

A contribution to the knowledge of the endemic and subendemic Carabidae (Coleoptera) from the Rila and Pirin mountain ranges in Bulgaria

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Abstract

Fifteen species of Carabidae with limited distribution were examined and reported from the Rila and Pirin Mountain Ranges in Bulgaria: Nebriini: *Nebria hybrida* ROTTENBERG, 1874, *N. rhilensis* FRIVALDSZKY, 1879. Trechini: *Trechus orphaeus* PAWLOWSKI, 1973, *T. demircapicus* MORAVEC, 1986, *T. gulickai* LOEBL, 1967, *T. pirinicus* PAWLOWSKI, 1972, *T. rambouseki* BREIT, 1909, *T. rhodopeius* JEANNEL, 1921, *T. rhilensis* KAUFMANN, 1884. Pterostichini: *Molops alpestris* DEJEAN, 1828, *M. dilatatus* CHAUDOIR, 1868, *M. rhodopensis* APFELBECK, 1904, *Pterostichus rhilensis* ROTTENBERG, 1874, *Tapinopterus balcanicus* GANGLBAUER, 1891, and *Xenion ignitum* (KRAATZ, 1875). Exact locations, photos of habitus and of male genitalia are provided.

Key words: Carabidae, Nebriini, Trechini, Pterostichini, endemism, Bulgaria.

Zusammenfassung

Aus dem Rila- und dem Pirin-Gebirge in Bulgarien wurden 15 Arten mit eingeschränkter Verbreitung untersucht: Nebriini: *Nebria hybrida* ROTTENBERG, 1874, *N. rhilensis* FRIVALDSZKY, 1879. Trechini: *Trechus orphaeus* PAWLOWSKI, 1973, *T. demircapicus* MORAVEC, 1986, *T. gulickai* LOEBL, 1967, *T. pirinicus* PAWLOWSKI, 1972, *T. rambouseki* BREIT, 1909, *T. rhodopeius* JEANNEL, 1921, *T. rhilensis* KAUFMANN, 1884. Pterostichini: *Molops alpestris* DEJEAN, 1828, *M. dilatatus* CHAUDOIR, 1868, *M. rhodopensis* APFELBECK, 1904, *Pterostichus rhilensis* ROTTENBERG, 1874, *Tapinopterus balcanicus* GANGLBAUER, 1891 und *Xenion ignitum* (KRAATZ, 1875). Die genauen Fundorte werden angegeben und Fotos der Käfer und der Genitalstrukturen der Männchen werden ergänzt.

Introduction

The Rila and Pirin Mountain Ranges in the southwest of Bulgaria are high mountains with summits reaching 2900 m a.s.l. Both ranges are strewn with more than a hundred glacial lakes and bear Europe's southernmost glaciers. This region is remarkable for its rich flora and fauna, as well as for the presence of several relict or endemic species. Much of the area is forested, with some of the best-preserved conifer woods in Bulgaria, holding important populations of the Balkans-endemic species Macedonian pine (*Pinus peuce*), Bosnian pine (*Pinus heldreichii*) and Bulgarian fir (*Abies borisii-regis*).

The carabid fauna of these regions is poor in taxa compared to other mountain ranges in Europe but includes three endemic species of *Nebria* and six endemic *Trechus*, most

of them restricted to the alpine zone. In the montane and subalpine forest belt, there are several subendemic species in the genera *Trechus*, *Pterostichus*, *Tapinopterus*, *Molops*, and *Xenion*, with a restricted distribution in the southern Balkans. All these endemic and subendemic elements belong to just three tribes of Carabidae: Nebriini, Trechini and Pterostichini. Endemic species of other tribes (such as Carabini, Patrobini, Omphreini, Harpalini, Platynini, Amarini or Lebiini), known for high rates of endemism in other mountain ranges, are not present in this specific area.

Material and methods

A field trip to the Rila and Pirin Ranges in 2019 resulted in ca. 2500 specimens of Carabidae, stored in the author's collection. Several localities at different altitudes have been investigated in both ranges, starting at 1000 m up to 2800 m a.s.l. Of the specimens collected, ca. 85 % belong to taxa of restricted distribution (endemic or subendemic) and are treated herein. Material of one additional site in the Bulgarian Rodopi (outside the study area) was also studied and included, because the Rila and Pirin together with the Vitosa in the north and the Rodopi in the east and south form a natural distributional area, sharing a highly similar carabid fauna.

The carabid fauna of Bulgaria was listed in two catalogues (HIEKE & WRASE 1988, GUÉORGUIEV & GUÉORGUIEV 1995). Most (sub)endemic species listed in these catalogues were collected in series and from different locations. The stacked habitus photographs were taken with a 5.0 Mpixel MicroQ digital Microscope Okular camera attached to a Nikon SMZ 745T binocular microscope and processed with GIMP 2.10.20 software. The photographs of male genitalia were taken with the same camera attached to a BTC Student-12 Microscope.

Results

Nebria LATREILLE, 1802

Nebria is a diverse genus of medium sized Carabidae with Holarctic distribution, last revised by LEDOIX & ROUX (2005). The majority of the more than 500 species are confined to mountain habitats. In the study area, there are three endemic and specialized species.

Nebria (Alpaonebria) hybrida ROTTENBERG, 1874 (Fig. 1)

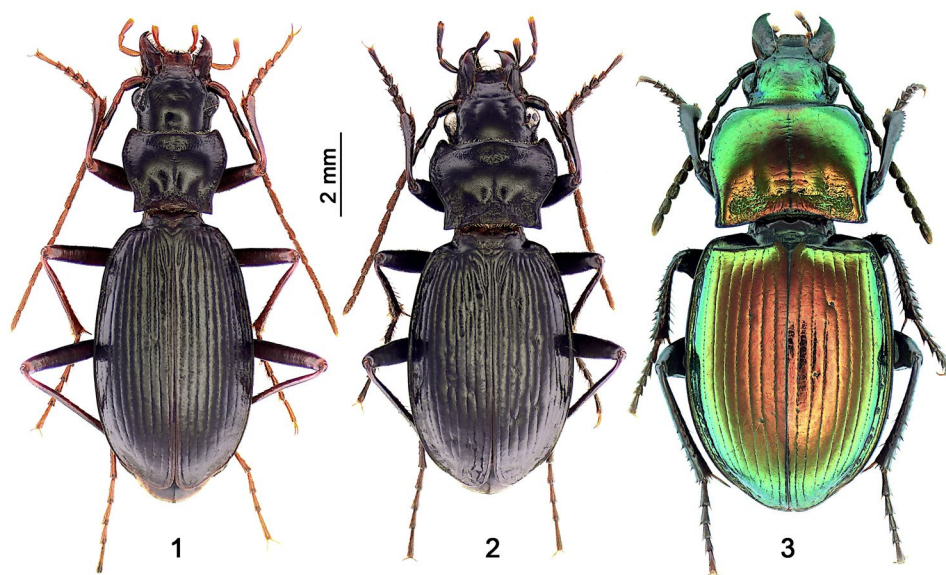
= *Nebria pirinensis* HORVATOVICH, 1973

= *Nebria rhodopensis* HORVATOVICH, 1973

Material examined: **Rila:** 40 ex.: Musala hut SE, ca. 2600 m a.s.l., 42.1900° N, 23.5956° E, 16.VI.2019. 2 ex.: Musala, ca. 2600–2800 m a.s.l., 42.1835° N, 23.5889° E, 15.VI.2019. 1 ex.: Belmeken, > 2500 m a.s.l., 42.1812° N, 23.7722° E, 13.VI.2019.

Distribution: Rila and Pirin; alpine zone; endemic.

Notes: *Nebria hybrida* is very similar to *N. germari* HEER, 1837 from the Alps and *N. carpathica* BIELZ, 1850 from the southern Carpathians in Romania. It is restricted to the highest peaks in Pirin and Rila, most common along large snow fields between rocks above 2500 m a.s.l. Not common.



Figs. 1–3: (1) *Nebria hybrida*; (2) *Nebria rhilensis*; (3) *Xenion ignitum*.

***Nebria (Alpaonebria) rhilensis* FRIVALDSZKY, 1879 (Fig. 2)**

Material examined: **Rila**: 18 ex.: Borovec env., 1850 m a.s.l., 42.2458° N, 23.5910° E, 15.VI.2019. 3 ex.: Borovec env., 1700 m a.s.l., 42.2333° N, 23.5945° E, 14.VI.2019. 2 ex.: Belmeken, > 2500 m a.s.l., 42.1812° N, 23.7722° E, 13.VI.2019. **Pirin**: 1 ex.: Bezbog, 2400 m a.s.l., 22.VI.2019.

Distribution: Rila and Pirin; subalpine and low alpine zone; endemic.

Notes: *Nebria rhilensis* is very similar to several related and strongly hygrophilous species from the Alps (*N. fasciatopunctata* MILLER, 1850) and the Carpathians (*N. fuscipes* FUSS, 1850, *N. reitteri* RYBINSKI, 1902, *N. reichei* DEJEAN, 1826, *N. bisсенica* BIELZ, 1887). It is restricted to the Pirin and Rila ranges and lives along small water bodies above 1500 m a.s.l., in the upper forest zone, the *Pinus mugo* belt and in the lower alpine zone. Not common.

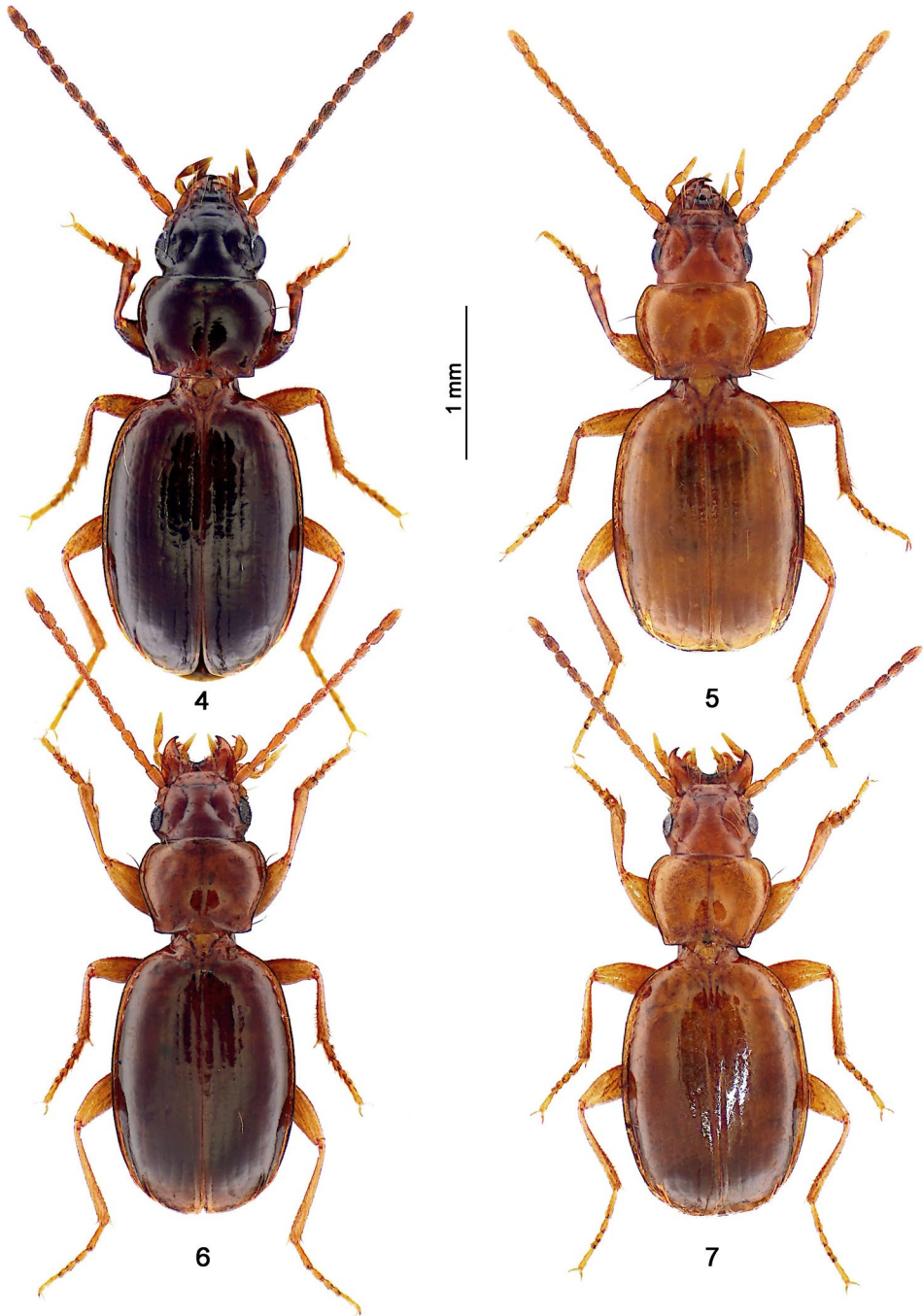
***Nebria (Tyrrenia) eugeniae* K. DANIEL, 1903**

Distribution: Rila; subalpine; endemic.

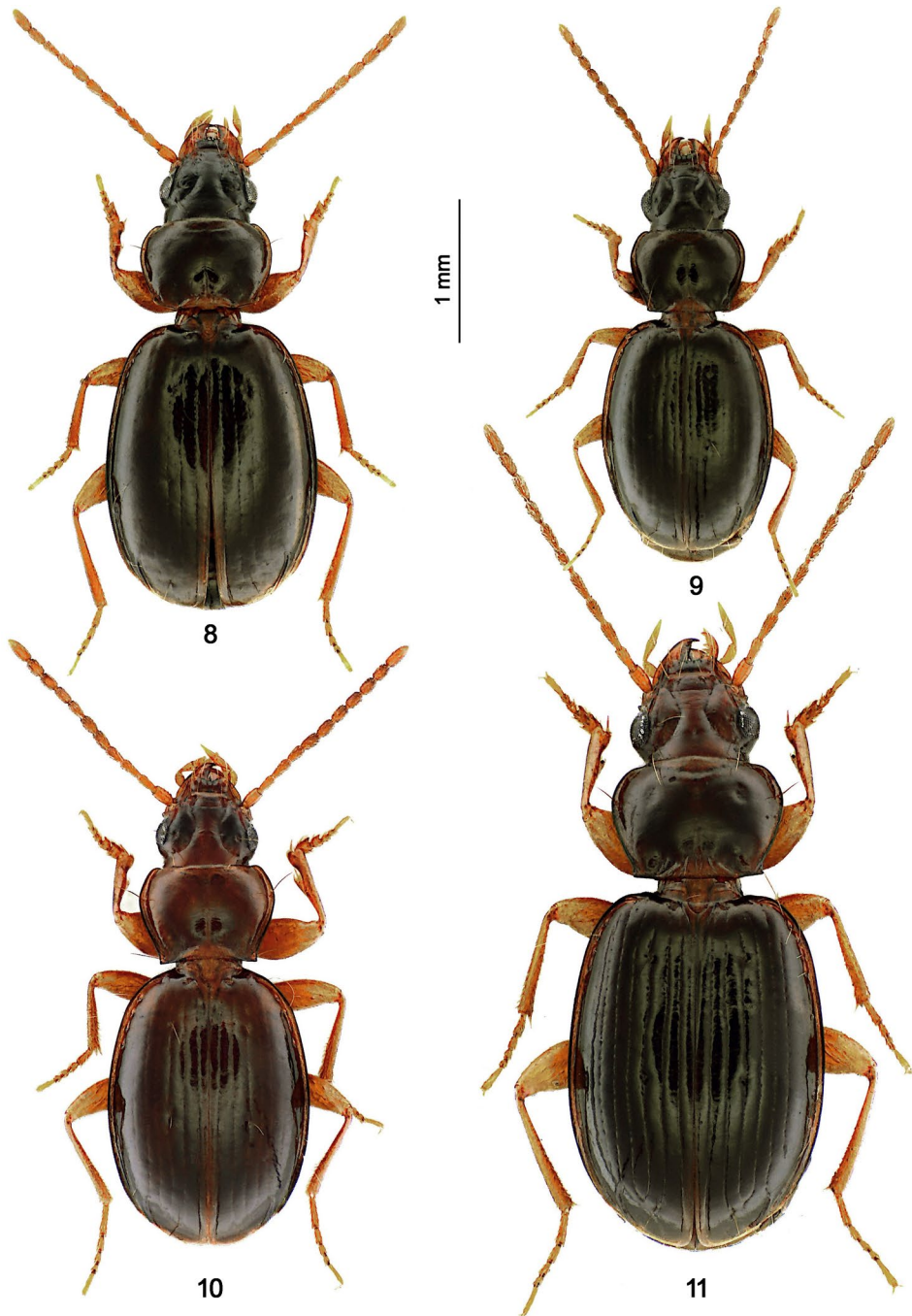
Notes: I could not obtain any specimens. This species was reported by HIEKE & WRASE (1988) from Rila: Ezero Grancar at 2200 m a.s.l., the single detailed location I am aware of. This species is like *N. rhilensis* but immediately distinguished by more brownish colouration, 4–5 lateral setae on pronotum and normal instead of the deeply impressed foveae on elytral disc. LEDOIX & ROUX (2005) provide a description, habitus and aedeagal line drawings and a photo of the habitus.

***Trechus* CLAIRVILLE, 1806**

This genus of small sized Carabidae is especially rich in species, many with limited distribution and restricted to single mountain ranges (DONABAUER 2019). The fauna of



Figs. 4–7: Alpine species of the *Trechus rhilensis* group: (4) *T. rhilensis*; (5) *T. orphaeus*; (6) *T. demircapicus*; (7) *T. gulickai*.



Figs. 8–11: Montane and subalpine species of *Trechus*: (8) *T. pirinicus*; (9) *T. szujeckii*; (10) *T. rhodopeius*; (11) *T. subnotatus*.

Bulgaria was revised by PAWLOWSKI (1972a, 1972b, 1973). One highly interesting species was added by MORAVEC (1986).

The fauna of Rila and Pirin is rich in species. Seven (sub)endemic and three widespread species (*T. quadristriatus* (SCHRANK, 1781), *T. obtusus* ERICHSON, 1837, and *T. subnotatus* DEJEAN, 1831) are confirmed by the material examined. Additionally, four doubtful records were reported from the study region (*T. priapus* DANIEL, 1912, *T. cardioderus* s.l., *T. bohemosorum* PAWLOWSKI, 1973, *T. kobingeri balcanicus* PAWLOWSKI, 1972). Two more species exist in the Rodopi east of Pirin in close vicinity, not yet recorded from the Pirin-Rila area (*T. szujekii* PAWLOWSKI, 1972 and *T. martismeae* PAWLOWSKI, 1972).

The phylogeny of the genus in Europe was summarized by DONABAUER (2019). Unfortunately, there is neither reliable placement nor support of monophyly for the *Trechus rhilensis* group sensu JEANNEL (1927). This group with five endemic species in the study area (first five species treated below) is further distributed in North Macedonia, Greece, and Serbia.

***Trechus rhilensis* KAUFMANN, 1884** (Figs. 4, 16)

= *Trechus moesiacus* JEANNEL, 1921

= *Trechus transylvanicus* JEANNEL, 1921

Material examined: **Rila**: 3 ex.: Borovec env., 1850 m a.s.l., 42.2458°N, 23.5910°E, 15.VI.2019. 124 ex.: Musala hut SE, ca. 2600 m a.s.l., 42.1900°N, 23.5956°E, 16.VI.2019. 175 ex.: Musala, ca. 2600–2800 m a.s.l., 42.1835°N, 23.5889°E, 15.VI.2019. 165 ex.: Belmeken, > 2500 m a.s.l., 42.1812°N, 23.7722°E, 13.VI.2019.

Distribution: Rila and Vitosa; alpine and subalpine zone; endemic.

Notes: *Trechus rhilensis* is restricted to the high elevations of the Rila and Vitosa range. In the alpine zone it is abundant, rather unspecialized in moderately moist places, especially in stony areas in the vicinity of melting snow. It can be found rather close to the surface under stones or in plant roots. It strongly resembles several members of the *Trechus* (*Orinotrechus*) *pertyi*-group from the Alps (like *T. sinuatus* SCHAUM, 1860, *T. hampei* GANGLBAUER, 1891, or *T. pertyi* HEER, 1837) in mode of life, body shape, body size, colouration, and even in aedeagal morphology. Whether this is a result of true relationship or convergence as frequently seen within alpine *Trechus* (see DONABAUER 2019) requires genetic investigations.

Three specimens were sifted from humid leaf litter at the lower border of the *Pinus mugo* belt around the mid station of the cable car together with *T. quadristriatus*, *T. subnotatus*, and *T. rhodopeius*. This location was almost 1000 m lower than the highest collection site on Musala peak!

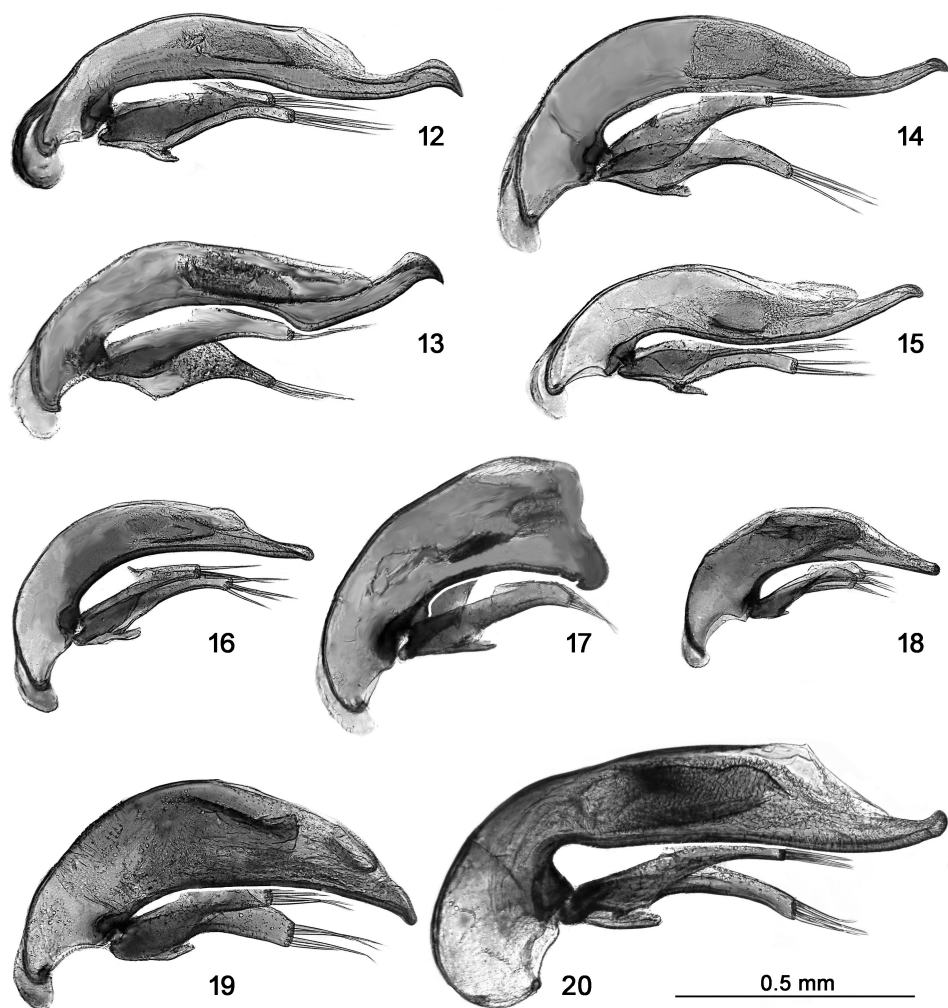
***Trechus rambouseki* BREIT, 1909** (Fig. 12)

= *Trechus fernandi-coburgi* BREIT, 1912

Material examined: **Rila**: 50 ex.: Musala hut SE, ca. 2600 m a.s.l., 42.1900°N, 23.5956°E, 16.VI.2019. 2 ex.: Musala, ca. 2600–2800 m a.s.l., 42.1835°N, 23.5889°E, 15.VI.2019. 3 ex.: Maljovica mt., 1900–2400 m a.s.l., 27.VI.1996.

Distribution: West and central Rila; alpine zone; endemic.

Notes: *Trechus rambouseki* is a rare, highly specialized, strongly depigmented, small *Trechus* with reduced size of eyes. It can be found under large stones in the alpine zone, well embedded in the ground. It was never found close to melting snow, but at several



Figs. 12–20: Aedeagi of *Trechus* in lateral view: (12) *T. rambouseki*; (13) *T. orphaeus*; (14) *T. demircapicus*; (15) *T. gulickai*; (16) *T. rhilensis*; (17) *T. rhodopeius*; (18) *T. szujeckii*; (19) *T. subnotatus*; (20) *T. pirinicus*.

meters distance. This species shares the same habitats as the closely related *T. rhilensis* but is significantly rarer and lives deeper in the ground.

***Trechus orphaeus* PAWLOWSKI, 1973** (Figs. 5, 13)

Material examined: **Rila**: 71 ex.: Belmeken, > 2500 m a.s.l., 42.1812°N, 23.7722°E, 13.VI.2019.

Distribution: East Rila; alpine zone; endemic.

Notes: This poorly known species can be distinguished from *T. rambouseki* by aedeagal characteristics alone (Figs. 12, 13). It is solely known from the eastern end of the Rila range, the alpine zone of the peak Belmeken, where it replaces *T. rambouseki*. It is not

rare along the crest around the summit under large stones embedded in slightly eroded meadows on the steep northern slope. This species could not be found directly at snow fields or in scree slopes.

***Trechus demircapicus* MORAVEC, 1986** (Figs. 6, 14)

Material examined: **Pirin**: 82 ex.: Bezbog, 2600 m a.s.l., 41.7251°N, 23.5074°E, 21.VI.2019. 42 ex.: Bezbog, 2400 m a.s.l., 41.7275°N, 23.5203°E, 22.VI.2019. 4 ex.: Begovica valley, 2100–2500 m a.s.l., 29.VI.1996.

Distribution: Pirin east; lower alpine zone; endemic.

Notes: *Trechus demircapicus* is a moderately depigmented *Trechus*, less specialized than the closely related *T. gulickai*. Although both species occur in vicinity on Peak Bezbog, they have never been collected syntopically. However, it was regularly found syntopic with *T. rhodopeius* at 2400 m a.s.l. in the *Pinus mugo* zone along a rocky crest.

***Trechus gulickai* LOEBL, 1967** (Figs. 7, 15)

Material examined: **Pirin**: 136 ex.: Wichren, 2500 m a.s.l., 41.7591°N, 23.3986°E, 19.VI.2019. 1 ex.: Bezbog, 2600 m a.s.l., 41.7256°N, 23.5088°E, 21.VI.2019. 4 ex.: Banderiski Circus, 2000–2400 m a.s.l., 1.VII.1996.

Distribution: Pirin; alpine zone; endemic.

Notes: *Trechus gulickai* is a moderately common, specialized, strongly depigmented, small *Trechus* with reduced eyes. It can be found in the alpine zone under stones well embedded in the ground. It was never found close to melting snow, but at several meters distance in rocky places with stable conditions, not in scree slopes.

***Trechus (Latotrechus) subnotatus* DEJEAN, 1831** (Figs. 11, 19)

Material examined: **Rila**: 24 ex.: Borovec env., 1100 m a.s.l., 42.2638°N, 23.5988°E, 13.VI.2019. 2 ex.: Borovec env., 1850 m a.s.l., 42.2458°N, 23.5910°E, 15.VI.2019.

Distribution: Italy (south), Greece, Albania, North Macedonia, Bulgaria, Great Britain (introduced); foothill to montane; widespread.

Notes: This species is widespread in south-eastern Europe, especially in Greece. Populations differ significantly in colouration and body shape. The populations from Rila do not show any maculae on elytra, strongly contrasting to individuals from the Vitosha range north of Rila or from southwestern Greece (type area). Similar conditions are known from *T. (Latotrechus) binotatus* PUTZEYS, 1870 in Italy (DEGIOVANNI & MAGRINI 2019). The male aedeagus, highly valuable for species delimitation in most cases, is strongly simplified in *T. subnotatus*. I am not able to separate the unicoloured specimens from Rila from maculate *T. subnotatus* by aedeagal morphology. I cannot confirm the presence of the closely related *T. cardioderus* PUTZEYS, 1870 as reported by GUERGORGIEV & GUERGORGIEV (1995).

***Trechus (Balcanotrechus) rhodopeius* JEANNEL, 1921** (Figs. 10, 17)

Material examined: **Rila**: 16 ex.: Musala hut, 2400 m a.s.l., 15.VI.2019. 69 ex.: Borovec env., 1500–1700 m a.s.l., 42.2333°N, 23.5945°E, 14.VI.2019. 28 ex.: Borovec env., 1850 m a.s.l., 42.2458°N, 23.5910°E, 15.VI.2019. **Pirin**: 136 ex.: Bezbog hut, 2000–2450 m a.s.l., 21.VI.2019. 53 ex.: Bezbog, 1500–2000 m a.s.l., 23.VI.2019. **Rodopi**: 19 ex.: Batashki Snezhnik-Karlaka, 1600 m a.s.l., 41.8852°N, 24.3082°E, 18.VI.2019. 3 ex.: Cernatica Goljam, Persenk, 1500–1900 m a.s.l., 24.VI.1996.

Distribution: Vitosha, Rila, Pirin, Rodopi; high montane and subalpine zone; endemic.

Notes: *Trechus rhodopeius* is a common species of the upper forest zone and the *Pinus mugo* belt (subalpine zone). It can be found under stones, in needle duff and leaf litter, rather indifferent to shade and moisture. It is by far the most common *Trechus* between 1500 and 2300 m a.s.l.

This species is closely related to another Balkans-endemic, *T. priapus*, and can be separated by slight aedeagal differences alone. It shares the same mode of life and is likely a vicariant species to *T. rhodopeius*. However, it was reported from the Vitosa and the Rila range together with *T. rhodopeius* (GUÉORGUIEV & GUÉORGUIEV 1995), which cannot be confirmed by the material examined.

***Trechus (Eurotrechus) szujeckii* PAWLOWSKI, 1972** (Figs. 9, 18)

Material examined: **Rodopi**: 36 ex.: Batashki Snezhnik-Karlaka, 1600 m a.s.l., 41.8852° N, 24.3082° E, 18.VI.2019.

Distribution: Rodopi; subalpine; endemic.

Notes: This smallest species of the genus from the Rodopi is rather common in humid leaf litter and needle duff in forests and known from several locations (together with *T. rhodopeius*) in the Rodopi. Most related species of *Eurotrechus* from Europe (like *T. pulchellus*, *T. splendens* or *T. striatulus*) are rather widespread. However, *T. szujeckii* was never reported from Pirin or Rila and its absence is difficult to explain.

***Trechus (Nigrinotrechus) pirinicus* PAWLOWSKI, 1972** (Figs. 8, 20)

Material examined: **Pirin**: 5 ex.: Bezbog, 1500–2000 m a.s.l., 41.7475° N, 23.5350° E, 23.VI.2019.

Distribution: Pirin, Rila; subalpine; endemic (?).

Notes: *Trechus pirinicus* is a rare species. The material examined was sifted from a thin layer of rather dry leaf litter under bushes beside a ski slope in a single location. An online reference with detailed photos (http://coleonet.de/coleo/texte/trechus_obtusiusculus-grp.htm) is provided by Arved Lompe from Rila: Slavov Vrach, confirming a wider distribution of this species. This species is probably more common in autumn and at lower altitudes (observations of related species by the author), less frequently investigated by collectors of Carabidae.

The members of the *T. obtusiusculus* group from the Balkans need revision due to lack of material. There is a second, extremely similar (or identical?) and poorly known species from the Rodopi: *Trechus martismiae* PAWLOWSKI, 1972. A third mysterious and extremely similar taxon is *T. kobingeri bulgaricus* PAWLOWSKI, 1972 described from Osogovska Planina (west of Rila at the border to North Macedonia) and reported from “Rhilo dagh” by PAWLOWSKI (1973). A fourth doubtful species from this group known from two female specimens (winged according to the original description!) without detailed location data is *T. bohorum* PAWLOWSKI, 1973 from Sarlir (Pirin) and Samokov.

Until more material including males is available from different sites, there is no convincing support for more than one species of this group in the Rila and Pirin mountains.

Pterostichini

This extraordinarily diverse tribe of Carabidae is rich in genera and species in the study area. There are several common and widespread species in the mountain forest zone, e.g.,

Pterostichus (Platysma) niger (SCHALLER, 1783) and *P. (Bothriopterus) oblongopunctatus* (FABRICIUS, 1787), both fully winged; *Abax ovalis* (DUFTSCHMID, 1812) and *Molops piceus* (PANZER, 1793) (Figs. 22, 30). In addition, I was able to study abundant material of six species, which are at least Balcan endemics and are not capable of flight, which will be discussed in more detail below.

In the 20th century, many subspecies were established (e.g. MLYNÁŘ 1977), following a “taxonomic fashion” by treating any population as subspecies. However, in more recent years, many subspecific names have been questioned because neither genetic investigations nor statistical analysis of measurements could deliver support. One example of such a modern revision was provided by ZANELLA (2016) for *Abax parallelepipedus* (PILLER & MITTERPACHER, 1783). All *Pterostichini* treated herein prefer forests, accept a wide range of microhabitats above 1000 m and actively disperse over longer distances. Intrapopulation variability of body size, proportions or colour is significant. In summary, the many subspecies relevant for the study area (GUÉORGUIEV & GUÉORGUIEV 1995) are in need of a modern revision and I prefer to omit them from the present study, as already done by HIEKE & WRASE (1988).

***Pterostichus rhilensis* ROTTENBERG, 1874 (Fig. 25)**

Material examined: **Pirin**: 3 ex.: Bansko env., 1700 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019. 42 ex.: Wichren, 2500 m a.s.l., 41.7591° N, 23.3986° E, 19.VI.2019. 28 ex.: Bezbog, 1500–2000 m a.s.l., 41.7475° N, 23.5350° E, 23.VI.2019. 42 ex.: Bezbog hut, 2000–2450 m a.s.l., 22.VI.2019. 42 ex.: Bezbog, 2600 m a.s.l., 41.7256° N, 23.5088° E, 21.VI.2019. **Rila**: 4 ex.: Borovec env., 1850 m a.s.l., 42.2458° N, 23.5910° E, 15.VI.2019. 10 ex.: Borovec env., 1500–1700 m a.s.l., 42.2333° N, 23.5945° E, 14.VI.2019. 40 ex.: Musala hut SE, ca. 2600 m a.s.l., 42.1900° N, 23.5956° E, 16.VI.2019. 56 ex.: Musala, ca. 2600–2800 m a.s.l., 42.1835° N, 23.5889° E, 15.VI.2019. 27 ex.: Belmeken, >2.500 m a.s.l., 42.1812° N, 23.7722° E, 13.VI.2019.

Distribution: Stara Planina, Pirin, Rila, Vitosa, Rodopi; subalpine, alpine; subendemic.

Notes: This is the dominant carabid in the alpine zone of Rila and Pirin mountains, locally extremely common under stones, less common in the forest zone. It is very variable in body length and setation of pronotum (number of lateral setae).

***Tapinopterus balcanicus* GANGLBAUER, 1891 (Figs. 26, 31)**

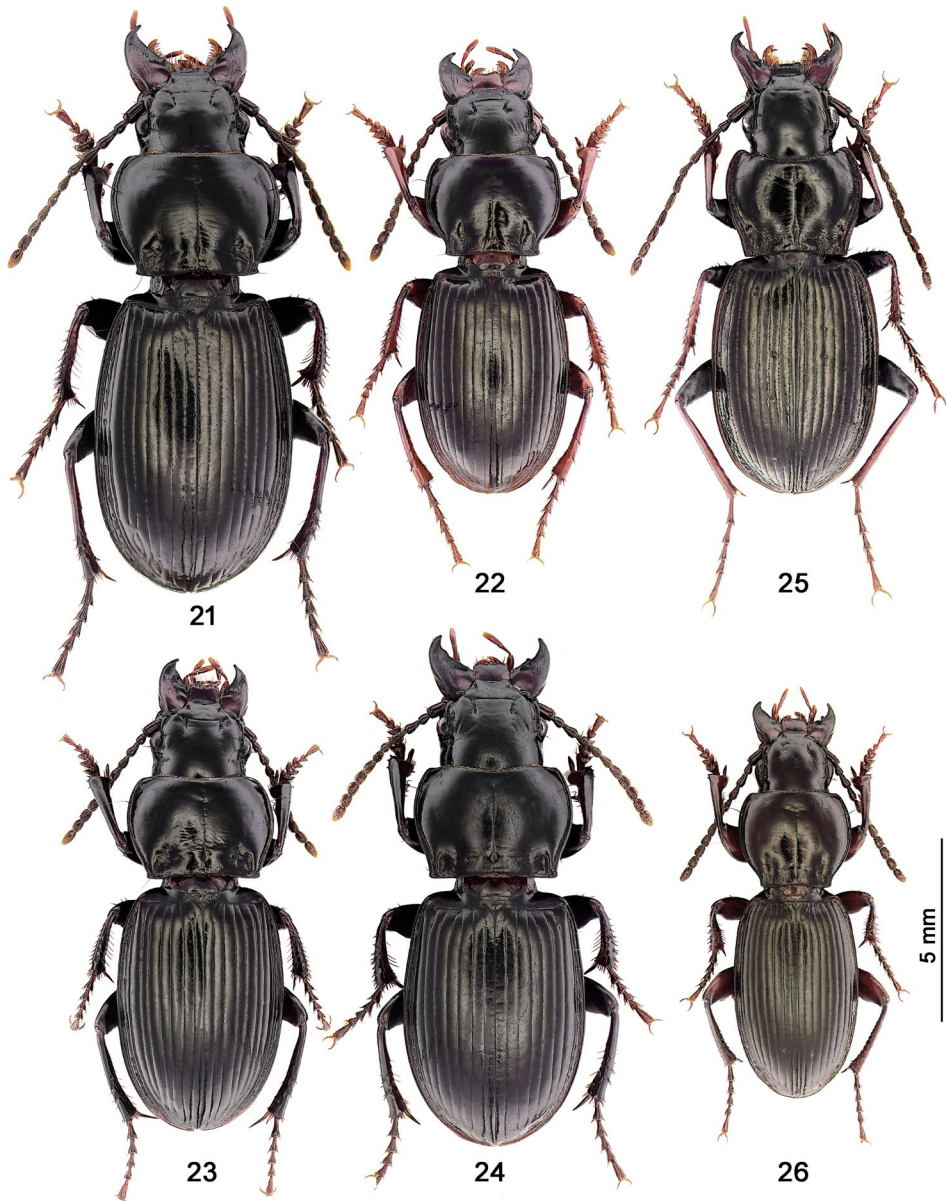
Material examined: **Rila**: 1 ex.: Belmeken power station, 1300 m a.s.l., 42.2009° N, 23.8566° E, 17.VI.2019. **Pirin**: 53 ex.: Bezbog, 1500–2000 m a.s.l., 41.7475° N, 23.5350° E, 23.VI.2019. 1 ex.: Bezbog hut, 2000–2450 m a.s.l., 22.VI.2019. 57 ex.: Bansko env., 1700 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019. **Rodopi**: 1 ex.: Batashki Snezhnik-Karlaka, 1600 m a.s.l., 41.8852° N, 24.3082° E, 18.VI.2019.

Distribution: Balkans.

Notes: This is the only representative of the genus I found in the forests under bark and rotten wood. There is a second species, *T. bartoni* MARAN, 1933 from Rila, known from a single female specimen, which should be critically reviewed according to HIEKE & WRASE (1988).

***Molops alpestris* DEJEAN, 1828 (Figs. 21, 27)**

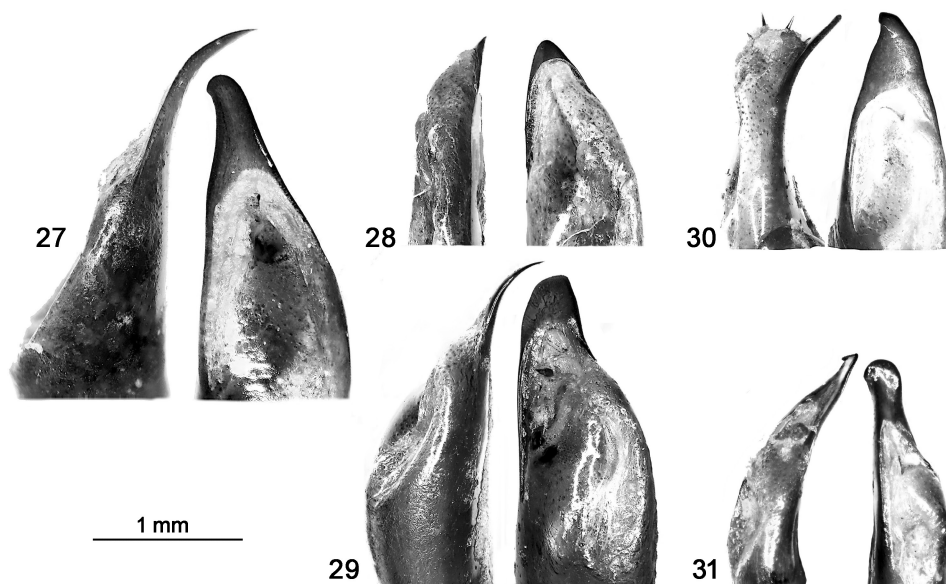
Material examined: **Rila**: 1 ex.: Borovec env., 1500–1700 m a.s.l., 42.2333° N, 23.5945° E, 14.VI.2019. **Pirin**: 3 ex.: Bezbog, 1500–2000 m a.s.l., 41.747° N, 23.535° E, 23.VI.2019. 1 ex.: Bezbog hut, 2000–2450 m a.s.l., 22.VI.2019. 31 ex.: Bansko env., 1700 m a.s.l., 41.784° N, 23.4482° E, 20.VI.2019.



Figs. 21–26: Habitus of Pterostichini: (21) *Molops alpestris*; (22) *M. piceus*; (23) *M. rhodopensis*; (24) *M. dilatatus*; (25) *Pterostichus rhilensis*; (26) *Tapinopterus balcanicus*.

Distribution: Balkans.

Notes: This is one of four *Molops* species (*M. piceus* is widespread, three are Balkans-endemics) in the study area. All are forest dwelling between 1000 and 2000 m a.s.l. and frequently occur together. The separation of species is difficult. The shape of pronotum,



Figs. 27–31: Apical part of aedeagi of Pterostichini: (27) *Molops alpestris*; (28) *M. dilatatus*; (29) *M. rhodopensis*; (30) *M. piceus*; (31) *Tapinopterus balcanicus*.

metatibia and elytra are helpful (Figs. 21–24), but determination should be confirmed by aedeagal dissection (Figs. 27–30).

***Molops rhodopensis* APFELBECK, 1904** (Figs. 23, 29)

Material examined: **Pirin**: 31 ex.: Bezbog, 1500–2000 m a.s.l., 41.7475° N, 23.5350° E, 23.VI.2019. 30 ex.: Bansko env., 1700 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019.

Distribution: Rila, Pirin, Rodopi.

***Molops dilatatus* CHAUDOIR, 1868** (Figs. 24, 28)

Material examined: **Rila**: 4 ex.: Borovec env., 1100 m a.s.l., 42.2638° N, 23.5988° E, 13.VI.2019. 3 ex.: Borovec env., 1500–1700 m a.s.l., 42.2333° N, 23.5945° E, 14.VI.2019. **Pirin**: 5 ex.: Bezbog, 1500–2000 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019. 6 ex.: Bezbog hut, 2000–2450 m a.s.l., 22.VI.2019. 40 ex.: Bansko env., 1700 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019. **Rodopi**: 7 ex.: Batashki Snezhnik-Karlaka, 1600 m a.s.l., 41.8852° N, 24.3082° E, 18.VI.2019.

Distribution: Balkans.

***Xenion ignitum* (KRAATZ, 1875)** (Fig. 3)

Material examined: **Pirin**: 11 ex.: Bezbansko env., 1700 m a.s.l., 41.7842° N, 23.4482° E, 20.VI.2019. 2 ex.: Bezbog, 1500–2000 m a.s.l., 41.7475° N, 23.5350° E.

Distribution: Bulgarian mountains and adjacent areas in northern Greece and North Macedonia.

Notes: This isolated, relict species with limited distribution is not common in the forest belt and can be found together with *Molops* and *Tapinopterus*.

Discussion

The fauna of the Rila and Pirin ranges is rather poor, both in species and genera. The mountain area was not heavily devastated by large ice shields (like parts of the Alps) in the past and today's climate is favourable for Carabidae (much more than in Greece). Thus, the absence of several elements otherwise typical for the Balkans or Greek mountains is difficult to explain. There is no endemic species of *Carabus*, *Ocys*, *Deltomerus*, *Omphreus*, *Tapinopterus*, *Laemostenus*, *Calathus*, *Platynus*, *Amara*, *Zabrus*, or *Cymindis*. Especially the forest soil fauna is extremely poor in endemic elements.

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