

**Rare and endemic for the South Urals species of coleopterans
(Coleoptera: Carabidae, Chrysomelidae): new records
from Mashak and Zigelga mountain ranges, Russia**

**Редкие и эндемичные для Южного Урала виды жестокрылых
(Coleoptera: Carabidae, Chrysomelidae): новые находки
с хр. Машак и Зигальга**

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Key words: Carabidae, Chrysomelidae, *Carabus karpinskii*, *Nebria uralensis*, *Chrysolina lagunovi*, *Chrysolina poretzkyi*, endemics, new record, alpine tundra, South Urals.

Ключевые слова: Carabidae, Chrysomelidae, *Carabus karpinskii*, *Nebria uralensis*, *Chrysolina lagunovi*, *Chrysolina poretzkyi*, эндемик, новая находка, горная тундра, Южный Урал.

Abstract. In 2024 and 2025 in the State Nature Reserve «Yuzhno-Uralskii» species composition of herpetobiont coleopterans was first surveyed at the highest summit of Zigelga Mountain Range and previously completely unexplored Mashak Mountain Range. *Carabus (Morphocarabus) karpinskii* Kryzhanovskij et Matveev, 1993, the only endemic species for the Urals from this genus, was found in alpine tundra of Bolshoi Shelom Mountain (Zigelga Mountain Range) and three surveyed summits of Mashak Mountain Range, namely: Medvezh'ya Mountain, Shirokaya Mountain and Kobeya Mountain. Along with *C. karpinskii* one more species of the genus, *C. (Oreocarabus) glabratus* Paykull, 1780, was recorded at the southern sector of Medvezh'ya Mountain, this is the first finding of this species in the alpine zone of the South Urals. The endemic ground beetle of the South Urals *Nebria (Boreonebria) uralensis* Glasunov, 1901 was found at Shirokaya Mountain. The leaf beetle *Chrysolina (Pleurosticha) lagunovi* Mikhailov, 2007, previously known in the Republic of Bashkortostan only from the Iremel Massif, was newly registered for alpine tundra of Medvezh'ya and Shirokaya mountains. However, breeding in cages showed that *Chrysolina lagunovi* from Mashak Mountain Range didn't feed on *Anemonastrum biarmiense* (Juz.) Holub, the main host plant of this species in all previously known locations. The leaf beetle *Chrysolina (Arctolina) poretzkyi* (Jacobson, 1897) was firstly collected in the tall herbage meadows of Kharitonova Mountain and Yagodnaya Mountain.

Резюме. В 2024 и 2025 гг. в Южно-Уральском государственном природном заповеднике был изучен видовой состав герпетобионтных жестокрылых высшей вершины хр. Зигальга и ранее совершенно неисследованного хр. Машак. В горных тундрах г. Большой Шелом (хр. Зигальга) и всех трёх обследованных вершин хр. Машак:

г. Медвежья, г. Широкая и г. Кобея, отмечена жужелица *Carabus (Morphocarabus) karpinskii* Kryzhanovskij et Matveev, 1993, единственный эндемик Урала из этого рода. Помимо *C. karpinskii* в южном секторе вершины г. Медвежьей отмечен ещё один вид рода — *C. (Oreocarabus) glabratus* Paykull, 1780, это первая находка данного вида в горных тундрах Южного Урала. Эндемичная для Южного Урала жужелица *Nebria (Boreonebria) uralensis* Glasunov, 1901 найдена на г. Широкая. В горных тундрах гор Медвежья и Широкая обнаружен листоед *Chrysolina (Pleurosticha) lagunovi* Mikhailov, 2007, ранее известный в Башкирии только с массива Иремель. Однако, как показало содержание в садках, *Chrysolina lagunovi* с хр. Машак не питаются на *Anemonastrum biarmiense* (Juz.) Holub, их основном кормовом растении во всех ранее известных точках находок. Листоед *Chrysolina (Arctolina) poretzkyi* (Jacobson, 1897) был впервые пойман в высокотравных лугах г. Харитонова и г. Ягодной.

Introduction

The studies of coleopterans of the high mountains of the South Urals were started from Carabidae in 1980-ies by Matveev [1985], Kashevarov [1986] and Korobeinikov [1988, 1991]. By the beginning of 1990-ies six mountain ranges and massives had been surveyed: Yamantau, Iremel, Nurgush, Uren'ga, Taganay and Yurma. Iremel Massif appeared to be best studied as all the mentioned researchers worked there along with Olschwang and Malozemov [1987], who collected insects other than carabids. Korobeinikov [1991] considered that study of the fauna of alpine zone of the South

Urals cannot be limited by so small number of surveyed summits, but because of his untimely death the research was not continued.

In 2000 the GLORIA (Global Observation Research Initiative in Alpine Environments) network was founded for the comparative study of climate change impacts on alpine biota and its biodiversity [Grabherr et al., 2000]. The first permanent plots were established in 2001 at 66 summits in 17 mountain regions of Europe including the South Urals [Pauli et al., 2012]. In the South Urals as a target region four summits were chosen: Dalniy Taganay (1109 m a.s.l.), Bolshoi Nurgush (1413 m), Maliy Iremel (1437 m) and Bolshoi Iremel (1565 m). Initially only the monitoring of plant communities was performed at the permanent plots but since 2008 the study of herpetobiont invertebrates was added by me. In 2015–2016 and 2022–2023 the summits were resurveyed.

The special studies demonstrate that in the mountains of South Urals alpine tundra communities can be found at 37 summits of 12 mountain ranges and massifs [Grigoriev et al., 2024]. The largest islands of alpine tundra (around 80 % of total area) are situated at the Iremel and Kuyantau massifs, Zigelga and Nurgush mountain ranges. The small islands of alpine tundra (less than 20 ha each) can be found at the mountain ranges Bolshoi Taganay, Zyuratkul, Uren'ga, Nary, Mashak, Kumardak and some others [Grigoriev et al., 2024]. Among the latter Mashak Mountain Range in the State Nature Reserve «Yuzhno-Uralskii» attracted my atten-

tion as this mountain range has at least five summits with alpine tundra but its insect fauna has not been studied yet. During the expedition in July 2025 we could study species composition of the herpetobiont coleopterans from three summits of this mountain range: Medvezh'ya, Shirokaya and Kobeya mountains, from first and second by establishing soil traps and from the third by manual collecting under stones.

Materials and methods

The collection of herpetobiont invertebrates was performed by pitfall traps installed according to the special protocol elaborated by me [Mikhailov, 2009] and later on included in the official manual of the GLORIA project [Pauli et al., 2015]. For each surveyed summit its highest point was marked and the area below divided into four sectors, in each sector 20 standard 75-mm-diameter plastic cups were installed in a cross-shaped line, i.e., 10 traps placed along the main line (north, south, east, and west) at least 1 m apart, and another 10 traps were placed perpendicular to the first line. Usually after three days the traps were removed and their contents placed in specially marked containers.

All material mentioned in the paper is preserved in the author's private collection in Yekaterinburg.

The present work is registered in ZooBank (www.zoobank.org) under urn:lsid:zoobank.org:pub:638FAD55-D1C0-4E51-901D-461C5B12A686

Results

Carabidae

Carabus (Morphocarabus) karpinskii

Kryzhanovskij et Matveev, 1993

Жужелица Карпинского

Fig. 1.

Material. Chelyabinskaya Oblast, Zigelga National Park: Zigelga Mountain Range, Kruglaya (Malaya Poperechnaya) Mountain, grass-moss alpine tundra, h~1362 m a.s.l., 54.64521° N, 58.63459° E, pitfall traps, 5–09.VIII.2023, Yu.E. Mikhailov leg. — 1♂, 1♀. Republic of Bashkortostan, Beloretskii District, State Nature Reserve «Yuzhno-Uralskii»: Zigelga Mountain Range, Bolshoi Shelom Mountain, summit plateau, grass-moss alpine tundra, h~1407 m a.s.l., 54.52187° N, 58.33385° E, pitfall traps, 10–13.VII.2024, Yu.E. Mikhailov leg. — 1♂, 3♀. Mashak Mountain Range, Medvezh'ya: Mountain, grass-moss alpine tundra, h~1303 m a.s.l., 54.42877° N, 58.32274° E, pitfall traps, 3–9.VII.2025, Yu.E. Mikhailov leg. — 9♂, 14♀. Kobeya Mountain, grass-moss alpine tundra, h~1250 m a.s.l., 54.38966° N, 58.28789° E, under flat stone, 6. VII.2025, Yu.E. Mikhailov leg. — 1♀. NE spur of Shirokaya Mountain, alpine tundra with *Juncus*, h~1320 m a.s.l., manual collection, 7.VII.2025, Yu.E. Mikhailov leg. — 1♂. Shirokaya Mountain, main summit, grass-moss alpine tundra, h~1332 m a.s.l., 54.37605° N, 58.25467° E, pitfall traps, 7–8.VII.2025, Yu.E. Mikhailov leg. — 2♂, 2♀.

Distribution and remarks. *Carabus karpinskii* is the only endemic species for the Urals from this genus, whose distribution is limited with the high mountainous part of the South Urals in Chelyabinskaya Oblast and Republic of Bashkortostan. It was described from Bolshoi Iremel Mountain by Kryzhanovskij and Matveev [1993] but known to the Urals' entomologists long before. Matveev [1985] and Kashevarov [1986] recorded it from Bolshoi Iremel Mountain and Korobeinikov [1991] also from Uren'ga and Nurgush mountain ranges.

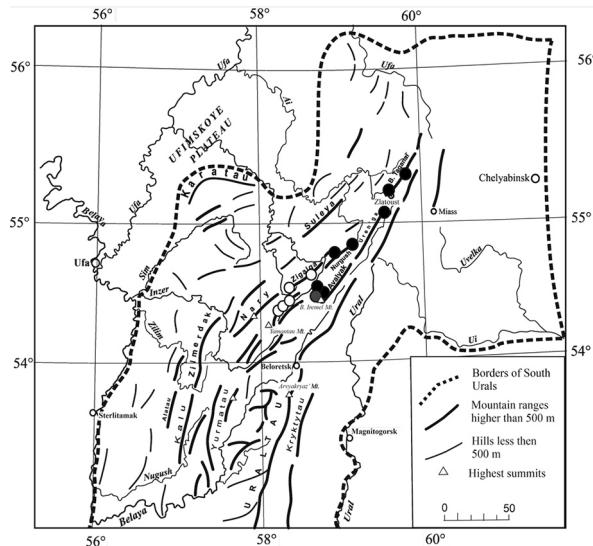


Fig. 1. Distribution map of *Carabus karpinskii* Kryzhanovskij et Matveev, 1993 in the South Urals. Designations: grey circle — locus typicus, black circles — previously known records, white circles — new records. Borders of the South Urals after Chibilyov, Chibilyov [2012], orographic scheme after Olenev [1965].

Рис. 1. Карта распространения *Carabus karpinskii* Kryzhanovskij et Matveev, 1993 на территории Южного Урала. Обозначения: серый круг — типовое местонахождение, чёрные круги — ранее известные находки, белые круги — новые находки. Границы Южного Урала даны согласно работе Чибилиёва и Чибилиёва [2012], орографическая схема — согласно Оленеву [1965].

The studies of ground beetles in the State Nature Reserve «Yuzhno-Uralskii» in 1980-ies were performed by Kashevarov [1986], but only in its southern part (at Belyagush, Malyi Yamantau and Yeraktash mountain ranges and Bolshoi Inzer river valley), accessible from its headquarters in Revet' village. It was clearly stated in the paper of Kashevarov [1986] that he did not find *C. karpinskii* in the State Nature Reserve «Yuzhno-Uralskii». This is not surprising as he visited only lower mountains without alpine zone. Kashevarov [1986] recorded *C. karpinskii* only from Bolshoi Iremel Mountain and wrote the following: «Probably this species will be found in future also at other mountain ranges with the elements of alpine tundra vegetation — Yamantau, Mashak, Zigalga». And further he wrote: «at Malyi Yamantau Mountain Range ... 7 species were recorded except *C. karpinskii*» [Kashevarov, 1986: 60].

Therefore we could state in the recent edition of the Red data book of the Republic of Bashkortostan [Zinov'yev, Mikhailov, 2025] that the citations of any records of *C. karpinskii* from Yamantau Mountain and Nary Mountain Range in the previous edition of this Red data book [Gorbunov, 2014] were erroneous because in the cited sources [Kashevarov, 1986; Korobeinikov et al., 1990] they were absent. The records from «Yamantau Mt., Zigalga Mt.» were given in the description of *C. karpinskii* [Kryzhanovskij, Matveev, 1993], although these specimens were not included in the type series. The types are preserved in the ZIN collection (Saint Petersburg), but there are no specimens with the label «Yamantau», only a pair of beetles (1 male, 1 female) with the label «Versh. hr. Zigalga Ufimskoy gub., 1 VII 926, Vakulenko» (A summit of Zigalga Mt. range in Ufimskaya Guberniya). But the exact summit here is not clear because in 1926 Ufimskaya Guberniya no more existed; in 1922 its territory was transferred to Bashkirian Autonomous Soviet Socialist Republic. And Zigalga Mountain Range was entirely situated in former Ufimskaya Guberniya, but since 1922 its main part without only the southern highest summits became a part of Chelyabinskaya Guberniya.

It is possible that the mentioned specimens were collected at the highest summit of Zigalga Mountain Range — Bolshoi Shelom Mountain. But definitely the presence of *C. karpinskii* at this mountain was confirmed by me in 2024 (see material), and earlier it was found at other summits of this mountain range — Poperechnaya and Kruglaya (Malaya Poperechnaya) in Chelyabinskaya Oblast.

By now in Chelyabinskaya Oblast *C. karpinskii* was recorded (Fig. 1) in mountain tundra at the altitudes more than 1000 m a. s. l. of the summits of Bolshoi Taganay, Nurgush, Uren'ga and Zigalga mountain ranges [Mikhailov, Ermakov, 2016; Lagunov, 2017a]. The beetles and their larvae can be found from May till September under flat stones on the tundra plateau or in the stone scree near rocky outcrops, rarely they can be seen running in a day time. Several colonies were found in the intermountain valleys near Tyulyuk village and at Kalagaza River, also at Alexandrovskaya Sopka Mountain in Zlatoust city at the altitude only 760 m a.s.l. [Lagunov, Veisberg, 2014]. On the hills without alpine tundra usually lives near rocky outcrops.

In the Republic of Bashkortostan the largest population lives in the alpine zone of Iremel Massif including the summit plateaus of Bolshoi and Malyi Iremel mountains and their spurs [Mikhailov, Ermakov, 2016]. In the State Nature Reserve «Yuzhno-Uralskii» *C. karpinskii* was recorded by me at Bolshoi Shelom Mountain (Zigalga Mountain Range) and for the first time at three summits of Mashak Mountain Range: Medvezh'ya, Shirokaya and Kobeya mountains. By now Shirokaya Mountain is the most southern reliable record of this species.

The maximum number of this species was recorded at the summits with large area of alpine tundra (Bolshoy Nurgush, Bolshoy and Malyi Iremel mountains), where *C. karpinskii* is one of dominants and the only representative of the genus *Carabus* [Mikhailov, Ermakov, 2016]. Mashak Mountain Range proved to be unique as only here one more species was recorded in alpine tundra along with *C. karpinskii*. *C. (Oreocarabus) glabratus* Paykull, 1780 was found in the southern sector of the summit of Medvezh'ya Mountain (a pair of *C. karpinskii* and a pair of *C. glabratus*). Earlier the typical forest species *C. glabratus* in the Ural Mountains was recorded in the forest zone or rare in birch scrub (krummholz) in subalpine zone, for example, in the Nature Reserve «Vishersky» in the North Urals [Kozminykh, Sannikov, 2018], but not in alpine tundra [Korobeinikov, 1991]. Only in the Nature Reserve «Basegi» (Middle Urals) *C. glabratus* was recorded in birch scrub, subalpine valleys and dwarf shrub alpine tundra [Voronin, 1999]. In the alpine zone of South Urals *C. glabratus* has been never recorded before [Korobeinikov, 1991; Mikhailov, Ermakov, 2016].

C. karpinskii belongs to the *C. odoratus* species group in the subgenus *Morphocarabus* Gehin, 1885. In this group of six species it is closer to *C. odoratus*. *C. karpinskii*, isolated in the high mountains of the South Urals, is peculiar with its strong petrophilic specialization, while *C. odoratus* is a polymorphic species with many forms and subspecies in different biotopes throughout entire Siberia; in the mountains it demonstrates more or less degree of petrophilic specialization [Brinev, 2002]. From this pair of species *C. odoratus* may be treated as younger and less specialized and *C. karpinskii* as specialized and probably older [Brinev, 2002]. From *C. odoratus* (the closest localities are in the mountains of the North Urals) *C. karpinskii* differs by more flattened and elongate body and details of aedeagus structure (mainly in the shape of endophallus).

According to Brinev [2002] the distribution areas of *C. karpinskii* and *C. kozhantschikovi*, the most specialized and isolated in the *C. odoratus* species group, coincide with the borders of the last Glacial maximum.

Limiting factors and protective measures. The extinction risk for small isolated colonies exists at the lower summits with small area of alpine tundra due to climate change. For example, at Dalniy Taganay summit for the last 50 years the alpine area contracted for 72 % [Grigoriev et al., 2025]. At that summit I first collected *C. karpinskii* in 1994 г. With the start of regular surveys under the GLORIA project this species was recorded there in 2008, 2015, and 2016. However, no adult or larval specimens were found in 2022. In 2023, to verify the results of the previous season, soil traps were installed in parallel on the peaks of Dalniy Taganay and Kruglitsa with a difference of one day. As a result, *C. karpinskii* was not found on Dalniy Taganay, while on Kruglitsa it was recorded with the same dynamic density as in 2016 [Mikhailov, 2024; Grigoriev et al., 2025].

As endemic and relict species is included in the Red data book of Chelyabinskaya Oblast [Lagunov, 2017a] and the Republic of Bashkortostan [Zinov'yev, Mikhailov, 2025]. All known localities are at the protected areas: in the National Parks «Taganay», «Zyuratkul» and «Zigalga» (Chelyabinskaya Oblast), State Nature Reserve «Yuzhno-Uralskii» and Natural Park «Iremel» (Republic of Bashkortostan).

Nebria (Boreonebria) uralensis Glasunov, 1901

Небрия уральская

Fig. 2.

Material. Chelyabinskaya Oblast: Zigalga National Park, Zigalga Mountain Range, between Poperechnaya and Kruglaya (Malaya

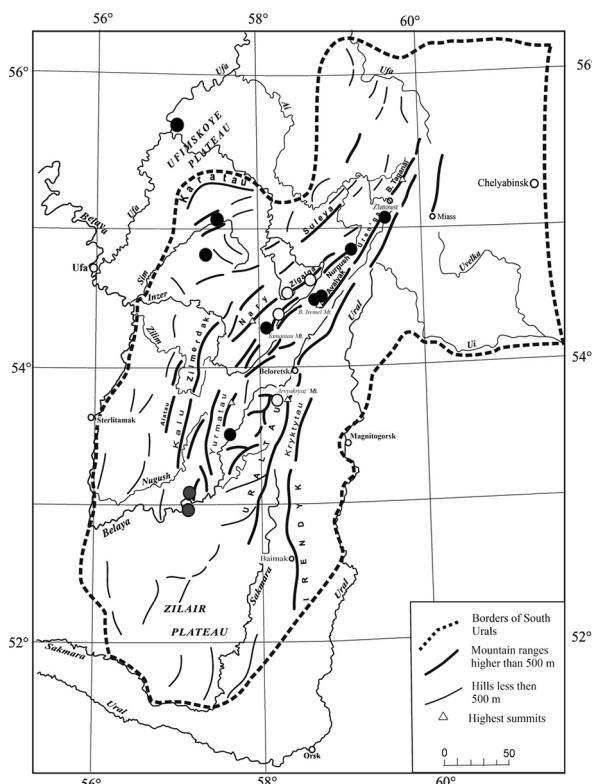


Fig. 2. Distribution map of *Nebria uralensis* Glasunov, 1901 in the South Urals. Designations: gray circles — locus typicus, black circles — previously known records, white circles — new records. Borders of the South Urals after Chibilyov and Chibilyov [2012], orographic scheme after Olenev [1965].

Рис. 2. Карта распространения *Nebria uralensis* Glasunov, 1901 на территории Южного Урала. Обозначения: серые круги — типовые местонахождения; чёрные круги — ранее известные находки; белые круги — новые находки. Границы Южного Урала даны согласно работе Чибилёва и Чибилёва [2012], орографическая схема — согласно Оленеву [1965].

Poperechnaya) mountains, treeline ecotone, h~1275 m a.s.l., pitfall traps, 7–10.VIII.2023, Yu.E. Mikhailov leg. — 1♀. **Republic of Bashkortostan, Beloretskii district:** foothills of Bolshoi Kraka Mountain Range, Shigaevо village, under stones at the river, 5.VIII.2019, Yu.E. Mikhailov leg. — 12 spm.; **State nature reserve «Yuzhno-Uralskii»:** Zigalga Mountain Range, Bolshoy Shelom Mountain, summit plateau, grass-moss alpine tundra, h~1407 m a.s.l., 54.52187° N, 58.33385° E, pitfall traps, 10–13.VII.2024, Yu.E. Mikhailov leg. — 1♂, 1♀; Mashak Mountain Range, Shirokaya Mountain, main summit, grass-moss alpine tundra, h~1332 m a.s.l., 54.37605° N, 58.25467° E, pitfall traps, 7–8. VII.2025, Yu.E. Mikhailov leg. — 1♀.

Distribution and remarks. This endemic species of the South Urals was first found by E.G. Rodd on 29.VII.1896 in the valley of Belaya River in the environs of Kapova Cave and later on collected in the same place and at Irgizla River by G.G. Jacobson in June of 1899 [Glasunov, 1901]. In 1980–1982 A.B. Matveev also found it at Belaya River valley in Nature Reserve «Bashkirskii» and at Ufa River valley near Maginsk (data from the Museum of Institute of Plant and Animal Ecology, Yekaterinburg). Under stones at the river in Shigaevо village this species was collected by me at foothills of Bolshoi Kraka Mountain Range (new record). All mentioned localities are situated in the Republic of Bashkortostan. In Chelyabinskaya Oblast the records are known from Asha District: near Min'yar [Kolodkin, Emelshin, 2019] and Sukhaya Atya settlements [Zinov'yev et al., 2022]. All these records are from the low mountainous part of the South Urals (Fig. 2).

In the alpine zone of high mountains it was recorded by Korobeinikov [1988, 1991], first at Yamantau Mountain, then at Iremel Massif and Nurgush Mountain Range, where he found the high density of this species in the stone scree and around the hollows temporarily filled by rainwater. In Chelyabinskaya Oblast the records of *N. uralensis* were known from Nurgush and Uren'ga mountain ranges, in 2023 it was recorded by me also from Zigalga Mountain Range in treeline ecotone between Poperechnaya and Kruglaya mountains (new record). For Bolshoi Taganay Mountain Range it was recorded only once by Korobeinikov [1991], although shortly before he did not mention it in the lists for two summits of this mountain range, Kruglitsa and Dalniy Taganay [Korobeinikov, 1988]. The record of *N. uralensis* from Bolshoy Taganay Mountain Range is erroneous because there are no specimens from there both in Korobeinikov's collection in the Museum of Institute of Plant and Animal Ecology and in our materials from Dalniy Taganay Mountain (collected in 2000, 2008–2023) and Kruglitsa Mountain (collected in 2000, 2016 and 2023). In the Republic of Bashkortostan was known from Yamantau and Iremel massifs [Korobeinikov, 1988], in 2024 was recorded by me at Bolshoi Shelom Mountain (Zigalga Mountain Range) (new record) and in 2025 at Shirokaya Mountain (Mashak Mountain Range) (new record).

In the description Glasunov [1901] compared *N. uralensis* with European species *N. (Eunebria) jockischii* Sturm, 1815 and Holarctic species *N. (Boreonebria) gyllenhali* (Schoenherr, 1806). The latter is in agreement with the contemporary position of this species in the subgenus *Boreonebria*, where *N. uralensis* according to Shilenkov [1975] is close to the Altai species *N. rubrofemorata* Shilenkov, 1975. According to R.Yu. Dudko (pers. comm), *N. uralensis* and *N. rubrofemorata* are the members of the chain of vicarious species that includes *N. heegeri* Dejean, 1826 from Carpathians, *N. sochondensis* Shilenkov, 1999 from Transbaicalian mountains and *N. biseriata* Lutshnik, 1915 from the mountains of Far East. All the mentioned species can be treated also as derivatives of the Holarctic arctic-alpine species *N. nivalis* (Paykull, 1798) that inhabits also alpine tundra of the Urals except only its southern part.

Limiting factors and protective measures. At Bolshoi Nurgush Mountain this species is a subdominant [Mikhailov, Ermakov, 2016]; in other locations its density was not evaluated. As endemic species and glacial relict is included in the Red data book of Chelyabinskaya Oblast [Lagunov, 2017b]. All known localities in the alpine zone are at the protected areas: in National Parks «Zyuratkul» and «Zigalga» (Chelyabinskaya Oblast), State Nature Reserve «Yuzhno-Uralskii» and Natural Park «Iremel» (Republic of Bashkortostan).

Chrysomelidae

Chrysolina (Arctolina) poretzkyi (Jacobson, 1897)
Листоед Порецкого
Figs 3–5.

Material. Republic of Bashkortostan, Beloretskii district, State nature reserve «Yuzhno-Uralskii»: Mashak Mountains Range, foothills of Kharitonova Mountain, tall herbage meadow, on the leaf of *Aconitum* sp., 2.VII.2025, Yu.E. Mikhailov leg. — 1♀; Mashak Mountains Range, foothills of Yagodnaya Mountain, tall herbage meadow, 05.VII.2025, Yu.E. Mikhailov leg. — 1♂ (lived in cage until August).

Distribution and remarks. This rare and relict species has fragmented distribution area, besides the main part in the South Urals it has isolated localities in the Zhiguli Mountains in Samarskaya Oblast and Nature Reserve «Galichia Gora» in Lipetskaya Oblast [Mikhailov, 2025a]. Although I did not examine the specimens from outside the South Urals and these records need confirmation.

This species was first found on 30.VII.1896 by the expedition of E.G. Rodd, M.M. Poretzky and S.A. Egiz in the former Orenburg Forestry at Irgizla River nearby its confluence with Belaya River and described by Jacobson [1897]. The type locality is situated in the environs of Irgizly village in the Burzyanskii District of Republic of Bashkortostan, but since then has been never recorded from there again. The following records were made in Ufa river valley at Ufimskoye Plateau (near Krasnyi Klyuch and Maginsk) [Mikhailov, 2018]. In Chelyabinskaya Oblast the species was recorded from the Nature Reserve «Ilmensky», in Katav-Ivanovskii District near Ignat'evskaya Cave and in Ashinskii District near Sukhaya Atya settlement [Mikhailov, 2018]. All the mentioned records belong to the foothill form *Chrysolina poretzkyi poretzkyi* (Jacobson, 1897), the biology and host plant of which are not known. In Lipetskaya Oblast beetles and larvae in cages fed on *Lamium purpureum* [Bienkowski, 2009], probably this is one of the host plants in the South Urals.

In the alpine tundra of Nurgush Mountain Range (Bol'shoi Nurgush Mountain) and Iremel Massif (Bol'shoi Iremel Mountain with spurs and Malyi Iremel Mountain) the alpine form was found that got the subspecific status — *C. poretzkyi olschwangi* Mikhailov, 2018. This subspecies inhabits grass-moss alpine tundra with the preference for cryophilic multispecies grassplots and feed mainly on alpine endemic plant *Lagotis uralensis* Schischk., sometimes also at *Ligularia arctica* Pojark. [Mikhailov, 2008]. The beetles and larvae can be found in daytime only at the roots of host plants, feeding on which takes place only at night. In the alpine zone of Zigalga and Mashak mountains ranges this species was not recorded.

Although at Mashak Mountain Range the beetles were collected in tall herbage meadows of the upper part of forest zone of Kharitonova and Yagodnaya mountains. Only two specimens were collected, the beetles were sitting on the lower side of leaves and were detected occasionally. The mentioned summits have no alpine tundra on tops but tall herbage meadows are very peculiar for Mashak Mountain Range and occupy vast areas there [Martynenko et al., 2008]. The new localities (Fig. 3) are situated closer to the previously known ones from Iremel Massif, from where the alpine subspecies is known. But at Mashak Mountain Range this species for the first time was found at tall herbage vegetation in the forest zone, so it was not clear what subspecies lives there. Based on the differential diagnoses of the subspecies of *C. poretzkyi* [Mikhailov, 2008] the key for their determination is given below.

Beetles dorsally green or bronze green, with rudimental hind wings. Elytral punctuation arranged in paired rows (even intervals, especially 4th ones, noticeably wider than odd ones). Aedeagus laterally C-shaped, with truncated apex and small, adpressed alae.

1(2) Beetles larger, more convex. Females broadly ovate, body length 6.9–7.8 mm, width 4.9–5.6 mm. Males broadly oval, body length 6.2–7.1 mm, body width — 3.9–4.7 mm. Lateral pronotal ridges moderately wide, basally comprise at least 1/4 of pronotum width. Scutellum usually smooth, impunctate. Punctuation of pronotal disk of the same size as secondary punctuation of elytra. Punctures in elytral rows large, rounded, distinct and deep; intervals slightly convex in anterior third. Punctuation of lateral groove same as in other rows; sutural groove well pronounced. Fore tarsi of males noticeably dilated, their 2nd tarsomere narrower, 3rd noticeably wider than others *C. poretzkyi poretzkyi* (Jacobson, 1897)

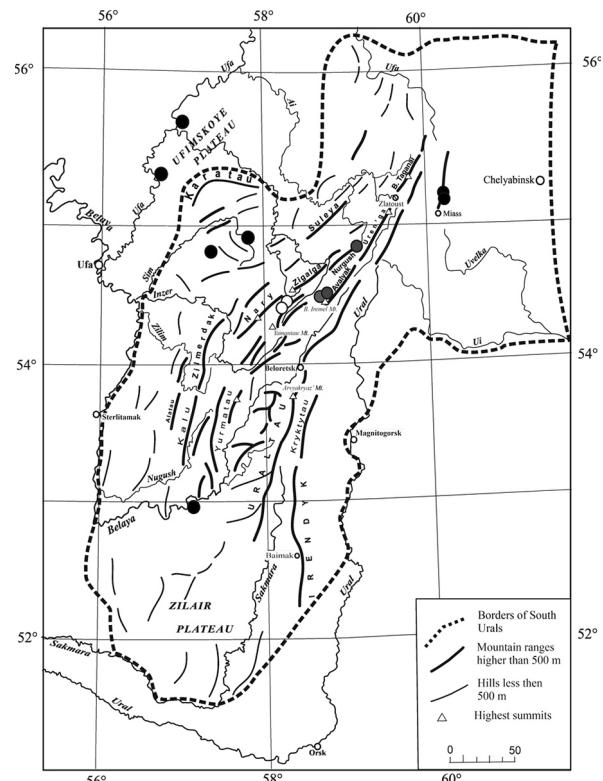


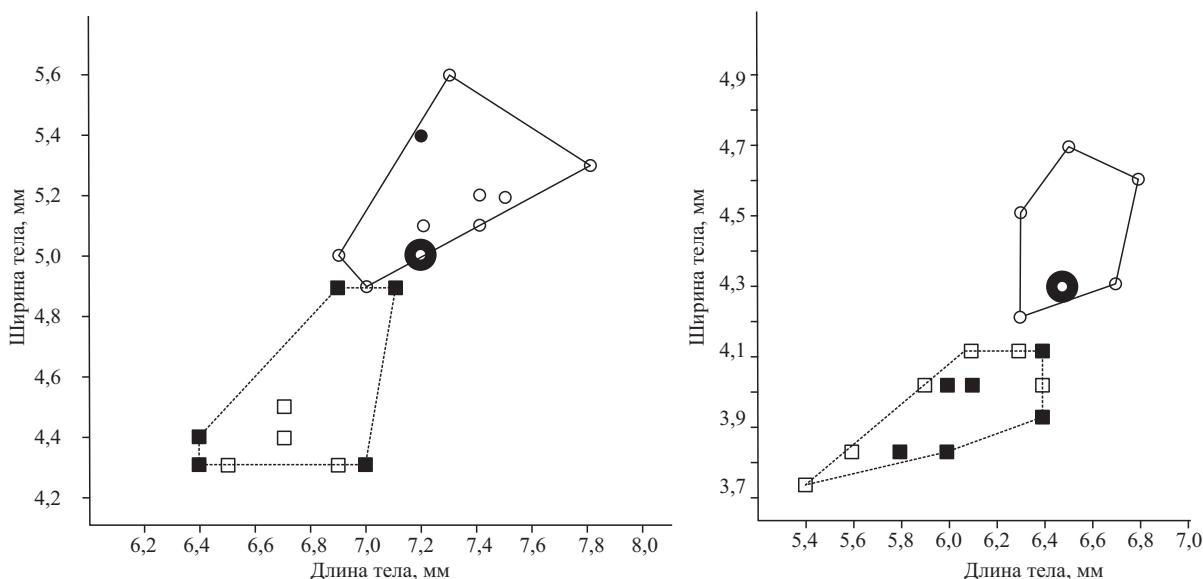
Fig. 3. Distribution map of *Chrysolina (Arctolina) poretzkyi* (Jacobson, 1897) in the South Urals. Designations: black circles — previously known records of foothill subspecies *Ch. poretzkyi poretzkyi*, white circles — new records of *Ch. poretzkyi poretzkyi*, gray circles — records of alpine subspecies *Ch. poretzkyi olschwangi*. Borders of the South Urals after Chibilyov, Chibilyov [2012], orographic scheme after Olenev [1965].

Рис. 3. Карта распространения *Chrysolina (Arctolina) poretzkyi* (Jacobson, 1897) на территории Южного Урала. Обозначения: чёрные круги — ранее известные находки предгорного подвида *Ch. poretzkyi poretzkyi*, белые круги — новые находки *Ch. poretzkyi poretzkyi*, серые круги — находки горно-тундрового подвида *Ch. poretzkyi olschwangi*. Границы Южного Урала даны согласно работе Чибилёва и Чибилёва [2012], орографическая схема — согласно Олениеву [1965].

2(1) Beetles smaller, less convex. Females elongate ovate, body length 6.4–7.1 mm, width 4.3–4.9 mm. Males elongate oval, body length 5.8–6.4 mm, width 3.8–4.1 mm. Lateral pronotal ridges narrow, basally comprising less than 1/4 of pronotum width. Scutellum usually punctate. Punctuation of pronotal disk coarser than secondary punctuation of elytra. Punctures in elytral rows usually small, elongate, not deep; intervals flat. Punctures in lateral groove larger and sparser than in elytral rows; sutural groove flat. Fore tarsi of males strongly dilated, 2nd tarsomere slightly narrower than 1st and 3rd *C. poretzkyi olschwangi* Mikhailov, 2018

The comparison of the characters of beetles from Mashak Mountain Range with the key to subspecies and the scatter plots of the body measurements (Figs 4–5) attributes them to the nominotypic, foothill subspecies *C. poretzkyi poretzkyi*. In the cage the beetle was feeding on leaves of *Delphinium elatum* (more preferable) and *Lamium album* (less preferable).

Limiting factors and protective measures. The species is first included in the Red data book of the Republic of Bashkortostan [Mikhailov, 2025a]. All known localities of



Figs 4–5. Scatter plots of the body measurements in the South Urals populations of *Chrysolina poretzkyi*. 4 — females; 5 — males. Designations: squares — *Ch. poretzkyi olschwangi*, circles — *Ch. poretzkyi poretzkyi*, ring — specimens from Mashak Mountain Range.

Рис. 4–5. Полигоны рассеивания размеров тела в южноуральских популяциях *Chrysolina poretzkyi*. 4 — самки; 5 — самцы. Обозначения: квадраты — *Ch. poretzkyi olschwangi*, круги — *Ch. poretzkyi poretzkyi*; кольца — экземпляры с хр. Машак.

the alpine subspecies are at the protected areas: in National Park «Zyuratkul» (Chelyabinskaya Oblast) and Natural Park «Iremel» (Republic of Bashkortostan). State Nature Reserve «Yuzhno-Uralskii» is a new protected area for this species.

Chrysolina (Pleurosticha) lagunovi
Mikhailov, 2007
Листоед Лагунова

Material. Chelyabinskaya Oblast, Zigalga National Park: Zigalga Mountain Range, Kruglaya (Malaya Poperechnaya) Mountain, 54.64521°N, 58.63459°E, grass-moss alpine tundra, h~1362 m a.s.l., pitfall traps, 5–9.VIII.2023, Yu.E. Mikhailov leg. — 2♂♂. Republic of Bashkortostan, Beloretskii district, State nature reserve «Yuzhno-Uralskii»: Mashak Mountain Range, Medvezh'ya Mountain, grass-moss alpine tundra, h~1303 m a.s.l., 54.42877°N, 58.32274°E, pitfall traps, leg. 3–9.VII.2025, Yu.E. Mikhailov — 1♂, 1♀; Mashak Mountain Range, Shirokaya Mountain, main summit, grass-moss alpine tundra, h~1332 m a.s.l., 54.37605°N, 58.25467°E, pitfall traps, 7–8.VII.2025, Yu.E. Mikhailov leg. — 1♀.

Distribution and remarks. Endemic of the alpine zone of the Urals, the only representative of the Arctic-alpine subgenus *Pleurosticha* Motschulsky, 1860. Although the first findings were made by the Urals' entomologists V.N. Olschwang and A.V. Lagunov at Bolshoi and Malyi Iremel in 1985–1990, the correct determination and treatment of this species was problematic for the long time [see Mikhailov, 2018]. It was described as a new species only in 2007 [Mikhailov, 2007] and subsequently included in both editions of the Catalogue of Palaearctic Coleoptera [Löbl, Smetana, 2010; Bezdek, Sekerka, 2024].

Ch. lagunovi is known from the highest summits of the South (Iremel Massif, Nurgush and Zigalga mountain ranges) and Northern Urals (Tyaisk-Konzhakovsk-Serebryansk and Denezhkin Kamen' massifs). The populations from South and North Urals are divided by the lower mountains of Middle Urals without alpine zone, and this isolation exists approximately 8000 years since the fragmentation of the entire belt of alpine tundra [Panova, 1990]. The species inhabits different types of alpine tundra and feed on the endemic alpine plant of the Urals *Anemonastrum biarmiense* (Juz.) Holub. [Mikhailov,

2007]. The beetles and larvae can be found in moss layer or under stones at the roots of host plants, feeding on which takes place only at night.

Anemonastrum biarmiense (Ranunculaceae) is the main host plant of this species everywhere in the before known localities. The findings of *Ch. lagunovi* on two summits of Mashak Mountain Range (Medvezh'ya and Shirokaya mountains) were predictable in general. But it was entirely unexpected that in cages the beetles and first instar larvae refused to feed on *Anemonastrum biarmiense* that was quite common on these summits. By now it was impossible to find out the host plant of *Ch. lagunovi* from Mashak Mountain Range, however it is clear that they belong to a special biological form.

In this regard I need to mention the presence of one more host plant of this species, *Saussurea uralensis* Lipsch. (Asteraceae). Feeding on this plant I could occasionally observe in the North Urals, Konzhakovskiy Kamen' Mountain, in 2011. In cages with both host plants *Anemonastrum biarmiense* and *Saussurea uralensis* the beetles were rarely feeding on the latter and larvae refused to eat it. According to Kulikov [2005] *Saussurea uralensis* is alpine endemic of the North Urals, and its records from the South Urals (Iremel Massif, Nurgush, Zigalga, Mashak mountain ranges) are in fact belong to the alpine ecological form of *Saussurea controversa* DC. In the State nature reserve «Yuzhno-Uralskii» this species was recorded in alpine tundra of Mashak, Kumardak and Zigalga mountain ranges as a rare species [Martynenko et al., 2008]. Presumably, *Saussurea controversa* may be the host plant of *Ch. lagunovi* at Mashak Mountain Range.

Limiting factors and protective measures. At the summits with large area of alpine tundra (Iremel Massif, Bolshoi Nurgush Mountain) the number may be up to 7–10 specimens of beetles and larvae per 1m², and no direct threats predicted. Although at the small islands of alpine tundra at Bolshoi Taganai Mountain Range the host plant *Anemonastrum biarmiense* is quite common but *Ch. lagunovi* is absent [Mikhailov, Ermakov, 2016].

The species is firstly included in the Red data book of the Republic of Bashkortostan [Mikhailov, 2025b]. All known

localities are at the protected areas: in National Parks «Zyuratkul» and «Zigalga» (Chelyabinskaya Oblast) and Natural Park «Iremel» (Republic of Bashkortostan). State Nature Reserve «Yuzhno-Uralskii» is a new protected area for this species.

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References

Bezdek J., Sekerka L. 2024. Catalogue of Palaearctic Coleoptera. Volume 6/2/1. Chrysomeloidea II (Orsodacnidae, Megalopodidae, Chrysomelidae). Updated and Revised Second Edition. Leiden: Koninklijke Brill. 750 p.

Bienkowski A.O. 2009. The morphology of larvae and systematics of the leaf-beetles *Chrysolina tundralis* and *Chrysolina rodii* (Coleoptera, Chrysomelidae, Chrysomelinae) // Zoologicheskii Zhurnal. Vol.88. No.11. P.1355–1364.

Brinev A.E. 2002. [To subspecies structure of *Carabus (Morphocarabus) mestscherjakovi* (Coleoptera, Carabidae)] // Zoologicheskii Zhurnal. Vol.81. No.1. P.34–52. [In Russian].

Chibilyov A.A., Chibilyov Ant.A. 2012. [Urals natural zoning based on latitudinal belts, elevation zones and vertical differentiation of landscapes] // Izvestiya Samarskogo Nauchnogo Tsentra Rossiyskoy Akademii Nauk. Vol.14. No.1(6). P.1660–1665. [In Russian].

Glasunov D.K. 1901. [New species of genus *Nebria* Latr. (Coleoptera, Carabidae) from south Urals] // Russkoye Entomologicheskoye Obozreniye. No.1–2. P.20–22. [In Russian].

Gorbunov P.Yu. 2014. *Carabus karpinskii* // Krasnaya Kniga Respubliki Bashkortostan. Vol.2: Animals. 2nd edition. Ufa: Informreklama. P.25. [In Russian].

Grabherr G., Gottfried M., Pauli H. 2000. GLORIA: A global observation research initiative in alpine environments // Mountain Research and Development. No.20. P.190–191.

Grigoriev A.A., Shalaumova Yu.V., Terentyeva M.V., Vyukhin S.O., Balakin D.S., Moiseev P.A. [Alpine tundras of the Southern Urals: current distribution and threat of extinction in the 21st century] // Geograficheskaya Sreda i Zhivye Sistemy. No.3. P.26–46. [In Russian].

Grigoriev A.A., Mikhailov Y.E., Shalaumova Y.V., V'yukhin S.O., Balakin D.S., Ermakov A.I., Terent'eva M.V., Erokhina O.V., Moiseev P.A., Kudryavtsev P.P. 2025. Upward expansion of trees and shrubs leads to alpine tundra contraction and local extinction of species in the Southern Urals // Ecosystems. Vol.28. Art.28. <https://doi.org/10.1007/s10021-025-00973-w>

Jacobson G.G. 1897. Materialia ad Cognitionem Faunae Chrysomelidarum Provinciae Orenburgensis // Trudy Russkogo Entomologicheskogo Obschestva. Vol.30. P.429–437.

Kashevarov B.N. 1986. [Peculiarities of ground beetles population in mountain taiga zone of the South Urals] // Fauna i ekologiya bespozvonochnyh zhivotnyh v zapovednikakh RSFSR: Collected papers. Moscow: CNIL Glavokhoty RSFSR. P.56–67. [In Russian].

Kolodkin M.V., Emelshin A.D. 2019. [Structure of herpetobiont invertebrates community of the Nature Monument «Krasnaya skala» in Min'yar city of Chelyabinskaya Oblast] // Sovremennye issledovaniya v naukakh o Zemle: retrospektiva, aktual'nye trendy i perspektivnye vnedreniya: Materials of international scientific-practical conference. Astrakhan', 20–21 February 2019. Astrakhan: Astrakhan State University. P.26–31.

Korobeinikov Yu.I. 1988. [On the fauna of carabids (Coleoptera, Carabidae) of the alpine regions of South Urals] // Entomologicheskoe Obozrenie. Vol.67. No.4. P.738–740. [In Russian].

Korobeinikov Yu.I. 1991. [Carabids of the alpine tundra of the Urals] // Olschwang V.N. (Ed.): Ecologicheskie gruppirovki zhuzhelits (Coleoptera, Carabidae) v estestvennyh i antropogennyyh landshaftah Urala: Selected papers. Sverdlovsk: Urals Branch of Academy of Sciences of the USSR. P.51–60. [In Russian].

Korobeinikov Yu.I., Olschwang V.N., Erokhin N.G. 1990. [Geographic analysis of entomofauna of mountain forests of the South Urals in connection with the history of its development] // Smirnov N.G. (Ed.): Istoricheskaya ekologiya zhivotnyh gor Yuzhnogo Urala. Sverdlovsk: Urals Branch of Academy of Sciences of the USSR. P.45–67. [In Russian].

Kozminikh V.O., Sannikov P.Yu. 2018. [Coleopterans (Insecta, Coleoptera) of the Nature reserve «Vishersky» and adjacent territories] // Antropogennaya transformatsiya prirodnoy sredy. No.4. Perm: Perm state national research university. P.60–66. [In Russian].

Kryzhanovskij O.L., Matveev A.B. 1993. A new species of *Carabus* from the South Urals (Coleoptera, Carabidae) // Zoosystematica Rossica. Vol.2. No.1. P.143.

Lagunov A.V. 2017a. *Carabus karpinskii* // Bolshakov V.N. (Ed.): Krasnaya Kniga Chelyabinskoy Oblasti: Zhivotnye, Rasteniya, Gribi. Moscow: OOO “Reart”. P.110. [In Russian].

Lagunov A.V. 2017b. *Nebria uralensis* // Bolshakov V.N. (Ed.): Krasnaya Kniga Chelyabinskoy Oblasti: Zhivotnye, Rasteniya, Gribi. Moscow: OOO “Reart”. P.104. [In Russian].

Lagunov A.V., Veisberg E.I. 2014. Holocene history of *Carabus karpinskii* (Kryzhanovskij et Matveev, 1993) endemic to the Southern Urals // The Quaternary of the Urals: global trends and Pan-European Quaternary records. Materials of the international conference INQUA-SEQS. Yekaterinburg: Ural Federal University. P.76–78.

Löbl I., Smetana A. 2010. Catalogue of Palaearctic Coleoptera. Vol.6: Chrysomeloidea. Stenstrup: Apollo Books. 924 p.

Martynenko V.B., Muldashev A.A., Gorichev Yu.P., Yamalov S.M., Baisheva E.Z. 2008. [Meadow, swamp and alpine tundra vegetation] // Mirkin B.M. (Ed.): Flora i restitelnost Yuzhno-Ural'skogo gosudarstvennogo prirodnoy zapovednika. Ufa: Gilem. P.111–123. [In Russian].

Mikhailov Yu.E. 2007. Leaf beetles from the Arctic-alpine subgenera *Arctolina* Kontkanen and *Pleurosticha* Motschulsky of genus *Chrysolina* Motschulsky in the Urals (Coleoptera, Chrysomelidae) // Izvestiya Chelyabinskogo Nauchnogo Tsentra. 2006. Vol.4. No.34. P.110–114.

Mikhailov Yu.E. 2018. [On two little known species of leaf beetles (Coleoptera, Chrysomelidae) from the Southern Urals] // Zoologicheskii Zhurnal. Vol.97. No.3. P.286–298. [In Russian].

Mikhailov Yu.E. 2024. [The first reliable detection of endemic carabid species extinction (Coleoptera, Carabidae) in the summit of the South Urals] // Kuanyshbayev S.B., Bragina T.M. (Eds): Conservation of biological diversity and development of the network of specially protected natural areas: Proceedings of the International research and training conference, February 26, 2024, Kostanay, Kazakhstan, dedicated to the anniversary of the honorary professor of the Kostanay State Pedagogical Institute, T.M. Bragina Dr. Sci. Biol. Kostanay: Akhmet Baitursynuly Kostanay regional university. P.28–34. [In Russian].

Mikhailov Yu.E. 2025a. *Chrysolina poretzkyi* // Khabibullin V.F. (Ed.): Krasnaya Kniga Respubliki Bashkortostan. Vol.2: Animals. 3rd edition. Ufa: OOO«Print». P.35. [In Russian].

Mikhailov Yu.E. 2025b. *Chrysolina lagunovi* // Khabibullin V.F. (Ed.): Krasnaya Kniga Respubliki Bashkortostan. Vol.2. Animals. 3rd edition. Ufa: OOO«Print». P.36. [In Russian].

Mikhailov Yu.E., Ermakov A.I. 2016. [Composition and structure of herpetobiont arthropod communities of mountain summits of the Southern Urals] // Fauna Urala i Sibiri. No.1. P.61–74. [In Russian].

Olenev A.M. 1965. [Ural i Novaya Zemlya: Ocherk prirody]. Moscow: Mysl. 215 p. [In Russian].

Olschwang V.N., Malozymov A.Yu. 1987. [Population of hortobiont arthropods in alpine tundra of the South Urals] // Fauna i ekologiya nasekomyh Urala: Collected papers. Sverdlovsk: Ural State University. P.121–130. [In Russian].

Panova N.K. 1990. [History of development of vegetation of the mountainous part of the South Urals in Late Pleistocene and Holocene] // Smirnov N.G. (Ed.): Istoricheskaya ekologiya

zhivotnyh gor Yuzhnogo Urala. Sverdlovsk: Ural Branch of Academy of Sciences of the USSR. P.144–159. [In Russian].

Pauli H., Gottfried M., Dullinger S., Abdaladze O., Akhalkatsi M., Alonso J.L.B., Coldea G., Dick J., Erschbamer B., Calzado R.F., Ghosn D., Holten J.I., Kanka R., Kazakis G., Kollár J., Larsson P., Moiseev P., Moiseev D., Molau U., Mesa J.M., Nagy L., Pelino G., Puşcaş M., Rossi G., Stanisci A., Syverhuset A.O., Theurillat J.-P., Tomaselli M., Unterluggauer P., Villar L., Vittoz P., Grabherr G. 2012. Recent plant diversity changes on Europe's Mountain summits // *Science*. Vol.336. P.353–355. <https://doi.org/10.1126/science.1219033>

Pauli H., Gottfried M., Lamprecht A., Niessner S., Rumpf S., Winkler M., Steinbauer K., Grabherr G. 2015. The GLORIA field manual — standard Multi-Summit approach, supplementary methods and extra approaches. 5th ed. Vienna: GLORIA-Coordination, Austrian Academy of Sciences & University of Natural Resources and Life Sciences. 140 p.

Shilenkov V.G. 1975. [Taxonomic review of genus *Nebria* Latr. (Coleoptera, Carabidae) from Siberia and Far East of the USSR] // *Entomologicheskoe Obozrenie*. Vol.54. No.4. P.830–845. [In Russian].

Voronin A.G. 1999. [Fauna and complexes of carabids (Coleoptera, Trachypachidae, Carabidae) of the forest zone of Middle Urals (ecological-zoogeographic analysis)]. Perm: Perm University. 244 p. [In Russian].

Zinovyev E., Erokhin N., Vorobiev A., Nesterkov A. 2022. Red Data Book Carabidae species of the Urals and Western Siberia in the collection of the Museum of IPAE UB RAS. Version 1.2. Institute of Plant and Animal Ecology (IPAE). Occurrence dataset <https://doi.org/10.15468/vmnytq>. Accessed 4.X.2025.

Zinovyev E.V., Mikhailov Yu.E. 2025. *Carabus karpinskii* // Khabibullin V.F. (Ed.): *Krasnaya kniga Respubliki Bashkortostan*. Vol.2: Animals. 3rd edition. Ufa: OOO«Print». P.25. [In Russian].

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