

A NEW SPECIES OF *DUVALIUS*, SUBG. *BIHAROTRECHUS*
(COLEOPTERA: CARABIDAE) FROM BULGARIA

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Duvalius (Biharotrechus) bekchievi GUÉORGUIEV, new species, found in caves and on forest ground in the Strandza Mt., is described and diagnosed. The new taxon is closely related to the West Anatolian *D. bortesii* CASALE et VIGNA TAGLIANTI, 1984. Peculiarities of the morphology and ecology determine *D. bekchievi* GUÉORGUIEV, sp. n. as “unspecialized” in respect to the hypogean environment.

Key words: Carabidae, Trechini, *Duvalius*, *Biharotrechus*, new species, Bulgaria

INTRODUCTION

The subgenus *Biharotrechus* BOKOR, 1922 includes 50 valid species, 48 in Europe and two in Asia Minor (CASALE 2011, CASALE & VIGNA TAGLIANTI 1984, 1999, ČURČIĆ *et al.* 2007, MORAVEC *et al.* 2003, PAVIĆEVIĆ & POPOVIĆ 2003, VIGNA TAGLIANTI 2011). The European species live in Romania (29 species), Ukraine (two species), Croatia (two species), Bosnia-Herzegovina (nine species), Montenegro (four species), Greece (two species) and Republic of Macedonia, Bulgaria, Serbia (one species in each), while the Anatolian species occur in southwest Turkey. The only Bulgarian species, *D. beshkovi* COIFFAIT, 1970, is a local endemic of the Osogovo Mt. (COIFFAIT 1970).

All the species from this phyletic line of *Duvalius* DELAROUZÉE, 1859 possess copulatory piece with median part (“phanère médiane”) protracted, forming simple appendage and shortened lateral shares (“phanères latérales”) at the front; same profoundly bifid in the rear (JEANNEL 1928: 383). As well, all species possess more or less clear morphological modifications (loss of pigmentation, reduced eyes) which are adaptations to the hypogean way of life (*ibid.*).

Recently, collecting trips of Bulgarian zoologists in the Strandzha Mt. led to findings of slightly depigmented trechine beetles, with partially atrophied eyes. After a careful investigation of the internal structure of aedeagus, it became evident that they belong to a new species of *Biharotrechus*, whose members have not

been known until now in the eastern part of the Balkan Peninsula. The description of the new taxon and quest for its systematic position are main objectives of the present work.

MATERIAL AND METHODS

Technical procedures follows those yet explicated by the first author (GUÉORGUEV 2009).

The type material is distributed among the following collections: Natural History Museum of Geneva, Switzerland (NHMG); National Museum of Natural History, Sofia, Bulgaria (NMNHS); private collection of ACHILLE CASALE, Turin, Italy (CCa); and private collection of PIER MAURO GIACHINO, Turin, Italy (CGi).

Duvalius (Biharotrechus) bekchievi GUÉORGUEV, sp. n. (Figs 1–6)

Type material. HOLOTYPE: male, Strandzha Mt., Maharata Cave, 160 m a.s.l., near the Kosti Village, 7.VII.2007, under stones near the entrance, leg. B. Petrov (NMNHS). PARATYPES: a total of seven males and 12 females: one male and one female, Strandzha Mt., Golyamata Vapa Cave at the place “Petrova Niva”, 255 m a.s.l., near the Stoilovo Village, 6.VIII.2006, under stones on guano-clay, leg. B. Petrov & T. Stoyanov (NMNHS); four males, five females, Strandzha Mt., Maharata Cave, 160 m a.s.l., near the Kosti Village, 25.IX.2006, under stones near the entrance, leg. B. Petrov & T. Stoyanov (NHMG, NMNHS); one male, five females, labelled as holotype (CCa, CGi, NMNHS); one male, one female, Strandzha Mt., “Bataka” protected area, 316 m a.s.l., north of the Bliznak Village, 25.IX.2010, under stone, leg. R. Bekchiev (NMNHS).

Etymology – We are pleased to name the new species after one of its collectors, our colleague and specialist on Pselaphinae (Staphylinidae), ROSTISLAV BEKCHIEV (NMNHS).

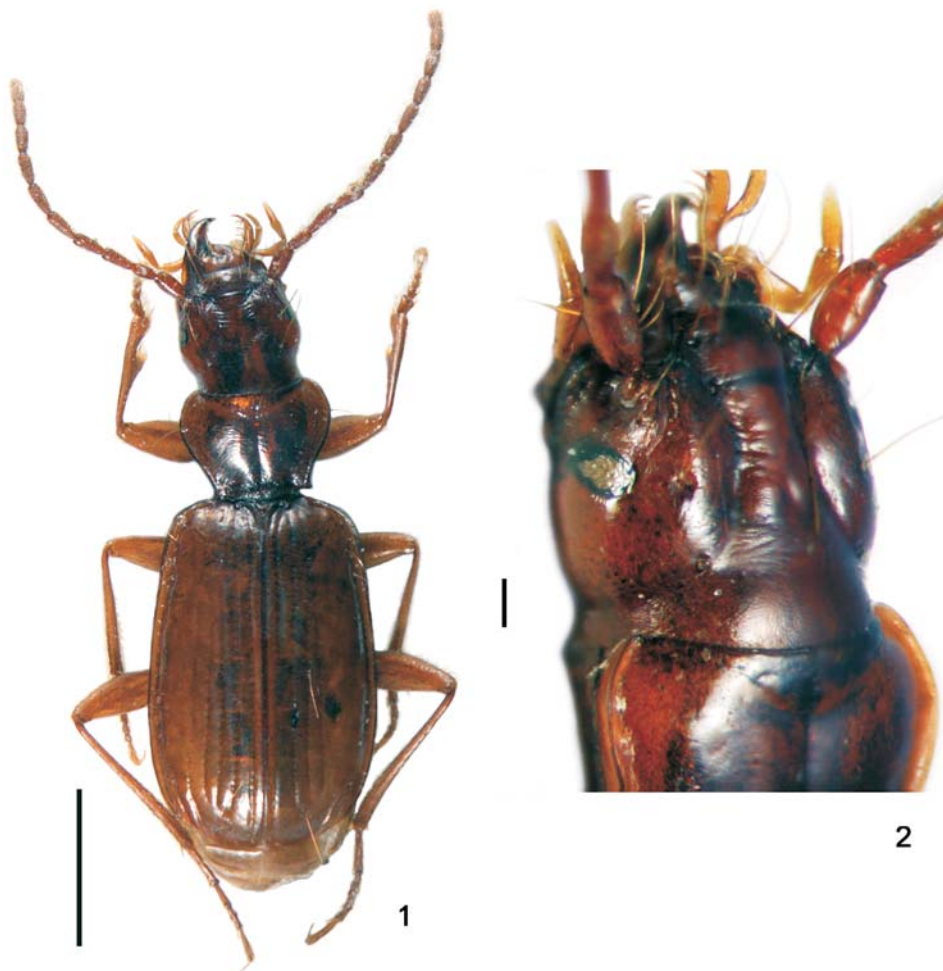
Diagnosis – Typical species of *Biharotrechus* with copulatory piece prominent in its middle and shortened proximally and distally, as well as profoundly bifid in the rear. Eyes not completely atrophied, ommatidia detectable, but vestigial; distinct; remnants of hind wings present; median lobe of aedeagus oblong, regularly curved in basal part, narrow in medial part, and broadened in subapical position (Fig. 3); copulatory piece short and wide, with a smaller dorsal part (“ligula”) consisting of some compact and well-chitinised spines and a bigger ventral part consisting of numerous less compact and chitinised spines; both parts connected in a bunch of squamae, ventral one with simple, widely round, and somewhat indistinct apex at the front (Figs 3–5).

Description – A *Duvalius* species, showing, at a mediocre degree, morphological adaptive modifications to the hypogean environment (Fig. 1). Medium sized, with elongated antennae and

legs, widely cordate pronotum and subparallel, depressed on disc elytra; pubescence absent (excl. appendages), hind wings remnants present. Colour reddish, testaceous; tegument relucet and shiny; microsculpture reduced, in fine polygonal meshes on labrum, clypeus, and neck, with fine transverse meshes on pronotum, elytra and abdomen.

Total length 4.1–4.5 mm (4.45 mm in HT) from anterior margin of labrum to apical margin of longer elytron; body maximum width 1.45–1.6 mm (1.6 mm in HT).

Head stout, with maximal width behind eyes (ratio of head length/width 1.24–1.47, mean 1.357); frontal furrows complete; eyes not completely disappeared, with some rather atrophied ommatidia (Fig. 2); genae inflated without hairs; two pair of supraorbital setae; two pairs of short

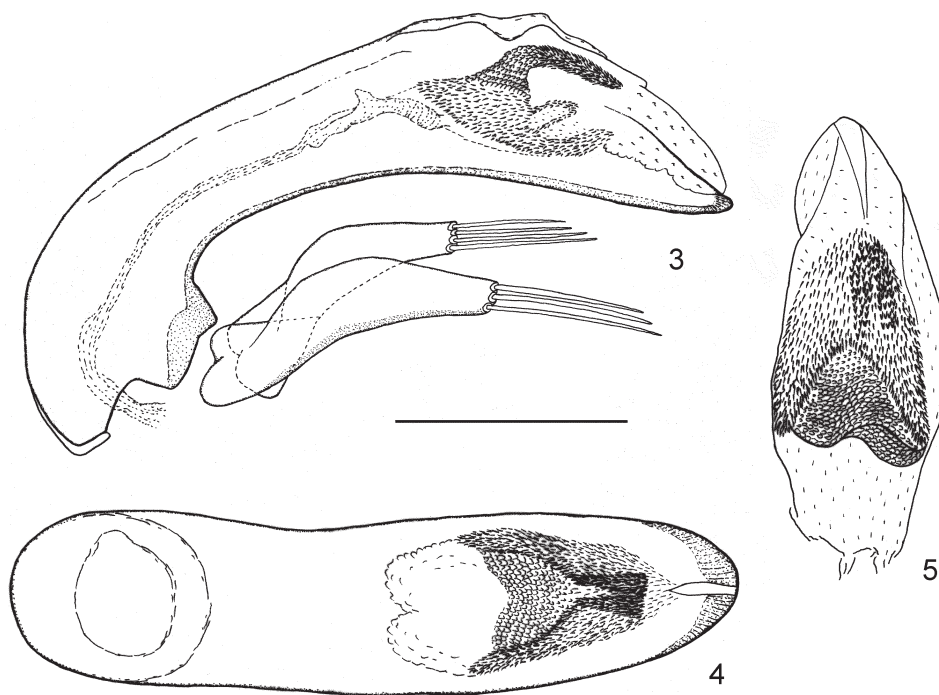


Figs 1–2. *Duvalius (Biharotrechus) bekchievi* GUÉORGUIEV sp. n.: 1 = dorsal aspect of body, male paratype (scale line = 1 mm), 2 = left latero-dorsal aspect of head, female paratype (scale line = 0.1 mm)

setae above the antennal base; clypeus with four setae situated far from anterior margin, the outer being longer; labrum emarginated at the apex, with six setae, the outer longer, the inner ones shorter. Mandibles thick, bidentate, strongly arcuate and acute at tips. Labium articulated in part, mentum separated from submentum distinctly only in sides; mentum with a prominent tooth in apical emargination, bifid at the tip, praementum with six setae. Antennae long and slender, exceeding the length of elytra, antennal segments 8–11 and distal part of segment 7 exceeding basal margin of pronotum.

Pronotum cordate, transverse, subconvex, significantly shorter and slightly wider than head (ratio of pronotum/head length 0.57–0.7, mean 0.64; ratio of pronotum/head width 1.17–1.24, mean 1.194), wider than long (ratio of pronotum length/width 0.7–0.76, mean 0.726), expanded anteriorly and restricted posteriorly, with maximal width at its anterior second fifth; sides arcuate in its anterior and median parts, sinuate towards the base, with lateral gutters concave and prominent; anterior and posterior margins almost rectilinear; anterior angles indistinct, hardly prominent forward, posterior angles sharply pointed, clearly prominent outwards; disc subconvex, mid-line deep; basal impressions moderately deep. Antero-lateral setae laying at point of maximal width of pronotum, baso-lateral setae situated above posterior angles.

Elytra elongate, sub-parallel, with maximal width at posterior third, depressed on disc, not coalesced along suture, with short basal depressions at the base of striae 5; shoulders well-marked, with rounded apices; marginal gutters slightly concave, start from the base of striae 5 (point of basal depression) and distinct to apex, wide anteriorly, becoming much narrower at apical fourth; striae dis-



Figs. 3–5. *Duvalius (Biharotrechus) bekchievi* GUÉORGUIEV sp. n., male genitalia: 3 = aedeagus, lateral view, holotype, 4 = median lobe of aedeagus, dorsal view, holotype, 5 = copulatory piece, dorsal view, paratype. Scale line = 0.2 mm

tinct, present at elytral sides and at the apex as well, punctate, striae 8 grooved along the apical sixth, scutellar striae present; intervals sub-convex, only intervals 8 elevated at the apical sixth. Hind wing remnants present, as long as 1/3 of abdominal length and 1/4 of elytral length. Elytra chaetotaxy: scutellar setiferous pores present; dorsal series with two pores on each elytron, situated on striae 3, first one in anterior fourth of elytra, at or slightly below the level of third humeral umbilicate pore, second one after the middle; pre-apical pores present, lying at striae 2; two apical pores present; marginal series of umbilicate pores aggregate, all in marginal gutters: the four pores of the humeral group close to each other, equidistant, fifth and sixth ones at place of maximal width of elytra, below the level of second dorsal pores, seventh and eighth pores at the apical fifth of elytra.

Abdomen with sternites glabrous, finely transversely microsculptured, sternites 4–6 with one pair of median setae; sternite 7 in both sexes with apical part impressed and more or less longitudinally rugose, with one pair of longer lateral setae in male, and with two pairs of similar setae, the outer being approximately twice as long as the inner ones in female.

Legs long, slender, distinctly pubescent; fore tibiae sulcate on external sides; tarsi pubescent on dorsal side, basal two tarsal segments in male dilated, not denticulate apico-internally.

Male genitalia: median lobe of aedeagus small, oblong in lateral view (Fig. 3), regularly curved in basal part, broadened distally, with maximal width in pre-apical position, sagittal carina distinct, quickly disappeared in dorsal direction, apex sub-triangular, with round tip, ventral margin regularly curved, biconcave, before and at basal orifice, dorsal margin regularly curved to straight, wavy at apical orifice; median lobe in dorsal view (Fig. 3) cylindrical with widely round basal bulb and apex. Parameres long, with three or four apical setae. Inner sac in sub-apical position in median lobe, with basal and apical parts hyaline, and central part complex, chitinised (Figs 3–5). Copulatory piece relatively short and wide in lateral view (Fig. 3), with a smaller dorsal part (“ligula”) situated near apical orifice, and consisting of some compact and well-chitinised spines and a bigger ventral part consisting of numerous less compact and chitinised spines (especially in front), both parts connected with a bunch of squamae; copulatory piece in dorsal view (Figs 4–5) with “ligula” united at

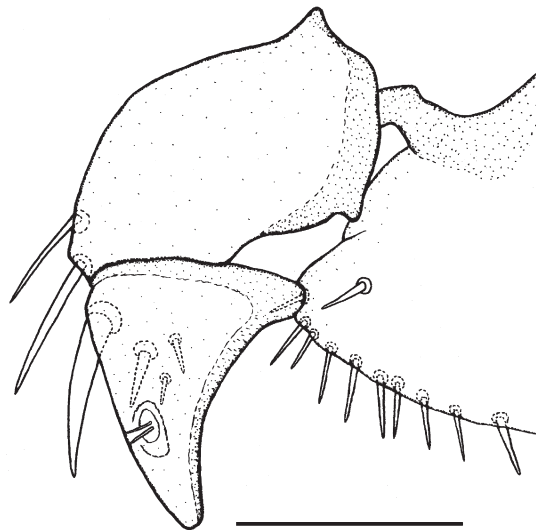


Fig. 6. *Duvalius (Biharotrechus) bekchievi* GUÉORGUIEV sp. n., ventral aspect of left stylus and part of valvifer, female paratype. Scale line = 0.1 mm

distal position and narrowly bifid at proximal position, with ventral part concave, profoundly bifid, forming two lateral bunches at proximal position, with simple, widely round, and somewhat indistinct apex in distal position, basal concavity posteriorly filled up with squamae.

Female genitalia: apical stylomere of stylus triangular (Fig. 6), with one big marginal and three smaller median ensiform setae on tergal position, with sensorial fovea bearing two minute nematiform setae on sternal position; basal stylomere sub-orthogonal, bigger than apical one, with two big marginal setae on tergal position.

DISCUSSION

By structure of the median lobe of aedeagus and copulatory piece, the new species is closely related to one of the two Anatolian representatives of *Biha-rotrechus*, *D. (B.) bortesii* CASALE et VIGNA TAGLIANTI, 1984. Both species share unique characteristics within the subgenus: copulatory piece ranged at two levels, one dorsal and one ventral, both composed of elementary, less chitinised spines (not part of spines aggregate in a “typical” well-chitinised structure). The traces of ommatidia, glabrous tegument of body (excl. appendages), protibiae sulcate on external surface, and quite similar, oblong form of the median lobe of aedeagus give final touch to this combination of special features, which bring together the above mentioned two species. However, *D. (B.) bekchievi* GUÉORGUIEV, sp. n. differs from its Anatolian congener in the median lobe of aedeagus regularly curved in basal part and broadened in sub-apical position (vs. median lobe of aedeagus suddenly curved in basal part and equally broadened in apical part; compare Fig. 3, present work, CASALE & VIGNA TAGLIANTI 1984: 313, Fig. 2), as well as in copulatory piece with somewhat indistinct apex at the front (vs. copulatory piece with distinct apex at the front; compare Fig. 5, present work, CASALE & VIGNA TAGLIANTI 1984: 313, Fig. 3).

So far, the new species was collected from three localities in the Strandzha Mt. as the distance between the farthest two ones is ca. 50 km as the crow flies. The Maharata Cave (N 42 00.558 E 27 82.364, WGS 84, 160 m a.s.l.) represents hot-pole with total length of 150 m. Its entrance is situated among predominant *Quercus* spp. forest and represents big funnel, wide ca. 40 m in diameter, where a brooklet enters the cave. The measured temperature inside is 9.5 °C in December 2010. West of this locality, *D. (B.) bekchievi* GUÉORGUIEV, sp. n. was found in the Golyamata Vapa Cave (N 42.07601 E 27.51252, WGS 84, 255 m a.s.l.). This cave is also descending hot-pole (–125 m), with several plumbs, and with total length of 420 m. Inside a brooklet with inconstant capacity passes through the most galleries. The measured temperature inside is 11.2–11.5 °C in December 2010. The last spot at the “Bataka” protected area (N 42 11.621 E 27 19.597, 316 m a.s.l.) is an open limestone terrain in the midst of predominant oak forest. At the day of col-

lecting the soil temperatures at this spot were: 15.6 °C (in 24.09.2010, 06.00 p.m.), and 13.6 °C (in 25.09.2010, 06.00 a.m.). All the specimens from the Maharata Cave were collected under stones at the hot-pole entrance. Specimens from the “Bataka” protected area were caught during turning stones at a dried up channel of a brook.

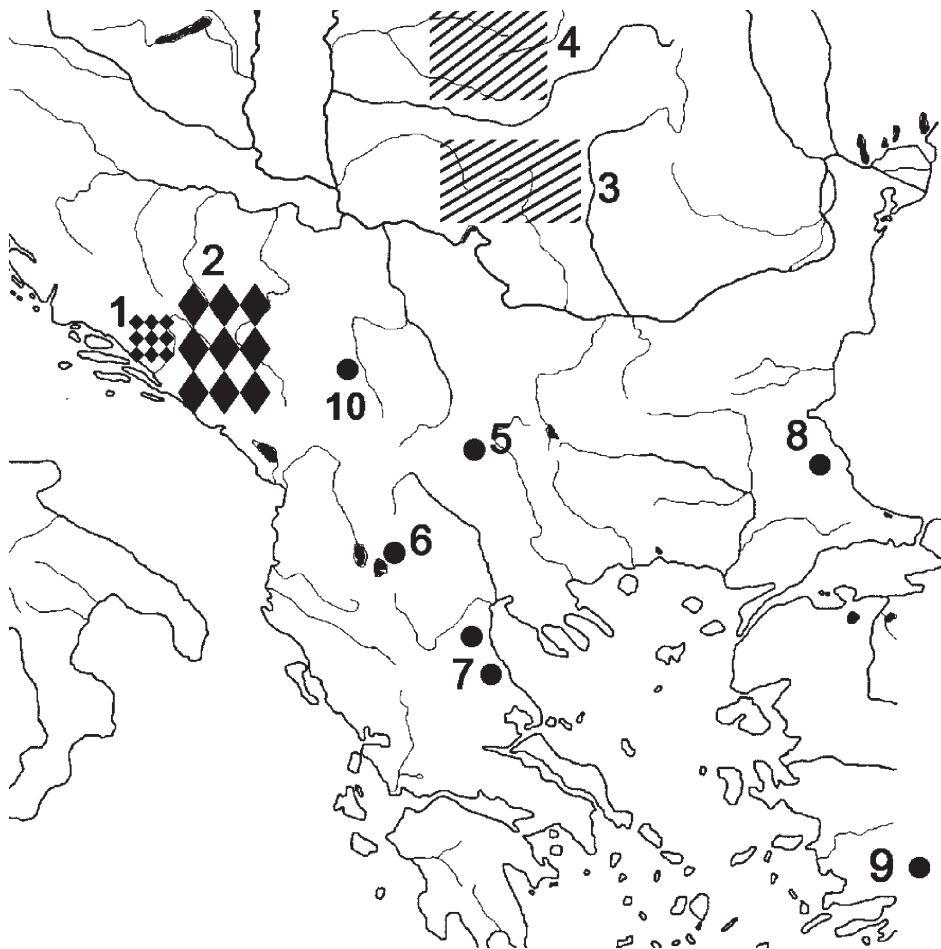


Fig. 7. Distribution of the subgenus *Bihartrechus* BOKOR: 1 = species in Dalmatia (“*biokovensis*” group of species), 2 = species in Bosnia-Herzegovina and Montenegro (“*pilifer*” group of species); 3 = species in the South Carpathians (“*budaï*” group of species); 4 = species in the Munții Apuseni (“*redtenbacheri*” group of species); 5 = species in the Osogovo Mt. (*Duvalius beshkovi* COIFFAIT); 6 = species in the Pelister Mt. (*D. peristericus* J. MÜLLER); 7 = species in the Olympus (*D. meschniggi* MEIXNER) and Ossa Mts (*D. roseni* JEANNEL); 8 = species in the Strandza Mt. (*D. bekchievi* GUÉORGUIEV, sp. n.); 9 = species in West Anatolia (*D. bortesii* CASALE & VIGNA TAGLIANTI); 10 = species in the Pešter Plateau (*D. reufi* PAVIČEVIĆ et POPOVIĆ); the distribution of *D. huberi* CASALE not shown

The presence of undisappeared eyes and remnants of hind wings and absence of tight sutural coalescence of elytra reveal a modest hypogean adaptation in the new species. The hand collecting by means of turning stones in non-typical hypogean habitats as well as relatively high soil temperatures established in a single point also demonstrated that *D. (B.) bekchievi* GUÉORGUIEV, sp. n. is unspecialized to subterranean existence.

JEANNEL (1928: 57–58, Fig. 1295) suggested *Biharotrechus* is quite ancient in terms of the time of its origin and distribution. The present-day range of this group is highly disjunct, but comparatively wide in the area (Fig. 7). Nowadays, a few species from the east and south of the Balkan Peninsula and two ones from Anatolia are known: *Duvalius (Biharotrechus) beshkovi* COIFFAIT, 1970 (Osogovo Mt.), *D. (B.) peristericus* (J. MÜLLER, 1914) (Pelister Mt.), *D. (B.) meschniggi* MEIXNER, 1928 (Olympus Mt.), *D. (B.) roseni* JEANNEL, 1929 (Ossa Mt.), *D. (B.) bekchievi* GUÉORGUIEV, sp. n. (Strandzha Mt.), *D. (B.) reufi* PAVIĆEVIĆ et POPOVIĆ, 2003 (Pešter Plateau), *D. (B.) bortesii* CASALE et VIGNA TAGLIANTI, 1984 (SW Anatolia), and *D. (B.) huberi* CASALE, 2011 (SW Anatolia).

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