

On cuboid-spored species of *Entoloma* (Agaricales)

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Zusammenfassung

Die bekannten Arten von *Entoloma* mit kubischen bis quadratischen Sporen (s. Tafel 1) werden einer kritischen Nachuntersuchung unterzogen. Beschreibung von 12 neuen Arten: *Entoloma talisporum*, *E. albogracile*, *E. gracilius*, *E. dennisii*, *E. aurantioalbum*, *E. latericolor*, *E. naniceps*, *E. praestans*, *E. griseoalbum*, *E. canoconicum*, *E. conspicuum* und *E. mesospermum*.

In this study the attempt is made to collect and to survey all information about cuboid-spored and quadrate-spored species of *Entoloma* Fr. (= *Rhodophyllus* QUÉLET). The type material of described taxa was whenever possible examined and thus a number of so far unknown or overlooked characters have been found. These additional data helped to clarify the systematic concept of a number of species which are scattered around the world.

I have to emphasize that only the effort was made to put together those *Entoloma* species which have the unusual spores in common. Under these circumstances the arrangement of the species as presented below does not reflect the natural systematic relationships of these taxa. According to our opinion steps into that direction are rather premature.

Our personal interest in cuboid-spored species of *Entoloma* goes back to 1963 when we — for the first time — observed such fungi in the coastal rain forest of Chile. Later many more taxa with pink spore print and quadrate-cuboid spores were collected personally in New Zealand, Papua New Guinea and Southern parts of South America. On several occasions material from New Zealand was kindly submitted for study by J. DINGLEY (DSIR, Auckland). However, the most important source of information stems from the numerous collections made by Prof. E. J. H. CORNER (Cambridge) in Malaysia, Borneo and other SE-Asian localities.

At the moment the region between Malaysia and New Zealand appears to be the centre of distribution concerning cuboid-spored species of *Entoloma*. According to ROMAGNESI (1974b and personal communication) numerous new African taxa are going to be published

soon. I assume that the African species will then outnumber the ones from the Far East.

Entoloma with cuboid spores mainly occur in the tropical and subtropical belt. However, many species are also represented in forests of the temperate zones and some taxa even manage to reach as far North as Eastern Siberia and Scandinavia. In the Southern Hemisphere *Entoloma minutoalbum* is a common fungus of the sub-antarctic *Nothofagus* forests of Tierra del Fuego and New Zealand.

The first record (see also list of imperfectly known species) of an *Entoloma* with cuboid spores was published in 1857. Describing *E. virescens* from Bonin Island, BERKELEY and CURTIS did not recognize yet the particular shape of the spores. It was ROMAGNESI (1941) who discovered the dice-like spores about 80 years later studying parts of the type collection kept in Paris (PC). The second species again was reported by BERKELEY and CURTIS (1859), this time from the East coast of the United States (*E. murrayi*). Since BERKELEY's descriptions many more species were found and reported from the following countries:

Brazil — SINGER (1973); Cameroon — BRESADOLA (1890); Ceylon — BERKELEY & BROOME (1871), PETCH (1917, 1923); Congo — BEELI (1928), ROMANGESI (1956); Europe — BRESADOLA (1929), KÜHNER & BOURSIER (1929), ROMAGNESI (1974); Japan — HIROE (1939), HONGO (1956, 1960), IMAZEKI & HONGO (1969); Java — HENNINGS & NYMANN (1900); Madagascar — PATOUILLARD (1927), HELM (1936), ROMAGNESI (1941); New Zealand — REICHARDT (1866), STEVENSON (1962), HORAK (1973); Singapore — MASSEE (1916); USA — PECK (1872, 1900), HESLER (1963, 1967); Venezuela — BAKER & DALE (1951), DENNIS (1950, 1953).

Furthermore cuboid-spored species of *Entoloma* are also reported from Russia (VASSILIEVA 1973), China (TENG 1932) and Morocco (MALENCON & BERTAULT 1970).

Recently ROMAGNESI (1974b) published a revised taxonomic concept of *Entoloma*. The genus is split into the following subgenera: *Eccilia*, *Leptonia*, *Inopilus*, *Nolanea* and *Entoloma*. Cuboid spores are (according to ROMAGNESI) reported to occur in 4 of these subgenera except *Entoloma*. Analyzing the material mentioned below, at present we know also taxa from the Far East which undoubtedly belong to subgen. *Entoloma* (*E. praestans*, *E. conspicuum*). Therefore it appears that cuboid spores are to be found in all taxonomic levels (as far as known today) of the genus *Entoloma*. Based on the 43 species studied in this paper there is no evident correlation between the cuboid-quadrate spores and the macro-morphology of the fruiting-body. Cube-like spores can go with a sharp conical pileus and almost free lamellae (*E. virescens*) or with deep umbilicate caps and long decurrent lamellae as well (*E. hyalodepas*, *E. infundibuliforme*).

The same is true what presence or absence of cystidia and clamp connections are concerned. The type of cuticle also may range from repent cylindrical hyphae (forming a smooth cutis) to a distinct trichoderm or palisade. In cuboid-spored species pigments can be absent (white coloured species) or, if present, they often are dissolved in cell sap or concentrated in the vacuoles; but they also can enrust the membranes of the cuticular hyphae. Taking all these facts into consideration it is rather difficult to interpret the taxonomic value of the character „cuboid spores“ (ROMAGNESI 1933, 1937). Nevertheless it is underlined that ROMAGNESI (1941) considers *Entoloma cuboidosporum* as one of the most primitive ancestors of the „*Rhodophylli*“. This African fungus is characterized by pink spore print, cuboid spores, umbilicate pileus, decurrent partly anastomosing lamellae, smooth cuticle (cutis) and greyish to brownish colours. However, we dare to ask: why can a „primitive species“ have such complicated spores?

ROMAGNESI's (1937, 1974b) taxonomic concept of *Entoloma* is, in contrast to LARGENT (1964, p. p.), based upon the morphology of the spores. Up to 9 spore types have been described regardless of the fact that all informations were obtained from observations seen with the conventional light microscope. Everybody who once tried to make out the „diédre basal“ knows that a lot of imagination is needed to recognize it with certainty. In the course of these studies several experiments have been undertaken to find further morphological details on the spores with the help of the scanning microscope (see plate 1). The results are not fully satisfying for as a rule the membranes of the *Entoloma* spores are thin and collapse easily: hence faces get often distorted and the real geometric form is rather difficult to reconstruct. Here waits an interesting field for the taxonomist skilled in scanning microscope techniques.

In the descriptions we used the terms „quadrate“ and „cuboid“. Under the light microscope the „quadrate“ spores appear in a more or less rectangular profile and it is hard to recognize their cube-like structure. However, „cuboid“ spores show well and from all angles the 6 faces of the cube-like shape especially when the focus is moved up and down. As the different drawings show we have also included species with spores in which the faces may be 3- or 5-angled. We are aware of the fact that the delimitation based on the two above mentioned characters is not concise but useful for the time being. As underlined on several occasions these results have to be considered as a base for more elaborate studies into the intricate taxonomic pattern and relationships of the genus *Entoloma*.

Unless otherwise stated the magnifications in the figures are: fruitingbodies (natural size), spores (2000×; measurements give the

length of the cube-sides taken from one corner to the other), basidia and cystidia (1000×) and cuticle (500×, vertical section).

Type material of the new species is kept in PDD, Prof. CORNER's herbarium in Cambridge (CBS) and in the personal herbarium at the Institute of Special Botany, Federal Institute of Technology, Zürich (ZT).

Acknowledgement

We have to thank the authorities of the Department of Forests in New Zealand and Papua New Guinea who sponsored numerous collecting trips. Our thanks are due also to the Consejo Nacional de Investigaciones Científicas y Técnicas in Buenos Aires (Argentina) and the Universidad Austral in Valdivia (Chile) which helped to finance and organize excursions in Tierra del Fuego and Southern Chile.

Material was received from different Herbaria (B, G, BR, K, NY, PC, PDD, S) and the personal herbaria of E. J. H. CORNER, J. DINGLEY and T. HONGO.

I have also to thank Prof. H. R. HOHL and Mr. J. ZWICKY who kindly took the micrographs with the scanning microscope of the Laboratory of Cytology, University of Zürich.

Finally I am grateful to Prof. H. ROMAGNESI (Paris) who critically went through my manuscript.

Key to quadrate-spored and cuboid-spored species of *Entoloma*

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|-----|---|----------------|
| 1. | Pileus white to yellow | Key A (p. 174) |
| 1*. | Pileus with other colours | 2 |
| 2. | Pileus orange to red-pink | Key B (p. 190) |
| 2*. | Pileus with other colours | 3 |
| 3. | Pileus with blue to green colours | Key C (p. 196) |
| 3*. | Pileus brown | 4 |
| 4. | Pileus convex, conical or cuspidate | Key D (p. 203) |
| 4*. | Pileus umbilicate | Key E (p. 226) |

Key A

- | | | |
|-----|--|---|
| 1. | Pileus umbilicate; lamellae broadly adnate-decurrent..... | 2 |
| 1*. | Pileus cuspidate, convex to umbonate | 3 |
| 2. | Pileus — 20 mm diam., white-yellowish; stipe — 60/— 2,5 mm, yellowish; smell none; spores 6—8 m μ , cuboid; rain forest; Papua New Guinea, Solomon Isl..... 1. <i>E. talisporum</i> (p. 176) | |
| 2*. | Pileus — 20 mm, yellow; stipe — 25/— 2,5 mm, yellow; spores 8—10 m μ , cuboid; Ceylon..... 2. <i>E. hyalodepas</i> (p. 177) | |

3. Pileus convex to umbonate 4
- 3*. Pileus conical to cuspidate; cylindrical cheilocystidia present 9
4. Pileus 30—100 mm diam., yellow, glabrous; lamellae dentate-serrate, adnexed; stipe —130/—15 mm, yellowish; smell none or slightly like radish; spores 7—10 $m\mu$, cuboid; cystidia —120/—12 μ , cylindrical; oak- and rain forest; Java (type), Borneo, Papua New Guinea ... 3. *E. pallide-flavum* (p. 178)
- 4*. Carpophores smaller; lamellae not serrate-dentate 5
5. Spores 10—12,5 $m\mu$, tetrahedral-cuboid; pileus —15 mm diam., yellowish, minutely squamulose; stipe —60/—1,5 mm, white to yellowish; smell absent; cystidia —80/—8 $m\mu$, cylindrical; Eucalyptus forests; Papua New Guinea 4. *E. albogracile* (p. 180)
- 5*. Spores less than 10 $m\mu$ 6
6. Lamellae broadly adnate to subdecurrent; pileus —10 mm diam., umbonate, lemon yellow (with greenish tints); stipe —40/—2 mm, yellowish; smell absent; spores 5,5—7 $m\mu$, cuboid; cystidia none; oak forests; Papua New Guinea 5. *E. gracilius* (p. 181)
- 6*. Lamellae adnate to adnexed 7
7. Pileus —10 mm diam., white, turning pink, convex; stipe —30/—1,5 mm; smell none; spores 7—9 $m\mu$, subcuboid; cystidia none; among debris in wet localities; New Zealand (type), Tierra del Fuego (Argentina) 6. *E. minutoalbum* (p. 182)
- 7*. Pileus larger, yellow; spores cuboid; cystidia present 8
8. Pileus —30 mm diam.; stipe —50/—6 mm; spores 5,5—7,5 $m\mu$; cystidia articulate; cylindrical; under bamboo; Trinidad 7. *E. dennisii* (p. 183)
- 8*. Pileus —25 mm diam.; stipe —75/—3 mm; spores 8—10 $m\mu$; cystidia —130/—20 $m\mu$, clavate to cylindrical; broad-leaved forests, rain forests; N-America (type), Malaya, Borneo 8. *E. luteum* (p. 185)
9. Pileus —10 mm diam., brownish yellow; stipe —30/—1 mm, yellow; spores 8—10 $m\mu$, cuboid-tetrahedral; Venezuela 9. *E. avilanum* (p. 186)
- 9*. Pileus larger 10
10. Pileus —40 mm diam., yellow; stipe —80/—4 mm, yellow; spores 7—9,5 $m\mu$, cuboid; cheilocystidia cylindrical to subclavate, — 100/—12 $m\mu$; in mixed forests; Eastern USA (type), Japan, Borneo 10. *E. murrayi* (p. 187)
- 10*. Pileus —20 mm diam., beige-yellowish; stipe —75/—3 mm, whitish; spores 7,5—9,5 $m\mu$, cuboid; cheilocystidia absent; on soil in forest; Congo 11. *E. semilanceatum* (p. 189)

1. *Entoloma talisporum* CORNER & HORAK sp. n.

Pileo usque ad 25 mm lato, ex albido luteolo, umbilicato, glabro; lamellis decurrentibus; stipite -60/-2 mm, ax albido luteolo. Odore nullo. Sporis 6-8 μ , cuboideis. Ad terram in silvis tropicalibus. Holotypus (Herb. HORAK ZT 73/81): Trauna Valley, Mt. Hagen, Papua New Guinea, 28. II. 1973.

Pileus 10-25 mm diam., from the very beginning umbilicate at the centre, later becoming concave or infundibuliform, white turning yellowish, smooth to slightly radially fibrillose, striated when wet, towards the margin incurved, dry, hygrophanous. Lamellae

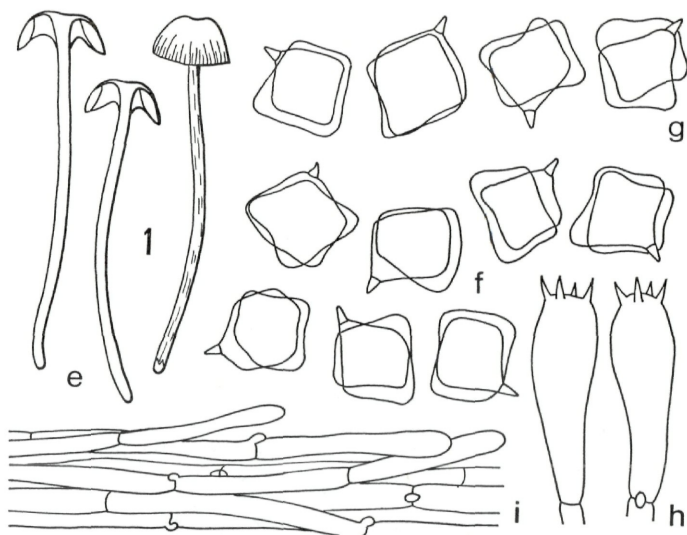


Fig. 1: *Entoloma talisporum* CORN. & HK. (type): e. carpophores. - f. spores. - h. basidia. - i. cuticle. - Coll. ZT 72/239: g. spores.

(L 8-12, l 3) subdecurrent to decurrent, white to yellowish later turning pinkish, gill edge concolorous. Stipe 20-60/1-2 mm, cylindrical, white to yellowish base with white tomentum, smooth, fistulose, dry, brittle, single. Context white to yellowish. Odour and taste not distinctive.

Spores 6-8 μ , cuboid to indistinctly tetrahedral. Basidia 30-46/10-12 μ , 4-spored. Cheilo- and pleurocystidia absent. Cuticle a cutis consisting of repent cylindrical hyphae (4-10 μ diam.), membrane not gelatinized, pigment lacking or plasmatic, clamp connections present but rare.

Habitat: On soil in (rain) forests (*Araucaria*, *Ficus*, *Castanopsis*/*Lithocarpus*. Papua New Guinea, Soloman Isl.

Illustrations: Fig. 1, e—i.

Material examined: Holotype (ZT, Herb. HORAK 73/81): „Trauna Valley, Baiyer River, Mt. Hagen, PNG, 28. II. 1973, leg. HORAK“. — ZT, Herb. HORAK 72/239: „Manki, Bulolo, Morobe District, PNG, 17. III. 1972, leg. HORAK“. — Herb. CORNER RSS 868: „Warahito River, San Cristobal, Solomon Isl., 30. VII. 1965, leg. CORNER“.

Due to the white colour and the subdecurrent lamellae this species is well characterized. Morphologically *E. talisporum* is similar to *E. rhombisporum* which differs, however, in colour of the carpophore, presence of cheilocystidia and less pronounced cuboid spores.

2. *Entoloma hyalodepas* (B. & Br.) HORAK comb. nov.

Basionym: *Ag. (Eccilia) hyalodepas* BERKELEY & BROOME 1871: *J. Linn. Soc.* 11: 540.

The original description reads as follows:

„Pileo ex umbilicato cyathiformi pallido striato; stipite flexuoso e farcto subtiliter fistuloso, lamellis ex albo carneis decurrentibus. — On the ground. Peradeniya, Dec. 1868. — Pileus 1 inch across, deeply cup-shaped, striated; margin wavy, striate, white, shaded with pink; stem 1 inch high, stuffed, running through the flesh of the pileus to the bottom of the cavity, with a slender channel in the centre;

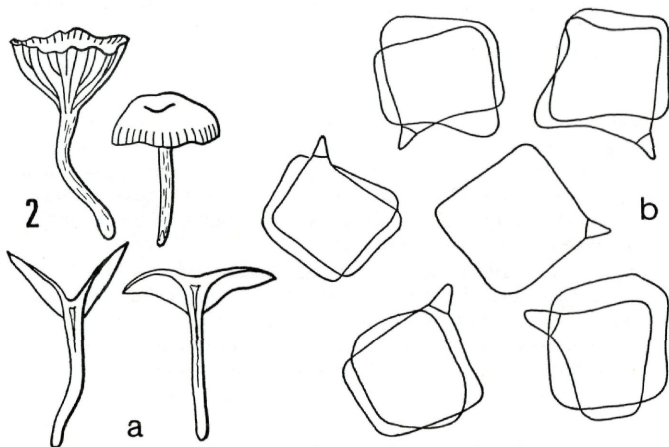


Fig. 2: *Entoloma hyalodepas* (B. & Br.) (type): a. carpophores. — b. spores

gills white, thin, narrow, slightly ventricose, decurrent, pink; spores angular to subglobose, 0.0004'—0.0005' in diam."

Spores 8—10 μ , cuboid. Basidia and cheilocystidia not observed for type material is in bad condition. Cuticle a cutis of cylindrical hyphae, clamp connections not seen.

Habitat: On soil. Ceylon.

Illustrations: Fig. 2, a—b.

Material examined: „Holotype (K): „Peradeniya, Dec. 1868; Nr. 871“. The type material (K) consists of a mixed collection: Nr. 871 represents undoubtedly the type of *E. hyalodepas*. Nr. 897 is also an *Entoloma* but its spores are pentagonal.

Among the white coloured species of cuboid-spored *Entoloma* there are only two taxa with an umbilicate pileus. *E. hyalodepas* is well separated from *E. talisporum* (which is known so far from Papua New Guinea and Solomon Isl.) due to the larger spores. The carpophores of the Ceylonese species are also much more robust und the colours of pileus and stipe are becoming yellowish in aged specimens.

3. *Entoloma pallide-flavum* (HENN. & NYM.) HORAK comb. nov.

Basionym: *Leptonia pallide-flava* HENNINGS & NYMAN 1900: Monunia 1: 18.

Pileus 30—90 mm diam., conical when young soon becoming umbonate to campanulate, old specimens expanded with obtuse umbo, margin straight, not inrolled; whitish yellow, pale yellow, colour fading when aging; dry, strongly radially innate, appressedly fibrillose, rimose but not becoming squamulose, often sulcate towards the margin, not striate, slightly hygrophanous. Lamellae adnexed to adnate, sinuate, edge often ventricose, broad (—10 mm wide), coarsely dentate-serrate at the concolorous edge, pale yellowish to yellowish becoming pink. Stipe —130/—11 mm, cylindrical or slightly attenuated towards the apex, terete, often twisted; whitish-yellowish, the villous base white, occasionally with white rhizoids; longitudinally fibrillose, apex subpruinose, dry, hollow, single. Context yellowish, waxy, sometimes giving a clear latex, unchanging. Smell and taste not distinctive, at times radish-like.

Spores 7,5—10 (10,5) μ , cuboid. Basidia 35—60/11—15 μ , 4-spored. Cheilocystidia (30) 50—120/5—12 μ , cylindrical, apex rounded, hyline, with thin-walled membranes, pigment absent. Cuticle a cutis of long cylindrical hyphae (6—12 μ diam.), plasmatic or vacuolar pigment present. Clamp connections numerous.

Habitat: On soil in forests, from sea level to 1700 m. Java (type), Borneo, Papua New Guinea.

Illustrations: Fig. 3, e—k.

Material examined: Herb. CORNER (J-8, toptotypical material!):

„Indonesia, Java, Bogor, Dungus Iwal Nature Reserve, 21. IV. 1972, leg. CORNER“. — Herb. CORNER (RSNB 2753): „North Borneo, Mt. Kinabalu, Kundasan, 4. IX. 1961, leg. CORNER“. — Herb. CORNER: „North Borneo, Mt. Kinabalu, Mesilau, leg. CORNER, 5. IV. 1964

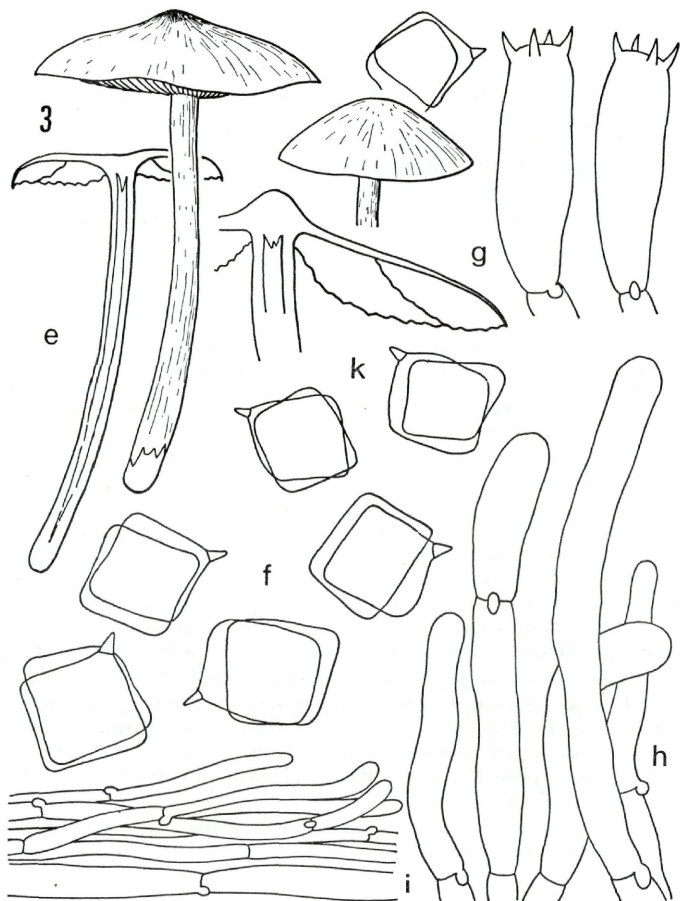


Fig. 3. *Entoloma pallide-flavum* (HENN. & NYM.): Coll. ZT 72/705: e. carpophores. — f. spores. — g. basidia. — h. cheilocystidia. — i. cuticle. — Coll. RSNB 5715 C: k. spores

(RSNB 5715 A); 19. IV. 1964 (RSNB 5715 B); 27. IV. 1964 (RSNB 5715 C); 6. V. 1964 (RSNB 8697); 2. IV. 1964 (RSNB 8077)". — ZT, Herb. HORAK 72/404: „Papua New Guinea, Morobe District, Bulolo, Manki, 25. IV. 1972, leg. HORAK". — ZT, Herb. HORAK 72/705: „Papua New Guinea, Eastern Highlands, Yonki, Bunan, 7. XII. 1972, leg. HORAK". — ZT, Herb. HORAK 72/728: „Papua New Guinea, Eastern Highlands, Kassem Pass, 13. XII. 1972, leg. HORAK".

Unfortunately the type of *E. pallideflavum* (HENN. & NYM.) was lost during World War II in the Berlin Herbarium. A few years ago Prof. CORNER, however, collected this fungus again near the type locality (Bogor). Hence the characteristics of this taxon are well known today.

E. pallideflavum shows similarities with *E. murrayi*. The latter species, however, bears a pointed cuspidate umbo and its gill edge is never serrate-dentate.

4. *Entoloma albogracile* HORAK sp. n.

Pileo usque ad 20 mm lato, e convexo umbonato, albedo vel luteolo, subsquamuloso. Lamellis adnexis. Stipite —60/—2 mm, albedo. Odore nullo. Sporis 8—12,5 μ , cuboideis. Cheilocystidiis cylindraceis. Ad terram in locis apricis. Holotypus (ZT, Herb. HORAK 72/388): Oro Bay, Popondetta, Papua New Guinea, 17. IV. 1972.

Pileus 10—20 mm diam., convex to umbonate-expanded, blunt papilla always present; white to yellowish, at centre covered with minute scales and fibrils, smooth towards the slightly striate margin, hygrophanous, dry. Lamellae (L 8—12, l 3) adnate, sometimes emarginate, ventricose towards the margin; pink to porphyry pink, gill edge concolorous, not fimbriate. Stipe 30—60/1—2 mm, cylindrical or slightly attenuated towards the apex; white, densely covered with concolorous longitudinal fibrils; often distorted, fragile, dry, single in groups. Context white, unchanging. Odour and taste not distinctive.

Spores 8—12,5 μ , cuboid to tetrahedral. Basidia 45—55/12—15 μ , 4-spored. Cheilocystidia 40—85/6—9 μ , cylindrical to subclavate, hyaline, pigment lacking, basal septa without clamp connections. Cuticle a cutis or trichoderm composed of subrepent cylindrical hyphae (5—8 μ diam.), pigment not observed. Clamp connections absent.

Habitat: On soil under *Eucalyptus*, *Deplanchea*, *Rhus* etc. in savannah-like vegetation. Papua New Guinea.

Illustrations: Fig. 4, k—o.

Material examined: Holotype (ZT, Herb. HORAK 72/388): „PNG, Northern District, Popondetta, Oro Bay, 17. IV. 1972, leg. HORAK".

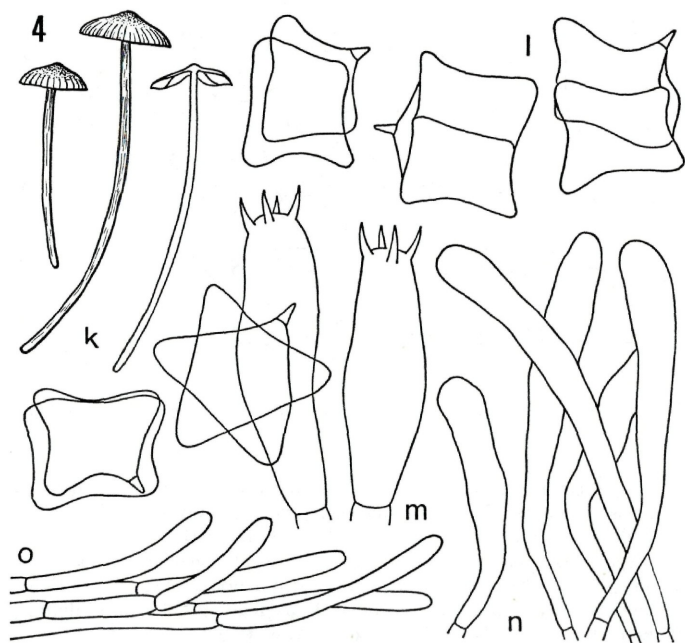


Fig. 4. *Entoloma albogracile* Hk. (type): k. carpophores. — l. spores. — m. basidia. — n. cheilocystidia. — o. cuticle

Due to the large spores the identification of *E. albogracile* is already possible with one little fragment of a lamella. Similar spores are known only from a few other taxa, i. e. *E. pinnum*, *E. marginatum* and *E. macrospermum*.

5. *Entoloma gracilius* HORÁK sp. n.

Pileo usque ad 15 mm lato, convexo umbonato, luteolo, subglabro; Lamellis adnato-subdecurrentibus. Stipite — 35/—1,5 mm, ex albido luteolo. Odore nullo. Sporis 5,5—7 μ m, cuboideis. Ad terram in silvis tropicalibus. Holotypus (ZT, Herb. HORÁK 72/711): Bunan, Kainantu, Papua New Guinea, 7. XII. 1972.

Pileus — 15 mm diam., convex with distinct and broad umbo, campanulate, yellowish (sometimes with greenish tint), slightly rugulose at centre, dry, striate, hygrophanous. Lamellae (L 8—12, l 3) broadly adnate to subdecurrent, at first yellowish turning pink,

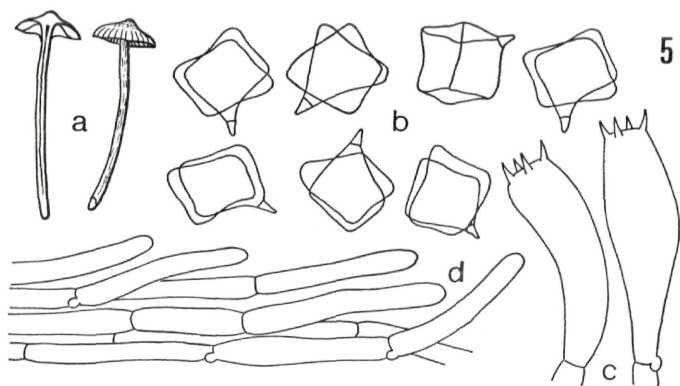


Fig. 5. *Entoloma gracilius* Hk. (type): a. carpophores. — b. spores. — c. basidia
d. cuticle

gill edge concolorous. Stipe —35/—1,5 mm, cylindrical, white to yellowish, smooth, fragile, fistulose, single. Context yellowish, often with distinct greenish tint. Odor and taste not distinctive.

Spores 5,5—7 μ , cuboid to tetrahedral. Basidia 34—40/10—14 μ , 4-spored. Cheilo- and pleurocystidia none. Cuticle a cutis or trichoderm consisting of cylindrical hyphae (6—10 μ diam.), pigment not seen. Clamp connections present.

Habitat: Among mosses on soil, in *Castanopsis/Lithocarpus* forests. Papua New Guinea.

Illustrations: Fig. 5, a—d.

Material examined: Holotype (ZT, Herb. HORAK 72/711): „PNG, Eastern Highlands, Yonki, Bunan, 7. XII. 1972, leg. HORAK“.

The small and fragile carpophores, the yellowish green tint of the umbonate pileus und the broadly adnate lamellae separate *E. gracilius* well from its New Guinean relatives.

6. *Entoloma minutoalbum* HORAK nom. nov.

= *Entoloma sordidulum* HORAK 1973: Nova Hedwigia, Beih. 43: 12 (preocc.) (nec *Rhod. sordidulus* KÜHNER & ROMAGNESI 1955: Rev. Myc. 20: 10).

Description of the Fuegian collection:

Pileus —12 mm diam., hemispherical to convex, white, aged specimens turning pink, covered with silky appressed fibrils, not striate, dry, membranaceous. Lamellae (L 5—6, l 1) emarginate-adnate, ventricose, gill edge concolorous. Stipe —20/—1,5 mm, cylindrical, often bent towards the base which is covered with fibrillose

white squamules, pruinose towards the apex, white, fragile, dry, single in groups. Context white. Odour and taste not distinctive.

Spores 6–8 μ , cuboid to quadrate. Basidia 32–40/10–12 μ , 4-spored. Cheilo- and pleurocystidia absent. Cuticle a cutis of repent cylindrical hyphae (4–10 μ diam.), membrane encrusted with pigment. Clamp connections present.

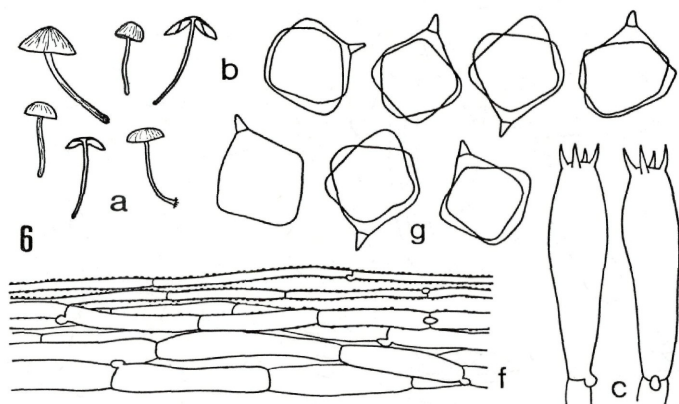


Fig. 6. *Entoloma minutoalbum* Hk. (type): g. spores. — Coll. 74/134: a. carpo-phores. — b. spores. — c. basidia. — f. cuticle

Habitat: On rotten wood or on soil in wet localities in broad leaved forests and *Nothofagus* forests. New Zealand (type), Tierra del Fuego (Argentina).

Illustrations: HORAK (1973: l. c.); Fig. 6, a–g.

Material examined: Holotype (PDD 27012): — ZT, Herb. HORAK 74/134: „Rancho Hambre, Valle Tierra Major, Tierra del Fuego, Argentina, 3. III. 1974, leg. HORAK“.

The collection from Tierra del Fuego corresponds well in all essential characters with the type from New Zealand. The small white fruitingbodies are easily overlooked for they grow preferably among debris in wet localities hidden by lush herbaceous plants.

7. *Entoloma dennisii* HORAK sp. n.

= *Entoloma murrayi* (BERK. & CURTIS) SACC. ss. BAKER & DALE 1951, ss. DENNIS 1953.

Pileo — 50 mm lato, e conico campanulato, luteo. Lamellis adnexis, luteis. Stipite — 50/–6 mm, cylindrico, pileo concolori. Odore nullo. Sporis 5,5–7 μ ,

subeuboideis. Cystidiis nullis. Fibulis praesentibus. Ad terram. Holotypus (K): Trinidad; leg. BAKER, 1714.

Pileus 10–50 mm diam., conical to campanulate with broad blunt umbo in aged specimens, margin expanded but not upturned; deep to pale yellow, fading; glabrous, dry, slightly striate. Lamellae adnexed to almost free; yellow turning pink, edge concolorous.

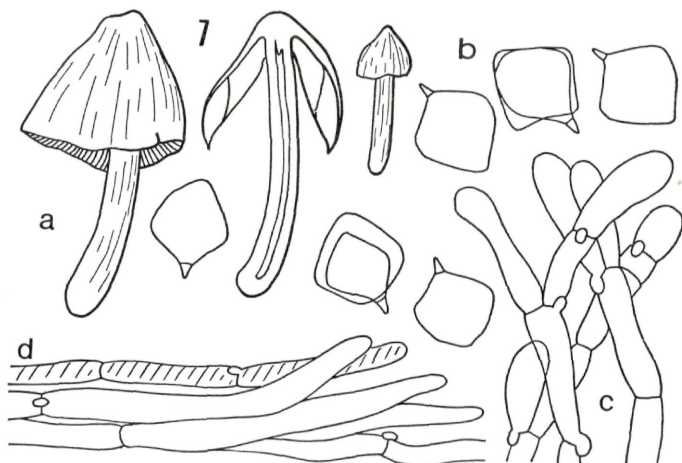


Fig. 7. *Entoloma dennisii* Hk. (type): a. carpophores. — b. spores. — c. cheilocystidia. — d. cuticle

Stipe 20–50/3–6 mm, cylindrical, concolorous with pileus, hollow, dry, glabrous. Taste and smell unknown.

Spores 5,5–7 μ , quadrate to subcuboid. Basidia not observed. Cheilocystidia articulated, terminal cells 15–50/5–9 μ , cylindrical to clavate, pigment absent, membranes hyaline. Cuticle a cutis consisting of cylindrical hyphae (5–14 μ diam.), yellow plasmatic pigment present. Clamp connections numerous.

Habitat: On soil in bamboo plantation. Trinidad.

Illustrations: BAKER & DALE (1951); DENNIS (1970); Fig. 7, a–d.

Material examined: Holotype (K): „Trinidad, St. Joseph, leg. BAKER, 1714“.

Studying the collection made by BAKER in Trinidad we found that the spores are considerably smaller than indicated in the original description. Hence this fungus does not represent *E. murrayi* ss. BERKELEY and CURTIS and therefore we propose a new species.

8. *Entoloma luteum* PECK 1900

N. Y. State Mus. Ann. Rep. 54: 146.

Pileus 10–40 mm diam., convex to hemispherical, obtusely subcampanulate, never with pointed conical papilla; pale to deep yellow, fading in aged carpophores; dry, hygrophanous, striate, glabrous to fibrillose, disk squamulose. Lamellae adnexed to almost free, ventricose, subdistant; whitish turning pale yellow, finally pink, edge concolorous, fimbriate. Stipe 35–70 (100)/2–4 (5) mm, cylindrical, equal, slender, often twisted; concolorous with pileus or paler, base white; dry, slightly fibrillose, striate, hollow, brittle, single. Context pale yellowish, thin. Odour and taste not distinctive. Chemical reactions unknown.

Spores 7,5–10 μ , cuboid. Basidia 35–55/10–14 μ , 4-spored. Cheilocystidia 30–130/7–15 (18) μ , cylindrical to subclavate, hyaline, thin-walled, pigment absent, in dense clusters on edge.

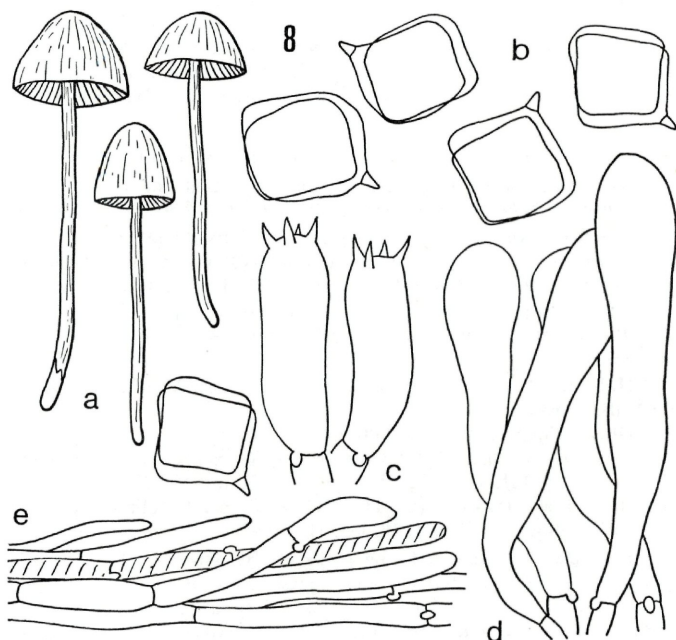


Fig. 8. *Entoloma luteum* PECK (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle

Cuticle a cutis composed of cylindrical hyphae (6–15 μ diam.), with yellow plasmatic pigment. Clamp connections numerous.

Habitat: On soil in forests; sea level up to 2700 m (Borneo). Eastern parts of USA (type), Borneo, Malaya.

Illustrations: PECK (1900); Fig. 8, a–e.

Material examined: Holotype (K): „Floodwood, leg. C. H. PECK“. — Herb. HESLER (22397): „USA, Tennessee, Cades Cone, 8. IX. 1956, leg. HESLER“. — Herb. CORNER (CBS, Ent. 15): „Malaya, Johore, Sedili River, Sungei Kayu, 22. X. 1939, leg. CORNER“. — Herb. CORNER: „Borneo, Mt. Kinabalu, East Ridge, 28. VI. 1961, leg. CORNER“.

According to PECK's original painting *E. luteum* is characterized by a hemispherical to convex pileus. However, we do not know yet the range of variation of this character in particular. In any case *E. luteum* is a close relative to *E. murrayi* which differs mainly in its cuspidate pileus. What the microscopical characters are concerned there are no differences between the two species. Nevertheless we treat here the two taxa as independent species. Further research and field observations in the forests of the North American East will show whether this opinion is correct or not. See also HESLER (1967).

9. *Entoloma avilanum* (DENNIS) HORAK comb. nov.

Basionym: *Nolanea avilana* DENNIS 1950: Kew Bull. 15: 151.

Synonym: *Entoloma ochraceum* HESLER 1967: Nova Hedwigia Beih. 23: 23.

For the macroscopical description see DENNIS (1950):

Spores 8–10 μ , cuboid. Basidia 40–46/10–12 μ , 4-spored. Cheilocystidia 90–120/6–13 μ , cylindrical, membrane hyaline, pigment absent. Cuticle a cutis composed of cylindrical hyphae (5–10 μ diam.), localisation of pigment unknow. Clamp connections numerous.

Habitat: On rotten wood, among mosses. Venezuela (type), USA (S. Carolina).

Illustrations: DENNIS (1950); Fig. 9, a–g.

Material examined: Holotype (K): „Venezuela, Dstro. Federal, El Avila, 17. VIII. 1958, leg. DENNIS“. — Holotype of *E. ochraceum* HESLER: Herb. HESLER (29444): „USA, South Carolina, Carolyne lyles, Winnsboro, 17. IX. 1966, leg. HESLER“.

E. avilanum appears to be a distinctive species (characterized by its small size, pointed cuspidate pileus and shape of spores and cheilocystidia) which obviously has close relationships with *E. murrayi* and *E. semilanceatum*. According to the macroscopical and microscopical details *E. avilanum* and *E. ochraceum* HESLER are considered synonymous.

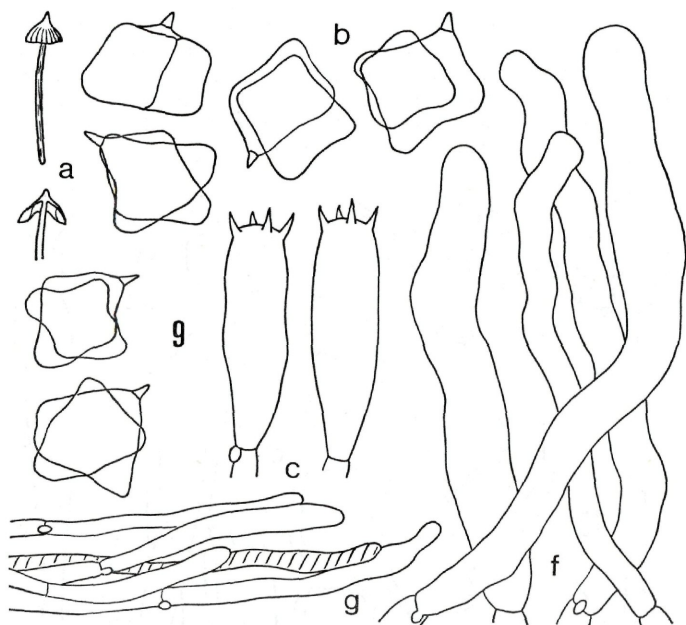


Fig. 9. *Entoloma avilanum* (DENNIS) (type): a. carpophores. — b. spores. — c. basidia. — f. cheilocystidia. — g. cuticle

10. *Entoloma murrayi* (BERK. & CURT.) SACC. 1899
Syll. Fung. 14: 127.

Basionym: *Agaricus murrayi* BERKELEY & CURTIS 1859: Ann. Mag. Hist. 4: 289.

Synonym: *Agaricus cuspidatus* PECK 1872: N. Y. State Mus, Ann. Rep. 24: 64.

Pileus — 40 mm diam., conical to conico-campanulate, with permanent conical, pointed or cuspidate papilla, never convex (?); deep to pale yellow, fading to ochraceous or ochraceous buff; dry, innately fibrillose, shiny, striate when wet. Lamellae adnexed to adnate, sometimes with short decurrent tooth; white to pale yellowish, yellow turning pink, edge concolorous, uneven to serrate-fimbriate, scarcely crowded, ventricose in aged specimens. Stipe 30—80 (120/2—4 (5) mm, cylindrical, equal or slightly attenuated towards the apex, often twisted; concolorous with pileus or paler, white at the base; dry, hollow, apically glabrous to pruinose, appressed fibrillose

towards the base, single. Context pale yellow. Taste and odour not distinctive or slightly like radish. Chemical reactions none.

Spores 7–9,5 μ , cuboid. Basidia 45–60/10–15 μ , 4-spored. Cheilocystidia 45–100/6–12 μ , cylindrical to subclavate, hyaline, membrane thin-walled, pigment absent, forming a sterile edge in scattered clusters. Clamp connections none.

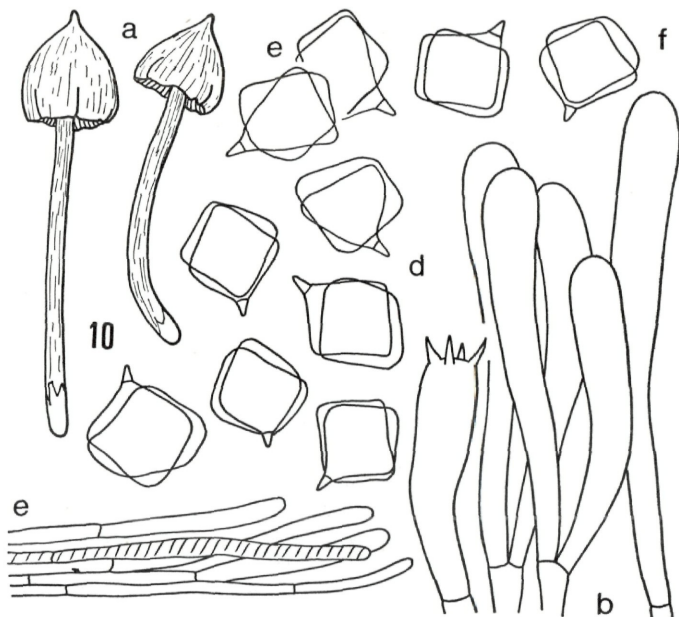


Fig. 10. *Entoloma murrayi* (B. & C.) (type): d. spores. — Coll. Hesler 26276: a. carpophores. — b. basidia and cheilocystidia. — e. cuticle. — Coll. RSNB 2756: f. spores. — Coll. ZT 70/308: e. spores

Habitat: On soil in forests, from sea level up to 1700 m (Borneo). Eastern USA (type), Siberia, Japan, Borneo.

Illustrations: PECK (1872); IMAZEKI & HONGO (1969); Fig. 10, a–e.

Material examined: Holotype (K): „New England, leg. MURRAY“ — Herb. HESLER (26276): „USA, Tennessee, Cades Cone, 3. VIII. 1964, leg. HESLER“. — Herb. HONGO (185): „Japan, Otsu, Seta-Minamiokaya,

10. VII. 1951, leg. HONGO¹¹. — Herb. CORNER (RSNB 2756: „Borneo, Mt. Kinabalu, Kundasan, 4. IX. 1961, leg. CORNER¹¹. — Herb. CORNER (RSNB 5848 A, B): „Borneo, Mt. Kinabalu, Mesilau, 17. III. and 25. IV. 1964, leg. CORNER¹¹. — *Entoloma murrayi* (B. & C.) f. *alba* (HIROE) HONGO.

Material examined: Herb. HONGO (505): „Japan, Otsu, Seta-Minamiökaya, 4. X. 1972, leg. HONGO¹¹. — Herb. CORNER (RSNB 8528): „Borneo, Mt. Kinabalu, Mesilau, leg. CORNER¹¹.

The area of distribution of this eye-catching fungus spreads from the Eastern regions of the USA to Borneo where this species was gathered by Prof. CORNER in the submontane forests on the slopes of Mt. Kinabalu (between 1300 m and 1700 m).

11. *Entoloma semilanceatum* (ROMAGNESI) HORAK comb. nov.

Basionym: *Rhodophyllus* (*Nolanea*) *semilanceatus* ROMAGNESI 1956: Bull. Jard. Bot. Brux. 26: 144.

For macroscopical description see ROMAGNESI (1956):

Spores 7,5–9,5 μ , cuboid. Basidia 32–43/8–9 μ , 4-spored. Cheilocystidia and pleurocystidia absent. Cuticle a cutis consisting

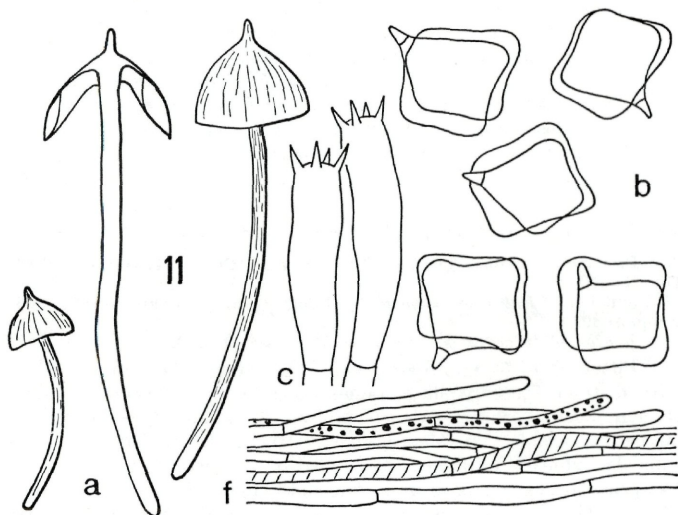


Fig. 11. *Entoloma semilanceatum* (ROMAGNESI) (type): a. carpophores. — b. spores. — c. basidia. — f. cuticle

of repent cylindrical hyphae (4–6 μ diam.), pigment vacuolar. Clamp connections absent.

Habitat: On soil in forests. Congo.

Illustrations: ROMAGNESI (1956); Fig. 11, a–f.

Material examined: Holotype (BR): „Congo, Binga, X. 1923, leg. M. GOOSSENS-FONTANA (900)“.

E. semilanceatum is separated from *E. murrayi* due to the different colours of the carpophores (towards the margin of the pileus greenish tints are reported) and the absence of cheilocystidia and pleurocystidia as well. Morphologically the two taxa are very much alike.

Key B

1. On soil; cheilocystidia clavate-cylindrical, conspicuous; pileus —50 mm diam., conical, campanulate or cuspidate, orange to pink with orange-yellow tints, lamellae and stipe concolorous (at least in young specimens); spores 7–10 μ , cuboid. In forests. USA (type), Japan, China, Borneo, Malaya, Borneo, Papua New Guinea, Madagascar 12. *E. quadratum* (p. 190)
- 1*. On rotten wood; cheilocystidia fusoid 2
2. Pileus —30 mm diam., orange-brown, squamulose at disc; stipe —80/—3 mm, white to yellowish; spores 6–9 μ ; cheilocystidia and pleurocystidia fusoid; Malaya..... 13. *E. aurantio-album* (p. 193)
- 2*. Pileus —40 mm diam., brick red to red-cinnamon, smooth to fibrillose; stipe —90/—2,5 mm, pink; spores 7–11 μ ; cheilocystidia fusoid-capitate, constricted; New Zealand... 14. *E. latericolor* (p. 194)

12. *Entoloma quadratum* (BERKELEY & CURTIS) HORAK comb. nov.

Basionym: *Nolanea quadrata* BERKELEY & CURTIS 1859: Ann. Nat. Hist. 4: 290.

Synonym: *Entoloma salmoneum* (PECK 1872) SACCARDO 1887: Syll. Fung. 5: 693.

Rhodophyllus lactifluus HEIM 1936: Rev. Myc. 1: 223.

Pileus up to 60 mm diam., conical to campanulate, more or less with distinct acute papilla; orange-brown to orange-yellow, orange salmon, ageing colours fading; glabrous becoming rimose-fibrillose, cuticle separable, membranaceous, striate, hygrophanous, dry. Lamellae adnexed to almost free, crowded, ventricose; salmon orange to apricot orange turning pink, fimbriate edge concolorous or paler. Stipe —110/—6 mm, cylindrical, often twisted, often attenuated towards the pruinose apex; orange-brown, more or less concolorous with pileus or paler; dry, striate fibrillose, hollow, single. Context

orange to salmon, with transparent latex when cut. Taste and smell not distinctive. Chemical reactions unknown.

Spores 7–10 μ , cuboid. Basidia 35–65/10–14 μ , 4-spored. Cheilocystidia —120/–15 μ , cylindrical to clavate, in dense clusters

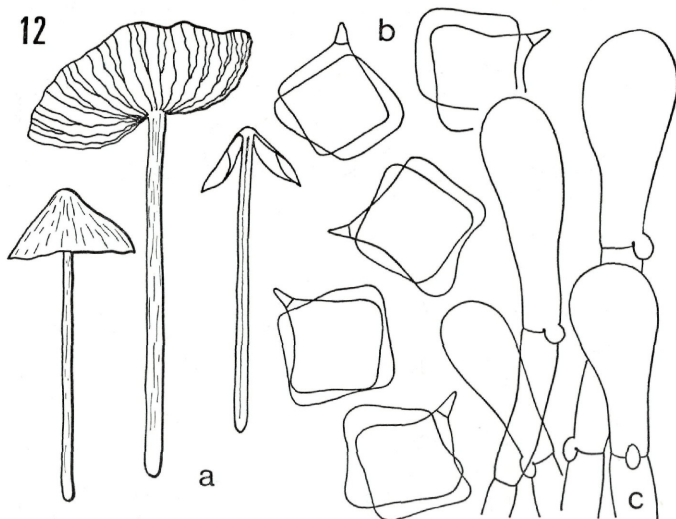


Fig. 12. *Entoloma quadratum* (B. & C.) (type): a. carpophores. — b. spores. — c. cheilocystidia

on sterile edge, membrane thin-walled, hyaline, pigment absent. Cuticle a cutis consisting of repent cylindrical hyphae (7–12 μ diam.), plasmatic pigment present, lacticifers numerous in hypoderm. Clamp connections present.

Habitat: On soil in forests, sea level up to 1800 m (Borneo). USA (type), Siberia, Japan, China, Malaya, Singapore, Borneo, Papua New Guinea, Madagascar.

Illustrations: PECK (1872); HELM (1936); HESLER (1967); IMAZEKI & HONGO (1971); Fig. 12, a–c, d–h.

Material examined: Holotype (K): „USA, New England, IX. 1856, leg. SPRAGUE (890)“. — Holotype of *Ag. salmoneus* PECK (NY): „USA, Sandlake, VIII, leg. PECK“. — Herb. HESLER (21870): „USA, North Carolina, 16. VII. 1955, leg HESLER“. — Herb. HONGO (1039): „Japan, Otsu, Seta-Minamiokaya, 6. X. 1954, leg. HONGO“. —

Herb. CORNER (Ent. 12): „Singapore, Reservoir Jungle, 4. IX. 1939, leg. CORNER“. — Herb. CORNER (Ent. 9 B): „Singapore, Bukit Timah, 4. IV. 1941, leg. CORNER“. — Herb. CORNER (RSNB 1823): „Borneo, Mt. Kinabalu, Bembangan River, 18. VIII. 1961, leg. CORNER“. — Herb. CORNER (RSNB 5760): „Borneo, Mt. Kinabalu, Mesilau, 12. III. 1964, leg. CORNER“. — Herb. CORNER (RSNB

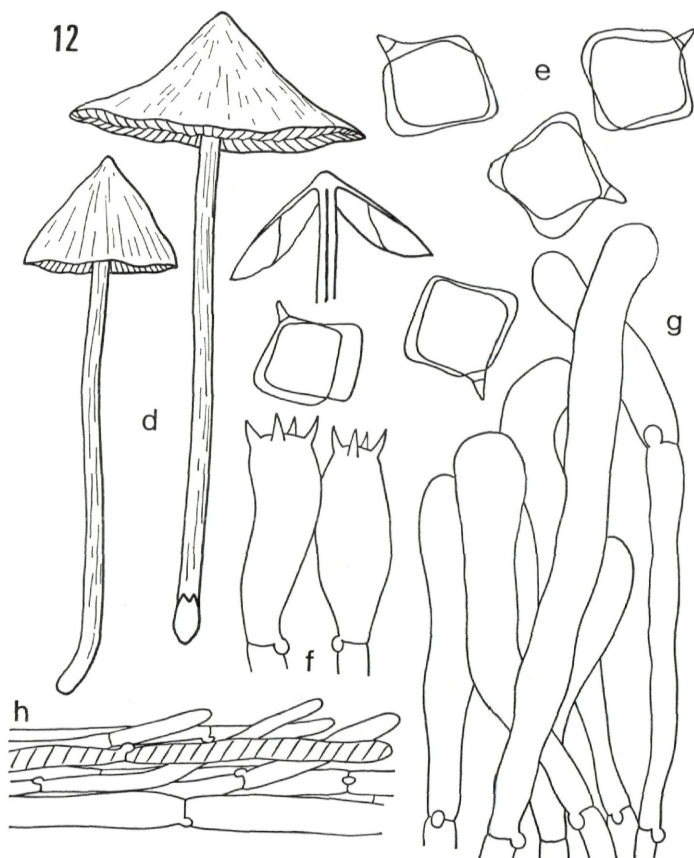


Fig. 12. *Entoloma quadratum* (B. & C.) (type): d. carpophores. — e. spores. — f. basidia. — g. cheilocystidia. — h. cuticle

8496): Borneo, Mt. Kinabalu, Mesilau, 29. IV. 1964, leg. CORNER⁴⁴. — ZT, Herb. HORAK 72/284: „Papua New Guinea, Morobe District, Bulolo, Manki, 22. III. 1972, leg. HORAK⁴⁴. — ZT, Herb. HORAK 73/111: Papua New Guinea, Morobe District, Bulolo, Manki, 20. III. 1973, leg. HORAK⁴⁴. — ZT, Herb. HORAK 73/21: „Papua New Guinea, Morobe District, Lac, Igam Range, 23. I. 1973, leg. HORAK⁴⁴. — Holotype of *Rhod. lactifluus* HEIM (PC, lost?). — Herb. CORNER (RSNB 8496): „Borneo, Mt. Kinabalu, Mesilau, 29. IV. 1964, leg. CORNER⁴⁴. — Herb. CORNER (P-70): „Malaya, Penang, 29. VII. 1972, leg. CORNER⁴⁴.

After some hesitation we consider now *E. salmoneum* (PECK) and *Rhod. lactifluus* HEIM as synonyms of *E. quadratum* (B. & C.). Formulating this opinion we expect criticism from various quarters. However, comparing the results of the numerous collections studied we could not find convincing characters to separate these taxa.

According to our observations in Papua New Guinea the colours of *E. quadratum* (B. & C.) in particular can change considerably in time and from fungus to fungus even in the same population. The orange component is fading out quickly and is giving way to pink, apricot or pale yellow colours.

13. *Entoloma aurantio-album* CORNER & HORAK sp. n.

Pileo usque ad 30 mm lato, convexo dein umbonato-expanso, aurantiaco brunnescente. Lamellis adnexo-subliberis. Stipite —80/—3 mm, cylindraceo, ex albo flavido. Ad lignum. Malaya-Singapore. Typus (Ent. 12 B): Selitar Forest, Singapore, 3. XI. 1941.

Pileus up to 30 mm diam., at first convex soon becoming plane or concave with a low indistinct umbo, margin undulate; orange-yellow when young turning tawny orange or brownish ochraceous, disc densely covered with fuscous squamules, fuscous fibrils towards the striate margin; dry, membranaceous, hygrophanous. Lamellae adnexed to adnate, occasionally with decurrent tooth, scarcely crowded; white turning pink, edge concolorous, even. Stipe 40—80/2—3 mm, equal or attenuated towards the apex; white turning pale yellow, base white and villous; cartilagineous, hollow, subfibrillose, dry, single. Context brownish-yellowish. Odour and taste not distinctive.

Spores 5.5—9 μ cuboid. Basidia 30—45/9—12 μ 4-spored. Cheiloecystidia 45—75/10—16 μ fusoid apex conical-rounded or slightly capitate membranes hyaline thin-walled pigment absent. Cuticle a cutis or trichoderm of fasciculate cylindrical or clavate cells (12—25 μ diam.) with brown plasmatic pigment present. Clamp connections numerous.

Habitat: On rotten wood in forests. Singapore, Malaya.

Illustrations: Fig. 13 a—e.

Material examined: Holotype (Herb. CORNER, Ent. 12 B):

„Singapore, Selitar Forest, 3. XI. 1941, leg. CORNER“. — Herb. CORNER (Ent. 7 A): Malaya, Johore Gunong Pulau 24. XI. 1940 leg. CORNER“.

This orange coloured species differs from *E. quadratum* (B. & C.) in a number of characters: colour of stipe, shape of cystidia, smaller spores and different habitat.

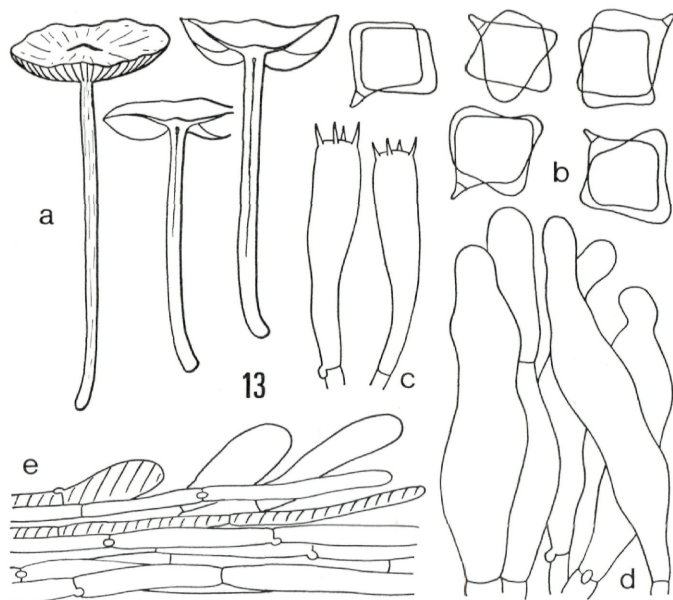


Fig. 13. *Entoloma aurantio-album* CORN. & HK. (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle

14. *Entoloma latericolor* HORAK sp. n.

Pileus usque ad 35 mm lato, convexo-campanulato, e cinnamomeo lateritio. Lamellis subliberis. Stipite —90/—4 mm, cylindraceo, roseobrunneo. Sporis 7—11 μ , cuboideis. Cheilocystidiis fusoidocapitatis, apicem versus contractis. Ad terram vel lignum putridum. Nova Zelandia. Typus (PDD 30274): Waipoua, 16. IV. 1972.

Pileus up to 35 mm diam. convex or indistinctly campanulate, without conspicuous umbo or papilla, old carpophores plane; cinnamon brown to brick red with radial buff to rosy buff streaks; dry glabrous to slightly fibrillose or hairy, striate hygrophanous. Lamellae free

to adnexed ventricose (—5 mm wide) distant; cinnamon when young turning brick red. Stipe 50—90/3—4 mm cylindrical or attenuated towards the apex; rosy buff with touches of brick red-base white; fibrillose dry hollow fragile single. Context pale brownish to brick red. Odour and taste not distinctive. Chemical reactions unknown.

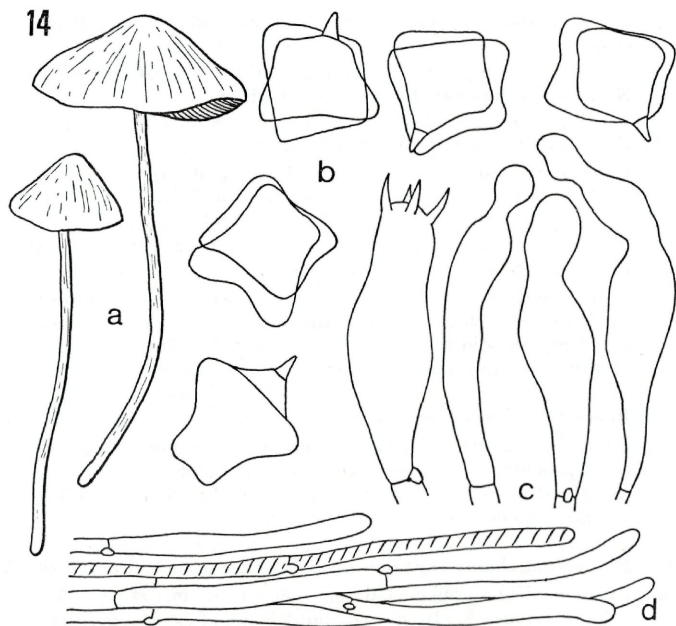


Fig. 14: *Entoloma latericolor* Hk. (type): a. carpophores. — b. spores. — c. basidia and cheilocystidia. — d. cuticle

Spores 7—11 μ . cuboid. Basidia 45—50/14—16 μ . 4-spered. Cheilocystidia 50—70/8—12 μ . fusoid with capitate apex sometimes several constrictions near the neck, membrane hyaline thin-walled, pigment absent. Cuticle a cutis of repent cylindrical hyphae (4—8 μ . diam.) plasmatic pigment present, membranes notgelatinized. Clamp connections numerous.

Habitat: On rotten wood of *Agathis australis*. New Zealand.
Illustrations: Fig. 14 a—d.

Material examined: Holotype (PDD 30274): „New Zealand,

N of Auckland, Hobson Co., Waipoua Forest, 16. IV. 1972, leg. DINGLEY⁶⁶.

Like the Malayan *E. aurantio-album* C. & Hk. this species also grows on rotten wood. The two taxa, however, are distinguished by the colours, the shape of the cystidia and the size of the spores.

Key C

1. Pileus umbilicate, very small, —6 mm diam., blue-lilac; stipe —20/—1 mm, concolorous; lamellae subdecurrent; spores 5,5—8 μ , cuboid to rhomboid; cheilocystidia none; Nothofagus forests; Papua New Guinea 15. *E. naniceps* (p. 196)
- 1*. Pileus larger, convex to conical..... 2
2. Pileus purple to purple-brown, —35 mm diam., convex; stipe —55/—5 mm, purple; spores 9—12 μ ; cheilocystidia —110/—15 μ , fusoid, constricted; New Zealand..... 16. *E. colensoi* (p. 197)
- 2*. Pileus green-olive, blue-green, blue 3
3. Young and old fruitingbodies olive-green, without bluish tints; pileus —50 mm diam.; stipe —70/—4 (10) mm; spores 7—11 μ , cuboid to quadrate; cheilocystidia absent, pseudocystidia present; Madagascar (type), New Zealand..... 17. *E. psittacinum* (p. 198)
- 3*. Pileus blue (brown) or blue-green 4
4. Pileus blue-brown (colour remains and does not change in aged specimens), rugulose, —100 mm diam., broadly umbonate, robust; stipe —100/—15 mm; spores small, quadrate, 4,5—5,5 μ ; cheilocystidia absent; Solomon Isl. 18. *E. praestans* (p. 199)
- 4*. Blue colour changes or fades into bluish green or bluish yellow 5
5. Pileus conical to subcuspidate, —50 mm diam.; stipe —70/—3 mm; spores 8—10 μ ; (pseudo)cystidia fusoid, sometimes strangulated; mixed forests; Bonin Isl. (type), Japan, New Zealand, Papua New Guinea, Madagascar, Malaya, Ceylon 19. *E. virescens* (p. 200)
- 5*. Pileus conical-umbonate, —50 mm diam.; stipe —120 (150)/—5 mm; spores 7—10,5 μ ; cheilocystidia —110/—12 μ , cylindrical; in mixed forests; Singapore (type), Borneo, Madagascar 20. *E. altissimum* (p. 203)

15. *Entoloma naniceps* HORAK sp. n.

Pileo usque ad 6 mm lato, convexo depresso, umbilicato, azureoilacino, sicco. Lamellis late adnatis. Stipite —20/0,5—1 mm, cylindraceo, lilacino. Sporis 5,5—8 μ , quadrangulatis vel rhomboideis. Ad terram in silvis nothofagineis. Nova Guinea. Typus (ZT 73/254): Mt. Kaindi, 23. II. 1973.

Pileus up to 6 mm diam., at first convex soon becoming depressed at centre finally slightly umbilicate; blue to lilac colours not fading in aged specimens; immately fibrillose, at times disk minutely squamulose, dry, margin not striate. Lamellae broadly adnate, not decurrent; at first white with bluish tint becoming pink, edge concolorous, even. Stipe — 20/0,5—1 mm, cylindrical, equal, slender, brittle; lilac to blue, base white; solid, dry, single. Context; blue in pileus. Odour and taste not distinctive. Chemical reactions unknown.

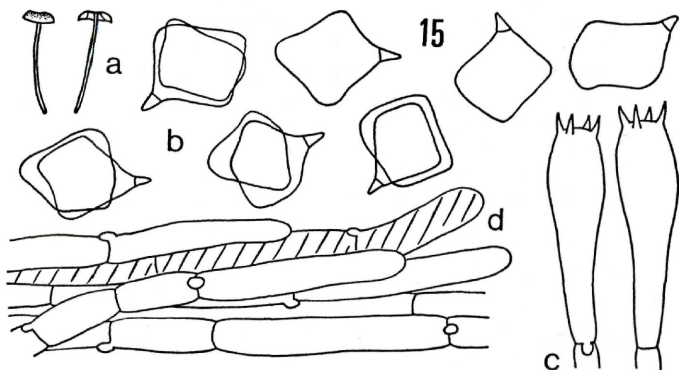


Fig. 15: *E. naniceps* Hk. (type): a. carpophores. — b. spores. — c. basidia. — d. cuticle

Spores 5,5—8 $m\mu$, quadrate to rhomboid or subcuboid. Basidia 30—40/10—12 $m\mu$, 4-spored. Cystidia absent. Cuticle a cutis of repent cylindrical hyphae (8—15 $m\mu$ diam.), with blue plasmatic pigment. Clamp connections numerous.

Habitat: On soil among mosses in forests (*Nothofagus carrii*), above 2100 m. Papua New Guinea.

Illustrations: Fig. 15. a—d.

Material examined: Holotype (ZT, Herb. HORAK 73/254): „PNG, Morobe District, Wau, Mt. Kaindi, 23. II. 1973, leg. HORAK“.

16. *Entoloma colensoi* STEVENSON 1962

Kew Bull. 16: 229.

For full description see HORAK (1973).

Habitat: On soil among litter in forests. New Zealand.

Illustrations: HORAK (1973).

Material examined: Holotype (K). — PDD 30265: „New Zealand, N. Auckland, Waipoua forest, under *Agathis australis*, 17. IV. 1972, leg. ASTRIDGE“.

The collection PDD 30265 agrees both in macroscopical und microscopical characters with the type material. However, there is one exception. STEVENSON describes *E. colensoi* as a fungus with plano-convex pileus whereas the fruitingbodies of the collection PDD 30265 are distinctly conical. Unfortunately we do not know whether STEVENSON described the fungus originally from dried (pressed!) material or not. Supposed the description was taken from badly preserved material we do not doubt that the shape of the pileus is not convex but conical. Further collections (preferably from the type locality) will help to resolve this question.

17. *Entoloma psittacinum* (ROMAGNESI) HORAK comb. nov.

Basionym: *Rhodophyllus psittacinus* ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 89.

Description of the New Zealand collection:

Pileus up to 35 mm diam., conical to campulate, margin not upturned; olivaceous, dull green to greenish glaucous, colours fading

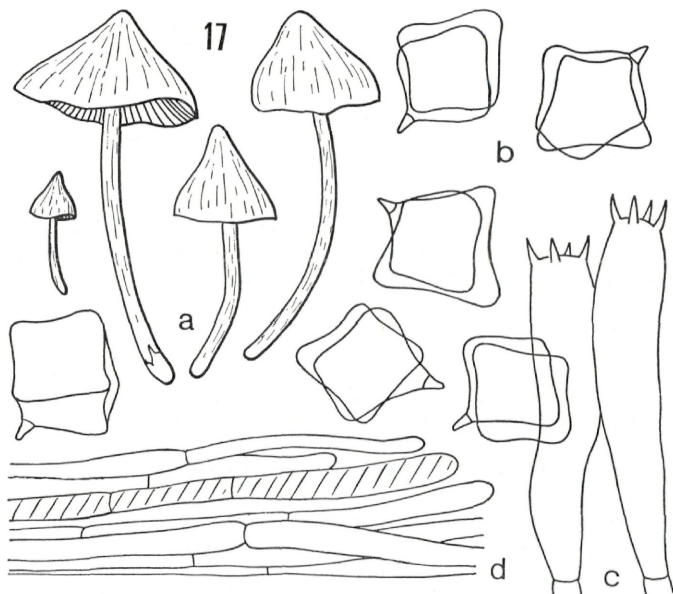


Fig. 17. *Entoloma psittacinum* (ROMAGNESI): Coll. PDD 29898: a. carpophores. — b. spores. — c. basidia. — d. cuticle

in aged specimens; fibrillose, dry, indistinctly striate, hygrophanous, membranaceous. Lamellae almost free to adnexed, ventricose, crowded; concolorous with pileus, edge even, not coloured. Stipe —60/—4 mm, cylindrical, occasionally attenuated towards the apex; olivaceous to glaucous, base white; striate silky, dry, twisted, brittle, hollow, single in groups. Context greenish. Odour and taste not distinctive. Chemical reactions unknown.

Spores 7—11 $m\mu$, cuboid. Basidia 50—70/11—13 $m\mu$, 4-spored. Cheilocystidia absent. Pseudocystidia not observed. Cuticle a cutis composed of repent cylindrical hyphae (4—15 $m\mu$ diam.), pigment plasmatic, membranes not gelatinized. Clamp connections lacking.

Habitat: On soil in forests. Madagascar (type), New Zealand.

Illustrations: ROMAGNESI (1941); Fig. 17, a—d.

Material examined: Holotype (PC): „Madagascar, près l'Ankadirano, sous Ravenala madagascariensis, 7. XI. 1934, leg. HEIM“. — PDD (29898): „New Zealand, Hunua Range, Mangatangi Gorge, under *Nothofagus truncata*, 26. IV. 1972, leg. DINGLEY“.

18. *Entoloma praestans* CORNER & HORAK sp. n.

Pileo usque ad 100 mm lato, umbonato-expanso, fusco azureo, ruguloso, sicc. Lamellis emarginato adnatis. Stipite —100/—15 mm, cylindrico, azureo,

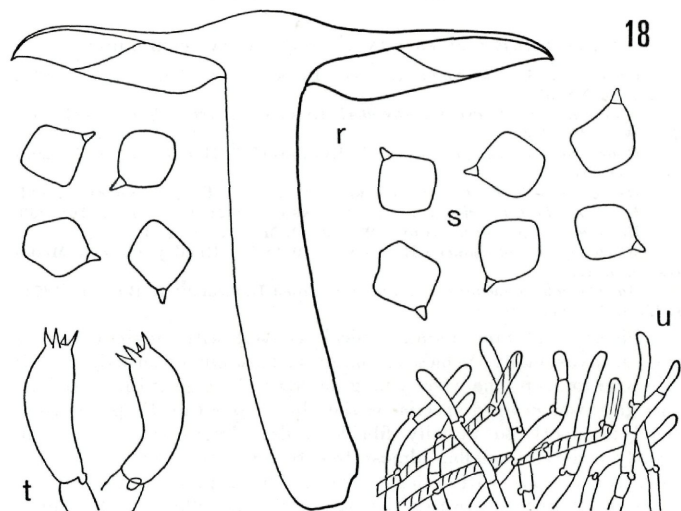


Fig. 18. *Entoloma praestans* CORN. & HK. (type): r. carpophore. — s. spores. — t. basidia. — u. cuticle

solido. Sporis 4,5—5,5 (6) $m\mu$, quadrangulatis. Ad terram in silvis. Solomon Isl. Typus (RSS 881): San Cristobal, 31. VII. 1965.

Pileus up to 100 mm diam., at first plano-convex soon becoming broadly umbonate, campanulate, margin incurved; fuscous grey with obvious indigo blue tint; radially rugulose, minutely venose especially between the smooth centre and the striate margin, dry, fleshy. Lamellae emerginate-adnate, with short tooth subdecurrent, ventricose (—11 mm wide), crowded; white, soon turning pink, edge concolorous. Stipe —100/—15 mm, cylindrical, solid, robust; purplish grey to slate blue, base white; dry, glabrous to fibrous, single in groups. Context —11 mm thick in the centre of the pileus, white in stipe, subolivaceous in pileus, unchanging. Taste and odour not distinctive. Chemical reactions unknown.

Spores 4,5—5,5 (6) $m\mu$, quadrate to rhomboid. Basidia 20—26/7—9 $m\mu$, 4-spored. Cheilocystidia none. Cuticle a palisade of erect to suberect hyphae (3—7 $m\mu$ diam.), terminal cells cylindrical, membranes not gelatinized, brown (in KOH) plasmatic pigment present. Clamp connections numerous.

Habitat: On soil in forests, Solomon Isl. (E of New Guinea). Illustrations: Fig. 18, r—u.

Material examined: Holotype (RSS 881, Herb. CORNER): „Solomon Isl., San Cristobal, 31. VII. 1965, leg. CORNER“.

19. *Entoloma virescens* (B. & C.) HORAK comb. nov.

Basionym: *Ag. (Leptonia) virescens* BERKELEY & CURTIS 1857—1860: Pac. Exp. Nr. 37.

Synonyms: *Cortinarius hochstetteri* REICHARDT 1866: Verh. zool. bot. Ges. Wien 16: 373.

Hygrophorus cyaneus BERKELEY in HOOKER 1867: Handbook New Zealand Flora II: 604.

Hygrophorus hochstetteri REICHARDT 1870: Reise Freg. Novarra, p. 144.

Entoloma hochstetteri (REICH.) STEVENSON 1962: Kew Bull. 16: 233.

Entoloma aeruginosum HIROE 1939: Appl. Mushr. Sci. 4: 1.

Rhodophyllus holocyaneus ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 87.

Ag. (Leptonia) incanus FR. var. *polychrous* BERKELEY & BROOME 1871: J. Linn. Soc. 11: 540.

Pileus —50 mm diam., conical, convex with distinct conical papilla, occasionally cuspidate, margin usually not upturned, waved; pale blue to deep blue when young, fading to blue greenish or yellow-blue greenish, in aged specimens the blue colour can disappear completely; smooth to radially fibrillose, dry, hygrophanous, margin slightly striate. Lamellae almost free to adnexed, crowded, ventricose, concolorous with pileus turning bluish pink; edge even or equal or attenuated towards the base, twisted, hollow, brittle, single in groups; blue greenish or greenish yellow like pileus, paler in aged carpophores, base white from mycelium. Context bluish in pileus,

greenish-yellowish in stipe, drying turning emerald green or green-brown. Odour and taste not distinctive. Chemical reactions unknown.

Spores (7) 8–10 μ , cuboid to quadrate. Basidia 35–60/10–20 μ , 4-spored. Cheilocystidia absent. Pseudocystidia 40–120/

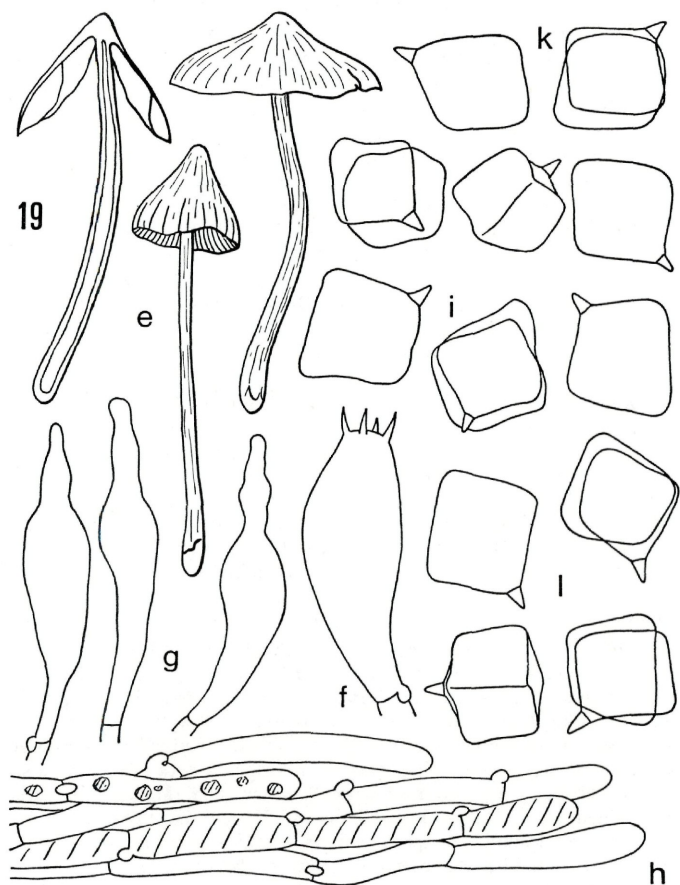


Fig. 19. *Entoloma virescens* (B. & C.) (type): k. spores. — Holotype of *Rhod. holocyaneus* ROM. (PC): l. spores. — Coll. ZT 68/122 (*Ent. hochstetteri* (REICH.) STEV.): e. carpophores. — f. basidia. — g. cheilo- and pleurocystidia. — h. cuticle. — i. spores

5–13 μ , fusoid to cylindrical, membran thin-walled, with brown (in KOH) plasmatic pigment. Cuticle a cutis of repent cylindrical hyphae (5–12 μ diam.), plasmatic pigment present, lactiferae frequent. Clamp connections absent or present.

Habitat: On soil in forests. Bonin Isl. (type), Japan, Papua New Guinea, New Zealand, Malaya, Ceylon, Madagascar.

Illustrations: ROMAGNESI (1941), STEVENSON (1962), IMAZEKI & HONGO (1971), HORAK (1973); Fig. 19, e–i.

Material examined: Holotype (K): „Bonin Isl.“. — Holotype of *Ag. (Lept.) incanus* var. *polychrous* (K): „Peradeniya, Ceylon, Dec. 1868, Nr. 801“. — Holotype of *Rhod. holocyaneus* (PC): „Madagascar, Ambila Lemaitso, 21. IV. 1935, leg. DECARY“. — ZT, Herb. HORAK 70/307: „*Rhod. aeruginosius* (HIROE), Japan, Taya, in mixed woods, 2. IX. 1956, leg. HONGO“. — ZT, Herb. HORAK 68/122: „*Ent. hochstetteri* (STEV.): New Zealand, between Kumara and Mitchells, Westcoast, 9. III. 1968, leg. HORAK“. — ZT, Herb. HORAK 72/339: „Papua New Guinea, Morobe District, Bulolo, Manki, under *Araucaria* and *Castanopsis*, 28. III. 1972, leg. HORAK“. — Herb. CORNER (Leptonia): „Malaya, Pahang, Frazer's Hill, 27. VIII. 1930, leg. CORNER“.

According to our present knowledge *E. virescens* (B. & C.) occurs in the tropical and subtropical forests in the region between Madagascar, Japan and New Zealand. Its blue colours attracted already the attention of the botanists who collected first in the Far East and Australasia. Thus the oldest record (?) from Bonin Isl. goes back to 1860 and the material is still, however badly, preserved in the Kew Herbarium. Despite the few words BERKELEY & CURTIS characterized this taxon rather well: „Totus pallide cyaneus, siccitate virescens, pileo centro depresso, lamellis latiusculis distantibus. adnexas. — On the ground, Bonin Isl. — A very curious species. The gills stain the drying paper with a yellow-olive tint“.

A very close relative of *E. virescens* (B. & C.) (if not synonym?) is *E. altissimum* (MASSEE). The latter fungus was collected in Singapore (1905) but no type material was found except a well done painting by CHAS. De ALWIS (see fig. 19). Prof. CORNER's collections represent topotypical samples so that the microscopical data are now also known. The area of distribution of *E. altissimum* (MASSEE) spreads from Singapore to Borneo in the East and Madagascar in South West. That means that both species share about the same geographic area what their hitherto known distribution is concerned.

At the moment we prefer to treat the two fungi as independent taxa which are separated by different colours (and discoloration), absence or presence of cheilocystidia and pseudocystidia.

ROMAGNESI (1941) who also studied the type collection emphasizes

that *E. virescens* (B. & C.) does have a conical pileus and not as stated in the diagnosis („pileo centro depresso“) an umbilicate pileus. We came to the same conclusion (see above).

20. *Entoloma altissimum* (MASSEE) HORAK comb. nov.

Basionym: *Leptonia altissima* MASSEE 1906: Kew Bull., p. 93.

Synonym: *Entoloma cubisporum* PATOULLARD 1927: Mém. Acad. Malgache 6.

Pileus up to 50 mm diam., convex to conical, occasionally with distinct papilla, in old specimens umbonate- expanded, margin not upturned; deep blue, disc brownish-greenish in aged fruitingbodies; radially innate, fibrillose, dry, scarcely hygrophanous, estriate, membranaceous. Lamellae almost free to adnexed, sometimes emarginate, ventricose, crowded; cream, grey to blue becoming blue pink; edge crenulate to fimbriate, concolorous. Stipe 30–100 (150)/2,5–5 mm, cylindrical, equal or attenuated towards the apex; concolorous with pileus, base white or bluish; coarsely innate to fibrillose, twisted, brittle, single in groups. Context blue beneath the cuticle, drying greyish, exuding slimy latex which turns (after bruising) yellow or greenish. Odour and taste not distinctive. Chemical reactions unknown.

Spores 7–10.5 μ , cuboid. Basidia 40–50/10–13 μ , 4-spored. Cheilocystidia 50–130/6–20 μ , cylindrical to clavate, occasionally with brown (in KOH) plasmatic pigment, membranes thin-walled. Cuticle a cutis of cylindrical repent hyphae (6–12 μ diam.), blue-brown plasmatic pigment present. Clamp connections numerous.

Habitat: On soil in forests. Singapore (type), Borneo, Madagascar.

Illustrations: PATOULLARD (1927); Fig. 20, a–d.

Material examined: Holotype (K): „Singapore, 6. XII. 1905, CH. DE ALWIS“ (painting only, no exsiccata in K). — Herb. CORNER (*Entoloma* 9): „Singapore, Reservoir Jungle, 30. IV. 1930 and 5. XII. 1940 (with painting), leg. CORNER“. — Herb. CORNER (*Entoloma* 9 A): „Singapore, Reservoir Jungle, 3. XII. 1940, leg. CORNER“. — Herb. CORNER (RSNB 8557): „Borneo, Mt. Kinabalu, Mesilau, 4. V. 1964, leg. CORNER“. — Holotype of *Rhod. cubisporum* PAT. (PC): „Madagascar, environs de Maromandia (forêt nord du Bejofo), 11. II. 1923, leg. DECARY“. — ZT, Herb. HORAK 72/415: „Papua New Guinea, Morobe District, Bulolo, Heads Hump, 27. IV. 1972, leg. HORAK“.

Key D

1. Cheilo- and/or pleuro (pseudo)cystidia present 2
- 1*. Cheilo- and pleurocystidia absent 10
2. Cheilo- and pleurocystidia with brown plasmatic pigment (gill edge brown!); see also *E. acutoconicum* (HONGO)..... 3

- 2*. Cheilo- and pleurocystidia without pigment (gill edge colorous with face of lamellae) or absent. 5
3. Stipe —70/—5 mm, pruinose to squamulose with brown dots or scales; pileus —60 mm diam., convex to conical, dark

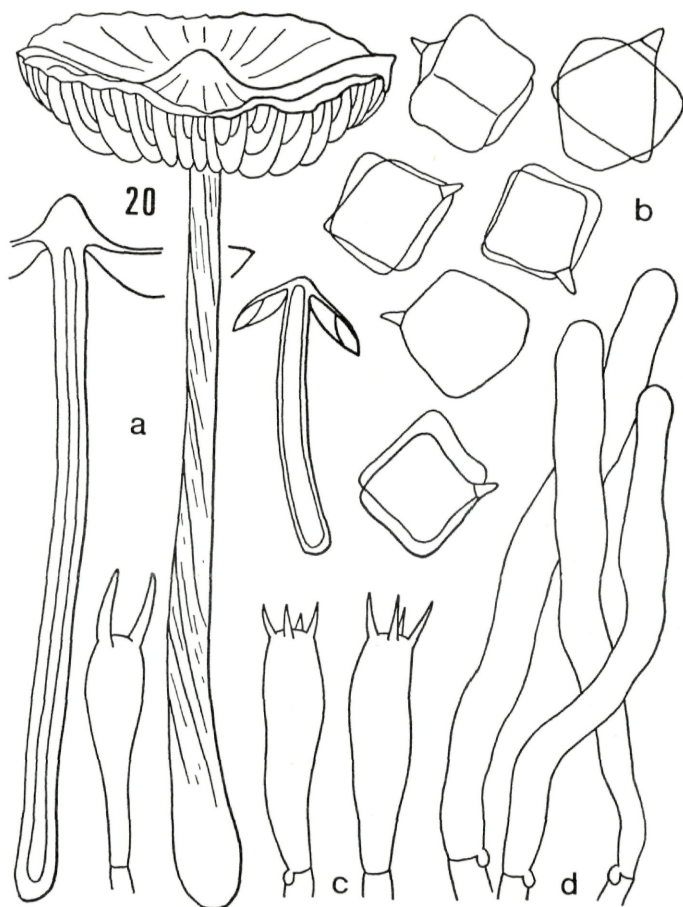


Fig. 20. *Entoloma altissimum* (MASSEE) (type): a. carpophores. — Coll. CORNER (Ent. 9: b. spores. — c. basidia. — d. cheilocystidia

- brown, squamulose to scurfy; lamellae emarginate-adnexed, edge brown; smell none; spores 8,5–12 $m\mu$, cuboid to quadrate; cheilocystidia —120 (150)/—14 (20) $m\mu$; on rotten wood or soil in forests; Ceylon (type), Malaya, Singapore, Borneo, USA 21. *E. brunneum* (p. 206)
- 3*. Stipe smooth, without conspicuous dots or fibrils; pileus fibrillose, lamellae adnexed 4
4. Pileus —45 mm diam., convex to umbonate, brown; lamellae adnexed; stipe —70/—8 mm, brownish, fibrillose; spores 7,5–11 $m\mu$, tetrahedral to cuboid; cheilocystidia —130/—25 $m\mu$; on soil in deciduous forests; New Zealand. 23. *E. procerum* (p. 210)
- 4*. Pileus —30 mm diam., hemispherical to convex, brown; stipe —60/—4 mm; spores 9,5–12 $m\mu$, quadrate; cheilocystidia 80–120/—13 $m\mu$, cylindrical-fusoid; on soil in forests; Madagascar 23a. *E. incertum* (p. 210)
5. Cheilo- and pleurocystidia absent, otherwise like *E. brunneum*; smell farinaceous; on soil in rain forests; Chile. 22. *E. brunneum* var. *chilense* (p. 210)
- 5*. Cheilo- and pleurocystidia present 6
6. Cheilocystidia cylindrical to subclavate; pileus conical. 7
- 6*. Cheilocystidia fusoid, often constricted towards apex. 8
7. Pileus —20 mm diam., grey-beige; stipe —40/—2 mm, whitish, smooth; spores 7–8,5 $m\mu$, cuboid; cheilocystidia —100/—15 $m\mu$; on soil in forests; Papua New Guinea. 24. *E. griseoalbum* (p. 211)
- 7*. Pileus —45 mm diam., brown with purple fibrils; stipe —100/—4,5 mm, whitish with purple fibrils; spores 7,5–10 $m\mu$, cuboid; cheilocystidia —110/—15 $m\mu$; on soil under bamboo and in forests; Japan (type) Papua New Guinea 25. *E. acutoconicum* (p. 214)
8. Pileus convex soon becoming plane or subconcave at centre; odour farinaceous: see 26. *E. farinolens* Hk. (p. 215) and 39. *E. rhombisporum* (K. & B.) (p. 228)
- 8*. Pileus conical to cuspidate 9
9. Pileus —9 mm diam. grey-brown; stipe —30/—2 mm, concolorous; spores 7–9 $m\mu$, quadrate; cheilocystidia —75/—12 $m\mu$; odour farinaceous; on soil under *Alnus*; Europe (France) 27. *E. prismatospermum* (p. 216)
- 9*. Pileus —40 mm diam., grey; stipe —80/—7 mm, grey; spores 7,5–11 $m\mu$, cuboid-tetrahedral; cheilocystidia —80/—13 $m\mu$, constricted towards the apex; on soil in *Agathis* forests; New Zealand 28. *E. canoconicum* (p. 216)
10. (1*) Spores 10–13 $m\mu$, cuboid-tetrahedral 11

- 10*. Spores smaller 12
11. Pileus —55 mm diam., conical, brown; stipe —180/—6 mm, concolorous; on soil in forests; Madagascar (type), Trinidad 29. *E. pinnum* (p. 217)
- 11*. Pileus —20 mm diam., conical, brown; stipe —70/—2 mm, brown; on soil in forests; USA 30. *E. hesleri* (p. 219)
12. Spores quadrate (to rhomboid) 13
- 12*. Spores cuboid to cruciform 14
13. Spores 4,5—6 $m\mu$; pileus —120 mm diam., umbonate-expanded, brown; stipe —120/—12 mm, robust; on soil under oaks; Papua New Guinea 31. *E. conspicuum* (p. 219)
- 13*. Spores 6—8 $m\mu$; pileus —35 mm diam., beige to grey-brown; stipe —80/—3 mm, concolorous; cystidia absent; on soil in forests; N-America (type), Papua New Guinea... 32. *E. alboumbonatum* (p. 221)
14. Spores rhomboid to cruciform, twisted, distorted, 6,5—10 (11) $m\mu$; pileus —50 mm diam., brown, convex, conical or campanulate, radially wrinkled or fibrillose-squamulose; clamp connections absent; smell farinaceous; on soil in and outside of forests, from sea level to 3200 m (Mt. Kinabalu); Europe, USA, Malaya, Borneo, Papua New Guinea, Solomon Isl., New Zealand 33. *E. staurosporum* (p. 222)
- 14*. Spores cuboid (not of irregular shape) 15
15. Pileus —30 mm diam., dark brown, fibrillose-squamulose; stipe —100/—2 mm, brownish; spores (7,5) 8—10,5 $m\mu$; lactifers absent; clamp connections present; on soil in forests; USA (type), Brazil 34. *E. spadix* (p. 224)
- 15*. Pileus —30 mm diam., yellowish brown; stipe —65/—4 mm, concolorous; spores 6—9 $m\mu$, often pentagonal; lactifers absent; clamp connections absent; on soil in forests; Madagascar (type), Cameroon 35. *E. phleboides* (p. 225)

21. *Entoloma brunneum* PETCH 1925

Ann. Roy. Bot. Gard. Peradeniya 9: 215.

Synonym: ? *Entoloma marginatum* HESLER 1967: Nova Hedwigia, Beih. 23: 19 (type lost ?).

Pileus 15—60 mm diam., conical to convex, often umbonate and expanded in aged specimens; dark brown, sepia brown, fuscous, drying paler; densely covered with concolorous or darker (minute)-squarrose scales, appressedly fibrillose towards the substriate (and often inrolled) margin, scurfy at centre; dry, hygrophanous. Lamellae emarginate, adnexed or subfree, ascending, ventricose; at first light beige to greyish buff later turning pink, edge brown, flocculose and occasionally serrate, subdistant. Stipe 30—70/3—5 mm, cylindrical, equal or attenuated towards the apex, sometimes eccentric; white

or concolorous with pileus but paler, in young specimens completely covered with concolorous or darker pruinose dots, minute fibrils or squamules, glabrous in aged specimens, occasionally with brownish-greenish tints, base white to yellowish, villous; hollow, brittle, dry, single. Context brownish, whitish-yellowish in stipe. Taste and smell not distinctive. Chemical reactions unknown.

Spores (7,5) 8,5–12 μ , cuboid to quadrate. Basidia 40–75/11–15 μ , 4-spored. Cheilocystidia 50–120 (150)/8–14 (20) μ , cylindrical to subclavate or fusoid thin-walled forming a sterile gill edge; filled with brown plasmatic pigment. Cuticle a cutis or trichoderm of cylindrical hyphae (5–20 μ diam.) with conspicuous brown plasmatic pigment. Clamp connections present (absent in CORNER: *Entoloma* 12 A und RSNB 8678).

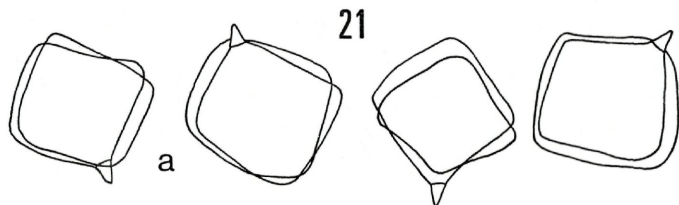


Fig. 21. *Entoloma brunneum* PETCH (type): a. spores

Habitat: On rotten wood or on soil in forests from sea level to 1700 m (Borneo). Ceylon (type), Madagascar, Malaya, Singapore, Borneo, Papua New Guinea, USA.

Illustrations: ROMAGNESI (1941); HESLER (1967); Fig. 21 a–h.

Material examined: Holotype (K): „Ceylon, Peradeniya, 14. XI. 1911 (3272)“. — Herb. CORNER (*Entoloma* 12 A): „Malaya, Johore, Gunong Pulai, 24. XI. 1940, leg. CORNER“. — Herb. CORNER s. n.: „Malaya, Penang, 31. V. 1941, leg. CORNER“. — Herb. CORNER (*Entoloma* 9 C): „Singapore, Selitar forest, 1. XI. 1941, leg. CORNER“. — Herb. CORNER (RSNB 8212): „Borneo, Mt. Kinabalu Mesilau, 10. IV. 1964, leg. CORNER“. — Herb. CORNER (RSNB 8678): „Borneo, Mt. Kinabalu, Mesilau, 5. V. 1964, leg. CORNER“. — ZT, Herb. HORAK 72/345: „Papua New Guinea, Morobe District, Bulolo, 31. III. 1972“. — ZT, Herb. HORAK 73/135: „Papua New Guinea, Morobe District, Bulolo, Manki, 2. III. 1973, leg. HORAK“. — Holotype of *E. marginatum* HESLER; mislaid (HESLER in litt.). — Herb. CORNER (P-110): „Borneo, Sarawak, Gunong Matang, 20. VIII. 1972, leg. CORNER“.

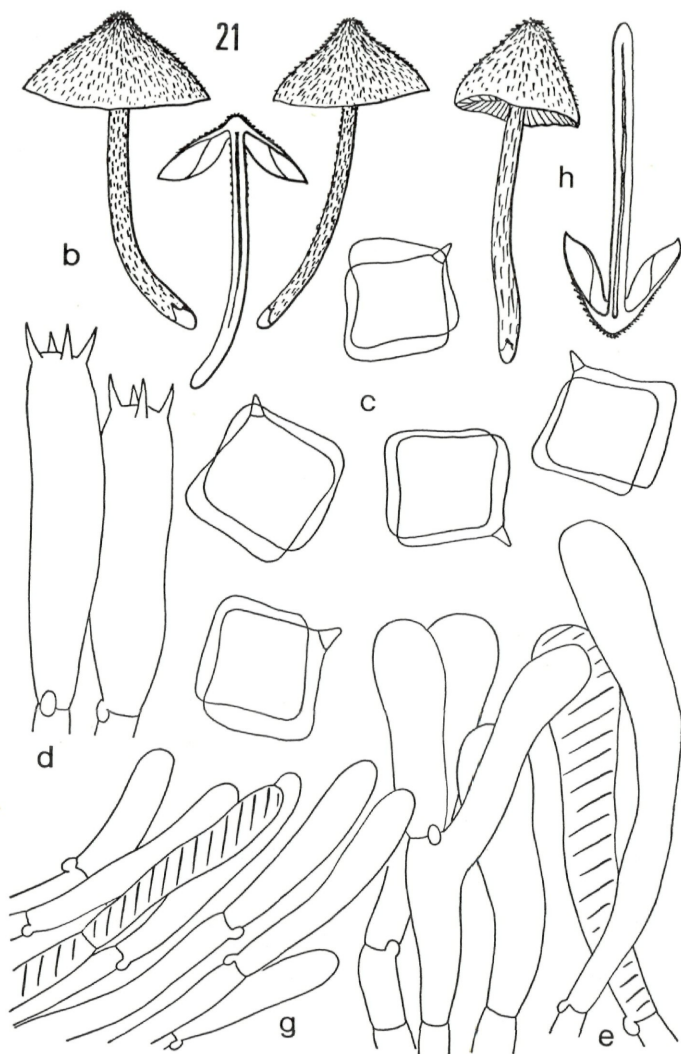


Fig. 21. *Entoloma brunneum* PETCH: Coll. ZT 72/345: b. carpophores. — c. spores. — d. basidia. — e. cheilocystidia. — g. cuticle. — Coll. CORNER (31. V. 1941): h. carpophores

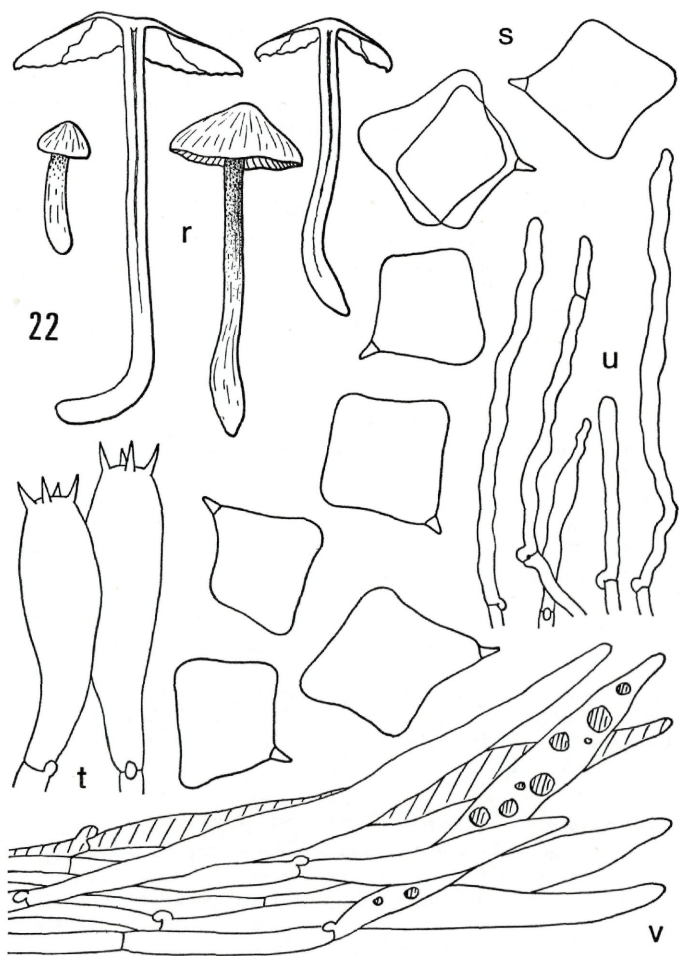


Fig. 22. *Entoloma brunneum* PETCH var. *chilense* Hk. (type): r. carpophores. — s. spores. — t. basidia. — u. caulocystidia. — v. cuticle

This widely distributed species is characterized by its dark brown scaly pileus, the brown gill edge, the brown dots over the whole length of the stipe and the conspicuous cylindrical-clavate cheilocystidia.

CORNER's collection (P-110) from Sarawak differs from the type by its smaller spores (7–9 $m\mu$) and the absence of clamp connections which, however, have also not been observed in two other Malayan samples (see material examined).

22. *Entoloma brunneum* var. *chilense* HORAK var. nov.

Differt a typo cheilocystidiis absentibus et odore farinaceo.

Habitat: On soil in rain forest. Chile.

Illustrations: Fig. 22, r–v.

Material examined: Holotype (ZT, Herb. HORAK 62/145): „Chile, Prov. Osorno, Pucatrihue, 22. IV. 1963, leg. HORAK“.

23. *Entoloma procerum* STEVENSON 1962

Kew Bull. 16: 233.

Synonym: *Entoloma inconspicuum* STEVENSON 1962: Kew Bull. 16: 236.

For detailed description see HORAK (1973: 15). We have to mention, however, that the spores are smaller than indicated there (7,5–11 $m\mu$).

Habitat: On soil in deciduous (*Leptospermum ericoides* and *L. scoparium*) and coniferous forests (*Agathis australis*). New Zealand.

Illustrations: STEVENSON (1962); HORAK (1973); Fig. 23, a–c.

Material examined: Holotype (K): „New Zealand, Wellington, 30. V. 1949, leg. STEVENSON, 599“ — Holotype of *Ent. inconspicuum* STEV. (K): „New Zealand, Kaingaroa, 12. III. 1958, leg. STEVENSON, 1260“ — After 1973 the following material was studied: PDD 30277: „New Zealand, Auckland, Kauri Glen Park, 3. VII. 1971, leg. CROXALL“ — PDD 29513 „New Zealand, Auckland, Kauri Glen Park, 24. VII. 1971, leg. PARRIS“.

23a. *Entoloma incertum* (ROMAGNESI) HORAK comb. nov.

Basionym: *Rhodophyllus incertus* ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 154.

Pileus — 30 mm diam., hemispherical to convex, brown, minutely fibrillose. Lamellae adnexed, ventricose, pink. Stipe — 60/–4 mm, cylindrical, brownish. Smell and taste unknown.

Spores 9,5–12 $m\mu$, quadrate to rhomboid. Basidia 35–65/11–16 $m\mu$, 4-spored. Cheilocystidia 80–120/10–13 $m\mu$, subfusoid to cylindrical, hyaline, thinwalled, with brownish plasmatic pigment, in dense clusters at gill edge. Cuticle a cutis of long cylindrical hyphae

(6–12 μ diam.), plasmatic pigment present. Clamp connections numerous.

Habitat: On soil in forests.

Distribution: Madagascar.

Illustrations: ROMAGNESI (1941: l. c.); Fig. 23a, a–e.

Material examined: Holotype (PC): „Ambatobia; leg. BOURIQUET, V. 1937“.

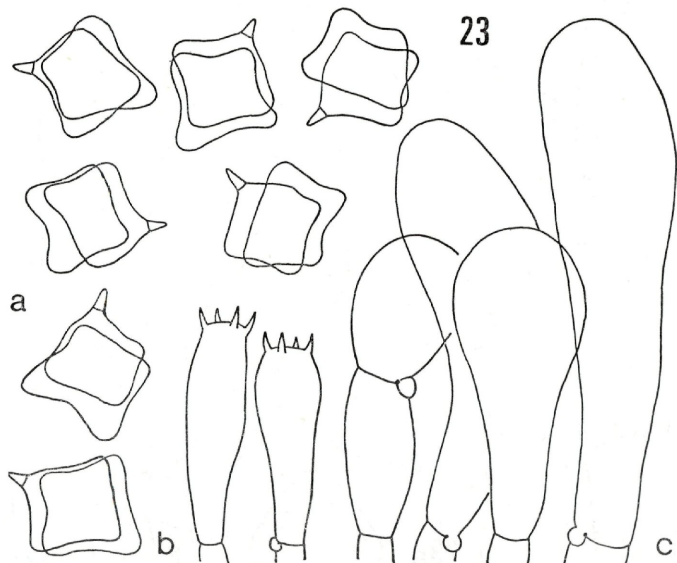


Fig. 23. *Entoloma procerum* STEV.: Coll. PDD 29513: a. spores. — b. basidia. — c. cheilocystidia

The convex pileus, the large quadrate spores and the conspicuous cheilocystidia (not mentioned in ROMAGNESI 1941) characterize this brown coloured species from Madagascar rather well.

24. *Entoloma griseoalbum* HORAK sp. n.

Pileo usque ad 20 mm lato, conico, isabellino-griseo, sicco. Lamellis adnexas. Stipite —40/—2 mm, cylindraco, albido. Sporis 7–8,5 μ , cuboideis. Cheilocystidiis e subelavato cylindraccis. Ad terram in silvis. Nova Guinea. Typus (ZT, Herb. HORAK 72/486): Musik Isl., 20. VI. 1972.

Pileus 10–20 mm diam., young and old conical, margin not

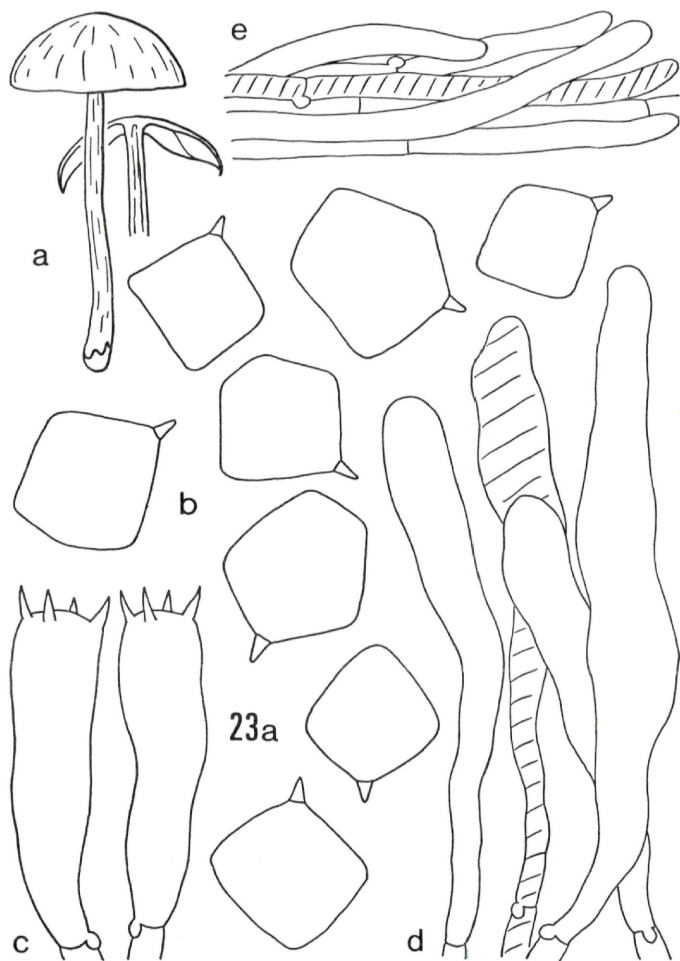


Fig. 23a. *Entoloma incertum* (ROMAGNESI) (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle

incurved; grey-beige turning grey-pink; dry, innate-fibrillose, centre velvety to fibrillose, transparently striate. Lamellae adnexed to almost free, ventricose, edge even, concolorous; whitish later turning pink. Stipe 20–40/1–2 mm, cylindrical, equal, terete;

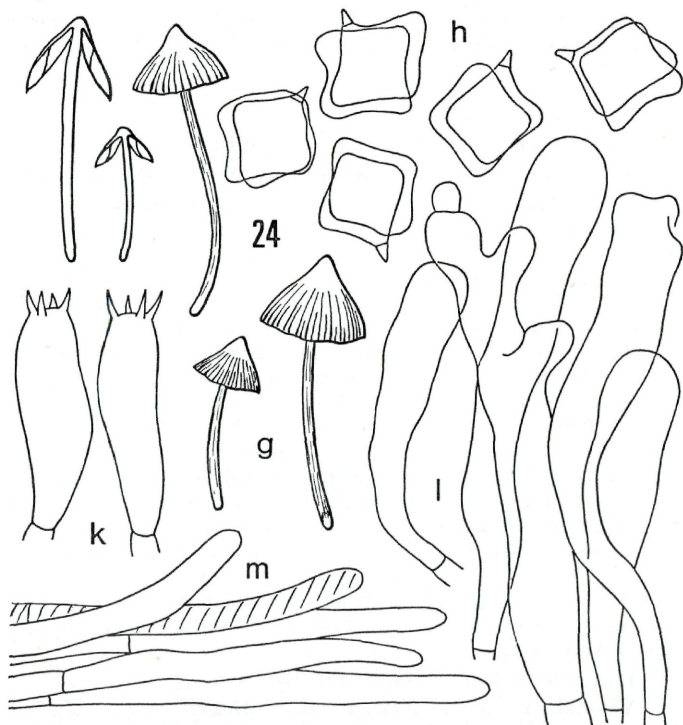


Fig. 24. *Entoloma griseoalbum* Hk. (type): g. carpophores. — h. spores. — k. basidia. — l. cheilocystidia. — m. cuticle

whitish, minutely innatefibrillose, pruinose at apex, hollow, brittle, single in groups. Context whitish-brownish. Odour and taste not distinctive. Chemical reactions unknown.

Spores 7–8,5 μ , cuboid. Basidia 35–40/10–12 μ , 4-spored. Cheilocystidia 60–100/10–15 μ , cylindrical to subclavate, sometimes with irregular blunt excrescences, hyaline, thin-walled, in dense

clusters on gill edge. Cuticle a cutis consisting of cylindrical hyphae (8—12 $m\mu$ diam.), brown plasmatic pigment present. Clamp connections absent.

Habitat: On soil in forests. Papua New Guinea.

Illustrations: Fig. 24, g—m.

Material examined: Holotype (ZT, Herb. HORAK, 72/486): „PNG, Morobe District, SE of Lae, Musik Isl., 20. VI. 1972, leg. HORAK“.

25. *Entoloma acutoconicum* (HONGO) HORAK comb. nov.

Basionym: *Rhodophyllum acutoconicus* HONGO 1956: J. Jap. Bot. 13: 252.

Description of the collection from Papua New Guinea:

Pileus 15—45 mm diam., conical to campanulate, often with distinct papilla; brown to reddish brown, densely covered with vinaceous brown to purple fibrils, apex squamulose; margin striate, thin, often irregularly undulate, dry, subhygrophanous. Lamellae annexed to almost free, ventricose; white to cream turning pink, gill edge purple-brown, crenulate. Stipe 50—100/2—4,5 mm, cylindrical, terete; whitish, covered (at least towards apex) with conspicuous purple brownish fibrils or dots, base white, villous; dry, hollow, twisted, fragile, single in groups. Context whitish. Taste and smell not distinctive. Chemical reactions unknown.

Spores 7,5—10 $m\mu$, cuboid to tetrahedral. Basidia 30—60/12—19 $m\mu$, 4-spored. Cheilocystidia 40—110/8—15 $m\mu$, subclavate to cylindrical, with brown plasmatic pigment (inconspicuous on type material), pleurocystidia scattered. Cuticle a cutis of cylindrical repent to suberect hyphae (7—15 $m\mu$ diam.), brown plasmatic and encrusting pigment present. Clamp connections numerous.

Habitat: On soil under bamboo or oak forests. Japan (type), Papua New Guinea.

Illustrations: HONGO (1956); Fig. 25, a—d.

Material examined: Holotype (Herb. HONGO, 1307): „Japan, Otsu, Ishiyama-Hiratsu-cho, 7. X. 1955, leg. HONGO“. — ZT. Herb. HORAK 73/134: „Papua New Guinea, Morobe District, Bulolo, Manki, 2. IV. 1973, leg. HORAK“.

Our collection from Papua New Guinea corresponds well in all details with the type originally described from Japan. The most distinctive characters are the purple-brown fibrils on the pileus and on the upper parts of the stipe. *E. acutoconicum* (HONGO) is obviously a close relative of *E. brunneum* which differs by brown colours and larger spores. Both taxa occur in the tropical and subtropical forests of the Far East and Australasia.

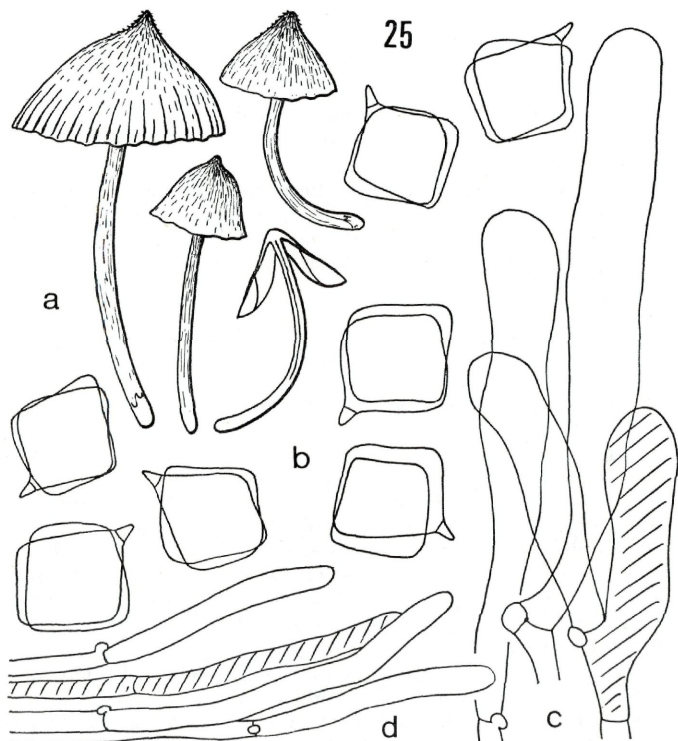


Fig. 25. *Entoloma acutoconicum* (Hongo): Coll. ZT 73/134: a. carpophores. — b. spores. — c. cheilocystidia. — d. cuticle

26. *Entoloma farinolens* HORAK 1973

Nova Hedwigia, Beih. 430: 111.

For full description see HORAK (1973).

Habitat: On ferns (*Dicksonia fibrosa*). New Zealand.

Illustrations: HORAK (1973).

Material examined: Holotype (PDD 27011): „New Zealand, Urewera N. P., Lake Waikaremoana, 23. VI. 1968, leg. HORAK“.

This species is near *E. rhombisporum* (K. & B.) which has more quadrate, subcuboid spores, different cheilocystidia and different habitat.

27. *Entoloma prismatospermum* (ROMAGNESI) HORAK comb. nov.

Basionym: *Rhodophyllus prismatospermus* ROMAGNESI 1974: Trav. Myc. Déd. à R. KÜHNER, Bull. Soc. Linn. Lyon, p. 369.

For the detailed description see ROMAGNESI (1974).

Habitat: On wet soil under *Alnus*. France.

Illustrations: ROMAGNESI (1974a).

Material examined: —

We have not examined authentic material of this species since the original description gives a fair idea about this taxon. *E. prismatospermum* (ROM.) keys out near *El griseoalbum* but the two fungi are well separated by the shape and size of the carpophores, cheilocystidia and spores.

28. *Entoloma canoconicum* HORAK sp. n.

Pileo usque ad 40 mm lato, conico, cinereo, sicco. Lamellis subliberis. Stipite -80/-7 mm, cylindraceo, pileo concolori. Sporis 7,5-11 μ , cuboideis. Cystidiis ad apicem constrictis. Ad terram in silvis. Novazelandia. Typus (PDD 29508): Piha, 17. V. 1971.

Pileus 20-40 mm diam., up to 40 mm high, conical, papilla always sharply conical, margin not inrolled; mouse grey, drying paler, apex yellowish in aged specimens; innately fibrillose, not striate, dry. Lamellae free or adnexed, ventricose; grey when young then turning pink, edge concolorous, even. Stipe 40-80/4-7 mm (-12 mm at the base), cylindrical or attenuated towards the apex, twisted; mouse grey, paler towards the whitish villous base; hollow, brittle, dry, single. Context grey, without bluish or greenish tints. Odour and taste unknown.

Spore print brick red. Spores 7,5-11 μ , cuboid. Basidia 40-50/10-12 μ , 4-spored. Cheilocystidia (and pleurocystidia) 45-80/10-13- μ , fusoid, several times constricted (like an hour-glass) towards the conical apex, hyaline, thin-walled, without pigment. Cuticle a cutis composed of cylindrical repent hyphae (6-12 μ diam.), plasmatic pigment present. Clamp connections numerous.

Habitat: On soil under *Leptospermum ericoides*. New Zealand.

Illustrations: Fig. 28, m-p.

Material examined: Holotype (PDD 29508): „New Zealand, Auckland, Piha, Kitekite Falls, 17. V. 1971, leg. DINGLEY“. — PDD 29026: „New Zealand, Auckland, Sharp's Bush, 25. IV. 1971, leg. DINGLEY“.

According to the microscopical and macroscopical characters this species is closely related with *E. virescens* (B. & C.). The young and fresh fruitingbodies of *E. canoconicum*, however, do not even show traces of bluish or greenish colours. The cystidia of that taxon are also quite different from those of *E. virescens* (B. & C.). For that

reason it is unlikely that *E. canoconicum* could be interpreted as a pale and washed out *E. virescens* (B. & C.).

29. *Entoloma pinnum* (ROMAGNESI) DENNIS 1953

Basionym: *Rhodophyllus pinnus* ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 63.

For a detailed description see ROMAGNESI (1941) and DENNIS (1953).

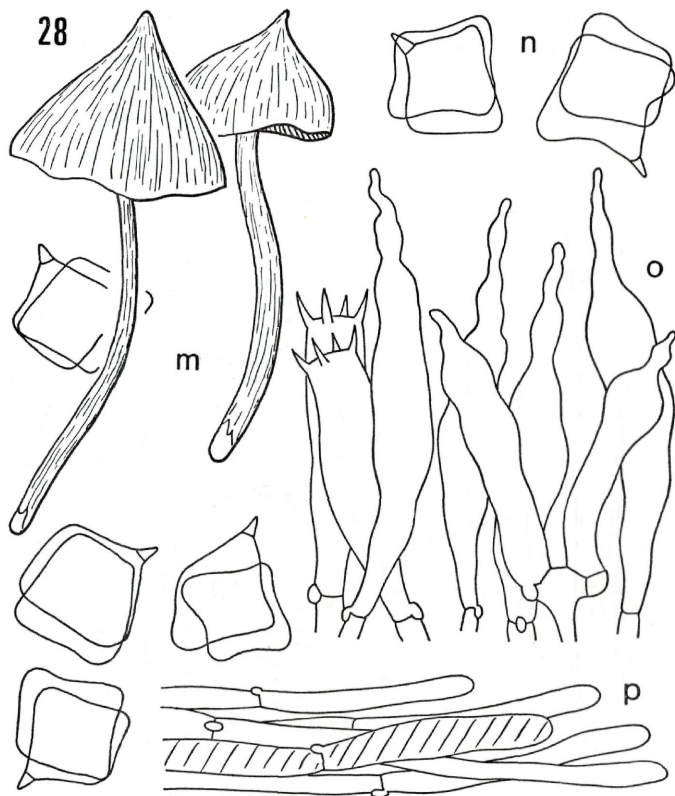


Fig. 28. *Entoloma canoconicum* Hk. (type): m. carpophores. — n. spores. — o. basidia and cheilo-/pleurocystidia. — p. cuticle

Habitat: On soil in forests. Madagascar (type), Trinidad.

Illustrations: ROMAGNESI (1941); DENNIS (1953); Fig. 29 r-u.

Material examined: Holotype (PC): „Madagascar, Ampotakamaroreny, 24. IV. 1934, leg. BOURIQUET“. — Herb. DENNIS (K): „Trinidad, N of Arima, 25. IX. 1949, leg. DENNIS, 46“.

The most obvious characters of this species are: large size of the carpophores and large spores (10–13 μ).

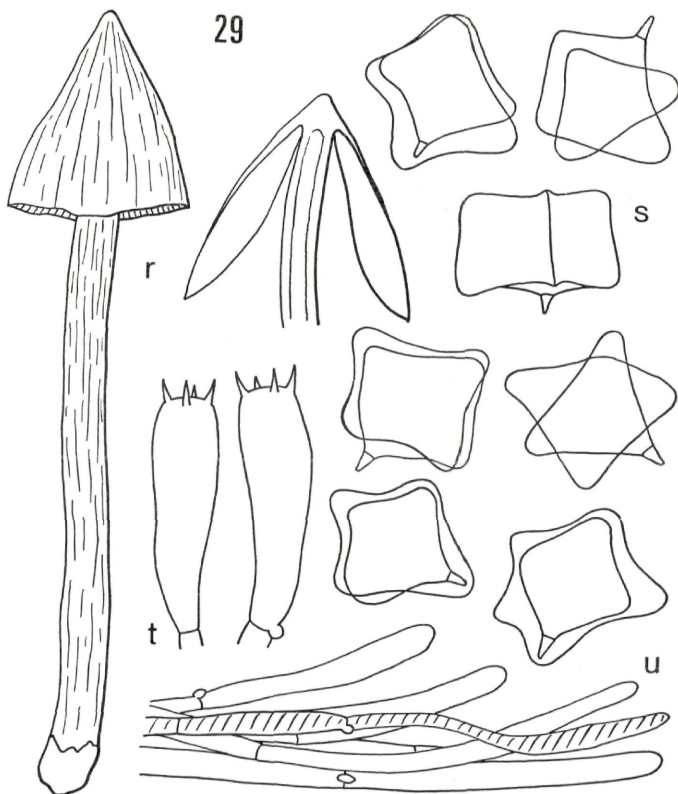


Fig. 29. *Entoloma pinnum* (ROMAGNESI) (type): r. carpophores. — s. spores. — t. basidia. — u. cuticle

30. *Entoloma hesleri* HORAK nom. nov.

= *Entoloma gracile* HESLER 1967: Nova Hedwigia, Beih. 23: 25 (= homonym to *Entoloma gracile* STEVENSON 1962: Kew Bull. 16: 236).

Detailed description in HESLER (1967).

Habitat: On soil in coniferous and deciduous forests. USA.

Illustrations: HESLER (1967); Fig. 30, a–b.

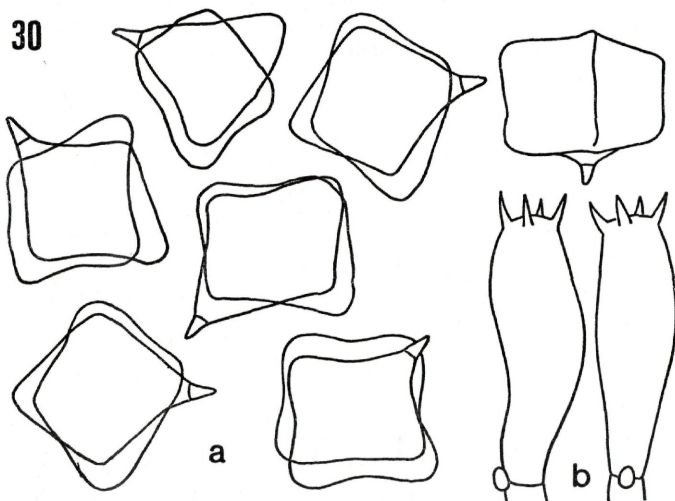


Fig. 30. *Entoloma hesleri* Hk. (type): a. spores. — b. spores

Material examined: Holotype (Herb. HESLER, 12756): „USA, GSMNP, Sevier Co., Mt. LeConte, 4. VIII. 1940, leg. HESLER“.

This species is similar to *E. pinnum* (ROM.) in having very large spores (10–13 μ). It differs in the colour of the pileus and the size of the carpophores.

31. *Entoloma conspicuum* HORAK sp. n.

Pileo usque ad 120 mm lato, conico dein umbonato, brunneo, fibrilloso-ruguloso, sicco. Lamellis adnexis. Stipite —120/–12 mm, cylindraco, albido. Odore saporeque nullo. Sporis 4,5–6 μ , quadrangulatis. Cystidiis nullis. Ad terram in silvis fagineis. Nova Guinea. Typus (ZT): Yonki, 7. XII. 1972.

Pileus up to 120 mm diam., at first broadly conical becoming obtuse umbonate to campanulate, robust; brown, opaque, drying paler; minutely rugulose to subvenose especially around the disc.;

dry, inconspicuously striate, margin straight. Lamellae adnexed to subemarginate, ventricose; whitish later turning pink; edge even, concolorous, narrow, often margin of pileus not reaching. Stipe 60–120/8–12 mm, cylindrical, robust; whitish, with white villous base; dry, longitudinally fibrillose, hollow, single. Context whitish. Odor and smell not distinctive.

Spores 4,5–6 μ , quadrate, sometimes 5-angled. Basidia 32–40/8–9 μ , 4-spored. Cystidia absent. Cuticle a cutis consisting of cylindrical hyphae (3–7 μ diam.), brown plasmatic pigment present; subcutis composed of short cylindrical to oval cells. Clamp connections numerous.

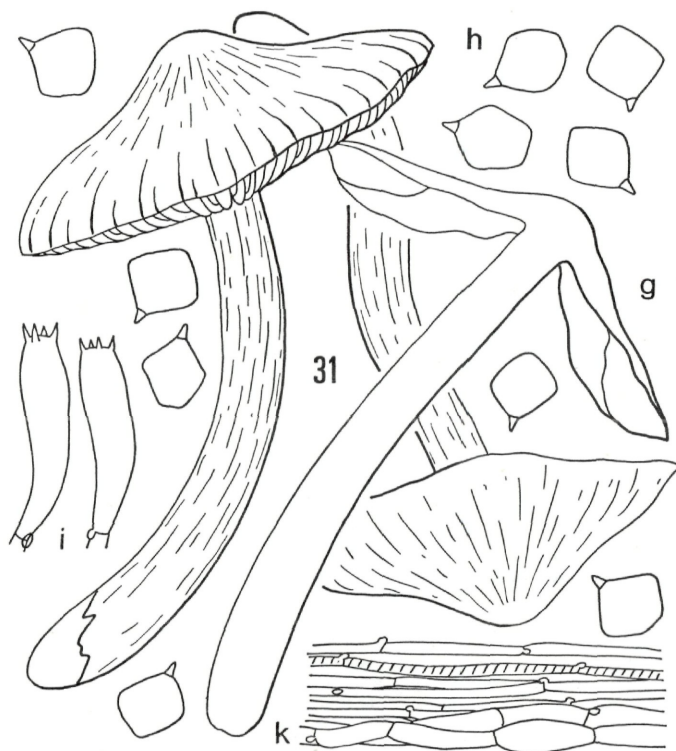


Fig. 31. *Entoloma conspicuum* Hk. (type): g. carpophores. — h. spores. — i. basidia. — k. cuticle

Habitat: On soil in *Lithocarpus*/*Castanopsis* forests. Papua New Guinea.

Illustrations: Fig. 31, g–k.

Material examined: Holotype (ZT, Herb. HORAK 72/706): „PNG, Eastern Highlands, Yonki, Bunan, 7. XII. 1972, leg. HORAK“.

32. *Entoloma albo-umbonatum* HESLER 1967

Nova Hedwigia, Beih. 23: 18.

Synonym: *Entoloma subquadratum* HESLER 1967: l. c.: 99.

Our collections from Papua New Guinea agree well with the North American fungus.

Habitat: On soil in forests. North America (type), Papua New Guinea.

Illustrations: HESLER (1967; Fig. 32, a–e).

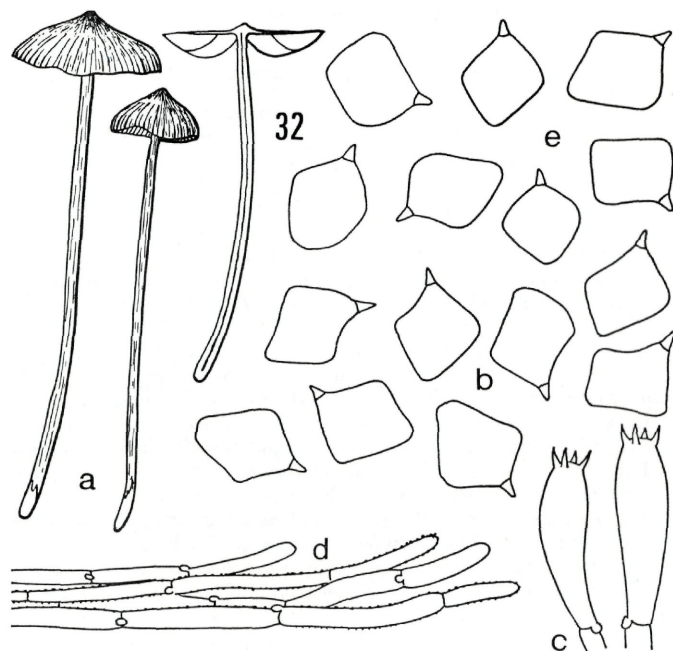


Fig. 32. *Entoloma albo-umbonatum* HESLER (type): b. spores. — c. basidia. — d. cuticle. — Holotype of *Ent. subquadratum* HESLER (type): e. spores. — Coll. ZT 71/377: a. carpophores

Material examined: Holotype (Herb. HESLER, 20467): „USA, North Carolina, Indian Creek, 14. VIII. 1952, leg. HESLER“. — Holotype of *Ent. subquadratum* HESLER (21391): „USA, GSMNP, Park Headquarters, 19. VIII. 1948. HESLER“. — ZT, Herb. HORAK 71/377: „Papua New Guinea, Eastern Highlands, Mt. Michael, Frigano (under *Nothofagus* sp.), 6. XII. 1971, leg. HORAK“. — ZT, Herb. HORAK 71/406: „Papua New Guinea, Eastern Highlands, Mt. Michael, Frigano (under *Nothofagus* sp.), 6. XII. 1971, leg. HORAK“.

This species is characterized chiefly by its greyish-brownish colours, fragile carpophores, quadrate to rhomboid spores, absence of cystidia (in contrast to HESLER's observations) and farinaceous smell. According to our opinion the list of synonyms will increase as soon as several North American species of *Entoloma* are carefully reexamined.

E. albo-umbonatum is related to *E. staurosporum* which differs in larger and more rhomboid-cruciform spores.

33. *Entoloma staurosporum* (BRESADOLA)

Basionym: *Rhodophyllus staurosporus* BRESADOLA 1929: Ic. Myc. 12: tab. 584.

Synonyms: *Entoloma nothofagi* STEVENSON 1962: Kew Bull. 16: 234.

Entoloma botanicum STEVENSON 1962: Kew Bull. 16: 236.

This is a very variable species which is rather familiar to the European mycologists. The fungus occurs often on wet or peaty localities in bogs (var. *platyphyllum*, var. *rickenii*) but grows also in dry places from sea level up to alpine meadows (var. *staurosporum*). The colour of the pileus varies between grey-brown to dark brown in fresh carpophores but fades in ageing specimens. The surface of the cuticle is fibrillose to silky, however, it was observed that the apex of pileus can be squamulose to scurfy (when dry) or wrinkled-grooved (when wet) as well. The lamellae are grey, beige or light brown and turn deep pink. The gill edge is even and concolorous. The colour of the stipe is in general similar to the one of the pileus. The most significant character of *E. staurosporum* are the rhomboid to cruciform (name!) spores which often are twisted and distorted. All kind of cystidia lacking. Cuticle a cutis or trichoderm consisting of cylindrical hyphae (5–16 μ diam.) with brown dissolved or encrusting pigment. Clamp connections absent. Smell and taste strongly farinaceous.

Habitat: On soil in wet (bogs, swamps) or dry localities from sea level up to the alpine zone (–2500 m in Europe, Swiss Alps; –3200 m on Mt. Kinabalu, Borneo). Distribution probably world-wide; material seen from Europe, Malaya, Borneo, Papua New Guinea, New Zealand.

Illustrations: BRESADOLA (1929: t. 584), LANGE 77 A; HORAK (1973); Fig. 33, a–h.

Material examined: ZT, Herb. HORAK 65/323: „Austria, Obergurgl, Rotmoos, 2. IX. 1965, leg. HORAK“. — ZT, Herb. HORAK

70/284: „France, Pontcarré (S. & M.), 28. X. 1942, ex Herb. ROMAGNESI“. — ZT, Herb. HORAK 70/287: „France, Yens (S. & O.), VIII. 1942, ex Herb. ROMAGNESI“. — Holotype of *E. nothofagi* STEV. (K): „New Zealand, Nelson, 3. V. 1956, leg. STEVENSON, 1118“. — Holotype of *E. botanicum* STEV. (K): „New Zealand, Wellington, 3. V. 1958,

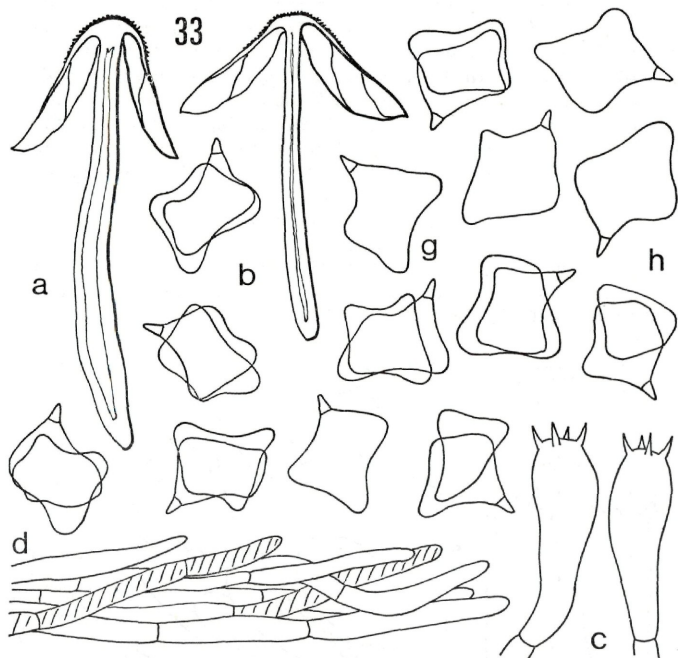


Fig. 33. *Entoloma staurosporum* (BRESADOLA): Coll. RSS 1617: a. carpophores. — b. spores. — c. basidia. — d. cuticle. — Coll. RSNB 5897: g. spores. — Coll. CORNER (Nolanea 1 A): h. spores

leg. STEVENSON & Well. Bot. Soc.“. — Herb. CORNER (Nol. 1 A): „Malaya, Johore, Sedili River, swamp-forest, 22. III. 1940, leg. CORNER“. — Herb. CORNER (RSNB 5900): „Borneo, Mt. Kinabalu, Mesilau, 3000 m, 22. III. 1964, leg. CORNER“. — Herb. CORNER (RSNB 5897): Borneo, Mt. Kinabalu, Mesilau, 3200 m, 22. III. 1964, leg. CORNER“. — Herb. CORNER (RSS 1617): „Solomon Isl., Guadalcanal, Popomanasiu, 2300 m, 26. X. 1965, leg. CORNER“. — ZT, Herb. HORAK 72/589: „Papua New Guinea, Morobe District, Wau,

Mt. Kaindi, 2300 m, under *Nothofagus grandis*, 5. XI. 1972, leg. HORÁK“.

E. staurosporum (BRES.) is a polymorphic species which is shown best by the number of varieties: var. *subrugosus* ROM., var. *obscurior* ROM., var. *rickenii* ROM., var. *platyphyllus* ROM. & FAVRE, var. *farinacea* LARGENT & THIERS and var. *incrustedata* LARGENT & THIERS. The area of distribution of that species stretches from Europe (where it inhabits sites from sea-level to the alpine zone of the Alps and Scandinavia) to North America, Borneo, Malaya, Papua New Guinea and finally New Zealand. From New Zealand *E. staurosporum* (BRES.) was described twice under the name of *E. nothofagi* STEV. and *E. botanicum* STEV. respectively. The type material of these two taxa was studied and there are little doubts about their synonymy.

34. *Entoloma spadix* HESLER 1967

Nova Hedwigia, Beih. 23: 24.

Synonym: *Rhodophyllus fraternus* SINGER 1973: Sydowia, Beih. VII: 97

For the description of the macroscopical data see HESLER (1967) and SINGER (1973).

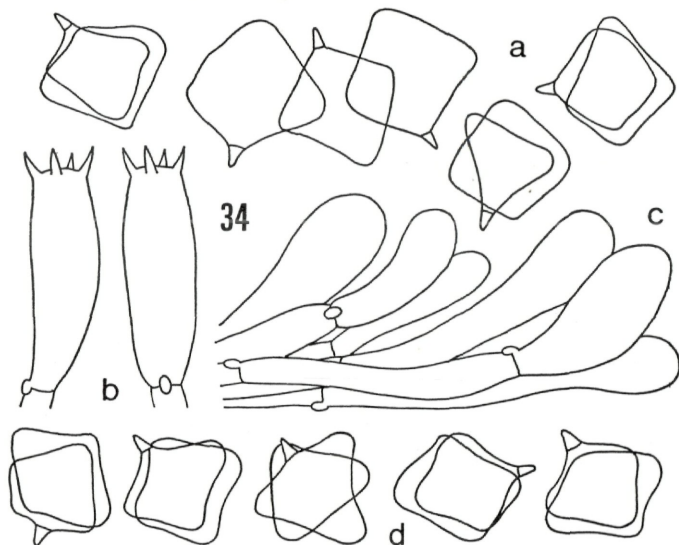


Fig. 34. *Entoloma spadix* HESLER (type): a. spores. — b. basidia. — c. cuticle. — Coll. B 3074: type of *Rhod. fraternus* SING. — d. spores

Spores (7,5) 8–10,5 μ , quadrate to cuboid. Basidia 35–46/10–15 μ , 4-spored. Cheilocystidia absent. Cuticle a cutis of repent or suberect cylindrical hyphae (8–30 μ diam.), with brown vacuolar or plasmatic pigment, Clamp connections present.

Habitat: On soil in forests; USA (Tennessee), Brazil.

Illustrations: Fig. 34, a–d.

Material examined: Holotype (Herb. HESLER, 10767): „USA, Tennessee, Knox Co., Roaring Springs, 9. VII. 1935, leg. HESLER“. — Holotype of *Rh. fraternus* SINGER (BAFC 23237): „Brazil, Pernambuco, Dois Irmaos, 5. VII. 1960, leg. SINGER, B. 3740“.

Contrary to HESLER's observations there are clamp connections on the septae of the cuticular hyphae. We found also the spore dimensions given by HESLER (1967) as incorrect.

Rhodophyllus fraternus SINGER has been placed in synonymy with *E. spadix* HESLER since there are no characters to separate the two taxa.

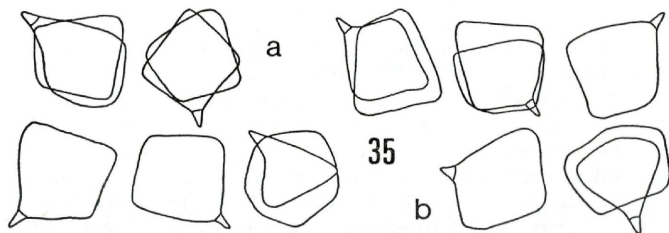


Fig. 35. *Entoloma phleboides* (ROMAGNESI) (type): a. spores. — Lectotype of *Rhod. camaroensis* (BRES.) ROM. (Coll. G 31, PC): b. spores

35. *Entoloma phleboides* (ROMAGNESI) HORAK comb. nov.

Basionym: *Rhodophyllus phleboides* ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 109.

Synonym: ? *Nolanea camaroensis* BRESADOLA 1890: Bull. Soc. Myc. Fr. 1: 34 (ss. ROMAGNESI).

? *Rhodophyllus rhodellus* ROMAGNESI (forma) 1941: Les Rhodophylles de Madagascar, p. 112.

Original description: „Nolaneae habitu. Cum fungus exsiccatus est, pileo ad 15–30 mm, primum metalli dein expanso, papillato vel mammoso, fere ad medium striato, paulum circum inaequali, glabro, siccio e rubrofulvo. Stipite 40–65/2–4 mm, striato sulcato, magis fusco quam pileus, Lamellis subdistantibus, ventricosis, siccis ex pullo roseis. Sporibus cubicis, 9–11/9 μ . Basidiis subcylindricis, in medio paulum angustatis, 35–42/11,5–13 μ . Trama lamellarum eximie lactiferis luteolis, ramosis, plurimis, 6–12 μ latis repleta.

Ad terram humosam⁴⁴. Microscopical characters according to our observation:

Spores 6—9 $m\mu$, quadrate to irregularly subcuboid. Basidia 35—42/10—13 $m\mu$, 4-spored. Cystidia absent. Cuticle a cutis of repent cylindrical hyphae (2—5 $m\mu$ diam.), brown plasmatic or encrusting pigment. Clamp connections absent.

Habitat: On soil Madagascar (type), Cameroon.

Illustrations: BRESADOLA (1890); ROMAGNESI (1941); Fig. 35, a—b.

Material examined: Holotype (PC): „Madagascar, Maroantaha, leg. HEIM (I 19).“ — Holotype of *Rhod. camaroensis* ss. ROMAGNESI (PC): „Madagascar, Ankadirano, 7. XII. 1934, leg. HEIM (G 31).“

The type material of *Nolanea camaroensis* BRES. is not kept in the BRESADOLA Herbarium at Stockholm (S). The type of *Rhod. phleboides* ROM., however, does exist but is in rather bad condition.

Key E

- | | | |
|----|--|---|
| 1. | Conspicuous cheilo- and pleurocystidia present | 2 |
| 1* | Cheilo- and pleurocystidia absent | 5 |
| 2. | Cheilocystidia clavate forming a sterile gill edge | 3 |
| 2* | Cheilocystidia inconspicuous or absent, spores not tetrahedral but more or less quadrate | 4 |
| 3. | Pileus —70 mm diam., brown, smooth; stipe —75/—8 mm, brown; spores 5,5—7 $m\mu$, quadrate; cheilocystidia —55/—25 $m\mu$; taste farinaceous; on soil in forests; Madagascar (type), Congo, Malaya, Borneo | 37. <i>E. cuboidosporum</i> (p. 227) |
| 3* | Pileus —40 mm diam., brown, scaly-squamulose; stipe —90/—4 mm, brownish; spores 10—13 $m\mu$, tetrahedral; pleuro- and cheilocystidia 50—115/15—35 $m\mu$, fusoid; odour absent; on soil in forests; New Zealand | 38. <i>E. squamiferum</i> (p. 228) |
| 4. | Pleurocystidia fusoid, apex round, often constricted; pileus —45 mm diam., brownish, convex (!) when young; spores 6,5—9 $m\mu$; odour farinaceous; in bogs, swamps, etc.; Europe (type), Papua New Guinea | 39. <i>E. rhombisporum</i> (p. 228) |
| 4* | Pleurocystidia fusoid, apex conical, pointed; pileus —60 mm diam., brown; spores 5,5—8 $m\mu$; Odour none; on soil in forests; Ceylon (type) Malaya, Papua New Guinea, Solomon Isl. | 40. <i>E. infundibuliforme</i> (p. 231) |
| 5. | Spores 10—12 $m\mu$, cuboid-tetrahedral; pileus —15 mm diam., brown; stipe —40/—2 mm, brownish; odour none; in rain forest; Chile | 41. <i>E. mesospermum</i> (p. 231) |
| 5* | Spores less than 9 $m\mu$, cuboid or quadrate | 6 |

6. Spores 7–9 μ , cuboid; pileus —20 mm diam., brown, squamulose at centre; stipe —80/—2 mm; on soil in deciduous forests; USA 42. *E. cuboideum* (p. 233)
- 6*. Spores 6–7 μ , quadrate; pileus —6 mm diam., brown, smooth to scaly; stipe —18/—1 mm, concolorous; under bamboo or in forests; Trinidad (type), Malaya.....
..... 43. *E. brunneostriatum* (p. 233)

37. *Entoloma cuboidosporum* (BEELI) HORAK comb. nov.

Basionym: *Tubaria cuboidospora* BEELI 1928: Bull. Soc. Roy. Bot. Belg. 41: 87.

Rhodophyllus (*Eccilia*) *cuboidosporus* (BEELI) ROMAGNESI 1956: Bull. Jard. Bot. Brux. 26: 171.

Synonym: ? *Rhodophyllus vitis* (FR.) f. *madecassensis* ROMAGNESI 1941: Les Rhodophylles de Madagascar, p. 123.

Pileus 40–100 mm diam., convex soon plane with depressed centre later concave to infundibuliform, margin often recurved and undulate; brown umber to pale fuscous; disc pruinose, concentrically cracking, smooth towards the striate margin, hygrophorous, dry. Lamellae sinuate-adnate to adnato-decurrent, ventricose, crowded; dingy whitish then pink, edge denticulate or crenate, concolorous. Stipe 40–90/5–12 mm, cylindrical, equal, sometimes base slightly thickened; concolorous with pileus, base white from mycelium; smooth, solid becoming hollow, firm, dry, single or in clusters. Context

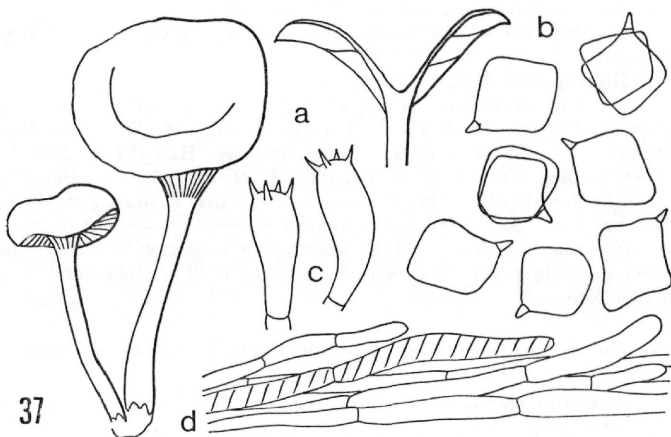


Fig. 37. *Entoloma cuboidosporum* (BEELI) (type): a. carpophores. — b. spores. — c. basidia. — d. cuticle

brown in pileus. Odour and taste distinctly farinaceous. Chemical reactions unknown.

Spores 5,5—7 (7,5) μ , quadrate to rhomboid. Basidia 25—40/8—10 μ , 4-spored. Cheilocystidia 35—60/12—30 μ , broadly clavate to vesiculose, hyaline, thin-walled, forming a sterile gill edge, pigment absent. Cuticle a cutis or trichoderm consisting of repent or suberect cylindrical hyphae (5—18 μ diam.), brown plasmatic pigment present. Clamp connections not observed.

Habitat: On rotten wood or on soil in forests. Congo (type), Madagascar, Malaya, Singapore, Borneo.

Illustrations: BEELI (1928); ROMAGNESI (1941, 1956); Fig. 37, a—d.

Material examined: Holotype (BR): „Congo, Lisala, XII. 1925, leg. GOOSSENS-FONTANA, 539“. — Holotype of *Rhod. vilis* f. *mada-cassensis* ROM. (PC): „Madagascar, Ankadirano, 7. XII. 1934, leg. HEIM“. — Herb. CORNER (Entoloma 24): „Singapore, Garden's Jungle, 20. II. 1944, leg. CORNER“. — Herb. CORNER (Entoloma A): „Malaya, Kewah, Lagkawi Isl., near Kuah, 23. XI. 1941, leg. CORNER“. — Herb. CORNER (RSNB 981): „Borneo, Mt. Kinabalu, East ridge, 25. VII. 1961, leg. CORNER“.

38. *Entoloma squamiferum* HORAK 1973

Nova Hedwigia, Beih. 43: 19.

Synonym: *Entoloma acuticystidiosum* HORAK 1973: l. c., p. 17.

For detailed description see HORAK (1973).

Habitat: On soil in broad leaved and coniferous forests. New Zealand.

Illustrations: HORAK (1973).

Material examined: Holotype (PDD 27016): „New Zealand, Pouakai Range, Mt. Egmont, Timaru Stream, 18. VI. 1968, leg. HORAK“. — Holotype of *E. acuticystidiosum* HK. (PDD 27105): „New Zealand, Urewera N. P. Tawa Track 24. VI. 1968 leg. HORAK“.

The restudy of the type material revealed that *E. acuticystidiosum* HK. has to be considered a synonym of *E. squamiferum* HK. despite the fact that the pleurocystidia are slightly different. There are no differences however between the spores, cheilocystidia and the carpophores.

39. *Entoloma rhombisporum* (KÜHNER & BOURSIER) HORAK comb. nov.

Basionym: *Leptonia rhombispora* KÜHNER & BOURSIER 1929: Bull. Soc. Myc. Fr. 45: 264.

Synonym: *E. solstitialis* ss. RICKEN (fide KÜHNER).

E. vilis ss. RICKEN (fide KÜHNER).

E. polita ss. BRESADOLA (fide FAVRE).

Pileus —45 mm diam., hemispherical to conical when young later becoming plane at the apex, finally subconcave to depressed at centre, margin uprolled in aged specimens; brownish to dirty yellowish, later brown when fresh, paler towards the striate margin; dry, radially fibrillose, hygrophanous. Lamellae adnate to subdecurrent, L 10—20,

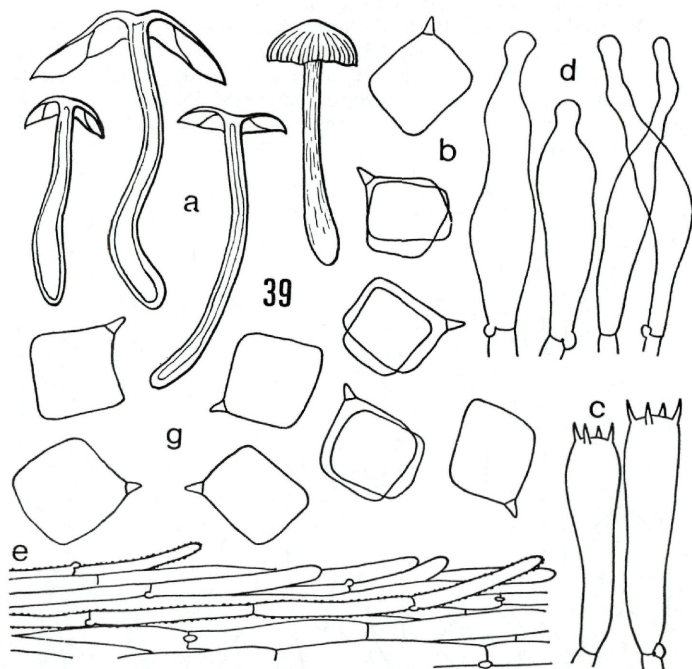


Fig. 39. *Entoloma rhombisporum* (KÜHN. & BOURS.): Coll. FAVRE (11. VI. 1945): g. spores. — Coll. ZT 72/25: a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle

l —7; brownish to beige when young later turning beige-pink, gill edge concolorous, even. Stipe 30—55/1,5—3,5 (6) mm, cylindrical to subclavate; whitish or pale brown, base white from mycelium; glabrous to slightly fibrillose; dry, hollow, fragile. Context whitish-brownish. Odour and taste spermatie to farinaceous.

Spores 6,5—9 μ , rhomboid to subcuboid. Basidia 30—55/

8–13 μ , 4-spored. Cheilocystidia 35–55 (75)/7–14 μ , fusoid, apex conical-rounded or slightly capitate, hyaline. Cuticle a cutis composed of short-cylindrical hyphae (4–12 μ diam.), pigment encrusting membranes. Clamp connections present or absent.

Habitat: In bogs or wet localities. Europe (type), Papua New Guinea.

Illustration: FAVRE (1948); Fig. 39, a–g.

Material examined: Herb. FAVRE (G): „Suisse, Herzogenbuchsee, hautmarais de Burgäschi, 11. VI. 1945, leg. FAVRE“. — ZT, Herb. HORAK 72/25: „PNG, Goroka, Daulo Pass, 6. I. 1972, leg. HORAK“.

Careful examination of European material showed that there are no differences between the specimens collected in Switzerland and Papua New Guinea.

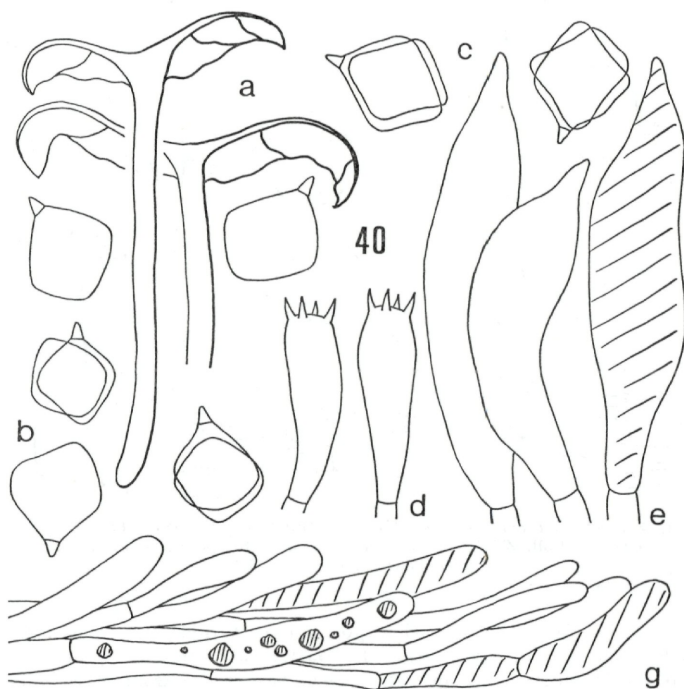


Fig. 40. *Entoloma infundibuliforme* PETCH (type): a. carpophores. — b. spores. — Coll. CORNER (*Entoloma*, 18. V. 1930): c. spores. — d. basidia. — e. cheilopleurocystidia. — g. cuticle

40. *Entoloma infundibuliforme* PETCH 1917

Ann. Roy. Bot. Gard. Peradeniya 6: 307.

Synonym: *Entoloma infundibuliforme* HESLER 1967: Nova Hedwigia, Beih. 23: 38.

Pileus 15–60 mm diam., at first convex soon plane and later depressed at centre, becoming convave, margin often strongly incurved; dark brown to fuscous, aged specimens paler, densely covered with minute concolorous or darker squamules, scurfy-squamulose at the disk appressedly fibrillose towards the striate margin, dry. Lamellae adnate to emarginate-decurrent, crowded (L 10–16, l 3–7); pale greyish or brownish turning pink, edge concolorous, even. Stipe 15–85/2–7 mm, cylindrical, equal; whitish then brownish, white villous base; dry, innately fibrillose, aged specimens glabrous, hollow, single in groups. Context brownish. Odour and taste not distinctive. Chemical reactions unknown.

Spores 5,5–8 μ , quadrate to subrhomboid. Basidia 22–42/5–12 μ , 4-spored, rarely 2-spored. Cheilocystidia 40–90/10–16 (20) μ , fusoid with conical tip, thin-walled, often collapsed in herbarium material, hyaline, scattered on edge, pigment absent or yellow-brown (in KOH). Cuticle a cutis or trichoderm composed of cylindrical hyphae (5–20 μ diam.), terminal cells often subclavate, brown plasmatic or vacuolar pigment present. Clamp connections rare.

Habitat: On soil in forests from sea level to 2000 m (PNG). Ceylon (type), Malaya, Papua New Guinea, Solomon Isl.

Illustrations: Fig. 40, a–g.

Material examined: Holotype (K): „Ceylon, Peradeniya, Sept. 1868, Nr. 760 (sub nom. *Ag. (Entoloma) rhodopolius* Fr.)“¹. — ZT, Herb. HORAK 72/487: „PNG, Morobe District, SE of Lae, Musik Isl., 20. VI. 1972, leg. HORAK“². — ZT, Herb. HORAK 72/2: „PNG, Eastern Highlands, Goroka, Daulo Pass, 5. I. 1972, leg. HORAK“³. — ZT, Herb. HORAK 72/10: „PNG, Eastern Highlands, Goroka, Daulo Pass, 5. I. 1972, leg. HORAK“⁴. — ZT, Herb. HORAK 73/89: „PNG, Morobe District, Bulolo, Watut, 13. III. 1973, leg. HORAK“⁵. — Herb. CORNER (RSS 1408): „Solomon Isl., Santa Isabel, Cockatoo Anchorage, 19. IX. 1965, leg. CORNER“⁶. — Herb. CORNER s. n.: „Malaya, Pahang, Frazer's Hill, 18. V. 1930, leg. CORNER“⁷.

41. *Entoloma mesospermum* HORAK sp. n.

Pileo usque ad 15 mm lato, fuligineo, squamuloso, sicco. Lamellis emarginatis, uncinatis. Stipite –40/–2 mm, cylindrico, brunneo, sicco. Odore saporeque nullo. Sporis 10–12 μ , cuboideis. Ad terram in silvis virgineis. Chile. Typus (ZT): Pucatrihue, 29. IV. 1963.

Pileus 5–8 mm diam., hemispherical, convex, aged specimens

depressed at centre, margin inrolled; dark brown, smoke brown, paler towards the estriate margin; scurfy to squamulose especially at the disc, innate or fibrillose towards the margin, dry, not hygrophanous. Lamellae emarginate-adnate, uncinata, ventricose; whitish grey later turning pink, edge concolorous, even to indistinctly serrate; L 10–12, 1–3. Stipe 20–40/–2 mm, cylindrical, equal; wax yellowish then brownish, white villous base; dry, apically pruinose, towards the base glabrous, firm, single. Context brownish. Odour and taste not distinctive. Chemical reactions unknown.

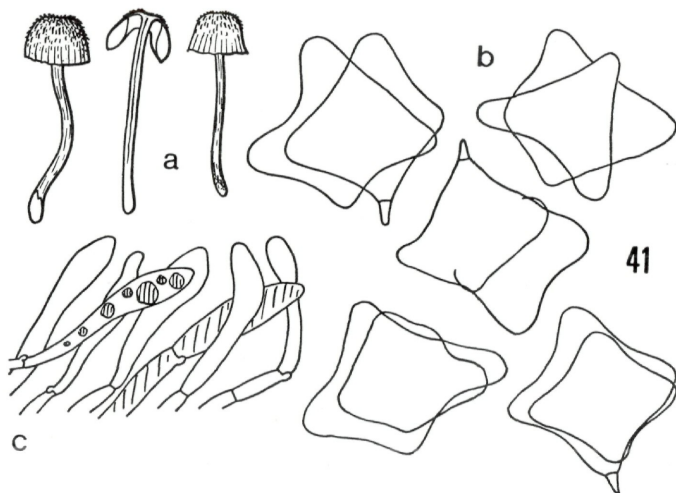


Fig. 41. *Entoloma mesospermum* Hk. (type): a. carpophores. — b. spores. — c. cuticle

Spores 10–12 $m\mu$, cuboid. Basidia 45–60/12–15 $m\mu$, 4-spored. Cystidia none. Cuticle a trichoderm consisting of bundled subclavate terminal cells (8–12 $m\mu$ diam.), brown plasmatic or vacuolar pigment present. Clamp connections numerous.

Habitat: In rain forest on soil. Chile.

Illustrations: Fig. 41, a–c.

Material examined: Holotype (ZT, Herb. HORAK 62/155): „Chile, Pucatrihue, Prov. Osorno, 29. IV. 1963, leg. HORAK“.

The large spores and the absence of cystidia characterize this South American species well.

42. *Entoloma cuboideum* HESLER 1967

Nova Hedwigia, Beih. 23: 22.

For description of the macroscopical characters see HESLER (1967).

Spores 7–9 μ , cuboid to tetrahedral. Basidia 35–42/10–12 μ , 4-spored. Cystidia absent. Cuticle a trichoderm composed of tufts of cylindrical hyphae (8–12 μ diam.), brown plasmatic pigment present. Clamp connections numerous.

Habitat: On soil in deciduous forests. USA (North Carolina).

Illustrations: Fig. 42, a–c.

Material examined: Holotype (Herb. HESLER, 21907): „USA, N. Carolina, Horse Cove, 14. VII. 1955, leg. HESLER“.

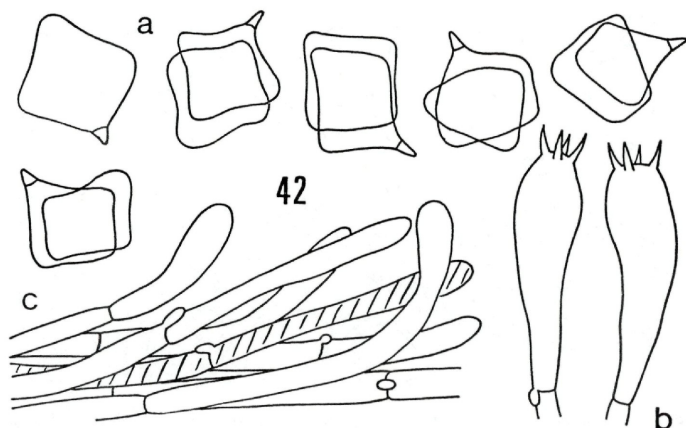


Fig. 42. *Entoloma cuboideum* HESLER (type): a. spores. — b. vasidia. — c. cuticle

43. *Entoloma brunneostriatum* DENNIS 1953

Bull. Soc. Myc. Fr. 69: 106.

Synonym: *Eccilia brunneostriata* (DENNIS) DENNIS 1970: Kew Bull. Add. Ser. 3: 79.

For the original description see DENNIS (1953).

Description of the Malayan material:

Pileus 5–6 mm diam., at first convex to plane becoming umbilicate; fuscous, opaque; hispid with darker minute recurved fibrillose squamules; dry, striate. Lamellae broadly adnate to decurrent, subtriangular; brown, edge concolorous, subdistant. Stipe 13–18/–1 mm, cylindrical, equal; pale fuscous to brownish; cartilagineous,

apex minutely fibrillose pubescent, dry, solid, single. Context brownish to pallid white. Taste and smell unknown.

Spores 6–7.5 μ , quadrate to subcuboid. Basidia 25–30/10 μ , 4-spored. Cheilocystidia none. Cuticle a cutis or trichoderm composed of cylindrical hyphae (8–14 μ diam.), terminal cells often fusoid, brown plasmatic pigment present. Clamp connections numerous.

Habitat: On soil (under bamboo or in virgin forest). Trinidad (type), Malaya.

Illustrations: DENNIS (1953, 1970). Fig. 43, a–d.

Material examined: Holotype (K): „Trinidad, St. Joseph, 20. X. 1949, leg. DENNIS“. — Herb. CORNER (s. n.): „Malaya, Pahang, Tembeling, 26. V. 1931, leg. CORNER“.

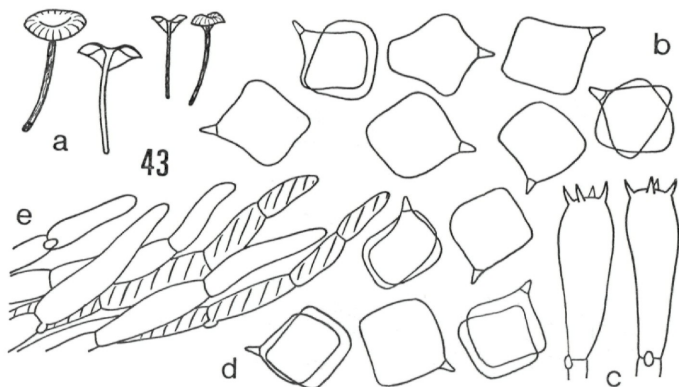


Fig. 43. *Entoloma brunneostriatum* DENNIS (type): b. spores. — Coll. CORNER (Eccilia, 26. V. 1931): a. carpophores. — c. basidia. — d. spores. — e. cuticle

We compared Prof. CORNER's collection from Malaya with the type. There are minor differences only between the two fungi which obviously are conspecific.

List of cuboid-spored *Entoloma* of uncertain taxonomic position:

Rhodophyllus politus (FR.) ss. BRESADOLA;

Rhodophyllus pusillus (VELENOVSKY) ROMAGNESI;

Rhodophyllus solstitialis (FR.) QUÉLET ss. RICKEN;

Entoloma variabile PECK 1900: N. Y. State Mus. Ann. Rep. 54: 144;

Rhodophyllus vilis (FR.) ss. RICKEN;

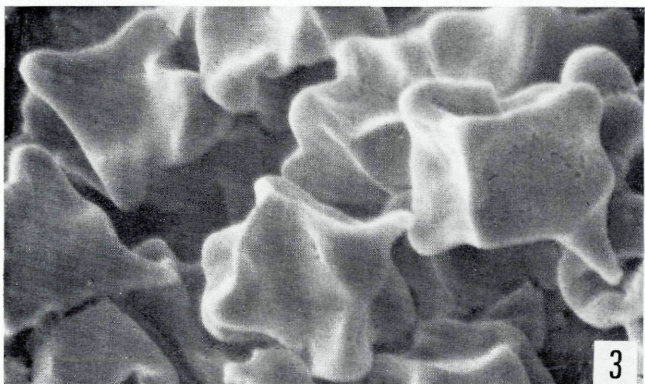
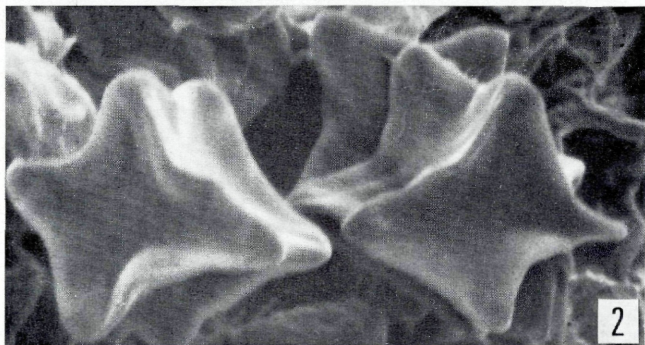
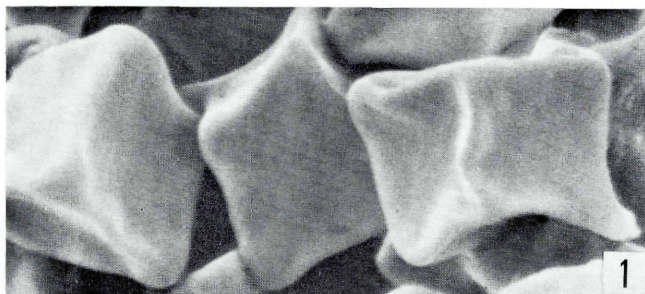
Ag. (Eccilia) watsoni PECK 1875: N. Y. State Mus. Ann. Rep. 28: 48 (Largent 1974).

Rhodophyllus xylophilus LANGE.

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1. *Entoloma virescens* (B. & C.): ZT, 68/122 (4200 \times). — 2. *Entoloma mesospermum* Hk.: ZT 62/155 (3300 \times). — 3. *Entoloma squamiferum* Hk.: PDD 27015 (4200 \times)

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