New Species of *Psilocybe* from Papua New Guinea, New Caledonia and New Zealand

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Between 1967 and 1977 one of the authors (HORAK) made several collections of *Psilocybe* in Papua New Guinea, New Caledonia and New Zealand. After studying the material it was surprising to note that all fungi collected do represent new species. This fact may indicate the high grade of endemism of the fungus flora on the Australasian Islands. Nevertheless, the new taxa described have interesting taxonomic relationships with species known from tropical America and temperate Eurasia. These connections are discussed in the text.

Concerning *Psilocybe* only three records are published so far from the before mentioned Australasian region: 1. *P. kumaenorum* HEIM (HEIM & al. 1967) which is a native fungus of Papua New Guinea. GUZMÁN restudied the type material and comes to the conclusion that HEIM’s species is different from the six species described here.

2, 3. According to COLENSO (1886) and MASSEE (1898) two taxa of *Psilocybe* (*P. crobula* and *P. inquilina*) are reported to occur in New Zealand. Since no authentic material is kept anywhere these two records remain doubtful (HORAK 1971 a, 1971 b).

This contribution is a part of the world monography of the genus *Psilocybe* which GUZMÁN has in preparation since 1971.

The authors are indebted to the Guggenheim Memorial Foundation (GUZMÁN), the Department of Forests in New Zealand and Papua New Guinea and the Swiss Society of Natural Sciences (HORAK) for the financial support in carrying out parts of this research project.
Thanks are expressed also to the Directors and Curators in E, FH, H, L, LPS, NY, PC and UPS for the loan of type material. We are grateful to Dr. R. Watling (E) who offered his personal collections from Australia as additional source of information, and to Dr. J. Rzedowski (Mexico) for his counsel on the vegetation in Papua New Guinea and New Zealand.

The holotypes are kept in ZT or PDD, isotypes are lodged in ENCB. The magnifications of the figures are: carpophores (natural size), spores (×2000), basidia and cystidia (×1000) and cuticle (vertical section, ×500).

Psilocybe brunneocystidiata Guzmán & Horák sp. n.

Fig. 1, a—e.

Pileus (3—)9—40 mm diam., conical (when young) to convex or expanded but always with sharp conical papilla, hygrophanous, brown to yellowish brown or stramineous, dry, smooth except of white dense fibrillose squamules from the veil, striate towards the margin. Lamellae broadly adnate to subdecurrent, distant, beige to cocoa brown, edge albofimbriate. Stipe 10—40/1—2 mm, cylindrical, equal, central, flexuos, dry, hollow, fragile, concolorous with pileus, covered with white squamules from the veil, forming fibrillose subannulus, apex pruinose. Context pale brown in pileus and stipe. Odour and taste subfarinaceous. Spore print dark brown.

Spores (5—)6—6,5(—7)/5,5—6/3,8—4,5 μm, subrhombic (dorsoventral) or subelliptical (lateral), yellowish brown (KOH), broad flattened germ pore present, smooth. Basidia 18—24/4,5—6 μm, hyaline (KOH), subvesiculose, occasionally with median constriction, 4-spored, sterigma 2—4(—7) μm long. Pleurocystidia 20—33/6,5—9 μm, hyaline but some brownish (KOH), ventricose-papillate, apical papilla 2—3,5 diam. Cheilocystidia 10—20/3—5 μm, 1—2,5 μm at apex, hyaline (KOH), polymorphous (ventricose-rostrate, clavate, straggulate or mucronate), forming sterile band along gill edge. Subhymenium of irregular cells, conspicuously encrusted with yellow (KOH) pigment. Trama regular, consisting of elongate cylindrical hyphae, 4,5—8 μm diam., pigmented like subhymenium. Epicutis a cutis of more or less gelatinized cylindrical hyphae, encrusted with yellow pigment. Subcuticular hyphae like those of the trama. Clamp connections present.
Fig. 1. *Psilocybe brunneocystidiata* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. pleurodystidia

Fig. 2. *Psilocybe nothofagensis* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle
Habitat: Gregarious or cespitose on rotten wood in subtropical forests. Known hosts: *Castanopsis acuminatissima* and *Nothofagus* spp. Reported from Papua New Guinea only. 500—2000 m a.s.l.


Observations: This fungus is closely related to the hallucinogenic and lignicolous *P. yungensis* Singer & Smith described from Bolivia (Singer & Smith, 1958) and reported also from Mexico (Heim & Wasson, 1958); furthermore it is close to *P. mammillata* Murill Smith, a native species from Jamaica (Murill, 1918). *P. brunneocystidiata* differs from the before mentioned two taxa in the brown pleurocystidia and in the well developed veil remnants forming the distinct subpersistent subannulus. Obvious relationships also can be traced to several species recently described by Guzmán (1977) from tropical forests in Mexico (*P. naematolomiformis* P. singen, *P. uxpanapensis* and *P. welde.ni*). All these Mexican species have brown pleurocystidia but are seperated from *P. brunneocystidiata* by different cheilocystidia. From the taxonomical point of view brown coloured pleurocystidia as observed in some tropical species are considered as a primitive character in *Psilocybe* (Guzmán 1977).

**Psilocybe nothofagensis** Guzmán & Horak sp. n.

Fig. 2 a—e.


Pileus 3—6 mm diam. conical (also in aged carpophores)—smooth, striate towards the margin, membranaceous, dark brown to fuscous, without veil remnants. Lamellae broadly adnate to sub-decurrent, deep brown, ventricose, albofimbriate at edge. Stipe 15—20/0,5—1 mm cylindrical, equal, cartilagineous, concolorous with pileus, apex pruinose, otherwise glabrous, veil remnants absent. Odour and taste not distinctive. Spore print brown.

Spores 5.5—6(—6,5)/3.5—4.5(—5)/3.3—3.8 μm, subrhombic (dorsoventral) to elliptical (lateral), yellowish brown (KOH), smooth, thin-walled, broad germ pore present. Basidia 15—25/5—7 μm, 4-spored, hyaline, subvesiculose. Pleurocystidia absent. Cheilocystidia 16,5—28/4,5—7 μm, ventricose-rostrate, hyaline (KOH), forming sterile gill edge. Subhymenium and trama composed of hyaline hyphae encrusted with yellowish (KOH) pigment. Epicutis
Fig. 3. *Psilocybe papuana* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. carpophores (ZT, 75/726)

Fig. 4. *Psilocybe inconspicua* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle
a cutis of more or less gelatinized cylindrical hyphae, irregularly encrusted with yellowish pigment. Clamp connections numerous.

Habitat: Single or cespitose on rotten, mossy wood in Nothofagus forests. Known from Papua New Guinea only.

Material: PAPUA NEW GUINEA, Morobe District, Wau, Mt. Kaindi; 11. XI. 1972, leg. HORAK (Holotype ZT, 72/605; isotype in ENCB).

Observations: P. nothofagensis is reminiscent of P. montana (FR.) KUMMER (= P. atrorufoa (FR.) QUELET) but the spores of the latter species are considerably larger. Furthermore P. montana grows usually on soil (among mosses) and its area of distribution is restricted to temperate or subalpine regions in Eurasia and America.

Psilocybe papuana GUZMÁN & HORAK sp. n.

Fig. 3, a—e.

Pileus 10—20 mm diam., conical to conico-convex, densely striate for about 2/3 when moist, membranaceous, glabrous, dry, hygrophanous, black-green to deep olive green, fading in aged carpophores. Lamellae adnexed or adnato-adnexed, densely crowded, brownish grey or pale brown when young, turning cocoa brown or brown in mature specimens, often with purplish tinge, staining greenish when bruised, edge albofimbriate or concolorous. Stipe 35—55/1—1,5 mm, cylindrical, equal or subbulbous at base, hollow, dark brown below, pale brown towards apex, covered with white fibrils from the veil, dry, base often with white mycelium or white short rhizoids. Stipe turns green in aged carpophores or when bruised. Context pale green or black green in pileus, brown in stipe especially towards base. Odour and taste absent or acidulous. Chemical reactions on pileus: KOH and HCl — negative.

Spores 5.5—7(—8)/4.5—6/3.8—4.5 μm, subrhombic (dorso-ventral) to elliptical (lateral), yellowish brown (KOH), smooth thick-walled membrane, broad flattened germ pore present. Basidia 13—22/4.5—6.5 μm, 4-spored, hyaline. Cheilocystidia (6.5) 10—18/6.5—13 μm, globose to broadly fusoid, often with irregular short neck (2.5—4.5/—2.5 μm), hyaline, thin-walled membrane, forming sterile gill edge. Pleurocystidia absent. Subhymenium and trama subhyaline, membranes of hyphae irregularly encrusted with yellowish or black (KOH) pigment which reacts pale black-blue (amyloid) in Melzer solution. Epicutis a cutis composed of partly gelatinized
parallel hyphae, membranes encrusted with yellowish (KOH) pigment. Subcutis of cylindrical to globose cells, membranes hyaline or brownish (KOH), like those of trama. Clamp connections on septae.

**Habitat:** Gregarious in small groups, occasionally also solitary, on soil or among litter in tropical or subtropical-montane forests under *Castanopsis, Lithocarpus* or *Nothofagus*, 1000—2400 m a. s. l. Known from Papua New Guinea only.


**Observations:** This species reminds of the hallucinogenic *P. caerulescens* MURR., reported from the SE of the United States and Mexico (SINGER & SMITH, 1958). The shape and size of the cheilocystidia, however, are distinctly separating the two species.

*Psilocybe inconspicua* GUZMÁN & HORAK sp. n.

Fig. 4, a—e.


*Pileus 5—10 mm diam., convex with conical papilla, margin incurved in young carpophores, pale or deep ochre brown or brown. margin estriate, dry, glabrous, membranaceous, without veil remnants. Lamellae broadly adnate to occasionally subdecurrent, very densely crowded, argillaceous, edges white and sometimes conspicuously fimbriate. Stipe 20—25/0.5—1 mm, cylindrical, fragile, brittle, concolorous with pileus or paler, covered with white fibrils of the veil, base white from mycelium, often with white rhizoids, dry, solid. Context thin, concolorous with pileus. Odour and taste not distinctive. Spore print brown. Spores 5.5—6.5(—7)/(3.5) 4—5/3.3—3.8 μm, subrhombic (dorso-ventral) to subelliptical (lateral), yellowish brown (KOH), smooth, thin-walled membrane, germ pore and apiculus distinct. Basidia 17.5—22/5.5—6.5 μm, subpyriform, hyaline, 4-spored. Cheilocystidia 20—30/7—14 μm, broadly fusoid to vesiculose, brownish (KOH), rarely hyaline, membrane thin-walled, forming sterile gill-edge. Pleurocystidia absent. Hyphae of subhymenium and trama irregularly encrusted with orange yellow (KOH) pigment. Epicutis a cutis of subgelatinized, brownish (KOH) parallel hyphae, encrusted with brown (KOH) pigment. Subcutis of cylindrical, hyaline, pigmentless hyphae. Clamp connections present.
Habitat: Gregarious in small groups on soil among litter in Araucaria cunninghamii forests. Known from Papua New Guinea only.

Material: PAPUA NEW GUINEA, Morobe District, Bulolo, Susu; 15. I. 1973, leg. HORAK (Holotype ZT, 72/751; isotype in ENCB).

Observations: This small Psilocybe is a very distinct species. P. inconspicua has no obvious relationships to other taxa of this genus except with some species described by GUZMÁN (1977) from the tropical forests of Mexico. The brownish cheilocystidia represent the most prominent taxonomic character. Due to its systematic position it is likely that P. inconspicua is an hallucinogenic fungus.

Psilocybe novae-zelandiae GUZMÁN & HORAK sp. n.

Fig. 5, a—a.


Pileus (3—)15—25 mm diam., hemispherical when young becoming umbonate expanded, disk depressed in aged carpophores, dark brown or fuscous when moist fading to orange-brown in drying specimens, smooth, strongly striate towards margin, subviscid, glabrous, without obvious veil remnants. Cuticle not sepaerable. Lamellae broadly adnate, densely crowded, pale rust brown when young (reminds of Cortinarius sp.) turning deep brown or fuscous in mature specimens, edge concolorous, occasionally fimbriate. Stipe (10) 30—40/(1) 2—3 mm, cylindrical, equal, pale brown or concolorous with pileus, dry, hollow, often curved, covered with white appressed fibrils or several distinct belts from veil. Cortina absent. Context pale brown. Odour and taste not distinctive. Spore print brown.

Spores (8) 10—11 (12)/(5,5) 6—7 (7,5)/3,5—5,5 μm, elongato-elliptical or subelliptical, yellowish brown (KOH), smooth, membrane thin-walled, apiculus and germ pore distinct. Basidia 22—28/6—7,5 μm, 4-spored, hyaline, subvesiculose, occasionally with median constriction. Pleurocystidia none. Cheilocystidia (16,5) 25—33/ (4,5) 6,5—9 μm, varying between fusoid-ampullaceous and mucronate, apical neck 2,2—3,5 μm diam., hyaline, forming sterile gill edge. Membranes of subhymenial hyphae encrusted with yellow (KOH) pigment. Epicutis a cutis of subgelatinized hyphae, irregularly encrusted with brownish or yellow (KOH) pigment, rarely with oleiferous hyphae with orange-brown plasmatic pigment. Subcutis consisting of hyphae like those of the trama. Clamp connections present.
Fig. 5. *Psilocybe novae-zelandiae* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle

Fig. 6. *Psilocybe neocaledonica* (type): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. pleurocystidia
Habitat: Single or cespitose in small groups on soil under *Nothofagus cliffortioides* var. *solandri* and *N. fusca*. Known from New Zealand only.


Observations: Like *P. nothofagensis* (from Papua New Guinea) this New Zealand species is closely related to *P. montana*. Due to the size of the spores, however, it is distinctly separated from the other two taxa.

*Psilocybe neocaledonica* Guzmán & Horak sp. n.

Fig. 6, a.—e.


Pileus 8—11 mm broad, conico-papillate to subconvex, deep brown, fading to pale orange-red or stramineous when drying, not viscid, densely covered with concolorous fibrillose squamules especially towards the striate margin, occasionally also with white minute squamules from the veil along the margin. Lamellae broadly adnate to subdecurrent, often with short tooth, deep chocolate brown to violaceous brown, edges whitish and fimbriate. Stipe 12—15/ 1—1,5 mm, cylindrical or rarely subbulbous, pale orange brown, covered with concolorous or whitish fibrils of the veil, but distinct cortina zone or anulus absent, hollow, single. Context whitish. Odour and taste not distinctive.

Spores (5) 5,5—6(—6,5)/5,5—6(—6,5)/4—4,5 μm, rhombic or globose-rhombic, subelliptical in side view, membrane yellowish brown, with broad truncate germ pore. Basidia 16,5—20/4—6,5 μm, 4-spored, hyaline (KOH), subcylindric with slight median constriction. Pleurocystidiis 22—28/11—14,5 μm, ventricose-rostrate, apical beak measuring 2—5,5/1,5—3,5 μm, hyaline or brownish (KOH), many with hyaline to yellowish refractive pigment-body of irregular shape (like chrysocystidia). Cheilocystidiis 17—27/4—6,5 μm, polymorphous (fusiform, subventricose-rostrate or sublageniform), forming dense and sterile turf on gill edge, hyaline (KOH), rarely with hyaline apical oil drop. Subhymenium with pale orange to brown (KOH) and irregularely distributed pigment. Trama regular, hyaline to pale orange brown (KOH), pigment irregularely encrusting the
membranes (0.5–1.5 μm diam.). Epicutis consisting of hyaline to yellowish-brownish subgelatinous parallel thin hyphae. Subcutis of elongate hyphae (5–15 μm diam.) with hyaline to brownish membranes (≈ 2 μm diam.). Clamp connections present.

Habitat: Gregarious on rotten wood, sticks and plant debris in tropical forest at about 1000 m a. s. l. Known from type locality only.


Observations: The pleurocystidia and cheilocystidia of this species are similar to the ones observed in *P. nematolomiformis* Guzmán (1977), described from tropical rain forest in Mexico, differ, however, in size and shape. Furthermore, the pileus of the Mexican species is glabrous. *P. neocaledonica* is also close to *Ag. (Naucoria) lonchophorus* B. & Br. from Ceylon. Upon examining the type material of this species (K) by one of the authors (Horak), only hyaline pleurocystidia have been found and chrysocystidia-like cystidia are absent. The non-cellular structure of the subcutis or hypodermium in combination with the rhombic spores are distinctly separating this New Caledonian species from taxa of the genus *Naematoloma* Karsten. It is possible that this new species is an hallucinogenic fungus since it has close taxonomic relationships with hallucinogenic species of the Stirps Yungensis.

**Literature**


