

SHORT COMMUNICATION

The discovery of *Neolentinus cirrhosus* (*Gloeophyllales*, *Basidiomycota*) in the Neotropics

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Abstract. *Neolentinus* is a brown-rot genus (order *Gloeophyllales*) rarely found in the Neotropics. The only known species in the region is *N. cyatiformis*, reported from Argentina. This paper reports the discovery of a second species of *Neolentinus* in the Neotropics: *N. cirrhosus*. The species has a set of unique characteristics: lentinoid habit, squamulose pileus with ciliate/pilose margin, decurrent lamellae, small basidiospore size, and habitat on sand, with soil-incrusted sclerotium. The species is described, illustrated and discussed.

Key words: *Agaricomycetes*, *Agaricomycetidae*, Caatinga, Fungi, taxonomy

Introduction

Neolentinus is a lentinoid genus characterized by the presence of skeletal and generative hyphae, the absence of hyphal pegs, mostly regular lamellar trama, and producing brown rot (Rune 1994). Hibbett & Vilgalys (1993) showed that members of this group do not belong to *Lentinus* or *Panus*, two white-rot genera. More recently, in analyses of amino acids (*rpb2*, *atp6*, *tef1*) and nucleotide (nuc-LSU, nuc-SSU, 5.8S rRNA) sequences (Garcia-Sandoval et al. 2011) and ITS (Zhang et al. 2018), *Neolentinus* was found to be clustered with many brown-rot fungi such as *Boreostereum*, *Chaetodermella*, *Donkioporia*, *Gloeophyllum*, *Heliocybe* and *Veluticeps*, in a clade corresponding to the order *Gloeophyllales*.

The type species of this genus is *N. kauffmanii*, described by Alexander H. Smith under the name *Lentinus* in a study of a supposed disease causing brown rot in *Picea sitchensis* (Bier & Nobles 1946). Later, many other species were described, but only one from South America, *N. cyatiformis* (Lechner & Wright 2002, as *N. schaefferi*). Two species of the genus occur in soil: *N. papuanus* and *N. cirrhosus* treated here. In studies of lentinoid fungi from the Brazilian semiarid region (Drechsler-Santos et al. 2012), I discovered *N. cirrhosus* for the first time from the Neotropics.

Materials and methods

Neolentinus cirrhosus was collected near a water reservoir at the locality called Juá dos Vieiras, Viçosa do Ceará Municipality, Ceará State, Northeast Brazil. The region comprises the ‘Área de Proteção Ambiental (APA) Planalto da Ibiapaba’ federal reserve and comprises mostly *carrasco*, a tall-shrubby vegetation that is relatively closed and xerophilous, with a high density of woody plants, especially small trees (3–4 m high) with thin trunks (Araújo & Martins 1999; Lima et al. 2011).

Microscopic observations were made from material mounted in 3% KOH, floxin solution and Melzer’s reagent. Color codes follow Kelly (1965). Presentation of of basidiospore data follows the methodology proposed by Tulloss et al. (1992), slightly modified. Measurements and statistics are based on 30 spores. Abbreviations include L(W) = average basidiospore length (width), Q = length: width ratio range as determined from all measured basidiospores, and Q_m = Q value averaged from all basidiospores measured. Description of basidiospore shape follows the methodology suggested by Bas (1969), based on a variation of the ‘Q’ value: globose (1.00–1.05), subglobose (1.05–1.15), broadly ellipsoid (1.15–1.30), ellipsoid (1.30–1.60), elongate (1.60–2.00), cylindrical (2.00–3.00) and bacilliform (> 3.00). The material is deposited at JPB (Thiers, continuously updated).

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Results and discussion

Neolentinus cirrhosus (Fr.) Redhead & Ginns, Trans. Mycol. Soc. Japan 26: 357. 1986. (Figs 1–2)

Basionym: *Lentinus cirrhosus* Fr., Adami Afzelii fungi Guineenses...: 7. 1837.

≡ *Porcillaria cirrhosa* (Fr.) Kuntze, Rev. Gen. Pl. 2: 865. 1891.

= *Lentinus chudaei* Har. & Pat., Bull. Soc. Mycol. Fr. 28: 145. 1912.

Description. Basidiomes small, solitary. Pileus 29 mm in diam., plane-convex and deeply umbilicate; dark grayish brown (81.d.gy.y.Br), covered by pale grayish brown (80.gy.y.Br) squamules; margin ciliate/pilose; context 1.5 mm thick; dirty white, unchanging. Lamellae adnate to subdecurrent, subcrowded; dark brown (75.deep y Br), 2.5 mm broad, somewhat dichotomous; edge entire, concolorous; lamellulae frequent, of diverse lengths. Stipe 15 × 6 mm, central, equal but swollen toward base, dark brown (78.d.y Br), covered by sand incrustations; context solid, fibrous, dirty white; sclerotium subterranean 60 × 6 mm, rooting with sand incrustations.

Basidiospores 7.1–10.2(–10.7) × (2.6–)3.1–3.6 μm, (L=8.4 μm; W=3.3 μm; Q=(2.15–)2.26–2.83(–3.24); Qm=2.58), inamyloid, hyaline colorless in KOH 3%, cylindric to occasionally baciliform, smooth, thin-walled, adaxial surface straight; hilar appendix small but well visible, subapical; frequently one or two guttule. Basidia 20–23 × 5.5–6 μm, mostly 4-sterigmate, up to 1.5–3.5 μm long, thin-walled, hyaline, clamps present. Basidioles clavate. Cystidia absent; lamella edge presenting some slightly thick-walled hyphae emerging from the lamellar

trama; very few (two observed) fusoid-ventricose cystidioid bodies 26 × 6 μm, very thin-walled, colorless in KOH and Melzer's reagent. Lamellar trama subregular to slightly irregular, but mostly with descendant construction, with subparallel to slightly interwoven hyphae 2–4.5 μm in diam., thin to slightly thick-walled to 1.5 μm thick, colorless in KOH. Pileus context a loose matrix containing thick-walled skeletal hyphae ranging to 5 μm wide with walls to 1.5 μm (sometimes 2 μm) thick and somewhat frequent blunt knobs; filamentous hyphae very common, up to 4 μm wide and dichotomous to ramified, all elements densely interwoven but slightly anticlinal near pileipellis. Pileipellis a epicutis up to 300 μm thick, with anticlinal hyphae 3–6.5 μm thick, dark brown in mass then individually melleous, wall thickening to 2 μm; erect to suberect attenuate tufts of anticlinal hyphae 300 × 58 μm (measured at base) with hyphae 3–4.5(–6.5) μm in diam. mostly thick-walled. Clamp connections present on almost all septa observed.

Known distribution. Mauritania, Zimbabwe and now Neotropics, in the semiarid region of Brazil.

Notes. *Neolentinus cirrhosus* was originally described from Guinea as a member of *Lentinus* (Fries & Nyman 1837). Later the epithet was transferred to *Pocillaria* by Kuntze (1891). Hariot & Patouillard (1912) described *Lentinus chudaei* from Mauritania. Pegler (1983) studied the materials and synonymized these epithets under the name *Lentinus cirrhosus*. Finally, Rune (1994), based on morphology, asserted a high degree of separation of *Neolentinus* from other white-rot lentinioid genera, confirming

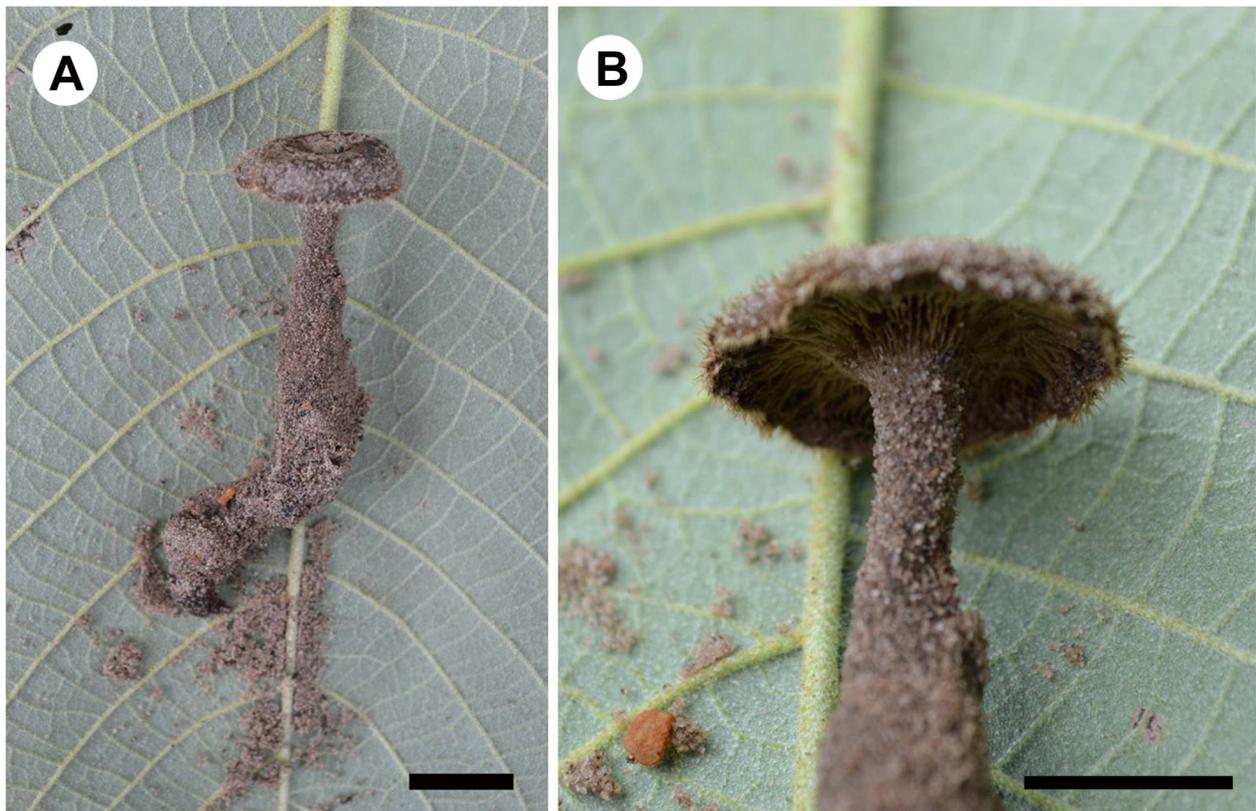


Figure 1. *Neolentinus cirrhosus*. A – basidiome in side view; B – details of stipe apex and lamellae. Scale bars = 15 mm.

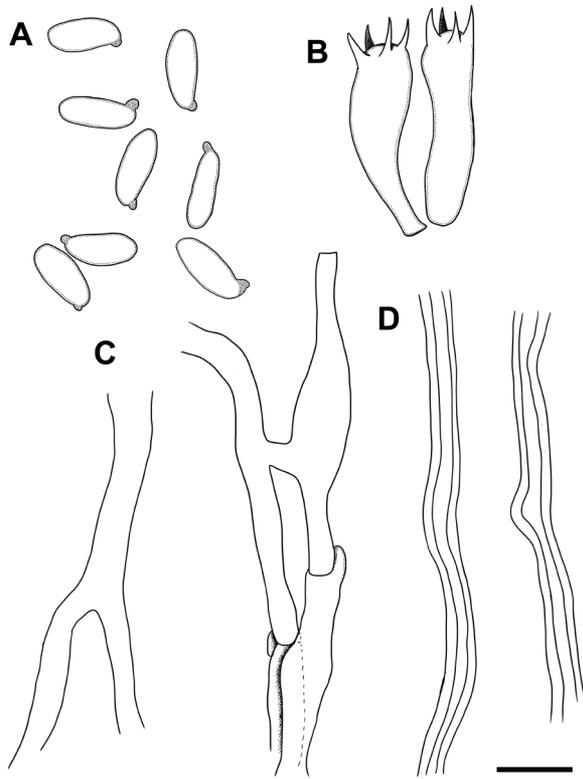


Figure 2. *Neolentinus cirrhosus*. A – basidiospores; B – basidia; C – generative hyphae. D – skeletal hyphae. Bars = 10 μm for all microstructures.

the placement of the epithet *cirrhosus* in this genus. More recently, Zmitrovich and Kovalenko (2016) introduced new data for delimitation of lentinioid fungi: for example, dimitic context with ‘fibrohyphae’ (uninflated with collapsed appendages) elements, basidia $> 30 \mu\text{m}$ long, and basidiospores with navicular or fusoid tendency. However, they still maintain the epithet *cirrhosus* in *Neolentinus*. Since the Brazilian collection agrees with the type specimens analyzed by Pegler (1983), I continue to consider it in the genus *Neolentinus*.

This species is characterized by the lentinioid habit, squamulose pileus with ciliate/pilose margin, decurrent and subcrowded lamellae, basidiospore size, and the habitat on sand with a soil-incrusted subterranean sclerotium. In many aspects the species fits with the West African materials revised by Pegler (1983, as *Lentinus cirrhosus*) and its synonym *Lentinus chudaei*, which was also protologued from this continent (Hariot & Patouillard 1912). The only difference was the more distant lamellae referred to for the African specimens (Fries 1837; Hariot & Patouillard 1912; Pegler 1983).

Another species growing on soil is *N. papuanus* from Papua New Guinea. This species was described by Hongo (1976, as *Lentinus papuanus*) as growing on burnt ground, with a grayish orange pileus with a more or less fibrillose or squamulose surface and stipe with a subterranean rooting base. Although not mentioned in the protologue, the accompanying figure 1 depicted an apparent soil incrustation in the subterranean portion of the stipe. Later, Pegler (1983) analyzed the holotype and also observed the stipe with rooting base, but without

indication of an underground sclerotium as observed in *N. cirrhosus*. Microscopically, he also observed cheilocystidia and more elongated basidiospores, $8.5\text{--}13 \times 3.7\text{--}4.5 \mu\text{m}$ ($10 \pm 0.5 \times 4.2 \pm 0.3 \mu\text{m}$, $Q_m = 2.38$, in *N. papuanus*).

Known originally from Guinea and Mauritania, this study gives the first report of *Neolentinus cirrhosus* from the Neotropics.

Specimen examined. BRAZIL, Ceará, Área de Proteção Ambiental Serra da Ibiapaba, Viçosa do Ceará, Juá dos Vieiras, near a dam of a water reservoir, $03^{\circ}30'46''\text{S}$ and $41^{\circ}15'51''\text{W}$, 607 m, 25 April 2013, F. Wartchow 13/2013 (JPB 638956).

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References

- Araújo, F. S. & Martins, F. R. 1999. Fisionomia e organização da vegetação do carrasco no Planalto da Ibiapaba, Estado do Ceará. *Acta Botanica Brasílica* 13: 1–13.
- Bas, C. 1969. Morphology and subdivision of *Amanita* and a monograph of its section *Lepidella*. *Persoonia* 5: 285–579.
- Bier, J. E. & Nobles, M. K. 1946. Brown pocket rot of sitka spruce. *Canadian Journal of Research, Section C* 24: 115–120.
- Corner, E. J. H. 1981. The agaric genera *Lentinus*, *Panus* and *Pleurotus* with particular reference to Malaysian species. *Beihfte zur Nova Hedvigia* 69: 1–169.
- Drechler-Santos, E. R., Wartchow, F., Coimbra, V. R. M., Gibertoni, T. B. & Cavalcanti, M. A. Q. 2012. Studies on lentinioid fungi (*Lentinus* and *Panus*) from the semi-arid region of Brazil. *Journal of the Torrey Botanical Society* 139: 437–446.
- Fries, E. M. & Nyman, C. M. 1837. *Adami Afzelli fungi Guineenses, quos ad schedulas et specimina inventoris, descriptos*. Excudebandt Regiae Academiae Typographi, Upsaliae.
- Garcia-Sandoval, R., Wang, Z., Binder, M. & Hibbett, D. S. 2011. Molecular phylogenetics of the Gloeophyllales and relative ages of clade of Agaricomycotina producing a brown rot. *Mycologia* 103: 510–524.
- Hariot, P. & Patouillard, N. 1912. Champignons de Mauritanie récoltés par M. R. Chudeau. *Bulletin de la Société Mycologique de France* 28: 144–147.
- Hibbett, D. S. & Vilgalys, R. 1993. Phylogenetic relationships of *Lentinus* (Basidiomycotina) inferred from Molecular and morphological characters. *Systematic Botany* 18: 409–433.
- Hongo, T. 1976. Agarics from Papua-New Guinea III. *Reports of the Tottori Mycological Institute, Japan* 14: 95–104.
- Kelly, K. L. 1965. *Color name charts illustrated with centroid colors*. Standard Sample No. 2106. Supplement to national Bureau of Standards Circular No. 553. U. S. Government Printing Office, Washington.
- Kuntze, O. 1891. *Revisio Generum Plantarum*. Pars II. Arthur Felix, Leipzig.
- Lechner, B. E. & Wright, J. E. 2002. First record of *Neolentinus schaefferi* in the Americas. *Mycotaxon* 82: 281–287.

- Lima, J. R., Sampaio, E. V. S. B., Rodal, M. J. N. & Araújo, F. S. A. 2011. Physionomy and structure of a seasonal deciduous forest on the Ibiapaba plateau, Ceará, Brazil. *Rodriguésia* 62: 379–389.
- Pegler, D. N. 1983. The genus *Lentinus*: a world monograph. *Kew Bulletin Additional Series* 10: 1–281.
- Rune, F. 1994. *Neolentinus* – a well-founded genus in Pleurotaceae that includes *Heliocybe*. *Mycological Research* 98: 542–544.
- Thiers B. [continuously updated]. *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/> (accessed 4 April 2019)
- Tulloss, R. E., Ovrebo, C. L. & Halling R. E. 1992. Studies on *Amanita* (*Amanitaceae*) from Andean Colombia. *Memoirs of the New York Botanical Garden* 66: 1–46.
- Zhang, M. Li, T.- H. & Sing, B. 2018. *Heliocybe villosa* sp. nov., a new member to the genus *Heliocybe* (Gloeophyllales). *Phytotaxa* 349: 173–178.
- Zmitrovich, I. V. & Kovalenko, A. E. 2016. Lentinoid and polyporoid fungi, two generic conglomerates containing important medicinal mushrooms in molecular perspective. *International Journal of Medicinal Mushrooms* 18: 23–38.