A New Bluing, Probably Hallucinogenic Species of Gymnopilus P. Karst. (Agaricomycetideae) from Mexico

Laura Guzmán-Dávalos & María Herrera

Departamento de Botánica y Zoología, Universidad de Guadalajara, Apdo. Postal 1-139, Zapopan, Jal., 45101, Mexico

Address all correspondence to Laura Guzmán-Dávalos, Departamento de Botánica y Zoología, Universidad de Guadalajara, Apdo. Postal 1-139, Zapopan, Jal., 45101, Mexico; lguzman@cuexba.udg.mx

ABSTRACT: A new species of Gymnopilus (Agaricomycetideae) from tropical Mexico, G. cyanopalmicola, with probable hallucinogenic properties is described. This species is closely related to G. palmicola, being mainly distinguished by the bluing stipe when bruised.

KEY WORDS: tropical species, hallucinogenic species, Gymnopilus, higher Basidiomycetes

INTRODUCTION

Following Singer (1986), the genus Gymnopilus P. Karst. belongs to the Cortinariaceae (Agaricomycetideae), mainly by its ferruginous spore print and basidiospores with a compound wall (endosporium and episporium), ornamented with warts. However, some authors have followed Kühner (1980) and included the genus in Strophariaceae, because the species are lignicolous (not mycorrhizal as many Cortinariaceae) and because of the presence of styrlpyrones, as in Pholiota.

Gymnopilus has been studied in Mexico by Guzmán-Dávalos and Guzmán (1986, 1991, 1995) and Guzmán-Dávalos (1994, 1995, 1996, 2002). According to Guzmán-Dávalos (2002), 31 species are known from Mexico, from which 17 are only reported from this country. Here a new species is described. It is of special interest because it can be expected that it has hallucinogenic properties because it stains blue when bruised.

METHODOLOGY

The description on macromorphology of the new fungus was made according to the annotations on fresh fruit bodies by the collector (F. Ramírez-Guillén), added with our observations on dry specimens. The color abbreviations are from Kornerup and Wanscher (1978). Micromorphological observations were made from sections of the basidioma mounted in 3% KOH, or gill fragments mounted in KOH, Melzer’s reagent, cotton blue and cresyl blue. The terms for the descriptions are mainly following Vellinga (1998) and in some cases Largent (1986). The definition of pseudosclerotium is following Kirk et al. (2001). The basidiospore shape was determined according to the Q coefficient (length-width ratio) (Bas, 1969) of at least 20 randomly selected but mature basidiospores. The measurements include ornamentation but not the apiculus and were made in KOH at 1000 × with a calibrated optical micrometer in a Zeiss K-7 optical microscope. The length in the basidia measurements includes sterigmata. The herbarium abbreviations are following Holmgren et al. (1990).

DESCRIPTION OF THE SPECIES

Gymnopilus cyanopalmicola Guzm.-Dáv., sp. nov. (Figs. 1–8)

Pileus 50–100 mm latus, squamulosus, stramineus, squamulae rufobrunneae. Lamellae adnatae, confertae, ferrugineae. Stipes 40–210 × 4–21 mm, centralis vel excentricus, alboluteus, basi...

**Pileus** 50–100 mm, convex, plane-convex to plane, margin involute to revolute, surface dry, straw-yellowish to light yellow (4A4) when dry, with radial fibrillose scales, suberect in the disk, appressed toward the margin, reddish brown (8F7), on older pilei surface occasionally areolate rimose at the margin. **Lamellae** adnate with decurrent tooth to decurrent, ventricose, crowded to close, reddish brown, ferruginous to reddish orange (7B8) when dry, margin entire, concolorous. **Stipe** 40–210 × 4–21 mm, central to eccentric, more or less cylindrical, with a tapering base in bigger basidiomata, flexuose, solid, fibrillose to virgate, yellowish white (4A2), turning blue at the base, also turning purple, reddish black, or brownish black when bruised or dried, especially toward the base, some basidiomata with an irregular, small, white pseudosclerotium; with a conspicuous membranous, evanescent, yellowish white (4A2) annulus. **Context** yellowish white (4A2) to concolorous with the pileus. Odor fungic.

**Basidiospores** 8.0–8.8 (–11.2) × 5–6 (–6.8) μm, Q = 1.57–1.8 (–1.92), ellipsoid to oblong, amygdaliform, with obtuse to subacute apex, wall thickish, verrucose, warts large, without germ pore and plage, with suprahilar depression, orange-brown in KOH, dextrinoid in Melzer’s reagent, not metachromatic, ornamentation cyanophilic. **Basidia** 26.4–37.5 × 6.4–7.7 μm, cylindrical to clavate, with central constriction, tetraspored, with basal clamp connection, hyaline or with yellowish content, sterigmata 3.2–4.8 μm long. **Pleurocystidia** extremely rare, when present 21.6–26 × 7 μm, apex 3.4–5.6 μm diam., utriform, with obtuse to subcapitate apex, hyaline to yellowish. **Cheilocystidia** 21.6–28 × 6.4–7.6 μm, apex 4.8–7.2 μm diam., narrowly lageniform, with a capitate or subcapitate apex, with basal clamp connection, hyaline, yellowish or with granulose yellow brown content. **Hymenophoral trama** subparallel, hyphae 3.4–14.7 μm diam., with thin to thickish walls, hyaline or yellowish, with many refringent drops. **Subhymenium** cellular, but with some elongate-inflated elements, hyaline. **Pileus trama** radial, but with interwoven zones next to the pileipellis, hyphae 4.8–8.7 μm diam., with thin,
A NEW BLUING, PROBABLY HALLUCINOGENIC SPECIES OF Gymnopilus P. Karst. (Agaricomycetideae) FROM MEXICO

thickish to thick wall (0.5–2.5 μm thick), yellowish to brownish. Pileipellis a cutis, hyphae prostrate, or a trichoderm in the scales, hyphae 7.2–23.5 μm diam., septate, with clamp connections, yellowish, with encrusted yellowish brown pigment in bands. Pileocystidia absent. Caulocystidia 31–44 × 5.6–11 μm, apex 3–7 μm diam., narrowly lageniform to narrowly utriform, with a capitate or subcapitate apex, some with long, straight, or flexuose neck, with thin to thickish or thick wall, with basal clamp connection, hyaline, yellowish or with granulose yellow brown content, in tufts at the stipe apex. Veil hyphae interwoven but forming strands, septate with clamp connections, with encrusted pigment in bands, orange brown in mass.

KOH on dry pileus. Light red to reddish brown.

Habitat. Gregarious to caespitose on roots of dead palm (Areccaceae), thus lignicolous, in tropical vegetation.

Etymology. Named according to the bluing basidiomata and the similarity of micromorphologic characters to Gymnopilus palmicola Murrill.

Type. Mexico, Veracruz, Puerto de Veracruz city, main square, 19 October 2003, F. Ramírez-Guillén 254a (holotype, XAL; isotype IBUG).

Observations. Gymnopilus cyanopalmicola is distinguished by large basidiomata, size of basidiospores, which have big warts, the pileus trama, the subhymenium, and the basidioma (stipe) changing to blue when bruised. This last characteristic should be noticed in the fresh condition because it is completely lost in dry material. In some basidiomata, a structure similar to a small and irregular pseudosclerotium was observed in the base of the stipe, formed by a compact mass of intermixed soil held together by the white mycelium. The type material of G. cyanopalmicola comprises six basidiomata in good state.

The bluing characteristic of this species suggests that it could be hallucinogenic. Until now, Gymnopilus psilocybin and baeocystin have been detected only in the nonbluing G. purpuratus (Cooke et Massee) Singer by Gartz (1996), but there are other very similar bluing or greenish species in the genus. In Mexico, G. subbearlei R. Valenz., Guzmán et J. Castillo and G. subpurpuratus Guzm.-Dáv. et Guzmán stain blue or green when bruised (Guzmán-Dávalos and Guzmán, 1995).

Gymnopilus cyanopalmicola is clearly very closely related to G. palmicola (= G. chryso-trichoides Murrill), and it is apparently also near G. subbearlei and G. subpurpuratus. These species

FIGURE 7. Hymenophoral trama.

FIGURE 8. Pleurocystidium.
Table 1. Comparison of Gymnopilus cyanopalmicola with Related Species

<table>
<thead>
<tr>
<th>Characteristic/Species</th>
<th>G. cyanopalmicola</th>
<th>G. palmicola</th>
<th>G. subearlei</th>
<th>G. subpurpuratus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bluing</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pileus diameter (mm)</td>
<td>50–100</td>
<td>20–50</td>
<td>10–50 (–120)</td>
<td>15–55</td>
</tr>
<tr>
<td>Basidiospore size (μm)</td>
<td>8–11 × 5–7</td>
<td>8–12 × 5–8</td>
<td>1.26–1.75, ellipsoid, few widely ellipsoid or oblong</td>
<td>1.36–1.55 (–1.64), ellipsoid, few oblong</td>
</tr>
<tr>
<td>Basidiospore form (Q)</td>
<td>1.57–1.8 (–1.92), ellipsoid to oblong</td>
<td>1.33–1.8, ellipsoid to oblong</td>
<td>1.26–1.75, ellipsoid, few widely ellipsoid or oblong</td>
<td>1.36–1.55 (–1.64), ellipsoid, few oblong</td>
</tr>
<tr>
<td>Basidiospore warts</td>
<td>Large</td>
<td>Very large, tubercles</td>
<td>Small to medium</td>
<td>Small to medium</td>
</tr>
<tr>
<td>Basidiospore apex</td>
<td>Obtuse to subacute</td>
<td>Obtuse to truncate</td>
<td>Obtuse to subacute</td>
<td>Obtuse to subacute</td>
</tr>
<tr>
<td>Hyphae hymenophoral trama</td>
<td>Thin walled</td>
<td>Thin walled</td>
<td>Thick walled</td>
<td>Thin walled</td>
</tr>
<tr>
<td>Subhymenium</td>
<td>Absent</td>
<td>Cellular</td>
<td>Present</td>
<td>Ramose</td>
</tr>
<tr>
<td>Pseudocystidia</td>
<td>Capitate or subcapitate</td>
<td>Obtuse or subcapitate, rarely capitate</td>
<td>Obtuse or subcapitate</td>
<td>Subcapitate or capitate</td>
</tr>
<tr>
<td>Cheilocystidia apex</td>
<td>Capitate or subcapitate</td>
<td>Obtuse or subcapitate, rarely capitate</td>
<td>Obtuse or subcapitate</td>
<td>Subcapitate or capitate</td>
</tr>
<tr>
<td>Pileus trama</td>
<td>Radial-interwoven</td>
<td>Interwoven-radial</td>
<td>Interwoven-radial</td>
<td>Interwoven</td>
</tr>
<tr>
<td>Habitat</td>
<td>Tropical</td>
<td>Tropical</td>
<td>Tropical</td>
<td>Temperate to subtropical</td>
</tr>
</tbody>
</table>

share the characteristic of having reddish-brown to purplish scales on a yellowish background. The differences among them are listed in Table 1. Gymnopilus palmicola has smaller basidioma, is not bluing, its basidiospores have very large tubercles and obtuse to truncate apex, and its cheilocystidia have mainly obtuse to subcapitate apex (Guzmán-Dávalos, 2003). Gymnopilus subearlei and G. subpurpuratus have bluing basidiomata, but smaller basidiospores with small to medium warts (Guzmán-Dávalos and Guzmán, 1995).

KEY OF THE MEXICAN BLUING SPECIES OF GYMNOPILUS

1a. —Basidiospores 6–9 μm long., subhymenium ramose or cellular……………………………………. 2

1b. —Basidiospores 8–11 μm long., subhymenium cellular .................................................. 1

2a. —Pileus trama interwoven, hyphae with thin wall......................................................... G. cyanopalmicola

2b. —Pileus trama radial, hyphae with thick wall ...................................................................... G. subearlei

ACKNOWLEDGMENTS

The work for this paper was supported by CONACyT, project SEP-2003-C02-42957, PROMEP/103.5/03/2580, and University of Guadalajara, projects P3E-34961, P3E-34322, and P3E-50052. Thanks are due to Teuvo Ahti for his help with the Latin description and review of the manuscript. Mabel Torres-Torres is thanked for her help inking the drawings.

REFERENCES


A NEW BLUING, PROBABLY HALLUCINOGENIC SPECIES OF GYMNOPILUS P. KARST. (AGARICOMYCETIDEAE) FROM MEXICO


