

A Bryophyte Checklist of the Ecological Reserve of Gurjaú, Pernambuco, Brazil¹

Shirley Rangel Germano

Kátia Cavalcanti Pôrto

Universidade Federal de Pernambuco, CCB, Departamento de Botânica, Av. Prof. Moraes Rego s/n - Cidade Universitária, 50670 – 901 Recife-Pernambuco – Brazil.

sgrangel@ufpe.br; kporto@ufpe.br

Abstract: A bryophyte checklist of the Ecological Reserve of Gurjaú (08°10'00"-08°15'00"S; 35°02'30"- 35°05'00"W), a remnant of the Atlantic Forest in the State of Pernambuco, has been compiled. The Reserve covers an area of approximately 1362 ha, including several forest fragments of diverse sizes and stages of conservation. Specimens collected during the years 2000 and 2001, and voucher specimens from the UFP Herbarium at the Federal University of Pernambuco (UFPE) were analyzed. Bryophytes were collected on live and dead trunks, rocks, leaves and soil. The studied bryoflora is composed of 53 species of liverworts, 37 species of mosses and one hornwort. Among the twenty-three registered families, Lejeuneaceae (41 spp.) was the most representative one with the highest generic and specific richness, which confirms its status as predominant in tropical rain forests. *Fissidens* (7 spp.), *Lejeunea* and *Cheilolejeunea* (6 spp.), and *Calymperes* (4 spp.) were the most representative genera. The studied bryoflora is predominantly composed of species of neotropical distribution, widely spread throughout Brazil. The presence of an endemic species of the Atlantic Forest, *Vitalianthus bichlerianus* (Pôrto & Grolle) Schust. & Giancotti, and some other exclusively Brazilian species, e.g., *Riccardia regnellii* (Ångstr.) Hell have been recorded from the site.

Introduction

The history of Brazilian bryology began in the early nineteenth century, when foreign researchers conducted expeditions to collect samples, mainly in the south, southeast and north of the country. The historical references to species from Brazil and the State of Pernambuco have been published by Yano & Andrade-Lima (1987) and (Pôrto (1990, 1996). It was after the

checklists of Yano (1981, 1984a, 1989, 1995) that a greater amount of bryofloristic information about the species of Pernambuco, which included all the scattered publications, became available. The literature about this group has been quite enriched since the last two decades of the twentieth century, due to the intensification of the studies on systematics, and especially to the floristic surveys (Pôrto 1996, Pôrto & Germano 2002).

With their studies, Yano & Andrade-Lima (1987) provided an important contribution to the

¹ Chapter of the first author's thesis.

bryophytes on Lowland Submontane Forest and Caatinga. Another equally relevant contribution was that by Pôrto (1990) who surveyed and compared the bryoflora of two Atlantic Forest remnants of different altitudes: the Biological Reserve of Salinho (50-120m alt.) and the João Vasconcelos Sobrinho Ecological Park (890-1000m). The present checklist compiles 170 bryophyte species as well as several new registers for Brazil and Pernambuco.

When studying the bryoflora occurring on dead trunks, Germano & Pôrto (1996, 1998) conducted an analysis of the epixylic bryoflora of a Lowland Atlantic Forest remnant, resulting in a list of 55 species, five of which represented new occurrences for northeastern Brazil.

Twenty-three species of pleurocarpous mosses, six of which are new references, were recently surveyed by Valdevino et al. (2002) at a Montane Atlantic Forest remnant (900-1200m).

A checklist of the bryoflora of the State of Pernambuco was published in the „Diagnóstico da Biodiversidade de Pernambuco“ (Diagnosis of the Biodiversity of Pernambuco), and it contains approximately 315 species, distributed among mosses (167), hepatics (143) and 5 hornworts (Pôrto & Germano 2002). This work is also the first contribution about bryophyte conservation in Pernambuco, since it deals with subjects such as rarity, endemism, vulnerability, and species' extinction.

This current research was carried out because of the urgent need to broaden the knowledge about the bryoflora of the Atlantic Forest remnants, which are being extensively exploited and are under the threat of destruction. The main goal of this study was to make an inventory of the bryoflora of the Ecological Reserve of Gurjaú, one of the most important lowland Atlantic Forest remnants of the State of Pernambuco.

Study site

The Ecological Reserve of Gurjaú (Lat. 08°10'00"- 08°15'00"S; Long. 35°02'30"- 35°05'00"W) was established by the Law 9989 of 01/13/87 concerning the Ecological Reserves

of Recife's Metropolitan Area. It occupies an area of 1362 ha (FIDEM 1993) composed by a group of forest fragments under distinct stages of conservation. Besides, there are three water dams located inside this area, which are partly responsible for the city's water supply.

The vegetation is classified as Dense Tropical Rain Forest according to the IBGE (2001); the climate, following Koeppen's classification, is pseudotropical of the As' type, with a rainy period during Fall-Winter seasons, with annual average rainfall of 2450 mm, and temperature of 25.5°C (INMET - Instituto Nacional de Meteorologia – the Meteorology National Institute). The landscape is undulating with altitudes varying from 80-150m above sea level (Andrade & Lins 1984). The soil is an association between reddish-yellow Latosol and reddish-yellow Podzolic, which are the characteristic types of very humid areas (Jacomine et al. 1972).

Besides being a remnant of a highly threatened ecosystem, its importance also relies on the fact that it has recently been considered an area of extreme biological importance for conservation (Brasil-MMA 2002).

Materials and Method

The floristic survey of the bryophyte flora was carried out at the largest and best preserved forest fragments (37 – 119 ha) of the Ecological Reserve of Gurjaú. During the expeditions conducted throughout 2000 and 2001, bryophytes growing on diverse types of microhabitats were collected: leaves, branches and trunks of both dead and live trees, rocks and soil.

The identifications and world wide distribution of species were mainly based on the publications by: Buck (1998), Florschütz (1964), Gradstein (1989, 1994), Gradstein & Buskes (1985), Gradstein & Costa (2003), Gradstein et al. (2001), Ilkiu-Borges (2000), Reiner-Drehwald (2000), Reyes (1982), Sharp et al. (1994), Schuster (1980) and Tixier (1985).

The techniques applied for collecting, herborizing and conserving the botanical samples follow by Yano (1984b).

After the study and identification of the species, the exsiccates were then incorporated into the reference collection of the UFP Herbarium at the Federal University of Pernambuco. Some species were sent to specialists for taxonomic confirmation.

A checklist of the bryoflora is presented, as well as the geographical distribution for Brazil and the rest of the world, and the microhabitats of occurrence. In Table 1, the taxa are displayed in alphabetical order of genera and species. The classification systems adopted were Crandall-Stotler & Stotler (2000) – hepatics, Renzaglia & Vaughn (2000) – hornworts and Buck & Goffinet (2000) – mosses. The taxonomic nomenclature regarding the genera *Lejeunea* and *Plagiochila* was updated according to Reiner-Drehwald (1999, 2000) and Heinrichs & Gradstein (2000), respectively. Previous registers from Pôrto *et al.* (1993) have also been included in this checklist.

The catalogues of Yano (1981, 1984a, 1989, 1995), and the publications of Bastos & Bôas-Bastos (2000), Bôas-Bastos & Bastos (1998), Germano & Pôrto (1996, 1998), Oliveira e Silva & Yano (1998), Pôrto *et al.* (1993), Pôrto *et al.* (2000), Vital & Visnadi (1994), and Yano & Colletes (2000), among others, were used in the bibliographic research about species' distribution in Brazil.

The abbreviations for the Brazilian States follow those established by the Instituto Brasileiro de Geografia e Estatística – IBGE (Brazilian Institute of Geography and Statistics): **Northern Region** – Acre (AC), Amapá (AP), Amazonas (AM), Pará (PA), Rondônia (RO), Roraima (RR); **Northeastern Region** – Alagoas (AL), Bahia (BA), Ceará (CE), Maranhão (MA), Paraíba (PB), Pernambuco (PE), Piauí (PI), Rio Grande do Norte (RN), Sergipe (SE); **Mid-Western Region** – Goiás (GO), Mato Grosso (MT), Mato Grosso do Sul (MS), Tocantins (TO); **Southeastern Region** – Espírito Santo (ES), Minas Gerais (MG), Rio de Janeiro (RJ), São Paulo (SP); **Southern Region** – Paraná (PR), Rio Grande do Sul (RS), Santa Catarina (SC).

Results

Synopsis of the bryophytes from the Ecological Reserve of Gurjaú.

MARCHANTIOPHYTA

1. ANEURACEAE
Riccardia amazonica (Spruce) Schiffn. ex Gradst.
R. digitiloba (Spruce ex Steph.) Pagán
R. regnellii (Aongstr.) Hell
2. CALYPOGEEACEAE
Calypogeia laxa Gott. & Lindenb.
3. FOSSOMBRONACEAE
Fossombronia porphyrhiza (Nees) Prosk.
4. FRULLANIACEAE
Frullania caulisequa (Nees) Nees
F. kunzei (Lehm. & Lindenb.) Lehm. & Lindenb.
F. riojaneirensis (Raddi) Aongst.
5. LEJEUNEACEAE
Aphanolejeunea sicaefolia (Gott. ex Steph.) A. Evans
A. truncatifolia Horik
Archilejeunea auberiana (Mont.) A. Evans
A. fuscescens (Hampe ex Lehm.) Fulf.
A. parviflora (Nees) Schiffn.
Ceratolejeunea cornuta (Lindenb.) Schiffn.
C. cubensis (Mont.) Schiffn.
C. guianensis (Nees & Mont.) Steph.
Cheilolejeunea acutangula (Nees) Grolle
C. adnata (Kunze) Grolle
C. clausa (Nees & Mont.) Schust.
C. holostipa (Spruce) Grolle & R.L. Zhu
C. rigidula (Mont.) Schiffn.
C. trifaria (Blume & Nees) Mizut
Cololejeunea cardiocarpa (Mont.) A. Evans
C. obliqua (Nees & Mont.) Schiffn.
C. subcardiocarpa Tixier
Colura greig-smithii Jovet-Ast
Diplasiolejeunea cavifolia Steph.
D. cobrensis Gott. ex Steph.
D. rudolphiana Steph.
Drepanolejeunea fragilis Bischl.

- D. mosenii* (Steph.) Bischl.
Harpalejeunea stricta (Lindenb. & Gott.) Steph.
Lejeunea caespitosa Lindenb.
L. flava (Sw.) Nees
L. glaucescens Gott.
L. laetevirens Nees & Mont.
L. monimiae (Steph.) Steph.
L. quinqueumbonata Spruce
Leptolejeunea elliptica (Lehm. & Lindenb.) Schiffn.
Lopholejeunea subfusca (Nees) Schiffn.
Microlejeunea epiphylla Bischl.
Prionolejeunea aemula (Gott.) A. Evans
Pycnolejeunea contigua (Nees) Grolle
Rectolejeunea flagelliformis A. Evans
Schiffnerolejeunea polycarpa (Nees) Gradst.
Stictolejeunea squamata (Willd. ex Web.) Schiffn.
Symbiezidium barbiflorum (Lindenb. & Gott.) A. Evans
Vitalianthus bichlerianus (Pôrto & Grolle) Schust. & Giancotti
Xylolejeunea crenata (Nees & Mont.) X.-L.H & Grolle
6. PLAGIOCHILACEAE
Plagiochila disticha (Lehm. & Lindenb.) Lindenb.
P. montagnei Nees
P. raddiana Lindenb.
7. RICCIACEAE
Riccia membranacea Gott. & Lindenb.
- ANTHOCEROPHYTA**
8. NOTOTHYLADACEAE
Notothylas vitalii Udar & Singh.
- BRYOPHYTA**
9. ARCHIDIACEAE
Archidium ohioense Schimp. ex C. Muell.
10. BARTRAMIACEAE
Philonotis uncinata (Schwaegr.) Brid.
11. BRYACEAE
Bryum pabstianum C. Muell.
12. CALYMPERACEAE
Calymperes afzelii Sw.
C. erosum C. Muell.
C. lonchophyllum Schwaegr.
C. palisotii Schwaegr.
Octoblepharum albidum Hedw.
Syrrophodon incompletus Schwaegr.
S. ligulatus Mont.
S. parasiticus (Brid.) Besch.
13. DICRANACEAE
Dicranella hilariana (Mont.) Mitt.
14. FISSIDENTACEAE
Fissidens inaequalis Mitt.
F. papillosus Sande Lac
F. prionodes Mont.
F. reticulosus (C. Muell.) Mitt.
F. scariosus Mitt.
F. submarginatus Bruch.
F. zollingeri Mont.
15. HYPNACEAE
Isopterygium tenerum (Sw.) Mitt.
Vesicularia vesicularis (Schwaegr.) Broth.
16. LEUCOMIACEAE
Leucomium strumosum (Hornsch.) Mitt.
17. NECKERACEAE
Neckeropsis disticha (Hedw.) Kindb.
18. ORTHOTRICHACEAE
Groutiella apiculata (Hook.) Crum & Steere
Schlotheimia jamesonii (Arn.) Brid.
19. POTTIACEAE
Hyophila involuta (Hook.) Jaeg.
20. PILOTRICHACEAE
Callicostella pallida (Hornsch.) Aongstr.
Crossomitrium patrisiae (Brid.) C. Muell.
Pilotrichum evanescens (C. Muell.) C. Muell.
21. PTEROBRYACEAE
Henicodium geniculatum (Mitt.) Buck
22. SEMATOPHYLLACEAE
Meiothecium revolubile Mitt.

Pterogonidium pulchellum (Hook.) C. Muell.
Sematophyllum subpinnatum (Brid.) Britt.
S. subsimplex (Hedw.) Mitt.
Taxithelium planum (Brid.) Mitt.
Trichosteleum papillosum (Hornsch.) Jaeg

23. STEREOPHYLLACEAE
Pilosium chlorophyllum (Hornsch.) Muell.
 Hall.
Sematophyllum subpinnatum (Brid.) Britt.

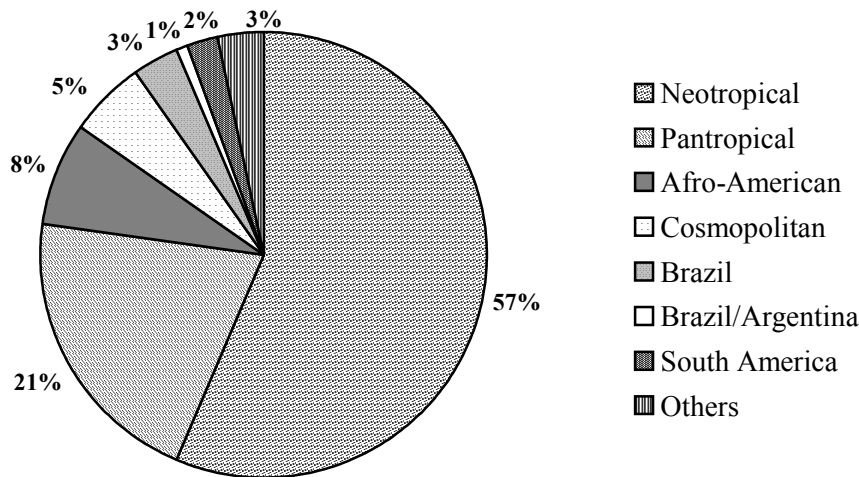


Fig. 1. World-wide distribution pattern of the bryophytes from the Ecological Reserve of Gurjaú, Pernambuco, Brazil.

The 91 registered taxa are distributed among 53 species of hepatics, 37 of mosses and one hornwort. Among the 23 families found, the most species-rich were Lejeuneaceae, Calymperaceae, Fissidentaceae and Sematophyllaceae. *Fissidens* (7 spp.), *Lejeunea* (6 spp.), *Cheilolejeunea* (6 spp.) and *Calymperes* (4 spp.), thus being the most representative genera.

The world-wide geographical distribution pattern found for the species was predominantly neotropical (57%), followed by pantropical (21%) (Fig. 1). The majority of these taxa are widely distributed in Brazil, and in a general sense, they occur in those States that have been most thoroughly investigated by the bryofloristic standpoint. *Riccardia regnellii* and *Vitalianthus bischlerianus* are restricted to Brazil (Tab. 1).

Specificity was not shown by most of the species in regard to their substrate. They usually occurred on two or three types (Tab. 1). However, *Archilejeunea fuscescens*, *Cheilolejeunea rigidula*, *Lejeunea monimiae*, besides other Lejeuneaceae and *Frullania* spp. were exclusively found as corticolous; *Cololejeunea* spp., *Leptolejeunea elliptica*, as epiphyllous; *Aphanolejeunea sicaefolia*, *Lejeunea quinqueumbonata* and *Riccardia* spp., as epixylic; and only *Neckeropsis disticha* as rupicolous. The terrestrial bryophytes were mainly represented by Fissidentaceae, thalloid hepatics and *Notothylas vitalii*.

Tab. 1. Bryoflora of the Ecological Reserve Gurjaú, Pernambuco, Brazil. Species; herbarium n°; world-wide and Brazilian distributions; microhabitats of occurrence: LT – Live trunk, DT – dead trunk, L – leaf, R – rock and S – soil. * Pôrto *et al.* (1993).

SPECIES	UFP HERBARIUM	DISTRIBU- TION WORLD- WIDE	DISTRIBUTION IN BRAZIL	MICRO HABITATS
<i>Aphanolejeunea sicaefolia</i>	19135	neotropical	PE,SP	DT
<i>A. truncatifolia</i>	31152	pantropical	PA,PE,SP,RJ	L
<i>Archidium ohioense</i>	32981	pantropical	BA,PB,PE	S
<i>Archilejeunea auberiana</i>	32798a	neotropical Argentina South America	AC,AM,PA,PR,RS,SP,PE	LT
<i>A. fuscescens</i>	31526a	Costa Rica	AC,AM,BA,PA,PE,RR	LT
<i>A. parviflora</i>	31817a	neotropical	AC,AM,ES,MG,PA,PE,RJ,RO,RR, SP	LT, S
<i>Bryum pabstianum</i>	31811	neotropical	ES,GO,PR,RJ,RS,S,SP	S
<i>Callicostella pallida</i>	31818	neotropical	AC,AM,AP,ES,GO,MG,MT,PA, PE,PR,RJ,RO,RS,RR,SE,SP	DT, S, R
<i>Calymperes afzelii</i>	12222	pantropical	AC,BA,ES,MT,PA,PE,RJ,RO,RR.	LT, DT
<i>C. erosum</i>	13420	pantropical	AC,AM,AP,BA,MT,PA, PB, PE,RJ,RO,RR	LT, DT, R
<i>C. lonchophyllum</i>	13427	pantropical	AC,AL,AM,AP,BA,ES,MA,MT, PA,PE,PR,RJ,RO,RR,SP	LT
<i>C. palisotii</i>	12149	neotropical	AL,AM,AP,BA,ES,FN,GO,PA, PB,PE,PI,PR,RJ,RN,RO,RR,SE	LT, DT, R
<i>Calypogeia laxa</i>	31805	neotropical	AM,CE,ES,MG,PA,PE,RJ,SP	S, R
<i>Ceratolejeunea cornuta</i>	31529d	pantropical	AM,AP,PA,PE,PR,RJ,RO,SC,SP	LT, DT,L
<i>C. cubensis</i>	31517a	neotropical	AC,AM,BA,PA,PB,PE,RJ,RO,SP	LT, DT, L, R
<i>C. guianensis</i>	* 8830b	neotropical	AM, PE	LT
<i>Cheilolejeunea acutangula</i>	32924	neotropical	AM,MG,ES,PA,PE,RJ,SP	LT
<i>C. adnata</i>	12221	neotropical	AM,MT,PA,PE,PR,RR	LT, DT, L
<i>C. clausa</i>	31487a	neotropical	AM,MG,PA,PE,RJ,SP	LT
<i>C. holostipa</i>	13987	neotropical	BA,ES,PA,PE,RJ,SP	LT, DT
<i>C. rigidula</i>	13416	Afro- American	AC,AM,BA,ES,PA,PE,PR,RJ,RR,S P	LT, DT, L, R
<i>C. trifaria</i>	13417	neotropical	ES,MG,PA,PE RR,SP	LT
<i>Cololejeunea cardiocarpa</i>	31143a	pantropical	AM,ES,PB,PE,PR,RJ,RO,RR,SP	L
<i>C. obliqua</i>	31547d	neotropical	AM, PA, PE, PR, RJ, SP, SC	LT, L
<i>C. subcardiocarpa</i>	31136a	neotropical	AM, MG, ES, PE, PR, SC	L

<i>Colura greig-smithii</i>	31128a	South America	AM, PE, SP	L
<i>Crossomitium patrisae</i>	31164d	neotropical	AC,AM,BA,PA,PE,RJ,RO,RR,SC,SP	LT, DT, L
<i>Dicranella hilariana</i>	31905	neotropical	BA,ES,MG,PB,PE,RJ,RO,SC,SP	S
<i>Diplasiolejeunea cavifolia</i>	31146b	pantropical	CE,PE,PR,SC,SP	LT, L
<i>D. cobrensis</i>	31499a	neotropical	AL,BA,PE,PR,RO	LT
<i>D. rudolphiana</i>	31140	pantropical	AC, BA, ES, PB, PE, RJ, SE, SP	LT, L
<i>Drepanolejeunea fragilis</i>	31127d	neotropical	AM,ES,PA,PE,SP	LT, L
<i>D. mosenii</i>	13418	neotropical	AM,BA,ES,MG,PE,PR,RJ,RS,SC,SP	LT, DT, L
<i>Fissidens inaequalis</i>	* 8522	neotropical	AC,AM,PA,PE,RO,RR	S
<i>F. papillosus</i>	31906a	pantropical	MG,MT,PE	S
<i>F. prionodes</i>	31809	neotropical	AC,AM,BA,ES,GO,MG,PA,PB,PE,PR, RJ,RR,SC,SP	S, R
<i>F. reticulosus</i>	8553	neotropical	CE,FN,MG,PE,RJ	S
<i>F. scariosus</i>	31839	neotropical	ES,PA,PE,PR,RJ,RO,SC,SP	S
<i>F. submarginatus</i>	32972	neotropical	ES,RO,PE	S
<i>F. zollingeri</i>	31804	cosmopolitan	AM,BA,ES,FN,MA,MG,PA,PB,PE,PI,RJ,RO,SC,SP,TO	DT, S
<i>Fossombronia brasiliensis</i>	31881	neotropical	ES,MG,MT,PE,RJ,SP	S, R
<i>Frullania caulisequa</i>	31502	neotropical	AC,BA,ES,MG,PA,PE,RR,RJ,RS,SC,SE,SP	LT, DT, L
<i>F. kunzei</i>	* 8529	neotropical	AC,AM,BA,CE,ES,MG,MT,PB,PE,PR,RJ,RR,RS,SE,SP	LT
<i>F. riojaneirensis</i>	* 8565	pantropical	BA,DF,ES,GO,MG,MT,PA,PB,PE,RJ,RS,SE,SP	LT
<i>Groutiella apiculata</i>	31515	neotropical	MS,PA,PE,PR,RJ,SP	LT
<i>Harpalejeunea stricta</i>	13425	neotropical	AC,BA,PA,PE,RJ	LT, L
<i>Henicodidium geniculatum</i>	31549a	neotropical	AC,AL,AM,AP,ES,GO,MT,PA,RJ,RO,SP	LT
<i>Hyophila involuta</i>	32973	cosmopolitan	AM,BA,ES,GO,MG,PB,PE,PI,PR, RJ,RO,RS,SP	S
<i>Isopterygium tenerum</i>	31882	pantropical	AC,AM,BA,ES,GO,MG,MT,PAPB,PE, PR,RJ,RR,RS, SC,SP	LT, DT, S
<i>Lejeunea caespitosa</i>	31135d	Afro-American	AC,PA,PE,RJ,SP	LT, L
<i>L. laetevirens</i>	31150a	neotropical	BA,ES,FN,PA,PE,RJ,SP	LT, DT, L, R
<i>L. flava</i>	31819c	cosmopolitan	AC,AM,BA,ES,GO,MG,PA,PE,RJ,RS,SP	LT, L

<i>L. glaucescens</i>	13162a	neotropical	AC,BA,ES,PA,PE,PR,RJ,RR,SP	DT, L, S, R
<i>L. monimiae</i>	31144	Brazil Argentina	SC,SP,PE	LT
<i>L. quinqueumbonata</i>	32832a	neotropical	AM,RJ,SP,PE	DT
<i>Leptolejeunea elliptica</i>	31136	neotropical	AC, AM, AP,ES,MG,PA, PE,PR,RJ, RR,SC,SP	L
<i>Leucomium strumosum</i>	19143	pantropical	AC,AM,AP,ES,MG,PA,PE,RJ, RO,RR,SC,SP	DT
<i>Lopholejeunea subfusca</i>	31828a	pantropical	AC,AM,BA,ES,PA,PB,PE,RJ,RO,R R,SP	LT, DT, R
<i>Meiothecium revolubile</i>	* 8524	neotropical	AM,ES,MT,PE	DT
<i>Microlejeunea epiphylla</i>	31141b	neotropical	BA, PA, PE, SP	LT, L
<i>Notothylas vitalii</i>	31834	pantropical	MA,MS,PE	S
<i>Octoblepharum albidum</i>	.14000	pantropical	TODOS OS ESTADOS	LT, DT, S, R
<i>Philonotis uncinata</i>	32002a	pantropical	AM,BA,ES,MG,MT,PB,PE,PI,RJ,R O	S, R
<i>Pilosium chlorophyllum</i>	12227	neotropical	AC,AL,AM,AP,ES,GO,MG, MT,PA,PE,RJ,RO,RR,SP	DT
<i>Pilotrichum evanescens</i>	31516a	neotropical	AM,MG,PA,PE,PR,RJ,RR,SC,SP	LT
<i>Plagiochila disticha</i>	32003	neotropical	AC, AP, AM, MG,PA, PB,PE,RJ,RR,RS, SP	LT, R
<i>P. montagnei</i>	32951	neotropical	AM,AP,PA,BA,PE,PR,RJ,SP	LT
<i>P. raddiana</i>	32889b	neotropical	PE, RJ, SP	LT, DT
<i>Prionolejeunea aemula</i>	31819b	neotropical	PA,PE,RJ,RR,SE,SP	LT, DT, R
<i>Pterogonidium puchellum</i>	19130	neotropical	AM,BA,PA,PE,RJ,RO	DT
<i>Pycnolejeunea contigua</i>	31608a	pantropical	AM,BA,ES,MG,PA,PE,RR,SC,SP	LT
<i>Rectolejeunea flagelliformis</i>	31158	neotropical	PE	LT, L
<i>Riccardia amazonica</i>	8528	Afro- American	AM,AP,PE,RJ,SP	DT
<i>R. digitiloba</i>	19132	neotropical	AM,MG,PE,RJ,SP	DT
<i>R. regnellii</i>	31831	Brazil	MG,PE,RJ,RS,SP	DT, R
<i>Riccia membranacea</i>	31840	Afro- American	AM,ES,MT,PA,PE,RS,SP	S
<i>Schiffneriolejeunea polycarpa</i>	31612c	pantropical	AM,BA,ES,GO,MG,PA,PE,RJ,RS, SC,SP	LT
<i>Schlotheimia jamesonii</i>	32006	neotropical	AC,PE,PR,RJ,RS,SP	DT, R
<i>Sematophyllum subpinnatum</i>	31823	cosmopolitan	AM,AP,BA,CE,ES,GO,MG,MT, PA,PB,PE,PR,RJ,RO,RR,RS,SC,SP	LT, DT, S, R
<i>S. subsimplex</i>	19141	Afro- American	AC,AM,AP,BA,DF,ES,GO,MA, MG, MT,PA,PB,PE,PR,RJ,RR,RS, SE,SC,SP	LT, DT

<i>Stictolejeunea squamata</i>	31150e	neotropical	AC,AM,AP,BA,MG,PA,PE,RJ,RS, SP	LT, L
<i>Symbiezidium barbiflorum</i>	31824	neotropical	AM,BA,ES,PA,PE,RJ,SC,SP	LT, DT, R
<i>Syrrophodon incompletus</i>	31538c	Afro-American	AC,AM,AP,BA,GO,MG,MT,PA, PE,PR,RJ,RO,RR,SC,SP	LT, DT
<i>S. ligulatus</i>	31559b	neotropical	AM,AP,BA,GO,MG,MT,PA,PE,RO, RR,SP	LT
<i>S. parasiticus</i>	31617a	pantropical	AC,AM,BA,ES,MG,PE,PR,RJ,RO, RR,SC,SP	LT, DT
<i>Taxithelium planum</i>	12223	cosmopolitan	AC,AL,AM,AP,BA,ES,GO,MG,MT, PA,PB,PE,PR,RJ,RO,RR,SC,SP,TO	LT, DT, R
<i>Trichosteleum papillosum</i>	32005	neotropical	AC,AM,AP,ES,MG,PA,PE,RJ,RO, RR,SE,SC,SP	DT, R
<i>Vesicularia vesicularis</i>	12151	neotropical	AM,BA,ES,MG,PI,PR,RJ,RS,SC,S P.	DT
<i>Vitalianthus bischlerianus</i>	31506	Brazil	BA, ES, PE, PR, RJ, SP	LT
<i>Xylolejeunea crenata</i>	16198	neotropical	AM,BA, PA,PE,RR,SP	LT, DT

Discussion

The work of Pôrto et al. (1993) served as a landmark to the knowledge of the bryoflora from the Ecological Reserve of Gurjaú. The authors listed 37 species, among which *Meiothecium revolubile* Mitt., was cited for the first time for the State of Pernambuco. New data are being added as a result of the present research, which amounts to 91 species for the surveyed area.

The bryofloristic richness found is close to that found at other Atlantic Forest remnants of the State, for example that of the Biological Reserve of Saltinho (Pôrto 1990), the Brejo of Bituri Grande and the Municipal Reserve of Bonito with 95, 89 and 87 species, respectively (Pôrto & Germano 2002). It is important to emphasize that, despite the fact that the differences found among the values for species' richness of those areas cited above are not that relevant, there was a difference in the floristic composition that resulted into similarity indexes (Sørensen) ranging from 40 to 55%.

On the other hand, when the obtained results are compared to those of other Atlantic Forest remnants from the Southwest (Rio de Janeiro), which have larger territorial extensions and less anthropic interference and are probably better preserved, the data differ just as much in richness as they do in floristic composition. For example, the values presented here for the Ecological Reserve of Gurjaú are lower than to those observed by Oliveira e Silva et al. (2002), who catalogued 140 species at the Rio das Pedras Reserve and 215 at Ilha Grande with a similarity of, respectively, 25% and 26.6%.

There was a predominance of hepatics over mosses in a proportion of 1.5:1 at the study sites. This fact is supported by the information provided by Gradstein et al. (2001), where it is said that the diversity of hepatics is higher than to that of mosses in the tropical lowland rain forest, while this tends to be reversed as forest height increases to 4000m.

As for the family richness, it is reported that the study site presents 42.5 % of those species listed for the State, by Pôrto & Germano

(2002). The most expressive ones at the site are commonly those of high species' richness at tropical lowland rain forest. In such forest ecosystems, species are unevenly distributed in a way that a reduced number of families comprise a large number of representatives (Gradstein 1995). For instance, this is the case for Lejeuneaceae, which is predominant in this forest formation, comprising 76% of the hepatic species, in other words, ca. 45% of the total of the Reserve's bryophytes. In turn, Calymperaceae, Fissidentaceae and Sematophyllaceae, together, represented 70% of the moss flora. The other families are generally represented by only one species. This also confirms the reports of Gradstein et al. (2001) about moss diversity in such forest ecosystems.

The studied bryoflora is predominantly distributed in the neotropics, with wide occurrence in the Brazilian States. Nevertheless, there are species of restricted distribution, such as *Vitalianthus bischlerianus*, endemic of the Atlantic Forest, and *Riccardia regnellii* (Aongstr.) Hell, endemic of Brazil.

The pattern observed for Tropical Forests is being repeated here, since the bryophytes were found colonizing various substrates (leaves, dead trunks, live trunks, rocks and soil), even though they are usually corticolous. Bryophytes were predominant in humid and shaded habitats, being rarely found in areas exposed to light. The presence of epiphyllous species at some of the studied fragments indicated a condition of higher humidity.

The data reveal a bryoflora characteristic of primary and secondary lowland moist forests, with elements typical of disturbed areas.

Acknowledgments

The authors wish to thank Drs. S. Rob Gradstein and Jochen Heinrichs from the Systematisch Geobotanisches Institut, University of Göttingen - Germany, for confirming the species of the genus *Plagiochila*; and CAPES, CNPq and WWF for the financial support.

References

- Andrade, G.O. & Lins, R.C. 1984.** Pirapama: um Estudo Geográfico e Histórico. Recife, Ed. Massangana. 224 p. (Estudos e Pesquisas, 31)
- Bastos, C.J.P & Bôas – Bastos, S.B.V. 2000.** Some new additions to the hepatic flora (Jungermanniophyta) for the state of Bahia, Brazil. *Tropical Bryology* 18: 1-11.
- Bôas – Bastos, S.B.V. & Bastos, C.J.P. 1998.** Briófitas de uma área de cerrado no município de Alagoinhas, Bahia, Brasil. *Tropical Bryology* 15: 101-110.
- BRASIL – Ministério do Meio Ambiente. 2002.** Avaliação e identificação de Áreas e Ações prioritárias para Conservação, Utilização Sustentável e Repartição dos Benefícios da Biodiversidade nos Biomas Brasileiros. Brasília. 404 p.
- Buck, W.R. & Goffinet, B. 2000.** Morphology and classification of mosses. In: Shaw, J. & Goffinet, B. (ed.) *Bryophyte Biology*. Cambridge University Press, Cambridge. p 71-123.
- Buck, W.R. 1998.** Pleurocarpus mosses of the West Indies. *Memoirs of The New York Botanical Garden* 82: 1-400.
- Costa, D.P. 1999.** Epiphytic bryophyte diversity in primary and secondary lowland rainforests in southeastern Brazil. *The Bryologist* 102(2): 320-326.
- Crandall-Stotler, B. & Stotler, R.E. 2000.** Morphology and classification of the Marchantiophyta. In: Shaw, J. & Goffinet, B. (ed.) *Bryophyte Biology*. Cambridge University Press, Cambridge. p 21-70.
- FIDEM – Fundação de Desenvolvimento da Região Metropolitana do Recife. 1993.** Monitoramento das Reservas ecológicas da RMR. Recife, Governo do estado de Pernambuco. Série Desenvolvimento Urbano e Meio Ambiente.
- Florschütz, P.A. 1964.** The mosses of Suriname. Leiden, E.J. Brill. 271p.

- Germano, S.R. & Pôrto, K.C. 1996.** Floristic survey of epixylic bryophytes of an area remnant of the Atlantic Forest (Timbaúba – PE, Brazil). 1. Hepaticopsida (except Lejeuneaceae) and Bryopsida. *Tropical Bryology* 12: 21-28.
- Germano, S.R. & Pôrto, K.C. 1998.** Briófitas epixilas de uma área remanescente de floresta atlântica (Timbaúba, PE, Brasil). 2. Lejeuneaceae. *Acta Botanica Brasilica* 12(1): 53-66.
- Gradstein, S.R. 1989.** A key to the Hepaticae & Anthocerotae of Puerto Rico & the Virgin Islands. *Bryologist* 92(3): 329-38.
- Gradstein, S.R. 1994.** Lejeuneaceae: Ptychantheae, Brachirolejeuneae. *Monograph Flora Neotropica* 62:1-216.
- Gradstein, S.R. 1995.** Diversity of Hepaticae and Anthocerotae in Montane Forest of Tropical Andes. In: Churchill, S. P. *et al* (ed.). *Biodiversity and Conservation of Neotropical Montane Forest*. p. 321-334.
- Gradstein, S.R. & Buskes, G.M.C. 1985.** A revision of neotropical *Archilejeunea* (Spruce) Schiffn. In: *Contribution to a monograph of the Lejeuneaceae subfamily Ptychanthoideae*. Beihefte zur Nova Hedwigia 80:89-112.
- Gradstein, S. R. & Costa, D.P. 2003.** Liverworts and Hornworts of Brazil. *Memoirs of the New York Botanical Garden*, v.88: 1- 673.
- Gradstein, S.R., Churchill, S.P. & Salazar, N. Allen. 2001.** Guide to the Bryophytes of Tropical America. *Memoirs of the New York Botanical Garden*. 86: 1-280.
- Heinrichs, J. & Gradstein, S.R. 2000.** A revision of *Plagiochila* sect. *Crispatae* and sect. *Hynoides* (Hepaticae) in the Neotropics. I. *Plagiochila disticha*, *P. montagnei* and *P. raddiana*. *Nova Hedwigia* 70: 161-184.
- Ilkiu-Borges, A.L. 2000.** Lejeuneaceae (Hepaticae) da Estação Científica Ferreira Penna, Caxiuanã, município de Melgaço, Pará. *Dissertação de Mestrado. Faculdade de Ciências Agrárias do Pará, Belém.*
- IBGE – Instituto Brasileiro de Geografia e Estatística. 2001.** Recursos Naturais e Meio Ambiente: uma visão do Brasil. Departamento de Recursos Naturais e Estudos Ambientais. 2 ed. Rio de Janeiro.
- Jacomine, P.K.T., Cavalcanti, A.C. & Burgos, N. 1972.** Levantamento exploratório: Reconhecimento dos solos do Estado de Pernambuco. *Boletim Técnico Pedologia* 2(26): 1-354.
- Oliveira e Silva, M^aL.M.N., Milanez, A.I. & Yano, O. 2002.** Aspectos ecológicos de briófitas em áreas preservadas de mata atlântica, Rio de Janeiro, Brasil. *Tropical Bryology* . 22: 77-102.
- Oliveira e Silva, M.I.M.N. & Yano, O. 1998.** Ocorrências novas de briófitas para o Brasil. *Revista Brasileira de Botânica* 21(2): 125-134.
- Pôrto, K.C. 1990.** Bryoflores d'une forêt de plaine et d'une forêt d'altitude moyenne dans l'État de Pernambuco (Brésil); Analyse floristique. *Cryptogamie, Bryologie Lichénologie* 11(2): 109-161.
- Pôrto, K.C. 1996.** Briófitas. In.: Sampaio, E. V. S. B.; Mayo, S. J. & Barbosa, M. R. V. *Pesquisa Botânica Nordestina: Progresso e Perspectivas*. Sociedade Botânica do Brasil, Regional Pernambuco. p. 91-103.
- Pôrto, K.C. & Germano, S.R. 2002.** Biodiversidade e importância das briófitas na conservação dos ecossistemas naturais de Pernambuco. In: Tabarelli, M. & Silva, J. M^a C. (orgs.) *Diagnóstico da Biodiversidade de Pernambuco*. Recife: SECTMA – Secretaria de Ciência, Tecnologia e Meio Ambiente, Recife. p. 125-152.
- Pôrto, K.C.; Belo, M.M.L.; Fonseca, E.R. & Silva, E.C. 1993.** Brioflora da Reserva do Gurjaú (Cabo - PE). *Biologica Brasilica* 5(1/2): 27-42.

- Pôrto, K. C., Germano, S. R. & Oliveira, S. M. 2000.** New records of bryophytes for Pernambuco State, Brazil. *Tropical Bryology* 18: 107-114.
- Reiner-Drehwald, M.E. 1999.** Catalogue of the genus *Lejeunea* Lib. (Hepaticae) of Latin America. *Bryophytorum Bibliotheca* 54: 1-101.
- Reiner-Drehwald, M.E. 2000.** Las Lejeuneaceae (Hepaticae) de Misiones, Argentina. VI *Lejeunea* y *Taxilejeunea*. *Tropical Bryology* 19: 81-131.
- Renzaglia, K.S. & Vaughn, K.C. 2000.** Anatomy, development and classification of hornworts. in: Shaw, J. & Goffinet, B. (ed.) *Bryophyte Biology*. Cambridge University Press, Cambridge. p. 1-20.
- Reyes, D.M. 1982.** El género *Diplasiolejeunea* en Cuba. *Acta Botánica Academiae Scientiarum Hungarica* 28(1-2): 145-180.
- Schuster, R.M. 1980.** The Hepaticae and Anthocerotae of North America. v. IV. New York: Columbia University Press.
- Sharp, A.J., Crum, H. & Eckel, P.M. 1994.** The moss flora of Mexico. *Memoirs of the New York Botanical Garden* 69(1-2): 1-1113.
- Tixier, P. 1985.** Contribution à la connaissance des Cololejeunoideae. *Bryophytorum Bibliotheca* 27: 298-351.
- Valdevino, J.A., Sá, P.S.A. & Pôrto, K.C. 2002.** Musgos pleurocárpicos de mata serrana em Pernambuco, Brasil. *Acta Botanica Brasilica* 16(2): 161-174.
- Vital, D.M. & Visnadi, S.R. 1994.** Bryophytes of Rio Branco Municipality, Acre, Brazil. *Tropical Bryology* 9: 69-74.
- Yano, O. 1981.** A checklist of Brazilian mosses. *Journal of the Hattori Botanical Laboratory* 50: 279-456.
- Yano, O. 1984a.** Checklist of Brazilian liverworts and hornworts. *Journal of the Hattori Botanical Laboratory* 56: 481-548.
- Yano, O. 1984b.** Briófitas. In: Fidalgo, O. & Bononi, V.L.R. *Técnicas de coleta, herborização e preservação de material botânico*. Manual do Instituto de Botânica 4: 1-30.
- Yano, O. 1989.** An additional checklist of brazilian bryophytes. *Journal of the Hattori Botanical Laboratory* 66: 371-434.
- Yano, O. 1995.** A new additional annotated checklist of brazilian bryophytes. *Journal of the Hattori Botanical Laboratory* 78: 137-182.
- Yano, O. & Andrade-Lima, D. 1987.** Briófitas no Nordeste brasileiro: Estado de Pernambuco. *Revista Brasileira de Botânica* 10: 171-181.
- Yano, O. & Colletes, A.G. 2000.** Briófitas do Parque Nacional de Sete Quedas, Guaira, PR, Brasil. *Acta botanica Brasilica* 14(2): 215-242.