

## Notes on extra-European taxa of *Bolbitiaceae* (*Agaricales*, *Basidiomycota*)

EGON HORAK

Geobotanical Institute, Herbarium, ETH  
Zollikerstrasse 107  
CH-8008 Zurich, Switzerland

ANTON HAUSKNECHT

Sonndorferstrasse 22  
A-3712 Maissau, Austria

Received 19. 8. 2002

**Key words:** *Agaricales*, *Bolbitiaceae*, *Conocybe*, *Galerella*, *Pholiotina*, *Tubariella*. – New taxa, species concepts, keys. – Mycoflora of Asia, Africa, North America, Australasia, and Oceania.

**Abstract:** Collections of *Bolbitiaceae* from different regions outside Europe (Australia, Cook Islands, Indonesia, Mauritius, New Zealand, Papua New Guinea, Trinidad, USA) are discussed. *Tubariella rhizophora* is described as a new genus and species. New species and varieties, respectively, are described for the genera *Galerella* (*G. fibrillosa*), *Conocybe* (*C. dennisii*, *C. discorosea*, *C. vinaceobrunnea*, *C. volviornata*, *C. zeylanica* var. *marginata*) and *Pholiotina* (*P. glutinosa*, *P. pilosa*, *P. resinocystidiata*, *P. vesiculosa*). *P. vesiculosa* is placed within the new section *Vesiculosae* due to its aberrant, vesiculose-subuteriform cheilocystidia. For most taxa, line drawings of macro- and microscopical features are provided. Species concepts are discussed, and keys are provided for complex infrageneric groups to facilitate determination and species delimitation. Colour plates of three taxa are given.

**Zusammenfassung:** Aufsammlungen von *Bolbitiaceae* aus verschiedenen außereuropäischen Regionen (Australien, Cook Islands, Indonesien, Mauritius, Neuseeland, Papua Neu Guinea, Trinidad, USA) werden behandelt. *Tubariella rhizophora* wird als neue Gattung und Art beschrieben. Neue Arten bzw. Varietäten werden aus den Gattungen *Galerella* (*G. fibrillosa*), *Conocybe* (*C. dennisii*, *C. discorosea*, *C. vinaceobrunnea*, *C. volviornata*, *C. zeylanica* var. *marginata*) und *Pholiotina* (*P. glutinosa*, *P. pilosa*, *P. resinocystidiata*, *P. vesiculosa*) beschrieben. *P. vesiculosa* wird aufgrund ihrer abweichenden, vesiculös-subuteriformen Cheilozystiden in die neue Sektion *Vesiculosae* gestellt. Die meisten Taxa werden mit Zeichnungen der makro- und mikroskopischen Merkmale dokumentiert. Artkonzepte werden mit Kommentaren diskutiert und Schlüssel erleichtern die Bestimmung und Abgrenzung von Taxa in komplexen infragenerischen Gruppen. Farbabbildungen von drei Taxa werden gegeben.

### Materials and methods

The taxonomic delimitation of the genera *Conocybe* versus *Pholiotina* and the interpretation of the species mentioned in this contribution closely follow the concepts proposed by WATLING (1982) and SINGER (1986).

For microscopical analysis, both fresh and dried specimens were examined either in aqua dest. and/or 4% KOH.

Scales (unless otherwise stated): basidiomes (natural size, bar = 20 mm), basidiospores (x 2000), basidia (x 1000), cheilocystidia (x 1000), caulocystidia (x 500), pileipellis and pileicystidia (x 500).

Concerning the new taxa mentioned in the text, holotype and isotype material are kept in the herbaria BO, K, WU, and ZT.

## Enumeration of material examined

### *Conocybe* subgen. *Conocybe* sect. *Conocybe* stirps *Mesospora*

#### *Conocybe dennisii* HAUSKN., spec. nova

**Synonym:** *Conocybe microspora* (VELEN.) DENNIS ss. DENNIS 1953. Bull. Soc. Mycol. France **69**: 189.  
non *Galera microspora* VELENOVSKÝ 1921. České Houby: 542; cf. SINGER & HAUSKNECHT (1992: 101).

#### **Descriptio latina:**

Pileus 3-5 mm diam., convexus, ochraceo-cinnamomeus, hygrophanus, siccus, fragilis. Lamellae distantes, emarginato-adnexae, angustae, brunneae. Stipes 6-10 x 0,2 mm, cylindricus, filiformis, aequalis, albus, minute pruinosis. Basidiosporae 4,5-5,5 x 3,5-4,0  $\mu$ m, lentiformes, subellipsoideae vel submitriformes, pallide aurantio-brunneae, poro nullo. Basidia 10-13 x 6,5-7,5  $\mu$ m, 4-sporigera. Cheilocystidia 13-19 x 6,5-8,5  $\mu$ m, lecythiformia, apicaliter capitata, 2,5-4  $\mu$ m diam. Caulocystidia 10-15 x 4-6  $\mu$ m, lecythiformia, apicaliter capitata, 2,5-3,5  $\mu$ m diam. Pileipellis hymeniformis, ex cellulis clavatis, usque ad 20  $\mu$ m diam. Pileicystidia nulla. Fibulae praesentes.

**Holotypus:** Trinidad, DENNIS No. 176 (K, "*Conocybe microspora*").

#### **Description:**

**Pileus:** 3-5 mm diam., convex, umbo absent, centre and striation "light ochraceous buff", "ochraceous buff", smooth, paler elsewhere, hygrophanous, dry.

**Lamellae:** rather distant, emarginate-adnexed, narrow, pale brown.

**Stipe:** 6-10 x 0.2 mm (from dried specimen), cylindrical, filiform, equal, white over whole length, minutely pruinose, dry.

**Context:** fragile.

**Spore print:** not recorded.

**Basidiospores:** 4.5-5.5 x 3.5-4.0  $\mu$ m, average 5.0 x 3.8  $\mu$ m, Q = 1.3-1.55, slightly lentiform to subellipsoid in lateral view, roundish to submitriform in frontal view, pale orange-brown in KOH, wall double, slightly thickened, germ-pore absent.

**Basidia:** 10-13 x 6.5-7.5  $\mu$ m, 4-spored.

**Cheilocystidia:** 13-19 x 6.5-8.5  $\mu$ m, lecythiform, capitate apex 2.5-4  $\mu$ m diam.

**Pleurocystidia:** absent.

**Caulocystidia:** 10-15 x 4-6  $\mu$ m, lecythiform, capitate apex 2.5-3.5  $\mu$ m diam., generally smaller than cheilocystidia.

**Pileipellis:** hymeniform, composed of clavate cells, up to 20  $\mu$ m diam. Pileicystidia not observed.

**Clamp connections:** present.

**Distribution:** Trinidad (Lesser Antilles).

**Holotype:** Trinidad: St. Joseph, on soil among moss under *Bambusa* spec. (*Bambusaceae*), 14. 10. 1949, leg. R. W. G. DENNIS 176 (K, as *Conocybe microspora*).

**Material examined:** Holotype.

**Additional material examined:** *Conocybe lentispora* SINGER: **Argentina:** Prov. Tucumán, San Pablo, 27. 3. 1949, leg. R. SINGER T 316 (isotype, LIL).

*Conocybe xerophytica* SINGER: **Argentina:** Prov. Tucumán, Tapía, inter muscos minimos in silva xerophytica, 15. 4. 1951, leg. R. SINGER T 1494 (holotype, LIL).

The macroscopical characters of this new Caribbean taxon *Conocybe dennisii* are taken from the original description in DENNIS (1953: 189) whereas the microscopical features were observed in the authentic collection.

The *Conocybe mesospora*-complex comprises only few species with pore-less basidiospores which are discussed and enumerated below:

*Conocybe minima* SINGER & HAUSKN. (1992: 93): so far only recorded from Austria, basidiospores nearly twice as long as in *C. dennisii*.

*Conocybe enderlei* HAUSKN., *Conocybe enderlei* var. *variispora* HAUSKN. and *Conocybe haglundii* HAUSKN.: these three species are characterized by larger basidiomes and larger basidiospores of different size (HAUSKNECHT 2001 b).

*Conocybe lobauensis* SINGER & HAUSKN. (1988: 107) is recognized by basidiospores of larger size and different shape, with lecythiform caulocystidia.

*Conocybe tuxlaensis* SINGER (1989: 105), originally described from Mexico but also recorded several times in Europe, has rather pale (in KOH) and thin-walled basidiospores without or with a small, indistinct germ-pore. The caulocystidia consist both of lecythiform and long, hair-like cells (HAUSKNECHT 2002 a).

Based on several collections from Brazil, SINGER (in SINGER & HAUSKNECHT 1992: 103) described *Conocybe microsperma* SINGER which obviously is closely related but not identical to *Conocybe microspora* ss. DENNIS (1953). Due to current legislation, the Amazonian material is not sent overseas for re-examination.

Relatively thin-walled basidiospores with a small and inconspicuous germ-pore are also reported for *Conocybe xerophytica* SINGER (SINGER & DIGILIO 1953: 294) from Argentina. In the protologue, SINGER emphasizes that the germ-pore in *C. xerophytica* is "distinctissimo". The re-examination revealed, however, that SINGER's observation is not correct and accordingly this Argentinian species has also close affinities to *C. dennisii*.

Finally, the holotype of a second Argentinian *Conocybe*, *C. lentispora* SINGER (1950: 134), is in rather fragmentary condition which does not allow to observe both the cheilocystidia and the caulocystidia. However, the rather thick-walled, distinctly lentiform basidiospores (mean 5.8 x 4.8 x 4 µm) with small germ-pore clearly separate this taxon from *C. dennisii*.

***Conocybe mesospora* KÜHNER & WATLING 1980**, Notes Roy. Bot. Gard. Edinburgh 38: 336. Fig. 1.

#### **Description of material from Indonesia, Java (ZT 6482):**

**Pileus:** 8-15 mm diam., hemispherical, soon convex-expanded, weakly umbonate, finally concave with upturned margin, deep ochre-brown, paler towards darker striate margin, thin, fragile, dry, slightly pruinose-hairy under lens.

**Lamellae:** 28-36 reaching stipe, up to 3 lamellulae, adnexed to subfree, up to 1.5 mm broad, at first off white becoming rust ochre, even edges concolourous.

**Stipe:** 15-35 x 0.5-1 mm, cylindrical, base slightly swollen (up to 2 mm diam.), at first white, later becoming paler concolourous with lamellae, pruinose over whole length, dry, solid, veil remnants absent.

**Context:** concolourous, very fragile, thin in pileus and stipe. Odour and taste not distinctive.

**Spore print:** rust ochre.

**Basidiospores:** (7-)8-9.5 x 4-4.5  $\mu\text{m}$ , slender amygdaliform, rust ochre-brown, smooth, thin-walled, germ-pore distinctive.

**Basidia:** 16-20 x 6-7  $\mu\text{m}$ , 4-(2-)spored.

**Cheilocystidia:** 16-20 x 4-8  $\mu\text{m}$ , lecythiform, capitate apex 4-5  $\mu\text{m}$  diam., hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** exclusively lecythiform, 18-26 x 5-10  $\mu\text{m}$ , capitate apex 3-4.5  $\mu\text{m}$  diam., hyaline, solitary and in clusters.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 12-25 x 10-20  $\mu\text{m}$ , at base often incrustated with pigment rust brown in KOH, pileocystidia 25-45 x 6-9  $\mu\text{m}$ , lecythiform or slender fusoid with elongated cylindrical or subconical neck, non-capitate apex obtusely rounded.

**Clamp connections:** present.

**Distribution:** Europe (see HAUSKNECHT 2002 b), North Africa, North America (Canada), New Zealand, and now Indonesia (Java).

**Holotype:** France: Paris, Ozoir, Ferrandière, on side of tracks, 28. 9. 1932, leg. R. KÜHNER (G).

**Material examined:** Holotype.

**New Zealand:** S-Island, Buller, S of Ahaura, 150 m s. m., among litter and on rotten wood of *Podocarpus dacrydioides* (*Podocarpaceae*), 14. 3. 1968, leg. E. HORAK 68-154 (ZT, WU 22214). Westland, Hari Hari, at about sea level, on rotting debris of broadleaf dicot trees and tree fern, 13. 2. 1969, leg. E. HORAK 69-67 (ZT, WU 22215). West Coast, Haast Pass, on rotten debris of broadleaf trees and tree ferns, 24. 2. 1997, leg. A. HAUSKNECHT (WU 17386).

**Indonesia:** Java, Halimun National Park, on soil among litter in tropical montane rain forest dominated by *Castanopsis-Quercus* (*Fagaceae*), 1150 m s. m., 6. 1. 1999, leg. E. HORAK 6482 (ZT, BO-99-48, WU 22213).

Morphologically, both the Javanese material and the New Zealand collections (WATLING & TAYLOR 1987) agree in all relevant features with authentic material of *Conocybe mesospora* from Europe (HAUSKNECHT 2002 b). It is noteworthy, however, that the basidiospores of the Indonesian collection are more slender ( $Q = \text{close to } 2$ ) as usually found in typical collections. But at several occasions, the authors have observed similar basidiospore sizes in European (e.g., Denmark, LAESOE, 30. 8. 1988, C; The Netherlands, KITS VAN WAVEREN, 2. 10. 1979, and ULJÉ, 17. 7. 1993, both in L; Sweden, RYMAN, 13. 10. 1974, UPS) and North American material (USA, SINGER, 1. 9. 1975, F). These afore-mentioned deviations in spore sizes still fall into the range of variation and thus do not warrant any infraspecific segregation. Finally, it is remarkable that in the pileipellis of the Javanese specimens scattered hair-like elements are also found intermixed with lecythiform cells.

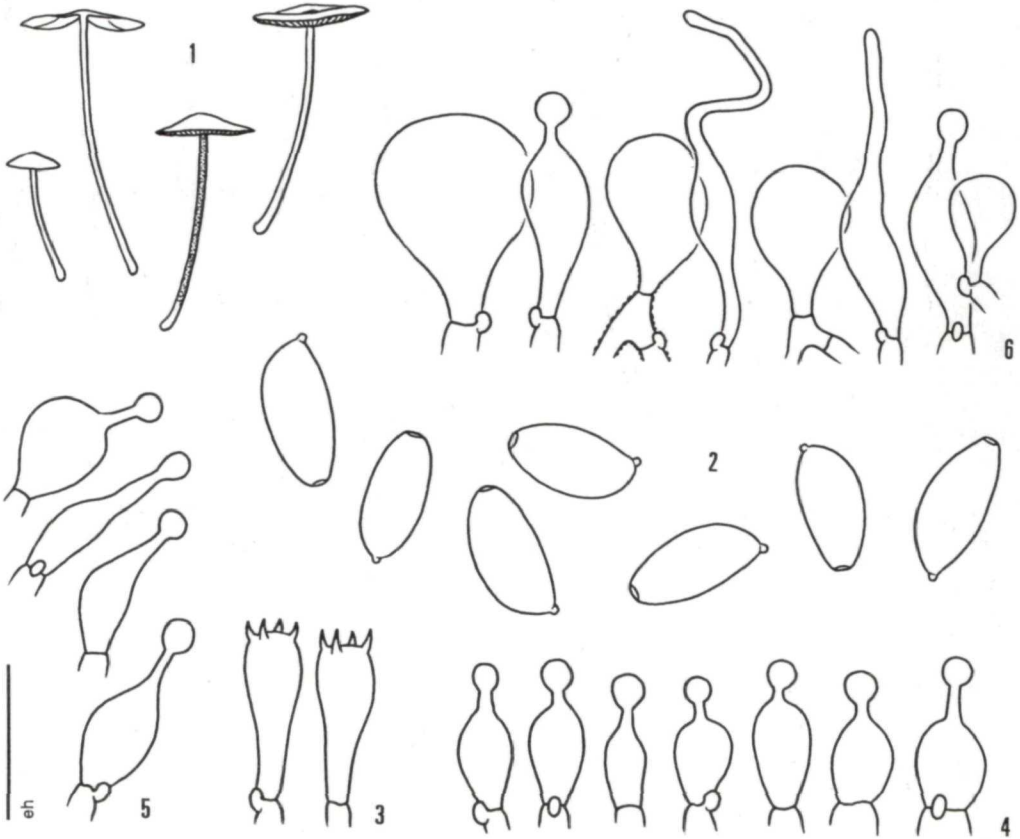


Fig. 1. *Conocybe mesospora* (ZT 6482). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis (x 1000).

***Conocybe* subgen. *Conocybe* sect. *Pilosellae* stirps *Siliginea***

***Conocybe* aff. *sienophylla* (BERK. & BROOME) SINGER 1962, Sydowia 15: 68. Fig. 2**

**Description of material from North America, USA, Montana (ZT 4378):**

Pileus: 8-20 mm diam., convex to broadly campanulate, deep umber brown to chocolate brown, hygrophanous, paling to ochre, translucent-striate, dry, fragile.

Lamellae: adnexed to subfree, very crowded, up to 2.5 mm broad, rust ochre, even edges concolourous.

Stipe: 30-75 x 1-1.5 mm, cylindrical, slender, equal, slightly swollen to subbulbous at base, white, with pale yellow tinge in mature specimens, pruinose over whole length, hollow, very fragile, solitary.

Spore print: rust brown.

Basidiospores: 10.5-12 x 5.5-6  $\mu$ m, elliptical, smooth, walls slightly thickened, rust ochre, germ-pore distinctive.

Basidia: 20-26 x 9-12  $\mu$ m, 4-spored, clavate.

Cheilocystidia: 16-28 x 6-8  $\mu$ m, lecythiform, capitate apex 3-4  $\mu$ m diam.

Pleurocystidia: absent.

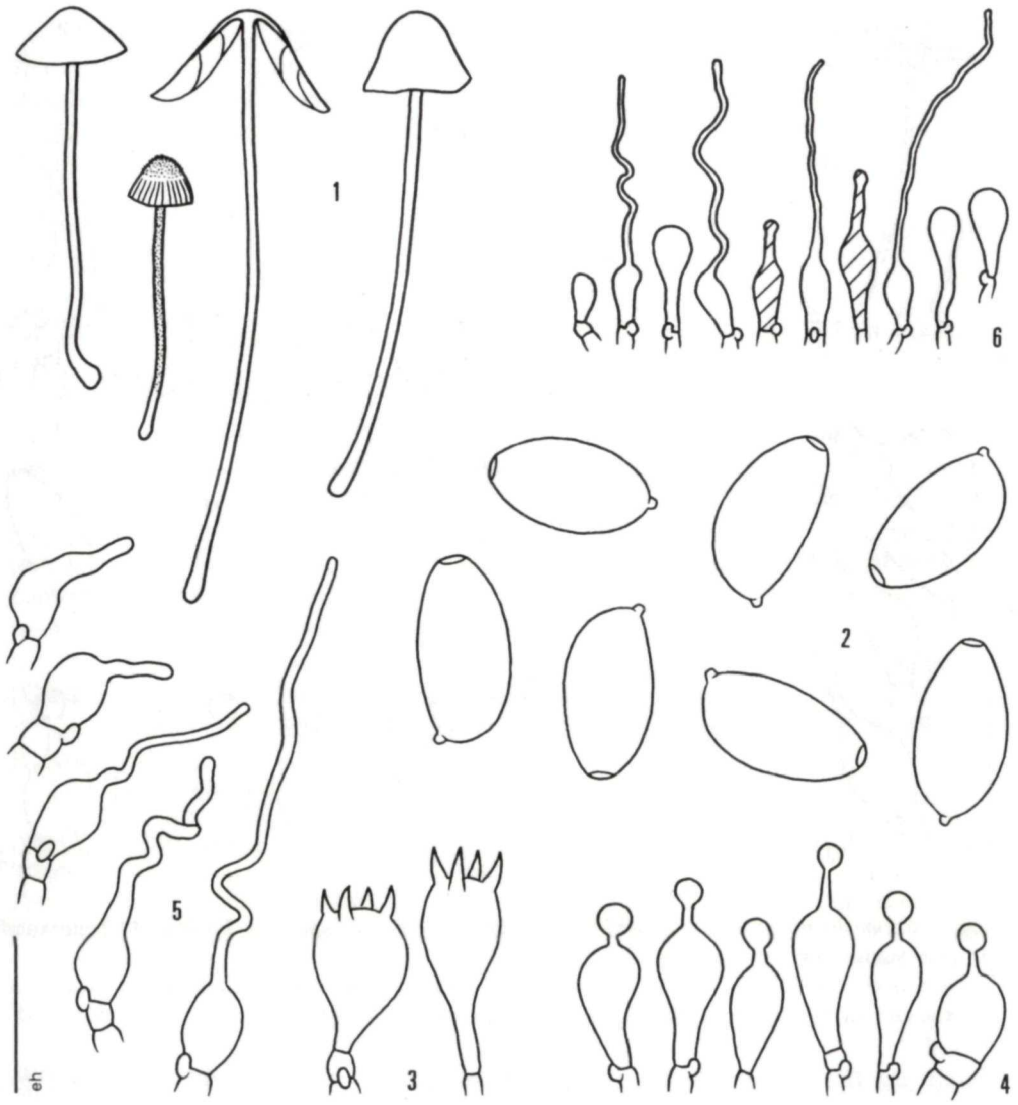


Fig. 2. *Conocybe* aff. *sienophylla* (ZT 4378). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

**Caulocystidia:** 15-75 x 5-8  $\mu\text{m}$ , polymorphic, fusoid with elongate cylindrical neck, occasionally coiled, hyaline, lecythiform cells absent.

**Pileipellis:** hymeniform, composed of a) clavate to vesiculose cells, b) typical lecythiform pileicystidia with yellow-brown plasmatic pigment and c) hair-like cells up to 90 x up to 10  $\mu\text{m}$ , shape similar as the caulocystidia.

**Clamp connections:** present.

**Distribution:** unknown (see below).

**Holotype:** Sri Lanka: Peradeniya, on the ground, Jan. 1869, leg. THWAITES No. 933 (K).

**Material examined:** Holotype.

**USA:** Montana, Flathead Lake, Biological Station, on soil among grass, 18. 8. 1989, MILLER in HORAK 4378 (ZT).

As compared to European material, the present specimens collected in Montana have darker pigmented pilei and the shape of the basidiospores are elliptical-subcylindrical.

The re-examination of the type material demonstrated that the microscopical features of the authentic Sri Lankan specimens do not conform with those as routinely observed in European material. The basidiospores of the type collection are darker coloured, the walls are thicker, and the size distinctly smaller (mean  $8.3 \times 5 \mu\text{m}$ ). Therefore, one of the most common European *Conocybe* does not have a valid name because the combination *Conocybe ochracea* (KÜHNER) SINGER (1959: 395) is actually invalid.

The present species belongs to a taxonomically complex group the species delimitation of which is not clearly defined yet.

### *Conocybe* subgen. *Conocybe* sect. *Singerella*

*Conocybe corneri* WATLING, Sydowia Beih. 8: 401. 1979. Fig. 3

**Distribution:** Malaysia (type), Papua New Guinea.

**Holotype:** Malaysia: Johore, on elephant dung, May 1940, leg. CORNER (CGE).

**Material examined:** Holotype.

**Papua New Guinea:** Morobe District, Bulolo, Manki, 1350 m s. m., on soil among rotting litter in submontane tropical rain forest dominated by *Castanopsis acuminatissima* (Fagaceae) and *Araucaria* spec. (Araucariaceae), 24. 4. 1972, leg. E. HORAK 72-402 (ZT).

The present Papuan collection of *Conocybe corneri* has already been referred to in the protologue of the type material from Malaysia (WATLING 1979). The basidiomes of this striking *Conocybe* are characterized by the purple to purple-brown pilei, the conspicuous white membranaceous persisting volva and the distinctly mitriform-lentiform basidiospores born on 4-spored basidia. Regarding the comparatively large basidiomes, *C. corneri* is in the field readily mistaken for *C. discorosea*, *C. volvacea* or *C. volviornata* (described below). However, these four macroscopically similar species with overlapping distribution patterns in the Malesian region are distinctly separated by the shape and size of the basidiospores (cf. key below).

In the original description of *Conocybe corneri*, WATLING (1979) described the stipe as a "mixture of vesiculose, clavate and lecythiform elements". According to our observations, no typical lecythiform but broadly fusoid to subuteriform caulocystidia have been found, at least on the Papuan specimens.

*Conocybe discorosea* E. HORAK, HAUSKN. & DESJARDIN, spec. nova. Fig. 4

### **Descriptio latina:**

Pileus 10-20 mm diam., primo obtuse conicus dein convexo-umbonatus, pallide argillaceus, distincte roseo-tinctus ad apicem, minute pruinoso-velutinus ex pileocystidiis, siccus, fragilissimus. Lamellae adnexae, angustae, pallide apricoso-rosaceae dein ferrugineo-rosaceae. Stipes 40-100 x 1-1,5 mm, cylindricus, aequalis sed clavato-bulbosus

ad basem, bulbus volva submembranacea alba instructus, pruinoso-striatus, fragilissimus, siccus. Odor saporque nulli. Basidiosporae 12,5-15(-16,5) x 7-8,5(-9)  $\mu\text{m}$ , subamygdaliformes vel ellipticae, ferrugineo-ochraceae, laeves, membrana incrassata et poro germinativo distincto instructae. Basidia 17-20 x 8-11  $\mu\text{m}$ , 4-(2-)sporigera. Cheilocystidia 12-18 x 6-9  $\mu\text{m}$ , inconspicua, lecythiformia, apicaliter capitata (3-4  $\mu\text{m}$  diam.). Caulocystidia 15-70 x 6-10  $\mu\text{m}$ , polymorphica, clavata, subfusoides vel fusoides, apicaliter elongata. Pileipellis hymeniformis, ex cellulis clavato-vesiculososis, 20-40 x 14-20  $\mu\text{m}$ , pileicystidiis lecythiformibus subcapitatis sparsis instructus. Fibulae presentes.

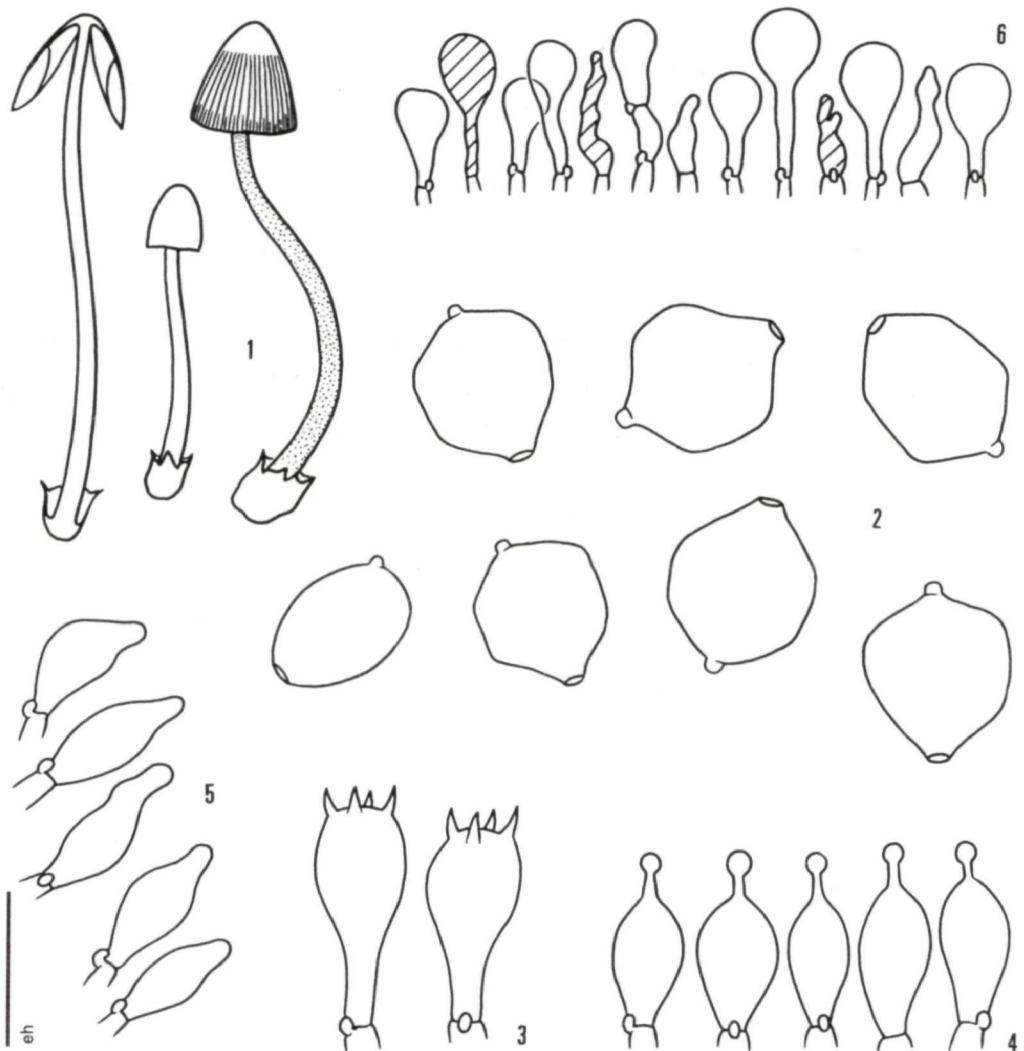


Fig. 3. *Conocybe corneri* (ZT 72-402). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.



**Holotypus:** Indonesia, HORAK 7216 (BO-99-322).

**Description:**

**Pileus:** 10-20 mm diam., at first obtuse conical becoming convex with small umbonate papilla, pale beige with vivid (raspberry) pink tinge over disk, completely covered with silvery bloom caused by projecting pileicystidia, half transparent-striate towards margin, dry, very thin.

**Lamellae:** 24-30 reaching stipe, up to 3 lamellulae, adnexed, narrow (up to 2 mm broad), at first pale apricot-pink becoming rust pink in age, even edges concolourous.

**Stipe:** 40-100 x 1-1.5 mm, cylindrical, gradually becoming broader into a clavate to globose bulb (up to 6 mm diam.), stiff, very slender, paler concolourous with pileus, but bulb white, hollow, very fragile, weakly longitudinally striate by caulocystidia, dry, solitary, with distinctive, persistent, membranaceous white volva.

**Context:** very brittle, thin, deep rust brown. Odour and taste not distinctive.

**Spore print:** deep rust brown.

**Basidiospores:** 12.5-15(-16.5) x 7-8.5(-9)  $\mu\text{m}$ , subamygdaliform in lateral view, elliptical in front view, rust ochre-brown, smooth, walls up to 1.5  $\mu\text{m}$  diam., distinctive germ-pore present, callus (or obscure germ pore) present.

**Basidia:** 17-20 x 8-11  $\mu\text{m}$ , 4-(2-) spored, clavate.

**Cheilocystidia:** 12-18 x 6-9  $\mu\text{m}$ , inconspicuous, lecythiform, capitate apex 3-4  $\mu\text{m}$  diam., hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** 15-70 x 6-10  $\mu\text{m}$ , polymorphic, shape ranging from clavate, subfusoid to fusoid with elongate cylindrical apical neck, hyaline.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 20-40 x 14-20  $\mu\text{m}$ , lecythiform pileicystidia scattered, subcapitate, apex often covered with resinous incrustation.

**Clamp connections:** present.

**Distribution:** Indonesia (Bali).

**Holotype:** Indonesia: Bali, Bedugl, Lake Bratan, S-Ridge of Mt Catur, 1400 m s. m., on humus among debris, in tropical montane rain forest, 17. 1. 1999, leg. E. HORAK 7216 (BO-99-322; isotypes in ZT and WU 22216).

**Material examined:** Holotype.

This striking new species is characterized by the following features: pileus distinctly raspberry pink over the disk (with silvery bloom effected by the conspicuous pileicystidia), very slender pale cinnamon stipe, white volva remnants at base, ellipsoid thick-walled basidiospores, 2-4-spored basidia and caulocystidia composed both of hair-like and scattered lecythiform cells, and sublecythiform pileicystidia (absent in *C. corneri* and *C. vaginata*).

The habit of *C. discorosea* is reminiscent of *Conocybe vaginata*, but in this taxon the pileus lacks pink colours, the stipe is white, the smaller basidiospores are lenti- to submitriform, the basidia are 4-spored, and lecythiform caulocystidia and pileicystidia are absent.

A second related species is *Conocybe volvata* K. A. THOMAS, HAUSKN. & MANIM., recently described from India (THOMAS & al. 2001). Its rather large basi-

diomes (pileus up to 55 mm diam., stipe up to 140 mm long), collected on elephant dung, are distinguished by the reddish brown to reddish tinge of both the pileus and stipe, the ellipsoid-lentiform basidiospores born exclusively on 4-spored basidia and the lack of lecythiform cystidia on the stipe and in the pileipellis.

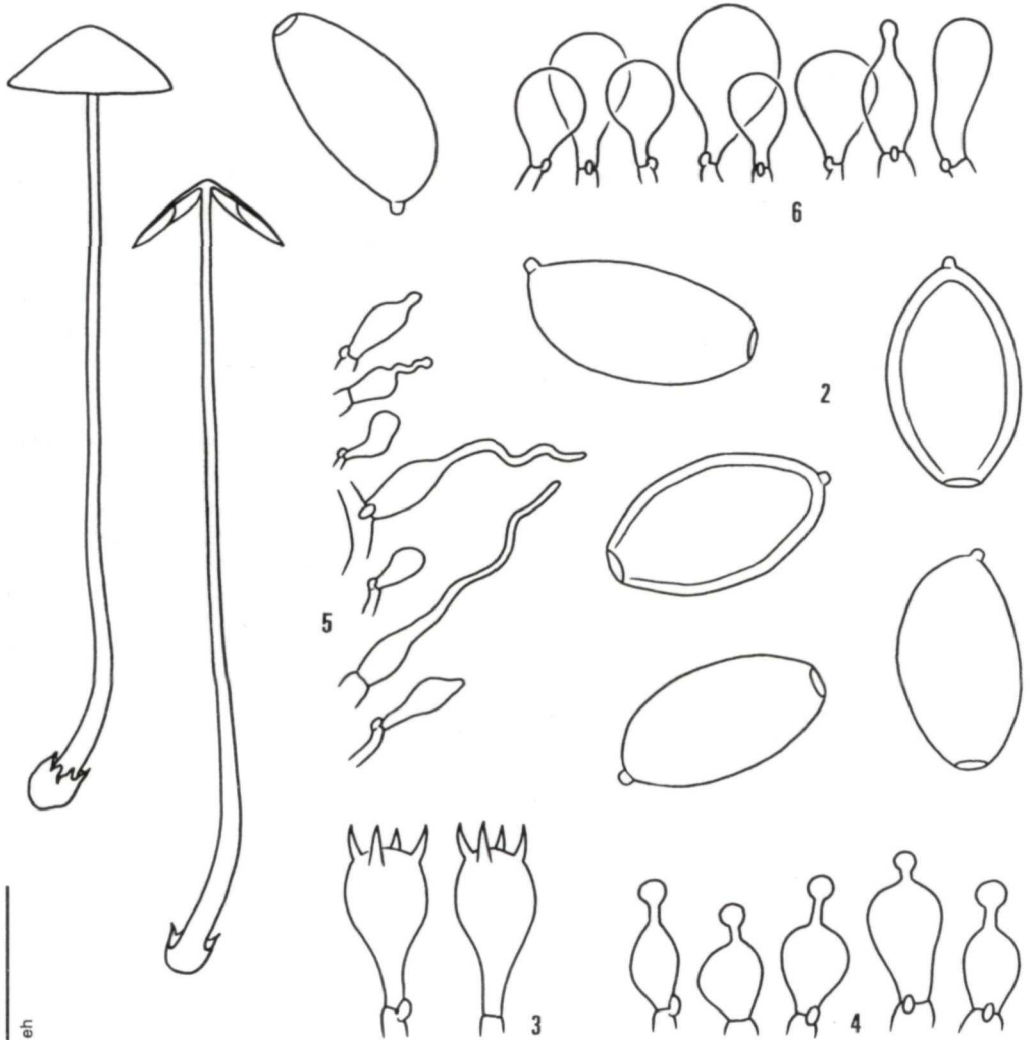


Fig. 4. *Conocybe discorosea* (ZT 7216, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

Finally, the new taxon *Conocybe volviornata* (described below) is distinguished by the exclusively 2-spored basidia, basidiospores of different size and shape and different structure of the pileipellis.

*Conocybe vaginata* WATLING, Sydowia Beih. 8: 405. 1979. Fig. 5

**Distribution:** Papua New Guinea.

**Holotype:** Papua New Guinea: Morobe District, between Bulolo and Wau, 1100 m s. m., on soil under *Bambusa* spec. in tropical montane broadleaf-conifer rain forest, 23. 7. 1972, leg. E. HORAK 72-538 (ZT).

**Material examined:** Holotype.

**Papua New Guinea:** Morobe District, Bulolo, Manki, 1200 m s. m., on rotten wood in tropical montane rain forest dominated by *Castanopsis acuminatissima* (Fagaceae), 24. 10. 1972, leg. E. HORAK 72-583 (ZT).

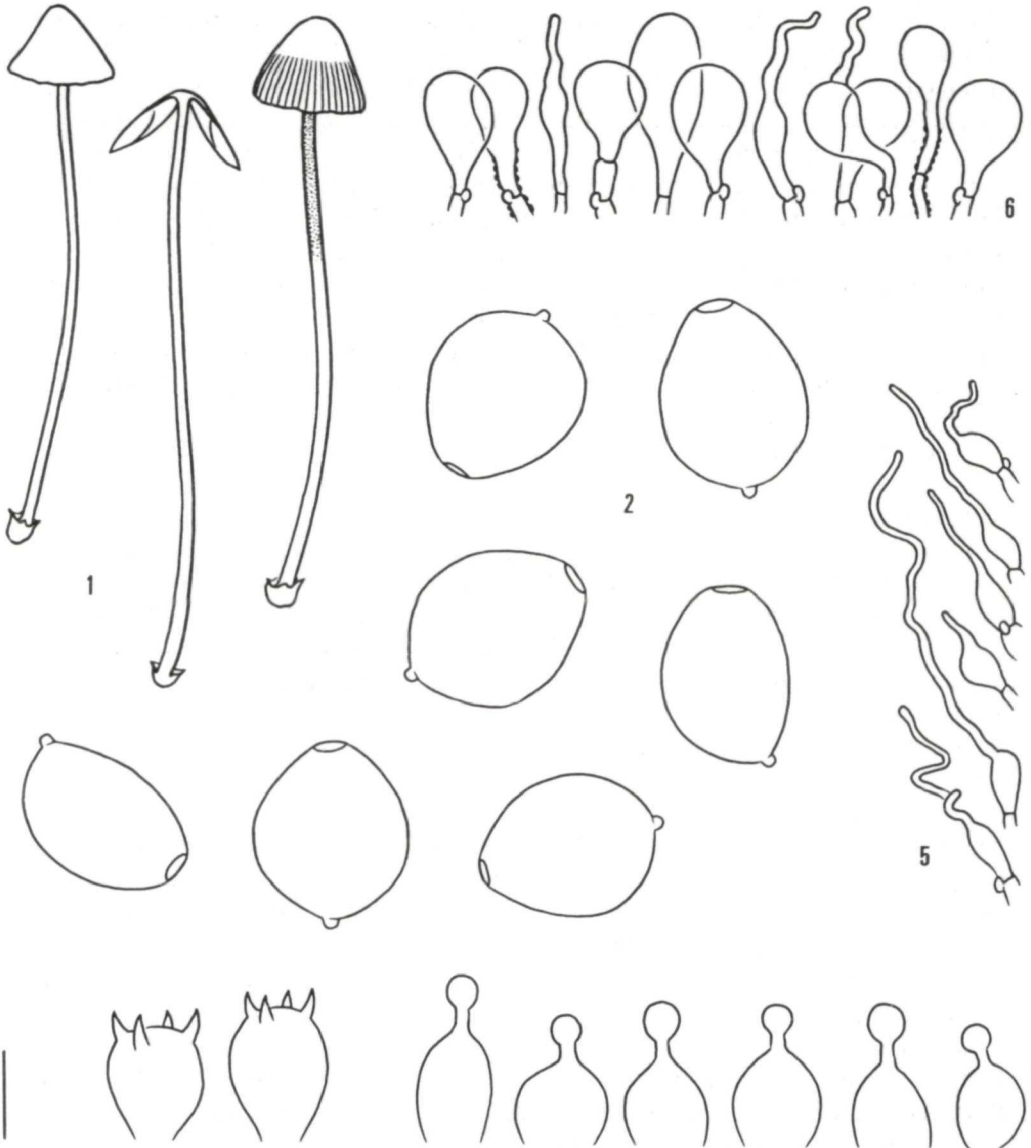


Fig. 5. *Conocybe vaginata* (ZT 72-538). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

A full description of *Conocybe vaginata* is published in WATLING (1979: 405). This volvate species is closely related to *C. corneri* WATLING (also reported from Papua New Guinea), and the two new Indonesian taxa *Conocybe discorosea* and *C. volviornata* described in this contribution. The latter three species are readily distinguished from *C. vaginata* by several distinctive macroscopical (colour of the basidiomes) and microscopical characters (size and shape of the basidiospores).

***Conocybe vinaceobrunnea* HAUSKN., spec. nova.** Colour fig. XIX, Fig. 6

**Descriptio latina:**

Pileus 5-16 mm diam., conicus, conico-campanulatus vel obtuse umbonatus, fuscus vel umbrinus, distincte vinaceo-tinctus ad discum, griseo-brunneus vel pallide aurantio-brunneus marginem estriatum versus, hygrophanus, conspicue venosus. Lamellae adnetae, densae, ventricosae, ferrugineae. Stipes 28-45 x 0,8-1,3 mm, cylindricus, ad basem bulbosus vel submarginatus (2-2,5 mm diam.), brunneus vel fuscus, distincte vinaceo-tinctus, minute striatus, ad basem floccosus vel pulveraceus, subvolvatus e velo albo, siccus, fragilis. Odor nullus. Basidiosporae (6,5-)7,5-10,5 x (4,5-)5,5-6,5 µm, ellipsoideae vel subamygdaliformes, laeves, poro germinativo distincte instructae. Basidia 18-26 x 9-12 µm, 4-sporigera. Cheilocystidia (18-)20-27 x (6-)8-11 µm, lecythiformia, apicaliter 3,5-5 µm diam. Caulocystidia 15-28 x 4,5-7 µm, lecythiformia, apicaliter 2,5-4 µm diam. Pileipellis hymeniformis, ex cellulis clavatis vel sphaeropedunculatis (15-)25-30(-45) x (10-)13-20 µm, pigmento incrustatis. Pileicystidia 25-30 x 4-8 µm, lecythiformia, apicaliter 3-5 µm diam.

**Holotypus:** Cook Islands, HAUSKNECHT (WU 21996).

**Description:**

Pileus: 5-16 mm diam., up to 10 mm high, conical to conico-campanulate with broad obtuse umbo, margin upturned in mature specimens, in centre dark brown (KORNERUP & WANSCHER 1975: 8F4, 8-9F4) or fuscous or umber brown (7E5) with more or less distinctive wine red tint, greyish brown (6D3) or pale orange-brown (5C3-4), hygrophanous, margin not translucent-striate, but marbled, surface distinctly wrinkled. Veil remnants absent.

Lamellae: crowded, adnexed, ventricose, often forked, anastomosing or even subporoid, rust brown, even edges concolourous.

Stipe: 28-45 x 0.8-1.3 mm, cylindrical, at bulbous to submarginate base 2-2.5 mm diam., brown to dark brown with distinctive wine red tint, paler both at apex and towards base, with fine longitudinal striation over whole length, in young specimens the base is covered with distinctive white, floccose to farinaceous (not membranaceous) volva-like zone, dry, solitary, brittle.

Context: pale brown to brown, brittle. Odour not distinctive.

Spore print: not recorded.

Basidiospores: (6.5-)7.5-10.5 x (4.5-)5.5-6.5 µm, average 7.9-9 x 5.3-6 µm, Q = 1.2-1.9, ellipsoid to subamygdaliform, variable in shape and size, yellow-brown in KOH, double wall smooth, germ pore distinctive, about 1.5 µm diam.

Basidia: 18-26 x 9-12 µm, 4-spored.

Cheilocystidia: (18-)20-27 x (6-)8-11 µm, lecythiform, capitate apex 3.5-5 µm diam.

**Caulocystidia:** 15-28 x 4.5-7  $\mu\text{m}$ , lecythiform, capitate apex 2.5-4  $\mu\text{m}$  diam., intermixed with a) scattered large caulocystidia up to 47 x 14  $\mu\text{m}$ , capitate apex up to 6.5  $\mu\text{m}$  diam., and b) cylindrical, occasionally septate cystidia (up to 85 x 7  $\mu\text{m}$ ) and vesiculose cells (up to 30 x 10  $\mu\text{m}$ ).

**Pileipellis:** hymeniform, composed of clavate (to sphaeropedunculate) cells, (15-)25-30(-45) x (10-)13-20  $\mu\text{m}$ , encrusted with pigment. Pileicystidia 25-30 x 4-8  $\mu\text{m}$  diam., capitate apex 3-5  $\mu\text{m}$  diam., lecythiform, numerous.

**Distribution:** Cook Islands (SW-Pacific).

**Holotype:** Cook Islands: Rarotonga, Avatiu Stream, on horse manure, 22. 3. 1997, leg. A. HAUSKNECHT (WU 21996; isotype in ZT).

**Material examined:** Holotype.

**Cook Islands:** Rarotonga, Muri Beach, on horse manure in meadow (under shrubs, ferns and coconut palms, 19. 3. 1997, leg. A. HAUSKNECHT (WU 17391).

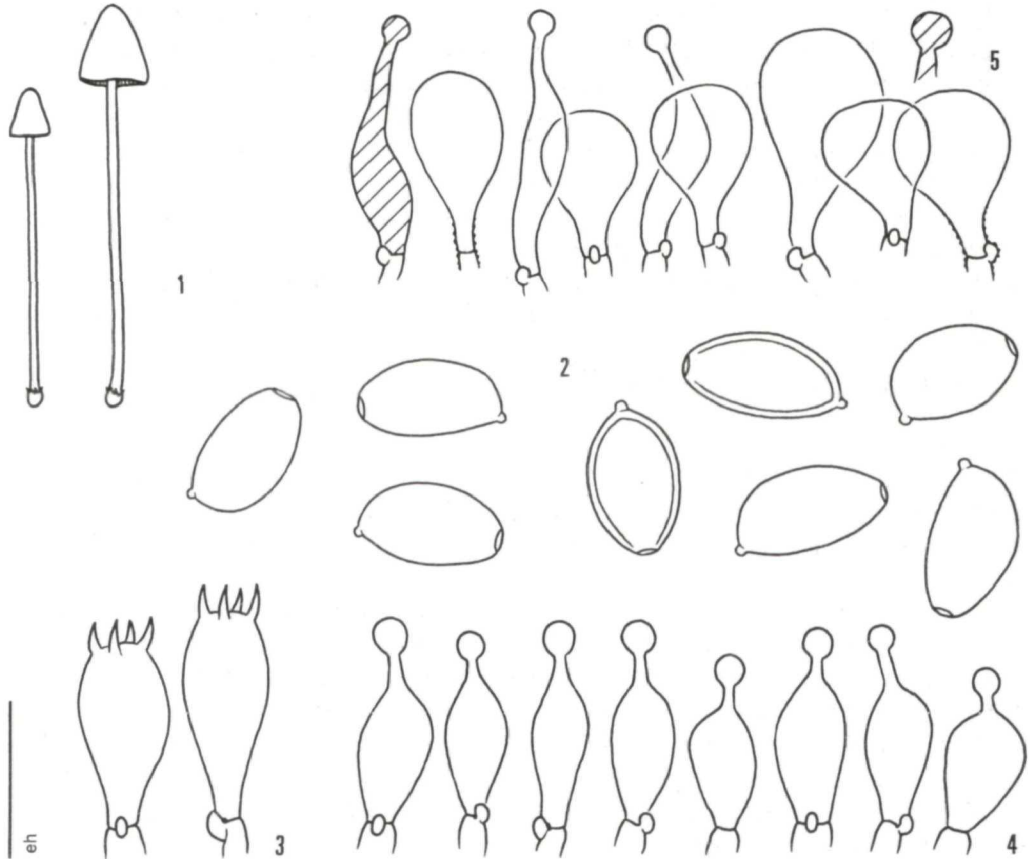


Fig. 6. *Conocybe vinaceobrunnea* (WU 21996, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Pileipellis (x 1000).

The most distinctive characters of *Conocybe vinaceobrunnea* are the white, pulverulent and volva-like zone at the base of the stipe, the predominantly lecythiform caulocystidia and the relatively small basidiospores. Based on these features, this new taxon belongs to sect. *Singerella* which, however, so far encompasses only taxa with different caulocystidia.

In case the fugaceous volva-like zone at the base of the stipe is overlooked, *C. vinaceobrunnea* may key out in the stirpes *Tenera* or *Mesospora*. However, neither in the key of MEUSERS (1996) nor SINGER (ined.) a reference is found which could lead to the taxon from the Cook Islands. In the current literature, taxa with reddish, pale wine red or violaceous tints on pileus and stipe are reported only for species in sect. *Pilosellae* [*Conocybe fragilis* (PECK) SINGER, *Conocybe murinacea* WATLING] and in sect. *Singerella*.

***Conocybe volviornata* E. HORAK, HAUSKN. & DESJARDIN, spec. nova. Fig. 7**

**Descriptio latina:**

Pileus 10-25 mm diam., conicus, rosaceo-cinnamomeus vel rosaceo-brunneus, minute pruinoso-velutinus ex pileicystidiis, hygrophanus, siccus, fragilis. Lamellae adnexae, angustae, pallide ferrugineo-brunneae. Stipes 45-90 x 1,5-2 mm, cylindricus, basim versus gradatim incrassatus et volva alba membranaceae ad basem instructus, pileo concolour, pruinosis. Odor saporque nulli. Basidiosporae 12,5-15 x 9,5-12 x 7,5-9,5  $\mu\text{m}$ , sublimoniformes, amygdaliformes vel submitriformes, ferrugineo-ochraceae, poro germinativo distincto instructae. Basidia 15-24 x 10-12  $\mu\text{m}$ , semper 2-sporigera. Cheilocystidia 20-26 x 7-9  $\mu\text{m}$ , lecythiformia, apicaliter capitata, 4-5  $\mu\text{m}$  diam. Caulocystidia polymorphica, clavato-vesiculosa vel conspicue fusoido-elongata. Pileipellis hymeniformis, ex cellulis clavatis, pileicystidiis conspicuis fusoido-elongatis dense instructus. Fibulae praesentes.

**Holotypus:** Indonesia, HORAK 8326 (ZT).

**Description:**

Pileus: 10-25 mm diam., conical, pinkish-beige, centre reddish brown, conspicuously translucent-striate from margin to centre if moist, strongly hygrophanous, completely white fluffy-hoary to hairy-velutinous from projecting pileicystidia, dry, thin, membranaceous, brittle.

Lamellae: 28-36 reaching stipe, up to 3 lamellulae, adnexed, narrow, up to 1.5 mm broad, pale rust brown, even edges concolourous.

Stipe: 45-90 x 1.5-2 mm, cylindrical, very slender, gradually enlarging towards base (up to 6 mm diam.), concolourous or paler as pileus, fragile, completely and densely covered with conspicuous caulocystidia, solid, solitary, at base with white, membranaceous, persistent volva.

Context: concolourous, very fragile. Odour and taste not distinctive.

Spore print: rust ochre.

Basidiospores: 12.5-15 x 9.5-12 x 7.5-9.5  $\mu\text{m}$ , slender sublimoniform to broadly amygdaliform in lateral view, sublimoniform to subhexagonal or submitriform in frontal view, rust ochre-brown, smooth, walls thick (up to 1.2  $\mu\text{m}$  diam.), with distinctive simple germ-pore.

Basidia: 15-24 x 10-12  $\mu\text{m}$ , exclusively 2-spored, broadly clavate.

Cheilocystidia: 20-26 x 7-9  $\mu\text{m}$ , lecythiform, capitate apex 4-5  $\mu\text{m}$  diam., hyaline.

Pleurocystidia: absent.

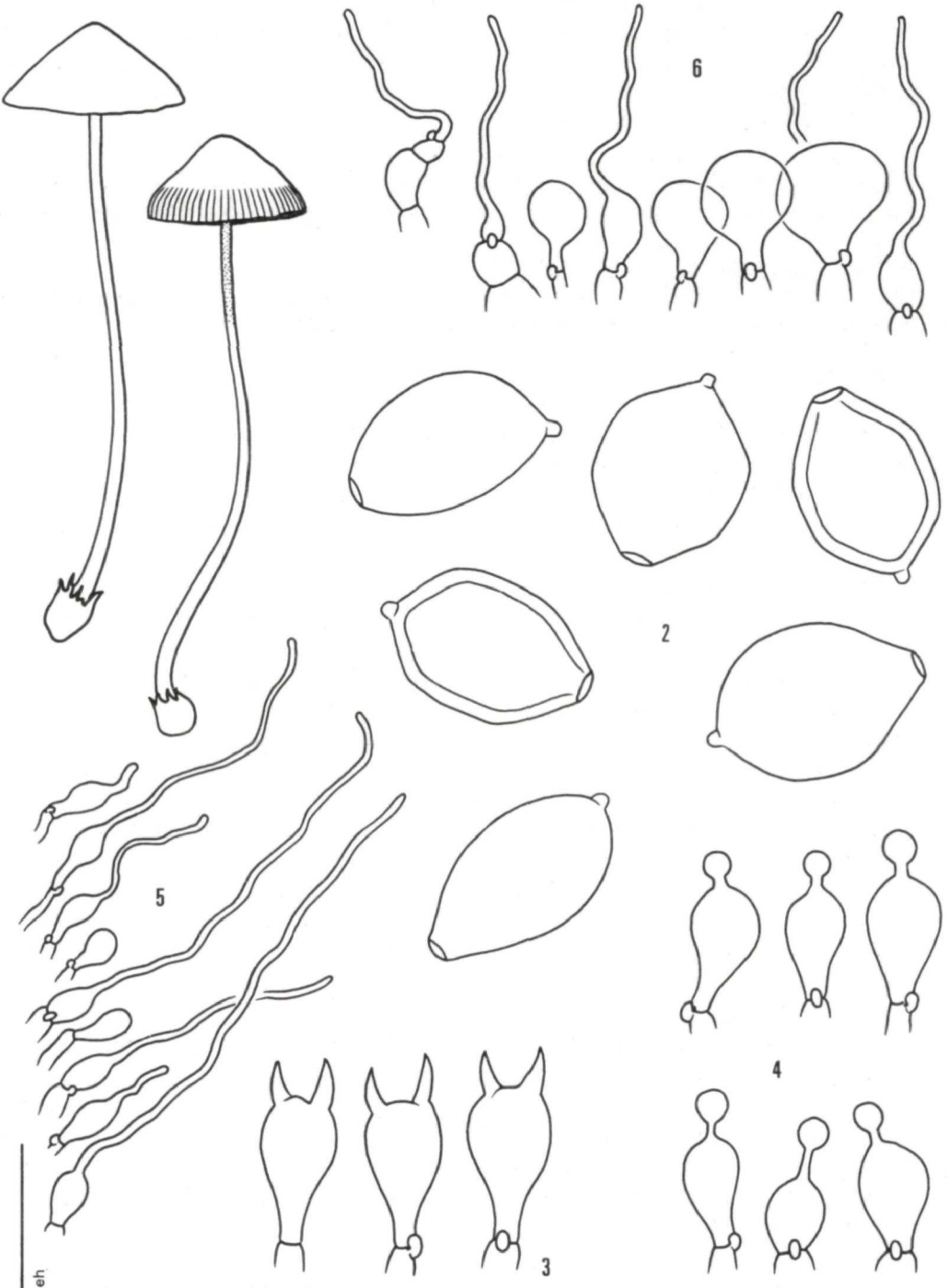


Fig. 7. *Conocybe volviornata* (ZT 8326, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

**Caulocystidia:** very conspicuous and intermixed: a) 20-40 x 8-16  $\mu\text{m}$ , clavate to vesiculose, b) cells intermediate with regard to size and shape, c) 60-400 x 15-20  $\mu\text{m}$ , very conspicuous, swollen-fusoid at base, extending into a long cylindrical flagella, 2-4  $\mu\text{m}$  diam., apex obtuse, thin-walled, hyaline.

**Pileipellis:** hymeniform, composed of broadly clavate to vesiculose, thin-walled cells, 16-30 x 12-32  $\mu\text{m}$ , pileicystidia shape like caulocystidia but shorter, up to 100 x 18  $\mu\text{m}$ .

**Clamp connections:** present.

**Distribution:** Indonesia, Solomon Islands?

**Holotype:** Indonesia: Java, Cibodas, 1650 m s. m., on soil in tropical montane rain forest dominated by fagalean trees, 31. 12. 1999, leg. E. HORAK 8326 (ZT; isotype in WU 22217).

**Material examined:** Holotype.

**Indonesia:** Bali, Lake Batur, trail to Mt Catur, on soil in tropical montane rain forest dominated by fagalean trees, 16. 1. 2000, leg. E. HORAK 8428 (ZT, WU 22218).

**Solomon Islands:** Guadalcanal, Tsuva, leg. CORNER RSS 1784 (E, probably contaxic with *C. volviornata*).

*Conocybe volviornata* represents a new species in sect. *Singerella* with pink to reddish colours on pileus and/or stipe. As compared to *C. corneri* (Malaysia, Papua New Guinea) and *C. volvata* (India), this Javanese taxon is readily distinguished by the habitat, by the size of the basidiomes and by several distinctive microscopical characters.

Specimens collected by CORNER on the Solomon Islands (cf. WATLING 1994: 374, "*Conocybe* spec. 1") probably refer to *C. volviornata* although the base is described only as "subvillous, subbulbous, thinly felted as if an adnate volva". However, it has to be taken into account that (especially in the tropical regions) the volva is very delicate and ephemeral in all so far reported species of *Conocybe*, and accordingly its presence can only be ascertained in fresh and perfect basidiomes.

The type locality of *Conocybe volviornata* is situated in tropical montane rain forests in Cibodas (Java). From this locality, HENNINGS already reported a new *Conocybe*, *C. umbrina* P. HENN. (1900: 151); however, its macro- and microcharacters are distinctly different from those of the striking sympatric taxon *C. volviornata*.

The following key to all, hitherto described taxa in sect. *Singerella* includes also the new species described in this contribution and accordingly outdates the key previously published by WATLING & HAUSKNECHT (1997).

1 Volva absent, veil remnants on margin of pileus only (cf. also *C. hornana*). Stipe white, with pseudorhiza. Basidiospores average 10.6 x 7.2  $\mu\text{m}$ , irregularly ovoid-elliptical, walls about 0.5  $\mu\text{m}$  diam. Argentina

*Conocybe subvelata*

1\* Volva present, persisting, other veil remnants absent except in *C. hornana* (with appendiculate velar squamules on margin of pileus). Stipe coloured, white only in *C. locellina*. Basidiospores >11  $\mu\text{m}$ , thick-walled, if smaller shape lentiform, angular or irregular

2 Basidiomes large. Pileus often >30(-70) mm diam. Stipe -100(-160) x 2-10 mm

2\* Basidiomes small. Pileus <25 mm. Stipe <100 x 2.5 mm



- 3 Pileus and stipe with conspicuous wine red, purple or pink colours. Basidiospores average  $10.3 \times 8.5 \times 6.4 \mu\text{m}$ , distinctly lentiform or angular. Malaysia, Papua New Guinea

*Conocybe corneri*

- 3\* Pileus reddish brown, orange-brown or sordid white. Stipe brown to grey (or paler) with reddish tint. Basidiospores  $>11.5 \mu\text{m}$  long

4

- 4 Pileus orange to vivid yellow-brown, wrinkled, margin non-striate. Volva brittle, veil remnants also present on margin of pileus and in lower portion of stipe. Europe (SINGER & HAUSKNECHT 1989).

*Conocybe hornana*

- 4\* Pileus sordid white to sordid yellowish or dark red-brown. Volva always distinctly saccate, veil remnants on pileus and on stipe absent

5

- 5 Pileus sordid white to sordid yellowish, conspicuously transparent-striate. Stipe white. Basidiospores ellipsoid, shape irregular in lateral view, walls  $<0.4 \mu\text{m}$  diam. On manure and saw dust. USA (Florida)

*Conocybe locellina*

- 5\* Pileus brown, reddish brown, occasionally pale brown, inconspicuously transparent-striate. Stipe reddish brown towards base. Basidiospores with walls up to  $1 \mu\text{m}$  diam. On elephant dung. India

*Conocybe volvata*

- 6 Caulocystidia predominantly lecythiform, intermixed with scattered cylindrical or clavate cells. Basidiospores average  $7.9-9 \times 5.3-6 \mu\text{m}$ . Volva brittle, floccose-granulose. On horse manure and among grass in dung-fertilized (?) soil. Cook Islands

*Conocybe vinaceobrunnea*

- 6\* Caulocystidia predominantly non-lecythiform but cylindrical or hair-like (except *C. discorosea* with lecythiform caulocystidia at apex of stipe). Basidiospores  $>11 \mu\text{m}$

7

- 7 Basidia exclusively 2-spored

8

- 7\* Basidia 4-spored

9

- 8 Basidiospores average  $12.9-13.8 \times 9.6-11.8 \times 7.8-8.7 \mu\text{m}$ , distinctly lentiform in lateral view, submitriform with elongate apiculus in front view. Stipe with scattered lecythiform caulocystidia at apex only. Pileus buff to cinnamon, reddish brown at disc. Indonesia (Java, Bali), Solomon Islands (?)

*Conocybe volviornata*

- 8\* Basidiospores average  $14.1 \times 8.3 \mu\text{m}$ , oblong-ellipsoid, not lentiform. Basidia occasionally also 4-spored. Stipe exclusively with non-lecythiform caulocystidia. Pileus buff to cinnamon, raspberry pink at disc. Indonesia (Bali)

*Conocybe discorosea*

- 9 Pileus umber brown, becoming dirty pale yellow-brown to sordid brown on drying, distinctly wrinkled in aged specimens, margin non-striate. Stipe up to 30 mm

long. Basidiospores average  $11.7 \times 7.7 \mu\text{m}$ , ellipsoid. Mauritius

*Conocybe anthurii* ("anthuriae")

9\* Pileus cinnamon-brown to grey-brown, distinctly transparent-striate, centre smooth. Stipe up to 80 mm long. Basidiospores average  $11.9\text{-}12.3 \times 9.4\text{-}9.9 \times 7.6\text{-}7.7 \mu\text{m}$ , distinctly lentiform-submitriform. Papua New Guinea

*Conocybe vaginata*

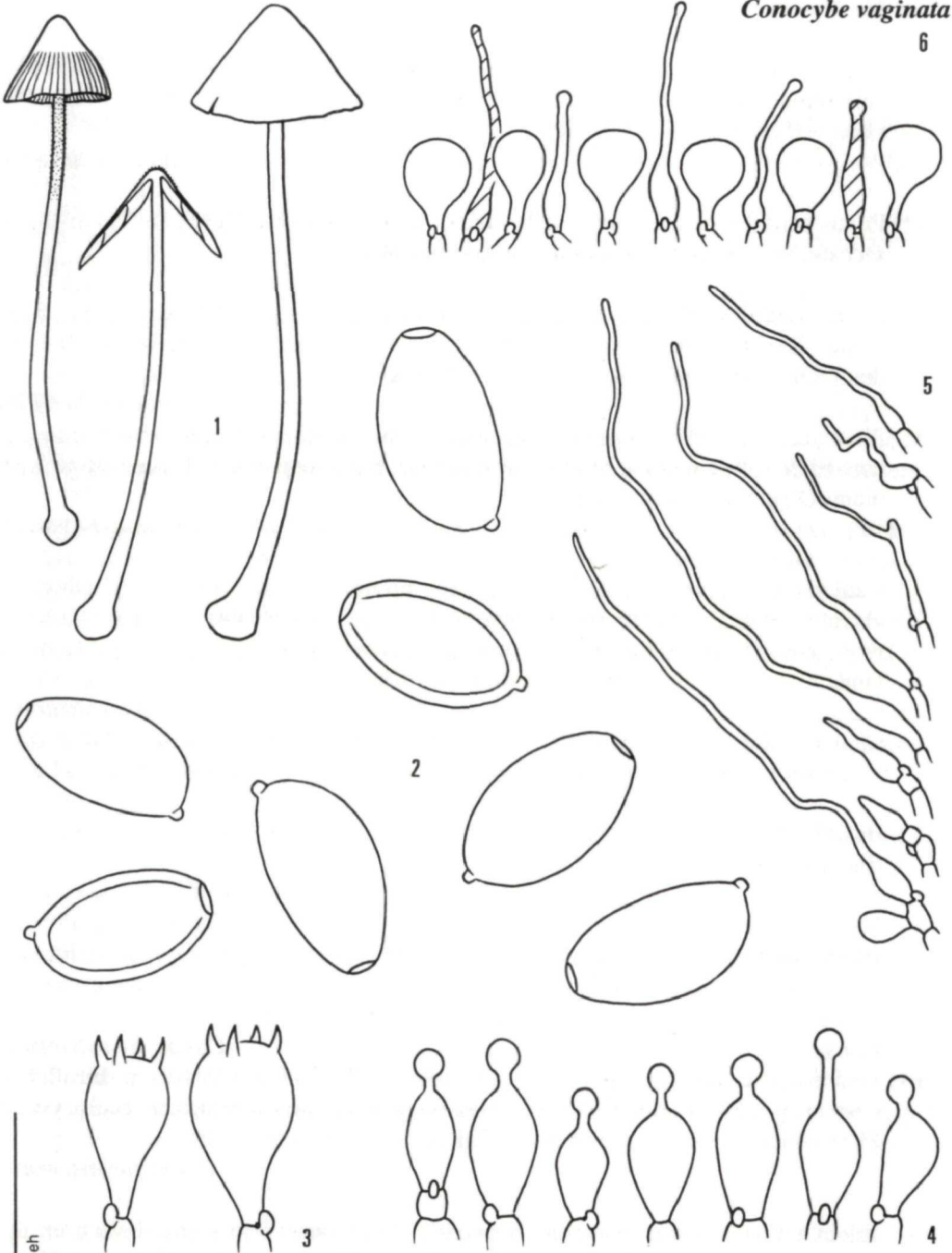


Fig. 8. *Conocybe crispella* (ZT 5015). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

**Conocybe subgen. Conocybe sect. Candida****Conocybe crispella (MURRILL) SINGER**, Sydowia 4: 132. 1950. Fig. 8**Basionym:** *Galerula crispella* MURRILL, Lloydia 5: 148. 1942.**Description of material from North America, USA, North Carolina (ZT 5015):**

**Pileus:** 10-25 mm diam., obtuse conical or thimble-shaped, pale cinnamon to argillaceous with ochraceous tint, 2/3 transparent-striate, hygrophanous, mature specimens radially wrinkled, minutely hairy-pruinose under hand lens, dry, very brittle.

**Lamellae:** free, crowded, by comparison very narrow, only up to 1 mm broad, pale rust ochre, even edges concolourous.

**Stipe:** 45-90 x 1.5-2 mm, cylindrical, gradually enlarged into swollen or bulbous, occasionally also submarginate base (up to 8 mm diam.), sordid white with pale pinkish tint, minutely white-hairy to fluffy over whole length, distinctive longitudinal striation absent, dry, hollow, extremely brittle, solitary. Veil remnants absent.

**Context:** odour not distinctive.

**Spore print:** rust ochre-brown.

**Basidiospores:** 12-14.5 x 7-8  $\mu\text{m}$ , broadly amygdaliform in lateral view, elliptical in front view, rust ochre-brown, smooth, walls thick, up to 1  $\mu\text{m}$  diam., conspicuous germ-pore present.

**Basidia:** 20-25 x 12-14  $\mu\text{m}$ , 4-spored, broadly clavate.

**Cheilocystidia:** 18-26 x 7-10  $\mu\text{m}$ , lecythiform, capitate apex 4-5  $\mu\text{m}$  diam., hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** mixed: a) short clavate to fusoid, 10-20 x 5-8  $\mu\text{m}$ , b) at base fusoid cells with long cylindrical flagella, 70-160 x 2-3  $\mu\text{m}$ , apex obtuse, hyaline. Lecythiform caulocystidia absent.

**Pileipellis:** hymeniform, composed of a) broadly clavate to vesiculose cells, 18-26 x 12-26  $\mu\text{m}$ , hyaline, thin walls often encrusted with rust yellow-brown pigment, and b) pileocystidia 30-60 x 6-10  $\mu\text{m}$ , slender fusoid with long cylindrical neck, apex obtuse or weakly swollen-capitate, with plasmatic pigment, yellow-brown in KOH.

**Clamp connections:** present.

**Distribution:** USA (southern region of SE-coast), Cook Islands, Mascarenes (La Réunion, Mauritius), Seychelles, Europe (adventitious, cf. HAUSKNECHT 1997).

**Holotype:** USA: Florida, Gainesville, in grass on open lawn, 5. 8. 1941, leg. MURRILL (F 18576).

**Material examined:** Holotype.

**USA:** North Carolina, Macon Co., Highlands, near Biological Station, 4200 ft., on soil among grass in lawn, 4. 8. 1993, leg. E. HORAK 5015 (ZT, WU 22219).

**Additional material examined:** **Cook Islands:** Muri Beach, on soil in garden, 22. 3. 1997, leg. A. HAUSKNECHT (WU 17309).

**France:** La Réunion, St. Gilles, in lawn of a hotel, 12. 2. 2000, leg. A. HAUSKNECHT (WU 20187).

**Mauritius:** Pamplemousses, Pointe aux Cannoniers, in lawn, 9. 3. 1993, leg. A. HAUSKNECHT (Herb. HAUSKNECHT); - Pamplemousses, Beach Villas, in lawn, 22. 2. 2000, leg. A. HAUSKNECHT (WU 20184); - Pamplemousses, Trou aux Biches, in lawn of a hotel, 25. 2. 2000, leg. A. HAUSKNECHT (WU 20188).

**Seychelles:** Mahé, Anse Intendance, grassy wayside spot, 19. 2. 2001, leg. A. HAUSKNECHT (Herb. HAUSKNECHT).

*Conocybe crispella* is closely related to *Conocybe albipes* (OTTH) HAUSKN. [= *Conocybe lactea* (J. E. LANGE) MÉTROD] but differs by its darker pigmented, hygrophanous and distinctly transparent-striate pileus. The present collection (ZT 5015) closely matches both the type collection originally described from Florida and records reported by SINGER from several localities on the SE-coast of the USA (in Herb. F). It is noteworthy that this species was also sporadically recorded from Central Europe (e.g., Austria) where it has been gathered in warm houses and flower pots (HAUSKNECHT 1997).

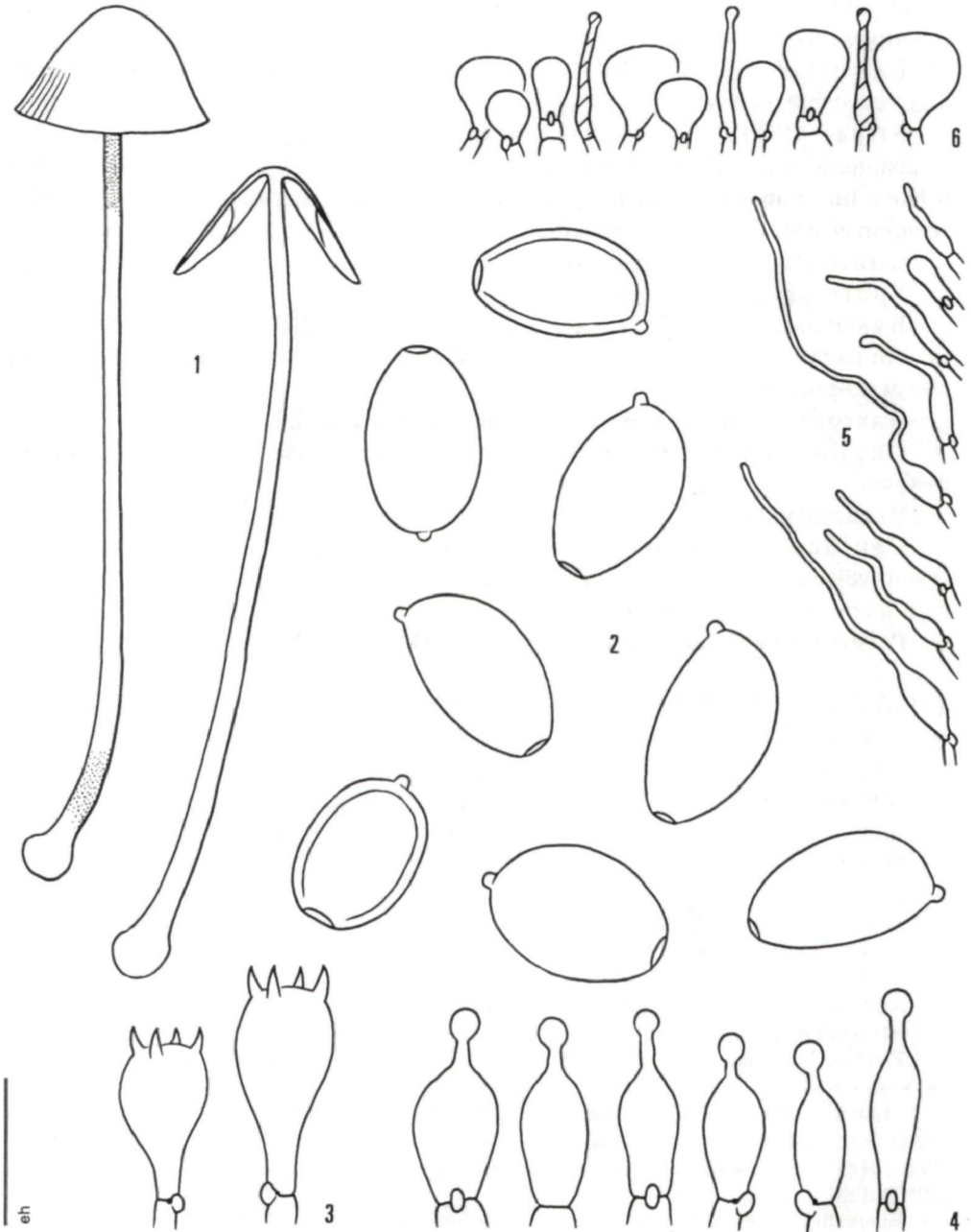


Fig. 9. *Conocybe zeylanica* (ZT 7012). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

***Conocybe zeylanica* (PETCH) BOEDIJN var. *zeylanica***, Sydowia 5: 223. 1951. Fig. 9  
**Basionym:** *Galera zeylanica* PETCH, Ann. Roy. Bot. Gard. Peradeniya 6: 317. 1917.

**Distribution:** Sri Lanka (type), India, Indonesia (Java), tropical Africa, adventitious in Europe (HAUSKNECHT 2002 a).

**Holotype:** Sri Lanka, Peradeniya, on ground, decaying vegetable refuse, Sept. 1868, THWAITES 711 (K).

**Material examined:** Holotype.

**Indonesia:** Java, Cibodas, trail to Mt Gedeh, 1500 m s. m., on rotten log, in tropical montane rain forest dominated by *Castanopsis javanica-argentea* (Fagaceae), 8. 1. 1998, leg. E. HORAK ZT 7012 (ZT, BO-98-26, WU 22220).

Within sect. *Candidae*, *Conocybe zeylanica* is remarkable not only due to its large basidiomes but also (in comparison to *C. albipes* and *C. crispella*) by the dark-pigmented pilei. A further distinguishing character in order to separate *C. zeylanica* from the two aforementioned species are its lentiform and often subangular basidiospores. The present Indonesian collection actually conforms much better with the type material from Sri Lanka (cf. redecription in PEGLER 1986: 385) as compared to numerous records from southern India described recently by THOMAS & al. (2001).

In tropical Asia and Africa, *Conocybe zeylanica* is a commonly encountered species which also occurs in the south-eastern regions of the USA. In addition, it was recorded once in a greenhouse in The Netherlands (HAUSKNECHT 2002 a).

The below-described, new variety from Mauritius, *Conocybe zeylanica* var. *marginata*, is characterized by the distinctly emarginate bulb at the base of the stipe, the 2-spored basidia and the slightly larger and more ellipsoid to oblong-lacrimiform basidiospores.

***Conocybe zeylanica* (PETCH) BOEDIJN var. *marginata* HAUSKN., var. nova.** Colour fig. XX, Fig. 10

#### **Diagnosis latina:**

Stipes ad basim bulbo distincte marginato instructus, basidia 2-sporigera, basidiosporae 12.0-17.5 x 7-9.5 µm, haud distincte lentiformes.

**Holotypus:** Mauritius, HAUSKNECHT (WU 21136).

#### **Description:**

**Pileus:** 25-60 mm diam., convex to campanulate, centre rust brown in fresh and young specimens, becoming hazel to brown (6E8, 6DE8, 6-7E8, 6-7D8), pale brown to grey-orange or whitish with orange tint (5AB2, 5B4, 6C5, 6C4) towards strongly striate-crenate, pale grey-brown margin (6C3-4), in dry specimens pale whitish yellow, hygrophanous, dry, brittle.

**Lamellae:** short-adnexed, crowded, narrow, at first whitish to cream colour, turning pale yellow rust brown in mature specimens, quickly deliquescent from edges.

**Stipe:** 70-115 x 2.5-6 mm, rather robust, cylindrical, gradually enlarging into distinctly emarginate bulb at base, 4-12 mm diam., white to sordid white, becoming pale straw yellow in age, minutely pruinose, distinctive longitudinal striation absent, dry,

very brittle, in young specimens emarginate base covered with scattered fibrils (of veil?) but volva or volva-like remnants absent, solitary and cespitose.

Context: brittle, rapidly deliquescent in pileus. Odour not distinctive.

Spore print: not recorded.

Basidiospores: 12.0-17.5 x 7-9.5  $\mu\text{m}$ , average 14.4 x 8.3  $\mu\text{m}$ , Q = 1.4-2.0, ellipsoid to oblong-elliptical, sublacrimiform, occasionally submitriform in front view, not lentiform, pale reddish yellow-brown in KOH, smooth, walls thick, up to 1.5  $\mu\text{m}$  diam., germ-pore large.

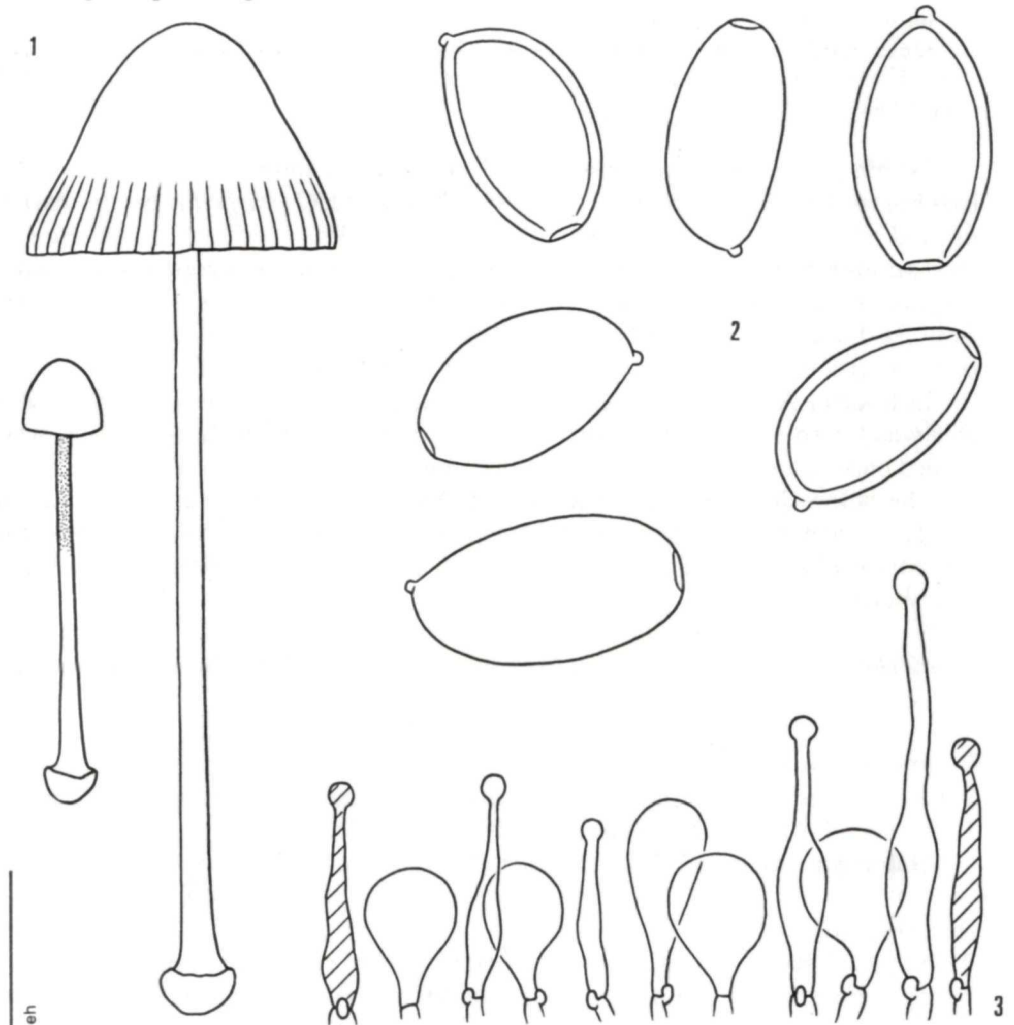


Fig. 10. *Conocybe zeylanica* var. *marginata* (WU 21136, holotype). 1 Basidiomes. 2 Basidiospores. 3 Pileipellis (x 1000).

Basidia: 14-27 x 8-12  $\mu\text{m}$ , exclusively 2-spored, with short and robust sterigmata.

Cheilocystidia: 10-15 x 7.5-9.5  $\mu\text{m}$ , lecythiform, capitate apex 2-4  $\mu\text{m}$  diam.

Pleurocystidia: absent.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 12-20 x 8-15 µm, often with plasmatic pigment, yellow-brown in KOH.

**Pileocystidia:** 20-55 x 3-6 µm, scattered, lecythiform, apex 3-5 µm diam.

**Clamp connections:** present.

**Distribution:** Mauritius.

**Holotype:** Mauritius: Plaine Willems, Henrietta, on fertile soil (among rotting debris of sugar cane) in sheds with plantation of *Anthurium* spec. (*Araceae*), 31. 1. 2001, leg. A. HAUSKNECHT (WU 21136; isotype in ZT).

**Material examined:** Holotype.

The type collection relating to this new variety is composed of numerous basidiomes which allowed to ascertain the range of taxonomically relevant features. As a result, both the strongly emarginate base of the stipes and the 2-spored basidia are persistent characters which clearly separate this taxon from the type variety of *Conocybe zeylanica*.

WATLING (1992: 93) published on two records of *Conocybe zeylanica* from Brazil, the descriptions of microscopical data of which closely conform with the new variety from Mauritius. So far the authors did not have the opportunity yet to re-examine these specimens kept in E in order to carry out a critical evaluation and comparison with the material from Brazil and Mauritius.

Based on SINGER's unpublished data (SINGER, ca. 1980) and the key comprising the European representatives (HAUSKNECHT 1998), the following key includes all species described world-wide of *Conocybe* sect. *Candidae*:

- |    |   |   |
|----|---|---|
| 1  | Basidia predominantly 4-spored  | 2 |
| 1* | Basidia predominantly or exclusively 2-spored   | 9 |
| 2  | Pileus white to sordid white, pale yellow or pale ochre over the disk at the most, non-hygrophanous, non-striate or crenate-striate at margin only      | 3 |
| 2* | Pileus darker coloured, usually distinctly translucent-striate and margin crenate or non-striate pileus deep brown                                      | 6 |
| 3  | Stipe with radicating pseudorhiza. Pileus up to 50 mm diam., pure white. Lamellae attached with collarium to stipe. On dung. Australia                  |   |
|    | <i>Conocybe candida</i>   |   |
| 3* | Stipe not radicating. Pileus 10-30(-40) mm diam., white, often with faint dark tint on disc. Lamellae adnexed. Rarely on dung                           | 4 |
| 4  | Lamellae persistently anastomosing to folded-crispate. Pileus expanding, obtuse-convex. USA, England (?)  |   |
|    | <i>Conocybe albipes</i> var. <i>crispa</i>  |   |
| 4* | Lamellae and shape of pileus different  | 5 |
| 5  | Pileus usually higher than wide, cylindrical-campanulate or thimble-shaped, rarely expanding, smooth. Basidiospores average 11.8-13.5 x 6.8-8.3 µm, ob- |   |

scurely lentiform. Distribution world-wide

*Conocybe albipes* var. *albipes* (= *Conocybe lactea*)

- 5\* Pileus consistently expanded in mature specimens, strongly wrinkled or venose-pitted on disc. Basidiospores average 11.3-11.6 x 7.8-8 x 7.0-7.1  $\mu\text{m}$ , sublentiform. Only recorded from Germany and The Netherlands, in gardens, greenhouses

*Conocybe albipes* var. *rugata*

- 6 Pileus if moist pale brown, grey brownish, grey-cinnamon, isabel

- 6\* Pileus if moist with darker or different colours

- 7 Pileus 10-30 mm diam. Basidiospores average 11.5-13.2 x 7.6-8.3 x 6.8-7.7  $\mu\text{m}$ , ellipsoid, slightly lentiform. Pileicystidia absent or very rare. Tropical regions, occasionally in Europe (greenhouses, flower pots)

*Conocybe crispella*

- 7\* Pileus <7 mm diam. Basidiospores average 14.7-15.3 x 8.5-8.6  $\mu\text{m}$ , ellipsoid to subcylindrical, not lentiform. Lecythiform pileicystidia present. USA

*Conocybe subcrispa*

- 8 Pileus 10-17 mm diam., deep brown all over, margin neither striate nor crenate. Odour raphanoid. Zaire

*Conocybe raphanacea*

- 8\* Pileus 10-60 mm diam., pale rust brown, rust yellow, orange-brown, paler at striate-crenate margin. Odour not distinctive. Basidiospores 9.5-14.5 x 6.0-8.0  $\mu\text{m}$ . In subtropical to tropical regions, The Netherlands (in greenhouse). [incl. *Conocybe bicolor* WATLING and *Conocybe africana* (PEGLER) WATLING]

*Conocybe zeylanica*

- 9 Pileus 5-20 mm diam., white with very pale yellow disk, non-hygrophanous, non-striate. Base of stipe equal or slightly swollen only. Europe

*Conocybe albipes* var. *pseudocrispa*

- 9\* Pileus 25-60 mm diam., brown to rust brown on disc, hygrophanous, distinctly striate-crenate margin. Base of stipe emarginate-bulbous. Basidiospores 12.0-17.5 x 7.0-9.5  $\mu\text{m}$ . Mauritius

*Conocybe zeylanica* var. *marginata*

*Galerella*

*Galerella fibrillosa* HAUSKN., spec. nova. Colour fig. XXI, Fig. 11

**Descriptio latina:**

Pileus 7-15 mm diam., primo plano-convexus, dein applanatus, pallide luteo-brunneus, obscurior ad discum, striato-crenatus, e velo pallido vel subochraceo conspicue obtectus, siccus. Lamellae subliberae, subventricosae, pallide brunneae vel luteo-brunneae, deliquescentes. Stipes 30-40 x 0,5-0,8 mm, cylindricus, aequalis, sed basim versus clavatus, albissimus, e velo farinaceo-pruinosis, ad basem granulosis ex fragmentis veli, siccus. Caro fragilissima, deliquescentis. Odor saporque nulli. Basidiosporae 7-8,5 x



(5-)5,5-6,5 x 4,5-5,0  $\mu\text{m}$ , ovoideae, ellipsoideae vel sublentiformes, pallide aurantio-brunneae, poro germinativo minuto instructae. Basidia 13-20 x 8,5-10,5  $\mu\text{m}$ , 4-sporigera. Cheilocystidia (28-)32-55(-62) x 10-20  $\mu\text{m}$ , vesiculosa vel lageniformia, apicaliter obtusa, tenuitunicata. Pleurocystidia nulla. Caulocystidia cheilocystidiis similia, rara. Pileipellis hymeniformis, ex cellulis clavato-vesiculososis tenui-tunicatis, (15-)25-32 x (8-)13-21  $\mu\text{m}$ , pileocystidiis raris fusoides intermixtus. Fibulae praesentes.

**Holotypus:** Mauritius, HAUSKNECHT (WU 14785).

### Description:

**Pileus:** 7-15 mm diam., plano-convex, soon expanding, finally centre depressed and margin upturned, pale yellow-brown, yellowish ochre or pale brown on disc, paler towards the non-striate margin, conspicuously crenate for 3/4 of the radius, non-hygrophanous, surface covered with whitish to pale ochre fibrillose or granulose remnants of veil, dry, thin.

**Lamellae:** subfree, moderately crowded, subventricose, pale brown to yellowish brown, even edges concolourous, rapidly deliquescent.

**Stipe:** 30-40 x 0.5-0.8 mm, cylindrical, equal above, base slightly swollen up to 1.3 mm diam.), pure white, minutely granular-mealy over whole length, dry, solitary, swollen base with inconspicuous granular to powdery volva-like remnants of veil.

**Context:** very brittle, rapidly deliquescent in pileus. Odour and taste not distinctive.

**Basidiospores:** 7-8.5 x (5-)5.5-6.5 x 4.5-5.0  $\mu\text{m}$ , average 7.8 x 6.0 x 4.8  $\mu\text{m}$ , ovoid to ellipsoid, sublentiform, pale orange-brown in KOH, walls thickened, small germ-pore present.

**Basidia:** 13-20 x 8.5-10.5  $\mu\text{m}$ , 4-spored, clavate.

**Cheilocystidia:** (28-)32-55(-62) x 10-20  $\mu\text{m}$ , shape ranging from vesiculose with more or less distinctive obtuse papilla to lageniform with elongate cylindrical neck, apex obtuse, thin-walled, sometimes with plasmatic pigment, pale yellow in KOH.

**Pleurocystidia:** absent.

**Caulocystidia:** size and shape like cheilocystidia, scattered. Stipitipellis composed of cylindrical hyphae, 3-10  $\mu\text{m}$  diam., walls smooth, oleiferous hyphae absent.

**Pileipellis:** hymeniform, composed of broadly clavate to vesiculose cells, (15-)25-32 x (8-)13-21  $\mu\text{m}$ , walls very thin and collapsing, intermixed with scattered, hyaline, fusoid pileocystidia, 30-45 x 5-7  $\mu\text{m}$ .

**Veil:** composed of cylindrical, thin-walled, smooth and collapsing hyphae, 2-4  $\mu\text{m}$  diam.

**Clamp connections:** present.

**Distribution:** Mauritius.

**Holotype:** Mauritius: Black River, Piton de la Petite Rivière Noire, about 800 m s. m., on soil along trail in rain forest, 28. 1. 1995, leg. A. HAUSKNECHT (WU 14785, isotypes in E and ZT).

**Material examined:** Holotype.

**Additional material examined:** **Brazil:** Paraná, Paranaguá, Ilha do mel, on decayed twig in dicot forest, 3. 6. 1990, leg. A. DE MEIJER (E).

**Galerella plicatella** (PECK) SINGER: **USA:** New York, Cayuga County, on grassy ground, no collecting date, leg. STERLING (NYS, holotype of *Agaricus coprinoideus* PECK).

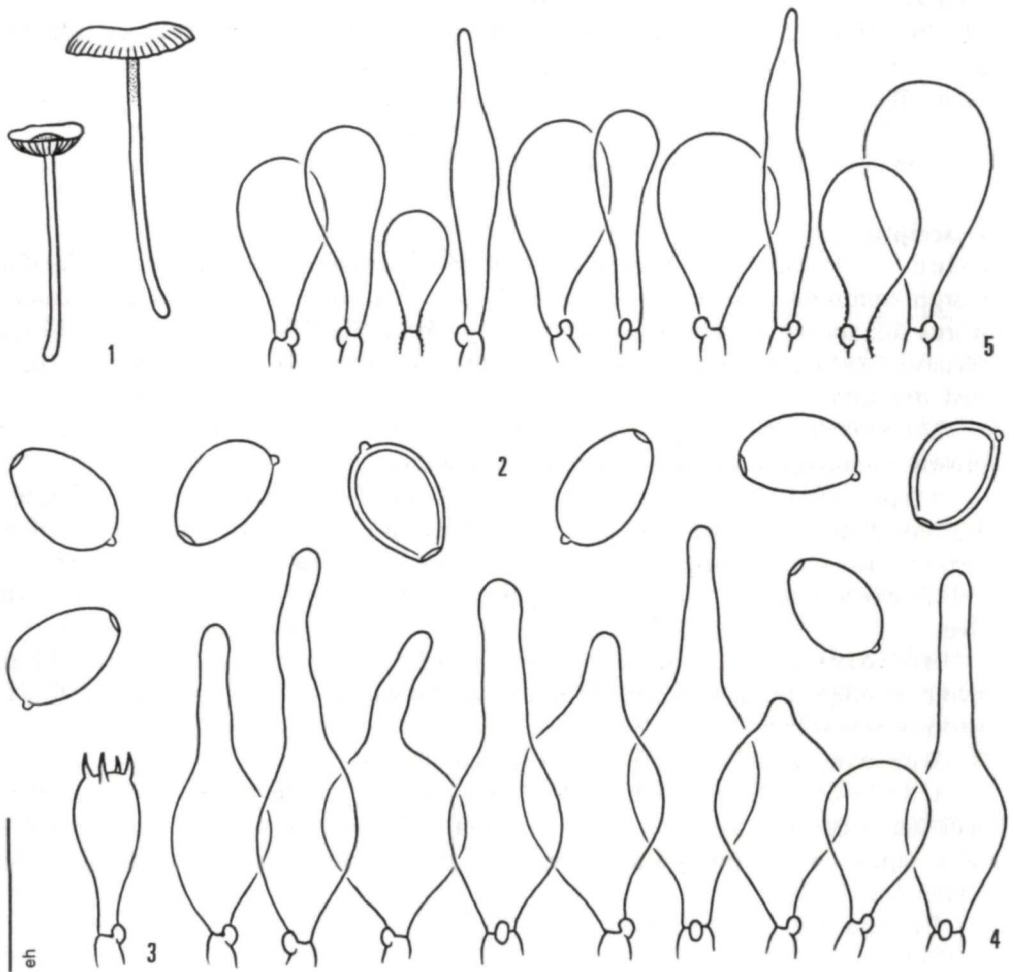


Fig. 11. *Galerella fibrillosa* (WU 14785, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidium. 4 Cheilocystidia. 5 Pileipellis (x 800).

The Brazilian material collected by DE MEIJER has been commented by WATLING (1992: 97). In the relevant description, the presence of veil remnants is not mentioned, however, re-examining the type collection loose velar hyphae were discovered on the pilei of young specimens. Scattered velar hyphae were also observed on the type specimens from Mauritius.

After examining our authentic material from Mauritius, WATLING (in litt.) concluded: "This is very close to a taxon seen in material from South America. I have not described this latter material as new although I know I should do. It is new."

The revision of the type specimens of *Galerella plicatella* (HORAK 1968: 243), originally described from North America, revealed that the size of the basidiospores

matches those of the present new taxon. In both taxa the shape of the basidiospores is weakly lentiform and more rarely angular-submitriform. Pileicystidia are absent and no velar remnants covering the surface of the pileus have been discovered.

By comparison, the (subcapitate) cheilocystidia of *Galerella fibrillosa*, however, are much more slender than those of *G. plicatella*.

As pointed out recently by THOMAS & al. (2001), *Galerella plicatella* ss. auct. europ. represents a different, still unnamed taxon which is distinguished by more robust and darker coloured basidiomes, and significantly larger and thick-walled basidiospores.

## *Pholiotina*

### *Pholiotina* subgen. *Piliferae* sect. *Piliferae* stirps *Sulcatipes*

#### *Pholiotina pilosa* E. HORAK, HAUSKN. & DESJARDIN, spec. nova. Fig. 12

#### **Descriptio latina:**

Pileus 10-15 mm diam., primo ovoideus dein obtuse conicus vel subcampanulatus, hepaticolor dein spadiceus, hygrophanus, subrugulosus ad discum, pileicystidiis albis conspicuis dense obtectus, siccus, evelatus. Lamellae adnexae, ferrugineo-brunneae, angustae, albo-fimbriatae. Stipes 20 x usque ad 1 mm, cylindricus, aequalis, ad basem subincrassatus, albidus vel brunneolus, ad apicem pruinosis, deorsum caulocystidiis pilosis dense obtectus, siccus. Odor saporque nulli. Basidiosporae 7-8,5 x 3,5-4 µm, subellipticae, ferrugineo-brunneae, laeves, tenui-tunicatae, poro distincto instructae. Basidia 18-24 x 8-9 µm, 4-sporigera. Cheilocystidia 25-55 x 8-15 µm, lageniformia vel fusioidea, apicaliter obtuso-elongata, tenui-tunicata. Caulocystidia 30-150 x 4-10 µm, polymorphica, saepe cheilocystidiis similia. Pileipellis hymeniformis, ex cellulis clavatis, 12-50 x 8-20 µm, basaliter pigmento brunneo incrustatis. Pileicystidia 60-130 (-200) µm, numerosa, fusioidea, pigmento brunneo impleta. Fibulae praesentes.

**Holotypus:** Indonesia, COLLINS in HORAK 7029 (BO 98-87).

#### **Description:**

**Pileus:** 10-15 mm diam., at first ovoid, then obtusely conical or subcampanulate, at first liver brown, fading with age to deep date brown, hygrophanous, if moist strongly striate halfway to margin, centre subrugulose, densely covered with white to hyaline hairs (!), visible by naked eye, dry, veil remnants absent.

**Lamellae:** 22-30 reaching stipe, up to 5 lamellulae, adnexed, rather narrow, deep rust brown or ferruginous, fimbriate edges concolourous.

**Stipe:** 20 x up to 1 mm, cylindrical, equal, base mostly swollen (up to 3 mm diam.), whitish to very pale brownish, apex pruinose, below with conspicuous white, hair-like caulocystidia, veil absent, dry, solid, solitary, basal tomentum absent.

**Context:** concolourous. Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 7-8.5 x 3.5-4.0 µm, ovoid to ellipsoid, pale orange-brown in KOH, walls thickened, small germ-pore present.

**Basidia:** 18-24 x 8-9 µm, 4-spored, clavate.

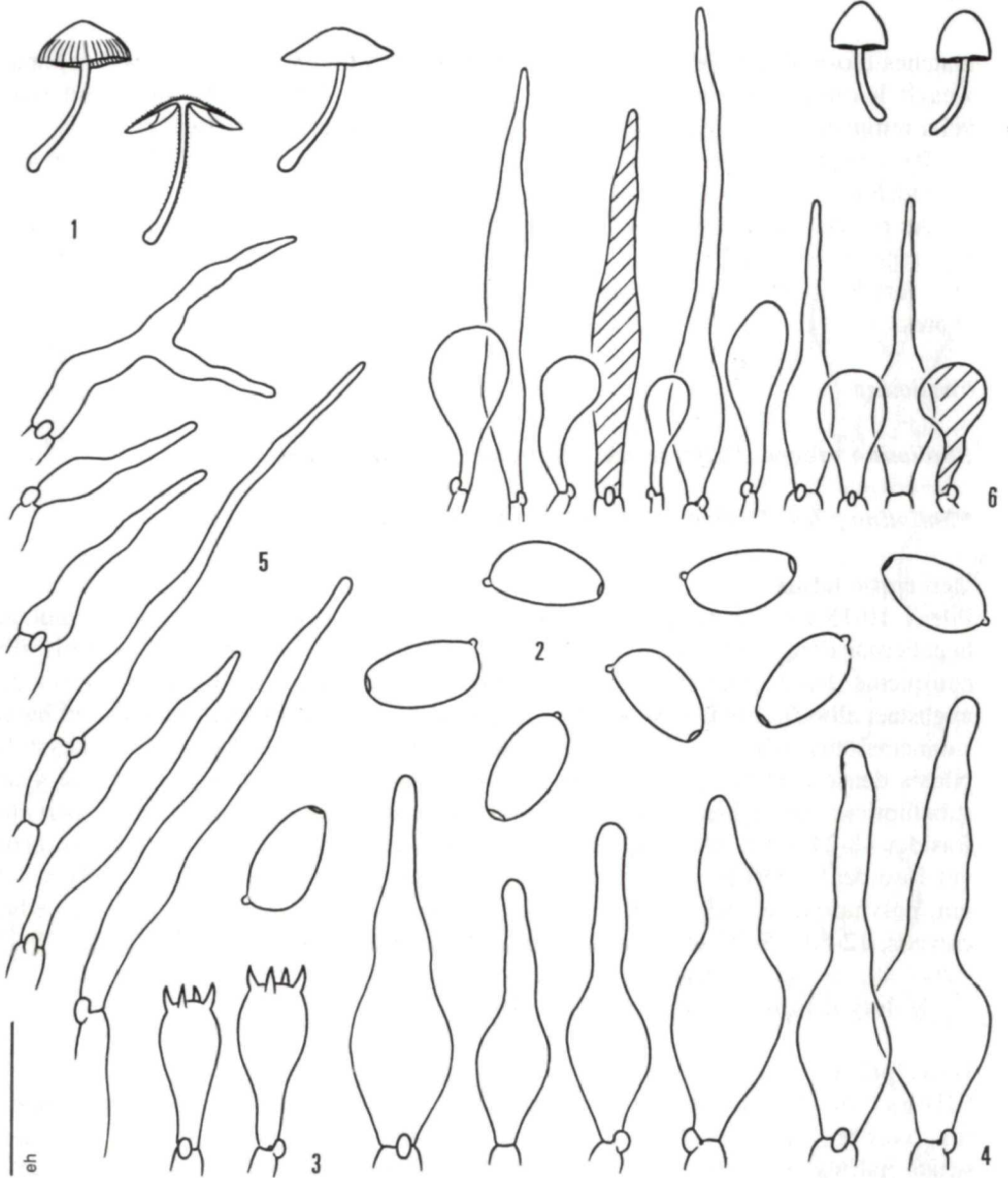


Fig. 12. *Pholiotina pilosa* (BO 98-87, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

Cheilocystidia: 25-55 x 8-15  $\mu\text{m}$ , lageniform to fusoid with long tapering neck, apex obtuse, hyaline, thin-walled.

Pleurocystidia: absent.

Caulocystidia: 30-150 x 4-10  $\mu\text{m}$ , polymorphic, mostly slender fusoid with elongate, gradually tapering neck, occasionally forked near obtuse to subacute apex, hyaline or rarely with plasmatic pigment, brown in KOH.

Pileipellis: hymeniform, composed of clavate cells, 12-50 x 8-20  $\mu\text{m}$ , thin-walled, hyaline, with brown plasmatic pigment, oleiferous hyphae in subcutis absent. Pileicystidia 60-130 (-200)  $\mu\text{m}$ , numerous, slender fusoid with tapering neck, hyaline, often with brown plasmatic pigment.

Clamp connections: present.

**Distribution:** Indonesia (Java).

**Holotype:** Indonesia: Java, Cibodas, trail to Mt Gedeh, between entrance of Forest Reserve and waterfalls, 1450 m s. m., on rotten wood, in tropical montane rain forest dominated by *Castanopsis javanica-argentea* (Fagaceae), 10. 1. 1998, leg. COLLINS in HORAK 7029 (BO 98-87, isotypes in ZT and WU 22221).

**Material examined:** Holotype.

**Additional material examined:** *Phliotina caricicola* SINGER: **Colombia:** Risaraldo, Mun. Sta. Rosa del Cabal, Quebrada La Serra, on *Carex pichinchensis* (Cyperaceae), 3550 m s. m., 26. 1. 1980, leg. T. BOEKHOUT, det. R. SINGER (F, holotype).

*Phliotina ealaensis* (BEELI) SINGER: **Zaire:** Eala, Central Forest area, on sandy soil of road at Botanic Garden, Nov. 1924, leg. GOOSSENS-FONTANA 362 (BR, holotype).

*Phliotina maireiaffinis* SINGER: **USA:** Illinois, Ogle Co., White Pine State Park, ad terram in via silvestri (*Quercus, Fraxinus*), 9. 10. 1976, leg. R. SINGER N 7591 (F, holotype).

*Phliotina ruiz-lealii* SINGER: **Argentina:** Mendoza, Las Heras, Zanjón de los Ciruelos, 30. 5. 1937, leg. A. RUIZ-LEAL 4614 (BAFC, holotype).

The very conspicuous cystidia both in the pileipellis (readily observed on fresh specimens), on the stipe and on the lamellar edges refer *Phliotina pilosa* clearly to *Phliotina* subgen. *Piliferae*. Taxonomically, this species neatly fits into stirps *Sulcatipes* (WATLING 1982) which encompasses also *Conocybe sulcatipes* (PECK) KÜHNER, *C. ealaensis* (BEELI) WATLING, *Phliotina galerinoides* CONTU, *Conocybe novae-zelandiae* WATLING & TAYLOR and probably both *C. capillaripes* (PECK) WATLING and *Phliotina maireiaffinis* SINGER (1989).

*Phliotina pilosa* is separated from *P. sulcatipes* by the smaller basidiomes, the darker coloured pilei, the shorter and thicker-walled basidiospores and the giant caulocystidia.

*Phliotina galerinoides*, originally described from Sardinia (CONTU 1997) is characterized by very small fragile basidiomes (pileus up to 6 mm diam., stipe long and filiform), significantly smaller basidiospores (5.2-7.5 x 3.7-4.5 µm) and shorter caulocystidia. So far we did not have the opportunity to re-examine the type material but taken by the data published in the protologue, this species is not contaxic with *P. pilosa*. According to our interpretation, it is possible that the Sardinian species actually represents a local form or variety of *Phliotina sulcatipes* rather than an independent taxon.

*Conocybe (Phliotina) novaezelandiae* WATLING & TAYLOR (1987) is closely related to *Phliotina sulcatipes* and has basidiospores of similar size and shape. However, the scattered pileicystidia (up to 36 µm long) and the caulocystidia (up to 48 µm long) are definitely shorter and consequently significantly different from those observed in *Phliotina pilosa*.

Unfortunately, the holotype material of *Conocybe ealaensis* (BEELI) WATLING is in very fragmentary condition and accordingly it was impossible to examine intact cheilocystidia and caulocystidia. Under these circumstances, our interpretation of this taxon follows WATLING (1974). The coloured illustration and the drawings show specimens with rather robust, brown basidiomes, relatively thick, white stipes, short lageniform cheilocystidia and large basidiospores measuring 9.5-11.3 x 6-7 µm. These features exclude this Central African *Phliotina* as being contaxic with the Indonesian *P. pilosa*.

Size and general shape of *Phliotina maireiaffinis* SINGER (1989), originally described from Illinois (USA), are reminiscent of those observed for *P. pilosa*. However,

the colours of basidiomes of the North American taxon are paler, and the length and the morphology of both the caulocystidia and pileicystidia (up to 40  $\mu\text{m}$  long, shape ranging from cylindrical to clavate or subuteriform) are clearly different from those reported for *P. pilosa*.

According to SINGER (1989), *Pholiotina maireiaffinis* is taxonomically close to *P. mairei* (WATLING) ENDERLE. However, on re-examining the type material of the former species, we conclude that this taxon better belongs to the species complex near *P. sulcatipes*.

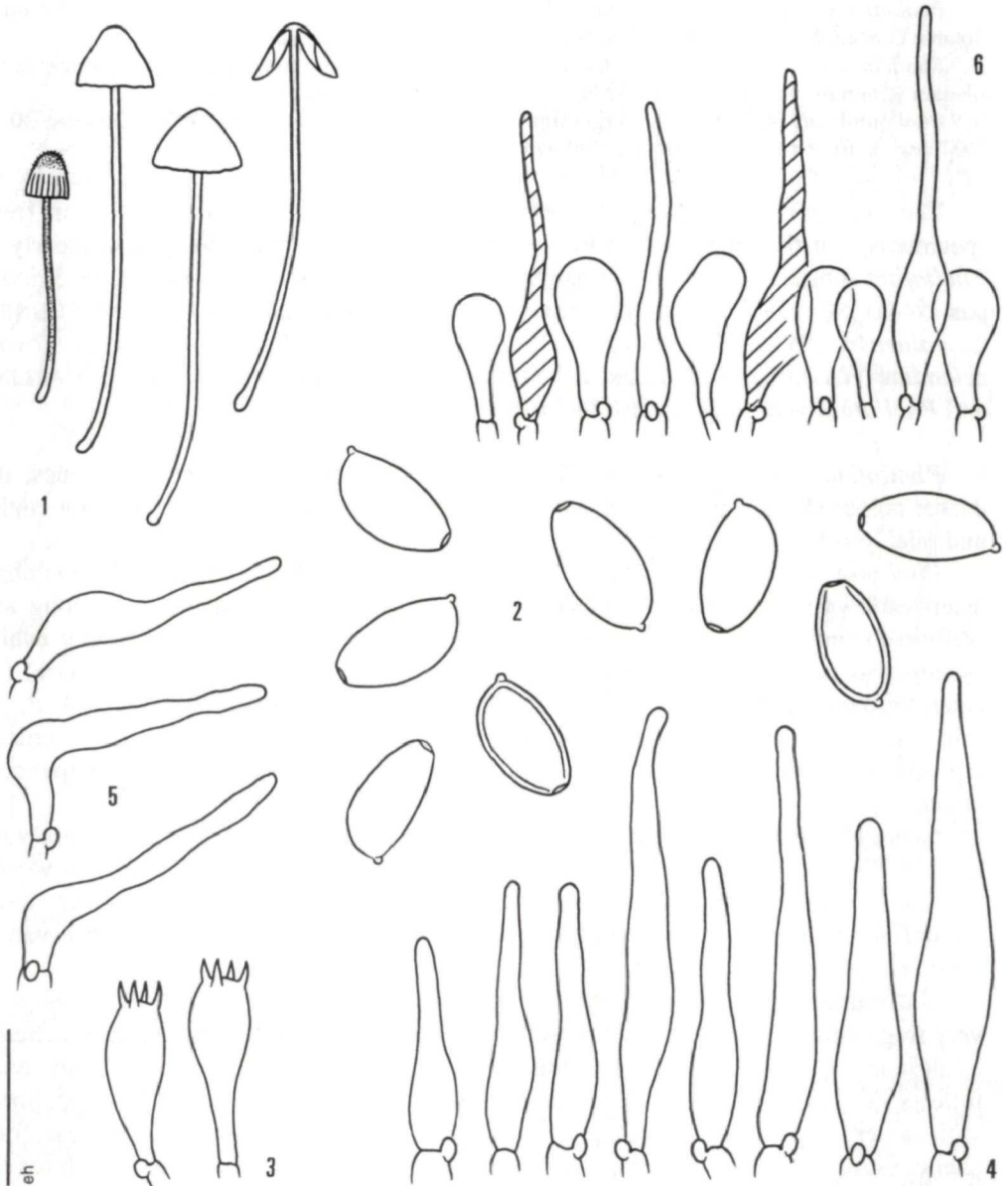


Fig. 13. *Pholiotina sulcatipes* (ZT 4365). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

The revision of type material revealed that the following two taxa must be excluded from stirps *Sulcatipes*.

Microscopically, *Pholiotina ruiz-lealii* (from Northern Argentina) is characterized by often long cheilocystidia, the polymorphic shape of which is ranging from fusoid to subcylindrical or subuteriform. Furthermore, the basidiospores measure 10.0-12.5 x 5.0-6.0  $\mu\text{m}$ , average 10.9 x 5.6  $\mu\text{m}$ .

Finally, *Pholiotina caricicola* (SINGER 1989) is a well defined species recorded from an alpine habitat in Colombia. It is characterized both by its particular habitat-substrate and the pale, thin-walled basidiospores (8.5-12.5 x 6.0-8.5  $\mu\text{m}$ , average 10.4 x 7.0  $\mu\text{m}$ ), the absent pileicystidia and the smaller cheilocystidia with subcapitate apex.

#### *Pholiotina* subgen. *Piliferae* sect. *Cyanopoda*

*Pholiotina sulcatipes* (PECK) BON, Doc. Mycol. 21/83: 39. 1991. Fig. 13

**Basionym:** *Agaricus sulcatipes* PECK, Ann. Rep. New York State Mus. Nat. Hist. 35: 132. 1884.

#### **Description of material from North America, USA, Montana (ZT 4365):**

**Pileus:** 6-12 mm diam., hemispherical to obtuse conical or broadly campanulate, ochraceous when moist, on drying turning reddish orange in centre, strongly hygrophanous, transparent-striate towards margin, micaceous, occasionally hoary due to pileicystidia, dry, fragile.

**Lamellae:** subfree to adnexed, up to 2 mm broad, deep rust brown, subfimbriate edges paler.

**Stipe:** 25-55 x 1 mm, cylindrical, slender, equal above, slightly swollen at base, white becoming pallid, minutely velutinous or hairy over whole length, dry, solid, brittle, solitary, veil remnants absent.

**Context:** odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 7.5-9.5 x 4-4.5(-5)  $\mu\text{m}$ , elliptical to subamygdaliform, rust brown, smooth walls thickened, germ-pore distinctive.

**Basidia:** 20-24 x 7-8  $\mu\text{m}$ , 4-spored, clavate.

**Cheilocystidia:** 25-60 x 5-10  $\mu\text{m}$ , slender fusoid, tapering towards obtuse apex (awl-shaped), thin-walled, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** 40-80 x 6-10  $\mu\text{m}$ , numerous, shape like cheilocystidia.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 25-40 x 8-18  $\mu\text{m}$ . Pileicystidia 60-100 x 10-15  $\mu\text{m}$ , numerous, slender fusoid, elongate and tapering towards obtuse apex, often with plasmatic pigment, yellow-brown in KOH.

**Clamp connections:** present.

**Distribution:** USA (type), Europe.

**Holotype:** USA: New York State, East Berne, on pile of buckwheat bran (*Fagopyrum*) in woods, Aug. 1883, leg. C. H. PECK (NYS).

**Material examined:** Holotype.

**USA:** Montana, St. Ignatius, Mission Falls, on soil among living and dead moss under *Tsuga-Abies-Picea*, 16. 7. 1989, leg. E. HORAK 4365 (ZT).

With exception of the more slender basidiospores, the characters of the specimens from Montana essentially agree with those of the holotype and specimens from Europe. The stipe of the present collection is white and contrary to PECK (1884) blue-green tinges are absent. Accordingly, it seems likely that *P. sulcatipes* is actually contaxic with *Pholiotina aberrans* (KÜHNER) SINGER (HAUSKNECHT 2001 a); cf. also discussion under *P. smithii*.

***Pholiotina smithii* (WATLING) ENDERLE in ENDERLE & HÜBNER, Z. Mycol. 65: 16. 1999. Fig. 14**

**Basionym:** *Conocybe smithii* WATLING in BENEDICT, TYLER & WATLING, Lloydia 30: 152. 1967

**Synonym:** *Pholiotina cyanopes* (KAUFFMAN) SINGER in RUMACK & SALZMAN, Mushroom Poisoning: 203. 1978.  
non *Pholiotina cyanopus* (ATK.) SINGER, Acta Inst. Bot. Komarov Acad. Sci. URSS, Series 2, 6: 425. 1950.  
= *Conocybe cyanopus* (ATK.) KÜHNER, Le genre Galera, 128. 1935.

**Description of material from North America, USA, Montana (ZT 4377):**

**Pileus:** 8-13 mm diam., hemispherical to obtusely campanulate, dirty brown when moist, on drying becoming pale ochre-brown, strongly hygrophanous, transparent-striate towards margin, minutely hoary due to pileocystidia, dry, fragile.

**Lamellae:** 16-24 reaching stipe, 3(-5) lamellulae, adnexed, ventricose, up to 2 mm broad, at first argillaceous, turning pale rust brown, subfimbriate edges whitish.

**Stipe:** 12-35 x 1 mm, cylindrical, equal above, base slightly bulbous (up to 2 mm diam.), white, in aged specimens gradually with distinctive pale blue-green tinge from base upwards, minutely fibrillose-fluffy over whole length, non-striate, dry, solid, solitary.

**Context:** white in stipe (young specimens). Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 7.5-9 x 5-5.5  $\mu\text{m}$ , ovoid to subamygdaliform, rust brown, smooth, walls distinctly thickened, germ pore distinctive.

**Basidia:** 16-20 x 6-7  $\mu\text{m}$ , 4-spored, clavate.

**Cheilocystidia:** 20-45 x 7-9  $\mu\text{m}$ , polymorphic, ventricose-fusoid with subcapitate apex, subuteriform, intermixed with scattered rather awl-shaped cystidia, thin-walled, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** 50-130 x 4-12  $\mu\text{m}$ , numerous and conspicuous, at base fusoid, gradually tapering to obtuse apex, thin-walled, hyaline.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 12-30 x 8-14  $\mu\text{m}$ . Pileocystidia 50-90 x 4-10  $\mu\text{m}$ , numerous, shape like caulocystidia.

**Clamp connections:** present.

**Holotype:** USA: Michigan, Ann Arbor, on *Polytrichum*, in poplar (*Populus*) swamp, July (MICH).

**Material examined:** USA: Montana, Flathead Lake, Yellow Bay, near Biological Station, on soil among moss, 18. 7. 1989, leg. BAILEY in HORAK 4377 (ZT).

**Additional material examined:** *Pholiotina cyanopus* (ATK.) SINGER: USA: New York State, Ithaca, on ground among grass, ATKINSON 23302 (CUP, holotype of *Galerula cyanopus* ATK.).



Regarding the macroscopical features, the present material from Montana concurs closely with the description by WATLING (BENEDICT & al. 1967). Microscopically, however, the shape and size of the cheilocystidia was found more polymorphic than reported by WATLING (1967) who interpreted the conspicuous flagellate pileicystidia as "abnormal" cells. Regardless of these differences, there is no doubt that our specimens are conspecific. In North America, *Pholiotina smithii* is commonly encountered and a fine illustration of this agaric is found in STAMETS (1999: 177).

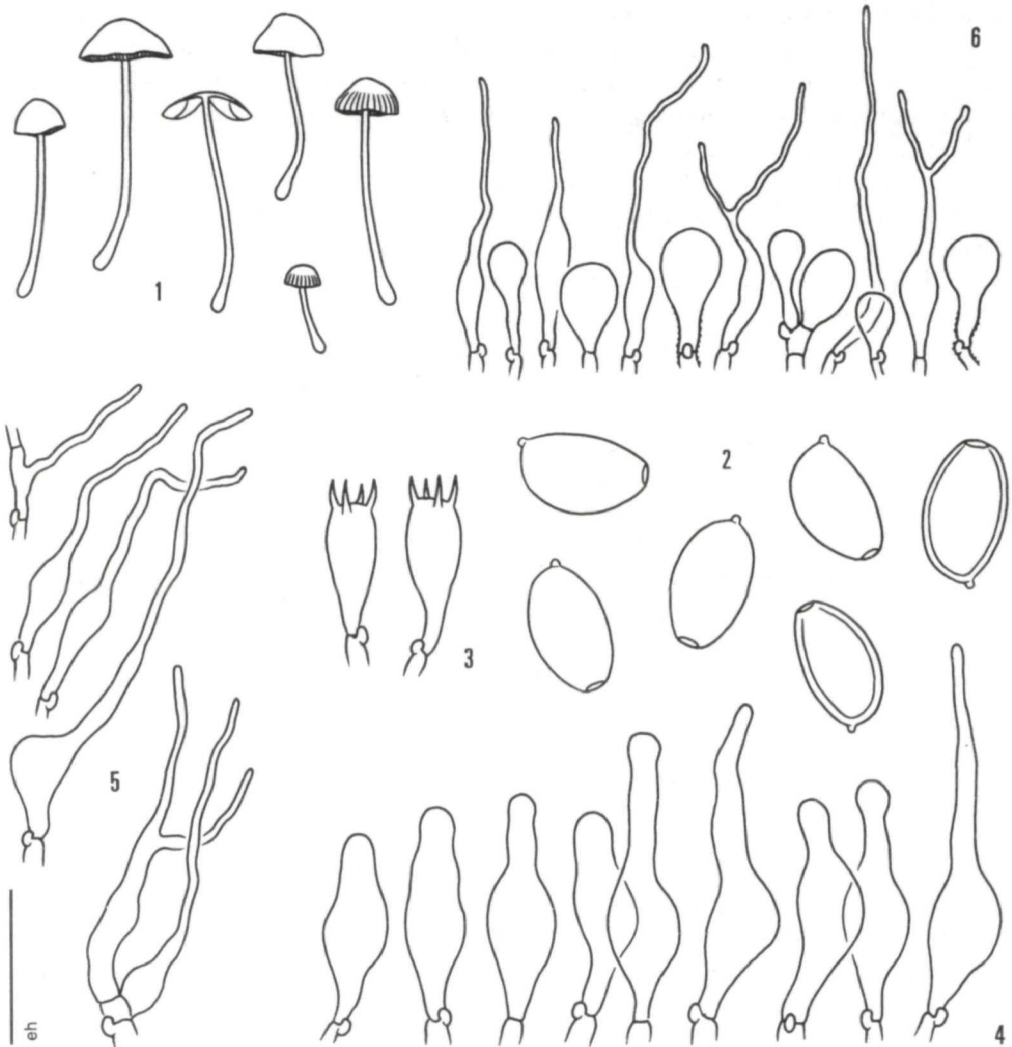


Fig. 14. *Pholiotina smithii* (ZT 4377). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

***Pholiotina* subgen. *Piliferae* sect. *Intermediae***

***Pholiotina brunnea* (J. E. LANGE & KÜHNER ex WATLING) BON, Doc. Mycol. 21/63: 38. 1991. Fig. 15**

**Basionym:** *Conocybe intermedia* var. *brunnea* J. E. Lange & KÜHNER, Le genre Galera, 143. 1935.

**Synonym:** *Conocybe fibrillosipes* WATLING, Persoonia 6: 325. 1971 (syn. nov.).

**Description of material from North America, USA, North Carolina (ZT 5075):**

**Pileus:** 10-25 mm diam., at first hemispherical or obtusely campanulate becoming convex-expanded (with or without low umbo), dark brown, opaque, on drying fading to pale brown (without rust orange tinge), hygrophanous, translucent-striate towards margin, in moist condition subviscid to glossy, centre with radially arranged low wrinkles, in young basidiomes surface (and especially margin) covered with pale ochre membranaceous appendiculate remnants of veil, washed or fallen off in aged specimens.

**Lamellae:** 17-20 reaching stipe, up to 5 lamellulae, free to adnexed, up to 2 mm broad, at first pale ochre changing to rust ochre in mature material, even edges concolourous.

**Stipe:** 30-50 x 1.5-4 mm, cylindrical, gradually enlarged towards subclavate or swollen (but never bulbous) base, relatively robust, at first pale yellow, changing to brown towards base and with age, apex pruinose, lower half and especially close to base densely covered with whitish appressed fibrils of veil, annulus absent, dry, hollow, fragile, solitary, rhizomorphs absent.

**Context:** brittle, pale brown. Odour strong, like *Pelargonium*, taste sour.

**Chemical reactions:** unknown in pileus and upper portion of stipe, dark brown towards base of stipe with KOH.

**Spore print:** rust brown.

**Basidiospores:** 6.5-7.5(-8) x 3-4 µm, elliptical, pale rust brown, thin-walled, smooth, with conspicuous apical germ pore.

**Basidia:** 20-26 x 6-7 µm, subclavate to cylindrical, 4-spored.

**Cheilocystidia:** 20-30 x 5-8 µm, lecythiform, capitate apex 3.5-6 µm diam., hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** lecythiform (like cheilocystidia), up to 40 x up to 7 µm, apex up to 6 µm broad, in dense clusters with clavate hyaline cells. Hyphae of stipe 5-14 µm diam., mixed with conspicuous oleiferous hyphae.

**Pileipellis:** hymeniform, composed of clavate cells, 20-40 x 8-20 µm, base encrusted with rust brown pigment, with scattered oleiferous hyphae in subcutis. Pileicystidia 16-30 x 3-8 µm, slender lecythiform, capitate apex up to 5 µm diam., scattered, with brown plasmatoc pigment.

**Clamp connections:** present.

**Distribution:** Europe, USA (Washington, North Carolina).

**Holotype:** France: Paris, Boissy-Saint-Leger, scattered on humus among dead leaves in hollows and wet ditches, 5. 10. 1932, leg. R. KÜHNER (G).

**Material examined:** USA: North Carolina, Jackson Co., between Cashiers and Sapphire Lakes, Hogback Creek, 1000 m s. m., on rotting bark and wood of broadleaf dicot tree (probably *Acer* spec., 20. 8. 1993, leg. E. HORAK 5075 (ZT, WU 22222).

In the protologue to *Conocybe fibrillosipes*, WATLING (1971) is referring to a single collection made in the Pacific-Northwest (Washington, USA). The rather robust basidiomes of this species resemble *Galerina unicolor* (FR.) SINGER. Following WATLING (1971: 327), further distinctive features of this *Pholiotina* are the pale yellow-brown veil remnants both on the margin of the pileus and the stipe and the numerous pileocystidia in the pileipellis.

The comparatively slender basidiomes of the new North American record from Highlands (NC) were found to have pale ochre coloured, loose, appendiculate veil remnants along the margin of the pileus. The lower portion of the stipes were densely covered with white, persistent fibrils of veil.

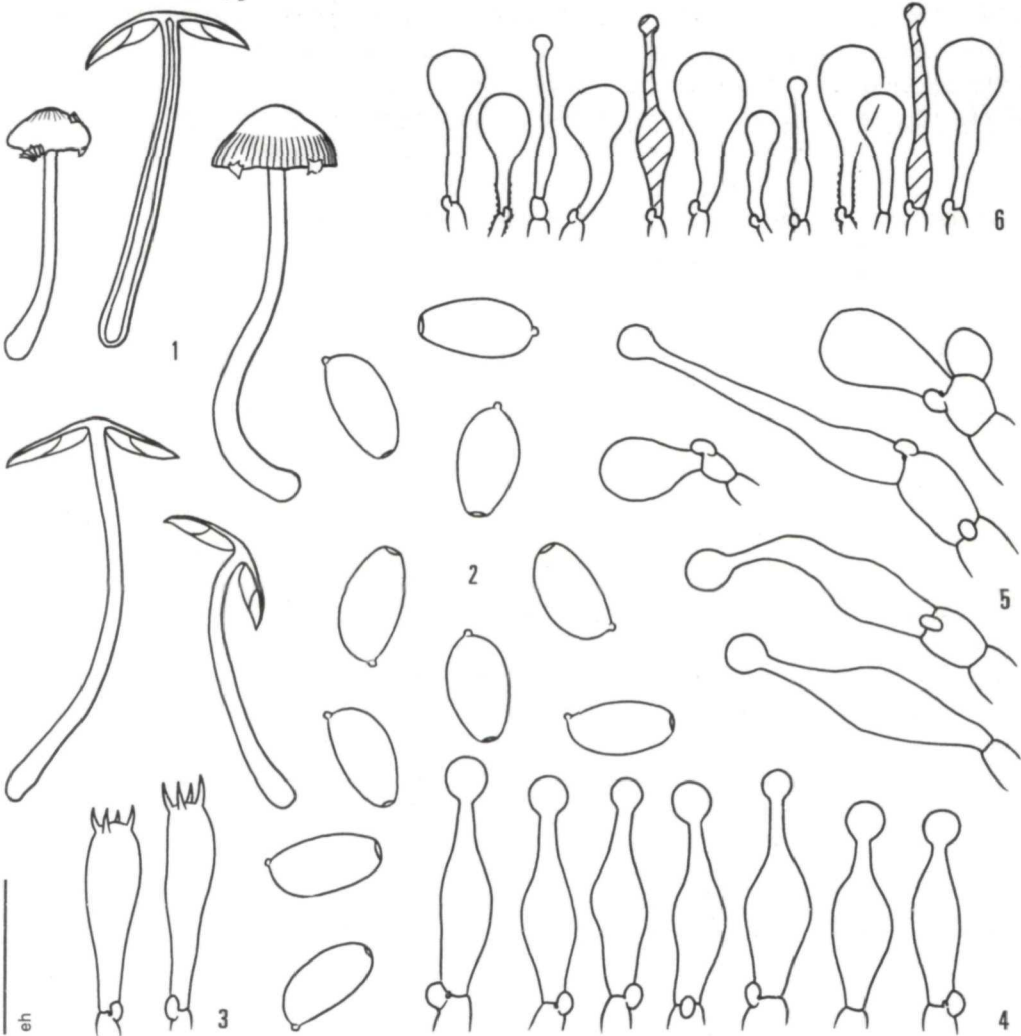


Fig. 15. *Pholiotina brunnea* (ZT 5075). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

Evaluating the taxonomically relevant characters of the North American *Pholiotina fibrillosipes*, we are coming to the conclusion that this taxon is conspecific with the European *P. brunnea*. According to the pertinent literature, WATLING already suggested that the two taxa are probably contaxic. Keeping in mind the remarkably wide

range of variation in this species (see collection WU 5431, depicted in MOSER & JÜLICH 1985-: III/7), both regarding macroscopical and microscopical features observed in ecotypes, we propose to consider *P. fibrillosipes* as a later synonym of *P. brunnea*.

For the time being, we do not have the facts yet whether or not *Pholiotina intermedia* (A. H. SMITH) SINGER represents a so far overlooked synonym of *P. brunnea*. Fresh topotypical material from North America is needed in order to allow a critical comparison of these two taxa. The same situation is encountered with the actual systematic position of *Pholiotina altaica* SINGER, described by SINGER (1950: 140) from the Altai Mts (Russia).

Finally, *Pholiotina microspora* SINGER (1989: 107; type locality Illinois, USA) is another critical species. Owing to the membranaceous annulus, SINGER suggested a close relationship to the group of species assembled in the *P. intermedia* complex. In our opinion, however, this interpretation is not supported by the presence of uteriform, fusoid-capitate or lecythiform cheilocystidia and the smaller basidiospores.

***Pholiotina* subgen. *Piliferae* sect. *Vesiculosae* E. HORAK & HAUSKN., sect. nova**

Differt cheilocystidiis (et caulocystidiis) late vesiculososis vel subuteriformibus. Pileipellis hymeniformis. Pileocystidia nulla.

**Typus sectionis:** *Pholiotina vesiculosa*.

***Pholiotina vesiculosa* E. HORAK & HAUSKN., spec. nova. Fig. 16**

**Descriptio latina:**

Pileus 8-12 mm diam., primo hemisphaericus dein obtuse convexus, spadiceus vel melleus, hygrophanus, striatus, conspicue venosus ad discum, siccus, fragilis. Lamellae adnexae, ventricosae, obscure ferrugineae, albo-marginatae. Stipes 30-40 x usque ad 1 mm, cylindricus, aequalis, pallide ferrugineus, apex subpruinosis, ceterum glabrus, solidus, fragilis, velo nullo instructus, rhizomorpha nulla. Odor saporque forte farinacei. Basidiosporae 8,5-9,5 x 4,5-5 µm, ellipticae, ferrugineae, laeves, tenui-tunicatae, poro germinativo distincto instructae. Cheilocystidia 25-35 x 15-22 µm, late clavato-vesiculosa vel subuteriformia, tenui-tunicata, hyalina. Pleurocystidia nulla. Caulocystidia cheilocystidiis similia. Pileipellis hymeniformis, ex cellulis clavatis, 12-26 x 8-12 µm, tenui-tunicatis, haud gelatinosis. Pileocystidia nulla. Fibulae praesentes.

**Holotypus:** Papua New Guinea, HORAK 72-680 (ZT).

**Description:**

**Pileus:** 8-12 mm diam., at first hemispheric soon becoming convex with obtuse centre, date brown to dark honey brown when moist, paler on drying, hygrophanous, striate towards margin, conspicuously venose to wrinkled, thin-membranaceous, dry, any veil remnants absent.

**Lamellae:** 10-18 reaching stipe, 1-5 lamellulae, adnexed, ventricose, up to 1.5 mm broad, dark rust brown, whitish edges fimbriate.

**Stipe:** 30-40 x up to 1 mm, cylindrical, equal, fragile, pale rust brown, apex subpruinose, otherwise glabrous, solid, solitary, veil remnants absent. Rhizomorphs absent.

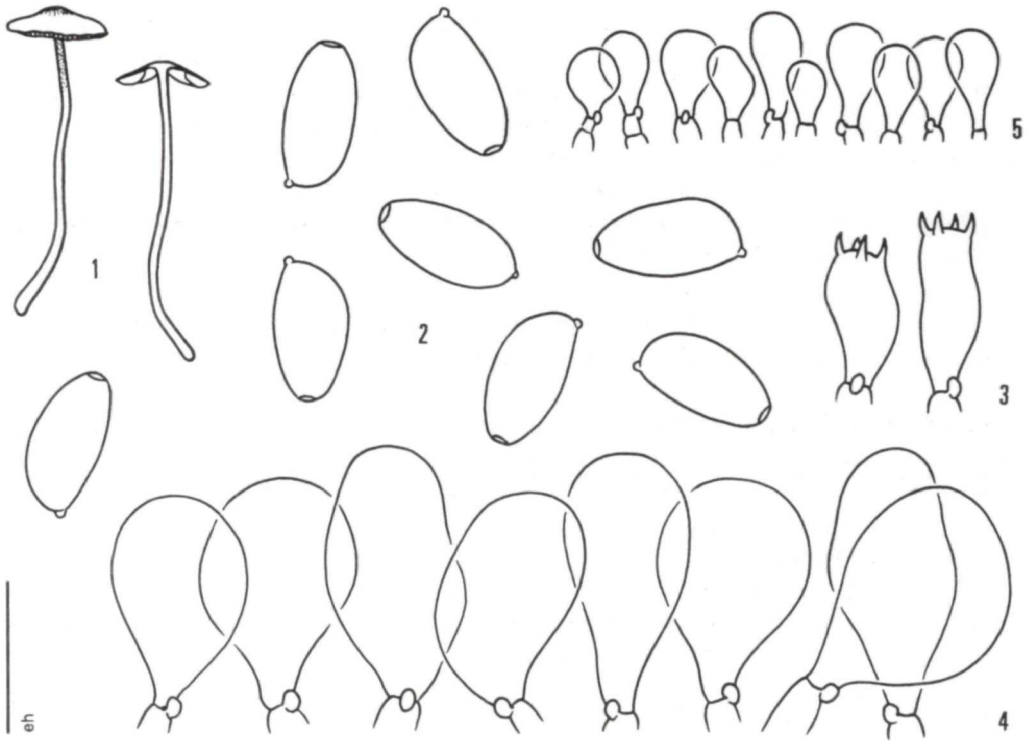


Fig. 16. *Pholiotina vesiculosa* (ZT 72-680, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Pileipellis.

Context: fragile, dark brown. Odour and taste strongly farinaceous.

Spore print: rust brown.

Basidiospores: 8.5-9.5 x 4.5-5  $\mu\text{m}$ , elliptical, rust brown, smooth, thin-walled, with broad apical germ-pore.

Basidia: 4-spored.

Cheilocystidia: 25-35 x 15-22  $\mu\text{m}$ , broadly clavate, vesiculose or balloon-shaped, thin-walled, hyaline.

Pleurocystidia: absent.

Caulocystidia: shape and size like cheilocystidia, scattered, sometimes encrusted or filled with pale rust ochre pigment. Hyphae in stipe 5-13(-22)  $\mu\text{m}$  diam., cylindrical, encrusted with pale yellow-rust brown pigment, oleiferous hyphae absent.

Pileipellis: hymeniform, composed of clavate cells, 12-26 x 8-12  $\mu\text{m}$ , non-gelatinized membranes thin-walled, basal parts encrusted with ferruginous pigment, oleiferous hyphae in subcutis absent. Pileicystidia absent.

Clamp connections: present.

**Distribution:** Papua New Guinea.

**Holotype:** Papua New Guinea: Morobe District, Bulolo, Heads Hump, 1100 m s. m., on soil among litter in montane subtropical rain forest dominated by *Castanopsis-Lithocarpus* (Fagaceae), 28. 11. 1972, leg. E. HORAK 72-680 (ZT; isotype in WU 22223).

**Material examined:** Holotype.

Based on our experience, vesiculose-subuteriform cheilocystidia have never been described yet for avelate species of *Pholiotina*. The shape of these cheilocystidia recall those observed in typical representatives of *Psathyrella*, subsect. *Spadiceogriseae* (KITS VAN WAVEREN 1985). Another unique character in *Pholiotina* subgen. *Piliferae* is the strong farinaceous odour and taste.

According to the protologue, *Conocybe keniensis* PEGLER (1977) and also the European *Pholiotina friesii* (LUNDELL) ENDERLE [= *Conocybe pygmaeoaffinis* (FR.) KÜHNER] are probably related to *P. vesiculosa*.

The avelate E-African species, however, is separated by its white stipe, the non-distinctive odour and taste, the larger basidiospores and in particular the much smaller (8.5-14  $\mu\text{m}$ ), uteriform to lageniform cheilocystidia.

### *Pholiotina* subgen. *Piliferae* sect. *Verrucisporae*

*Pholiotina glutinosa* E. HORAK & HAUSKN., spec. nova. Fig. 17, Pl. 1

#### **Descriptio latina:**

Pileus 10-25 mm diam., hemisphaericus dein convexus, applanatus vel subdepressus, griseo-brunneus vel spadiceus, hygrophanus, distincte striatus, glutinosus, fragilis. Lamellae adnexo-adnatae vel submarginatae, pallide ferrugineae, albo-fimbriatae. Stipes 15-30 x 1-1,5 mm, cylindricus, aequalis, pallide griseo-brunneus vel fuscus, apicaliter pruinosis, deorsum fibrillosus, fragilis, velo nullo instructus, rhizomorpha nulla. Odor saporque nulli. Basidiosporae (6,5-)7-9 x 4-5  $\mu\text{m}$ , amygdaliformes vel pruniformes, ferrugineae, tenui-tunicatae, verruculosae, poro germinativo distincto instructae. Basidia 18-22 x 7-8  $\mu\text{m}$ , 4-sporigera. Cheilocystidia (20-)25-35(-40) x 6-12  $\mu\text{m}$ , clavata vel subcapitato-fusoidea, tenui-tunicatae, hyalina. Caulocystidia 25-60 x 7-15  $\mu\text{m}$ , cheilocystidiis similia. Pileipellis hymeniformis, ex cellulis clavato-vesiculososis, 20-40 x 6-15(-20)  $\mu\text{m}$ , membrana hyalina, tenui-tunicata, gelatinosa et pigmento incrustato instructis. Fibulae praesentes.

**Holotypus:** Papua New Guinea, HORAK 72-752 (ZT).

#### **Description:**

**Pileus:** 10-25 mm diam., at first hemispherical soon convex, finally expanded with subdepressed centre, grey-brown to deep date brown, becoming paler on drying, hygrophanous, strongly translucent-striate, if moist covered by thick glutinous layer, membranaceous, thin, fragile, veil remnants absent.

**Lamellae:** 8-12 reaching stipe, up to 5 lamellulae, adnexed-adnate to submarginate, up to 2.5 mm broad, pale rust brown becoming dark rust brown with age, paler coloured or whitish edges fimbriate.

**Stipe:** 15-30 x 1-1.5 mm, cylindrical, equal, slender, pale grey-brown to brown, apex pruinose, lower half covered with concolourous fibrils, dry, hollow, fragile, solitary, rhizomorphs absent, veil remnants absent.

**Context:** pale brown, brittle, unchanging. Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** (6.5-)7-9 x 4-5  $\mu\text{m}$ , amygdaliform or pip-shaped, occasionally with flat supraapical depression, rust brown, thin-walled, with distinctive often sub-

truncate germ-pore, densely covered with minute isolated warts, perispore and plage absent (Pl. 1).

**Basidia:** 18-22 x 7-8  $\mu\text{m}$ , 4-spored, subclavate.

**Cheilocystidia:** (20-)25-35(-40) x 6-12  $\mu\text{m}$ , polymorphic, clavate to subcapitate-fusoid, sometimes uteriform, thin-walled, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** 25-60 x 7-15  $\mu\text{m}$ , polymorphic, shape like cheilocystidia, thin-walled, at base with encrusting pigment, brown in KOH. Stipitipellis composed of cylindrical hyphae, 1.5-10  $\mu\text{m}$  diam., encrusted with pigment pale yellow-brown in KOH. Oleiferous hyphae present.

**Pileipellis:** hymeniform, composed of polymorphic cells, shape ranging from slender clavate-subcapitate to broadly clavate or vesiculose, 20-40 x 6-15(-20)  $\mu\text{m}$ , hyaline, gelatinized walls thin, at base encrusted with pigment pale rust brown in KOH. Oleiferous hyphae in subcutis absent. Differentiated pileicystidia absent.

**Clamp connections:** present.

**Distribution:** Papua New Guinea.

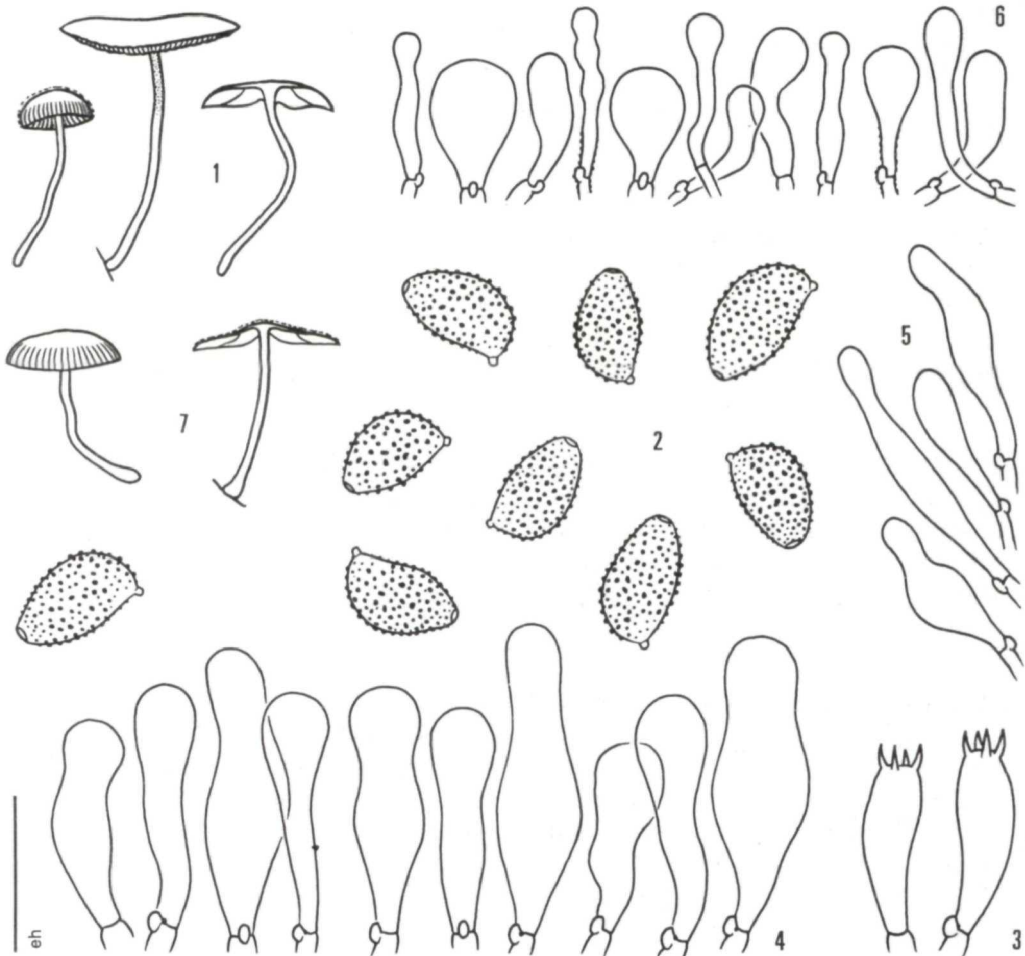


Fig. 17. *Pholiotina glutinosa* (ZT 72-752, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis. 7 Basidiomes (ZT 82-805).

**Holotype:** Papua New Guinea: Morobe District, Bulolo, Susu, 1150 m s. m., on rotten wood in tropical montane rain forest dominated by *Castanopsis-Lithocarpus* (*Fagaceae*), 15. 1. 1973, leg. E. HORAK 72-752 (ZT; isotype in WU 22224).

**Material examined:** Holotype.

**Papua New Guinea:** Eastern Highlands, E of Kainantu, Kassem Pass, 1200 m s. m., on rotten wood in tropical montane rain forest dominated by *Castanopsis acuminatissima* and *Lithocarpus* spp. (*Fagaceae*), 2. 12. 1972, leg. E. HORAK 72-805 (ZT, WU 22225).

Except the wide range of variation in basidiospore size, there are no differences between the two Papuan collections gathered in ecologically similar habitats.

The most distinctive macroscopical feature of this new species is the thick and sticky layer of gluten covering the conspicuously translucent-striate and fragile pileus. As a matter of fact, in the field *Pholiotina glutinosa* can be readily mistaken as a representative of *Bolbitius*. Microscopically, this taxon is well characterized by its amygdaliform to pip-shaped, verruculose basidiospores (Pl. 1) which refer *P. glutinosa* to sect. *Verrucisporae*. World-wide, only the following five species belong to this section:

*Pholiotina australis* SINGER (1969), *P. glutinosa* E. HORAK & HAUSKN., *P. uteriformis* (ORTON) BON (1991) [= *P. subnuda* (KÜHNER & WATLING) Bon], *P. verrucispora* SINGER (1969), and probably also *Conocybe phaeodropis* (BERK. & BROOME) PEGLER (1986).

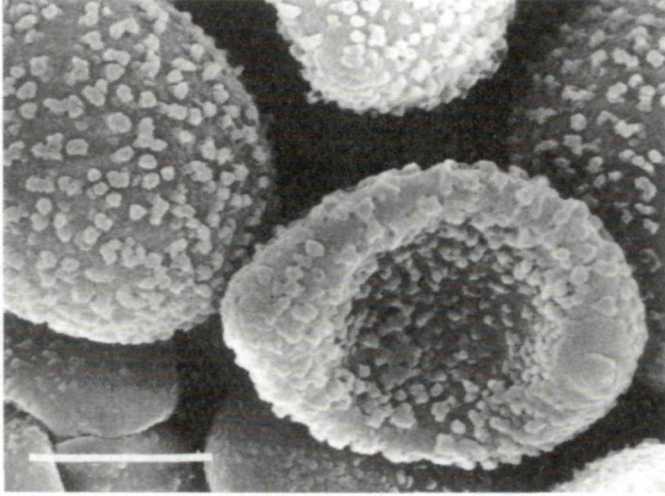
Within this taxonomic group, the presence of a viscid pileipellis is also occasionally observed on basidiomes of *Pholiotina uteriformis*, a common species in Europe. As compared to *P. glutinosa*, however, the basidiospores of the aforementioned species are larger and the pattern of spore ornamentation is different (HAUSKNECHT 1993: 35).

Large and projecting pileicystidia (up to 80 x up to 20.5  $\mu\text{m}$ ) are the most distinctive microscopical character of *Pholiotina verrucispora*, originally described from Patagonia (Argentina) by SINGER (1969). In addition, this taxon is recognized by the dry, tomentose and weakly translucent-striate pileipellis.

*Pholiotina australis*, also reported from Patagonia (Argentina), is considered as a closely related taxon of *P. subnuda* by SINGER (1969). Microscopically, it differs, however, by basidiospores with less distinctive (roughened) ornamentation and a comparatively larger germ pore on the generally larger basidiospores (7.5-10  $\mu\text{m}$  long). In addition, other discriminating characters are: vivid ochre-brown colours on the pileus, white to pallid stipe, presence of fugaceous veil, subviscid pileipellis, and presence of scattered pileicystidia. Unfortunately, the type material of *P. australis*, lodged in BAFC, is not available and accordingly no SEM photograms showing the type of basidiospore ornamentation can be provided.

Based on the observations published by PEGLER (1986), the basidiospores of *Conocybe phaeodropis* are also reported to have a finely rugulose ornamentation. This species is considered by the present authors to belong to *Pholiotina* and has been recorded from tropical Sri Lanka. It is distinctly separated from *P. glutinosa* by large basidiospores (without conspicuous germ pore!) measuring 11-13.5 x 5-6  $\mu\text{m}$  and the presence of lecythiform cheilocystidia.





Pl. 1. *Pholiotina glutinosa* (holotype). Basidiospores (x 6000, bar = 3 µm).

*Pholiotina* subgen. *Pholiotina* sect. *Pholiotina* stirps *Arrhenii*

*Pholiotina blattaria* (FR.: FR.) FAYOD, Ann. Sci. Nat., sér. 7, 9: 359. 1889.

**Basionym:** *Agaricus blattarius* FR., Syst. Mycol. 1: 426. 1821.

**Distribution:** Europe (Sweden, type; see also ENDERLE 1997), New Zealand.

**Holotype:** Sweden (not designated).

**Material examined:** New Zealand: South Island, Nelson, Wharariki, Cape Farewell, at sea level, on sandy soil under *Kunzea ericoides* (Myrtaceae), 13. 5. 1968, leg. E. HORAK 68-440 (ZT, WU 22226); - Murchison, Buller Gorge, on cow dung, 25. 1. 1969, leg. E. HORAK 69-20 (ZT, WU 22227).

The two New Zealand collections have previously been examined and published by WATLING & TAYLOR (1987) as *Conocybe* cf. *vexans*. We are in accordance with many other European authors and consider *C. vexans* as a later synonym of *Pholiotina blattaria* ss. MOSER & JÜLICH (1985). The New Zealand material fully agrees in all taxonomically relevant features with European collections, and accordingly it is suspected that they have been incidentally introduced into this country.

The original description of *Pholiotina procera* SINGER (1950: 142) indicates that this species, reported from the Altai Mts (Pamir), also closely belongs to the *P. blattaria*-complex. Beside the larger size of the basidiomes and minor differences with regard to the shape of the annulus, all other microscopical characters are identical with those described for *P. blattaria*. The type material of SINGER's taxon cannot be traced and consequently the question whether or not these two taxa are actually closely related or even contaxic remains open.

*Pholiotina indica* K. A. THOMAS, HAUSKN. & MANIM., Österr. Z. Pilzk. 10: 109. 2001. Fig. 18

**Description of material from Papua New Guinea (ZT 72-379):**

**Pileus:** 10-20 mm diam., hemispherical to convex, finally expanded with low and obtuse umbo, orange-brown, paler on drying, hygrophanous, translucent-striate towards margin, conspicuously radially wrinkled, dry, thin-membranaceous, dry, veil remnants absent.

**Lamellae:** 40-48 reaching stipe, 3(-5) lamellulae, adnexed, ventricose, up to 2 mm broad, rust brown, whitish edges fimbriate.

**Stipe:** 25-35 x 1-2 mm, cylindrical, equal, concolourous with pileus, apex subpruinose, otherwise glabrous, dry, solid, solitary, with whitish, persisting, submobile, membranaceous and grooved annulus. Rhizomorphs absent.

**Context:** fragile, pale brown, brittle, unchanging. Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 7.5-10 x 4-5  $\mu\text{m}$ , elliptical, rust brown, thin-walled, smooth, with distinctive apical germ-pore.

**Basidia:** 16-22 x 6-7  $\mu\text{m}$ , subcylindrical, 4-spored.

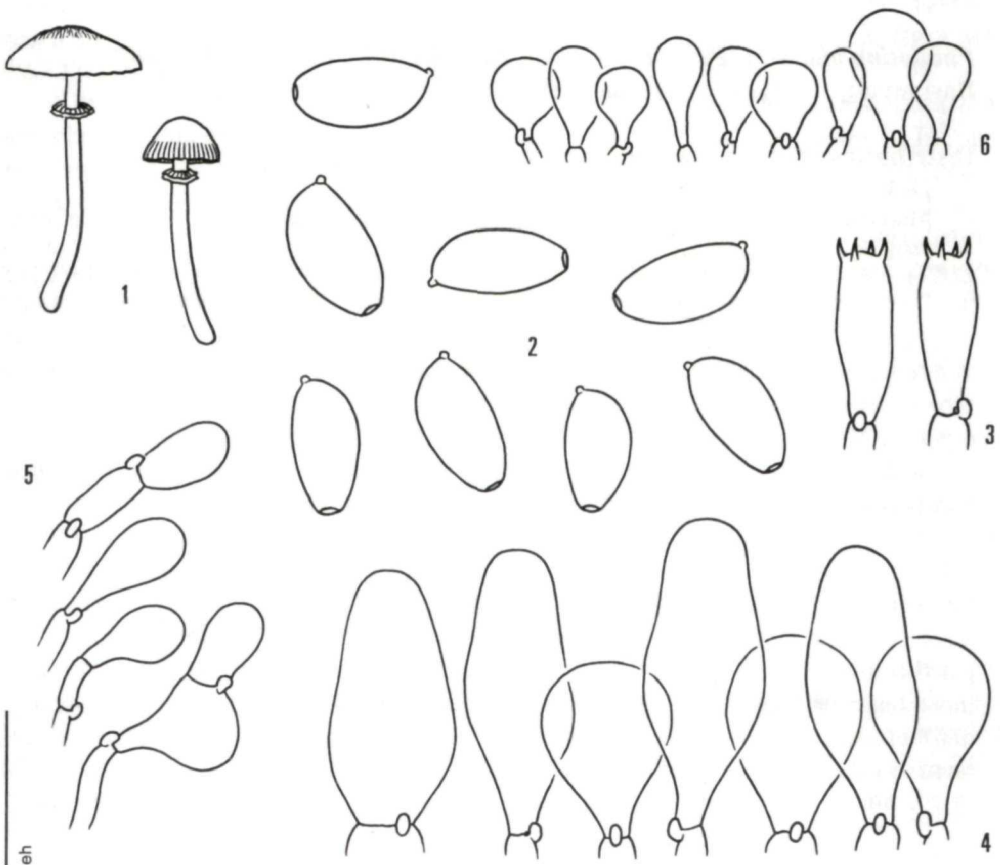


Fig. 18. *Pholiotina indica* (ZT 72-379). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

**Cheilocystidia:** 20-35 x 12-20  $\mu\text{m}$ , ranging from vesiculose or balloon-shaped to broadly fusoid or uteriform, thin-walled, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** shape and size like cheilocystidia. Hyphae in stipe 2-12  $\mu\text{m}$  diam., cylindrical, encrusted with pale rust brown pigment.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 12-30 x 8-20  $\mu\text{m}$ , thin-walled membranes non-gelatinized, at base encrusted with rust brown pigment, oleiferous hyphae in subcutis absent. Pileicystidia absent.

**Clamp connections:** present.

**Distribution:** India (type), Papua New Guinea.

**Holotype:** India: Kerala State, Wayanad District, Muthanga, on elephant dung, 9. 6. 1999, leg. K. A. THOMAS (WU 20890).

**Material examined:** Holotype.

**Papua New Guinea:** Morobe District, Popondetta, Kaudata, trail to Mt Lamington, on soil and among litter in tropical lowland forest, 3. 4. 1972, leg. E. HORAK 72-379 (ZT, WU 22228).

The specimens collected in Papua New Guinea are essentially identical with those of the recently described *Pholiotina indica* (THOMAS & al. 2001). The only differences are the slightly larger size of the basidiospores and the habitat.

*Pholiotina indica* is a closely related species of *Pholiotina utricystidiata* ENDERLE & HÜBNER (1999) which is reported both from Europe and India. These two taxa are readily separated by the following features: the basidiospores of *P. indica* are smaller, less pigmented and have thinner walls. Furthermore, the cheilocystidia are composed both of globose and broadly uteriform cells, whereas in *P. utricystidiata* globose cells are absent and the uteriform cells are distinctly narrower.

***Pholiotina rugosa* (PECK) SINGER**, Pap. Mich. Acad. Sci. **30**: 149. 1946. Fig. 19

**Basionym:** *Pholiota rugosa* PECK, Rep. New York State Mus. Nat. Hist. **50**: 102. 1898.

#### **Description of material from Australia (ZT 1297):**

**Pileus:** 15-25 mm diam., at first hemispherical or obtusely campanulate, becoming expanded with low umbo, date brown, on drying fading to pale (reddish-)brown, hygrophanous, translucent-striate, umbo covered with low radial wrinkles, micaceous, dry, veil remnants absent.

**Lamellae:** 10-16 reaching stipe, 5(-7) lamellulae, adnexed, ventricose (up to 2 mm broad), dirty brown (without rust ochre tinge!), even edges paler.

**Stipe:** 40-65 x 2-4 mm, cylindrical, gradually enlarged into non-swollen base, pale (yellow-) brown, apex pruinose, lower portion densely covered with concolourous, appressed longitudinal fibrils, with persistent membranaceous, immobile, striate-sulcate, yellow-brown annulus, dry, hollow, fragile, solitary, rhizomorphs absent.

**Context:** brown to yellowish brown, brittle. Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 8.5-10 x 4.5-5  $\mu\text{m}$ , elliptical, rust brown, smooth, thin-walled, with conspicuous apical germ-pore.

**Basidia:** 17-20 x 7-9  $\mu\text{m}$ , cylindrical, 4-spored.

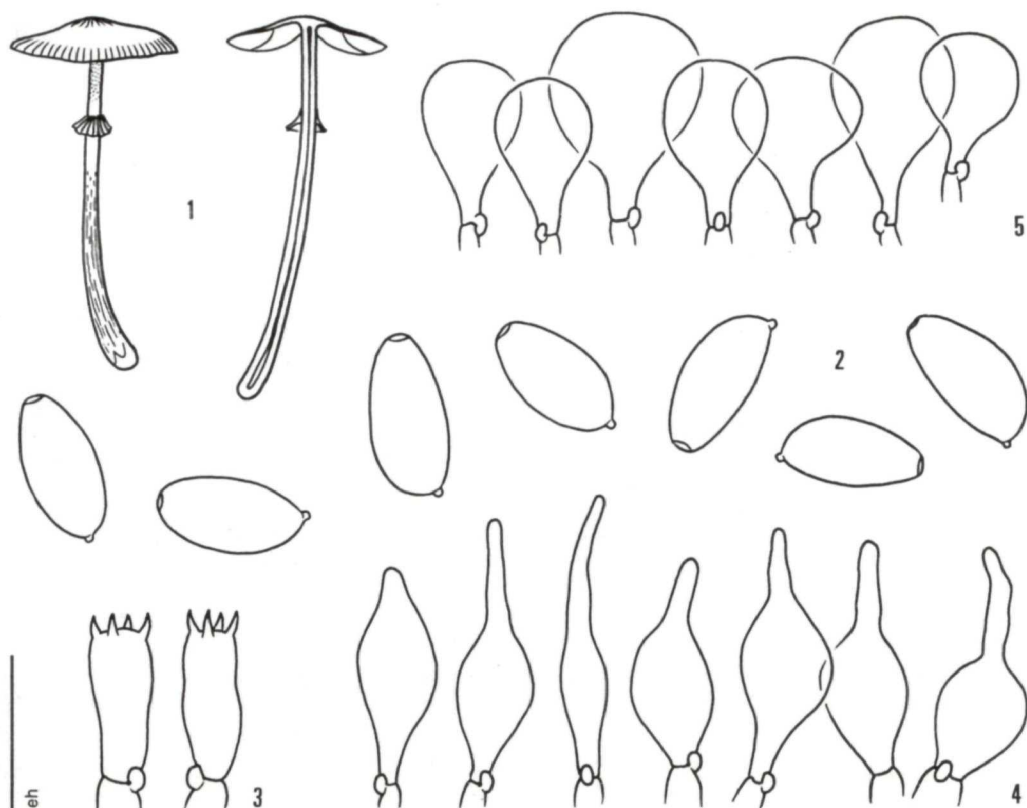


Fig. 19. *Pholiotina rugosa* (ZT 1297). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Pileipellis.

**Cheilocystidia:** 25-35 x 6-12  $\mu\text{m}$ , fusoid with elongate, gradually tapering neck, apex rounded, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** scattered, size and shape like cheilocystidia.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 30-60 x 20-40  $\mu\text{m}$ , hyaline, base encrusted with orange-brown pigment, oleiferous hyphae in subcutis absent. Pileicystidia absent.

**Clamp connections:** present.

**Distribution:** USA (type), Argentina (SINGER & DIGILIO 1953), New Zealand (WATLING & TAYLOR 1987), Australia (NSW, new record), Europe.

**Holotype:** USA: New York State, Adirondack Mountains, on ground in open woods (NYS).

**Material examined:** **Australia:** NSW, Wauchope, Hastings State Forest, Wilson River, on rotten wood in subtropical broadleaf sclerophyll forest, 18. 8. 1981, leg. E. HORAK 1297 (ZT, WU 22229).

**Additional material examined:** *Pholiotina austrofilaris* SINGER: **Argentina:** Neuquén, Rincón, 13. 3. 1963, leg. R. SINGER M 3537 (BAFC, holotype).

KITS VAN WAVEREN (1970) is one of several authors who synonymized *Pholiotina rugosa* with *P. filaris* (FR.) SINGER. However, in accordance with MEUSERS (1996) and BON (1992), we recognize two independent taxa.

This concept is supported in particular by macroscopical characters which, with regard to *P. rugosa*, are the more robust habit of the basidiomes, the darker colours of the wrinkled pileus and stipe, the darker context in the stipe and the distinctive pale yellow to yellow-brown annulus.

In the field, the basidiomes of the Australian material of *P. rugosa* can be readily mistaken for *Descolea recedens* (COOKE & MASSEE) SINGER (HORAK 1971), which is a common sympatric agaric encountered along the E-Coast of New South Wales and Queensland.

The slender habit of the Patagonian *Pholiotina austrofilaris* SINGER (1969) recalls the basidiomes of *P. filaris* but the Argentinian taxon is distinguished by the different shape of the cheilocystidia and the smaller and thin-walled basidiospores.

Finally, a second Argentinian species, *Pholiotina tucumana* SINGER (1973), also belongs to this distinctive taxonomic group centred around *P. filaris* which is separated by several microscopical characters both from this taxon and *P. rugosa* with distinctly smaller basidiospores.

***Pholiotina* subgen. *Pholiotina* sect. *Vestitae* stirps *Vestita***

***Pholiotina resinosocystidiata* E. HORAK & HAUSKN., spec. nova. Fig. 20**

**Descriptio latina:**

Pileus 10-15 mm diam., primo convexus dein applanato-papillatus, spadiceus, in statu sicco pallide rubro-brunneus, hygrophanus, striatus, rugulosus ad discum, fragmentis e velo albo-floccoso obtectus, siccus, fragilis. Lamellae adnatae vel adnexae, primo argillaceae dein cinnamomeae vel fuscae, fimbriatae. Stipes 8-15 x usque ad 1 mm, cylindricus, aequalis vel gradatim incrassatus basem versus, pileo concolor, apicaliter pruinosis, dense fibrillis albis e velo obtectus, siccus. Rhizomorpha nulla. Odor saporque nulli. Basidiosporae 6,5-8 x 4-5 µm, amygdaliformes vel pruniformes, ferrugineae, laeves, tenui-tunicatae, poro germinativo inconspicuo instructae. Basidia 16-22 x 6-7 µm, 4-sporigera. Cheilocystidia 35-50 x 12-20 µm, clavata vel pedicellato-capitata, hyalina, tenui-tunicata, resina incrustata. Caulocystidia 25-35 x 10-14 µm, cheilocystidiis similia. Pileipellis hymeniformis, ex cellulis clavatis tenui-tunicatis, haud gelatinosis et pigmento rubro-brunneo incrustatis. Fibulae praesentes.

**Holotypus:** Papua New Guinea, HORAK 72-140 (ZT).

**Description:**

**Pileus:** 10-15 mm diam., at first convex becoming expanded with distinctive obtuse papilla, date brown to chocolate brown when moist, on drying changing to reddish brown, hygrophanous, translucent-striate towards margin, thin-membranaceous, dry, centre more or less distinctly radially wrinkled, at least in young specimens densely covered with ephemeral, white, floccose remnants of universal veil.

**Lamellae:** close, adnate to adnexed, subventricose, up to 1.5 mm broad, at first argillaceous or beige, changing to deep tobacco brown with age, paler edges fimbriate.

**Stipe:** 8-15 x up to 1 mm, cylindrical, equal or gradually enlarged (1.5-2 mm diam.) towards non-bulbous base, concolourous with pileus but paler, apex pruinose, densely covered with whitish fibrils from veil, but distinctive cortina absent, dry, solid, solitary. Rhizomorphs absent.

Context: fragile, brown. Odour and taste not distinctive.

Spore print: rust brown.

Basidiospores: 6.5-8 x 4-5  $\mu\text{m}$ , amygdaliform or pip-shaped, rust brown, smooth, thin-walled, germ-pore or callus not distinctive.

Basidia: 16-22 x 6-7  $\mu\text{m}$ , cylindrical, 4-spored.

Cheilocystidia: 35-50 x 12-20  $\mu\text{m}$ , conspicuously clavate to pedicellate-capitate, hyaline, thin-walled, densely encrusted with hyaline, thick, subcrystalline or amorphous plaques of resin.

Pleurocystidia: absent.

Caulocystidia: 25-35 x 10-14  $\mu\text{m}$ , clavate to subfusoid, encrusted like cheilocystidia.

Pileipellis: hymeniform, composed of clavate cells, thin-walled membranes non-gelatinized, towards base coarsely encrusted with pigment reddish brown in KOH. Oleiferous hyphae in subcutis absent. Pileocystidia absent.

Clamp connections: present.

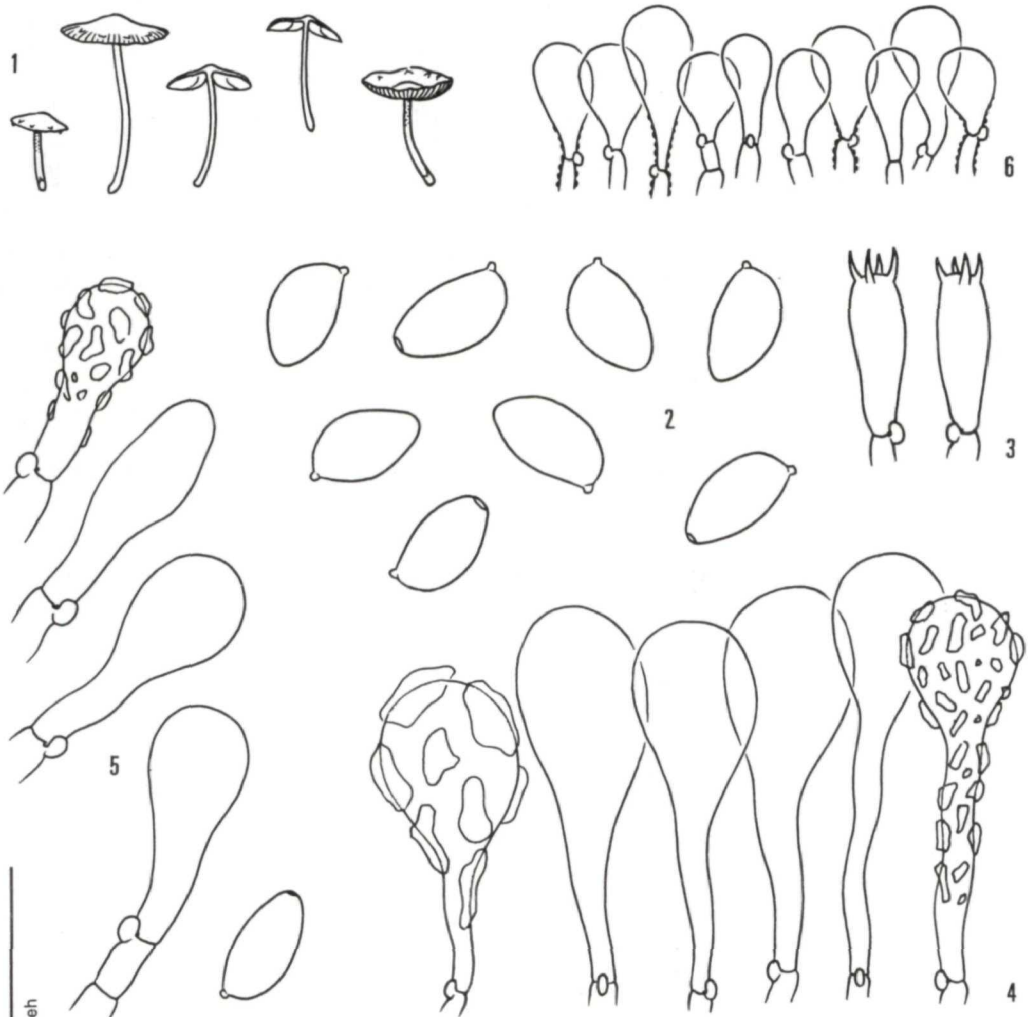


Fig. 20. *Pholiotina resinocystidiata* (ZT 72-140, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Caulocystidia. 6 Pileipellis.

**Distribution:** Papua New Guinea.

**Holotype:** Papua New Guinea: Morobe District, Bulolo, Agathis Reserve, 1240 m s. m., on rotten wood and bark in montane subtropical rain forest dominated by *Castanopsis-Lithocarpus* (*Fagaceae*), 14. 2. 1972, leg. E. HORAK 72-140 (ZT; isotype in WU 22230).

**Material examined:** Holotype.

**Additional material examined:** "Conocybe spec. 3": Malaysia: Sabah, Mt Kinabalu, Mahamed River, in river gravel, 3. 8. 1961, leg. CORNER (E).

The veil remnants on the margin of the pileus, in combination with basidiospores devoid of a distinctive germ pore, indicate that *Pholiotina resinosocystidiata* belongs to the species complex close to *P. vestita* (FR.) SINGER. The latter taxon, however, is distinguished by persisting and ample velar remnants on the pileus. A more distinctive feature of the Papuan *Pholiotina* are the clavate to vesiculose cheilocystidia covered with hyaline crystals or incrustations which so far have never been observed before in taxa belonging to *Pholiotina*.

It is noteworthy that WATLING (1994: 378), referring to material ("Conocybe 3") gathered by CORNER in Sabah (Borneo), also observed cheilocystidia with amorphous, honey brown coloured plasmatic pigment. In order to check this distinctive character, the authentic specimens were re-examined but unfortunately only collapsed and degraded cheilocystidia were recovered. Taking into account the other specific characters (larger basidiospores with distinctive germ-pore, larger basidiomes), there is no doubt that the collection from Sabah is not contaxic with *Pholiotina resinosocystidiata*. Accordingly, in the Malesian region there is a second, yet undescribed species of *Pholiotina* with clavate and resin-covered cheilocystidia.

***Pholiotina* subgen. *Pholiotina* sect. *Vestitae* stirps *Appendiculata***

***Pholiotina velata* (VELEN.) HAUSKN. & SVRČEK**, Czech Mycol. 51: 66. 1999. Fig. 21

**Basionym:** *Galera velata* VELEN., České houby: 547. 1921.

**Synonym:** *Pholiotina appendiculata* (J. E. LANGE & KÜHNER ex WATLING) SINGER ex COURTEC., Doc. Mycol. 16/61: 47. 1985.

**Description of material from Australia (ZT 1282):**

**Pileus:** 6-12 mm diam., hemispherical to convex, finally expanded, deep date brown fading to pale ochre, weakly transparent-striate towards margin, hygrophanous, distinctly wrinkled over disk, dry, membranaceous, margin densely covered with pale ochre-argillaceous fibrillose or floccose persisting veil remnants.

**Lamellae:** 16-24 reaching stipe, up to 3 lamellulae, crowded, adnexed to sub-emarginate, subventricose, up to 1.5 mm broad, deep chocolate brown or tobacco brown changing to rust brown, fimbriate edges whitish.

**Stipe:** 20-40 x 1-2.5 mm, cylindrical, equal or gradually attenuated towards apex, pale brown, apex smooth, lower portion densely covered with subpersistent fibrillose pale ochre-argillaceous veil remnants, occasionally forming inconspicuous belts, at first solid becoming hollow with age, dry, solitary, rhizomorphs absent.

**Context:** fragile, brown, brittle, pale brown. Odour and taste not distinctive.

**Spore print:** rust brown.

**Basidiospores:** 7-8 x (3-)3.5-4  $\mu\text{m}$ , slender elliptical to subfusoid, rust brown, smooth, thin-walled, apical germ-pore.

**Basidia:** 15-22 x 6-7  $\mu\text{m}$ , cylindrical to subclavate, 4-spored.

**Cheilocystidia:** 20-40 x 6-11  $\mu\text{m}$ , not typically lecythiform, polymorphic, mostly fusoid to lageniform, apex rounded or subcapitate (up to 6  $\mu\text{m}$  diam.) but also intermixed with scattered, clavate cells, hyaline.

**Pleurocystidia:** absent.

**Caulocystidia:** scattered, like cheilocystidia.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, 12-34 x 10-20  $\mu\text{m}$ , hyaline, at base encrusted with rust brown pigment, oleiferous hyphae in subcutis absent. Pileicystidia absent.

**Clamp connections:** present.

**Distribution:** Europe, Australia.

**Holotype:** Czech Republic: Bohemia, Mnichovice, in garden, 1918, leg. J. VELENOVSKÝ (PRC).

**Material examined:** Holotype.

**Australia:** NSW, Hastings State Forest, Wilson River, on rotten wood in broadleaf sclerophyll forest dominated by myrtaceous trees, 17. 8. 1981, leg. E. HORAK 1282 (ZT, WU 22231).

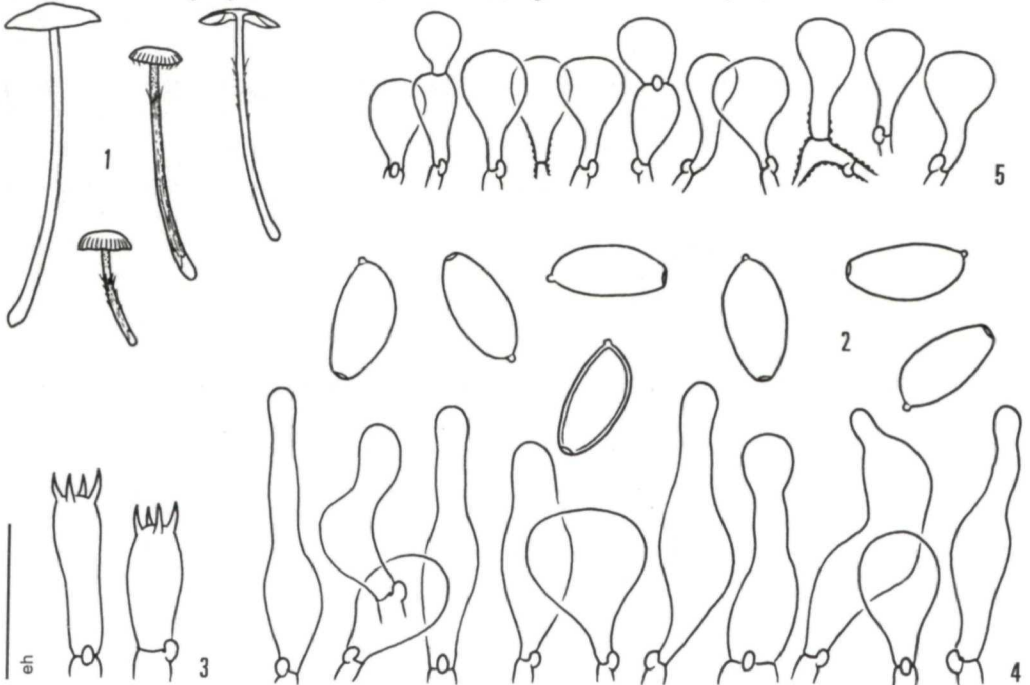


Fig. 21. *Pholiotina velata* (ZT 1282). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Pileipellis.

Regarding its microscopical characters, the Australian collection of *Pholiotina velata* fully agrees with those found in European specimens. Macroscopically, however, the deep date brown wrinkled pileus is much darker as usually observed in basidiomes of European origin (BREITENBACH & KRÄNZLIN 1995: 397; ENDERLE 2001: 171).

This minor phenotypic difference (observed on a single collection only) does not have enough taxonomic relevance to warrant the creation of a new form or variety.



***Tubariella* E. HORAK & HAUSKN., gen. nov.**

Genus Agaricalium, Bolbitio similis. Basidioma fragilia, rhizomorphis albis interconnecta, velum nullum. Lamellae late adnatae vel subdecurrentes. Basidiosporae in cumulo brunneae, laeves, tenui-tunicatae, poro germinativo distincto instructae. Cheilocystidia late clavato-vesiculosa. Pleurocystidia, chrysocystidia, caulocystidia et pileicystidia nulla. Pileipellis hymeniformis. Trama lamellarum regularis, ex hyphis cylindraceis. Fibulae praesentes. Ad lignum putridum.

**Typus generis:** *Tubariella rhizophora* E. HORAK & HAUSKN.

***Tubariella rhizophora* E. HORAK & HAUSKN., spec. nova. Fig. 22****Descriptio latina:**

Pileus 6-12 mm diam., primo plano-convexus dein applanatus vel subumbilicatus ad discum, cinnamomeus vel pallide luteo-brunneus, striatus, subhygrophanus, distincte rugulosus, siccus, membranaceus. Lamellae adnatae vel subdecurrentes, angustae, pallide cinnamomeo-argillaceae. Stipes 5-8 x usque ad 1 mm, cylindricus, aequalis, centralis vel subexcentricus, pallide brunneus, apicaliter subpruinosis, siccus, ad basem rhizomorphis albis conspicuis instructus. Cortina nulla. Odor saporeque nulli.

Basidiosporae 5,5-7 x 3,5-4(-4,5)  $\mu\text{m}$ , lateraliter amygdaliformes vel pruniformes, ventraliter obovoideo-ellipticae, pallide brunneae, laeves, poro germinativo distincto instructae. Basidia 18-22 x 5-6  $\mu\text{m}$ , 4-sporigera. Cheilocystidia 18-30 x 10-22  $\mu\text{m}$ , late clavato-vesiculosa, hyalina, tenui-tunicata. Pleurocystidia et caulocystidia nulla. Pileipellis hymeniformis, ex cellulis clavato-vesiculososis, hyalinis, tenui-tunicatis, membrana haud gelatinosa pigmento incrustata. Fibulae praesentes.

**Holotypus:** Papua New Guinea, HORAK 72-210 (ZT).

**Description:**

**Pileus:** 6-12 mm diam., at first plano-convex soon becoming expanded, with depressed to subumbilicate centre, translucent-striate margin incurved, cinnamon to argillaceous-yellow or pale dirty yellow, paler towards margin, weakly hygrophanous, fading on drying, distinctly rugulose, dry, membranaceous, veil remnants absent.

**Lamellae:** (5-)6-10 reaching stipe, 1-3 lamellulae, adnate in young specimens, soon broadly adnate, subdecurrent in mature specimens, narrow, up to 1.5 mm broad, pale brown to cinnamon-beige, concolourous edges smooth. Trama regular, composed of cylindrical, smooth, non-gelatinized hyphae.

**Stipe:** 5-8 x up to 1 mm, cylindrical, equal, central or occasionally subeccentric, curved, fragile, pale brown, apex subpruinose, base with numerous, white, cord-like rhizomorphs interconnecting several basidiomes, dry, solid, solitary, veil remnants absent.

**Context:** fragile, brown, pale brown, brittle. Odour and taste not distinctive.

**Spore print:** brown, rust ochre tints absent.

**Basidiospores:** 5.5-7 x 3.5-4(-4.5)  $\mu\text{m}$ , obscurely amygdaliform to pip-shaped in lateral view, obovoid-elliptical in front view, pale brown, opaque, smooth, thin-walled, with small but distinctive apical germ-pore.

**Basidia:** 18-22 x 5-6  $\mu\text{m}$ , 4-spored, subcylindrical.

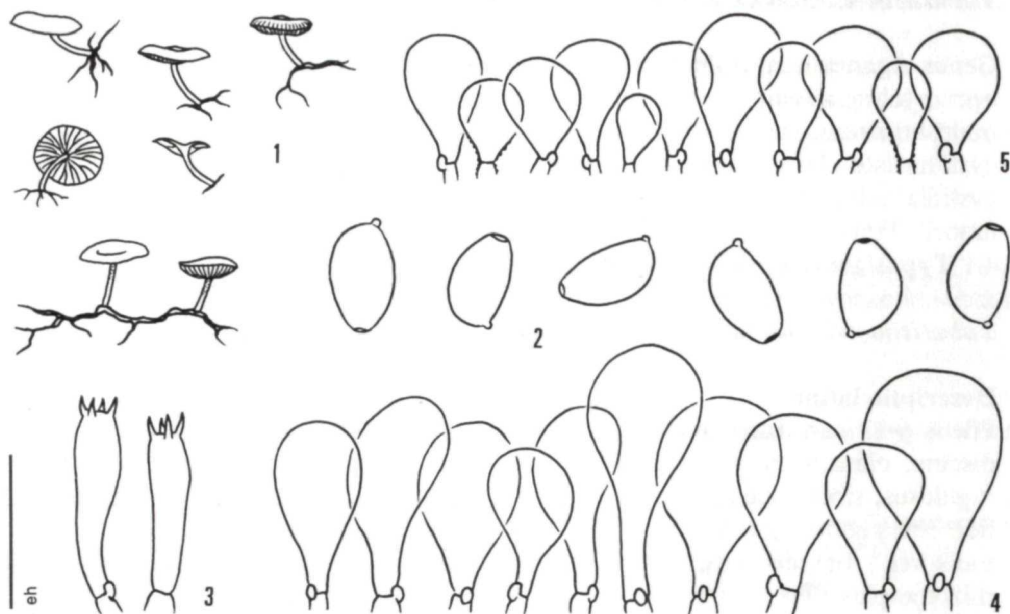


Fig. 22. *Tubariella rhizophora* (ZT 72-210, holotype). 1 Basidiomes. 2 Basidiospores. 3 Basidia. 4 Cheilocystidia. 5 Pileipellis.

**Cheilocystidia:** 18-30 x 10-22  $\mu\text{m}$ , clavate-vesiculose to balloon-shaped, hyaline thin walls smooth or rarely weakly encrusted with pigment pale yellow in KOH.

**Pleurocystidia:** absent.

**Caulocystidia:** absent. Hyphae in stipe cylindrical, 3-14  $\mu\text{m}$  diam., membranes often thickened, encrusted with pale yellow-brown (in KOH) pigment. Oleiferous hyphae numerous.

**Pileipellis:** hymeniform, composed of clavate to vesiculose cells, hyaline thin non-gelatinized walls smooth or distinctly encrusted with pigment yellow in KOH. Pileicystidia absent. Oleiferous hyphae in subcutis absent.

**Clamp connections:** present.

**Distribution:** Papua New Guinea.

**Holotype:** Papua New Guinea: Morobe District, Bulolo, Watut, 1000 m s. m., on rotten wood in tropical montane rain forest dominated by *Lithocarpus* (*Fagaceae*), 13. 3. 1972, leg. E. HORAK 72-210 (ZT; isotype in WU 22232).

**Material examined:** Holotype.

**Papua New Guinea:** Morobe District, Bulolo, Manki, 1450 m s. m., on rotten wood in tropical montane rain forest dominated by *Castanopsis-Lithocarpus* (*Fagaceae*), 13. 3. 1973, leg. E. HORAK 73-90 (ZT, WU 22233).

The most distinctive macroscopical character of this new taxon are the white, tough and cord-like rhizomorphs at the base of the stipes which penetrate the very rotten wood and bark and interconnect between several basidiomes. Further remarkable features are the small hygrophanous pilei with depressed to subumbilicate centre in mature specimens, the adnate to subdecurrent lamellae, the stipes without traces of veil remnants, the clavate to vesiculose, thin-walled, hyaline cheilocystidia often encrusted

with resinous material, the absence both of pleurocystidia, chrysocystidia and differentiated caulocystidia, the regular trama of the lamellae, the encrusting pigment at the base of the pileipellis cells, and the presence of clamp connections. Despite the rather unusual set of macroscopical and microscopical characters, *Tubariella* is a well defined but taxonomically isolated new genus of the *Bolbitiaceae*. The name "Tubariella" refers to the fact that at first glimpse the basidiomes recall a small species of *Tubaria* (W. G. SMITH) GILLET.

The authors are grateful to the curators of the herbaria BAFC, BR, CGE, CUP, E, F, G, K, LIL, NYS, PRC, WU and ZT for the loan of type material needed for comparison. The senior author is indebted to Mrs A. TANNER and Mrs A. HORAK (Herbarium ZT, Geobotanical Institute, Zurich, Switzerland) for technical help and editorial assistance. Mr U. JAUCH (Electron Microscopy Laboratory, University of Zurich) is thanked for providing the SEM-photogram published in this contribution. Furthermore, the senior author is indebted to the following institutions and to colleagues which provided financial and logistic support in connection with field work: P. BUCHANAN (Herbarium PDD, New Zealand), O. K. MILLER (USA), R. PETERSEN (USA: Hesler Fund), A. RETNOVATI (Herbarium Bogor, Indonesia), R. SHAFFER (Ann Arbor, A. H. SMITH Fund), A. WOOD (Australia), Forest Research Institute, Rangiora (New Zealand), Forest Research Institute, Bulolo (Papua New Guinea), and US National Science Foundation (Grant DEB-9705083, Indonesia, DESJARDIN - HORAK).

## References

- BENEDICT, R. G., TYLER, V. E., WATLING, R., 1967: Blueing in *Conocybe*, *Psilocybe* and a *Stropharia* species and the detection of Psilocybin. – *Lloydia* **30**: 150-157.
- BON, M., 1992: Clé monographique des espèces Galero-Naucoroïdes. – *Doc. Mycol.* **21/84**: 1-89.
- BREITENBACH, J., KRÄNZLIN, F., 1995: Pilze der Schweiz. Band 4. – Luzern: Mykologia.
- CONTU, M., 1997: Studi sulle *Bolbitiaceae* della Sardegna 1. Tre nove specie nei generi *Agrocybe* e *Pholiotina*. – *Cryptogamie, Mycol.* **18**: 349-353.
- DENNIS, R. W. G., 1953: Les *Agaricales* de l'île de la Trinité. – *Bull. Soc. Mycol. France* **69**: 145-198.
- ENDERLE, M., 1997: *Conocybe-Pholiotina*-Studien 7. – *Z. Mykol.* **63**: 3-34.
- 2001: *Conocybe-Pholiotina*-Studien 10. – *Mycologia* 2000: 165-176. – Vicenza: AMB.
- HÜBNER, H.-J., 1999: *Conocybe-Pholiotina*-Studien. 8. – *Z. Mykol.* **65**: 3-22.
- HAUSKNECHT, A., 1993: Beiträge zur Kenntnis der *Bolbitiaceae* 1. *Pholiotina subnuda* und *Conocybe hexagonospora*. – *Österr. Z. Pilzk.* **2**: 33-43.
- 1997: Erste Funde von *Conocybe crispella* in Europa. – *Boll. Gr. Micol. Bresadola* **40**: 261-265.
- 1998: Beiträge zur Kenntnis der *Bolbitiaceae*. 4. Die Sektion *Candidae* und andere hellhütige Arten der Gattung *Conocybe*. – *Österr. Z. Pilzk.* **7**: 91-121.
- 2001 a: Das Problem *Pholiotina sulcatipes* – *P. aberrans*. – *Czech Mycol.* **52**: 299-306.
- 2001 b: Four new *Conocybe* taxa in Europe. – *Österr. Z. Pilzk.* **10**: 201-211.
- 2002 a: *Conocybe tuxlaensis* und *C. zeylanica* – neu für Europa. – *Feddes Rep.* **113**: 41-47.
- 2002 b: Beiträge zur Kenntnis der *Bolbitiaceae* 7. Die *Conocybe tenera*-Gruppe, Teil 2, und eine Revision der Arten um *Conocybe mesospora* in Europa. – *Österr. Z. Pilzk.* **11**: 35-77.
- HENNINGS, P. (in WARBURG, O.), 1900: Beiträge zur Kenntnis der Vegetation des süd- und ostasiatischen Monsungebietes. – *Monsunia* **1**: 1-38, 137-159.
- HORAK, E., 1971: Studies in the genus *Descolea* SING. – *Persoonia* **6**: 231-248.
- 1968: Synopsis generum *Agaricalium* (Die Gattungstypen der *Agaricales*). – *Beitr. Krypt. Flora Schweiz* **13**: 1-741.
- KITS VAN WAVEREN, E., 1970: The genus *Conocybe* subgen. *Pholiotina*. 1. The European annulate species. – *Persoonia* **6**: 119-165.
- 1985: The Dutch, French and British species of *Psathyrella*. – *Persoonia Suppl.* **2**. – Leiden: Rijksherbarium.
- KORNERUP, A., WANSCHER, J. H., 1975: Taschenlexikon der Farben, 2. Aufl. – Zürich, Göttingen: Musterschmidt.
- MEUSERS, M., 1996: Bestimmungsschlüssel für europäische Arten der Gattungen *Conocybe* und *Pholiotina*. – *Österr. Z. Pilzk.* **5**: 245-272.

- MOSER, M., JÜLICH, W., 1985: Farbatlas der Basidiomyceten. 1. – Stuttgart, New York: G. Fischer.
- PECK, C. P., 1884: Thirty-fifth annual report. – New York State Mus. Nat. Hist. **35**: 125-164.
- PEGLER, D., 1977: Preliminary Agaric Flora of East Africa. – Kew Bull. Add. Ser. **6**: 1-615.
- 1986: Agaric Flora of Sri Lanka. – Kew Bull. Add. Ser. **12**: 1-519.
- SINGER, R., 1950: New and interesting species of *Basidiomycetes*. 3. – Sydowia **4**: 130-157.
- 1959: New and interesting species of *Basidiomycetes*. 6. – Mycologia **51**: 375-400.
- 1969: Mycoflora australis. – Beih. Nova Hedwigia **29**: 1-405.
- 1973: Diagnoses fungorum novorum *Agaricalium*. – Sydowia Beih. **7**: 1-106.
- 1986: The *Agaricales* in modern taxonomy. 4th edn. – Koenigstein: Koeltz.
- 1989: New taxa and new combinations of *Agaricales* (Diagnoses fungorum novorum *Agaricalium*. 4). – Fieldiana n. s. **21**: 1-133.
- ined.: *Conocybe* keys.
- DIGILIO, A. P. L., 1953 ("1951"): Prodomo de la Flora Agaricina Argentina. – Lilloa **25**: 1-832.
- HAUSKNECHT, A., 1988: Notes on *Conocybe* (*Bolbitiaceae*). – Pl. Syst. Evol. **159**: 107-121.
- — 1989: *Conocybe hornana* – eine neue Art mit Volva aus Österreich. – Beitr. Kenntn. Pilze Mitteleur. **5**: 87-91.
- — 1992: The group of *Conocybe mesospora* in Europe (*Bolbitiaceae*). – Pl. Syst. Evol. **180**: 77-104.
- STAMETS, P., 1999: Psilocybinpilze der Welt. – Aarau: AT.
- THOMAS, K. A., HAUSKNECHT, A., MANIMOHAN, P., 2001: *Bolbitiaceae* of Kerala State, India: New species and new and noteworthy records. – Österr. Z. Pilzk. **10**: 87-114.
- WATLING, R., 1971: The genus *Conocybe* subgenus *Pholiotina*. 11. Some European exannulate species and North American annulate species. – Persoonia **6**: 313-339.
- 1974: Flore illustrée des champignons d'Afrique Centrale. 3. *Bolbitiaceae*. – Meise: Jard. Bot. Nat. Belgique.
- 1979: Observations on the *Bolbitiaceae*. 17. Volvate species of *Conocybe*. – Sydowia, Beih. **8**: 401-415.
- 1982: *Bolbitiaceae: Agrocybe, Bolbitius and Conocybe*. – In: HENDERSON, D. M., ORTON, P. D., WATLING, R. (eds.): British fungus flora. **3**. Agarics and boleti. – Edinburgh: Her Majesty's Stationery Office.
- 1992: Observations on the *Bolbitiaceae* – 30. Some Brazilian Taxa. – Bol. Soc. Argent. Bot. **28**: 77-103.
- 1994. Observation on Malaysian *Bolbitiaceae* with records from Solomon Islands. – Gard. Bull. Singapore **45**: 359-381.
- HAUSKNECHT, A., 1997: *Conocybe anthuriae*, a new volvate species from Mauritius (Africa). – Österr. Z. Pilzk. **6**: 55-59.
- TAYLOR, M., 1987: Observations on the *Bolbitiaceae*: 27 Preliminary account of the *Bolbitiaceae* of New Zealand. – Bibl. Mycol. **117**: 1-61. – Berlin, Stuttgart: J. Cramer.



XIX



XX



XXI

Colour fig. XIX. *Conocybe vinaceobrunnea* (holotype). Colour fig. XX. *Conocybe zeylanica* var. *marginata* (holotype). Colour fig. XXI. *Galerella fibrillosa* (holotype). – Phot. INGRID HAUSKNECHT.

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Österreichische Zeitschrift für Pilzkunde](#)

Jahr/Year: 2002

Band/Volume: [11](#)

Autor(en)/Author(s): Horak Egon, Hausknecht Anton

Artikel/Article: [Notes on extra-European taxa of Bolbitiaceae \(Agaricales, Basidiomycota\). 213-264](#)