

A new pathogenic species of *Marasmiellus* from Brazil

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Abstract – *Marasmiellus colocasiae* sp. nov., anatomically and morphologically distinct from other *Marasmiellus* species, is described from Brazil. The new species is pathogenic to taro and this is the first record of *Marasmiellus* on *Colocasia esculenta*.

Agaricales / Basidiomycota / parasitic fungi / taxonomy

INTRODUCTION

The genus *Marasmiellus* Murrill is a large genus (c. 400 names in the CABI index). It is well-known in South America especially since a monograph by Singer (1973a). Several *Marasmiellus* species were also published by e.g. Dennis (1961, 1968, 1970), Pegler (1983, 1997), and Singer (1969, 1989).

Recently, a severe disease of *Colocasia esculenta* (L.) Schott (taro) was observed in Espírito Santo State, Brazil. *Colocasia esculenta* is a tropical plant of the family *Araceae*, originated in South Central Asia and it is presently grown worldwide (Irwin *et al.*, 1998; Plucknett, 1983). It is one of the oldest cultivated crops and is grown for its edible corms and leaves. In Espírito Santo State, it is grown on most family farms and is often intercropped or rotated with other crops for several years and it is normally sold in Farmers' market.

The taro has low pests and diseases, however in 2005 was observed a severe loss in the crop production, reaching 100% in an area of 2 ha, caused by a basidiomycete that is now assigned to *Marasmiellus* and is proposed as a new species here.

To confirm the pathogenity, isolates obtained from corms of infected plants were wound-inoculated into two-month-old plants of *Colocasia esculenta* cv. Chinês. The fungus colonized the taro corms, developing basidiomata and was successfully re-isolated from the inoculated corms. The pathogenity of some *Marasmiellus* species is already known (e.g. Dennis & Reid, 1957; Singer, 1986).

MATERIAL AND METHODS

Sampling

The studied material was collected on infected taro corm (*Colocasia esculenta*, cv. Chinês) in Aracê, Domingos Martins County, an agricultural region located near a reserve of Atlantic Forest, in the highlands of Espírito Santo State (20°22.50'6''S 41°00.04'7''W; 1026 m altitude).

Morphological study

For microscopic analyses, the dried material was rehydrated in 70% ethanol followed by 5% KOH, Congo Red, and Melzer's reagent. All microscopic illustrations were made with the aid of a drawing tube. The following abbreviations have been used: L = number of entire lamellae, l = number of lamellulae between each pair of entire lamellae, E = quotient of length and width of the basidiospores and Q = the mean value of E in all collections studied. The material was deposited at the herbarium of the Instituto de Botânica (SP) and at Moravian Museum (BRNM).

DNA sequences of the internal transcribed space (ITS) region of nuclear ribosomal DNA was obtained for future molecular studies. GenBank accession number is cited below the species name at the beginning of the formal description.

TAXONOMY

Marasmiellus colocasiae Capelari & Antonín *sp. nov.*

Fig. 1-2

Mycobank 515102 ; GenBank GQ452780

Pileus 11-46 mm *latus*, *convexus ad applanatus*, *suaviter depressus in centro*, *marginē recurva*, *albidus vel cremeus*. *Lamellae distantes* L = 18-20, l = 2-4, *adnatae ad suaviter decurrentis*, *albidae*. *Stipes* 16-44 × 1.4-1.8 mm, *cylindricus*, *aequalis*, *albidus*, *cum aut sine mycelio basale*. *Basidiosporae* 10-12 × 5.5-7.5 μm, *ellipsoideae*, *ellipsoideae-fusoideae*, *ellipsoideae-cylindricae*, *laeves*. *Cheilocystidia* 14-33 × 7-9.5 μm, *cylindrica*, *clavata*, *subfusiformia*, *irregularia*, *rostrata aut projecturis*, *fibulatis*. *Pleurocystidia nulla*. *Pileipellis* *hiphis incrustatis*, *tenuibus ad crassitunicatas*, *usque ad 10 μm latas*, *fibulatis*, *cellulis terminalibus et projectura laterali cylindrica*, *subulata*, *irregularis ad coralloidem*. *Stiptipellis* *hyphis* 6-8 μm *latis*, *suaviter crassitunicatis*, *laevis*, *fibulatis*. *Caulocystidia* 25-40 × 4-6.5 μm, *subulata*, *anguste fusiformia*, *subcylindrica*, *regularia ad irregularia*, *fibulatis munitis*.

Holotypus (hic designatus): Brazil, Espírito Santo State, Domingos Martins County, Aracê, July 12, 2005, leg. J.A. Ventura s.n. (*holotypus in herbario SP376044 asservatur*, *isotypus in herbario BRNM724684 asservatur*).

Pileus 11-46 mm broad, convex expanding to applanate, slowly depressed in the center, with recurved margin; non hygrophanous, white to cream, glabrous, sometimes, sulcate. Lamellae distant, L = 18-20, l = 2-4, adnexed to slightly decurrent, well-developed, reaching the margin of the pileus, not intervenose, white, with concolorous edge. Stipe 16-44 × 1.4-1.8 mm, cylindrical, equal, white, pruinose, subinsititious, without or with some basal mycelium. Context membranaceous, white. Smell and taste not recorded.

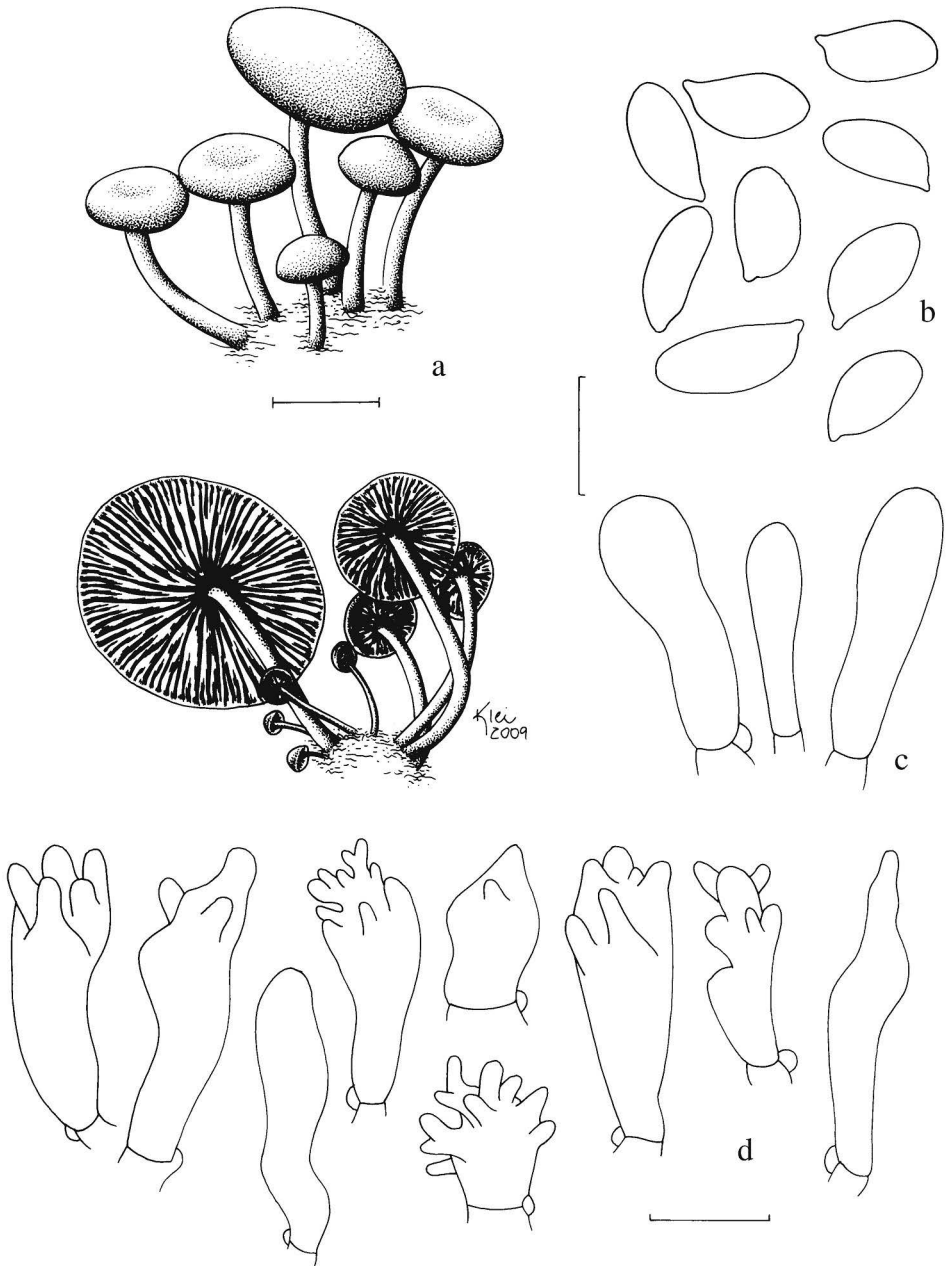


Fig. 1. *Marasmiellus colocasiae* (holotype). **a.** habit. **b.** basidiospores. **c.** basidioles. **d.** cheilocystidia. Scale bars **a.** 1 cm. **b-d.** 10 μm .

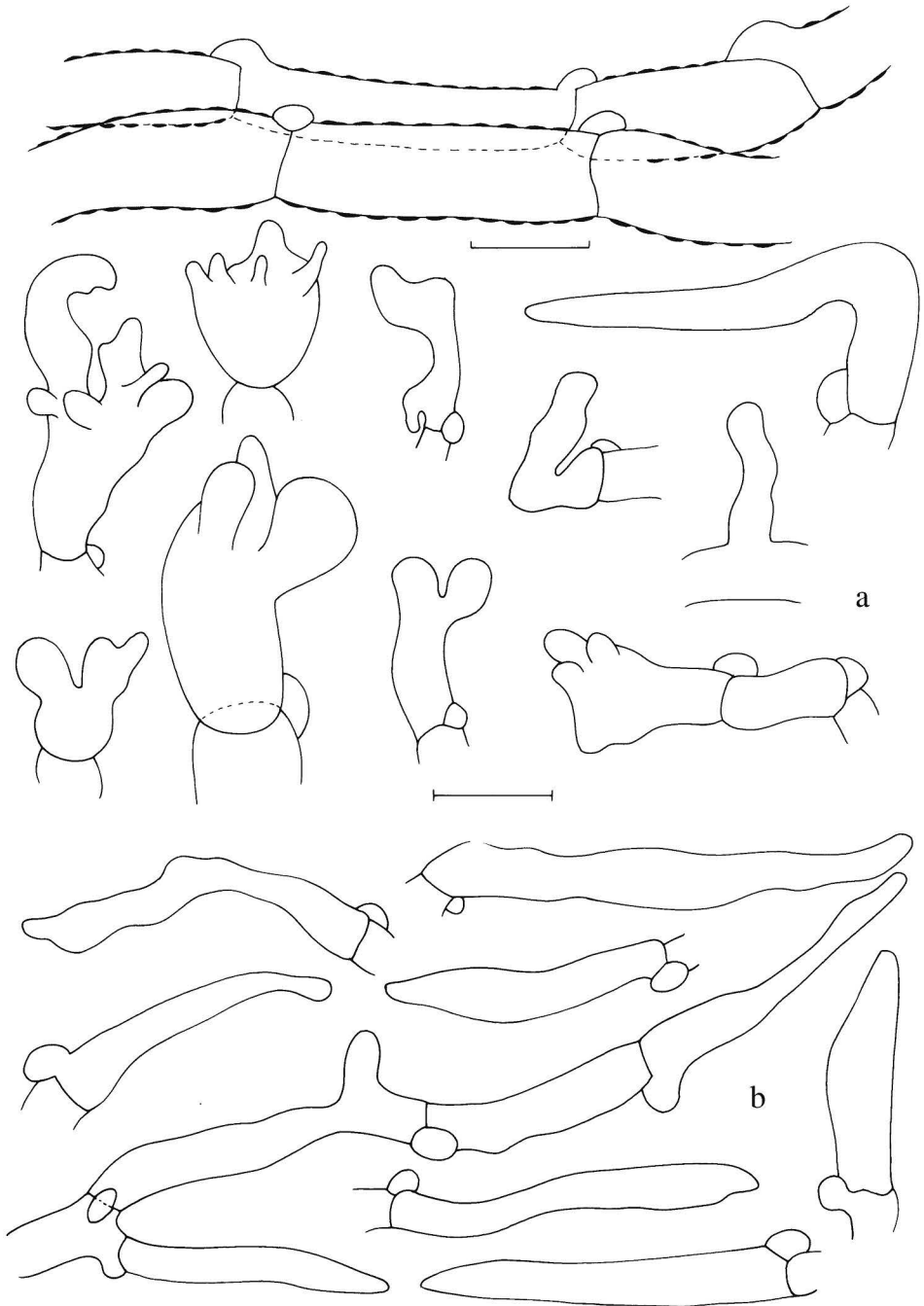


Fig. 2. *Marasmiellus colocasiae* (holotype). **a.** pileipellis. **b.** caulocystidia. Scale bars **a-b.** 10 μm .

Basidiospores 10-12 × 5.5-7.5 µm, average = 11.2 × 5.6 µm, E = 1.8-2.3, Q = 2.0, ellipsoid, ellipsoid-fusoid, ellipsoid-cylindrical, smooth, thin-walled, inamyloid. Basidia not found. Basidioles 13-30 × 4-9 µm, clavate, subcylindrical, subfusoid, thin-walled, clamped. Lamellae edge sterile. Cheilocystidia 14-33 × 7-9.5 µm, variable in shape, cylindrical, clavate, subfusoid, irregular, rostrate or with projections (broom cells), thin-walled, clamped. Pleurocystidia absent. Trama of cylindrical or subinflated hyphae, up to 17 µm wide, thin- to slightly thick-walled, slightly gelatinized, clamped, non-dextrinoid. Pileipellis a cutis of cylindrical, thin- to slightly thick-walled, up to 10 µm wide, clamped, incrustated hyphae made up of short articles; terminal cells and lateral projections cylindrical, subulate, irregular to coralloid, thin- to slightly thick-walled. Stipitipellis of cylindrical, up to 6-8 µm wide, slightly thick-walled, smooth, non-dextrinoid, clamped hyphae. Caulocystidia 25-40 × 4-6.5 µm, subulate, narrowly fusoid, subcylindrical, regular or irregular, more or less thick-walled, clamped.

Holotype: Brazil, Espírito Santo State, Domingos Martins County, Aracê (20°22.50'6"S, 41°00.04'7"W), 12 July 2005, J.A. Ventura s.n. (SP376044).

Etymology: The name refers to the genus of the infected plant.

Habitat: Gregarious to caespitose on stems and corms of *Colocasia esculenta* cv. Chinês (taro plants).

Known distribution: Espírito Santo State, Brazil.

Material examined: Brazil, Espírito Santo State, Domingos Martins County, Aracê, 20°22.50'6"S and 41°00.04'7"W, alt. 1026 m; 12 July 2005, leg. J.A. Ventura s.n. (holotype, SP376044, isotype BRNM724684).

Marasmiellus colocasiae is characterized by rather large, white to cream basidiomata, slightly decurrent lamellae, rather large basidiospores, variable cheilocystidia, often in the form of broom cells, well-developed caulocystidia and absent pleuro- and pileocystidia. Having these characters, it belongs to sect. *Dealbati* Singer, subsect. *Dealbatini* Singer.

It is a very distinct species. All similar species or species from the same subsection from Central and South America mentioned by Singer (1969, 1973a, 1989) and Pegler (1983) have distinctly smaller basidiomata and basidiospores, as well as white or pale coloured European *Marasmiellus* species (Antonín & Noordeloos, 2010). *Marasmiellus troyanus* (Murrill) Dennis also has smaller basidiospores, 7-8 × 4.5-6 µm (Dennis, 1970). Our species also is not included among the *Marasmius* species from the former West India originally described by Murrill and revised by Dennis (1951), neither the species mentioned for Brazil by Rick (1961) under *Collybia*, *Mycena* and *Omphalia*, from which it differs either in pileus colour or in basidiomata and basidiospores dimension.

Because *Colocasia* is an introduced plant in Brazil, originally from South Asia, it is also possible that *Marasmiellus colocasiae* was also introduced with its substrate. However, literature about *Marasmiellus* in South (South-East) Asia is very poor. *Marasmiellus hirtellus* (Berk. & Broome) Pegler, described from Sri Lanka, has a smaller pileus, only 5-10 mm broad, which is white or pale ochraceous, a stipe darkening from base, and smaller basidiospores, 5-6.5 × 2.7-3.5 µm (Pegler, 1986). Corner (1996) described *Marasmius tenellulus* Corner which has a smaller pileus, only 3-14 mm broad, and smaller basidiospores, 6.5-8 × 2.3-3 µm. The genus *Marasmius* in the sense of Corner (1996) represented a lot of distinct genera, among them e.g. *Marasmiellus*.

The blast search of the *M. colocasiae* ITS sequence shows some "uncultured root-associated fungus" and *Marasmiellus mesosporus* Singer that also causes disease on beach-grass (*Ammophila breviligulata* Fern.) in the U.S.A. and on *Eleusina flagellifera* Nees in Pakistan (Singer, 1973b). For now, the genus

Marasmiellus is polyphyletic and further studies with more taxa and other genes will be necessary to elucidate the phylogenetic relationships of this wide morphological group.

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