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New records for the bryophyte flora of the Brazilian Amazon

Novos registros para as briófitas da Amazonia brasileira

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Abstract

Results from recent botanical excursions in northern Brazil include 38 new state and country records. In summary, seven (five liverworts and two mosses) taxa are newly confirmed for Brazil, 18 (10 liverworts and eight mosses) new to Amazonas state and 20 (16 liverworts and four mosses) new to Roraima state.

Key words: Amazon, bryophytes, distributions, flora, new records, Tepuis.

Resumo

Excursões botânicas recentes no norte do Brasil resultaram em 38 registros novos para estados brasileiros e o país. Resumido, sete (cinco hepáticas e dois musgos) espécies são novos registros para o Brasil, 18 sendo novos registros para o estado do Amazonas (10 hepáticas e oito musgos) e 20 para o estado de Roraima (16 hepáticas e quatro musgos).

Palavras-chave: Amazônia, briófitas, distribuições, flora, novas ocorrências, Tepuis.

Introduction

Brazil harbors approximately 1,524 species of mosses, hornworts and liverworts making it the richest country in the Neotropics with respect to bryophytes (Costa & Peralta 2015). Most of this richness has been documented in the Atlantic rainforests of southeastern Brazil, followed by the Amazonian rainforest and finally the Cerrado of central Brazil, respectively. The recently published Brazilian list of the bryoflora has immensely contributed to the knowledge of bryophyte distributions throughout the country but gaps remain particularly for the northern region where collection is scarce due to its immense size and isolation (Costa & Peralta 2015; Hopkins 2007).

Previous studies of bryophytes in the recent past conducted in the states of Amazonas and Roraima have greatly contributed to our knowledge of the bryophyte flora of northern Brazil (Gradstein & Costa 2003; Griffin III 1979; Lisboa 1976; Lisboa & Yano 1987; Schäfer-Verwimp & Vital 1989; Schäfer-Verwimp 1989; Yano & Camara 2004; Yano & Mello 1992; Zartman & Ackerman 2002; Zartman & Ilkiu-Borges 2007). Recent field work in Amazonian mountains of northern Brazil

has furthermore resulted in new country records (Costa 2017; Costa *et al.* 2017; Ellis *et al.* 2015) as well as new species descriptions (Bastos & Zartman 2016; Bastos *et al.* 2016).

The aim of this paper is to register new country and state records from the Brazilian Amazon.

Material and Methods

Here we studied recent bryophyte collections from various localities in northern Brazil and present a list of new records for the Brazilian Amazon.

The specimens were haphazardly collected at the remote tepui complexes of Serra da Mocidade (Roraima, Brazil), Pico da Neblina (Amazonas, Brazil), Serra do Aracá (Amazonas, Brazil) and the ancient volcanic plugs of Morro dos Seis Lagos (Amazonas, Brazil). The expedition to Serra Aracá took place during September of 2014, while to Morro dos Seis Lagos was during September of 2011. The samples from the Serra da Mocidade were collected during a large interdisciplinary expedition. The samples from Pico da Neblina consisted in specimens already deposited in the INPA herbarium. For each locality the specific site coordinates are given in the species collecting

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information. All specimens are deposited at the herbarium of the National Institute for Amazonian Research (INPA).

The new records are listed in alphabetical order, and global and Brazilian distributions are given for all species. In some special cases additional taxonomic notes are included when deemed necessary. New country records are marked with (**). Unless otherwise cited, bryophyte distributions for Brazil are based on information found in the Brazilian List of Bryophytes (Costa DP & Peralta DF 2017).

Results

Marchantiophyta

1. ***Bazzania bidens* (Gottsche & Lindenb.) Trevis.

Distributed in scattered localities from the West Indies to northern South America specifically in the highlands of Puerto Rico, Guadalupe, Dominica, Martinique, Colombia, Venezuela, French Guiana and Peru (Bischler 1962a; Fulford 1963).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epifito, 1°72'11.9"S, 61°76'48"W, 2.II.2016, *M.H. Terra-Araujo 1276*.

2. *Bazzania roraimensis* (Steph.) Fulford

Found from the Caribbean (Jamaica, Puerto Rico), Central America to northern South America (Colombia, Guiana and Brazil) with a disjunction to southern Brazil (Bischler 1962a; Fulford 1963; Dauphin 2007). Brazil: RR; SP.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, Epiphyte, 0°51'32.7"N, 63°20'1.5"W, Alt 600 m, 24.VIII.2014, *C.E. Zartman 9722*.

3. *Ceratolejeunea rubiginosa* Steph.

Known from the Caribbean, Central (Costa Rica) and South America (Brazil and Colombia) (Bernal *et al.* 2015; Dauphin 2003; Gradstein & Costa 2003). Brazil: PA; RJ.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, On rock, 0°51'32.7"N, 63°20'01.5"W, Alt 600 m, 24.VIII.2014, *C.E. Zartman 9721*.

4. ***Ceratolejeunea spinosa* (Gottsche, Lindenb. & Nees) Steph.

Known from the Caribbean, Central (Costa Rica and Panama) and northern South (Columbian Chocó and western and eastern flanks of Andes) America (Dauphin 2003). *Ceratolejeunea spinosa* is known from open environments in wet submontane forests at middle elevations (Dauphin 2003).

The voucher of this species putatively reported from Amazonas (Lisboa & Yano 1987) was misidentified. The sample (W.R. Buck 3170 /INPA!) has leaf margins with unicellular teeth, and is a small monoicous plant: features which correspond to *Ceratolejeunea coarina* (Gottsche) Schiffn. rather than *C. spinosa*.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte, 1°72'11"S, 61°76'48"W, 1.II.2016, *M.H. Terra-Araujo 1265*; Epiphyte, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1222, 1224*; Epiphyte, 1°70'75.1"S, 61°79'12"W, 31.I.2016, *M.H. Terra-Araujo 1245*.

5. *Cheilolejeunea lineata* (Lehm. & Lindenb.) Steph.

Widespread in the Neotropics from the West Indies, Central and northern South America (Bernal *et al.* 2015; Dauphin *et al.* 2008; Gradstein & Ilkiu-Borges 2009, and southeastern Brazil (Gradstein & Costa 2003). Brazil: SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte on tree, 1°71'40.5"S, 61°80'49"W, 29.I.2016, *M.H. Terra-Araujo 1217*; Epiphyte, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1226*.

6. *Cololejeunea microscópica* var. *africana* (Pócs) Pócs & Bernecker.

A pantropical species widely distributed in America and Africa (Gradstein & Costa 2003; Pócs & Bernecker 2009). Brazil: MG; RJ; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyllous on *Pyrrhobryum spiniforme* (Hedw.) Mitt, 1°70'75.1"S, 61°79'12"W, 31.I.2016, *M.H. Terra-Araujo 1244*.

7. *Cololejeunea winkleri* (Morales & Bernecker) Bernecker & Pócs.

Known from Costa Rica, French Guiana, Surinam, and Brazil (Gradstein & Costa 2003; Pócs & Bernecker 2009). *Cololejeunea winkleri* was collected along the upper Rio Negro (São Gabriel da Cachoeira) by Schuster in 1979. It is a common epiphyllous species in the central Amazon (Zartman & Ilkiu-Borges 2007) Brazil: PA.

Material examined: AMAZONAS: São Gabriel da Cachoeira, Serra Curicuriari, from Igarapé Arabú on Rio Curicuriari to summit, 2°0'S, 66°5'W, alt. 450 m, 9.VII.1979, *R.M. Schuster 79.15.779* (INPA!).

8. *Colura greig-smithii* Jovet-Ast

Scattered throughout the Neotropics (Mexico, Colombia, Surinam, French Guiana, Brazil, Venezuela, Cuba and Trinidad) (Gradstein & Costa

2003). Brazil: AM; MT; PE; SP; PA (Alvarenga *et al.* 2007).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1221*.

9. *Colura tortifolia* (Nees & Mont.) Steph.

Reported from tropical America (Gradstein & Costa 2003). Brazil: AC; PA; PE; SP.

Material examined: AMAZONAS: Manaus, PDBFF, Reserva de 1 ha, Q-20, Fazenda Porto Alegre, Epiphyll, 2°24'0"S, 59°43'0"W, 18.VII.2016, *A.M. Sierra 2053*.

10. *Cyclolejeunea convexistipa* (Lehm. & Lindenb.) A. Evans.

Widespread in tropical America (Gradstein & Costa 2003). Brazil: AL; AM; AP; BA; CE; MA; PA; PE; RJ; RN; RO; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1229*; Epiphyll, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1221*.

11. *Diplasiolejeunea brunnea* Steph.

Tropical America (Gradstein & Costa 2003). Brazil: AC; AL; AM; BA; CE; ES; MT; PA; RJ; RO; SC; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'75.1"S, 61°79'12"W, 31.I.2016, *M.H. Terra-Araujo 1250*.

12. *Drepanolejeunea inchoata* (Meissner) Schiffn.

Widespread in tropical America. Brazil: CE; RJ.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'75.1"S, 61°79'12"W, 31.I.2016, *M.H. Terra-Araujo 1250*.

13. *******Drepanolejeunea infundibulata* (Spruce)

A. Evans.

Scattered in the Neotropics from Central America, the West Indies to Ecuador (Bischler 1967).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1221*.

14. *Drepanolejeunea crucianella* (Taylor) A. Evans.

Tropical America. Brazil: AM; PA.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1221*.

15. *Frullania apiculata* (Reinw., Blume & Nees) Dumort.

Pantropical (Gradstein & Costa 2003). Brazil: AM; BA; DF; GO; MS; PA; PE; RJ; SC; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte on branch, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo 1227*.

16. *Frullania setigera* Steph.

Scattered throughout the Neotropics from Mexico, Guatemala, Costa Rica, Panama, Trinidad, Brazil, Colombia, to Ecuador (Stotler 1969; Fulford & Sharp 1990; Benitez *et al.* 2012; Gradstein & Uribe-M. 2011; Schäfer-Verwimp 2014). Brazil: ES; MG; PR; RJ; RS; SC; SP.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, on rotten log, 0°51'32.7"N, 63°20'01.5"W, Alt 800 m, 24.VIII.2014, *C.E. Zartman 9718*.

17. *Harpalejeunea tridens* (Besch. & Spruce) Steph.

Known from the West Indies, Panama, northern South America and southeastern Brazil (Gradstein & Costa 2003; Schäfer-Verwimp 2014). Brazil: SP; AL; BA (Alvarenga *et al.* 2008; Bastos & Valente 2008).

Material examined: RORAIMA: Caracará, Serra da Mocidade, growing over *Leucobryum sp.* on rock, 1°71'40.5"S, 61°80'49"W, 29.I.2016, *M.H. Terra-Araujo 1214*; Epiphyte 1°71'40.5"S, 61°80'49"W, 29.I.2016, *M.H. Terra-Araujo 1217*; Epiphyte on small branch, 1°70'76.8"S, 61°79'06"W, 31.I.2016, *M.H. Terra-Araujo 1243*.

18. *Lepidozia cupressina* (Sw.) Lindenb.

A cosmopolitan species distributed from tropical Americas to Africa, and Western Europe (Gradstein & Costa 2003; Gradstein 2013). This new current record in Roraima, a disjunction of more than 2,000 km suggests that this species may be more widely spread in Brazil than presently recognized Brazil: BA; PE; RJ; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte on rotten log, 1°72'11.9"S, 61°76'48"W, 1.II.2016, *M.H. Terra-Araujo 1274*.

19. *Lejeunea controversa* Gottsche.

Widely distributed in tropical America (Reiner-Drewald & Goda 2000). Brazil: AC; AL; BA; MS; PA; PE; RJ; SP.

Material examined: AMAZONAS: São Gabriel da Cachoeira, Reserva Biológica Morro dos Seis Lagos, Rheophyte, small creek immediately downstream of Igarapé Yá Mirim basecamp, 31.VIII.2011, *C.E. Zartman 8731, 8727, 8719*.

20. *Leptolejeunea convexistipa* Bischl.

From Central (Costa Rica and Panama) to South (Brazil and Ecuador) America (Gradstein & Costa 2003; Schäfer-Verwimp 2014). Brazil: AM; RJ.

All *Leptolejeunea* with toothed margins and asymmetrical leaves were treated by Gradstein & Costa (2003) as *L. maculata* (Mitt.) Schiffn. based on synonymies proposed by Grolle (1976). Heinrichs *et al.* (2014) concluded that the *L. maculata* complex is composed of several valid species including *L. convexistipa* (Bischler 1969).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyll, 1°70'75.1"S, 61°79'12"W, 31.I.2016. *M.H. Terra-Araujo 1250*.

21. *Leptolejeunea tridentata* Bischl.

Known from western Colombia and Brazil (Bischler 1969; Gradstein & Costa 2003). Brazil: PA. It is a very common epiphyllous species known from Pará (Ilkiu-Borges & Lisboa 2002), and Amazonas (Zartman & Ilkiu-Borges 2007) states. Vouchers from the latter publication are now cited in this paper.

Material examined: AMAZONAS: Manaus, PDBFF, Reserva de 100 ha, Q-43, Fazenda Dimona, Epiphyll, 2°24'0"S, 59°43'0"W, 7.IX.2000, *C.E. Zartman 2176, 2175*; Reserva Florestal, pelas trilhas, Epiphyll, 15.VIII.2000, *C.E. Zartman 1822, 1825*; Fazenda Gavião, km 25, Epiphyll, 21.VIII.2000, *C.E. Zartman 1906*; Epiphyll on leaves of Melastomataceae, 21.VIII.2000, *C.E. Zartman 1913*.

22. *Micropterygium duidae* Reimers.

Known from Venezuela and Ecuador. This is a rare Neotropical species known only from the Guyana highlands of Venezuela (Fulford 1966; Rico & Pócs 2004), and the Cerro Plateado of the Ecuadorian Andes (Ellis *et al.* 2014).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte on rotten log, 1°71'84.3"S, 61°75'37"W, 2.II.2016, *M.H. Terra-Araujo 1285*. AMAZONAS: Barcelos, Serra do Aracá, on rocky seeps, 0°52'4.1N, 63°19'56.4"W, 23.VIII.2014, *C.E. Zartman 9691*.

23. *Micropterygium grandistipulum* Steph.

Known only from a few scattered collections in northern South America (Venezuela and Guiana) (Fulford 1966). This species is easily recognized by its leafy, isophyllous shoots which vary from lanceolate to acute and/or acuminate leaves and underleaves (Fulford 1966; Schuster 2000). Further

records are expected for the state of Roraima (Reimers 1933; Gradstein & Costa 2003).

Material examined: AMAZONAS: Santa Isabel do Rio Negro, Pico da Neblina, on soil, IX.2011, *M. Pombo MmP 9/1142*.

24. *Mnioloma cyclostipum* (Spruce) R.M. Schust.

Known from the tropical Andes, Central America, Guyana highlands, and southeastern Brazil (Bischler 1962b; Fulford 1968). The current record in northern Brazil represents a long-range disjunction suggesting a continuous distribution from Amazonia to the Brazilian Atlantic Rainforests. Brazil: MG; RJ.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte, 1°72'11.9"S, 61°76'48"W, 2.II.2016, *M.H. Terra-Araujo 1279*.

25. *Stictolejeunea balfourii* (Mitt.) E.W. Jones.

Pantropically distributed. This species has probably been overlooked in the Neotropics (Gradstein 1994). Brazil: AC; PA (Garcia *et al.* 2014).

Material examined: AMAZONAS: São Gabriel da Cachoeira, Reserva Biológica Morro dos Seis Lagos, rheophyte on rock, small creek immediately downstream of Yá-Mirim basecamp, 31.VIII.2011, *C.E. Zartman 8702*.

Bryopkyta**26. *Campylopus bryotropii* J.-P. Frahm.**

Known from northern South America (Venezuela, Colombia and Peru) (Frahm 1991). This species is found commonly above 3,500 m usually growing on rocks and boulders, as an occasional epiphyte. According to Frahm (1991) it is an Andean element that should probably occur in Ecuador and Costa Rica. This is its first record for Brazil.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte, 1°71'84.3"S, 61°75'37"W, 3.II.2016, *M.H. Terra-Araujo 1315*.

27. *Campylopus cubensis* Sull.

Known from the Caribbean, Central and northern South America (Venezuela, Guyana, Surinam, French Guyana) (Frahm 1991). This species is commonly found between 500–2,000 m altitude on soil, rotten wood and base of trees of tropical montane forests.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, on soil, 0°52'04.1N, 63°19'56.5W, 22.VIII.2014, *M.R. Pereira 420*.

28. *Campylopus julicaulis* Broth.

Prior to this publication the species was only known from the Atlantic Forest in Brazil (Frahm 1991). It is found commonly between 500 and 2,000 m altitude on soil, rotten wood and base of trees in tropical forest. Brazil: BA; MG; PR; RJ; RS; SC; SP.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, 0°52'4.1"N, 63°19'56.5"W, 22.VIII.2014, *M.R. Pereira* 406, 420.

29. *Leucobryum albicans* Schwägr.

This is a widespread Brazilian endemic which usually occurs on moist soil or tree bases. Brazil: BA; CE; DF; ES; MG; MT; PA; PE; PR; RJ; RS; SC; SP.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, on soil, 0°52'04.1"N, 63°19'56.5"W, 22.VIII.2014, *M.R. Pereira* 412, 419; on soil, 0°22'19.0"N, 63°21'10.6"W, 22.VIII.2014, *M.R. Pereira* 528, 534.

30. *Leucobryum albidum* Brid.

This widespread species was not registered in the past in Yano (2011) nor in Costa & Peralta (2015), however it is quite common in the Amazon. Brazil: BA; DF; ES; GO; MA; MG; MT; PA; PE; PR; RJ; RO; RS; SC; SP; TO.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, Epiphyte, 0°52'4.1"N, 63°19'56.5"W, 22.VII.2014, *M.R. Pereira* 432, 430, 435; Epiphyte, 0°22'19.0"N, 63°21'10.6"W, 25.VIII.2014, *M.R. Pereira* 499, 530; Epiphyte, 24.VIII.2014, *M.R. Pereira* 453, 490.

31. *Leucobryum bowringii* Mitt.

Widespread in Asia (Yamaguchi 1993), but rare in the Neotropics in Mexico, Costa Rica and the Caribbean (Jamaica) (Sharp *et al.* 1994). Brazil: RO; RJ (Yano 1982; Yano 2011).

This is a rare species which occurs on moist soil and cliffs in cloud forests from 600–750 m (Frahm 1991). The species was registered for Roraima (Yano 1982), and mentioned in the catalogue of Brazilian bryophytes (Yano 2011). Even though this species was included in the Flora of Brazil (2011) it was not included in Costa & Peralta (2015). We examined the specimen registered from Roraima state (Prance *et al.* 21595 INPA!) and this one (Amazonas), and compared it with the original description from Asian material (Yamaguchi 1993) confirming this record.

Material examined: AMAZONAS: Barcelos, Serra do Aracá, On soil, 0°52'4.1"N, 63°19'56.5"W, 22.VIII.2014, *M.R. Pereira* 421.

32. *Pilotrichella flexilis* (Hedw.) Ångstr.

Pantropical. Pendent on tree branches at mid elevations. Brazil: AP; BA; ES; MG; MS; MT; PE; PR; RJ; RS; SC; SP.

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte on branch, 1°70'79.9"S, 61°78'51"W, 30.I.2016, *M.H. Terra-Araujo* 1227, Epiphyte, 1°70'71.1"S, 61°78'58"W, 5.II.2016, *M.H. Terra-Araujo* 1323.

33. *Rhacocarpus purpurascens* (Brid.) Paris.

Pantropical. A common and widespread species in the southern hemisphere, predominantly occurring in open montane to paramo and puma, ca. 500–4,600 m (Allen 2010). Brazil: ES; MG; RJ; PA; SC; RS.

Material examined: AMAZONAS: Santa Isabel do Rio Negro, Pico da Neblina, on rock, IX.2011, *M. Pombo* MP 9/1120, MP9/1121, MP9/1119.

34. *Syrrhopodon prolifer* var. *cincinatus* (Hampe) W.D. Reese.

Central America, Caribbean, Western and Northern South America. Usually on rotten log, tree, rock, in forest at mid elevations, to 1,400 m. Brazil: AM; SP (Reese 1993).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte, 1°71'84.3"S, 61°75'37"W, 3.II.2016, *M.H. Terra-Araujo* 1318; AMAZONAS: Barcelos, Serra do Aracá, Epiphyte on tree base, 0°52'4.1"N, 63°19'56.5"W, Alt 700 m, 24.VIII.2014, *M.R. Pereira* 454.

35. *Syrrhopodon prolifer* var. *prolifer* Schwägr.

Pantropical. Found on tree trunks and bases, roots stumps, humus, in forests to ca. 2,000 m. Brazil: AL; AM; AP; BA; CE; DF; ES; GO; MG; MT; PA; PE; PI; PR; RJ; RO; RS; SC; SE; SP; TO SP (Reese 1993).

Material examined: RORAIMA: Caracará, Serra da Mocidade, Epiphyte, 1°71'84.3"S, 61°75'37"W, 30.I.2016, *M.H. Terra-Araujo* 1231.

36. *Syrrhopodon prolifer* var. *tenuifolius* (Sull.) W.D. Reese.

Tropical America. Occurring on tree stumps, logs, soil, humus in forests above 1000–2,300 m. Brazil: BA; ES; MG; RJ; SP; RS; SC. The present record may indicate a continuous distribution from northern South America to southern Brazil for this species (Reese 1993).

Material examined: AMAZONAS: Barcelos, Serra do Aracá, on rotten log, 0°52'4.1"N, 63°19'56.5"W, alt 700 m, 24.VIII.2014, *M.R. Pereira* 498.

Discussion

In the present paper, we report a total of 38 new records, including 35 species and four varieties. The new records represent seven species new for Brazil (five liverworts and two mosses), 20 new state records from Roraima (16 spp. of liverworts and three spp. and two varieties of mosses) and 18 from Amazonas (10 spp. of liverworts and seven spp. and two varieties of mosses). Among the records, 16 species and one variety are entirely new to the Brazilian Amazon (Tab. 1 and Tab. 2). The genus *Rhacocarpus* is herein first recorded for the Brazilian Amazon, and the genera *Pilotrichella* and *Mnioloma* are herein first recorded for the state of Roraima.

Among the taxa cited above *Bazzania bidens*, *B. roraimensis*, *Ceratolejeunea rubiginosa*, *C. spinosa*, *Cheilolejeunea lineata*, *Cololejeunea microscopica* var. *africana*, *Colura greig-*

smithii, *C. tortifolia*, *Cyclolejeunea convexistipa*, *Diplasiolejeunea brunnea*, *Drepanolejeunea crucianella*, *D. infundibulata*, *Frullania apiculata*, *Harpalejeunea tridens*, *Lepidozia cupressina*, *Lejeunea controversa*, *Mnioloma cyclostipum*, *Campylopus bryotropii*, *C. cubensis*, *Leucobryum albicans*, *L. albidum*, *Pilotrichella flexilis*, *Syrrhopodon prolifer* var. *cincinatus*, *S. prolifer* var. *prolifer* and *S. prolifer* var. *tenuifolius* were previously registered from adjacent regions and were expected to occur in northern Brazil. However, the new distributional record of *L. cupressina* confirm large distributional extensions suggesting that this taxon is either widely disjunct to the Amazon Region or more continuously widespread than previously registered (Gradstein & Costa 2003). Increased collection efforts in northern South America is necessary to better understand the geographic distributions of such apparently disjunct taxa.

Table 1 – New liverwort taxa records for the Brazilian Amazon forest

<i>Bazzania bidens</i>
<i>Ceratolejeunea spinosa</i>
<i>Cheilolejeunea lineata</i>
<i>Cololejeunea microscopica</i> var. <i>africana</i>
<i>Drepanolejeunea inchoata</i>
<i>Drepanolejeunea infundibulata</i>
<i>Frullania setigera</i>
<i>Harpalejeunea tridens</i>
<i>Lepidozia cupressina</i>
<i>Micropterygium duidae</i>
<i>Micropterygium grandistipulum</i>
<i>Mnioloma cyclostipum</i>

Table 2 – New mosses taxa records for the Brazilian Amazon forest

<i>Campylopus bryotropii</i>
<i>Campylopus arctocarpus</i>
<i>Campylopus cubensis</i>
<i>Campylopus julicaulis</i>
<i>Rhacocarpus purpurascens</i>
<i>Syrrhopodon prolifer</i> var. <i>tenuifolius</i>

The state records for Roraima in proportion to the samples studied (43% resulted in new occurrences) illustrate an exceptionally high ratio of distributional novelties. Many of these taxa are indeed common and widespread (*Cyclolejeunea convexistipa*, *Colura greig-smithii*, *Drepanolejeunea inchoata*, *Diplasiolejeunea brunnea*, and *Frullania apiculata*) in neighboring states. Nonetheless, noteworthy (*Bazzania bidens*, *Ceratolejeunea spinosa*, *Drepanolejeunea infundibulata*, *Micropterygium duidae* and *Campylopus bryotropii*) as well as recently described species from these same sites (Bastos *et al.* 2016) suggest that continued investment in bryophyte surveys of northern Brazilian should continue to result in numerous taxonomic and floristic novelties.

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