia*. In the monograph of Romagnesi and Gilles (1979), it keys out to subgenus *Alboleptonia*, sect. *Pallidorosei*, on account of the abundant brilliant granules and lack of clamp connections. Interestingly, Romagnesi made the remark that the species of this section are probably better classified as pale-coloured *Leptonia fuliginosa* (part of subgenus *Leptonia*, sect. *Cyanula*). *Rhodophyllus sabulosus* Romagn. & Gilles from Gabon differs especially by the omphaloid habit, narrower spores and lack of cheilocystidia; *Rh. nudus* Romagn. & Gilles from Gabon is slightly more pink to brownish pink and has much larger cheilocystidia (to 80 μm long); *Rh. subalbidulus* Romagn. & Gilles

from Gabon has much smaller spores. Among the whitish or pale species from Madagascar, *Rh. truncatus* Romagn. differs by having grey-pink tinges and a fertile lamellar edge; *Rh. platypus* Romagn. also lacks cheilocystidia and has narrower spores. *Entoloma proprium* E. Horak, originally described from New Caledonia, and also recorded by Manimohan *et al.* (1995) from Kerala State, India, differs by the tiny fruit bodies with white then pale pink pileus and smaller spores.

***Entoloma speciosum* (Romagn.) Putzke & M. Putzke** (Fig. 14, Pl. 2.4)

*Syn.*: *Rhodophyllus peckianus* var. *speciosus* Romagn.; *Rhodophyllus speciosus* (Romagn.) Romagn. & Gilles

*Pileus* 20-35 mm broad, to 15 mm high, convex to plano-convex, not umbonate, not translucently striate, slightly hygrophanous, grey-brown at centre when young, greyish brown to beige-grey towards margin, then more yellow-brown towards margin, minutely granulose-tomentose, rather radially fibrillose-tomentose, dull. *Lamellae* moderately distant, adnate-emarginate, broadly ventricose, white in youth, beige-pink with concolorous, eroded edge with maturity. *Stipe* 30-55 × 2-5 mm, cylindrical, pure white, slightly grey tinged with age, glabrous, polished or very slightly fibrillose-striate, rather firm. *Context* white, sometimes somewhat reddening at base of stipe when bruised, compact. *Smell* none. Taste mild.

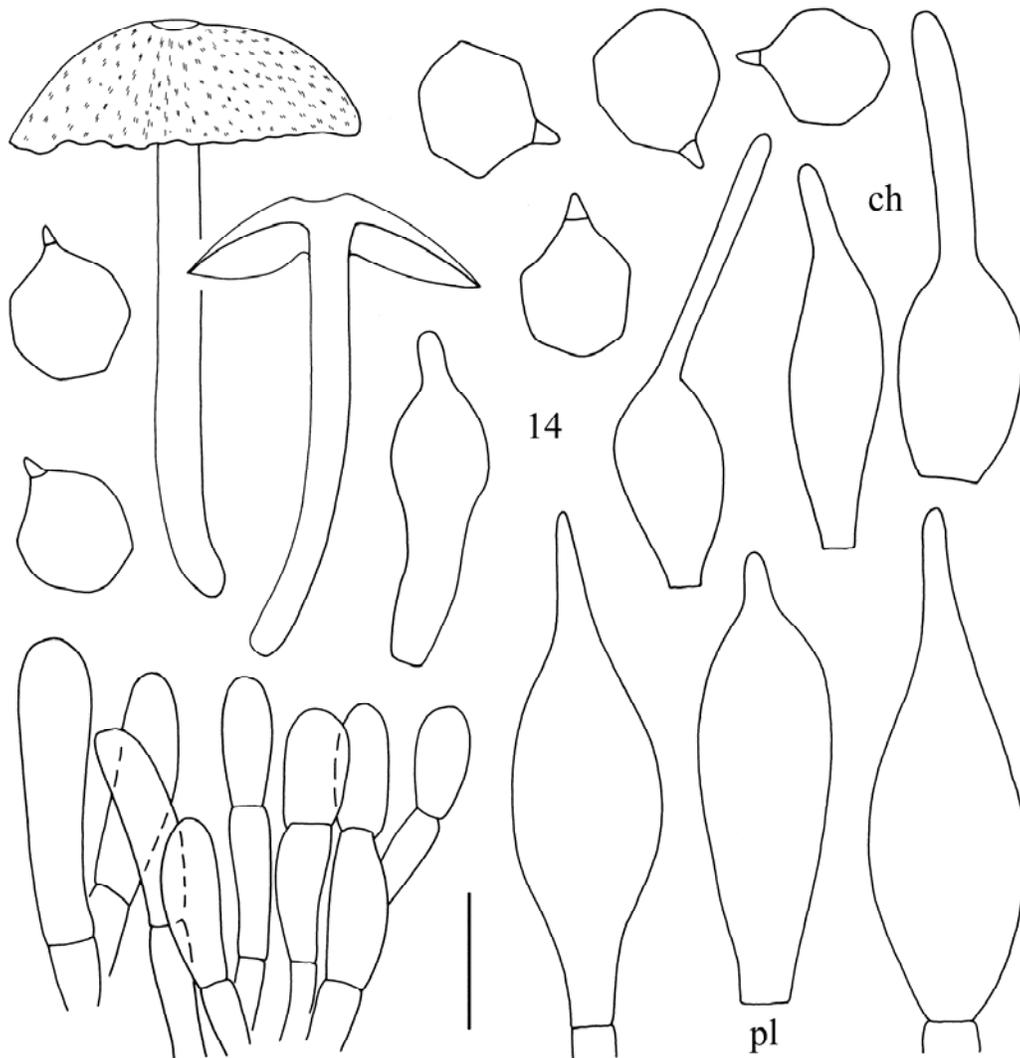
*Spores* 8.5-11 × 7.5-9.5 μm, on average 9.3 × 8.3 μm, Q = 1-1.25, 6-8-angled, ± subisodiametrical. *Basidia* 22-33 × 7-12 μm, 4-spored, clampless. *Lamella edge* sterile. *Cheilocystidia* 40-90 × 12-23 μm, ± lageniform or clavate-mucronate, often with granular yellow content.

*Pleurocystida* abundant, similar to cheilocystidia. *Hymenophoral trama* regular, consisting of inflated elements, 25-90 × 7-18 μm. *Pileipellis* a cutis at margin, trichodermal in squamules at centre, consisting of cylindrical hyphae 5-10 μm wide, squamules composed of clusters of clavate elements, 20-35(-45) × 8-12(-15) μm. *Pigment* very dark brown, coarse granular intracellular in pileipellis and upper pileitrama. *Pileitrama* regular, consisting of inflated elements, 20-60(-80) × 7-16(-20) μm. *Brilliant* granules present in hymenophoral and pileitrama, but not abundant. *Clamp connections* not observed.

*Habitat*: on decaying wood or on soil in tropical rainforest.

*Material examined*: La Réunion, Saint-Pierre, Saint-Philippe, S.B. de Mare Longue, 12 Feb. 2000, leg. A. Hausknecht (WU 21102); -2 Apr 2005, leg. A. Hausknecht (WU 27135).

These collections matches well with the description of *Entoloma speciosum* from Madagascar on account of the brown pileus, white stipe and the (sub-) isodiametrical spores. It belongs to the core of subgenus *Inocephalus* Romagn. (Romagnesi & Gilles, 1979) because of the mycenoid habit,



**Fig. 14.** *Entoloma speciosum*. Habit, spores, cheilocystidia, pleurocystidia, and pileipellis Bar = 10  $\mu\text{m}$  (spores), 20  $\mu\text{m}$  (cheilocystidia, pleurocystidia, and pileipellis)

presence of cheilo- and pleurocystidia with granular content, and absence of clamp connections. *Rhodophyllus longissimus* Romagn. & Gilles from Gabon and the Ivory Coast is similar, but has a strongly pigmented stipe, almost concolorous with the pileus. *Entoloma heimii* (Romagn.) Eyssart., Buyck & Courtec. and *E. pseudoheimii* Eyssart., Buyck & Courtec., both described from Madagascar, differ by having cuboid spores. The shape of both the spores and the hymenial cystidia are also distinctive for section *Griseorubida* (Romagn.) Noordel., but the species of that section usually have abundant clamp

connections. Among the Gabonese species, *Rhodophyllus fusifer* Romagn. & Gilles is similar, but differs by the more pronouncedly angled spores, lack of pleurocystidia and darker stipe. All other species in sect. *Griseorubida* from West Africa have rather different spore shapes.

***Entoloma stylophorum*** (Berk. & Broome) Sacc. (Fig. 15, Pl. 3.2)

*Pileus* 5-20 mm broad, to 12 mm high, campanulate with acute, conical papilla, not translucently striate, not hygrophanous, white to pale cream at centre, finely granulose to minutely squamulose-fibrillose, dull. *Lamellae* broadly adnate, segmentiform to subventricose, crowded, pinkish white with concolorous, entire edge. *Stipe* 10-20 × 2-3 mm, cylindrical, often somewhat compressed, white, glabrous, polished. *Context* white, rather tough, particularly in stipe. Smell and taste indistinct.

*Spores* 10.5-13 × 8.5-10 µm, on average 11.9 × 9.1 µm, Q = 1.2-1.4, 5-8 angled, often distorted, relatively thick-walled. *Basidia* 20-22 × 10-11 µm, clavate, clampless. *Lamella edge* fertile. *Cheilocystidia* absent. *Hymenophoral trama* regular, consisting of cylindrical hyphae, elements 60-170 × 5-15 µm, brilliant granules absent. *Pileipellis* a cutis of cylindrical hyphae, 3-9 µm wide with scattered ascending subclavate terminal elements, to 14 µm wide. Pigment absent. *Pileitrama* regular, consisting of narrow, cylindrical, 4-16 µm wide hyphae. *Brilliant granules* present in hymenophoral and pileitrama, but not abundant. *Clamp connections* absent from all tissues.

*Habitat*: on bare soil in a tropical highland rainforest at about 800 m above sea level.

*Material examined*: MAURITIUS, Black River, Piton de la Petite Rivière Noire, 29 Jan. 2003, leg. A. Hausknecht (WU 27128).

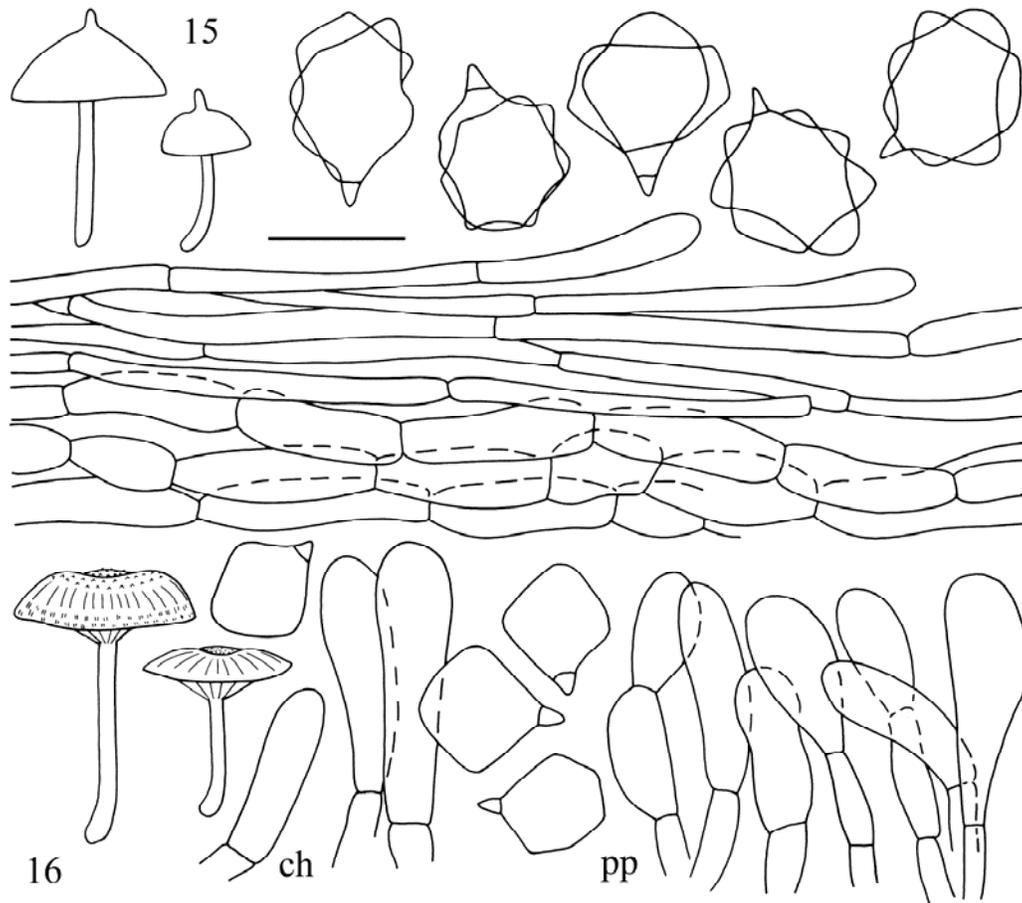
The observed material fits well with the general concept of *Entoloma stylophorum* with its whitish pileus with acute papilla, and large, distorted spores. It agrees well with the descriptions of Romagnesi (1941: 132-133) from Madagascar, Manimohan *et al.* (1995) from Kerala, India, Pegler (1986) from Sri Lanka, and Horak (1980) from various parts of S.E. Asia. Horak & Desjardin (1993) recorded a form with a sterile lamella edge with dense clusters of cylindrical to clavate cheilocystidia from Hawaii.

***Entoloma umbraphilum*** Noordel. & Hauskn., **sp. nov.** (Fig. 16, Pl. 2.5)

Mycobank: 511124

*Etymology*: umbra = shade, philum = loving, referring to the shady type locality.

*Pileus* 10-21 mm latus, plano-convexus, depressus, hygrophanus, translucido-striatus, griseo-brunneus, minute granuloso-squamulosus. *Lamellae* decurrentes, confertae, pallide griseus demum griseo-roseae. *Stipes* 15-22 × 1.5-2.5 mm, cylindraceus, pallide griseus, glaber vel leviter tomentosus. *Odore* saporeque farinaceo-rancidis. *Sporae* 7-9 × 6.5-8.5 µm, cuboideae vel 5-6-angulatae. *Acies lamellarum* sterilis. *Cheilocystidia* 20-30 × 7-13 µm,



**Figs 15-16.** 15. *Entoloma stylophorum*. Habit, spores, and pileipellis. 16. *Entoloma umbraphilum*. Habit, spores, cheilocystidia, and pileipellis. Bar = 10  $\mu\text{m}$  (spores), 20  $\mu\text{m}$  (cheilocystidia, and pileipellis).

clavata. *Pileipellis* trichoderma ex elementis clavatis, 15-45  $\times$  8-16  $\mu\text{m}$  pigmentis intracellulosis constituta. *Granulae brilliantes* absentes. *Fibulae* absentes.

**Holotypus:** Seychelles, Mahé, Val d'Endorre, on soil in shady ditch under broadleaf trees, 11 Feb. 2001, leg. A. Hausknecht (WU 27124).

*Pileus* 10-21 mm broad, plano-convex with distinctly, but slightly depressed centre, margin involute, translucently striate at margin, hygrophanous, grey-brown at centre, paler, more orange-brown towards margin, (6E3-4, 6D3; margin 5C3), somewhat darker and more uniformly greyish brown (centre to 5-6EF4) with age; minutely granulose-squamulose all over, at centre more fibrillose-squamulose with darker squamules on paler background. *Lamellae* weakly to distinctly decurrent, crowded, narrow, beige-grey at first, then with pinkish grey tinge, with flocculose, brown coloured

edge. *Stipe* 15-22 × 1.5-2.5 mm, cylindrical, beige-grey, paler than pileus, glabrous to finely tomentose, not striate. *Context* thin. *Smell* farinaceous-rancid, particularly when bruised. *Taste* rancid-farinaceous.

*Spores* 7-9 × 6.5-8.5 μm, on average 8 × 7.7 μm, Q = 1-1.1, the majority cuboid, rarely 5-6-angled. *Basidia* 23-31 × 8-11 μm, 2-spored, rarely 4-spored, clampless. *Lamella* edge sterile. *Cheilocystidia* 20-30 × 7-13 μm, clavate. *Pileipellis* a trichoderm of clavate to broadly clavate elements (15-45 × 8-16 μm), with abundant granular dark brown intracellular pigment; pileitrama regular, consisting of cylindrical to inflated hyphae, 40-100 × 10-22 μm, not constricted at septae, without brilliant granules. *Clamp connections* absent.

*Habitat*: on soil in shady ditch near broadleaf trees, tropical rain forest.

*Entoloma umbraphilum* is distinct because of the depressed, squamulose pileus, coloured lamella edge, clampless septae, and cuboid spores. *Entoloma cuboidosporum* (Beeli) E. Horak from Central Africa is a larger species with glabrous pileus, a simple cutis, and a concolorous lamella edge (Horak, 1976). *Entoloma cuboidosporum* var. *chromostomum* (Romagn. & Gilles) Eyssart., Buyck & Courtec. from Madagascar, has the same type of spores, and a coloured lamella edge, but differs, however, by a glabrous pileus, and darker stipe. *Entoloma perinfundibuliforme* Manim. & Noordel. from Kerala, India, is a larger species with much larger spores; *E. infundibuliforme* Petch from Sri Lanka resembles *E. umbraphilum* in the minutely squamulose pileus, but has a concolorous lamella edge and smaller spores (5.5-8 μm long).

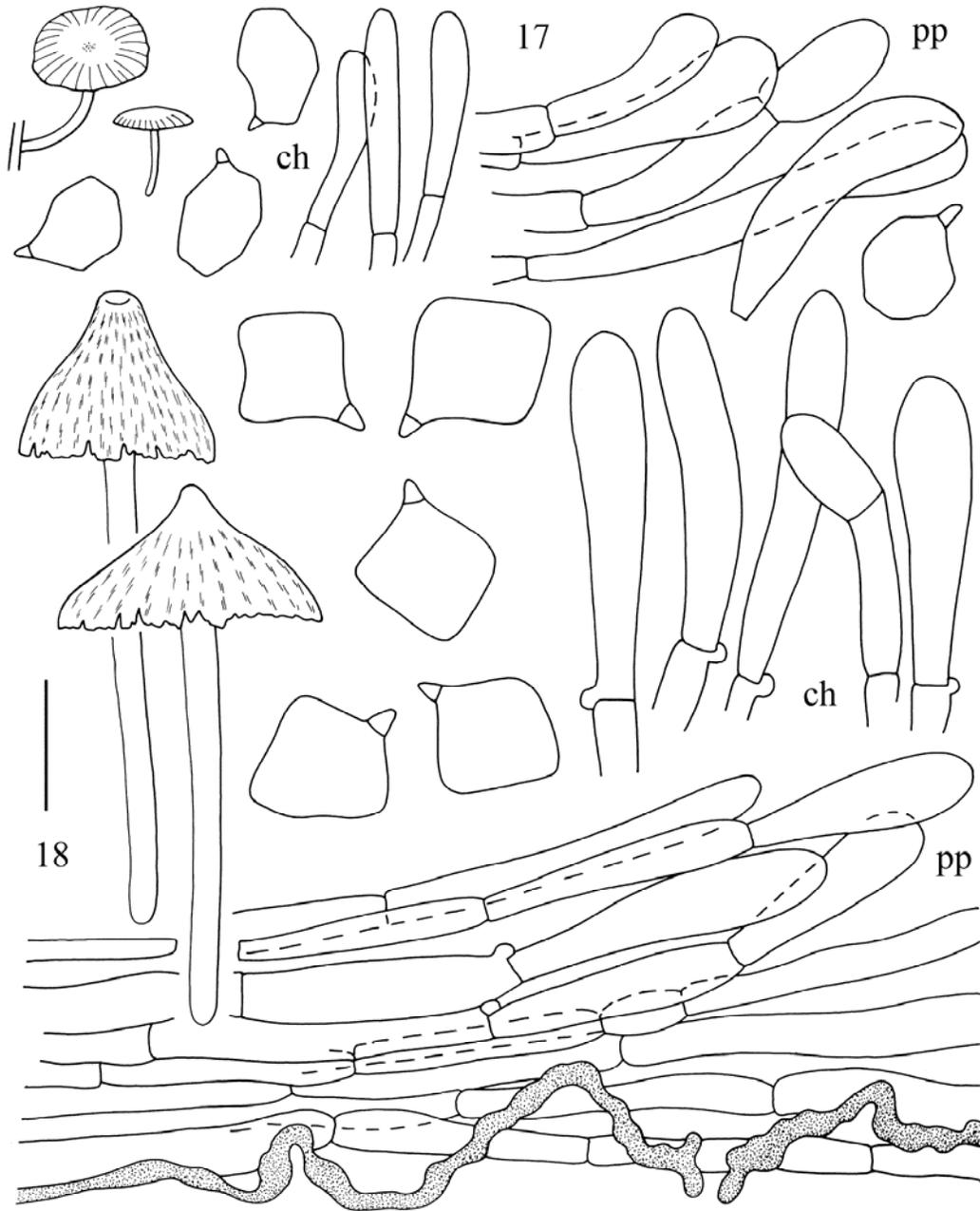
***Entoloma violaceostriatum*** Noordel. & Hauskn., **sp. nov.** (Fig. 17, Pl. 2.6)  
Mycobank: 511125

*Etymology*: violaceus = violaceous, striatus = striate, referring to the deeply translucently striate, violaceous pileus.

*Pileus* 7-12 mm latus, applanatus, depressus, hygrophanus, valde translucido-striatus, violaceus vel griseo-violaceus, minute tomentoso-squamulosus. *Lamellae* decurrentes, moderate distantes vel distantes, violaceo-griseae demum roseo-tinctae. *Stipes* 5-15 × 1 mm, cylindraceus, curvatus, pallide violaceo-griseus, politus. *Odore* saporeque nullis. *Sporae* 7-10 × 6-7 μm, 6-7-angulatae. *Acies lamellarum* sterilis. *Cheilocystidia* 30-40 × 5-8 μm, cylindracea vel clavata, septata. *Pileipellis* trichoderma ex elementis clavatis, 30-65 × 12-18 μm pigmentis intracellulosis constituta. *Granulae brilliantes* abundantes. *Fibulae* absentes.

***Holotypus***: La Réunion, Saint-Pierre, Saint-Philippe, S. B. de Mare Longue, on rocky soil in tropical rain forest, 12 Feb. 2000, leg. A. Hausknecht (WU 21103).

*Pileus* 7-12 mm broad, applanate in youth, slightly depressed at maturity, translucently striate to centre, hygrophanous, dull violaceous to violaceous grey (16E3, 16E2-3), paler violaceous grey towards margin (16D2), pallescent to white with lilac tinge (16B1-2); minutely tomentose to subsquamulose, glabrescent with age, particularly in marginal zone. *Lamellae* slightly decurrent, moderately distant to distant, narrow, violaceous grey in youth, whitish pink



**Figs. 17-18.** 17. *Entoloma violaceostriatum*. Habit, spores, cheilocystidia, and pileipellis. 18. *Entoloma virescens*. Habit, spores, cheilocystidia, and pileipellis. Bar = 10  $\mu$ m (spores), 20  $\mu$ m (cheilocystidia, and pileipellis).

with minutely flocculose, concolorous edge at maturity. *Stipe* 5-12 × 1 mm, cylindrical, often curved, violaceous grey at apex (near 16D2) when young, downwards somewhat paler, pruinose to almost hairy at apex, glabrous towards the base, polished. *Context* membranaceous. *Smell* indistinct.

*Spores* 7-10 × 6-7 μm, on average 8.1 × 6.4 μm, Q = 1.1-1.35, μm, 6-7-angled, heterodiametrical. *Basidia* 25-31 × 9-10.5 μm, 4-spored, clampless. Lamella edge sterile. *Cheilocystidia* 30-40 × 5-8 μm, cylindrical to subclavate, often septate. *Pileipellis* a trichoderm with clavate terminal cells (30-65 × 12-18 μm), with pale violaceous brown intracellular pigment. *Brilliant granules* abundant in hymenophoral and pileitrama. *Clamp connections* absent.

*Habitat*: In small groups on bare, volcanic soil. In tropical rainforest at about 250 m above sea level.

*Entoloma violaceostriatum* is another tropical member of subgenus *Cyanula* with small, violaceous fruit bodies with deeply striate pileus and small spores. *Rhodophyllus ianthomelas* Romagn. & Gilles from Gabon has darker violaceous colours and larger, more heterodiametrical spores. *Entoloma floccosodentatum* Corner & E. Horak from New Caledonia and the Solomon Islands appears similar with an amethyst blue pileus which fades with age, a flocculose, concolorous lamella edge, and a pale, whitish stipe, but that species differs by having larger spores (10-12 × 6.5-8 μm), clamped hyphae, and a cutis-like pileipellis of narrow, cylindrical hyphae.

***Entoloma virescens*** (Berk. & M.A. Curtis) E. Horak ex Courtec., sensu lato.  
(Fig. 18)

*Pileus* 10-35 mm broad, to 15 mm high, conical to acutely conical, often with slender, acute papilla, slightly hygrophanous, only slightly translucently striate when moist and with age, vivid light blue to greyish blue (21C5, 21B5, 21A5) when young and fresh, unchanging with age. *Pileus* surface radially wrinkled, often splitting from margin with age, deeply depressed at centre, like *Hygrocybe firma* (Berk. & Broome) Singer. *Lamellae* narrowly adnate, ventricose, distant, pale blue, concolorous with pileus in youth, developing pinkish rusty tinges with maturity, with irregularly serrate, concolorous edge. *Stipe* 45-70 × 1.5-3 mm, cylindrical, mostly somewhat lighter than pileus, pastel blue (22A4, 22AB4), striate with loose, concolorous fibrils, fistulose. *Context* pastel blue, without distinct smell. All parts of the fruit body stain pastel green (26A4, 27A4) within 20-30 s when bruised or cut.

*Spores* 10.5-12.5 × 10.5-12 μm, on average 11.3 × 11 μm, Q = 1-1.1, cuboid. *Basidia* 30-52 × 10-17 μm, 4-spored, clamped, with granular, brownish intracellular pigment. *Lamella* edge sterile, being a dense strand of parallel hyphae with clustered terminal elements (cheilocystidia) filled with brown

granules. *Cheilocystidia* 30-62 × 12-16 µm, cylindro-clavate. *Hymenophoral trama* regular, consisting of very long, ± cylindrical hyphae with brown granular intracellular pigment, to 16 µm wide. Vascular hyphae very abundant. *Brilliant granules* very abundant. *Pileipellis* a cutis of cylindrical hyphae with slightly ascending terminal elements, to 15 µm wide, filled with abundant granular intracellular pigment. *Pileitrama* regular, consisting of cylindrical hyphae, frequently with granular intracellular pigment. Vascular hyphae very abundant. *Brilliant granules* extremely abundant. *Clamp connections* present.

*Habitat*: In large group in grassy edge of forest road in tropical rainforest at about 250 m alt.

*Material examined*: La Réunion, Saint-Pierre, Saint-Philippe, S.B. de Mare Longue, 17 Feb. 2000, leg. A. Hausknecht (WU 21096, L).

In trying to name this collection using Romagnesi (1941), the key leads one to *Rhodophyllus holocyaneus* Romagn. in section *Psittacini*, on account of the blue-green colour of the fruit body and cuboid spores. Microscopically this species is characterized by very abundant vascular hyphae, which sometimes protrude through the hymenium and form pseudocystidia. In all parts, brilliant granules are so abundant that they hamper proper microscopical observation. Romagnesi (1941) described a few very similar species, which differ mainly in colour: *Rhodophyllus psittacinus* Romagn. has an overall green colour changing to yellow, and *Rh. cubisporus* Pat. is more uniformly indigo-blue without green tinges.

Horak (1976) placed *Rh. holocyaneus* under the synonymy of *Entoloma virescens* (Berk. & M.A. Curtis) E. Horak, originally described from the Bonin Islands, together with *Entoloma hochstetteri* (Reichardt) G. Stev. from New Zealand, and *E. aeruginosum* Hiroë from Japan. Besides *E. virescens*, Horak distinguishes *Entoloma altissimum* (Masse) E. Horak, originally described from Singapore, and includes in the synonymy *Rhodophyllus cubisporus* Pat. from Madagascar. The only difference between these two species seems to be the shape of the cheilocystidia, which are fusoid in *E. virescens* and cylindrical in *E. altissimum*, since all other characters intergrade, including the green tinges, which may be present in both *E. virescens* and *E. altissimum*. For both species, Horak gives a spore size ranging from 7-10.5 µm, which is not in agreement with the spore size given by Horak (1973) for *E. hochstetteri*, viz. 11-15 × 11-14 µm. *Entoloma virescens* has also been recorded from S. America (Pegler, 1997), with spore size 10-12(-14) × 9-11 µm, and cylindro-clavate hymenial cystidia.

Courtecuisse (1986) studied the type of *Agaricus virescens* Berk. & M.A. Curtis in Kew and determined the spore shape as cuboid, 8.8-11 µm. He also examined the type of *Entoloma aeruginosum* Hiroë, and determined the spore



**Plate 1.** 1.1. *Entoloma belouvense*. 1.2. *E. borbonicum*. 1.3. *E. candidogranulosum*. 1.4. *E. gibbosporum*. 1.5. *E. maheense*. 1.6. *E. hoyafragrans*.



**Plate 2.** 2.1. *Entoloma pallideviolaceum*. 2.2. *E. reunionense*. 2.3. *E. roseotransparans*. 2.4. *E. speciosum*. 2.5. *E. umbraphilum*. 2.6. *E. violaceostriatum*.



**Plate. 3.** 3.1. *Entoloma mauritianum*. 3.2. *E. stylophorum*. 3.3. *E. contortisporum*. 3.4. *E. mascarense* (del. Gabriele Kovacs).

shape as cuboid, 9.5-11.5(-12)  $\mu\text{m}$ . Cheilocystidia in this collection were fusiform to lageniform. These spore sizes are more in the range of our observations of the material from La Réunion.

We conclude that apparently within a very wide geographical range, from the old to the Neotropics and into the temperate regions of Japan, New Zealand, and Australia, a striking blue-green species occurs with cuboid spores, and voluminous hymenial cystidia. Careful work must be done to compare collections from over the whole geographic range, in order to estimate the degree of morphological variation, and to establish sound specific limits. It may therefore also form an interesting object for phylogeographical studies using molecular markers. For the time being we therefore list our find from La Réunion as *Entoloma virescens* sensu lato.

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