Taxonomy and phylogeny of *Pluteus glaucotinctus* sensu lato (Agaricales, Basidiomycota), a multicontinental species complex

NELSON MENOLLI JR.1,2*, ALFREDO JUSTO3, PEDRO ARRILLAGA4, C. K. PRADEEP5, ANDREW M. MINNIS6 & MARINA CAPELARI2

1 Instituto Federal de Educação, Ciência e Tecnologia de São Paulo, Campus São Paulo, CCT / Biologia, Rua Pedro Vicente 625, 01109-010 São Paulo, SP, Brazil
2 Núcleo de Pesquisa em Micologia, Instituto de Botânica, Caixa Postal 68041, 04045-972 São Paulo, SP, Brazil
3 Biology Department, Clark University, 950 Main St., Worcester, MA 01610, USA
4 Sociedad de Ciencias Aranzadi, Departamento de Micología, Alto de Zorroaga 11, San Sebastián 20014, Spain
5 Jawaharlal Nehru Tropical Botanic Garden & Research Institute, Palode, Trivandrum, Kerala 695562, India
6 Center for Forest Mycology Research, USDA-US Forest Service, One Gifford Pinchot Dr., Madison, WI 53726, USA
*Corresponding author: menolljr@yahoo.com.br

Abstract

In order to better understand species delimitation in the *Pluteus glaucotinctus* species complex, we present a detailed study based on morphological and DNA sequence (nrITS + tef1) data. *Pluteus glaucotinctus* sensu stricto is known only from the type collection (Democratic Republic of the Congo), which is re-examined here. Four other species are recognized in this complex and described herein as new: *P. izurun* from Spain, *P. meridionalis* from Brazil, *P. padanilus* from India and *P. thoenii* from Africa. Phylogenetic analyses based on nrITS + tef1 sequence data support the recognition of all species in this complex.

Key words: nrITS, Pluteaceae, section Pluteus, species delimitation, tef1

Introduction

The genus *Pluteus* Fr. (Pluteaceae, Agaricales) comprises ca. 300 species with a circumglobal distribution (Kirk et al. 2008) and is very common in forested areas from boreal to tropical regions. The genus is found primarily in association with well-rotted wood and it is characterized by free lamellae, absence of a volva, pinkish spore print, inamyloid basidiospores and inverse hymenophoral trama (Singer 1986). Recent molecular and morphological studies (Minnis et al. 2006; Corriol & Moreau 2007; Menolli et al. 2010; Vizzini & Ercole 2011; Justo et al. 2011a, b) found *Pluteus* to include some annulate species previously placed in the genus *Chaemaeota* (W.G. Sm.) Earle and also have typically supported the traditional infrageneric subdivision into three sections: *Pluteus*, *Celluloderma* Fayod and *Hispidoderma* Fayod.

According to the infrageneric classification of *Pluteus* proposed by Singer (1959, 1986) and as clarified by DNA sequence data (Justo et al. 2011a, b), *Pluteus* sect. *Pluteus* includes species with a pileipellis as a cutis, with metuloid pleurocystidia, as well as species with indistinct metuloids [*Pluteus albostipitatus* (Dennis) Singer] or with non-metuloid pleurocystidia (*Pluteus glaucotinctus*).

Justo et al. (2011b) recognized sixteen well-supported clades in *Pluteus* sect. *Pluteus*, most of which are represented by species complexes with apparent intercontinental distributions. Many of these have been investigated (Justo et al. 2014) and others require further molecular and morphological studies to better understand species delimitation, diversity, and biogeography in the genus. In the present article we critically examine the widespread species complex around *P. glaucotinctus* using morphological approaches and molecular phylogenies based on two loci, the nuclear ribosomal internal transcribed spacers region (nrITS) and translation-elongation factor 1-alpha (tefl a single-copy, protein-coding gene).
Basidiospores [30/1/1] 6.5–8.5(−9.0) × 5.5–7.5 μm (Q = 1.10–1.17; Qm = 1.15; Lm = 7.7 μm; Wm = 6.7 μm), subglobose to broadly ellipsoid, inamyloid, hyaline, smooth, thick-walled. Pleurocystidia 55–85 × 18.0–32 μm; ovoid, clavate or oblong, with rounded apices, colorless, thin-walled. Cheilocystidia 53–94 × 12.0–15.0 μm; narrowly utriform, cylindrical, lageniform, flexuous, colorless, thin-walled. Pileipellis a cutis; terminal elements 70–105 × 10.0–20 μm; cylindrical or tapering towards apex; colorless or with brown pigments; thin-walled. Stipitipellis a cutis; hyphae 5.0–15.0 μm wide; colorless; thin-walled. Clamp-connections not observed.

Etymology:—thoenii in honor of the collector of the holotype, Daniel Thoen, and for his contribution to the knowledge of fungi from tropical Africa.

Distribution:—Africa: Known only from Democratic Republic of the Congo.


Notes:—Despite the lack of macro-morphological data from fresh collections of P. thoenii, we consider the DNA sequences, the shape of the basidiospores (Qm = 1.15) and the size of the cheilocystidia (up to 94 μm long) as sufficiently distinctive characters to propose this new species. Pluteus thoenii has been up until now only represented by the holotype, which represents a single herbarium collection from more than 50 years ago that was previously identified by Horak & Heinemann (1978) as P. glaucotinctus.

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References

http://dx.doi.org/10.11646/phytotaxa.180.1.1

http://dx.doi.org/10.1093/bib/bbn013


http://dx.doi.org/10.1080/21501203.2010.493531


http://dx.doi.org/10.2590/naf2010.005.001


http://dx.doi.org/10.3852/mycologia.97.1.84


http://dx.doi.org/10.2307/3759505


http://dx.doi.org/10.3852/mycologia.97.1.84

http://dx.doi.org/10.1016/B978-0-12-372180-8.50042-1

http://dx.doi.org/10.1111/j.1462-2920.2008.01605.x