

## **A review of *Deltomerus* (Coleoptera: Carabidae: Patrobini) from the Doğu Karadeniz Dağları in northeastern Turkey**

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### **Abstract**

The species of *Deltomerus* MOTSCHULSKY, 1850 from the Doğu Karadeniz Dağları (Pontic Alps) in the eastern Black Sea region of Turkey are reviewed. Two new species are described: *D.* (s.str.) *barbarae* sp.n. (Rize province: Kackar Dag) and *D.* (s.str.) *legorskyi* sp.n. (Trabzon province: Soganli gecidi).

Key words: Carabidae, Trechinae, Patrobini, *Deltomerus*, new species, taxonomy, Turkey.

### **Zusammenfassung**

Die Arten der Gattung *Deltomerus* MOTSCHULSKY, 1850, welche im Doğu Karadeniz Dağları (den Pontischen Alpen) in der Schwarzmeerregion der Türkei vorkommen, werden besprochen. Zwei neue Arten werden beschrieben: *D.* (s.str.) *barbarae* sp.n. (Rize Provinz: Kackar Dag) und *D.* (s.str.) *legorskyi* sp.n. (Trabzon Provinz: Soganli gecidi).

### **Introduction**

The Doğu Karadeniz Dağları is a mountain range in northeastern Turkey and the easternmost part of the Pontic Mountains. For the purposes of this work it is defined as the area limited by the Black Sea in the north, the river Kelkit in the west and south, and the river Çoruh in the southeast and east. In the east it is continued by the Karcal Dag, the western end of the Lesser Caucasus. In the south the Mescit Dağları forms a parallel range. These three ranges are well separated by the deep gorge of the Çoruh river and are inhabited by distinct endemic species of carabid beetles.

The northern part of the Doğu Karadeniz Dağları is covered by a complex mosaic of vegetation zones: dense and humid mixed forests of varying composition up to 2000 m a.s.l. with a rich undergrowth of *Rhododendron* are followed by a zone of subalpine shrubs and pastures above 2000 to 2800 m and finally an alpine zone with long lasting snow fields above 2800 m. The northern slopes are inhabited by an outstanding diverse fauna of Carabidae. Many endemic taxa, especially within the well-known genera *Carabus*, *Nebria*, *Leistus*, *Deltomerus*, *Trechus*, *Calathus*, and *Pterostichus*, have been recognized; several taxa are not yet described.

The western Palearctic genus *Deltomerus* MOTSCHULSKY, 1850 is discontinuously distributed and scattered in the Mediterranean region, the Carpathians, the Caucasus and the mountain systems of the Iran. About 65 species (LÖBL & SMETANA 2003) have

been described so far, the majority from the Greater Caucasus. Species of *Deltomerus* are flightless and restricted to cool and wet microhabitats (therefore restricted to mountain regions) and live next to snow fields and rivulets. Their ability for dispersal is extraordinary low and species are endemics with very limited distribution. Although species may be locally common, they are poorly represented in collections. From a taxonomic point of view this group is difficult, and careful examination of male genitalia is required for determination.

Knowledge about the species of Turkey is poor. One ripicolous species is recorded from Syria (DONABAUER 2004) and may be expected in southern Turkey as well. Three alpine species have been described from the highest mountain areas in the Hakkari province in the southeastern corner of Turkey, and one alpine species from the Rize province in northeastern Turkey (LEDOUX 1976, HEINZ & LEDOUX 1987). A single taxon, *Deltomerus* (s.str.) *validus* CHAUDOIR, 1846, is known from the Lesser Caucasus in Georgia and is reported from Turkey by LÖBL & SMETANA (2003) without precise location. Several more species can be expected in the high mountain ranges of Turkey.

Intensive collection efforts in the Doğu Karadeniz Dağları have been conducted by the author to study the diverse *Trechus* fauna (Carabidae: Trechini). As a side effect three stenotopic alpine species of *Deltomerus* have been collected beside snow fields. The purpose of this paper is the description of two new species, extending the knowledge of *Deltomerus* in Turkey significantly.

#### Material and methods

All specimens are deposited in the author's collection.

Proportions are given as average (minimum - maximum). Acronyms: HW – head width; PA – width of pronotum at apex; PB – width of pronotum at base; PW – maximal width of pronotum; PL – length of pronotum; EL – length of elytra; EW – maximal width of elytra; M – mean.

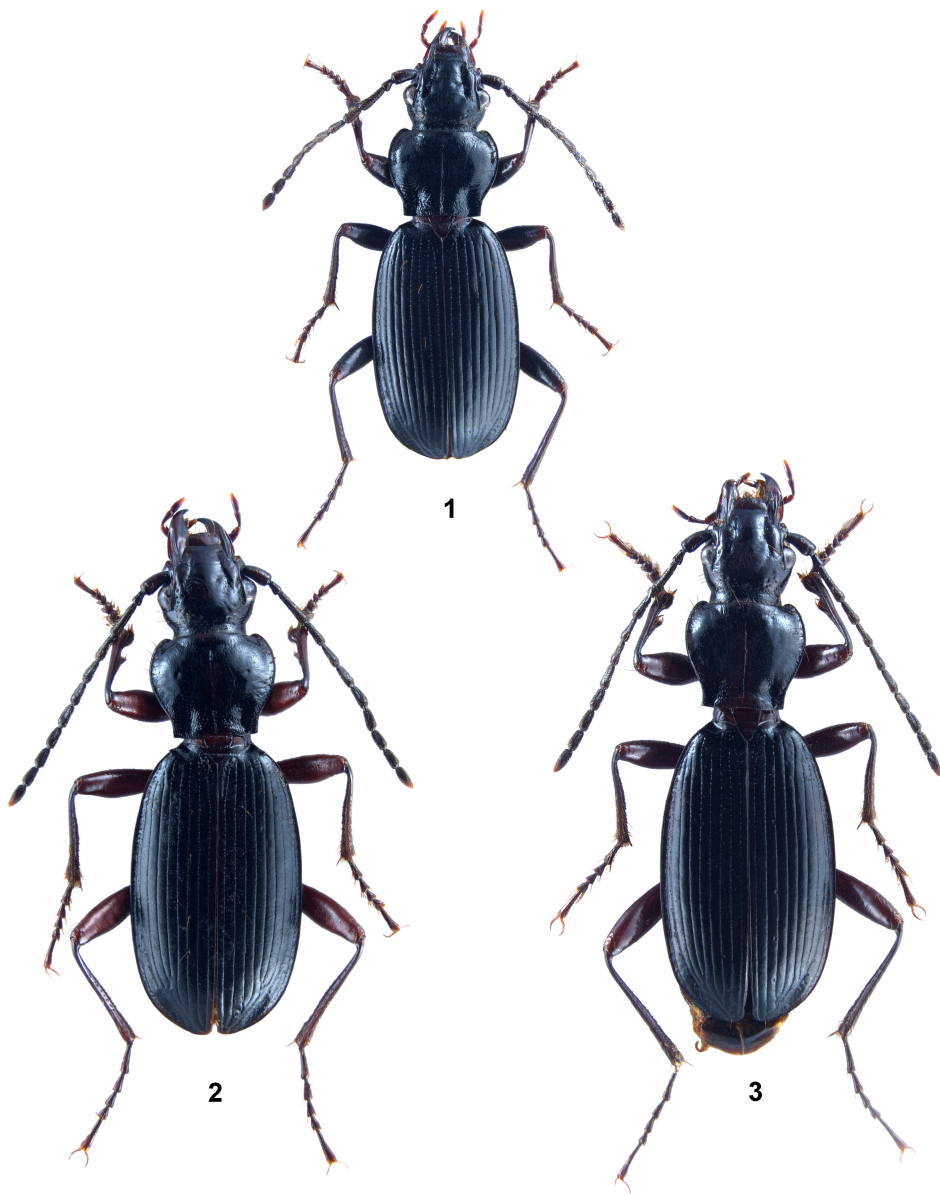
The stacked photographs (Figs. 1 - 3) were taken with a Leica DFC490 camera attached to a Leica MZ16 binocular microscope with the help of Leica Application Suite V3 and processed with CombineZM and Adobe Photoshop 7.0 software.

#### Results

List of *Deltomerus* species from Doğu Karadeniz Dağları (from west to east):

1. *D. legorskyi* sp.n. Trabzon, Soganli gecidi
2. *D. dinci* LEDOUX, 1976 Rize, Ovit gecidi
3. *D. barbarae* sp.n. Rize, Kackar Dag

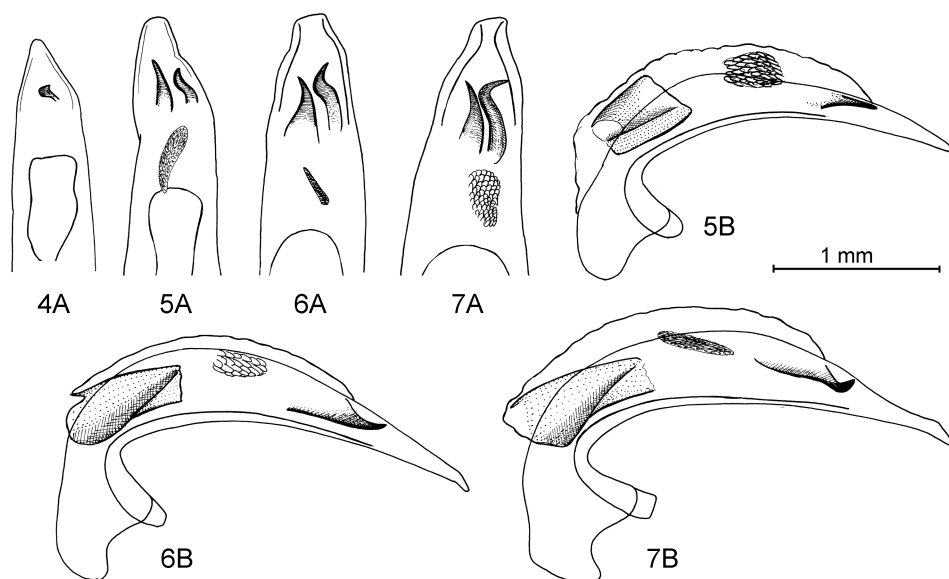
These species belong to the genus *Deltomerus* as defined by ZAMOTAJLOV (1992) due to the following characters: Antennomere 1 bearing several long setae; neck constriction rather shallow; vertex and tempora with numerous setae; upper surface of tarsi ciliate. Furthermore they belong to the subgenus *Deltomerus* s.str. which is defined by unicolourous elytra and relatively prominent shoulders.



Figs. 1 - 3: Habitus of (1) *Deltomerus legorskyi* sp.n., (2) *D. dinci*, and (3) *D. barbarae* sp.n.

***Deltomerus* (s.str.) *validus* CHAUDOIR, 1846 (Fig. 4)**

Material examined: 2 males, 3 females labelled "Georgia, Imeretinsky reg., Meskhetskyi mg., Zekarskyi pass env., 2100-2200 m, 26-30.VIII.2006, A. Putschkov leg", "*Deltomerus validus* (Chd. 1846)".



Figs. 4 - 7: Aedeagi of *Deltomerus* species in dorsal (A) and lateral (B) view: (4) *D. validus*; (5) *D. legorskyi* sp.n.; (6) *D. dinci*; (7) *D. barbara* sp.n.

Measurements: Length 10 - 12.5 mm. Proportions (N = 5): PW/HW = 1.27 (1.24 - 1.29); PW/PL = 1.29 (1.24 - 1.33); PW/PA = 1.4 (1.37 - 1.43); PW/PB = 1.42 (1.37 - 1.45); PB/PA = 0.99 (0.98 - 1.00); EW/PW = 1.4 (1.36 - 1.47); EL/EW = 1.6 (1.49 - 1.65).

Remarks: *Deltomerus validus* is endemic in the Lesser Caucasus and the only representative here. The existence in Turkey (LÖBL & SMETANA 2003) is possible and needs further confirmation. This species can be best separated from the three following species by aedeagal characteristics (see Fig. 4): the lack of a central field of scales, lack of left apical spine, distinct shape of right apical spine, which is very short.

***Deltomerus* (s.str.) *legorskyi* sp.n.** (Figs. 1, 5, 8, 9)

Etymology: On the occasion of his 90<sup>th</sup> birthday, I dedicated this species to Franz Legorsky, coleopterist in Vienna, who led the Austrian Entomologists' Association for several decades.

Type material: Holotype (male) and paratypes (2 females) from northeastern Turkey, Trabzon, Üzüngöl, Soganli Gecidi, 2100 - 2200 m, snow field, 10.VII.2010, leg. M. Donabauer.

Type locality (Fig. 8): Northeastern Turkey, Trabzon Province, Soganli gecidi, N 40.518°, E 40.253°.

Diagnosis: Similar to *D. validus* and *D. dinci*, distinguished by slight differences in body shape and shape of pronotum (see proportions), but mainly by aedeagal characteristics (compare Fig. 5 with Figs. 4 and 6), especially the configuration of the apical tooth-shaped spines and the presence of a clearly defined area of scales in the central part.

**Description:** Body dark piceous; antennae, mandibles, tibiae, and tarsi slightly paler and dark reddish piceous, hardly contrasting to body; total length 10 - 12 mm. Habitus as in Figure 1.

Proportions (N = 3): PW/HW = 1.26 (1.22 - 1.29); PW/PL = 1.28 (1.26 - 1.31); PW/PA = 1.38 (1.33 - 1.42); PW/PB = 1.44 (1.40 - 1.46); PB/PA = 0.96 (0.95 - 0.97); EW/PW = 1.38 (1.33 - 1.41); EL/EW = 1.67 (1.62 - 1.74).

Head ovate; eyes normal-sized and strongly projecting; temples as long as eye diameter; neck constriction rather shallow; frontal furrows distinct, slightly divergent posteriorly; surface punctate around temples and vertex, behind eyes with several strong punctures and setae.

Pronotum strongly cordate, faintly convex, strongly constricted posteriorly, lateral margin rounded in front and sinuate before hind angles, anterior and posterior margin nearly straight, front angles distinct and slightly projected, hind angles rectangular; basal foveae well developed, punctate and not ciliate; median line distinct, extended almost to both extremities, lateral margins with 4 - 6 anterior setae and one regular posterior lateral seta situated exactly in the hind angle. Tarsi with dorsal surface scarcely ciliate.

Elytra oblong-ovate, almost flat, humeri rounded, humeral tooth distinct; striae normally impressed and punctate in basal half of elytra; intervals flat, interval 3 with ca. 6 setiferous punctures equally distributed over full length, intervals 5 and 7 with few setiferous punctures in basal fourth, intervals otherwise not punctate, microsculpture strongly developed as fine, isodiametric meshes.

Aedeagus (Fig. 5) bent at base, apex equally and slightly curved (in lateral view), relatively broad (in dorsal view) and twisted slightly leftwards; endophallus with one large, markedly sclerotized proximal copulatory piece, two apical tooth-shaped pieces, and additionally with a well delimited area of scales in central part.

**Ecology:** All three specimens have been collected below or very close to a huge snow field under very wet and cold conditions in the lowest alpine zone (Fig. 9). Other characteristic Carabidae at this location were *Leistus schuelkei* FARKAČ & WRASE, 2010, *Trechus ziganensis* JEANNE, 1976, and *Trechus ulrichi* PAWLOWSKI, 1976.

#### ***Deltomerus* (s.str.) *dinci* LEDOUX, 1976** (Figs. 2, 6, 8)

**Material examined:** 21 males and females from northeastern Turkey, Rize, Ovit gecidi, 2640 - 2800 m a.s.l., 15.VII.2010, leg. M. Donabauer.

**Measurements:** Length 10 - 12 mm. Proportions (N = 5): PW/HW = 1.22 (1.17 - 1.27); PW/PL = 1.2 (1.12 - 1.27); PW/PA = 1.35 (1.32 - 1.43); PW/PB = 1.47 (1.4 - 1.54); PB/PA = 0.92 (0.9 - 0.95); EW/PW = 1.42 (1.31 - 1.52); EL/EW = 1.75 (1.69 - 1.81).

**Type locality** (Fig. 8): Northeastern Turkey, Rize Province, Ovit gecidi.

**Ecology:** All specimens were collected at the type locality at the border of large snow fields together with *Lindrothius aeneocupreus* (HEINZ, 1971) in the high alpine zone.

#### ***Deltomerus* (s.str.) *barbarae* sp.n.** (Figs. 3, 7, 8, 10)

**Etymology:** This new species is dedicated to my wife, Barbara Donabauer, who accompanied me and supported me during three unforgettable journeys to northern Turkey.



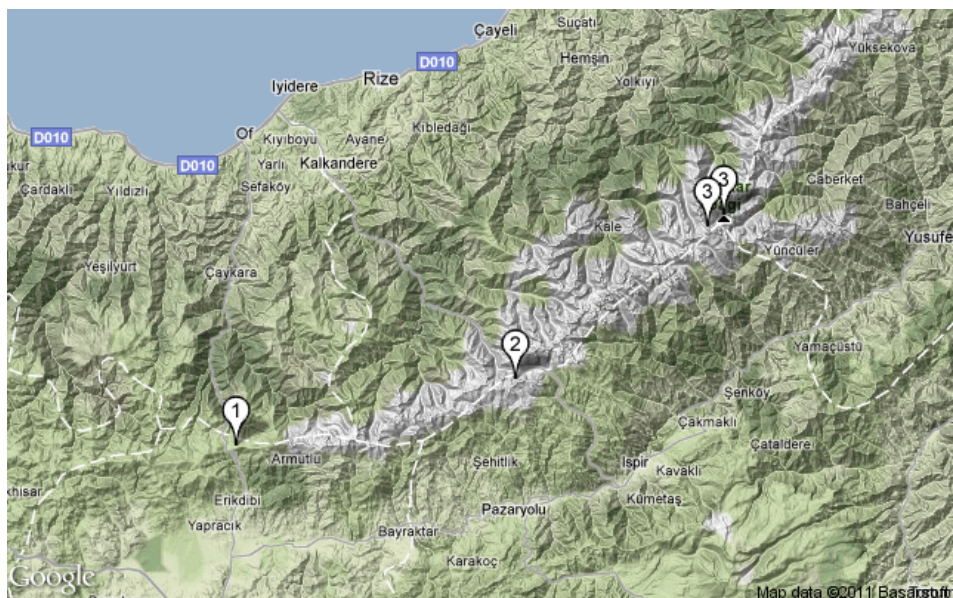


Fig. 8: Distribution map of *Deltomerus* in the Doğu Karadeniz Dağları: 1 – *D. legorskyi* sp.n.; 2 – *D. dinci*; 3 – *D. barbara*e sp.n.

Type material: holotype (male) and 34 paratypes (14 males, 20 females) from Turkey NE (Rize), Kavron glacier, 3000 - 3200 m a.s.l., 14.VII.2010, leg. M. Donabauer; 25 paratypes (14 males, 11 females, from Turkey, Rize, Kavron Lake, 3000 m a.s.l., 12.VII.2010, leg. M. Donabauer.

Type locality (Fig. 8): Northeastern Turkey, Rize Province, Kavron glacier, N 40.842°, E 41.160°.

Diagnosis: This species is very similar to *D. dinci* in many respects and can be distinguished only by aedeagal characteristics: the position and shape of the field of scales and the shape of the two apical tooth-shaped pieces (Fig. 7).

Description: Body colour variable, uniform dark piceous to pale reddish; antennae, mandibles, tibiae and tarsi slightly paler and reddish piceous, moderately contrasting to body in dark specimens, not contrasting in paler ones; total length 10 - 12 mm. Habitus as in Figure 3, showing strong adaptations to the extreme mode of life by the flattened and elongated body.

Proportions (N = 5): PW/HW = 1.26 (1.21 - 1.30); PW/PL = 1.22 (1.19 - 1.26); PW/PA = 1.39 (1.33 - 1.43); PW/PB = 1.45 (1.41 - 1.51); PB/PA = 0.96 (0.92 - 1.00); EW/PW = 1.39 (1.35 - 1.44); EL/EW = 1.73 (1.64 - 1.77).

Head ovate; eyes slightly reduced, still projecting; temples longer than eye diameter; neck constriction rather shallow; frontal furrows distinct, slightly divergent posterior; surface punctate around temples and vertex, behind eyes with several strong punctures and setae.

Pronotum elongate and cordate, faintly convex, strongly constricted posteriorly, lateral margin rounded in front and sinuate before hind angles, anterior and posterior margin



Figs. 9 - 10: (9) The author at the type locality of *Deltomerus legorskyi* sp.n. on Soganli Geçidi at 2200 m a.s.l. and (10) at the type locality of *Deltomerus barbarae* sp.n. just below Kavron glacier II at 3200 m a.s.l.



nearly straight, front angles distinct and slightly projected, hind angles rectangular; basal foveae well developed, punctate and not ciliate; median line distinct, extended almost to both extremities, lateral margins with 6 anterior setae and one regular posterior lateral seta situated exactly in the hind angle. Tarsi with dorsal surface scarcely ciliate.

Elytra strongly flattened and elongated, oblong-ovate, humeri strongly rounded, humeral tooth distinct but small; striae normally impressed and punctate in basal half of elytra; intervals flat, interval 3 with 5 - 6 setiferous punctures equally distributed over full length, intervals 5 and 7 with few setiferous punctures in basal section, intervals otherwise not punctate and not irregularly punctate and ciliate as seen in several other *Deltomerus*, microsculpture consisting of fine and dense isodiametric meshes.

Aedeagus (Fig. 7) bent at base, apex almost straight (in lateral view), relatively broad (in dorsal view) and rather symmetrical; endophallus with one large, markedly sclerotized proximal copulatory piece and two strongly developed apical tooth-shaped pieces, in dorsal view the right one stronger curved and turned more to the right side than that of *D. dinci*; additionally a well delimited area of scales in the central part, which is in a more dorsal position than in *D. dinci*.

**Ecology:** Stenotopic hygrophilous in the nival zone above 3000 m a.s.l. All specimens have been collected at the border of snow fields in almost sterile environment under loose stones (Fig. 10). *Deltomerus barbarae* sp.n. was found together with a poor fauna of carabid beetles: *Lindrothius aeneocupreus* in drier places, *Nebria glacialis* LEDOUX & ROUX, 2001 and a wingless undescribed *Bembidion* in wet places. At lower elevations with much better developed vegetation *Deltomerus barbarae* sp.n. was absent. Distribution is unknown, but likely this is a microendemic species in the Kackar Mountains above Ayder.

## Discussion

All three taxa are similar to each other in respect of mode of life, habitus, coloration, and aedeagal characteristics. Intraspecific variability, especially in body size and colour is high. Therefore, it can be concluded that these taxa are the result of a rather recent radiation of a single ancestor (neoendemism) from the Caucasus.

Data at hand indicate a strictly vicariant distribution and extreme endemism in the Doğu Karadeniz Dağları. In the central Anatolian mountains *Deltomerus* seems to be absent. Very similar observations have been reported on some species groups within *Carabus* (CAVAZZUTI 2006), *Nebria* (LEDoux & ROUX 2005), *Leistus* (FARKAČ & WRASE 2010), *Trechus* (DONABAUER 2007), and *Calathus* (BATTONI 1986). The three type localities of *Deltomerus* species are in the same range in relatively short distance from another, not separated by significant distribution barriers. They host a carabid fauna that is very similar on generic level, but distinct on species level.

## Acknowledgements

I want to thank Harald Bruckner (Vienna) for making the stacked photographs (Figs. 1 - 3), Dr. Peter Cate and Dr. Herbert Zettel for reviewing the manuscript. Furthermore my thanks go to my wife Barbara for support and patience during three strenuous field trips to northern Turkey.



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