

## ***Cookeina tricholoma* (Pezizales): a new distributional record of an unexpected edible fungus in Brazilian Northeast rain forests**

## ***Cookeina tricholoma* (Pezizales): um novo registro de distribuição de um inesperado fungo comestível nas florestas do Nordeste brasileiro**

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### **Abstract**

*Cookeina tricholoma* is an operculate discomycete belonging to Pezizomycetes, growing saprobe on dead trunks. The species distribution is widespread around the world, occurring in tropical and subtropical regions. It is characterized by its bright colors, hirsute/hairy surface, stipitate apothecia, operculate asci, and ascospores with longitudinal ribs. This paper provides a new distributional record of *C. tricholoma* in a “brejo de altitude” forest in the State of Paraíba and, in a submontane rain forest of the Federal Biological Reserve of Pedra Talhada, in the State of Alagoas, with morphological description of the ascomata, discussion and photographs.

**Keywords:** Ascomycota, Neotropic, Pezizomycetes, Sarcoscyphaceae, taxonomy

### **Resumo**

*Cookeina tricholoma* é um discomiceto operculado pertencente a classe Pezizomicetes. São saprófitos e se desenvolvem em troncos em decomposição. A espécie se distribui ao redor do mundo, ocorrendo em áreas tropicais e subtropicais. O fungo é caracterizado por suas cores vibrantes, por pêlos em sua superfície, apotécio estipitado, ascos operculados,

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e ascósporos com fendas longitudinais. Este artigo apresenta um novo registro de distribuição da *C. tricholoma*, na floresta de “brejo de altitude” no Estado da Paraíba e na floresta pluvial da Reserva Biológica de Pedra Talhada no Estado de Alagoas, bem como descrições morfológicas do ascomiceto, discussão e fotografias.

**Palavras-chave:** Ascomycota, Neotrópico, Pezizomycetes, Sarcoscyphaceae, Taxonomia

## Introduction

*Cookeina tricholoma* is an operculate discomycete belonging to Pezizomycetes, with a saprobic habit on dead stems. It possesses bright color, stipitate apothecia with fasciculate excipular hairs (Iturriaga & Pfister, 2006; Ekanayaka et al. 2016, Kropp, 2017). Members of this genus are often collected because of the flashy color, being *Cookeina tricholoma* the most commonly recognized species (see Ekanayaka et al., 2016; Kropp, 2017).

Traditionally, the morphological features of species of *Cookeina* Kunze are: 1) asci which are constricted abruptly below, forming a blunt, with rounded base, and a slender tail-like connection; 2) asci which mature simultaneously rather than seriate; 3) paraphyses that anastomose forming a three-dimensional network; 4) a thin, flexible excipulum; 5) a deep, cup -to funnel- shaped apothecium; and 6) mostly, a brightly colored (yellow to red) hymenium. The apothecial hairs, when present, are fasciculate, i.e., composed of bundles of cylindrical hyphae. Finally, the ascospores are quite large (up to 25 µm long), ellipsoid or slightly unequal-sided, and either smooth or ornamented with fine wrinkles. The genus appears to be mostly restricted to growing on wood in early stages of decay (Denison, 1967; Pfister, 1978).

With about 13 known species (see Ekanayaka et al., 2016; Wijayawardene et al., 2017; 2020), the distribution of the genus is widespread around the world, mostly in tropical and subtropical regions of South and Central America as well Australasia (see Iturriaga & Pfister, 2006). In Brazil, *C. colensoi* (Berk.) Saever, *C. sulcipes* (Berk.) Kuntze, *C. speciosa* (Fr.) Dennis, *C. venezuelae* (Berk. & M.A. Curtis ex Cooke) Le Gal, and *C. tricholoma*, are the known taxa at least from the States of Amazonas, Bahia, Mato Grosso, Pará, Rio de Janeiro, Rio Grande do Sul, and São Paulo (Viegas, 1961; Oliveira et al., 2013; Maggio et al., 2021). Recently, Santos et al. (2020) observed that *C. tricholoma* is edible after an ex-hunter reported it in the State of Alagoas, Brazil.

Thus, this paper provides new distributional records of *C. tricholoma* from Paraíba and Alagoas, with the morphological description, discussion, and photograph of the ascomata.

## Material & Methods

The specimens of *Cookeina tricholoma* were collected in two montane forests: Reserva Biológica de Pedra Talhada (Correia et al., 2011), in the State of Alagoas, and Parque Estadual Mata do Pau-Ferro, in the State of Paraíba (Barbosa et al., 2004). Color codes follow Kelly (1965). Microscopic observations were made from material mounted in 3% KOH mixed with Congo red or Fuchsin solution, and also mounted solely with Melzer's reagent, following the methodology of discomycete study by Paden (1983). The materials are deposited at herbarium JPB (Universidade Federal da Paraíba, Departamento de Sistemática e Ecologia).

## Resultados

*Cookeina tricholoma* (Mont.) Kunze,  
Brotéria, Ser. Bot. 26: 357. 1931.  
(Figures 1-3)

## Typification

Iturriaga & Pfister (2006: 167): Brazil, Rio de Janeiro, Gaudich no. 44 [PC, lectotype of *Peziza (Lachnea) tricholoma* Mont.]; same place, 1831-33, Gaudich no. 44 [PC, isolectotype of *Peziza (Lachnea) tricholoma* Mont.].

## Description (JPB 63974)

Apothecia cup-like with more inrolled margin in dried state, up to 16 mm in diam. and up to 50 mm



**Figure 1.** *Cookeina tricholoma* (JPB 63974). Ascomata on a piece of twig. Scale bar = 10 mm.

high, outer surface pale salmon-orange (31. p. y Pink, 28. l. y Pink), pale orange to salmon in the hymenium (26. s. y Pink), then uniformly buff (72. d. O Y, 74. s. y Br) in dried state; more or less cartilaginous when fresh then slightly wiry in dried state; trichomes sparse to abundant, brown, dark brown to black even in dried state, with acute ranging up to 3 mm long; stipe up to 8 mm long and 1 mm in diam., subequal, subcylindrical to slightly tapering downward, slightly wiry, concolorous to cup outer surface, covered with sparse black acute hairs.

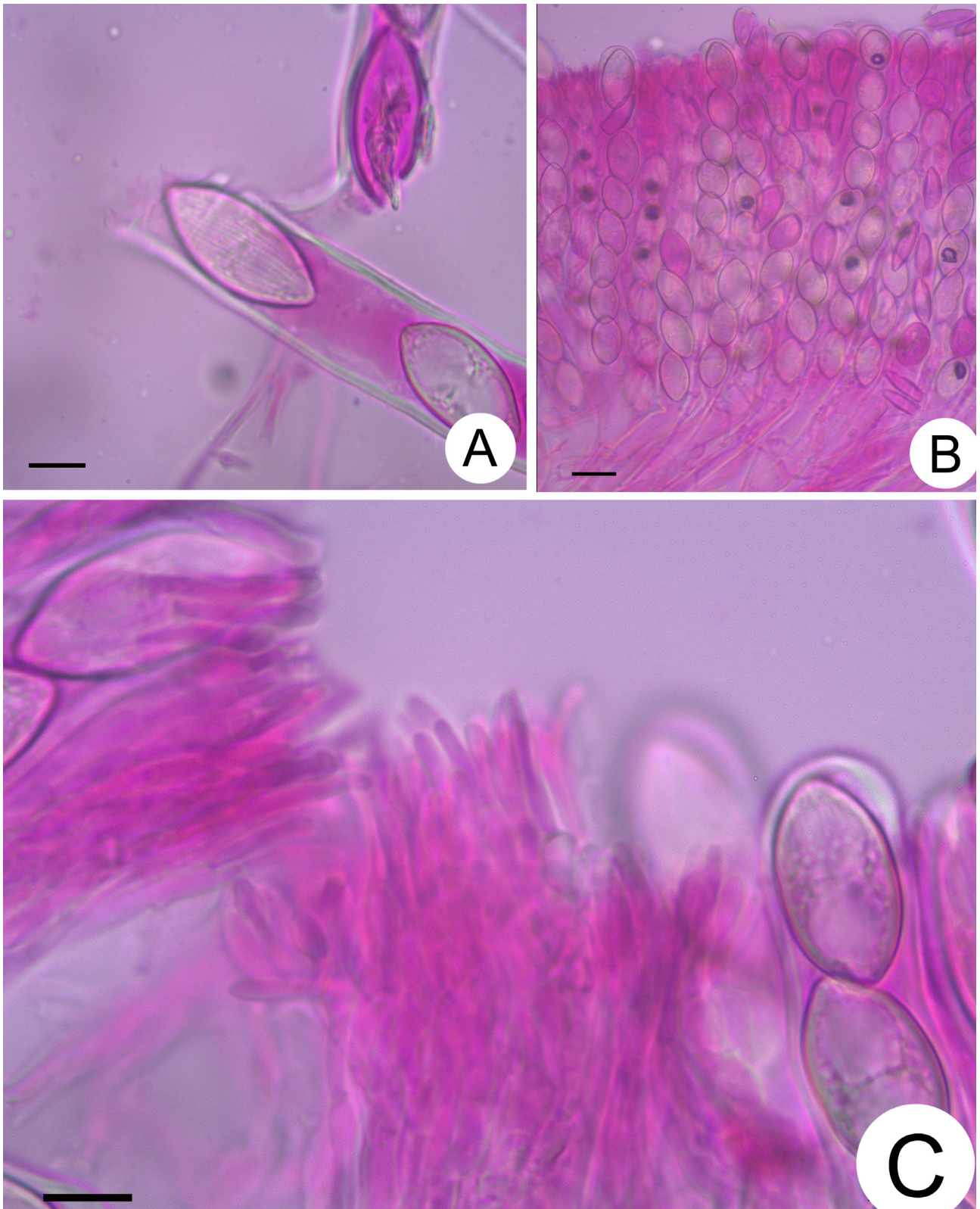
*Ascospores* 22.5–35 × 12.5–17.5 μm (av. = 29.9 × 14.5 μm, Q = 1.66–2.40, av. Q = 2.07, n = 50), ellipsoid-fusoid, with rounded or slightly subacute extremities, amyloid, guttulate, colorless to hyaline, thin walled, with longitudinal striations. *Asci* 315–370 × 20 μm (x = 333.25 × 20 μm, n = 20), uniseriate, long stipitate, cylindrical, colorless, suboperculate, 8-spored. *Paraphyses* 2–4 μm wide, abundant among the asci, highly branched, filiform, repeatedly septate toward the hyphal ends. *Subhymenium* composed of gelatinized cells of *textura intricata* with interwoven

hyphae 2–5 μm wide. *Medullary excipulum* 137–187 μm thick, composed of plentiful, intensely interwoven arranged thin-walled hyphae of *textura porrecta* 2–5 μm wide. *Ectal excipulum* 50–112 μm thick at lower flanks, composed of rounded asymmetric loosely arranged cells of *textura globulosa*, each measuring 9.8–24.5 × 9.8–19.6 μm (x = 17.8 × 14.7 μm, n = 20). Hairs 425–2000 × 51–88.5 μm (x = 1191.25 × 68.25 μm, n = 18) on flanks and margins, acute to subacute then spiniform, formed by compact and solid columns of longitudinally strongly appressed and repeatedly septate hyphae; brownish pigmented, slightly thick-walled.

## Material examined

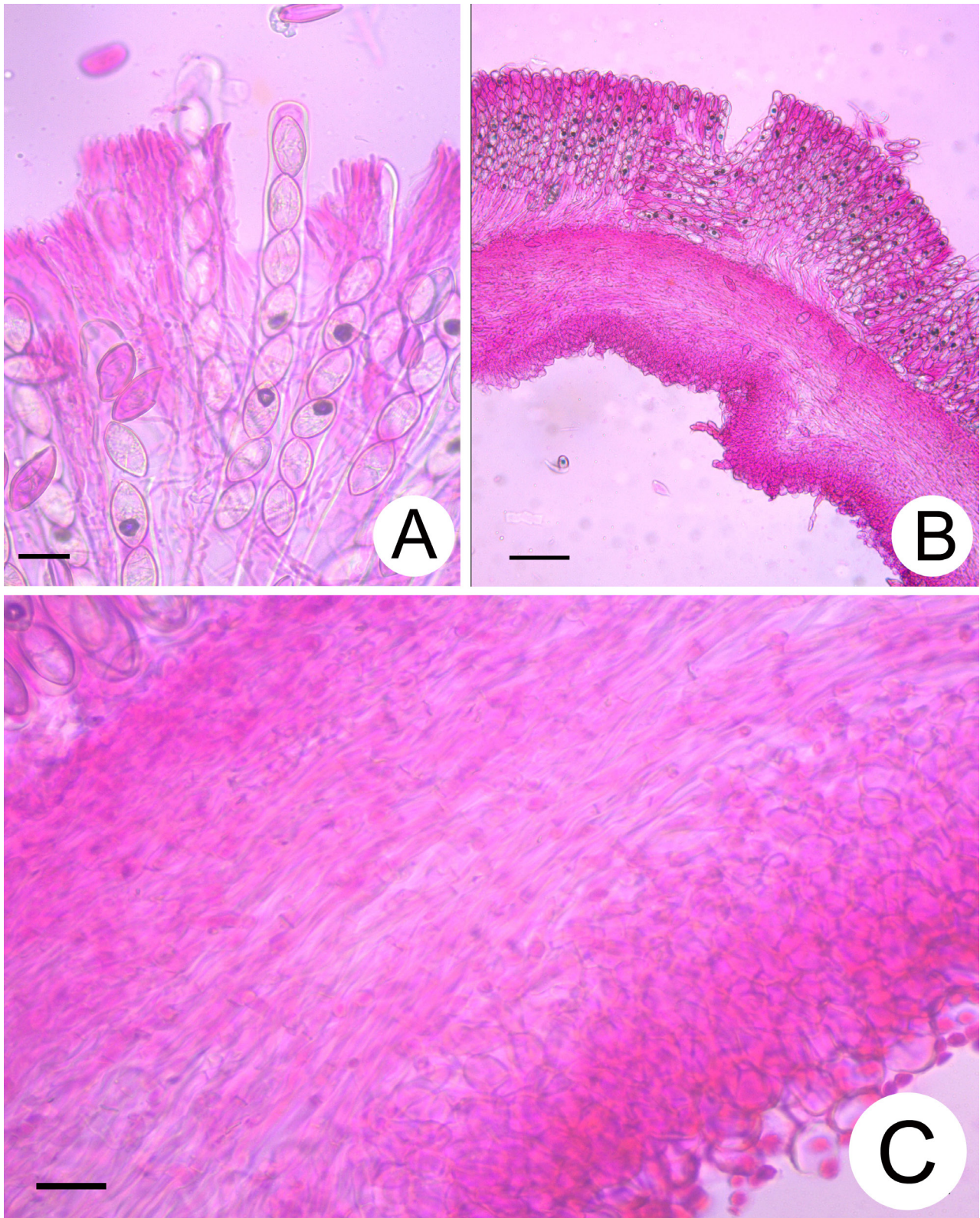
Brazil, Alagoas, Quebrângulo, REBio Pedra Talhada, 20 April 2014, L. Nusbaumer & L.N.A. Studer LN 3943 (JPB 57773); Paraíba, Areia, Parque Estadual Mata do Pau-Ferro, Trilha do Cumbe, 17 July 2018, F. Wartchow FW 06/2018 (JPB 63974).





**Figure 2.** *Cookeina tricholoma* (JPB 57773). A) Ascospores with parallel longitudinal low ridges ornamentation. B) Asci and ascospores. C) Highly branched paraphysis among the asci. Scale bars: A, C = 10  $\mu\text{m}$ ; B = 20  $\mu\text{m}$ .





**Figure 3.** *Cookeina tricholoma* (JPB 57773). A) Asci, ascospores and paraphyses in the hymenium layer. B-C) Cross section of an apothecium showing the medullary and ectal excipulum. Scale bars: A, C = 20  $\mu\text{m}$ ; B = 100  $\mu\text{m}$ .

## Habit

On rotten decayed branch (JPB 63974) in Brazilian submontane rain forests. In the herbarium sheet of the Alagoas' material (JPB 57773), there is only the information that it was collected on a dead wood.

## Known distribution

*Cookeina* has a widespread occurrence in pantropical regions (Denison, 1967; Kropp, 2017), most precisely in tropical and subtropical regions (Wijayawardene et al., 2017). The genus has been cited from South, Central and North America, Africa, Asia and Oceania (e.g., Gamundi, 1957; Paden, 1983; Iturriaga & Phister, 2006; Ekanayaka et al., 2016). In Brazil, *Cookeina colensoi* (Berk.) Seaver was discovered from the state of São Paulo (Viégas, 1961), while *C. sulcipes* and *C. tricholoma* were previously found in the Brazilian northeast rain forests of the state of Bahia (Oliveira et al., 2013). Iturriaga and Pfister (2006) analyzed materials of *C. tricholoma* from several countries of Africa (Cameroon, Congo, Liberia), South America (Argentina, Brazil, French Guiana, Trinidad, Venezuela), Central America (Costa Rica, Cuba, Dominican Republic, Guadeloupe, Guatemala, Jamaica, Panama), North America (Mexico, Puerto Rico, United States) and Asia (China, India, Indonesia, Philippines). In Brazil, the species were referred at least from the states of Alagoas, Amazonas, Bahia, Paraíba, Rio de Janeiro, and Santa Catarina (Montagne, 1834; Denison, 1967; Iturriaga & Phister, 2006; Oliveira et al., 2013; Santos et al., 2020).

## DISCUSSION

*Cookeina tricholoma* is macroscopically characterized by the stipitate, deeply cupulate and singly arising apothecia; by the concave, glabrous and orange when fresh hymenium; and black or brownish long-cylindrical hairs ranging 2000 µm long (Iturriaga & Pfister, 2006; Ekanayaka et al., 2016). Microscopically, the unitunicate, operculate, cylindrical, long stipitate, and colorless 8-spored asci measuring 315–370 × 20–20 µm helps in the species

determination. Indeed, one microscopic feature characterizes very well *C. tricholoma*: the parallel longitudinal low ridges ascospore's ornamentation, and the slightly spinose surface, that can only be seen in very mature ascospores (Ekanayaka et al., 2016; Hermawan et al., 2022).

Originally described from the State of Rio de Janeiro in Brazil, this species was described as having turbinate yellowish (i.e., luteus) ascoma with rugulose outer surface with concolorous hirsute projection, and glabrous stipe (Montagne, 1834: 77). Iturriaga and Pfister (2006) reported whitish to brownish yellow to brown hairs in *C. tricholoma*. They also provided a key for species differentiation and we can consider *C. speciosa* sensu lato somewhat similar, but differing in the hairs concentrated in the apotecial margin.

The recently described *C. korfi* Itur., F. Xu & Pfister has similarities in its general aspect of the ascomata with *C. tricholoma*, but it was noted some differences based in molecular and morphological aspects, for example, in the smoothy and smaller ascospores with more apiculate extremities (Iturriaga et al., 2015).

*Cookeina tricholoma* is edible, and can be considered a 'FANC' (portuguese acronym for Non-Conventional Food Fungi), as established by Trierveiller-Pereira (2019). Indeed, Santos et al. (2020) reported edibility of this species by an old man in a community surrounding the REBio Pedra Talhada, the same location of one of our examined materials. The name given to this fungus by the old man was 'forest onion'.

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## Conflicts of interest

The authors declare no conflict of interest.

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