

CROATODIRUS (NOV. GEN.) *BOZICEVICI* N. SP., AN ENIGMATIC NEW LEPTODIRINE BEETLE FROM CROATIA (COLEOPTERA, CHOLEVIDAE)

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Casale, A., Giachino, P. M. & Jalžić, B.: *Croatodirus* (nov. gen.) *bozicevici* n. sp., an enigmatic new leptodirine beetle from Croatia (Coleoptera, Cholevidae). *Nat. Croat.*, Vol. 9, No. 2., 83–92, 2000, Zagreb.

Croatodirus, new genus, *bozicevici* new species (Coleoptera, Cholevidae) are described from the cave Cavern in Učka Tunnel, Mt. Učka (Monte Maggiore) near the town of Rijeka (Croatia). The new taxon, provisionally attributed to the phyletic lineage of *Antroherpon*, is however markedly isolated owing to the following peculiar combination of morphological features: 1) antennal insertion on the posterior 4th of the head; 2) antennomere 1 slightly longer than antennomere 2; 3) pterothorax not pedunculate, mesosternum not carinate; 4) mesocoxal cavities contiguous; 5) tarsal claws widened; 6) protibiae without external apical comb of spines and without external spurs; 7) meso- and metatibiae furnished with inner, unified spurs; 8) aedeagus medium sized, with inner sac without sclerotized pieces; and 9) female stylomeres and spermatheca fully atrophied.

The systematic position and the peculiar ecology of this new, exceptional troglobiontic beetle are illustrated and discussed.

Key words: *Croatodirus*, *bozicevici*, new genus, new species, Coleoptera, Cholevidae, systematics

Casale, A., Giachino, P. M. & Jalžić, B.: *Croatodirus* (nov. gen.) *bozicevici* n. sp., novi neobični leptodirski tvrdokrillac iz Hrvatske (Coleoptera, Cholevidae). *Nat. Croat.*, Vol. 9, No. 2., 83–92, 2000, Zagreb.

Novi rod *Croatodirus* i nova vrsta *bozicevici* (Coleoptera, Cholevidae) opisani su iz špilje Kaverna u tunelu Učka u Učki (Monte Maggiore) pokraj Rijeke (Hrvatska). Nova svojta, provizorno pripojena filetičkoj liniji *Antroherpon*, je morfološki ipak značajno izolirana zbog neobične kombinacije sljedećih morfoloških osobina: 1) ticala su smještena na stražnjoj četvrtini glave; 2) prvi članak ticala je neznatno duži od drugog članka; 3) pterotoraks nije ispučen, mezosternum nije grebenast; 4) mezokoksalne šupljine se dodiruju; 5) tarzalne pandžice proširene; 6) protibije bez vanjskog

vršnog češljica igala i bez vanjskih trnova; 7) mezotibije i metatibije imaju jednake unutarnje trnove; 8) edeagus srednje veličine, s unutrašnjom vrećicom bez sklerotiziranih dijelova; 9) stilomere ženki i spermateka potpuno atrofirale.

U radu se daje opis i raspravlja o sistematskom položaju ovog novog, izuzetnog troglobiontskog kornjaša i o njegovoj neobičnoj ekologiji.

Ključne riječi: *Croatodirus*, *bozicevici*, novi rod, nova vrsta, Coleoptera, Cholevidae, sistematika

INTRODUCTION

The subterranean fauna of Croatia has been the object of extensive investigations in the last two centuries (NONVEILLER, 1999), and is well known today for its high specific diversity and the exceptional specialization of many of the taxa. Several troglobitic organisms, however, have been discovered and described only in recent years, and demonstrate that our knowledge of the subterranean fauna of the Dinaric region is still far from complete.

The present contribution deals with a new, ultraspecialized leptodirine beetle, for which a new, isolated genus is proposed. It was discovered during speleological explorations performed by the Department of Zoology, Croatian Natural History Museum in Zagreb, and comes from a carefully explored coastal area close to the town of Rijeka (known as »Fiume«, in older entomological literature).

Some other, very interesting troglobitic Leptodirinae, just discovered in nearby areas, will be object of a subsequent contribution, and will furnish further data on of the hypogean cholevids of the region. Furthermore, they will allow a re-examination of some morphological characters currently emphasized in reconstructed phylogenies of this group.

CROATODIRUS NOV. GEN.

Type species: *Croatodirus bozicevici* n. sp.

A genus of medium sized, eyeless, pubescent, infraflagellate Leptodirini (sensu CASALE *et al.*, 1991 and GIACHINO *et al.*, 1998; = section Antroherpona of JEANNEL, 1924; Antroherponina of GUÉORGUIEV, 1976, and NEWTON, 1998) with a markedly pholeuonoid body, large, subrectangular pronotum, ovate elytra, and antennae longer than the body length.

Head elongate, free, without occipital carina; clypeus and labrum with dense, medium long pubescence. Penultimate labial palpomere long; apical palpomere very short. Antennae inserted on the posterior 4th of head, very long, similar in both sexes, and exceeding the elytron apex; antennomere 1 slightly widened at apex, and longer than antennomere 2; antennomere 11 shorter than antennomere 10.

Pronotum large, with its maximum width just before the middle, subrectangular in shape; lateral sides regularly rounded anteriorly, slightly sinuated basally, with hind angles obtuse but evident; basal margin as wide as the base of elytra.

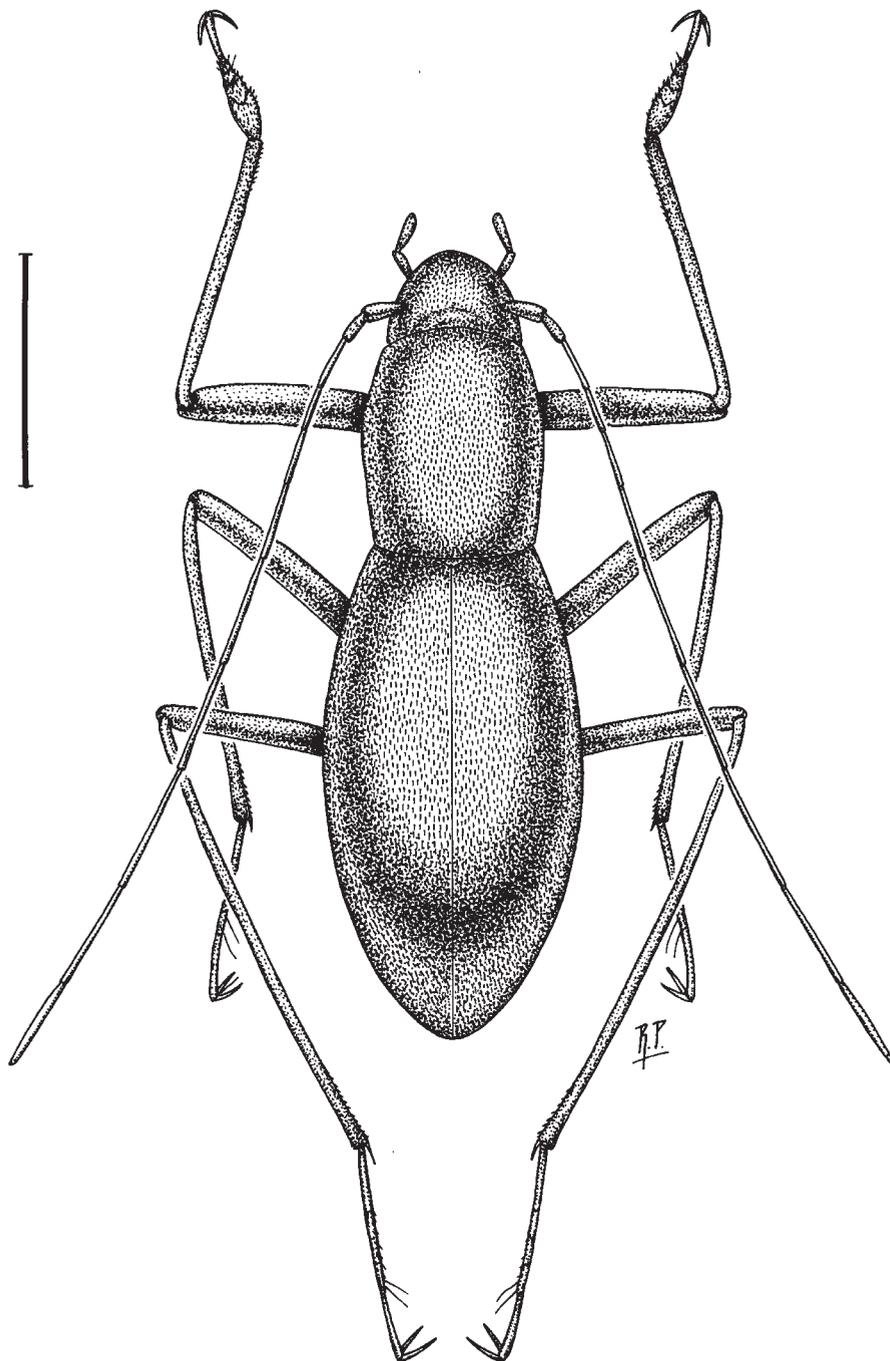


Fig. 1. *Croatodirus* (nov. gen.) *bozicevici* n. sp., holotypus m: habitus. Scale: 1 mm.

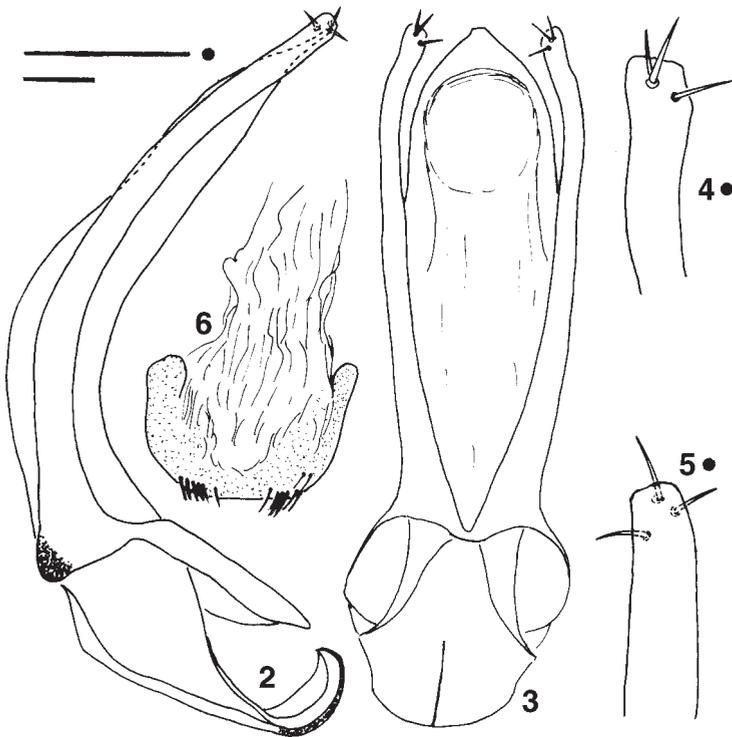
Pterothorax not pedunculate. Mesosternal carina absent; mesocoxal cavities contiguous.

Elytra elongate ovate, attenuate at apex, similar in both sexes. Microsculpture not forming transversal rows; disc with short, thin pubescence; sutural stria absent.

Legs very long and slender, with femora thickened basally. Protibiae widened at apex, without apical comb and outer and inner spurs, with inner unified apical spur and apical row of apical spines; tarsal claws long and slightly widened. Male protarsi 5-segmented, with three basal tarsomeres dilated.

Male genital segment reduced in size. Aedeagus (Figs. 2–5) medium sized, stout, regularly arcuate; basal lamina of median lobe very arcuate, curly shaped, with a little evident ventral carina; parameres as long as the median lobe, each furnished with three short apical setae. Inner sac unarmed.

Ovipositor and spermatheca fully atrophied. Female genital segment (Fig. 6) membranous, ventrite only slightly sclerotized and furnished with a group of short, thickened setae on each side.



Figs. 2–6. *Croatodirus* (nov. gen.) *bozicevici* n. sp., parts of holotypus and one paratypus: 2) aedeagus lateral view; 3) aedeagus dorsal view; 4) left paramere, dorsal view; 5) right paramere, lateral view; 6) female genital segment. Scale: 0.1 mm.

DERIVATIO NOMINIS

Croatodirus: epithet composed of the names »Croatia« and »Leptodirus«, the latter being a well known genus of troglobitic, ultraspecialized leptodirine beetles.

Croatodirus bozicevici n. sp.

Loc. Typ.: Croatia, Rijeka, Mt. Učka, cave Cavern in Učka Tunnel

Type material: Holotypus male, Croatia, Rijeka, Mt. Učka, cave Cavern in Učka Tunnel, Oct. 15, 1999, B. Jalžić leg. (Croatian Natural History Museum). Paratypes: 2 males, 6 females, and remnants of 1 specimen, Croatia, Rijeka, Mt. Učka, cave Cavern in Učka Tunnel, Oct. 15, 1999, B. Jalžić leg.; 1 female, Croatia, Rijeka, Mt. Učka, cave Cavern in Učka Tunnel, Sep. 27, 1996, B. Jalžić leg. (Coll. Casale, Torino; Coll. Giachino, Torino).

DESCRIPTION

A medium sized (TL: mm 3.48–3.52 mm; 3.68–3.70 ff), pholeuonoid, highly specialized leptodirine beetle. Colour dark reddish, integument opaque, pubescent.

Head elongate, not retractile, anophthalmous, without occipital carina. Mouth parts adapted to a »Hadean« way of life, i.e. to filtering water and organic matter (JEANNEL, 1924; CASALE & JALŽIĆ, 1988; NONVEILLER & PAVIČEVIĆ, 1999). Antennae very long and slender (ratio prothorax + elytra / antennae: 0.75 m, 0.80 f).

Antennomere ratio:

HT m: 4.17; 4.14; 6.32; 5.69; 6.32; 8.79; 12.52; 13.35; 14.59; 13.71; 10.40

PT f: 4.78; 4.02; 6.37; 5.97; 6.77; 9.56; 11.95; 12.74; 14.34; 12.35; 11.15

Pronotum large in size, subrectangular, longer than wide (ratio ML / MW: 1.09 m; 1.16 f), slightly constricted towards the base; disc subconvex, covered by dense, short, decumbent pubescence.

Elytra elongate ovate, slightly shorter in the female (ratio ML / MW: 1.80 m; 1.67 f), with maximum width at middle. Disc very convex, covered by dense, short pubescence. Apex fully covering the pygidium.

Legs: see description of the genus.

Aedeagus (Figs. 2–5) medium sized, stout. Median lobe, in dorsal view, subtruncate at apex; in lateral view arcuate, dorsally depressed in the apical third, acuminate apically. Parameres each furnished with three short setae (one apical, the others pre-apical, respectively), similar in size and length.

Specific epithet

The new species is dedicated to the retired geologist and speleologist Srećko Božičević PhD, who did a lot of research on this cave and many others in the Dinaric karst.

DISTRIBUTION, ECOLOGY

The cave Cavern Učka Tunnel was discovered after rock blasting during the excavation of the Učka Road Tunnel near Rijeka (Fig. 7) in 1979. Speleological investigations allowed the discovery of 1490 m of galleries with an elevation difference of 135 m (Fig. 8). A natural cave opening was not discovered, so that access to the cavern is possible only through an artificial shaft. Since it is located within a water supply extraction site and along the route of the tunnel, an entrance permit must be obtained.

The origin of the cave is a consequence of tectonic events within the Učka massif. The reverse faults and the overthrusting of Cretaceous carbonate rocks into impermeable flysch deposits were a prerequisite for the formation of the cavern. The movement of water, along the areas of contact of the flysch rocks and the limestone, caused the formation of large caves. In a genetic sense, the cavern is geologically young and still under the influence of intensive geological transformation. The groundwater flow is formed by surface waters draining from the region of Crkveni Vrh peak. The flow velocities measured in the cavern range from 10 to 30 l/s. Periodically, turbulent flow also occurs. Groundwater tracing proved that the waters from the cavern supply the coastal spring from the settlement of Ičići to the settlement of Medveja. The water temperature, measured in September 26th, 1996, was 8.5 °C.

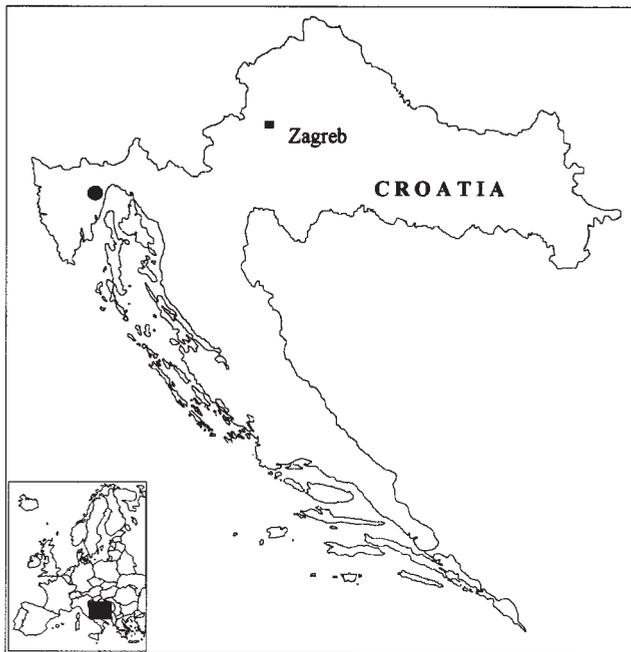


Fig. 7. Map of Croatia with the position of cave Cavern in Učka Tunnel (●).

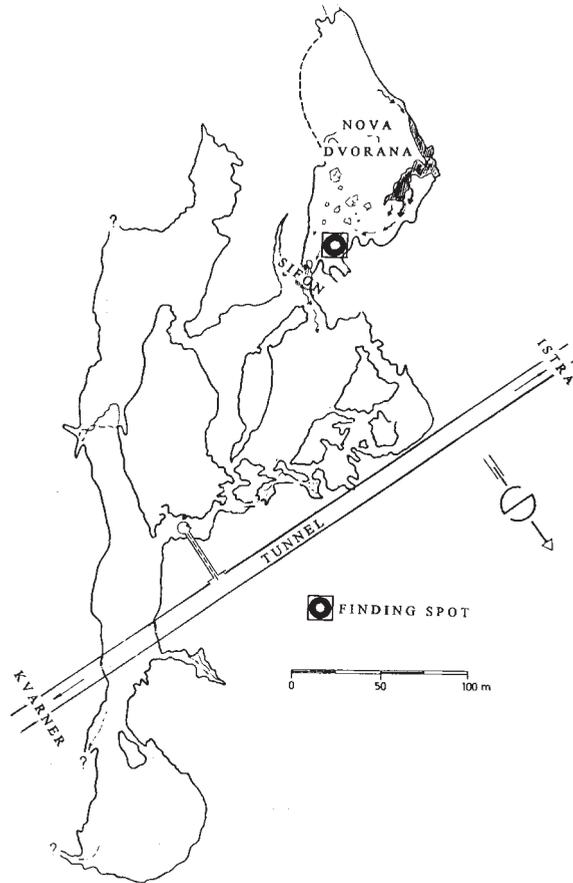


Fig. 8. Part of the plan of cave Cavern in Učka Tunnel.

An investigation into the subterranean fauna was carried out twice, during geological speleological studies on September 26th, 1996, and October 15th, 1999. In the area that leads to the siphon no animal organisms were found: this is probably a temporary situation caused by the tunnel-building work. Parts of the channel are covered by dust and soot from blasting.

The faunistic findings are located in the area after the siphon, which does not contain any visible traces of human activity, and therefore can be considered as intact.

Sampling was made in the chamber after the siphon named the Nova dvorana (New chamber). A stream flows through the chamber over rocks that are located on its floor. Only in the upper part of the chamber do sandy and muddy sediments occur along the banks of a somewhat large lake/pool. At this location, there is intensive seepage of water from the chamber ceiling.

Most specimens of the new beetle species were found on the stalagmitic encrustations along the stream. Beside these, the species *Typhlotrechus bilimeki istrus* (G. Müller, 1926) (Coleoptera, Carabidae) was also found. Furthermore, the following crustacean species were collected and identified: the terrestrial species *Titanethes dahli* Verhoeff, 1926, and the stygobian species *Monolistra bericum hadzii* Sket, 1959 and *Niphargus krameri* Schellenberg, 1935.

RELATIONSHIPS

Its general features and degree of specialization make *Croatodirus* (n. gen.) *bozicevici* n. sp. superficially similar to other leptodirine taxa of Dinaric Alps, adapted to life in deep hypogean compartments: in particular, to *Radziella styx* Casale & Jalžić, 1988, from Biokovo (Croatia), *Deelemania pretneri* Perreau, 1999, from Sana Valley (Bosnia), and *Tartariella durmitorensis* Nonveiller & Pavičević, 1999, from Durmitor (Crna Gora).

A more careful examination shows, however, many peculiar morphological characters, which isolate the new »infraflagellate« taxon from the monobasic genera cited above (»Theleomorpha« sensu GIACHINO *et al.*, 1998), and from all other dinaric leptodirine genera known so far. It should belong to the phyletic lineage of *Anthroherpon* (in the sense of the authors) owing to the following features: 1) antennae inserted in the posterior 4th of the head; 2) antennomere 1 longer than antennomere 2; 3) mesocoxal cavities contiguous; 4) femora thickened basally, narrowed apically; 5) protibiae without apical comb of spines and without external spurs, and meso- and metatibiae each provided with inner unified spur and apical row of spiniform setae (the latter, absent in *Anthroherpon*); 6) tarsal claws dilated (less dilated however than in *Anthroherpon*, *Radziella*, and in other troglobitic cholevids specialized to life on stalagmitic walls).

Some other characteristics, however, suggest *Croatodirus* also has relationships with the phyletic lineage of *Leptodirus* (of the authors). In particular: 1) pterothorax not pedunculate, 2) male genitalian segment very reduced in size, such as in *Leptodirus* (less reduced in the examined *Anthroherpon* species); 3) aedeagus medium sized, *Leptodirus*-like.

Finally, the full atrophy of female stylomeres and spermatheca is peculiar to *Croatodirus*, and suggest a particular, unknown way of fecundation and oviposition. Reduced spermatheca, on the other hand, is a character already reported for other subterranean cholevid beetles (GIACHINO *et al.*, 1998, Fig. 26).

All the characteristics illustrated and discussed above demonstrate the need for a new and original phylogenetic analysis of the Leptodirinae (sensu NEWTON, 1998) as a whole, going beyond traditional classifications, and carefully weighing morphological features that are markedly convergent in different subterranean taxa adapted to the same way of life. Such an examination of taxonomic groups, on a global scale, now seems necessary for some phyletic lineages which – as hypothesised about some trechine Carabids by SCIACY & VIGNA TAGLIANTI (1990) and CASALE & JALŽIĆ (1999), among others – could be polyphyletic assemblages of taxa, linked

more by similar adaptive features than by real phyletic relationships, as a result of independent, heterochronic phases of colonization of the subterranean environment by different, unrelated epigeic ancestors.

Such an analysis will be presented in a subsequent contribution, in which further new, ultraspecialized troglobitic cholevids from Croatia, just discovered, will be described.

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