



SHORT COMMUNICATION

## Occurrence of *Cladonia curta* Ahti & Marcelli (Cladoniaceae, lichenized Ascomycota) in the Brazilian Pampa biome

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**ABSTRACT:** (Occurrence of *Cladonia curta* Ahti & Marcelli (Cladoniaceae, lichenized Ascomycota) in the Brazilian Pampa biome). The Cladoniaceae family presents more than 450 species that are distributed in varied environments, ranging from well-preserved areas, such as mountains, to urban areas with anthropic structures. Cladoniaceae has species with large thalli to species with diminutive thalli. The objective of this note was to record *Cladonia curta* for the first time in the Pampa biome. Previously, *C. curta* was only recorded in the Cerrado and mesophyll forest in the states of Minas Gerais, São Paulo, and in the Federal District.

**Keywords:** biodiversity, dimorphic thallus, fungi, lichen, taxonomy.

**RESUMO:** (Ocorrência de *Cladonia curta* Ahti & Marcelli (Cladoniaceae, Ascomycota liquenizado) no bioma Pampa brasileiro). Cladoniaceae é uma família com mais de 450 espécies aceitas e distribuídas nos mais variados ambientes, desde áreas bem preservadas como no topo de montanhas até áreas urbanas em estruturas de origem antrópica. Esta família apresenta desde espécies com talos volumosos até espécies com talos diminutos. O objetivo desta nota é registrar pela primeira vez a ocorrência de *Cladonia curta* no bioma Pampa, uma espécie conhecida apenas para áreas de Cerrado e floresta mesófila nos estados de Minas Gerais, São Paulo e Distrito Federal.

**Palavras-chave:** biodiversidade, talo dimórfico, fungo, líquen, taxonomia.

### INTRODUCTION

The Brazilian portion of the Pampa biome is located within the Temperate Zone in Southern Brazil, in Rio Grande do Sul State, and presents both subtropical and temperate climates. The biome occupies an area of 176,496 km<sup>2</sup>, which corresponds to about 2.07% of the national territory. Although the Pampa is frequently interpreted as a pure grassland environment, it comprises at least seven different physiographic formations including savanna, steppe, steppe-savanna, coast, transition areas, and patches of seasonal deciduous and semideciduous forests (Roesch *et al.* 2009).

The lichen biota in the state of Rio Grande do Sul has been well-documented (although probably underestimated). Spielmann (2006) listed 912 species of lichenized fungi in Rio Grande do Sul, distributed in the most diverse environments, including the Pampa biome, an important collection area for research carried out by the lichenologists Gustaf O. An. Malme, Mariana Fleig and Hector S. Osorio. Fleig *et al.* (1995) recorded 40 species of Cladoniaceae in the state, distributed in four different genera: *Cladia* Nyl., *Cladina* (Nyl.) Nyl. (= *Cladonia*), *Cladonia* P. Browne and *Pycnothelia* (Ach.) Dufour. They described two new species of *Cladonia* (*Cladonia macilentoides* Ahti & Fleig and *C. palmicola* Ahti & Fleig), six new records for Brazil (*C. arcuata* Ahti, *C. corniculata*

Ahti & Kashiw., *C. grayi* G. Merr. ex Sandst., *C. merochlorophaea* Asahina, *C. robbinsii* A. Evans, and *C. strepsilis* (Ach.) Grognot), and several new records for the state. However, the last initiative describing lichenized fungi species in the Pampa Biome was carried out punctually in a conservation area where 254 taxa, including *Cladonia ceratophylla* (Sw.) Spreng., *Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng. and *Cladonia* cf. *sphacelata* Vain (Käffer *et al.* 2015), were recorded.

Cladoniaceae species present great morphological variation (Fleig *et al.* 1995, Ahti 2000), from species with very prominent thalli occupying large areas (e.g., *Cladonia crispata* (Nyl.) Ahti and *C. confusa* R. Sant.) to very discrete species with reduced podetia and/or primary squamules (*C. cartilaginea* Müll. Arg. and *C. nana* Vain.), which are oftentimes overlooked in field.

Herein, we aim to contribute to the knowledge about Cladoniaceae distribution in Brazil by reporting the occurrence of *Cladonia curta* Ahti & Marcelli in the Pampa biome. Until now, this endemic species (Ahti 2000) was known in three localities of mesophilic forests and 'cerrado' (between 800 and 1200 m alt.) in Midwestern and Southeastern regions of Brazil, including the Federal District, state of Minas Gerais, and state of São Paulo (Ahti 2000).

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## MATERIAL AND METHODS

The lichen samples were collected at the Federal University of Pampa (UNIPAMPA) campus (30°20'06.3"S, 054°21'46.5"W) at 124 m asl, in the municipality of São Gabriel, Rio Grande do Sul state, Brazil. Samples were found on a dead trunk of *Eucalyptus camaldulensis* Dehnh (Myrtaceae), at the edge of *Eucalyptus* vegetation understory. Predominant native species in the study area include *Schinus polygamus* (Cav.) Cabrera, *Lithraea molleoides* (Vell.) Engl., *Saccharum angustifolium* (Nees) Trin., and representative of genera *Baccharis*, *Eugenia*, *Vachellia* and *Eryngium*. The samples were collected from October 2015 to February 2016. Rainfall average was  $196 \pm 1$  mm, humidity was typically medium (~57%), and daily temperatures at the site ranged from 18 °C to 27 °C (INMET 2017).

Specimens were examined using standard stereoscopic and light microscopic techniques according to Brodo *et al.* (2001). Sections of primary thallus, podetia, and ascomata were mounted in water. Chemical constituents were identified using spot tests, ultraviolet light exposure, and thin layer chromatography using solvent system C (Orange *et al.* 2001, Elix 2014).

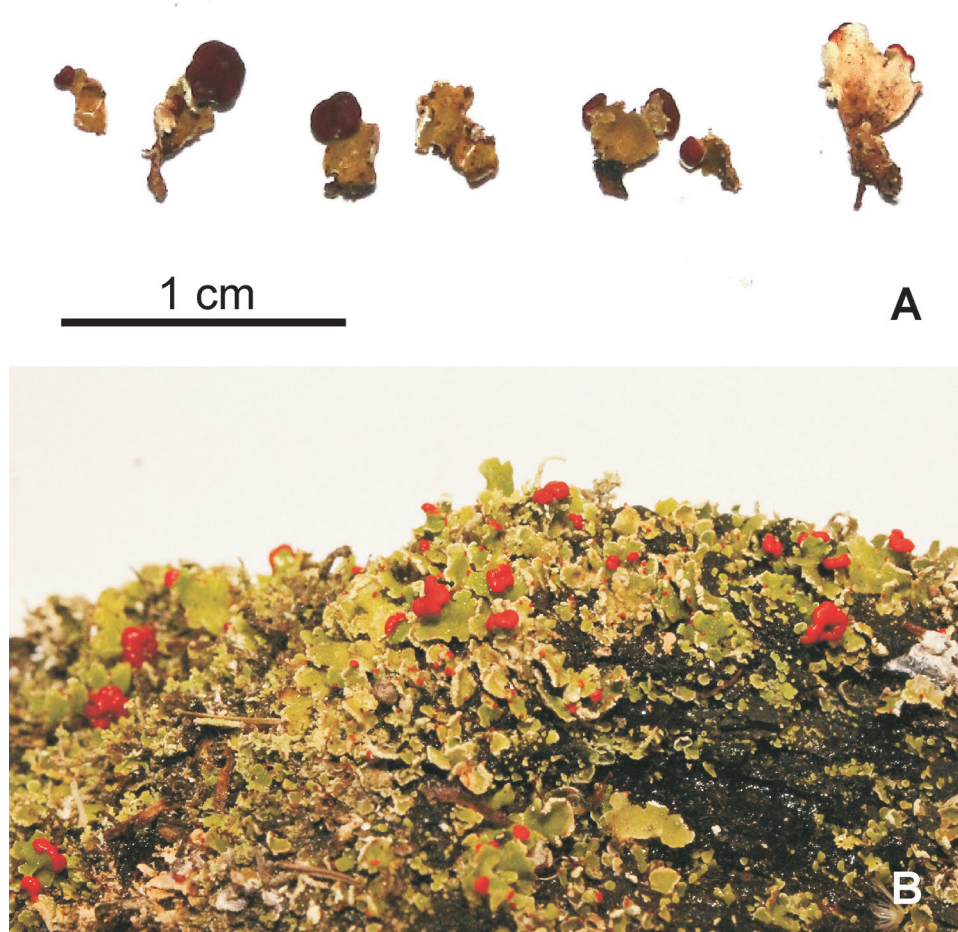
## RESULTS AND DISCUSSION

*Cladonia curta* Ahti & Marcelli, Flora Neotropica 78: 192. 2000.

Type. Brazil. Minas Gerais: Mun. Catas Altas, 0.5 km S of Santuario do Caraca, 1100–1200 m, 1993, Marcelli, Ahti, *et al.* 25916 (holotype, SP; isotype, H). *fide* Ahti (2000).

Fig. 1

*Description.* Primary thallus persistent, irregular, squamules 0.8–3.5 mm wide, 0.5–4.5 mm long, slightly to clearly arachnoid above, whitish to beige, partially dissolved into soredia, margins irregularly crenate, slightly sorediate, soredia 200–800 µm in diam.; upper surface greenish, slightly maculate, smooth, epruinose, cortex 60–120 µm thick, algal layer continuous, 15–25 µm thick, medulla 100–500 µm thick. Pycnidia not seen. Podetia common, inconspicuous, 0.5–0.8 mm tall, 0.2–1.0 mm thick, greenish, submarginal to marginal, unbranched, ascyphose; surface verruculose-corticate, partially denuded mainly near the hymenial discs, esorediate, usually esquamose, not melanotic; cortex 0–50 µm thick, medulla loose, not clearly differentiated between stereome and central cavity. Pycnidia not seen. Hymenial disks red, 1.0–1.8 mm diam., hymenium hyaline, 25–30 µm thick, hipohymenium 25–38 µm thick, ascospores not seen.



**Figure 1.** *Cladonia curta* Ahti & Marcelli. **A.** Primary thallus and podetia (JOI). **B.** Specimens on wood (HBEI 023).

*Cladonia curta* is characterized by discrete primary squamules and short podetia with red hymenial disc. The primary squamules are arachnoid above and slightly sorediated at margins. The podetia are mainly corticated without symbiotic propagules.

*Specimens examined:* BRAZIL. STATE OF RIO GRANDE DO SUL: **Municipality of São Gabriel**, 30°20'06.3"S, 54°21'46.5"W, on dead wood, *Pena-Cañón*, R. s.n. (HBEI 023; JOI).

*C. curta* is similar to *C. pumila* Ahti due to the tiny podetia, but differ due to the chemistry (sekikaic acid) and byssoid primary squamules in *C. pumila* (Ahti 2000). The constant presence of the red hymenial discs in *C. curta* resembles *C. didyma* (Fée) Vain. or even a tiny podetia of *C. macilenta* Hoffm., however, both species have an ecorticate podetia. Additionally, *C. didyma* presents squamules on podetia, and *C. macilenta* are dense sorediated (Gumboski & Eliasaro 2012).

Specimens of *Cladonia ahtii* S. Stenroos and *C. miniata* G. Mey grow on wood and resemble *C. curta*. However, *C. ahtii* presents a clearly sorediate under surface and margins, while *C. miniata* has a reddish medulla on primary thallus, and the two species have well-developed primary squamules (Stenroos 1989, Fleig *et al.* 1995, Ahti 2000).

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