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Annotated zoogeography of non-marine Tardigrada. Part II: South America

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Table of contents

Abstract	4
Introduction	4
Material and methods	5
List of limno-terrestrial tardigrade species records in South America	7
Phylum: Tardigrada Spallanzani, 1776	7
Class: Heterotardigrada Marcus, 1927	7
Family: Echiniscidae Thulin, 1928	7
Genus: <i>Antechiniscus</i> Kristensen, 1987	7
Genus: <i>Bryochoerus</i> Marcus, 1936	8
Genus: <i>Bryodelphax</i> Thulin, 1928	8
Genus: <i>Cornechiniscus</i> Maucci & Ramazzotti, 1981	9
Genus: <i>Echiniscus</i> C.A.S. Schultze, 1840	9
Genus: <i>Hypechiniscus</i> Thulin, 1928	24
Genus: <i>Mopsechiniscus</i> du Bois-Reymond Marcus, 1944	24
Genus: <i>Pseudechiniscus</i> Thulin, 1911	25
Genus: <i>Testechiniscus</i> Kristensen, 1987	29
Family: Oreellidae Puglia, 1959	30
Genus: <i>Oreella</i> Murray, 1910	30
Class: Eutardigrada Richters, 1926	30
Order: Apochela Schuster, Nelson, Grigarick & Christenberry, 1980	30
Family: Milnesiidae Ramazzotti, 1962a	30
Genus: <i>Milnesium</i> Doyère, 1840	30
Order: Parachela Schuster, Nelson Grigarick & Christenberry, 1980	35
Superfamily: Hysibiioidea Pilato, 1969	35
Family: Calohypsibiidae Pilato, 1969	35
Genus: <i>Calohypsibius</i> Thulin, 1928	35
Family: Hysibiidae Pilato, 1969	36
Subfamily: Diphasconinae Dastych, 1992	36
Genus: <i>Diphascon</i> Plate, 1888	36
Subfamily: Hysibiinae Pilato, 1969	39
Genus: <i>Hypsibius</i> Ehrenberg, 1848	39
Subfamily: Itaquasconinae Rudescu, 1964	44
Genus: <i>Adropion</i> (Pilato, 1987)	44
Genus: <i>Astatumen</i> Pilato, 1997	46
Genus: <i>Itaquascon</i> de Barros, 1939b	47
Genus: <i>Platicrista</i> Pilato, 1987	47
Subfamily: Pilatobiinae Bertolani, Guidetti, Marchioro, Altiero, Rebecchi & Cesari, 2014	47
Genus: <i>Pilatobius</i> Bertolani, Guidetti, Marchioro, Altiero, Rebecchi & Cesari, 2014	47
Incerta subfamilia {according to Bertolani <i>et al.</i> 2014}	49
Genus: <i>Acutuncus</i> Pilato & Binda, 1997a	49
Genus: <i>Mixibius</i> Pilato, 1992	49
Family: Microhypsibiidae Pilato, 1998	49
Genus: <i>Fractonotus</i> Pilato, 1998	49
Family: Ramazzottiidae Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008	50
Genus: <i>Hebesuncus</i> Pilato, 1987	50
Genus: <i>Ramazzottius</i> Binda & Pilato, 1986	50
Superfamily: Isohypsibiioidea Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008	53
Family: Isohypsibiidae Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008	53
Genus: <i>Doryphoribius</i> Pilato, 1969	53
Genus: <i>Haplohexapodibius</i> Pilato & Beasley, 1987	55
Genus: <i>Isohypsibius</i> Thulin, 1928	55
Genus: <i>Parhexapodibius</i> Pilato, 1969	60
Genus: <i>Pseudobiotus</i> Nelson, 1980	61
Genus: <i>Thulinus</i> Bertolani, 2003	62
Family: Macrobiotidae Thulin, 1928	62
Genus: <i>Macrobiotus</i> C.A.S. Schultze, 1833	62
Genus: <i>Minibiotus</i> Schuster, 1980	78
Genus: <i>Paramacrobiotus</i> Guidetti, Schill, Bertolani, Dandekar & Wolf, 2009	83
Genus: <i>Richtersius</i> Pilato & Binda, 1989	88
Genus: <i>Schusterius</i> Kaczmarek & Michalczyk, 2006b	88

Family: Murrayidae Guidetti, Gandolfi, Rossi & Bertolani, 2005	88
Genus: <i>Dactylobiotus</i> Schuster, 1980	90
Genus: <i>Murrayon</i> Bertolani & Pilato, 1988	90
Discussion	97
Acknowledgements	98
References	104

Abstract

This paper is the second monograph of nine that describes the global records of limno-terrestrial water bears (Tardigrada). Here, we provide a comprehensive list of non-marine tardigrades recorded from South America, providing an updated and revised taxonomy accompanied by geographic co-ordinates, habitat, and biogeographic comments. It is hoped this work will serve as a reference point and background for further zoogeographical and taxonomical studies.

Key words: biogeography, Neotropic ecozone, species list, tardigrades, taxonomy

Introduction

Whilst often referred to as one of the ‘minor’ or ‘lesser known’ phyla, the Tardigrada comprises a group of animals with an almost ubiquitous worldwide distribution. These micro-metazoans average 500 µm as mature adults; with a few larger taxa reaching over 2 mm and juveniles/larvae ca. 100 µm. Tardigrades are bilaterally symmetrical with five distinct ‘pseudosegments’: the head and four body segments, each bearing a pair of lobopod limbs most often terminated with claws. They are found in a variety of habitats from tropical rain forests to arid polar deserts, and from mountain tops to the abyssal ocean depths.

Initially identified in the 18th Century, tardigrades have been studied throughout the 20th Century, with modern interest focusing on the anabiotic adaptations (e.g. Welnicz *et al.* 2011). The early work was largely based on morphology with few physiological studies and latterly more discussion on evolutionary and systematic status. Recently, Marley *et al.* (2011) revised the higher subdivisions of the order Parachela and Pilato & Binda (2010) the families within this order. There have been additional ‘species complex’ revisions and new or revised taxonomic criteria, with an increasing emphasis on molecular data (e.g. Bertolani & Rebecchi 1993; Claxton 1998; Guidetti *et al.* 2000; Guidetti & Bertolani 2001; Jørgensen & Kristensen 2004; Guidetti *et al.* 2005; Jørgensen *et al.* 2011; Michalczyk *et al.* 2012a; 2012b). The monographs by Ramazzotti (1962a; 1972; 1974) with the final edition III (Ramazzotti and Maucci 1983) and its English translation (Beasley 1995) are still the main starting point for most taxonomic studies on tardigrades. However, it should be noted that the data in the monographs are dated and users would be advised to check original and modern literature for species diagnosis, current taxon names and distribution. A checklist of the known tardigrade taxa (Guidetti & Bertolani 2005; Degma & Guidetti 2007) is regularly updated (Degma *et al.* 2009–2014), and there is also a new online tardigrade taxonomy data repository, ‘the Tardigrada Register’ (Michalczyk & Kaczmarek 2013).

The first global biogeographic synthesis of non-marine tardigrades (McInnes 1994a) provided limited species bio-distribution ranges within the confines of geopolitical borders, but remains the starting point for all subsequent studies on any aspect of taxonomy and biogeography. These baseline data have increased by over 70%, while distribution data can now be pinpointed to less than a degree of latitude and longitude. This literature and data explosion of the last two decades has prompted us to embark on an updated and enriched biogeography of the Tardigrada. The sheer quantity of data necessitates that this will be/or were already published as a series of nine papers, covering: Central America, South America, North America, Polar Regions, Europe, Africa, Asia, Australia, and Oceanic Islands. Each paper will be defined in detail with this, the second section, being the non-marine tardigrades of South America (Figs 1–2).

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