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Taxonomy and Systematics

New records of oribatid mites (Acari: Oribatida) from a Patagonian forest affected by wildfire in Argentina

Nuevos registros de ácaros oribátidos (Acari: Oribatida) de un bosque patagónico afectado por fuego en Argentina

Rosa M. Manzo ^{a, b, *}, M. Manuela Dadamia ^a, Susana Rizzuto ^{a, c}

^a Universidad Nacional de la Patagonia San Juan Bosco, Laboratorio de Investigaciones en Evolución y Biodiversidad, Ruta N° 259, Km 16.5, 9200 Esquel, Chubut, Argentina

^b Consejo Nacional de Investigaciones Científicas y Técnicas, Godoy Cruz 2290, B1766 Buenos Aires, Argentina

^c Universidad Nacional de la Patagonia San Juan Bosco, Centro de Investigación Esquel de Montaña y Estepa Patagónica, Roca 780, 9200 Esquel, Chubut, Argentina

*Corresponding author: rosamanzo19@gmail.com (R.M. Manzo)

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Abstract

A study of oribatid mite communities in a Patagonian forest affected by wildfires was carried out to assess their taxonomic diversity and to increase knowledge of their distribution. A total of 43 species/morphospecies were found. Ten were new records for Chubut and 3 for Argentina. Increased knowledge of this fauna will be fundamental in aiding further understanding about its ecology and distribution.

Keywords: New records; National Park; Chubut

Resumen

Se llevó a cabo un estudio de la comunidad de ácaros oribátidos de un bosque afectado por fuego ubicado en la Patagonia argentina para evaluar su diversidad taxonómica e incrementar el conocimiento de su distribución. Un total de 43 especies/morfoespecies fueron encontradas; del total, 10 fueron nuevos registros para la provincia de Chubut y 3 fueron nuevos registros para la Argentina. Incrementar el conocimiento de esta fauna se vuelve fundamental para ayudar a comprender su ecología y distribución.

Palabras claves: Nuevos registros; Parque Nacional, Chubut

Introduction

Naturally generated fire has an important role in the maintenance and evolution of ecosystems and has been an essential part of human life systems since ancient times (Bowman et al., 2011). In some forest ecosystems, fires are vital and essential for the process of ecological succession and for maintaining stability (Knicker, 2007). Such stability has been disrupted because of increasingly aggressive human action on renewable natural resources. In fact, intentional burning and anthropogenic large-scale forest fires have caused the loss and degradation of extensive forest areas (Castillo-Soto, 2006). Fire is the most prominent large-scale disturbance regime in many of the world's ecosystems, including forests and grasslands (Harnett, 1991; Hobbs & Atkins, 1990; Jonson, 1992; Liacos, 1977; Malmström, 2010). Historic fire regimes vary greatly across the different ecosystem types in the southern Andean region, and the tree-ring record shows that before the 20th century, large, severe fires also played a significant ecological role in shaping even the wettest forests (Veblen et al., 2009). In Patagonia, and particularly in the Andean-Patagonian forests (*Nothofagus* spp.), anthropogenic fire has been a recurrent problem during the past century or so, both deliberate and accidental anthropic fires became very frequent, and in all cases influenced the development of vegetation in temperate forest regions (Donoso, 1997).

One of the direct impacts of wildfires is the death of micro- macro- and mesofauna, bacteria and fungi—indeed several studies have shown that soil animal numbers are markedly reduced by forest fires (Heyward & Tissot, 1936; Huhta et al., 1967; Malmström, 2008; Malmström et al., 2008; N'Dri et al., 2017; Pearse, 1943). The recovery rate of soil faunal communities after a fire is poorly understood because it is difficult to have many sites with similar conditions and similar severity of fire impact, so there are few papers about it (Zaitsev et al., 2016).

Oribatid mites mainly inhabit the soil-litter system and tend to be the dominant arthropod group in highly organic forest soils (Norton & Behan-Pelletier, 2009), with over 10,000 species described worldwide (Walter & Proctor, 2013). Studies of the oribatid fauna in Argentina are limited compared to other parts of the world (Kun et al., 2010). Recently, Fredes (2018) published a catalogue that provides an overview of the known Argentinian oribatid mite fauna. This catalogue includes a total of 398 described species comprising 185 genera and 75 families, but it does not include the findings of Ruiz et al. (2018) who reported 9 new records, and Manzo et al. (2019, 2020) reported 3 new records, raising the total number of species from Argentina to 410. In all cases, the aforementioned studies mainly

analyzed material from the Andean Patagonian forests and steppe, but not from forests affected by wildfire. The aim of this study is to provide information on the Oribatid mites species present in a Patagonian forest (in Chubut) affected by wildfires, taking into consideration the new records for Chubut and Argentina.

Materials and methods

The study was carried out in a *Nothofagus* spp. forest where anthropogenic fire occurred both in 2008 and in 2015, in an area bordering Los Alerces National Park in the northwest of Chubut (Fig. 1). This forest is in the sub-Antarctic province of the deciduous forest district (Cabrera & Willink, 1980). The medium altitude of both areas (burnt and unburnt) is 1,000 m asl, with an annual average temperature of 8 °C. The soil is of sandy loam texture with a pH of 6.8 and 11.5% organic matter content and is classified as Andisols (Soil Survey Staff, 2014). The unburnt area is characterized by *Austrocedrus chilensis* and *Nothofagus* spp. with endemic herbaceous associations, *Maytenus boaria*, *Schinus patagonicus*, *Embothrium coccineum*, *Lomatia hirsuta*, *Austrocedrus chilensis*, *Ovidia andina* and the burnt forest area, in addition to the lenga (*N. pumilio*), is composed of other species: *Osmorhiza chilensis*, *Berberis microphylla*, *Berberis serratodentata*, *Poa pratensis*, *Acaena ovalifolia*, *Ribes cucullatum*, *Ribes magellanicum*, *Phacelia secunda*, and *Calceolaria biflora* (Silva et al., 2017).

The samples were taken 1 year after the fire in both cases (in 2009 and in 2016). Burnt and unburnt forest areas were selected using satellite images (sensor MODIS satellite Aqua) and processed using the open source software QGIS 3.4.4. The selected burnt sites presented a high severity of fire impact (> 50% of the subcanopy trees killed or damaged; high charring and some crown damage on canopy trees, but > 50% killed), according to the classification proposed by Mutch and Swetman (1995). Soil invertebrates were sampled using a 10 cm diameter stainless steel core, and each sediment core sample was taken at a depth of 10 cm (the study included a total of 80 soil samples). The samples were taken from the burnt area and from a relict area in the control “unburnt” part, that was not affected by the fire. The samples were repeated in all 4 seasons of both years (2009 and 2016).

The samples were brought to the laboratory, where the mesofauna was extracted with Berlese-Tullgren funnels for 12 days, collecting the fauna in bottles with 70% alcohol. Then, specimens were sorted, counted, and identified to species-level under a microscope (LEICA ICC50 HD) using general and regional keys (Balogh & Balogh, 1988, 1990; Balogh & Csiszár, 1963; Hammer,

1958, 1961, 1962a, b), and the recent catalogue published by Fredes (2018), in which a total of 398 species are listed. Regarding the systematics, the criteria of Schatz (2011) and Fredes (2018) were followed and the biogeographical distribution of species, the criteria of Subías (2004 and updated in 2018) and Fredes (2018) were followed. Species identified as “sp.” and “aff.” were only included in Table 1. The “aff.” term refers to species with morphological deviations, but which are probably not the same species. Taxon authors are not given in the reference list.

Results

A total of 43 species/morphospecies were found. Ten species were new records for Chubut province and 3 to Argentina (Table 1). Thirty-two species are listed below, along with the material examined: number of specimens collected (in parentheses), records in Argentina, and comments. Eleven morphospecies listed in Table 1, identified with “sp.” and “aff.” were not included in the list.

Brachychthoniidae Thor, 1934

Liochthonius van der Hammen, 1959

Liochthonius fimbriatissimus (Hammer, 1958)

Material examined: unburnt (3) and burnt (2).

Records in Argentina: Chubut, Mendoza, Río Negro, Santa Cruz, Tierra del Fuego (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Chile), Australian, and Subantarctic (Subías, 2004, update 2018).

Sellnickochthonius Krivolutsky, 1964

Sellnickochthonius elsosneadensis (Hammer, 1958)

Material examined: unburnt (1) and burnt (2).

Records in Argentina: Buenos Aires, Chubut, Mendoza, Río Negro (Fredes, 2018).

Comments: the distribution of the species is semi-cosmopolitan (Subías, 2004, update 2018).

Trichthoniidae Lee, 1982

Trichthonius Hammer, 1961

Trichthonius pulcherrimus (Hammer, 1958)

Material examined: unburnt (2).

Records in Argentina: Buenos Aires, Chubut, Mendoza, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Bolivia, Chile and Peru) and Australian (Australia) (Subías, 2004, update 2018).

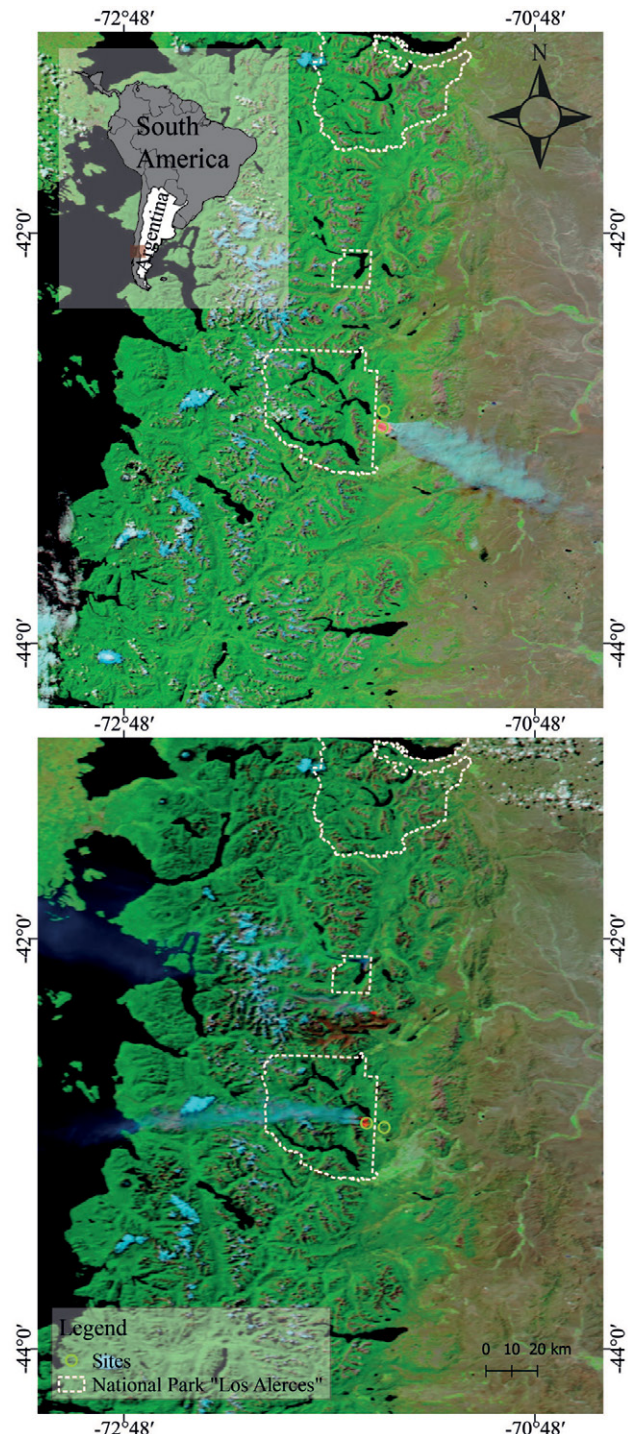


Figure 1. Study area map from Patagonian Argentina. The circles correspond to burnt and unburnt area. The map above corresponds to 2008 wildfire, and the map below to 2015 wildfire.

Table 1

Oribatid mites from the Patagonian forest (Chubut province, Argentina), according to burnt and not burnt (*First record for Chubut and **First record for Argentina)

Oribatid species/morphospecies	UNBURNT	BURNT
Acaronychidae		
<i>Stomacarus</i> sp.	1	
Brachychthoniidae		
<i>Liochthonius</i> (<i>Liochthonius</i>) <i>fimbriatissimus</i>	3	2
<i>Sellnickochthonius elsosneadensis</i>	1	2
Cosmochthoniidae		
<i>Trichthonius pulcherrimus</i>	2	
Euphthiracaridae		
<i>Acrotritia parareticulata</i> **	2	
Phthiracaridae		
Phthiracaridae sp.	1	
Crotoniidae		
<i>Camisia</i> (<i>Camisia</i>) <i>australis</i> *	1	
Tyrphonothrur		
<i>Tyrphonothrur</i> (<i>Tyrphonothrur</i>) <i>latus</i> **	1	
Nothridae		
<i>Nothrus peruensis</i> *	1	1
<i>Nothrus</i> sp. 1	14	
<i>Nothrus</i> sp. 2	1	
Pheroliodidae		
<i>Pheroliodes roblensis</i>	11	
Caleremaeidae		
<i>Anderemaeus magellanicus</i>	2	1
Nodocephidae		
<i>Nodocephus dentatus</i>	1	
Carabodidae		
<i>Carabodes</i> sp.	1	
Autognetidae		
<i>Austrogneta multipilosa</i>		1
<i>Austroppia crozetensis</i>	1	5
Oppiidae		
<i>Brachioppiella</i> (<i>Gressittoppia</i>) <i>pepitensis</i>	2	

Table 1 Continued

Oribatid species/morphospecies	UNBURNT	BURNT
<i>Brachioppiella</i> (<i>Brachioppiella</i>) <i>periculosa</i> *	2	
<i>Brachioppiella</i> (<i>Gressittoppia</i>) <i>peullaensis</i> *	1	
<i>Lanceoppia</i> (<i>Lanceoppia</i>) <i>intermedia</i>	19	
<i>Lanceoppia</i> (<i>Lanceoppia</i>) <i>maior</i> *	2	3
<i>Lanceoppia</i> (<i>Lancelalmoppia</i>) sp.	2	4
<i>Lanceoppia</i> (<i>Lancelalmoppia</i>) <i>kovacsi</i>	2	
<i>Membranoppia</i> (<i>Membranoppia</i>) <i>tuxeni</i>		4
<i>Microppia minus</i>	1	
<i>Lanceoppia</i> (<i>Lancelalmoppia</i>) <i>nodosa</i> *	1	1
<i>Lanceoppia</i> (<i>Bicristoppia</i>) <i>bicristata</i> *	1	2
<i>Membranoppia argentinensis</i>	8	2
<i>Oppiella nova</i>	14	17
<i>Paroppia patagonica</i>	4	2
<i>Oxyoppia</i> (<i>Oxyoppiella</i>) <i>suramericana</i>	2	6
<i>Ramusella</i> (<i>Insculptoppia</i>) sp.	1	
<i>Similoppia</i> (<i>Reductoppia</i>) sp.	2	
Suctobelbidae		
<i>Suctobelbella</i> sp.	1	
Tectocephidae		
<i>Tectocephus velatus</i>	22	
Cymbaeremaeidae		
<i>Scapheremaeus ornatus</i> *		1
Scutoverticidae		
<i>Scutovertex</i> sp.	1	
Tegoribatidae		
<i>Physobates spinipes</i> *	4	
<i>Lauropia fallax</i> **		1
Scheloribatidae		
<i>Fijibates</i> aff. <i>rostratus</i>	11	
Oribatellidae		
<i>Cuspidozetes armatus</i> *	3	

Euphthiracaridae Jacot, 1930

Acrotrititia Jacot, 1923

Acrotrititia parareticulata (Niedbala, 2002)

Material examined: unburnt (2).

Records in Argentina: first record (Chubut province).

Comments: the species was originally described in Canada as *Rhysotrititia parareticulata* by Niedbala (2002), who found 21 specimens under wet moss in Cedar Grove, Ontario.

Crotoniidae Thorell, 1876

Camisia Heyden, 1826

Camisia australis Hammer, 1958

Material examined: unburnt (1).

Records in Argentina: Mendoza, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Chile, Mexico, and Peru) and Subantarctic (Argentina) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Malaconothridae Berlese, 1916

Tyrphonothrus Knülle, 1957

Tyrphonothrus (*Tyrphonothrus*) Knülle, 1957

Tyrphonothrus (*Tyrphonotrurus*) *latus* (Hammer, 1962)

Material examined: unburnt (1).

Records in Argentina: first records for Argentina.

Comments: recorded distribution in Chile (Subías, 2004, update 2018). It is the first record for Argentina.

Nothridae Berlese, 1896

Nothrus Koch, 1836

Nothrus peruensis Hammer, 1961

Material examined: unburnt (1) and burnt (1).

Records in Argentina: Buenos Aires, Río Negro, Tierra del Fuego (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Chile, Mexico, and Peru) and Subantarctic (Argentina) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Pheroliodidae Paschoal, 1987

Pheroliodes Grandjean, 1931

Pheroliodes roblensis Covarrubias, 1968

Material examined: unburnt (11).

Records in Argentina: Chubut (Fredes, 2018).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) (Subías, 2004, update 2018).

Anderemaeidae Balogh, 1972

Anderemaeus Hammer, 1958

Anderemaeus magellanicus Hammer, 1962

Material examined: unburnt (2).

Records in Argentina: Río Negro, Tierra del Fuego (Fredes, 2018), and Chubut (Manzo et al., 2019).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) (Subías, 2004, update 2018).

Nodocepheidae Piffel, 1972

Nodocepheus Hammer, 1958

Nodocepheus dentatus Hammer, 1958

Material examined: unburnt (1).

Records in Argentina: Mendoza, Río Negro, Chubut, Subantarctic region (Fredes, 2018).

Comments: the distribution of species is Neotropical (Argentina, Chile, Ecuador), Oriental (Vietnam), and Subantarctic (Argentina) (Subías, 2004, update 2018).

Autognetidae Grandjean, 1960

Austrogneta Balogh & Csiszár, 1963

Austrogneta multipilosa Balogh & Csiszár, 1963

Material examined: unburnt (2) and burnt (1).

Records in Argentina: Buenos Aires, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Peru) and Australian (Australia, New Zealand) (Subías, 2004, update 2018).

Austroppia Balogh, 1983

Austroppia crozetensis (Richters, 1908)

Material examined: unburnt (1) and burnt (5).

Records in Argentina: Subantarctic, Chubut, Tierra del Fuego (Fredes, 2018).

Comments: the distribution of the species is Antarctic, Australian, Neotropical austral (Argentina, Chile), and Subantarctic (Subías, 2004, update 2018).

Oppiidae Sellnick, 1937

Brachioppiella (*Brachioppiella*) Hammer, 1962

Brachioppiella (*Brachioppiella*) *periculosa* Hammer, 1962

Material examined: unburnt (2).

Records in Argentina: Chubut, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Cuba) (Subías, 2004, update 2018).

Brachioppiella (*Gressittoppia*) Balogh, 1983

Brachioppiella (*Gressittoppia*) *pepitensis* (Hammer, 1962)

Material examined: unburnt (2).

Records in Argentina: Chubut, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) (Subías, 2004, update 2018).

Brachioppiella (Gressittoppia) peullaensis Hammer, 1962
Material examined: unburnt (1).

Records in Argentina: Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Graptoppia Balogh, 1983

Graptoppia angusta (Hammer, 1962)

Material examined: unburnt (2).

Records in Argentina: Chubut, Río Negro, Tierra del Fuego (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Peru) (Subías, 2004, update 2018).

Lanceoppia (Lanceoppia) intermedia (Hammer, 1962)

Material examined: unburnt (19).

Records in Argentina: Chubut, Río Negro, Tierra del Fuego, Subantarctic (Fredes, 2018).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) and Subantarctic (Argentina), and Antarctic (Subías, 2004, update 2018).

Globoppia Hammer, 1962

Lanceoppia (Lanceoppia) maior (Hammer, 1962)

Material examined: unburnt (2) and burnt (3).

Records in Argentina: Río Negro, Santa Cruz, Tierra del Fuego, Subantarctic region (Fredes, 2018).

Comments: the distribution of the species is Neotropical austral (Argentina, Chile) and Subantarctic (Argentina) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Lanceoppia (Bicristoppia) Subías, 1989

Lanceoppia (Bicristoppia) bicristata (Hammer, 1962)

Material examined: unburnt (1) and burnt (2).

Records in Argentina: Río Negro (Fredes, 2018)

Comments: the distribution of the species is in Argentina (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Lanceoppia (Lanceoppia) Hammer, 1962

Lanceoppia (Lancelalmoppia) kovacsi (Balogh & Csiszár, 1963)

Material examined: unburnt (2).

Records in Argentina: Chubut, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina) (Subías, 2004, update 2018).

Lanceoppia (Lancelalmoppia) Subías, 1989

Lanceoppia (Lancelalmoppia) nodosa (Hammer, 1958)

Material examined: unburnt (1) and burnt (1).

Records in Argentina: Buenos Aires, Mendoza (Fredes, 2018)

Comments: the distribution of the species is Neotropical (Argentina) and Oriental (India) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Membranoppia Hammer, 1968

Membranoppia argentinensis (Balogh & Csiszár, 1963)

Material examined: unburnt (8) and burnt (2).

Records in Argentina: Chubut, Río Negro, Tierra del Fuego (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Chile) (Subías, 2004, update 2018).

Membranoppia (Membranoppia) Hammer, 1968

Membranoppia (Membranoppia) tuxeni (Hammer, 1968)

Material examined: burnt (4).

Records in Argentina: Chubut (Ruiz, 2018).

Comments: the distribution of the species is Neotropical, New Zealand, and India (Subías, 2004, update 2018).

Microppia balogh, 1983

Microppia minus (Paoli, 1908)

Material examined: unburnt (1).

Records in Argentina: Buenos Aires, Chubut, Misiones, Río Negro (Fredes, 2018). *Comments:* the distribution of the species is cosmopolitan (Subías, 2004, update 2018). It is fire tolerant (Migliorini et al., 2004)

Oppiella Jacot, 1937

Oppiella nova (Oudemans, 1902)

Material examined: unburnt (14) and burnt (17).

Records in Argentina: Buenos Aires, Chubut, Río Negro (Fredes, 2018).

Comments: the distribution of the species is cosmopolitan (Subías, 2004, update 2018). It is fire tolerant (Webb, 1994)

Oxyoppia (Oxyoppiella) Subías & Rodriguez, 1986

Oxyoppia (Oxyoppiella) suramericana (Hammer, 1958)

Material examined: unburnt (2) and burnt (6).

Records in Argentina: Buenos Aires, Chubut, Mendoza, Misiones, Santa Cruz, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical, Australian, and Oriental (Subías, 2004, update 2018).

Paroppia Hammer, 1968

Paroppia patagonica Kun, 2012

Material examined: unburnt (4) and burnt (2).

Records in Argentina: Río Negro (Fredes, 2018)

Comments: the distribution of the species is in Argentina (Subías, 2004, update 2018).

Tectocephidae Grandjean, 1954

Tectocephus Berlese, 1896

Tectocephus velatus (Michael, 1880)

Material examined: unburnt (22).

Records in Argentina: Buenos Aires, Chubut, Entre Ríos, Misiones, Río Negro, subantarctic region (Fredes, 2018).

Comments: the distribution of this species is cosmopolitan (Subías, 2004, update 2018). It is the most heat-tolerant species within Oribatida (Malmström, 2008).

Cymbaeremaeidae Sellnick, 1928

Scapheremaeus Berlese, 1910

Scapheremaeus ornatus Balogh & Mahunka, 1968

Material examined: burnt (1).

Records in Argentina: Córdoba (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Mexico) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Tegoribatidae Grandjean, 1954

Physobates Hammer, 1962

Physobates spinipes Hammer, 1962

Material examined: unburnt (4).

Records in Argentina: Buenos Aires, Río Negro (Fredes, 2018).

Comments: the distribution of the species is Neotropical (Argentina, Chile) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Lauroppia Subías & Mínguez, 1986

Lauroppia fallax (Paoli, 1908)

Material examined: burnt (1).

Records in Argentina: first records for Argentina.

Comments: the distribution of the species is semi-cosmopolitan (Holarctic: western Palearctic, India: Uttar Pradesh, New Zealand, Chile). It is the first record for Argentina.

Oribatellidae Jacot, 1925

Cuspidozetes Hammer, 1962

Cuspidozetes armatus Hammer, 1962

Material examined: unburnt (3).

Records in Argentina: Río Negro (Fredes, 2018)

Comments: the distribution of the species is Neotropical (Argentina, Mexico) (Subías, 2004, update 2018). It is the first record for the province of Chubut.

Discussion

Of the new records from Argentina, there are 2 previously cited from Chile *Tyrphonostrus* (*Tyrphonotrus*) *latus* and *Lauroppia fallax* (Subías, 2004, update 2018). More than 60% of listed species are shared with Chile. Such a large proportion would possibly be expected due to the proximity of the sampling sites to the Chile-Argentina border. These species include: *Trichthonius pulcherrimus*, *Anderemaeus magellanicus*, *Pheroliodus roblensis*, *Brachiopiella* (*Gressittoppia*) *pepitensis*, *Lanceoppia* (*Lanceoppia*) *intermedia*, *Lanceoppia* (*Lanceoppia*) *maior*, *Lanceoppia* (*Lanceoppia*) *kovacsi*, *Graptoppia* (*Stenoppia*) *angusta*, *Nodocephus dentatus* (Subías, 2004, update 2018). While *Acrotrititia parareticulata*, which the present study cites as a new record for Argentina, has previously been described in Canada, other species from the same genera have also been cited in studies from both Canada and Argentina, e.g., *Acrotrititia ardua* (Koch, 1841). Furthermore, other, distinct genera have also been documented in studies from both countries. These include: *Banksinoma spinifera* (Hammer, 1952), *Verachthonius montanus* (Hammer 1952), *Tectoribates borealis* Behan-Pelletier & Walters, 2013 (Subías, 2004, update 2018), all of which are species endemic to the Americas.

Of the new records from Chubut, more than 80% have previously been found in central and southern Argentina, which is no doubt a testament to the biogeographical relationships between these different regions (Fredes & Martínez, 2008).

Exactly one quarter of the species found were shared with New Zealand. These include *Lauroppia fallax*, *Austrogneta multipilosa*, and *Membranoppia* (*M.*) *tuxeni*. Such a high proportion could be expected and explained by the fact that the 2 regions were directly connected by land during the Paleozoic Era. This has been cited by several authors (e.g., Kun et al., 2010; Ruiz et al., 2018). In addition, both regions shared the *Nothofagus* spp. distribution, which might point towards a specific relationship between *Nothofagus* spp. and Oribatid mite species.

Of the identified species, *Sellnickochthonius elsosneadensis*, *Oppiella nova*, *Micropoppia minus*, and *Tectocephus velatus* have a cosmopolitan or semi-cosmopolitan distribution (Subías, 2004, update 2018). *Sellnickochthonius elsosneadensis* was originally described in Mendoza, Argentina, on moist moss cushions between stiff *Juncus* (Hammer, 1958). Kun et al. (2010) found it under the forest soil of *Nothofagus antarctica*, Ruiz et al. (2015) found it in Chubut under the forest soil

of *Nothofagus pumilio*, and Fredes (2016) under patches of tala (*Celtis ehrenbergiana*). *Oppiella nova*, *Microppia minus*, and *Tectocephus velatus* are euryoecious species, found in all types of soils and climates, and are resistant to drought conditions (Lindberg & Bengtsson, 2005), pesticides (Prinzing et al., 2002) and fires (Webb, 1994). Their adaptive success is attributed, among other things, to a generalist diet and parthenogenetic reproduction (Norton & Palmer, 1991; Siepel, 1994). *Tectocephus velatus* is characterized by its dietary preference for mosses (Murvaridze et al., 2008), and requires sites with high humidity and organic matter, conditions that are not presented by a burnt site after a year. Malmström et al. (2008) did not record any recovery in oribatid mite communities 2 years after an incidence of fire.

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