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Lactifluus batistae (RUSSULACEAE), A NEW SPECIES FROM BAHIA, BRAZIL

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Lactifluus batistae is described here as new species from the Atlantic Forest of Northeast Brazil. It is characterized by the rather stout basidiome, straw yellow pileus, velutinous pileal surface, very distant yellowish lamellae, subglobose to ellipsoid basidiospores with isolate warts up to 0.7 µm high, trichoderm pileipellis-structure with long narrow erect cylindric-fusoid hyphae, pseudoparenchymatous subpellis and a lamella trama and pileus context that lack sphaerocytes. The type specimen of *Lactifluus caribaeus*, the phenetically most similar taxon, is also studied. Both species are assigned to *L.* subgenus *Lactifluus* section *Phlebonemi*.

Key words: *Agaricomycetes*, Neotropic, Russulales, taxonomy

***Lactifluus batistae* - uma nova espécie para a Bahia, Brasil.** *Lactifluus batistae* é descrito como uma espécie nova para a Mata Atlântica do Nordeste Brasileiro. Ele é caracterizado pelo basidioma curto, lamelas amareladas muito distantes, basidiosporos subglobosos a elipsoides, com verrugas isoladas atingindo 0.7 µm de altura, pileipelis uma tricoderme com longas hifas cilíndricas-fusóides, subpelis pseudoparenquimatosa e trama da lamela sem esferocistos. O tipo de *Lactifluus caribaeus*, a espécie feneticamente mais próxima, tembém é analisada. Ambas espécies pertencem a *L.* subgênero *Lactifluus* seção *Phlebonemi*.

Palavras-chave: Agaricomycetes, Neotrópico, Russulales, taxonomia

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Introduction

Recent molecular studies report that the genus *Lactarius* Pers. is paraphyletic and represents two genera: one contains *L.* subgenera *Russularia* (Fr. ex. Burl.) Kaufman, *Piperites* (Fr. ex. J. Kickx) Kauffman and *Plinthogali* (Burl.) Hesler & A.H. Sm.; the other genus encompasses *L.* subgenera *Lactarius*, *Lactifluus* (Pers.) Hesler & A.H. Sm.,*Lactariopsis* (Henn,) R. Heim, *Gerardii* (A.H. Sm. & Hesler) Stubbe and *L. sect.* Edules Verbeken (Buyck et al., 2008; Stubbe *et* al.; 2010). A recent proposal was accepted to change the type of *Lactarius* from *L. piperatus* (L.) Pers. to *L. torminosus* (Schaeff.: Fr.) Pers. conserving the name *Lactarius* for the first genus and *Lactifluus* (Pers.) Roussel for de second (Buyck et al., 2010; Verbeken *et* al., 2011), which comprises mostly tropical taxa.

To summarize, *Lactifluus* is a relatively common tropical taxon that is certainly abundant in the Neotropics. Recently, Sá et al. (2013) described *Lf. dunensis* Sá & Wartchow from sand dune area in the State of Rio Grande do Norte. Actually, many milk caps taxa described by Pegler and Fiard (1979), Pegler (1983), Singer et al. (1983), Singer (1984), Miller Jr. et al. (2000), Miller et al. (2002) and Wartchow and Cavalcanti (2010) might belong to this genus.

The Atlantic Forest region of Southeast Bahia is an area of variously sized fragments (Saatchi et al., 2001), some of them surrounding cocoa plantations called 'cabruca' (Sambuichi, 2002). This area is characterized by a high occurrence of plant endemism but in the northern part of this forest, the species disjunction between Atlantic and Amazon forests is very low. Our material was collected in a latosol (i.e. sandy) soil (Campos et al., 2008). Myrtaceae, Sapotaceae, Fabaceae, Lauraceae and Chrysobalanaceae are the most common families in that particular area (Mori et al., 1983; Thomas et al., 1998).

Here we describe an interesting taxon of *Lactifluus*, *Lf. batistae*, as new species from South America and discuss its taxonomic placement based on the modern systematic arrangement of this genus (Verbeken, 1998; Verbeken et al., 2011, 2012; Stubbe et al., 2012).

Materials and Methods

Presentation of basidiospore data follows the methodology proposed by Tulloss et al. (1992), slightly modified (Wartchow, 2012; Wartchow et al., 2012). Twenty-five basidiospores were measured for statistics. Abbreviations include **L**(**W**) = basidiospore length (width) average, **Q** = the length : width ratio range as determined from all measured basidiospores, and **Q** = the **Q** value averaged from all basidiospores measured. Herbaria codes follow Thiers (2012).

For Scanning electron microscopy (SEM) studies, sections were removed from dried basidiomata and mounted directly on aluminum stubs using carbon adhesive tabs. The fragments were coated with gold using a sputter coater and examined in Shimadzu SSX-550.

Taxonomy

Lactifluus batistae Wartchow, J.L. Bezerra & M. Cavalc. **sp. nov.**

PLATES 1 (A-B), 2 (A-D) and 3 (A).

MYCOBANK MB 801789

HOLOTYPE: BRAZIL. Bahia, mun. Ilhéus, Olivença, Fazenda Ferkau, 31.vii.2007 J.L. Bezerra et al. 31 (JPB 46811).

From *Lactifluus caribeus* it differs in the yellowish basidiome, lack of brown spots on pileus and context and hyphoid-cylindric suptrapellis elements.

ETYMOLOGY: in honor to Dr. Augusto Chaves Batista (1917-1967), one of the most important tropical mycologist of the world (Carneiro 1968, Singer 1968).

PILEUS up to 50 mm in diam., concave-infundibuliform, strongly umbilicate at centre, uniformly pale straw yellow, dry, distinctly velutinous; context thin, fleshy; margin entire, not striate neither sulcate, slightly involute. LAMELLAE decurrent, yellowish, rather distant, up to 3 mm broad; margin smooth, brownish purple; lamellulae frequent, one length, short, up to 5 mm long. STIPE 30 × 10 mm, slightly eccentrically attached, tapering downwards, pale yellowish, velutinous. LATEX not seen at moment of collection.

BASIDIOSPORES (6.5-)6.7-8.3(-8.5) × (5.2-)5.5-6.5(-7) µm (**L** = 7.5 µm, **W** = 6.1 µm, **Q** = (1.10-)1.16-1.46(-1.54), **Q** = 1.25), broadly ellipsoid to ellipsoid,

occasionally subglobose; ornamentation amyloid, finely verrucose with each wart ranging from 0.5-0.7 (-1.4) µm high, mainly isolate, but sometimes connected by fine lines; hilar appendix narrowly obtuse to subconical to conical; plage distinctly amyloid. BASIDIA 70-85 × 7.5-8.5 µm, slender clavate, bearing four to occasionally two sterigmata, each up to 8 µm long. PSEUDOPLEUROCYSTIDIA frequent, 4.7-8 µm wide, with pale brownish contents, thin-walled, arising deeply from the hymenophoral trama. LAMELLA edge with slender clavate marginal cells. True cystidia absent. Subhymenium with exclusively narrow hyphae. HYMENOPHORAL TRAMA lacking sphaerocytes; filamentous hyphae 2-6 µm wide, plentiful; lactiferous hyphae common, up to 6.5-8 µm wide, frequently having an irregular orientation and then diverging from trama forming projecting pseudocystidia. PILEUS CONTEXT filamentous hyphae 3-8 µm wide, plentiful, strongly interwoven; lactiferous hyphae frequent, up to 7 µm wide, straight and occasionally branching; sphaerocytes absent. PILEIPELLIS suprapellis a trichoderm up to 100 µm thick, hyphae erect, plentiful, pale pigmented, thin-walled or somewhat thickening (wall up to 0.5 µm), (sub)cylindric, obtuse, subacute to very infrequently subcapitate, 20-80 × 4-6 µm; subpellis composed of plentiful radially oriented hyphae, 3-5 µm wide, pale yellowish brown; subpellis pseudoparenchymatous, composed of spherocytes, 12-30 × 11-28 µm. Clamp-connections absent in all tissues examined.

HABITAT: on sandy soil near to members of *Fabaceae* subfam. *Caesalpinoideae* and other in Atlantic Forest fragment.

DISTRIBUTION: only known from the type locality.

The lack of true cystidia and the basidiospore ornamentation composed of isolated warts, never forming an incomplete reticulum and the hymenophoral trama mainly composed of narrow hyphae lead *Lf. batistae* to small set of taxa classified in *Lf.* sect. *Phlebonemi* (R. Heim ex Verbeken) Verbeken (Verbeken, 1998). Among the taxa this group, our new species is characterized by its dry and velvety, pale yellowish basidiome, very distant lamellae, broadly ellipsoid to ellipsoid basidiospores with distinct amyloid plage, and the pileipellis being a palisade with a pale yellowish-brown suprapellis made of erect mostly hyphoid-cylindric elements.

The most similar taxon is *Lactifluus caribeus*, differs mainly in the whitish basidiomes, presence of brownish spots and pileipellis structures (Pegler and Fiard, 1979). See notes below.

Taxa of *Lf. sect. Phlebonemi* have an apparent Gondwanan distribution, with members occurring in Africa and the Neotropics. The other described taxa in this section segregate from *L. batistae* as follow:

Lactifluus nonpiscis (Verbeken) Verbeken was described from Zambia and Zimbabwe and is characterized by a whitish, cream-yellow to yellowish pileus (which is similar to *L. batistae*). However, it differs in the narrower (closer?) lamellae, larger basidiospores with non-isolated warts (8.3-10 × 6.1-7.2 µm, L = 9.2 µm, W = 6.7 µm) and capitate pileipellis elements (Verbeken, 1996, 1998; Verbeken *et al.*, 2000).

Lactifluus angustus (R. Heim & Gooss.-Font.) Verbeken from the Republic Democratic of Congo differs in the vivid ochraceous orange pileus colour, brown colour change of the context and dense lamellae (Heim, 1955; Verbeken, 1998).

Lactifluus phlebonemus (R. Heim & Gooss.-Font.) Verbeken differs in the brown pileus with sinuous veins and strongly wrinkling surface, narrow and crowded lamella and a pileipellis a lampropalisade with elements of suprapellis thick-walled to 1 µm (Heim, 1955; Verbeken, 1998; Verbeken et al., 2000). *Lactifluus arsenei* (R. Heim) Verbeken is reported as similar to that species, but the latex is referred as unchangeable, turning the placement of this species in the *Phlebonemi* uncertain (Verbeken, 1998).

Type study on *Lactifluus caribaeus* (Pegler) Verbeken

PLATES 1 (C-D), 2 (E-F) and 3 (B).

ADDITIONAL EXTRALIMITAL MATERIAL EXAMINED: ***Lactarius caribeus***-MARTINIQUE. Reserve de La Caravelle, 5 m alt., 26.viii.1976, J.P. *Fiard 818A* (K 173239, **holotype!**).

Notes: The analysis of the holotype of *Lf. caribeus* revealed basidiospores somewhat similar in size and shape to *Lf. batistae*, somewhat falling in the same range [7-8.4(-8.7) × (5.1-)5.5-6.4(-6.6) µm, **L** = 7.7 µm, **W** = 5.9 µm, **Q** = (1.16-)1.20-1.42(-1.50), **Q** =

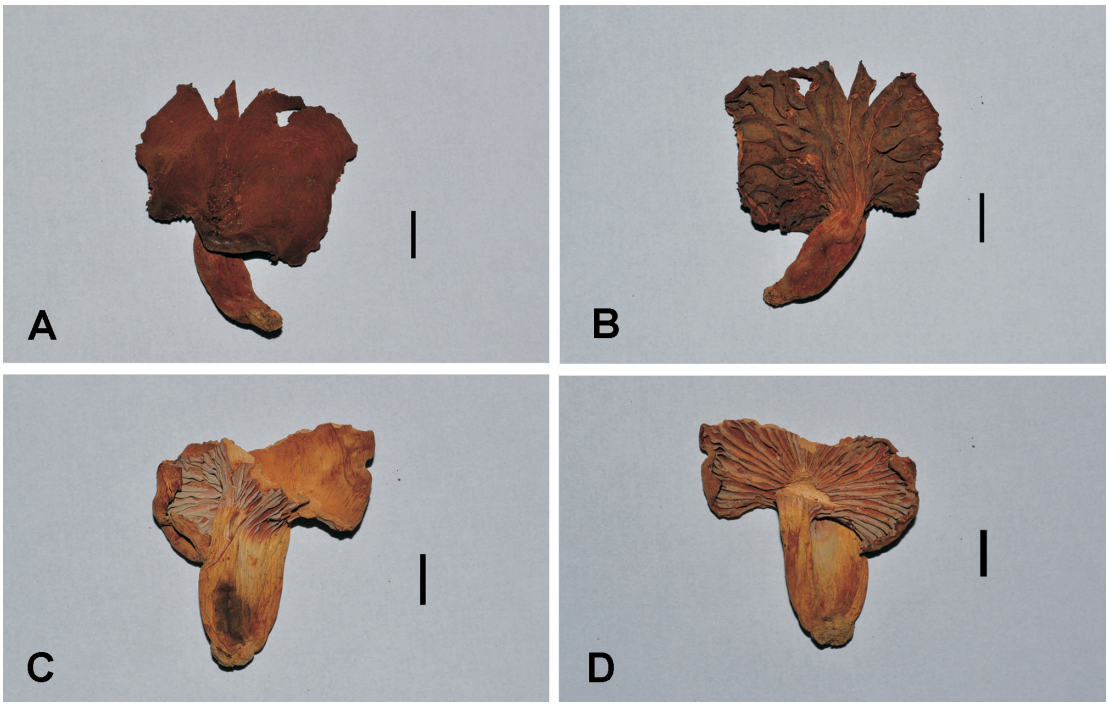

Plate 1. Exsiccates. A–B. *Lactifluus batistae* (holotype). A. Pileus surface. B. Hymenium. C–D. *Lactifluus caribaeus* (holotype). C. Pileus surface. D. Hymenium. Bars = 10 mm. Photo by F. Wartchow.

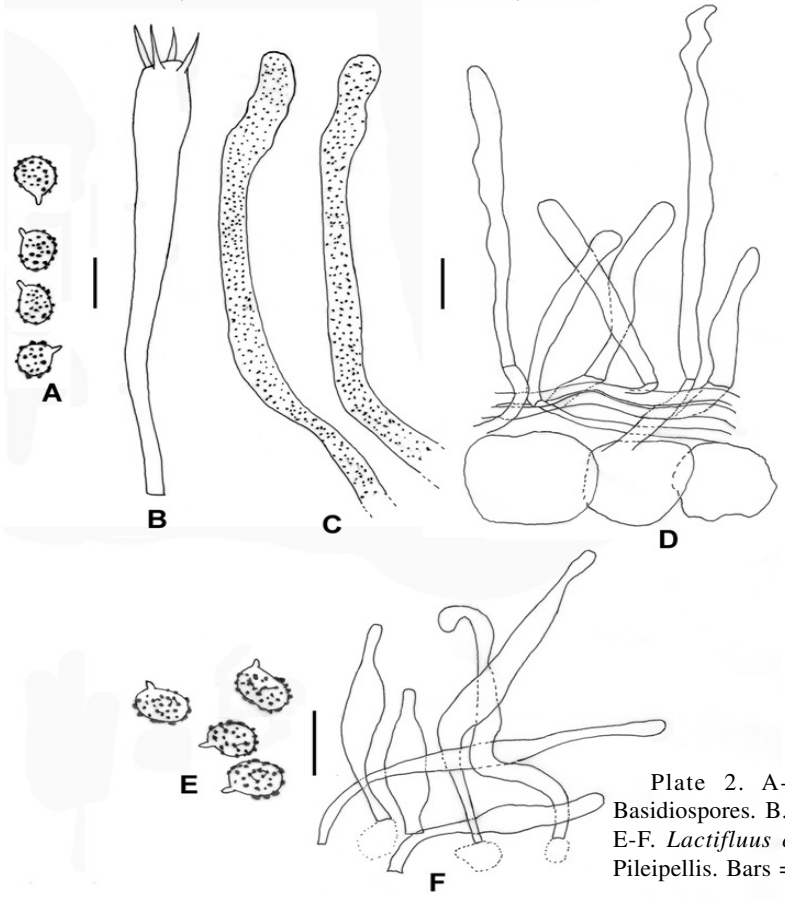

Plate 2. A-D. *Lactifluus batistae* (holotype). A. Basidiospores. B. Basidium. C. Pseudocystidia. D. Pileipellis. E-F. *Lactifluus caribaeus* (holotype). E. Basidiospores. F. Pileipellis. Bars = 10 µm.

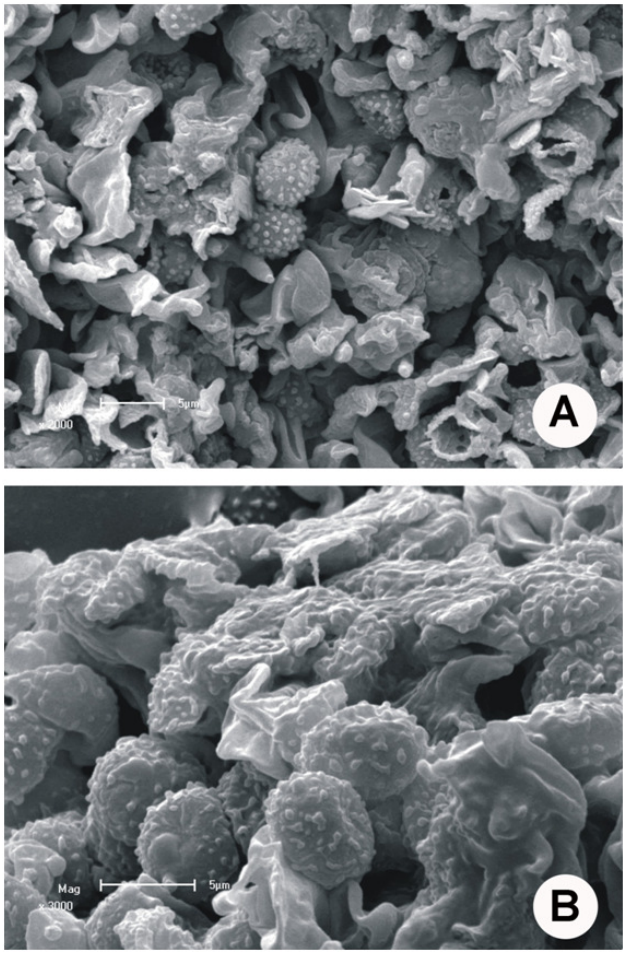

Plate 3. SEM of the basidiospores. A. *Lactifluus batistae*. B. *Lactifluus caribaeus*.

1.31], with warts reaching 0.5 µm high, and sometimes connected by fine lines, although several basidiospores have isolate ones. Other similarity is the lack of sphaerocytes in the tramal portions of the basidiome. The pileipellis (although subpellis difficult to discern due the insufficient rehydration of the holotype) shows the suprapellis composed by very common fusoid elements rather than cylindric as occur in *Lf. batistae*, which is the most prominent microscopic feature for segregate it from our new species. As observed in *Lf. batistae* the suprapellis elements are somewhat thin walled, very unusual for the genus.

Since some features of both taxa, i.e. the dry and velvety pileus surface and distribution in the tropics, are diagnostic features for *Lactifluus*, we increase here the diversity of this group in the Neotropic describing a new species for that genus.

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