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Calvatia sporocristata **sp. nov. (**Gasteromycetes**) from Costa Rica**

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Abstract: *Calvatia sporocristata*, Gasteromycetes, is described and illustrated as a new species. Its taxonomic characters are discussed and compared with other closely related species of the genus. Few studies have been carried out on tropical Gasteromycetes. The new species here proposed has, as the main features: exoperidium corky, smooth, one-layered, pseudoparenchymatous; endoperidium thin, papyraceous, dextrinoid; subgleba cellular; capillitium septate, dissociated at the septal site, lycoperdon type, without pores, elastic and spores amigdaloid, 4-6 (-7) x 2.5-4.5 µm with spines aligned, forming crests, 0.8 µm high.

Key words: Gasteromycetes, Lycoperdales, taxonomy, tropical fungi, Costa Rica.

The genus *Calvatia* was established by Fries in 1849 and it includes 35 species (Hawksworth *et al*. 1995). Due to the conspicuous size of most of the species on this genus, it has been studied in detail in several countries: Ahmad (1980) in Pakistan, Bottomley (1948) in South Africa, Dissing and Lange (1962) and Dring (1964) in Central Africa, Coker and Couch (1928) and Zeller and Smith (1964) in USA, Cunningham (1944) in Australia and New Zealand, Demoulin (1968) in Belgium, Calonge (1998) in Spain and Portugal, Hollós (1904) in Hungary, Smarda (1958) in former Czechoslovakia, Kreisel (1973) in Germany, Liu (1984) in China, Lange (1990) in the Arctic regions, etc.

Recently, Kreisel (1989, 1992, 1994) has carried out several contributions on the *Calvatia* complex, proposing some new systematic arrangements.

MATERIALS AND METHODS

The material studied is deposited at the USJ herbarium and was collected in Costa Rica, in the following localities: Cartago, Guarco, La Estrella, immature, 31-V-1994, leg. B.A. Strack, USJ 55147; Guarco, under *Quercus* sp., two almost mature basidiomata, 15-VI-1996, leg. J. Ammiratii, USJ 64256; Cartago, Turrialba, CATIE, Bosque Florencia, a mature basidioma in process of disintegration, 14-III-1977, leg. L. San Román, USJ 21675. Microscopic observations were carried out using 5% KOH as mounting medium, and ultramicroscopic ones coating samples of gleba with gold-palladium. Photographs were taken using an Hitachi S-2360 belonging to the Centro de Investigación en Estructuras Microscópicas at the University of Costa Rica.

DESCRIPTION

Calvatia sporocristata
Calonge, sp. nov. Figs. 1-5

Etym.: sporocristata, spores with spines forming crests.

Basidiomata turbinata vel subglobosa, 13-30 x 12-25 cm. Exoperidium brunneum

laeve. Endoperidium tenue, dextrinoideum. Gleba inmatura luteo-brunnea, matura brunnea, lanosa. Subgleba cellularis, atro-brunnea. Capillitium hyalinum, septatum, non perforatum, fragile, 3-6 µm latum. Sporae ellipsoideae, 4-6 x 2.5-3.5 µm, cum cristae echinulatae, apedicellatae.

Holotypus: Costa Rica, Cartago, Guarco, La Estrella, subter *Quercus* sp., 15-VI-1996, leg. J. Ammiratii, USJ 64256, Universitatis Costaricensis. **Isotypus**: MA-Fungi 52002, Hortus Botanicus Matritensis.

Basidioma turbinate to subglobose (Fig. 1), 13-30 x 12-25 cm. Exoperidium corky, brownish, dark on the top but paler towards the base, smooth, one-layered, pseudoparenchymatous, with elements up to 80 x 50 µm diam, polymorphous from globose to polygonal. Endoperidium thin, papyraceous, dextrinoid, made of 3-5 µm diam, septate, branched, hyaline hyphae. Gleba occupying one fourth of the basidioma, yellowish-brown before maturity, then dark brownish, woolly. Subgleba taking the rest of the basidioma, chocolate brown, cellular (Fig. 1). Capillitium hyaline, 2-6 µm diam, septate, dissociating at the septa, lycoperdon type, smooth, without pores, elastic, with 1 µm thick walls. Spores ellipsoid to amygdaloid, 4-6(-7) x 2.5-3.5(-4.5) µm, excluding the spines, which are aligned forming crests, 0.8-1 µm high (Figs. 2-5).

DISCUSSION

The literature on *Calvatia* does not show any taxon matching *C. sporocristata*, but several species show some similarities, for

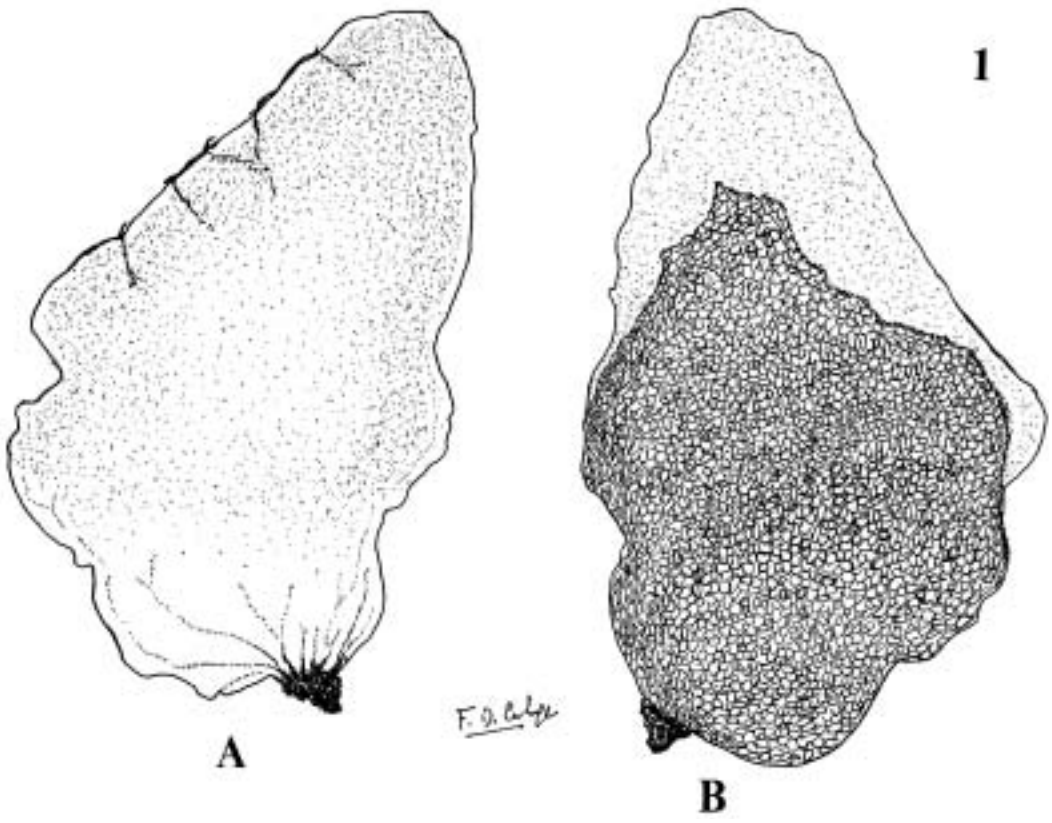
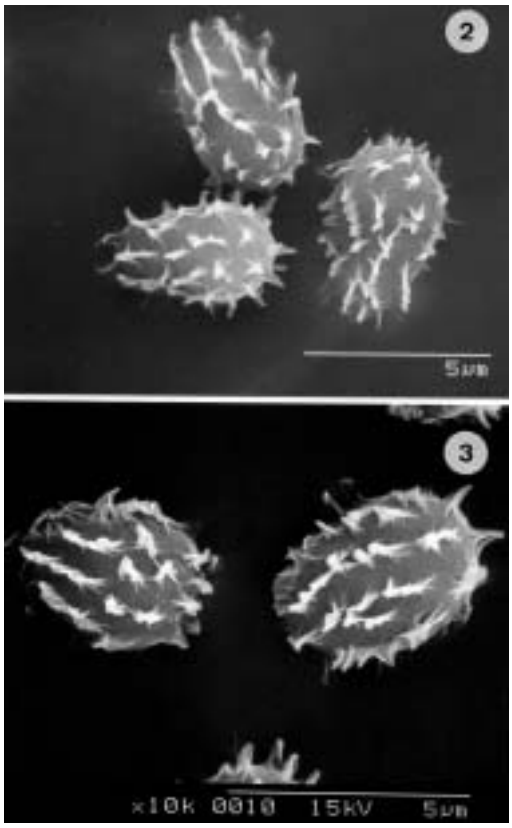
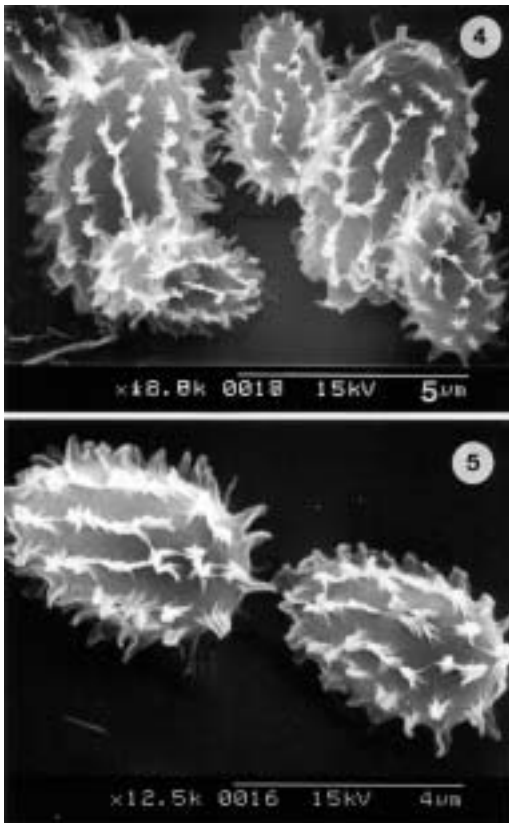


Fig. 1. *Calvatia sporocristata*. A: Basidioma showing a smooth peridium just before opening. B: Longitudinal section of the basidioma to show the distribution of subgleba (in dark) and gleba (on the top). USJ 64256. Holotypus.



Figs. 2-3. *Calvatia sporocristata*. Spores with the typical ornamentation made of spines aligned forming crests. USJ 64256. Holotypus.



Figs. 4-5. *Calvatia sporocristata*. Spores from a different locality with the same kind of ornamentation. USJ 21675.

instance, Kreisel (1994) pointed out that *C. lepidophora* (Ell. and Ev.) Coker and Couch has ellipsoid, verruculose to verrucose spores, but Coker and Couch (1928) and Bottomley (1948) said that the spores of this species are spherical. Another close species is *C. longicauda* (P. Henn.) C. G. Lloyd (= *C. agaricoides* Dissing and M. Lange), which shows an agaricoid shape, with the upper part of the basidioma flattened, 3-7 cm broad, 1-2 cm high, often clearly grooved to lobed, with a distinct pseudostipe, 4-6 cm high, 1-2 cm broad. Exoperidium velvety to fibrillose, two-layered. The capillitium is pitted with dichotomous branching (Dissing and Lange 1962). All these characters separate *C. longicauda* from *C. sporocristata*, although the spores are similar, 4-5 x 3.2-3.8 µm, ovoid and echinulate with the spines not aligned in crests (Dissing and Lange 1962).

Other related species is *C. ochrogleba* Zeller, which has a basidioma of the same shape, peridium duplex and similar size and colour, but the capillitium is pitted and subglobose to almost spherical, spores without crests (Zeller 1947), and *C. tatrensis* Hollós, which presents similar shape, but has quite different microscopy (Zeller and Smith 1964). Suárez and Wright (unpublished) have found a new species, *C. oblongispora* Suárez and Wright, which shows similar spores, both in shape and size, to our *C. sporocristata*, growing in a tropical habitat in Brazil. However, the study of a sample of such collection has shown clear differences. For instance, in *C. oblongispora* the basidioma is smaller, less than 10 cm diam, exoperidium is two-layered

and the capillitium has abundant pores. Thus, the only two features which suggest a common origin for both species are the tropical habitat and the amygdaliform spores, with the spines aligned in crests.

Then, we believe that *C. sporocristata* and *C. oblongispora* could well be included in a new section; *Sporocristata* Calonge, within the subgenus *Calvatia*, following the classification proposed by Lange (1993).

Thus, the combination of the above mentioned characters: a dextrinoid endoperidium, a non pitted capillitium, ellipsoid to amygdaliform spores with an ornamentation made of spines aligned in crests, differentiates this taxon from the previously known species, and support the proposal of *C. sporocristata* as a new species.

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RESUMEN

Se describe e ilustra una especie nueva de Gasteromycete para Costa Rica, *Calvatia sporocristata*. Las características más importantes que distinguen esta nueva especie son: exoperidio corchoso, suave, uniestratificado, pseudoparenquimatoso; endoperidio delgado, papiráceo, dextrinoide; subgleba celular; capilicio septado, disociado en el septo, de tipo lycoperdon, sin poros, elástico y esporas amigdaloides, 4-6(-7) x 2.5-4.5 µm con equinulaciones alineadas formando crestas, 0,8-1 µm de altura.

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