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## *Inocybe lepidosparta* (Agaricales: Basidiomycota): a new species from Pernambuco, Brazil

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### ABSTRACT

The genus *Inocybe* (Inocybaceae) has a wide distribution, with species occurring in both temperate and tropical zones. Despite being a well known ectomycorrhizal genus, descriptions of species are infrequent in the Neotropics and poorly documented. Only five species are well documented from Brazil and studies on this genus are needed. This report describes *I. lepidosparta* as a new species from tropical montane forest ('brejo de altitude') of Pernambuco, Brazil. The usual methodology for analysis of agaric fungi was followed and colour codes are annotated based on a standard colour chart; the microscopic examinations were made using 3%–5% KOH and stained with Congo red, and 30 basidiospores were measured for statistics. The new species is characterised by its brownish squamulose pileus, scattered squamulose-fibrillose stipe, nodulose basidiospores 9–11.5 × (5.8–) 6.5–8.5 μm, large metuloid pleurocystidia 68–93 × 13–25 μm and absence of caulocystidia. *Inocybe amazonensis*, *I. epidendron* and *I. paralanuginosa* are compared with our new species and differ in several features; for example, pileus surface (fibrillose or squamulose), stipe colour, basidiospores size and characteristics of the metuloids (size, shape and wall thickness).

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## Introduction

*Inocybe* (Fr.) Fr. is the type genus of Inocybaceae, comprising about 500 (Kirk et al. 2008) to 700 (Matheny et al. 2009) widespread species. However, recent works (e.g. Jabeen et al. 2016; Ullah et al. 2018) estimated 735 species, while Naseer et al. (2017) extrapolated to more than 850. Most species occur in temperate zones, but Matheny et al. (2009) counted at least 153 species from tropics and the Southern Hemisphere. This number increased considerably when Matheny & Bougher (2017) recognised 137 species from Australia, of which 101 were new to science and 121 known only from this country.

For members of *Inocybe* s.l., the key character for subgeneric delimitation is the presence of metuloid pleurocystidia (Matheny et al. 2002; Matheny 2005, 2009) and the occurrence of nodulose or smooth basidiospores, presence or absence of cortina, stipe entirely pruinose or fibrillose or woolly-floccose and totally elongate or bearing a marginate bulb,

are decisive for infrageneric placement of the species (Matheny 2009; Ryberg et al. 2010). Even so, after previous classification of *Inocybe* by Singer (1986) and Kobayashi (2002), recent molecular studies performed by Matheny et al. (2009) and Matheny & Bougher (2017) recognised seven major clades for Inocybaceae. Two of them, clade Auritella was erected to the genus *Auritella* Matheny & Bougher while clade Mallocybella was placed in the genus *Tubariomyces* Esteve-Rav. & Matheny (Matheny & Bougher 2006; Alvarado et al. 2010).

For a long time *I. violaceolamellata* Rick and *I. hyperythra* Rick were the only two well documented species from Brazil (Singer 1953; Wartchow et al. 2014), although recently three additional taxa were described: *I. curvipes* P. Karst. and *I. australilacina* Wartchow & R.M. Silveira from the State of Rio Grande do Sul, South Brazil (Cortez & Coelho 2005; Wartchow et al. 2014), and *I. martinica* Pegler known from Pernambuco, Northeast Brazil (Wartchow et al. 2008).

Since *Inocybe* is a well known ectomycorrhizal genus (Smith & Read 2008), and descriptions of species are infrequent in the Neotropics and poorly documented over the years, studies on this genus are needed. Thus, we describe a new species of *Inocybe* with squamulose pileus and mostly scattered fibrillose-squamulose stipe from tropical montane forest ('brejo de altitude') in Pernambuco.

## Materials and methods

Data about the collection site was briefly described by Sá & Wartchow (2016). Microscopic examinations were made on material mounted in 3%–5% KOH and stained with Congo red. Colour codes are annotated OAC (Outline Color Chart 2004). Presentation of basidiospore data follows the slightly modified methodology proposed by Tulloss et al. (1992). Measurements and statistics are based on 30 spores. Abbreviations include: L (W), average basidiospore length (width); Q, the length:width ratio range as determined from all measured basidiospores; and Qm, the Q value averaged from all basidiospores measured. The holotype is deposited at JPB (Thiers 2018).

## Taxonomy

*Inocybe lepidosparta* Wartchow, sp. nov.

Figures 1–2.

Mycobank number: MB 826935

*Type.* Brazil, Pernambuco, Caruaru, Brejo dos Cavalos, Parque Municipal Professor João Vasconcellos Sobrinho, 08°21'43" S, 36°02'10" W, 859 m, 29.7.2010, *F. Wartchow 31/2010* (JPB 63213 **holotype!**).

*Etymology.* From Greek ('lepidō' = squamules and 'sparta' = scarce); referring to the scarce squamules over the stipe.

Pileus 11 mm in diam. and 7.5 mm high when young, campanulate, then 15 mm in diam., convex umbonate in older ones; surface brownish (OAC 722) then slightly darkening (OAC 700), squamulose at centre showing the pale cream (OAC 805) context then radially squamulose-fibrillose, with free tips; margin translucent striate up to 5 mm long; context pale cream, very soft. Lamellae adnexed with sometimes short decurrent lines, relatively distant; pale brownish (OAC 747–748) with concolorous, more or less

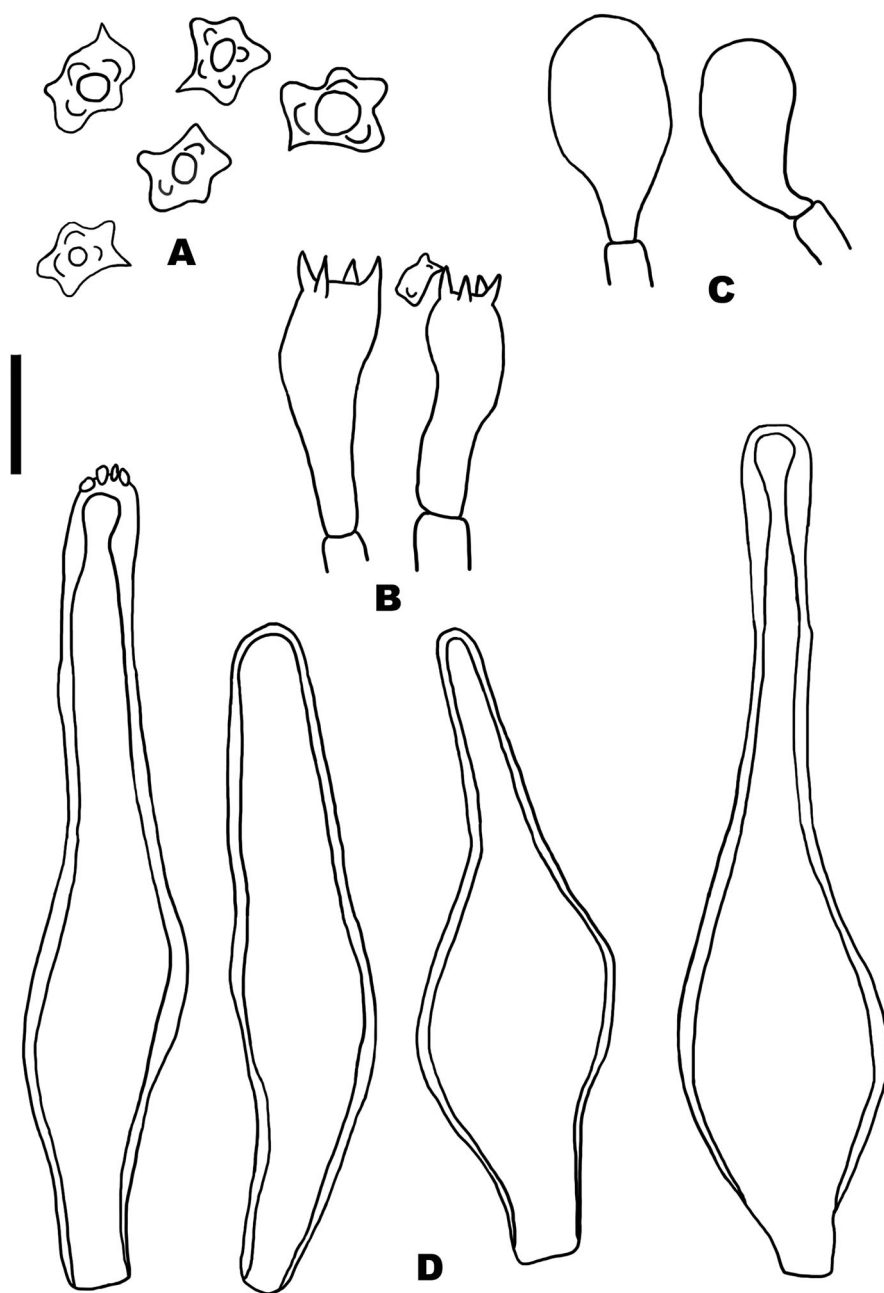


**Figure 1.** *Inocybe lepidosparta* (holotype). Basidiomes in situ. Scale bar = 10 mm. Photo by F. Wartchow.

crenulate edge; lamellulae very common, the shortest ones abruptly truncate and the longest rounded obtuse. Stipe (22–) 31–40 × 2–3 mm, equal, cylindrical, buff (OAC 776–777); scattered fibrillose-squamulose ornamentations over entire length, pruinose only at very apex near lamellae; context pale cream, longitudinally fibrillose. Odour indistinct.

Basidiospores 9–11.5 × (5.8–) 6.5–8.5 μm, L = 10.4 μm; W = 7.3 μm; Q = (1.21–) 1.28 – 1.50 (–1.58), Qm = 1.39; brownish in KOH, colourless, broadly ellipsoid to ellipsoid, smooth, thin-walled, adaxially concave, with 9–12 rounded obtuse nodules; apiculus small, sub-lateral; contents including one large guttule. Basidia 26–32 × 10–11 μm, clavate, with 2–4 sterigmata. Pleurocystidia metuloidal, 68–93 × 13–25 μm, abundant, hyaline, lageniform, thick-walled 1.5–2 μm, sometimes thickening to 4.5 μm near apex, stramineous, apex sometimes incrustated by crystals, mostly dissolved in KOH. Cheilocystidia similar to pleurocystidia. Paracystidia e.g. 20–25 × 11.5–14 μm, broadly clavate, thin-walled, hyaline, frequent between cheilocystidia. Stipitipellis composed of brownish yellow sometimes paler periclinal hyphae 5–10 μm, sometimes anticlinal, wall occasionally thickening to 0.7 μm, sometimes incrustated; caulocystidia absent. Lamella trama regular, made of variously inflated hyphae 6.5–16 (–20) μm, thin-walled, pale. Pileipellis a cutis of radially oriented hyphae 5–12 (–24) μm, yellowish brown pigmented, frequently incrustated, thin-walled, in the region of the squamules they turn anticlinal. Clamp connections present in all tissues examined.





**Figure 2.** *Inocybe lepidosparta* (holotype). **A**, Basidiospores; **B**, basidia; **C**, paracystidia; **D**, hymenial metuloids. Scale bar = 10  $\mu$ m.

*Known distribution.* Known from type locality.

*Habitat.* Scattered on the ground in secondary tropical montane forest ('brejo de altitude') with trees including putative ectomycorrhizal members of Nyctaginaceae, Euphorbiaceae, Fabaceae subfam. Caesalpinioideae and others (Tavares et al. 2000).

## Discussion

*Inocybe lepidosparta* is characterised by the brownish fibrillose-squamulose pileus and the scattered fibrillose-squamulose stipe, pale brown lamellae, nodulose basidiospores  $9\text{--}11.5 \times (5.8\text{--}) 6.5\text{--}8.5 \mu\text{m}$  and absence of metuloid caulocystidia.

In the Neotropical region some other species have similar basidiome colour and decoration of the stipe surface, for example, *I. amazonensis* Singer, *I. epidendron* Matheny, Aime & T.W. Henkel and *I. paralanuginosa* Pegler.

*Inocybe amazonensis* from Amazonas, Brazil and Guiana Shield differs in the fibrillose pileus that breaks up into appressed scurfy scales with age, more pallid stipe with minutely white floccose apex and white fibrillose below, and distinctly smaller basidiospores  $6.5\text{--}7.8\text{--}8.5 \pm 0.57 \times (5.0\text{--}) 5.5\text{--}6.0\text{--}6.5 \pm 0.45 \mu\text{m}$ ,  $Q = (1.08\text{--}) 1.14\text{--}1.29\text{--} 1.42 \pm 0.09$  (Singer et al. 1983; Matheny et al. 2012).

*Inocybe epidendron* from the Guiana Shield shares the brownish squamulose pileus, but differs in the hygrophanous pileus, silky fibrillose nowhere pruinose stipe, which is vinaceous brown with a silvery white superficial covering to light greyish vinaceous or avellaneous, smaller basidiospores  $6.5\text{--}7.2\text{--}8 \times 5\text{--}5.8\text{--}6 (-6.5) \mu\text{m}$ ;  $Q = 1.1\text{--}1.2\text{--}1.4$ , and occurring on trunks of *Dicymbe* or rarely on woody debris (Matheny et al. 2003, 2012).

Both *Inocybe paralanuginosa* from Guadeloupe and *I. lepidosparta* possess remarkable thick-walled metuloids in comparison to other species cited above. However, the shape of metuloids and wall thickness are quite different in *I. paralanuginosa*. The Antillean entity differs in the shorter ventricose-fusoid cystidia  $45\text{--}62 \times 20\text{--}25 \mu\text{m}$  and walls ranging to  $5 \mu\text{m}$  thick. Additionally the pileus is light ochraceous-salmon, the basidiospores are somewhat shorter  $8\text{--}10 \times 6\text{--}8.5(-9.5) \mu\text{m}$ , ( $L = 9.4 \mu\text{m}$ ;  $W = 7.2 \mu\text{m}$ ;  $Q_m = 1.30$ ) and caulocystidia are confined to the upper portion of the stipe (Pegler 1983).

## Disclosure statement

No potential conflict of interest was reported by the authors

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