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A new remarkable *Duvalius* from Bulgaria (Coleoptera: Carabidae: Trechinae)

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Abstract. A new species of *Duvalius* Delarouzée, 1859 from Pticha Dupka pot hole (Stara planina mts., Bulgaria), *D.* (*Duvalius* s. str.) *krum* sp. nov. is described, illustrated and distinguished from related species.

INTRODUCTION

The last revision of the genus *Duvalius* Delarouzée, 1859 was published by Jeannel (1928) a little more than 80 years ago. A lot of new species have been described since then, and 442 valid species and sub-species were listed in the Catalogue of Palaearctic Coleoptera (Moravec et al. 2003). The genus has a Palaearctic distribution, with most species known from Europe. No brachyptery or macroptery has been recorded in the genus until Deuve (2000) published the first macropterous *Duvalius* representative reported flying in Iranian desert areas, near the Persian Gulf. The Iranian new taxon, *D.* (*Duvalius* s. str.) *hetschkoi matilei* Deuve, 2000 is the first representative of the genus living in desert lands at a low altitude above sea level. Recently the second macropterous species of the genus - *D. koeni* Muilwijk et Felix, 2008 was described from south Iran (Muilwijk & Felix, 2008).

Among the material of *Duvalius* (*Paraduvalius*) from various caves of Central Stara planina mountains (Bulgaria) preserved in alcohol and sent to me for study by Borislav Guéorguiev, I surprisingly recognised a brachypterous, glabrous species of *Duvalius*, quite different from pubescent representatives of the subgenus *Paraduvalius* Knirsch, 1924, inhabiting caves and other endogean habitats in the Stara planina mountains.

I decided to present here a description of this species, even though only two (partly teneral) female specimens have been hitherto known. One of the reasons is the fact that the typical locality (a pot about 100 m deep) is difficult to access for an entomologist. This species also seems to be very rare there, because it was found in the pot only once despite several biospeleological investigations. That´s why I do not expect new material for study in reasonable time. Secondly, I hope that the present study could inspire future investigations in Bulgarian caves by Bulgarian and foreign biospeleologists using modern collection methods, i.e. traps.

MATERIAL AND METHODS

The material examined is deposited in the following collections:

JJRC Jiří Janák private collection, Rtyně nad Bílinou, Czech Republic;
NMNHS National Museum of Natural History, Sofia, Bulgaria.

Terminalia and a wing of dissected female were embedded in Euparal. Dry-mounted specimens were studied under binocular stereomicroscope MBS 10. Line drawings were made using a Zeiss Laboval compound microscope with ocular grid. Measurements were taken with the stereomicroscope using an ocular scale.

Locality labels for the material examined are cited in the original version and marked with quotation marks („“).

Abbreviations:

HT- holotype, PT- paratype, AL- mean length of both antennae, HW- greatest width of head, HL- greatest length of head measured from the base of neck to apices of clypeus, MTL- mean length of metatarsus (without claw), PW- greatest width of pronotum, PL- length of pronotum measured along the midline, PBW- greatest width of pronotum base, EW- greatest width of elytra, EL- length of elytra measured along the suture from deepest point of humeral angle to elytral apex. Total body length was measured from apical margin of mandibles in closed position to apices of elytra. Length of antennomeres was measured as greatest length of each article. For details and examples of measurement see Janák (2009) and Hůrka et al. (1989).

TAXONOMY

Duvalius (*Duvalius*) *krum* sp. nov.

(Figs 1-3, 5-7)

Type material. Holotype (♀): „BULGARIA, pot hole Pticha Dupka near vil. Cherni Ossam, 2.viii.1997, P. Beron leg.“ (NMNHS). Paratype (1 ♀): same data as the holotype (JJRC).

Description. Total body length 4.05 (HT) - 4.10 (PT). Body long and narrow (Fig. 1), brachypterous, flightless, wings remainders slightly longer than half of elytral length (Fig. 7). Colour reddish-brown, lateral gutter of pronotum, elytra, antenna and legs light brownish-yellow, tarsi light yellow. Whole body glabrous, except for *Duvalius* usual long setae. Vertex smooth in the middle, only with scattered micropunctures, other parts of head mostly completely smooth, only around frontal furrows and above antennal sockets with remnants of microsculpture, neck with very fine microsculpture consisting of slightly transverse fields. Pronotum smooth and shiny in the middle, sides with remnants of microsculpture consisting of transverse waves. Elytra smooth, only apical part slightly wrinkled, with remnants of microsculpture.

Head (Fig. 2) wide (HW/HL = 1.27 (HT), 1.26 (PT)), moderately narrower than pronotum (PW/HW = 1.19). Eyes flat, reduced to whitish oval area, but with about 15 still distinct, but only moderately convex ommatidia. Frontal furrows entire, becoming narrower and deeper in the middle. Temporae moderately convex, glabrous. Front supraorbital seta situated near

Figs 1-2. *Duvalius krum* sp. nov., holotype: 1- habitus; 2- head and pronotum.

above the posterior angle of eye. Middle prominence of mentum wide and short (Fig. 6) with two rectangular teeth apically. Antennae very long and slender, about as long as elytra (EL/AL = 0.97 (HT, PT)). Mean ratios of antennomeres (HT) = 1.10 : 1.00 : 1.21 : 1.13 : 1.14 : 1.20 : 1.13 : 1.09 : 1.02 : 1.02 : 1.27. Pronotum cordiform, moderately convex and moderately transverse (PW/PL = 1.26 (HT), 1.24 (PT)), distinctly narrowed toward base (PW/PBW = 1.52 (HT), 1.49 (PT)), lateral sides elongately and deeply sinuate before posterior angles, posterior angles rectangular to slightly obtuse, not or hardly prominent. Middle furrow deep and at the base connected with the oval shaped furrow. Basal impressions very large and deep. Basal margin straight. Lateral groove narrow, in the anterior third moderately widened. Chaetotaxy of pronotum with anterior seta situated in widest part of pronotum, basal seta near before posterior angle.

Elytra narrow, elongate, oval (EL/EW = 1.83 (HT), 1.81 (PT)), more than three times as long as pronotum (EL/PL = 3.20 (HT), 3.23 (PT) and distinctly wider than it (EW/PW = 1.39 (HT), 1.44 (PT)), very flat along suture, shoulders slightly prominent. Lateral gutter very wide, striae in the middle part of elytra very deeply and moderately coarsely punctured, starting from 4th stria the punctures getting finer, 7th and 8th stria consisting of fine punctures, similarly to anterior and posterior parts of remaining striae. Internal interstices slightly convex, starting from 5th almost flat. Apical stria deep, connected with 5th or 7th stria.

Chaetotaxy of elytra: first discal setiferous puncture situated in fourth interstice at the level of third point of anterior umbilicate series or slightly before it, second discal point in third stria behind middle of elytra length, before first point of middle umbilicate series. Preapical point situated in second stria mostly at connection with third and fourth striae. Anterior (posthumeral) umbilicate series situated at inner margin of lateral gutter, all points equidistant. Distance between anterior and median umbilicate series about 1.6 larger than the length of anterior series. Remainders of wings slightly longer than half of elytral length, membranous, only with remnant of one basal vein (Fig. 3).

Legs long and slender. Metatarsus long and narrow (EL/MTL = 2.56 (HT), 2.65 (PT). First segment distinctly longer than segments 2 and 3 combined. Protibia with setae on inner side and distinctly grooved outer side.

Male: unknown.

Female: stylus with 4 strong setae (Fig. 5).

Differential diagnosis and Phylogeny. *D. krum* sp. nov. differs from all hitherto known species of *Duvalius* through the size of wing remnants, half as long as the length of elytra. The main differences from most species of *Duvalius* are in combination of the following characters: eyes reduced, body (except for *Duvalius* usual long setae) glabrous, elytra very long and narrow, appendices (mainly antennae and metatarsi) long and narrow, distance between humeral and median group of umbilicate points less than twice as long as the length of humeral series.

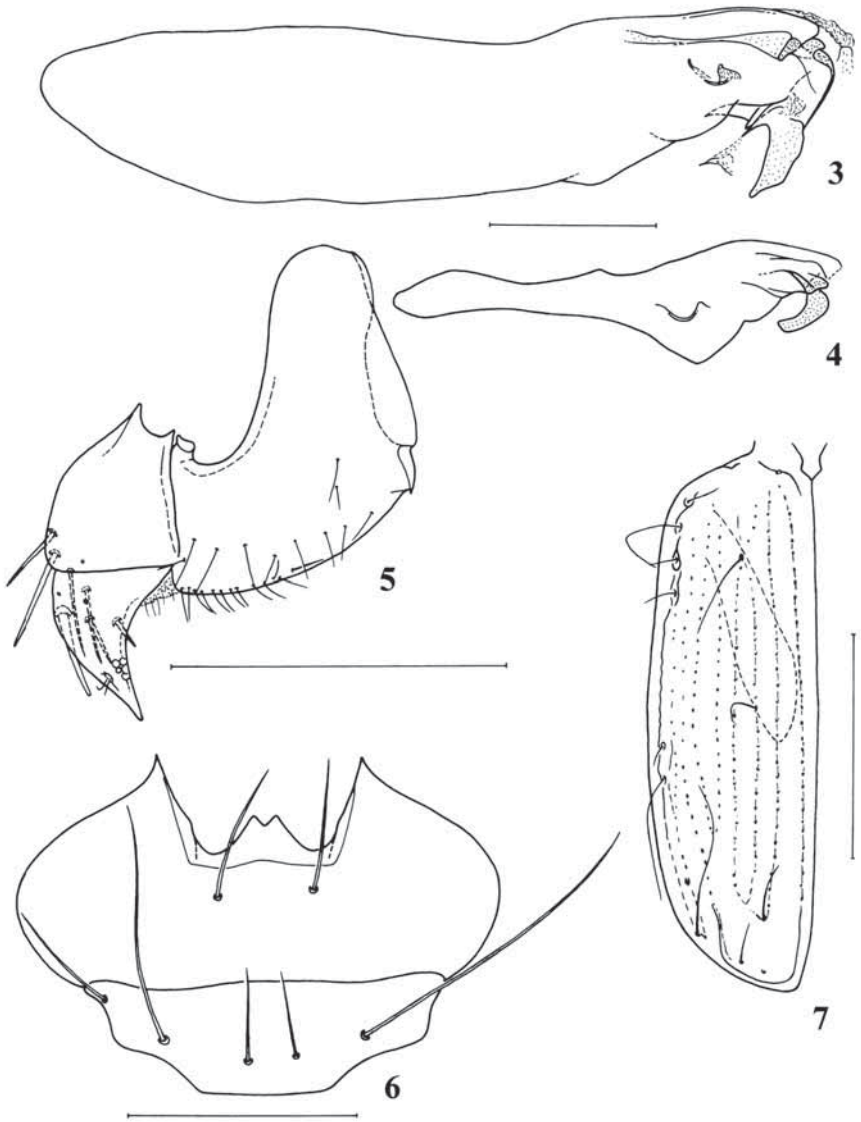
From geographically closest species *D. krum* sp. nov. differs as follows:

- from all *D.* (*Paraduvalius*) comprising most of Bulgarian *Duvalius* species by glabrous body,
- from *D.* (*Hungarotrechus*) *klimai* Janák et Moravec, 2008 (Bulgaria, Mt. Kom) by different colour, smaller, reduced eyes and distinctly shorter distance between humeral and medial groups of umbilicate punctures,
- from *D.* (*Biharotrechus*) *beschkovi* Coiffait, 1970 by shorter elytra and less distinct humeri (cf. Coiffait 1970: Fig. 1),
- from Greek *Duvalius* species mainly by a different shape of elytra and humeri (cf. Casale et al. 1996). *D. krum* sp. nov. is in these characters similar only to *D.* (*Duvalius*) *antonellae* Casale, Giachino, Vailati et Vigna Taglianti, 1996 and *D.* (*Duvalius*) *smolikanus* Casale, Giachino, Vailati et Vigna Taglianti, 1996, but differs through glabrous, unsetose tempora and smaller body,

D. krum sp. nov. differs from Central Asian *Duvalius bodoanus* group containing macrophthalmous, apterous and macropterous species/subspecies (i. e. *D.* (*Duvalius* s. str.) *hetschkoi matilei* Deuve, 2000 a *D. koeni* Muilwijk et Felix, 2008) by distinctly reduced eyes.

Due to the fact that the male and internal structures of aedeagus are unknown, based only on external characters *D. krum* sp. nov., I include this new species tentatively in the subgenus *Duvalius* s. str., without attempting to add this species to a certain species group.

The reduction in wings of Trechinae was discussed by Jeannel (1926: 329-338). He supposed that all *Duvalius* - macrophthalmous, microphthalmous and anophthalmous - are apterous. Two brownish coloured, macrophthalmous *Duvalius* checked by me - *D. exaratus*



Figs 3-7. *Duvalius krum* sp. nov.: 3- left wing, paratype; 5- right stylus and valvifer, paratype; 6- mentum, paratype; 7- left elytron (--- = wing), holotype ; *Duvalius exaratus* (Schaum), Slovenia: 4- left wing. Scale 0.25 mm (3-6) and 1 mm (7).

exaratus (Schaum, 1860) (Slovenia, Dobrovlje Mts.) and *D. klimai* Janák et Moravec, 2008 (paratype from Kom Mt., Bulgaria) - have both similarly short wing remnants as in Fig. 4, which are also distinctly shorter than in *D. krum* sp. nov. (Fig. 3). Macroptery in *Duvalius* has been discovered only recently in two Central Asian species. Wing polymorphism in the genus *Duvalius* is known only in Central Asian *D. hetschkoi* (Reitter, 1911): *D. hetschkoi hetschkoi*

(Reitter, 1911) described from Turkestan is apterous and *D. hetschkoi matilei* Deuve, 2000 described from Iran is macropterous. The second hitherto known macrophthalmous and macropterous species of the genus is *D. koeni* Muilwijk et Felix, 2008, described from south Iran (Muilwijk & Felix, 2008). Among Trechinae, wing polymorphism is known in *Trechus* - i.e., in *Trechus obtusus* Erichson, 1837 and *T. austriacus* Dejean, 1831 - with some populations macropterous and some brachypterous or even apterous (Jeannel 1926: 334). In *T. obtusus* it is known that young colonizing populations contain more winged individuals than old, established populations (for details see Liebherr & Takumi, 2002). In *D. krum* sp. nov., the relatively large remnants of wings could support relative young colonizing of cave habitat, but the advanced reduction in eyes is inconsistent with this. The discovery of males of this new species and/or other populations or related species/subspecies could help not only in determining relationships to other species of the genus, but also clarifying the relationship between the wing reduction and the time since colonizing a new habitat.

Note. Both specimens were cited by Guéorguiev (2005: 95) as *Duvalius* (*Paraduvalius*) sp.2.

Phenology and distribution. Both typical, partly teneral specimens were collected in August. The Pticha dupka pot hole is mentioned in the Internet published index of Bulgarian caves (Anonymous 2010) with following details: No 0086, total length: 522 m, maximal depth: - 108 m, GPS coordinates: E 24° 41' 47.50'', N 42° 43' 24.70''. The pot hole was listed in Guéorguiev & Beron (1963) and Beron (1972, 1994) under the code Lv 38. Coleoptera in this locality were collected by Zagorov (14.x.1958), by Delčev (1.vii.1962, 1.vii.1970) (Beron, l. c.).

Etymology. Named after Krum, Khan of Bulgaria between 802 and 814 AD, the ruler who introduced the first written law in this country.

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