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TWO PARTICULAR TAXA FROM BRAZIL:  
MACROCYBE TITANS AND MARASMIUS LEONINUS

### Abstract

*The macro-, microscopical and ecological features of Brazilian collections of Macrocybe titans and Marasmius leoninus are reported. Photographs of basidiomes and some microscopic structures are provided plus a black and white plate of the latter elements. The authors make several taxonomic considerations and compare them to allied entities. As far as M. leoninus is concerned some data about its worldwide distribution are supplied.*

### Riassunto

*Vengono riportate le caratteristiche macro-, microscopiche ed ecologiche di collezioni brasiliane di Macrocybe titans e Marasmius leoninus, nonché presentati dei fotocolor dei basidiomi e di alcuni elementi microscopici oltre ad una tavola in bianco e nero di alcune microstrutture. Gli autori fanno altresì alcune considerazioni tassonomiche sui taxa in argomento e li confrontano con entità simili. Per quanto concerne M. leoninus vengono forniti anche alcuni dati sulla sua distribuzione a livello mondiale.*

**Key words:** Agaricales, Macrocybe, Marasmius, titans, leoninus, Neotropics, taxonomy.

### Introduction

During a recent journey in Brazil one of the authors (P.P.) picked up a couple of particular species belonging to the genera *Macrocybe* and *Marasmius*. Despite of some striking macromorphological characters, their identification hasn't been plain. We are pleased to present them in order to spread the knowledge of such fungi and similar ones to people and mycologists who ignore their existence.

### Materials and Methods

Colour photographs of the basidiomes were taken in the field by a Nikon D90 digital camera. The description of macroscopic features derived from the observation of fresh specimens, while the microscopic analysis was made on fragments of dried material previously hydrated by distilled water and stained by Congo red, Floxine or Cresyl blue through Nikon Eclipse E-200 and Optech Biostar B3 light microscopes. Technical terms used for the morphological description refer to SINGER (1976) and VELLINGA (1998). Authors of fungal names have been quoted in accordance with the indications of the Internet sites [www.indexfungorum.org/Names/AuthorsOfFungalNames.asp](http://www.indexfungorum.org/Names/AuthorsOfFungalNames.asp) and [www.mycobank.org](http://www.mycobank.org). The exsiccata have been deposited in MCVE and labelled as 28653 (*Macrocybe titans*) and 28655 (*Marasmius leoninus*).

### TAXONOMY

***Macrocybe titans*** (H.E. Bigelow & Kimbr.) Pegler, Lodge & Nakasone, Mycologia 90: 500 (1998) [MB#443595]

Basionym: *Tricholoma titans* H.E. Bigelow & Kimbr. Mycotaxon 11 (2): 426 (1980) [MB#113415]

**Pileus** 40-180 mm broad, at first hemisphaerical to convex, then more or less appanate, fleshy, compact, solid, dry, smooth, pale ochraceous, light brown-greyish, ochre-grayish, cracking and with tiny, adpressed squamules at centre; margin inflexed, not striate, sometimes with darker spots.



*Macrocybe titans*

Photo by Paolo Picciola



*M. titans*. Details.

Photo by Paolo Picciola

**Lamellae** crowded, segmentiform, strongly sinuate, up to 6 mm broad with lamellulae of different length, white to cream: edge entire and concolorous.

**Stipe** 60-100 × 15-23 mm (apex)/ 24-47 mm (base), cylindrical to obclavate, solid, fleshy, central, dry, at first white, then ochre-greyish, covered with evident reflexed squamules.

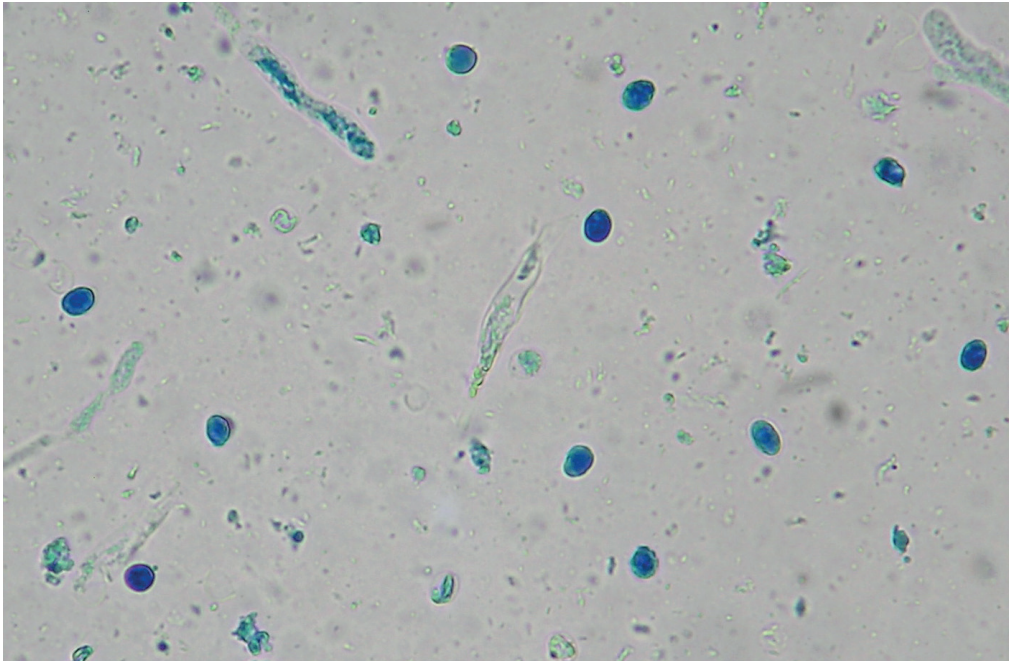
**Context** compact, white, unchanging; odour indistinctive, taste bitter.

**Spore print** not recorded.

**Spores** 5-6.7 × 4.2-5 μm, ellipsoid to broadly ellipsoid or ovoid, smooth, thin walled, hyaline, inamyloid.

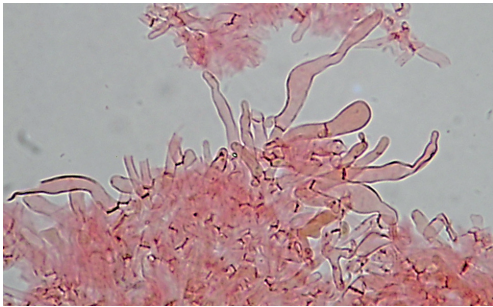
**Basidia** clavate, hyaline, 4-spored.

**Pseudocystidia** 30-57 × 4.2-10 μm, polymorphic, fusoid-rostrate, cylindrical, cylindrical with subcapitate apex, very often flexuose, sometimes a bit strangulate, thin walled, hyaline or slightly refractive in KOH 30%.



*M. titans*. Spores stained with Cresyl blue.

Photo by Eliseo Battistin



*M. titans*. Pseudocystidia.

Photo by Eliseo Battistin



*M. titans*. Pseudocystidia.

Photo by Eliseo Battistin



*M. titans*. Clamped hyphae.

Photo by Eliseo Battistin

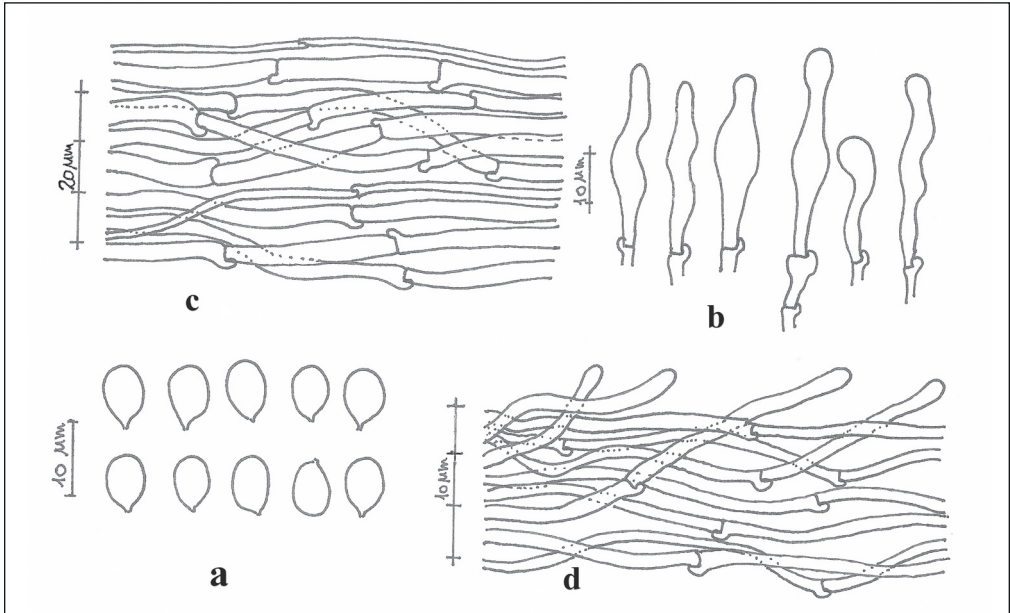
**Hymenophoral trama** regular, made up of parallel cylindrical hyphae (3.3-4.2-5.0 (-6.7)  $\mu\text{m}$  wide).

**Pileipellis** a cutis of interwoven, cylindrical hyphae, 3.3-5.8  $\mu\text{m}$  wide, provided with many clamp-connections.

**Clamp-connections** present and abundant especially in the pileipellis and pileitrama.

**Ecology** terricolous, fasciculate in a wood of broadleaved trees with some specimens of *Araucaria angustifolia* (Bertol.) Kuntze (980 m elevation).





*M. titans*. a. Spores; b. Pseudocystidia; c. Hymenophoral trama; d. Pileipellis.

Drawing by Paolo Picciola

**Phenology** 4 Apr. 2015.

**Material examined:** Brazil, Paraná, Curitiba, Campina Grande do Sul, 25° 18' 21'' South, 49° 03' 18'' West, leg. P. Picciola, det. E. Battistin and P. Picciola.

## Discussion

*Macrocybe* is a genus introduced by PEGLER & LODGE in 1998 to accommodate saprotrophic taxa with usually tricholomatoid habit and conspicuous size growing in subtropical or tropical regions. Microscopically they present basidia lacking siderophilous granulation and have clamp-connections, unlike *Tricholoma* (Fr.) Staude, while gloeocystidioid pseudocystidia can occur or not.

Macroscopically *Macrocybe titans* is recognizable by its remarkable size (the diameter of the pileus can reach 100 cm), the ochre-grayish tinges of the pileus whose pileipellis tends to crack, the sinuate lamellae and the stipes covered with reflexed squamules.

Microscopically it is worth reporting the presence of clamp-connections and gloeocystidioid pseudocystidia.

*Macrocybe pachymeres* (Berk & Broome) Pegler & Lodge from Sri Lanka looks very much like *M. titans* and both share a stipe provided with numerous, grey-brown, recurved fibrillose squamules; curiously PEGLER (1983) recorded the presence of *Tricholoma pachymeres* (Berk. & Broome) Sacc. in the Lesser Antilles and French Guyana stating it has a pantropical distribution.

In 1998 PEGLER, LODGE & NAKASONE affirmed that being the holotypus of *Agaricus pachymeres* Berk. & Broome in poor condition it was impossible to establish if it possesses pseudocystidia; for this reason and because of the geographical separation they preferred to consider *M. pachymeres* and *M. titans* as different taxa.

With regard to the pseudocystidia there seems to exist a bit of confusion: we noted that neither BERKLEY & BROOM (1871) nor PEGLER (1983) mentioned their occurrence in *Agaricus pachymeres* from Sri Lanka and in *T. pachymeres* from the Lesser Antilles [collection considered as *M. titans* later (1998)].

We wonder whether they are really absent or were overlooked in *Agaricus/Macrocybe pachymeres*. According to our experience related to the Brazilian find of *M. titans* they are often small, hyaline or slightly refractive, therefore it is sometimes difficult to observe them and we were able to discover them only after preparing several slides; a further difficulty is represented by a CORNER's illustration (1994) of a fungus from Malaya he described as *Tricholoma crassum* Sacc.: "according to PEGLER ET AL. (1998) it resembles *T. pachymeres* and was stated to have pleurocystidia".

The question is open. Besides admitting that *M. pachymeres* lacks pseudocystidia, and that hasn't been proven yet, we are not sure this microscopical feature along with the geographical separation suffices to separate *M. pachymeres* from *M. titans*; perhaps, if not conspecific, they could be thought as forms or varieties of one and the same species. Of course this is only a taxonomical hypothesis.

Accurate molecular investigations on topotypic material from Florida and Sri Lanka could hopefully solve that taxonomic issue.

***Marasmius leoninus*** Berk., *Hooker's Journal of Botany and Kew Garden Miscellany* 8: 135 (1856) [MB#198914]

**Pileus** 5-20 mm broad, convex to applanate, red-orange, orange, fulvous-orange, a bit darker at centre; margin slightly inflexed. Surface glabrous, dry, velutinous, usually slightly radially sulcate in mature specimens.

**Lamellae** moderately crowded, adnexed, slightly ventricose, up to 3 mm broad, white; edge entire and concolorous or brown spotted.

**Stipe** 30-60 × 1-2 mm, central, cylindrical, not insititious, dry, glabrous, almost polished, white at apex, yellow-brown, reddish-brown, chestnut-brown elsewhere.

**Context** scanty, whitish; odour none, taste mild.

**Spore print** not recorded.

**Spores** (8.0)9-11(12) × 3.3-4.2(5) µm, (sub)fusoid, smooth, hyaline, inamyloid, thin-walled.

**Basidia** clavate, hyaline, with four sterigmata.

**Cheilocystidia** broom cells of the *siccus-type*: the size is more or less equal to that of the cells of the pileipellis.

**Pleurocystidia** absent.

**Caulocystidia** present only at the stipe apex as broom cells of the *siccus-type* with reduced main bodies and setulae up to 15 µm long.

**Pileipellis** a hymeniform layer of *siccus-type* broom cells 12-22 × 5-10 µm, cylindrical to clavate hyaline. Apical setulae 4-11 µm long, narrowly conical, brown. Smooth cells absent.

**Pileitrama** composed of pseudoamyloid hyphae.

**Hymenophoral trama** made up of subparallel, cylindrical hyphae 6-21 µm wide, thin-walled, hyaline, pseudoamyloid.

**Stipitipellis** a cutis of parallel, cylindrical hyphae 5-12 µm wide, hyaline, pseudoamyloid.

**Clamp-connections** present in all tissues.

**Ecology** in a forest of broadleaved trees and *Araucaria angustifolia* (Bertol.) Kuntze (980 m elevation), on the ground among buried woody debris and leaves.

**Phenology** 28 Dec. 2013, 11 Jan. 2014 and 27 Mar. 2015.

**Material examined** Brazil, Paraná, Curitiba, Campina Grande do Sul, 25° 18' 21" South, 49° 03' 18" West, leg. P. Picciola, det. E. Battistin and P. Picciola.



*Marasmius leoninus* in habitat.

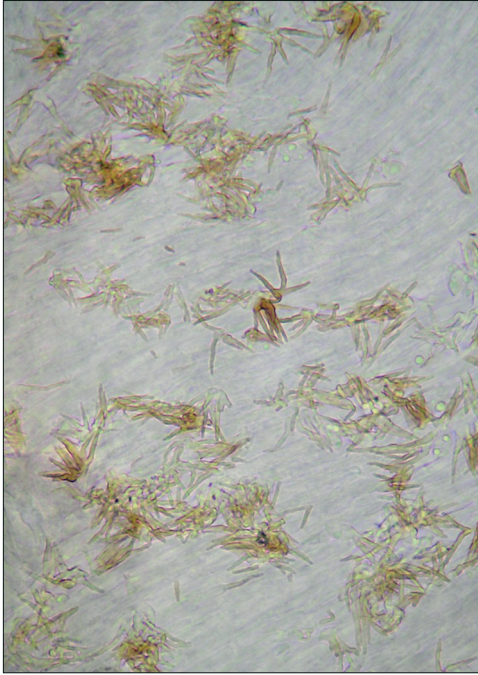
Photo by Paolo Picciola



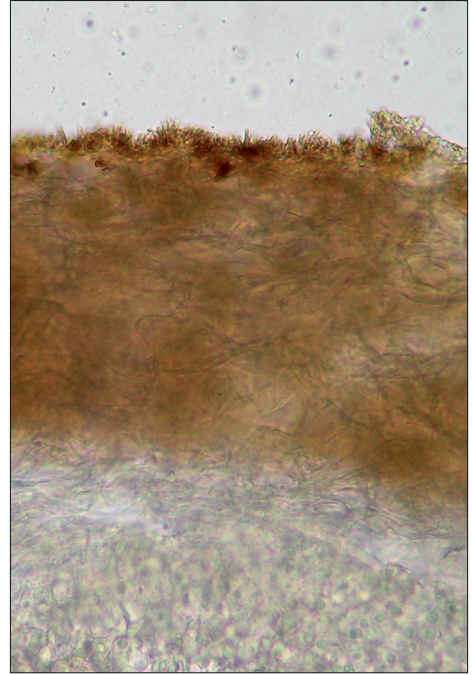
*Marasmius leoninus* in habitat.

Photo by Paolo Picciola





*M. leoninus*. Caulocystidia. Photo by Eliseo Battistin



*M. leoninus*. Pileipellis. Photo by Eliseo Battistin

## Discussion

According to SINGER's taxonomic point of view (1976) *Marasmius leoninus* Berk is to be placed in the genus *Marasmius*, section *Sicci* Singer, subsection *Siccini* Singer series *Leonini* Singer, because of the structure of the pileipellis, a hymeniderm of broom cells of the *siccus-type*, the hymenophoral trama composed of pseudoamyloid hyphae and absence of pileo-, caulo-, hymenial setae and clearly differentiated pleurocystidia.

Within the series *Leonini*, *M. leoninus* can be recognized especially on account of the orange, red orange, fulvous orange tinges of the pileus which is almost always slightly sulcate in mature specimens and the pileipellis made up of (almost) exclusively broom cells of the *siccus-type*.

By consulting PEGLER's (1983) and SINGER's (1976) descriptions one becomes acquainted with the remarkable morphological variability of such a species especially with regard to colours of the pilei, number of lamellae, aspect of the stipe and structure of the pileitrama.

The morphological differences between *Marasmius floriceps* Berk & M.A. Curtis and *M. leoninus* are really minimal, so taking into account the aforementioned variability of the latter species we reckon that it is highly probable they are conspecific.

*Marasmius opulentus* Har. Takah. (2000), a Japanese entity, looks much like *M. leoninus*, but its orange marginate lamellae, the entirely pubescent to minutely velutinous stipe, the thick-walled, irregularly cylindrical or *siccus-typed* caulocystidia with long and forked setulae permit to distinguish it from *M. leoninus*.

PEGLER (1983) reported its occurrence in the Lesser Antilles (Martinique, Dominica, Guadeloupe, Trinidad), while SINGER (1976) studied material coming from Argentina, Bolivia, Brazil, Ecuador, Mexico, U.S.A. (Florida) and Venezuela.

According to ANTONÍN (2007) and PEGLER (1977, 1986) the taxon in question doesn't occur neither in tropical Africa nor in Sri Lanka and east Africa respectively.

So far there is no mention of any find of *M. leoninus* for Europe (ANTONÍN & NOORDELOOS, 2010), Australia (GRGURINOVIC, 1997), Hawaiian islands (HEMMES & DESJARDIN, 2002), Madagascar and the Mascarenes (ANTONÍN & BUYCK, 2006).

TAN ET AL. (2009) reported the find of *Marasmius* aff. *leoninus* from Peninsular Malaysia: the described specimens presented pale orange to pale yellow pilei with a brown disc.

As far as Brazil is concerned it was picked up in Amazonas, Rio Grande do Sul (SINGER, 1965, 1976), Paraná (DE MEIJER 2006) and São Paulo (PEGLER, 1997, PUCCINELLI & CAPELARI, 2009).

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