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New records of oribatid mites (Acari: Oribatida) from Argentina

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Abstract

A taxonomic inventory of oribatid mites from lenga forests in Patagonia Argentina was carried out to assess the taxonomic diversity and to increase the knowledge of their distribution. Nine new records of soil oribatid mites from Argentina are reported. Those species were collected in Chubut province and Tierra del Fuego province. The new registered species belong to the genera *Lamellozetes*, *Hermannia (Phyllhermannia)*, *Crotonia*, *Kokoppia*, *Acutoppia*, *Lanceoppia (Baioppia)*, *Loboppia*, *Membranoppia(Membranoppia)* and *Graptoppia (Stenoppia)*.

Key words: Patagonia, *Graptoppia*, *Lamellozetes*, *Acutoppia*, Tierra del Fuego, Chubut

Introduction

Cold temperate forests in Andean Patagonia (Argentina) occupy a thin strip of land stretching 75 km wide along the mountain range of the Andes from Neuquén up to Tierra del Fuego province. Biodiversity in these temperate forests takes low values compared to tropical forests of Argentina, however the number of endemic species of trees is very high (Bertonatti & Corcuera 2000). The level of degradation of the Andean Patagonian forests is in general low.

A good knowledge of the arthropod species inhabiting these forests is basic to monitor forest degradation and to plan adequate forest conservation measures (Hanski *et al.* 2007). For example, litter arthropods like ants (Nakamura *et al.* 2007) and mites (Culvik 2007) have been used as bio-indicators of the impacts of rainforest clearing.

Microarthropods are the most abundant fauna group in edaphic ecosystems (Bardgett 2005); they are involved in the process of nutrient cycling that regulates litter decomposition (Crossley 1977). Acari are the dominant microarthropod taxon in the soil (Behan-Pelletier & Newton 1999), with more than 40.000 described species worldwide (Walter & Proctor 1999).

Oribatid mites, in particular, inhabit the soil-litter system and tend to be the dominant arthropod group in highly organic soils of temperate forests (Norton & Behan-Pelletier 2009). With approximately 10000 described species worldwide (Schatz 2002) they are a diverse and abundant suborder (Norton 1985, Norton 1994, Behan-Pelletier 1999) and their density can exceed hundreds of thousands of individuals/m^2 in forest soil (Petersen & Luxton 1982, Behan-Pelletier & Newton 1999). However the taxonomic study of oribatid mites of Argentina has been largely incomplete as great regions of our territory have never been explored in this respect. Based on the recent catalogue of Subías (2004, 2009) the taxonomic studies of the oribatid fauna in Argentina are limited compared with studies in other parts of the world. The intensity of the investigations carried out in the Argentinian region is not in the least substantial considering that it harbours the highest number of species known from the Palearctic region even at the generic level (Schatz 2004).

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Martínez & Velis (2000) and Martínez (2008) listed the species cited for Argentina, reaching a little more than 300, to which must be added those recently cited by us (Fredes & Martínez 2008, Salazar Martínez *et al.* 2007, Kun *et al.* 2010, Ruiz *et al.* 2015). The largest surveys were generally carried out by foreign specialists and date back to the 50s and 60s of the last century. The Cordillera region of northern Patagonia (Neuquén, Río Negro and north of Chubut), in particular, was prospected by Hammer (1962b), who reported there about 60 species. At the same latitude, but in Chile, Hammer (1962a) identified about 40 species of oribatid mites.

Afterwards, Balogh & Csiszár (1963) described 26 new species found in Topal`s collection which was taken near El Bolsón (Río Negro, Argentina). Apart from the above mentioned works and those of Niedbała (1984), Baranek (1986) and Mahunka (1980), no other taxonomical works on oribatid mites were performed in Patagonia Argentina. Additionally, type specimens of new species and genera described in these works are mainly deposited in foreign museums (Denmark, Hungary, Sweden, Italy and France).

Fortunately, such studies are resumed today in our country (particularly in Patagonia), for example Kun *et al.* (2010) who reported new records of oribatid mites in North western Patagonian forest, and in general fifty-five species, belonging to 46 genera in 28 families, or the study of Ruiz *et al.* (2015) reporting nineteen new records of soil oribatid mites from lenga forest in Chubut. The aim of the present study is to add nine new records of soil oribatid mites from Patagonia Argentina, three in the province of Tierra del Fuego and six in the province of Chubut.

Material and methods

The material studied was collected under *Nothofagus pumilio* (also called lenga) forests in the provinces of Chubut and Tierra del Fuego. In the Province of Chubut, sampling sites are located in Huemules (42°46´44,4”S; 71°27´50,4”W), Guacho Lake (43°49´49,6”S; 71°27´57,7”W) and La Plata Lake (44°49´57,4”S; 71°43´34,7”W). These sites are arranged along a latitudinal strip in the west of the province on Andes range.

In Tierra del Fuego province, sampling sites are located near Fagnano Lake, in Estancia Ushuaia (54°28´77,1”S; 67°26´86,4”W) and Reserve Corazón de la Isla (54°27´46,4”S; 67°31´15,1”W). The specimens were collected during the fall and spring seasons of two years (2013-2014)

Soils were sampled under mulch. Soil borers (5 cm x 5 cm x 10 cm) were used to extract soil samples of 10 cm depth. Mites were extracted with Berlese-Tullgren funnels and stored in 75% alcohol. Oribatid species were separated under a stereomicroscope with Pasteur pipettes. Identification was carried using published taxonomic literature, mainly Balogh & Balogh (1988, 1990) as well as descriptions made by Balogh & Csiszár (1963), Hammer (1958, 1961, 1962a, 1962b), Mahunka (1980) and Baranek (1984, 1986). The classification system adopted was based on Subías (2004).

Specimens preserved in alcohol 75 % and permanent preparations in Hoyer’s médium are stored in the collection of Universidad Nacional de la Patagonia San Juan Bosco, Facultad de CienciasNaturales, Laboratorio de Investigación en Evolución y Biodiversidad (LIEB).

The following is a list of the nine new records of oribatid mites for Argentina. The origin of the study material collected (between parenthesis number of individuals), the known distribution prior to the finding and observations of the species

Results

Nine new records of oribatid mite species, belonging to nine genera of four families were obtained. The species were collected in *Nothofagus pumilio* forests, three in the province of Tierra del Fuego and six in the province of Chubut.

All the reported species are first records for Argentina. The distribution listed below does not include the actual Argentinian reports and is based on Subías (2004). Numbers in parentheses refer to the numbers of specimens found in the present study.

Astegistidae Balogh, 1961

***Lamellozetes* Covarrubias, 1967**

***Lamellozetes pseudoareolatus* Covarrubias, 1967**

Material studied. Huemules (1).

Distribution. Andean (Chile).

Remarks. The species was described by Covarrubias, 1967. His specimens were collected on Isla Muñoz Gamero, Province of Magallanes, Chile, in cold forests.

Hermanniidae Sellnick, 1928

***Hermannia (Phyllhermannia)* Berlese, 1916**

***Hermannia (Phyllhermannia) tuberculata* (Covarrubias, 1967)**

Phyllhermannia tuberculata: Covarrubias, 1967:90 [Chile].

Material studied. Estancia Ushuaia (2) and Reserva Corazón de la Isla (2).

Distribution. Andean (Chile) and Neotropical (Uruguay).

Remarks. The species was described as *Phyllhermannia tuberculata*, by Covarrubias, 1967. The specimens were collected about 20 km from the city of Valdivia, Chile, in the Valdivian jungle. It was later found by Martinez & Casanueva (1995) near Lake Icalma, Chile in a forest with *Nothofagus pumilio* and *Araucaria araucana*.

Crotoniidae Thorell, 1876

***Crotonia* Thorell, 1876**

***Crotonia chiloensis* Wallwork, 1978**

Material studied. Estancia Ushuaia (9) and Reserva Corazón de la Isla (2).

Distribution. Andean (Chile).

Remarks. The species was originally collected in Chile, in Chepu, Isla de Chiloé. This material was found in a terrestrial collection by Dr. Holdgate that was donated to the British Museum, it is a small collection containing the species of *Crotonia* sp., only represented by a single individual. This specimen was cited by Wallwork as *Crotonia chiloensis* and the description was made from this single adult, designated as holotype.

Oppiidae Sellnick, 1937

***Kokoppia* Balogh, 1983**

***Kokoppia rafalskii* (Hammer, 1968)**

Brachioppiella rafalskii: Hammer, 1968:61 [New Zealand].

Material studied. Guacho Lake (5).

Distribution. Australasian (New Zealand).

Remarks. The species was described by Hammer in 1968 as *Brachioppiella rafalskii,* which was collected near the Rotoiti Lake in New Zealand in mosses growing on *Nothofagus* sp**.** Balogh (1983) proposed the new genus *Kokoppia*, and Subías & Balogh (1989) transferred *rafalskii* to it.

Acutoppia Balogh, 1983

Acutoppia crassiseta (Hammer, 1968)

Operculoppia crassiseta: Hammer, 1968:24-25 [NewZealand].

Material studied. Estancia Ushuaia (2) and Reserva corazón de la Isla (3)

Distribution. Australasian (New Zealand).

Remarks. The species was described as *Operculoppia crassiseta* by Hammer in 1968 found at Arthur's Pass, in the New Zealand Alps of the South Island of New Zealand; the specimens were collected from a nest of *Nestor notabilis*, a psitaciform bird species. Then Balogh (1983) proposed the new genus *Acutoppia*, which *Acutoppia crassiseta*as type species.

Lanceoppia (Baioppia) Luxton, 1985

Lanceoppia (Baioppia) luxtoni Hammer, 1968

Lanceoppia luxtoni: Hammer, 1968:37 [New Zealand].

Material studied. Huemules (3) and Guacho Lake (1).

Distribution. Australasian (New Zealand).

Remarks. The species was described as *Lanceoppia luxtoni* by Hammer in 1968. The specimens were collected from mosses, grasses and remains of wooden logs in Waitakere, Keri-Keri, Christchurch, Fox Glacier and Milford, New Zealand.

Luxton (1985) erected the genus *Baioppia* to accomodate *Lanceoppia moritzi* Hammer, 1968 but did not transfer *L. luxtoni* to it. Subías & Balogh (1989) considered *Baioppia* as a subgenus of *Lanceoppia*, and hence included *moritzi* and *luxtoni*.

Loboppia Balogh, 1983

Loboppia covarrubiasi (Hammer, 1968)

Oppia covarrubiasi: Hammer, 1968 [New Zelaand].

Material studied. Guacho Lake (2).

Distribution. Australasian (New Zealand).

Remarks. The species was described as *Oppia covarrubiasi* in New Zealand (Hammer, 1968). The specimens were collected come from moist penguin dung, mixed with herbs from their nests, collected in Dunedin, New Zealand. Balogh (1983) erected the genus *Loboppia* and transferred *Oppia covarrubiasi* to it. At present, the genus remains monospecific (Subías 2004, updated 2017).

Membranoppia (Membranoppia) Hammer, 1968

Membranoppia (Membranoppia) tuxeni(Hammer, 1968)

Oppia tuxeni: Hammer, 1968:52 [New Zealand]; Sanyal, 2000:71 [India].

Material studied. Huemules (12); La Plata Lake (8); Estancia Ushuaia (2) and Reserva Corazón de la Isla (1).

Distribution. Australasian (New Zealand), Oriental (India).

Remarks. The species was described as *Oppia tuxeni* by Hammer (1968), found at Lake Rotoiti, New Zealand, on *Leucobryum* moss under *Nothofagus sp*. There are also records of the species in Tripura (India) (Sanyal, 2000).

***Graptoppia (Stenoppia) multicorrugata* (Hammer, 1962a)**

Oppia multicorrugata: Hammer, 1962a:39 [Chile].

Material studied. Guacho Lake (1) and La Plata Lake (2).

Distribution. Andean (Chile).

Remarks. The species was described as *Oppia multicorrugata* (Hammer 1962a) in Puerto Montt and Cueva del Milodón, Chile. The individuals collected in Puerto Montt were found in a small cave near the city, on humid ferns and liverworts.

Discussion

The new records of nine species from nine different genera and four families clearly show that there is a lack of knowledge about the microarthropod fauna from Argentina. This may be a result of only very few people working with this group of mites in this country, and due to their small body size they may be overlooked in general faunal studies.

Of the nine species mentioned in this work*, Lamellozetes pseudoareolatus, Crotonia chiloensis, Graptoppia (Stenoppia) multicorrugata* and *Hermannia (Phyllhermannia) tuberculata* have been previously found in the Southern Andes and in the southern region of Chile and never outside this region, except for *H. tuberculata* found in Uruguay. The high level of endemism in the Andes Mountains is in agreement with the current knowledge on the world distribution trend of oribatid mites, in which the vast majority of all oribatid species (almost 90 %) is restricted to one zoogeographical region (Schatz 2004). The present data support the claim that Neotropical high Andes (over 1000 m) are a Gondwanan refuge for oribatid fauna (Marshall & Pugh 1996).

Four species found in this research were already known for Chile, which could be expected due to the proximity of the sampling sites to the Chile–Argentina border. Five species were also known from New Zealand, supporting the ancient connection by land.

The last five species cited have been described from New Zeland: *Kokoppia rafalskii, Acutoppia crassiseta, Lanceoppia (Baioppia) luxtoni, Loboppia covarrubiasi* and *Membranoppia (Membranoppia) tuxeni.* Apart from the present reports, these species were not found outside this region, except for *M. tuxeni*, also cited for India.

Among the conclusions drawn from her extensive work on New Zealand oribatids (Hammer 1966, 1967, 1968), Hammer (1968) noted that a significant number of the species found were shared with South America. Based on morphological characters of species of the genus *Trimalaconothrus* common in species of both regions, but not in species outside them (e.g. Europe), she concluded that the two regions have been directly connected by land". The exclusive presence of species in the two regions, like the Oppiidae mentioned here, supports this conjecture.

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