

A Taxonomic Review of the Species of Four Genera of Pterostichinae (Coleoptera: Carabidae) from South-Central Turkey¹

Sakine Serap Avgin² and İskender Emre

Çukurova University, Art & Science Faculty, Department of Biology, Balcalı, Adana, Turkey

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Abstract Fourteen species and subspecies belonging to the genera *Poecilus* Bonelli, *Pterostichus* Bonelli, *Tapinopterus* Schaum, and *Zabrus* Clairville (Coleoptera: Carabidae: Pterostichinae) were taxonomically reviewed in this study. The specimens studied were collected during 2004 and 2005 from localities between 550 and 1810 m in elevation above sea level from different habitats (steppe, macchie, and forest biomes), primarily in the province of Kahramanmaraş but also in the neighboring provinces of Adana, Adıyaman, Gaziantep, Kayseri, Malatya, and Sivas, situated in south-central Turkey, in the Taurus Mountains, and mostly within the Taurus refugium. Each taxon was characterized with descriptive keys, descriptions of structural features, and photographs of habitus (male and female) and male genitalia. Species collected and examined represent 23% (3 species) of the *Poecilus* species, 6% (4 species) of the *Pterostichus* species, 4% (1 species) of the *Tapinopterus* species, and 13% (6 species) of the *Zabrus* species reportedly occurring in Turkey. Collection localities, coordinates, and elevations, as well as the known distribution in Turkey and their chorotypes are reported. The preponderance of endemic species (8 of 14) in the study are expected to part of one of the Anatolian refugia.

Key Words *Poecilus*, *Pterostichus*, *Tapinopterus*, *Zabrus*, Pterostichinae

The aim of this paper is to expand knowledge of Turkish carabid diversity in the Taurus mountains by making better known a part of the pterostichine assemblage in the Taurus biogeographical refugium of south-central Turkey (Casale and Vigna Taglianti 1999), primarily in Kahramanmaraş province, but in 6 adjacent provinces as well. In this paper species and subspecies of the genera *Pterostichus* Bonelli, *Tapinopterus* Schaum, *Poecilus* Bonelli, and *Zabrus* Clairville are treated taxonomically. Casale and Vigna Taglianti (1999) provided a checklist of Anatolian Carabidae that included these genera and served as a useful starting point.

Materials and Methods

Collection localities. The specimens used in this study were from 590 specimens collected in 2004 and 2005 from different elevations (550 - 1810 m) and habitats including steppe, forest, agricultural areas, and in the vicinity of reservoir, lakes, and rivers, principally in Kahramanmaraş Province, but also in the provinces of Adana,

¹Received 03 September 2008; accepted for publication 06 October 2008.

²Address inquiries (email: serapavgin@hotmail.com).

Adıyaman, Gaziantep, Kayseri, Malatya, and Sivas. This area is part of the Taurus refugium (Casale and Vigna Taglianti 1999).

Kahramanmaraş Province is in the Mediterranean Region and is bordered by Sivas Province to the north, Matatya Province to the northeast, Adıyaman Province to the east, Gaziantep Province to the southeast, Adana Province and Gaziantep Province to the south, Adana Province to the west, and Kayseri Province to the northwest. Kahramanmaraş is located between 27°11'-38°36'N and 15°-35°42' E (K.H.G.M. 1997, Yılmaz 2006). A large part of the study area is in the Taurus Mountain refugium. In Kahramanmaraş, 463,186 ha is devoted to agriculture with 348,701 ha cultivated, 63,444 ha left unplanted, 8,807 ha for vegetable production, and 42,234 ha of fruit, olive, grape and tea production (D.İ.E. 2002, Yılmaz 2006). The climate is Mediterranean with dry summers and warm, rainy winters (Akman 1990). The mean annual temperature is 16.5°C with the mean maximum temperature of 35.9°C during August and the mean minimum temperature of 1.2°C in January (Varol 2003).

The area is characterized by 3 biomes which are, from higher to lower elevations, steppe, macchie, and forest. The dominant genera of the steppe vegetation are *Acantholimon* sp. (Plumbaginaceae), *Arenaria* sp. (Caryophyllaceae), *Astragalus* sp. (Leguminosae), *Micromeria* sp., *Teucrium* sp., and *Thymus* sp. (all Lamiaceae). The dominant genera of the macchie vegetation are *Arbutus* sp. (Ericaceae), *Cotinus* sp. and *Pistacia* sp. (both Anacardiaceae), *Quercus* sp. (Fagaceae), and *Styrax* sp. (Styracaceae). The dominant genera of the forest are *Abies* sp., *Cedrus* sp., and *Pinus* sp. (all Pinaceae), *Fagus* sp. and *Quercus* sp. (both Fagaceae), *Ostrya* sp. (Betulaceae), and *Populus* sp. (Salicaceae) on the sides of mountains, on the high areas, and near rivers (Avgin 2006a).

An adequate representation of pterostichines in the area was obtained by sampling sites that ranged over 1200 m in altitude and included the vegetation types noted above. The altitudes and coordinates of the localities from which the specimens were collected are given in Table 1. The principal collecting devices were plastic pitfall traps containing 25% ethylene glycol which were checked once every 15 d or once per month (Armstrong and McKinlay 1997, Magura et al. 2000). Additional specimens were collected by hand from underneath stones. Only those specimens whose measurements and morphological features were checked in detail are included in the reports of this study. All are deposited in the Biology Department of Çukurova University, Adana, Turkey. Some more taxonomically difficult species were identified by Prof. Augusto Vigna Taglianti (Rome, Italy).

Descriptions are minimal, including limited numerical data, notes about color, and a moderately detailed treatment of the male genitalia. This publication was derived from a PhD thesis prepared by Avgin (2006b) and therein are data about worldwide distribution and more detailed descriptions. For specimen identification, much reliance is placed on the figures, particularly those showing adult habitus.

The specimens were measured using an ocular micrometer. Some specimens were dissected, and the male genitalia prepared. Illustrations of habitus and male genitalia are photographs, prepared with a digital camera.

Identification keys were prepared for the pterostichinae taxa treated, based in part on modifications of previous publications by Müller (1926), Jeannel (1941, 1942), Trautner and Geigenmüller (1987), and Hurka (1996).

The distribution of each species in Turkey was characterized and analyzed using the chorotype system proposed by Vigna Taglianti et al. (1999) and applied to the Carabidae by Casale and Vigna Taglianti (1999). Of the 36 chorotypic patterns for the

Table 1. Provinces and sites in south-central Turkey where Pterostichinae specimens were collected during 2004 and 2005

No	Localities	Coordinates (° ' ")	Altitudes (m)
1	Adana-Saimbeyli	37 50 59 N; 36 08 56 E	1100
2	Adana-Tufanbeyli	38 18 34 N; 36 12 50 E	1450
3	Adıyaman-Azaplı	37 45 34 N; 37 32 59 E	920
4	Gaziantep-Nurdağı-Yeşiloba	37 12 53 N; 36 47 12 E	569
5	Kahramanmaraş-Afşin (apricot orchard)	38 26 17 N; 36 56 22 E	1243
6	Kahramanmaraş-Afşin (peach orchard)	38 14 15 N; 36 55 20 E	1242
7	Kahramanmaraş-Başkonuş(1)	37 34 12 N; 36 34 58 E	1321
8	Kahramanmaraş-Başkonuş(2)	37 33 54 N; 36 34 57 E	1312
9	Kahramanmaraş-Başkonuş-Sersem	37 33 26 N; 36 34 14 E	1403
10	Kahramanmaraş-Elbistan-Demircilik (poplar plantation)	38 15 00 N; 37 20 29 E	1206
11	Kahramanmaraş-Ekinözü-Akpınar (apple plantation)	38 05 32 N; 37 13 17 E	1380
12	Kahramanmaraş-Göksun(wheat field)	38 01 04 N; 36 30 35 E	1341
13	Kahramanmaraş-Göksun-Çardak	38 03 02 N; 36 38 34 E	1365
14	Kahramanmaraş-Göksun-Çardak- Karaahmet	38 01 42 N; 36 34 17 E	1342
15	Kahramanmaraş-Göksun-Çardak- Kuzutepesi	38 03 52 N; 36 42 01 E	1362
16	Kahramanmaraş-Göksun-Çardak- Küçüksu	38 03 37 N; 36 40 30 E	1358
17	Kahramanmaraş-Göksun-Kireçköy	38 59 48 N; 36 31 10 E	1334
18	Kahramanmaraş-Göksun-Mehmetbey	38 05 54 N; 36 27 54 E	1413
19	Kahramanmaraş-Göksun-Mehmetbey (reservoir)	38 06 15 N; 36 26 40 E	1441
20	Kahramanmaraş-Türkoğlu (Tigem)	37 17 55 N 36 47 59 E	550
21	Kayseri-Sarız	38 33 28 N; 36 27 02 E	1810
22	Kayseri-Sarız-Uzunahmet	38 36 29 N; 36 25 59 E	1663
23	Malatya-Karanlıkdere	37 53 48 N; 37 47 39 E	905
24	Sivas-Gürün	37 52 49 N; 37 43 27 E	1250

Western Palaearctic area, 5 are represented among the pterostichines collected from the study area. These are as follows:

- (1) Palaearctic chorotype (Vigna Taglianti et al. 1999). Species exhibiting this chorotype are widespread in the Palaearctic Region, the range extending through Eurasia, south to the Himalaya and Africa north of the Sahara Desert and Macaronesia.
- (2) Asiatic-European chorotype (Vigna Taglianti et al. 1999). Species widespread through the Eurasian continent, south to the Himalaya, excluding North Africa.
- (3) Southwest Asiatic chorotype (Vigna Taglianti et al. 1999). Species widespread in Middle East countries, including the area from the Eastern Mediterranean coast (Anatolia to the Sinai desert) east to the Sind (Indus River basin), through the Arabian peninsula, Mesopotamia, and Iran, north to the Caucasus and southwestern Turkmenistan.
- (4) East-Mediterranean chorotype (Vigna Taglianti et al. 1999). Species occurring in the eastern countries of the Mediterranean Basin, east of the Italian Peninsula and the Gulf of Sirte, east to the Black Sea.
- (5) Anatolian chorotype (Vigna Taglianti et al. 1999). Species confined to the Anatolian Peninsula, some of which are widespread therein, and some of which occur in only parts of the area.

Species distribution was further analyzed in terms of altitude, recorded ranges being characterized as “low” (550 - 999 m), “middle” (1000 - 1450 m), and “high” (1451 - 1900 m).

Results and Discussion

Following are taxonomic treatments of the species and subspecies of, *Pterostichus* (four species), *Tapinopterus* (one species), *Poecilus* (three species), and *Zabrus* (six species). Each treatment includes: a description, based on external features, and on details of the male genitalia; and information about geographical distribution within the study area. Most locality records given are new for the region.

For the genera and subgenera, notes are provided about diversity and other matters, as appropriate.

Subfamily Pterostichinae. According to Lorenz (2005) this subfamily comprises 4,626 species, worldwide. For Turkey (Anatolian Peninsula), Casale and Vigna Taglianti (1999) list 205 species and subspecies, which they include in 17 genera.

Key to the genera of Pterostichinae

1- Labial palpomere 2 inwards with more than 2 setae **2**

1¹- Labial palpomere 2 with 2 setae **3**

2 (1)- Head with one pair of supra-orbital setae ***Zabrus* Clairville**

2¹- Head with 2 pairs of supra-orbital setae ***Amara* Bonelli**

3 (1¹)- Pronotum with single pair of lateral setae, posterior angles asetose ***Tapinopterus* Schaum**

3¹- Media lateral and posterior angles of pronotum with seta **4**

4 (3¹)- At least antennomere 3 flattened from sides, keeled or not ***Poecilus Bonelli***

4¹- Antennomere 3 terete, as usual, not flattened or keeled ***Pterostichus Bonelli***

Genus *Pterostichus Bonelli*, 1810. About 1000 species are assigned to this diverse genus, distributed mainly in the Holarctic Dominion, but reaching also the northern parts of the Oriental and Neotropical regions (Hurka, 1996). The group is complex morphologically, and its limits vary according to authors. Casale and Vigna Taglianti (1999), in their list of Anatolian Carabidae, exclude from *Pterostichus Argutor* Dejean, *Phonias* Gozis, *Platysma* Bonelli, and *Pseudomaseus* Chaudoir, whereas these supraspecific groups are included in that genus by Lorenz (2005), in his world catalogue of Carabidae, and by Löbl and Smetana (2003) in their catalogue of Palaearctic Carabidae. We accept the last two more inclusive classifications. Accordingly, we recognize 60 species and subspecies in 13 subgenera belonging to this genus from Turkey. In contrast, Casale and Vigna Taglianti (1999) include in the Anatolian *Pterostichus* assemblage 45 species and subspecies in nine subgenera.

Key to species of *Pterostichus (sensu latissime)* Bonelli

1- Color black body length 18 - 20 mm; ***P. (Platysma) niger* (Schaller)**

1¹- Color various, predominantly black, but at least parts of mouth or legs brown-redish; body length less than 18 - 20 mm, **2**

2 (1¹)- Head capsule dorsally impunctate, or sparsely punctate; pronotum with punctation confined to basal impressions; body length 10.5 - 12 mm ***P. (Pseudomaseus) fuscicornis* (Reiche & Saulcy)**

2¹- Head capsule dorsally markedly punctate; pronotum including basal impressions entirely punctate; body length less than 5 - 8 mm **3**

3 (2¹)- Tarsi above with longitudinal, medial furrow ***P. (Phonias) strennus* (Panzer)**

3¹- Tarsi above without longitudinal, medial furrow ***P. (Argutor) vernalis* (Panzer)**

Subgenus *Argutor* Dejean, 1821. Of the three Turkish species of this Holarctic assemblage, only one occurs in the study area.

***Pterostichus (Argutor) vernalis* (Panzer, 1796)**

Descriptive notes: Habitus, dorsal aspect, as in Fig. 1a. Measurements and proportions: Body length ♀ 7 mm; pronotum ♀ 1.67 times as wide as long; elytra ♀ 1.33 times as long as wide; Color: dorsal and ventral surfaces of body black.

Collecting notes: The single specimen was collected near a reservoir, at the middle altitude of 1441 m.

Geographical distribution: This range exemplifies a Palaearctic chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A single female, collected at Kahramanmaraş-Göksun-Mehmetbey (reservoir), 27.V.2004.

Subgenus *Phonias* Gozis, 1886. Four species (two doubtfully) of this predominantly Palaearctic group are listed from the Anatolian Peninsula by Casale and Vigna Taglianti (1999). Of these, only one occurs in the Kahramanmaraş Province.

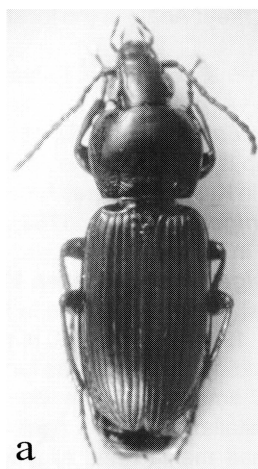


Fig. 1. *Pterostichus (Argutor) vernalis* (Panzer, 1796) female habitus and dorsal view.

***Pterostichus (Phonias) strenuus* (Panzer, 1796)**

Descriptive notes: Habitus, dorsal aspect, as in Fig. 2a. Measurements and proportions: Body length 6.5 - 7 mm; pronotum ♀ 1.33 - 2.00 times as wide as long; elytra ♀ 1.40 - 1.60 times as long as wide. Color: dorsal and ventral surfaces of body black.

Collecting notes: The single specimen was collected near a reservoir, at the middle altitude of 1441 m.

Geographical distribution: This range exemplifies an Asiatic-European chorotype.

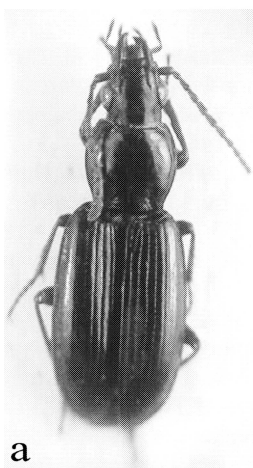


Fig. 2. *Pterostichus (Phonias) strenuus* (Panzer, 1796) female habitus and dorsal view.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: Two females, collected at Kahramanmaraş-Göksun-Mehmetbey (reservoir), 27.V.2004.

Subgenus *Platysma* (*sensu stricto*) Bonelli, 181. Only a single species of this predominantly Palaearctic group is listed from the Anatolian Peninsula by Casale and Vigna Taglianti (1999). It occurs in Kahramanmaraş Province and the surrounding towns.

***Pterostichus* (*Platysma*) *niger* (Schaller, 1783).** Only one subspecies of this tribasic species is represented in Turkey.

***Pterostichus* (*Platysma*) *niger niger* (Schaller, 1783)**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 3a-b. Measurements and proportions: Body length ♂ 18 - 19 mm, ♀ 18.5 - 20 mm; pronotum ♂ 1.33 - 1.43 times as wide as long and ♀ 1.11 - 1.25 times as wide as long; elytra ♂ 1.62 - 1.64 times as long as wide and ♀ 1.57 - 1.67 times as long as wide. Color: dorsal and ventral surfaces of body black. Male genitalia: Phallus in right lateral view (Fig. 3c) markedly curved ventrad, slightly widened mediad and slightly narrowed toward base, with base wide, apex rounded; in dorsal view (Fig. 3d) wide mediad, narrow proximad, apical orifice left laterad, apical plate short, with apex rounded; endophallus with medio-apical dentiform projections; both parameres large (Figs. 3 e-f).

Collecting notes: Specimens were collected in disturbed habitats, in steppe, near a reservoir, and in forest from middle to high altitude.

Geographical distribution: This range exemplifies an Asiatic-European chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 35 specimens from the following localities: Adana-Saimbeyli: 19.VI.2004 1♂, 1♀; Adana-Tufanbeyli: 19.VI.2004 1♀; Kahramanmaraş-Göksun-Kireçköy: 11.VII.2004 2♀♀; Kahramanmaraş-Göksun-Çardak-Kuzutepesi: 19.VI.2004 2♂♂; Kahramanmaraş-Göksun-Çardak-Küçüksu: 12.VII.2004 2♂♂, 1♀; Kahramanmaraş-Göksun-Mehmetbey: 19.VI.2004 1♂; 11.VII.2004 4♂♂, 4♀♀; 29.VI.2005 2♀♀; Kahramanmaraş-Göksun-Mehmetbey (reservoir): 18.IX.2005 2♂♂, 1♀; Kayseri-Sarız: 18.VI.2004 1♀; 25.VIII.2004 3♂♂, 7♀♀.

Subgenus *Pseudomaseus* Chaudoir, 1838. Casale and Vigna Taglianti (1999) list four species of *Melanius* Bonelli, but this Holarctic group is not represented in the Anatolian Peninsula (Lorenz 2005). Rather, these species belong to *Pseudomaseus*, one of which occurs in the study area.

***Pterostichus* (*Pseudomaseus*) *fuscicornis* (Reiche & Saulcy, 1855)**

Descriptive Notes: Habitus, dorsal aspect, as in Figs. 4a-b. Measurements and proportions: Body length ♂ 10.5 - 11 mm, ♀ 11 - 12 mm; pronotum ♂ 1.20 - 1.50 times as wide as long and ♀ 1.40 - 1.75 times as wide as long; elytra ♂ 1.50 - 1.63 times as long as wide and ♀ 1.56 - 1.63 times as long as wide; Color: dorsal and ventral surfaces of body black. Male genitalia (Figs. 4c-f): phallus in right lateral view (Fig. 4c) markedly curved ventrad, wide medially and markedly narrowed toward base; latter widened; in dorsal view (Fig. 4d) wide medially, markedly narrowed proximad, apical orifice wide and directed slightly left laterad, apical plate short and narrowly rounded apically; endophallus with three sclerotized patches, one near phallic apex, and two medio-apically; right paramere (Fig. 4e) 1.5 times as long as left paramere (Fig. 4f).

Female genitalia: ovipositor and abdominal sternum IX as in Fig. 4g; abdominal sternum IX alone as in Figs. 4h.

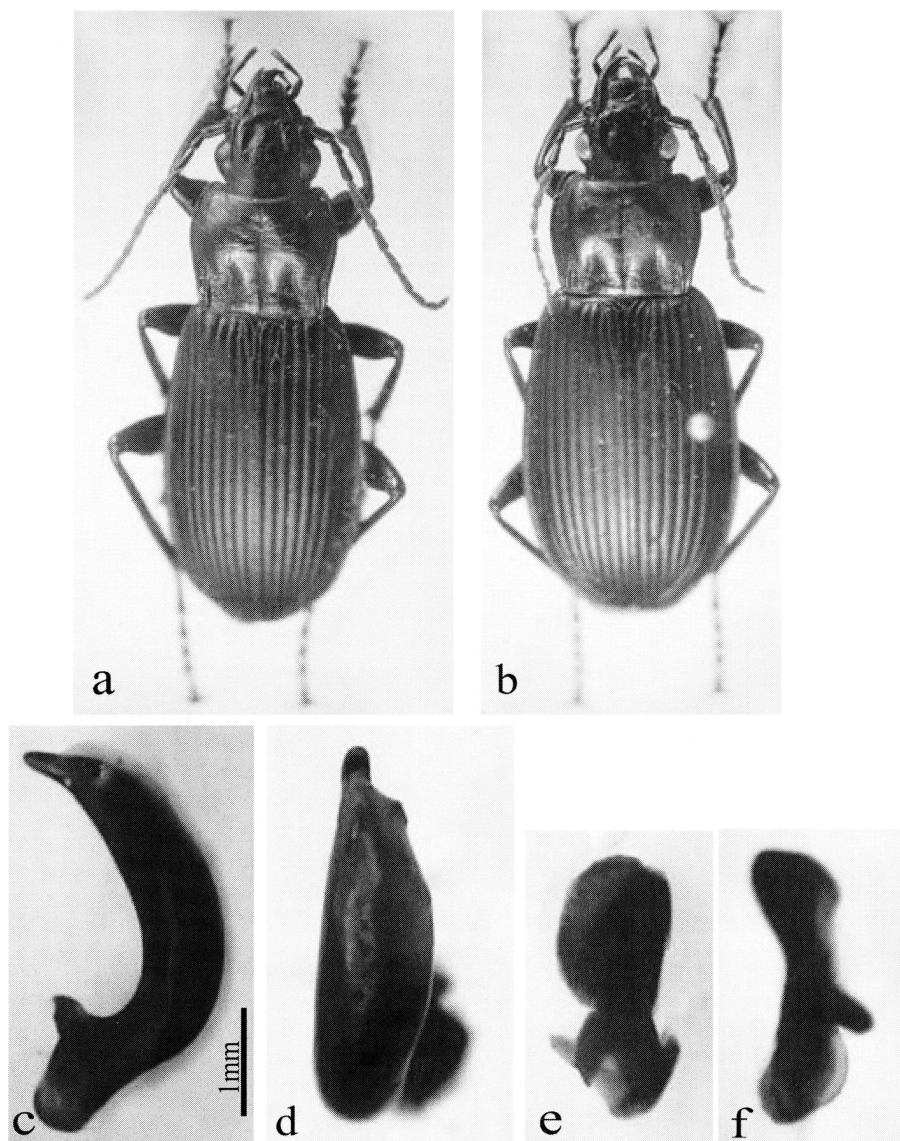


Fig. 3. *Pterostichus niger niger* (Schaller, 1783) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of phallus, ventral view of the right paramere (e) and left paramere (f) of the male genitalia.

Collecting notes: Specimens were collected in disturbed habitats (poplar plantation), near a lake and reservoir, and in steppe vegetation from low to middle altitude (550 - 1441 m).

Geographical distribution: This range exemplifies a Southwest Asiatic chorotype.

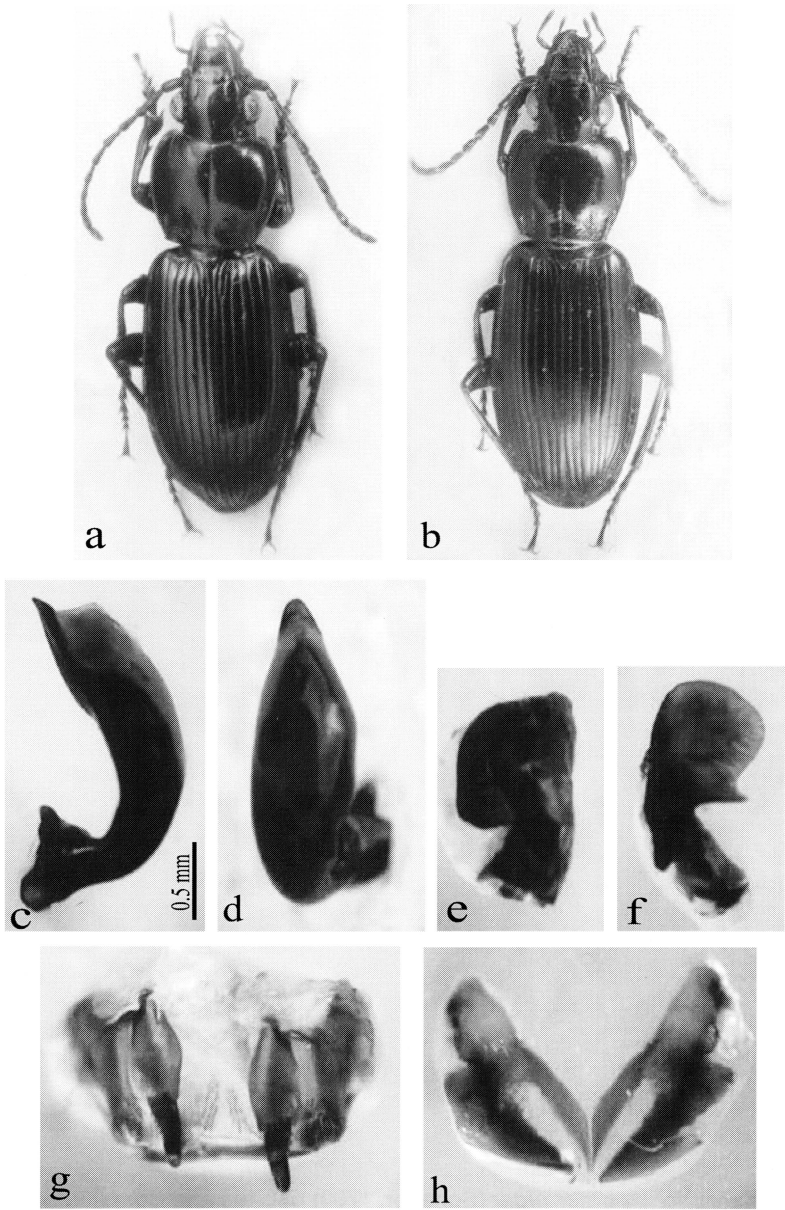


Fig. 4. *Pterostichus fuscicirnis* (Reiche and Saulcy, 1855) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia, and ventral view of the ovipositor (g) and sternum IX (h) of the female.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 72 specimens from the following localities: Adıyaman-Azaplı: 06.V.2004 1♂; 20.V.2004 12♂♂, 13♀♀; 26.VI.2004 1♂, 2♀♀; 29.VI.2005 7♂♂, 3♀♀; Kahramanmaraş-Elbistan-Demircilik (poplar plantation): 27.V.2004 1♀; Kahramanmaraş-Göksun-Mehmetbey (reservoir): 27.V.2004 5♂♂, 3♀♀; Kahramanmaraş-Türkoğlu (Tigem): 30.IV.2004 1♀; 07.V.2004 1♀; 21.V.2004; 11.VI.2004 1♂; 27.VI.2004 1♀; 13.XI.2004 2♂♂, 3♀♀; 25.V.2005 6♂♂, 9♀♀.

Genus *Tapinopterus* Schaum, 1858. This genus, which is confined to the Palaearctic Region, is closely related to *Pterostichus*, but the hind-angles of the pronotum of adults are asetose. A diverse group, this genus includes 92 species and subspecies. Of these, 28 (30%) are reported from the Anatolian Peninsula (Löbl and Smetana 2003), but 35 Turkish species and subspecies are reported by Casale and Vigna Taglianti (1999). The mountains of the Balkan Peninsula are inhabited by about 45 species, adults of some of which are cavernicolous and exhibit markedly reduced eyes (Trautner and Geigenmüller 1987).

Lorenz (2005), Löbl and Smetana (2003), and Casale and Vigna Taglianti (1999) differ markedly about the taxonomic boundaries of *Tapinopterus*, and to some extent about intrageneric ranking: by Lorenz and Löbl and Smetana, the name *Nesosteropus* Ganglbauer, 1891, is treated as a junior synonym of *Tapinopterus* (*sensu stricto*), whereas Casale and Vigna Taglianti treat the taxon as a separate subgenus. We elect to follow the last-named authors.

Subgenus *Nesosteropus* Ganglbauer, 1891. Ten species and four subspecies of this subgenus are known from the Anatolian Peninsula (Vigna Taglianti et al. 1999), only one of which occurs within the study area.

***Tapinopterus* (*Nesosteropus*) *samai* Straneo, 1986**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 5a-b. Measurements and proportions: Body length ♂ 10 - 11 mm, ♀ 11 - 11.5 mm; pronotum ♂ 1.20 - 1.50 times as wide as long and ♀ 1.40 - 1.50 times as wide as long; elytra ♂ 1.86 - 2.00 times as long as wide and ♀ 1.86 - 1.96 times as long as wide; ♂ 10 - 11 mm, ♀ 11 - 11.5 mm; pronotum ♂ 1.20 - 1.50 times as wide as long. Color: dorsal surface of body black, ventral surface red-black. Male genitalia: phallus in right lateral view (Fig. 5c) markedly curved ventrad, slightly widened medially; in dorsal view (Fig. 5d) slightly widened medially, apical plate wide and apex narrowly rounded; right paramere (Fig. 5e) 1.2 times elder than left paramere (Fig. 5f).

Collecting notes: Specimens were collected in a disturbed habitat (wheat field), as well as in forest and steppe at middle altitude from 1312 - 1403 m.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

Published records from Turkey: Anatolia (Eastern Toros Range) (Straneo 1986); Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material Examined: A total of nine specimens, from the following localities: Kahramanmaraş-Başkonuş: 01.V.2004 1♂, 1♀; 14.V.2004 2♂♂, 1♀; 28.V.2004 1♂; Kahramanmaraş-Başkonuş-Sersem: 23.VIII.2005 1♂, 1♀; Kahramanmaraş-Göksun (wheat field): 09.IV.2004 1♀.

Genus *Poecilus* Bonelli, 1810. This Holarctic genus, its more than 100 species and subspecies arranged in eight subgenera, is closely related to *Pterostichus* (Trautner and Geigenmüller 1987). However, status of some subgenera is not resolved and the group is in need of a taxonomic revision (Hurka 1996). The Palaearctic Region has

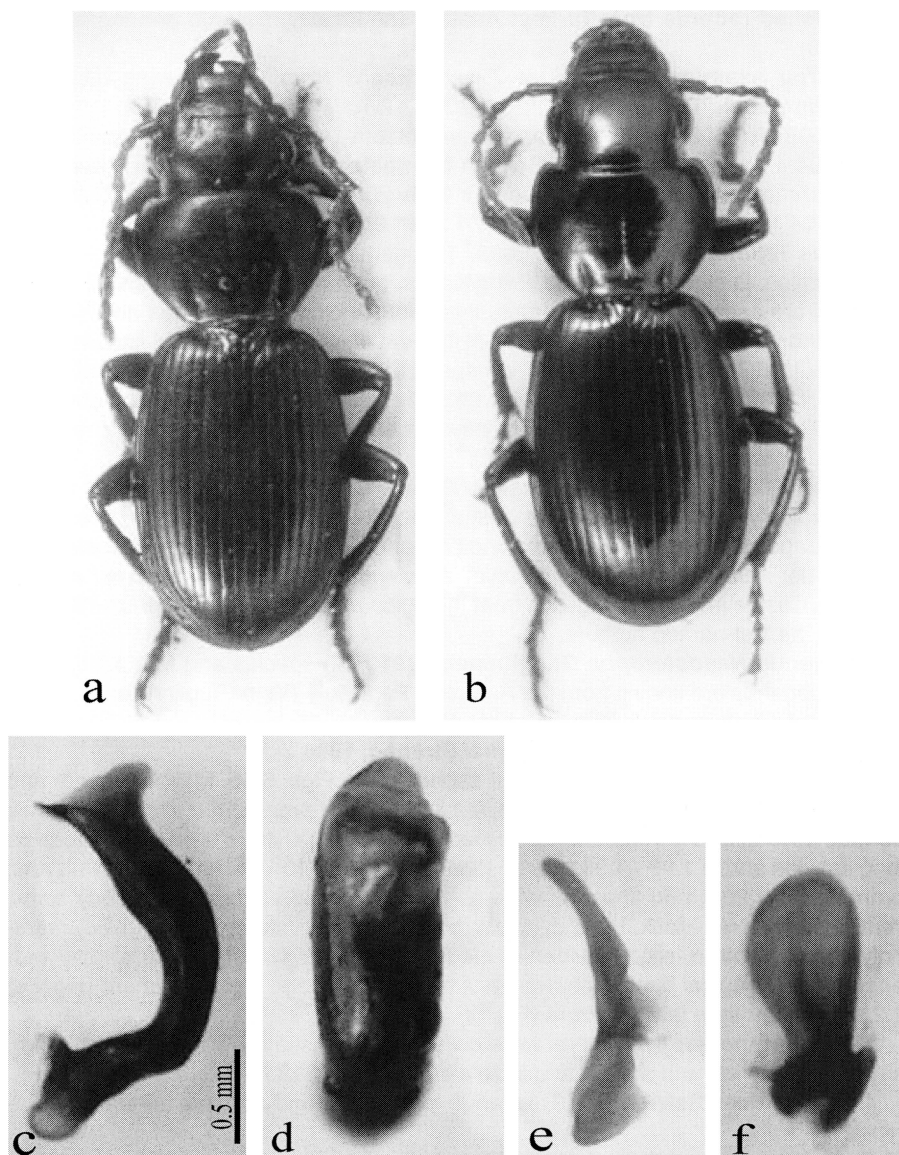


Fig. 5. *Tapinopterus (Nesosteropus) samai* Straneo, 1986 habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

171 species and subspecies of *Poecilus*, 13 (8%) of these reported from the Anatolian Peninsula (Löbl and Smetana 2003, Casale and Vigna Taglianti 1999). The latter authors recognize *Macropoecilus* Lutshnik, 1914, as a distinct subgenus, but this taxon is treated as consubgeneric with subgenus *Poecilus* by Lorenz (2005) and

Löbl and Smetana (2003). Also, Casale and Vigna Taglianti (1999) exclude *Angoleus* Villa and Villa, 1833 from *Poecilus*, treating the former group as a distinct genus.

Key to species of *Poecilus*

1- Legs entirely black *P. cupreus* (Linné)

1¹- Legs red or only tarsi and tibiae red, femora red-black 2

2 (1¹)- Body blue-black metallic; antennae, maxillary and labial palpi red *P. reicheianus* (Peyron)

2¹- Body generally green or brown metallic; antennomeres 1 and 2 red, maxillary and labial palpi red-black *P. anatolicus* (Chaudoir)

Subgenus *Poecilus* Bonelli, 1810. Of the five Turkish taxa of this group (Casale and Vigna Taglianti 1999), two occur in the study area.

Poecilus (*Poecilus*) *anatolicus* (Chaudoir, 1850)

Descriptive notes: Habitus, dorsal aspect, as in Figs. 6a-b. Measurements and proportions: Body length ♂ 12 - 13 mm, ♀ 12 - 13 mm; pronotum ♂ 1.33 - 1.40 times as wide as long and ♀ 1.40 - 1.60 times as wide as long; elytra ♂ 1.70 - 1.78 times as long as wide and ♀ 1.50 - 1.56 times as long as wide. Color: dorsal surface green metallic or brown metallic, ventral surface black. Male genitalia (Figs. 6c-f): phallus in right lateral view (Fig. 6c) curved ventrad, widened medially and slightly narrowed basad, apical plate with apex narrowly rounded in dorsal view (Fig. 6d) distinctly widened medially, apical plate with apex rounded; endophallus with three sclerotized patches medio-apically; right paramere (Fig. 6e) twice as wide as left paramere (Fig. 6f).

Collecting notes: Specimens were collected in a disturbed habitat as well as near a lake, and in steppe and forest, from low to middle altitudes, at 550 to 1413 m.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 246 specimens from the following localities: Adıyaman-Azaplı: 06.V.2004 1♀; 20.V.2004 1♀, 1♂; 10.VI.2004 1♀, 4♂♂, 6♀♀; 26.VI.2004 6♂♂, 8♀♀; 29.VI.2005 2♂♂; Gaziantep-Nurdağı-Yeşiloba: 11.VI.2004 2♂♂, 8♀♀; 26.X.2004 3♂♂, 4♀♀; Kahramanmaraş-Bulutoğlu: 12.VI.2004 3♂♂, 2♀♀; Kahramanmaraş-Göksun-Mehmetbey: 19.VI.2004 2♂♂, 4♀♀; Kahramanmaraş-Türkoğlu (Tigem): 14.IV.2004 4♂♂, 10♀♀; 17.IV.2004 3♂♂, 3♀♀; 22.IV.2004 7♂♂, 6♀♀; 30.IV.2004 22♂♂, 14♀♀; 07.V.2004 6♂♂, 11♀♀; 21.V.2004 2♂♂, 1♀; 11.VI.2004 2♂♂, 6♀♀; 30.VI.2004 5♂♂, 2♀♀; 26.X.2004 8♂♂, 9♀♀; 13.XI.2004 18♂♂, 10♀♀; 17.V.2005 5♂♂, 4♀♀; 24.V.2005 5♂♂, 9♀♀; Malatya-Karanlıkdere: 26.V.2004 6♂♂, 11♀♀; Sivas-Gürün: 30.VIII.2004 1♂.

***Poecilus* (*Poecilus*) *cupreus* (Linné, 1758).** This wide ranging species includes four subspecies, only one of which is represented in Turkey.

Poecilus (*Poecilus*) *cupreus cupreus* (Linné, 1758)

Descriptive notes: Habitus, dorsal aspect, as in Figs. 7a-b. Measurements and proportions: Body length ♂ 10.5 - 13.5 mm, ♀ 10.5 - 13 mm; pronotum ♂ 1.50 - 1.60 times as wide as long and ♀ 1.50 - 1.60 times as wide as long; elytra ♂ 1.45 - 1.63 times as long as wide and ♀ 1.50 - 1.70 times as long as wide. Color: dorsal surface green metallic or copper metallic, ventral surface black. Male genitalia (Figs. 7c-f): Phallus in right lateral view (Fig. 7c) curved ventrad, wide medially and slightly narrowed basad, slightly widened basally, apical plate rounded on apex; in dorsal view

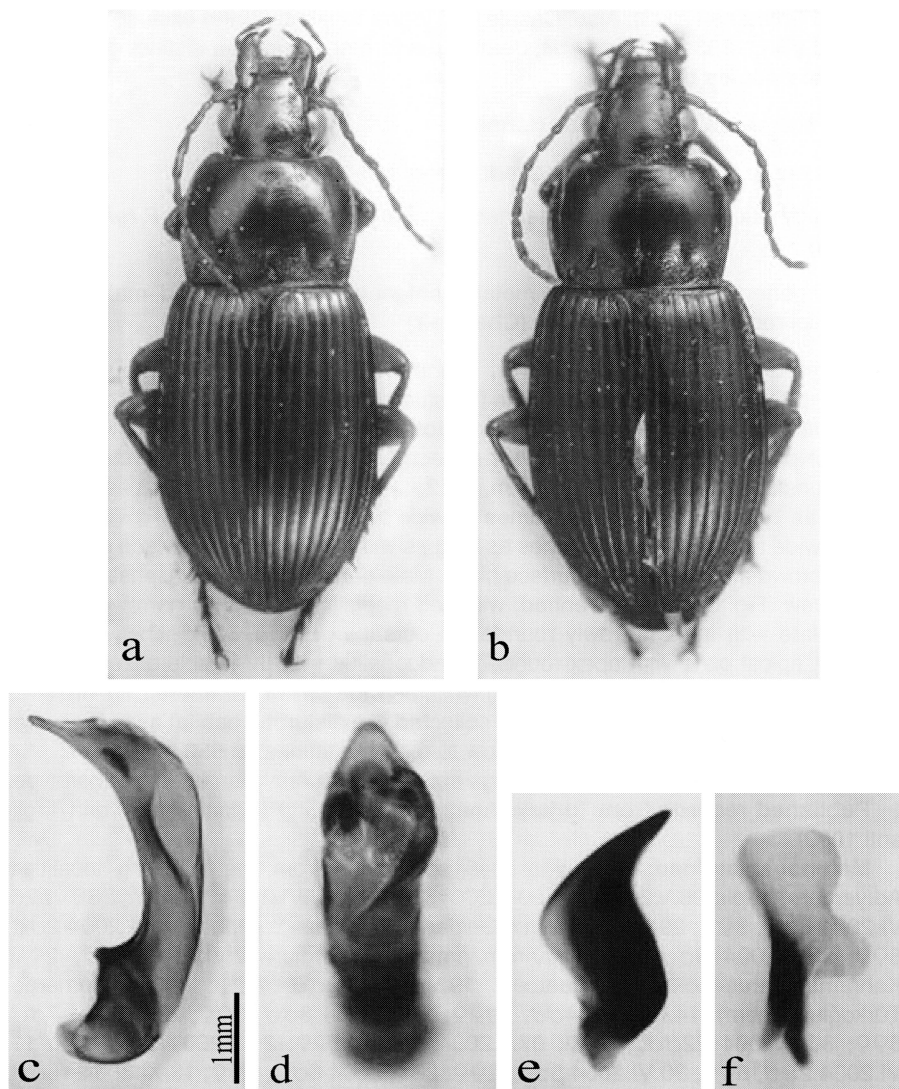


Fig. 6. *Poecilus (Poecilus) anatolicus* (Chaudoir, 1850) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

weakly wide in medial, apical plate rounded apically; endophallus with a sclerotized patch, and several dentiform projections; right paramere (Fig. 7e) 1.33 times as wide as left paramere (Fig. 7f).

Collecting notes: Specimens were collected in a disturbed habitat (a wheat field); also in steppe, near a lake, and near a reservoir, from low to middle altitudes, at 569 to 1413 m.

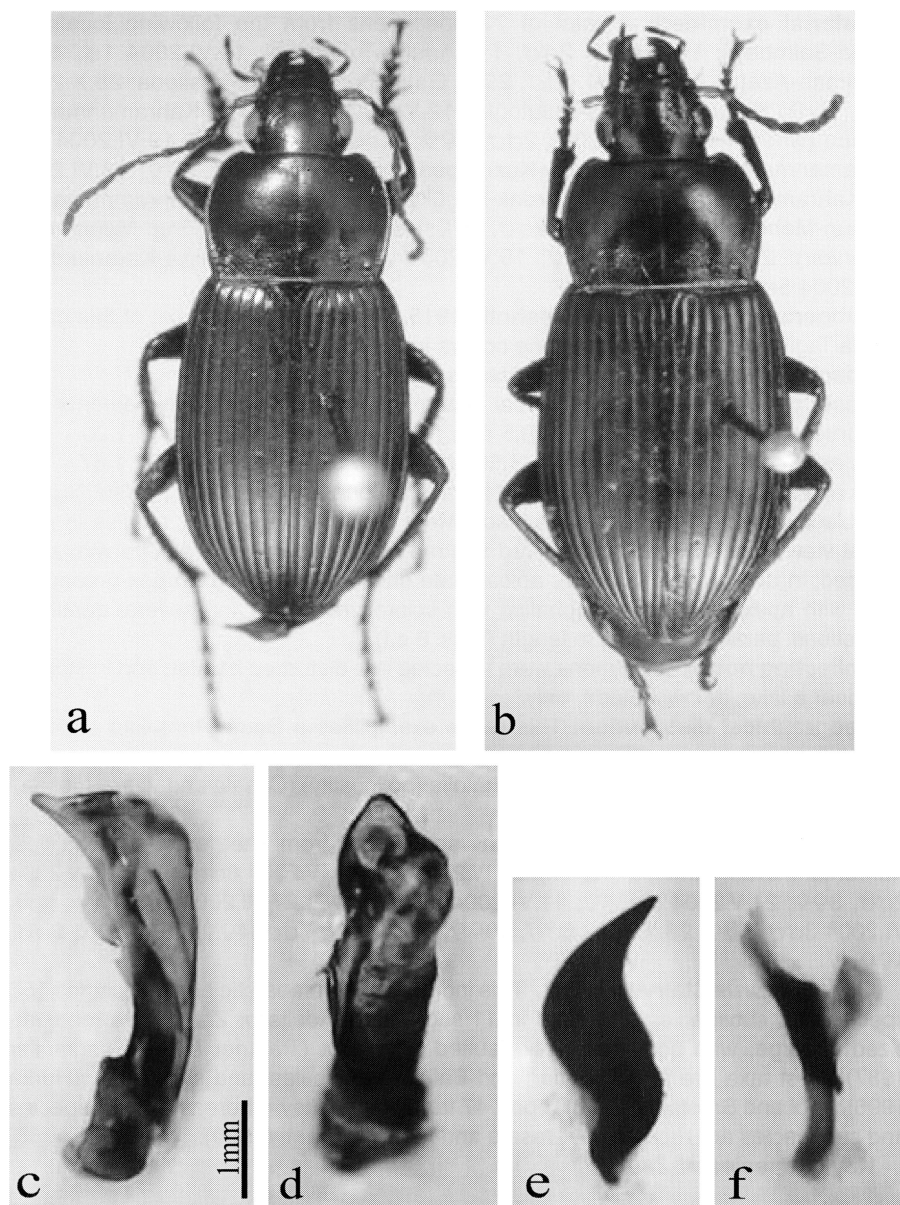


Fig. 7. *Poecilus (Poecilus) cupreus cupreus* (Linné, 1758) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

Geographical distribution: This range exemplifies an Asiatic-European chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 72 specimens from the following localities: Adana-Saimbeyli: 19.VI.2004 2♂♂, 1♀; Adana-Tufanbeyli: 19.VI.2004 1♂, 4♀♀; Adıyaman-Azaplı: 10.VI.2004 4♂♂, 2♀♀; Gaziantep-Nurdağı-Yeşiloba: 26.X.2004 5♂♂, 6♀♀; Kahramanmaraş-Bulutoğlu: 12.VI.2004 2♂♂, 1♀; Kahramanmaraş-Göksun (wheat field): 25.IV.2004 2♂♂, 3♀♀; 11.V.2004 5♂♂, 1♀; 19.VI.2004 1♀; Kahramanmaraş-Göksun-Çardak-Kuzutepesi: 02.VI.2004 2♂♂, 3♀♀; 12.VI.2005 1♂; Kahramanmaraş-Göksun-Çardak-Küçüksu: 19.VI.2004 1♀; Kahramanmaraş-Göksun-Mehmetbey: 29.VI.2005 2♂♂, 6♀♀; Kahramanmaraş-Göksun-Mehmetbey (reservoir): 27.V.2004 1♂, 2♀♀; 19.VI.2004 3♂♂, 4♀♀; Malatya-Karanlıkdere: 26.V.2004 5♂♂, 2♀♀.

Subgenus *Macropoecilus* Lutshnik, 1915. Of the six Turkish taxa of this group (Vigna Taglianti et al. 1999), only one occurs in the study area.

***Poecilus (Macropoecilus) reicheianus* (Peyron, 1858)**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 8a-b. Measurements and proportions: Body length ♂ 9.5 - 10.5 mm, ♀ 10 - 11 mm; pronotum ♂ 1.20 - 1.50 times as wide as long and ♀ 1.20 - 1.50 times as wide as long; elytra ♂ 1.67 - 1.86 times as long as wide and ♀ 1.57 - 1.71 times as long as wide. Color: dorsal surface blue-black metallic, ventral surface black. Male genitalia (Figs. 8c-f): phallus in right lateral view (Fig. 8c) markedly curved ventrad, wide basally, apical plate with apex rounded; in dorsal view (Fig. 8d), apical plate short, narrow toward apex and apical plate with apex rounded; endophallus with sclerotized patch and several dentiform projections; parameres equal in length (Figs. 8 e,f).

Collecting notes: Specimens were collected in a disturbed habitat, and in steppe, and near a lake, at low altitude, only.

Geographical distribution: This range exemplifies a South Anatolian endemic chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material Examined: A total of 88 specimens from the following localities: Kahramanmaraş-Türkoğlu (Tigem): 22.IV.2004 1♀; 30.IV.2004 8♂♂, 3♀♀; 07.V.2004 2♂♂, 3♀♀; 21.V.2004 1♂, 1♀; 11.VI.2004 12♂♂, 6♀♀; 27.VI.2004 6♂♂, 4♀♀; 30.VI.2004 3♂♂, 5♀♀; 26.X.2004 6♂♂, 10♀♀; 13.XI.2004 7♂♂, 4♀♀; 30.VI.2005 2♂♂, 4♀♀.

Genus *Zabrus* Clairville, 1806. This indigeneous Palearctic genus includes 156 species and subspecies, arranged in 11 subgenera. Adults of *Zabrus* are medium-sized or large, with body markedly vaulted and stout (Trautner and Geigenmüller 1987). Most taxa live in the Iberian and Balkan peninsulas, and in Anatolia (Hurka 1996). Löbl and Smetana (2003) report 47 taxa from Turkey, whereas only 34 species and subspecies are reported by Casale and Vigna Taglianti (1999).

Key to species of *Zabrus*

1- Large, 19 - 21 mm; antennae entirely black; palpi black and apex of palpi red-brown
***Z. kraatzii* Andujar & Serrano**

1¹- Smaller, 19 mm; antennae not entirely black; palpi different color **2**

2 (1¹)- Pronotum flattened, not concave in posterior; apical and base of pronotum densely punctate and medial with punctate; elytral stria markedly punctate; aedeagus dorsal view apical plate narrow and long, apical plate flattened and rounded on apex
***Z. sublaevis* Ménériés**

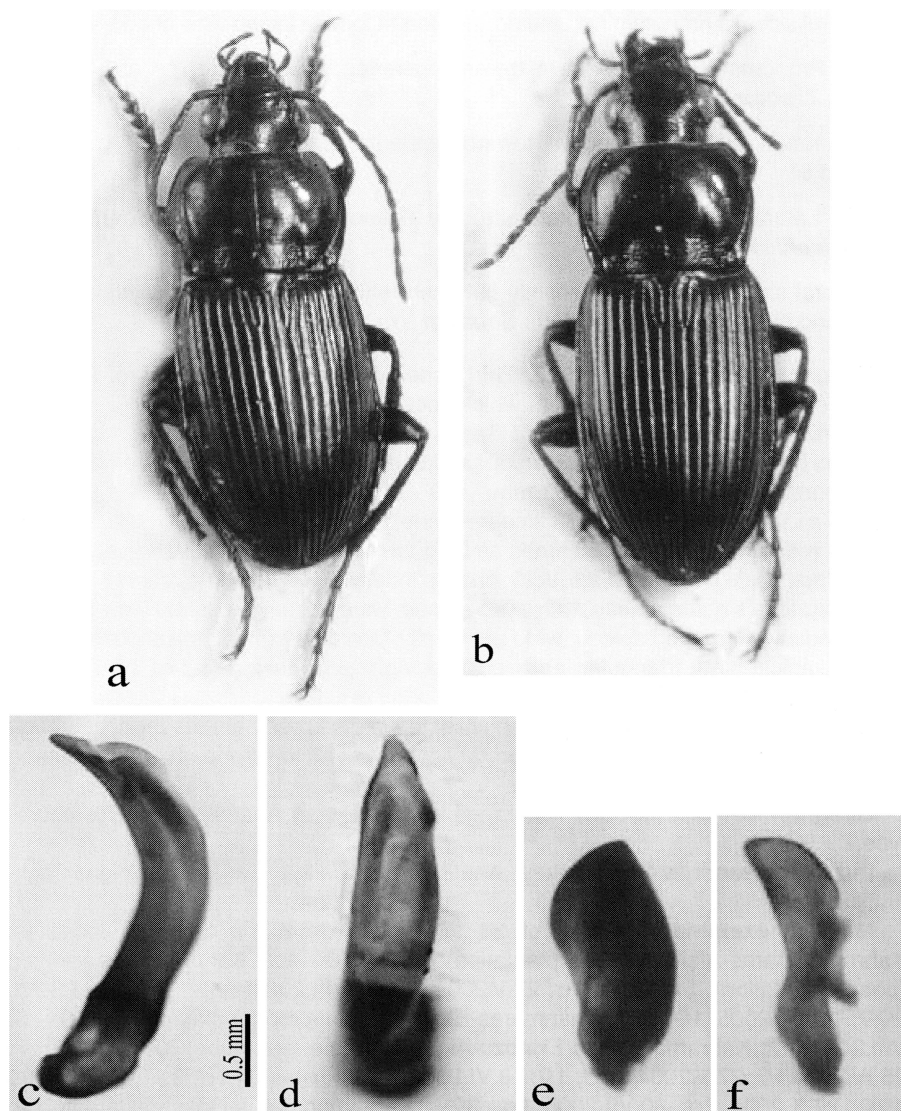


Fig. 8. *Poecilus (Macropoecilus) reicheianus* (Peyron, 1858) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

2¹- Pronotum not flattened in posterior; pronotum with punctate in apical and basal, without punctate in medial; elytral stria not markedly punctate; apical plate different in dorsal view of aedeagus **3**

3 (2¹)- Lateral sides of pronotum slightly sinuate; apical plate strongly curved toward ventral on apex in lateral view of aedeagus **Z. *trinii* Fischer von Waldheim**

3¹- Lateral sides of pronotum not sinuate; in different form in lateral view of aedeagus **4**

4 (3¹)- Pronotum slightly concave toward posterior, posterior angles of pronotum straight **Z. *socialis* Schaum**

4¹- Pronotum markedly concave toward posterior, posterior angles of pronotum rounded **5**

5 (4¹)- Lateral sides of pronotum strongly flattened; elytral striae deepened **Z. *rotundicollis* Ménétrés**

5¹- Lateral sides of pronotum slightly flattened; elytral striae normal, elytral interval larger and bigger **Z. *melancholicus* Schaum**

Subgenus *Pelor* Bonelli, 1810. Thirty one species and subspecies of *Pelor* inhabit the Anatolian Peninsula, six of which occur in the study area.

***Zabrus (Pelor) kraatzi* Andujar & Serrano, 2000**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 9a-b. Measurements and proportions: Body length ♂ 19 - 21 mm, ♀ 19 - 21 mm; pronotum ♂ 1.88 - 1.89 times as wide as long and ♀ 1.78 - 1.88 times as wide as long; elytra ♂ 1.44 - 1.47 times as long as wide and ♀ 1.39 - 1.50 times as long as wide. Color: dorsal and ventral surfaces black. Male genitalia (Figs. 9c-f): phallus in lateral view (Fig. 9c) curved ventrad, ventral surface sinuate apicad, narrowed apicad, wide basally; in dorsal view (Fig. 9d) wide medially, narrowed apicad, wide proximally, lateral margin of apical plate slightly sinuate, apical plate triangular, apex pointed; right paramere (Fig. 9e) 1.8 times as long as left paramere (Fig. 9f).

Collecting notes: Specimens were collected in disturbed habitats (apricot, peach and apple orchards, and a poplar plantation) as well as in steppe, at middle altitude only, from 1206 - 1365 m.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 36 specimens, from the following localities: Kahramanmaraş-Afşin (apricot plantation): 25.IV.2004 1♂; Kahramanmaraş-Afşin (peach plantation): 11.V.2004 1♂; 27.V.2004 1♂; 25.VIII.2004 3♀♀; 27.X.2004 3♂♂, 2♀♀; 30.VII.2005 1♀; Kahramanmaraş-Elbistan-Demircilik (poplar plantation): 25.VIII.2004 1♀; Kahramanmaraş-Ekinozu-Akpınar (apple plantation): 09.IV.2004 1♀; 25.IV.2004 1♀; 27.V.2004 2♂♂, 1♀; 18.VI.2004 1♀; 11.VII.2004 1♂, 3♀♀; 12.IX.2004 4♀♀; 27.X.2004 1♂; 30.VII.2005 1♂, 3♀♀; Kahramanmaraş-Göksun-Çardak: 02.VI.2004 1♀; 10.X.2004, 2♀♀; 13.VI.2005 1♀.

***Zabrus (Pelor) melancholicus* Schaum, 1864.** This species includes three subspecies in the Anatolian Peninsula (Casale and Vigna Taglianti 1999). Only the nomotypical subspecies occurs in the study area.

***Zabrus (Pelor) melancholicus melancholicus* Schaum, 1864**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 10a-b. Measurements and proportions: Body length ♂ 13.5 - 14 mm, ♀ 13 - 14 mm; pronotum ♂ 1.67 times as wide as long and ♀ 1.57 - 1.67 times as wide as long; elytra ♂ 1.50 - 1.55 times as long as wide and ♀ 1.42 - 1.45 times as long as wide. Color: dorsal surface brown, ventral surface red. Male genitalia (Figs. 10c-f): phallus in lateral view (Fig. 10c) curved ventrad, markedly widened medially, narrow apicad, apical plate with apex rounded;

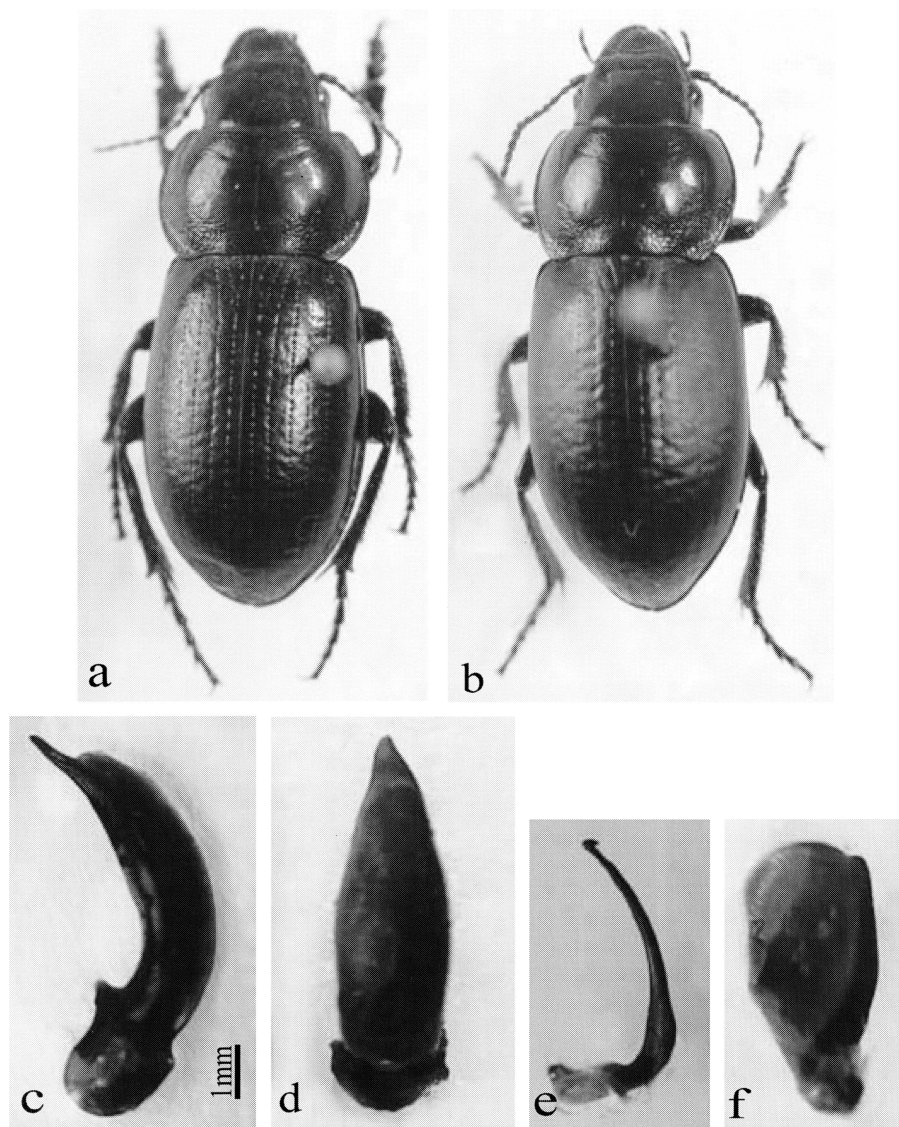


Fig. 9. *Zabrus (Pelor) kraatzi* (Andujar & Serrano, 2000) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

in dorsal view (Fig. 10d) wide mediad, narrowed from medial area apically, apical plate rounded and apex broadly rounded; right paramere (Fig. 10e) 1.25 times as long as left paramere (Fig. 10f).

Collecting notes: Specimens were collected in steppe at middle altitude (1365 m), only.

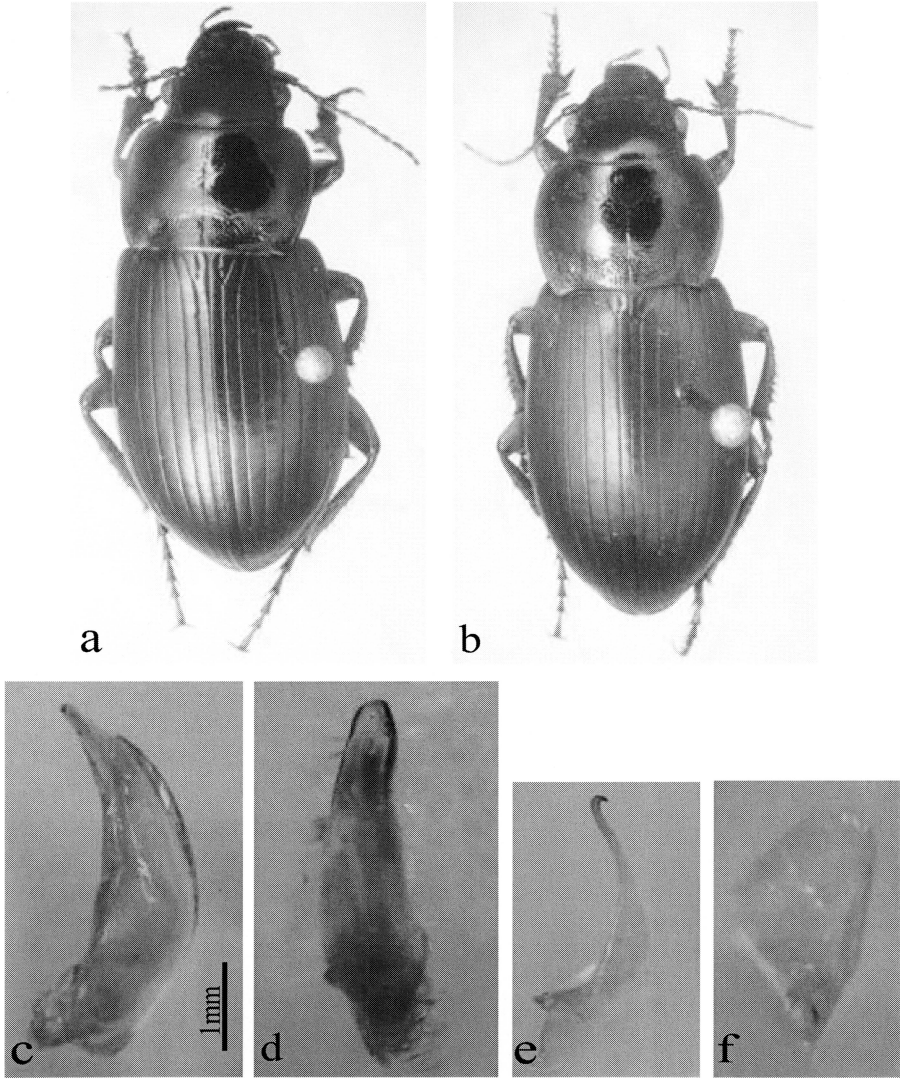


Fig. 10. *Zabrus (Pelor) melancholicus melancholicus* (Schaum, 1864) habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

Geographical distribution: This range exemplifies an East-Mediterranean chorotype.

Published records from Turkey: Konya, İçel, İzmir, Manisa, Niğde (Lodos 1983); Ankara, Konya, İzmir, Niğde, Manisa (Lodos 1989); Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of 9 specimens, from the following locality: Kahramanmaraş-Göksun-Çardak: 19.VI.2004 2♂♂, 3♀♀; 10.X.2004 2♂♂, 2♀♀.

***Zabrus (Pelor) rotundicollis* Ménériés, 1836**

Descriptive notes: Habitus, dorsal aspect, as in Fig. 11b. Measurements and proportions: Body length ♂ 12 - 13 mm; pronotum ♂ 1.50 - 2.00 times as wide as long; elytra ♂ 1.36 - 1.60 times as long as wide. Color: dorsal surface brown, ventral surface red. Male genitalia (Figs. 11c-f): phallus in right lateral view (Fig. 11c) curved ventrad, markedly wide medially, narrow apicad, wide basally, apical plate with apex rounded; in dorsal view wide medially, slightly narrowed apicad, apical plate wide and apex rounded; right paramere (Fig. 11e) 1.67 times as long as left paramere (Fig. 11f).

Collecting notes: Specimens were collected in steppe, at a middle altitude locality.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

Published records from Turkey: Eskişehir (Türkkan, 1998); Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: Two males from Kahramanmaraş-Göksun-Çardak-Kuzutepesi: 02.VI.2004

***Zabrus (Pelor) socialis* Schaum, 1864**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 12a-b. Measurements and proportions: Body length ♂ 13.5 mm, ♀ 14 mm; pronotum ♂ 1.67 times as wide as long and ♀ 1.67 times as wide as long; elytra ♂ 1.55 times as long as wide and ♀ 1.50 times as long as wide. Color: dorsal surface black, ventral surface red-black. Male genitalia (Figs. 12c-f): phallus in lateral view (Fig. 12c) curved ventrad, narrowed apicad, wide basally, apex pointed; in dorsal view (Fig. 12d) slightly widened medially, slightly narrowed apicad, apical plate, wide proximally, apex rounded right paramere (Fig. 12e) 1.5 times as long as left paramere (Fig. 12f).

Collecting notes: Specimens were collected in steppe and forest, near a river at high altitude, only.

Geographical distribution: The range of this species exemplifies a West Anatolian endemic chorotype.

Published records from Turkey: Eskişehir (Türkkan 1998); Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of eight specimens, from the following localities: Kayseri-Sarız: 11.VII.2004 2♂♂, 4♀♀; Kayseri-Sarız-Uzunahmet: 26.VIII.2005 1♂, 1♀.

***Zabrus (Pelor) sublaevis* Ménériés, 1836**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 13a-b. Measurements and proportions: Body length ♂ 12 mm, ♀ 12.5 - 13 mm; pronotum ♂ 1.67 times as wide as long and ♀ 1.43 - 1.67 times as wide as long; elytra ♂ 1.27 times as long as wide and ♀ 1.36 - 1.42 times as long as wide. Color: dorsal surface black, ventral surface red-black. Male genitalia (Figs. 13c-f): Phallus in right lateral view (Fig. 13c) curved ventrally, wide medially, narrow apicad, wide basally, apex rounded; in dorsal view (Fig. 13d), wide medially, slightly narrowed distally, apical plate long, flattened, with apex rounded; endophallus with one sclerotized patch, medially located; right paramere (Fig. 13e) 1.5 times as long as left paramere (Fig. 13f).

Collecting notes: Specimens were collected in steppe, forest and near a river, at middle altitude, only.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

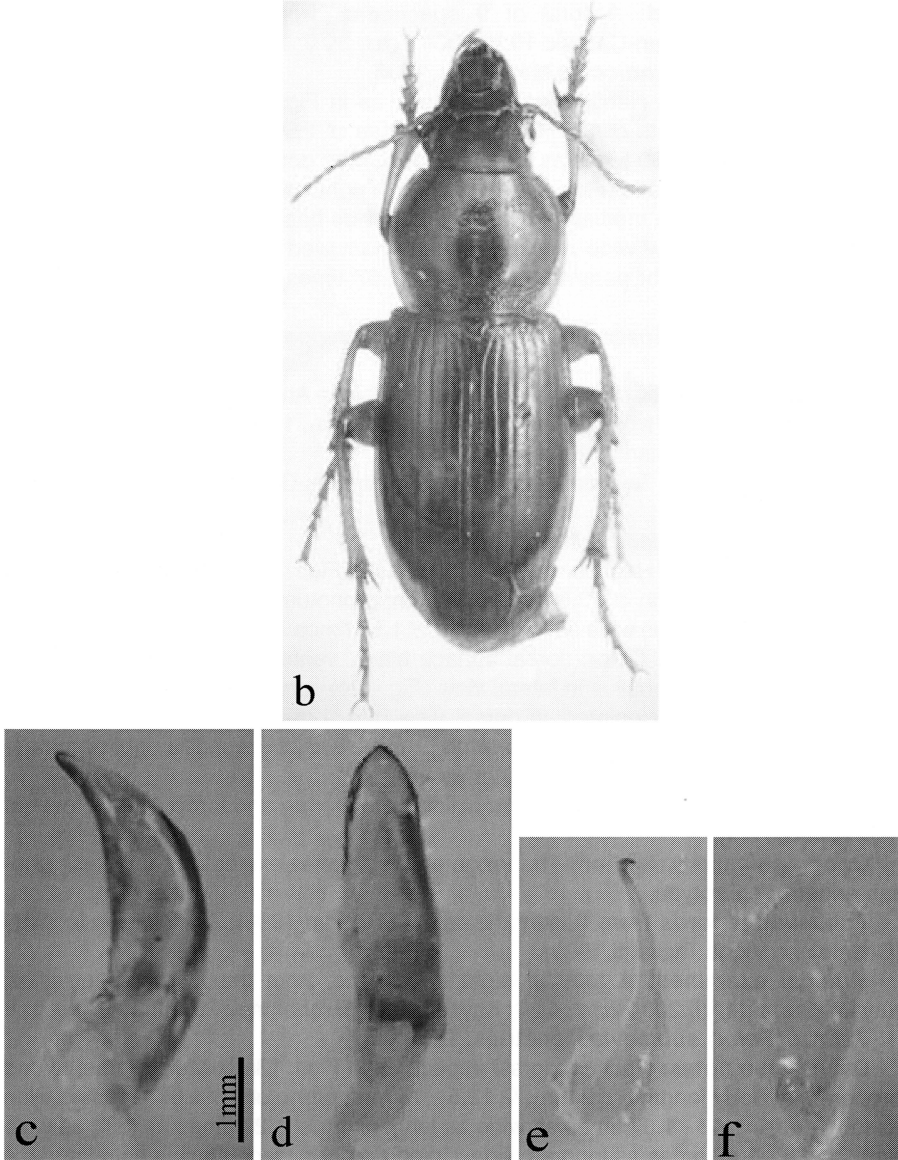


Fig. 11. *Zabrus (Pelor) rotundicollis* Ménériés, 1836 habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

Published records from Turkey: Eskişehir (Türktaş 1998); Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of seven specimens, from the following localities: Kahramanmaraş-Göksun-Çardak-Karaahmet: 12.VII.2004 1♀; Kayseri-Sarız:

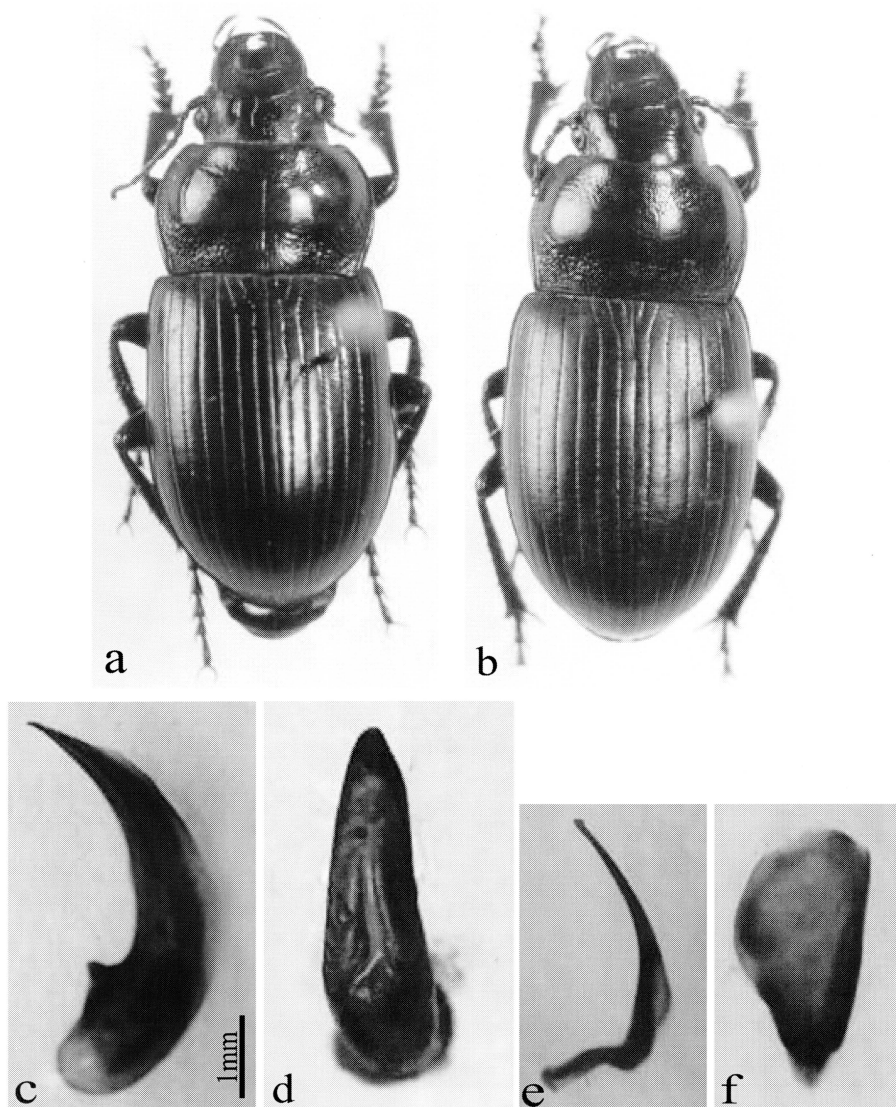


Fig. 12. *Zabrus (Pelor) socialis* Schaum, 1864 habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

27.V.2004 1♂; 11.VII.2004 1♂, 2♀♀; Kayseri-Sarız-Uzunahmet: 11.VII.2004 1♂, 2♀♀.

***Zabrus (Pelor) trinii* (Fischer von Waldheim, 1817).** This tribasic species (Löbl and Smetana 2003) is represented in the Anatolian Peninsula by a single sub-species.

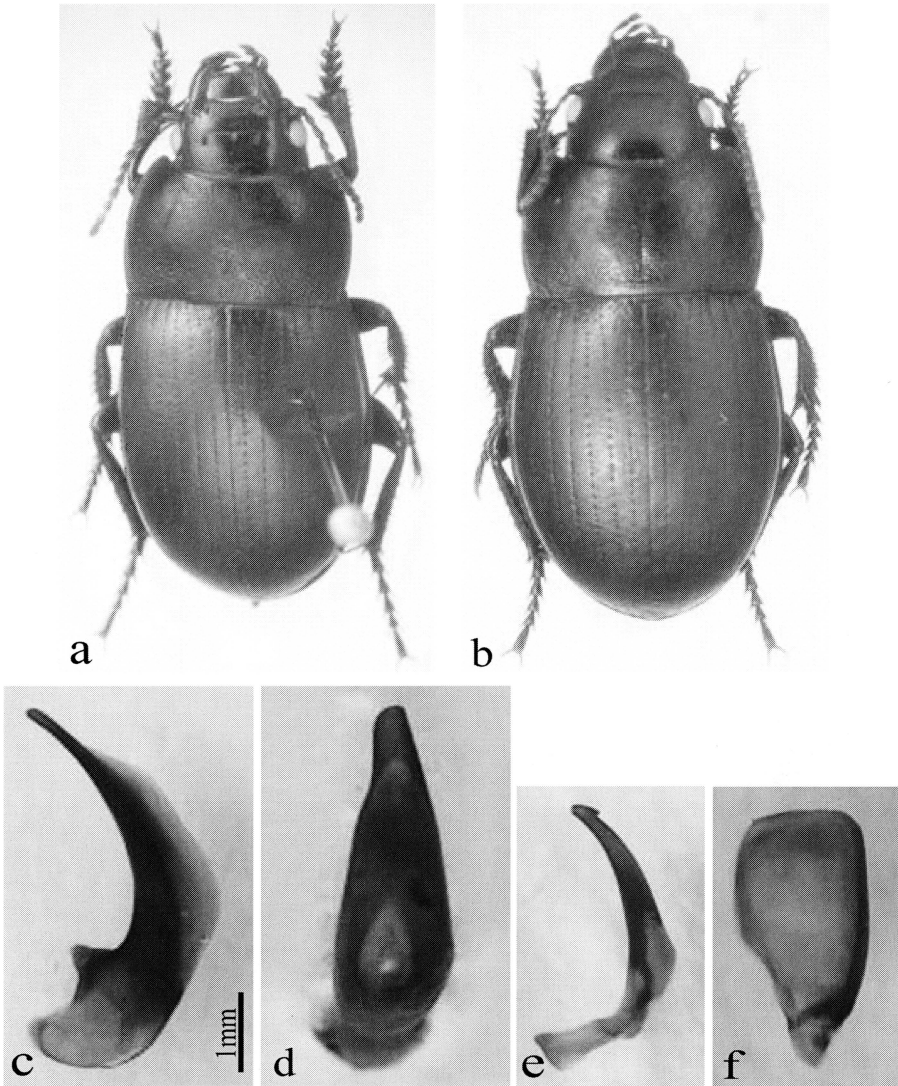


Fig. 13. *Zabrus (Pelor) sublaevis* Ménériés, 1836 habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

***Zabrus (Pelor) trinii anatolicus* Ganglbauer, 1931**

Descriptive notes: Habitus, dorsal aspect, as in Figs. 14a-b. Measurements and proportions: Body length ♂ 14 - 15 mm, ♀ 15 mm; pronotum ♂ 1.67 - 1.83 times as wide as long and ♀ 1.67 times as wide as long; elytra ♂ 1.33 - 1.64 times as long as wide and ♀ 1.58 times as long as wide. Color: dorsal surface black, ventral surface red-black. Male genitalia (Figs. 14c-f): phallus in right lateral view (Fig. 14c) curved

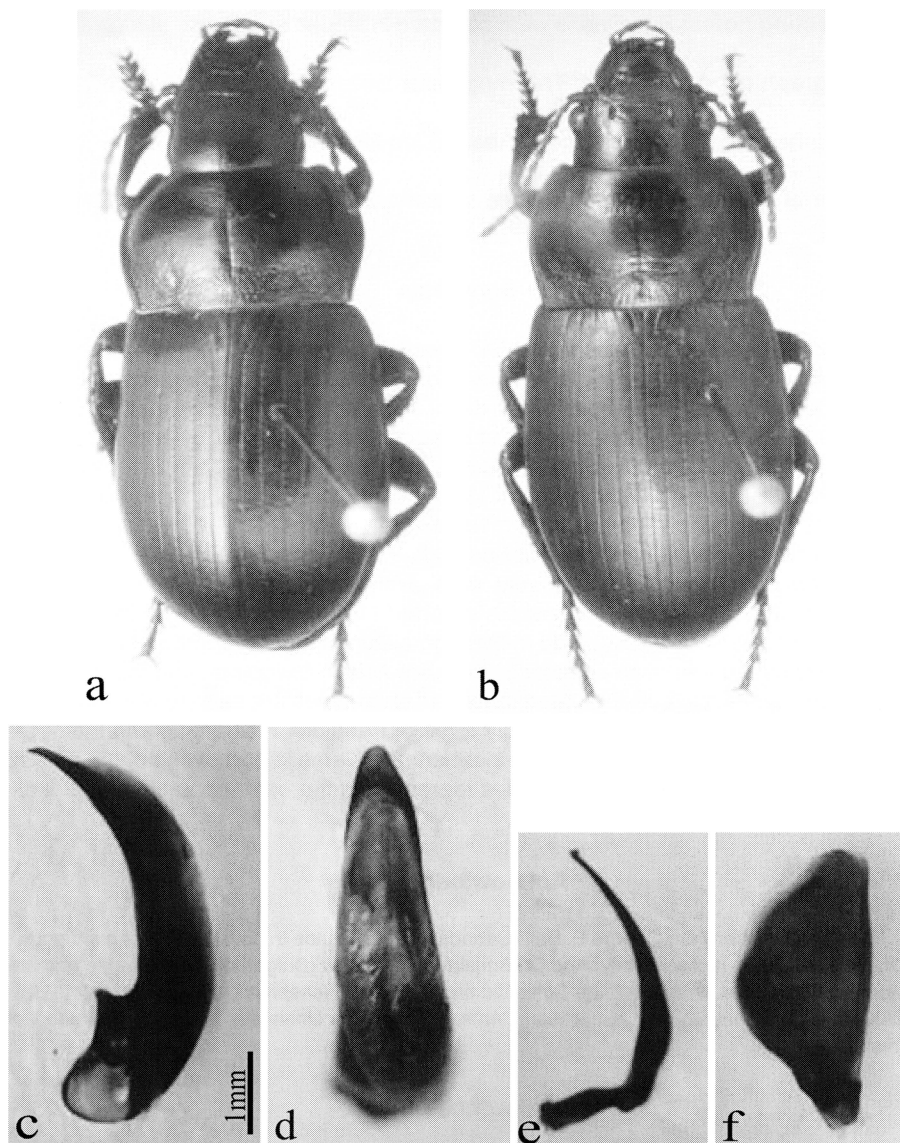


Fig. 14. *Zabrus (Pelor) trinii anatolicus* Ganglbauer, 1931 habitus and dorsal view of male (a) and female (b), right lateral (c) and dorsal (d) view of the phallus, ventral view of the right (e) and left (f) paramere of the male genitalia.

ventrad, wide medially, markedly narrowed apicad, wide basally, apical plate markedly curved ventrad; in dorsal view (Fig. 14d) generally wide, apical plate narrow and markedly flattened toward apex, curved ventrad apex rounded; right paramere (Fig. 14e) 1.5 times as long as left paramere (Fig. 14f).

Collecting notes: Specimens were collected in steppe and forest, at high altitude, only.

Geographical distribution: This range exemplifies an Anatolian endemic chorotype.

Published records from Turkey: Anatolia (no locality) (Casale and Vigna Taglianti 1999).

Material examined: A total of three specimens, from Kayseri-Sarız: 11.VII.2004 2♂♂, 1♀.

Synthesis

The 14 species and subspecies of *Poecilus*, *Pterostichus*, *Tapinopterus*, and *Zabrus* that inhabit Kahramanmaraş Province and the surrounding regions situated in South-Central Turkey were examined in detail. According to Löbl and Smetana (2003), in the Palaearctic Region the number of species and subspecies belonging to these genera in Turkey are 13, 60, 28, 47 respectively. According to the check-list of Anatolian Carabidae (Casale and Vigna Taglianti 1999) the number of species and subspecies belonging to the genus *Pterostichus* in Turkey are 45. Thus, 23% (3), 6% (4), 4% (1), 13% (6) of the species and subspecies belonging to the genus *Poecilus*, *Pterostichus*, *Tapinopterus*, and *Zabrus* respectively, were given in this study.

Most of the species and subspecies reported (10) occur in middle altitude localities. Four species are represented in the high altitudes, and four in the low altitudes. Eight species are Anatolian endemics, three are Asiatic-European, and the Palaearctic, Southwest Asiatic and East-Mediterranean chorotypes are each represented by a single species. The endemics are likely to be old Anatolian residents, and their preponderance is to be expected if the Kahramanmaraş area is part of one of the refugia of the Anatolian Peninsula. The species representing the other chorotypes are likely to be more recent arrivals in Anatolia.

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