

Checklist of myriapods (Arthropoda: Myriapoda) from the colombian Caribbean region Lista de miriápodos (Arthropoda: Myriapoda) de la región Caribe colombiana

Martín Carrillo-Pallares¹ , Daniela Martínez-Torres²  y Gabriel R. Navas-S¹ 

1. Grupo de Investigación en Biología Descriptiva y Aplicada, Programa de Biología, Universidad de Cartagena

2. Grupo de Investigación en Hidrobiología, Programa de Biología, Universidad de Cartagena

3. Grupo colombiano de Aracnología, Universidad Nacional de Colombia, Instituto de Ciencias Naturales, Bogotá

Abstract

Based on the available literature and a review of collections of organisms, a checklist of 58 myriapods was made for the Colombian Caribbean region; 12 chilopods and 46 diplopods; in total, 16 families (four from Chilopoda and 12 from Diplopoda) of 11 orders (three from Chilopoda and six from Diplopoda). Each species's geographical range by department, altitude, reference collection, and bibliographic source were included. The presence in Colombian collections of diplopod specimens that are new records of their taxonomic group for the region, such as *Chondrodesmus* cf. *riparius* (Chelodesmidae), two species of Fuhrmannodesmidae, three of Paradoxosomatidae and one of Lophoproctidae. Likewise, two species of Scolopendrellidae of the class Symphyla. This demonstrates the urgent need to complete the essential diversity inventories of the main groups of organisms in the face of the alarming environmental deterioration to which the Colombian Caribbean region is subjected.

Key words: Chilopoda; Diplopoda; review; taxonomy; Colombia

Resumen

Con base en la literatura disponible, y revisión de colecciones de organismos, se realizó una lista de chequeo de 58 miriápodos para la región Caribe colombiana; 12 quilópodos y 46 diplópodos; en total, 16 familias (cuatro de Chilopoda y 12 de Diplopoda) de 11 órdenes (tres de Chilopoda y seis de Diplopoda). Para cada especie se incluyó su ámbito geográfico por departamentos, ámbito altitudinal, colección de referencia y fuente bibliográfica. Se confirmó la presencia en colecciones colombianas de especímenes de diplópodos que son nuevos registros de su grupo taxonómico para la región, como *Chondrodesmus* cf. *riparius* (Chelodesmidae), dos especies de Fuhrmannodesmidae, tres de Paradoxosomatidae y una de Lophoproctidae. Así mismo, dos especies de Scolopendrellidae de la clase Symphyla. Esto demuestra la imperiosa necesidad de completar los inventarios básicos de diversidad de los principales grupos de organismos ante el alarmante deterioro ambiental al que está sometida la región Caribe colombiana.

Palabras clave: Chilopoda; Diplopoda; revisión; taxonomía; Colombia

*Autor de correspondencia: gnavas@gmail.com

Editor: Neys Martínez

Recibido: 25 de agosto de 2022

Aceptado: 20 de noviembre de 2022

Publicación en línea: 31 diciembre de 2022

Citar como: Carrillo-Pallares M.; Martínez-Torres D. y Navas-S. G.R. 2022. Checklist of myriapods (Arthropoda: Myriapoda) from the colombian Caribbean region. *Intropica* 17(2): Preprint.

<https://doi.org/10.21676/23897864.4604>.



Introducción

Recent studies on the Colombian Caribbean region indicate species inventories are far from complete (*e.g.*, Ahumada-C *et al.*, 2020; Botero *et al.*, 2021; López-Orozco *et al.*, 2022). There is not even basic information on species, which allows comparing or estimating changes due to already identified anthropogenic activities that threaten biodiversity (*e.g.*, urbanization, deforestation, contamination for agrochemicals, biological invasions). This is the case of areas recently sampled by the authors of this study, finding species new to science that were completely wiped out in two or three years (extensions of dry forests transformed into oil palm crops, or hills with remnant dry forests in Montes de María, completely burned for unsustainable agriculture).

One of the problems with the available species checklists on the Internet is the accuracy of the species identification and data (Reyserhove *et al.*, 2020). For this reason, this work aims to produce a reliable checklist of Myriapods of the Colombian Caribbean region, including species that the authors consider relevant to study, first taxonomically.

The myriapods (*Subphylum* Myriapoda Latreille, 1802) are edaphic arthropods characterized in a general way by a body with marked metamery where two tagmata are distinguished, head and trunk, with a high number of segments which, for the most part, have one or two pairs of legs. They are widely distributed in ecosystems from sea level to more than three thousand meters of altitude. The greater richness occurs in the tropical and subtropical areas, inhabiting a great variety of terrestrial microhabitats (soil, litter, decomposing trunks, stems, trees, and canopy) (Minelli, 2011; Bueno-Villegas, 2012).

They can transform the soil's physical and chemical structure due to their ability to excavate, which increases the porosity and, therefore, the soil's water retention capacity, thus improving the flow of nutrients. Their feces release nitrogenous components that allow humus formation, accelerating the processes of decomposition and mineralization of organic matter (Scheller, 2011; Bueno-Villegas, 2012). Others, like centipedes (Chilopoda) are predators of other arthropods; the large specimens of up to 30 cm prey on amphibians, reptiles, birds and mammals (Cupul-Magaña, 2013).

Myriapoda includes four classes: Chilopoda Latreille, 1817 (commonly known as centipedes), with five orders, 18 families, 39 genera, and approximately 3.110 species worldwide (Minelli, 2011; Bonato *et al.*, 2016). Diplopoda de Blainville in Gervais,

1844 (commonly known as millipedes) with 16 orders, 140 families, and approximately 13.000 recorded species (Adis, 2002; Enghoff, 2015; Sierwald and Spelda, 2020). Pauropoda Lubbock, 1868 (commonly known as pauropods), is comprised of two orders, twelve families, 46 genera, and approximately 800 species (Scheller, 2008, 2011); and finally, Symphyla Ryder, 1880 (commonly known as garden centipedes), with only two families, 15 genera, and around 200 species (Scheller and Adis, 2002b; Scheller, 2011).

Chilopods have a sclerotized body of variable size (between 2 and 300 mm in length), they have a pair of legs for each of their segments, and their first pair of legs (known as forcípules) is modified for the injection of venom (Minelli, 2011). Most of these organisms are predators that feed on both other invertebrates and small vertebrates. This class comprises five orders: Geophilomorpha, Lithobiomorpha, Scolopendromorpha, Scutigleromorpha, and Craterostigmomorpha. The first four are registered for Colombia (Lewis, 1981; Minelli, 2011; Prado-Sepúlveda *et al.*, 2016; Prado *et al.*, 2018).

Individuals of Diplopoda class also have a sclerotized body of variable size (between 1.5 and 350 mm in length). They have two pairs of legs in most of their segments (diplosegments). Are detritivores with mandibular structures adapted to fragment decomposing plant material (Hopkin and Read, 1992; Bueno-Villegas, 2012). Of the 16 orders of this class, seven have been reported for Colombia: Polydesmida, Spirostreptida, Spirobolida, Siphonophorida, Polyxenida, Glomeridesmida, and Stemmiulida (Ruiz-Cobo *et al.*, 2010; Martínez-Torres and Flórez, 2015).

A poorly sclerotized body characterizes pauropods, with a length between 0.4 and 2 mm, and a pair of branched antennae. Their feeding habits are little understood; it is believed that they feed on fluids from fungal hyphae and root hairs (Hüther, 1959). Although they are challenging to observe and collect due to their small size, there are 780 described species distributed in the Hexamerocerata and Tetramerocerata orders, the latter having distribution in Colombia with the genus *Hemipauropus* Silvestri, 1902 (Scheller and Adis, 2002a; Scheller, 2008; Minelli, 2011).

Symphyla includes blind individuals with a small body (0.5-8.0 mm in length) and a poorly sclerotized cuticle. They have long and filiform antennae and a pair of spiracles on the head; their feeding habits vary since they can be herbivorous or fungivorous (Szucsich and Scheller, 2011). In the Neotropic, its fauna has received little attention, probably due to the few

specialists in the group and the difficulty in observing the characters that allow them to be assigned at the genus and species level (Scheller and Adis, 2002b; Minelli, 2011). Only 29 species have been reported for Central America (Scheller, 1986; 1992). Although its distribution is known in other Neotropical countries, for Colombia, only one species is reported *Scutigereilla immaculata* Newport, 1845, which is considered a pest for pineapple and flower crops (Agredo *et al.*, 1988; Navarro and Gaviria, 2001).

The first records of the species of myriapods distributed in Colombia were published in the mid-19th century (Gervais and Goudot, 1844; Gervais, 1844, 1859; Humbert and De Saussure, 1870; Karsch, 1884; Pocock, 1896), thanks to European expeditions that reported, cataloged, and preserved specimens in different museums and foreign biological collections. At the beginning of the 20th century, expeditions such as those of Otto Fuhrmann and Eugene Mayor in 1910 and the one carried out by the University of Michigan to Central America (1913) (Fuhrmann, 1914) made it possible to consolidate the knowledge of the species of the group. The reports were made by Ribaut (1912), Carl (1914), and Chamberlin (1921). Since the 20th century, as a consequence of the recognition of biological diversity and the accelerated loss of species richness, there has been a growing interest in the study of myriapods in the country, which is reflected in biological, taxonomic, ecological, and geographic studies, such as those of Ruiz-Cobo *et al.* (2010), Martínez-Torres *et al.* (2011), Hoffman and Martínez-Torres (2012), Chagas-Jr *et al.* (2014), Castillo-Ávila *et al.* (2015),

Martínez-Torres and Flórez (2015), Prado-Sepúlveda *et al.* (2016), and Prado *et al.* (2018).

Materials and Methods

The Colombian Caribbean region has approximately 132.288 km², corresponding to 11.6 % of the country's total area, spread over a continental area of 132.218 km² and another insular area of 70 km². The continental area is located between 12° 60' and 7° 80' latitude north and 75° and 71° longitude west, and is compound of seven departments (La Guajira, Atlántico, Bolívar, Cesar, Córdoba, Magdalena and Sucre; figure 1) (Quintero *et al.*, 2009). Given its geography, the Caribbean region is considered relatively homogeneous in most of its territory (Galvis, 2009). It presents low and flatlands that do not exceed 500 m of altitude, mainly in the Córdoba, Bolívar, and Cesar departments. The mountainous area includes the Sierra Nevada de Santa Marta in Magdalena, which presents heights of 5.775 masl (Mesa *et al.*, 2016). Colombian Caribbean ecosystems are subject to a marked climatic seasonality (Pizano and García, 2014). Rainfall ranges from 20 mm in dry months to 200 mm in months of higher rainfall, and temperatures vary between 26 and 30 °C. In the Sierra Nevada de Santa Marta and its surroundings, the average monthly precipitation is 209.9 mm in the upper part, and the temperature drops to 0 °C (Jaramillo-Robledo and Chaves-Córdoba, 2000; Pabón-Caicedo *et al.*, 2001; Maass and Burgos, 2011; Arango *et al.*, 2015).

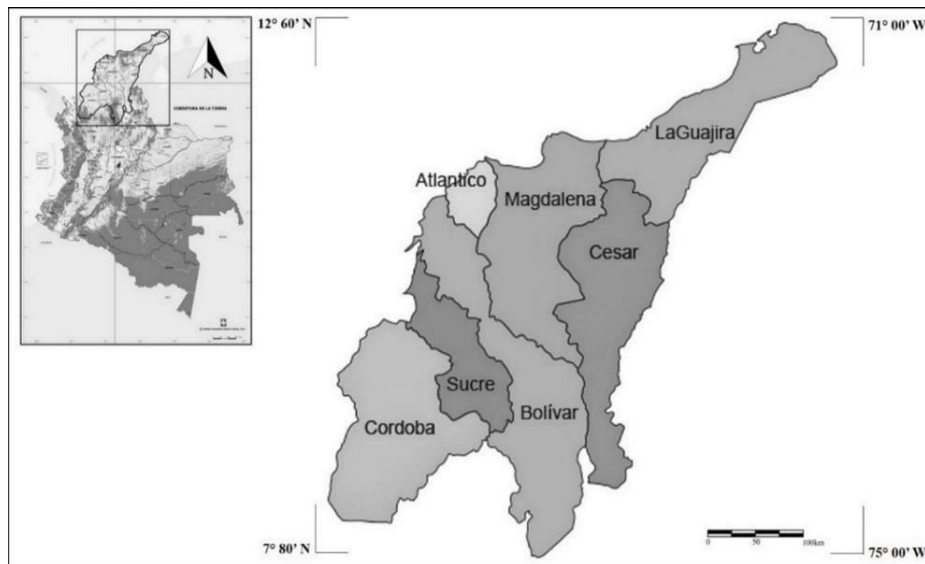


Figure 1. Departments of the Caribbean region, Colombia. In the upper left margin, general map of Colombia.

Checklist of myriapods (Arthropoda: Myriapoda) from the colombian Caribbean region

Results

There are 58 confirmed species of Myriapods known for the Colombian Caribbean region; 12 belong to the Chilopoda class and 46 to the Diplopoda class. In total, 16

families (four from Chilopoda and 12 from Diplopoda) of 11 orders (three from Chilopoda, six from Diplopoda). Table 1 shows each species's geographical distribution in the Caribbean region (by departments), its altitudinal range, and its published bibliography.

Table 1. List of myriapods known for the Colombian Caribbean region, based on available literature and material preserved in collections. For each species, its geographical range, altitude, reference collection, source of the record, and the reference are provided. The new records are presented in bold; the list is organized based on Miyazawa *et al.* (2014) and the alphabetical order for the species.

Class/Clase	Order /Orden	Family / Familia	Taxon/ Taxón	Distribution in Colombian Caribbean/ Distribución en el Caribe colombiano	Altitude (masl)/Altitud (msnm)	Reference Collection /Colección de Referencia	Reference / Referencias
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius forficatus</i>	Cor	87	ICN	Linnaeus, 1758; Prado <i>et al.</i> , 2018
			<i>Linnaeus, 1758</i>				
	Scolopendromorpha	Scolopendridae	<i>Otostigmus clavifer</i>	Mag	13 - 16	MCZ	Chamberlin, 1921; Chagas-Jr <i>et al.</i> , 2014
			<i>Chamberlin, 1921</i>				
			<i>Rhysida celeris</i>	Suc, Bol	1210	ICN	Humbert and De Saussure, 1870
			<i>Humbert y Saussure, 1870</i>				
			<i>Rhysida longipes</i>	Suc, Bol	44 - 100	CUDC, ICN	Newport, 1845; Chagas-Jr <i>et al.</i> , 2014
			<i>Newport, 1845</i>				
			<i>Scolopendra alternans</i>	Atl	-	ICN	Leach, 1815
			<i>Leach, 1815</i>				
<i>Scolopendra arthrorhabdoides</i>	Atl, Bol	0 - 100	ICN, CUDC	Ribaut, 1912			
<i>Ribaut, 1912</i>							
		<i>Scolopendra gigantea</i>	Suc, Atl, Bol, Mag, Cor	9 - 102	CUDC, ICN	Linnaeus, 1758; Chagas-Jr <i>et al.</i> , 2014	
		<i>Linnaeus, 1758</i>					
	Scolopocryptopidae	<i>Newportia longitarsis stechowi</i>	Mag	1300 - 3245	ICN	Verhoeff, 1938; Chagas-Jr <i>et al.</i> , 2014	
<i>Verhoeff, 1938</i>							
<i>Newportia longitarsis longitarsis</i>		Mag	10-50	NMNH	Gervais, 1847; Chagas-Jr <i>et al.</i> , 2014		
		<i>Gervais, 1847</i>					

Table 1 continued.

Class/Clase	Order /Orden	Family / Familia	Taxon/ Taxón	Distribution in Colombian Caribbean/ Distribución en el Caribe colombiano	Altitude (masl)/Altitud (msnm)	Reference Collection /Colección de Referencia	Reference / Referencias
	Scolopendromorpha	Scolopocryptopidae	<i>Newportia longitarsis guadeloupensis</i> Demange, 1981	Mag	200 - 2850	ICN	Demange, 1981; Chagas-Jr <i>et al.</i> , 2014
			<i>Newportia monticola</i> Pocock, 1890	Bol	20	ICN	Pocock, 1890
			<i>Newportia simoni</i> Brölemann, 1898	Suc	640 - 1920		Brölemann, 1898; Chagas-Jr <i>et al.</i> , 2014
			<i>Scolopocryptops ferrugineus</i> Linnaeus, 1767	Mag	1300	ICN	Linnaeus, 1767; Chagas-Jr <i>et al.</i> , 2014
			<i>Sphendononema guildingii</i> Newport, 1845	Mag, Bol	60 - 2200	ICN, NMNH	Newport, 1845; Stoev and Geoffroy, 2004
	Scutigermorpha	Pselliodidae	<i>Glomeridesmus porcellus</i> Gervais y Goudot, 1844	Mag	762 - 1219	CRVC	Gervais y Goudot, 1844; Loomis, 1968
Diplopoda	Glomeridesmida	Glomeridesmidae	<i>Pycnotropis cylindroides</i> Chamberlin, 1923	Mag	1620	MCZ	Chamberlin, 1923
	Polydesmida	Aphelidesmidae	<i>Pycnotropis colombiensis</i> Chamberlin, 1923	Mag	915 - 1370	MCZ	Chamberlin, 1923
		Chelodesmidae	<i>Alassodesmus reductus</i> Chamberlin, 1923	Mag	1890	MCZ	Chamberlin, 1923; Hoffman, 1975
			<i>Alocodesmus longipes</i> Chamberlin, 1923	Mag	10	MCZ	Hoffman, 1969; Chamberlin, 1923
			<i>Chondrodesmus ceracinopus</i> Chamberlin, 1923	Mag	10	MCZ	Chamberlin, 1923
			<i>Chondrodesmus</i> cf. <i>riparius</i> Carl, 1914	Bol	0 - 100	CUDC, ICN	Carl, 1914
			<i>Chondrodesmus rugosior</i> Chamberlin, 1923	Mag	1370	MCZ	Chamberlin, 1923
			<i>Chondrodesmus tamocalanus</i> Chamberlin, 1923	Mag	200 - 1370	MCZ	Chamberlin, 1923

Checklist of myriapods (Arthropoda: Myriapoda) from the colombian Caribbean region

Table 1 continued.

Class/Clase	Order /Orden	Family / Familia	Taxon/ Taxón	Distribution in Colombian Caribbean/ Distribución en el Caribe colombiano	Altitude (masl)/Altitud (msnm)	Reference Collection /Colección de Referencia	Reference / Referencias	
Diplopoda	Polydesmida	Chelodesmidae	<i>Chondrodesmus virgatus</i>	Mag	10	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
			<i>Colombodesmus catharus</i>	Mag	1370	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
			<i>Colombodesmus lygrus</i>	Mag	610 -1370	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
			<i>Cormodesmus hirutellus</i>	Mag	1220-1620	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
			<i>Trachelodesmus ancylophor</i>	Mag	1890	MCZ	Chamberlin, 1923; Hoffman, 1975	
			Chamberlin, 1923					
			<i>Trachelodesmus angulatus</i>	Mag	1220	MCZ	Chamberlin, 1923; Hoffman, 1975	
			Chamberlin, 1923					
			<i>Trichomorpha angulella</i>	Mag	762	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
			<i>Trichomorpha eusema</i>	Mag	1370	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
<i>Trichomorpha eutyla</i>	Mag	1370	MCZ	Chamberlin, 1923				
Chamberlin, 1923								
<i>Trichomorpha manzanaris</i>	Mag	-	FMNH	Chamberlin, 1952; Sierwald <i>et al.</i> , 2005				
Chamberlin, 1952								
<i>Trichomorpha pauorthrix</i>	Mag	1530	MCZ	Chamberlin, 1923				
Chamberlin, 1923								
<i>Trichomorpha rondonum</i>	Mag	-	FMNH	Chamberlin, 1952; Sierwald <i>et al.</i> , 2005				
Chamberlin, 1952								
<i>Trichomorpha rugosella</i>	Mag	1036 - 1220	MCZ	Chamberlin, 1923				
Chamberlin, 1923								
<i>Trichomorpha setosior</i>	Mag	1370	MCZ	Chamberlin, 1923				
Chamberlin, 1923								
<i>Trichomorpha tuberculosa</i>	Mag	1890	MCZ	Chamberlin, 1923				
Chamberlin, 1923								

Table 1 continued.

Class/Clase	Order /Orden	Family / Familia	Taxon/ Taxón	Distribution in Colombian Caribbean/ Distribución en el Caribe colombiano	Altitude (masl)/Altitud (msnm)	Reference Collection /Colección de Referencia	Reference / Referencias	
Diplopoda	Polydesmida	Cyrtodesmidae	<i>Agnurodesmus thrixophor</i>	Mag	1370	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
		Fuhrmannodesmidae	Fuhrmannodesmidae sp1	Bol	100	CUDC	Brolemann, 1916	
			Fuhrmannodesmidae sp2	Bol	100	CUDC	Brolemann, 1916	
		Paradoxosomatidae	Paradoxosomatidae sp1	Bol	0 - 100	CUDC, ICN	Daday, 1889	
			Paradoxosomatidae sp2	Bol	56 - 67	ICN	Daday, 1889	
			Paradoxosomatidae sp3	Bol	100	ICN	Daday, 1889	
		Platyrrhacidae	<i>Colomborus martanus</i>	Mag	0 - 700	FMNH	Chamberlin, 1952; Sierwald <i>et al.</i> , 2005	
			<i>Colomborus colombiensis</i>	Mag	1370	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
		Pyrgodesmidae	<i>Arionus ulophilus</i>	Mag	1220	MCZ	Chamberlin, 1923	
			Chamberlin, 1923					
		Polyxenida	Lophoproctidae	Lophoproctidae sp1	Bol	9 - 120	CUDC, ICN	Pocock, 1894
		Siphonophorida	Siphonophoridae	<i>Columbiozonium pearsei</i>	Mag	10	MCZ	Chamberlin, 1923
<i>Siphonophora graciliceps</i>	Mag			10	MCZ	Chamberlin, 1923		
Chamberlin, 1923								
Spirobolida	Rhinocricidae	<i>Lissocricus howlandi</i>	Mag	-	FMNH	Chamberlin, 1953; Sierwald <i>et al.</i> , 2005		
		Chamberlin, 1953						
		<i>Rhinocricus amblus</i>	Mag	1370	MCZ	Chamberlin, 1923		
		Chamberlin, 1923						
		<i>Rhinocricus colombianus</i>	Mag	610	-	Schubart, 1951		
	Schubart, 1951							
	<i>Rhinocricus hylophilus</i>	Mag	610 -1370	MCZ	Chamberlin, 1923; Marek <i>et al.</i> , 2003			
	Chamberlin, 1923							
	<i>Rhinocricus pycnus</i>	Mag	610 -1280	MCZ	Chamberlin, 1923; Marek <i>et al.</i> , 2003			
	Chamberlin, 1923							

Checklist of myriapods (Arthropoda: Myriapoda) from the colombian Caribbean region

Table 1 continued.

Class/Clase	Order /Orden	Family / Familia	Taxon/ Taxón	Distribution in Colombian Caribbean/ Distribución en el Caribe colombiano	Altitude (masl)/Altitud (msnm)	Reference Collection /Colección de Referencia	Reference / Referencias
	Spirobolida	Spirobolellidae	<i>Microspirobolus tridens</i> Chamberlin, 1923	Mag	1370	MCZ	Chamberlin, 1923
	Spirostreptida	Pseudonannolenidae	<i>Epinannolene arius</i> Chamberlin, 1923	Mag	260	MCZ	Chamberlin, 1923
<i>Epinannolene lorenzonus</i> Chamberlin, 1923			Mag	915	MCZ	Chamberlin, 1923	
<i>Epinannolene xestus</i> Chamberlin, 1923			Mag	1370-1520	MCZ	Chamberlin, 1923	
<i>Phallorthus colombianus</i> Chamberlin, 1952			Mag	-	FMNH	Chamberlin, 1952; Hoffman and Florez, 1995; Sierwald <i>et al.</i> , 2005	
<i>Phallorthus lorenzanus</i> Chamberlin, 1923		Mag	-	MCZ	Chamberlin, 1923		
<i>Spirostreptus atoporius</i> Chamberlin, 1923		Mag	610-1370	MCZ	Chamberlin, 1923		
<i>Spirostreptus eustriatus</i> Chamberlin, 1923		Mag	10	MCZ	Chamberlin, 1923		
	Stemmiulida	Stemmiulidae	<i>Orthoporus gaigei</i> Chamberlin, 1923	Mag	610 -1370	MCZ	Chamberlin, 1923
<i>Stemmiulus craurus</i> Chamberlin, 1923			Mag	790	MCZ	Chamberlin, 1923	
<i>Stemmiulus major</i> Carl, 1914			Mag	610	-	Carl, 1914	
<i>Stemmiulus ruthveni</i> Chamberlin, 1929			Mag	1370 -1520	-	Chamberlin, 1923; Sierwald and Spelda, 2020	
Symphyla	Symphyla	Scolopendrellidae	Scolopendrellidae sp1	Bol	100	CUDC	Bagnall, 1913
			Scolopendrellidae sp2	Bol	100	CUDC	Bagnall, 1913

For the Chilopoda class, the families with the highest richness were Scolopendridae, with six species and Scolopocryptopidae with four, both belonging to the Scolopendromorpha order. In comparison, the Lithobiidae families of the Lithobiomorpha order and Pselliodidae of the Scutigermorpha order presented one species. *Scolopendra gigantea* Linnaeus, 1758 was the species with the largest geographic range in the Caribbean region, with records in five departments (table 1).

For the Diplopoda class, the family with the highest richness was Chelodesmidae (Polydesmida) with 20 species, followed by Pseudonannolenidae (Spirostreptida) and Rhinocricidae (Spirobolida), each one with five species. Glomeridesmidae (Glomeridesmida), Cyrtodesmidae and Pyrgodesmidae (Polydesmida), and Spirobolellidae (Spirobolida), shown the lower richness with one species each one (table 1).

The unidentified examined specimens stored in the Universidad de Cartagena research laboratories and in the ICN collections, were assigned to the diplopods *Chondrodesmus* cf. *riparius* (Chelodesmidae), two species of Fuhrmannodesmidae, three of Paradoxosomatidae, and one of Lophoproctidae.

Regarding the Symphyla class, no publications were found with records of species for the Colombian Caribbean. Still, in the collections of both institutions specimens of two unidentified species of Scolopendrellidae were found.

Discusión

In general, the species documented in the literature for the Caribbean region are found in the Magdalena Department, reporting a total of 51 species; these records are related to the expeditions made by Otto Fuhrmann and Eugene Mayor (1910), Carl (1914), and University of Michigan to Central America (1913) and Chamberlin (1921) in the 20th century, which focused mainly on determining the biological diversity of the Sierra Nevada de Santa Marta and its surroundings.

Regarding *Scolopendra gigantea* Linnaeus, 1758, it was the species with the largest geographic range in the Caribbean region, with records in five departments. According Chagas-Jr *et al.* (2014), in Colombia, this species is only distributed in this region. In this work, the species *Scolopendra arthrorhabdoides* Ribaut, 1912, is recorded for the department of Bolívar, expanding its distribution which is considered restricted by Chagas-Jr *et al.* (2014) and Prado *et al.* (2018); records between 0 and 1300 masl (Prado-Sepúlveda *et al.*, 2016) were found. The list includes the species *Trachelodesmus angulatus* (Chamberlin, 1923) and *T. ancylophor* (Chamberlin, 1923) recorded for the

Colombian Caribbean by Chamberlin (1923). However, Hoffman and Flórez (1995) consider that these species' taxonomic identity is not sure, and they possibly do not belong to the *Trachelodesmus* genus. Therefore, it is recommended to do a review of the type material. Of the Pauropoda class, no species records were found for the Colombian Caribbean. However, their presence in the region is possible, so it is recommended to increase the search for these tiny individuals.

The results obtained here show a high richness of myriapods in the Colombian Caribbean region, which should be reviewed in a more detailed way, for example, by examining the type material of the species, in addition to taxonomically determining the morphospecies mentioned here. For this, it is recommended to continue carrying out projects that allow a more detailed contribution to the myriapod fauna knowledge in this region of the country.

Acknowledgments

This manuscript is a result of the support of the Vicerrectoría de Investigación of the Universidad de Cartagena to the Semilleros de Investigación of undergraduate students. We thank the editor and reviewers who contributed significantly to improving the document.

References

- Adis, J. 2002. Myriapoda: Identification to classes. In: Adis, J. Editor. *Amazonian Arachnida y Myriapoda: Identification keys to all classes, orders, families, some genera and lists of known terrestrial species Amazonian Arachnida and Myriapoda*. Pensoft Series Faunistica, Sofia.
- Agredo, C.E., Chaparro, E. and Zuluaga, J.I. 1988. Observaciones sobre características, distribución y daños de sinfílidos (Symphyla) y otros organismos del suelo, en cultivos de piña (*Ananas comosus*) del Valle. *Acta Agronómica* 38(2): 65–73.
- Ahumada-C., D.G., García, A.F. and Navas-S., G.R. 2020. The spiny agoristenid genus Barinas (Arachnida: Opiliones), with the description of a new species from the Colombian Caribbean. *Arachnology* 18(6): 632–641. Doi: <https://doi.org/10.13156/arac.2020.18.6.632>.
- Arango, C., Dorado, J., Guzmán, D. and Ruiz, J.F. 2015. Climatología trimestral de Colombia. Grupo de Modelamiento de Tiempo, Clima y Escenarios de Cambio Climático Subdirección de Meteorología, IDEAM. Available at: <http://www.ideam.gov.co/documents/21021/21789/Climatolog%C3%ADa+Trimestral+para+Colombia+%28Ruiz%2C+Guzma>

- [n%2C+Arango+y+Dorado%29.pdf/c2825963-c373-449a-a7cb-8480874478d9](#). Accessed: 07 de mayo de 2022.
- Bagnall, R.S. 1913. On the classification of the order Symphyla. *Zoological Journal of the Linnean Society* 32(216): 195–199. <https://doi.org/10.1111/j.1096-3642.1913.tb01775.x>.
- Bonato, L., Chagas-Jr, A., Edgecombe, G.D., Lewis, J.G.E., Minelli, A., Pereira, L.A., Shelley, R.M., Stoev, P. and Zapparoli M. 2016. ChiloBase 2.0 - A World Catalogue of Centipedes (Chilopoda). Available at: <https://chilobase.biologia.unipd.it> Accessed 20 de diciembre de 2020.
- Botero, J.P., Ahumada-C., D.G. and Navas-S, GR. 2021. A new Colombian species of Phaea Newman, 1840 and new geographical records in Cerambycinae and Lamiinae (Coleoptera: Cerambycidae) from the Colombian Caribbean. *The Coleopterists Bulletin* 75(2): 415–421. Doi: <https://doi.org/10.1649/0010-065X-75.2.415>.
- Brölemann, H.W. 1898. Myriapodes du Haut et Bas Sarare (Venezuela) donnés par M. F. Geayau au Muséum d'Histoire Naturelle de Paris. *Annals de la Société Entomologique de France* 67(3): 314–335.
- Brolemann, H. W. 1916. Les gonopodes des Spirostreptes [Myriap. Diplop.]. Note préliminaire. *Bulletin de la Société entomologique de France* 21(1): 51–53.
- Bueno-Villegas, J. 2012. Diplópodos: los desconocidos formadores de suelo. *Biodiversitas* 102: 1–5.
- Carl, J. 1914. Die Diplopoden von Columbien nebst Beiträgen zur Morphologie der Stemmatoiuiliden. In: Fuhrmann, O. and Mayor, F. Editor. *Voyage d'Exploration scientifique en Colombie*. Neuchatel: Attinger Frères.
- Castillo-Ávila, C.C., Prado, C. and García, A. 2015. First record of the intake of lichenized fungi by diplopods (Myriapoda) in Eastern subregion of Sumapaz, Colombia. *Boletín de La Sociedad Entomológica Aragonesa* 57: 358–360.
- Chagas-Jr, A., Chaparro, E., Galvis, S., Triana, H.D., Flórez, E. and Sicoli, J.C. 2014. The centipedes (Arthropoda, Myriapoda, Chilopoda) from Colombia: Part I. Scutigermorpha and Scolopendromorpha. *Zootaxa* 3779 (2): 133–156. Doi: <http://dx.doi.org/10.11646/zootaxa.3779.2.2>.
- Chamberlin, R.V. 1921. New Chilopoda and Diplopoda from the East Indian Region. *Annals and Magazine of Natural History* 7: 50–87. Doi: <https://doi.org/10.1080/00222932108632489>.
- Chamberlin, R.V. 1923. *Results of the Bryant Walker expeditions of the University of Michigan to Colombia, 1913, and British Guiana, 1914. The Diplopoda*. Occasional Papers of the Museum of Zoology. University of Michigan, Michigan.
- Chamberlin, R.V. 1952. Further records and descriptions of American millipeds. *Great Basin Naturalist* 12: 13–34.
- Chamberlin, R.V. 1953. Some American Millipeds of the Order Spirobolida. *American Midland Naturalist* 50(1): 138–151. Doi: <https://doi.org/10.2307/2422159>.
- Cupul-Magaña, F.G. 2013. La diversidad de los ciempiés (Chilopoda) de México. *Dugesiana* 20(1): 17–41. DOI: Doi: <https://doi.org/10.32870/dugesiana.v20i1.4076>.
- Daday, J. 1889. Pauropoda. In: Hungariae, R. and Trigyes, K. Editor. *Myriapoda*. Budapest.
- Demange, J.M. 1981. Scolopendromorphes et Lithobiomorphes (Myriapoda, Chilopoda) de la Guadeloupe et dépendances. *Bulletin du Muséum national D'histoire naturelle, 4ème série – section A - Zoologie, biologie et écologie animales* 3(3): 825–839.
- Enghoff, H. 2015. Diplopoda Geographical Distribution. In: Minelli, A. Editor. *The Myriapoda*. Brill. Leiden, Boston.
- Fernandes, M.F., Cardoso, D., de Queiroz, L.P. 2020. An updated plant checklist of the Brazilian Caatinga seasonally dry forests and woodlands reveals high species richness and endemism. *Journal of Arid Environments* 174: 104079. Doi: <https://doi.org/10.1016/j.jaridenv.2019.104079>.
- Fuhrmann, O. 1914. Turbellarie d' eau douce de Colombie. Voyage d' exploration scientifique en Colombie par Dr. O. Fuhrmann et Dr. Eug. Mayor. *Memoires de la Société Neutaâchateloise des Sciences naturelles* 5 (2): 793–804.
- Galvis, L. 2009. Geografía económica del Caribe Continental. Documentos de trabajo sobre economía regional No. 119. Banco de la República. Centro de Estudios Económicos Regionales (CEER) 87.
- Gervais, P. 1844. Études sur les Myriapodes. *Annales des Sciences Naturelles* 3 (2): 51–80.
- Gervais, P. 1847. Chilopodes. In: Walckenaer, M. and Gervais, P., Editores. *Histoire Naturelle des Insects*. Aptères. Suites á Buffon, Paris.
- Gervais, P. 1859. Myriapodes et Scorpions. In: Bertrand, P. Editor. *Animaux nouveaux ou rares recueillis pendant l'expédition dans les parties centrales de l'Amérique du Sud, de Rio de Janeiro à*

- Lima, et de Lima au Para; exécutée par ordre du Gouvernement Français pendant les années 1843 a 1847, sous la direction du Comte Francis de Castelnau.* Comte Francis de Castelnau, Paris.
- Gervais, P. and Goudot, J. 1844. Description des Myriapodes recueillis par Goudot en Colombie. *Annales de la Société Entomologique de France* 2 (2): 26–29.
- Hobern, D., Barik, S.K., Christidis, L., Garnett, S.T., Kirk, P., Orrell, T.M., Pape, T., Pyle, R.L., Thiele K.R., Zachos, F.E. and Bánki, O. 2021. Towards a global list of accepted species VI: The Catalogue of Life Checklist. *Organisms Diversity & Evolution* 21: 677–690. Doi: <https://doi.org/10.1007/s13127-021-00516-w>
- Hoffman, R.L. 1969. Myriapoda, exclusive of Insecta. In: Moore, R. Editor. *Treatise on invertebrate paleontology*. Pt. R, Arthropoda 4, ed. RC Moore, Buckinghamshire.
- Hoffman, R.L. 1975. Chelodesmid studies VI. A synopsis of the tribe Trachelodesmini (Diplopoda: Polydesmida). *Studies on Neotropical Fauna* 10(2): 127–144. <https://doi.org/10.1080/01650527509360488>.
- Hoffman, R.L. and Flórez, E. 1995. The milliped genus Phallorthis revalidated: another facet of a taxonomic enigma (Spirostreptida: Pseudonannolenidae). *Myriapodologica* 13(3): 115–126. Doi: <https://doi.org/10.1.1.691.9186>.
- Hoffman, R.L. and Martínez-Torres, D. 2012. Amnestorhacus, a new genus in the neotropical diplopod fauna, based on the forgotten species *Arcidesmus ologona* Silvestri, 1898. *Estratto Dagli Annali Del Museo Civico Di Storia Naturale "G. Doria,"* 104: 131–140.
- Hopkin, S.P. and Read, H. J. 1992. The biology of millipedes. Oxford University Press, Oxford.
- Humbert, A. and De Saussure, H. 1870. Myriapoda nova Americana. Description de divers Myriapodes nouveaux du musée de Vienne. *Revue et Magasin de Zoologie* 22: 196–205. Available at : <https://www.biodiversitylibrary.org/item/105308#page/182/mode/1up>.
- Hüther, W. 1959. Zur Ernährung der Paupoden. *Naturwissenschaften* 46: 563–564. Doi: <https://doi.org/10.1007/BF00631300>.
- Jaramillo-Robledo, A., and Chaves-Córdoba, B. 2000. Distribución de la precipitación en Colombia analizada mediante conglomeración estadística. *Cenicafé* 51(2): 102–113. Available at:
- [https://www.cenicafe.org/es/publications/arc051\(02\)102-113.pdf](https://www.cenicafe.org/es/publications/arc051(02)102-113.pdf).
- Karsch, F. 1884. Über eine neue und minder bekannte Arthropoden des Bremer Museums. *Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen* 9: 65–71. Available at: <https://www.biodiversitylibrary.org/page/3371386#page/71/mode/1up>.
- Leach, W.E. 1815. A tabular view of the external characters of four classes of animals which Linné arranged under Insecta; with the distribution of the genera composing three of these classes into orders, etc. and descriptions of several new genera and species. *Transactions of the Linnean Society of London* 11: 306–400.
- Lewis, J. E. 1981. *The biology of centipedes*. Cambridge University Press, Cambridge.
- Lindenmayer, D., Hobbs, R.J., Montague-Drake, R., Alexandra, J., Bennett, A., Burgman, M., Cale, P., Calhoun, A., Cramer, V., Cullen, P., Driscoll, D., Fahrig, L., Fischer, J., Franklin, J., Haila, Y., Hunter, M., Gibbons, P., Lake, S., Luck, G., MacGregor, C., McIntyre, S., Mac Nally, R., Manning, A., Miller, J., Mooney, H., Noss, R., Possingham, H., Saunders, D., Schmiegelow, F., Scott, M., Simberloff, D., Sisk, T., Tabor G., Walker, B., Wiens, J., Woinarski, J. and Zavaleta, E. 2008. A checklist for ecological management of landscapes for conservation. *Ecology Letters* 11: 78–91. Doi: <https://doi.org/10.1111/j.1461-0248.2007.01114.x>.
- Linnaeus, C. 1758. Holmiae, *Laurentus Salvus. Systema Naturae* 1: 1–824.
- Linnaeus, C. 1767. *Systema Naturae per regna tria nature, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio duodecima, reformata, Holmiae*, 533-1327.
- Loomis, H.F. 1968. A checklist of the millipeds of Mexico and Central America. *Bulletin of the U.S. National Museum* 266: 1–137. <https://doi.org/10.5479/si.03629236.266>.
- Maass, M. and Burgos, A. 2011. Water dynamics at the ecosystem level in seasonally dry tropical forests: seasonally dry tropical forests. *Ecology and Conservation* 141–156.
- Marek, P.E., Bond, J. E. and Sierwald, P. 2003. Rhinocricidae Systematics II, A species catalog of the Rhinocricidae (Diplopoda, Spirobolida) with synonymies. *Zootaxa* 308: 1–108.
- Martínez-Torres, D. and Flórez, D. E. 2015. Clase Diplopoda. In:

- E. Flórez D., C. Romero-Ortíz and D. S. López. Editor. Los artrópodos de la reserva natural río Nambí. *Serie de Guías de Campo del Instituto de Ciencias Naturales* 15: 264–2190.
- Martínez-Torres, S.D., Flórez, A.E. and Linares, E.L. 2011. Meeting between kingdoms: discovery of a close association between Diplopoda and Bryophyta in a transitional Andean-Pacific forest in Colombia. *International Journal of Myriapodology* 6: 29–36. Doi: <https://doi.org/10.3897/ijm.6.2187>.
- Mesa, L.M., Santamaría, M., García, H. and Aguilar-Cano, H. 2016. Catálogo de biodiversidad de la región Caribe. Volumen 3. Serie Planeación ambiental para la conservación de la biodiversidad en áreas operativas de Ecopetrol. Proyecto Planeación ambiental para la conservación de la biodiversidad en las áreas operativas de Ecopetrol. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt – Ecopetrol S.A. Bogotá D.C.
- Minelli, A. 2006. A World Catalogue of Centipedes (Chilopoda) for the Web. In: Bánki, O., Roskov, Y., Döring, M., Ower, G., Vandepitte, L., Hobern, D., Remsen, D., Schalk, P., DeWalt, R.E., Keping, M., Miller, J., Orrell, T., Aalbu, R., Adlard, R., Adriaenssens, E.M., Aedo, C., Aeschl, E., Akkari, N., Alfenas-Zerbini, P. Catalogue of Life Checklist, Catalogue of Life: Leiden.
- Minelli, A. 2011. The Myriapoda. In: Minelli, A. Editor. *Treatise on Zoology - Anatomy, Taxonomy, Biology - The Myriapoda Volume 1*. Nijhoff Publishers. and VS. Leiden.
- Miyazawa, H., Ueda, C., Yahata, K. and Su, Z.H. 2014. Molecular phylogeny of Myriapoda provides insights into evolutionary patterns of the mode in post-embryonic development. *Scientific Reports* 4: 4127. Doi: <https://doi.org/10.1038/srep04127>.
- Navarro, R. and Gaviria, B. 2001. Resistencia de variedades de crisantemo a la pudrición de raíces (*Cylindrocarpon destructans*. Zinssin) Schalten. Reinfestación por nemátodos en suelos y nematofauna asociada a las aguas de riego. Serie de investigación, Asociación Colombiana de Exportadores de Flores ASOCOLFLORES, Universidad Católica de Oriente, Unidad de Sanidad Vegetal, Rionegro, Antioquia, Colombia.
- Newport, G. 1845. Monograph of the class Myriapoda order Chilopoda; with observations on the general arrangement of the Articulata. *Transactions of the Linnean Society of London* 19: 349–439.
- López-Orozco, C.M., Carpio-Díaz, Y.M., Borja-Arrieta, R., Navas-S., G.R., Campos-Filho, I.S., Taiti, S., Mateos, M., Olazarán, A., Caballero, I.C., Jotty, K., Gómez-Estrada, H. and Hurtado, L.A. 2022. A glimpse into a remarkable unknown diversity of oniscideans along the Caribbean coasts revealed on a tiny island. *European Journal of Taxonomy* 793: 1–50. Doi: <https://doi.org/10.5852/ejt.2022.793.1643>.
- Pabón-Caicedo, J.D., Eslava-Ramírez, J.A. and Gómez-Torres, R.E. 2001. Generalidades de la distribución espacial y temporal de la temperatura del aire y de la precipitación en Colombia. *Meteorología colombiana* 4: 47–59.
- Pizano, C. and García, H. 2014. El Bosque Seco Tropical en Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá.
- Pocock, R.I. 1890. Report upon a small collection of scorpions and centipedes sent from Madras by Mr. Edgar Thurston, of the Government Central Museum. *Annals and Magazine of Natural History* 6: 236–245.
- Pocock, R. I. 1894. Contributions to our knowledge of the arthropod fauna of the West Indies. Part III. Diplopoda and Malacopoda, with a supplement on the Arachnida of the class Pedipalpi. *Journal of the Linnean Society of London, Zoology* 24 (157): 473–544. <https://doi.org/10.1111/j.1096-3642.1894.tb02494.x>.
- Pocock, R.I. 1896. Class Chilopoda. In: Pocock, R.I. Editor. *Chilopoda and Diplopoda. Biologia Centrali-Americana. Biologia Centrali-Americana*. Zoologia. Taylor & Francis, London.
- Prado, C.C., Triana, H.D., Castillo, C.C. and Tulandé-M, E. 2018. First records of *Lithobius* (*Lithobius*) *forficatus* (Linnaeus, 1758) and *Lithobius* (*Lithobius*) *obscurus* Meinert, 1872 (Lithobiomorpha, Lithobiidae) introduced to Colombia. 14 (3): 559–568. Doi: 10.15560/14.3.559.
- Prado-Sepúlveda, C., Triana, H.D. and Galvis, S. 2016. Los ciempiés (Myriapoda: Chilopoda) de bosque andino en el municipio de Icononzo (Colombia, Tolima) y clave para las familias presentes en Colombia. *Boletín de la Sociedad Entomológica Aragonesa* 58: 188–196.
- Quintero, J., García, A., Vergara, B., Leviller, L., Coneo, Y., Rodríguez, M. and Salcedo, A. 2009. El Caribe colombiano frente a los objetivos de desarrollo del milenio (ODM). Programa de Naciones Unidas para el Desarrollo.
- Reyserhove, L., Desmet, P., Oldoni, D., Adriaens, T., Strubbe, D., Davis, A.J.S., Vanderhoeven, S., Verloove, F. and Groom, Q. 2020. A checklist recipe: making species data open and FAIR.

- Database, 2020 :1–12. Doi: <https://10.1093/database/baaa084>.
- Ribaut, H. 1912. Contribution à l'étude des chilopodes de Colombie (O. Fuhrmann et Eug. Mayor, voyage d'exploration scientifique en Colombie). *Mémoires de la Société de Sciences Naturelles de Neuchâtel* 5: 67–95.
- Ruiz-Cobo, D.H., Bueno-Villegas, J. and Feijoo-Martínez, A. 2010. Uso de la tierra y diversidades alfa, beta y gamma de diplópodos en la cuenca del río Otún, Colombia. *Universitas Scientiarum* 15 (1): 59–67. Doi: <https://doi.org/10.11144/javeriana.SC15-1.luaa>.
- Scheller, U. 1986. Symphyla from the United States and Mexico. *Texas Memorial Museum, Speleological Monographs* 1: 87–125.
- Scheller, U. 1992. A study of neotropical Symphyla (Myriapoda): List of species, keys to genera and description of two new Amazonian species. *Amazoniana* 12(2):169–180.
- Scheller, U. 2008. A reclassification of the Pauropoda (Myriapoda). *International Journal of Myriapodology* 1: 1–38. Doi <https://doi.org/10.1163/187525408X316730>.
- Scheller, U. 2011. Pauropoda. 467–511 In: Minelli, A. Editor *The Myriapoda. Treatise on Zoology - Anatomy, Taxonomy, Biology, Volume 1*. Brill. Leiden.
- Scheller, U. and Adis, J. 2002a. Pauropoda. In: Adis, J. Editor. *Amazonian Arachnida and Myriapoda*. Pensoft Publishers. Moscow.
- Scheller, U. and Adis, J. 2002b. Symphyla. In: Adis, J. Editor. *Amazonian Arachnida and Myriapoda*. Pensoft Publishers. Moscow.
- Schubart, O. 1951. Contribuição para a fauna do estado de Sao Paulo II. Os Rhinocricidae (Opisthopermophora, Diplopoda). *Anais de Academia Brasileira de Ciências* 23(2): 221–275.
- Sierwald, P., Bond, J.E. and Gurda, G.T. 2005. The millipede type specimens in the Collections of the Field Museum of Natural History (Arthropoda: Diplopoda). *Zootaxa* 1005(1):1–64.
- Sierwald, P. and Spelda, J. 2020. MilliBase. Available at: <http://www.millibase.org> Accessed 20/12/2020.
- Stoev, P. and Geoffroy, J.J. 2004. An annotated catalogue of the scutigeromorph centipedes in the collection of the Muséum National d'Histoire Naturelle, Paris (France) (Chilopoda: Scutigeromorpha). *Zootaxa* 635: 1–12. Doi: <https://doi.org/10.11646/zootaxa.635>.
- Szucsich, N. and Scheller, U. 2011. Symphyla. In: Minelli, A. Editor. *The Myriapoda*. Brill. Leiden.
- Verhoeff, K.W. 1938. Über einige amerikanische Myriapoden. *Zoologischer Anzeiger*.122: 273–284.