
***Scleroderma minutisporum*, a new earthball from the Amazon rainforest**

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Alfredo DS, Leite AG, Braga-Neto R, Cortez VG, Baseia IG 2012 – *Scleroderma minutisporum*, a new earthball from the Amazon rainforest. Mycosphere 3(3), 294–299, Doi 10.5943/mycosphere/3/3/4

A new species of earthball, *Scleroderma minutisporum* was found in the Brazilian Amazon. The specimen, collected in Adolpho Ducke Forest Reserve, Amazonas State, Brazil is named because of the small size of its basidiospores. A description, photographs, and taxonomical comments are provided, and the holotype is compared with related taxa.

Key words – Basidiomycota – Boletales – Gasteromycetes – Neotropics – Taxonomy

Article Information

Received 23 March 2012

Accepted 11 April 2012

Published online 11 May 2012

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Introduction

Scleroderma Pers. is a genus of earthballs with a worldwide distribution, from tropical to temperate areas. The taxonomy of the genus has been based mostly on basidiospore features, as well details of the structure and dehiscence of the peridium (Guzmán 1970). Basidiospore features such as size and pattern of the ornamentation were used by Guzmán (1970) and Sims et al. (1995) to produce keys in a worldwide basis. Both authors emphasized the importance of this morphological feature in the taxonomy of this group of fungi. Recent molecular studies supported the accommodation of *Scleroderma* in the Boletales (Binder & Bresinsky 2002) and confirmed that ornamentation pattern is, in fact, an informative character for the genus (Phosri et al. 2009, Nouhra et al. 2012).

In a checklist of gasteroid fungi from

Brazil, Trierveiler-Pereira & Baseia (2009) reported fourteen species of *Scleroderma*, mostly recorded from southern and northeastern regions of the country. From the Brazilian Amazon, only *S. stellatum* Berk.; has been registered, although five species were cited from Venezuelan Amazon by Dennis (1970). Several species of *Scleroderma* that were reported from the Neotropical region are known to be exotic and introduced, especially with *Pinus* and *Eucalyptus* shoots (Giachini et al. 2000). However, native species of earthballs have been recorded from different autochthonous vegetation types in Brazil (Baseia & Milanez 2000, Gurgel et al. 2008, Cortez et al. 2011). In the present study, we provide the description of a new species in the genus *Scleroderma* from native Amazon rainforest, as part of a survey of gasteromycetes in progress (Leite et al. 2011, Trierveiler



Figs 1–2 – *Scleroderma minutisporum*. **1** Amazon forest, Ducke Forest Reserve (type locality). **2** Mature basidioma (holotype).

-Pereira et al. 2012, Alfredo et al. 2012).

Methods

Basidiomata were collected during the rainy season of 2008 (January), in the Adolpho Ducke Reserve Forest, Manaus, AM, Brazil (Fig. 1). Fresh specimens were photographed and examined in the field. Macroscopic characters were described following observation of fresh and dried material. Microscopic observations were made from sections of peridium and gleba mounted in 5% KOH, in lactophenol (Guzmán et al. 2004) on glass slides and observed under an Olympus BX41 light microscope (LM). Fifty randomly selected basidiospores were measured (including the ornamentation) under the LM at 1000x magnification. The basidiospores were examined under a Philips XL20 scanning electron microscopy (SEM), following Baseia & Calonge (2008). Colors were based on Kornerup & Wanscher (1978) and voucher specimens are deposited in the INPA Herbarium.

Results

Scleroderma minutisporum Baseia, Alfredo & Cortez, **sp. nov.**

Mycobank 564898
(<http://www.mycobank.org>).

Etymology – Named in reference to the small size of the basidiospores.

Diagnosis – Basidiomata 18–20 mm diam., fresh peridium <1 mm thick, with stellate dehiscence and basidiospores 4–7 µm diam. (including the reticulate ornamentation).

Basidiomata epigeous, sessile, subglobose, 18–20 mm high, 16–17 mm broad; peridium subcoriaceous, three layered, thin, when fresh about 0.8–1 mm thick, when dry about 0.4–0.6 mm thick, upper portion opening by stellate dehiscence that produces 5–6 irregular lobes, basal portion with scarce rhizomorphs; exoperidium reddish brown (KW 8E7), velutinous to asperulate, sub-coriaceous, composed of hyphae 3–6 µm diam., clamp connection present, yellowish brown in 5% KOH; mesoperidium inconspicuous, hyphae hyaline to pale yellow in 5% KOH, mucilaginous substance present; endoperidium greyish orange (KW 5B3), cellular, formed by

15–40 × 50–90 µm diam. hyphae, hyaline, thick-walled, pale yellow in 5% KOH; gleba cottonose, greyish brown (KW 6D3); basidiospores 4–7 µm diam. under LM and 3.8–7.3 µm diam. under SEM, irregularly reticulate, yellowish brown in 5% KOH, usually mixed with remains of the cellular endoperidium.

Habitat – Solitary on soil, rhizomorphs aggregated with roots of native trees (Fig. 1).

Known distribution – Amazon rainforest, Brazil.

Material examined – Brazil, Manaus, Adolpho Ducke Forest Reserve, on soil, 28 January 2008, leg. R. Braga-Neto, RBN 664 (INPA 220507, **Holotype**).

Discussion

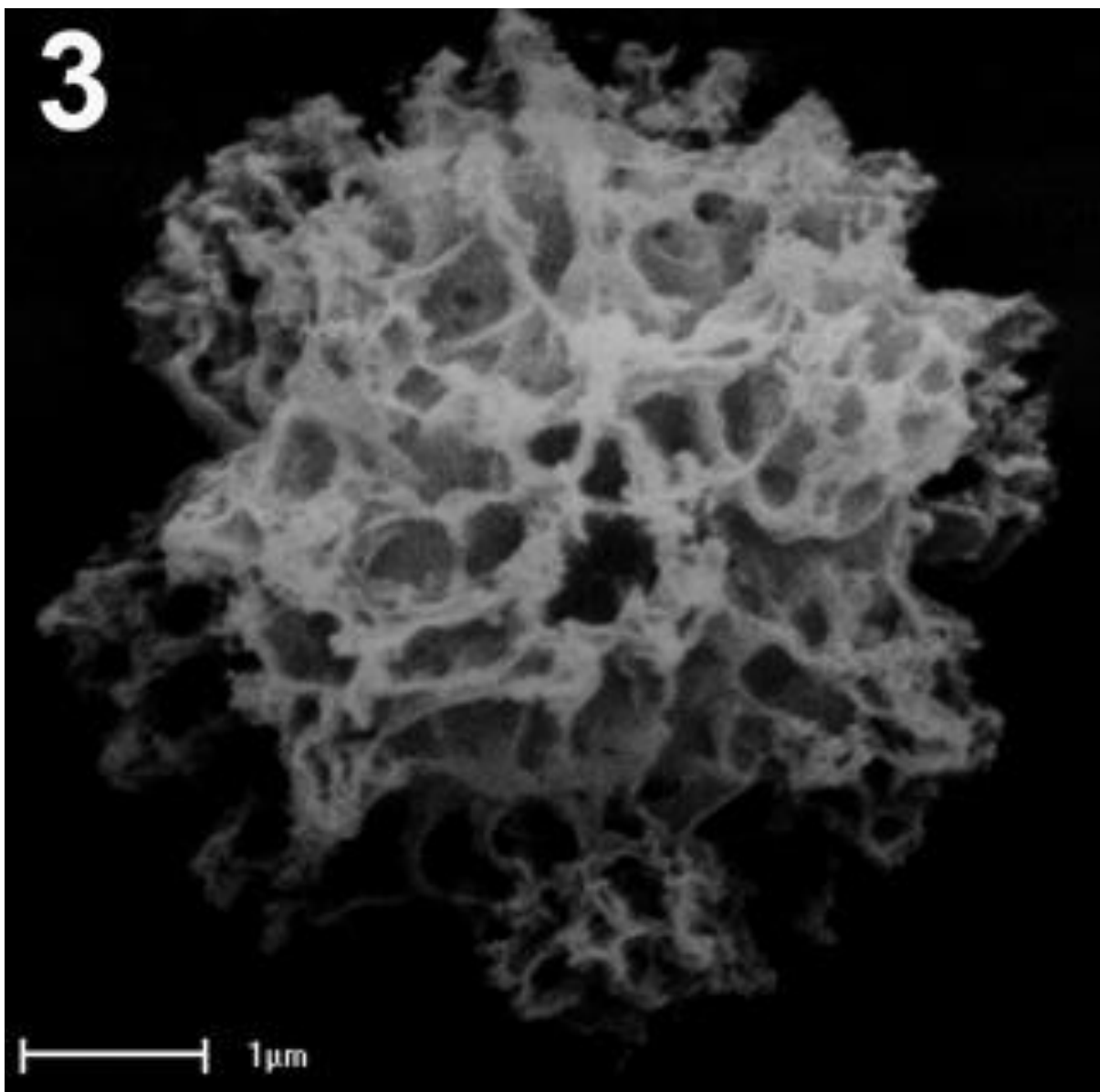
Scleroderma minutisporum exhibits distinct morphological features such as small basidiomata (<20 mm diam.), thin peridium (<1 mm thick – Fig. 2), and the smallest reticulate basidiospores observed to date in the genus (4–7 µm diam. – Fig. 3). Studies conducted by Guzmán (1970) and Guzmán et al. (2004) on the holotypes of *S. sennamariense* Mont., *S. bermudense* Coker and *S. stellatum* demonstrate that they also have small basidiospores less than 5 µm in diameter. The ornamentation pattern observed in *S. minutisporum* also differs from those found in other species. (Table 1).

Scleroderma bermudense, *S. sennamariense* and *S. stellatum* present echinulate basidiospores and are included in *Scleroderma* Sect. *Sclerangium* (Guzmán 1970). According to Guzmán (1970) and Sims et al. (1995), representatives of the genus that exhibit a reticulate ornamentation pattern are classified in *Scleroderma* Sect. *Scleroderma*, with *S. dictyosporum* Pat. as the member with smallest basidiospore size (Table 1). The set of morphological data show that *S. minutisporum* is a species distinct from others in the genus and, based on the reticulate ornamentation pattern, this new taxon belongs in Sect. *Scleroderma*, making it the species with the smallest basidiospores in this gasteroid genus.

Recent biochemical studies have suggested the healing potential of certain polysaccharides synthesized by *Scleroderma nitidum* Berk. (Nascimento et al. 2012). The

Table 1 Basidiospore characters of *Scleroderma minutisporum* compared to similar species.

Species	Ornamentation	Spore size (μm)	References
<i>S. bermudense</i>	Strongly echinulate	5–10	Guzmán et al. (2004)
<i>S. dictyosporum</i>	Strongly and strikingly reticulate	9–14	Guzmán (1970)
<i>S. minutisporum</i>	Irregularly reticulate	4–7	Present work
<i>S. sinnamariense</i>	Echinulate to finely reticulate	7–9	Guzmán & Ovrebo (2000)
<i>S. stellatum</i>	Strongly echinulate	5–9	Guzmán et al. (2004)

**Fig. 3** – *Scleroderma minutisporum*. Basidiospore under SEM.

potential of bioproducts derived from these species is enormous and thus, the continuing studies on the species diversity are essential to both basic and applied research.

Acknowledgements

The first author would like to thank CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brazil) for providing the Master's scholarship and financial support. The authors also acknowledge Dr. Carlos Franciscan, Curator of INPA Herbarium, for loan of exsiccates and the CTPETRO-INFRA and FINEP/LIEM for their collaboration with scanning electron microscopy.

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