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*Croatotrechus* (NEW GENUS) *tvtkovici* N. SP.,  
A NEW SPECIES OF EYELESS TRECHINE BEETLE  
FROM GORSKI KOTAR (COLEOPTERA,  
CARABIDAE, TRECHINI)

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*Croatotrechus* (nov. gen.) *tvtkovici* n. sp. is described from Pećinik cave (near the town of Ogulin), and its morphological features are illustrated. The peculiar combination of characters (two dilated fore tarsomeres in the male, basolateral setae of pronotum present, unusual shape of median lobe and inner sac of aedeagus, among other things), isolates the new taxon from all other eyeless trechines known so far from the Dinaric massifs. The hypothesis of its derivation from an epigeal ancestor is discussed. Data about the distribution and ecology of the type species are also provided.

**Key words:** *Croatotrechus*, *tvtkovici*, new genus, new species, Carabidae, Trechini, systematics

Casale, A. & Jalžić, B.: *Croatotrechus* (novi rod) *tvtkovici* n. sp., nova vrsta slijepog trehina iz Gorskog kotara (Coleoptera, Carabidae, Trechini), *Nat. Croat.*, Vol. 8, No. 2, 137–145, 1999, Zagreb.

U radu je opisan *Croatotrechus* (nov. gen.) *tvtkovici* n. sp. iz špilje Pećinik (pokraj grada Ogulina) i prikazane su njegove morfološke značajke. Neobična kombinacija značajki (između ostalog dvije proširene prednje tarzomere kod mužjaka, postojeće bazolateralne sete na pronotumu, neobični oblik srednjeg dijela i unutarnje vrećice edeagusa) izdvajaju novi takson od svih ostalih slijepih trehina, poznatih do sada iz Dinarskog masiva. Iznosi se hipoteza o njegovom postanku od epigejskog pretka sličnog vrsti *Trechus pulchellus*. Također se daju podaci o rasprostranjenosti i ekologiji vrste.

**Ključne riječi:** *Croatotrechus*, *tvtkovici*, novi rod, nova vrsta, Carabidae, Trechini, sistematika

## INTRODUCTION

The great abundance of troglobite fauna in the Dinaric karst is impressive and famous: since the description of the *Proteus anguinus* Laurenti, 1768 and the »slender-necked« cholevid beetle *Leptodirus hochenwarti* Schmidt, 1832, hundreds of species and genera of subterranean, highly specialized animals have been discovered and described from the caves and upper hypogean zone in this area (see, for recent data about the geographical distribution of some taxa, KLETEČKI *et al.*, 1996; JALŽIĆ, 1998). Therefore, it is not very surprising that some peculiar subterranean trechines, isolated at generic rank, have been described in recent years from the Dinaric massifs, such as *Dalmataphaenops* Monguzzi, 1993, and *Albanotrechus* Casale & Guéorguiev, 1994.

A new case is an enigmatic, eyeless carabid species discovered in 1981 by one of the authors (B.J.) in the Pećinik cave (Croatia, near Ogulin), which is the object of the present note: as will be stressed below, the species, on account of its peculiar morphological features, does not fit in to any genus described so far, and its real relationships still remain extremely enigmatic.

### *Croatotrechus* nov. gen.

Type species: *Croatotrechus tvrtkovići* n. sp.

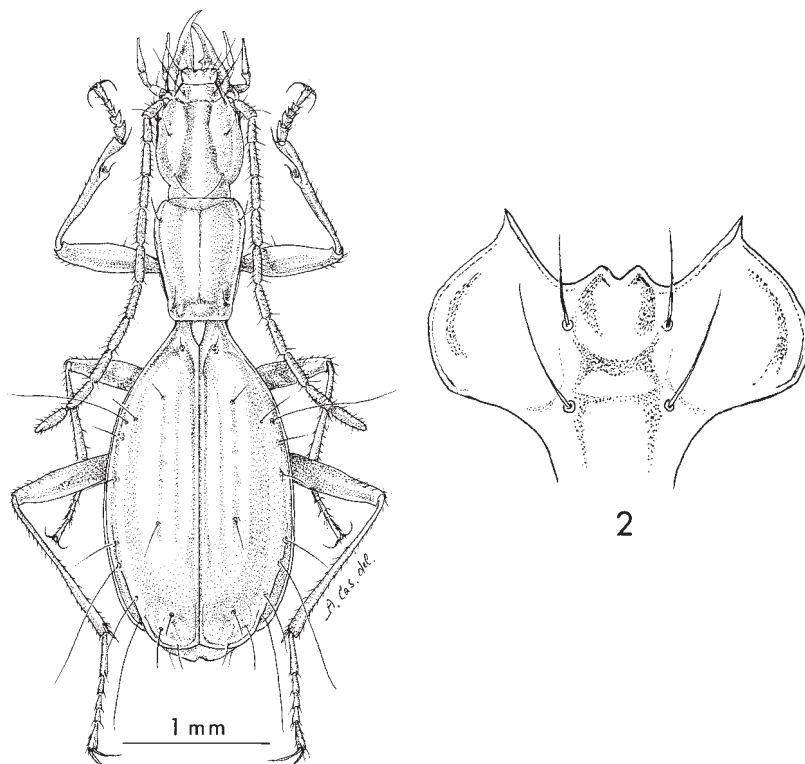
Etymology: from Croatia, the country in which the type species of the genus has been discovered.

## DESCRIPTION

A trechine genus of uncertain affinity, exhibiting some general features in common with species of *Aphaenopsis* and related genera, of the »*Aphaenopsis* phyletic lineage« sensu JEANNEL (1927), but differing from all the known taxa of the *Aphaenopsis* genus-group in basolateral setae of the pronotum present, and in the peculiar shape of the male genitalia, like that of some epigeal *Trechus* species, of the *pulchellus* species group (sensu JEANNEL, 1927: 524).

Small sized (about 4.5 mm). Body elongate, slender, partially depigmented; integument thin and glabrous. Head and prothorax very elongated and narrow, elytra elongated ovate, subconvex (Fig. 1).

Head very elongate, almost parallel-sided; frontal furrows deep and complete; eyes absent; genae strongly constricted to the neck; two pairs of supraorbital setae present; labrum transversal, slightly convex in the middle, with six setae on the anterior side. Mandibles very long and narrow, straight, bidentate, slightly arcuate at the apex. Mentum fused with submentum, though traces of labial suture are still indicated in the middle; mentum tooth very short, wide, obtusely bifid; submentum provided with two setae (Fig. 2). Maxillary palpus slender, with the penultimate much shorter than the apical segment. Antennae moderately long, not reaching the middle length of elytra.



**Figs. 1-2.** 1: *Croatotrechus* (new genus) *tvrtkovici* n. sp., male holotype, habitus; 2: the same, mentum and submentum.

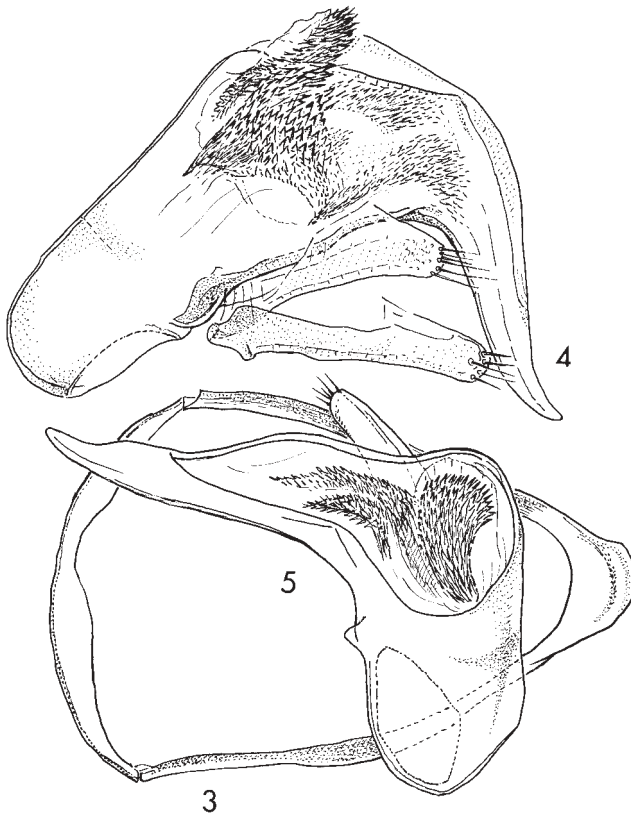
Pronotum small, elongate and narrow, distinctly longer than wide, hardly wider than the head; lateral sides narrowly beaded throughout, not sinuate. Both anterior and basal angles obtusely rounded. Both anterior and basolateral setae present and moved forwards.

Elytra elongate ovate, pedunculate, with long and very oblique prehumeral borders and completely vanished shoulders; lateral sides slightly reflexed throughout; striae vanished, only striae 1-3 superficially indicated, none of them reaching the base or apex of the elytron; scuteller stria absent; apical striole present, arcuate, vanished at external apex; sutural interval convex, intervals 2-3 subconvex, the other intervals flat; apical carina well developed. Interval 3 with three setiferous pores, including the preapical pore which is as distant from the apex as from the suture; two apical pores present, forming a triangle with the preapical pore of stria 3; the lateral umbilicate series of eight pores; humeral group of four pores, not aggregated, the first one moved on disc at the level of pore 2; pore 4 not adjoining the marginal gutter and rather widely distant from the others, inserted about at the middle of the elytron.

Ventral surface smooth and glabrous. Each abdominal sternum with a pair of setae, only; abdominal sternum VII with the posterior side emarginated in the middle and with one seta on each side in the male. Abdominal sexual segment IX in the male small, triangular in shape (Fig. 3).

Legs rather long but not slender, the femora thickened. Protibiae without longitudinal external groove, sparsely pubescent; tarsomeres thin, segment 4 with a long, ventral adhesive apophysis in the mesotarsi; two basal segment in protarsi dilated in the male, inwardly denticulate, and furnished with ventral adhesive setae; tarsal claws very long and thin, arcuate, each as long as the onychium.

Male genitalia very small and peculiarly shaped: median lobe of aedeagus short, basally straight, strongly arcuate on the ventral side at the apical third, its apex long, acute and slightly bent on the dorsal side; basal carina absent; inner sac without a distinct copulatory piece, but furnished with two developed groups of spines, as in Figs.4-5; dorsal and basal orifices very wide; parameres short and wide, each provided with several short apical setae.



Figs. 3-5. 3: *Croatotrechus tvrkovici* n. sp., male holotype, abdominal segment IX; 4, 5: aedeagus in left lateral and right dorso-lateral views.

## RELATIONSHIPS

Its general features make this new *Geotrechus*-like trechine similar to other eyeless, microcavernicolous taxa present in the Eastern Alps and the Balkan peninsula, such as some specialized species of the genera *Orotrechus* G. Müller, 1913 and *Neotrechus* G. Müller, 1913, of the *Orotrechus* phyletic lineage, and some species of genera close to *Aphenopsis* G. Müller, 1913.

Nevertheless, the external similarities between these genera and the new genus seem to depend on mere convergence. In fact, several morphological characters, and the peculiar combination of these, show the deep isolation of *Croatotrechus* from all other trechines known so far. First of all, the presence of two dilated segments of fore tarsi in the male isolates the genus from all Alpine and Dinaric genera of the *Neotrechus* phyletic lineage (sensu JEANNEL, 1928, and CASALE & LANEYRIE, 1982). In this lineage, two dilated fore tarsomeres are present only in the genus *Pontodytes* Casale & Giachino, 1989, which belongs, however, to another series of Caucasian-Anatolian, primitive genera of endogenic trechines (BELOUSOV, 1998).

Certain similarities to taxa of the genus group related to *Aphaenopsis* (see PRETNER, 1959; SCIAKY & VIGNA TAGLIANTI, 1990; MONGUZZI, 1993; CASALE & GUÉORGUIEV, 1994) are also evident. In particular, the general shape of the body, the small size and long, narrow mandibles, markedly recall those of some species of the genera *Scotoplanetes* Absolon, 1913, and *Adriaphaenops* Noesske, 1928. However, the presence of the basolateral setae of pronotum, and the peculiar shape of the male genitalia, associated with other morphological features (very small size; integument glabrous; protibiae not sulcate; mentum fused, with median tooth short and bifid; submentum with a pair of setae only; elytron striae vanished; humeral group of setiferous pores not aggregated; body glabrous) distinguishes *Croatotrechus* from all taxa of the *Aphaenopsis* phyletic lineage, and makes it an isolated genus, which does not have any close relationship among the genera of eyeless Trechinae known so far.

The morphological characters of the mentum and submentum, emphasized in past systematic treatments, at the present stage of our knowledge of subterranean trechines do not seem highly valuable for phylogenetic investigations: a fused mentum seems to be a frequent feature in specialized hypogean species; furthermore, low number (one pair, only) of setae on submentum seems a plesiomorphic feature widespread in small species of different lineages, although the number markedly increases in large sized taxa. On the contrary, the shape of the aedaegus merits particular attention: its general shape in *Croatotrechus* markedly recalls that of some epigeal, oculate species of *Trechus* present in the same area, of the *pulchellus* species group sensu JEANNEL (1927) (in particular, *T. croaticus* Dejean, 1931, and *T. jezerensis* Apfelbeck, 1908, in which however the endophallus is furnished with a large copulatory piece). It is well known that male genitalia are highly phylogenetically informative and conservative in trechines, because they are not, or are only slightly, tied to selective environmental pressures; furthermore, it is very similar to the hypothesis that some isolated, hypogean organisms could be derived from ancestors that colonized the subterranean environment in independent, eterochromic phases and

in secondary, not primary refugia. It could be that the taxon *Croatotrechus* derived from an epigeal, forest dwelling ancestor in common with both the *Croatotrechus* and *Trechus* of *pulchellus* species group, more than a representative of a phyletic lineage of trechines unknown so far, and extinct now in the epigeal environment.

If the above mentioned hypothesis is correct, then the real monophyly of some lineages of hypogean trechines, and the weight of adaptive convergences to the subterranean environment, will have to be more carefully examined in future phylogenetic reconstructions.

### *Croatotrechus tvrtkovići* n. sp.

Type material: male, holotype: Croatia, Pećinik, Puškarić selo, Ogulin, 17.I.1981, leg. Jalžić.

Holotype is deposited in the Croatian Natural History Museum.

Etymology: the new species is dedicated to Dr. Nikola Tvrtković, director of the Croatian Natural History Museum in Zagreb.

Overall length: 4.4 mm (from apex of mandibles to apices of elytra, in male holotype); TL (from anterior margin of clypeus to apex of elytra): 4 mm. Maximum width: 1.34 mm. Colour pale reddish. General shape as in Fig. 1. Integument thin, translucent, moderately shiny; microsculpture distinct, consisting of polygonal meshes on head and pronotum, and transversal meshes on elytron intervals.

Head elongate and narrow, not inflated, anophthalmous; two pairs of supraorbital setae on almost parallel lines; no supplementary setae present. Frontal furrows very deep, more deeply impressed in anterior three-fourths of head, gently sinuate behind their middle length. Frons narrow and convex. Mentum: Fig. 2. Antennae rather short, exceeding the base of pronotum by five segments, not reaching (male HT) the middle length of the elytron.

Pronotum small, not cordate, very elongate and narrow, distinctly longer than wide (ratio ML/MW: 1.34), hardly wider than the head, with its maximum width at the anterior fifth, slightly narrowed at the base. Lateral margins very narrowly beaded, moderately arcuate in front, slightly constricted to the base, parallel sided before the basal angles, which are obtusely rounded. Anterior margin hardly wider than the base, slightly emarginate; anterior angles rounded, not prominent. Disc convex; median furrow shallow; basal foveae small, very narrow and deep.

Elytra elongate ovate, moderately convex, transversally depressed at base, very narrow and pedunculate basally, widened at their apical third, subtruncated at the apex. Prehumeral borders very long and oblique, shoulders fully vanished, smooth, lateral margins slightly reflexed; apical carina well developed. Striae almost vanished, though traces of fragmented striae 1–3 and part of 4 are perceptible; sutural interval convex, almost carinate along the suture; intervals 2–3 subconvex. Three discal setiferous pores (including the preapical pore) present, the first one at the basal fourth of the elytron, the second before the apical third. The first pore of the humeral group on stria 7, at about the level of the second pore; the fourth pore distant from the others, the distance between the third and the fourth being almost twice

the distance between the second and third; the other pores of the lateral umbilicate series as in Fig. 1.

Legs and abdominal sterna with morphological characters as described for the genus. Male genitalia as in Figs. 4–5. Parameres each with five apical setae.

Female unknown.

## TOPOGRAPHIC LOCATION

The Pećinik cave was unknown until we started our research, and there are no published data about it. To get into the cave we had to enlarge the entrance. The cave did not have a name, so we named it after a natural amphitheatre called Pećinik, in which the cave is located. The natural amphitheatre lies on the left bank of the river Dobra near the village Puškarići 2.5 km SE of the centre of the town Ogulin. The Gauss-Krüger coordinates of the entrance to the feature are x 5012,650; y 5515,850; z 400 m.



Fig. 6: Map of Croatia with the position of the town of Ogulin

The Pećinik cave is a branched speleological feature, 305 m long, formed in limestone. It is a tectonic, erosion-corrosion morphological type of cave. At the lowest part of the cave there is a minor water flow. At the end of the sink, as well as stones, there are layers of soil and mud.

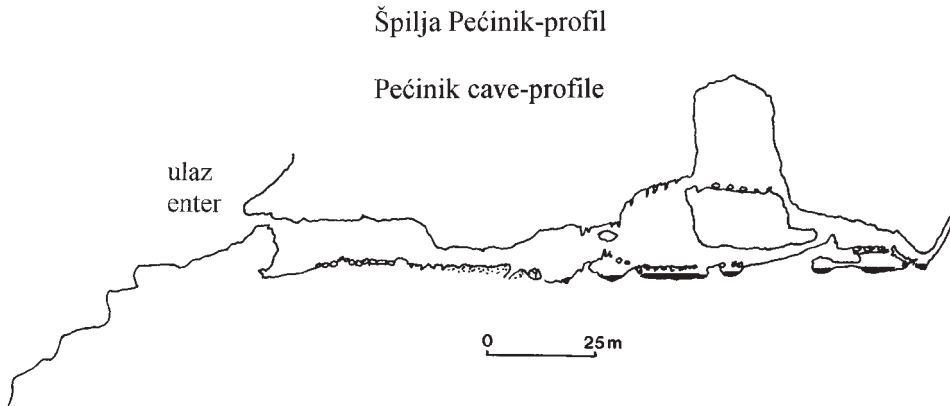


Fig. 7: Profile of Pećinik Cave

## ECOLOGY

The extreme rarity of the species described above in accessible caves, and its general morphological features typical of other rare and little known subterranean trechines (small size, integument thin, elongate shape, strong constriction between front and hind part of the body, long and straight mandibles, moderately elongate antennae and legs), indicates a microcavernicolous way of life in deep fissures of limestone systems.

The cave is visited by martens (*Martes* sp.), whose excrement can be found in all parts of it, and by the forest owl (*Stryx* sp.), whose pellets were found in the first part of the Pećinik cave. Occasionally a large colony of (unidentified) bats inhabits the cave. The excrement of these animals is very important in the cave food chain.

Air temperature, measured during regular visits in different seasons, showed great variations at the entrance and very small oscillations of 8° to 9° C in the deep parts of the cave.

During our investigations we noted (collected or seen) the following animal species:

### Isopoda:

*Monolistra caeca* Gerstaecher, 1856

*Titanethes albus* Schiödte, 1849



## Coleoptera:

- Typhlotrechus bilimeki* (Sturm, 1847)  
*Bathyscimorphus byssinus* Schiödte, 1848  
*Parapropus sericeus* (Schmidt, 1852)  
*Leptodirus hochenwarti* Schmidt, 1832

## Aves:

- Stryx* sp.

## Mammalia:

- Rhinolophus* sp.  
*Martes* sp.

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## REFERENCES

- BELOUSOV, I. A., 1998: Le complexe générique de *Nannotrechus* Winkler du Caucase et de la Crimée (Coleoptera, Carabidae, Trechini). Pensoft publ., Sofia – Moscow – St. Petersburg, Series Faunistica N. 8, 256 pp.
- CASALE, A. & GUÉORGUIEV, V., 1994: *Albanotrechus beroni*, nuovo genere nuova specie di Trechini cavernicoli di Albania (Coleoptera, Carabidae). Boll. Mus. reg. Sci. nat. Torino **12**(2), 413–423.
- CASALE, A. & LANEYRIE, R., 1982: Trechodinae et Trechinae du monde. Tableau des sous-familles, tribus, series phylétiques, genres et catalogue général des esp. ces. Mém. Biospéol. **9**, 226 pp.
- JEANNEL, R., 1927: Monographie des Trechinae. II. Abeille, **33**, 1–592.
- JALŽIĆ, B., 1998: The stygobiont bivalve *Congerina kusceri* Bole, 1962 (Bivalvia, Dreissenidae) in Croatia. Nat. Croat. **7**(4), 341–347.
- JEANNEL, R., 1928: Monographie des Trechinae. III. Les Trechini cavernicoles. Abeille **35**, 1–808.
- KLETEČKI, E., JALŽIĆ, B. & RAĐA, T., 1996: Distribution of the olm (*Proteus anguinus* Laur.) in Croatia. Mém. Biospéol., **23**, 227–231.
- MONGUZZI, R., 1993: *Dalmataphaenops* (n. gen.) *chiarae* (n. sp.) nuovo eccezionale Trechino troglobio della regione dinarica e considerazioni sul genere *Aphaenopsis* G. Muller, 1913 (Coleoptera Carabidae Trechinae). Natura Bresciana, Ann. Mus. civ. St. nat. Brescia **28** (1992), 231–242.
- PRETNER, E., 1959: Doneski k poznavanju rodu *Aphaenopsis* J. Muller (Coleoptera, Trechinae). Poročila **2**, 79–95.
- SCIACY, R. & VIGNA TAGLIANTI, A., 1990: The genus *Lessinodytes* Vigna Taglianti, 1982, a biogeographical and systematic puzzle (Coleoptera, Carabidae, Trechinae). Mem. Biospéol. **17**, 169–173.