

Tropical Bryology 15: 15-20, 1998

Additional Contribution to the Bryophyte Flora of Chapada Diamantina National Park, State of Bahia, Brazil

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Abstract. This paper represents an additional contribution toward the knowledge of a bryophyte flora of Chapada Diamantina National Park in the State of Bahia, Brazil, in which are reported 27 species of mosses belonging to 22 genera and 14 families, and four species of liverworts belonging to four genera and three families. Most of these species seem to be restricted to this high altitude geomorphological complex area.

INTRODUCTION

The Chapada Diamantina National Park is situated in State of Bahia, Brazil and occupies around 152,000 ha between 12°25'S and 13°20'S, 41°35'W and 41°15'W. It is a geomorphological complex in which metamorphosed sandstone, conglomerates and igneous rocks contribute to a varied and highly dissected landscape. The vegetation types include campo rupestre at higher altitudes, the cerrado occupying almost all the lower slopes and uplands, and the caatinga and forest mostly represented by gallery forest along the streams. The climate is mesothermic, type Cwb of the Köppen-Geiger system of classification. The mean temperature falls below 18°C some months during the winter period and usually

does not exceed 22°C during the hottest months (Harley, 1995a).

In spite of the large amount of data on the vascular plant flora, the bryophyte flora is less known. After the records compiled by Yano (1981, 1984, 1989, 1995) the first effective contribution toward the knowledge of the bryophyte flora of Chapada Diamantina was given by Harley (1995b) who compiled the data about bryophytes collected at the Pico das Almas, which is situated at 13°34'S and 41°58'W.

This paper provides an additional list of the bryophytes from Chapada Diamantina in which 31 species of bryophytes have been identified. Most of them seems to be restricted to this high altitude geomorphological complex area. However, an evaluation of this preferential habitat depends on

additional information on the surrounding complex uplands.

METHODOLOGY

The present survey was carried out between the town of Lençóis and Palmeiras, 12°25'S and 41°05'W. The landscape is characterized by scarps, inselbergs and sandy plateaus around 950-1000 m in altitude. The annual mean temperature does not exceed 22.9°C, with annual rainfall ranging from around 900 to 1200 mm. The rainy season ranges from November to January.

Most species were collected along the Bodão Trail, which is surrounded by great inselbergs. All specimens are deposited at Alexandre Leal Costa Herbarium (ALCB) of the Instituto de Biologia da Universidade Federal da Bahia, Brazil. The identifications were based on Bartram (1949), Frahm (1979), Schuster (1980), Yano et al. (1985) and Churchill & Linares C. (1995). Some Dicranaceae species were identified by Dr. Jan-Peter Frahm from Botanisches Institut der Universität, Meckenheimer Allee, Germany. The classification of Bryophyta (Bryopsida) follows Vitt (1984) with modifications by Buck & Vitt (1986) to the pleurocarpous mosses. The classification of Hepatophyta (Hepaticopsida) follows Schuster (1984). The species in each family are arranged in alphabetical order.

RESULTS

I. BRYOPHYTA

SHAGNOPSISIDA

Sphagnaceae

Sphagnum capillifolium (Ehrh.) Hedw.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Rio Ribeirão, M. T. S. Stradmann 24, 8-3-1995 (ALCB 28268).

Comments: This species has not been collected in other areas of Bahia and within the state it seems to be restricted to the Chapada Diamantina.

BRYOPSIDA

Orthotrichaceae

Macromitrium punctatum (Hook. & Grev.) Brid.
Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 33, 18-4-1997 (ALCB 29419).

Comments: This is a common species in Bahia, also occurring in ombrophilous forest and seasonal forest. Reported by Harley (1995b) for the Pico das Almas.

Schlotheimia rugifolia (Hook.) Schwaegr.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Rio Mucugezinho, growing on bare rocks, M. T. S. Stradmann 15, 30-8-1994 (ALCB 28270); Rio Ribeirão de Cima, on bare rocks, M. T. S. Stradmann 20, 1-9-1994 (ALCB 28271); "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 38, 18-4-1997 (ALCB 29418).

Comments: This species has not been collected in other areas of Bahia and within the state it seems to be restricted to Chapada Diamantina.

Bryaceae

Bryum argenteum Hedw.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, town of Lençóis, urban zone, M. T. S. Stradmann et al. 47, 22-4-1997 (ALCB 29417).

Comments: This is a widely distributed species in Bahia also occurring in caatinga, cerrado and often in urban areas. Reported by Harley (1995b) for the Pico das Almas.

Bryum coronatum Schwaegr.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, town of Lençóis, urban zone, M. T. S. Stradmann et al. 50, 22-4-1997 (ALCB 29416).

Comments: The species occurs in other areas of Bahia, including the cerrado vegetation and urban areas.

Rosulabryum capillare (Hedw.) Spence

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, M. T. S. Stradmann 19, 1-9-1994 (ALCB 28261).

Comments: this species is relatively rare in Ba-

hia; it was previously known from secondary forests at Salvador.

Mniaceae

Pyrrhobryum spiniforme (Hedw.) Mitt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, M. T. S. Stradmann 16, 1-4-1994 (ALCB 28262); “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest on shady soil, M. T. S. Stradmann et al. 35, 18-4-1997 (ALCB 29415).

Comments: This species has not been collected in other areas of Bahia and within the state it seems to be restricted to the Chapada Diamantina. Reported by Harley (1995b) for the Pico das Almas.

Bartramiaceae

Breutelia tomentosa (Sw. ex. Brid.) Jaeg.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, M. T. S. Stradmann 17, 1-9-1994 (ALCB 28263).

Comments: This species is rare in Bahia, and has not been collected in other areas of the state.

Philonotis uncinata (Schwaegr.) Brid.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, town of Lençóis, urban zone, M. T. S. Stradmann et al. 48, 22-4-1997 (ALCB 29420).

Comments: This species is common in Bahia, also occurring in ombrophilous forest and in urban areas.

Thuidiaceae

Thuidium urceolatum Lorentz.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on bare rocks, M. T. S. Stradmann et al. 34, 18-4-1997 (ALCB 29422).

Comments: This species has not been collected in other areas of Bahia and it seems to be restricted at the Chapada Diamantina within Bahia.

Sematophyllaceae

Sematophyllum subpinnatum (Brid.) Britt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the

Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 32, 18-4-1997 (ALCB 29424).

Comments: This is very common in Bahia, also occurring in different vegetation types, such as ombrophilous forest, seasonal forest, cerrado and restinga. Reported by Harley (1995b) for the Pico das Almas.

Wijkia flagellifera (Broth.) Crum

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, on wet rock, M. T. S. Stradmann 18, 1-9-1994 (ALCB 28239).

Comments: This is rare and has not been collected in other areas of Bahia.

Hypnaceae

Isopterygium tenerum (Sw.) Mitt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 41, 18-4-1997 (ALCB 29423).

Comments: this is common in Bahia, also occurring in different vegetation types, such as ombrophilous forest, seasonal forest, cerrado, restinga and secondary forest near urban areas.

Neckeraceae

Neckeropsis undulata (Hedw.) Reichardt

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest on bare rocks, M. T. S. Stradmann et al. 40, 18-4-1997 (ALCB 29426).

Comments: This species is relatively rare in Bahia. The most common sibling species is *Neckeropsis disticha*.

Phyllogoniaceae

Phyllogonium viride Brid.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann 25, 5-11-1995 (ALCB 28264).

Comments: This species occurs in other areas of Bahia. Reported by Harley (1995b) for the Pico das Almas.

Meteoriaceae

Squamidium leucotrichum (Tayl.) Broth.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on bare rocks, M. T. S. Stradmann et al. 37, 18-4-1997 (ALCB 29425).

Comments: The genus *Squamidium*, as well as other Meteoriaceae species, seems to be restricted to the southern and southeast of Bahia and to the Chapada Diamantina.

Pottiaceae

Plaubelia sprengellii (Schwaegr.) Zander

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, in the urban zone of Lençóis town, M. T. S. Stradmann et al. 49, 22-4-1997 (ALCB 29427).

Comments: This is common in Bahia. It is an urbanophilous species also reported in the urban zone of Salvador.

Calymperaceae

Syrrhopodon ligulatus Mont.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 43, 18-4-1997 (ALCB 29428).

Comments: Although rare in Bahia, this species was reported by Harley (1995b) for the Pico das Almas. Within Bahia seems to be restricted to the Chapada Diamantina.

Syrrhopodon prolifer Schwaegr.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 23, 8-3-1995 (ALCB 28260); col. M. T. S. Stradmann et al. 39, 18-4-1997 (ALCB 29429).
Comments: This is common in Bahia. Reported by Harley (1995b) for the Pico das Almas.

Dicranaceae

Bryohumbertia filifolia (Hornsch.) Frahm

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Rio Ribeirão, on soil, A. Poveda & M. T. S. Stradmann, 30-12-1992 (ALCB 18719).

Comments: this species has not been collected

in other areas of Bahia and within the state it seems to be restricted to the Chapada Diamantina.

Campylopus arctocarpus (Hronsch.) Mitt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, M. T. S. Stradmann 21, 1-9-1994 (ALCB 28265), det. J. P. Frahm.

Comments: Within Bahia, this species seems to be restricted to the Chapada Diamantina.

Campylopus julaceus (Hampe) Jaeg.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Trilha do Capão, Lençóis, on soil, M. T. S. Stradmann 30, 9-3-1996 (ALCB 28258).

Comments: Within Bahia, this species seems to be restricted to the Chapada Diamantina.

Campylopus occultus Mitt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Ribeirão de Cima, on bare rocks, M. T. S. Stradmann 22, 1-9-1994 (ALCB 28269), det. J.-P. Frahm.

Comments: Within Bahia, this species seems to be restricted to the Chapada Diamantina.

Holomitrium arboreum Mitt.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, M. T. S. Stradmann et al. 42, 18-4-1997 (ALCB 29421).

Comments: Within Bahia, this species seems to be restricted to the Chapada Diamantina.

Pilopogon guadeloupensis (Brid.) Frahm

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, "Bodão trail" of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on soil, M. T. S. Stradmann 29, 5-11-1995 (ALCB 28266), det. J. P. Frahm.

Comments: Within Bahia, this species seems to be restricted to the Chapada Diamantina.

Leucobryaceae

Leucobryum albicans (Schwaegr.) Lindenb.

Specimens examined: Brazil, Bahia, Chapada

Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on bare rocks, col. M. T. S. Stradmann et al. 36, 18-4-1997 (ALCB 29433). Comments: This species is relatively common in Bahia, also occurring in southern areas of the state.

Leucobryum martianum (Hornsch.) Hampe
Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on bare rocks M. T. S. Stradmann 26, 5-11-1995 (ALCB 28267).
Comments: This species is common in Bahia, also occurring in cerrado vegetation.

II - HEPATOPHYTA

Lepidoziaceae

Kurzia brasiliensis (Steph.) Grolle
Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on bare rocks, M. T. S. Stradmann 27, 5-11-1995 (ALCB 28257).
Comments: Within Bahia, this species seems to be restricted at the Chapada Diamantina.

Telaranea nematodes (Gott. ex Aust.) Howe
Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, Rio Ribeirão de Cima, Lençóis, M. T. S. Stradmann, 1-9-1994 (ALCB 29466).
Comments: This species is common in Bahia, also occurring in cerrado vegetation. Reported by Harley (1995b) for the Pico das Almas.

Frullaniaceae

Frullania mucronata (Lehm. & Lindenb.) Lehm. & Lindenb.
Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, on shaded wet rock, M. T. S. Stradmann et al. 46, 18-4-1997 (ALCB 29430).
Comments: This species has not been collected in other areas of Bahia.

Lejeuneaceae

Ptychanthoideae

Mastigolejeunea auriculata (Wils. & Hook.) Schiffn.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic, M. T. S. Stradmann et al. 44, 18-4-1997 (ALCB 29431).

Comments: This species is common in Bahia, also occurring in ombrophilous forest, cerrado and the urban area of Salvador.

Lejeuneoideae

Lejeunea dimorphophylla (Bischn.) Schust.

Specimens examined: Brazil, Bahia, Chapada Diamantina National Park, “Bodão trail” of the Rio Ribeirão, between Lençóis and Palmeiras, in the gallery forest, epiphytic on other bryophytes, M. T. S. Stradmann et al. 45, 18-4-1997 (ALCB 29432).

Comments: This species is common in Bahia, also occurring in ombrophilous forest, cerrado and restinga.

FINAL COMMENTS

Harley (1995b) provide the first effective survey of bryophytes from south-western Chapada Diamantina. The most of the previously recorded species in this area, including those reported by Yano (1981, 1984, 1989, 1995) were also found in the present survey. They seems to form a group whose distribution within Bahia is restricted to the Chapada Diamantina. In this group, the best represented mosses families are Dicranaceae with the genera *Campylopus*, *Holomitrium* and *Pilopogon* (the former genus is most common); Sphagnaceae, with several species; Leucobryaceae with *Leucobryum*; Orthotrichaceae with *Macromitrium* and *Schlotheimia*, (*Schlotheimia rugifolia* is the most common species); Meteoraceae with *Squamidium*; Mniaceae with *Pyrrhobryum spiniforme*; Phyllogoniaceae with *Phyllogonium viride*; Thuidiaceae with *Thuidium*. Among the hepatics, Frullaniaceae, Lejeuneaceae and Lepidoziaceae are the best represented in the Chapada Diamantina.

Some local species also occur in other vegetations types, such as *Isopterygium tenerum*, *Sematophyllum subpinnatum*, *Leucobryum martianum*,

Leucobryum albicans and *Syrrophodon prolifer*, among the mosses, and *Mastigolejeunea auriculata*, *Lejeunea dimorphophylla*, *Lejeunea laetevirens* and *Frullania brasiliensis* (both reported by Harley, 1995b), among the hepatics.

As pointed out by Harley (1995a), the Chapada Diamantina is an interesting phytogeographical area concerning bryophyte distribution. Its varied microhabitats promote the growth and reproduction of bryophytes, mainly due to periods of high atmospheric humidity. Although our knowledge of species composition and distribution is still far from complete, the bryophyte flora seems to be specialized and very diversified. Thus, a more complete survey must be attempted in this interesting and rich environment.

Acknowledgements:

We thank Dr. Jan-Peter Frahm for identifications of the some Dicranaceae species and Dr. Mauro Ramalho from Departamento de Botânica do Instituto de Biologia da Universidade Federal da Bahia for revision of the manuscript.

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