A Catalogue of Species of Collembola (Hexapoda: Ellipura) Deposited in Coleção de Referência de Fauna de Solo of the Universidade Estadual da Paraíba, Brazil

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A catalogue of species of Collembola (Hexapoda: Ellipura) deposited in Coleção de Referência de Fauna de Solo of the Universidade Estadual da Paraíba, Brazil

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Abstract

We present the catalogue of species of Collembola of the Coleção de Referência de Fauna de Solo at the Universidade Estadual da Paraíba (CRFS/UEPB), including 6 holotypes of species of the Isotogastruridae, Lepidocyrtidae, Neanuridae, and Sminthuridae families. Four species are newly recorded in Brazil: *Arrhopalites caecus* (Tullberg, 1871) Börner, 1906; *Lepidocyrtus neofasciatus* Wray, 1948; *Folsomides famarensis* Fjellberg, 1993; *Sminthurides aquaticus* (Bourlet, 1842) Folsom, 1896; and 1 genus, *Neelus* Folsom, 1896.

Key Words: biogeography; new record; scientific collection; taxonomy; type material

Resumo

Apresentamos o catálogo de espécies de Collembola da Coleção de Referência de Fauna de Solo da Universidade Estadual da Paraíba (CRFS / UEPB), com seis holótipos de espécies das famílias Isotogastruridae, Lepidocyrtidae, Neanuridae e Sminthuridae. Quatro novos registros de espécies foram feitos para o Brasil: *Arrhopalites caecus* (Tullberg, 1871) Börner; *Lepidocyrtus neofasciatus* Wray, 1948; *Folsomides famarensis* Fjellberg, 1993; *Sminthurides aquaticus* (Bourlet, 1842) Folsom, 1896; e um gênero, *Neelus* Folsom, 1896.

Palavras Chave: biogeografia; novos registros; coleção cientifica; taxonomia; material tipo

The Collembola Lubbock class (Hexapoda: Ellipura sensu Tomizuka & Machida 2015) comprises small animals that are found worldwide in a wide variety of habitats after having adapted to terrestrial environments as well as to the surface water film (Deharveng et al. 2008). It is one of most important groups of soil mesofauna with high abundance (Hopkin 1997; Deharveng 2004; Zeppelini et al. 2009) and plays a key role in the functioning of ecosystems; therefore, it is an efficient bioindicator of soil quality and anthropogenic disturbances (Cassagne et al. 2003; Uehara-Prado et al. 2009; Winkler 2014).

Although it is among the dominant group of Arthropoda in terrestrial ecosystems, there has been a moderate number of described springtail species, including approximately 8,600 species, 689 genera, 36 families (some of them extinct, as Protentomobryidae Folsom, Oncobryidae Christiansen & Pike, Paleotullbergiidae Deharveng, and Praentomobryidae Christiansen & Nascimbene), and 4 orders (Poduromorpha, Entomobryomorpha, Symphypleona, and Neelipleona) (Bellinger et al. 1996–2015). The most specious families are Neanuridae (~1,463 species), Isotomidae (~1,406), and Entomobryidae (~1,014) (Bellinger et al. 1996–2015). These numbers tend to drastically increase as new tools and approaches are developed (Deharveng 2004), possibly reaching an estimated 50,000 species or more (Hopkin 1997; Cicconardi et al. 2013).

A survey published in 2012 presented 287 records in Brazil, distributed in 94 genera of 19 families (Abrantes et al. 2012). With the increasing number of descriptions of new taxa and faunistic surveys, in the last few years, that number has increased to 315 species in 98 genera of 21 families. The new supraspecific records are as follows: *Mucrosomia* Bagnall, 1949 (Mendonça & Queiroz 2013); *Varelasminthurus* Silva, Palacios-Vargas & Bellini, 2015 (Silva et al. 2015); *Isotogastrura* Thibaud & Najt, 1992 (new record for Isotogastruridae) (Palacios-Vargas et al. 2013; Silveira et al. 2014); and *Collophora* Richards in Delamare Debouteville & Massoud, 1964 (new record for Collophoridae) (Zeppelini & Brito 2013).

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The Coleção de Referência de Fauna de Solo (CRFS), founded in 2013 at Universidade Estadual da Paraíba (UEPB), maintains a collection of Collembola, found in various habitats from soil to caves and littoral, in slides and ethanol. The collection has more than 6,100 entries in the slide-mounted specimens database, identified either as species or morphospecies, most of them still undescribed. In addition to a large amount of material preserved in ethanol, a considerable number of slides are still being uploaded to the data base every day, while new material arrives weekly.

This paper presents the first complete list of species deposited in CRFS-UEPB, with first records of 4 species and 1 genus in Brazil; the publication of these data allows better access to the biogeographical taxa information and facilitates an understanding of their distribution, serving as a documentary record of their occurrence, helping studies of taxonomy, phylogeography, and conservation.

Materials and Methods

The catalogue is organized in alphabetic sequence of families, genera, and species, following the taxonomic hierarchy within each order (Poduromorpha, Entomobryomorpha, Symphypleona, and Neelipleona). It includes only the slide-mounted specimens deposited at the CRFS-UEPB. Taxonomic names, combinations, orthography, and biogeographical distribution follow the Checklist of the Collembola (Bellinger et al. 1996–2015).

For each species, data are presented in the following format:

Line 1. Species name, author, date of publication.

Line 2. Location: Country–State (# biogeographical classification number), collectors, habitat, collection date, additional biogeographical classification numbers. First records in Brazil are noted **in bold**. Holotypes are indicated by "Holotype" followed by sex and label information (location and habitat, date, collector, and the registration number in CRFS). Unknown information is indicated as "UNK". Three Brazilian biogeographical zones: #26 (Amazon, north); #27 (northeast, mid-west, and southeast); and #29 (Pampas, south) are recorded for the first time as regions from which Collembola have been collected according to Culik & Zeppelini (2003).

Results

PODUROMORPHA Börner, 1913

Brachystomellidae Stach, 1949

Brachystomella agrosa Wray, 1953

Brazil–Paraíba (#27); B. C. Bellini, C. Farias, and R. A. Brito colls. Habitats: Forest litter, monoculture sugarcane, turtle nest, sandbank vegetation. Years: 2008–2010, 2012. Biogeographic regions: 24a, 24b, 25, 26, 27.

Brachystomella contorta Denis, 1931

Brazil–Minas Gerais (#27); M. P. A. Oliveira coll. Habitat: Cave. Year: 2013. Biogeographic regions: 6, 8, 10, 12, 17, 19, 20, 24a, 24ac, 24b, 27, 28.

Brachystomella parvula (Schäffer, 1896) Stach, 1926

Brazil–Paraíba (#27); B. C. Bellini and D. Zeppelini colls. Habitat: Reforestation areas. Years: 2005, 2006. Biogeographic regions: 1, 2a, 2b, 3a, 3b, 4, 5, 7a, 7b, 8, 19, 20, 24a, 24b, 26, 27, 28, 29, 31, 35?, 36?.

Brachystomella saladaensis Weiner & Najt, 2001

Brazil–Ceará (#27); I. Cizauskas and V. Felice colls. Habitat: UNK. Year: 2013. Biogeographic regions: 27, 29.

Hypogastruridae Börner, 1906

Acherontides eleonorae Palacios-Vargas & Gnaspini-Netto, 1992

Brazil–São Paulo (#27); D. Zeppelini coll. Habitat: UNK. Year: 1998. Biogeographic region: 27.

Austrogastrura travassosi (Arlé, 1939) Thibaud & Palacios-Vargas, 1999

Brazil–Paraíba (#27); C. Farias coll. Habitats: Turtle nest and sandbank vegetation. Years: 2008–2010. Biogeographic region: 27.

Xenylla maritima Tullberg, 1869

Brazil–Paraíba (#27); R. A. Brito coll. Habitat: Forest litter. Year: 2012. Biogeographic regions: 2a, 2b, 4, 5, 6, 24a, 24b, 27, 28, 31, 32, 33, 34, 35.

Xenylla nirae da Gama & de Oliveira, 1994

Brazil–Pará (#26); UNK coll. Habitat: Vegetation adjacent to cave. Year: 2012. Biogeographic region: 26.

Xenylla welchi Folsom, 1916

Brazil–Paraíba (#27); C. Farias coll. Habitats: Turtle nest and sandbank vegetation. Years: 2008–2010. Biogeographic regions: 2a, 4, 5, 6, 7a, 7b, 7bc, 8, 9, 17, 19, 20, 21, 24a, 24ac, 24b, 25, 27, 28, 29, 32, 34.

Xenylla yucatana Mills & Pearse, 1938

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic regions: 9, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24a, 24b, 25, 27, 28, 32.

Isotogastruridae Thibaud & Najt, 1992

Isotogastrura mucrospatulata Palacios-Vargas, de Lima & Zeppelini, 2013

Brazil–Pernambuco (#27); D. Zeppelini and E. C. A. Lima colls. Habitat: Sand beach. Year: 2012. Biogeographic region: 27.

Holotype: male, with labels: (1) printed on white paper: Pernambuco, Fernando de Noronha, Boldró, "Areia de Praia" (marine littoral sand), 20-VII-2012, Lima and Zeppelini coll.; (2) printed on white paper: "Holótipo" *Isotogastrura mucrospatulata*, registration number CRFS #3680.

Neanuridae Börner, 1901

Friesea cubensis Potapov & Banasko, 1985

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic regions: 24b, 27.

Hylaeanura mendoncae Zeppelini & Palacios-Vargas, 2013

Brazil–Minas Gerais (#27); Bioespeleo Team coll. Habitat: Vegetation adjacent to cave. Years: 2012, 2013. Biogeographic region: 27.

Holotype: female, with labels: (1) handwritten on white paper: Minas Gerais, Itabirito, 24-I-2013, Bioespeleo; (2) handwritten on white paper: "Holótipo" *Hylaeanura mendoncae*, registration number CRFS #2841.

Pseudachorutes parvulus Börner, 1901

Brazil–Paraíba (#27); R. A. Brito coll. Habitat: Forest litter. Year: 2012. Biogeographic regions: 2a, 2b, 4, 5, 24a, 24b, 28, 29.

Pseudanurida sawayana Schuster, 1965

Brazil–Paraíba (#27); A. F. Soares coll. Habitat: Mangrove. Years: 2009, 2010. Biogeographic regions: 9, 10, 17, 19, 24a, 24b, 27.

Anurida maritima (Guérin-Méneville, 1836) Laboulbène, 1865

Brazil–Alagoas (#27); Sovieugoshi coll. Habitat: UNK. Year: 2002. Biogeographic regions: 1, 2a, 2b, 5, 7a, 7b, 8, 14, 24a, 27, 28?, 31.

Brasilimeria wygodzinskyi (Arlé, 1943) Arlé, 1962

Brazil–Minas Gerais (#27); UNK coll. Habitat: UNK. Year: UNK. Biogeographic region: 27.

ENTOMOBRYOMORPHA Börner, 1913

Entomobryidae Schäffer, 1896

Campylothorax cassagnaus Mitra &Dallai, 1980

Brazil–Minas Gerais (#27); Ativo Ambiental Team coll. Habitat: Cave. Year: 2013. Biogeographic regions: 24a; 27.

Entomobrya atrocincta Schött, 1896

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest litter. Year: 2012. Biogeographic regions: 2a, 3a, 4, 5, 6, 7a, 7b, 8, 20, 24a, 28, 29, 31, 34, 35.

Entomobrya griseoolivata (Packard, 1873) Folsom, 1901

Brazil–Paraíba (#27); B. C. Bellini and D. Zeppelini colls. Habitat: Reforestation areas. Years: 2005, 2006. Biogeographic regions: 3a; 7a; 7b; 8; 20; 24a; 27.

Entomobrya nivalis (Linnæus, 1758) Rondani, 1861

Brazil–Paraíba (#27); B. C. Bellini and D. Zeppelini colls. Habitat: Reforestation areas. Years: 2005, 2006. Biogeographic regions: 1, 2a, 3a?, 5, 6, 7a, 12, 14, 17, 24a, 24b, 27?, 29, 31, 32, 34, 35, 37.

Isotomidae Schäffer, 1896

Arlea lucifuga (Arlé, 1939) Womersley, 1939

Brazil–Minas Gerais (#27); R. Andrade coll. Habitat: Cave. Year: 2012. Biogeographic region: 27.

Axelsonia littoralis (Moniez, 1890) Denis, 1923

Brazil–Paraíba (#27); A. F. Soares coll. Habitat: Mangrove. Years: 2009, 2010. Biogeographic regions: 2a, 5, 6, 24a, 27, 28, 32, 33, 34.

Folsomia candida Willem, 1902

Brazil–Minas Gerais and Paraíba (#27); A. Mota and Carste team colls. Habitats: Turtle nest, sandbank vegetation, and cave. Years: 2009, 2010, 2012. Biogeographic regions: 2a, 2b, 3ac, 4, 5, 6, 7a, 7bc, 8, 16, 19, 20, 24a, 24ac, 26, 27, 29, 32, 33, 34, 35, 37.

Folsomides famarensis Fjellberg, 1993

Brazil–Ceará (#27); I. Cizauskas and V. Felice colls. Habitat: UNK. Year: 2013. Biogeographic region: 6. **First record in Brazil**.

Folsomina onychiurina Denis, 1931

Brazil–Paraíba (#27); C. Farias and R. A. Brito colls. Habitats: Forest litter, turtle nest, and sandbank vegetation. Years: 2008, 2009, 2012. Biogeographic regions: 2a, 3a, 3b, 4, 5, 7a, 7b, 8, 9, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24a, 24b, 26, 27, 28, 29, 32, 33, 34, 35.

Hemisotoma thermophila (Axelson, 1900) Bagnall, 1949

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic regions: 1, 2a, 3a, 3b, 4, 5, 6, 7a, 7b, 7bc, 8, 9, 12, 13, 15, 17, 18, 20, 22, 23, 24a, 24b, 26, 27, 28, 29, 30, 32, 33, 34, 35.

Isotomiella nummulifer Deharveng & Oliveira, 1990

Brazil–Minas Gerais and Pará (#26 and #27); L. G. S. Soares, R. Andrade, and Carste team colls. Habitats: Cave and vegetation adjacent. Years: 2007–2014. Biogeographic regions: 13, 18, 19, 24a, 26.

Psammisotoma restingae Abrantes & Mendonça, 2009

Brazil–Paraíba (#27); A. Mota coll. Habitats: Turtle nest and sandbank vegetation. Years: 2009, 2010. Biogeographic region: 27.

Lepidocyrtidae Wahlgren, 1906

Cyphoderus agnotus Börner, 1906

Brazil–Minas Gerais, Pará, Pernambuco, and Rio Grande do Norte (#26 and #27); E. C. A. Lima and Carste team colls. Habitats: Forest and cave. Years: 2007, 2012–2014. Biogeographic regions: 9?, 24b, 27, 29.

Cyphoderus arlei Cassagnau, 1963

Brazil–Minas Gerais and Pará (#26 and #27); Carste team coll. Habitat: Cave. Years: 2007, 2009–2014. Biogeographic region: 27.

Cyphoderus caetetus Zeppelini & Oliveira, 2016

Brazil–Paraíba, Pernambuco, and Minas Gerais (#27); E. C. A. Lima, D. Zeppelini, Soares et al., Andrade et al., and Carste Team colls. Habitats: Forest, beach, and cave. Years: 2011–2014. Biogeographic region: 27.

Holotype: male, with labels: (1) handwritten on white paper: Pernambuco, Fernando de Noronha, Sancho Beach, forest leaf litter, 02–06.X.2011, Carste et al. coll.; (2) handwritten on white paper: "Holótipo" *Cyphoderus caetetus*, registration number CRFS #6146.

Cyphoderus innominatus Mills & Pearse, 1938

Brazil–Ceará, Minas Gerais, Pará, Paraíba, and Pernambuco (#26 and #27); E. C. A. Lima, R. A. Brito, and Carste team colls. Habitats: Forest litter and cave. Years: 2010, 2012–2014. Biogeographic regions: 24ac, 27c.

Cyphoderus similis Folsom, 1927

Brazil–Minas Gerais, Pará, and Rio Grande do Norte (#26 and #27); Carste Team coll. Habitat: Cave. Years: 2009, 2011–2014. Biogeographic regions: 6, 7a, 7b, 8, 12, 20, 24a, 24b, 26, 29.

Lepidocyrtus neofasciatus Wray, 1948

Brazil–Minas Gerais (#27); M. T. M. Souza coll. Habitat: Cave. Year: 2013. Biogeographic regions: 7a?, 7b. **First record in Brazil**.

Lepidocyrtus nigrosetosus Folsom, 1927

Brazil–Paraíba (#27); D. Zeppelini coll. Habitat: Shrub vegetation (Caatinga). Year: 2003. Biogeographic regions: 24a, 24b, 27.

Pseudosinella aera Christiansen & Bellinger, 1980

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic regions: 7a, 7b, 7bc, 24a, 27.

Pseudosinella flatua Christiansen & Bellinger, 1996

Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic regions: 7a, 27.

Troglobius ferroicus Zeppelini, da Silva & Palacios-Vargas, 2014

Brazil–Minas Gerais (#27); R. Andrade and Carste Team colls. Habitat: Cave. Years: 2007, 2011, 2012. Biogeographic region: 27.

Holotype: male, with labels: (1) handwritten on white paper: Minas Gerais, Itabirito, VL-29/30, 02–06.X.2011, Carste et al. coll.; (2) handwritten on white paper: "Holótipo" *Troglobius ferroicus*, registration number CRFS #2766.

Oncopoduridae Carl & Lebedinsky, 1905

Oncopodura hyleana Arlé, 1961

Brazil–Pará (#26); I. Cizauskas coll. Habitat: Vegetation adjacent to cave. Year: 2012. Biogeographic region: 26.

Seiridae Yosii, 1961

Seira annulata (Handschin, 1927) Mari Mutt & Bellinger, 1990

Brazil–São Paulo (#27); D. Zeppelini coll. Habitat: Vegetation adjacent to cave. Year: 1998. Biogeographic regions: 24a, 27.

Seira arenicola Bellini & Zeppelini, 2008

Brazil–Minas Gerais and Paraíba (#27); C. Farias, F. O. Borges, and M. T. M. Souza colls. Habitats: Cave and sandbank vegetation. Years: 2008–2010, 2013, 2014. Biogeographic region: 27.

Seira brasiliana (Arlé, 1939) Marcus, 1949

Brazil–Minas Gerais, Paraíba, and São Paulo (#27); B. C. Bellini, D. Zeppelini, F. O. Borges, M. T. M. Souza, R. A. Brito, and L. A. Mazzaroloi

et al. colls. Habitats: Vegetation adjacent to cave, forest litter, and monoculture sugarcane. Years: 1998, 2012, 2013. Biogeographic regions: 7b, 24b, 27, 28.

Seira mataraquensis Bellini & Zeppelini, 2008
Brazil–Paraíba (#27); C. Farias and R. A. Brito colls. Habitats: Forest litter, monoculture sugarcane, turtle nest, and sandbank vegetation. Years: 2008–2010, 2012. Biogeographic region: 27.

Seira mendoncae Bellini & Zeppelini, 2008
Brazil–Minas Gerais and Paraíba (#27); A. A. Farias, D. Zeppelini, L. G. S. Soares, and R. A. Brito colls. Habitats: Shrub vegetation (Caatinga), cave, forest litter, and monoculture sugarcane. Years: 2008–2010, 2012, 2014. Biogeographic region: 27.

Seira mirianae Arlé & Guimaraes, 1981
Brazil–Maranhão, Minas Gerais, and Paraíba (#27); D. Zeppelini, F. O. Borges, G. Carvalho, L. G. S. Soares, M. T. M. Souza, and R. Andrade colls. Habitats: Shrub vegetation (Caatinga) and cave. Years: 2003, 2010, 2011, 2013, 2014. Biogeographic region: 27.

Seira musarum Ridley, 1890
Brazil–Pernambuco (#27); E. C. A. Lima coll. Habitat: Forest. Year: 2012. Biogeographic region: 27.

Seira nigrans (Arlé, 1960) Christiansen & Bellinger, 2000
Brazil–Minas Gerais and Paraíba (#27); D. Zeppelini, F. O. Borges, M. Barcelos, R. A. Zampaulo, and R. N. S. L. Garro colls. Habitats: Shrub vegetation (Caatinga) and cave. Years: 2003, 2013, 2014. Biogeographic region: 27.

Seira paraibensis Bellini & Zeppelini, 2009
Brazil–Paraíba (#27); A. Mota and R. A. Brito colls. Habitats: Forest litter, monoculture sugarcane, and sandbank vegetation. Years: 2010, 2012. Biogeographic region: 27.

Seira prodiga (Arlé, 1960) Christiansen & Bellinger, 2000
Brazil–Minas Gerais, Pará, Paraíba, and São Paulo (#26 and #27); B. C. Bellini, D. Zeppelini, D. S. Amorim, and R. Andrade colls. Habitats: Reforestation areas, forest, and vegetation adjacent to cave. Years: 1997, 1998, 2007, 2008, 2011, 2013. Biogeographic region: 27.

Seira ritae Bellini & Zeppelini, 2011
Brazil–Paraíba (#27); C. F. Melo coll. Habitat: Sandbank vegetation. Years: 2009, 2010. Biogeographic region: 27.

Seira xinguensis (Arlé, 1960) Christiansen & Bellinger, 2000
Brazil–Minas Gerais, Pará, and Paraíba (#26 and #27); B. C. Bellini, D. Zeppelini, F. O. Borges, K. Mise, R. Andrade, and R. N. S. L. Garro colls. Habitats: Reforestation areas, cave, and vegetation adjacent to cave. Years: 2007, 2011, 2013, 2014. Biogeographic regions: 27, 29.

Tyrannoseira raptora (Zeppelini & Bellini, 2006) Bellini & Zeppelini, 2011
Brazil–Paraíba (#27); D. Zeppelini coll. Habitat: Dry areas (Caatinga). Year: 2003. Biogeographic region: 27.

SYMPHYPLEONA Börner, 1901

Arrhopalitidae Stach, 1956

Arrhopalites caecus (Tullberg, 1871) Börner, 1906
Brazil–Minas Gerais (#27); R. Andrade et al. coll. Habitat: Cave. Years: 2010, 2012. Biogeographic regions: 1, 2a, 2ac, 2b, 3a, 4, 5, 6, 7a, 7ac, 7b, 7bc, 8, 20, 32, 33, 34, 35. **First record in Brazil**.

Arrhopalites diversus Mills, 1934
Canada–British Columbia (#8); United States–Alaska (#7a); A. Fjellberg coll. Habitat: Hemlock litter. Years: 1980, 1981, 1983. Biogeographic regions: 7a, 7b, 8, 24a.

Pygmarrhopalites aggtelekiensis (Stach, 1930) Vargovitsh, 2009
Slovakia–East Slovakia: Slovak Paradise (#2a); V. Rosel coll. Habitat: Cave. Years: 1985–1988. Biogeographic region: 2ac.

Pygmarrhopalites arcus (Zeppelini & Christiansen, 2003) Vargovitsh, 2009
United States–Idaho (#8); D. Hubbard coll. Habitat: Cave. Year: 1999. Biogeographic region: 8c.

Pygmarrhopalites benitus (Folsom, 1896) Vargovitsh, 2009
United States–Tennessee (#7b); Lewis and Mann colls. Habitat: Cave. Year: 2003. Biogeographic regions: 7a, 7ac, 7b, 7bc, 8, 20, 24a.

Pygmarrhopalites buekkensis (Loksa, 1969) Vargovitsh, 2009
Slovakia–Slovak Karst: Ardovska Cave (#2a); L. Kovâc coll. Habitat: Cave. Year: 1997. Biogeographic region: 2ac.

Pygmarrhopalites cochlearifer (Gisin, 1947) Vargovitsh, 2009
Poland–Lesser Poland Voivodeship (#2a); A. Szeptycki coll. Habitat: UNK. Year: 1964. Biogeographic regions: 2a, 5.

Pygmarrhopalites lewisi (Christiansen & Bellinger, 1998) Vargovitsh, 2009
United States–Indiana (#7a); J. Lewis coll. Habitat: Cave. Years: 2003, 2004. Biogeographic region: 7ac.

Pygmarrhopalites madonnensis (Zeppelini & Christiansen, 2003) Vargovitsh, 2009
United States–Illinois (#7b); J. Lewis coll. Habitat: Cave. Year: 1998. Biogeographic region: 7bc.

Pygmarrhopalites marshalli (Christiansen & Bellinger, 1996) Vargovitsh, 2009
United States–Tennessee (#7b); J. Lewis, Mann, and C. Holladay colls. Habitat: Cave. Year: 2004. Biogeographic region: 7bc.

Pygmarrhopalites obtusus (Zeppelini & Christiansen, 2003) Vargovitsh, 2009
United States–Virginia (#7b); UNK coll. Habitat: Cave. Year: 1994. Biogeographic region: 7bc.

Pygmarrhopalites pavo (Christiansen &Bellinger, 1996) Vargovitsh, 2009
United States–Tennessee (#7b); J. Lewis, C. Holliday, G. Call, Garland, and H. Harlland colls. Habitat: Cave. Years: 2004, 2005. Biogeographic region: 7bc.

Pygmarrhopalites principalis (Stach, 1945) Vargovitsh, 2009
United States–Alaska (#7a); A. Fjellberg coll. Habitat: UNK. Year: 1980, 1981. Biogeographic regions: 1, 2a, 2b, 7a, 7b, 8.

Pygmarrhopalites pygmaeus (Wankel, 1860) Vargovitsh, 2009
United States–Tennessee (#7b); J. Lewis et al. coll. Habitat: Cave. Years: 2003–2005. Biogeographic regions: 1, 2ac, 2b, 4, 5, 7a, 7bc, 8, 24a, 34?.

Pygmarrhopalites sapo (Zeppelini & Christiansen, 2003) Vargovitsh, 2009
United States–Illinois (#7b); J. Lewis coll. Habitat: Cave. Year: 1999. Biogeographic region: 7bc.

Pygmarrhopalites sericus (Gisin, 1947) Vargovitsh, 2009
Poland–Lesser Poland Voivodeship (#2a); A. Szeptycki coll. Habitat: Calcareous rock. Year: 1963, 1964. Biogeographic region: 2a, 5, 6.

Pygmarrhopalites sextus (Zeppelini & Christiansen, 2003) Vargovitsh, 2009
United States–Virginia (#7b); D. Hubbard coll. Habitat: Cave. Year: 1998, 2001. Biogeographic region: 7bc.

Bourletiellidae Börner, 1912

Tenentiella janssensi Zeppelini & da Silva, 2012
Brazil–Paraíba (#27); D. D. Silva and R. A. Brito colls. Habitats: Forest litter and monoculture sugarcane. Year: 2012. Biogeographic region: 27.

Collophoridae Bretfeld, 1999

Collophora terrabrasilis Zeppelini & Brito, 2013

Brazil–Bahia, Paraíba, and Pernambuco (#27); R. A. Brito and E. C. A. Lima colls. Habitat: Forest litter. Year: 2012. Biogeographic region: 27.

Dicyrtomidae Börner, 1906

Ptenothrix brasiliensis Delamare Debouteville & Massoud, 1963

Brazil–São Paulo (#27); D. Zeppelini coll. Habitat: Cave. Year: 1999. Biogeographic region: 27.

Ptenothrix marmorata (Packard, 1873) Folsom, 1928

United States–Indiana (#7a) and Tennessee (#7b); Lewis, Rafail, and Garland colls. Habitat: Cave. Year: 2003. Biogeographic regions: 3a?, 7a, 7b, 8, 24a.

Sminthuridae Lubbock, 1862

Pararrhopalites palaciosi Zeppelini & Brito, 2014

Brazil–Paraíba (#27); R. A. Brito coll. Habitat: Forest litter. Years: 2011–2013. Biogeographic region: 27.

Holotype: female, with labels: (1) handwritten on white paper: Reserva Biológica Guaribas, SEMA 3 Floresta, Mamanguape, 10.XII.2011, R. A. Brito coll.; (2) handwritten on white paper: "Holótipo" *Pararrhopalites palaciosi*, registration number CRFS #5043.

Pararrhopalites papaveroi (Palacios-Vargas & Zeppelini, 1999)

Brazil–Bahia and Mato Grosso do Sul (#27); D. Zeppelini and R. L. Ferreira colls. Habitat: Cave. Years: 1997, 1998. Biogeographic region: 27.

Pararrhopalites sideroicus Zeppelini & Brito, 2014

Brazil–Minas Gerais (#27); Mascarenhas et al. coll. Habitat: Cave. Year: 2013. Biogeographic region: 27.

Holotype: female, with labels: (1) handwritten on white paper: Minas Gerais, Itabirito, VL-29 Caverna, 21–24.V.2013, Mascarenhas et al. coll.; (2) handwritten on white paper: "Holótipo" *Pararrhopalites sideroicus*, registration number CRFS #5044.

Sminthurididae Börner, 1906

Sminthurides aquaticus (Bourlet, 1842)

Brazil–Paraíba and Pernambuco (#27); A. F. Soares and E. A. C. Lima colls. Habitats: Mangrove and forest. Years: 2009, 2010, 2012. Biogeographic regions: 1, 2a, 3a, 4, 5, 7a, 7b, 8?, 32?, 33?, 34?. **First record in Brazil**.

Sphaeridia cardosi Arlé, 1984

Brazil–Paraíba (#27); R. A. Brito coll. Habitats: Forest litter and monoculture sugarcane. Year: 2012. Biogeographic region: 27.

Sphaeridia heloisae Arlé, 1984

Brazil–Paraíba (#27); D. Zeppelini and R. A. Brito colls. Habitats: Forest litter and monoculture sugarcane. Years: 2002, 2012. Biogeographic region: 27.

Sphaeridia pumilis (Krausbauer, 1898) Agrell, 1934

Brazil–Paraíba and Pernambuco (#27); A. Mota, E. C. A. Lima, and R. A. Brito colls. Habitats: Forest litter, monoculture sugarcane, turtle nest, and sandbank vegetation. Years: 2009, 2010, 2012. Biogeographic regions: 1, 2a, 2b, 3a, 4, 5, 6, 7a, 7b, 8, 9, 12, 13, 17, 22, 24a, 24b, 26, 28, 29, 32, 33, 34.

NEELIPLEONA Massoud, 1971

Neelidae Folsom, 1896

Megalothorax minimus Willem, 1900

Brazil–Minas Gerais, Pará, Paraíba, and Pernambuco (#26 and #27); E. C. A. Lima, R. A. Brito, and Carste team colls. Habitats: Forest, forest litter, and cave. Years: 2010, 2012, 2013. Biogeographic regions: 1, 2a, 2b, 3a, 5, 5c, 6, 7a, 7b, 7bc, 8, 10, 12, 17, 18, 19, 22, 23, 24a, 24ac, 24b, 27, 31, 37.

Neelus murinus Folsom, 1896

Brazil–Minas Gerais (#27); Carste team coll. Habitat: Cave. Year: 2013. Biogeographic regions: 2a, 4, 5, 6, 7a, 7b, 8, 12, 17, 18, 24a, 24b, 32?, 34. **First record in Brazil**.

Discussion

Results show that most of the specimens deposited in CRFS are sourced from forest habitats, as is also observed in the previous checklists regarding Brazilian species (Culik & Zeppelini 2003; Abrantes et al. 2010, 2012). Few studies are developed in specific niches, such as reforestation areas, nesting on salt marsh vegetation, dry areas, and especially in ecosystems such as mangroves and interstices (e.g., psammophilous and interstitial fauna).

The use of Collembola fauna for environmental monitoring of mining activities in the states of Minas Gerais and Pará has helped to increase surveys of troglomorphic and troglobiont Collembola in iron ore caves (Christiansen 1962; Sket 2008). Fifteen species have been described in Brazil that have occurrence in hypogean habitat (10 CR, 2 EN, and 3 VU), with 13 endangered species (Brasil 2015). The increase in research directed towards this environment can decrease the risk of extinction of a still unknown fauna (Machado et al. 2008). Most Brazilian biomes still need further study, such as the Cerrado (Brazilian savannah), Pantanal (flood plains of the mid-western region) and the Pampas (southern region).

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