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New records of springtails (Collembola: Entomobryomorpha) and oribatid mites (Acari: Oribatida) in Georgia

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Abstract: Four species of springtails and four species of oribatid mites were identified as new records for the Georgian fauna from different regions of the country: *Coecobrya tenebricosa* (Folsom, 1902); *Entomobrya muscorum* (Nicolet, 1842) Rondani, 1861; *Heteromurus major* (Moniez, 1889); *Pseudosinella octopunctata* Börner, 1901; *Austrocarabodes ensifer* (Sellnick, 1931); *Jacotella frondeus* (Kulijev, 1969); *Lasiobelba pori* (Vasilii & Ivan, 1995); and *Bipassalozetes sabulosus* (Shtanchaeva, 1986). Moreover, *L. pori* is the first record for the Caucasian fauna. With these new records, the number of springtail species known from Georgia increases to 97 and the number of oribatid mite species in Georgia exceeds 530.

Key words: Acari, Oribatida, Collembola, Caucasus

Oribatid mites (Oribatida) and springtails (Collembola), as other living organisms, have great importance in terms of biodiversity studies. There are ca. 8500 springtail species in the world (Bellingeret al., 1996–2015), while about 10,000 species of oribatid mites are known worldwide (Subías, 2004, electronically update in 2015).

Oribatid mites and springtails are found almost everywhere: in the soil, under the bark of trees, in decayed organic matter, in moss and litter, in the canopy, on water surfaces, on snow, and in caves (Coleman et al., 2004; Norton and Behan-Pelletier, 2009). These groups of invertebrates can be used to study the biodiversity of various terrestrial and above-ground habitats, as well as soil nutrient recycling and environmental health. Springtails and oribatid mites are excellent bioindicators of environmental pollution (Dunger et al., 2001; Fountain and Hopkin, 2001).

At present 93 species of springtails are known from Georgia (Barjadze et al., 2012; Vargovitsh, 2013; Djanashvili et al., 2014). According to the latest checklist of Caucasian oribatid mites, there were about 550 species of oribatid mites recorded for Georgia (Shtanchaeva and Subías, 2010); however, after that time a number of new findings have been registered, some systematic revisions have been made, and new species and subspecies are described (Murvanidze and Behan-Pelletier, 2011; Murvanidze and Weigmann,

2012; Shtanchaeva and Subías, 2012a, 2012b; Murvanidze et al., 2013, 2015; Murvanidze, 2014; Murvanidze and Todria, 2015) and currently 533 species of oribatid mites are known for Georgia (unpublished data).

Material was sampled in the Imereti, Racha-Lechkhumi, and Kvemo Svaneti (Western Georgia); Shida Kartli, Kvemo Kartli, Kakheti (Eastern Georgia); and Samtskhe-Javakheti regions (Southern Georgia) in 2011–2014. At each site six 10-cm³ soil samples were randomly taken using a hand trowel. Samples were placed in plastic bags and appropriately labelled. Extraction of oribatids and collembolans from the soil was performed using a modified Berlese–Tullgren device over 1 week. Extracted animals were put in plastic vials containing 75% ethyl alcohol for determination of species based on morphology. In order to identify oribatid mites, temporary slides were prepared using lactic acid. Springtails were mounted in Rusek's medium on slides for investigating under the microscope. Identification of oribatid mites was performed mainly using keys given by Ghilarov and Krivolutsky (1975) and other special papers. Springtails were identified based on Fjellberg (2007) and Jordana (2012). Voucher specimens are deposited in the collection of the Institute of Entomology, Agricultural University of Georgia, Tbilisi, Georgia.

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The springtail and oribatid mite species listed below are recorded for the first time for the fauna of Georgia, while *Lasiobelba pori* (Vasiliu & Ivan, 1995) is a first record for the Caucasian fauna.

Collembolans

Coecobrya tenebricosa (Folsom, 1902) (Family Entomobryidae, tribe Entomobryini)

Material examined: One specimen, soil, entrance zone of Navenakhevi cave (42°15'6.48"N, 42°52'11.72"E, 399 m a.s.l.), 1 March 2013, leg. Sh. Barjadze; two specimens, guano, dark zone of Navenakhevi cave (42°15'6.48"N, 42°52'11.72"E, 399 m a.s.l.), 1 March 2013, leg. Sh. Barjadze.

Ecology: It lives in soil and in caves (Jordana, 2012).

General distribution: Cosmopolitan (Jordana, 2012).

Entomobrya muscorum (Nicolet, 1842) Rondani, 1861 (Family Entomobryidae, tribe Entomobryini)

Material examined: Three specimens, broadleaved forest near administration building at Lagodekhi State Reserve (41°50'31.43"N, 46°16'57.08"E, 561 m a.s.l.), 17–27 June 2012, sampled by Malaise trap, leg. G. Japoshvili.

Ecology: It lives in wet habitats with vegetation and in wood litter (Jordana, 2012).

General distribution: Europe, from the Arctic to the Mediterranean (Jordana, 2012).

Heteromurus major (Moniez, 1889) (Family Entomobryidae, tribe Heteromurini)

Material examined: Four specimens, in soil, mixed broadleaved forest at the copper post smelting dump, Kazretipolymetal tailing sites (41°23'19.83"N, 44°26'27.93"E, 867 m a.s.l.), 18 April 2013, leg. M. Murvanidze.

Ecology: Unknown.

General distribution: Albania, Algeria, Austria, Azerbaijan, Azores, Balearic Is., Bulgaria, Canary Is., Chile, Corsica, Crete, Croatia, Czech Republic, Dodecanese Is., French mainland, Germany, Hungary, Italian mainland, Madeira, Malta, Mexico, Moldova, Palestine, Portuguese mainland, Romania, Sardinia, Sicily, Spanish mainland, Switzerland, Ukraine (Mari Mutt, 1980; Deharveng, 2013).

Pseudosinella octopunctata Börner, 1901 (Family Entomobryidae, tribe Lepidocyrtini)

Material examined: Six specimens, on a rotten tree, broadleaved forest, Likani, Borjomi-Kharagauli National Park (41°50'28.09"N, 43°20'23.27"E, 988 m a.s.l.), 11 June 2011, leg. M. Salakaia; seven specimens, in soil, mixed broadleaved forest at the copper post smelting dump, Kazretipolymetal tailing sites (41°23'19.83"N, 44°26'27.93"E, 867 m a.s.l.), 18 April 2013, leg. M. Murvanidze; two specimens, in soil, 15-year-old copper post smelting dump, dried, without vegetation, Kazretipolymetal tailing sites (41°23'24.55"N, 44°26'12.44"E, 777 m a.s.l.), 18 April 2013, leg. M. Murvanidze; four specimens, in soil, Gardabani clay

quarry (41°30'8.10"N, 45°5'51.96"E, 313 m a.s.l.), 13 May 2014, leg. M. Murvanidze.

Ecology: It lives in dry, warm habitats (Fjellberg, 2007).

General distribution: Cosmopolitan (Fjellberg, 2007).

Oribatid mites

Jacotella frondeus (Kulijev, 1969) (Family Gymnodamaeidae)

Material examined: One specimen, arid steppe with open arid woodland, Vashlovani Reserve (41°12'48.27"N, 46°21'42.34"E, 290 m a.s.l.), 10 October 2014, leg. L. Mumladze.

Ecology: Unclear.

General distribution: Mediterranean (Subías, 2004).

Austrocarabodes ensifer (Sellnick, 1931) (Family Carabodidae)

Material examined: Seven specimens, artificial arid woodland, Aspindza (41°35'0.29"N, 43°14'42.35"E, 1078 m a.s.l.), 15 September 2014, leg. L. Mumladze; one specimen, mixed forest, Shovi (42°40'36.95"N, 43°40'52.89"E, 1914 m a.s.l.), 20 September 2014, leg. L. Mumladze.

Ecology: Unclear.

General distribution: Palaearctic (Subías, 2004).

Lasiobelba pori (Vasiliu & Ivan, 1995) (Family Ooppiidae)

Material examined: Three specimens, natural meadow, Kavtiskhevi (41°53'16.62"N, 44°27'40.86"E, 535 m a.s.l.), 13 May 2014, leg. M. Murvanidze.

Ecology: Unclear.

General distribution: Ethiopian and Palaearctic regions, Hawaii (Ermilov et al., 2014).

Passalozetes sabulosus Shtanchaeva, 1986 (Family Passalozetidae)

Material examined: One specimen, arid steppe with open arid woodland, Vashlovani Reserve (41°12'48.27"N, 46°21'42.34"E, 286 m a.s.l.), 10 October 2014, leg. L. Mumladze.

Ecology: Dry steppe and forest soils.

General distribution: Caucasus (Subías, 2004).

With these new records, the number of springtail species known from Georgia increases to 97 and the number of oribatid mite species in Georgia reaches 533.

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