

The millipedes (Diplopoda) of the Chechen Republic, northern Caucasus, Russia

Двупарноногие многоножки (Diplopoda) Чеченской Республики (Северный Кавказ, Россия)

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КЛЮЧЕВЫЕ СЛОВА: таксономия, фауна, иконография, распространение, карта, Предкавказье.

ABSTRACT. No special studies on the millipede fauna of the Chechen Republic have hitherto been performed, the known published records being quite few and highly sporadic. The fauna is summarized here and it presently totals 19 species from 14 genera, 11 families and seven orders, all records thereby being mapped, both new and old, several species illustrated, and each species account supplied with notes on its distribution.

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РЕЗЮМЕ. Специальных исследований по многоножкам-диплоподам Чеченской Республики до сих пор не проводилось, а все известные находки там были очень немногочисленными и спорадическими. В настоящее время фауна обобщена и ныне включает

19 видов из 14 родов, 11 семейств и семи отрядов, при этом все новые и прежние находки отмечены на карте, частью снабжены иллюстрациями, а к каждому виду даны заметки по его распространению.

Introduction

The millipede faunas of only some of Russia's regions and republics in the northern Caucasus and Ciscaucasia can boast to be properly surveyed and summarized. This concerns the Rostov Region (Evsyukov, Golovatch [2013], with updates: Evsyukov [2016]), the Stavropol Province [Zuev, 2021], the Republic of Karachay-Cherkessia [Zuev *et al.*, 2023], and the Republic of North Ossetia – Alania [Golovatch, Antipova, 2022].

The present contribution summarizes the diplopod fauna of the Chechen Republic, based both on literature records and fresh material. The collecting localities are plotted on a relief map of the Chechen Republic (Fig. 9).



Fig. 1. *Hirudisoma roseum* (Victor, 1839), habitus, dorsal view. Taken not to scale.

Рис. 1. *Hirudisoma roseum* (Victor, 1839), внешний вид, сверху. Без масштаба.

Material and methods

The fresh material underlying the present contribution is shared between the following collections: Complex Research Institute, Russian Academy of Sciences, Laboratory of the Ecological and Genetic Monitoring of Living Systems, Grozny (CI RAS); Zoological Museum of the North Caucasian Federal University, Stavropol (ZMS); and Don State Technical University, Rostov-on-Don (DSTU).

The distribution map was created using Google Earth Pro (ver. 7.3.4.8248) and Adobe Photoshop CS6 (ver. 13.0.1.3). All collecting localities in and under the faunistic sections are referred to as the respective numbers on the map (Fig. 9) put in square brackets ([]).

Taxonomy

Order Polyxenida Family Polyxenidae

Genus *Propolyxenus* Silvestri, 1948 *Propolyxenus argentifer* (Verhoeff, 1921)

MATERIAL. 6 ex. (ZMS), Chechen Republic, Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix*, *Alnus* forest, in leaf litter, 42°44'00.6"N 46°02'52.8"E, 13.IV.2024; 2 ex. (ZMS), 1 ex. (DSTU), same place, 2 km SW of Makazhoy [15], Ansalta River Canyon, ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is widespread in the Caucasus and surrounding areas: Turkey, Georgia, Azerbaijan, Armenia and Iran. In Russia, it is known to occur in Crimea, the Krasnodar and Stavropol provinces, and in the Adygea Republic [Short *et al.*, 2020]. A species formally new to the fauna of the Chechen Republic.

Order Polyzoniida Family Hirudisomatidae Genus *Hirudisoma* Fanzago, 1881 *Hirudisoma roseum* (Victor, 1839) Fig. 1.

MATERIAL. 2 ♂♂, 4 ♀♀ (ZMS), 1 ♂, 1 juv. (DSTU), Chechen Republic, Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 12.IV.2024; 1 ♂, 3 ♀♀ (ZMS), same place [15], 13.IV.2024; 9 ♂♂, 9 ♀♀, 2 juv. (ZMS), same place, 2 km SW of Makazhoy [15], ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 1 ♂ (ZMS), Vedeno Distr., 1.4 km SW of Makazhoy [15], near Tundukoy, cliffs above Ansalta River Canyon, ~1500 m a.s.l., under stones and logs, 42°44'02.4"N

46°02'58.9"E, 14.IV.2024; 2 ♂♂, 4 ♀♀ (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 2 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species of Colobognatha is the most widespread in the Caucasus and surrounding areas: Turkey, Georgia, Azerbaijan and Russia: Krasnodar Province and the Adygea, Karachay-Cherkessia, Kabardino-Balkaria, and North Ossetia – Alania republics [Golovatch *et al.*, 2015; Evsyukov *et al.*, 2022; Golovatch, Antipova, 2023; Zuev *et al.*, 2023]. A species formally new to the fauna of the Chechen Republic.

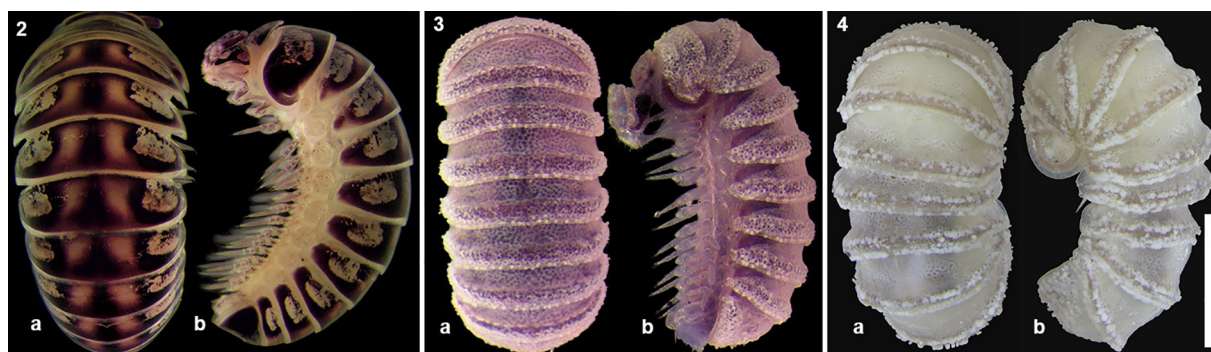
Order Glomerida Family Glomeridae Genus *Hyleoglomeris* Verhoeff, 1910 *Hyleoglomeris specialis* Golovatch, 1989 Fig. 2.

MATERIAL. 1 ♂, 2 ♀♀ (CI RAS), Chechen Republic, Shali Distr., near Avtura [13], *Carpinus* and *Ulmus* forest, 43°09'32.65"N 46°03'36.64"E, ~310 m a.s.l., 16.IX.2022; 1 ♀ (CI RAS), Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022, all L.M. Saparbayeva leg.; 4 ♀♀ (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 2 ♂♂, 4 ♀♀, 1 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is widespread in the central and eastern parts of the Caucasus Major, both in Ciscaucasia and Transcaucasia within Georgia, Azerbaijan and Russia: Ingushetia and Chechen republics (near Shaami-Yurt [2], Achkhoy-Martani Distr.; near Ulus-Kert [8] and near Shatoy [9], Shatoy Distr.; near Niki-Khita [14], Kurchaloy Distr.; Kharachoy [16], Vedeno Distr.) and Dagestan [Golovatch, 1989; Golovatch *et al.*, 2021; Evsyukov *et al.*, 2022].

Genus *Trachysphaera* Heller, 1857 *Trachysphaera costata* (Waga, 1857) Fig. 3.

MATERIAL. 1 ♀ (CI RAS), Chechen Republic, Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022, L.M. Saparbayeva leg.; 1 ♂, 19 ♀♀ (ZMS), 1 ♂, 4 ♀♀ (DSTU), Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 12.IV.2024; 4 ♀♀ (ZMS), same place [15], 13.IV.2024; 1 ♂, 1 ♀ (ZMS), 3 ♀♀ (DSTU),



Figs 2–4. Millipedes of the family Glomeridae, habitus, dorsal (a) and lateral views (b): 2 — *Hyleoglomeris specialis* Golovatch, 1989; 3 — *Trachysphaera costata* (Waga, 1857); 4 — *Trachysphaera minuta* Golovatch, 1976. Taken not to scale (2–3); scale bar: 1 mm (4).

Рис. 2–4. Диплоподы семейства Glomeridae, внешний вид, сверху (a) и сбоку (b): 2 — *Hyleoglomeris specialis* Golovatch, 1989; 3 — *Trachysphaera costata* (Waga, 1857); 4 — *Trachysphaera minuta* Golovatch, 1976. Без масштаба (2–3); масштаб 1 мм (4).

same place, 2 km SW of Makazhoy [15], Ansalta River Canyon, ~1400 m a.s.l., *Corylus* and *Carpinus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 1 ♂, 11 ♀♀, 1 juv. (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 24 ♀♀, 5 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is the most widespread among congeners, ranging from Central, Eastern and Southern Europe in the west, through Crimea and Anatolia, to nearly throughout the Caucasus in the east: Abkhazia, Georgia, Armenia, Azerbaijan (including Hyrcania in Azerbaijan and Iran), and Russia: Krasnodar and Stavropol provinces, Adygea, Karachay-Cherkessia, Kabardino-Balkaria, North Ossetia – Alania, Ingushetia, Dagestan and Chechen republics (mostly sub *T. rotundata* (Lignau, 1911): near Shaami-Yurt [2], Achkhoy-Martan Distr.; near Shatoy [9], Shatoy Distr.; near Tevzana [12] and Kharachoy [16], Vedeno Distr.; near Niki-Khita [14], Kurchaloy Distr.) [Golovatch, 1990, 2008, 2010, 2023; Evsyukov *et al.*, 2022]. Such a vast distribution seems at least partly to be due to parthenogenesis [Enghoff *et al.*, 2015; Antić *et al.*, 2021; Zuev *et al.*, 2023].

Trachysphaera minuta Golovatch, 1976

Fig. 4.

MATERIAL. 2 ♀♀ (DSTU), Chechen Republic, Shatoy Distr., 7.1 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~540 m a.s.l., Sayd-Emin (= Sayd-Emin Khyekh) Cave, 42°55'12.4"N 45°46'32.9"E, 17.IV.2024, I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species was described from caves in the Krasnodar Province, Russia [Golovatch, 1976]. Later found in forest litter in different areas of the Krasnodar Province, in the Republic of Ingushetia, northwestern Azerbaijan and western Georgia, as well as in the Nikortsminda Cave in Racha, Georgia [Golovatch, 1981, 1985, 1990]. A species formally new to the fauna of the Chechen Republic.

Order Julida

Family Blaniulidae

Genus *Nopoiulus* Menge, 1851
Nopoiulus kochii (Gervais, 1847)

MATERIAL. 2 juv. (CI RAS), Chechen Republic, Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022; 1 juv. (CI RAS), Shali Distr., near Avtura [13], *Carpinus* and *Ulmus* forest, 43°09'32.65"N

46°03'36.64"E, ~310 m a.s.l., 16.IX.2022, all L.M. Saparbayeva leg.; 1 ♀, 1 juv. (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, under bark, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 2 ♂♂ (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, under bark, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. A subcosmopolitan species widespread in the Caucasus [Enghoff, 1984; Golovatch, Enghoff, 1990; Evsyukov *et al.*, 2022; Golovatch, 2023; Zuev *et al.*, 2023]. A species formally new to the fauna of the Chechen Republic.

Family Nemasomatidae

Genus *Nemasoma* C.L. Koch, 1847

Nemasoma caucasicum (Lohmander, 1932)

MATERIAL. 1 ♀ (ZMS), Chechen Republic, Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, under bark, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 2 ♀♀ (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, under bark, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. Subendemic to the Caucasus, distributed in Turkey, Georgia, Azerbaijan, Armenia and Russia: Stavropol and Krasnodar provinces, Dagestan and North Ossetia – Alania republics [Enghoff, 1985, Korobushkin *et al.*, 2016; Zuev, 2021; Golovatch, Antipova, 2023; Zuev *et al.*, 2023]. A species formally new to the fauna of the Chechen Republic.

Family Julidae

Genus *Byzantorhopalum* Verhoeff, 1930

Byzantorhopalum rossicum (Timotheew, 1897)

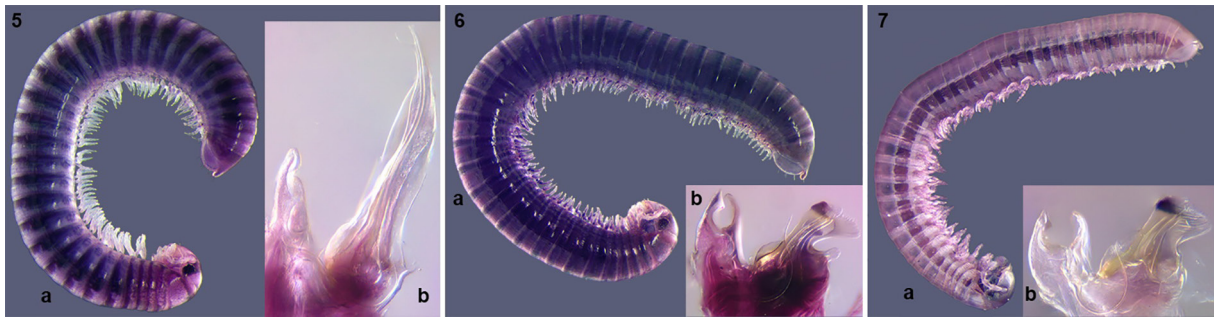
MATERIAL. 1 ♂ (ZMS), Chechen Republic, Shatoy Distr., 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, I.S. Turbanov and R.V. Zuev leg.

REMARKS. An Eastern Euro-Mediterranean species widely distributed in the Caucasus [Vagalinski, Golovatch, 2021; Golovatch, Antipova, 2023]. Previously unknown for the Chechen Republic.

Genus *Cylindroiulus* Verhoeff, 1894
Cylindroiulus kacheticus Lohmander, 1936

Fig. 5.

MATERIAL. 5 juv. (CI RAS), Chechen Republic, Shatoy Distr., near Dachu-Borzoi [6], mixed *Fagus* and *Quercus* forest, 42°59'43.31"N



Figs 5–7. Millipedes of the genus *Cylindroiulus*, habitus, lateral views (a) and gonopods, mesal views (b): 5 — *Cylindroiulus kacheticus* Lohmander, 1936; 6 — *Cylindroiulus pterophylacum* Read, 1992; 7 — *Cylindroiulus schestoperovi* Lohmander, 1932. Taken not to scale.

Рис. 5–7. Диплоподы рода *Cylindroiulus*, внешний вид, сбоку (а) и гоноподы, изнутри (б): 5 — *Cylindroiulus kacheticus* Lohmander, 1936; 6 — *Cylindroiulus pterophylacum* Read, 1992; 7 — *Cylindroiulus schestoperovi* Lohmander, 1932. Без масштаба.

45°45'43.15"E, 505 m a.s.l., 28.V.2023; 1 juv. (CI RAS), Shatoy Distr., Yarysh-Mardy [7], mixed *Quercus* and *Fagus* forest, 42°58'29.80"N 45°42'39.20"E, 411 m a.s.l., 28.V.2023; 10 juv. (CI RAS), Baysangur Distr., near Prigorodnoye [4], 43°15'06.05"N 45°46'36.58"E, ~280 m a.s.l., 9.IX.2022; 1 ♂, 6 ♀♀, 58 juv. (CI RAS), Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022; 10 juv. (CI RAS), Shali Distr., near Avtura [13], *Carpinus* and *Ulmus* forest, 43°09'32.65"N 46°03'36.64"E, ~310 m a.s.l., 16.IX.2022, all L.M. Saparbayeva leg.; 1 ♂, 8 ♀♀ (ZMS), Sernovodsk Distr., 0.5 km E of Bamut [1], western slope of Mount Nokhchi-Kort, ~360 m a.s.l., *Fraxinus*, *Carpinus* and *Quercus* forest, leaf litter, 43°09'26.3"N 45°12'23.4"E, 16.IV.2024; 4 ♀♀, 1 juv. (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 3 ♂♂, 3 ♀♀, 2 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is widespread in the eastern half of the Caucasus Major: eastern Georgia, northern Azerbaijan and Russia: Dagestan and Chechen republics: near Agishty [11], Shali Distr. and near Niki-Khita [14], Kurchaloy Distr. [Evsyukov *et al.*, 2022].

Cylindroiulus pterophylacum Read, 1992

Fig. 6.

MATERIAL. 2 ♂♂, 3 ♀♀, 2 juv. (ZMS), Chechen Republic, Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 12.IV.2024; 1 ♂, 4 ♀♀ (ZMS), same place [15], 13.IV.2024; 4 ♂♂, 11 ♀♀, 1 juv. (ZMS), 3 ♂♂, 2 ♀♀ (DSTU), 2 km SW of Makazhoy [15], ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 1 ♂, 2 ♀♀ (ZMS), Shatoy Distr., 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is widespread in the western Caucasus [Read, 1992; Evsyukov *et al.*, 2022]. A species formally new to the fauna of the Chechen Republic, currently representing its easternmost record.

Cylindroiulus schestoperovi Lohmander, 1932

Fig. 7.

MATERIAL. 1 ♂, 13 ♀♀, 1 juv. (ZMS), Chechen Republic, Vedeno Distr., 2 km SW of Makazhoy [15], ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. Endemic to the Caucasus, known only from Georgia and Russia (Krasnodar Province) [Read, 1992]. Above is the easternmost record of this species which has hitherto been unknown from the Chechen Republic.

Genus *Julus* Linnaeus, 1758

Julus kubanus Verhoeff, 1921

Fig. 8.

MATERIAL. 1 ♀ (CI RAS), Chechen Republic, Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022, L.M. Saparbayeva leg.; 1 ♂, 6 juv. (DSTU), Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 13.IV.2024 3 ♂♂, 1 juv. (DSTU), Shatoy Distr., 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. This species is endemic to the Caucasus, one of the most common and widespread in the region: Abkhazia, Georgia and Russia: Krasnodar Province, Adygea, Karachay-Cherkessia, North Ossetia – Alania, and Chechen republics: Kharachoy [16], Vedeno Distr. [Evsyukov *et al.*, 2018].

All freshly collected males show morphological differences from the typical form [Evsyukov *et al.*, 2018] in the main process of each ♂ coxa 2 being devoid of a caudal outgrowth (Fig. 8c).

Genus *Leucogeorgia* Verhoeff, 1930

Leucogeorgia umari Antić et Turbanov, 2022

REMARK. This troglobitic species is endemic to a sulfuric cave in the Sharo-Argun River gorge near Ulus-Kert [8], Shatoy District in the Chechen Republic [Antić, Turbanov, 2022].

Genus *Omobrachiulus* Lohmander, 1936

Omobrachiulus caucasicus (Karsch, 1881)

MATERIAL. 1 juv. (CI RAS), Chechen Republic, Shatoy Distr., Yarysh-Mardy [7], 42°58'29.80"N 45°42'39.20"E, ~410 m a.s.l., 28.V.2023; 2 ♀♀, 5 juv. (CI RAS), Shatoy Distr., near Benoy [10], mixed *Fagus*, *Quercus* and *Carpinus* forest, 42°49'27.01"N 45°42'00.30"E, ~950 m a.s.l., 28.V.2023; 2 ♀♀ (CI RAS), Shali Distr., near Chiri-Yurt [5], 43°04'15.44"N 45°47'34.31"E, ~450 m a.s.l., 28.V.2023; 2 ♀♀, 3 juv. (CI RAS), Nozhai-Yurt Distr., near Chechel-Khi [18], mixed grassland on slope, 43°00'54.96"N 46°25'35.67"E, 905 m a.s.l., 18.VII.2023; 1 ♂, 5 ♀♀, 3 juv. (CI RAS), Baysangur Distr., near Prigorodnoye [4], mixed *Quercus* and *Ulmus* forest,



Fig. 8. *Julus kubanus* Verhoeff, 1921, habitus, lateral view (a), gonopod, mesal view (b), main process of ♂ соха 2, mesal view (c). Scale bars: 1 mm (a); 0.1 mm (b, c).

Рис. 8. *Julus kubanus* Verhoeff, 1921, внешний вид, сбоку (a), гонопод, изнутри (b), главный отросток коксы 2 самца, изнутри (c). Scale bars: 1 мм (a); 0.1 мм (b, c).

43°15'06.05"N 45°46'36.58"E, ~280 m a.s.l., 9.IX.2022; 2 ♀♀, 11 juv. (CI RAS), Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022; 3 juv. (CI RAS), Shelkovskoy Distr., near Shelkovskaya Railway Station [17], Lake Stepnaya Zhemchuzhina, mixed-grass steppe, 43°35'42"N 46°21'43"E, 5 m a.s.l., 16.V.2023; 1 ♂, 1 ♀, 6 juv. (CI RAS), Shali Distr., near Avtura [13], *Carpinus* and *Ulmus* forest, 43°09'32.65"N 46°03'36.64"E, ~310 m a.s.l., 16.IX.2022, all L.M. Saparbayeva leg.; 7 ♂♂, 11 ♀♀, 27 juv. (ZMS), 2 ♂♂, 3 ♀♀ (DSTU), Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 12.IV.2024; 3 ♂♂, 5 ♀♀, 18 juv. (ZMS), same place [15], 13.IV.2024; 1 ♂, 9 ♀♀, 4 juv. (ZMS), 2 ♂♂, 3 ♀♀ (DSTU), 2 km SW of Makazhoy [15], Ansalta River Canyon, ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 5 ♂♂, 2 ♀♀, 2 juv. (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 10 ♂♂, 3 ♀♀, 2 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. Subendemic to the Caucasus region, very common and highly widespread across Ciscaucasia (Stavropol in the north and up to Kalmykia in the northeast), entire Dagestan, as well as most of Georgia (except for the Black Sea coast), Armenia and Azerbaijan (including the Hyrcanian part), also in northern and northwestern Iran, and northeastern Turkey [Vagalinski, Golovatch, 2021]. Previously recorded from the Chechen Republic: near Ulus-Kert [8], Shatoy Distr.; near Tevzana [12], Vedeno Distr.; and near Niki-Khita [14], Kurchaloy Distr. [Golovatch *et al.*, 2021; Evsyukov *et al.*, 2022].

Omobrachiulus macrourus (Lohmander, 1928)

MATERIAL. 1 juv. (CI RAS), Chechen Republic, Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022; 1 ♀ (CI RAS), Shali Distr., near Avtura [13], *Carpinus* and *Ulmus* forest, 43°09'32.65"N 46°03'36.64"E, ~310 m a.s.l., 16.IX.2022, all L.M. Saparbayeva leg.

REMARKS. A Caucasian endemic hitherto recorded from Abkhazia, most of Georgia, and in Russia: Kabardino-Balkaria,

North Ossetia – Alania, and Chechen republics (near Tevzana [12], Vedeno Distr.) [Vagalinski, Golovatch, 2021; Golovatch, 2023].

Order Chordeumatida

Family Athroleucosomatidae

Genus *Enghoffiella* Antić et Makarov, 2016

Enghoffiella insolita Antić et Makarov, 2016

MATERIAL. 2 ♀♀ (CI RAS), Chechen Republic, Kurchaloy Distr., near Niki-Khita [14], mixed *Fagus* and *Carpinus* forest, 43°07'14.56"N 46°03'53.72"E, 525 m a.s.l., 28.IV.2022, L.M. Saparbayeva leg.; 1 ♂, 2 ♀♀, 1 juv. (ZMS), Shatoy Distr., 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, I.S. Turbanov and R.V. Zuev leg.

REMARK. Endemic to the Chechen Republic: this species was described from Argun River Valley in near Shatoy [9], Shatoy Distr. [Antić, Makarov, 2016].

Order Polydesmida

Family Polydesmidae

Genus *Brachydesmus* Heller, 1858

Brachydesmus assimilis Lohmander, 1936

MATERIAL. 4 ♂♂, 7 ♀♀, 2 juv. (ZMS), 3 ♂♂, 3 ♀♀ (DSTU), Chechen Republic, Vedeno Distr., 1.5 km SW of Makazhoy [15], Ansalta River Canyon, ~1350 m a.s.l., *Corylus*, *Betula*, *Salix* and *Alnus* forest, leaf litter, 42°44'00.6"N 46°02'52.8"E, 12.IV.2024; 1 ♂, 3 ♀♀ (ZMS), same place [15], 13.IV.2024; 1 ♀ (DSTU), 2 km SW of Makazhoy [15], Ansalta River Canyon, ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 2 ♂♂, 1 ♀ (ZMS), Urus-Martan Distr., 1.7 km W to Urus-Martan, Urus-Martan Nature Reserve [3], Roshnya River Valley, ~250 m a.s.l., *Crataegus*, *Acer* and *Populus* forest, leaf litter, 43°07'25.7"N 45°29'10.3"E, 16.IV.2024; 2 ♂♂, 1 ♀ (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 14 ♂♂, 9 ♀♀, 6 juv. (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

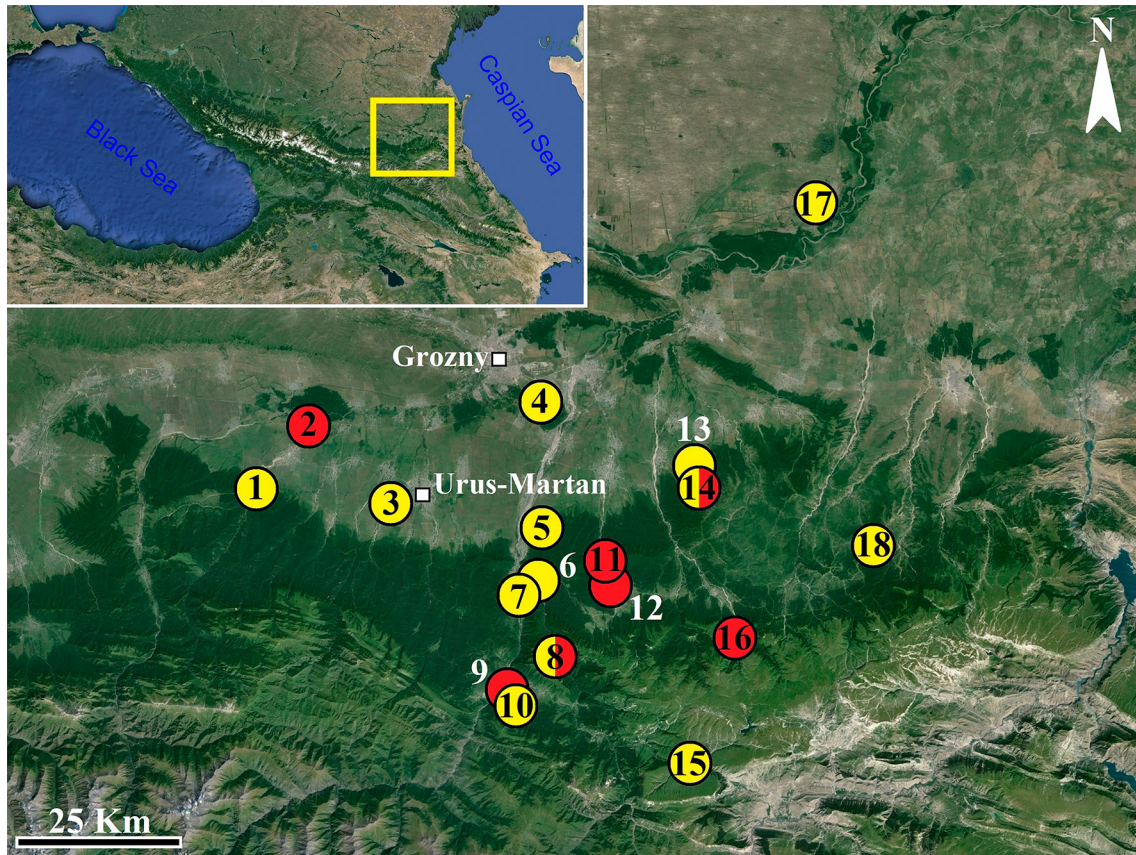


Fig. 9. Relief map of the Chechen Republic, with the collecting localities arranged from west to east (yellow/light circles: the present study, red/dark circles: previous data): 1 — Sernovodsk Distr., near Bamut; 2 — Achkhoy-Martan Distr., near Shaami-Yurt; 3 — Urus-Martan Distr., near Urus-Martan; 4 — Baysangur Distr., near Prigorodnoye; 5 — Shali Distr., near Chiri-Yurt; 6 — Shatoy Distr., near Dachu-Borzo; 7 — Shatoy Distr., Yarysh-Mardy; 8 — Shatoy Distr., near Ulus-Kert; 9 — Shatoy Distr., near Shatoy; 10 — Shatoy Distr., near Benoy; 11 — Shali Distr., near Agishty; 12 — Vedeno Distr., near Tevzana; 13 — Shali Distr., near Avtura; 14 — Kurchaloy Distr., near Niki-Khita; 15 — Vedeno Distr., near Makazhoy; 16 — Vedeno Distr., Kharachoy; 17 — Shelkovskoy Distr., near Shelkovskaya Railway Station; 18 — Nozhai-Yurt Distr., near Chechchel-Khi.

Рис. 9. Рельефная карта Чеченской Республики с основными точками сбора, показанными с запада на восток (желтые/светлые круги — наши данные, красные/темные круги — литературные данные): 1 — Серноводский р-н, близ Бамута; 2 — Ачхой-Мартановский р-н, близ Шаами-Юрт; 3 — Урус-Мартановский р-н, близ Урус-Мартана; 4 — Байсангуровский р-н, близ Пригородного; 5 — Шалинский р-н, близ Чир-Юрт; 6 — Шатойский р-н, близ Дачу-Борзой; 7 — Шатойский р-н, Ярыш-Марды; 8 — Шатойский р-н, близ Улус-Керта; 9 — Шатойский р-н, близ Шатой; 10 — Шатойский р-н, близ Беной; 11 — Шалинский р-н, близ Агишты; 12 — Веденский р-н, близ Тевзаны; 13 — Шалинский р-н, близ Автуры; 14 — Курчалоевский р-н, близ Ники-Хита; 15 — Веденский р-н, близ Макажой; 16 — Веденский р-н, Харачой; 17 — Шелковской р-н, близ ж/д станции Шелковская; 18 — Ножай-Юртовский р-н, близ Чечель-Хи.

REMARKS. Endemic to the Caucasus, this common and widespread species occurs over most of the region: Azerbaijan, Armenia, Georgia and Russia: Adygea, Kabardino-Balkaria, North Ossetia – Alania, Ingushetia, Chechen and Dagestan republics [Golovatch *et al.*, 2016; Golovatch, Antipova, 2023]. In the Chechen Republic, it has been recorded: near Shatoy [9], Shatoy Distr.; and Kharachoy [16], Vedeno Distr. [Golovatch *et al.*, 2016].

Brachydesmus kalischewskyi Lignau, 1915

MATERIAL. 1 ♂, 1 ♀ (ZMS), Chechen Republic, Vedeno Distr., 2 km SW of Makazhoy [15], Ansalta River Canyon, ~1400 m a.s.l., *Carpinus* and *Corylus* forest, leaf litter, 42°43'57.2"N 46°02'31.4"E, 13.IV.2024; 4 ♂♂, 2 ♀♀ (ZMS), Shatoy Distr., 7.1 km S of Ulus-Kert [8], slope on left bank of Sharo-Argun River gorge, ~565 m a.s.l., *Fagus* and *Fraxinus* forest, leaf litter, 42°55'10.9"N 45°46'21.7"E, 16.IV.2024; 1 ♀ (ZMS), 7.0 km S of Ulus-Kert [8], right bank of Sharo-Argun River, ~500 m a.s.l., *Fagus*, *Carpinus* and *Alnus* forest, leaf litter, 42°55'10.8"N 45°46'34.5"E, 17.IV.2024, all I.S. Turbanov and R.V. Zuev leg.

REMARKS. Subendemic to the Caucasus region, this highly polymorphous species is very common and highly widespread in Russia's Caucasus, as well as Azerbaijan, Georgia, Armenia, eastern Turkey and northwestern Iran [Golovatch *et al.*, 2016; Golovatch, Antipova, 2023]. In the Chechen Republic, it has been recorded from near Niki-Khita [14], Kurchaloy Distr. [Evsvyukov *et al.*, 2022].

Family Paradoxosomatidae Genus *Strongylosoma* Brandt, 1833 *Strongylosoma kordylamythrum* Attems, 1898

MATERIAL. 1 juv. (CI RAS), Chechen Republic, Shali Distr., near Chiri-Yurt [5], 43°04'15.44"N 45°47'34.31"E, ~450 m a.s.l., 28.V.2023, L.M. Saparbayeva leg.

REMARKS. Subendemic of the Caucasus region, this species is highly common and widespread nearly throughout the region [Evsvyukov *et al.*, 2018]. In the Chechen Republic, it has been recorded from near Shatoy [9], Shatoy Distr. [Evsvyukov *et al.*, 2018].

Table. Fauna and chorology of Diplopoda in the Chechen Republic.
Таблица. Фауна и хорология Диплопода Чеченской Республики.

Species	Chorotypes	Northern plains and foothills	Southern montane forests	Subalpine and alpine grasslands (>1700 m a.s.l.)
<i>Nopoiulus kochii</i>	A	+	+	
<i>Trachysphaera costata</i>	EM		+	
<i>Byzantorhopalum rossicum</i>	EM		+	
<i>Propolyxenus argentifer</i>	CSe		+	
<i>Hirudisoma roseum</i>	CSe		+	
<i>Nemasoma caucasicum</i>	CSe		+	
<i>Brachydesmus kalischewskyi</i>	CSe		+	
<i>Strongylosoma kordylamythrum</i>	CSe		+	
<i>Trachysphaera minuta</i>	CE		+	
<i>Hyleoglomeris specialis</i>	CE		+	
<i>Cylindroiulus kacheticus</i>	CE	+	+	
<i>Cylindroiulus pterophylacum</i>	CE		+	
<i>Cylindroiulus schestoperovi</i>	CE		+	
<i>Julus kubanus</i>	CE		+	
<i>Omobrachiulus caucasicus</i>	CE	+	+	
<i>Omobrachiulus macrourus</i>	CE		+	
<i>Brachydesmus assimilis</i>	CE	+	+	
<i>Leucogeorgia umari</i>	E, T		+	
<i>Enghoffiella insolita</i>	E		+	
Total: 19		4	11	-

Chorotypes, from wider to increasingly narrower distributions: A — subcosmopolitan anthropochore; EM — Euro-Mediterranean; CSe — subendemic to the Caucasus; CE — endemic to the Caucasus; E — endemic to the Chechen Republic; T — troglobiont.

Conclusion

As a result of the present contribution, the millipede fauna of the Chechen Republic presently amounts to 19 species from 14 genera, 11 families and seven orders (Table). As many as eight species are formally new to the Chechen list. There is little doubt that the above diversity estimates are not final, the more so as the high-montane subalpine and alpine grassland habitats (>1700 m a.s.l.) remain virtually fully unexplored (Table).

Quite expectedly, most of the diplopod species revealed, like elsewhere in the Caucasus, are forest-dwellers endemic or subendemic to the Caucasus region. Only one, *Leucogeorgia umari*, seems to be a troglobiont restricted to an ecologically very peculiar karst, i.e. a sulfuric cave [Antić, Turbanov, 2022]. The only unquestioned anthropochore is the subcosmopolitan *Nopoiulus kochii*. The more arid, steppe-clad to semi-desert parts in the north of the Chechen Republic appear to be particularly poor in millipedes, thus again emphasizing the class Diplopoda being largely composed of meso- to hygrophilous species [Golovatch, 1984].

The long noted trend in a gradual west to east depauperation of the diplopod faunas of the Caucasus [Kokhia, Golovatch, 2020], including the Caucasus Major that supports the Chechen Republic on its northern macro slope, is generally confirmed in the present study. Thus, the faunas of the Republic of Karachay-Cherkessia, the Stavropol Province and the Republic of North Ossetia – Alania, all three regions comparable in area and also lying on the northern macro slope of the Caucasus Major, but situated increasingly west of the Chechen Republic, amount to 31, 27 and 17 species, respectively [Zuev, 2021; Golovatch, Antipova, 2022; Zuev *et al.*, 2023], vs 19 in the Chechen Republic (Table).

The distribution of the endemic Caucasian genus *Leucogeorgia* may serve as another example of the same trend. Presently, the genus encompasses 15 species in the western Caucasus (Georgia, Abkhazia and Russia: Adygea Republic and Krasnodar Province), largely eutroglobionts, and *L. umari*, a single, strongly isolated and the easternmost outlier in the Chechen Republic [Antić, Turbanov, 2022].

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

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