

## Bryophytes from Jalapão, state of Tocantins, northern Brazil.

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**Abstract.** Although occupying almost half the area of Brazil, the northern region of the country remains poorly known bryologically. In an attempt to help remedy this problem, a collecting trip was made to Jalapão Desert, located in the state of Tocantins. A total of 22 taxa were found, 21 are new occurrences to the state and three are new to the northern region of Brazil. *Bryum caespiticium* Hedw. is listed for the second time from Brazil. A list of the taxa with references of descriptions and illustrations are provided.

**Resumo.** Embora ocupe quase metade da área do país, a região norte do Brasil, continua sendo pouco conhecida do ponto de vista briológico. A fim de contribuir com o conhecimento sobre a brioflora da área, uma viagem de coleta foi feita a região do Jalapão, localizado no estado do Tocantins. Um total de 22 taxa foram encontrados, 21 novas ocorrências para o estado e três novas para a região norte. *Bryum caespiticium* Hedw. é citado pela segunda vez para o Brasil. É fornecida uma lista dos taxa com referências de descrições e ilustrações.

### Introduction

The Brazilian bryoflora is still poorly known, and there are many places uncollected. In this context the state of Tocantins remains as one of the least known and undercollected places in Brazil.

Tocantins was previously part of Goiás and so it was considered part of central-west Brazil. With the promulgation of a new Brazilian

constitution on October 5<sup>th</sup>, 1988, the state of Tocantins was created and added to the northern region (IBGE, 2003), which is the largest region in the country, with 3,853,327.229 km<sup>2</sup>, occupying almost half the area of Brazil (IBGE, 2003) and includes seven states: Acre, Amapá, Amazonas, Pará, Roraima and Rondônia. Tocantins itself has an area of 277,620.914 km<sup>2</sup> (IBGE, 2003).

Although the Jalapão is within the cerrado biome, this area is strongly influenced from neighboring ecosystems such as the Amazon forest to the north, the cerrado (Brazilian savanna) to the south and also from the caatinga (semi-desert) to the east; it makes the Tocantins a transition area with unique characteristics.

Jalapão is the name of a desert region of almost 53,340.90 km<sup>2</sup> located in the eastern part of Tocantins, between the city of Palmas and the state of Bahia. The climate is tropical with temperatures averaging 26°C during the rainy season and 32°C during the dry season. The amount of rain is 1000 mm/year, and the most common vegetation is cerrado and the soil is sandy.

Human occupation is wide scattered and has density of 1.2 inhabitants per km<sup>2</sup>, with a total population of 64,629 people. Although there is a demographic emptiness, the Jalapão region is experiencing increased anthropogenic pressure through tourism and increasing demand for crafts that use fire practices.

The first scientific expedition to Jalapão on May 2001 attempted to assess the biodiversity and environmental aspects of the region, however, no bryological material was collected (Arruda & von Behr, 2002), indicating a lack of importance given to bryophytes and the absence of professionals interested with the study of the group. Above that problem, the isolation and the lack of infrastructure in the Jalapão, such as roads, hotels and cities, contributes to why the area is very poorly collected. This characteristic is responsible for the common name of the area: „Jalapão's desert“.

This paper presents the first effort to collect bryophytes in the state, especially in the Jalapão area, a part of the important Brazilian cerrado ecosystem.

### Materials and Methods

Collections were made in July 2003 during a field trip to the area. Specimens were collected and preserved following Yano (1984), and are deposited in the University of Brazilia's Herbarium (UB). Identification was made using

literature and consulting herbarium specimens. When necessary semi-permanent slides were made using Hoyer's solution (Schuster, 1966).

The geographic distribution presented is restricted to Brazil and based on: Bastos & Yano (1993), Bastos e Vilas-Bôas-Bastos (2000), Buck & Schäfer-Verwimp (1993), Câmara (2002), Castro et al. (2002), Costa & Yano (1995), Frahm (1991), Griffin (1979), Lisboa (1993), Lisboa & Ilkiu-Borges (1995), Oliveira-e-Silva & Yano (2000), Pôrto et al (1999), Reese (1993), Schäfer-Verwimp (1991, 1992, 1996) Yano (1981), Yano (1992), Yano (1994), Yano (1995), Yano (1996), Yano & Carvalho (1994), Yano & Costa (2000), Yano & Lisboa (1988), Yano & Mello (1992), Visnadi (1998), Visnadi & Vital (1995), Visnadi & Vital (1997) Vital & Visnadi (1994), The classification follows Buck & Goffinet (2000).

Because the state of Tocantis was once part of Goiás (until 1988), necessary precautions were taken during the geographic distribution analyses.

### Results and discussion

A total of 22 species were found, distributed among 10 families. The most speciose family is the Sematophyllaceae with four species, followed by the Calymperaceae with four species. Twenty-one species are new occurrences for Tocantins. *Bryum caespiticium* Hedw., *Calymperes palisotii* Schwaegr., *Fissidens pellucidus* Hornsch. and *Taxiphyllum taxirameum* (Mitt.) Fleisch. are new to the Northern Region of Brazil. *Bryum caespiticium* is cited for only the second time for Brazil.

The new taxa to the Northern Region are marked with two asterisks and those new to Tocantins state are marked with a single asterisk. The states in the Geographic Distribution sections are presented following the abbreviations of IBGE (2003).

### Bryaceae

\*\**Bryum caespiticium* Hedw.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, cerrado, on termite mound, on the ground, close to a tree, *Leite 08*, 17-VI-2003 (UB).

Geographic distribution: Southeastern Region: RJ. Cited for the second time for Brazil.

\**Bryum densifolium* Brid.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on rocks in the river, *Leite 43*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks in the river, *Leite 47*, 22-VI-2003 (UB).

Geographic distribution: North Region: AC. Northwestern Region: BA and PE. Southeastern Region: MG, RJ, ES and SP. Southern Region: PR, RS and SC. Central-Western Region: DF.

### Calymperaceae

\**Calymperes afzelii* Sw.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on tree trunk. *Leite 44*, 22-VI-2003 (UB).

Geographic distribution: North Region: AC, AM, PA, RO and RR. Northwestern Region: BA, PB, and PE. Southeastern Region: ES and SP. Central-Western Region: MT. Southern Region: SC.

\**Calymperes palisoti* Schwägr.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on rocks in the river. *Leite 43*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, tree trunk, *Leite 46*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest on rocks. *Leite 47*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, tree trunk, *Leite 24*, 22-VI-2003 (UB).

Geographic distribution: North Region: AP, AM, PA and RO. Northwestern Region: BA, FN, RN, PE, PI and SE. Southeastern Region: ES, RJ and SP.

\**Syrrhopodon gaudichaudii* Mont.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest on rocks, *Leite 33*, 33-VI-2003 (UB).

Geographic distribution: North Region: AM and PA. Northwestern Region: BA and MA. Southeastern Region: ES, MG, RJ and SP. Southern Region: PR, RS and SC. Center-Western Region: GO, DF and MT.

\**Syrrhopodon prolifer* Schwägr.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore *Leite 17*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore, among roots, acampamento's beach. *Leite 13*, 18-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest. *Leite 40*, 22-VI-2003.

Geographic distribution: North Region: AM, PA and RO. Northwestern Region: BA, PE, PI and SE. Southeastern Region: MG, RJ and SP. Southern Region: PR, RS, SC. Central-Western Region: DF, GO and MT.

### Dicranaceae

\**Campylopus savannarum* (Müll. Hal.) Mitt.

Description and illustrations: Frahm (1991).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, Palm tree trunk, gallery forest, *Leite 14*, 18-VI-2003 (UB), at shore at Acampamento's beach, over tree trunk on soil.

Geographic distribution: North Region: AM and PA. Northern region: BA, CE, PE and PI. Southeastern region: MG. Central-western: GO and MT.

### Fissidentaceae

\**Fissidens elegans* Brid.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on rocks. *Leite 32*, 22-VI-2003 (UB).

Geographic distribution: North Region: AM, RO and RR. Northwestern Region: PE. Southeastern Region: MG. Southern Region: SC.

\*\**Fissidens pellucidus* Hornsch.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on rocks. *Leite 29*, 22-VI-2003 (UB).

Geographic distribution: Southeastern Region: MG, RJ and SP. Southern Region: PR and SC. Central-Western Region: MT.

*\*Fissidens submarginatus* Bruch.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Cerrado, sandy road, over termite mound. Associated with *Bryum caespiticium*, *Leite 09*, 17-VI-2003 (UB).

Geographic distribution: North Region: AC, PA and RO. Northwestern Region: FN and PE. Southeastern Region: SP. Central-Western Region: DF.

### Hypnaceae

*\*Isopterygium tenerum* (Sw.) Mitt.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore, acampamento's beach, on rocks, *Leite 16*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore at acampamento's beach, on rocks, *Leite 17*, 18-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks, river shore, *Leite 42*, 22-VI-2003 (UB).

Geographic distribution: North Region: AC, AM, PA and RR. Northwestern Region: BA, PB and PE. Southeastern Region: ES, MG, RJ and SP. Southern Region: PR, RS and SC. Central-Western Region: GO, MT and DF.

*\*\*Taxiphyllum taxirameum* (Mitt.) M. Fleisch.

Description and illustrations: Buck (1998).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, rocks, *Leite 30*, 22-VI-2003 (UB).

Geographic distribution: Southeastern Region: SP. Central-Western Region: GO.

### Leucobryaceae

*\*Ochrobryum gardneri* (Müll. Hal.) Mitt.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore, acampamento's beach, on sand soil, under trees, *Leite 11*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, beach shore at acampamento, on shaded and sandy soil. *Leite 12*, 18-VI-2003 (UB), *ibidem*, Curicaca River, shore, at water level on trunk of *Mauritia*, open field, *Leite 07C*, 17-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks. *Leite 38*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on shaded rocks, *Leite 21*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, *Leite 40*, 22-VI-2003 (UB).

Geographic distribution: North Region: AM. Northeast Region: BA and CE. Southeastern Region: MG, RJ and SP. Central-Western Region: DF, GO and MT.

*Octoblepharum albidum* Hedw.

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore, acampamento's beach, on sand soil under trees, *Leite 11*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, shore at acampamento's beach, on sand and shaded soil, *Leite 12*, 18-VI-2003 (UB), *ibidem*, Curicaca River, river shore at opened gallery forest, tree trunk, *Leite 04*, 17-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore, among roots, acampamento's beach, *Leite 13*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore, among roots, acampamento's beach, *Leite 13*, 18-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks, *Leite 26*, 22-VI-2003 (UB), *ibidem* Velha's cascade, gallery forest, on palm tree trunk, *Leite 25*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, tree trunk, *Leite 23*, 22-VI-2003 (UB), *ibidem* Velha's cascade, gallery forest on rocks, *Leite 35*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest on rocks, *Leite 34*, 22-VI-2003 (UB).

Geographic distribution: North Region: AC, AM, AP, PA, RO, RR and TO. Northeast Region: BA, CE, FN, MA, PB, PE, PI and SE. Southeastern Region: ES, MG, RJ and SP. Southern Region: PR e SC. Central-Western Region: DF, GO and MT.

**Pottiaceae**

\**Hyophiladelphus agrarius* (Hedw.) R.H. Zander

Description and illustrations: Sharp et al. (1994, as *Barbula agraria* Hedw.)

Analyzed material: Brasil, Tocantins, Jalapão, Curicaca River, river shore, on rocks, in transition between gallery forest and cerrado, *Leite 06*, 17-VI-2003 (UB).

Geographic distribution: North Region: AC, AM and PA. Northeast Region: BA, PB, PE and FN. Southeastern Region: RJ.

**Sematophyllaceae**

\**Sematophyllum adnatum* (Michx.) E. Britton

Description and illustrations: Buck (1998).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, on rocks, *Leite 33*, 33-VI-2003 (UB).

Geographic distribution: North Region: AM and PA. Southeastern Region: ES and RJ.

\**Sematophyllum subpinnatum* (Brid.) E. Britton

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Velha's cascade, gallery forest, tree trunk. *Leite 44*, 22-VI-2003 (UB), *ibidem*, acampamento's beach, Rio Novo's shore on tree trunk, *Leite 18*, 18-VI-2003 (UB).

\**Sematophyllum subsimplex* (Hedw.) Mitt.

Description and illustrations: Câmara (2002).

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore, acampamento's beach, on trunk. *Leite 15*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore, acampamento's beach, on trunk, *Leite 14*, 18-VI-2003 (UB), *ibidem*, Velha's cascade, palm tree, gallery forest, *Leite 27*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks, *Leite 39*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on shaded rock, *Leite 21*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, *Leite 40*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest on rock, *Leite 28*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks, *Leite 36*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery

forest, on rocks. *Leite 37*, *Leite 38*, 22-VI-2003 (UB), *ibidem*, Velha's cascade, gallery forest, on rocks.

Geographic distribution: North Region: AC, AM, AP, PA, RO and RR. Northeast Region: BA, MA, PB, PE, PI and SE. Southeastern Region: ES, MG, RJ and SP. Southern Region: PR, RS, SC. Central-Western Region: DF, GO and MT.

*Sematophyllum galipense* (Müll. Hal.) Mitt.

Description and illustrations: Sharp et al. (1994)

Analyzed material: Brasil, Tocantins, Jalapão, Rio Novo's bridge, river shore, acampamento's beach, over, under trees in sandy soil, *Leite 11*, 18-VI-2003 (UB), *ibidem*, acampamento's beach, on tree trunk, Rio Novo's bridge. *Leite 10*, 18-VI-2003 (UB), *ibidem*, Rio Novo's bridge, river shore, acampamento's beach, *Leite 12*, 18-VI-2003 (UB), *ibidem*, Curicaca River, on *Mauritia* palm trunk, *Leite 07B*, 16-VI-2003 (UB), *ibidem*, *ibidem*, Velha's cascade, gallery forest, *Leite 22*, 22-VI-2003 (UB).

**Sphagnaceae**

\**Sphagnum perichaetiale* Hampe

Description and illustrations: Sharp et al. (1994).

Analyzed material: Brasil, Tocantins, Jalapão, Curicaca River, shore, at river level at *Mauritia* trunk, open field. *Leite 07C*, 17-VI-2003 (UB), *ibidem*, Rio Novo's bridge, in contact with water on rocks. *Leite 01*, 16-VI-2003 (UB).

Geographic distribution: North Region: AM. Southeastern Region: MG, RJ and SP. Southern Region: SC. Central-Western Region: DF.

**Stereophyllaceae**

\**Entodontopsis leucostega* (Brid.) W.R. Buck & Ireland

Description and illustrations: Buck (1998).

Analyzed material: Brasil, Tocantins, Jalapão, acampamento's beach, Rio Novo's shore on tree trunk, *Leite 18*, 18-VI-2003 (UB).

Geographic distribution: North Region: AC, AM, PA, RO and RR. Northeast Region: BA, CE, FN, MA, PE and PI. Southeastern Region: MG,

RJ and SP. Central-Western Region: GO, DF and MT.

\**Pilosium chlorophyllum* (Hornsch.) Müll. Hal. Description and illustrations: Buck (1998).

Analyzed material: Brasil, Tocantins, Jalapão. Velha's cascade, gallery forest, *Leite 45*, 22-VII-2003 (UB).

Geographic distribution: North Region: AC, AM, AP, PA, RO and RR. Northeast Region: BA and PE. Southeastern Region: ES, MG, RJ and SP. Central -Western Region: MT.

The results suggest a very diversified bryoflora, and how poorly collected the region remains; further studies are needed in order to better understand the biodiversity of Tocantins.

#### Acknowledgments

The author express his gratitude to Master Adriana Lannes Souza from University of Brasília, UnB, for her important contributions on the geographic data, Prof. Dr. Fabian Borghetti from Termobiologia Laboratory at University of Brasilia and also to Dr. Robert Magill, Dr. Bruce Allen and Dr. Ronald Pursell, for confirming some of the identifications and supporting this work. Thanks also to Dr. Bill Buck and Dr. Lucia Lohmann for revising the manuscript and given important suggestions

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