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Article

Myriapods (Arthropoda, Myriapoda) in the Pantanal of Poconé, Mato Grosso, Brazil

Lorhaine Santos-Silva[1], Sergei Ilyich Golovatch[2], Tamaris Gimenez Pinheiro[3], Amazonas Chagas-Jr[4], Marinêz Isaac Marques[4] & Leandro Dênis Battirola[1]*

[1]Universidade Federal de Mato Grosso, Instituto de Ciências Naturais, Humanas e Sociais, Programa de Pós-Graduação em Ciências Ambientais, Av. Alexandre Ferronato, 1.200, Setor Industrial, 78557-267, Sinop, MT, Brasil
[2]Institute for Problems of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russia
[3]Universidade Federal do Piauí, Avenida Cícero Eduardo, S/N, Junco, 64607-675, Picos, PI, Brasil
[4]Universidade Federal de Mato Grosso, Instituto de Biociências, Departamento de Biologia e Zoologia, Avenida Fernando Corrêa da Costa, 2.367, Boa Esperança, 78060-900, Cuiabá, MT, Brasil
**Corresponding author: Lorhaine Santos-Silva, e-mail: lorhaine.silva@gmail.com*

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Abstract: The Brazilian Pantanal biome is one of the largest and most important floodplains in the world by virtue of its biodiversity and indispensable ecological services on local, regional, and global scales. Despite this importance, many gaps remain concerning its biodiversity as well as its generation and maintenance mechanisms. In view of expanding the information about its biological diversity, we compiled a list of Myriapoda (Arthropoda) species occurring in the Pantanal of Poconé, Mato Grosso, Brazil, based on the records from literature and on the specimens available in the zoological collections of Federal University of Mato Grosso -UFMT. A total of 33 Myriapoda species were recorded in the region. The Diplopoda species (20 spp.; 60.6%) are distributed ‘between four orders: Polydesmida, represented by five families (Chelodesmidae, notably, with three species; Paradoxosomatidae and Pyrgodesmidae, with two species each; and Cyrtodesmidae and Fuhrmannodesmidae, with one species each, recently recorded in the region); Spirostreptida, represented by Spirostreptidae, with eight species; Spirobolida, with two species (one Rhinocricidae and one not identified); and Polyxenida. The Chilopoda (10 spp.; 30.3%) belong to three orders: Scolopendromorpha, with four species of the family Scolopendridae, two Scolopocryptopidae species, and one Cryptopidae species; Geophilomorpha, with the families Aphilodontidae and Schendylidae, with one species each; and Lithobiomorpha, with one Henicopidae species. Symphyla was represented by only two species (6.1%) of the family Scutigerellidae; and Pauropoda (3.0%) by a single species of Pauropodidae. The Myriapoda species richness, as well as the high number of new records in recent studies reinforce the importance of the northern region of the Pantanal biome as a diversity center with potential priority for measures aimed at the conservation of its many habitats.
Keywords: *Biodiversity, Chilopoda, Diplopoda, Pauropoda, Symphyla.*

Miriápodes (Arthropoda, Myriapoda) do Pantanal de Poconé, Mato Grosso, Brasil

Resumo: O Pantanal de Mato Grosso é uma das maiores e mais importantes planícies de inundação do mundo, em relação à sua biodiversidade e aos seus indispensáveis serviços ecológicos em escalas locais, regionais e globais. Apesar dessa importância, existem, ainda, muitas lacunas sobre o conhecimento de sua biodiversidade, bem como de seus mecanismos geradores e mantenedores. Desse modo, a fim de contribuir com o conhecimento de sua diversidade biológica compilamos, com base na literatura e em espécimes disponíveis nas coleções e acervos zoológicos da Universidade Federal de Mato Grosso-UFMT, uma lista de espécies de miriápodes (Arthropoda, Myriapoda) ocorrentes no Pantanal de Poconé, Mato Grosso, Brasil. Um total de 33 espécies de Myriapoda foi registrado como ocorrentes nessa região. As espécies de Diplopoda (20 spp.; 60,6%), estão distribuídas em quatro ordens. Polydesmida está representada por cinco famílias, com destaque para Chelodesmidae com três espécies, Paradoxosomatidae e Pyrgodesmidae, com duas espécies cada, além de Cyrtodesmidae e Fuhrmannodesmidae, com uma espécie cada, recentemente registradas para essa região; Spirostrepida representada por Spirostreptidae, com oito espécies; Spirobolida, com duas espécies (uma Rhinocricidae e uma não identificada); e Polyxenida. Os Chilopoda (10 spp.; 30,3%) estão distribuídos em três ordens: Scolopendromorpha, com quatro espécies da família Scolopendridae, duas espécies de Scolopocryptopidae e uma espécie de Cryptopidae; Geophilomorpha, com as famílias Aphilodontidae e Schendylidae, com uma espécie cada; e Lithobiomorpha, com uma única espécie de Henicopidae. Symphyla foi representada por apenas duas espécies (6,1%) da família Scutigerellidae e Pauropoda (3,0%) por uma única espécie de Pauropodidae. A riqueza de espécies de Myriapoda, bem como a alta proporção de novos registros em estudos recentes, reforçam a importância da região norte do Pantanal como um centro de diversidade com potencial prioridade às medidas de conservação de seus variados habitats.

Palavras-chave: *Biodiversidade, Chilopoda, Diplopoda, Pauropoda, Symphyla.*

Introduction

Wetlands are defined as ecosystems inserted at the interface between terrestrial and aquatic, continental and coastal, natural or artificial environments which may permanently or periodically be flooded by shallow, fresh, briny, or salt water (Junk et al. 2015). These areas provide important ecological services on both local and global scales, with functional values related mainly to the renewal of groundwater stores, storage and maintenance of increased atmospheric humidity, protection against soil erosion, water purification, organic carbon storage, and their consequent impact on climatic conditions (Denny 1994). They also feature a mosaic of seasonally flooded habitats that are home to numerous species of significant value to biodiversity (Junk et al. 2006, Nunes-da-Cunha & Junk 2015).

Brazil is a country with a vast territory that includes a large variety of wetland types and their consequent broad biodiversity (Junk et al. 2015). The 'Pantanal' biome is one of the largest wetlands in the world, encompassing an area of approximately 138,000 km^2 (Da Silva & Abdon 1998, Fantin-Cruz et al. 2010). The Pantanal is subject to a predictable monomodal flood pulse, with marked aquatic and terrestrial phases that alternate annually (Nunes-da-Cunha & Junk 2015). This floodplain has four well-defined seasonal periods: dry season, rising water, high water, and receding water (Heckman 1998). The region floods due to the lateral overflow of great rivers or lakes, precipitation, or underground water, and the flood is classified according to its amplitude, frequency, predictability and strength (Signor et al. 2010, Junk et al. 2015).

Based on the heterogeneity of landscapes and on the intensity and duration of floods, Adámoli (1982) categorized the Pantanal into 11 sub-regions. The northern Pantanal region belonging to Mato Grosso State is formed by the sub-regions of Poconé, Cáceres, and Barão de Melgaço. The Pantanal of Poconé sub-region accounts for 11% of the entire Pantanal, covering 11,945 km^2 (Signor et al. 2010). This region has a wide variety of vegetation formations such as 'murundu' fields, clean fields, mixed formations of evergreen flooded forests ('landizal') with dominance of *Calophyllum brasiliensis* Cambess (Clusiaceae) and 'cerradão', dense tree savannas (mountain ranges), in addition to monodominant dense fields of *Callisthene fasciculata* (Spr.) Mart. (Vochysiaceae) ('carvoal'), *Attalea phalerata* Mart. (Arecaceae) ('acurizal'), *Vochysia divergens* Pohl. (Vochysiaceae) ('cambarazal'), as well as aquatic and semi-aquatic vegetations (Silva et al. 2000, Santos et al. 2003, Arieira & Nunes-da-Cunha 2006, Nunes-da-Cunha et al. 2007, 2010, Nunes-da-Cunha & Junk 2015).

Although the Pantanal of Mato Grosso state is known for its importance as a wetland, many gaps exist knowledge about regarding its biodiversity and maintenance mechanisms, especially well-defined species-richness values for some groups or lists of species. This clearly demonstrates the need for more in-depth knowledge of the biology and taxonomy of the species occurring in that region (Junk et al. 2006), especially for poorly studied taxa with sparse information like Myriapoda (e.g. Golovatch et al. 2005, Junk et al. 2006, Battirola et al. 2009, 2017, Pinheiro et al. 2009, 2011, Santos-Silva et al. 2018a,b).

Myriapoda are widespread across all continents, except Antarctica, with greatest diversity concentrated in the tropical and hot temperate regions. They are widely distributed in several habitats such as soil, plant litter, tree barks and trunks, forest canopy, fields and pastures, dense forests, deserts, caverns, and coastal areas (Hopkin & Read 1992, Golovatch et al. 1995, 2005, Knysak & Martins 1999, Kime & Golovatch 2000, Scheller 2002, Scheller & Adis 2002, Edgecombe & Giribet 2007, Minelli & Golovatch 2013, Battirola et al. 2017). At present, this group consists of four taxonomic classes: Diplopoda, Chilopoda, Symphyla, and Pauropoda.

The Diplopoda correspond to a great part of the soil and plant-litter macrofauna in most terrestrial biomes, where they act on the decomposition, reduction, and fragmentation of plant litter (Hopkin & Read 1992, Golovatch et al. 1995, Hoffman et al. 2002, Battirola et al. 2011), in addition to constituting the largest group of Myriapoda, with more than 12,000 species (Sierwald & Bond 2007). The Chilopoda are important predators that control populations of other arthropods and small vertebrates. They currently comprise five orders, with approximately 3,300 species described around the world (Edgecombe & Giribet 2007). The lowest diversity taxa of myriapods comprise the Symphyla and the Pauropoda. The former corresponds to the group of Myriapoda with the lowest species richness, containing around 200 species distributed into two families and 15 genera (Scheller & Adis 2002). The Pauropoda, in turn, have 0.5 to 1.5 mm in length, with a world fauna consisting of two orders, five families, 30 genera, and around 708 species described (Scheller 2002).

These organisms are of utmost importance for the balance of systemic functions, since they act as predators and decomposers, but little research has been undertaken in the Pantanal of Mato Grosso State on the biology, taxonomy, and diversity of Myriapoda. The present study presents a compilation of information available in the literature and in different zoological collections of the Federal University of Mato Grosso on the occurrence of these taxa in the Pantanal of Poconé - MT, to expand the knowledge of the biodiversity of the Pantanal of Mato Grosso State.

Material and Methods

For the data compilation, we used Myriapoda (Diplopoda, Chilopoda, Symphyla, and Pauropoda) occurrence metadata available in the scientific literature referring to the Pantanal of Poconé region (Figure 1) as well as the results obtained in studies led by the teams of the Laboratory of Ecology and Taxonomy of Terrestrial and Aquatic Arthropods (LETA) of the Bioscience Institute at the Federal University of Mato Grosso, in Cuiabá, Mato Grosso; of the Biological Collection of Southern Amazon (ABAM) at the Federal University of Mato Grosso, in Sinop, Mato Grosso; and of the Zoological Collection of the Federal University of Mato Grosso, in Cuiabá, Mato Grosso.

In addition to the species survey, information is provided about their record location, associated vegetation types, site of deposition of the control material sampled in the region and collection method. Different sampling methodologies were used in the studies with myriapods, e.g., Winkler and mini-Winkler extractors, ground and tree photo-eclectors, pitfall traps, manual collection, and canopy fogging (Table 1). Species determined only at generic level and present in more than one habitat or record were grouped as a single taxon, in view of the difficulty in determining these individuals sampled in different studies. The Polyxenida, which were not identified at lower taxonomic levels in any of the studies for this region, were considered a single taxon.

Results

Thirty-three Myriapoda taxa were recorded in the Pantanal of Poconé, corresponding to species of Diplopoda (20 spp.; 60.6%), followed by Chilopoda (10 spp.; 30.3%), Symphyla (2 spp.; 6.1%), and Pauropoda (1 sp.; 3.0%) (Table 1).

The 20 diplopod species were distributed into four orders, the largest being Polydesmida (9 spp.; 45%) and Spirostreptida (8 spp.; 40%), followed by Spirobolida (2 spp.; 10%) and Polyxenida (1 sp.; 5%).

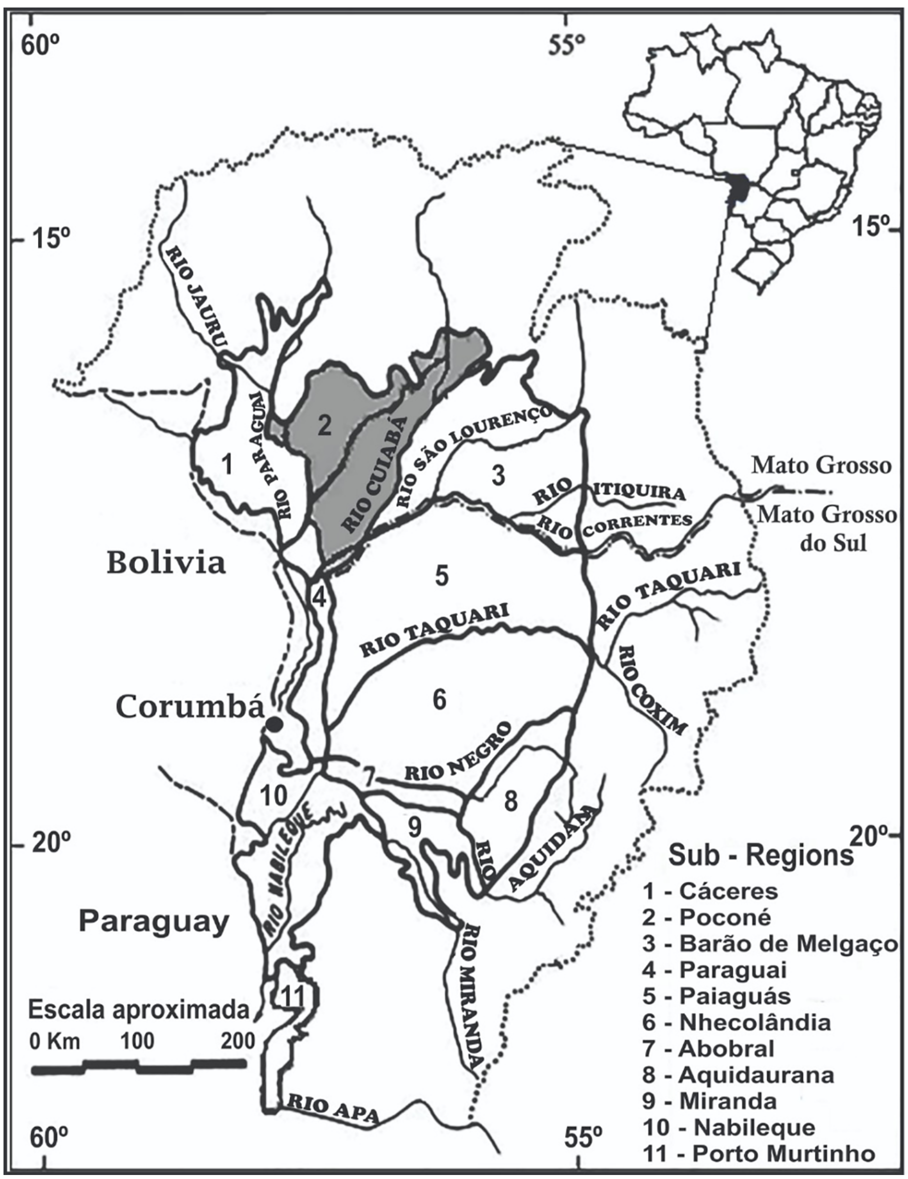

Figure 1. Map of the Pantanal and its sub-regions, between the parallels 16° and 21° S and the meridians 55° and 58° W, highlighting the Pantanal of Poconé (Modified from Silva et al., 2000).

Table 1. Data compilation of Myriapoda (Chilopoda, Diplopoda, Pauropoda, and Symphyla) species richness in the Pantanal of Poconé, Mato Grosso, Brazil. Locations: PC - Porto Cercado/Poconé-MT; PI - Pirizal/ Nossa Senhora do Livramento-MT; PJ - Porto Jofre-MT; RT - Rodovia Transpantaneira/Poconé-MT; IT - Itaisi/MT; SL - Rio São Lourenço. Habitats = AC - acurizal (monodominance of *A. phalerata*); CA - cambarazal (monodominance of *V. divergens*); CO - mountain range vegetation; CM - murundum field; CV - carvoal (monodominance of *C. fasciculata*); LA - landizal (dominance of *C. brasiliensis*); CE - cerradão; CL - clean field; SV - under plant pot/land area/no sign of vegetation. Sampling method = EXW - Winkler extractor; EMW - mini-Winkler extractor; FET - tree photo-eclector; FES - soil photo-eclector; PTR - pitfall traps; CMA - manual collection; CFA - canopy fogging. Collections with control material = ABAM - Biological Collection of Southern Amazonia, Mato Grosso, Brazil; CZRAS - Zoological Collection of the Russian Academy of Science, Moscow, Russia; CZUFMT-MYR - Zoological Collection of the Federal University of Mato Grosso - Myriapoda, Mato Grosso, Brazil; FMNH - The Field Museum of Natural History, Illinois, United States; INPA - National Institute of Amazonian Research, Manaus, Brazil; LETA - Laboratory of Ecology and Taxonomy of Arthropods, Mato Grosso, Brazil; MLP - La Plata Museum, La Plata, Argentina; MNHG (Geneve) Museum of Natural History, Geneva, Switzerland, Genebra, Switzerland -; MPIL - Max-Planck Institute for Limnology, Plön, Germany; MPEG (Belem) - Museu Paraense Emílio Goeldi, Pará, Brazil; MZUSP - Zoology Museum of the University of São Paulo, São Paulo, Brazil; VMNH (Martinsville) - Virginia Museum of Natural History, Virginia, United States.

Taxa	Species	Location	Habitat	Method	Collection	Reference
Diplopoda						
Polydesmida						
Chelodesmidae	*Brasilodesmus* sp.	PC	AC, CE	EMW, PTR	ABAM	Santos-Silva et al. (2018a)
	Leiodesmus validus (Attems, 1898)	PJ	SV	-	-	Golovatch et al. (2005)
	Pantanalodesmus marinezae Hoffman, 2000	RT, PI	AC	CMA	CZUFMT-MYR FMNH, INPA, MNHG, MPEG, MZUSP, VMNH, CZRAS	Hoffman (2000) Adis et al. (2001) Golovatch et al. (2005)
Cyrtodesmidae	Cyrtodesmidae sp.	PC	AC, CE	PTR	ABAM	Santos-Silva et al. (2018a)
Fuhrmannodesmidae	Fuhrmannodesmidae sp.	PC	AC	EMW	ABAM	Santos-Silva et al. (2018a)
Paradoxosomatidae	*Catharosoma paraguayense* (Silvestri, 1895)	PJ	SV	-	-	Golovatch et al. (2005)
	Promestosoma boggianii Silvestri, 1898	PC, PI	AC, CA, CL, CM, CV, CE, LA, CO	EXW, PTR	ABAM, LETA	Battirola et al. (2009) Wantzen et al. (2016) Santos-Silva et al. (2018a,b)
Pyrgodesmidae	*Myrmecodesmus hastatus* (Schubart, 1945)	PC	SV	CMA	LETA	Pinheiro (2013)
	Poratia salvator Golovatch & Sierwald, 2001	PC, PI	CA, CL, LA, CE	CMA, EXW, EMW, PTR	ABAM, LETA	Golovatch et al. (2005) Battirola et al. (2009) Pinheiro (2013) Pinheiro et al. (2009, 2011) Wantzen et al. (2016) Santos-Silva et al. (2018a)
Polyxenida Polyxenidae	Polyxenidae sp.	PC, PI	AC, CA, CM	CAF, EXW, EMW, FES, FET, PTR	ABAM, LETA	Golovatch et al. (2005) Battirola et al. (2009, 2017) Marques et al. (2011) Santos-Silva et al. (2018a)
Spirobolida	Spirobolida sp.	PI	CA	EXW	ABAM, LETA	Battirola et al. (2009, 2017)
Rhinocricidae	*Anadenobolus* sp.	PI	SV	-	-	Golovatch et al. (2005)
Spirostreptida	Spirostreptida sp.	PI	AC	EXW	LETA	Marques et al. (2011)
Spirostreptidae	*Heteropyge paraguayensis* (Silvestri,1895)	IT	SV	-	-	Golovatch et al. (2005)
	Orthoporus (aff.) *americanus* (Silvestri, 1895)	PC, PI	CO	PTR	ABAM	Golovatch et al. (2005) Santos-Silva et al. (2018a)

Continuation Table 1.

Taxa	Species	Location	Habitat	Method	Collection	Reference
Spirostreptidae	*Plusioporus salvadorii* Silvestri, 1895	PC, PI	AC, CA, CL, CV	EXW, EMW, CMA, PTR	ABAM, LETA	Adis et al. (2001) Battirola et al. (2009, 2017) Santos-Silva et al. (2018a)
	Plusioporus sp.	PJ, SL	SV	-	-	Golovatch et al. (2005)
	Trichogonostreptus (Oreastreptus) mattogrossensis (Silvestri, 1902)	PC, IT, PI	AC, CA, CL, CM, CV, CE, CO	EXW, EMW, PTR	ABAM, LETA	Golovatch et al. (2005) Battirola et al. (2009, 2017) Santos-Silva et al. (2018a)
	Urostreptus sp.	PC, PI	CO, CA	PTR	ABAM, LETA	Golovatch et al. (2005) Battirola et al. (2009, 2017) Santos-Silva et al. (2018a)
	Urostreptus tampiitauensis (Shubart, 1947)	PC	CO	PTR	ABAM	Santos-Silva et al. (2018a)
Chilopoda						
Scolopendromorpha Cryptopidae	*Cryptops* sp.	PC	AC, CA, CO	EXW, FET, PTR	ABAM, LETA, CZUFMT-MYR	Battirola et al. (2017) Santos-Silva et al. (2018a)
Scolopocryptopidae	*Newportia (Tidops) balzanii* Silvestri, 1895	PC	AC, CO	EMW	ABAM, CZUFMT-MYR	Santos-Silva et al. (2018a)
	Newportia (Tidops) sp.	PC, PI	AC	EXW, EMW, CZUFMT-MYR	ABAM, LETA	Marques et al. (2011) Santos-Silva et al. (2018a)
Scolopendridae	*Otostigmus tidius* Chamberlin, 1914	PC	AC, CM, CV, CO	PTR	ABAM, CZUFMT-MYR	Santos-Silva et al. (2018a)
	Otostigmus sp.	PC	LA, CO	PTR	ABAM, CZUFMT-MYR	Santos-Silva et al. (2018a)
	Rhysida celeris (Humbert & Saussure, 1870)	PC, PI	CM, CV, CE, CA, CO	PTR, FET, EMW, EXW	ABAM, LETA, CZUFMT-MYR	Battirola et al. (2017) Santos-Silva et al. (2018a)
	Scolopendra viridicornis Newport, 1844	PC	CO	PTR	ABAM, CZUFMT-MYR	Santos-Silva et al. (2018a)
Geophilomorpha Aphilodontidae	*Aphilodon angustatus* Silvestri, 1909	PI	CA	CMA, CZUFMT-MYR	MLP, MZUSP	Pereira et al. (2007) Battirola et al. (2017)
Schendylidae	*Schendylops inquilinus* Pereira et al., 2007	PC, PI	AC, CA, CL, CM, CO, CV, CE	EXW, EMW, FET, CMA, PTR, CZUFMT-MYR	ABAM, LETA, MLP, MZUSP	Pereira et al. (2007) Marques et al. (2011) Battirola et al. (2017) Santos-Silva et al. (2018a)
Lithobiomorpha Henicopidae	*Lamyctes* sp.	PC, PI	AC, CA, CL, CM, CV, CE, CO	EMW, EXW, PTR, CZUFMT-MYR	ABAM, LETA	Battirola et al. (2017) Santos-Silva et al. (2018a)
Symphyla						
Scutigerellidae	*Hanseniella guimaraensis* Scheller, 2007	PI	CA	FES, EW	MNHG, MZUSP	Scheller (2007) Battirola et al. (2017)
	Hanseniella orientalis (Hansen, 1903)	PC	SV	CMA	MNHG, MZUSP	Scheller (2007)
Pauropoda						
Tetramocerata Pauropodidae	*Allopauropus (Allopauropus) pantanalicus* Scheller, 2007	PI	CA	FES	MNHG, MZUSP	Scheller (2007) Battirola et al. (2017)

Polydesmida corresponded to five families: Chelodesmidae, which stood out with three records (*Brasilodesmus* sp., *Leiodesmus validus* (Attems, 1898), and *Pantanalodesmus marinezae* Hoffman, 2000); Paradoxosomatidae, with two species (*Catharosoma paraguayense* (Silvestri, 1895) and *Promestosoma boggianii* Silvestri, 1898; Pyrgodesmidae, with *Myrmecodesmus hastatus* (Schubart, 1945) and *Poratia salvator* Golovatch & Sierwald, 2001; and Cyrtodesmidae and Fuhrmannodesmidae, with one morphospecies each (Table 1). In Spirostreptida, Spirostreptidae species predominated, notably *Heteropyge paraguayensis* (Silvestri, 1895), *Orthoporus* (aff.) *americanus* (Silvestri, 1895), *Plusioporus salvadorii* Silvestri, 1895, *Plusioporus* sp., *Trichogonostreptus* (*Oreastreptus*) *mattogrossensis* (Silvestri, 1902), *Urostreptus tampiitauensis* (Shubart, 1947), and *Urostreptus* sp. The Spirobolida were represented by two species, only: *Anadenobolus* sp. (Rhinocricidae) and Spirobolida sp. (indeterminated family) (Table 1). Lastly, Polyxenida was represented by the family Polyxenidae (Table 1).

The Chilopoda were represented by species of three orders: Scolopendromorpha (7 spp.; 70%), Geophilomorpha (2 spp.; 20%), and Lithobiomorpha (1 sp.; 10%). Noteworthy families among the Scolopendromorpha were the Scolopendridae, represented by *Otostigmus tidius* Chamberlin, 1914, *Otostigmus* sp., *Rhysida celeris* (Humbert & Saussure, 1870), and *Scolopendra viridicornis* Newport, 1844. There were also the families Cryptopidae, represented by *Cryptops* sp., and Scolopocryptopidae, represented by *Newportia* (*Tidops*) *balzanii* Silvestri, 1895 and *Newportia* (*Tidops*) sp. Among the Geophilomorpha, two families were recognized: Aphilodontidae, with the species *Aphilodon angustatus* Silvestri, 1909, and Schendylidae, with *Schendylops inquilinus* Pereira et al., 2007 (Table 1). For Lithobiomorpha, only Henicopidae were recorded, represented by *Lamyctes* sp. Symphyla was found in only two Scutigerellidae species: *Hanseniella guimaraensis* Scheller, 2007 and *Hanseniella orientalis* (Hansen, 1903), while Pauropoda was represented by only one Pauropodidae species: *Allopauropus* (*Allopauropus*) *pantanalicus* Scheller, 2007.

As for the different types of methodologies and habitats in which the studies were carried out, the highest species occurrence was recorded for the 'acurizal' (15 spp.; 18.5%), 'cambarazal' (14 spp.; 17.3%), and mountain range (14 spp.; 17.3%) areas, whereas the lowest were obtained in 'cerradão' (8 spp.; 9.9%), 'murundum' field (7 spp.; 8.6%), 'carvoal' (7 spp.; 8.6%), clean field (6 spp.; 7.4%), and 'landizal' (3 spp.; 3.7%) areas. Seven species (8.6%) cited in the literature as occurring in the Pantanal of Poconé sub-region do not have an indication of the type of habit in which they were sampled (Table 1).

Discussion

In the Pantanal of Poconé, the Myriapoda fauna has considerable species richness; however, to the present date, it has been characterized by the dominance of few taxa (Golovatch et al. 2005, Battirola et al. 2009, Pinheiro et al. 2009, 2011, Santos-Silva et al. 2018a). The majority of species corresponds to large-sized individuals, which are thus more easily collected, corroborating Golovatch et al. (2005). The same was described in recent studies on Chilopoda (Battirola et al. 2017, Santos-Silva et al. 2018a). These results can explain why the Symphyla and Pauropoda showed a lower number of species in studies conducted in that region: probably because these myriapods are small-sized, have little mobility, and are associated with the soil organic layers, their sampling is more difficult. This is especially true considering the sampling methods already used for arthropods in the region such as pitfall traps and Winkler extractors (e.g. Battirola et al. 2017, Scheller 2007), which are considered unsuitable for the sampling of Symphyla and Pauropoda (Battirola et al. 2017). Those myriapods should preferably be sampled using specific extraction methods such as soil flotation, Kempson apparatuses, and Berlese funnels (Scheller 2002, Scheller & Adis 2002).

Other surveys have shown structural differences regarding assemblages of Myriapoda in comparison with that sampled from the Pantanal of Poconé sub-region in Mato Grosso State. In Central Amazon, assemblages are mostly constituted by small-sized taxa such as Henicopidae (Chilopoda), Pyrgodesmidae, Furhmannodesmidae (Diplopoda), Pauropodinae (Pauropoda) and Scutigerellidae (Symphyla), though with elevated species richness (Adis 1997, Adis & Harvey 2000, Adis et al. 2002, Foddai et al. 2002, Hoffman et al. 2002, Scheller & Adis 2002, Scheller 2002). For the Pantanal of Poconé, Spirostreptidae, Paradoxosomatidae, and Chelodesmidae predominate among the Diplopoda, while the Scolopendridae prevail among the Chilopoda, characterizing the assemblage as containing large-sized individuals and a smaller number of species in each habitat (e.g. Golovatch et al. 2005, Scheller 2007, Battirola et al. 2017, Santos-Silva et al. 2018a). An example of such variation can be verified in the Myriapod species richness of the Ducke Reserve near the city of Manaus, Central Amazon, whose 73 species occurring in the area are divided into 31 Pauropoda, 23 Chilopoda, 14 Diplopoda, and five Symphyla (Adis et al. 2002).

Despite the remarkable difference in Myriapoda assemblage structure in Central Amazon and Pantanal of Poconé, we must stress that studies conducted in the Pantanal and its sub-regions are still very recent (Adis et al. 2001, Golovatch et al. 2005, Pereira et al. 2007, Scheller 2007, Pinheiro et al. 2009, 2011, Battirola et al. 2009, 2017, Wantzen et al. 2016, Santos-Silva et al. 2018a,b) when compared with those performed in Central Amazon (Hoffman 1984, Adis 1986, 1992, 1997, Tapia-Coral 1999, Adis & Harvey 2000, Adis et al. 2002, Foddai et al. 2002, Hoffman et al. 2002, Scheller 2002, Scheller & Adis 2002). Two other important factors are the difference in mechanisms responsible for maintaining the seasonality present in the Pantanal and in Central Amazon (e.g. Junk et al. 2015) and the distinct habitat structures of those areas. The Pantanal has sudden humidity drops throughout the year and vegetation types with prevalence of herbaceous plants on sandy soils and a consequently low nutritional content to support a diversified myriapod fauna (Golovatch et al. 2005).

The same variation is observed for Southern Amazon, which has also had its biological diversity recently investigated (Battirola et al. 2011, 2016, Noronha et al. 2015, Batistella et al. 2015). The Myriapoda fauna in the Pantanal of Poconé and Southern Amazon can be considered similar in terms of assemblage structure, given the size of its individuals, species richness, and proportion of new records, besides the short period of studies and sampling carried out in the region. Battirola et al. (2016) reported the occurrence of 20 Myriapoda species distributed into Chilopoda (7 spp.) and Diplopoda (13 spp.) in the State Park of Cristalino, Mato Grosso state. Another survey conducted in Southern Amazon, in the municipality of Cotriguaçu, Mato Grosso state, also had 20 diplopod species recorded, consisting mostly of Polydesmida (9 spp.), Spirostreptida (5 spp.), Spirobolida (5 spp.) and Polyxenida (1 sp.) (Battirola et al. 2011). Batistella et al. (2015) analyzed the distribution of three Spirostreptidae species in an Amazon area of Mato Grosso State and associated the occurrence of these species with the abiotic conditions of the habitats, evidencing the larger size of species in that region.

In the Pantanal, seasonal floods exert a limiting function on the vegetation, selecting species adapted to periodical conditions (Rebellato & Nunes-da-Cunha 2005, Arieira & Nunes-da-Cunha 2006, Machado et al. 2012) and influencing the distribution of different vegetation types in the region (Nunes-da-Cunha & Junk 2015); hence the movement of the fauna across habitats, including the Myriapoda (Battirola et al. 2009, 2017, Wantzen et al. 2016, Santos-Silva et al. 2018a,b). To tolerate the changes that take place in the habitat structure due to water seasonality, some myriapod species developed strategies to adapt to and survive in the Pantanal. The Polyxenida in this region showed a pattern of distribution between soil and tree canopies influenced by the seasonal variation of environmental conditions (Battirola et al. 2009). *Poratia salvator* and *Promestosoma boggianii* adapted their life cycle, reproduction, and phenology to the flood cycles occurring in the region (Pinheiro et al. 2009, 2011, Wantzen et al. 2016, Santos-Silva et al. 2018b), while other species developed temporary migratory strategies (Adis et al. 2001, Battirola et al. 2009, 2017).

The Myriapoda have a fundamental role in the balance of ecosystems, as they act by fragmenting organic matter — the feed base of other animals (e.g. Diplopoda, Symphyla, Pauropoda) — in addition to being important predators that help to control the population of other organisms (e.g. Chilopoda) (Hoffman et al. 2002, Edgecombe & Giribet 2007, Battirola et al. 2011, Minelli & Golovatch 2013, Noronha et al. 2015, Guizze et al. 2016). The great species richness of myriapod species, ocurrence of new records, and estimated number of species in the Pantanal (e.g. Golovatch et al. 2005, Battirola et al. 2009, Pinheiro et al. 2009, 2011, Santos-Silva et al. 2018a) reinforce the importance of the region as an area of wide diversity, with potential priority for conservation measures. It is thus paramount to acknowledge the diversity of macrohabitats in that region for the maintenance of this diversity; and to protect the structural and functional integrity of these important wetlands.

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Author Contributions

Leandro Dênis Battirola: Substantial contribution in the concept and design of the study; Contribution to manuscript preparation; Contribution to data interpretation.

Lorhaine Santos-Silva: Substantial contribution in the concept and design of the study; Contribution to manuscript preparation; Contribution to data interpretation.

Serguei Ilyich Golovatch: Contribution to critical revision, adding intellectual content.

Tamaris Gimenez Pinheiro: Contribution to critical revision, adding intellectual content.

Amazonas Chagas-Jr: Contribution to critical revision, adding intellectual content.

Marinêz Isaac Marques: Contribution to critical revision, adding intellectual content.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

Ethics

All biological material collected in the different studies evaluated in this data compilation, has the appropriate collection permits in environmental bodies.

Availability of Data and Material

All material collected from Myriapoda (Diplopoda,Chilopoda, Symphyla and Pauropoda) is duly registered and deposited in the Acervo Biológico da Amazônia Meridional - ABAM, in the zoological collections of UFMT, and others zoological collections.

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