

New Species of Hallucinogenic *Psilocybe* (Fr.) P. Kumm. (Agaricomycetidae) from the Eastern U.S.A.

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ABSTRACT: *Psilocybe ovoideocystidiata* is described as a new blueing species from Pennsylvania, USA. It belongs to section *Stuntzii* Guzmán of genus *Psilocybe* for its subrhomboid, thick-walled spores and its caerulescent basidioma with annulus.

KEY WORDS: hallucinogenic and blueing species, *Psilocybe*, sect. *Stuntzii*, USA, ecology, geography

INTRODUCTION

Through several explorations in a Pennsylvania State Park in the United States since the spring of 2003 made by one of the authors (Gaines), we found a blueing *Psilocybe* that is herein described as a new species. It is interesting to observe that, although the genus *Psilocybe* began to be studied in the United States in 1872 by Peck (1872, 1912), and in 1958 it came to attention with the discovery of the hallucinogenic species (Singer and Smith, 1958)—which Guzmán (1983, 1995, 2000) added to the known species found in the United States—and recently Guzmán and Trappe (2005) and Guzmán et al. (1997, 2003) described new species from the United States, we nevertheless found yet another new species. There are in the United States around 60 species of *Psilocybe*, of which approximately 25 are hallucinogenic, and of which around 10 are from the eastern United States (Guzmán et al., 1997, 2003; Guzmán, 2005).

MATERIALS AND METHODS

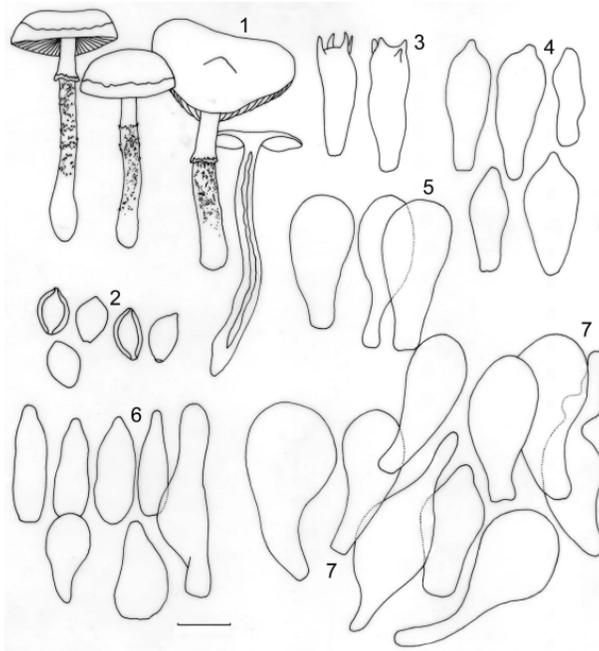
Microscopic observations were made through handle sections of dry basidiomata, mounted in 5% KOH or 5% NH₄OH solutions or both, mixed with 1% Congo

Red solution, previously treated with 96% alcohol for rehydrating of the tissues. The size of spores is long and wide on face view and thick on side view.

RESULTS

Psilocybe ovoideocystidiata Guzmán et Gaines, sp. nov. (Figs. 1–7)

Pileus (10–) 15–25 (–45) mm latus, convexus vel subumbonatus, glaber, subviscidus, hygrophanus, aurantiacus brunneus vel fulvus. Lamellae subadnatae, subfuscus violaceus, marginis concolor. Stipes (15–) 25–60 (–90) × (1–) 2–5 (–7) mm, albidus, caerulescente. Annulus membranaceus. Sporae (7–) 8–9 (–12) × (5.5–) 6–7 (–8.5) μm, rhomboideus vel sub-rhomboides, crassotunicatae, poro germanativo praeditae. Pleurocystidia duobus typis, a: 16–24 (–35) × 6–8 (–10) μm, hyalina, ventricose rostrata; et b: 20–30 (–40) × (10–) 12–16 (–20) μm, pallidus brunneus griseolus, globose pyriformis vel ventricose clavatus. Cheilocystidia duobus typis, a: 18–22 × 5–9 (–11) μm, hyalina, ventricose rostrata; et b: 25–29 × 9–13 μm, hyaline vel inaequalis cyaneus, globosus, peduncule vel subpenduncule. Pileipellis ixocutis crassa. Hyphae fibulate. Species lignicola vel sub-



FIGURES 1–7. *Psilocybe ovoideocystidiata*, 1: four basidiomata, showing convex to subumbonate, hygrophanous pileus, the annulus, and the smooth to scaly, subbulbous and hollow stipe, 2: spores, 3: basidia, 4: cheilocystidia type a, 5: cheilocystidia type b, 6: pleurocystidia type a (that on the right is uncommon), 7: pleurocystidia type b (those with neck are uncommon) (all from the holotype). Scale bar 1: 10 mm, 2–7: 10 μ m.

lignicola, sylva temperatus deciduous. **Holotypus:** USA, Pennsylvania, Montgomery, Evansburg State Park, Gaines 51b, XAL.

Etymology: From the Frequent Ovoid Both Pleuro- and Cheilocystidia

Pileus (10–) 15–25 (–45) mm diam., convex to subumbonate, lubricous to subviscid, glabrous, translucent striate at the margin, hygrophanous, orangish brown to yellowish brown, sometimes white when dry. *Lamellae* subadnate, brownish pale to dark brownish violaceous, uniform in color. *Stipe* (15–) 25–60 (–90) \times (1–) 2–5 (–7) mm, smooth above to floccose-scaly below, cylindric, equal, somewhat subbulbous, base sometimes hypogeous, whitish, with irregular pale ochre or violaceous tones below or pale reddish brown above, hollow, with white mycelium at the base. *Annulus* membraneous, white, evanescent. *Context* whitish to ocherous pale, blueing, odor farinaceous. *Spore print* violaceous dark.

Spores (7–) 8–9 (–12) \times (5.5–) 6–7 (–8.5) μ m, rhomboid or subrhomboid in face view, subellipsoid in side view, thick walled, wall 0.8–1.5 μ m thick, yellowish brown, with a broad germ pore at one end and a short appendage at the other. *Basidia* 20–28 \times 7–9 μ m, 4-spored, clavate-ventricose, sometimes with a middle constriction, hyaline. *Pleurocystidia* of two types, a: short, 16–24 (–35) \times 6–8 (–10) μ m, hyaline, ventricose-rostrate, with an acute or broad base; b: large, 20–30 (–40) \times (10–) 12–16 (–20) μ m, brownish gray pale, globose-pyriform, sometimes with a narrow or moniliform apex, and has a large narrow base. *Cheilocystidia* of two types, a: short, 18–22 \times 5–9 (–11) μ m, as pleurocystidia type a; b: 25–29 \times 9–13 μ m, globose, pedunculate or subpedunculate, hyaline or with a bluing irregular content. *Subhymenium* subcellular, brownish pale. *Hymenophoral trama* regular, with hyphae hyaline to yellowish in mass, 3–18 μ m wide. *Pileipellis* an ixocutis, 90–100 μ m thick, with hyaline, thin-walled hyphae, 2–5 μ m wide. *Pileus trama* with hyaline to yellowish in mass hyphae, 4–18 μ m wide. *Basal*

mycelium with hyaline, thin-walled hyphae, 1.5–5 µm wide. *Clamp connections* present.

Habitat and Distribution

Gregarious, on wood or wood debris, in trails or places with herbaceous plants, in a deciduous forest. Known only from the type locality.

Studied Specimens

USA, Pennsylvania, Montgomery Co., east of Evansburg, Evansburg State Park, June 5, 2005, Gaines 51b (holotype XAL, isotype NY and Gaines Herb.); June 6, 2005, Gaines 50a; June 22, 2005, Gaines 52a, 53b (all in XAL and Gaines Herb.).

Discussion

This species is close to *Psilocybe subaeruginascens* Hohnel from Java, *P. septentrionalis* (Guzmán) Guzmán from Japan, and *P. wayanadensis* K. A.

Thomas, Manim. et Guzmán from India (Guzmán, 1983; Thomas et al., 2002), for the rhomboid or subrhomboid, thick-walled spores, and the annulus and the blueing feature of the basidioma. All these species belong to the section *Stuntzii* Guzmán, following the classification of Guzmán (1983, 1995). *Psilocybe ovoideocystidiata* differs for the two types of wide pleurocystidia and cheilocystidia. For the blueing feature, this species probably has hallucinogenic properties, following Guzmán's (1983) criterion.

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REFERENCES

- Guzmán G. 1983. The genus *Psilocybe*. Beihefte zur Nova Hedwigia 74, Cramer, Vaduz, Germany. 439 pp. + 40 pls.
- Guzmán G. 1995. Supplement to the monograph of the genus *Psilocybe*. In: Taxonomic Monographs of Agaricales, Petrini O. and Horak E., eds. Bibliotheca Mycologica 159, Cramer, Berlin, pp. 91–141.
- Guzmán G. 2000. New species and new records of *Psilocybe* from Spain, the U.S.A., and Mexico, and a new case of poisoning by *P. barrerae*. *Documents Mycologiques*, 29, 41–48.
- Guzmán G. 2005. Species diversity of the genus *Psilocybe* in the world mycobiota, with special attention to hallucinogenic properties. *Int J Med Mushr*, 7, 305–331.
- Guzmán G., Hanlin R. T., and White C. 2003. Another new species of *Psilocybe* from Georgia, U.S.A. *Mycotaxon*, 86, 179–183.
- Guzmán G., Tapia F., and Stamets P. 1997. A new bluing *Psilocybe* from the U.S.A. *Mycotaxon*, 65, 191–195.
- Guzmán G. and Trappe J. M. 2005. The hallucinogenic and non-hallucinogenic species of *Psilocybe* in Washington State, U.S.A.: new records and new species. *Int J Med Mushr*, 7, 583–589.
- Peck C. H. 1872. Report of the botanist. *Ann Rep N Y St Mus Nat Hist*, 24, 41–108.
- Peck C. H. 1912. New York species of *Psilocybe*. *N Y St Mus Bull*, 157, 94–105.
- Singer R. and Smith A. H. 1958. Mycological investigations on teonanácatl, the Mexican hallucinogenic mushroom II. A taxonomic monograph of *Psilocybe*, section *Caerulescentes*. *Mycologia*, 50, 262–303.
- Thomas A. K., Manimohan P., Guzmán G., Tapia F., and Ramírez-Guillén F. 2002. The genus *Psilocybe* in Kerala State, India. *Mycotaxon*, 83, 195–207.

