

## AGARICUS GUACHARI, SP. NOV. (AGARICALES), FROM VENEZUELA

por

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**Summary.** CALONGE, F.D. & F. ESTEVE-RAVENTÓS (1998). *Agaricus guachari*, sp. nov. (Agaricales), from Venezuela. *Bol. Soc. Micol. Madrid* 23: 111-118.

*Agaricus guachari* is proposed and described as a new species. It was found growing on dung of a nocturnal bird called "guácharo" (*Steatornis caripensis* Humboldt), in a cave, showing white basidiomata, which reddened quickly when cut or rubbed. The habitat, presence of a well-developed universal veil and negative Schaeffer's reaction distinguished this species from the rest of taxa included in this genus. Data, including iconography, micro- and ultramicroscopic features, are also added.

**Key words:** *Agaricus guachari*, Agaricales, taxonomy, ecology, Venezuela.

**Resumen.** CALONGE, F.D. & F. ESTEVE-RAVENTÓS (1998). *Agaricus guachari*, sp. nov. (Agaricales), encontrada en Venezuela. *Bol. Soc. Micol. Madrid* 23: 111-118.

Se propone y describe *Agaricus guachari* como especie nueva para la ciencia. Este hongo se encontró viviendo sobre excrementos de "guácharo" (*Steatornis caripensis* Humboldt), que es un ave nocturna que habita en cuevas y se alimenta de frutos de plantas tropicales en Suramérica. El hongo presenta basidiomas blancos en fresco, que al rozarlos o cortarlos pasan rápidamente a tomar un color rojizo. Este hábitat tan característico, unido al hecho de presentar velo universal bien desarrollado y reacción negativa frente al reactivo de Schaeffer, confiere a esta especie una identidad propia que la separa y diferencia de los otros táxones de *Agaricus* conocidos hasta ahora. Además de la descripción completa, se aporta una detallada iconografía con los datos más relevantes sobre sus características micro- y ultramicroscópicas.

**Palabras clave:** *Agaricus guachari*, Agaricales, taxonomía, ecología, Venezuela.

### INTRODUCTION

As a result of the stay of one of us (F.D.C.) in Venezuela, in 1990, numerous collections of fungi were gathered, and the species collected are being published in monographs, such as those on *Gasteromycetes* (CALONGE & VERDE, 1996) and *Aphyllphorales* (CALONGE & al., 1996). However, one of the most surprising collections was done during a visit to the "Cueva del Guácharo". This cave was already known since remote times by the natives, but the first Europeans to visit this place were Spanish missionaries in 1657. Finally, the first scientific publication on the cave was carried out by Humboldt in 1816, who named the abundant



Map 1.—Situation of the Cueva del Guácharo in Venezuela.

nocturnal birds inhabiting the grotto as *Steatornis caripensis*. This bird is present in Perú, Ecuador, Colombia, Guyana, Trinidad and Venezuela (map 1).

It is interesting to notice that the cave has a length of 10,200 m, but the allowed space to be visited by tourists is about 2,600 m. Any kind of artificial lighting is forbidden inside the cave, to prevent possible disturbances to the birds. Thus, the guide's torch was the sole available illumination to keep on the way. The fungus was growing on guacharo's dung by the path side, approximately between 1,500-2,000 m inside the cave where the human eye is unable to appreciate any daylight.

After finishing the visit, the fungus was photographed outside the cave and the main macroscopic and organoleptic features were written down in a diary. The material is preserved in the Jardín Botánico de Madrid (MA-Fungi).

#### DESCRIPTION

***Agaricus guachari* Calonge & Esteve-Raventós, sp. nov.** (figs. 1-5)

Expl. nom.: *guachari* means growing in guacharo's cave.

*Pileus* 2-6 cm diam., *carnosus*, *primo hemisphaericus*, *deinde applanato-convexus*, *cum centrum protuberante*. *Caro in pileis primo albus deinde sanguinolento*. *Pileicutis cum squamis fibrillosis brunneis dispersis supra fundum album*; *marginis concoloris, cum residuus veli universalis*. *Lamellae liberae, confertae, primo roseae, deinde atro-brunneae*. *Stipe* 2-10 × 0.8-1 cm, *cylindraceus, non bulbosus, primo albus deinde albo-brunneus; caro compacta primo alba deinde sanguinolenta, sapor indistinctus, odor debilis non ingratus*. *Reactio Schaefferii negativa*. *Annulus fugaceus aut nullus*. *Sporae* 5.2-6 × 3.6-4.1 μm, *ovoideae vel ellipsoideae, levis, purpura-brunneae*. *Basidia* 15-22 × 6-7.5 μm, *clavata, 4-sporigera*. *Cheilocystidia clavata* 13-16 × 6-12 μm.

*Holotypus*: Venezuela, Estado Monagas, Cueva del Guácharo, *in excrementa guachari (Steatornis caripensis)*, 2-VIII-1990, *legit* F.D. Calonge, MA-Fungi 34253.

*Pileus* 2-6 cm diam., at first hemispherical then plano-convex to applanate with a central broad umbo (figs. 1-2). Context up to 1.5 cm thick, turning from whitish to reddish-brown. Cuticle whitish covered with abundant concentric, appressed, greyish-buff scales (figs. 1-2), margin greyish, appendiculate by remnants of universal veil. Lamellae free, at first pale pink, turning to purplish-brown, and finally blackish-brown, ventricose, up to 0.5 cm broad, rather crowded, with edge concolorous and numerous intermediate lamellulae. *Stipe* 2-10 × 0.8-1 cm, cylindrical, non bulbous, at first whitish, then concolorous with pileus, finely



Fig. 1.- *Agaricus guachari*: aspects of the basidiomata in fresh conditions (MA-Fungi 34253).

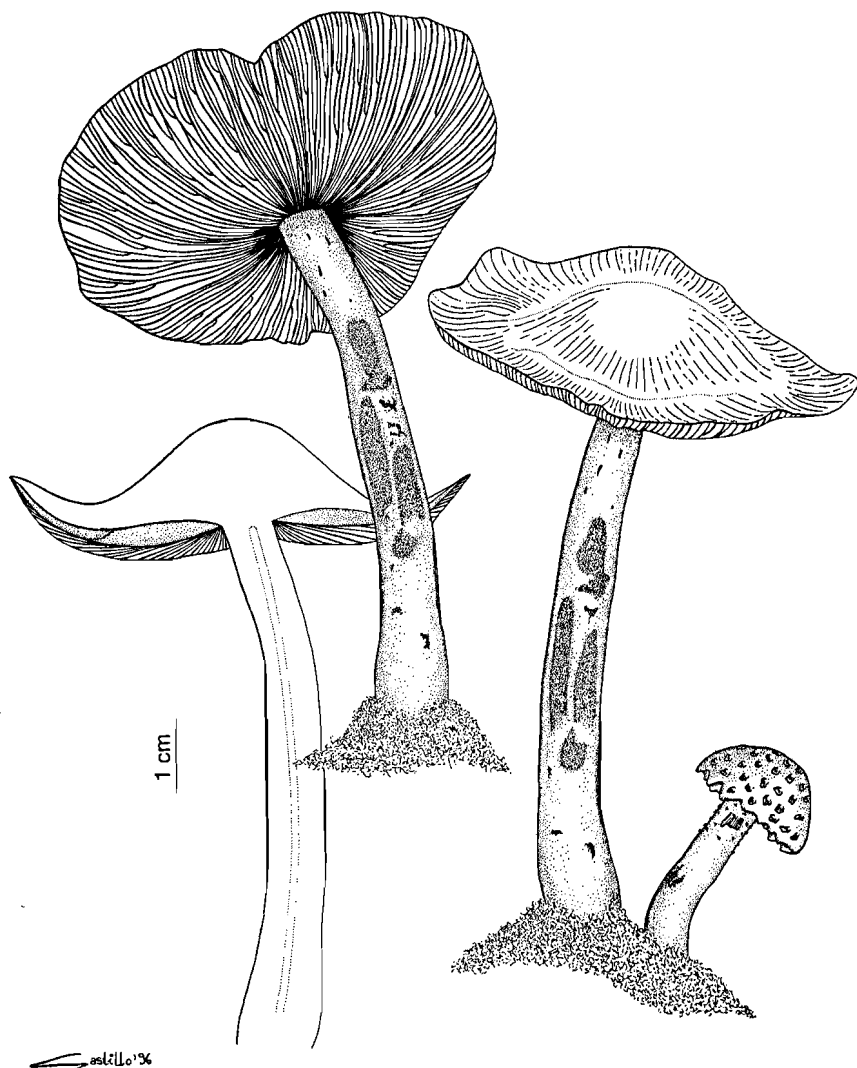


Fig. 2.—*Agaricus guachari*: diagrammatic representation of basidiomata in different degrees of development; one is represented in section (MA-Fungi 34253).

fibrillose-squamose in the lower part, turning from white to dark reddish-blood when rubbed or cut (fig. 1); context of the stipe up to 0.5 cm thick, turning from whitish to reddish-brown. Annulus fugacious or absent (figs. 1-2). Spores  $5.2\text{--}5.6\text{--}6 \times 3.6\text{--}3.9\text{--}4.2 \mu\text{m}$ ;  $Q (L/l) = 1.3\text{--}1.4\text{--}1.5 \mu\text{m}$ , ovoid to broadly ellipsoid, smooth

(figs. 3-5), pale brown to dark purplish-brown, depending on the ripening degree, thick-walled, with a clear apiculum. Basidia 15-22 × 6-7.5 μm, clavate, 4-spored, with sterigmata up to 3.5 μm long. Pileipellis a cutis of septate, thin-walled hyphae, 3-10 μm diam., hyaline becoming reddish by intracellular pigment (fig. 3a). Universal veil hyphae 3-6 μm diam., made of short, branched cells, mostly with refringent walls, not truly thick-walled, with numerous free ends, filled with pale yellowish pigment (fig. 3b). Cheilocystidia 13-16 × 6-12 μm, polymorphic, from globose to sphaeropedunculate or clavate, sometimes 2-3 septate, frequently encrusted with blackish-brown pigment, arising from a layer of parallel hyphae, 4-5 μm diam. (fig. 3d). Hymenophoral trama made of hyaline, septate, thin-walled hyphae, 2-3 μm diam., becoming reddish by intracellular pigment (fig. 3e). Subhymenium up to 25 μm thick, pseudoparenchymatous, with isodiametric cells. Schaeffer's reaction negative. Smell and taste indistinct.

*Holotypus*: Venezuela, Estado Monagas, Cueva del Guácharo, growing on guácharo's dung (*Steatornis caripensis*), 2-VIII-1990, *legit* F.D. Calonge, MA-Fungi 34253.

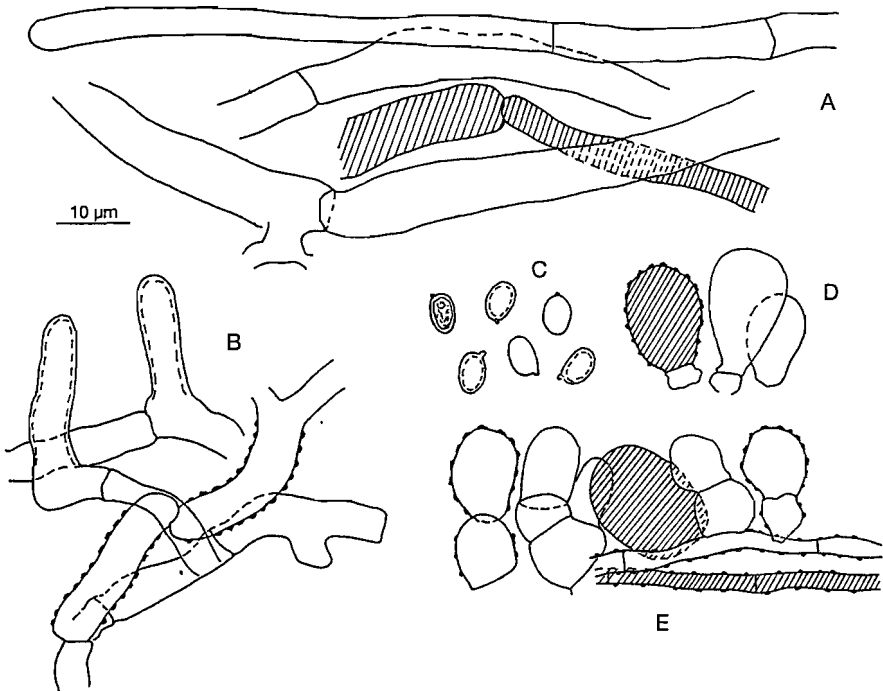
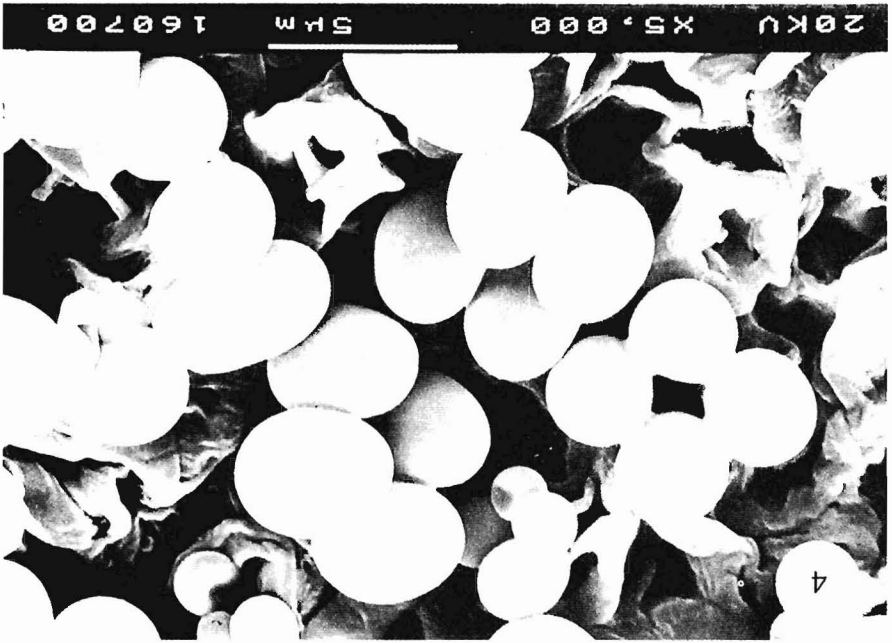
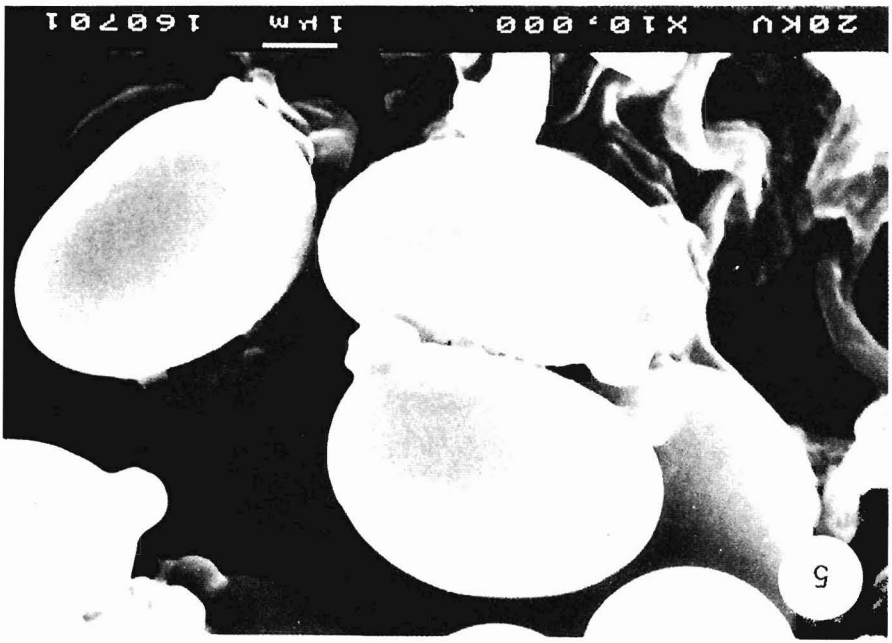


Fig. 3.—*Agaricus guachari*: illustrations of the elements of the pileipellis (A), hyphae of the universal veil (B), spores (C), cheilocystidia (D) and layer of parallel hyphae (E) from which the cheilocystidia emerge (MA-Fungi 34253).

Figs. 4-5. *Agaricus ginsengii*: spores observed under the SEM, at different magnification (MA-Fungi 31253).



## DISCUSSION

The genus *Agaricus* L.: Fr. includes about 200 species worldwide (HAWKSWORTH & *al.*, 1995), being cosmopolitan. The specimens studied in this work do not fit with any of the species described for Europe (BOHUS, 1990; BON, 1985; CAPPELLI, 1984; DANIEL-ARRANZ, 1997; PARRA, 1995, 1996, 1997), America (ALBERTO, 1996; DENNIS, 1970; FREEMAN, 1979a, 1979b; HEINEMANN, 1961, 1962a, 1962b, 1962c, 1986a, 1990; MURRILL, 1912; PEGLER, 1988; PEGLER & FIARD, 1983; SMITH, 1939; WASSER, 1989), Africa (HEINEMANN, 1956, 1986b; PEGLER, 1977), Asia (HEINEMANN, 1980; PEGLER, 1986; WASSER, 1995) and New Zealand (HEINEMANN, 1974).

According to the systematics proposed by HEINEMANN (1977), our new species should be included in the subgenus *Lanagaricus* Heinem., sect. *Rufolanosi* Heinem. Originally described from Africa, *Lanagaricus* (HEINEMANN, 1956) includes all those taxa characterized by the presence of a well-developed universal veil, either on the pileus or on the stipe. About 20-25 species have been described, all from tropical regions (SINGER, 1986). Within this subgenus, the different species can be separated on account of the colour of fruit bodies, shape of the spores and Schaeffer's reaction.

*Agaricus guachari*, apart from presenting a distinct and particular habitat, is characterized by the combination of white colours on the basidiomata, strong and quick reddening of the context, whitish to grayish-buff universal veil and negative Schaeffer's reaction. In the consulted bibliography, related to tropical representatives of the genus *Agaricus* (DENNIS, 1970; HEINEMANN, 1956, 1961, 1962a, 1962b, 1962c, 1974, 1980; PEGLER, 1977, 1986, 1988; PEGLER & FIARD, 1983), only two species share with *A. guachari* whitish colours and strong reddening of the context: *A. haematosarcus* Heinem. & Gooss.-Font. (HEINEMANN, 1956) and *A. simulans* Berk. (PEGLER, 1986). The first differs in having bigger spores ( $6.5-7.5 \times 4.8-5.6 \mu\text{m}$ ) and cheilocystidia ( $16-36 \times 10-18 \mu\text{m}$ ), while *A. simulans* has bigger basidia ( $21-28 \times 6.5-7.5 \mu\text{m}$ ) and more slender, cylindric cheilocystidia ( $28-32 \times 5-6 \mu\text{m}$ ).

Several taxa belonging to the section *Lanagaricus* were previously reported from Venezuela (DENNIS, 1970; HEINEMANN, 1962a), as well as from other tropical areas of Central and South America, such as Bolivia, Jamaica and Trinidad (HEINEMANN, 1961, 1962a, 1962b). However, all described taxa from these countries lack whitish colours and the combination of characters described in our specimens. Thus, we propose *A. guachari* as a new species.

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