

NEW RECORDS OF BRYOPHYTES FOR THE STATE OF PARANÁ, BRAZIL

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Abstract

The aim of this study was to complete the species list and disseminate data regarding the diversity of bryophytes in the state of Paraná, Brazil. We registered 203 species of bryophytes (98 liverworts and 105 mosses) as new records for Paraná, seven of which represent the second records for Brazil.

Key words: bryophytes, new records, geographical range

Resumo

O objetivo deste estudo foi completar a lista das espécies e disseminar informações sobre a diversidade das briófitas do estado do Paraná, Brasil. Foram registradas 203 espécies de briófitas (98 hepáticas e 105 musgos) como novos registros para o Paraná, sete deles representam o segundo registro brasileiro.

Palavras chave: briófitas, novos registros, distribuição geográfica.

Introduction

Paraná state is located in south Brazil (199.307,922 km², IBGE, 2013), is covered by Atlantic forest and its ecosystems: Dense Shad Forest, Mixed Shad Forest, Decidual Intermittent Forest and Semi Decidual Intermittent Forest, as well as Cerrado (IAP 2013). The Köppen classification of the weather is Cfa (subtropical) and Cfb (temperate) (IAPAR 2013).

João Angely started the bryophyte study in this state 60 years ago and published the papers "Musgos paranaenses: Contribuição para o Estudo e Conhecimento da Flora Bryológica do Paraná" (Angely, 1961) and "Bryophytos Paranaenses, in Flora Analítica do Paraná" (Angely, 1965, 1968); these works listed 38 families, 112 genera and 233 bryophyte species.

In the 70 years seven volumes of "Musgos Sul-Brasileiros" have been published by Aloysio Sehnem (1969, 1970, 1972, 1976, 1978, 1979, 1980) with several records from Paraná.

Kummrow & Prevedello (1982) listed 190 species in 31 families housed in the MBM herbaria.

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Recent papers include floristic lists (Hirai, 1996; Hirai *et al.*, 1998; Yano & Colletes, 2000), notes of new records (Schäfer-Verwimp 1989, 1996; Schäfer-Verwimp & Vital 1989, Yano, 1992; Gradstein *et al.* 1993; Schäfer-Verwimp & Giancotti 1993; Ellis *et al.*, 2012; Schäfer-Verwimp *et al.* 2012); and works covering the whole country including the Paraná state, "A checklist of Brazilian mosses" (Yano, 1981, 1989, 1995, 2006, 2010).

The Brazilian plant list cited 1.521 species for Brazil, 469 species for Paraná state in 216 genera and 83 families (Forzza *et al.*, 2010). Yano (2013, 2014) published a bryophyte species list for Paraná with 706 species in 242 genera and 85 families (6 Anthocerotophyta, 191 Marchantiophyta and 486 Bryophyta), based on literature reports; however, the author did not mention the original publication citation, few species on the list have *voucher*; this way it is a very problematic list and does not follow the recommendations proposed for checklists (Koponen *et al.*, 1998; Koponen *et al.*, 2003), and are missing several species, as, p.eg. *Dicranolejeunea axillaris* (Nees & Mont.) Schiffner, first occurrence to Brazil cited to Paraná state (Ellis *et al.*, 2012).

The Paraná state is the type locality of six currently valid taxa: *Campylopus occultus* Mitt., *Frullania paranensis* Steph., *Sphagnum atroligneum* H.A. Crum, *Sphagnum crumii* Schäf.-Verw., *Sphagnum paranense* H.A. Crum, *Syrrhopodon stenophyllus* Sehnem and the paratype locality of *Cheilolejeunea caducifolia* (Gradst. & Schäfer-Verwimp) W.Ye & R.L. Zhu (Gradstein *et al.*, 1993).

Material and methods

We analyzed specimens from collections deposited in the CBRV, IRAI, JE, MBM and SP herbarium (IH 2015), as well as specimens collected in several field trips from areas not explored; we analysed 1.500 samples. For identification we used Gradstein & Costa (2003), Vaz & Costa (2008) and Sharp *et al.* (1994). The classification systems follow Crandall-Stotler *et al.* (2009) to Marchantiophyta and Goffinet & Buck (2004) to Bryophyta.

Results and discussion

There are few works covering large areas of the state, and more field work and study of herbarium specimens are necessary to reach a more complete inventory of the bryophyte flora. We present a list of 203 new records in alphabetical order of families, genera and species (Table 1 and Table 2).

We are listing 98 liverworts (Table 1) and 105 mosses (Table 2), representing an increase of 29 % for the bryophyte flora of Paraná state, seven of these endemic to Brazil (*Callicostella apophysata*, *Campylopus gemmatus*, *Drepanolejeunea grollei*, *Holomitrium nitidum*, *Lejeunea cristulata*, *Lejeunea oligoclada* and *Leucoloma triforme*). *Drepanolejeunea grollei* was so far known only from the type collections from Minas Gerais and it is the second citation to Brazil.

After check of the "Lista da Flora Brasileira Ameaçada de Extinção", "The IUCN Red List of Threatened Species" and "Livro Vermelho das Espécies

Vegetais Ameaçadas do Estado de São Paulo” there is not threatened species knowledge to Paraná state (CRIA, 2013).

Updated inferences on the composition and biogeography of bryophytes in southern Brazil are probably inconsistent because this is not a systematic survey. Therefore, additional surveys in the biomes of the region should be carried out in order to properly evaluate the community of bryophytes in the state.

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Table 1. List of new liverworts records for the state of Paraná (* new record to Brazil ** endemic to Brazil)

Family	Taxon	Municipality	Altitude	Voucher
Adelanthaceae	<i>Pseudomarsupidium decipiens</i> (Hook.) Grolle	Morretes	1400	Ristow, R. & Ferreira, W.T. 2803 (CBRV, IRAI, SP)
Aneuraceae	<i>Aneura pinguis</i> (L.) Dumort.	Colombo	990	Ristow, R. & Ristow, N.R. 1452 (CBRV, IRAI, MBM, SP)
	<i>Riccardia fucoidea</i> (Sw.) Schiffn.	Campina Grande do Sul	1600	Lozano, E.D. & Larocca, P. 1346 (CBRV)
	<i>Riccardia glaziovii</i> (Spruce) Meenks	Morretes	840	Ristow, R. et al. 3032 (CBRV, IRAI)
	<i>Riccardia metzgeriiformis</i> (Steph.) Schiffner	Morretes	340	Ristow, R. et al. 1116 (CBRV, IRAI)
Balantiopsidaceae	<i>Isotachis multiceps</i> (Lindenb. & Gottsche) Gottsche	Morretes	1400	Ristow, R. & Ferreira, W.T. 2810 (CBRV, IRAI, SP)
	<i>Neesioscyphus argillaceus</i> (Nees) Grolle	Ortigueira	750	Cordeiro, J. et al. 2501 (CBRV, IRAI, MBM)
	<i>Neesioscyphus bicuspidatus</i> (Steph.) Grolle	Tibagi	1220	Schäfer-Verwimp & Verwimp 15144 (JE, SP)
Calypogeiaceae	<i>Calypogeia laxa</i> Gottsche & Lindenb.	Morretes	490	Ristow, R. & Ristow, N.R. 1311 (CBRV, IRAI, SP)
	<i>Calypogeia peruviana</i> Nees & Mont.	Lapa	830	Ristow, R. & Santos, E.L. dos 3732 (CBRV, SP)
	<i>Calypogeia subintegra</i> (Gottsche, Lindenb. & Nees) Bischl.	Palmeira	880	Schäfer-Verwimp & Verwimp 15178 (JE, SP)
Cephaloziaceae	<i>Fuscocephaloziopsis crassifolia</i> (Lindenb. & Gottsche) Vána & L.Söderstr.	Morretes	1400	Ristow, R. & Ferreira, W.T. 2820 (CBRV, IRAI)
	<i>Odontoschisma variable</i> (Lindenb. & Gottsche) Trevis.	Morretes	700	Ristow, R. & Ferreira, W.T. 2906 (CBRV, IRAI)
Cephaloziellaceae	<i>Cylindrocolea rhizantha</i> (Mont.) R. M. Schust.	Cambará	448	Ristow, R. et al. 3416 (CBRV)
Fossombroniaceae	<i>Fossombronia porphyrorhiza</i> (Nees) Prosk.	Tibagi	970	Ristow, R. & Villagra, B.L.P. 4123 (CBRV, IRAI)
Frullaniaceae	<i>Frullania kunzei</i> (Lehm.) Lehm. & Lindenb.	Prudentópolis	780	Ristow, R. & et al. 3257 (CBRV, IRAI, SP)
	<i>Frullania lindmanii</i> Steph.	Rio Negro	780	Schäfer-Verwimp & Verwimp 10450 (JE, SP)
	<i>Frullania vitalii</i> Yuzawa & Hatt.	Antonina	5	Ristow, R. & Ferreira, W.T. 1521 (CBRV, IRAI, MBM, SP)
Herbertaceae	<i>Herbertus acanthelius</i>	Capivari	1550	Schäfer-Verwimp, A.

Family	Taxon	Municipality	Altitude	Voucher
Jungermanniaceae	Spruce	Grande		<i>et al.</i> 33903 (JE, SP)
	<i>Herbertus bivittatus</i>	Antonina	1563	Ristow, R. <i>et al.</i> 1588 (CBRV, IRAI, SP)
	Spruce			Ristow, R. & Ristow, N.R. 1458 (CBRV, IRAI, SP)
	<i>Solenostoma sphaerocarpum</i> (Hook.) Steph.	Colombo	960	Ristow, R. & Villagra, B.L.P. 4198 (CBRV)
Lejeuneaceae	<i>Acanthocoleus trigonus</i> (Nees & Mont.) Gradst.	Realeza	440	Ristow, R. & Villagra, B.L.P. 3091 (CBRV)
	<i>Archilejeunea parviflora</i> (Nees) Schiffn.	Guamiranga	680	Schäfer-Verwimp, A. <i>et al.</i> 33895 (JE, SP)
	<i>Blepharolejeunea incongrua</i> (Lindenb. & Gottsche) Slageren & Kruijt	Capivari Grande	1550	Schäfer-Verwimp, A. <i>et al.</i> 33965 (JE, SP)
	<i>Brachiolejeunea phyllorhiza</i> (Nees) Kruijt & Gradst.	Antonina	260-290	Schäfer-Verwimp, A. <i>et al.</i> 33995 (JE, SP)
	<i>Ceratolejeunea laetefusca</i> (Austin) R.M.Schust.	Antonina	260-290	Ristow, R. & Ferreira, W.T. 2889 (CBRV, IRAI, SP)
	<i>Cheilelejeunea acutangula</i> (Nees) Grolle	Morretes	700	Schäfer-Verwimp, A. <i>et al.</i> 33991 (JE)
	<i>Cheilelejeunea aneogyna</i> (Spruce) A.Evans	Antonina	290	Ristow, R. & Ristow, N.R. 1468 (CBRV, IRAI, SP)
	<i>Cheilelejeunea conchifolia</i> (A.Evans) W.Ye & R.L.Zhu	Colombo	980	Ristow, R. & Ristow, N.R. 1326 (CBRV, IRAI)
	<i>Cheilelejeunea discoidea</i> (Lehm. & Lindenb.) Kachr. & R.M.Schust.	Colombo	980	Ristow, R. & Santos, E.L. dos 3714 (CBRV)
	<i>Cheilelejeunea insecta</i> Grolle & Gradst.	Lapa	855	Ristow, R. <i>et al.</i> 3107 (CBRV, IRAI)
	<i>Cololejeunea camillii</i> (Lehm.) A.Evans	Prudentópolis	790	Peretto, E. <i>et al.</i> 07 (CBRV, DVPR)
	<i>Cololejeunea diaphana</i> A.Evans	Dois Vizinhas	480	Ristow, R. <i>et al.</i> 2417 (CBRV, IRAI)
	<i>Cololejeunea gracilis</i> (Ast) Pócs	Quatro Barras	1430	Ristow, R. <i>et al.</i> 4208 (CBRV)
	<i>Cololejeunea minuscula</i> Pócs	Morretes	380	Schäfer-Verwimp & Verwimp 9310 (JE, SP)
	<i>Cololejeunea papilliloba</i> (Steph.) Steph.	Foz de Iguaçu	160	Schäfer-Verwimp & Verwimp 15210/B (JE, SP)
	<i>Cololejeunea paucifolia</i> (Spruce) Bernecker & Pócs	Lapa	1000	Schäfer-Verwimp, A. <i>et al.</i> 34008/A (JE)
	<i>Colura greig-smithii</i> Ast	Antonina	280	Schäfer-Verwimp, A. <i>et al.</i> 33887 (JE)
	<i>Colura tenuicornis</i> (A.Evans) Steph.	Capivari Grande	1320	Silva, A.F. <i>et al.</i> s.n. (CBRV, IRAI)
	<i>Cyclolejeunea luteola</i> (Spruce) Grolle	Quatro Barras	1406	Schäfer-Verwimp, A.
	<i>Diplasiolejeunea</i>	Antonina	280	

Family	Taxon	Municipality	Altitude	Voucher
	<i>brunnea</i> Steph.			<i>et al.</i> 33989 (JE, SP)
	* <i>Diplasiolejeunea</i>			
	<i>involuta</i> subsp. <i>andicola</i>	Capivari Grande	1550	Schäfer-Verwimp, A. <i>et al.</i> 33888 (JE, SP)
	Pócs			
	<i>Diplasiolejeunea</i>			
	<i>rudolphiana</i> Steph.	Antonina	250	Schäfer-Verwimp, A. <i>et al.</i> 33953/A (JE)
	<i>Drepanolejeunea</i>			
	<i>anoplantha</i> (Spruce)	Quatro Barras	1430	Ristow, R. <i>et al.</i> 2416 (CBRV, IRAI, SP)
	Steph.			
	<i>Drepanolejeunea</i>			
	<i>araucariae</i> Steph.	Morretes	1090	Ristow, R. & <i>et al.</i> 4215 (CBRV, IRAI)
	<i>Drepanolejeunea</i>			
	<i>biocellata</i> A. Evans	Lapa	888	Ristow, R. <i>et al.</i> 3000 (CBRV)
	<i>Drepanolejeunea fragilis</i>	Antonina	1563	Ristow, R. <i>et al.</i> 1600 (CBRV, IRAI, SP)
	Bischn.			
	<i>Drepanolejeunea grollei</i>			
	M.E.Reiner & Schäf.-Verw.	Pinhais	895	Picote, L.E. <i>et al.</i> 089 (CBRV)
	<i>Drepanolejeunea</i>			
	<i>orthophylla</i> Bischn.	Lapa	830	Ristow, R. & Santos, E.L. dos 3721 (CBRV)
	<i>Frullanoides tristis</i>	Curitiba	940	Ristow, N.R. 014 (CBRV, IRAI, SP)
	(Steph.) Slageren			
	<i>Harpalejeunea</i>			
	<i>oxyphylla</i> (Nees & Mont.) Steph.	Morretes	840	Lozano, E.D. <i>et al.</i> 1268 (CBRV, SP)
	<i>Harpalejeunea tridens</i>			
	(Besch. & Spruce)	Morretes	1400	Ristow, R. & Ferreira, W.T. 2827 (CBRV, IRAI, SP)
	Steph.			
	<i>Lejeunea bermudiana</i>	Prudentópolis	790	Ristow, R. <i>et al.</i> 3176 (CBRV)
	(A. Evans) R.M.Schust.			
	<i>Lejeunea calcicola</i>	Realeza	370	Ristow, R. & Villagra, B.L.P. 4066 (CBRV)
	R.M.Schust.			
	<i>Lejeunea cerina</i> (Lehm. & Lindenb.) Gottsche, Lindenb. & Nees	Lapa	970	Ristow, R. & Schenoveber, D. 1791 (CBRV, IRAI, SP)
	<i>Lejeunea controversa</i>			
	Gottsche	Morretes	900	Ristow, R. & Ferreira, W.T. 2875 (CBRV, IRAI, SP)
	** <i>Lejeunea cristulata</i>			
	(Steph.i) M.E.Reiner & Goda	Curitiba	920	Ristow, R. <i>et al.</i> 4388 (CBRV)
	<i>Lejeunea glaucescens</i>			
	Gottsche	Prudentópolis	780	Ristow, R. <i>et al.</i> 3258 (CBRV, IRAI, SP)
	<i>Lejeunea laeta</i> (Lehm. & Lindenb.) Lehm. & Lindenb.	Bocaiúva do Sul	1000	Ristow, R. <i>et al.</i> 1252 (CBRV, IRAI, SP)
	<i>Lejeunea monimiae</i>			
	(Steph.) Steph.	Colombo	980	Ristow, R. 1146 (CBRV, IRAI, SP)
	<i>Lejeunea puiggariana</i>			
	Steph.	Morretes	510	Ristow, R. & Ristow, N.R. 1322 (CBRV, IRAI)
	<i>Lejeunea sporadica</i>			
	Besch. & Spruce	Capivari Grande	1160	Schäfer-Verwimp, A. <i>et al.</i> 33869 (JE)
	<i>Lopholejeunea subfusca</i>	Pontal do Paraná	2	Ristow, R. <i>et al.</i> 1852 (CBRV, IRAI, SP)
	(Nees) Schiffn.			
	<i>Marchesinia</i>	Antonina	260-290	Schäfer-Verwimp, A.

Family	Taxon	Municipality	Altitude	Voucher
Lepicoleaceae	<i>bongardiana</i> Trevis.			et al. 33975 (JE, SP)
	<i>Microlejeunea acutifolia</i> Steph.	Pinhais	900	Ristow, R. 2999 (CBRV, IRAI, SP)
	<i>Microlejeunea epiphylla</i> Bischl.	Pontal do Paraná	2	Ristow, R. et al. 1848 (CBRV, IRAI, SP)
	<i>Microlejeunea squarrosa</i> (Steph.) Heinrichs, Schäf.-Verw., Pócs & S.Dong	Capivari Grande	1550	Schäfer-Verwimp, A. et al. 33886 (JE, SP)
	<i>Myriocoleopsis minutissima</i> (Sm.) R.L.Zhu, Y.Yu & Pócs	Colombo	980	Ristow, R. 1148 (CBRV, IRAI)
	<i>Prionolejeunea aemula</i> (Gottsche) A.Evans	Morretes	840	Ristow, R. et al. 3054 (CBRV, IRAI)
	<i>Prionolejeunea denticulata</i> (F.Weber) Schiffn.	Quatro Barras	1406	Ristow, R. et al. 4043 (CBRV, IRAI)
	<i>Stictolejeunea squamata</i> (Willd. ex F.Weber) Schiffn.	Antonina	260-290	Schäfer-Verwimp, A. et al. 33986 (JE, SP)
	<i>Xylolejeunea crenata</i> (Nees & Mont.) X.-L.He & Grolle	Colombo	980	Ristow, R. 2721 (CBRV, IRAI)
	<i>Lepicolea ochroleuca</i> (Spreng.) Spruce	Capivari Grande	1550	Schäfer-Verwimp, A. et al. 33897 (JE)
	<i>Bazzania aurescens</i> Spruce	Quatro Barras	1400	Ristow, R. et al. 2422 (CBRV, IRAI)
	<i>Bazzania nitida</i> (F.Weber) Grolle	Antonina	120	Ferreira, W.T. & Ristow, R. 012 (CBRV, IRAI)
	<i>Telaranea diacantha</i> (Mont.) Engel & Merr.	Dois Vizinhos	480	Lesbik, S.A. & et al. 2 (CBRV, DVPR)
	<i>Chiloscyphus mandonii</i> (Steph.) J.J.Engel & R.M.Schust.	Colombo	980	Ristow, R. & Ristow, N.R. 2320 (CBRV, IRAI, SP)
Lophocoleaceae	<i>Chiloscyphus liebmannianus</i> (Gottsche) J.J.Engel & R.M.Schust.	Prudentópolis	790	Ristow, R. et al. 3162 (CBRV, IRAI)
	<i>Chiloscyphus muricatus</i> (Lehm.) J.J.Engel & R.M.Schust.	Morretes	840	Ristow, R. et al. 3047 (CBRV, IRAI)
	<i>Chiloscyphus profundus</i> (Nees) J.J.Engel & R.M.Schust.	Dois Vizinhos	480	Villagra, B.L.P. et al. 914 (CBRV)
	<i>Clasmatocolea vermicularis</i> (Lehm.) Grolle	Palmeira	950	Viesser, J.A. & Machado, C.A. s.n. (CBRV, IRAI, SP)
	<i>Heteroscyphus combinatus</i> (Nees) Schiffn.	Prudentópolis	780	Ristow, R. et al. 3228 (CBRV, IRAI)
	<i>Marchantia berteriana</i> Lehm. & Lindenb.	Pinhais	900	Amaro, A.C.C. & Ristow, R. s.n. (CBRV, IRAI, SP)
	<i>Marchantia polymorpha</i> L.	Curitiba	950	Ristow, R. 1113 (CBRV, IRAI, MBM,

Family	Taxon	Municipality	Altitude	Voucher
Metzgeriaceae	<i>Metzgeria bahiensis</i> Schiffn.	Palmas	1205	SP) Ristow, R. et al. 4092 (CBRV, SP)
	<i>Metzgeria ciliata</i> Raddi	Palmas	1205	Ristow, R. et al. 4109 (CBRV, IRAI, SP)
Monocleaceae	<i>Monoclea gottschei</i> Lindb.	Bocaiúva do Sul	905	Ristow, R. et al. 2748 (CBRV, IRAI, SP)
Pallaviciniaceae	<i>Pallavicinia lyellii</i> (Hook.) S.F.Gray	Jaguariaíva	750	Ristow, R. 2243 (CBRV, IRAI, SP)
	<i>Symphyogyna podophylla</i> (Thunb.) Mont. & Nees	Morretes	840	Ristow, R. et al. 3026 (CBRV, IRAI)
Plagiochilaceae	<i>Plagiochila cristata</i> (Sw.) Lindenb.	Morretes	440	Ristow, R. & Ristow, N.R. 1285 (CBRV, IRAI)
	<i>Plagiochila disticha</i> (Lehm.) Lindenb.	Morretes	700	Ristow, R. & Ferreira, W.T. 2884 (CBRV, IRAI, SP)
	<i>Plagiochila macrostachya</i> Lindenb.	Antonina	1600	Ribas, O.S. & Dittrich, VA de O. 2189 (CBRV, IRAI, MBM, SP)
	<i>Plagiochila micropteryx</i> Gottsche	Morretes	230	Ristow, R. & Ferreira, W.T. 1134 (CBRV, IRAI, SP)
Radulaceae	<i>Radula ellioti</i> Castle	Quatro Barras	1330	Ristow, R. et al. 2380 (CBRV, IRAI, SP)
	<i>Radula gottscheana</i> Tayl.	Pinhais	900	Ristow, R. & Picote, L.E. 3552 (CBRV)
	<i>Radula schaefer-verwimpii</i> K. Yamada	Morretes	700	Ristow, R. et al. 1534 (CBRV, IRAI)
Trichocoleaceae	<i>Leiomitria flaccida</i> Spruce	Antonina	1563	Ristow, R. et al. 1581 (CBRV, IRAI, SP)
	<i>Leiomitria tomentosa</i> (Sw.) Lindb.	Quatro Barras	1406	Pauletti, J.; et al. 23 (CBRV, IRAI)

Table 2. List of new moss records for the state of Paraná (* new record to Brazil ** endemic to Brazil).

Family	Taxon	Municipality	Altitude	Voucher
Amblystegiaceae	<i>Amblystegium serpens</i> (Hedw.) Schimp.	Curitiba	960	Ristow, R. & Schenoveber, D. 1217 (CBRV, IRAI, SP)
Bartramiaceae	<i>Philonotis sphaerocarpa</i> (Hedw.) Brid.	Campina Grande do Sul	1280	Ristow, R. & Ferreira, W.T. 1505 (CBRV, IRAI, SP)
Brachytheciaceae	<i>Zelometeorium patens</i> (Hook.) Manuel	Curitiba	910	Ristow, R. & Ristow, N.R. 1751 (CBRV, IRAI, SP)
	<i>Zelometeorium recurvifolium</i> (Hornsch.) Manuel	Antonina	260-290	Schäfer-Verwimp, A. et al. 33973 (JE, SP)
Bryaceae	<i>Anomobryum filiforme</i> (Griff.) A. Jaeger	Campina Grande do Sul	800	Villagra, B.L.P. & Ristow, N.R. 680 (CBRV, IRAI)
	<i>Brachymerium acuminatum</i> Harv.	Prudentópolis	780	Ristow, R. et al. 3259 (CBRV, IRAI, SP)
	<i>Brachymerium radiculosum</i> (Schwägr.) Hampe	Quatro Barras	880	Schäfer-Verwimp, A. et al. 33951 (JE, SP)
	<i>Brachymerium systium</i> (Müll. Hal.) A. Jaeger	Curitiba	900	Briani de Paula, B. 084 (CBRV, IRAI)
	<i>Bryum apiculatum</i> Schwägr.	Realeza	375	Ristow, R. & Villagra, B.L.P. 3635 (CBRV, IRAI)
	<i>Bryum brasiliense</i> Hampe	Ampére	384	Ristow, R. & Villagra, B.L.P. 3518 (CBRV, IRAI)
	<i>Bryum caespitium</i> Hedw.	Pinhais	900	Ristow, R. 1213 (CBRV, IRAI, MBM, SP)
	<i>Bryum capillare</i> Hedw.	Realeza	440	Ristow, R. & Villagra, B.L.P. 3534 (CBRV)
	<i>Bryum densifolium</i> Brid.	Jaguariaíva	910	Ristow, R. & Briani de Paula, B. 1335 (CBRV, IRAI, SP)
	<i>Bryum dichotomum</i> Hedw.	Lapa	1010	Ristow, R. & Schenoveber, D. 1774 (CBRV, IRAI, SP)
	<i>Bryum huillense</i> Welw. & Duby	Ampére	384	Ristow, R. & Villagra, B.L.P. 3520 (CBRV, IRAI)
	<i>Rhodobryum beyrichianum</i> (Hornsch.) Müll. Hal.	Morretes	440	Ristow, R. & Ristow, N.R. 1279 (CBRV, IRAI)
	<i>Rhodobryum roseolum</i> (Müll. Hal.) Paris	Capivari Grande	1550	Schäfer-Verwimp, A. et al. 33905 (JE, SP)
	<i>Rhodobryum roseum</i>	Quatro	1400	Ristow, R. &

Family	Taxon	Municipality	Altitude	Voucher
	(Hedw.) Limpr.	Barras		Santos, E.L. dos 4303 (CBRV, SP)
Calymperaceae	<i>Syrrhopodon graminicola</i> R.S.Williams	Antonina	260-290	Schäfer-Verwimp, A. et al. 33990 (JE, SP)
	<i>Syrrhopodon ligulatus</i> Mont.	Morretes	495	Ristow, R. & Ristow, N.R. 1320 (CBRV, IRAI, SP)
Catagoniaceae	<i>Catagonium brevicaudatum</i> Müll. Hal. ex Broth.	Lapa	950-1000	Schäfer-Verwimp & Verwimp 15192 (JE, SP; Bryophyta Neotropica Exsiccata 308))
Daltoniaceae	<i>Daltonia splachnoides</i> (Sm.) Hook. & Taylor	Capivari Grande	1320	Schäfer-Verwimp, A. et al. 33875 (JE, SP)
	<i>Daltonia stenophylla</i> Mitt.	Capivari Grande	1550	Schäfer-Verwimp, A. et al. 33917 (JE)
Dicranaceae	<i>Dicranodontium brasiliense</i> Herzog	Lapa	970	Ristow, R. & Schenoveber, D. 1786 (CBRV, IRAI, SP)
	<i>Dicranella guilleminiana</i> (Mont.) Mitt.	Prudentópolis	710	Ristow, R. & et al. 3216 (CBRV, IRAI)
	<i>Dicranella lindigiana</i> Mitt.	Guaraqueçaba	15	Ristow, R. & Ferreira, W.T. 1608 (CBRV, IRAI, SP)
	<i>Dicranella varia</i> (Hedw.) Schimp.	Quatro Barras	850	Ristow, R. & Ristow, N.R. 3563 (CBRV, IRAI)
	<i>Dicranoloma billardiarei</i> (Brid.) Paris	Antonina	1470	Ristow, R. 750 (CBRV, IRAI, MBM, SP)
	<i>Dicranum frigidum</i> Müll. Hal.	Antonina	1470	Ristow, R. 749 (CBRV, IRAI, MBM, SP)
	<i>Holomitrium nitidum</i> Herzog	Morretes	1230	Ferreira, G.T. & Ferreira, W.T. 005 (CBRV, IRAI, SP)
	<i>Leucoloma cruegerianum</i> (Müll.Hal.) A. Jaeger	Morretes	440	Ristow, R. & Ristow, N.R. 1278 (CBRV, IRAI, SP)
	<i>Leucoloma serrulatum</i> Brid.	Morretes	1310	Ristow, R. & Ristow, N.R. 1310 (CBRV, IRAI)
	<i>**Leucoloma trifforme</i> (Mitt.) A. Jaeger	Morretes	700	Ristow, R. & Ferreira, W.T. 2894 (CBRV, IRAI, SP)
Ditrichaceae	<i>Ditrichum subrufescens</i> Broth.	Lapa	830	Ristow, R. & Santos, E.L. dos 3735 (CBRV, SP)
Eustichiaceae	<i>Eustichia brotheri</i> Besch. ex Broth.	Prudentópolis	780	Ristow, R. et al. 3264 (CBRV)
Fissidentaceae	<i>Fissidens angustifolius</i> Sull.	Lapa	830	Ristow, R. & Santos, E.L. dos

Family	Taxon	Municipality	Altitude	Voucher
Funariaceae	<i>Fissidens berterii</i> (Mont.) Müll.Hal.	Nova Prata do Iguaçu	275	3716 (CBRV) Ristow, R. et al. 3613 (CBRV, IRAI)
	<i>Fissidens palmatus</i> Hedw.	Salto do Lontra	400	Villagra, B.L.P. & Ristow, R. 788 (CBRV, IRAI)
	<i>Fissidens ramicola</i> Broth.	Pinhais	900	Picote, L.E. & Ristow, R. 053 (CBRV)
	<i>Fissidens taxifolius</i> Hedw.	Curitiba	930	Ristow, R. 1179 (CBRV, IRAI, SP)
	<i>Entosthodon bonplandii</i> (Hook.) Mitt.	Lapa	855	Ristow, R. & Santos, E.L. dos 3698 (CBRV)
	<i>Funaria calvescens</i> Schwägr.	Colombo	930	Ristow, R. & Ferreira, W.T. 2255 (CBRV, IRAI, SP)
	<i>Physcomitrium falcifolium</i> Müll.Hal. ex Broth.	Realeza	470	Ristow, R. & Villagra, B.L.P. 3468 (CBRV, IRAI)
Hookeriaceae	<i>Physcomitrium subsphaericum</i> Schimp.	Curitiba	895	Ristow, R. et al. 1259 (CBRV, IRAI, SP)
	<i>Hookeriopsis rubens</i> (Müll. Hal.) Broth.	Curitiba	900	Briani de Paula, B. 085 (CBRV, IRAI)
	<i>Crossomitrium epiphyllum</i> (Mitt.) Müll. Hal.	Prudentópolis	825	Ristow, R. et al. 3679 (CBRV)
Hypnaceae	<i>Mittenothamnium reduncum</i> (Schimp. ex Mitt.) Ochyra	Morretes	840	Ristow, R. et al. 3002 (CBRV, IRAI, SP)
Lembophyllaceae	<i>Orthostichella pentasticha</i> (Brid.) W.R.Buck	Realeza	370	Ristow, R. & Villagra, B.L.P. 4049 (CBRV, SP)
Leucobryaceae	<i>Orthostichella welwitschii</i> (Duby) B.H.Allen & Magill	Lapa	960	Ristow, R. & Schenoveber, D. 1793 (CBRV, IRAI, SP)
	<i>Bryohumbertia filifolia</i> (Hornsch.) J.-P. Frahm	Morretes	532	Ristow, R. et al. 1870 (CBRV, IRAI, SP)
	<i>Campylopus anderssonii</i> (Müll. Hal.) A. Jaeger	Quatro Barras	1330	Ristow, R. et al. 2363 (CBRV, IRAI, SP)
	<i>Campylopus capitatus</i> E.B.Bartram	Curitiba	920	Ristow, R. 1182 (CBRV, IRAI, SP)
	<i>Campylopus carolinae</i> Grout.	Jaguariaíva	895	Ristow, R. et al. 1398 (CBRV, IRAI)
	<i>Campylopus dichrostis</i> (Müll.Hal.) Paris	Realeza	440	Ristow, R. & Villagra, B.L.P. 3527 (CBRV)
	<i>Campylopus flexuosus</i> (Hedw.) Brid.	Antonina	60	Ristow, R. et al. 1703 (CBRV, IRAI, SP)
	<i>Campylopus</i>	Morretes	440	Ristow, R. & Ristow,

Family	Taxon	Municipality	Altitude	Voucher
	<i>oerstedianus</i> (Müll.Hal.) Mitt.			N.R. 1298 (CBRV, IRAI)
	<i>**Campylopus</i> <i>gemmatus</i> (Müll.Hal.) Paris	Lapa	1010	Ristow, R. & Schenoveber, D. 1775 (CBRV, IRAI)
	<i>Campylopus</i> <i>thwaitesii</i> (Mitt.) A.Jaeger	Morretes	840	Ristow, R. & Schenoveber, D. 1233 (CBRV, IRAI)
	<i>Dicranodontium</i> <i>brasiliense</i> Herzog	Lapa	970	Ristow, R. & Schenoveber, D. 1786 (CBRV, IRAI, SP)
	<i>Leucobryum</i> <i>juniperoideum</i> (Brid.) Müll.Hal.	São José dos Pinhais	910	Ristow, R. et al. 1419 (CBRV, IRAI)
Leucomiaceae	<i>Leucomium</i> <i>strumosum</i> (Hornsch.) Mitt.	Morretes	230	Ristow, R. et al. 1093 (CBRV, IRAI, SP)
Leptodontaceae	<i>Forsstroemia</i> <i>producta</i> (Hornsch.) Paris	Bocaiúva do Sul	900	Ristow, R. et al. 2770 (CBRV, IRAI)
Meteoriaceae	<i>Meteorium deppei</i> (Hornsch. ex Müll.Hal.) Mitt.	Quatro Barras	880	Schäfer-Verwimp, A. et al. 33944 (JE, SP)
	<i>Meteorium</i> <i>pseudoterres</i> W.R.Buck	Quatro Barras	1200	Ristow, R. et al. 2372 (CBRV, IRAI, SP)
	<i>Meteorium teres</i> Mitt.	Curitiba	920	Ristow, R. 1181 (CBRV, IRAI, SP)
Neckeraceae	<i>Porotrichum filiferum</i> Mitt.	Prudentópolis	780	Ristow, R. et al. 3226 (CBRV, IRAI)
Orthotrichaceae	<i>Groutiella tomentosa</i> (Hornsch.) Wijk & Margad.	Colombo	1000	Ristow, R. et al. 4373 (CBRV, IRAI, SP)
Pilotrichaceae	<i>**Callicostella</i> <i>apophysata</i> (Hampe) A.Jaeger	Morretes	90	Ristow, R. et al. 1549 (CBRV, IRAI)
	<i>Callicostella depressa</i> (Hedw.) A.Jaeger	Dois Vizinhos	480	Correa, B.J.S. et al. 5 (CBRV, DVPR)
	<i>Callicostella</i> <i>rufescens</i> (Mitt.) A.Jaeger	Dois Vizinhos	480	Moreira, F.L. et al. 1 (CBRV, DVPR)
	<i>Hookeriopsis rubens</i> (Müll.Hal.) Broth.	Curitiba	900	Briani de Paula, B. 085 (CBRV, IRAI)
	<i>Lepidopilidium aureo-purpureum</i> (Geh. & Hampe) Broth.	Morretes	840	Ristow, R. et al. 3004 (CBRV, IRAI)
	<i>Lepidopilum</i> <i>ovalifolium</i> (Duby) Broth.	Guaraqueçaba	16	Ristow, R. & Ferreira, W.T. 1617 (CBRV, IRAI, SP)
	<i>Lepidopilum</i> <i>surinamense</i> Müll. Hal.	Morretes	1090	Ristow, R. et al. 4234 (CBRV, IRAI)
	<i>Philophyllum</i> <i>tenuifolium</i> (Mitt.) Broth.	Capivari Grande	1520	Schäfer-Verwimp, A. et al. 33880 (JE, SP)

Family	Taxon	Municipality	Altitude	Voucher
Polytrichaceae	<i>Trachyxiphium saxicola</i> (R.S. Willia) Vaz-Imbassahy & Costa	Lapa	970	Ristow, R. & Schenoveber, D. 1787 (CBRV, IRAI, SP)
	<i>Pogonatum campylocarpon</i> (Müll.Hal) Mitt.	Morretes	1400	Ristow, R. & Ferreira, W.T. 2798 (CBRV, IRAI)
	<i>Barbula riograndensis</i> E.B.Bartram	Pinhais	895	Picote, L.E. et al. 071 (CBRV, IRAI)
Pottiaceae	<i>Chenia leptophylla</i> (Müll.Hal.) R.H.Zander	Curitiba	890	Ristow, R. et al. 1678 (CBRV, IRAI, SP)
	<i>Dolotortula mniifolia</i> (Sull.) R.H.Zander	Rio Branco do Sul	890	Ristow, R. & Villagra, B.L.P. 3584 (CBRV, IRAI)
	<i>Molendoa sendtneriana</i> (Bruch & Schimp.) Limpr.	Prudentópolis	710	Ristow, R. et al. 3214 (CBRV, IRAI)
	<i>Pseudosymblespharis schimperiana</i> (Paris) H.A.Crum	Colombo	990	Ristow, R. & Ristow, N.R. 1453 (CBRV, IRAI, SP)
	<i>Splachnobryum obtusum</i> (Brid.) Müll.Hal.	Rio Branco do Sul	890	Ristow, R. & Villagra, B.L.P. 3587 (CBRV, IRAI)
	<i>Streptopogon calymperes</i> Müll.Hal.	Curitiba	960	Ristow, R. & Schenoveber, D. 1225 (CBRV, IRAI)
	<i>Trichostomum brachydontium</i> Bruch	Pinhais	900	Ristow, R. et al. 772 (CBRV, IRAI)
	<i>Orthostichidium quadrangulare</i> (Schwägr.) B.H.Allen & Magill	Dois Vizinhos	480	Girardi, F. Et al. 8 (CBRV, DVPR)
	<i>Orthostichopsis latifolia</i> Sehnem	Prudentópolis	765	Ristow, R. et al. 2614 (CBRV, IRAI, SP)
	<i>Orthostichopsis tortipilis</i> (Müll.Hal.) Broth.	Morretes	7	Ristow, R. et al. 1683 (CBRV, IRAI, SP)
	<i>Rhachithecium perpusillum</i> (Thwaites & Mitt.) Broth.	Curitiba	925	Schäfer-Verwimp, A. 34045 (JE, SP)
	<i>Pseudocryphaea flagellifera</i> (Brid.) E. Britton	Francisco Beltrão	510	Ristow, R. 3446 (CBRV)
Rutenbergiaceae	<i>Acroporium caespitosum</i> (Hedw.) W.R.Buck	Lapa	830	Ristow, R. & Santos, E.L. dos 3722 (CBRV)
	<i>Aptychopsis pungifolia</i> (Hampe) Broth.	Palmas	1206	Ristow, R. et al. 4119 (CBRV)
	<i>Donnellia commutata</i> (Müll. Hal.) W.R.Buck	Morretes	380	Ristow, R. et al. 1124 (CBRV, IRAI)
Sematophyllaceae	<i>Sematophyllum adnatum</i> (Michx.) Brid.	Realeza	440	Ristow, R. & Villagra, B.L.P. 4193 (CBRV)

Family	Taxon	Municipality	Altitude	Voucher
Sphagnaceae	<i>Sematophyllum cochleatum</i> (Broth.) Broth.	Antonina	740	Ristow, R. et al. 1066 (CBRV, IRAI)
	<i>Sematophyllum cuspidiferum</i> Mitt.	Cambará	448	Ristow, R. et al. 3424 (CBRV, IRAI, SP)
	<i>Sematophyllum panduraefolium</i> (Broth.) Broth.	Morretes	1100	Ristow, R. & Ferreira, W.T. 2857 (CBRV, IRAI, SP)
	<i>Sphagnum aciphyllum</i> Müll.Hal.	Quatro Barras	1406	Ristow, R. et al. 4017 (CBRV, IRAI)
	<i>Sphagnum longistolo</i> Müll.Hal.	Balsa Nova	1180	Ferreira, W.T. & Ristow, R. 031 (CBRV, IRAI, SP)
	<i>Sphagnum turgens</i> Warnst.	Jaguariaíva	800	Vinicius s.n. (CBRV, IRAI, SP)
Stereophyllaceae	<i>Pilosium chlorophyllum</i> (Hornsch.) Müll.Hal. ex Broth.	Salto do Lontra	400	Villagra, B.L.P. & Ristow, R. 786 (CBRV, IRAI, SP)
	<i>Pelekium scabrosulum</i> (Mitt.) Touw	Curitiba	935	Briani de Paula, B. 018 (CBRV, IRAI, SP)
Thuidiaceae	<i>Pelekium schistocalyx</i> (Müll. Hal.) Touw	Bocaiúva do Sul	900	Ristow, R. et al. 2763 (CBRV, IRAI, SP)
	<i>Thuidium brasiliense</i> Mitt.	Morretes	900	Ristow, R. & Ferreira, W.T. 2877 (CBRV, IRAI, SP)
	<i>Thuidium tamariscinum</i> (Hedw.) Schimp.	Curitiba	960	Ristow, R. & Schenoveber, D. 1215 (CBRV, IRAI, SP)