

# *Pluteus* section *Celluloderma* (*Pluteaceae*, *Agaricales*) in Brazil: additional morphological studies and an annotated checklist of all named taxa

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**ABSTRACT** – For the first time the complete morphological descriptions of three taxa previously recorded from Brazil, viz. *P. diptychocystis* Singer, *P. iguazuensis* Singer and *P. rimosoaffinis* Singer are presented. Additionally, we provide descriptions of *Pluteus* cf. *fastigiatus* Singer and *Pluteus* cf. *fuliginosus* Murrill although these records are maintained as uncertain due to some ecological and micromorphological differences between the type descriptions and the Brazilian material. Searches in the bibliographic and herbarium records expanded the current knowledge of *Pluteus* sect. *Celluloderma* in Brazil. We produced an annotated list confirming the occurrence of 34 taxa in the country.

**Keywords:** Basidiomycota, biodiversity, taxonomy

**RESUMO** – *Pluteus* seção *Celluloderma* (*Pluteaceae*, *Agaricales*) no Brasil: estudos morfológicos adicionais e uma lista comentada de todos os táxons nomeados. Pela primeira vez é apresentada a descrição morfológica completa de três táxons previamente registrados para o Brasil, *P. diptychocystis* Singer, *P. iguazuensis* Singer e *P. rimosoaffinis* Singer. Adicionalmente, são fornecidas descrições de *Pluteus* cf. *fastigiatus* Singer e *Pluteus* cf. *fuliginosus* apesar de esses registros serem mantidos como incertos devido a algumas diferenças ecológicas e micromorfológicas entre as descrições tipo e os materiais brasileiros. Levantamentos bibliográficos e registros de herbário incrementam o conhecimento atual de *Pluteus* seção *Celluloderma* no Brasil, sendo fornecida uma lista comentada e confirmando a ocorrência de 34 táxons no país.

**Palavras-chave:** Basidiomycota, biodiversidade, taxonomia

## INTRODUCTION

*Pluteus* sect. *Celluloderma* Fayod is one of the three *Pluteus* sections traditionally recognized by morphological characters (Singer 1959, 1986) and recently supported by molecular phylogenetic studies (Minnis *et al.* 2006, Menolli *et al.* 2010, Justo *et al.* 2011a, b, Vizzini & Ercole 2011) with some amendments mainly concerning the pileipellis structure. Based on the combination of historical morphological studies and recent molecular phylogenies, *Pluteus* sect. *Celluloderma* now includes species with or without a partial veil, with non-metuloid pleurocystidia and a pileipellis as an euhymeniderm or an epithelium of short elements, interrupted or not by elongate cystidioid bodies, and also species with a cutis-like pileipellis and non-metuloid cystidia (Singer 1959, 1986, Justo *et al.* 2011a, b).

In Brazil, taxa of *Pluteus* sect. *Celluloderma* have been reported from nine States: Amazonas (Singer 1989, Menolli *et al.* 2015a), Bahia (Singer 1989), Minas Gerais (Rosa *et al.* 2003, Rosa & Capelari 2009), Pará (Singer 1973a), Paraná (Stijve & de Meijer 1993, Meijer 2006, 2009, Dias & Cortez 2013, Menolli *et al.* 2015c), Rio de Janeiro (Singer 1956, 1959, Menolli *et al.* 2015a), Rio Grande do Sul (Rick 1919, 1938, 1961, Singer 1954b,

1956, Raitelhuber 1991, Wartchow *et al.* 2004, 2006, Drechsler-Santos *et al.* 2007), Rondônia (Singer 1959) and São Paulo (Pegler 1997, Xavier-Santos *et al.* 2004, Menolli & Capelari 2010, Menolli *et al.* 2010, 2015a, Justo *et al.* 2011a, b). However, there are no systematic studies that have revised these records and certified which taxa of *Pluteus* sect. *Celluloderma* occur for certain in Brazil.

Based on specimens recently collected in Brazil, we present for the first time the complete morphological descriptions of three taxa previously recorded for the country in lists of morphological or molecular studies, viz. *P. diptychocystis* (Pegler 1997, Menolli *et al.* 2015a), *P. iguazuensis* (Meijer 2006, Drechsler-Santos *et al.* 2007, Menolli *et al.* 2015a) and *P. rimosoaffinis* (Pegler 1997, Menolli *et al.* 2015a). Descriptions of *Pluteus* cf. *fastigiatus* and *Pluteus* cf. *fuliginosus* are also presented and discussed. Additionally, we present a list of all taxa of *Pluteus* sect. *Celluloderma* previously recorded for the country with an update of the taxonomic status of the Brazilian collections.

## MATERIAL AND METHODS

### Sampling

The materials studied include specimens recently collected in Brazil by some collaborators and collections

previously published and/or deposited in herbaria. Searches of the bibliographical and herbarium records were the basis to preparing a list including the current knowledge of *Pluteus* sect. *Celluloderma* in Brazil. The herbarium acronyms follow Thiers (2015) and the 'Rede Brasileira de Herbários' ([www.botanica.org.br/rede\\_herbarios.php](http://www.botanica.org.br/rede_herbarios.php)) for the Herbarium from Passo Fundo University (RSPF).

Species characterized as having non-metuloid pleurocystidia and a pileipellis as a cutis were included in this work because we accept the section delimitation of Justo *et al.* (2011a, b) who placed these species in *Pluteus* sect. *Celluloderma* instead of in *Pluteus* sect. *Hispidoderma* Fayod (Singer 1959, 1986) or *Pluteus* sect. *Villosi* Vellinga & Schreurs (Vellinga & Schreurs 1985).

### Morphological studies

The macroscopic descriptions are based on fresh specimens. Color terms are according to Küppers (1979). For microscopic analyses, the dried material was wetted with 70% ethanol and then rehydrated in 5% KOH or stained with Melzer's reagent to determine any amyloid reaction of the basidiospores. The notation [a/b/c] at the beginning of a set of basidiospores data is to be read as "(a) basidiospores were measured from (b) basidiomata taken from (c) collections". Q represents the range of the length/width ratio for all of the measured basidiospores, Qm represents the average of all calculated Q values for all of the measured basidiospores and Lm (Wm) represents the average of all of the lengths (widths) of the measured basidiospores. At least 20 basidiospores from each basidioma were measured in lateral view, and the terms denoting basidiospore shape follow Bas (1969). Other descriptive terms for micromorphological features follow Vellinga (1988).

## RESULTS AND DISCUSSION

### Taxonomy

*Pluteus diptychocystis* Singer, Sydowia 8: 123. 1954. excl. *Pluteus diptychocystis sensu* Pegler 1997 (= *Pluteus rimosoaffinis*).

(Figs. 1a, 2)

Pileus 22 mm diam., convex-campanulate, umbonate, dark brown to blackish ( $N_{90}A_{60}M_{50}$ ) at center and greyish brown ( $N_{80}A_{99}M_{50}$ ) towards the margin, covered by appressed fibrils, densely tomentose-fibrillose with blackish, spinulose squamules at center, sometimes exposing at margin the paler background between the fibrils, margin not striate or sulcate. Lamellae free, pinkish, crowded, ventricose, with concolorous edges and lamellulae of different lengths, 1–2 for each lamellae. Stipe 45 × 2 (apex)–4 (base) mm, attenuated upwards; base sometimes clavate to subbulbous; central; surface whitish cream, with very small brownish punctation mainly in the midpoint, with scanty basal mycelium. Odor, taste and context color not recorded.

Basidiospores [60/3/3] (5.6–)6.2–7.5(–8.7) × 5.0–6.2 μm (Q = 1.11–1.50; Qm = 1.25; Lm = 6.6 μm; Wm = 5.3 μm), subglobose to ellipsoid, inamyloid, hyaline, smooth, thick-walled, guttulate. Basidia 27–32 × 7.5–8.7 μm, narrowly clavate, thin-walled, four-spored. Pleurocystidia 41–81 × 16.2–27 μm, narrowly utriform to utriform, clavate or narrowly lageniform, mostly with a median or apical outer collar adhered to the wall that detaches and breaks easily, sometimes with a basal septum, hyaline, thin-walled, sparse to moderately abundant. Cheilocystidia 40–65 × 12.5–17.5 μm, similar to the pleurocystidia in shape, mostly also with the outer collar, sometimes with basal septum, hyaline, thin-walled, abundant. Lamellar trama convergent, up to 50 μm wide, composed of thin-walled hyphae, 2.5–15.0 μm diam., sometimes interspersed with inflated hyphae up to 21 μm diam., hyaline. Pileus context undifferentiated, approx. 81 μm thick, composed of thin-walled hyphae, 2.5–15.0 μm diam., hyaline. Pileipellis a cutis, approx. 100 μm thick, composed of parallel chains of cylindrical and thin-walled hyphae with individual terminal elements 90–160 × 10.0–12.5 μm, sometimes with ascendant and suberect elements, mostly with rounded apex or gradually attenuated towards the apex (6.0–10.0 μm broad), with evenly dissolved brownish plasmatic pigment, sometimes with pigment encrusted wall. Caulocystidia absent. Stipitipellis composed of thin-walled and yellowish hyphae, 3.7–8.7 μm diam. Clamp-connections absent.

**Habit and habitat:** Solitary on litter. In Brazil it occurs in fragments of the Atlantic Forest domain.

**Specimens examined:** ARGENTINA, PATAGONIA, Parque Nacional Nahuel Huapi, Isla Victoria, 17.V.1952, *R. Singer M725* (MICH, SP – ISOTYPE). BRAZIL, RIO GRANDE DO NORTE, Baía Formosa, Reserva Particular do Patrimônio Natural Mata Estrela, 14.VII.2010, *Menolli Jr. et al. NMJ184* (SP445829). SÃO PAULO, Cananéia, Parque Estadual da Ilha do Cardoso, between Morro Três Irmãos and Ipanema, 10.IV.1985, *M. Capelari MC247* (SP193821 as *P. cubensis*).

**Remarks:** *Pluteus diptychocystis* was described from Argentina (Singer 1954a) and also recorded from Chile (Singer 1969) and Brazil (Pegler 1997). However, the material (*Eiten & Goodland 6313* – SP106367!) studied by Pegler (1997) from the state of São Paulo is actually *P. rimosoaffinis* (see description under this species).

*Pluteus diptychocystis* is easily recognized by the dark brown to blackish fibrillose pileus with blackish and spinulose squamules at center and by the distinctive pleuro- and cheilocystidia with an outer and fragmentary collar adhered to the wall in the median or apical region. Similar ornamentation is also observed on the pleurocystidia of *P. striatocystis* Pegler reported from Kenya (Pegler 1977) and recently from Brazil (Menolli *et al.* 2015c). However, a distinctive character of *P. striatocystis* is the outer collar



**Figs. 1 a-e.** a. *Pluteus diptychocystis* (NMJ184); b. *Pluteus* cf. *fastigiatus* (NKI12); c, d. *Pluteus* cf. *fuliginosus* (FK2158); e. *Pluteus rimosoaffinis* (MC4607). Bars = 1 cm. Photos: a. I.G. Baseia. b. N.K. Ishikawa. c, d. F. Karstedt. e. J.J.S. Oliveira.

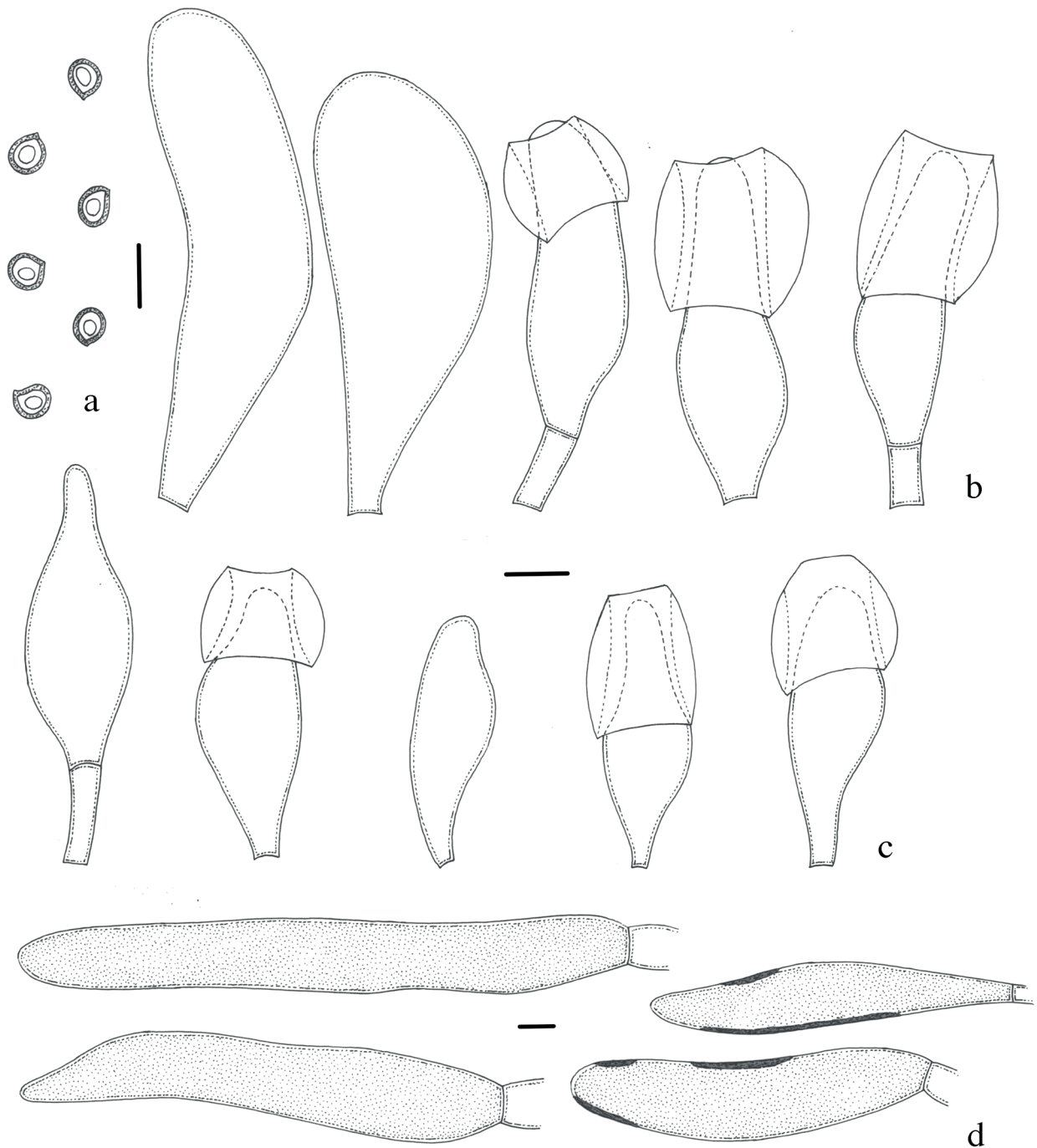
that is evenly striate instead of smooth as observed in *P. diptychocystis*.

*Pluteus* cf. *fastigiatus* Singer, in Singer & Digilio, Lilloa 25: 259. 1952.

(Figs. 1b, 3)

Pileus 52 mm diam, conico-convex, with a truncate umbo that is slightly depressed at center, dark brown, covered by appressed and radially arranged fibrils, finely squamulose at depressed umbo with the fibrils appearing radially split outside the central disc and sometimes exposing at margin the paler background, margin not striate or sulcate. Lamellae free, pinkish, crowded, ventricose, with concolorous edges, 1–2 tiers of lamellulae. Stipe 74 × 6(apex)–8(base) mm, almost equal; central; with small brownish fibrils on whitish cream background, with a small amount of basal mycelium. Odor, taste and context color not recorded.

Basidiospores [20/1/1] (5.0–)5.6–6.2 × (4.3–)5.0 μm (Q = 1.12–1.24; Qm = 1.17; Lm = 5.8 μm; Wm = 4.9 μm), subglobose to broadly ellipsoid, inamyloid, hyaline, smooth, thick-walled, guttulate. Basidia 19–31 × 5.0–8.7 μm, clavate to narrowly clavate, thin-walled, four-spored. Pleurocystidia 51–80 × 12.5–26 μm, clavate to fusiform or narrowly lageniform, sometimes with an apical mucilage, hyaline, thin-walled, sparse. Cheilocystidia 39–75 × (10.0–)15.0–31 μm, clavate to fusiform, hyaline, thin-walled, numerous, forming fascicles. Lamellar edges sterile. Lamellar trama convergent, up to 75 μm wide, composed of thin-walled hyphae, 2.5–10.0 μm diam., hyaline. Pileus context undifferentiated, approx. 125 μm thick, composed of thin-walled hyphae, 2.5–10.0 μm diam., hyaline. Pileipellis a cutis, approx. 100 μm thick, composed of parallel chains of cylindrical and thin-walled hyphae with individual terminal elements 80–154 × 7.5–11.2 μm, mostly with an acute apex (2.5–3.7 μm broad), filled with evenly dissolved brownish plasmatic pigment. Caulocystidia



**Figs. 2 a-d.** *Pluteus diptychocystis* (NMJ184). **a.** Basidiospores; **b.** Pleurocystidia; **c.** Cheilocystidia; **d.** Pileipellis elements. Bars = 10  $\mu$ m.

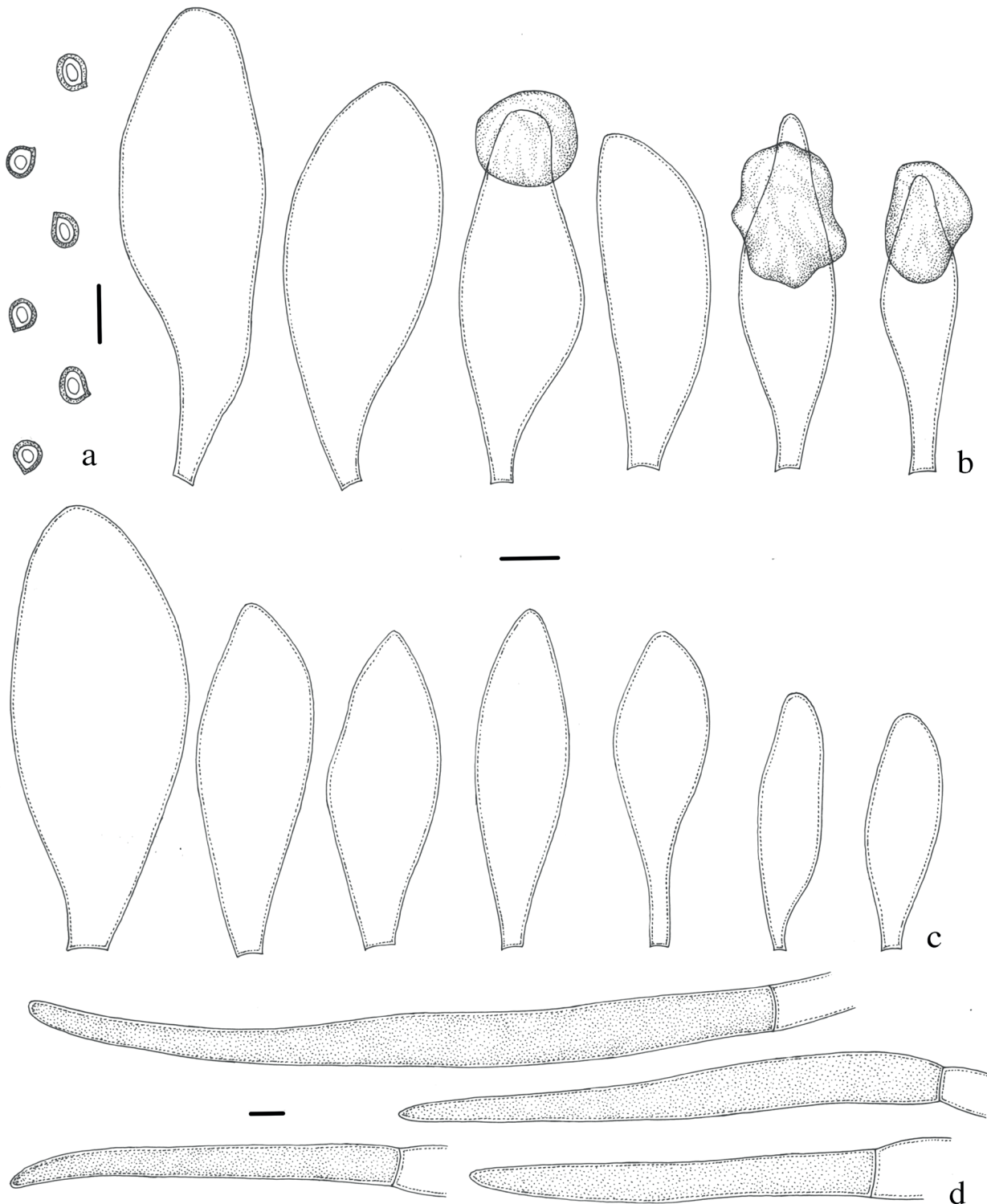
absent. Stipitipellis composed of thin-walled hyphae, 6.2–17.5  $\mu$ m diam., hyaline. Clamp-connections absent.

**Habit and habitat:** Solitary on soil. In Brazil it was found in an anthropogenic fragment of secondary forest ('capoeira') from original 'dense ombrophilous forest', part of the Amazon Forest.

**Specimen examined:** BRAZIL, AMAZONAS, Manaus,

Instituto Nacional de Pesquisas da Amazônia (INPA), Campus III – V-8, 25.IV.2011, N.K. Ishikawa & R. Vargas-Isla NK112 (INPA239970).

**Remarks:** The collection NK112 is undoubtedly close to *P. fastigiatus* described from Argentina (Singer & Digilio 1952, Singer 1956, 1959), mainly due to the macroscopic characteristics of the pileus surface, the brownish and long stipe, and the substrate (also occurring on soil). However,



**Figs. 3 a-d.** *Pluteus cf. fastigiatus* (NK112). **a.** Basidiospores; **b.** Pleurocystidia; **c.** Cheilocystidia; **d.** Pileipellis elements. Bars = 10  $\mu\text{m}$ .

the following micromorphological differences observed when comparing our collections to Singer's descriptions (Singer & Digilio 1952, Singer 1956, 1959) led us to maintain the identity as inconclusive.

The description of *P. fastigiatus* by Singer (1959)

reported: i) basidiospores ( $6.5\text{--}7.3 \times 5\text{--}6.5 \mu\text{m}$ ), which are slightly broader and occasionally some even larger ( $9\text{--}11 \times 7\text{--}8.5 \mu\text{m}$ ) than NK112; ii) basidia with one, two or three sterigmata that are different from those four-spored of NK112; iii) pleurocystidia "almost exclusively

ventricose-ampullaceous (...) to ampullaceous-subcapitate, and mostly pedicellate, sometimes with spiral bodies inside but always hyaline, with thin to moderately thickened wall without encrustation, without prongs or merely with nodose or small spinulose excrescencies at apex, not metuloid”, different from those clavate to fusiform or narrowly lageniform observed in *NK112*; iv) cheilocystidia “vesiculose-subampullaceous, more rarely ventricose-ampullaceous, or ampullaceous, or vesiculose-clavate to vesiculose-submucronate”, different from those strictly clavate to fusiform found in *NK112*; v) broadly rounded tips in the pileipellis cells, which are different from the acute apices of the *NK112* pileipellis.

Singer (1959) placed *P. albostipitatus* (Dennis) Singer and *P. cubensis* (Murrill) Dennis into the same morphological group as *P. fastigiatus* because of the presence of long and radial fibrils on the pileus surface and by the white to cinereous stipe with darker fibrils. However, *P. albostipitatus* is currently classified in *Pluteus* sect. *Pluteus* because of the presence of unusual pleurocystidia with slightly thickened to thickened walls and some small apical outgrowths (Menolli *et al.* 2010, Justo *et al.* 2011a, b). Based on Singer’s description (1959) of the pleurocystidia of *P. fastigiatus*, maybe it would be better classified in *Pluteus* sect. *Pluteus* like *P. albostipitatus*; and *NK112* could be described as a new species. Considering that we were unable to examine the type of *P. fastigiatus*, we prefer to maintain *NK112* as *P. cf. fastigiatus*, although there are obvious differences between them.

The re-examination of the holotype of *P. cubensis* (Menolli *et al.* 2015c) revealed it has broader basidiospores [ $7.5\text{--}8.7(-10.0) \times (5.0\text{--})6.2\text{--}7.5(-8.7) \mu\text{m}$ ]. Furthermore, a Brazilian collection identified as *P. cubensis* appears in the molecular analyses of Menolli *et al.* (2015a) as an external branch to the ‘aurantiorugosus’ clade and so not related to *NK112* that is positioned in the ‘ephebeus’ clade.

The presence of terminal members of the pileipellis cells with an acute to subacute apex is a characteristic shared by *NK112*, *P. fuliginosus* and other species classified by Singer (1959) in stirps *fuliginosus*, such as *P. argentinensis* Singer, *P. pluvialis* Singer, *P. rhoadsii* Murrill and *P. yungensis* Singer. However, all of them are different from *NK112*. *Pluteus argentinensis* has a shorter stipe and cystidia with inconspicuous stramineous resinous incrustation (Singer 1959); *P. fuliginosus* has some pronged pleurocystidia (Smith & Stuntz 1959, Banerjee & Sundberg 1993); *P. pluvialis* has a long plicate-sulcate pileus and pure white stipe (Singer 1959); *P. rhoadsii* has globose basidiospores and some pigmented pleurocystidia (Banerjee & Sundberg 1993); and *P. yungensis* has broader basidiospores [ $5.8\text{--}8.2 \times 5.0\text{--}7.0(-7.5) \mu\text{m}$ ] and a white stipe (Singer 1959).

***Pluteus cf. fuliginosus*** Murrill, N. Amer. Fl. 10: 134. 1917. (Figs. 1c–d, 4)

Pileus 70 mm diam., applanate, umbonate, surface dark brown ( $N_{80}Y_{99}M_{50}$ ), densely covered by appressed and

radially arranged fibrils; surface minutely cracking around the umbo and showing the cream flesh; margin striate over at least one-third of the radius. Lamellae free, pinkish, crowded, ventricose,  $\leq 6$  mm broad, with concolorous edges and with scarce lamellulae. Stipe  $92 \times 6(\text{apex})\text{--}10(\text{base})$  mm, attenuated upwards; central; greyish-brown ( $N_{10}Y_{40}M_{20}$ ), shiny and longitudinally striate all over. Odor, taste and context color not recorded.

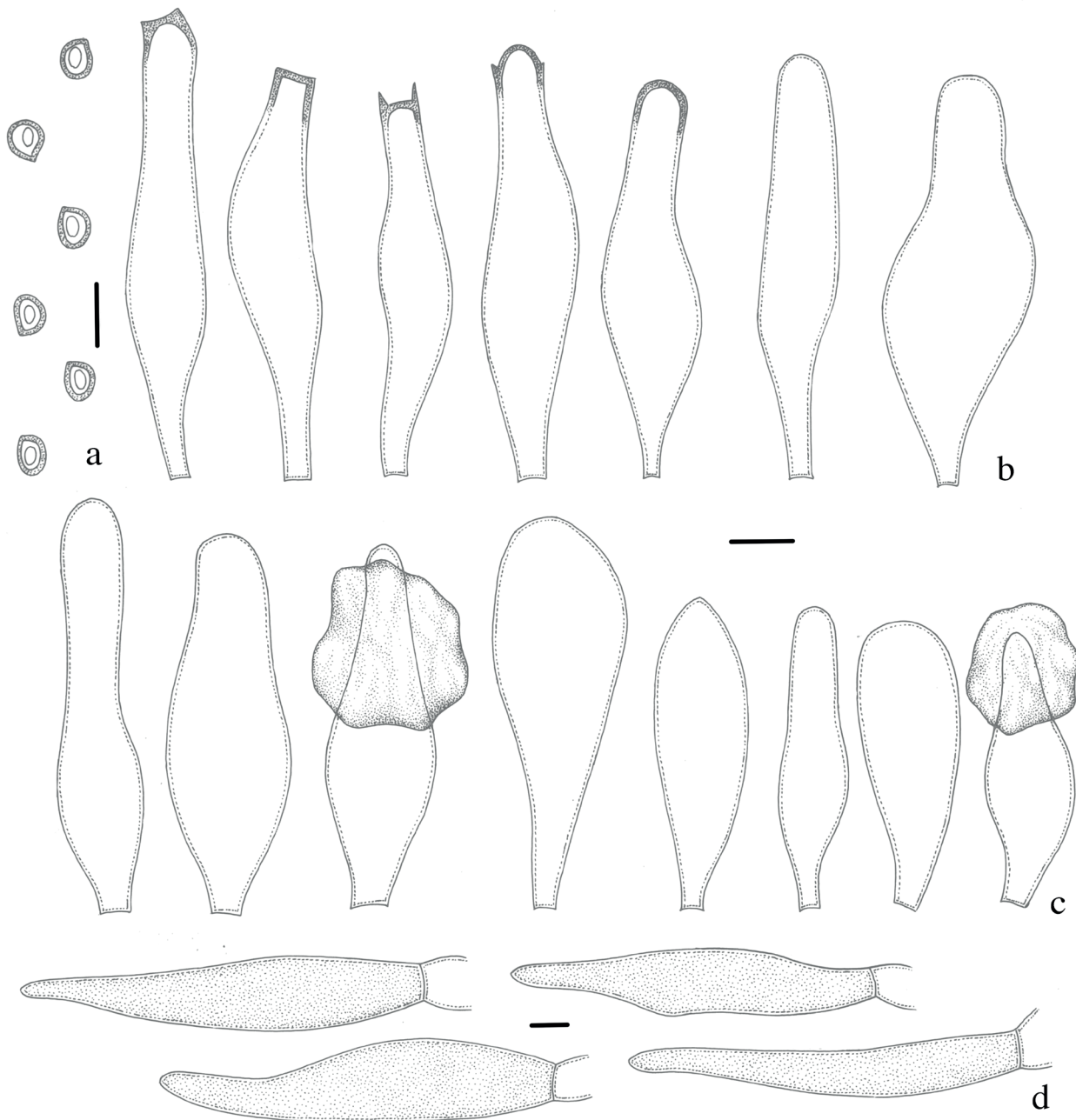
Basidiospores [ $20/1/2$ ]  $6.2\text{--}6.8(-7.5) \times 5.0\text{--}5.6(-6.2) \mu\text{m}$  [ $Q = (1.11\text{--})1.21\text{--}1.24$ ;  $Qm = 1.23$ ;  $Lm = 6.3 \mu\text{m}$ ;  $Wm = 5.2 \mu\text{m}$ ], broadly ellipsoid, rarely subglobose, inamyloid, hyaline, smooth, thick-walled, guttulate. Basidia  $25\text{--}27 \times 6.2\text{--}7.5 \mu\text{m}$ , narrowly clavate to versiform, thin-walled, four-spored. Pleurocystidia  $60\text{--}74 \times 12.5\text{--}15.0(-22) \mu\text{m}$ , narrowly utriform to utriform, usually with 2 small acute protuberances and slightly thick-walled at apex, mostly with apical mucilage, hyaline, thin-walled, sparse and numerous. Cheilocystidia  $44\text{--}66 \times 11.2\text{--}20 \mu\text{m}$ , narrowly utriform to utriform, narrowly lageniform, fusiform or clavate, hyaline, thin-walled, abundant and usually with apical mucilage containing a mass of basidiospores. Lamellar edges sterile. Lamellar trama convergent, up to  $75 \mu\text{m}$  wide, composed of thin-walled hyphae,  $2.5\text{--}10.0 \mu\text{m}$  diam., sometimes interspersed with oleiferous hyphae up to  $2.5 \mu\text{m}$  diam., hyaline. Pileus context undifferentiated, up to  $400 \mu\text{m}$  thick, composed of thin-walled hyphae, up to  $6.2 \mu\text{m}$  diam., sometimes interspersed with oleiferous hyphae up to  $2.5 \mu\text{m}$  diam., hyaline. Pileipellis a cutis composed of parallel chains of fusoid and thin-walled hyphae, individual terminal elements  $95\text{--}115 \times 16.0\text{--}20 \mu\text{m}$ , sometimes with ascendant and suberect elements, mostly with an attenuated to subacute apex ( $4.0\text{--}6.0 \mu\text{m}$  broad), filled with evenly dissolved brownish plasmatic pigment. Caulocystidia absent. Stipitipellis composed of hyaline, thin-walled hyphae,  $3.7\text{--}15.0 \mu\text{m}$  diam. Clamp-connections absent.

**Habit and habitat:** Solitary on decayed wood. In Brazil it was found in a fragment of ‘seasonal semi-deciduous forest’, part of the Atlantic Forest.

**Specimen examined:** BRAZIL, SÃO PAULO, São Paulo, Parque Estadual das Fontes do Ipiranga, 20.IV.2012, F. Karstedt & M. Capelari FK2158 (SP445827).

**Remarks:** The collection *FK2158* is morphologically close to *P. fuliginosus* mainly on account of the presence sterigma-like projections in the pleurocystidia apex, but the numerous problems surrounding this species, outlined below, have prevented us from applying with certainty the name *P. fuliginosus* to this Brazilian collection.

*Pluteus fuliginosus* is a barely documented species known by the type from the U.S.A. – New York (Murrill 1917) with additional records from Trinidad and Jamaica (Dennis 1953). Singer (1956) also reported *P. fuliginosus* from Argentina but he was deliberately safeguarding the true identification of the collections that were after



**Figs. 4 a-d.** *Pluteus* cf. *fuliginosus* (FK2158). **a.** Basidiospores; **b.** Pleurocystidia; **c.** Cheilocystidia; **d.** Pileipellis elements. Bars = 10  $\mu$ m.

described as *P. argentinensis* Singer (Singer 1959).

Smith & Stuntz (1959) and Banerjee & Sundberg (1993) re-examined the holotype of *P. fuliginosus* and they reported the presence of sterigma-like projections on the pleurocystidia apex, which are most likely the main distinctive characters for this species. Dennis (1953) and Singer (1956) also re-examined the type collection but there is no mention of any apical projection on the cystidia. In our material both types of pleurocystidia occur.

Smith & Stuntz (1959) reported the presence of clamp-connections for *P. fuliginosus*, although the authors emphasized that they could be considered absent for all

practical purposes because only one recognizable clamp-connection was found after several hours of searching. We did not find clamp-connections in our material and they were not found in any other type re-examination (Dennis 1953, Singer 1956, Banerjee & Sundberg 1993). Another characteristic observed only by Smith & Stuntz (1959) was the presence of unusually long basidia (up to 44  $\mu$ m long) and also pronged cheilocystidia.

Singer (1986) considered *P. fuliginosus* in a distinctive stirps "characterized by the subacute or acuminate-subacute terminal cells of the epicutal trichodermium". However, the organization of a trichodermal pileipellis instead of

a cutis-like pileipellis as observed in our collection is also uncertain for *P. fuliginosus* because according to the type re-examination made by Smith & Stuntz (1959), the pileipellis was described only as having “cuticular elements of terminal cells in fascicules and cells elongate-fusoid,  $100\text{--}220 \times 10\text{--}20 \mu\text{m}$ ”.

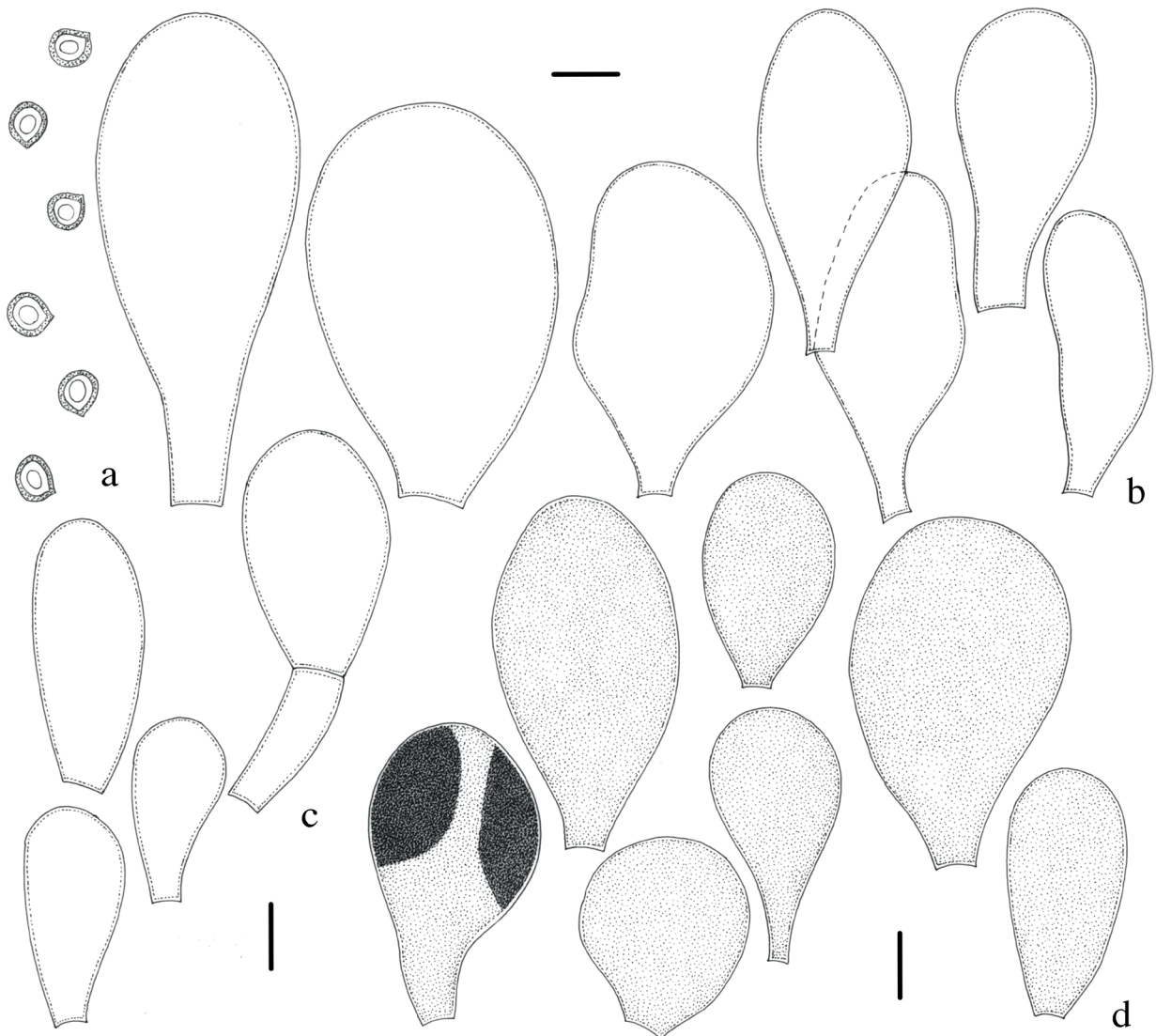
Considering the few preserved collections identified as *P. fuliginosus* and that some incongruities about its morphology were noted, we prefer to maintain *FK2158* as inconclusive until more collections have become available from North America for an accurate morphological and molecular comparison with this Brazilian collection. It is also important to note the ecological differences between *FK2158* and the type of *P. fuliginosus*, which was originally described from a temperate/sub-boreal forest (Adirondack Mountains, NY, U.S.A.) on a white-pine stump (Murril 1917).

*Pluteus iguazuensis* Singer, Trans. Brit. Mycol. Soc. 39: 201. 1956.

(Fig. 5)

Pileus 21 mm diam., convex then applanate, dark brown on disc and paler towards the margin, smooth at center and sulcate-striate over half of the radius. Lamellae free, pinkish, crowded, ventricose, with concolorous edges and few lamellulae. Stipe  $37 \times 1.5$ (apex)– $2$ (base) mm, almost equal, central, surface whitish cream with brownish base, longitudinally striate, with scanty basal mycelium. Odor, taste and flesh color not recorded.

Basidiospores [20/1/1]  $(5.0\text{--})5.6\text{--}6.2 \times 5.0\text{--}5.6$ (–6.2)  $\mu\text{m}$  ( $Q = 1.00\text{--}1.12$ ;  $Q_m = 1.06$ ;  $L_m = 5.8 \mu\text{m}$ ;  $W_m = 5.5 \mu\text{m}$ ), globose to subglobose, inamyloid, hyaline, smooth, thick-walled, guttulate. Basidia  $27\text{--}34 \times 7.5\text{--}10.0 \mu\text{m}$ , narrowly clavate, thin-walled, four-spored.



**Figs. 5 a-d.** *Pluteus iguazuensis* (NK110). **a.** Basidiospores; **b.** Pleurocystidia; **c.** Cheilocystidia; **d.** Pileipellis elements. Bars = 10  $\mu\text{m}$ .



Pleurocystidia 41–59(–71) × (14.7–)21–29(–36) µm, clavate, broadly clavate, obovoid or utriform, colorless and hyaline, thin-walled, sparse. Cheilocystidia 26–39 × 8.7–20 µm, mostly clavate or obovoid, colorless and hyaline, thin-walled, moderately numerous. Lamellar edges fertile. Lamellar trama convergent, approx. 31 µm wide, composed of hyaline thin-walled hyphae, 2.5–11.2 µm diam., interspersed with oleiferous hyphae up to 5.0 µm diam.. Pileus context undifferentiated, up to 37 µm thick, composed predominantly of oleiferous hyphae up to 5.0 µm diam. and intermixed with inflated hyaline thin-walled hyphae, 12.5–18.7 µm diam., hyaline. Pileipellis a transition between a hymeniderm and an epithelium, up to 50 µm thick, composed of one layer of subglobose, spheropedunculate, clavate or obovoid cells, 28–50 × 16–31 µm, thin-walled, filled with evenly dissolved brownish plasmatic pigment or sometimes with few condensations. Caulocystidia not observed. Stipitipellis composed of colorless hyaline thin-walled hyphae, with elongated terminal members filled with brownish content, 56–77 × 8.7–11.2 µm. Clamp-connections absent.

**Habit and habitat:** Solitary on decayed wood. In Brazil it was found in an anthropogenic fragment of secondary forest ('capoeira') from original 'dense ombrophilous forest', part of the Amazon Forest, and there are also previous records in the Atlantic Forest.

**Specimen examined:** BRAZIL, AMAZONAS, Manaus, Instituto Nacional de Pesquisas da Amazônia (INPA), Campus III – V-8, 25.IV.2011, N.K. Ishikawa & R. Vargas-Isla NK110 (INPA239968).

**Remarks:** *Pluteus iguazuensis* was described from Argentina (Singer 1956) and also recorded from Brazil by Meijer (2006 as *P. cf. iguazuensis*) and Drechsler-Santos *et al.* (2007). However, the re-examination of the material studied by Meijer (2006) was re-identified as *P. crassocystidiatus* Menolli & de Meijer by Menolli *et al.* (2015c). We were unable to certify the identification of the record of Drechsler-Santos *et al.* (2007) because the authors only presented the species in a list without indication of the collection studied.

Morphologically *P. iguazuensis* is recognized by a sulcate and non-venose brownish pileus, the globose to subglobose basidiospores and by the similarity in the shape of the pleuro- and cheilocystidia. Singer (1959) placed *P. fallax* Singer and *P. tucumanus* Singer into the same morphological group (stirps *tucumanus*) as *P. iguazuensis*. However, according to Singer (1959), *P. fallax* has a rimose but indistinctly sulcate pileus and *P. tucumanus* has an appendiculate-crenate pileus margin and smaller basidiospores (3.8–5.5 × 2.7–3.8 µm).

*Pluteus rimosoaffinis* Singer, Trans. Brit. Mycol. Soc. 39: 211. 1956.

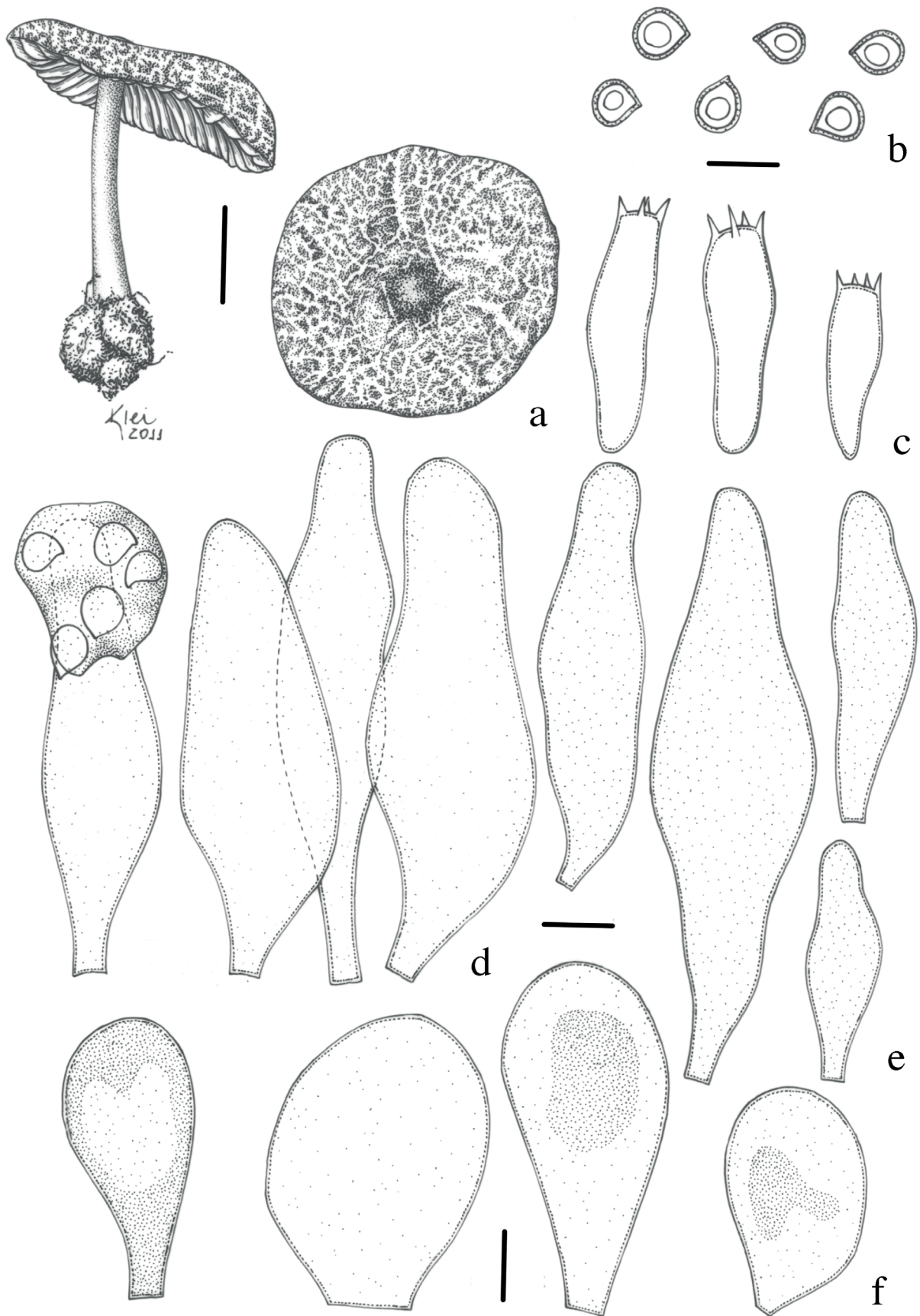
(Figs. 1e, 6)

Pileus 25–35 mm diam., plane-convex, slightly depressed around a broad and low umbo, dark brown ( $A_{90}M_{90}C_{90}$ ) at center and light brown ( $A_{80}M_{70}C_{70}$ ) at margin, subvelutinous; surface cracking overall and showing the cream flesh except at umbo; center almost entire, minutely rugose to venose; margin indistinctly sulcate. Lamellae free to subfree, pinkish, with concolorous edges, 1–2 tiers of lamellulae, on lamellar faces using at least a 10× lens it is possible to see numerous cystidia that are apparently pigmented due to the pale-melleous mass of basidiospores adhering to the apical mucilage (seen under microscopy). Stipe 25–30 × 3(apex)–4–5(base) mm, tapering towards the apex; base subbulbous; central to slightly eccentric; pale cream to slightly brownish, lightly pruinose and with fine brownish fibrils at base, slightly longitudinally striate, with a small amount of basal mycelium. Odor, taste and context color not recorded.

Basidiospores [100/5/5] 5.0–7.5 × 5.0–6.8(–7.5) µm (Q = 1.00–1.24; Qm = 1.10; Lm = 6.5 µm; Wm = 6.0 µm), globose to broadly ellipsoid, inamyloid, hyaline or pale yellowish, smooth, thick-walled, guttulate. Basidia 25–34 × 7.5–8.7(–10.0) µm, clavate to versiform, thin-walled, four-spored. Pleurocystidia (42–)55–79 × 14.0–24(–29) µm, narrowly utriform to utriform, sometimes conical or clavate, frequently with basidiospores adhering to an apical mucilage, colorless or sometimes with very pale yellowish plasmatic dissolved content, thin-walled, sparse to moderately abundant. Cheilocystidia (32–)45–75(–85) × (10.0–)13.7–25(–37) µm, like the pleurocystidia in shape, with pale yellowish plasmatic dissolved content or in some collections hyaline and colorless, moderately numerous. Lamellar edges apparently sterile. Lamellar trama convergent, 50–100 µm wide, composed of hyaline thin-walled hyphae, 6.2–12.5 µm diam., interspersed with oleiferous hyphae up to 5.0 µm diam. Pileus context undifferentiated, approx. 360 µm or up to 800 µm thick at pileus center, composed of hyaline thin-walled hyphae, 5.0–12.5 µm diam., interspersed with oleiferous hyphae up to 3.7 µm diam., hyaline. Pileipellis a transition between a hymeniderm and an epithelium, up to 50 µm thick, composed of one layer of clavate, subglobose or obovoid cells, 30–62 × 18.7–37(–56) µm, thin-walled, filled with evenly dissolved or condensed brownish intracellular pigment. Caulocystidia not observed. Stipitipellis composed of thin-walled hyphae, colorless and hyaline but with elongated terminal members filled with brownish content, 52–80 × 7.5–11.2 µm. Clamp-connections absent.

**Habit and habitat:** Solitary or gregarious on decayed wood. In Brazil it occurs in fragments of the Atlantic Forest and also of the Cerrado domain.

**Specimens examined:** BRAZIL, BAHIA, Itabuna, 6.VI.1978, R. Singer B 11111 (INPA82432); RIO GRANDE DO SUL, Passo Fundo, Jaboticabal, 23.X.2003, M.S. Rother & B.M.A. Severo s.n. (RSPF327 as *P. fallax*); SÃO PAULO, Itapeperica da Serra, 25.VI.1965, Eiten & Goodland 6313



**Figs. 6 a-f.** *Pluteus rimosoaffinis* (A.M. Gugliotta et al. PEF107/2009). **a.** Basidiomata; **b.** Basidiospores; **c.** Basidia; **d.** Pleurocystidia; **e.** Cheilocystidia; **f.** Pileipellis elements. Bars: **a** = 1 cm; **b-f** = 10  $\mu$ m.

(SP106867 as *P. diptychocystis*); São Paulo, Parque Estadual da Cantareira, Núcleo Engordador, 7.XI.2011, *M. Capelari & J.J.S. Oliveira MC4607* (SP416740); Parque Estadual das Fontes do Ipiranga, 19.VIII.2009, *A.M. Gugliotta et al. PEFI07/2009* (SP394379); Mogi Guaçu, Reserva Biológica de Mogi Guaçu, Fazenda Campininha, 29-30.I.1987, *D.N. Pegler et al. 3896* (SP214395).

**Remarks:** *Pluteus rimosoaffinis* was described from Argentina (Singer 1956) and since then it has been recorded from Brazil by Pegler (1997) and Meijer (2006 as *P. cf. rimosoaffinis*), but both records are not accompanied by a complete description.

Singer (1956) mentioned in the protologue some characteristics that were not observed in the Brazilian collections, such as the entirely white stipe, the grayish-pallid lamellar edges, non-globose basidiospores, and the presence of obpyriform pleuro- and cheilocystidia. Moreover, we also observed some weakly pigmented pleurocystidia in the Brazilian material.

It was not possible to observe the basidiospores or the cystidia to confirm these variations in the Brazilian material collected and identified by R. Singer (*R. Singer B 11111* – INPA82432!, data not published). On the other hand, we verified that collection *D.N. Pegler et al. 3896* (SP214395!) has narrowly utriform, conical or clavate pleuro- and cheilocystidia and broadly ellipsoid basidiospores, instead of obpyriform cystidia and subglobose basidiospores as published by Pegler (1997). The collections studied by Meijer (2006) and published as *P. cf. rimosoaffinis* actually represent other species (Tab. 1, Menolli *et al.* 2015c).

Although Singer (1956, 1959) emphasized the obpyriform shape of the cystidia, he also illustrated clavate and narrowly utriform pleuro- and cheilocystidia like some of those found in the Brazilian collections examined in the present study, even characterizing the cheilocystidia as more versiform than the pleurocystidia. Despite the differences between the Brazilian and the Argentinean collections, we still accept *P. rimosoaffinis* with these variations and confirm its occurrence in Brazil. The re-examination of the Argentinean collections studied by Singer (1956, 1959) would be useful, but the holotype is not available for loan and the other collections (including the paratype) mentioned in Singer's papers were not found in LIL.

#### **Additional comments on *Pluteus* section *Celluloderma* in Brazil and annotated checklist**

The current knowledge of *Pluteus* sect. *Celluloderma* in Brazil is presented in Tab. 1. Searches of the bibliographical and herbarium records, complemented by the species herein presented, led to a total of 55 taxa names of *Pluteus* sect. *Celluloderma* that were linked to specimens collected in Brazil (Tab. 1). However, we consider only 34 taxa here as occurring in Brazil based on the specimens revised or the complete descriptions presented by the authors referenced. The occurrence in Brazil of the other 21 taxa was not confirmed because these records are not accompanied by

a complete description and the collections associated to these names could not be located, are too insufficient or unavailable for study, or represent species of other sections. Data of previous studies were also used to confirm the occurrence of these taxa in the country (Singer 1954b, 1959, 1973a, 1989, Wartchow *et al.* 2004, 2006, Menolli & Capelari 2010, 2014, Menolli *et al.* 2010, 2014, 2015a, b, Dias & Cortez 2013).

The infrageneric position of some species in *Pluteus* sect. *Celluloderma* should be regarded with caution. The position of *P. amazonicus* Singer between sections *Hispidoderma* and *Celluloderma* as discussed by Singer (1959) is doubtful due to its pileipellis structure with elements varying from short to long. However, considering the average of length/width ratio ( $Q_m < 3$ , according to Justo *et al.* 2011a) for the measurements of the pileipellis elements done by Singer (1989), we consider *P. amazonicus* better classified in *Pluteus* sect. *Celluloderma*. Although the Brazilian type was not located at INPA herbarium (Tab. 1), we prefer to maintain this species as occurring in Brazil based on the complete description presented by Singer (1989).

It is not obvious to us the real infrageneric position of *P. minutus* Pat. but based on the characteristics of the pileipellis described by Singer (1956) we prefer to maintain it in *Pluteus* sect. *Celluloderma*. It is important to note that although Singer (1989) mentioned the collection from Bahia State, Itabuna (*R. Singer B 11119*, 7 Jun. 1973, INPA) as *P. minutus*, it is deposited at INPA as *P. oligocystis* var. *dennisii* (Singer) Singer and dated of 6 Jun. 1978, which probably is the correct date according to the field itinerary of R. Singer (Strack & Mueller 1997). Nevertheless, its occurrence in Brazil could not be confirmed because the material available at INPA is not sufficient for study and because Singer did not provide any description for this collection.

*Pluteus argentinensis*, *P. avellaneus* Murrill, *P. hispidulus* (Fr.) Gillet and *P. pluvialis* Singer are considered species with a cutis-like pileipellis and therefore are listed as species of *Pluteus* sect. *Celluloderma* previously recorded from Brazil, but only the occurrence of *P. argentinensis* is confirmed (Tab. 1). Although we considered *P. argentinensis* as having a cutis-like pileipellis, it is important to note that Singer (1959) did not characterize it well in the protologue. According to his illustrations (Singer 1959), the pileipellis of *P. argentinensis* seems to be composed of cutis-like elements as also illustrated by Dias & Cortez (2013) for a Brazilian collection. A type revision of *P. argentinensis* is needed because in a previous record from México, Rodríguez & Guzmán-Dávalos (1999) characterized its pileipellis as a trichoderm. Singer & Digilio (1952) also mentioned a trichodermal pileipellis (mainly composed of depressed elements) for an Argentinean collection (*R. Singer T 929*), which was at first (Singer & Digilio 1952) identified as *P. plautus* (Weinm.) Gillet and after included in the material described as *P. argentinensis* by Singer (1959), who put the latter species in the trichodermal pileipellis

**Table 1.** *Pluteus* sect. *Celluloderma* taxa recorded from Brazil and notes about the identification of the Brazilian collections.

Taxon	Reference or Herbarium data	Notes
<i>P. amazonicus</i> Singer <sup>◊</sup> * <sup>o</sup> *	Singer (1989)	Unavailable for study
<i>P. anomocystidiatus</i> Menolli & de Meijer <sup>■</sup> *	Menolli <i>et al.</i> (2015c)	
<i>P. argentinensis</i> Singer <sup>◊</sup> * <sup>o</sup> *	Dias & Cortez (2013)	
<i>P. atriavellaneus</i> Murrill	Unpublished data (SP233830)	<i>P. meridionalis</i> Menolli & Capelari (Menolli <i>et al.</i> 2014)
<i>P. aureovenatus</i> Menolli & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2010)	
<i>P. avellaneus</i> Murrill	Unpublished data (SMDB9193 in herbarium database)	Unavailable for study
<i>P. beniensis</i> Singer <sup>◊</sup> * <sup>o</sup> *	Stijve & de Meijer (1993 <sup>♦</sup> as <i>P. cf. beniensis</i> ) Meijer (2006 as <i>P. cf. beniensis</i> ) Wartchow <i>et al.</i> (2006)	Unavailable for study Not found Too insufficient for study
<i>P. brunneocrinitus</i> Menolli, Justo & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2015a)	
<i>P. brunneopictus</i> Berk. & Broome	Rick (1938 <sup>♦</sup> , 1961*)	Most likely <i>P. tucumanus</i> Singer and <i>P. cubensis</i> (Menolli & Capelari 2014)
<i>P. burserae</i> Singer <sup>■</sup> *	Singer (1959)	
<i>P. cebolinhae</i> Menolli, Justo & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2015a)	
<i>P. chrysophlebius</i> subsp. <i>bruchii</i> (Speg.) Singer	Meijer (2006)	<i>P. crassocystidiatus</i> (Menolli <i>et al.</i> 2015c)
<i>P. crassocystidiatus</i> Menolli & de Meijer <sup>■</sup> *	Menolli <i>et al.</i> (2015c)	
<i>P. crinitus</i> Menolli & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2015a)	
<i>P. cubensis</i> (Murrill) Dennis <sup>■</sup> *	Stijve & de Meijer (1993 <sup>♦</sup> ) Pegler (1997*) Meijer (2006*) Rosa <i>et al.</i> (2003 <sup>♦</sup> ) Xavier-Santos <i>et al.</i> (2004 <sup>♦</sup> as <i>P. cf. cubensis</i> ) Rosa & Capelari (2009 <sup>♦</sup> ) Justo <i>et al.</i> (2011a, b as <i>Pluteus</i> sp. V) Menolli <i>et al.</i> (2015c)	Unavailable for study <i>P. cubensis</i> and <i>P. allostipitatus</i> (Menolli <i>et al.</i> 2015c) <i>P. cubensis</i> , <i>P. rimosellus</i> Singer and <i>P. striatocystis</i> (Menolli <i>et al.</i> 2015c) <i>P. fibrillosus</i> Murrill (Menolli <i>et al.</i> 2015b) Unavailable for study <i>P. fibrillosus</i> (Menolli <i>et al.</i> 2015b)
<i>P. diptychocystis</i> *	Pegler (1997) This paper	<i>P. rimosoaffinis</i> (this paper)
<i>P. dominicanus</i> var. <i>hyalinus</i> Menolli & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2010)	
<i>P. eludens</i> E.F. Malysheva, Minnis & Justo <sup>■</sup> *	Menolli <i>et al.</i> (2015c)	
<i>P. eugraptus</i> (Berk. & Broome) Sacc.	Meijer (2006)	<i>P. chusqueae</i> (E. Horak) Menolli (Menolli <i>et al.</i> 2015c)
<i>P. fallax</i> Singer <sup>◊</sup> * <sup>o</sup> *	Singer (1954b and 1956 as <i>P. umbrinoalbidus</i> for the collection <i>R. Singer B 110</i> ) Singer (1959)	Collection <i>R. Singer B 110</i> was re-identified as <i>P. fallax</i> by Singer (1959) Not found
<i>P. cf. fastigiatus</i> Singer	This paper	See comments in Taxonomy part Collection <i>R. Singer B 432</i> was re-identified as <i>P. fluminensis</i> by Singer (1959) that was considered a synonym of <i>P. jamaicensis</i> by Menolli <i>et al.</i> (2015c)
<i>P. fluminensis</i> Singer	Singer (1956 as <i>P. variipes</i> for the collection <i>R. Singer B 432</i> ) Singer (1959) Stijve & de Meijer (1993 <sup>♦</sup> ) Meijer (2006 as <i>P. cf. fluminensis</i> ) Pegler (1997) Menolli <i>et al.</i> (2010)	Considered synonym of <i>P. jamaicensis</i> by Menolli <i>et al.</i> (2015c) Unavailable for study <i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c) <i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c) <i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c) <i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c)
<i>P. fuligineovenosus</i> E. Horak	Menolli <i>et al.</i> (2010)	<i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c)
<i>P. cf. fuliginosus</i> Murrill	This paper	See comments in Taxonomy part
<i>P. fusconigrans</i> (Berk. & Broome) Sacc. <sup>■</sup> *	Menolli <i>et al.</i> (2015c)	
<i>P. globiger</i> Singer <sup>■</sup> *	Wartchow <i>et al.</i> (2006) Dias & Cortez (2013)	
<i>P. halonatus</i> Menolli, Justo & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2015a)	
<i>P. hispidulus</i> (Fr.) Gillet	Rick (1919 <sup>♦</sup> , 1938 <sup>♦</sup> , 1961)	Most likely <i>P. yungensis</i> Singer (Menolli & Capelari 2014)
<i>P. hispidulopsis</i> Menolli, Justo & Capelari <sup>■</sup> *	Menolli <i>et al.</i> (2015a)	

Table 1. Cont.

Taxon	Reference or Herbarium data	Notes
<i>P. homolae</i> Minnis & Sundb.■*	Menolli <i>et al.</i> (2015c)	
<i>P. iguazuensis</i> Singer*	Meijer (2006 as <i>P. cf. iguazuensis</i> ) Drechsler-Santos <i>et al.</i> (2007♦) This paper	<i>P. crassocystidiatus</i> (Menolli <i>et al.</i> 2015c) Unavailable for study
<i>P. jamaicensis</i> Murrill■*	Singer (1956 as <i>P. variipes</i> for the collection <i>R. Singer B 432</i> )  Singer (1959) as <i>P. fluminensis</i>	Collection <i>R. Singer B 432</i> was re-identified as <i>P. fluminensis</i> by Singer (1959) and considered <i>P. jamaicensis</i> by Menolli <i>et al.</i> (2015c) Considered <i>P. jamaicensis</i> by Menolli <i>et al.</i> (2015c)
<i>P. karstedtia</i> Menolli, Justo & Capelari■*	Menolli <i>et al.</i> (2010) Menolli <i>et al.</i> (2015a)	<i>P. cf. jamaicensis</i> (Menolli <i>et al.</i> 2015c)
<i>P. laetifrons</i> var. <i>laetifrons</i> (Berk. & M.A. Curtis) Sacc.	Meijer (2006, 2009♦)	Too insufficient for study
<i>P. laetifrons</i> var. <i>floridae</i> Singer	Meijer (2006)	Not found
<i>P. nanus</i> (Pers.) P. Kumm.	Rick (1919♦, 1938♦, 1961)	Most likely <i>P. sapiicola</i> (Menolli & Capelari 2014)
<i>P. nanus</i> var. <i>podospileus</i> (Sacc. & Cub.) Rick	Rick (1938♦, 1961♦)	Not found
<i>P. aff. neophlebophorus</i> Singer	Meijer (2006)	<i>P. eludens</i> (Menolli <i>et al.</i> 2015c)
<i>P. microsporus</i> (Dennis) Singer	Unpublished data (SP250534 in herbarium database)	Not found in herbarium collections
<i>P. minutus</i> Pat.†	Singer (1989)	Too insufficient for study
<i>P. necopinatus</i> Menolli & Capelari■*	Menolli <i>et al.</i> (2015a)	
<i>P. paraensis</i> Singer <sup>o*</sup>	Singer (1973a)	Not found
<i>P. paucicystidiatus</i> Menolli, Justo & Capelari■*	Justo <i>et al.</i> (2011a, b as <i>Pluteus</i> sp. IV) Menolli <i>et al.</i> (2015a)	
<i>P. phlebophorus</i> (Ditmar) P. Kumm.	Rick (1938♦, 1961*)	Most likely <i>P. sapiicola</i> and <i>P. tucumanus</i> (Menolli & Capelari 2014)
<i>P. pluvialis</i> Singer	Pegler (1997)	<i>P. longistriatus</i> (N. Menolli Jr. pers. obs.)
<i>P. pulverulentus</i> var. <i>pseudonanus</i> Singer	Meijer (2006)	Not found
<i>P. riberaltensis</i> var. <i>conquistensis</i> Singer■*	Menolli <i>et al.</i> (2010)	
<i>P. rimosoaffinis</i> *	Pegler (1997)  Meijer (2006* as <i>P. cf. rimosoaffinis</i> )  Justo <i>et al.</i> (2011a, b as <i>Pluteus</i> sp. III) This paper	<i>P. cf. jamaicensis</i> and <i>P. sapiicola</i> (Menolli <i>et al.</i> 2015c)
<i>P. riograndensis</i> Singer <sup>o*</sup>	Singer (1954b, 1956, 1959) Raithelhuber (1991♦)	Unavailable for study Unavailable for study
<i>P. sapiicola</i> Singer■*	Justo <i>et al.</i> (2011a,b as <i>Pluteus</i> sp. II) Menolli <i>et al.</i> (2015c)	
<i>P. striatocystis</i> Pegler■*	Menolli <i>et al.</i> (2015c)	
<i>P. sublaevigatus</i> (Singer) Menolli & Capelari■*	Menolli <i>et al.</i> (2010, 2015c)	
<i>P. thomsonii</i> (Berk. & Broome) Dennis■*	Wartchow <i>et al.</i> (2004) Meijer (2006 as <i>P. cf. thomsonii</i> ) Menolli <i>et al.</i> (2015c)	Unavailable for study <i>P. thomsonii</i> (Menolli <i>et al.</i> 2015c)
<i>P. umbrinoalbidus</i> Singer■*	Singer (1954b, 1956, 1959)  Raithelhuber (1991♦) Meijer (2006, 2009♦) Rosa & Capelari (2009♦) Menolli & Capelari (2010)	Collection <i>R. Singer B 110</i> mentioned in Singer (1954b, 1956) was re-identified as <i>P. fallax</i> by Singer (1959) Unavailable for study Not found Too insufficient for study
<i>P. variipes</i> Singer	Singer (1956)  Meijer (2006* as <i>P. cf. rimosoaffinis</i> )	Collection <i>R. Singer B 432</i> was re-identified as <i>P. fluminensis</i> by Singer (1959) that was considered a synonym of <i>P. jamaicensis</i> by Menolli <i>et al.</i> (2015c) <i>P. cf. jamaicensis</i> and <i>P. sapiicola</i> (Menolli <i>et al.</i> 2015c)

\* are considered as occurring in Brazil; ♦ = See discussion in the text about the infrageneric classification of these species; ○ = Species not studied in this work but that are considered as occurring in Brazil due to the complete description presented by the authors referenced. New collections of them are needed to certify their existence in Brazil; ■ = Species not studied in this work but that are considered as occurring in Brazil because the Brazilian collections were revised and the name certified by the first author; ◆ = Reference without indication of the collection studied and/or the herbarium where the materials were deposited; \* = Reference that includes two or more collections that are actually different species.

entry of the key. If it is confirmed that *P. argentinensis* has a trichodermal pileipellis (= *Pluteus* sect. *Hispiderma*), most likely the Brazilian material identified by Dias & Cortez (2013) could represent a cutis-like species closer to *P. fastigiatus* and to the collection *NK112* named here as *P. cf. fastigiatus*. However, for now, based on the record of Dias & Cortez (2013), we accepted *P. argentinensis* as a species of *Pluteus* sect. *Celluloderma* occurring in Brazil.

Although the occurrence of *P. variipes* in Brazil was disregarded because Singer (1959) re-identified the Brazilian collection (*R. Singer B 432*) as *P. fluminensis* Singer, we located in FH herbarium another collection named as *P. variipes* (*R. Singer B 1425* – FH00301675) and presumably from Brazil according to the exsiccate label. However, this collection obviously is not from Brazil but actually from Bolivia because Singer (1959) mentioned *R. Singer B 1425* as a specimen of *P. variipes* collected in Bolivia on 23 Feb. 1956. Moreover, according to Strack & Mueller (1997), during 1956, Singer arrived in Brazil only in March. Collections of other species made on 23 Feb. 1956 (*Pluteus oligocystis* Singer, *R. Singer B 1420* and *Crepidotus yungicola* Singer, *R. Singer B 1422*) were also referenced from Bolivia (Singer 1959, 1973b, Wu *et al.* 1997), confirming the mistake in FH herbarium. Thus, the occurrence of *P. variipes* from Brazil must be disregarded.

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