Contribution to the knowledge of *Camillea* (Ascomycota, Graphostromataceae) in the Amazon forest in Pará, Brazil

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**ABSTRACT**

Three species of the Ascomycetes genus *Camillea* were recorded in a fragment of Amazon rainforest in the region of Santarém, Pará state, Brazil. The occurrence of *C. leprieurii*, *C. cyclops* and *C. bilabiata* expand the range of distribution of these species in the state. *Camillea leprieurii* has previous records in the regions of Marabá, Oriximiná, Itaituba and Novo Progresso, while *C. cyclops* had been recorded in the west of the state. This is the first record of *C. bilabiata* for Pará. We provide a morphological description of the specimens and an identification key for *Camillea* species found in Pará.

**KEYWORDS:** Ascomycetes, Fungi, mycodiversity, Xylariales

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Contribuição ao conhecimento de *Camillea* (Ascomycota, Graphostromataceae) na floresta amazônica no Pará, Brasil

**RESUMO**

Três espécies de Ascomycetes, gênero *Camillea*, foram registradas em um fragmento de floresta Amazônica na região de Santarém, Pará, Brasil. A ocorrência de *C. leprieurii*, *C. cyclops* e *C. bilabiata* expande a área de distribuição dessas espécies no estado. *Camillea leprieurii* foi registrada previamente nos regiões de Marabá, Oriximiná, Itaituba e Novo Progresso, enquanto *C. cyclops* havia sido registrada apenas no oeste do estado. Este é o primeiro registro de *C. bilabiata* para Pará. Fornecemos uma descrição morfológica dos espécimes e uma chave de identificação para as espécies de *Camillea* encontradas no Pará.

**PALAVRAS-CHAVE:** Ascomycetes, Fungi, micodiversidade, Xylariales

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Of the 144,000 known species of fungi (Willis 2018), 5,719 have been described for Brazil, of which 1,881 species belong to the Ascomycota phylum (Maia et al. 2015). *Camillea* Fr. is a genus of Ascomycota that comprises 62 listed records, some as synonyms of species of *Phylacia* Lév. and *Rhopalostroma* D. Hawksw., with 46 recognized species in the Index Fungorum (CABI 2020), which formerly belonged to the Xylariaceae Tul & C. Tul. family. Recently, Wendt et al. (2017) accommodated the genus in Graphostromataceae M.E. Barr, J.D. Rogers & Y.M. Ju., which was accepted by Daranagama et al. (2018).

*Camillea* species generally have columnar (e.g. *C. leprieurii* (Mont.) Mont.), flattened (e.g. *C. heterostoma* (Mont.) Læssøe, J.D. Rogers & Whalley) or discoid stroma (e.g. *C. labellum* Mont.), bipartite with dehiscent ectostromas, lightly colored and ornamented ascospores without visible germ slits (Læssøe et al. 1989; Hastrup and Læssøe 2009), although *C. labiata* J.D. Rogers, F. San Martín & YM Ju has almost smooth ascospores with germ slits (Rogers et al. 2002). The genus is almost exclusively confined to the Americas and concentrated mainly in the Amazon region (Hastrup and Læssøe 2009).

The knowledge of the genus in the Brazilian Amazon, however, is based on only 14 species (*Camillea amazonica* Læssøe, J.D. Rogers & Whalley; *C. bilabiata* Speg.; *C. broomeana* (Berk. & M.A. Curtis) Læssøe, J.D. Rogers & Whalley; *C. cyclops* (Mont.) Læssøe, J.D. Rogers & Whalley; *C. cyclops* (Mont.) Læssøe, J.D. Rogers & Whalley; *C. flosulata* (Mont.) Læssøe, J.D. Rogers & Whalley).

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In Pará, *C. leprieurii* is the most representative species, occurring in the regions of Marabá, Oriximiná, Itaituba and Novo Progresso. *Camillea mucronata* and *C. cyclops* were recorded only in the western region of the state (Santana et al. 2018; CRIA 2020). This study reports *C. bilabiata* as a new record for the state of Pará (Figure 1). The material in this study agrees with the description of Hastrup and Læssøe (2009) and Pereira (2011). Silveira and Rodrigues (1985) began their studies in the Amazon, with specimens from the states of Amazonas and Mato Grosso, reporting five species of *Camillea*, among which *C. bilabiata*, *C. cyclops* and *C. leprieurii* were listed, in addition to *C. bacillum* and *C. labellum*.

**Taxonomy**

*Camillea cyclops* (Mont.) Mont., Annales des Sciences Naturelles Botanique 3: 113 (1855). Figure 2a–e.

*Hypoxylon cyclops* Mont., Annales des Sciences Naturelles Botanique 13: 353 (1840).

Eroded cylindrical stroma with 3–5 mm in diameter, with a flat apical, circular disk surrounded by a ring below, carbonaceous and black, each containing 6–8 perithecia located in its central region. Papillary ostioles emerge in a ring below the apical disk. Ascus and ascospores not seen. The examined specimens are similar to those examined by Læssøe et al. (1989).

**Material examined** - Brazil, Pará, Santarém, forest fragment near Silvio Braga HPP (Curú-Ua hydroelectric power plant), on a decaying fallen trunk, 02°48’55.8”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF 457, HSTM-Fungi 12276; on a decaying trunk, 02°48’54.5”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF 508, HSTM-Fungi 12278; on a decaying fallen trunk, 02°48’54.5”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF-508, HSTM-Fungi 12278; on a decaying trunk, 02°48’55.8”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF-508, HSTM-Fungi 12278; on a decaying trunk, 02°48’55.8”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF-508, HSTM-Fungi 12278; on a decaying trunk, 02°48’55.8”S, 054°17’04.3”W, 20 VII 2017, Santana, MDF-508, HSTM-Fungi 12278.

**Figure 1.** Distribution of *Camillea* species in the Brazilian Amazon region (area in grey). Letters are the acronyms for state names. AC = Acre; AM = Amazonas; AP = Amapá; MA = Maranhão; MT = Mato Grosso; PA = Pará; RO = Rondônia; RR = Roraima; TO = Tocantins.

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**Camillea specimens** were collected during excursions to fragments of Amazon rainforest near the Silvio Braga hydroelectric power plant (HPP) (2°48’44.45”S, 054°17’56.23”W) in western Pará state, Brazil, in November 2017 and April and July 2018. The fragments present around 30,000 ha each, and for the most part, they are in a plateau area with little variation (Silva 1966), covered with high-canopy forest, understory dominated by natural regeneration, herbaceous and shrub plants, palm trees and bushes.

The primary vegetation cover in the region is dense ombrophilous forest (Veloso et al. 1991). The climate is xeroquimenic (Bagnouls and Gaussen 1963), with an average temperature of 27 ºC (± 5 ºC) and average relative humidity of about 88%. The average annual rainfall is 2,200 mm, with a rainy season from January to May (monthly average of 231 mm) and a dry season from June to December (monthly average of 61 mm) (Alvares et al. 2013).

Fungal specimens were removed from the substrate with the help of a pocket knife and placed in paper bags as proposed by Lodge et al. (2004). They were dehydrated at 38 °C for 48 hours, for taxonomic identification. Macroscopic stroma characteristics were observed as described by Læssøe et al. (1989), San Martin González and Rogers (1993), Whalley (1995) and Hastrup and Læssøe (2009). Microscopic characteristics were not observed, but the species were easily identified in the field (Hastrup and Læssøe 2009). Reference samples were deposited in the fungi collection of the HSTM herbarium of Universidade Federal do Oeste do Pará (UFOPA).

We collected 15 *Camillea* specimens belonging to three species: *C. bilabiata* (HSTM-Fungi 12288; 12284; 12281; 12277; 12279; 12286), *C. cyclops* (HSTM-Fungi 10799; 12285; 12283; 12282; 12280; 12278; 12276) and *C. leprieurii* (HSTM-Fungi 12290; 12287). The fungi were found on trunks and branches of fallen trees with rigid decomposition, a habitat that coincides with what is known from other species of the family (Læssøe et al. 1989; Whalley 1996; Pereira 2011; 2015).
SANTANA et al. New records of Camillea species in Pará state

17°04.3′W, 29 IV 2018, Santana, MDF 617, HSTM-Fungi 12282.

**Camillea bilabiata** Speg., Boletín de la Academia Nacional de Ciencias en Córdoba 11 (4): 509-510 [no. 259, reprint pages 131-132], 1889. Figure 2f–i.

**Numulariola bilabiata** (Speg.) PMD. Martin, South African Journal of Botany 35: 288, 1969.

Eroded, erect, with 3–5 mm in diameter, with concave surface and bilabial apex, brownish black, glabrous stromata, gregarious. Carbonaceous, brittle perithecia form long individual channels that merge into a common channel just below the ostiole. The characteristics of the examined specimens are similar to the descriptions by Læssøe *et al.* (1989) and Hastrup and Læssøe (2009).

**Material examined** - Brazil, Pará, Santarém, forest fragment near the Silvio Pinto HPP (Curuá-Una hydroelectric power plant), on a tree branch on the ground, 2°48′38.0″S, 54°17′22.0″W, 27 IV 2018, Santana, MDF 487, HSTM-
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