
Hydropus griseolazulinus, a striking new species from Paraíba, Brazil

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A new species of *Hydropus* is described. This species is easy to identify due its greyish blue pileus with blue lamellae and yellow tinted edge, inamyloid basidiospores, scarcity of pleurocystidia and crowded cheilocystidia. A description, discussion, photographs and line drawings are provided.

Key words – Agaricomycetes – Agaricales – Neotropic – taxonomy

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Introduction

Hydropus Kühner ex Singer was characterized to accommodate all omphalinoid, collybioid and mycenoid taxa with amyloid or inamyloid basidiospores and inflated pileocystidia on pileipellis (Singer 1982, 1986). Orton (1988) and Moncalvo et al. (2002), on the other hand, preferred to use the name *Hydropus* in the very narrow concept of Kühner (1938), i.e. amyloid basidiospores, lacking pleurocystidia and producing latex.

In Brazil, *Hydropus* is a relatively well inventoried genus. Singer (1953, 1973, 1982, 1989) reported more than 60 taxa, many of them as new species, mostly from Amazon. Later, Pegler (1997) cited 10 species from the state of São Paulo, including a new combination, *Hydropus laetus* (Corner) Pegler. From the state of Paraná, de Meijer (2001) numbered 23 taxa, but did not give them any

names. Souza & Aguiar (2004) cited two unnamed specimens of *Hydropus* from Amazon several years after Singer's (1982) monograph. The recent lists of de Meijer (2006, 2008, 2010) from Paraná reduced the number of taxa of *Hydropus* to 14 species. More recently, Drechsler-Santos et al. (2007) and Rosa & Capelari (2009) cited some species in Atlantic Forest of Rio Grande do Sul and Minas Gerais, respectively. From Northeast Brazil, only six taxa are known: *H. camarigibensis* Singer, *H. mesites* Singer, *H. mycenoides* (Dennis) Singer and *H. semimarginellus* Singer from Pernambuco, *H. brunneoumbonatus* (Dennis) Singer and *H. phylogenus* var. *bahiensis* Singer from the state of Bahia (Singer 1973, 1982).

Here we describe a new and striking species of *Hydropus* from the 'restinga' forest from the State of Paraíba, Brazil.



Figs 1–2 – *Hydropus griseolazulinus* (holotype). **1** Basidiome in side-view. **2** Pileus surface. Bars = 10 mm.

Methods

The new species was collected at the “Floresta Nacional da Restinga de Cabedelo”, an Atlantic Forest protected area comprising about 100 ha, located in municipality of Cabedelo, State of Paraíba, Brazil. The area comprises a ‘restinga’ forest, with 160 species of angiosperms belonging to 61 families, of which the most diverse are *Myrtaceae*, *Leguminosae* (all subfamilies), *Rubiaceae*, *Poaceae* and *Euphorbiaceae* (Pontes & Barbosa 2008). Microscopic observations were made from material mounted in 3% KOH, Congo red solution and Melzer’s reagent. Color codes are ‘K’ (Kelly 1965) and ‘OAC’ (Online Auction Color 2004). Presentation of basidiospore data follows the methodology proposed by Tulloss et al. (1992), slightly modified by Wartchow (2012) and Wartchow et al. (2012). 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 2012).

Results

Hydropus griseolazulins F.G.B. Pinheiro, Sá & Wartchow, **sp. nov.** Figs. 1–8
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Holotype— BRAZIL. PARAÍBA. Cabedelo, Floresta Nacional da Restinga de Cabedelo, 01.vi.2012, *F.G.B. Pinheiro & F. Wartchow FW 29/2012* (JPB 51899).

Etymology – from Latin ‘griseo’ (=grey) and lazulinus (=blue), regarding to greyish blue pileus.

Basidiome small, solitary. *Pileus* 25 mm in diam., subinfundibuliform, greyish blue (OAC 283-284; K 190 I. b Gray) with yellowish tints; surface velvety overall; margin smooth, not sulcate, straight; context greyish blue, thin about 1 mm thick near centre. *Lamellae* decurrent with short tooth, spaced, thick, dark blue (OAC 280-281; K 182. M Blue); edge entire, buff-sulfur-yellow (OAC 825; K 85. deep Y); lamellulae common, attenuating. *Stipe* 42 × 4 mm, slightly tapering towards base, whitish; surface with shallowly

twisted grooves, from near base to apex; smooth at base, glabrous in all length; context hollow; rhizomorphs present. Odour indistinct.

Basidiospores (7.4–)7.7–9.4 × (4.1–)4.3–5.6(–5.9) μm, (**L** = 8.4 μm; **W** = 5.1 μm; **Q** = 1.50–1.90; **Qm** = 1.70), inamyloid, hyaline, colourless, subglobose to broadly ellipsoid sometimes globose, smooth, thin walled; apiculus sublateral; content as a large guttule. *Basidia* (33–)43–49 × 6.5–8.7 μm, clavate, 4-sterigmate about 10 μm high, clamp connections absent. *Pleurocystidia* very rare, (21–)31–41 × (5–)6–10 μm, lageniform, colourless, thin walled. Lamella edge sterile, with crowded cheilocystidia. *Cheilocystidia* 28–36 × 7–10 μm, clavate to slender clavate to sometimes slender ventricose, hyaline, thin walled. *Lamella trama* regular to subregular, sarcodimitic, made by two types of hyphae, one wider 14–21 μm, sometimes long and thick walled up to 1 μm thick, and other 3–5 μm wide. *Stipe context* with hyphae 2.5–11 μm in diam., abundant, colourless, longitudinally oriented. *Pileus context* sarcodimitic; made of hyphae to 13.5 μm in diam., mostly with thick walled up to 1–1.8 μm thick. *Stipitipellis* with abundant caulocystidia dispersed along the stipe, (15–)21–31 × 6.7–9.5 μm, broadly clavate to clavate, hyaline, thin walled. *Pileipellis* a disrupting hymenoderm with pileocystidia, 44–75 × 15–26 μm, broadly clavate, clavate occasionally fusoid, pale colourless to almost hyaline, thick walled to 0.8 μm thick.

Known distribution – only known from the type locality.

Habit – solitary on sandy soil in ‘restinga’ vegetation Atlantic Forest.

Taxonomic observation on *Hydropus*

Recent phylogenetic analysis (Moncalvo et al. 2002, Matheny et al. 2006) put in check the systematic of *Hydropus s.l.* According to them *Hydropus s.str.* must be restricted to Kühner’s original concept. However, they only used *H. sect. Hydropus sensu* Singer (1982), not taxa of *H. sect. Mycenoides* Singer. They observed that *H. scabripes* (Murrill) Singer, belonging to sect. *Floccipedes* (Kühner) Singer ex Singer (1961), did not cluster with taxa of *Hydropus s.str.* According to Singer (1982) diagnostic



Figs 3–7 – *Hydropus griseolazulinus* (holotype). **3** Pleurocystidia. **4** Pileocystidia. **5** Basidiospores. **6** Cheilocystidia **7** Basidia. Bars = 10 μ m.

features to segregate *Hydropus s.str.* and *H. scabripes* (and possibly other member of sect. *Floccipedes*) are lack of, or scanty pileocystidia and the presence of cutis in the second group. Since material of *H. sect. Mycenoides* used in phylogenetic analysis by

Moncalvo et al. (2002) and Matheny et al. (2006) is lacking, we prefer to use the generic name *Hydropus* for our new species, since it agrees with some feature (i.e., pileipellis structure) with *H. sect. Hydropus sensu* Singer (1982).

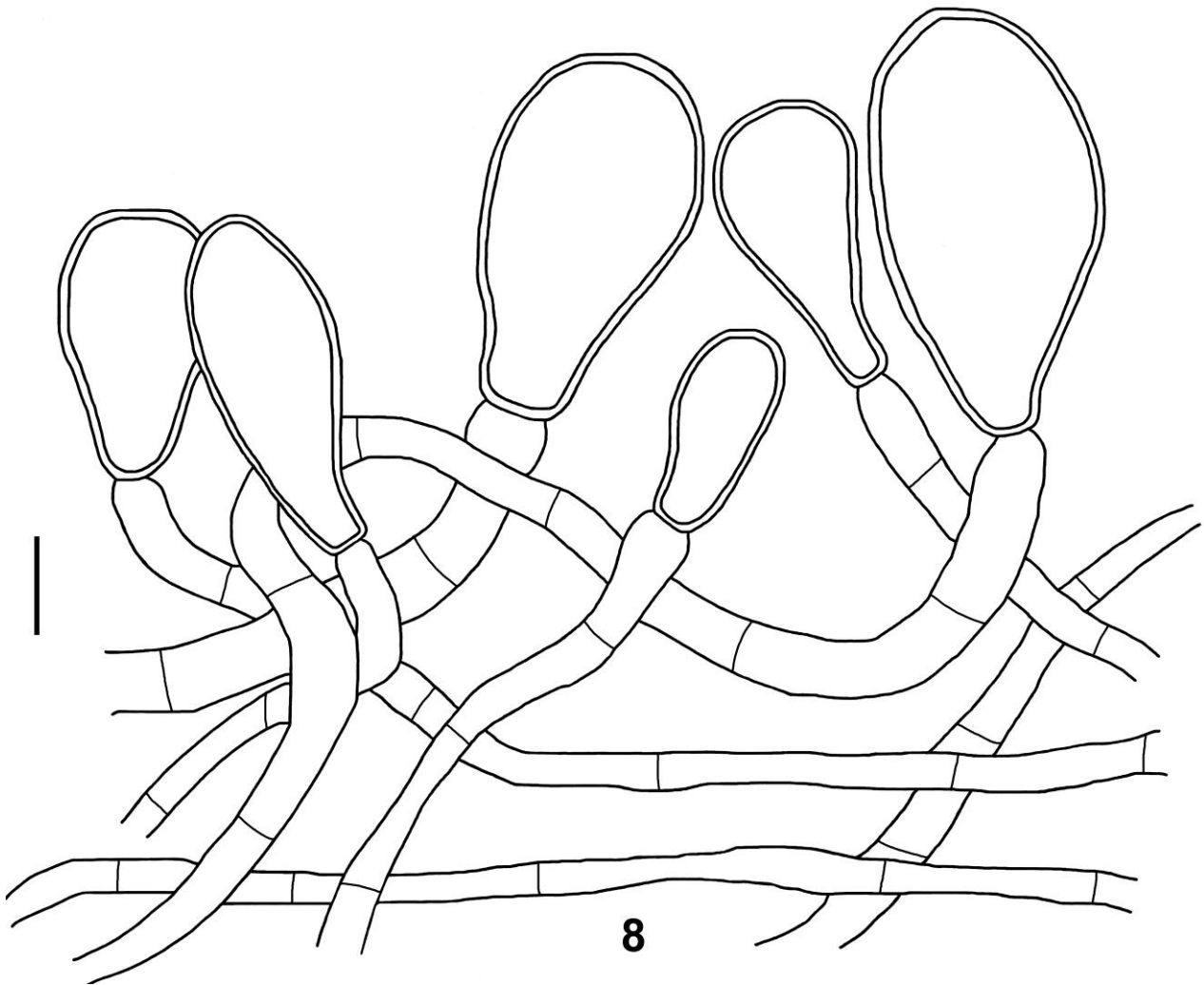


Fig. 8 – *Hydropus griseolazulinus* (holotype). Details of the pileipellis showing the thick walled pileocystidia. Bar = 10 μ m.

Discussion

The omphalinoid habit and a pileipellis a disrupting hymeniform with broadly clavate pileocystidia are typical feature of the genus *Hydropus* (Singer 1982, 1986). *Hydropus griseolazulinus* can be keyed in *H.* sect. *Mycenoides* subsect. *Anthidepas* Singer due the presence of pileocystidia forming a disrupting hymeniform layer in the pileipellis, inamyloid basidiospores and presence of thin-walled cystidia (Singer 1982). Among this subsection, the scarcity of pleurocystidia, the yellow tints in the lamellae and somewhat greyish tints in the pileus, our new species can be compared with *H. terraefirmae* Singer. In spite of the slightly similar basidiospores size, $6.5\text{--}8.5 \times 4.2\text{--}5.5 \mu\text{m}$, it differs from our new species in the presence of ventricose cheilocystidia, and lack of any bluish colour in the basidiome (Singer 1982).

'*Trogia subviride* Corner', although reported with bluish tints and somewhat similar basidiospores size ($7\text{--}10 \times 4\text{--}5 \mu\text{m}$), differs in the greyish tinged greenish ochraceous to greenish blue pileus color, subdistant to rather crowded and whitish lamellae, white then yellowish in age stipe, abundant pleurocystidia and larger cheilocystidia, and growing on dead wood (Corner 1966, 1991).

Corner (1966, 1991) emphasized the importance of the sarcodimitic tissue as taxonomic characters, and considered the genus *Trogia* Fr. in a very wide sense, dividing this genus in four groups. One of these groups is keyed as possessing cheilocystidia forming a sterile lamellae edge. Some of them have pileipellis structure similar to *Hydropus* sensu Singer (1982); *T. pleurotoides* Corner has a pleurotoid habit, and *T. calyculus* Corner

differs primarily in the greenish rather than bluish color in the pileus.

Trogia cyanea Corner, compared by Singer (1982) with *H. terraefirmae*, had the holotype recently revised by Kumar & Manimohan (2009: 431). However, several features, i.e. easily reviving basidiomes, discoid stipe base with radiating basal mycelium, narrow, forked lamellae and the pileipellis as a cutis, are diagnostic features for maintaining this name in *Trogia* rather than *Hydropus*.

Another interesting feature of our new species is the occurrence of long, thick-walled hyphae in the lamella trama and pileus context. This sarcodimitic tissue (differently as proposed by Corner 1966, 1991, who considered it as one diagnostic feature for *Trogia*) is widespread among several taxa of Agaricales. Redhead (1987) reported several taxa that present this specialized tissue, including two *Hydropus* analysed by him, *H. kauffmanii* (A.H. Sm.) Singer and *H. marginellus* Pers.: Fr.) Singer. Singer (1986) also pointed out this character in *Hydropus*.

Singer (1961), Singer & Grinling (1967), Dennis (1968), Pegler & Rayner (1969), Machol & Singer (1977), Bas (1983), Maas Geesteranus & Hausknecht (1993), Cléménçon & Hongo (1994), Hausknecht et al. (1997), Pegler (1997), Pérez-de-Gregório (2001), Moreau & Cortecuisse (2004), Seok et al. (2005), de Meijer (2008) and Holec (2008) described many species of *Hydropus* from several parts of the world, viz. Africa, Asia, Europe, North and South America, and Caribbean. None of them are reported with blue tints. As far as we know, we present a novel macroscopic feature that seems unique among the genus.

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