

# Four new species of *Psilocybe* from Malaysia and Thailand, with a key to the species of sect. Neocaledonicae and discussion on the distribution of the tropical and temperate species

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The present paper is divided into four parts. A. New species with bluing tints on the basidiomes (*Psilocybe magnispora*, *Ps. umbrina*, *Ps. thailandensis*). – B. New species lacking bluing tints on the basidiomes (*Psilocybe deconicooides*). – C. An updated key of species at present referred to *Psilocybe* sect. Neocaledonicae. – D. Discussion on the distribution of tropical and temperate species of *Psilocybe*.

Key words: Basidiomycotina, taxonomy, mycogeography.

## Materials and Methods

All specimens examined were originally gathered by E. Horak during collecting trips to Thailand and Malaysia.

For microscopical analysis, the material was mounted in 3–5 % KOH or 1% Congo Red in 5 % KOH.

Type specimens are deposited in the mycology herbaria either at BIOTEC (BBH) Bangkok, or at University of Malaya (KLU-M), Kuala Lumpur. Isotype material is lodged in the Herbaria XAL (Xalapa, Mexico) and ZT (Zurich, Switzerland).

## Taxonomy

### A. New species of *Psilocybe* with bluing basidiomes

#### 1. *Psilocybe magnispora* E.Horak, Guzmán & Desjardin, **sp.nov.**

Fig. 1: 1–6 MycoBank MB 514071

Pileus (20–)30–45 mm diam., persistenter convexus, papilla conica semper instructa, griseobrunneus, apicaliter olivaceus, hygrophanus, subviscidus, velum

nullum. Lamellae late adnatae, pallide argillaceae vel cinnamomeae, albofimbriatae. Stipes 35–60 x 2.5–4(–6) mm, cylindricus, albidus vel brunneolus, dein pallide rubrobrunneus, olivaceo tactu, fibrillis albis basin versus. Annulus fibrillosus vel submembranaceus, persistens. Caro pallide olivaceo-coerulea. Basidiosporae 7–8 x (5.5–)6–7 x 5–5.5  $\mu$ m, frontaliter rhomboideae, lateraliter ovoideae, luteobrunneae, crasse tunicatae, poro germinativo instructae. Cheilocystidia (13–)16–26(–30) x 5–8(–10)  $\mu$ m, subfusioidea vel ventricosa, hyalina, rare incrustata. Pleurocystidia sparsa vel cheilocystidia similia. Pileipellis ex hyphis cylindricis, subgelatinosis ixocutem formantibus, pigmento brunneo minute incrustatis. Fibulae praesentes. Ad fimum elephanti in silvis montanis tropicalibus.

Holotypus. – Thailandia. E. & A. Horak 10171 (BBH; isotypi in XAL, ZT).

Pileus (20–)30–45 mm diam., at first convex, later expanded, young and mature specimens with acutely or obtuse-conical papilla, brownish gray, upon drying becoming paler or whitish brown, strongly hygrophanous, with persistent olive-green tinge (at least at disk), weakly viscid, margin transparent-striate. Veil remnants absent. – Lamellae 36–44 reaching stipe, up to 15 lamellulae, broadly adnate, not emarginate, at first pale beige, becoming gray-beige or pale coffee brown in age, in young and mature specimens with pale but distinctive lilac tinge, whitish edges subfimbriate. – Stipe 35–60 x 2.5–4(–6) mm, cylindrical, swollen at base, whitish to pallid brownish, upon drying becoming pale reddish brown, turning green upon bruising, towards base with whitish fibrils from veil, often with white strigose hairs at the base, dry, hollow, solid. – Annulus (cortina) whitish, fibrillose or submembranous, persistent. – Context in pileus whitish but upon exposure pale blue-green beneath pileipellis, whitish in stipe. – Odor and taste acidulous, like crushed corn.

Spore print fuscous, with lilac tinge. – Basidiospores 7–8 x (5.5–)6–7 x 5–5.5  $\mu$ m, rhomboid in face-view, subellipsoid in side-view, wall up to 1  $\mu$ m thick, yellowish-brown, with narrow but distinctive germ pore. – Basidia 18–24 x 6–7  $\mu$ m, 4-spored, cylindrical or suburniform, clamped. – Cheilocystidia (13–)16–26(–30) x 5–8(–10)  $\mu$ m, subfusoid or clavate, obtuse at apex (occasionally covered with refringent encrustation), thin-walled, hyaline, forming sterile band at lamellar edges. – Pleurocystidia 21–28(–31) x (7–)9–13  $\mu$ m, common or scattered, subfusoid or clavate like cheilocystidia, but with refringent incrustations. – Caulocystidia 16–30 x 5–10  $\mu$ m, scattered, polymorphic, cylindrical, subclavate or fusoid. – Pileipellis a thin ixocutis composed or repent, cylindrical, hyaline, weakly gelatinized thin-walled hyphae, 1.5–5  $\mu$ m wide, clamped. Subpellis composed of cylindrical to ovoid cells, 6–15(–20)  $\mu$ m wide, minutely incrustated with yellow-brown pigment. Subhymenium consisting of subcellular or cylindrical, hyaline, thin-walled hyphae, 4–8  $\mu$ m wide. Trama regular, hyaline to yellowish hyphae 3–18  $\mu$ m wide. Oleiferous hyphae absent. – Clamp connections present.

Etymology: *magnus* (Lat.), large: *sporus* (Lat.), spore.

Habitat and Ecology: Cespitose, on rotting elephant dung, tropical montane broadleaf forest, 850 m alt.

Distribution: Thailand. Only recorded at the type locality.

Material examined: Holotype. – *Psilocybe magnispora* E.Horak, Guzmán & Desjardin: THAILAND: Kha Yai N. P., Pong Chang, Princess Trail, 10 Jul 2002, leg. E. & A.Horak 10171 (BBH; isotypes in XAL, ZT).

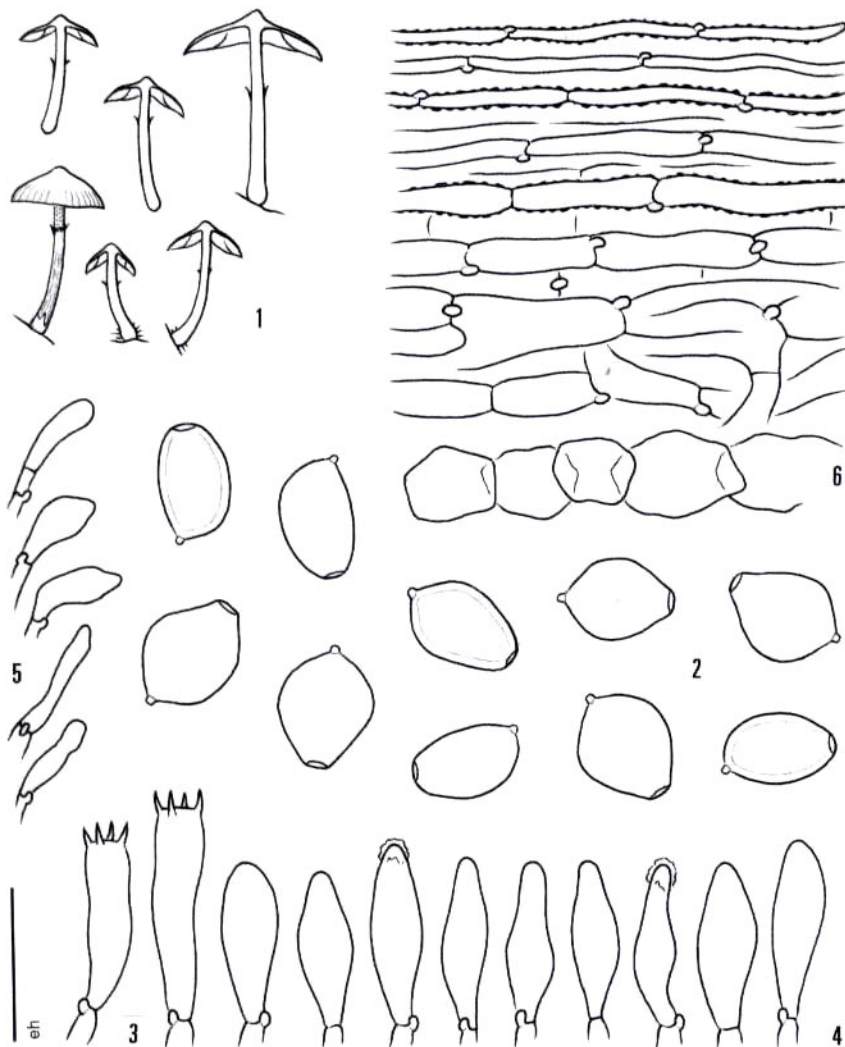


Fig. 1: 1–6. *Psilocybe magnispora* (holotype): 1. Basidiomes. 2. Basidiospores. 3. Basidia. 4. Cheilocystidia. 5. Caulocystidia. 6. Pileipellis. Scale bar: 10 mm (1), 5  $\mu$ m (2), 10  $\mu$ m (3,4,5), 20  $\mu$ m (6).

Discussion. The comparatively large basidiospores and the presence of a fibrillose annulus are important taxonomic features to separate *Psilocybe magnispora* from other members in sect. *Neocaledonicae* (Guzmán, 2004; cf. Key). This new Thai species recalls the Indonesian *P. aureicystidiata* E. Horak & Desjardin (2006), which, however, differs in the smaller size of the basidiospores (mean 5.5–6 µm long) and its habitat on rotting logs.

2. *Psilocybe umbrina* E. Horak, Guzmán & Desjardin, **sp. nov.**

Fig. 2: 1–6 MycoBank MB 514072

Pileus 10–15 mm diam., conicus, apicaliter subpapillatus, brunneus, hygrophanus. Lamellae adnaate, obscure brunneae, lilacino tinctu. Stipes 10–18 x 0.8–1.3 mm, pallide rubrobrunneus, innate fibrillosus basim versus, annulus vel cortina nulli. Caro leve cyanescens. Basidiosporae (5.5–)6–7 x 5–6 x 3.5–5 µm, frontaliter rhomboideae, lateraliter subellipsoideae, crasse tunicatae, poro germinativo instructae. Cheilocystidia 14–24(–26) x 5–6(–7) µm, fusioidea, hyalina. Pleurocystidia A. (23–)26–30(–34) x (9–)10–12(–13), late fusioidea, pigmento luteobrunneo conspicue impleta, chrysocystidia in mentem revocant. Pleurocystidia B. cheilocystidiis similia. Pileipellis ex hyphis cylindricis haud gelatinosis cutem formantibus. Fibulae praesentes. Ad truncum putridum filicis in silvis montanis tropicalibus.

Holotypus. – Malaysia. E. & A. Horak 12186 (KLU-M; isotypi in XAL, ZT).

Pileus 10–15 mm diam., conical, subpapillate, deep date brown, becoming paler upon drying, opaque, hygrophanous, dry, margin non-striate, veil remnants absent. – Lamellae 36–44 reaching stipe, 1–3(–5) lamellulae, adnate, narrow (up to 1 mm wide), dark tobacco brown, with faint lilac tinge, edges concolorous. – Stipe 10–18 x 0.8–1.3 mm, cylindrical, equal but base slightly swollen, reddish brown, pruinose at apex, lower half smooth or fibrillose, hollow, tough, base with whitish mycelium attached to substrate, dry, solid. – Cortina or annulus absent. – Context relatively thick in pileus, tough, whitish or concolorous with stipe surface, weakly bluing upon exposure. – Odor and taste not distinctive.

Spore print brown with lilac tinge. – Basidiospores (5.5–)6–7 x 5–6 x 3.5–5 µm, rhomboid (or subhexagonal) in face-view, subellipsoid in side-view, yellowish-brown, wall up to 0.8 µm thick, with narrow but distinctive germ pore. – Basidia 14–18 x 5–7 µm, 4-spored, cylindrical or urniform, clamped. – Cheilocystidia 14–24(–26) x 5–6(–7) µm, fusoid, hyaline, thin-walled, forming sterile lamellar edges, shape and size like pleurocystidia type B. – Pleurocystidia: Type A: (23–)26–30(–34) x (9–)10–12(–13) µm, broadly fusoid, distinctly thick-walled towards apex, with conspicuous yellow-brown, strongly refringent content, recalling chrysocystidia. Type B: shape and size like cheilocystidia. – Caulocystidia not distinctive or absent. – Pileipellis a cutis of repent, non-gelatinized hyphae, 1.5–3 µm wide, clamped, weakly incrustated with brown

pigment. Subpellis composed of interwoven, hyaline hyphae, 5–10  $\mu\text{m}$  wide. Trama regular. Oleiferous hyphae absent. – Clamp connections present.

Etymology: *umbrinus* (Lat.): umber brown.

Habitat and Ecology: Gregarious, on rotting stump of tree fern, temperate tropical montane broadleaf rain forest, dominated by *Quercus* spp., 1400 m alt.

Distribution: Malaysia. Only recorded at type locality.

Specimens examined: Holotype. – *Psilocybe umbrina* E.Horak, Guzmán & Desjardin: MALAYSIA: Pahang, Frazer's Hill, Bishop trail, 15 Jan 2004, leg. E. & A.Horak 12186 (KLU-M; isotypes in XAL, ZT).

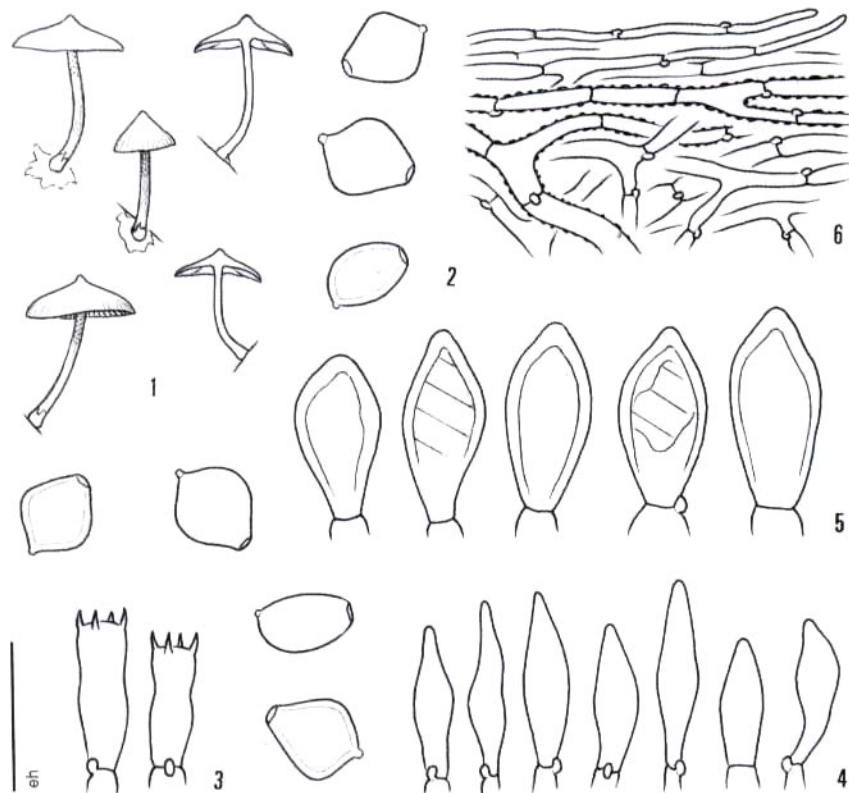


Fig. 2: 1–6. *Psilocybe umbrina* (holotype): 1. Basidiomes. 2. Basidiospores. 3. Basidia. 4. Cheilocystidia. 5. Pleurocystidia (Type A). 6. Pileipellis. Scale bar: 10 mm (1), 5  $\mu\text{m}$  (2), 10  $\mu\text{m}$  (3,4,5), 20  $\mu\text{m}$  (6).

Discussion. *Psilocybe umbrina* is a distinctive species characterized by the lack of veil remnants both on pileus and stipe, and the presence of two types of pleurocystidia: hyaline and thin-walled,

and thick-walled of chrysocystidia-like cells. Taxonomically this Thai species is closely related both to the Malayan *Psilocybe magnispora* (described above) and *P. aureicystidiata*, recently reported from Indonesia (Horak and Desjardin, 2006 cf. Key).

3. *Psilocybe thailandensis* E. Horak, Guzmán & Desjardin, **sp.nov.**

Fig. 3: 1–6 MycoBank MB 514073

Pileus (4–)6–15 mm, obtuse conicus vel planus papilla conica distincta instructus, brunneus, hygrophanus, siccus, velo albidulo fibrilloso vel appendiculato persistenter ad marginem obtecto. Lamellae adnatae, fuscae, lilaceo tinctae. Stipes (10–)15–30 x 1–2 mm, cylindraceus, albidulus vel argillaceus, fibrillis albis basin versus obtectus, annulo vel cortina fibrillosa persistenter obtectus. Carohaeridia cyanescentis. Basidiosporae (4.5–)5–6(–6.5) x 4.5–5.5 x 3–4 µm, frontaliter rhomboideae, lateraliter ellipsoideae, luteobrunneae, crasse tunicatae, poro germinativo instructae. Cheilocystidia (11–)20–30 x 3.5–6 µm, fusioidea vel lanceolata, hyalina. Pleurocystidia 16–25(–30) x 7–10 µm, clavata, ad apicem incrassata, pigmento luteo impleta, chrysocystidia similia. Pileipellis ex hypis cylindraceis haud gelatinosis cutem formantibus, pigmento brunneo incrustatis. Fibulae praesentes. Ad lignum putridum in silvis montanis tropicalibus.

Holotypus. – Thailandia. E. & A.Horak 10128 (BBH; isotypi in XAL, ZT).

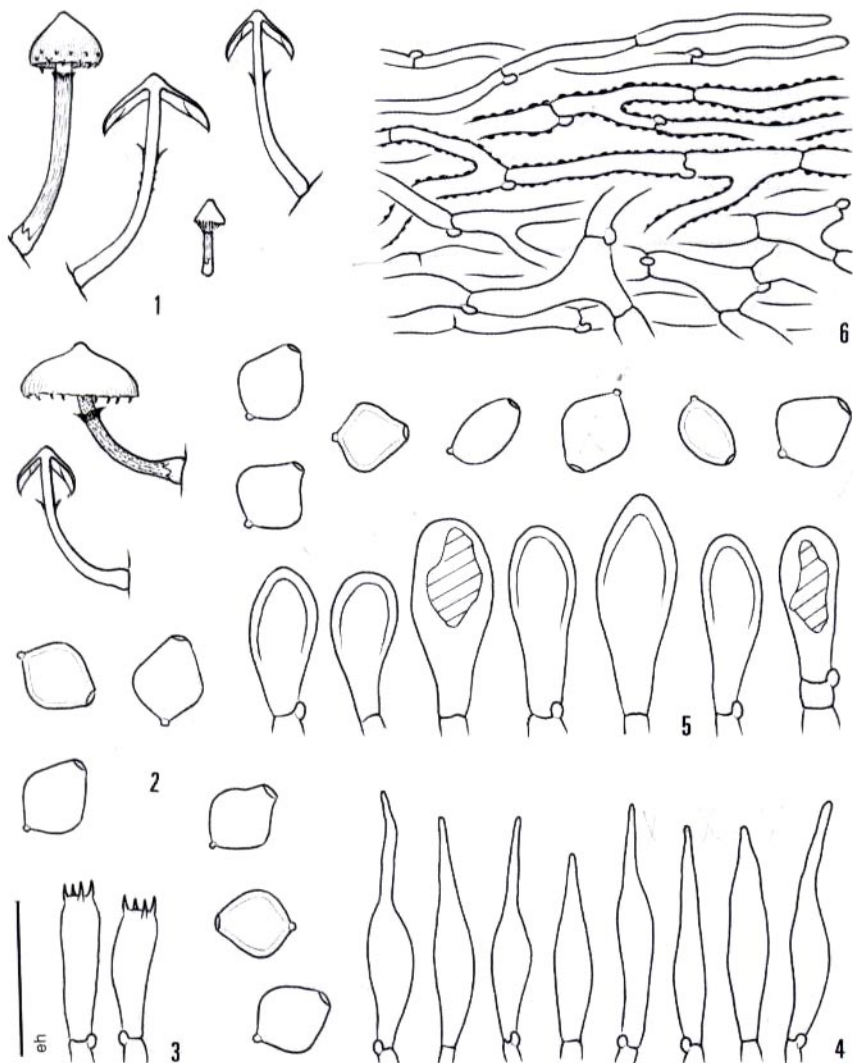
Pileus (4–)6–15 diam., obtusely convex becoming expanded, with persistent conical papilla, brown to pale brown, turning paler upon drying, hygrophanous, slightly striate at the margin, dry. Veil remnants whitish, conspicuous, towards margin with distinctive, persistent fibrils of veil, and margin appendiculate from persisting fibrillose squamules. – Lamellae adnate, narrow (up to 2 mm wide, brown with lilac tinge, subfimbriate edges concolorous. – Stipe (10–)15–30 x 1–2 mm, cylindrical, slightly swollen at base, whitish to beige, apex pruinose, towards base covered with whitish fibrils of veil, dry, solid. – Annulus (or cortina) fibrillose-membranaceous, persistent. – Context concolorous, weakly bluing upon exposure. – Odor and taste not distinctive.

Spore print brown, lilac tinge absent. – Basidiospores (4.5–)5–6(–6.5) x 4.5–5.5 x 3–4 µm, rhomboid or mitriform in face-view, ellipsoid in side-view, wall up to 0.8 µm thick, yellowish brown, with narrow but distinctive germ pore. – Basidia 16–22 x 5 µm, 4-spored, hyaline, slender clavate, clamped. – Cheilocystidia (11–)20–30 x 3.5–6 µm, slender fusoid with acute apex, lanceolate, hyaline, thin-walled, clamped. – Pleurocystidia 16–25(–30) x 7–10 µm, common, broadly clavate or vesiculose, walls hyaline to yellowish, thin-walled but often also thick-walled towards apex, filled with strongly refringent content, recalling chrysocystidia. – Caulocystidia scattered, subcylindrical, thin-walled. – Pileipellis a cutis of non-gelatinized, repent, cylindrical, hyaline hyphae, 1.5–3 µm wide, clamped. Subpellis composed of entangled

cylindrical hyphae and globose cells, 4–12  $\mu\text{m}$  wide, walls incrustated with brown pigment. Oleiferous hyphae absent. – Clamp connections present.

**Etymology.** – *thailandensis* (Lat.), refers to Thailand, the country of origin.

**Habitat and Ecology.** – Gregarious on rotten bark and wood of trees, in tropical montane broadleaf rain forest, dominated by



**Fig. 3:** 1–6. *Psilocybe thailandensis* (holotype): 1. Basidiomes. 2. Basidiospores. 3. Basidia. 4. Cheilocystidia. 5. Pleurocystidia. 6. Pileipellis. Scale bar: 10 mm (1), 5  $\mu\text{m}$  (2), 10  $\mu\text{m}$  (3,4,5), 20  $\mu\text{m}$  (6).

*Castanopsis*, *Quercus* and *Lithocarpus*, with scattered *Dipterocarpus*, 660–1220 m alt.

Distribution. – Thailand. Only recorded at two localities.

Material examined. – Holotype. – *Psilocybe thailandensis* E. Horak, Guzmán & Desjardin: THAILAND: Doi Suthep, Monthatharn Waterfall Trail, 4 Jul 2002, leg. E. & A. Horak 10128 (BBH; isotypes in XAL, ZT).

Additional material examined. – THAILAND: Chiang Mai Prov., trail to Huai Kok Ma Village, 2 Jun. 2002, leg. E. & A. Horak 10115 (BBH, XAL, ZT).

Discussion. – *Psilocybe thailandensis* is characterized by the comparatively small rhomboid basidiospores, the lanceolate cheilocystidia lacking branched projections at the apex, and the broadly clavate pleurocystidia recalling chrysocystidia. Due to the presence of distinctive chrysocystidia-like pleurocystidia *P. thailandensis* is a close relative of the Mexican *P. naematolomiformis* Guzmán (1979), and *P. aequatoriae* Singer (1973), only recorded from Ecuador, with fusoid-subpapillate or globose pleurocystidia. *Psilocybe samuiensis* Guzmán, Bandala & Allen (Guzmán et al., 1993) is a sympatric species in sect. *Mexicanae* Guzmán, which is characterized by its large subrhomboid spores in face-view.

#### B. A new species of *Psilocybe* with non-bluing basidiomes

##### 4. *Psilocybe deconicoides* E. Horak, Guzmán & Desjardin, sp.nov.

Fig. 4: 1–6 MycoBank MB 514074

Pileus 6–15(–20) mm diam., convex to planus, umbo obtuso instructus, umbrinus vel fuscus, hygrophanus, siccus, fibrillis floccosis albis e velo obtectus. Lamellae adnatae vel decurrentes, obscure umbrinus albomarginatae. Stipes 25–35 x 1–1.5 mm, cylindricus vel gradatim attenuatus basim versus, pileo concolor, apicaliter subpruinosis, basim versus albofibrillosus. Annulus vel cortina nulli. Caro pileo concolor, immutabilis. Basidiosporae (5.5–)6–6.5 x (4.5–)5–5.5 x 3.5–4 µm, rhomboideae, crasse tunicatae, poro germinativo instructae. Cheilocystidia (14.5–)16–19(–24) x 5–6(–7) µm, hyaline, polymorphica, lageniformia-fusoidea vel clavata, hyalina. Pleurocystidia nulla. Caulocystidia 19–30 x 5–5.5 µm, sparsa. Pileipellis ex hyphis cylindricis haud gelatinosis cutem formantibus. Fibulae praesentes. Ad lignum putridum, in silvis montanis tropicalibus.

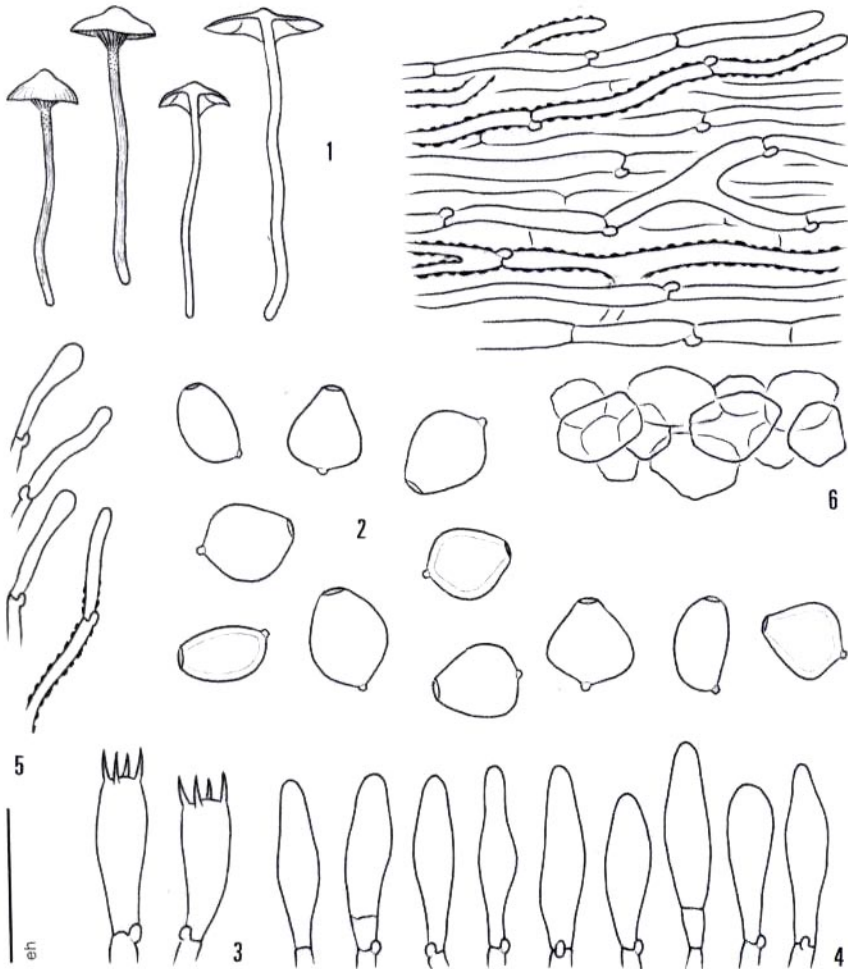
Holotypus. – Thailandia. E. & A. Horak 10156 (BBH; isotypi in XAL, ZT).

Pileus 6–15(–20) mm diam., convex to expanded, with rather broad and obtuse umbo, dark date brown, dark umber brown or fuscous, upon drying turning paler or becoming ochre-brownish, with distinctly darker transparent-striate margin, hygrophanous, dry, in fresh specimens densely covered with whitish fibrillose to floccose veil remnants. – Lamellae broadly adnate to decurrent, dark umber brown or chocolate brown (but brownish orange in dry material), entire edges whitish. – Stipe 25–35 x 1–1.5 mm, equal or



gradually tapering towards base, concolorous with pileus, turning reddish-brown in dry material, apex subpruinose, lower half densely covered with conspicuous, persistent, whitish or pallid fibrils of the veil, hollow, rather tough. – Annulus or cortina absent. – Context concolorous with pileus, thin but tough, unchanging upon exposure. – Odor and taste not distinctive.

Spore print brown, lilac tinge absent. – Basidiospores (5.5–)6–6.5 x (4.5–)5–5.5 x 3.5–4  $\mu$ m, rhomboid in face-view, ellipsoid in side-view, yellowish brown, thick-walled, with narrow but distinctive germ pore. – Basidia 15–23 x (5.5–)6.5–7  $\mu$ m, 4-spored,



**Fig. 4:** 1–6. *Psilocybe deconicoides* (holotype): 1. Basidiomes. 2. Basidiospores. 3. Basidia. 4. Cheilocystidia. 5. Caulocystidia. 6. Pileipellis. Scale bar: 10 mm (1), 5  $\mu$ m (2), 10  $\mu$ m (3,4,5), 20  $\mu$ m (6).

sterigmata up to 8  $\mu\text{m}$  long, hyaline, subclavate, clamped. – Cheilocystidia (14.5–)16–19(–24) x 5–6(–7)  $\mu\text{m}$ , hyaline, polymorphic, ventricose, clavate or fusoid, thin-walled. – Pleurocystidia absent. – Caulocystidia 19–30 x 5–5.5  $\mu\text{m}$ , scattered, cylindrical, hyaline. – Pileipellis a cutis of repent, cylindrical, non-gelatinized, entangled hyphae, 3–4  $\mu\text{m}$  wide, wall encrusted with yellow-brown pigment. Subpellis composed of densely packed globose, hyaline, thin-walled cells, 12–22  $\mu\text{m}$  wide. Oleiferous hyphae absent. – Clamp connections present.

**Etymology:** *deconicoides* (Lat.), recalling the habit of species formerly referred to *Deconia*, characterized by broadly attached or subdecurent lamellae.

**Habitat and Ecology:** On rotting branches and debris, in tropical montane broadleaf-conifer rain forest, dominated by *Castanopsis*, *Quercus*, *Lithocarpus* and *Pinus*, 1260 m alt.

**Distribution:** Thailand. Only recorded at type locality.

**Material examined:** Holotype. – *Psilocybe deconicoides* E.Horak, Guzmán & Desjardin: THAILAND: Chiang Mai Prov., Chiang Mai, Doi Suthep, 19 km marker, 6 Jun 2002, leg. E. & A.Horak 10156 (BBH; isotypes in XAL, ZT).

**Discussion.** Following the taxonomical concept of *Psilocybe* proposed by Guzmán (1983, 1995), *Psilocybe deconicoides* belongs to sect. *Psilocybe* because of the rhomboid, thick-walled basidiospores in face-view and the absence of pleurocystidia. Taxonomically this new species is closely related to *P. februaryia* Singer (1989), a non-hallucinogenic species reported from tropical montane habitat in Bolivia, however the South American species is distinctly separated by the non-decurrent lamellae, and its terrestrial habitat. Both species belong to the small group of non-bluing taxa restricted to tropical habitats (see part D).

### C. Updated key to species of *Psilocybe* sect. Neocaledonicae

Including the three aforementioned, new and bluing species of *Psilocybe*, there are now 10 taxa accommodated in sect. Neocaledonicae. The previously known species in this section (Guzmán, 2004) were originally described from Oceania, Indonesia, Sri Lanka, Mexico and Ecuador and probably from Africa (Guzmán & Horak, 1978; Guzmán, 1979, 1980; Horak & Desjardin, 2006; Pegler, 1977, 1986; Singer, 1973, 1977). Regarding the taxonomical delimitation, the subgeneric concept proposed by Guzmán (2004) is followed.

- 1a. Annulus on stipe present ..... 2  
 1b. Annulus on stipe absent ..... 3

- 2a. Basidiospores up to 6  $\mu\text{m}$  long. Indonesia .....  
 ..... *P. aureicystidiata* E.Horak & Desjardin
- 2b. Basidiospores up to 8  $\mu\text{m}$  long. Thailand .....  
 ..... 1. *P. magnispora* (see above)
- 3a. Two different types of pleurocystidia. Malaysia .....  
 ..... 2. *P. umbrina* (see above)
- 3b. One type of pleurocystidia ..... 4
- 4a. Pleurocystidia 8–16  $\mu\text{m}$  wide ..... 5
- 4b. Pleurocystidia more slender ..... 6
- 5a. Pleurocystidia non-capitate. Sri Lanka (probably also Africa) ...  
 ..... *P. goniospora* (Berk. & Broome) Singer
- 5b. Pleurocystidia capitate. New Caledonia .....  
 ..... *P. neocaledonica* Guzmán & E.Horak
- 6a. Cheilocystidia branched at apex ..... 7
- 6b. Cheilocystidia not branched at apex ..... 8
- 7a. Cheilocystidia 5–8  $\mu\text{m}$  wide, fusoid-ventricose. Mexico .....  
 ..... *P. naematolomiformis* Guzmán
- 7b. Cheilocystidia 3.5–6  $\mu\text{m}$  wide, clavate or mucronate. Indonesia ..  
 ..... *P. overeemii* E.Horak & Desjardin
- 8a. Pleurocystidia and cheilocystidia globose-fusoid or vesiculose-  
 fusoid. Mexico ..... *P. neorhombispora* Guzmán
- 8b. Pleurocystidia and cheilocystidia different in shape ..... 9
- 9a. Pleurocystidia varying in shape between fusoid-subpapillate and  
 globose with a narrow base. Ecuador ..... *P. aequatoriae* Singer
- 9b. Pleurocystidia ventricose, apex not papillate. Thailand .....  
 ..... 3. *P. thailandensis* (see above)

#### D. Distribution of tropical and temperate species of *Psilocybe*.

It is interesting to observe that the localities in Thailand and Malaysia here considered are situated in tropical montane forests. This pattern of distribution refers also to several species recorded from South America, Mexico and the Caribbean, from where many species of *Psilocybe* are described. This type of vegetation with very humid climate is common between 1000–2000 m altitude. In comparison to this montane tropical forest, habitats with temperate climate dominated by coniferous and deciduous forests are characterized by a poor diversity of fungi vs. a high diversity in the tropics (Hawksworth, 1991).

Referring to *Psilocybe*, recent mycological explorations yielded further new taxa in Indonesia (Horak & Desjardin, 2006), in Papua New Guinea and in New Caledonia (Guzmán & Horak, 1978; Horak, 2006). In addition, the rich diversity of *Psilocybe* in tropical habitats is also illustrated by the fact that Guzmán (1979) gathered during a

one day-long excursion four new taxa in a small area of a tropical rain forest in Mexico.

Furthermore, it is remarkable that the exclusively hallucinogenic taxa of *Psilocybe* accommodated in sect. Bisporae, Brunneocystidia, Cordisporae, Cubensis, Neocaledonicae and Zapotecorum, are reported only from tropical habitats (Guzmán, 1983, 1995, 2004; Guzmán et al., 2007).

Reversely, the majority of the *Psilocybe* representatives encountered in temperate regions are non-hallucinogenic species. However, typical representatives for tropical non-hallucinogenic species (besides *P. deconicoides* and *P. februaryia* discussed above) are *P. scutigera* (Berk. & M.A.Curtis) Guzmán, *P. singeriana* Guzmán and *P. tuxtliensis* Guzmán (belonging to sect. Singerianae, Guzmán, 1983).

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