Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 77: 1–10 | Wien, Dezember 2025 | ISSN 0375–5223

Trechus priapus K. Daniel, 1902 (Coleoptera: Carabidae: Trechini) and its relatives in Bulgaria

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Abstract

Trechus priapus K. Daniel, 1902 and its closely related taxa from Bulgaria are reviewed. Four species are reported, habitus and aedeagus are illustrated, and detailed information on habitats and localities is given. Two subspecies are elevated to species: *T. divergens* Meixner, 1939 stat.n. and *T. medius* Meixner, 1939 stat.n.

Keywords. Carabidae, Trechinae, Trechini, *Trechus*, taxonomy, Bulgaria.

Zusammenfassung

Trechus priapus K. Daniel, 1902 und seine nächstverwandten Taxa aus Bulgarien werden besprochen. Vier Arten werden gemeldet, Habitus und Aedeagus werden abgebildet, und Lebensräume und Fundorte werden detailliert beschrieben. Zwei Unterarten werden zu Arten erhoben: *T. divergens* Meixner, 1939 stat.n. und *T. medius* Meixner, 1939 stat.n.

Introduction

Trechus priapus K. Daniel, 1902 (Fig. 1) is a small, flightless carabid beetle that is restricted to cool, humid microhabitats. Nevertheless, it is widespread in the higher mountains of the Balkan Peninsula, from southern Slovenia in the north to Albania, the Republic of North Macedonia, and Bulgaria in the south. Its closest relative is *T. rhodopeius* Jeannel, 1921 (Fig. 4) from the southern and south-eastern Bulgarian mountains (Rila, Pirin and Rodopi). According to Donabauer (2019), these two species constitute the subgenus *Balcanotrechus* Donabauer, 2019, an isolated clade within *Trechus* Clairville, 1806, which is not closely related to *T. croaticus* Dejean, 1831 or *T. pulchellus* Putzeys, 1846 as suggested by Jeannel (1927).

The common character of *Balcanotrechus* is the unique configuration of the median lobe of the aedeagus, in particular the steep apical truncation with a strongly shortened apex and the single, simply shaped, elongate copulatory piece in a dorsal position (instead of non-symmetrical and in a lateral position, the "normal" state within *Trechus*).

Most authors have listed exactly these two species (*T. priapus*, *T. rhodopeius*) for Bulgaria (Jeannel 1927, Pawlowski 1973, Hieke & Wrase 1988 and Guéorguiev & Guéorguiev 1995). In contrast, the catalogue of Palaearctic Coleoptera (Belousov 2017) lists four taxa, adding *T. priapus divergens* (Fig. 3) and *T. priapus medius* (Fig. 4), described by Meixner (1939) in a hardly accessible publication.

Meixner (1939) classified both taxa as "races" of *Trechus priapus* without reference to a holotype, type locality or type material repository. However, the author intended to

describe the subspecies "*T. priapus medius* nov. subspec." and "*T. priapus divergens* nov. subspec." (p. 309) instead of variations. The author has provided excellent line drawings of the male aedeagus (p. 312), a differential diagnosis (pp. 312–313) and a distribution map (p. 304), a list of the collection sites (p. 311) and acknowledgements to the entomologists who provided the material (p. 309). The taxa are thus clearly available.

Three field trips to Bulgaria and to the Republic of North Macedonia by the present author resulted in four distinct forms (Figs 1–4) closely related to *T. priapus*, distinguished by aedeagal differences alone, which correspond perfectly to the four taxa recognised by Meixner (1939). On Mt. Kom, on the border between Serbia and Bulgaria, two species were shown to coexist, clearly indicating that these taxa represent distinct species rather than subspecies.

The aim of this paper is to revive these almost forgotten taxa and to elevate them to valid species.

Material and methods

This study is based on 842 specimens of *Trechus* (*Balcanotrechus*) from the Balkan Peninsula, stored in the collection of the author and the Natural History Museum Vienna (NHMW). No historical specimens could be found in the collection of the Universalmuseum Joanneum in Graz (personal information by W. Paill and J. Gunczy) where Adolf Meixner was active. The stacked photographs were taken with a 5.0 Mpixel MicroQ digital Microscope Ocular camera attached to a Nikon SMZ 745T binocular microscope and processed with GIMP 2.10.24 software.

Results

Trechus (*Balcanotrechus*) *priapus* K. Daniel, 1902 (Figs 1, 5–9, 15–19, 28)

Trechus (s.str.) *priapus priapus* K. Daniel, 1902 – Type locality: Ivan Planina, NNE of Mostar, Bosnia and Herzegovina; Belousov 2017.

= *T. priapus meuseli* Reitter, 1910 – Type locality: Dundovici, Croatia.

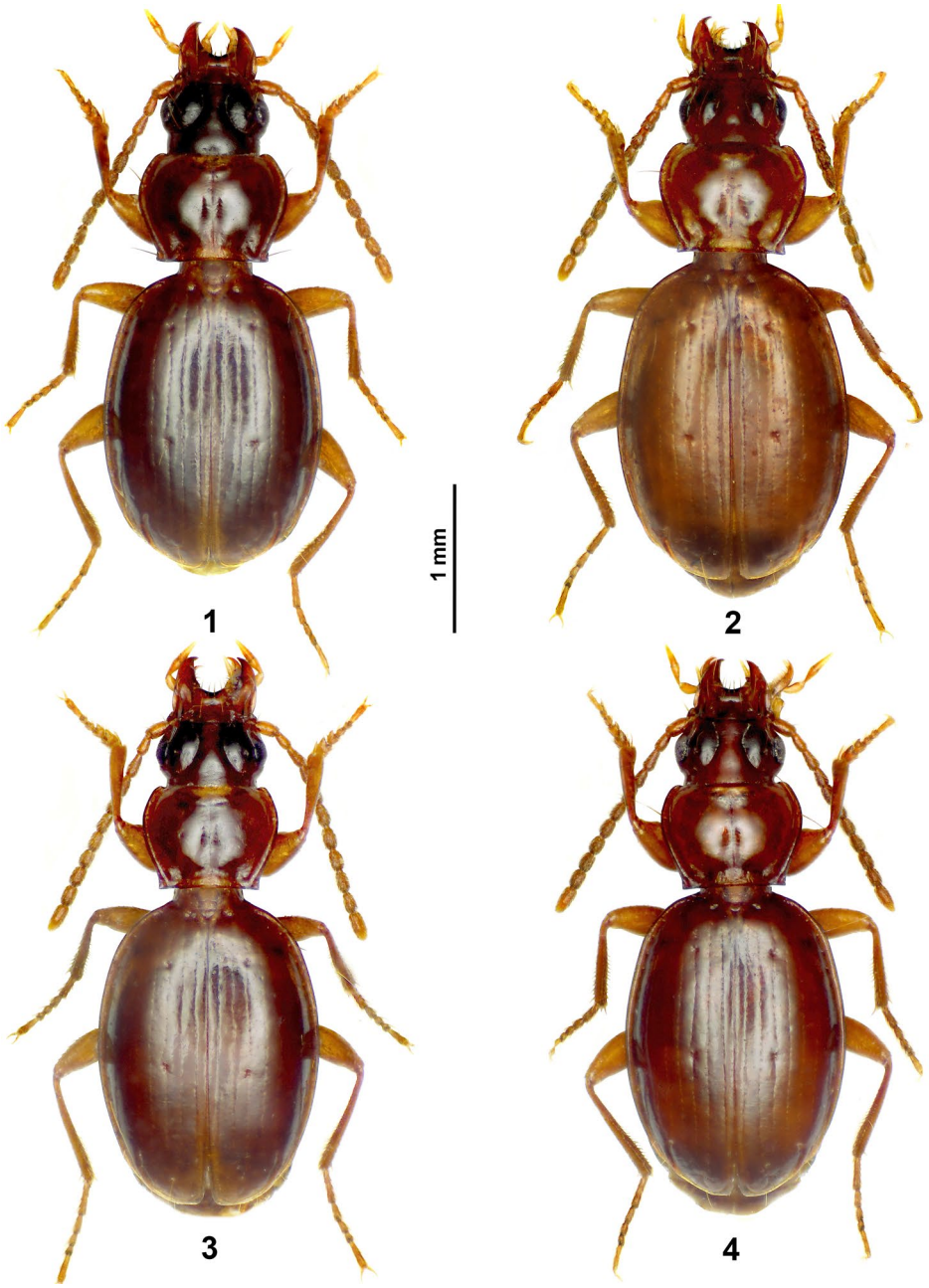
= *T. priapus pygmaeus* Apfelbeck, 1902 – Type locality: Igman Planina, Bosnia & Herzegovina.

= *T. priapus temporalis* Apfelbeck, 1902 – Type locality: Vranica Planina, Bosnia & Herzegovina.

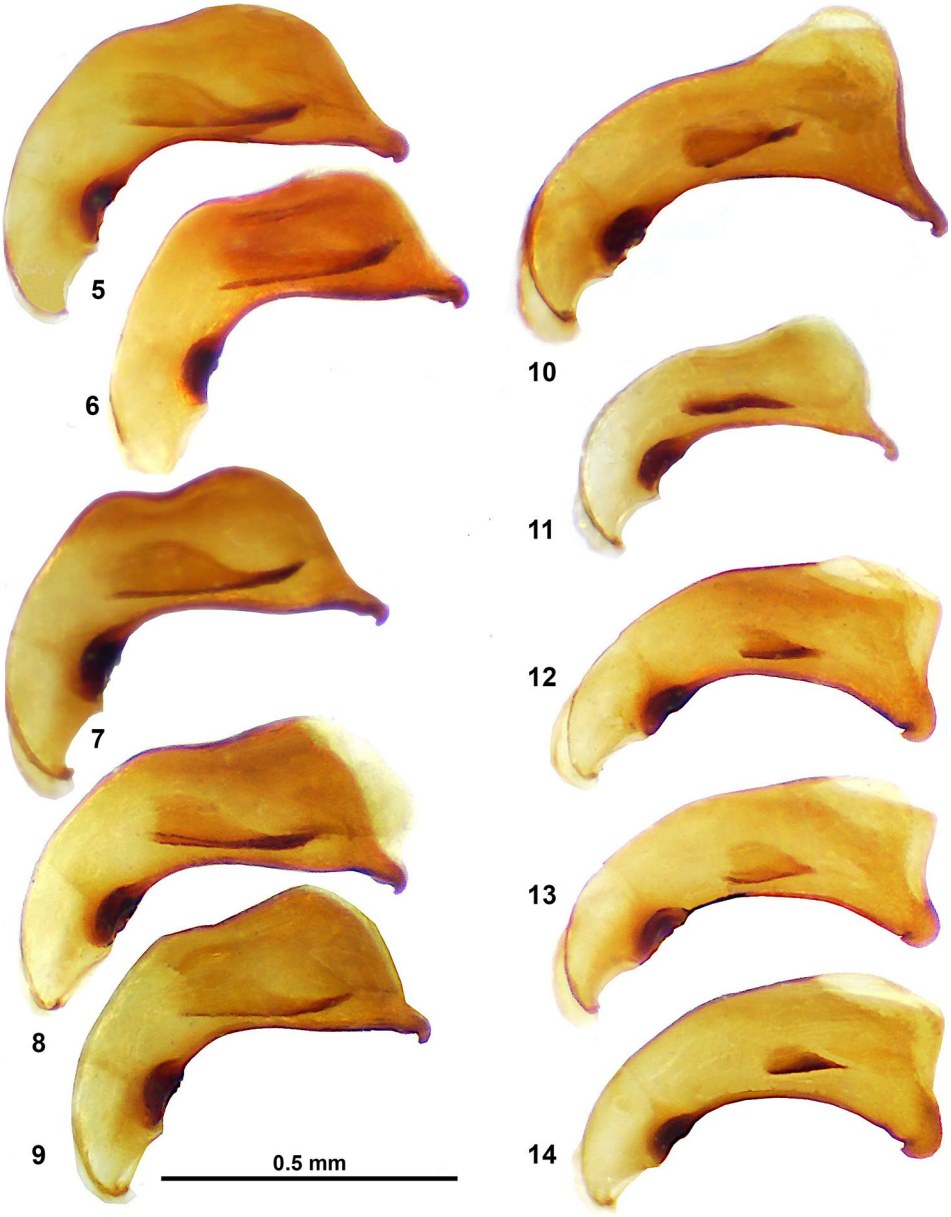
= ? *T. priapus serbicus* Apfelbeck, 1902 – Type locality: Serbia, Kopaonik Planina, Serbia.

Notes on type localities. *Trechus priapus* was described from Ivan Planina in Bosnia and Herzegovina. The type localities of the synonyms (by Jeannel 1927) fit within the distribution area of *T. priapus* and thus it is unlikely that these are senior synonyms of Meixner's taxa.

Material examined. Slovenia. 140 ex., Postojna env., Predjama, cave entry. Croatia. 2 ex., N-Velebit, Plješevica, 1500 m a.s.l. Bosnia & Herzegovina. 1 ex., Trescavica Planina. 10 ex., Bjelasnica planina. 16 ex., Ivan Planina, 1931. Kosovo: 16 ex., Shar Planina (Šar Mountains), Popova shapka, 6–11.VI.1955. Republic of North Macedonia. 89 ex., Marovo N.P., Belichica env., 1500–1600 m a.s.l., N 41.6905°, E 20.6757°, 20.VI.2024; 3 ex., Marovo env., 1200–1400 m a.s.l., N 41.6410°, E 20.7425°, 21.VI.2024; 6 ex., Perister, alpin, VII.1914. Serbia. 2 ex., Serbia, Midzor, 1.IX.1922. Bulgaria. 6 ex., Montana S, Mt. Kom, Kom hut, N 43.1908°, E 23.0817°, 1500 m a.s.l., 28.V.2023; 4 ex., Montana S, Perohanski pass, N 43.1210°, E 23.1245°, 1400 m a.s.l., 27.V.2023; 88 ex., Osogovo Montains, Mt. Ruen, > 2000 m a.s.l., N 42.1585°, E 22.5197°, 9.VI.2023; 74 ex., Osogovo Montains, Ski center, 1700 m a.s.l., N 42.1997°, E 22.6218°, 10.VI.2023.



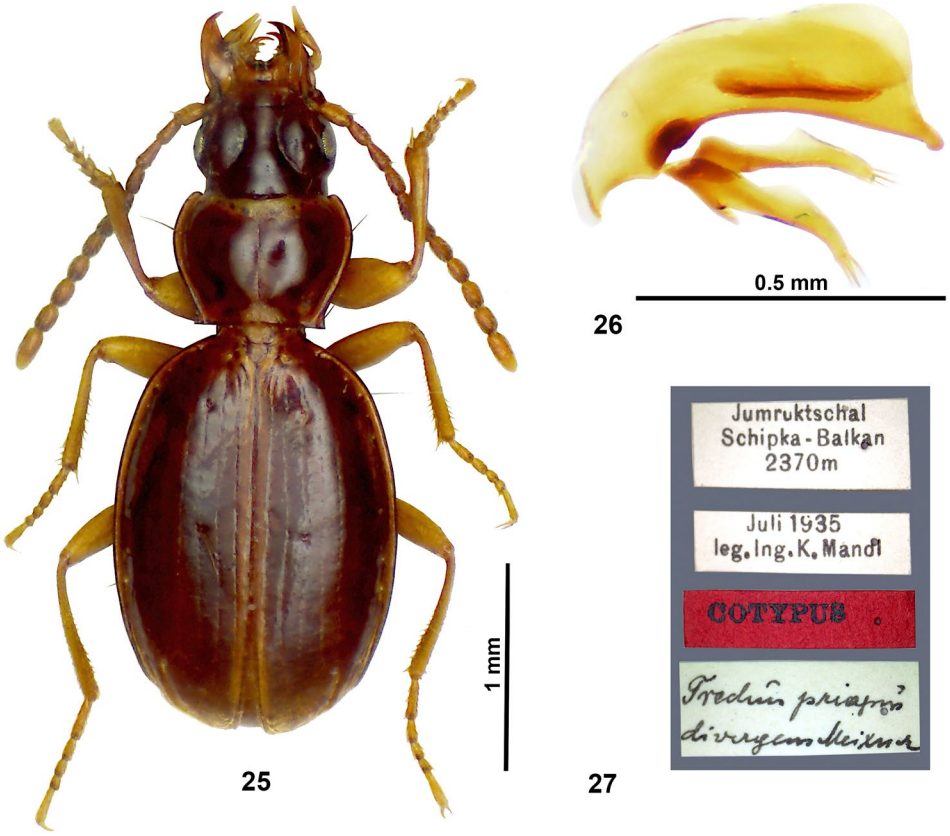
Figs 1–4. Habitus of *Trechus* from Bulgaria. (1) *T. priapus*, Stara Planina west, Mt. Kom; (2) *T. medius* stat.n., Stara Planina west, Mt. Kom; (3) *T. divergens* stat.n., central Stara Planina, Mt. Botev; (4) *T. rhodopeius*, Rila, above Borovez.



Figs 5–14. Median lobe in lateral view. (5) *T. priapus*, Slovenia, Predjama; (6) *T. priapus*, Bosnia, Ivan Planina (type locality); (7) *T. priapus*, Republic of North Macedonia, Marovo env.; (8) *T. priapus*, Bulgaria, Stara Planina west, Mt. Kom; (9) *T. priapus*, Bulgaria, Osogovo, Mt. Ruen; (10) *T. medius* stat.n., Bulgaria, Stara Planina west, Mt. Kom; (11) *T. divergens* stat.n., Bulgaria, central Stara Planina, Mt. Botev; (12) *T. rhodopeius*, Bulgaria, Rila, above Borovez; (13) *T. rhodopeius*, Bulgaria, Pirin, Bezbog; (14) *T. rhodopeius*, Bulgaria, Rodopi, Batashki.

Figs 15–24. Median lobe in dorsoposterior view. (15) *T. priapus*, Slovenia, Predjama; (16) *T. priapus*, Bosnia, Ivan Planina (type locality); (17) *T. priapus*, Republic of North Macedonia, Marovo env.; (18) *T. priapus*, Bulgaria, Stara Planina west, Mt. Kom; (19) *T. priapus*, Bulgaria, Osogovo, Mt. Ruen; (20) *T. medius* stat.n., Bulgaria, Stara Planina west, Mt. Kom; (21) *T. divergens* stat.n., Bulgaria, central Stara Planina, Mt. Botev; (22) *T. rhodopeius*, Bulgaria, Rila, above Borovez; (23) *T. rhodopeius*, Bulgaria, Pirin, Bezbog; (24) *T. rhodopeius*, Bulgaria, Rodopi, Batashki.

Diagnosis: Median lobe of aedeagus in lateral view (Figs 5–9) short and thickened, ventral margin saddled in the middle and moderately enlarged, equally curved and posteriorly convex, finally steeply truncated just before and towards the apex, apex very short, dorsal margin almost straight, ending in a characteristic angular cutout before a tiny knob. The single copulatory piece is elongated, simple, trough-shaped, 40–50% of the length of the median lobe, symmetrical and parallel to the dorsal margin. Highly characteristic and best suited for diagnosis is the apex in dorsoposterior view (Figs 15–19), which is broadly rounded with an extremely narrow margin of constant width, because the ostium almost reaches the apical margin. There is little variation seen within the wide distribution.



Figs 25–27. Lectotype of *Trechus divergens* stat.n., (25) habitus; (26) median lobe in lateral view; (27) original labels.

Observations. This species lives at an unusually wide range of altitudes, from cold habitats such as cave entrances and large sinkholes in the foothills, to alpine meadows, in woodland as well as in open areas near melting snow. It prefers a certain level of moisture, but is not restricted to permanently wet microhabitats.

Distribution. Endemic to the Balkan Peninsula, widespread (Fig. 28) and locally common. Found in mountain ranges along the Adriatic coast, from southern Slovenia in the north to northern Albania and southern North Macedonia in the south and westernmost Bulgaria in the south-east, not yet recorded from Greece. I can confirm its existence in westernmost Bulgaria in two mountain ranges, the Osogovo and the western Stara Planina. All other earlier reports need confirmation.

Discussion. The rather unspecialised habitats of *T. priapus* and its wide distribution are accompanied by a certain variability in respect to body size and pigmentation, which has led to the description of several subspecies, nowadays synonymous with the nominate form. A subspecies *serbicus* Apfelbeck, 1902 from Kopaonik Planina (Serbia) is still accepted, which is distinguished only by larger body size (Jeannel 1927) and therefore needs to be revised.

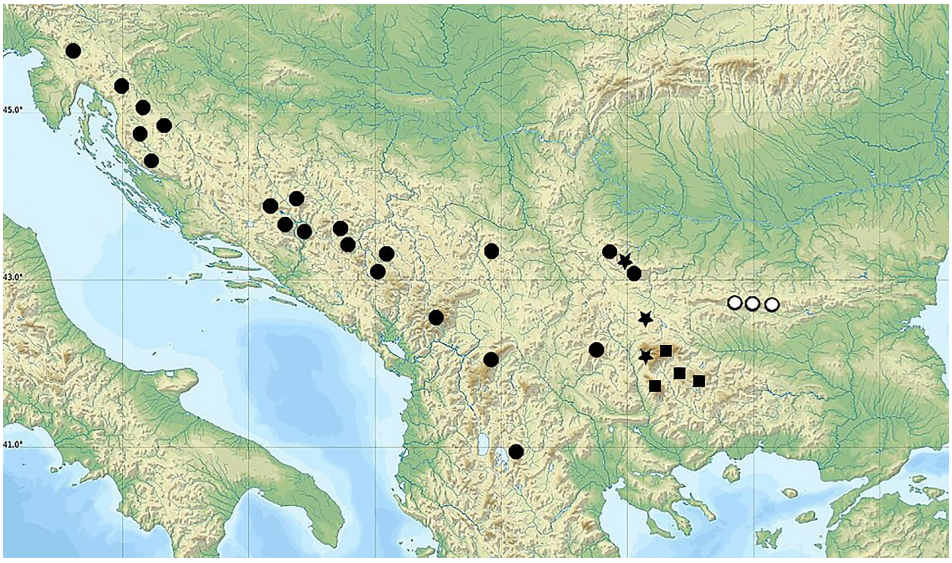


Fig. 28. Distribution map of the species of subgenus *Balcanotrechus*, redrawn from Meixner (1939): black circles – *Trechus priapus*; black asterisks – *T. medius*; white circles – *T. divergens*; black squares – *T. rhodopeius*. (Map base: Balkans relief location map; Wikimedia Commons.)

Trechus (*Balcanotrechus*) *medius* Meixner, 1939 stat.n. (Figs 2, 10, 20, 28)

Trechus (s.str.) *priapus medius* Meixner, 1939: Belousov 2017.

Trechus rhodopeius (nec Jeannel, 1921!): Pawlowski 1973: fig. 77.

Type locality. Not exactly specified, three rather distant localities are mentioned by Meixner (1939): "Stara Planina 2186 m; Vitosa 2291 m; Rila Planina 2675 m". These localities are scattered throughout western Bulgaria (Fig. 28) and should refer to: western Stara Planina (Mt. Midschur 2169 m), Vitosha (2292 m) south of Sofia and western Rila around Rila Monastery (Mt. Dudov 2674 m). The "description" is restricted to a figure of a median aedeagal lobe from Rila Planina.

Material examined. Bulgaria. 16 ex., Montana S, Mt. Kom, Kom hut, N 43.1751°, E 23.0805°, 1600 m a.s.l., 28.V.2023; 1 ex., Stara planina, Kom, 1700–2000 m a.s.l., 17.VI.1996.

Diagnosis: Median lobe of aedeagus in lateral view (Fig. 10) short and thickened, ventral margin saddle-shaped in the middle and strongly enlarged (more than in *T. priapus*), strongly curved and convex behind the middle and finally steeply truncated just before and towards the apex, apex short but longer than in *T. priapus*, the dorsal margin ending in a characteristic angular notch before a tiny knob. The single copulatory piece is elongate, simple, trough-shaped, less than 30% of the length of the median lobe and considerably shorter than in *T. priapus*. Very characteristic and best suited for diagnosis is the median lobe and apex in dorsoposterior view (Fig. 20), which is broadly blown up like a bubble and apically elongated into a narrower, parallel-sided apex with thick lateral margins, almost linearly truncated at the apex.

Observations. This species was found in the upper forest belt near watercourses in damp leaf litter under bushes.

Distribution. Discontinuous, known from western Stara Planina, Vitosha and western Rila (Fig. 28). The genitalia figures from Rila (Meixner 1939: Fig. 5), Vitosha (Pawlowski 1973: fig. 77, as *T. rhodopeius*) and western Stara Planina (Fig. 10) are almost identical. The occurrence in Serbia is expected, but not yet confirmed. This taxon was reported for the Republic of North Macedonia from Osogovo by Hristovski & Guéorguiev (2015), which is not confirmed by the rich material at hand (listed under *T. priapus*) and seems unlikely to me.

Discussion. *Trechus medius* stat.n. was found at 1600 m on Mt. Kom, and *T. priapus* at a lower altitude of 1400 m. Both taxa coexist on the same mountain and are morphologically different, even in habitus, with larger body size and lighter pigmentation in *T. medius* stat.n. (Figs 1–2). Treatment as a species is therefore appropriate. Otherwise, *T. medius* stat.n. is reported and illustrated from Rila (Meixner 1939: Fig. 5), the type locality of *T. rhodpeius*. Both species should occur there in close proximity. The name *medius* (= middle) is applicable to both the distribution and the genital morphology between *T. priapus* and *T. rhodopeius*.

Trechus (*Balcanotrechus*) *divergens* Meixner, 1939 stat.n. (Figs 3, 11, 21, 25–28)

Trechus (s.str.) *priapus divergens* Meixner, 1939: Belousov 2017.

Type locality and lectotype designation. The type locality was not exactly specified, several locations are listed by Meixner (1939): "Hoher Balkan, Jumruktschal 2380 m, Mara Güdük, Masalat, Gebirge westlich des Shipka Passes". All these localities are situated in Bulgaria, in the Central Balkan Mountains (Stara Planina), around its highest peak Botev (Bulgarian: Ботев), at 2376 m above sea level. Meixner did not mention a holotype; therefore, all specimens studied by him are syntypes. Probably they were not labelled by Meixner himself. I have studied three specimens that bear a red label „COTYPE" of unknown authorship and selected one of them as the lectotype.

Type material examined. Bulgaria. Lectotype (♂, in NHMW, Figs 25–27, present designation), Jumrukschal, Schipka-Balkan, 2370 m, Juli 1935, leg. Ing. K. Mandl". Paralectotypes 3 ♂♂, 3 ♀♀, same locality (NHMW); 8 ♂♂, 4 ♀♀, same location (author's collection).

Additional material examined. Bulgaria. 31 ex., Stara Planina, Botev, N 42.7274°, E 24.8917°; >1800 m a.s.l., 5.VI.2023; 1 ♂, 1 ♀, Masalat, Rosalito-Polje, Schipka-Balkan.

Diagnosis: Median lobe of aedeagus in lateral view (Fig. 11) short and thickened, smaller than in all other taxa considered here, ventral margin saddle-shaped in the middle and moderately enlarged (similar to *T. priapus*), curved and convex behind the middle and finally steeply truncated just before and towards the apex, apex short but considerably longer than in *T. priapus* and *T. medius* stat.n., the dorsal margin ending in a tiny knob, without an angular notch before. The single copulatory piece is elongated, simple, trough-shaped, about 35% of the length of the median lobe, shorter than in *T. priapus* and longer than in *T. medius* stat.n. or *T. rhodopeius*. Very characteristic and best suited for diagnosis is the median lobe and apex in dorsoposterior view (Fig. 21), which is slightly enlarged and apically extended into a narrower, slightly convergent apex with thin lateral margins and a narrowly rounded tip.

Observations. This species was collected at high altitudes along the ridge of the central Stara Planina, west of the Botev peak, between 2100 and 2200 m, near melting snow fields in meadows under deeply embedded stones together with *Pterostichus rhilensis*

Rottenberg, 1874. No specimens were found (despite intensive search) in forested areas where *T. priapus* is otherwise common.

Distribution. Endemic in the central Stara Planina in Bulgaria (Fig. 28).

Discussion. *Trechus divergens* stat.n. is a vicariant taxon that is quite different in genital morphology from the other three taxa. The central Stara Planina is an area of endemism with *Pterostichus merklii* J. Frivaldszky, 1879 as a well-known example.

Trechus (*Balcanotrechus*) *rhodopeius* Jeannel, 1921 (Figs 4, 12–14, 22–24, 28)

Type locality. "monts Rhodope" = Rila (Guéorguiev & Guéorguiev 1995).

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

Diagnosis: Median lobe of aedeagus in lateral view (Figs 12–14) short and thickened, ventral margin evenly curved (not saddle-shaped in the middle) and enlarged (more than in *T. priapus*) in the apical half, curved and convex behind the middle and finally steeply truncated just before and towards the apex, apex short but considerably thicker than in the previous three species, the dorsal margin evenly curved, ending in a characteristic oblique incision before a voluminous, equally rounded apex. The single copulatory piece is elongate, simple, trough-shaped, less than 25% of the length of the median lobe and considerably shorter than in any of the previous species. Very characteristic and best suited for diagnosis is the median lobe and apex in dorsoposterior view (Figs 22–24), which is slightly enlarged and apically elongated to a slightly narrower apex with thick and convex lateral margins meeting in a blunt, angled tip.

Observations. This species has been collected in a variety of humid habitats ranging from pine forests, beech forests, subalpine shrubs and high subalpine meadows.

Distribution. Endemic in Bulgaria (Fig. 28); Rila, Pirin and Rodopi. All other localities need confirmation, especially Vitosha. Occurrence in Greece is possible.

Acknowledgments

I am thankful to Matthias Seidel, who granted me access to the collection of NHMW, to Wolfgang Paill and Johanna Gunczy, who searched for types in the collection of Universalmuseum Joanneum, to Alexander Dostal for reviewing the manuscript, and to Alice Laciny and Herbert Zettel for their editorial work.

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