

## ***Cantharellus protectus*, a new species from Paraíba, Brazil**

Felipe G. B. Pinheiro & Felipe Wartchow\*

Universidade Federal da Paraíba, Departamento de Sistemática e Ecologia/CCEN, CEP 58051-970, João Pessoa, PB, Brazil.

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*Cantharellus protectus* is described as a new species from the Atlantic Forest of northeastern Brazil. It is characterized by yellow-orange basidiomata that fade to yellow, basidiospores measuring  $5.5\text{--}7.5(8) \times (3)3.5\text{--}5(5.5) \mu\text{m}$  and pileipellis terminal elements up to  $68 \mu\text{m}$  long with a  $0.5 \mu\text{m}$  thick wall.

Keywords: Agaricomycetes, Cantharellaceae, Neotropics, taxonomy.

Recent studies of *Cantharellus* Adans.: Fr. in Brazil have led to interesting discoveries. Wartchow *et al.* (2012 a) gave a brief report regarding the diversity of this genus in Brazil. They enumerate 11 taxa, but most of them were transferred to other genera or must be interpreted with caution, since names of the temperate Northern Hemisphere were used for taxa in native areas of Brazil. To date, only three taxa can be confirmed for Brazil: Singer *et al.* (1983) reported *C. guyanensis* Mont. from the State of Amazonas; more recently, Wartchow *et al.* (2012 a) described *C. aurantioconspicuus* Wartchow & Buyck from an Atlantic Forest fragment in Pernambuco, Northeast Brazil and Wartchow *et al.* (2012 b) *C. amazonensis* Wartchow in ‘terra firme’ forest from the state of Amazonas. Here we describe a second new species from the Atlantic Forest of Northeast Brazil.

### **Materials and methods**

*Cantharellus* basidiomata were collected at the “Reserva Biológica de Guaribas”, an Atlantic Forest protected area of 4029 ha. About 630 species of vascular plants occur in this area, from diverse families: Fabaceae (all sub-families), Poaceae, Cyperaceae, Rubiaceae, Asteraceae, Malvaceae, Melastomataceae and Myrtaceae (Barbosa *et al.* 2011). Color codes follow Kelly (1965) and were taken on fresh material. Microscopic observations were made from material mounted in 3 % KOH and Congo red solutions. Descrip-

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\* e-mail: fwartchow@yahoo.com.br

tion of the basidiospores follows the methodology proposed by Tulloss *et al.* (1992), slightly modified by Wartchow (2012) and Wartchow *et al.* (2012 a). Measurements and statistics are based on 30 spores. Abbreviations include L(W) = average basidiospores length (width), Q = the length/width ratio range as determined from the basidiospores measured, and  $Q_m$  = the Q value averaged from all basidiospores measured. The holotype and additional material analyzed are deposited at JPB (Thiers, continuously updated).



Fig. 1. *Cantharellus protectus*. Basidiomata *in situ*. Bar: 20 mm.

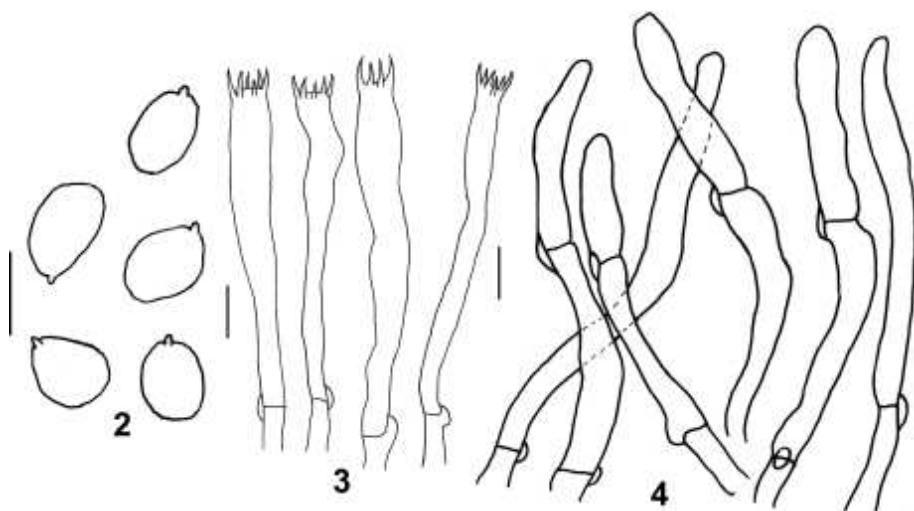
### Taxonomy

***Cantharellus protectus*** Wartchow & F. G. B. Pinheiro, sp. nov. – Figs. 1–4.  
Mycobank no.: MB 801747

Holotypus. – BRAZIL, Paraíba, Mamanguape, Reserva Biológica de Guaribas, Umapiritanga, on soil in Atlantic Forest, 27 Jul 2012, *leg. & det.* F. Wartchow & F. Pinheiro FW 132/2012, (JPB 51317).

Description. – Basidiomata small to medium sized. – Pileus: 17–52 mm in diam., convex to plane, then broadly convex with slight depression at centre; surface smooth, dull, orange yellow (66. v. OY), then fading to pale yellow (86. I. Y), with dark yellow-orange (68. s. OY) tints in older basidiomata; margin finely inrolled in young specimens, then slightly incurved

to almost straight, not sulcate or striate; context solid, 2–4 mm thick near center, whitish, unchanging. – Hymenial folds: decurrent, subclose to subdistant, orange-yellow (70. I. OY), repeatedly forked, frequently anastomosing, then somewhat venose near pileus margin; folds up to 2 mm broad; edge entire, concolorous. – Stipe: 30–60 × 4–9 mm, central but eccentric in one basidiome, orange yellow (66. v. OY), then pale orange-yellow (67. brill. OY) in some parts or yellowish (83. brill. Y) in some specimens; surface smooth, glabrous; context solid yellowish white (92. y White), unchanging.



**Figs. 2–4.** *Cantharellus protectus*. 2. Basidiospores. 3. Basidia and adjacent hyphae. 4. Terminal segments of the pileipellis. Bars: 10  $\mu$ m.

Basidiospores: 5.5–7.5(8) × (3)3.5–5(5.5)  $\mu$ m,  $L = 6.4$   $\mu$ m;  $W = 4.2$   $\mu$ m;  $Q = 1.33$ – $1.75(1.83)$ ;  $Q_m = 1.50$ , inamyloid, hyaline, colorless, ellipsoid to sometimes elongate, smooth, moderately thick-walled (0.4  $\mu$ m), with adaxial surface slightly convex to flattened, only occasionally concave flattened, rarely reniform; hilar appendix obtuse, sublateral to subapical; guttulate. – Basidia: 36–58 × 5–8  $\mu$ m, mostly 6-spored, with sterigmata up to 4–5  $\mu$ m long, clamp connections abundant at base. – Subhymenium: made up of filamentous hyphae up to 6  $\mu$ m wide. – Cystidia: absent. – Hymenophoral trama: irregular; composed of filamentous hyphae 2.5–47.5  $\mu$ m wide, colorless, thin walled; clamp connections abundant, present on almost all septa. – Pileipellis: a loose differentiated cutis; made up of terminal hyphal cells being 37–66 × 4–7  $\mu$ m, mostly cylindric with obtuse tips, with pale yellowish cytoplasmatic pigment, interwoven to suberect; wall somewhat thickening up to 0.5  $\mu$ m; clamp connections abundant, present on almost all septa.

**Etymology.** – From Latin *protectus* (=protected); the new species was collected in a federal biological reserve protected by law.

**Habitat.** – Scattered on sandy soil in Atlantic Forest, surrounded by *Coccoloba* and other trees.

**Distribution.** – Only known from the type locality.

**Material examined** (besides holotype). – BRAZIL, Reserva Biológica de Guaribas, Cabeça de Boi, 12 June 1991, *leg.* M. A. Sousa & J. V. B. Silva s.n., *det.* F. Wartchow & F. Pinheiro (JPB 18541).

## Discussion

The holotype of *Cantharellus protectus* is characterized by yellow-orange basidiomata, forked and anastomosed and then more or less venose hymenial folds, basidiospores measuring  $5.5\text{--}7.5(8) \times (3)3.5\text{--}5(5.5) \mu\text{m}$ , and relatively thin-walled (max.  $0.5 \mu\text{m}$  thick) and long (up to  $68 \mu\text{m}$ ) terminal hyphae of the pileipellis. The specimen JPB 18541, collected in 1991 “on soil under the shadow of the trees” (according to annotation in the herbarium sheet), is clearly conspecific. A short fieldnote reports yellowish basidiomata. In addition, our analysis revealed basidiospores almost similar in size, but slightly more elongate:  $6.5\text{--}7.5 \times 3.5\text{--}4.5(5) \mu\text{m}$ ,  $L = 7.0 \mu\text{m}$ ;  $W = 4.2 \mu\text{m}$ ;  $Q = (1.44)1.50\text{--}1.85$ ;  $Q_m = 1.68$  (several basidiospores and basidiomata damaged).

Two other orange-colored taxa occurring in Brazil are similar to this new species and could eventually be confused. *Cantharellus guyanensis* Mont. was recently discussed by Wartchow *et al.* (2012 a). Its basidiospores are similar in shape, rarely reniform, but wider,  $6\text{--}8 \times 5\text{--}5.5 \mu\text{m}$ . Further, the pileus has purplish tints and the terminal hyphal cells of the pileipellis are distinctly shorter and wider,  $(5)8\text{--}10(12) \mu\text{m}$ , and distinctly thick-walled (Montagne 1854, Corner 1966, Wartchow *et al.* 2012 a). Another Atlantic Forest species, *C. aurantioconspicuus*, has larger basidiomata reaching up to 90 mm in diam., more orange and less yellow colors, cream hymenophoral folds in mature specimens, and more elongate basidiospores  $(6.5)7\text{--}9(9.5) \times 4\text{--}5 \mu\text{m}$ , ( $L = 7.8 \mu\text{m}$ ;  $W = 4.6 \mu\text{m}$ ;  $Q = (1.43)1.46\text{--}2.02(2.07)$ ;  $Q_m = 1.67$ ) and immeasurable thinner walls (Wartchow 2012 a).

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Autor(en)/Author(s): Pinheiro Felipe G. B., Wartchow Felipe

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