A NEW SPECIES OF *Macrolepiota* FROM COLOMBIA

UNA NUEVA ESPECIE DE *Macrolepiota* DE COLOMBIA

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Abstract

Macrolepiota colombiana, a new species from Colombia, is described based on macroscopic and microscopic characters and its comparison with its closer relative *M. procera* (Scop. : Fr.) Sing.

Key words: Agaricales, Lepiotaceae, *Quercus, Macrolepiota, Leucoagaricus, Chlorophyllum*, systematics, Colombia.

Resumen

Macrolepiota colombiana, una nueva especie de Colombia, es descrita con base en caracteres macroscópicos y microscópicos y su comparación con *M. procera* (Scop.: Fr.) Sing., con la que está estrechamente emparentada.

Palabras claves: Agaricales, Lepiotaceae, *Quercus, Macrolepiota, Leucoagaricus, Chlorophyllum*, sistemática, Colombia.

INTRODUCTION

In the last three decades the Agaricales of Colombia have been documented, several new taxa described, and the geographical range of several genera and species has been extended (Franco-M., 1993 and 1995; Guzmán *et al.*, 1989; Halling, 1989a, 1989b and 1992; Halling and Ovrebo, 1987; Horak and Halling, 1991; Pulido, 1983; Saldarriaga *et al.*, 1988; Singer, 1963; Tulloss *et al.*, 1992; Velásquez *et al.*, 1989). In recent collections exploring *Quercus humboldtii* and Pinaceae forests and through the examination of herbarium material, a new species of *Macrolepiota* [erroneously determined as *Macrolepiota procera* (Pulido, 1983)] has been discovered. So far, it is the only species of the genus found in Colombia.

MATERIALS AND METHODS

Color designations within parentheses are from Kornerup and Wanscher (1983). Line drawings were made with the aid of a drawing tube. All measurements of microscopic structures were made in 3% KOH. Q represents the mean length/width ratio of 30 basidiospores.

Taxonomy

The genus *Macrolepiota* was erected by Singer (1946) to include species with large (above 10 µm length), metachromatic basidiospores with a broad germ pore, white spore print, and having clamp connections. Macroscopically, the carpophores are characterized by being tall, possessing lamellae separated from the stipe by a well-developed collarium, and having a complex annulus which becomes moveable with age. In addition, the context of the pileus and stipe becomes reddish when bruised or not (Romagnesi, 1990). Microscopically, the genus lacks pleurocystidia, and the hymenophoral trama becomes lacunose with age (Heinemann, 1989), and the spore wall consists of a double episporium and a

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metachromatic endosporium (Romagnesi, 1990). *Chlorophyllum* differs from *Macrolepiota* in the green spore print, in lacking or having very inconstant clamp connections, and in the reaction of the basidiospores to Congo red. The spores of *Chlorophyllum* do not stain with Congo red while the spores of *Macrolepiota* become red to orange (Weresub, 1971). Furthermore, the basidiospores of *Chlorophyllum* are not affected by treatment with ammonia and acetic acid, while the basidiospores of *Macrolepiota* distend under the same treatment (Heinemann, 1968). *Leucoagaricus* also lacks clamp connections (Singer, 1986) and lacks a well-developed germ pore (Heinemann, 1969). *Type species*: *Lepiota procera* (Scop.: Fr.) S. F. Gray [*Macrolepiota procera* (Scop.: Fr.) Sing.]

Macrolepiota colombiana Franco-Molano, sp. nov. (figs.1-2).

Macrolepiota procerae (Scop.: Fr.) Singer arcte affinis sed epicute in umbonem integram vel subareolatum apicalem et squamules seu areolas, minutas majoresque, submarginales (nec in umbonem centralem et squamas magnas detersiles) diffracta carnem albam laevem vel fibrillosam (nec brumeum fibrilloso-squamulosam) praebenti diversa; ulterius trichodermio e hyphis ± catenulatis 100 µm haud excedentibus (nec cylindricis acutis septatis 300-400 x 8-14 µm) constanti et basidiosporis 12-14 (18) x 7-10(12) µm (nec 13-17(23) x (8.5) 9-10.5(12)µm a *M. procera* divergens.

Etymology

Named for the Republic of Colombia.

Pileus 4-12 cm broad, convex, plane to umbonate; surface dry, entire at the center, breaking into large to small scales or areolae to fine granules toward the margin; center and areolae brown (7E7) on white background; margin entire or splitting radially toward the center, tuberculate, inrolled. *Context* ± 5 mm thick, white, slowly changing to grayish-red (7B3) when exposed. Odor very strong of cabbage, taste indistinct. *Lamellae* free, close, thick, ± 1.2 cm broad, white, unchanging; margin finely serrate, not marginate. *Stipe* 15 cm long, 1 cm broad near the apex, 1.3 cm broad at the middle, 3 cm at the base, central, bulbous, tough, strict to curved; surface dry, smooth to rugulose, glabrous to finely velutinous with lens, brown (paler than 6F6) except at the base which is white, breaking circumferentially as the stipe elongates, showing a white context; interior white slowly becoming grayish-red (7B3) when exposed, hollow at the center, annulate. Scattered, white, cottony mycelium at the base. *Annulus* superior, flaring, double, white and membranous on the inner side, tough and concolorous with the stipe outside, becoming moveable with age.

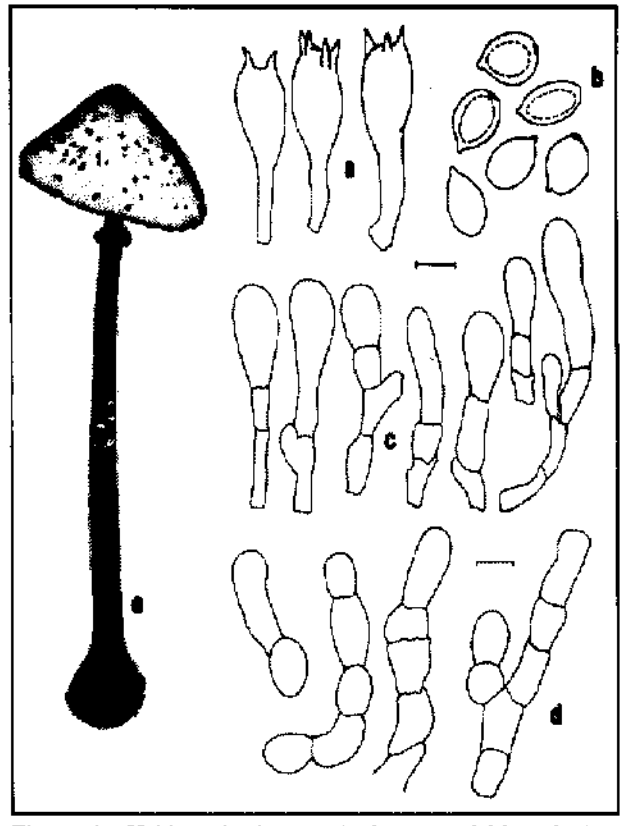

Figure 1. Habit and microscopic features of *Macrolepiota colombiana (Franco-M. 775)*. a. Basidia. b. Basidiospores. c. Cheilocystidia. d. Pileipellis elements. e. Habit approx. x ½. Scale lines = 10 µm. Habit by Gloria Mora G.

Macrochemical tests: positive for tyrosinase throughout basidiomata; negative for laccase; KOH on pileus, negative.

Basidiospores (fig. 1b) white in mass, 12-14(18) x 7-10(12) µm (Q = 1.56), broadly ellipsoid to ovoid in all views, hyaline in KOH, dextrinoid in Melzer's reagent, metachromatic in Cresyl blue, smooth, thick-walled, with broad germ pore, round at apex. Germ

pore up to 2 µm broad, covered by a hyaline membrane. *Basidia* (fig. 1a) clavate, narrowly clavate to pedicellate, 4-sterigmate, hyaline in H_2O and KOH, inamyloid, 45-55(60) x 12-15 µm, often buried in the subhymenium. *Pleurocystidia* absent. Edge of lamellae sterile with crowded cheilocystidia. *Cheilocystidia* (fig. 1c) abundant, oblong to clavate, rarely utriform, mostly septate, often branched; terminal cells 17-55(70) x 8-14 µm. *Hymenophoral trama* hyaline, inamyloid, lacunose; hyphae cylindric, 3-12µm broad *Subhymenium* pseudoparenchymatous, 25-30 µm thick, formed of cells 2-7 µm broad. *Pileus trama* hyaline, inamyloid, formed of densely interwoven hyphae; hyphae 4-12(15) µm broad. *Suprapileipellis* formed of two layers: a basal layer of repent, parallel to loosely interwoven but radially arranged hyphae; hyphae yellowish brown in H_2O, paler in KOH, smooth to slightly incrusted, rather thin-walled, 4-12 µm broad; the basal layer or mediopileipellis giving rise to a trichodermium somewhat gelatinized, yellowish brown in KOH, of hyphae ± catenulate, smooth or incrusted, rather thin-walled, 70-110 x (3)5-12 µm (fig. 1d). *Subpileipellis* hyaline to very pale yellow in H_2O and KOH, formed of repent, parallel, radially arranged hyphae; hyphae smooth to incrusted, thin-walled, 4-8 µm broad. *Stipitipellis* formed of parallel to loosely interwoven hyphae but vertically arranged; hyphae similar to those forming the suprapileipellis, yellowish brown in H_2O and KOH, catenulate, smooth, rather thin-walled, 5-15 µm broad. *Annulus* two layered; the inner layer formed of densely interwoven, hyaline hyphae, 3-10 µm broad; the outer layer is formed for hyphae similar to those forming the stipitipellis. *Clamp connections* abundant on stipe.

Material studied: *Macrolepiota colombiana.* Colombia. Dpto Antioquia: municipio de San Cristóbal, vereda San José, mixed forest with *Pinus* and *Eucalyptus*, ± 1700 m, 3 jun. 1992, *Franco-M. 913* (HUA, NY); municipio de La Ceja, parcelación La Selva, lote 1, 6º 00' 76" N, 75º 22' 92" W , 2400 m, 13 apr. 1998, *Franco-M. 1636* (*Holotype:* HUA); Dpto Boyacá: Bojircá sector Manzanos, 2800 m, on grass beside a road, 26 apr. 1992, *Franco-M. 784* (COL; NY); Dpto Cundinamarca: municipio de Cogua, Parque Neusa, pine forest predominated by *Pinus patula*, 3000 m, 26 may 1991, *Franco-M. 694* (NY, HUA); municipio de Cogua, Tibito, in front of charcoal industry, on soil under *Pinus*, 2500 m, 18 apr. 1992, *Franco-M. 775* (HUA); between Susa and Simijaca, finca Taquira, 5°28' N 73°51' W, plantation of *Pinus radiata* and *Pinus patula*, in duff, ca 2650 m, 10 may 1987, *G. Mueller 2800* (F); NW of Pacho, 5°9' N 74°9' W, *Quercus humboldtii* dominated forest, in grass under *Quercus humboldtii*, ca 2450-2500 m, 11 may 1987, *G. Mueller 2806* (F); Dpto Nariño: municipio La Florida a 26-28 km de Pasto, hacienda El Barranco, propiedad de Francisco Villarreal, on grass outside a forest of *Quercus humboldtii*, 11 may 1990, *Franco-M. 450* (NY, PSO).

Comparative material examined of *Macrolepiota procera*. Germany. Bavaria: Regensburg, Penkertal, between Endfeld and Pen, under *Fagus*, 4 sep. 1990, *Franco-M. 539* (NY); USA. Massachusetts: Hampshire Co., Amherst, Wildwood Cementery, under mixed hardwoods, 18 sep. 1981, *R. E. Halling 3437* (NY); New York: Suffolk Co., Hither Hills State Park, 19 sep. 1965, *C. T. Rogerson* (NY); Pennsylvania: Butler Co., 5 mi N of Zelienople, 8 nov. 1935, *L. K. Henry 369* (NY); South Carolina: Oconee State Park, 18 aug. 1992, *Franco-M. 1024* (NY).

Distribution: probably neotropical. It has been collected only in Colombia in the departments of Antioquia, Boyacá, Cundinamarca and Nariño.

Discussion: apparently because of its size collections of this species were erroneously determined as *Macrolepiota procera*. Comparison of fresh material of both species showed macroscopic differences. In *M. procera* the epicutis breaks leaving a "calotte" at the center and small to big detersile scales toward the margin on a brownish, fibrillose to squamulose background while in *M. colombiana* the epicutis breaks leaving an entire to finely areolate "calotte" at the center and larger or small to tiny appressed scales or areolae toward the margin on pure white, smooth or finely fibrillose background.

Microscopically, the suprapileipellis of *M. procera*

(fig. 2b) is characterized by a trichodermium formed of long, cylindric, septate hyphae, with acute apices, 300-400 x 8-14 µm as observed also by Candusso and Lanzoni (1990). In *M. colombiana*, the trichodermium (fig. 2a) is formed of ± catenulate hyphae not exceeding 110 µm in length. The subpileipellis of *M. procera* is bright yellow in KOH while in *M. colombiana* it is hyaline to very pale yellow. The basidiospores are longer [13-17(23) x (8.5)9-12 µm] in *M. procera*, and shorter [12-14(18) x 7-10(12) µm] in *M. colombiana*. Although, septate cheilocystidia can be found in both species, they are more abundant and frequently branched in *M. colombiana*.

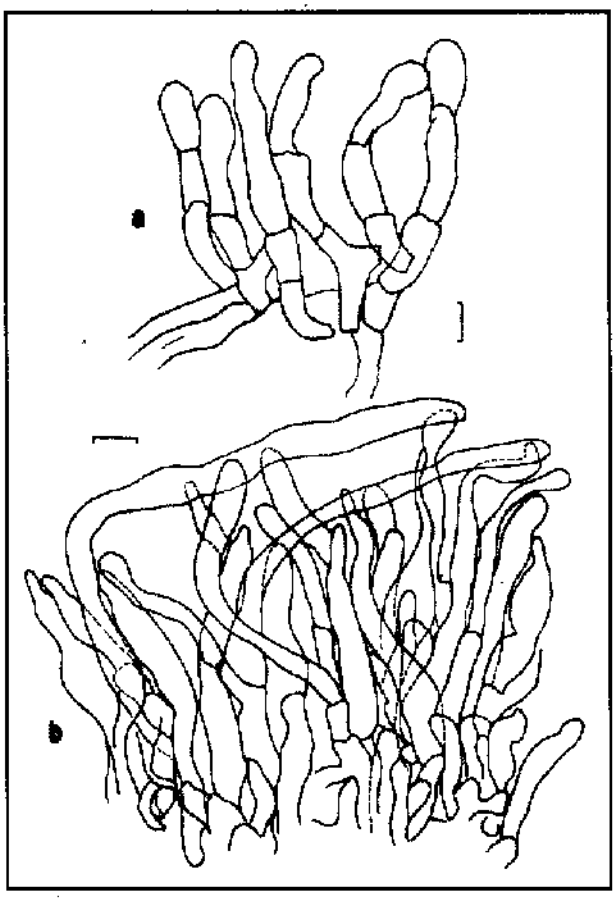

Figure 2. Line drawings of the suprapileipellis: a. *Macrolepiota colombiana (Franco-M. 775)*. b. *Macrolepiota procera (Franco-M. 539)*. Scales lines = 10 µm.

Macrolepiota colombiana resembles *M. gracilenta* (Krombh.) Moser from which it differs in having bigger basidiospores, 9.8-11.5 x 7.4-8.4 µm in the latter (Heinemann, 1969), and in the size and shape of the cheilocystidia. *Macrolepiota gracilenta* has clavate to pyriform, aseptate, 23-35 x 10-18 µm cheilocystidia (Heinemann, 1969), while *M. colombiana* has oblong to clavate, rarely utriform, mostly septate, often branched cheilocystidia with terminal cells 17-55 (70) x 12-15 µm.

In adittion, molecular and morphological data by Johnson and Vilgalys (1998) and Johnson (1999) support the separation of *Macrolepiota colombiana* from *M. procera* and *M. gracilenta* and showed that *M. colombiana* is closer to *M. procera* than to *M. gracilenta*.

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