



Delitschia gigaspora var. *pescanii*: a new variety of coprophilous fungus from Brazil

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Calça FJS, Delpont M, Xavier-Santos S 2015 – *Delitschia gigaspora* var. *pescanii*: a new variety of coprophilous fungus from Brazil. *Mycosphere* 6(1), 122–126, Doi 10.5943/mycosphe/6/1/12

Abstract

This study presents a new variety of *Delitschia gigaspora*, called *pescanii*, that was obtained in moist chamber cultures of cow dung collected in the Parque Estadual da Serra de Caldas Novas (PESCAN), a conservation unit of the Cerrado bioma (Brazilian Savanna) in the State of Goiás, Brazil. The study also brings the first record of the genus *Delitschia* for Brazil. A taxonomic description, illustrations, and a dichotomous key for the known varieties of the species are provided.

Key words – Ascomycota – Brazilian Savanna – Delitschiaceae – dung fungi

Introduction

Herbivore dung is an excellent substrate for an ample variety of species of coprophilous fungi (Lundqvist 1972, Bell 1983, 2005, Richardson 2001). The genus *Delitschia*, proposed by Auerswald in 1866, is characterized by fimicolous species, with pseudothecia immersed to partially immersed in the substrate, bitunicate and non-amyloid asci and dark brown bicellular ascospores, that connected by a septum with germ slit and surrounded by a gelatinous sheath (Luck-Allen & Cain 1975, Doveri 2004, Bell 2005). Coprophilous species are mainly found in herbivore dung, preferably in bovine dung. According to Doveri (2011), representatives of that genus greatly prefer bovine dung as substrate. Such preference shows that the genus *Delitschia* is a very demanding genus as for the substrate where it occurs (Lundqvist 1972). With regard to the substrate, the species of coprophilous fungi were subdivided into less demanding fungi, that are able to occur in more than one type of dung, as in dung of monogastric animals in general, such as horse, rabbit, and more demanding, which grow only in a specific type of substrate, restricting themselves to one or a few dung types.

The species *D. gigaspora*, described by Cain (1934), is characterized by large fusiform spores (82–88 × 22–25µm), with constricted septum and cells that are susceptible to separation. Two varieties were known so far, namely *D. gigaspora* var. *gigaspora* Cain (1934) and *D. gigaspora* var. *ceciliae* (Doveri 2004). The *ceciliae* variety is considered of rare occurrence, having been found on horse dung in Italy. In Brazil, the genus had never been recorded. This study brings the first record of the genus *Delitschia* for Brazil and propose a new variety of the species *D. gigaspora* to the science.

Materials & Methods

Cow (*Bos taurus* L.) dung was collected in a pasture area of the Parque Estadual da Serra de Caldas Novas (PESCAN), a conservation unit of the Cerrado bioma (Brazilian Savanna), located at 17°43' and 17°53' S and 42°39' and 42°46' W, between the municipalities of Caldas Novas and Rio Quente, in the State of Goiás, Brazil (Figure 1). The collected material was incubated in moist chamber, in accordance with the methodology proposed by Lundqvist (1972), Bell (1983) and Doveri (2004).

Found pseudothecia were examined and photographed under stereo and optical microscope, via preparation of histological slides with a drop of sterilized water and stained with lactophenol cotton blue, when necessary, to highlight hardly visible structures and to provide measuring of the microstructures, by following the methodology of Bell (1983). The holotype, preserved in wet way (alcohol 70%) as well as in permanent slides, were deposited in the Herbarium of the Universidade Estadual de Goiás (HUEG), with registration number HUEG 9204.

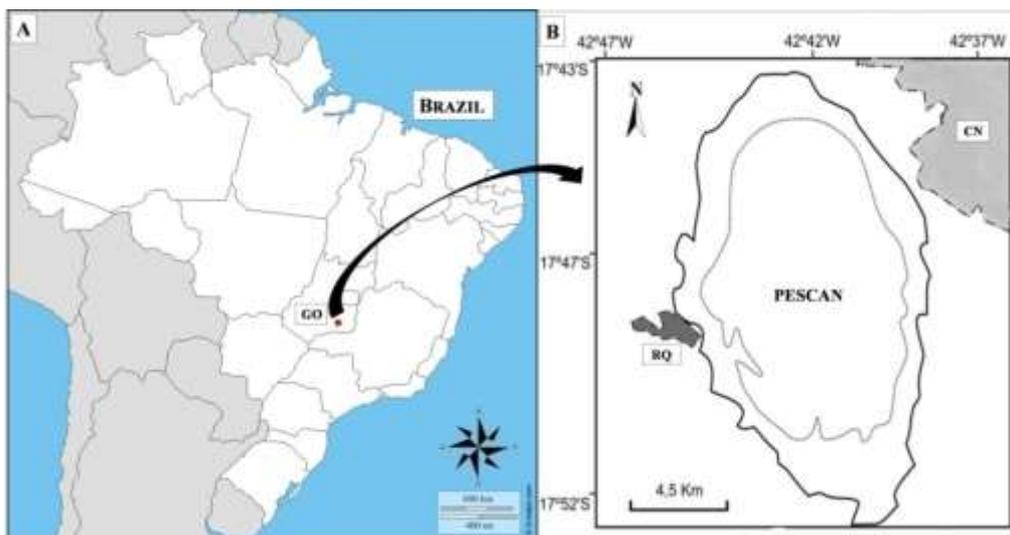


Fig. 1 – Localization of the Parque Estadual da Serra de Caldas Novas (PESCAN). **A:** The red dot shows the localization of PESCAN in Brazil and in the State of Goiás (GO). **B:** Localization of the park between the cities of Rio Quente (RQ) and Caldas Novas (CN). Maps modified from www.d-maps.com and Oliveira (2009).

Results & Discussion

Taxonomy

Delitschia gigaspora var. *pescanii* F.J.S Calaça, S. Xavier-Santos & M. Delpont, *n. var.* (Figs. 2 and 3).

MycoBank: 809411

Etymology: From Latin, *pescanii*, by reference to the variety's collecting place, the Parque Estadual da Serra de Caldas Novas (PESCAN).

Pseudothecia glabrous, with dark walls, partially immersed in the substrate, 500–1000 × 500–550 μm. Asci eight-spored, bitunicate, club to cylindrical, with slightly sharp apex, 500–600 × 40–50 μm, with peridium composed of two layers (endoperidium and exoperidium) formed of pseudoparenchymatous tissue, the exoperidium formed of epidermoid cells, 5–10 × 10–20 μm, pale to slightly brown color. Ascospores elliptical, 80–85(–87) × 25–30 (–35) μm, obliquely uniseriate, with slightly conical to oblique apex; septate with transverse and unconstricted septum. Ascospore cells not separable at maturity, each one having a de Bary bubble and a germ slit oblique in relation to the cell axis, olive-greenish brown, at maturity, surrounded with a clear gelatinous sheath. Pseudoparaphyses long (usually exceeding the length of asci) and filiform.

Distribution – known only from the type locality.

Material examined – Brazil, Goiás State, Caldas Novas, Parque Estadual da Serra de Caldas Novas, 18/XII/2013, obtained from cow (*Bos taurus* L.) dung culture in moist chamber, 29 January 2014, Calaça & Xavier-Santos FJSC31 (Holotypus HUEG 9204).

Notes – Pseudothecia of *D. gigaspora* var. *pescanii* (Figs. 2 and 3) emerged at the end of the first week of incubation, remaining for three consecutive days in the culture, no new emergence being seen after that period.

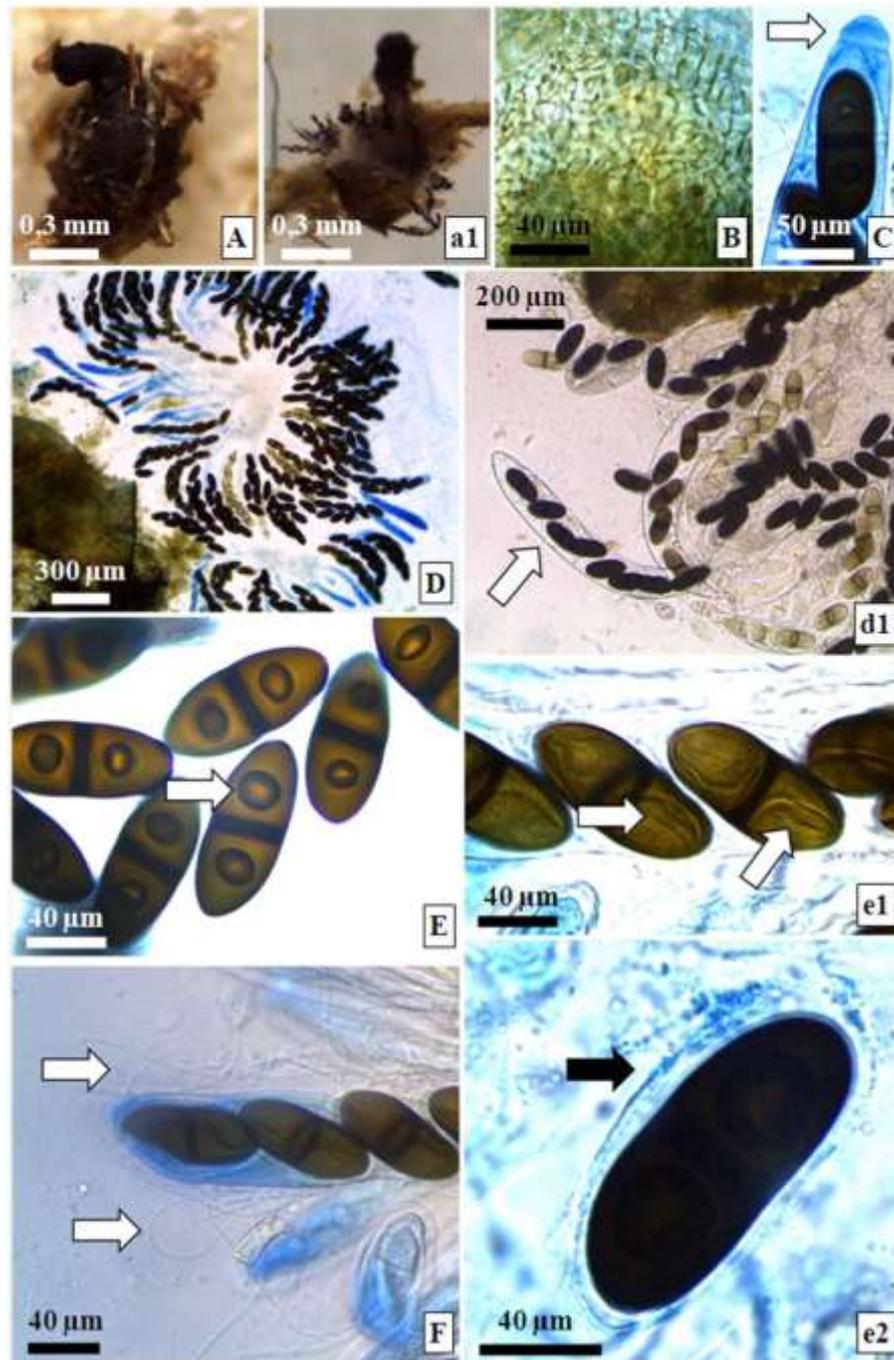


Fig. 2 – *Delitschia gigaspora* var. *pescanii*. A-a1: Pseudothecium under stereo microscope. B: Neck peridium (exoperidium) under optical microscope, highlighting the epidermoid texture. C: Detail of the ascus apex (arrow), stained with cotton blue. D-d1: Format of the asci and the organization of the ascospores (arrow). E: Detail of the ascospores, highlighting the de Bary bubbles (arrow). e1: Germ slit in mature ascospores (arrows). e2: Detail of the gelatinous sheath surrounding a mature ascospore (arrow). F: Pseudoparaphyses (arrows).

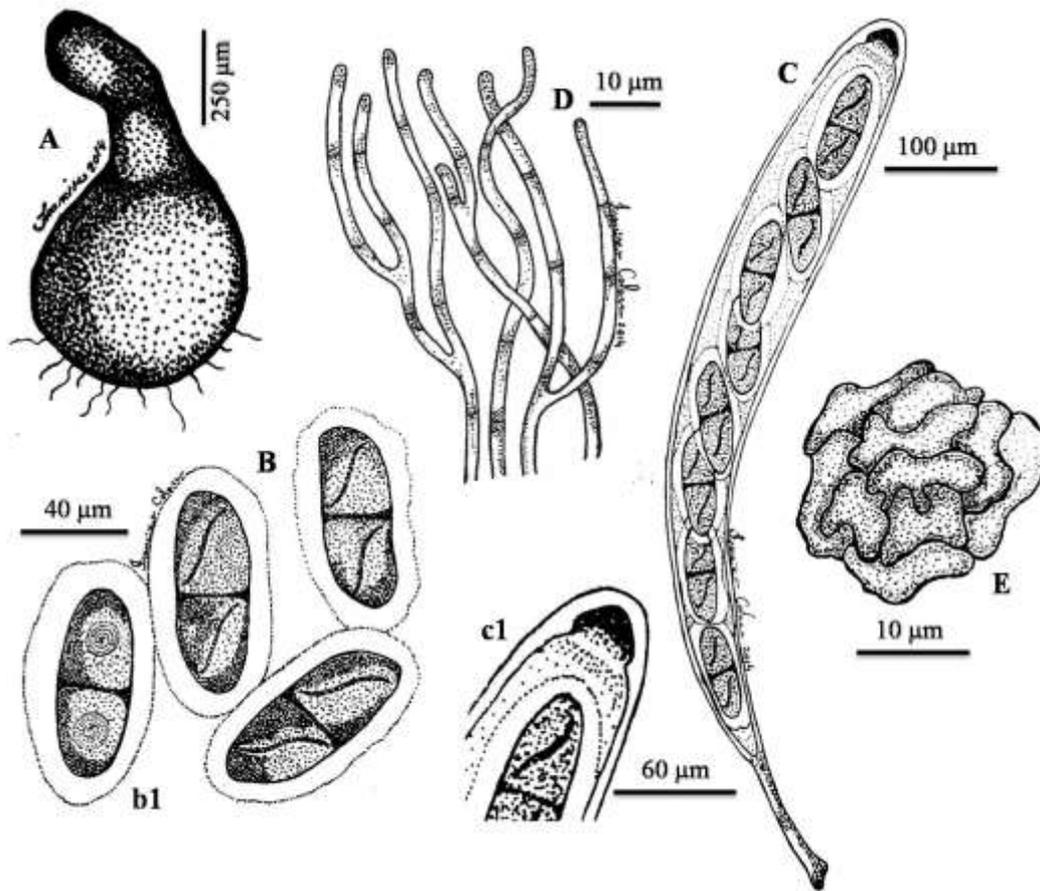


Fig. 3 – *Delitschia gigaspora* var. *pescanii*. A: Pseudothecium. B: Mature ascospores, with germ slit. b1: Immature ascospore, with de Bary bubbles. C: Mature ascus. c1: Detail of the ascus apex. D: Pseudoparaphyses. E: Exoperidium cells.

Key to the varieties of *Delitschia gigaspora*

1. Pseudothecium glabrous. Ascospores elliptical, 80–85 × 25–30 µm, uniseriate, with unstricted transverse septum, apex slightly conical to oblique, germ slit oblique in relation to the vertical axis of the ascospores.....*Delitschia gigaspora* var. *pescanii* (Fig. 2 and 3).
 - 1.1 Pseudothecium tomentose. Ascospores different of that described above 2
2. Ascospores subfusiform, biseriata, 70–80 × 23–26 µm, with unstricted transverse septum, apex acute to conical, germ slit longitudinal, usually runs for the full length of spore.*Delitschia gigaspora* var. *ceciliae* (description in Doveri 2004).
 - 2.1 Ascospores subfusiform, uniseriate to biseriata, 74–95 × 20–25 µm, with constricted transverse septum, apex conical, germ slit longitudinal, running for the full length of spore.*Delitschia gigaspora* var. *gigaspora* (description in Doveri 2004).

The variety *pescanii* differs of *ceciliae* and *gigaspora* mainly in relation to the pseudothecia, which are glabrous, contrasting with the tomentose pseudothecia of the other varieties, and in relation to the shape of the spores, which are elliptical (with aspect robust) contrasting with the spores subfusiforms of the other varieties (Doveri 2004). Comparison of the varieties are presented in Table 1. Just as in the *gigaspora* variety, the spores of the *pescanii* variety do not tend to separation, given that the transverse septum between the ascospore sister cells is less deep than in *D. gigaspora* var. *ceciliae*, whose ascospore sister cells can break up (Doveri 2004).

Table 1 Main differences among the three varieties of *Delitschia gigaspora*

Variety	Pseudothecia	Spore	Asci	Substrate
<i>D. g. var. gigaspora</i>	Presence of tomentum	Long, narrow and subfusiform, apex conical, germ slit longitudinal	With uniseriate or biseriate ascospores	Usually on leporid dung
<i>D. g. var. ceciliae</i>	Presence of tomentum	Long, subfusiform, apex acute to conical, germ slit longitudinal	With biseriate ascospores	On horse dung
<i>D. g. var. pescanii</i>	Absence of tomentum	Large in comparison to the total length of the spores, elliptical, apex slightly conical to oblique, germ slit oblique	With uniseriate ascospores	On cattle (cow) dung

Acknowledgements

The authors would like to express their thanks to Dr. Francesco Doveri, Peter Püwert and Peter Welt for their valuable commentaries, to Gabriele Cacialli and Joop Van Der Lee for the granted bibliography, to the administration of the Parque Estadual da Serra de Caldas Novas for the logistic support in the collection of the material, to the Universidade Estadual de Goiás and the Pró-Reitoria de Pesquisa e Pós-graduação (PrP) for the support in the translation of the manuscript and to FAPEG for its financial support (Process nr.201210267001098).

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