

# Studies on Tiger Beetles. CVII. The cicindelid fauna of Anatolia: faunistics and biogeography (Coleoptera, Cicindelidae)

FABIO CASSOLA

Via F. Tomassucci, 12/20 - I-00144 Roma (Italy)

Key words: Anatolia, Turkey, Cicindelidae, Tiger beetles, biogeography.

## SUMMARY

A short history of the entomological exploration and systematics of the tiger beetle fauna of Anatolia are re-examined and discussed. Some puzzling and previously poorly known species suggest a remarkable biogeographical origin of this fauna. Based on the available data, a total of 26 species (2 of which are Anatolian endemics) has been recorded so far from present-day Turkey. Of the 38 taxa (species and subspecies) listed, 11 (28.9%) are strict Anatolian endemics, thus confirming Anatolia as an important center of endemic speciation. Three species [*Cicindela turkestanicoidea* W. Horn, 1938, *Cylindera (Eugrapha) sublacerata* (Solsky, 1874), and *Cephalota (Taenidia) deserticola* (Faldermann, 1836)] have been added to the Anatolia list only recently (the first one in 1987, the others in 1998), and one of the Anatolian endemic species [*Cephalota (Taenidia) eiselti* (Mandl, 1967)] was discovered and described only 33 years ago. Apart from a Japanese species described in 1955, this species represents one of the only two Palaearctic species described in the second half of the 20th Century. The geographical distributions of all the listed species, as well as their zoogeographical affinities and their possible routes of dispersal are also examined and discussed. *Cicindela turkestanicoidea* W. Horn, 1938, is raised to full specific status, and moreover a new combination, *C. turkestanicoidea perreai* Deuve, 1987, is proposed.

## INTRODUCTION

Anatolia, the Asian part of Turkey, has long been to all Europeans the fascinating door to the Middle East. Entomologists began to visit it for zoological exploration purposes in the beginning of the 19th Century, but collecting has long been episodic and fragmentary, due largely to considerable difficulty of travelling the country in the 1800s and early 1900s. Despite the fact that tiger beetles have always been a favourite and popular group of many entomologists, just a few scattered data are to be found in older entomological literature, namely in articles by Ménétries (1832, 1839), Fairmaire (1866, 1884), Gilnicki (1872), and Piochard de la Brulerie (1875). During the first half of the 20th Century, a few additional data were provided by Bodemeyer (1906) and Eichler (1922). In fact, detailed attention to the entomological exploration of Anatolia and the Near East started only in the 1960s, either by coleopterists interested in all beetle groups

(Muche, 1960; Tassi, 1968), or mainly focused on species-rich genera such as *Carabus* L. (s.l.) (Blümenthal, 1969). Moreover, an intense programme of zoological research was also begun in the 1960s by the Universities of Rome, Italy, the results of which were summarized by Sbordoni and Vigna Taglianti (1989).

As far as tiger beetles are concerned, however, specialized collecting was infrequent, as only a few data were added by K. Mandl (1961, 1963, 1967), based on episodic findings by R. Petrovitz and F. Ressler (Mandl 1961, 1963) or on those by the Zoological Expedition of the Natural History Museum of Wien, Austria, in April 1966. This expedition led to the discovery of a new endemic tiger beetle species, *Cephalota eiselti*, in the largest salt lake (Tuz Gölü) of the Anatolian plateau. Such a discovery indicated that the level of field research was inadequate, thus pushing many collectors (W. Heinz, Holzschuh, H. Czipka, L. Ivanovs, W. Eckweiler, A. Richter, A. Korell, E. Şekeroğlu, M. Pavesi, Th. Deuve, A. Riedel, and others) to pay more attention to tiger beetles. The first collecting trips especially devoted to tiger beetle research were conducted beginning in the early 1970s, in particular those by M. Cassola (July 1970, July 1971), F. Cassola (May 1974, July 1978), A. Korell (April 1978, May 1982, May-June 1985, April 1986), K. Werner (August 1987), and M. Franzen (July 1996, June-July 1997).

In 1987 Th. Deuve discovered, in the environs of Pülümür (Tunceli), another new interesting but puzzling taxon, *Cicindela perreaudi*, what again emphasized the imperfect knowledge of the Anatolian tiger beetle fauna. The first comprehensive publication was provided by Korell (1988, 1994), who listed 23 species (with 10 additional subspecies) in all. Subsequently two more Transcaspien species [*Cylindera (Eugrapha) sublacerata* (Solsky, 1874) and *Cephalota (Taenidia) deserticola* (Faldermann, 1836)] were found to occur in Anatolia too, apparently entering the Turkish political boundaries at their extreme eastern edge only. At present, the tiger beetle fauna of Turkey includes 26 species (2 of which are Anatolian endemics), as listed below.

The aim of this paper is to present the latest knowledge of Anatolian tiger beetles, and briefly discuss their systematics, taxonomy, biogeographical affinities, and possible routes of dispersal. Distributional data have been ordered in a North to South and West to East sequence, according to present-day administrative provinces (indicated in bold letters). Localities have been searched for and identified through the careful consultation of several maps, such as the EuroAtlas "Turkey" (1990/91) by RV-Reise- und Verkehrsverlag GmbH, Germany (scale 1:800,000), and the road-map "Turkey" (1996) by Freytag and Berndt (scale 1:800,000/1:2,000,000). M. Pavesi and A. Korell also helped to locate some toponyms. Old records "Türkei" (Apfelbeck, 1904) are often to be referred in reality to Greece instead of Turkey. As far as possible, the Turkish spelling of toponyms has been used, such as for terms as "dağ" (mountain), "geçidi" (mountain pass), "yayla" (plateau), "nehri" (river), "çayı" (stream), "gölü" (salt lake). An asterisk (\*) indicates endemic taxa.

## LIST OF SPECIES

Subfam. Cicindelinae Csiki, 1906  
Tribe Megacephalini Csiki, 1906

### 1. *Megacephala e. euphratica* Dejean, 1822

The nominate form of this widespread Palearctic species discontinuously occurs in coastal or inland saline habitats from SE Spain, Morocco and Mauritania eastwards through the whole of northern Africa, the Arabian peninsula (south to Oman, Yemen, and Djibouti) and the Middle East area (Israel, Jordania, Syria, Iraq, Kuwait, and south-western Iran), as well as in a few East Mediterranean islands (Crete, Cyprus, Rhodes) (Cassola, 1981; Jeanne, 1986; Cassola and Rihane, 1996; Cassola and Schneider, 1997). Moreover, a distinctive bluish subspecies (*M. e. armenica*) occurs from eastern Iran to Armenia, Afghanistan, Pakistan and Central Asia (Naviaux, 1983; Kryzhanovskij et al., 1995).

In Turkey, this species was first recorded by Korell (1988), based on a single pair of elytra found by him near Silifke (Wiesner, 1992). This record has been recently confirmed by additional material (Korell, 1999) (Fig. 3).

DISTRIBUTION - Içel (Mersin): Silifke, E of Kurtuluş, banks of River Göksü, 7.V.1982, A. Korell (Korell, 1988: "Ein Elytrenpaar"). River Göksü delta nr. Kurtuluş, 1.VII.1996, M. Franzen and U. Rischel (Korell, 1999).

Tribe Cicindelini Sloane, 1906  
Subtribe Cicindelina W. Horn, 1908

### 2. *Cicindela sylvatica* L. ssp. *fasciatopunctata* Germar, 1845\*

*Cicindela sylvatica* Linné, 1758, is a northern Palearctic species, which is widely distributed from western Europe (France) through the whole of the European continent north of the Alps (including England), and eastwards to Ukraine, Russia, Siberia and N Mongolia (Wiesner, 1992). It occurs as well in northern Spain (ssp. *rubescens* Jeanne, 1967) and in north-western Turkey (ssp. *fasciatopunctata* Germar, 1845), with two southern, disjunct, poorly distinct populations.

*C. s. fasciatopunctata* was originally described as a species (*Cicindela fasciatopunctata* Germar, 1845, Fauna Ins. ur. 23, t.1), as Guérin-Méneville (1847) wrote the following: "Nous possédons une Cicindèle qui forme la seconde espèce du groupe ayant pour type la *Cicindela sylvatica*; elle a été trouvée par M. Montandon, près de Brousse, en Turquie, et publiée par M. Germar". However, Chaudoir (1857) correctly considered it to be a southern form of *C. sylvatica* ("Für mich ist sie nur eine südliche Form der *sylvatica*"). For long time it was known only from

the environs of Bursa (W. Horn, in Horn and Roeschke, 1892: "ist mir nur aus der Türkei und aus Brussa bekannt"; Apfelbeck, 1904) (Fig. 1), but more recently Korell (1988) recorded it from the Alemdağ as well (Istanbul), and moreover it is now also known from a more eastern locality in the Sivas province (Karabayir Geçidi, S of Ordu) (Fig. 3).

Contrary to the central and northern European countries, where *C. s. sylvatica* is known to occur at low altitudes, normally in sandy areas within pine forests, *C. s. fasciatopunctata* is found only on isolated mountain massifs above 1600 m elevation. This disjunct distribution at high altitudes reinforces an interpretation of remnant populations, isolated following climatic changes associated with post glaciation periods.

DISTRIBUTION - "Türkei" (Beuthin, 1890b). Türkei, Merkl (Schilder, 1911). Istanbul: Alemdağ, Kenyery (Korell, 1988). Bursa: "Brussa; Bythinischer Olymp, Kleinasien" (Mandl, 1937). Uludağ nr. Bursa, 1700-1800 m, 17.VIII.1971, W. Heinz (FCC); 1800 m, 18.VII.1972, M. and G. Osella (FCC); 2000 m, 15-17.VI.1972, M. and G. Osella (FCC); 2000 m, VII.1973, M. and G. Osella (FCC); 2000 m, 29.V.1974 (FCC); 1900 m, 7.VII.1978, F. Cassola (FCC; Fig. 1); 1700-1800 m, 15.VIII.1978, L. Ivanovs (Korell, 1988); 15.VI.1981, A. Richter (Korell, 1988); 1600-1900 m, 22.VI.1986, M. Bologna (FCC); 1800 m, VII.1987, P. Cavazzuti (Werner, 1991: Fig. 40); VIII.1988, A. Riedel (Werner, 1991: Fig. 41). Sivas: Karabayir geçidi [W of Suşehri], 1800 m, 4.VI.1968, C. Blumenthal (FCC).

### 3. *Cicindela monticola* Ménétries, 1832

The *Cicindela hybrida*-group (*sensu* Mandl, 1935/36; Wiesner, 1992) was recently reviewed by Gebert (1995). He separated four closely related species (*hybrida* Linné, 1758, *transversalis* Dejean, 1822, *sahlbergii* Fischer, 1824, and *lagunensis* Gautier, 1872), which are distinguishable by their geographical distribution and by the shape of male genitalia. One more species of such a group, the Italian endemic *Cicindela majalis* Mandl, 1935, had been already raised to full specific status previously (Cassola, 1974). In particular, Gebert (1995) raised to full specific status *Cicindela sahlbergii* Fischer, 1824 (described from Siberia and widespread to Mongolia, Kazakhstan, Russia and South Ukraine as well), and he ascribed to it also the Caucasian (ssp. *monticola* Ménétries, 1832), Anatolian (ssp. *tokatensis* Chaudoir, 1863) and South Balkanian populations (ssp. *rumelica* Apfelbeck, 1904, and ssp. *albanica* Apfelbeck, 1909). However, a recent study by Matalin (1999) raised to full specific status *monticola* too, to which, instead of *sahlbergii*, *tokatensis* and *rumelica* have been ascribed as subspecies. Until better information is available, this assessment is followed here.

According to Gebert (1995), both *rumelica* and *tokatensis* are to be found in Turkey, but in my interpretation the easternmost Turkish populations (Artvin, Kars) should be ascribed to the nominate *monticola* as well, following Korell (1988, 1994) (Fig. 3).

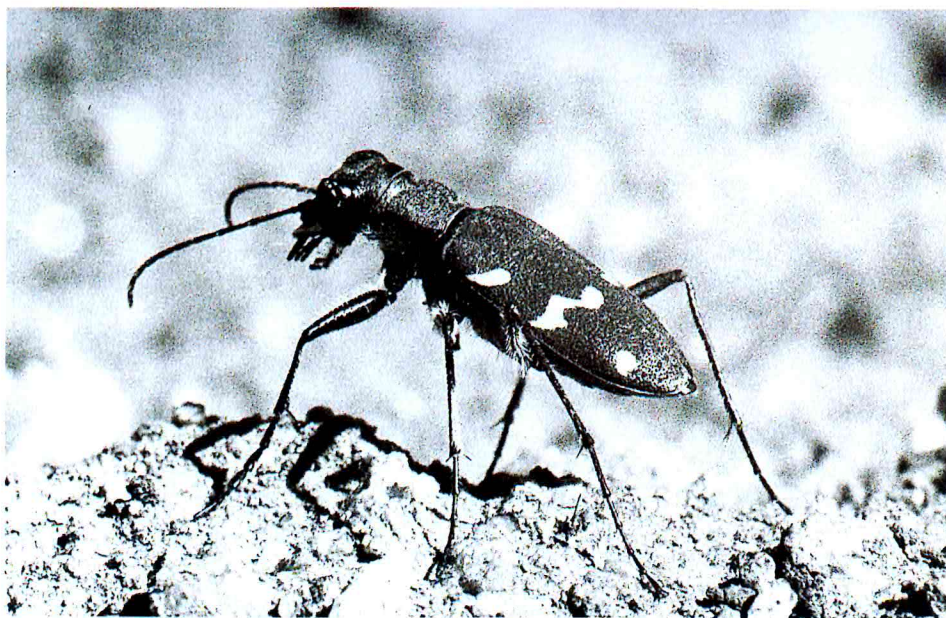


Fig. 1 - A male specimen of *Cicindela sylvatica fasciatopunctata* (Uludağ, Bursa, elev. 1900 m, July 1978. Photo by the author).



Fig. 2 - A female specimen of *Cephalota (Cephalota) turcica* (photographed near Néa Agathóúpolis, northern Greece, June 1998. Photo by Silvano Tinelli, Piacenza, Italy).

ssp. *rumelica* Apfelbeck, 1904

This distinct subspecies is known to occur only from coastal Bulgaria to north-western Turkey. I consider the population from the Inegöl area (Bursa), which was referred to by Gebert (1995) as ssp. *rumelica*, as the ssp. *tokatensis*.

DISTRIBUTION - **Istanbul**: Kilyos, Black Sea beach and first sand dunes, 29.V.1961, A. Giordani Soika (FCC); 1.VII.1962, A. Giordani Soika (FCC). N of Istanbul, nr. Kilyos, 29.III.1989, G. Müller and M. Schubert (Korell, 1994). Kilyos (Matalin, 1999). NE of Istanbul, Şile, 12.VIII.1979, L. Ivanovs (Korell, 1988). **Içel (Mersin)** [locality certainly erroneous!]: Silifke, Göksü delta, 5.VIII.1992, ex E. Şekeroğlu (FCC).

ssp. *tokatensis* Chaudoir, 1863\*

This subspecies (type locality: “Tokat in Anatolia”) is endemic to the whole northern part of Anatolia. Sometimes it has been referred to as ssp. *monticola* (Cassola, 1974; Korell, 1988 and 1994), a subspecies which, according to the few available data, should be distributed in southern Russia, the Caucasian area and the easternmost Turkish provinces only.

DISTRIBUTION - **Izmir**: Smyrna (Gebert, 1995). **Denizli**: Pamukkale, River Menderes, 16.VII.1970, M. Cassola (FCC). **Burdur**: Karacal, 28 km W of Burdur, 16.VII.1970, M. Cassola (FCC). **Bursa**: Inegöl, 27.VII.1970, M. Cassola (FCC). 10 km E Inegöl, 25.VII.1988, A. Riedel (Gebert, 1995, sub *C. sahlbergi rumelica*). **Bilecik**: Biledjik (Mandl, 1935); “Asia minor, Biledjik, Bodemeyer” (Gebert, 1995; Matalin, 1999). **Sakarya**: “Adabazar/Asia Min.” [=Adapazari] (FCC). **Bolu**: Lake Abant, Doğandere, 900 m, 6.VIII.1983, E. Şekeroğlu (FCC). Gerede, 1450 m, 17.VI.1987, C. Panella (MPC). **Zonguldak**: Karabük, VIII.1987, K. Werner (FCC). **Kastamonu**: 35 km from Kastamonu to Çankiri, 30.V.1969, P. Brignoli (FCC). **Çankiri**: Çerkeş Karabük, VIII.1987, K. Werner (FCC; Werner, 1988; Werner, 1991: figs. 76 and 77; Korell, 1994). Çankiri, VIII.1987, K. Werner (Gebert, 1995). **Tokat**: Tokat, Motschulsky (type locality); Donckier (Gebert, 1995). Tokat (Matalin, 1999). Sinop (Mandl, 1935). Kelkit çayı, S of Niksar, 300 m, VI.1985, F. Kleinfeld (Korell, 1988). E of Kelkit River (Korell, 1994). “Tokat Alpen” (Matalin, 1999). **Ordu**: Ordu, K. Werner (Werner, 1988). **Sivas**: Çetinkaya, 30.VII.1988, A. Riedel (Gebert, 1995). **Gümüşhane**. “Krehty”, VII.1917, W. Eichler (Eichler, 1922). “Kialkitcz.” [Kelkit], VII.1917, W. Eichler (Eichler, 1922). “Ardassa”, VII.1917, W. Eichler (Eichler, 1922). Harsit çayı, nr. Kurtün, 26.VII.1973, W. Heinz (FC). Kurtün Yayla, 26.VII.1973, H. Czipka (Korell, 1988). **Trabzon**: Of, 1.VIII.1963, W. Heinz (Korell, 1988; Gebert, 1995). Trabzon, 10.VIII.1964, C. Blumenthal (FCC; Korell, 1988). **Erzurum**: Aşkale to Kandilli, Çakdaris çayı, 16.VIII.1986, M. Pavesi (EMC).

ssp. *monticola* Ménétries, 1832

The easternmost populations of Turkey (Artvin province) seem to me to rather belong to this larger Caucasian subspecies (“Près de la rivière Nalschik au Caucase”: Ménétries, 1832), instead of to *tokatensis*. The few Anatolian specimens which were available to me appear to be almost indistinguishable from two *monticola* specimens (FC) collected at Teberda, Caucasus.

DISTRIBUTION - **Artvin**: Ardesen, 16.VI.1969, G. Osella (FCC). Şavşat, VI.1972, C. Holzschuh (Korell, 1988; Gebert, 1995, sub *C. sahlbergi tokatensis*). Çoruh River, nr. Şavşat, VIII.1987, L. Falletti (Korell, 1994; Gebert, 1995). Murgul, 400 m, 1.VIII.1984, H. Czipka (Korell, 1988, sub *C. sahlbergi tokatensis*). **Kars**: Akçay, 1200-1400 m, 6.V.1980, W. Eckweiler (Korell, 1988).

#### 4. *Cicindela campestris* Linné, 1758

Oddly enough, the systematics of the common widespread Palaearctic *Cicindela campestris* - the type species of the whole family Cicindelidae - are in need of revision using modern biogeographical and phylogenetic criteria. Such a task, however, is made more difficult by the large number of names (nearly one hundred) that have been applied to by many “variety-lovers” (especially in 19th Century), many of which are based on insignificant variations of colour and elytral markings. As Rivalier (1950a) stated, “tous les catalogues sérieux comportent après la dénomination de l’espèce une énumération comique d’aberrations’, *tripunctata*, *connata*, *inhumeralis*, etc... ceci au détriment des races géographiques les plus valables dont il n’est en général pas question”.

The last comprehensive taxonomic review is that by Mandl (1944), who recognized 14 subspecies within the enormous geographical range of *C. campestris*. Subsequently several populations were placed in this taxon that likely deserve a separate specific status. For example, Rivalier (1950b,c) made it clear that *C. maroccana* Fabricius, 1801 (with its ssp. *pseudomaroccana* Roeschke, 1891) is a separate species, sympatrically living from Morocco up to southern France (also in western Liguria, Italy: Cassola, 1978), but he kept within *campestris*, as “sous-espèces qui doivent légitimement lui demeurer rattachées”, *C. desertorum* Dejean, 1825, *C. herbacea* Klug, 1832, *C. talychensis* Chaudoir, 1846, and the puzzling *C. javeti* Chaudoir, 1861, all of which Mandl (1944) had already considered to be full species (Cassola and Brouerius van Nidek, 1984; Werner, 1991; Wiesner, 1992). However, in his last published paper, Mandl (1988) again considered *maroccana* to be a *campestris* subspecies.

In our present interpretation (Wiesner, 1992), the geographical distribution of *C. campestris* (originally described from Sweden) includes Europe up to England, Scandinavia, Russia and Siberia, with some more or less well-characterized subspecies in Maghreb (Morocco to Tunisia: ssp. *atlantis* Mandl, 1944), in southern Balkan peninsula (Dalmatia to Greece: ssp. *olivieria* Brullé, 1832), and in some Mediterranean islands such as the Balears (ssp. *balearica* Sydow, 1934), Corsica and Sardinia (ssp. *corsicana* Roeschke, 1891), San Pietro Island (ssp. *saphyrina* Gené, 1836), Sicily (ssp. *siculorum* Schilder, 1953), Cyprus (ssp. *cyprensis* Hlisenikowski, 1929), and the Greek islands of Krete, Rhodos, Sporades and Cyclades (ssp. *suffriani* Loew, 1843).

*C. campestris* populations from Anatolia appear to belong to two distinct and recognizable subspecies: ssp. *palustris* Motschulsky, 1840, apparently restricted to the Marmara Sea and Bosphorus area, and ssp. *pontica* Fischer, 1825, occurring from northern Pontus mountains (Fig. 4) eastwards to Armenia, Azerbaijan and Caucasus (Mandl, 1944; Wiesner, 1992; Kryzhanovskij et al., 1995), as well as to NW Iran (40 km SW of Ardabil, Sabalan Mts., 38°02'N-47°59'E, 14.IV.1999, J. Kaláb, FCC). However, without precise detailed label data, the subspecific identification of most *campestris* specimens is difficult, sometimes even impossible.

Subspecies *olivieria* Brullé has been recorded from "Türkei" by Mandl (1944) and Wiesner (1992), but it is more properly to be considered a Greek and South Balkan endemic (Cassola, 1973c).

ssp. *palustris* Motschulsky, 1840\*

Specimens of ssp. *palustris* have green flattened elytra with small median dots and usually no traces of apical and subapical spots. Mandl (1944) detailed the subspecies' distribution as follows: "Türkei in der Umgebund von Istanbul und der gegenüberliegenden kleinasiatischen Küste sowie auf den Inseln des Marmarameeres; Alem Dagh, Magnesia, Smyrna, Insel Prinkipo".

DISTRIBUTION - "Türkei" (Beuthin, 1889). **Istanbul**: "entre Constantinople et le Balkan" (Ménétries, 1839, sub "*C. campestris* v. *taurica*"). "Konstantinopel, E. Merkl" (Apfelbeck, 1904). "Osthängen des Alem-Dagh, Richtung Riva" (Bodemeyer, 1906: "var. *obscurata*, in tief schwarzen Exemplaren"). Istanbul, IV.1939, N.M. Downie (FCC). "Konstantinopel" (Mandl, 1944). Üsküdar, 4.V.1964, F. Tassi (FCC; Tassi, 1968). W of Istanbul, Küçükçekmece, 15.III.81, G. Müller (Korell, 1994). **Kocaeli (Izmit)**: SE of Istanbul, Gebze, 100 m, IV.1992, H. Czipka (Korell, 1994). **Çanakkale**: S of Truva (=Troja), IV.1990, H. Czipka (Korell, 1994, sub *C. c. pontica*). **Izmir**: "Smyrna, Kleinasien" (Mandl, 1944).

ssp. *pontica* Fischer, 1828

Specimens of ssp. *pontica* should be recognizable because of the heart-shaped pronotum, strong erect frons pubescence, and middle side and discal dots of elytra tending to join with each other through a narrow poorly visible lineole (Mandl, 1944). However, these characters in reality are far from obvious, and are also found in other *campestris* subspecies.

Mandl (1944) indicated the Anatolian distribution of *c. pontica* as follows: "Kleinasien: Amasia, Biledjik, Grusien, Achalzich und Tiflis im Kaukasusgebiet". The few additional data available to me, listed below, seem to indicate that *campestris* occurs in Southern Turkey (Antalya province) as well. However, further research is still needed to definitely ascertain the southern and eastern boundaries of this species. For example, an old record from the Gümüşhane province (Eichler, 1922) seems to be doubtful, as it would possibly be referred to *C. desertorum* (Dejean).



DISTRIBUTION - Işıkdag IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Işıkdag (Wiesner, 1992). **Izmir**: "Bosz-Dagh, Kisilgye-Aole" (Fairmaire, 1866). Bozdağ köy, III.1986, H. Czipka (Korell, 1994). 5 km W of Korak, 480 m, 19.V.1992, L. Latella (FCC). **Manisa**: "Magnesia, Kleinasien" (Mandl, 1944, sub *C. campestris palustris*). NE of Kirkağaç, Siledik, IV.1988, G. Müller and M. Schubert (Korell, 1994); IV.1988, K. Werner (FCC). **Uşak**: W of Uşak, IV.1978, H. Czipka (Korell, 1988). **Mula**: Yatağan-Gökbel, 30.IV.1973, A. Vigna Taglianti (FCC). **Burdur**: Bucak, 1.V.1969, W. Wittmer (Korell, 1988). **Isparta**: Isparta, Davraz Dağ, 1300 m, IV.1996 (FCC). **Antalya**: Korkuteli-Kemer, Souguk nr. Seki, 1400 m, 30.IV.1982, A. Casale et al. (FCC). **Bursa**: Uludağ VI.1967, A. Richter (Korell, 1988). **Bilecik**: "Kleinasien: Biledjik" (Mandl, 1944). Bilecik, IV.1973, H. Czipka (Korell, 1988). **Eskiehir**: "Klein-Asien, Eski-chehir, v. Bodemeyer" (FCC). **Bolu**: Gerece, 1400 m, III.1983, H. Czipka (Korell, 1988). Mt. Abant, S of Lake Abant, 1500 m, 20.VI.1997, S. Rubizzani (FCC). **Ankara**: Kizilcahamam (Mandl, 1963). Ankara, 900-1000 m, IV.1983, W. Eckweiler (Korell, 1988). Akyarma geçidi, 5.V.1994, C. Pesarini (MPC). **Konya**: Ayranci, WSW of Ereğli (Mandl, 1967). Ereğli (Wiesner, 1992). **Kastamonu**: 35 km from Kastamonu to Çankiri, 30.V.1969, P. Brignoli (FCC). Ilgazdağı geçidi, 1800-2300 m, 6-10.VII.1972, M. and G. Osella (FCC). Ilgazdağ, 1500 m, IV.1979, W. Heinz. Ödemis, 1100 m, VI.1985, F. Kleinfeld and A. Korell (Korell, 1988). Masruf geçidi (Kastamonu-Inebolu), 6.V.1992, C. Pesarini and A. Sabbadini (FCC). 40 km W of Araf Yesilova, 7.V.1992, C. Pesarini and A. Sabbadini (MPC). Tasköprü, 8.V.1992, C. Pesarini and A. Sabbadini (MPC). **Çorum**: Pass N of Iskilip, 1600 m, 3.V.1987, A. Vigna Taglianti (FCC). Çorum, 3.V.1992, C. Pesarini (MPC). **Yozgat**: Akdamağdeni, 1200-1400 m, IV.1983, W. Eckweiler (Korell, 1988). **Amasya**: "Amasia, Kleinasien" (Mandl, 1944). **Tokat**: Tokat, 700 m, IV.1986, A. Korell (Korell, 1988). **Ordu**: Pass S of Gököy, 1700 m, VII.1974, H. Czipka (Korell, 1988; Korell, 1994). Pass between Mesudiye and Gököy, 1400 m, 14.VII.1976, G. Carpaneto (FCC). **Gümüşhane** [doubtful record] "Kialkit-cz." [Kelkit], VII.1917, W. Eichler (Eichler, 1922).

##### 5. *Cicindela herbacea* Klug, 1832

*C. herbacea* is a still poorly known and poorly understood species, which Klug (1832) described from Beirut ("Habitat in ora Syriae prope Berytum") as a separate species. In subsequent publications, it was long considered to merely be a form of *C. campestris* (H. Roeschke, in: Horn and Roeschke, 1891; Horn, 1926, 1930, 1938; Rivalier, 1950c). More recently, however, several authors (Mandl, 1944; Cassola and Brouerius van Nidek, 1984; Korell, 1988; Mandl, 1988; Wiesner, 1992) have considered it as a full species. Korell (1994) considers *herbacea* to be a "species inquirenda", probably to be lumped again into *campestris* ("wahrscheinlich ist *herbacea* als Subspezies von *C. campestris* zu werten").

The general distribution usually known for this form includes Syria, Lebanon, Israel, Turkey and Armenia (Wiesner, 1992), but perhaps some misidentifications may be involved in, especially as far as Armenia is concerned. Moreover, the record by Jeanne (1986) from Mt. Olympus, Cyprus, has most certainly to be considered as referred to *C. campestris cyprensis*. It has also to be emphasized that sometimes old label localities may have to be regarded as gathering centers only, as for instance specimens of *Lophyridia concolor* (thus certainly a sea beach dwelling species) appear to bear the same label data ("Syria, Akbès", the present-day Akbez, a

well-inland locality on the road İslahiye-Hassa, behind the Nur dağları mountain massif), as *Cicindela herbacea* and *Homodela ismenia* (Pavesi, 2000).

A long homogeneous series of specimens from Osmaniye (Adana) suggests that *C. herbacea*, tentatively at least, may be a distinct species, distinguished from *C. campestris* by the comparatively smaller and narrower head and pronotum, and the complete, subtransversal, acutely bent middle band of elytra. Male aedeagi do not differ significantly. However, some variability seems to be involved and more material from S and SE Turkey, Syria, Lebanon and Israel is needed before any definite taxonomic statement is possible. The geographical range of *herbacea* seems to not overlap that of *campestris*, thus suggesting a subspecific instead of a specific status (Fig. 4). Moreover, two *herbacea* specimens (a pair) from my own collection, collected in Lebanon (Biblos, Les Cèdres, 24.VI.1971, A. Vigna Taglianti leg., FCC), appear to be slightly larger in size, with a wider middle band, and moreover the female specimen has, unlike most female specimens from Osmaniye have, a wide transversal pronotum. Several specimens from the İrmasan Pass (Antalya) appear to be intermediate, by having a similar elytral middle band (however, a bit more horizontal) and a wider pronotum. Because of the occurrence of *C. campestris pontica* in the Antalya province, this population may be a *herbacea* x *campestris* intergrade.

Presently, I consider *C. herbacea* a species rather than the south-eastern most subspecies of *campestris*. Mandl's (1988) interpretation may be valid that the taxa *herbacea*, *desertorum*, *talychensis* and *javeti* are ancient ("Natürlich handelte es sich bei allen genannten Formen nicht um die heutigen Arten, sondern um deren Urformen vor mehr als sechs Millionen Jahren").

DISTRIBUTION - "Kleinasien" (Apfelbeck, 1904). **Aydin:** Aphrodisias, 600 m, 5.IV.1982, L. Ivanovs (Korell, 1988). **Isparta:** Aksu, ESE of Eğridir, 1200-1400 m, V.1977, J. de Freina (Korell, 1988). **Antalya:** İrmasan geçidi, S slope (Akseki), 1450-1500 m, IV.1974, W. Heinz (Korell, 1988); V.1982 and V.1983, C. Blumenthal, F. Kleinfeld and A. Korell (Korell, 1988); 1500 m, no date, W. Heinz (FCC) (*herbacea* x *campestris* integrades?); 1500 m, 8.V.1978, P. Besuchet and I. Löbl (FCC). 10-20 km S of Akseki, 600-900 m, 16.IV.1991, H. and Th. v. Oorschot (FCC) (*herbacea* x *campestris* integrades?). Gazipasa, 45 km E of Alanya, IV.1989, Turlin (FCC). **Karaman:** Sertavul geçidi, N slope, 1300 m, IV.1978, W. Heinz (Korell, 1988); 1600 m, 14.IV.1988, H. Czipka (Korell, 1994, *herbacea* x *campestris* integrades?); 1550 m, 21.V.1992, H. Czipka (Korell, 1994, *C. campestris pontica*?; Korell, 1999). **İçel (Mersin):** Namrun [=Çamlıyayla], IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Mederselek [=Medreselik, E of Sertavul geçidi], 30.IV.1996, B. Makovsky (FCC). **Adana:** Adana (DEI). Pozanti, IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963); IV.1987, D. Liebegott (Korell, 1994). Osmaniye, Karatepe, 300-400 m, IV.1973, H. Czipka (Korell, 1988); 23.IV.1983, W. Eckweiler (Korell, 1988). Osmaniye, 500 m, IV.1996 (FCC). **Kahramanmaraş:** N of Maras, 700 m, III.1989, H. Czipka (Korell, 1994). "Zeitoon [Zeytün?], Staudinger" (DEI). **Gaziantep:** Akbès [=Akbez, on road İslahiye-Hassa at junction with road to Kilis] (Fairmaire, 1884, sub "*Cicindela desertorum* Fald."). "Akbes, Syria" (DEI). "Syrie, Akbès, Ch. Delagrange, été 1890" (DEI). "Amanos Dagl.: Akbes, ohne Datum, Em. Reiter" (Korell, 1988). **Hatay:** "Asia minor, Gülek, Taur. Cilic. 1897, Holtz" (DEI). "Alexandrette, Asia minor, A. Kricheldorf" (DEI). **Amasya** [doubtful record]: Amasia, 1888, Korb (DEI); Möring (DEI).

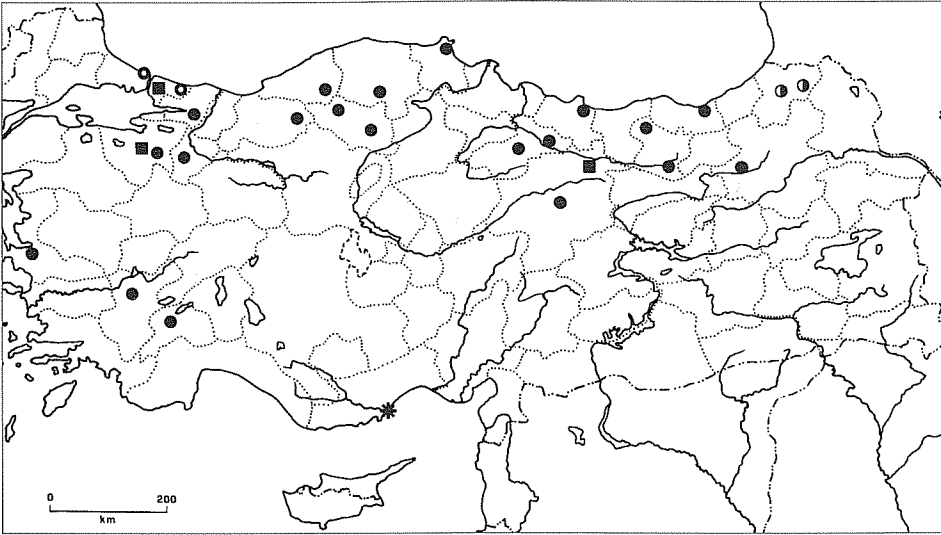


Fig. 3 - Map showing the geographical distributions of *Megacephala euphratica* (asterisk), *Cicindela sylvatica fasciatopunctata* (solid squares), and *Cicindela monticola* (solid circles, *ssp. tokatensis*; bold-faced circle: *ssp. rumelica*; half-solid circles: *ssp. monticola*), in Anatolia.

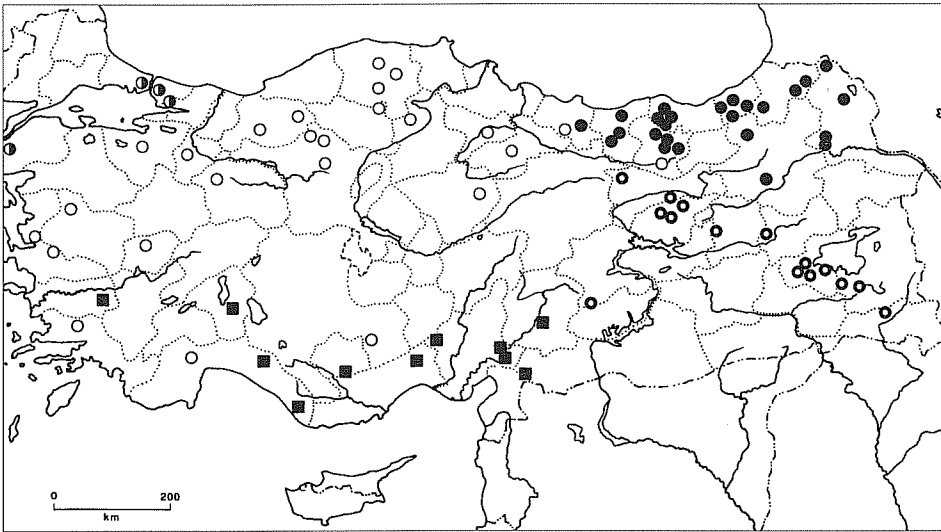


Fig. 4 - Map showing the geographical distributions of *Cicindela campestris* (open circles: *ssp. pontica*; half-solid circles: *ssp. palustris*), *C. herbacea* (solid squares), *C. desertorum* (solid circles), and *C. turkestanicooides perreai* (bold-faced circles) in Anatolia.

## 6. *Cicindela desertorum* Dejean, 1825

Described by Dejean (1825) from southern Russia ("Elle se trouve dans la Russie méridionale"), this species was considered a species by Fleutiaux (1892), but it was thereafter considered by H. Roeschke (in Horn and Roeschke, 1891) and by all subsequent authors (including Rivalier, 1950c) to be a subspecies of *C. campestris* (Horn, 1926, 1930). It was raised again to full specific status by Cassola and Brouerius Van Nidek (1984) and subsequent authors. However, it has continued to raise considerable difficulty in taxonomy, as Wiesner (1992) and Korell (1988, 1994) have tentatively attached to it, as subspecies, the puzzling taxa *turkestanicoides* W. Horn, 1938, and *perreaui* Deuve, 1987 [see below].

*C. desertorum*, in reality, is a species which is obviously and easily separated from *C. campestris* and its allied species, especially because of the distinct elytral markings and shape, which somewhat resemble those of the *C. hybrida*-group. Moreover, the geographical ranges of *C. campestris* and *C. desertorum* partially overlap in Armenia and Azerbaijan (Kryzhanovskij et al., 1995). *C. desertorum* occurs also in Georgia and in the whole Caucasian region (Kryzhanovskij et al., 1995), from where it penetrates the Turkish territory along the northern mountainous areas from the provinces of Artvin in the East to that of Ordu westwards (Fig. 4). Two records from Adana and Mardin are most certainly erroneous and due to mislabelling.

Specimens of *C. desertorum* normally are green to bright green, but sometimes they may have a more reddish hue, such as two specimens from the Kaçkar Dağ (Ayder, Rize) and from Savsat (Artvin), which are somewhat reminiscent of *C. talychensis* Chaudoir, 1846, because of their smaller size, the reddish colour and the short elytral middle band. Although Wiesner (1992) indicated *talychensis* [sic!] from Turkey as well ("Turkei: Elbrus"), in reality Mount Elbrus lies in western Caucasus instead of Turkey, and the actual geographical range of *talychensis* should rather lie in the area between SE Azerbaijan (type-locality: "bois du Khanat de Talyche, près de Lenkoran": Chaudoir, 1846) and northern Iran (Elburz or Elburs Mountains) only. Therefore, its occurrence in Armenia, stated by Horn (1926) and Wiesner (1992), until better information is available, should be regarded as doubtful. In addition, the discrimination of this species group (*campestris*, *desertorum*, *talychensis*, *turkestanicoides*) in previous literature has not been clear and reliable.

DISTRIBUTION - **Ordu:** Pass N of Cambaşı, 1700 m, 23.VII.1973, W. Heinz (FCC). **Giresun:** Dereli, VI.1970, E. Sturani (FCC). Eribel geçidi, 24-25.VII.1973, W. Heinz (FCC); 2200-2500 m, 16.VII.1976, S. Bruschi and A. Vigna Taglianti (FCC). Kümbet, 1800 m, 16.VII.1976, G. Sabatinelli (FCC); 1200-1700 m, 18.VI.1992, P. Audisio and A. De Biase (FCC). N of Kümbet yayla, VIII.1984, H. Czipka (Korell, 1988). N of Tamdere, 1450 m, 1.IX.1987, A. Korell (Korell, 1994; AKC). **Gümüşhane:** "Zigana-Korduni" [Zigana geçidi?], VII.1917, W. Eichler (Eichler, 1922). Balaban dağl., 2500 m, VII.1974, H. Czipka (Korell, 1988). Gümüşhane, 1300 m, 14.VII.1978, P. Cavazzuti (MPC). "Kessa-dagh" [Kösedagi], VII.1917, W. Eichler (Eichler, 1922). S side of Kösedagi geçidi, 1800 m, 14-16.VI.1988, H. and Th. v. Oorschot, H. v. d. Brink and H. Wiering (FCC). Bayburt, Kop dağl. geçidi, 2300 m, 15.VII.1992, A.A.W. Lucas (FCC, VNC).

**Trabzon:** Trébizonde (Gilnicki, 1872). 5 km S of Maçka, 29.VI.1999, P. Kabátek (FCC). Maçka, Sumelas Mts., 1600 m, 1.VI.1993, P. Kabátek (FCC). Zigana Dağ Hamsiköy, Rasse (FCC). Zigana geçidi, 2025 m, 12.VI.1969, V. Cottarelli and G. Osella (FCC); 2000 m, VI.1974, S. Battoni (FCC); VIII.1975, A. Richter (Korell, 1988); 2100 m, 18.VII.1976, A. Vigna Taglianti (FCC); 2100 m, 7.V.1987, A. Vigna Taglianti and M. Zapparoli (FCC); 2000 m, 26.VI.1987, C. Panella (MPC); 1200 m, VIII.1987, K. Werner (Werner, 1988). Zigana Dağ, 2000 m, 22.V.1970, W. Wittmer (Korell, 1988). Söumela [Sumelas], 1000-1500 m, 10-11.VII.1987, P. Audisio and M. Biondi (FCC). **Rize:** Ilica, Tatos dağ, 16.VI.1969, F. Ruspoli (FCC). "Massif de Kaçkar", 2500 m, 23.VII.1973 (FCC). Ilica (Ayder), 1200-1600 m, 20-21 and 28.VII.1976, S. Bruschi and M. Bologna (FCC). Pass 30 km S of İkizdere, 2700 m, VI.1975, W. Heinz (Korell, 1988); 2800-3000 m, 18-19.VIII.1976, W. Eckweiler (AKC; Korell, 1988); 1500 m, W. Heinz (FCC); 1950 m, 15.X.1982, P. Cavazzuti (FCC). Ardesen-Ilica, VII.1975, A. Richter (Korell, 1988). Kaptanpaşa, 1550 m, 21.VII.1978, P. Cavazzuti (MPC). Ayder, Kaçkar dağı, 2200-2700 m, 26.VII.1987, H. Hetzel (AKC). Ayder, Ardesen Valley, 1600-2000 m, W. Heinz (Werner, 1991: Fig. 164). Ovitdağ i Geçidi, 1800-1900 m, 2-5.VIII.1990, A. Korell (Korell, 1999). **Artvin:** Yalnızçam, VI.1970, E. Sturani (FCC); 23.VII.1976, P. Cavazzuti (FCC). Yalnızçam geçidi, 2200 m, 8.VII.1971, A. Vigna Taglianti (FCC); 1800-2200 m, 20-21.VI.1999, T. Lackner (FCC). Altıparmak, NW Yusufeli, 28.VII.1973, H. Czipka (Korell, 1994). Karçkal-Otingo, 2000-2600 m, VIII.1973, W. Heinz (FCC; Korell, 1988). Karçkal, Otingo yayla, 2000 m, VII.1987, W. Heinz (KWC; Werner, 1991: Taf. 20, Nr. 158, sub C. *herbacea*). Savşat, 2100-2200 m, 25.VI.1976, A. Vigna Taglianti (FCC). **Erzurum:** Ispir, 17.VI.1973, K. Warncke (Korell, 1994); 7.VI.1980, H. Ozbek (FCC). Mt. Palandöken, 2850 m, 11.VII.1987, G. Giacomazzo (MPC). **Kars:** Ararat, VI.1970 (Korell, 1988). NW of Susuz, VII.1976, H. Czipka (Korell, 1988). Posof, 1400-1700 m, VII.1980, W. Eckweiler (Korell, 1988). Karakurt, VI.1990, S. Pokorny (Korell, 1994). Sarikamiş, 80 km NE of Horasan, 40°18N-42°29E, 25.VI.1999, P. Kabátek (FCC). **Adana** [erroneous record]: Misis, E of Adana (Mandl, 1967). **Mardin** [erroneous record]: Mardin, Staudinger (1 ♂ DEL, aedeagus missing!).

7. *Cicindela turkestanicoidea* W. Horn, 1938, bona species  
ssp. *perreaui* Deuve, 1987\*, comb. nova

W. Horn (1938, page 13 and pl. 66, figs. 12-14) described *C. campestris turkestanicoidea* based on two female specimens collected by von Christoph in NE Iran ("Nord-Ost-Persien"), "bei Taesch [Tash] und Schahku (zwischen Astrabad und Schahrud [Sharud])". These localities probably lie E of Gorgan [=Astrabad], inland from SE corner of the Caspian Sea, i.e. over 300 km ENE of Teheran. W. Horn's type specimens are, unfortunately, not to be found in Horn's collection (Döbler, 1973), and their depository is presently unknown to me. Anyway, it is interesting to notice that in his description Walther Horn emphasized the different proportions of the insect body parts ("Differt a subsp. *desertorum* Dj. statura angustiore multoque longiore") and the less convex elytral shape ("elytris parum convexis marginaliter") (Horn, 1938). An additional female specimen, recently collected in northern Iran (Mazandaran, N. slope of Mt. Elburz, 2600-2800m, 36°8N-51°18E, 2.VI.1999, L. Saltini leg., FCC), also appears to be *turkestanicoidea*, thus providing a N-Iranian specimen at least.

In the very same description paper, Horn (1938) provisionally ascribed to ssp. *turkestanicoidea* some further Turkish specimens, labelled "Zeitün (Cilicischer

Taurus), leg. Manissadjan und ded. Staudinger”, “Moks (Armenischer Taurus), leg. Kulzer 1912”, and “Van (Armenischer Taurus), leg. Kulzer 1912”, all of which I examined from Horn’s collection in DEI. Consequently, Wiesner (1992) has included Eastern Turkey in the range of this taxon. Consultation of the old “Andrees Handatlas” (Verlag von Velhagen und Klasing, Bielefeld u. Leipzig, 1899) shows that “Moks” corresponds to present-day “Çatak”, ca. 30 km S of Gevas, SE side of Lake Van (Korell, 1999). As to the locality “Zeitün”, a map in the Nouvelle Larousse Illustré (Paris, 1897-1906) would show such a locality to correspond to present-day Süleymanlı, in the Karamanmaraş province (“Cilicischer Taurus”) (Pavesi, 2000), thus probably being erroneous, also because the very same locality data were given by O. Staudinger for *C. herbacea* too.

More recently, Deuve (1987) described, as a new species, *C. perreai*, based on a single male specimen collected by himself in Anatolia at Pülümür (Tunceli), on the sandy banks of a mountain stream, syntopically with *Cicindela asiatica* Audouin and Brullé, 1839, and *Lophyridia fischeri* (Adams, 1817). Deuve did not compare his new species either to *desertorum* or to *turkestanicoïdes*, and moreover he stated that the aedeagus was “sans ailerons ni autres formations préapicales”, thus placing the endophallus in Rivalier’s “groupe II” (*silvicola-hybrida* group) (“...un taxon nouveau, phénétiqument proche de *Cicindela hybrida* L.”). However, considerable doubts were raised about the true taxonomic position of *perreai*, as perhaps Deuve overlooked *desertorum* and *turkestanicoïdes*, neither of which he mentioned in his diagnosis of *perreai*.

Examination of several specimens from the type locality (Pülümür) and from several other localities shows that, contrary to Deuve’s statement, the aedeagus of *perreai* has long preapical crests, thus placing it in Rivalier’s “groupe V” (*campestris*-group). Moreover, it has become obvious that *perreai* is conspecific, possibly even synonymous, with *turkestanicoïdes*, as the specimens mentioned by Horn (1938) from “Moks” (see also Werner, 1991: Fig. 166, sub *C. desertorum turkestanicoïdes*) and Van have also proved to be *perreai*. Thus I consider *turkestanicoïdes* to be a full species, while a new combination is provisorily established here for its subspecies *perreai*, unless future research and more Iranian *turkestanicoïdes* specimens would show *perreai* to be synonymous with *turkestanicoïdes*.

In addition, further field research is needed to precisely ascertain the respective geographical ranges of *C. desertorum* and *C. turkestanicoïdes* in the Anatolian mountains. As far as it is presently known, *C. turkestanicoïdes* has a more southern distribution than *C. desertorum*, and it is positively known to occur in the provinces of Hakkâri, Van, Bitlis, Muş, Bingöl, Malatya, Tunceli, westwards up to the Erzincan province (Fig. 4). Relative to *C. desertorum*, *C. turkestanicoïdes* has clearly longer, more flattened and parallel-sided elytra (EL/PL ratio: >3.6 with *turkestanicoïdes*, <3.4 with *desertorum*: see Tab. I), less bright green colour, and a slenderer, more elongate male aedeagus (apically narrowed in a marked

and typical beak). Despite a strong overall resemblance to *desertorum*, it may well be easily discriminated at first sight with experience.

DISTRIBUTION - **Tunceli**: Pülümür, 1600 m, VII.1986 (Deuve, 1987: *C. perreai*'s type locality); 1600 m, V.1988 (FCC; Werner, 1991: Fig. 168, sub *C. desertorum perreai*); 1600 m, VI.1988, B. Lassalle (AKC; Korell, 1994). Gözen-Ovacik, 1900-2100 m, VI.1987, K. Staven (Korell, 1994, sub *C. desertorum perreai*: "mit *C. d. desertorum* von verschiedenen Fundorten in NE-Anatolien zeigt eindeutig die sehr nahe Verwandtschaft beider Taxa"; photograph examined!). Gözen, Munzur dağ l., 1500-2100 m, W. Heinz (Werner, 1991: Fig. 167, sub *C. desertorum perreai*). **Erzincan**: Kizildağ geçidi, 2160 m, 12.VI.1973, R. Argano, L. Boitani and V. Cottarelli (FCC). W of Erzincan, Pass W of Akarsu, D. Bernh. (FCC). Çağlayan, VI.1993, P. Kahakh (FCC). **Malatya**: Malatya, 1600 m, 7.VI.1986, E. Şekeroglu (FCC). 90 km from Malatya, Nachoaly, 1300-1800 m, H. Kriska (Gebert, 1996). **Bingöl**: Kurucu geçidi, 1800 m, 31.V.1992, V. Biza and Z. Kostal (FCC, MPC). **Muş** Buğlan Pass, 1600 m, VI.1976, C. Holzschuh and F. Ressler (Korell, 1988, sub *C. desertorum*). **Bitlis**: Bitlis (Gilnicki, 1872, sub *C. desertorum*). Bölükçyazi, VI.1991, B. Lassalle (FCC) (a small male specimen). 15 km W of Tatvan, 4.VI.1992, V. Biza and Z. Kostal (FCC). Resadiye, 25 km E Tatvan, 31.V.1994, M. Pavesi (FCC, MPC). **Van**: "Van (Armenischer Taurus), leg. Kulzer 1912" (Horn, 1938, sub *C. campestris turkestanicoidea*); "Wan 1912/Kulzer" (DEJ). "Moks (Armenischer Taurus) [=Çatak, 30 km S Gevas], leg. Kulzer 1912" (Horn, 1938, sub *C. campestris turkestanicoidea*); "Moks 1912/Kulzer; Taurus/armen." (DEJ). Karabel Geçidi, 21.VI.1993 (MPC). Kusunkiran, E of Van (Mandl, 1967, sub *desertorum*). **Hakkâri**: Karadağ 3000-3200m, 22-25.VII.80, W. Eckweiler (AKC; Korell, 1988, sub *C. desertorum turkestanicoidea*). **Trabzon** [doubtful record, possibly due to mislabelling]: Zigana geçidi., 28.VI.1987, C. Pesarini (MPC). **Kahramanmaraş** [erroneous record]: "Zeitün (Cilicischer Taurus; leg. Manissadjan und ded. Staudinger)" (=Süleymanlı, ca. 35 km SE of Göksun] (Horn, 1938, sub *C. campestris turkestanicoidea*); "Staudinger, Zeitoon" (1 ♀ DEJ).

Tab. I - Elytral length (from hind apex of scutellum to elytral apex) (EL) vs. pronotal length (PL) in *Cicindela desertorum* and *C. turkestanicoidea perreai*.

	EL (mm)	PL (mm)	EL/PL
<i>C. desertorum</i>			
N Caucasus, Elbrus (♀)	8.3	2.5	3.32
N Caucasus, Elbrus (♀)	8.2	2.5	3.28
N Caucasus, Elbrus (♂)	8.3	2.6	3.19
Yalničzam (Artvin) (♀)	8.9	2.6	3.42
Yalničzam (Artvin) (♀)	7.3	2.3	3.17
30 km S İkizdere (Rize) (♂)	7.6	2.4	3.16
30 km S İkizdere (Rize) (♂)	8.1	2.3	3.52
Kaçkar Dağ (Rize) (♂)	7.7	2.5	3.08
Env. Soümela (Trabzon) (♂)	8.1	2.6	3.11
Zigana geçidi (Trabzon) (♀)	8.6	2.6	3.30
Eğribel geçidi (Giresun) (♂)	8.4	2.7	3.11
<i>C. turkestanicoidea perreai</i>			
Moks (Van) (♂)	8.7	2.4	3.62
Moks (Van) (♀)	8.7	2.4	3.62
Moks (Van) (♀)	9.5	2.5	3.80
"Wan, Kurzer" (Van) (♂)	8.6	2.3	3.73
Karadağ (Hakkâri) (♂)	8.5	2.3	3.69
Pülümür (Tunceli) (♂)	8.3	2.3	3.60
Pülümür (Tunceli) (♂)	9.5	2.6	3.65
Kizildağ geçidi (Erzincan) (♂)	8.8	2.4	3.66
Kizildağ geçidi (Erzincan) (♂)	8.7	2.4	3.62
Bölükçyazi (Bitlis) (♂)	7.0	1.9	3.68
Zigana geçidi (Trabzon) [doubtful record] (♀)	9.1	2.5	3.64

## 8. *Cicindela asiatica* Audouin and Brullé, 1839

Described from “Mesopotamia” (Audouin and Brullé, 1839), this species is now known to range to Syria, Turkey, Iran, Armenia and the coast of the Caspian Sea (Wiesner, 1992). H. Roeschke (in Horn and Roeschke, 1891) summarized its distribution as follows: “Südkaucasus jenseits vom Kurthal (Araxesthal bei Ordubad etc.), Armenien, Persien, Mesopotamien”. More recently, however, a separate subspecies *sumbarica* was described by Putshkov (1993) from western Kopet-Dagh Mts (Kara-Kala), Turkmenistan, thus confirming the species’ occurrence in the Turkestan area, previously questioned by Horn (1926: “?Turkestan: Wernyi”). Mandl (1939) had already considered this species to belong to the “Turkmenischen Subregion”. Larval instars have been described by Putshkov and Shilenkov (1992).

In Turkey *C. asiatica* seems to be restricted to south-eastern provinces only. It is a spring emerging species, but at higher elevations it is active into early July.

DISTRIBUTION - **Adana**: N of Tufanbeyli [SW of Yalac = Yezilkent,] 1400 m NN, 20.V.1997, J. Frisch (Korell, i.l.). **Osmaniye**, 700 m, IV.1996 (FCC). **Hatay**: Antakya, Yayladağı, 600-900 m, IV.1981, W. Heinz (Werner, 1992: figs. 357 and 358, sub “*Homodela ismenia* Gory”). **Kahramanmaraş**: Göksun, Tekir, 1100 m, 1.IV.1986, E. Görgner (Korell, 1988). **Narlı**, 16.IV.1987, H. Czipka (Korell, 1994). **Sanli Urfa**: Siverek, River Euphrates (Firat), 7.IV.1971, M. Cassola (FCC). **Elâziğ**: 48 km SW of Elâziğ, 1800 m, 29.IV.1975, C. Holzschuh and F. Ressler (Korell, 1988). **Tunceli**: Pülümür, 1600 m, VII.1986, Th. Deuve (Deuve, 1987). **Bingöl**: NE of Bingöl, 1600-1900 m, Türkei-Exped. 1967 Naturhist. Mus. Wien (FCC). E of Kuruca geçidi, 1700 m, IV.1975, C. Holzschuh and F. Ressler (Korell, 1988). Kuruca geçidi, 1800 m, 31.V.1992, V. Biza and Z. Kostal (FCC). 36 km E of Bingöl, 19.VI.1993, M. Pavesi (MPC); 28.V.1994, M. Pavesi (FCC, MPC). **Muş**: Buğlan geçidi, 1600 m, 27.IV.1990, Kautt (Korell, 1994). Buğlan dağlari, 20 km E of Solban, 9.VI.1992, V. Biza and Z. Kostal (FCC). **Van**: Wan 1912, Kulzer (DEI). **Hakkâri**: Karadağ, 2000 m, 6.VII.1985, A. Richter (Korell, 1988).

## 9. *Lophyridia caucasica* (Adams, 1817)

Almost an Anatolian endemic, this species, originally described from the Caucasus area (“Habitat frequens ad ripas arenosas fl. Xyae, in Iberiae provincia Somchet”: Adams, 1817), has been recorded in Armenia (Kryzhanovskij et al., 1995) and Iraq (Wiesner, 1992), and it is likely to occur in Syria too, as I found it on the banks of the Euphrates River at Birecik, Turkey, a bit upstream from the Syrian border. In contrast, all previous records in the literature from Iran and the Turkestan area (Horn, 1926; Naviaux, 1983; Wiesner, 1992), as well as from Azerbaijan (Kryzhanovskij et al., 1995), are probably instead the closely relative *L. sturmi* (Ménétries, 1832), a larger Caspian species.

A riparian fresh-water species, *L. caucasica* is found, sometimes in large numbers, on sandy riverbanks in central and eastern Anatolia (figs. 8, 9).



DISTRIBUTION - "Taurus, Lichtneckert" (FCC). **Karaman/Konia**: Karaman-Ermenek, Kizil Dağ, Bosch (Korell, 1988). **Nevşehir**: Avanos (Göreme), River Kizilirmak, 23.VII.1970, M. Cassola (FCC); 11.VII.1978, F. Cassola (FCC). **Kayseri**: "Asia minor, Mt. Argacus" [=Argaeus, present-day Erciyes da] (FCC). **Amasya**: "Amasia" (FCC; Beuthin, 1893). **Tokat**: Kelkit çayı, S of Niksar, 300 m, VI.1985, A. Korell and F. Kleinfeld (Korell, 1988). **İçel (Mersin)**: Mersin, A. Kricheldorf (Korell, 1988). Silifke, River Göksü, IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). **Adana**: Adana, Bosch (Korell, 1988). "Adana, Taurus, Cl. Splichal" (FCC). **Gaziantep**: Birecik, Fırat nehri (River Euphrates), 6.IV.1971, M. Cassola (FCC); 30.V.1974, F. Cassola (FCC, figs. 8-9). **Malatya**: E of Malatya, bridge on River Euphrates, 800-900 m, VI.1980, W. Eckweiler (Korell, 1988). **Elâziğ**: 50 km E of Elâziğ, Fırat nehri (River Euphrates), 22.VII.1971, M. Cassola (FCC). **Tunceli**: N of Tunceli, VII.1985, H. Korge and W. Heinz (Korell, 1988). **Erzincan**: Erzincan-Aşkale, Fırat nehri (River Euphrates), 16.VIII.1986, M. Pavesi (EMC, MPC). **Sanli Urfa**: Siverek, Fırat nehri (River Euphrates), 7.IV.1971, M. Cassola (FCC); 28.VII.1971, M. Cassola (FCC). **Diyarbakir**: Diyarbakir, 25.VI.1971, G. Osella (FCC); 7.VI.1985, 650 m, E. Şekeroğlu (FCC). Diyarbakir, Dicle nehri (River Tigris), 29.VI.1971, A. Vigna Taglianti (FCC); 17.VIII.1987, M. Pavesi (MPC); 12.VII.1993 (ABC). **Mardin**: 20 km W of Hasankef, Dicle nehri (River Tigris), 26.VII.1971, M. Cassola (FCC). 30 km W Cizre/80 km E Midyat, Dicle nehri (River Tigris) (Wiesner, 1988). Cizre, 8.VII.1992, M. Pavesi (MPC, FCC). **Siirt**: Kozluk, Batman çayı, 16.VIII.1987, M. Pavesi (MPC). Kozluk, Yanarsu çayı, 14.VIII.1988, M. Pavesi (MPC). Kasrik bogazi, Kizilsu çayı, 26.VIII.1989, M. Pavesi (MPC). Dicle nehri (River Tigris), Kumluca Köyü, 18.VIII.1989, M. Pavesi (MPC). Batman çayı, nr. Çeviksu, 17.VIII.1989, M. Pavesi (MPC). Batman çayı, 12 km N of Batman, 1.VI.1994, M. Pavesi (MPC). **Hakkâri**: Zapsuyu, 25.VII.1971, M. Cassola (FCC). Zap valley, 1500 m, VII.1985, A. Richter (Korell, 1988). Gulmar Kale, Zap çayı, 19.VIII.1990, M. Pavesi (MPC). **Kars**: Akçay, 1200-1400 m, V.1980, W. Eckweiler (Korell, 1988).

## 10. *Lophyridia concolor* (Dejean, 1822)

Described from Crete (Dejean, in: Latreille and Dejean, 1822), this is an E-Mediterranean, sea beach dwelling species, whose limited known range extends from the coasts of Syria and southern Turkey (Fig. 15) to Cyprus, Rhodes, Crete, as well as to Naxos and Karpathos in the Cyclades (Cassola, 1973c; Baehr, 1985; Jeanne, 1986; Wiesner, 1992) (Fig. 5). However, its exact distribution in the many smaller Greek islands has still to be more precisely understood. The "*Cicindela rouxii*" described from Syria by Barthélemy (1835), previously considered to be a junior synonym, has been recently re-established as a valid subspecies by Franzen (1999).

DISTRIBUTION - **Aydın**: Kuşadası, C. Naumann (Korell, 1988). **Muğla**: Iztuzu, nr. Köyceğiz gölü, 19.V.1994, M. Pavesi (MPC). Marmaris, 5-8.V.1996, D. Luchetti (FCC). **Antalya**: Antalya, Plaj Lara, 16.VII.1964, E. de Bros (Korell, 1988). Antalya, 16.VI.1970, R. Argano (FCC). Manavgat, Side, 19.VII.1970, M. Cassola (FCC). Manavgat-Sorgun, V.1983, F. Kleinfeld and A. Korell (Korell, 1988). Alanya, 15.VIII.1967, V. Sbordoni (FCC). 12 km W and 16 km SE of Alanya, IV.1978, A. Korell (Korell, 1988). **İçel (Mersin)**: Anamur, VIII.1978, A. Korell (Korell, 1988); 1-10.VII.1993, J. Borowski (FCC, AJC). Silifke, mouth of River Göksü, 13.VII.1978, F. Cassola (FCC; Fig. 5). Silifke-Kurtuluş, River Göksü, VII.1981, V.1982, A. Korell (Korell,



Fig. 5 - Mating pair of *Lophyridia concolor* (mouth of River Göksü, near Silifke, İçel, July 1978. Photo by the author).



Fig. 6 - Mating pair of *Cyllindera (Eugrapha) arenaria* (banks of River Kizilirmak, near Avanos, Nevşehir, July 1978. Photo by the author).

1988). River Göksü delta, 5.VI.1993, E. Şekeroğlu (FCC). Silifke: Tasacu, 25.VIII.1986, M. Pavesi (MPC). 30 km E of Silifke (Muche, 1960); 30.VII.1971, M. Cassola (FCC). Kumkuyu, SW of Erdemli, 11.VII.1988, G. Gardini (FCC). **Adana:** Adana, 10.V.1982, G. Sabatinelli (MCSNV). Karataş, V.1985, A. Korell (Korell, 1988); 19.VIII.1987, M. Pavesi (MPC). Karataş , beach and lagoon, 5.VII.1993, E. Şekeroğlu (FCC). 2-3 km SE of Karataş, sandy beach, 25.VI.1997, S. Rubizzani (FCC). Yumurtalık, S of Ceyhan, 15.VI.1977, E. Şekeroğlu (FCC). **Hatay:** Antakya, Samandağ, 16.IV.1962, sea beach, F. Ressler and R. Petrovitz (Mandl, 1963). **Gaziantep** [erroneous record]: “Akbes, Syria” [=Akbez, on road Islahiye-Hassa at junction with road to Kilis] (MPC).

### 11. *Lophyridia f. fischeri* (Adams, 1817)

The nominate form of this species, which was described from Tiflis (Tbilisi) in Georgia [“Habitat ad ripas arenosas fl. Cyri circa Tiflin frequens”: Adams, 1817)], is known to occur in south-eastern Europe and Middle Orient from Bulgaria and Greece to Rhodes, Cyprus, Syria, Turkey, Armenia, Azerbaijan and northern Iran (ssp. *fischeri*). Moreover, a distinctive eastern subspecies (ssp. *elongatosignata* W. Horn, 1922, described from the Tedschen Oasis in Turkmenistan: Horn, 1922), occurs from Iraq eastwards to southern Iran, Afghanistan, Pakistan (Baluchistan: Acciavatti and Pearson, 1989) and the Turkestan area from Turmenistan to Tadzhikistan, and more recently it was recorded from Oman as well (Cassola and Rihane, 1996). However, the boundary between these two subspecies is still to be accurately defined, as the literature data appear sometimes to be inconsistent (Horn, 1922; Mandl, 1972; Naviaux, 1983; Wiesner, 1992; Kryzhanovskij et al., 1995; Cassola and Rihane, 1996). The Anatolian populations obviously belong to the nominate form.

The larva of *L. fischeri* has been described by Putschkov and Cassola (1994), based on material from E Caucasus and E Turkmenia.

DISTRIBUTION - “Türkei” (Beuthin, 1890a). **Izmir:** “Bosz-Dagh, Kisilgye-Aole” (Fairmaire, 1866). “Smyrna” (FCC). **Mula:** Dalaman çayı, 18.V.1985, E. Şekeroğlu (FCC). Fethiye, VIII.1989, H. Czipka (Korell, 1994). **Denizli:** Pamukkale, River Menderes, 16.VII.1970, M. Cassola (FCC). **Kühtahya:** Abide, 4.VIII.1967, V. Sbordoni (FCC). **Bursa:** “Brussa” (Beuthin, 1892). Inegöl, 27.VII.1970, M. Cassola (FCC). **Çankiri:** 12 km S of Çankiri, River W of Dedeköy, 650 m, VI.1985, F. Kleinfeld and A. Korell (Korell, 1988). Ilgaz, VIII.1987, K. Werner (FCC; Werner, 1988). S of Çankiri, Acisu çayı, 12.VIII.1989, M. Pavesi (MPC). 2-3 km S of Çankiri, river banks, 730 m, 25.VI.97, S. Rubizzani (FCC). **Çorum:** nr. Osmancık, VIII.1987, K. Werner (Werner, 1988). **Neveşehir:** Avanos (Göreme), River Kizilirmak, 23.VII.70, M. Cassola (FCC); 11.VII.78, F. Cassola (FCC). **Kayseri:** Kayseri, River Kizilirmak, 11.IV.1971, M. Cassola (FCC). **Tokat:** Kelkit çayı, S of Niksar, 300 m, VI.1985, A. Korell (Korell, 1988). **Malatya:** Malatya, 27.VII.1977, E. Şekeroğlu (FCC). E of Malatya, banks of River Euphrates, 6.VI.1979, R. Argano, L. Boitani and V. Cottarelli (FCC); 800-900 m, VI.1980, W. Eckweiler (Korell, 1988). Kale, Firat nehri (River Euphrates), 17.VIII.1986, M. Pavesi (MPC). **Elâziğ:** 50 km E Elâziğ, Firat nehri (River Euphrates), 22.VII.1971, M. Cassola (FCC). **Tunceli:** Ana Fatma, 1000-1200 m, VII.1980, W. Eckweiler (Korell, 1988). N of

Pülümür, VII.1983, H. Czipka (Korell, 1988). Pülümür, 1600 m, VII.1986, Th. Deuve (Deuve, 1987). **Erzincan:** Aşkale-Erzincan, Firat nehri (River Euphrates), 16.VIII.1986, M. Pavesi (MPC). **Bingöl:** Gayit çayı/Murat nehri (River Murat), 1100 m, VIII.1964, C. Blumenthal (Korell, 1988). **Gümüşhane:** “Krehty”, VII.1917, W. Eichler (Eichler, 1922). “Kialkit-cz.” [Kelkit], VII.1917, W. Eichler (Eichler, 1922). “Ardassa”, VII.1917, W. Eichler (Eichler, 1922). **Erzurum:** Tortum çayı, 19.VII.1979, S. Vit (FCC). **Kars:** Akçay, 1200-1400 m, V.1980, W. Eckweiler (Korell, 1988). **Antalya:** Aksu, Aksu çayı, 18.VII.70, M. Cassola (FCC). Alanya, 19.VII.1970, M. Cassola (FCC). 22 km E of Alanya, 20.VII.1970, M. Cassola (FCC). Manavgat, 21.VII.70, M. Cassola (FCC). 15 km W of Alanya, V.1978, P. Brandl (Korell, 1988). **İçel (Mersin):** “Bulghar-Maaden”, v. Bodemeyer (Korell, 1988). 30 km E of Silifke, 30.VII.1971, M. Cassola (FCC). Sipahili, Babadil çayı, 65 km from Silifke to Anamur, 25.VIII.1986, M. Pavesi (FCC). S of Tekir [N of Gülek boğazi], 8.VI.1978, E. Şekeroğlu (FCC). **Adana:** “Alihotscha- und Bozanti-Tal” (Bodemeyer, 1906). Pozanti, 22-30.IV.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Kozan (Mandl, 1963). Karaisali, 15.VIII.1978, E. Şekeroğlu (FCC). **Hatay:** Arsuz [=Artuz, near Kale, S of Uluçinar?], 23.VIII.1978, E. Şekeroğlu (FCC). Iskenderun, Kirikhan, 20.VIII.1986, M. Pavesi (EMC). Kirikhan, 20.VIII.1986, M. Pavesi (greenish integridates to *elongatosignata*) (MPC, FCC). **Kahramanmaraş:** River Ceyhan, 400 m, W. Heinz (Korell, 1988). **Gaziantep:** Birecik, Firat nehri (River Euphrates), 6.IV.1971, M. Cassola (FCC). NW of Kilis, 1.V.1992, H. Czipka (Korell, 1994). **Adıyaman:** Karanlık dere, Gökso çayı, 31.VIII.1985, E. Şekeroğlu (FCC). Adıyaman-Samsat, Halber çayı, 9.VIII.1987, M. Pavesi (MPC). **Sanli Urfa:** Siverek, Firat nehri (River Euphrates), 7.IV.1971, M. Cassola (FCC); 28.VII.71, M. Cassola (FCC). **Mardin:** 20 km W of Hasankeyf, Dicle nehri (River Tigris), 26.VII.1971, M. Cassola (FCC). **Siirt:** Kozluk, Batman çayı, 16.VIII.1987, M. Pavesi (MPC). Kozluk, Yanarsu çayı, 14.VIII.1988, M. Pavesi (MPC). Kasrik Bogazi, Kizilsu çayı, 26.VIII.1989, M. Pavesi (MPC). **Hakkâri:** Zapsuyu, 25.VII.1971, M. Cassola (FCC). Zap valley, 1500 m, VII.1985, A. Richter (Korell, 1988). Gulmar Kale, Zap çayı, 19.VIII.1990, M. Pavesi (MPC).

## 12. *Lophyridia littoralis* (Fabricius, 1787)

A common, widespread, polytypic species, *L. littoralis* was previously regarded as a subspecies of *L. lunulata* (Fabricius, 1781) (Mandl, 1934; Rivalier, 1953), but was later separated from it and raised to full specific status (Cassola, 1973a). More recently Mandl (1981b, 1982) dealt again with this difficult tiger beetle group, and he gave full specific status to two additional *taxa* (usually regarded as being *littoralis* subspecies), namely *L. aulicoides* (Sahlberg, 1913) and *L. nemoralis* (Olivier, 1790). However, Wiesner (1992) did not accept Mandl's taxonomy and he listed *L. littoralis* as including, over its large geographical distribution (ranging from the Atlantic coasts to China), 11 subspecies in all, three of which (*nemoralis*, *winkleri* Mandl, 1934, and *mandli* Mandl, 1967) are known to occur in Turkey (Fig. 7). Until better information is available, this assessment is followed here.

ssp. *nemoralis* (Olivier, 1790)

The *littoralis* populations of north-western Turkey (northern Aegean coasts) appear to belong to this subspecies (Mandl, 1934, 1981b, 1982; Wiesner, 1992), which is known to have a large geographical range along most of the European

coasts of the Mediterranean Sea from northern Spain to Italy, the Adriatic sea and Greece. Specimens are greenish in colour, their elytral spots are normally well separated from each other, and moreover the large sclerite in the inner sac of their males genitalia - variously called “Dornenplatte” by Mandl (1934), “grande dent chitineuse” by Rivalier (1953), and “Chitinzahn” by Mandl (1981b) - is normally and acutely pointed in front.

DISTRIBUTION - “Taurus” (Mandl, 1981; Korell, 1988). **Edirne**: 28 km S of Kesan, 7.VI.1993, M. Pavesi (FCC). **Tekirdağ**: Tekirdağ, 15.VIII.1968, M. Ranocchia (FCC). **Istanbul**: Silivri, 31.VII.1970, M. Cassola (FCC). European part of Turkey, a little freshwater lake, VIII.1987, K. Werner (Werner, 1988). NE of Istanbul, Şile, 12.VIII.1979, L. Ivanovs (Korell, 1988). **Bursa**: Karacabey, 28.VII.1970, M. Cassola (FCC). **Sakarya**: Sabandja (Mandl, 1934); Sabandja, West-Anatolien (“wahrscheinlich Sabandja gölü”: Mandl, 1981b) [=Sapanca gölü].

ssp. *winkleri* (Mandl, 1934)

This well-established subspecies was described by Mandl (1934), who correctly showed that the populations from several East Mediterranean localities (Rhodes, Cyprus, Anatolia and coastal Syria) conspicuously differ from *nemoralis* by having the “Chitinzahn” of inner sac of male aedeagus laterally bifurcated instead of apically acuminate: a distinguishing character, which may be considered to give these populations a separate subspecific status. Moreover, their elytral shape is somewhat more abruptly curved posteriorly. Mandl (1981b, 1982) later considered the eastern Black Sea and the southern Caspian Sea populations as also belonging to such a subspecies.

However, some inconsistencies appear still to be involved in Mandl’s papers, as specimens from the same areas (“Tuz Gölü”, “Talysch- und Elburs-Gebiet”) are considered to be either *winkleri* or *mandli* (see below). My own data, while confirming southern Anatolian populations to be *winkleri*, indicate Central Anatolian populations to be *mandli*, but do not allow any definite statements about the Black Sea populations.

DISTRIBUTION - **Izmir**: “Bosz-Dagh, Kisilgye-Aole” (Fairmaire, 1866, sub “*Cicindela littoralis* Fab.”). “Smyrna” (Mandl, 1934, sub “*Cicindela lunulata nemoralis*”; Korell, 1988, sub *L. littoralis nemoralis*). Foça, 14.VII.1970, M. Cassola (FCC). **Aydın**: Kuşadası, III-IV.1982, L. Ivanovs (Korell, 1988). **Mula**: Fethiye, VIII.1989, H. Czipka (Korell, 1994, sub *L. l. mandli*). **Denizli**: Pamukkale, River Menderes, 16.VII.1970, M. Cassola (FCC). **Antalya**: Finike, R. Petrovitz and F. Ressler (FCC). Kemer, 15-20.VII.1985, C. Callegari (FCC). Antalya, VII-VIII.1964, Blattner (Korell, 1988). Lora, 17.VII.1970, M. Cassola (FCC). Manavgat, Side, 19.VII.1970, M. Cassola (FCC). Manavgat, 21.VII.1970, M. Cassola (FCC). Alanya, 19.VII.1970, M. Cassola (FCC). 12 km W of Alanya, VII.1978, A. Korell (Korell, 1988; Korell, 1994, sub *L. l. mandli*). **Içel (Mersin)**: Anamur (Mandl, 1981b; Korell, 1988); 1-10.VII.1993, J. Borowski (FCC, AJC). 30 km from Silifke (Muche, 1960, sub *Cicindela lunulata*). Ovacık, Babadil çayı, 17.VI.1970, R. Argano, L. Boitani and V. Cottarelli (FCC). Silifke, River Göksü, 3-10.V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Silifke, mouth of River Göksü, 13.VII.1978, F. Cassola (FCC). Silifke-Kurtuluş, mouth of River Göksü, VII.1981, A. Korell (Korell, 1988). Göksü River delta,

5.VI.1993, E. Şekeroğlu (FCC). 30 km E of Silifke, 30.VII.1971, M. Cassola (FCC). Adana: Karataş, VII.1983, E. Şekeroğlu (FCC); V.1985, A. Korell (Korell, 1988); 19.VIII.1987, M. Pavesi (MPC). Yumurtalık, S of Ceyhan, 19.VI.1978, E. Şekeroğlu (FCC). Osmaniye, Çay kenarı, 17.VIII.1978, E. Şekeroğlu (FCC). Hatay: Antakya (Mandl, 1981b; Korell, 1988).

ssp. *mandli* Mandl, 1967\*

Central and eastern Anatolian populations primarily differ from ssp. *winkleri* by their more reddish or darker colouration and the different shape of the “Chitin Zahn”. This sclerite is strongly variable, sometimes laterally bifurcated as in typical *winkleri*, sometimes irregularly toothed sideways, sometimes even acutely pointed in front as in normal *nemoralis* specimens. It is clear that *mandli* represents a highly variable subspecific form, which may intergrade with *winkleri* in parts at least of its geographical range. Described from Eastern Turkey (“Zwischen Van und Özalp”: Mandl, 1967), *mandli* was considered by Korell (1988) as an intermediate form between *winkleri* and *nemoralis*, occurring also in the “Umgebung von Alanya, Ereğli und Çankiri”. According to Mandl (1981b, 1982) both *mandli* and *winkleri* should be considered to be subspecies of *L. nemoralis*, which again would raise the problem of properly separating them both morphologically and geographically.

Mandl (1981b) and Wiesner (1992) have respectively recorded *mandli* as occurring in the European part of Turkey (where *nemoralis* should be present instead), and in Lebanon and Syria (where populations should rather belong either to *winkleri* in coastal areas or to *aulicoides* in inland regions). Moreover, populations from the Black Sea coastal areas of eastern Turkey (Samsun, Ordu, Trabzon provinces) should be reviewed, as they could well prove to belong to *L. l. nemoralis* (see Mandl, 1982), with *L. l. mandli* just including the Anatolian inland populations only.

DISTRIBUTION - **Burdur**: Burdur gölü, 6.VI.1962, F. Ressler and R. Petrovitz (Mandl, 1963); 22.VII.1978, F. Cassola (FCC). Burdur (Mandl, 1981b, sub *L. l. nemoralis*; Korell, 1988, sub *L. l. nemoralis*). **Isparta**: Eğirdir gölü, 950 m, VII.1974, H. Czipka (Korell, 1988 and 1994, sub *L. l. nemoralis*). **Ankara**: Tuz gölü, 22.VIII.1966, V. Sbordon (FCC). Tuz gölü, 905 m, 25.VII.1970, M. Cassola (FCC); 2.IV.1971, M. Cassola (FCC). Tuz gölü (Mandl, 1981b, sub *L. n. winkleri*; Korell, 1988, sub *L. l. winkleri*). NE shore of Tuz gölü, 900 m, 15.V.1988, P. Audisio (FCC). Sereflikoçhisar, Tuz gölü, 19.VIII.1985, E. Şekeroğlu (FCC); 10.VIII.1989, M. Pavesi (MPC). 30 km W of Ankara, 27.VII.1970, M. Cassola (FCC). **Konya**: Yarma, 20 km E of Konya, 22.VII.1970, M. Cassola (FCC). Karapınar, Krater gölü (Aci Göl), 22.VII.1970, M. Cassola (FCC). Seydişehir, Suğla gölü, 1040 m, 7.VIII.1983, E. Şekeroğlu (FCC). 14 km W of Ereğli, 1000 m, V.1983, F. Kleinfeld and A. Korell (AKC; Korell, 1988, sub *L. l. winkleri*; Korell, 1994). **Niğde**: Bor, 22.VII.1970, M. Cassola (FCC). **Kırşehir**: Kırşehir-Ortakoy, River Kızılırmak, 21.VII.1970, M. Cassola (FCC). **Neveşehir**: Topaklı, 25.V.1967 (FCC). **Kayseri**: Kayseri, river at jct. Niğde-Ankara, 21.VII.1971, M. Cassola (FCC). Incesu, Kurbaga gölü (Çöl gölü), 28.V.1974, F. Cassola (FCC); 1.VI.1974, F. Cassola (FCC). Himmetdede, River Kızılırmak, 1.VI.1974, F. Cassola (FCC). Sultansazlığı, Yeşilhisar, 1000 m, 24.VI.1989, E. Şekeroğlu (FCC).

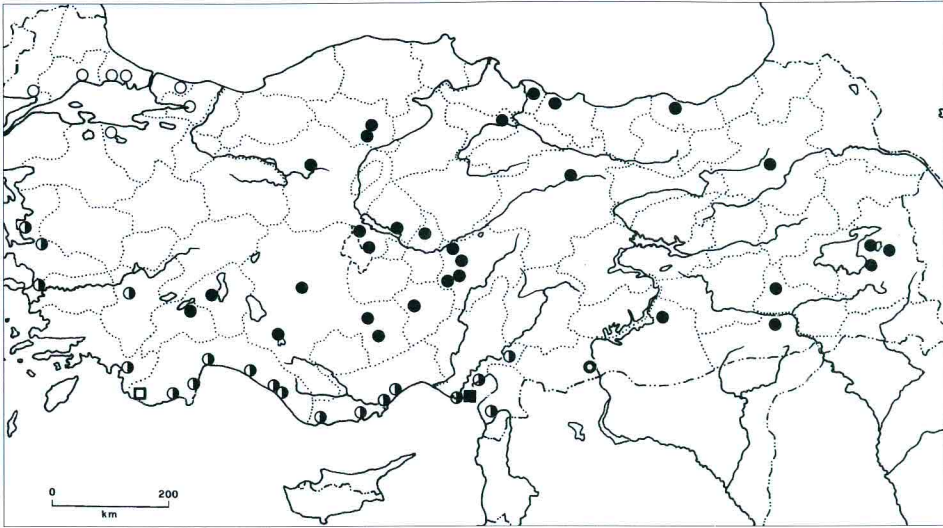


Fig. 7 - Map showing the geographical distributions of *Lophyridia littoralis* (open circles: ssp. *nemoralis*; half-solid circles: ssp. *winkleri*; solid circles: ssp. *mandli*; bold-faced circle: ssp. *aulicoides*), and *L. aphrodisia* (solid square: ssp. *aphrodisia*; open square: ssp. *cypricola*), in Anatolia.

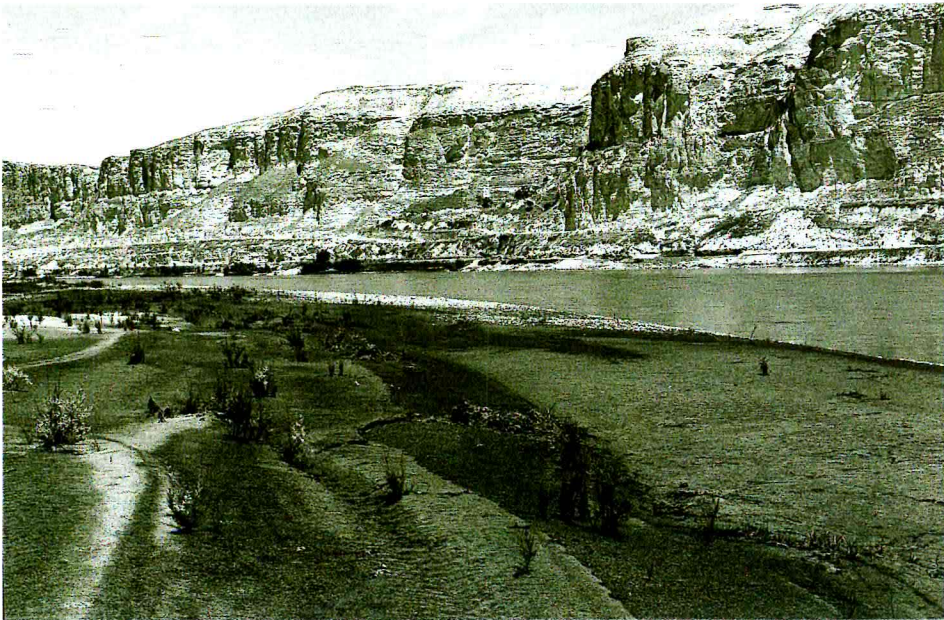


Fig. 8 - Birecik (Gaziantep), banks of River Euphrates: habitat of *Lophyridia caucasica*, *L. littoralis aulicoides*, *L. f. fischeri*, and *Cylindera pygmaea* (May 1974, photo by the author).

**Sivas:** Zara Lake nr. Sivas [Tötürge gölü] (Mandl, 1981b; Korell, 1988). **Elâziğ:** “Anatolien: Enzig” (Mandl, 1981b, sub *L. winkleri*). **Sanli Urfa:** Siverek, Firat nehri (River Euphrates), 7.IV.1971, M. Cassola (FCC). **Mardin:** 20 km W Hasanheyf, Dicle nehri (River Tigris), 26.VII.1971, M. Cassola (FCC). **Siirt:** Kozluk, Batman çayı, 16.VIII.1987, M. Pavesi (MPC). **Van:** Van-Özalp, 27.V.1966, Turkei-Exped. 1966 Naturhist. Mus. Wien (FCC, 4 paratype specimens). Van gölü, 10 km S of Van, 23.VII.1971, M. Cassola (FCC). Ercek gölü, E of Van, 24.VII.1971, M. Cassola (FCC). Özalp (Mandl, 1981b; Korell, 1988). **Çankiri:** 20 km SE of Dedeköy, VI.1985, A. Korell (Korell, 1988, sub *L. l. winkleri*; Korell, 1994). 12 km S of Çankiri, 650 m, VI.1985, Kleinfeld and A. Korell (Korell, 1988, sub *L. l. winkleri*). Çankiri, dry riverbed, VIII.1987, K. Werner (FCC; Werner, 1988: “black variation... It was quite interesting that there wasn’t any overlapping between the green and black form”). S of Çankiri, Acisu çayı, 12.VIII.1989, M. Pavesi (MPC). 2-3 km S of Çankiri, 730 m, 25.VI.1997, S. Rubizzani (FCC). **Tokat:** Kelkit çayı, S of Niksar, 300 m, VI.1985, A. Korell (Korell, 1988, sub *L. l. winkleri*). **Samsun:** Çarşamba (Mandl, 1981b, sub *L. l. winkleri*; Korell, 1988, sub *L. l. winkleri*). Bıafra plain, 17.VI.1982, P. Audisio (FCC). **Ordu:** 20 km before Unye, Black Sea broad seashore, K. Werner (Werner, 1988, sub *L. l. winkleri*). **Trabzon:** Trapezunt (Mandl, 1981b, sub *L. l. nemoralis*). Trabzon (Korell, 1988, sub *L. l. nemoralis*). **Erzurum:** “Erzerum, Taurus” (Mandl, 1934; Mandl, 1981b, sub *L. l. nemoralis*; Korell, 1988, sub *L. l. nemoralis*).

ssp. *aulicoides* Sahlberg, 1913

As indicated previously, Mandl (1981b, 1982) elevated *aulicoides* to full specific status and, as a matter of fact, his distributional maps (Mandl 1982) indicate that *aulicoides* overlaps the subspecies *conjunctaepustulata* Dokhtouroff, 1887, in south-western Iran. This evidence reinforces the interpretation of *aulicoides* as specifically separated from *littoralis*. However, until more data are available, I prefer to maintain Wiesner’s conservative taxonomy and consider *aulicoides* as a subspecies of *littoralis*, whose known geographical range extends from Iraq and inland Syria southwards to Israel, the Red Sea coast and the Arabian Peninsula.

The *L. littoralis* populations occurring on the banks of the River Euphrates at Birecik, not far from the Syrian border, include especially small specimens that may prove to be in the ssp. *aulicoides*.

DISTRIBUTION - **Gaziantep:** Birecik, Firat nehri (River Euphrates), 6.IV.1971, M. Cassola (FCC); 30.V.1974, F. Cassola (FCC).

13. *Lophyridia aphrodisia* (Baudi, 1864)

With regard to this species, a nomenclatural problem has first to be resolved. *L. aphrodisia* was firstly described by Baudi (1864) as a “variety” of *L. littoralis* (Fabricius), based on material (“ultra sexaginta exemplaria”) collected by Eugenio Truqui during his journey to Cyprus and the Syrian coast (“in insula Cypro et Asia minore”). Some years later, Ragusa (1882) indicated that this species occurs in Sicily as well, stating that at Mondello near Palermo he had collected a specimen of “*Cicindela littoralis* var. *lugens* Dahl”, and that in the very same locality he had





Fig. 9 - A specimen of *Lophyridia caucasica* (Birecik, banks of River Euphrates, May 1974. Photo by the author).



Fig. 10 - A specimen of *Cylindera pygmaea* (Birecik, banks of River Euphrates, May 1974. Photo by the author).

also collected two *aphrodisia* specimens [“l’istesso giorno, nella medesima località presi pure due esemplari di questa bella varietà scoperta dal Truqui nell’isola di Cipro, e che confrontata con degli esemplari di quest’ultima località, avuti dal Cav. Baudi, per nulla ne differisce”]. The same author later separated *aphrodisia* and *littoralis* into two distinct species (Ragusa, 1887), and he described the Sicilian form of *aphrodisia* as a separate subspecies, *panormitana* (Ragusa, 1906).

However, in his Catalogue of the world’s tiger beetles, Wiesner (1992) quoted this species as *Lophyridia lugens* (Dejean, 1831), and he considered *lugens* (*sensu* Ragusa) and *panormitana* to be junior synonyms of it, with *aphrodisia* as merely being its E-Mediterranean subspecies. Korell (1994), while otherwise following Wiesner’s proposed taxonomy, still referred to the species as *L. aphrodisia*.

As a matter of fact, the name *lugens* Dahl i.l. was first described by Dejean (1831) as follows: “*Cicindela littoralis*. Var. *C. Lugens*. Dahl. M. Dahl m’a envoyé, sous le nom de *Lugens*, des individus pris par lui en Sicile, qui sont un peu moins allongés, et dont la couleur est presque noire en-dessus, mais qui ne me paraissent cependant qu’une simple variété de cette espèce. M. Goudot en a rapporté de semblables des environs de Tanger”. Dejean’s description obviously applies to a variety of *L. littoralis*, as Ragusa (1882), Grandi (1906a) and Horn (1926) stated, and it can thus not be referred to *aphrodisia*. In addition, the latter, compared with *L. littoralis*, clearly shows longer (instead of shorter) elytra. Dejean (1831) referred to the same “var.” *lugens* for specimens from Tanger (Morocco), thus clearly indicating that he was dealing with *littoralis* specimens. As a consequence, the first valid description of the species I am treating here is that of Baudi (1864), and its first available name is *aphrodisia*, with *panormitana* being a valid Sicilian subspecies. I had already come to such a conclusion some years ago (Cassola, 1983), but my paper was apparently overlooked by Wiesner (1992).

A second difficult problem comes from the precise identification of the type locality for *aphrodisia*, because Baudi (1864) did not indicate if Truqui’s specimens had been collected on Cyprus or on the Syrian coast. Piochard de la Brulerie (1875), with regard to Baudi’s paper, stated that “l’auteur n’a pas toujours pu indiquer de façon précise les localités d’où provenaient les insectes qu’il a trouvés dans la collection de Truqui après la mort si regrettable de cet entomologiste. On sait que les notes manuscrites qu’il avait laissées ont été perdues, de là l’impossibilité pour M. Baudi de savoir si certaines espèces provenaient de Syrie, de Caramanie ou de l’île de Chypre”. As far as *L. aphrodisia* is concerned, Piochard de la Brulerie (1875) only indicated Cyprus as its type locality [“Ile de Chypre (Truqui)”], and, possibly relying on him, Walther Horn (in Horn and Roeschke, 1891) did the same [“Er beschrieb sie aus Cypern”].

However, Horn himself (1931) later rightly emphasized that the island of Cyprus cannot be the *terra typica* of this species, because the *aphrodisia* populations occurring at Cyprus and those occurring on the Syrian coast are

clearly different from each other, and Baudi's description appears to apply to the latter only ("caput et thorax virescenti-cuprea, elytra nigra, basi virescentia, sutura cuprea"). Mandl (1981a) later raised the Cyprus populations to a separate subspecific status (ssp. *cypricola*), an alternative that appears to be consistent with the geographical and morphological data, contrary to Jeanne (1986).

*L. aphrodisia* is clearly a relic species which – unlike its close and much more widespread relative, *L. aulica* (Dejean, 1831), a species which has sometimes been confused with *aphrodisia* (Horn, in Horn and Roeschke 1891; Grandi, 1906a,b) – it is known to occur in a few coastal localities of Syria and SE Turkey (ssp. *aphrodisia*), Cyprus, Rhodos and SW Turkey (ssp. *cypricola*), as well as Sicily (ssp. *panormitana*) (Cassola, 1983; Wiesner, 1992) (Fig. 7). Tschitschérine (1903) has recorded *aphrodisia* from Israel (Haifa) as well, but such a record has not been confirmed so far (Nussbaum, 1987). Ecologically, unlike *L. littoralis*, *L. aphrodisia* is more narrowly linked to rocky coasts instead of to sandy sea beaches (Cassola, 1983).

*L. aphrodisia* was first recorded from Turkey (Karataş) by me (Cassola, 1983), but the species was already known from "Castelrosso" (= Megisti I., a Greek islet just off the SW Turkish coast near Kaş: Horn, 1931; Schatzmayr, 1935), and moreover Korell (1994) has interestingly recorded ssp. *cypricola* from a locality (Kalkan) in Turkish mainland. Both subspecies, therefore, inhabit Turkey.

ssp. *aphrodisia* Baudi, 1864

DISTRIBUTION - **Adana**: "Isol Karataş", 22.V.1961, G. Cadamuro (Korell, 1988). Karataş, VII.1983, E. Şekeroğlu (FCC; Cassola, 1983). 3 km E of Karataş 9.V.1985, A. Korell (Korell, 1988); VI.1988, J. Fritsch and A. Korell (Korell, 1994); 24.V.1994 (FCC, MPC). Karataş, 19.VI.1997, M. Pavesi (FCC, MPC).

ssp. *cypricola* Mandl, 1981

DISTRIBUTION - **Antalya**: Kalkan, 4.VII.1986, L. and S. Falletti (Korell, 1988; Korell, 1994).

#### 14. *Lophyra (Lophyra) hilariola* (Bates, 1874)

A small, interesting, endemic Mesopotamian species, known to date from a few localities in Iran (Susa, Dalaki, Meshregeh), Iraq (Mosul, Baghdad, Zawita), northern Syria (Ar-Raqqa, Afrin), and south-eastern Turkey (Naviaux, 1983; Wiesner, 1988 and 1992; Korell, 1994; Franzen and Bischoff, 1995) (Fig. 17). However, the entire extent of its geographical range is yet unknown.

DISTRIBUTION - **Gaziantep**: 10 km NW of Kilis, 450 m, X.1991 and 1.V.1992, H. Czipka (Korell, 1994). **Sanli Urfa**: Halfeti, N of Birecik, 8.V.1996, M. Dudycha (FCC, MPC). **Mardin**: Midyat, 25.V.1983, Kühbandner (Wiesner, 1988). 30 km W of Cizre, 80 km E of Mydiat, 25.V.1983, Kühbandner (Wiesner, 1988).

15. *Cephalota (Cephalota) turcica* (Schaum, 1859)

*C. turcica* is basically a peri-Aegean species that has apparently a restricted relic distribution, ranging from north-eastern Greece (Macedonia, Tessalia) (Fig. 2) to western Turkey ("de Macédoine et d'Asie Mineure": Rivalier, 1950c) (Fig. 15) and purportedly to Bulgaria (Kalfalar) as well (Hieke and Wrase, 1988; Wiesner, 1992). As far as Bulgaria is concerned, Guéorguiev and Guéorguiev (1995) also reported it from another locality (Minzuhar in East Rhodope Mts.), but the species' occurrence in present-day Bulgaria still appears to be questionable and in need to be confirmed, as *C. turcica* is known to occur in sandy, saline, coastal habitats only.

Schaum (1859) described *C. turcica* from Turkey ("Habitat in Turcia") as a full species, but Horn (in: Horn and Roeschke, 1892; 1926) has long considered it to be merely a subspecies of *C. hispanica* (Gory, 1833), a closely allied species which is known from the southern Iberian Peninsula only (Algarve, Andalusia). It was raised again to full specific status by Rivalier (1950c), a status with which I concur. The subgenus *Cephalota* s. str. includes as well a third strictly localized species, *C. luctuosa* (Dejean, 1831), endemic to Morocco, and its overall distribution seems to indicate the subgenus as being an older eu-Mediterranean stem having presently a scattered relic distribution.

DISTRIBUTION - **Edirne**: 28 km S of Keşan, 21.V.1986, C. Panella (FCC, MPC). **Istanbul**: "Konstantinopel, Kindermann" (Apfelbeck, 1904). **Bursa**: "Bei Brussa" (Apfelbeck, 1904). **Balikesir**: Burhaniye, 5.VII.1982, E. Şekeroğlu (Korell, 1988). **Izmir**: "Bosz-Dagh, Kisilgye-Aole" (Fairmaire, 1866). Selçuk, Toprak, 9.VI.1977 (MPC).

16. *Cephalota (Taenidia) circumdata* (Dejean, 1822)

*C. circumdata* is a typical Mediterranean species, occurring in appropriate habitats (salty lakes and lagoons) from Spain and northern Africa to Anatolia (Cassola, 1970). Originally described from the Aegean Sea islands (Dejean, in: Latreille and Dejean, 1822), its nominate subspecies occupies the eastern part of the Mediterranean Basin (from southern Italy to mainland Greece, the Greek islands of Corfu, Aegyna, Cyclades, Lesbos, Naxos and Crete, the western coasts of Turkey, and possibly to Bulgaria as well) (Cassola, 1970; Guéorguiev and Guéorguiev, 1995). The western part of the Mediterranean Basin (from Eastern Spain to Balears, Algeria, Tunisia, Sardinia and Sicily) is inhabited by ssp. *imperialis* Klug, 1834, while the populations from southern France (Camargue) and Tuscany (Orbetello) belong to a separate subspecies, *leonschaeferi* mihi (Cassola, 1970 and 1973b). Due to its geographical location in the middle of the Mediterranean Sea, Italy has populations belonging to all three of these subspecies (Cassola, 1973b; Wiesner, 1992).

Earlier in the 1970s, I indicated that relic, isolated *circumdata* populations occur in the central Anatolian plateau, at altitudes of nearly 1,000 metres above sea level

(Tuz Gölü, Kurbaga Gölü near Incesu), and that these populations might be regarded as separate subspecies (Cassola, 1970). These have been described recently by Franzen (1996) as two distinct new subspecies, ssp. *cappadocica* (from Tuz Gölü) and ssp. *hattusae* (from the environs of Sungurlu) (Fig. 15). The few *hattusae* specimens I was able to personally examine and study do not allow me to express any personal opinion about Franzen's second subspecies. I can only emphasize here that there are still several more isolated salt lakes and salt habitats in central Anatolia, where the species is likely to occur, and that more research is needed to verify how many distinct populations should be named as subspecies.

Gebert (1999) has recently summarized the present knowledge of the geographical distribution of *C. circumdata* s.l., and presented a key to its various subspecies.

ssp. *circumdata* (Dejean, 1822)

DISTRIBUTION - **Edirne**: 28 km S of Keşan, 21.V.1986, C. Panella (MPC, FCC); 7.VI.1993, M. Pavesi (MPC). SW shore of Tuzla gölü, nr. Erikli, 21.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). **Çanakkale**: Kadıköy, Saros köfezi, 16.VII.1981, Naumann (Korell, 1988). Kavak dere Delta, SE of Kocaçesme, 21.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). Kavak dere Delta, E of Kavak, 21.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). **Balikesir**: Heberkent, WSW of Edremit, 22.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). "Tatil Köyü", W of Armutova, 23.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). **Izmir**: Delta 3 km E of Çandarlı, 23.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). Çaltidere 8.VIII.1986, M. Pavesi (MPC, FCC; Gebert, 1999). Plajerleri, Çaltidere, 31.V.1988, A. Riedel (Gebert, 1999). Çaltidere, NE of Aliğa, 25.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). 40 km N of Izmir, VIII.1988, A. Riedel (Gebert, 1999). Bornova, 3.VII.1982, E. Şekeroğlu (Korell, 1988). Selçuk, 4-22.VI.1985, K. and S. Wellschmied (Franzen, 1996). 2.5 km of Pamucak, W of Selçuk, 26.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). 6.3 km W of Selçuk, 26.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). **Aydın**: Alkköy, mouth of River Menderes, 24.VII.1978, F. Cassola (FCC; Gebert, 1999). **Muğla**: NW edge of Patara Bay, 27-28.VI.1996, M. Franzen and U. Rischel (Franzen, 1996). **Afyon**: Acigöl, NE of Yüreğil, 6.VII.1996, M. Franzen and U. Rischel (Franzen, 1996).

ssp. *cappadocica* Franzen, 1996\*

DISTRIBUTION - **Ankara**: Tuz gölü, N edge, 16.VIII.1968, Bernhauer (AKC; Franzen, 1996); 25.VII.1970, M. Cassola (FCC); 10.VII.1978, F. Cassola (FCC). Sereflikoçhisar, Tuz gölü, 18.VIII.1986, M. Pavesi (Gebert, 1999). Tuz gölü, 900 m, Holzschuh (Korell, 1988). 15 km SSE of Sereflikoçhisar, 905 m, 24.VI.1995, M. Franzen and U. Rischel (Franzen, 1996). N edge of Tuz gölü, 905 m, 24.VI.1995, M. Franzen and U. Rischel (Franzen, 1996). **Kırşehir**: Seyfe Ovaşi, NE of Kizildağ, 1100 m, 22.VI.1995, M. Franzen and U. Rischel (Franzen, 1996). **Kayseri**: Incesu, Kurbaga gölü (Çol gölü), 1000 m, VII.1970, M. Cassola (Cassola, 1970); 23.VII.1970 M. Cassola (FCC); 21.VII.1971 M. Cassola (FCC; Gebert, 1999); 11.VII.1978, F. Cassola (FCC). Çol gölü, E of Dörtöy, 1070 m, 23.VI.1995, M. Franzen and U. Rischel (Franzen, 1996); 25.VI.1997, M. Franzen (Korell, 1999)



Fig. 11 - Çöl (=Kurbaga) Gölü, near Incesu (Kayseri): search for *Cephalota eiselti* (July 1978, photo by the author).

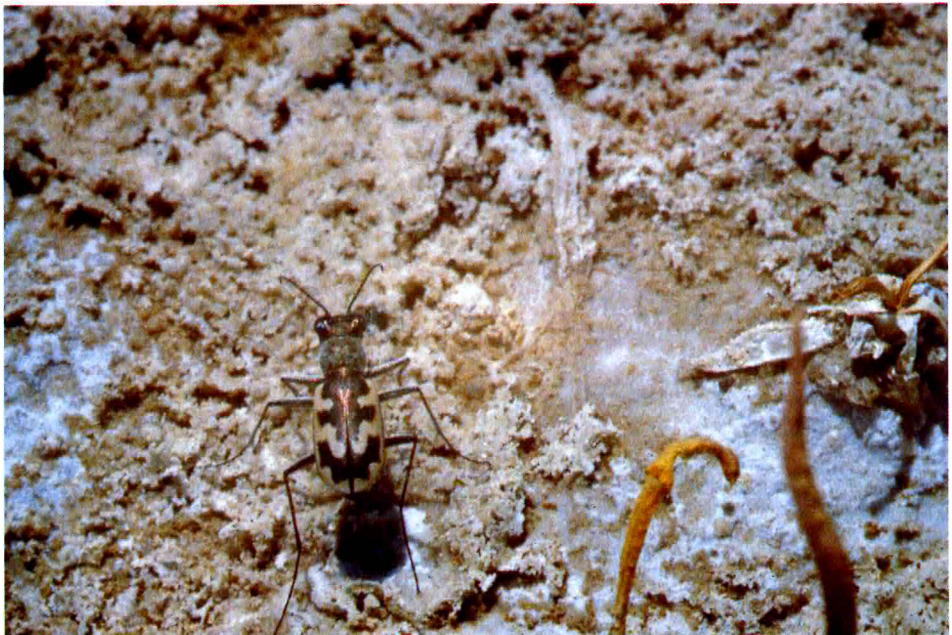


Fig. 12 - A specimen of *Cephalota eiselti* at Çöl Gölü near Incesu (July 1978, photo by the author).

ssp. *hattusae* Franzen, 1996\*

DISTRIBUTION - **Çorum**: 21 km W of Sungurlu, salty pond, 10.VIII.1986, M. Pavesi (FCC; Gebert, 1999). 19.1 km WSW of Sungurlu, 650 m, 20.VI.1995, M. Franzen and U. Rischel (Franzen, 1996); 18.VII.1997, M. Franzen and U. Rischel (Korell, 1999). 17.2 km W of Sungurlu, 630 m, 20.VI.1995, M. Franzen and U. Rischel (Franzen, 1996). 3.4 km and 6.1 km NW of road Delice-Sungurlu, rd to Inegazili, 650 m, 21.VI.1995, M. Franzen and U. Rischel (Franzen, 1996). **Yozgat**: 3 km ESE of Çerikli (S of Delice), 650 m, 9.VII.1995, M. Franzen and U. Rischel (Franzen, 1996). "Delice", 4.VIII.1985, M. Niehuis (Franzen, 1996).

### 17. *Cephalota (Taenidia) eiselti* (Mandl, 1967)\*

*C. eiselti* is a beautiful and distinctive Anatolian endemic (Wiesner, 1992). It is one of the three Western Palaearctic species discovered and described in the course of the 20th Century, the other two being *Cicindela turkestanicoidea* W. Horn, 1938 [see above], also based on Anatolian material, and *Cephalota (Taenidia) deserticoloides* (Codina, 1931), from south-eastern Spain. Thus, apart from a Japanese species [*Callytron yuasai* (Nakane, 1955)], it is one of the only two which have been discovered in the second half of the 20th century from the whole Palaearctic region, the other one being the recently described Kazakhstan species *Cephalota (Taenidia) kutshumi* (Putchkov, 1992), clearly a close relative of *C. deserticola* (Faldermann, 1836). These historical data by themselves represent a clear indication of how poor the knowledge of the Anatolian fauna still was until a few years ago only.

*C. eiselti* was firstly collected on 10 June 1966, on the East coast of Tuz Gölü, during the Anatolian expedition of the Naturhistorischen Museum of Wien (Austria) (Mandl, 1967). In subsequent years, the species was collected again in larger series in the Tuz Gölü area and moreover a new collection locality, the salt lake near Incesu (Kayseri), was added, based on material collected by M. Cassola (Mandl, 1974) (figs. 11-15). However, I know *C. eiselti* from the Zara Lake (Sivas) as well (a single male specimen having unusual elytral markings), and it is to be expected that the species will be found to occur in several more suitable habitats, when all the inland Anatolian salt lakes and salty areas have been investigated.

In 1985, Korell and Kleinfeld described a distinct subspecies, *C. eiselti cankiriana*, from a salty biotope in a river valley, some 10 km S of Çankiri. Additional information and a picture of the biotope were subsequently published by Korell (1994) (Fig. 15). Thanks to the courtesy of Armin Korell (Kassel, Germany) himself, I was able to examine one pair specimens from such a locality, which in fact show some slight but remarkable differences in head, pronotal and elytral sculpture, as well as in elytral maculation (see also Werner, 1992: figs. 339-341), thus even suggesting for *canikiriana* a full specific status. However, the material examined is yet too scanty to form a basis for such a consideration, and moreover *C. eiselti* is known for its remarkable individual variation in elytral maculation

(Mandl, 1974). Therefore, bearing in mind that tiger beetle populations from saline habitats are generally more or less geographical isolates (Willis, 1967), I will await more material from many more localities before attempting any definite statements about the distribution and taxonomy of this remarkable Anatolian endemic.

At the generic level, neither Mandl (1967, 1974) nor Korell and Kleinfeld (1985), Werner (1992) and Korell (1994), made attempts to assess the subgenus into which *C. eiselti* should be placed. However, Wiesner (1992) listed it in subgenus *Taenidia* Rivalier, 1950, an alternative with which I fully agree.

ssp. *eiselti* (Mandl, 1967)\*

DISTRIBUTION - **Ankara**: “Tuzgölü, Ostufer, 905 m, 10.6.1966”, J. Eiselt (Mandl, 1967). “Asia minor, Tuzsee”, 12.VI.1968, Wewalka (FCC). Tuz gölü (Mandl, 1974). Tuz gölü, 12.V.1968, C. Holzschuh (Korell, 1988). Tuz gölü, 900 m, 10.VII.1978, F. Cassola (FCC). Tuz gölü, NE edge, 1.VII.1979, C. Holzschuh (Korell, 1988). 20 km S Sereflikoçisar, Tuz gölü, 900 m, 2.VII.1997, S. Rubizzani (FCC). **Aksaray**: Tuz gölü, Acipinar, 12.VI.1983, G. Sama (FCC; Werner, 1992, Fig. 338). **Kayseri**: Incesu, Kurbaga gölü (Çöl gölü), ca. 1000 m, 23.VII.1970, M. Cassola (FCC; Cassola, 1970); 21.VII.1971, M. Cassola (FCC); ca. 1000 m, 11.VII.1978, F. Cassola (FCC; figs. 11-14). “Salzsee Incesu, ca. 1000m” (Mandl, 1974). **Sivas**: Zara Lake [=Tötürge gölü], 5.VII.1960, Guichard and Harvey (FCC).

ssp. *cankiriana* Korell and Kleinfeld, 1985\*

DISTRIBUTION - **Çankiri**: ca. 10 km S of Çankiri, tributary of River Kizilirmak, 650 m, 22.VII.1984, A. Korell and F. Kleinfeld (Korell and Kleinfeld, 1985; Korell, 1988); 16 and 29.VI.1985, A. Korell and F. Kleinfeld (AKC; Korell, 1988); VI-VII.1993, F. Kleinfeld and H. Schütze (Korell, 1994). 11 km S of Çankiri, 650 m, 30.VI.1993, F. Kleinfeld (Korell, 1999; photograph seen!). E of Sungurlu, 820 m, 18.VII.1997, M. Franzen and U. Rischel (Korell, 1999).

## 18. *Cephalota (Taenidia) deserticola* (Faldermann, 1836)

*C. deserticola* is a Central Asian species, ranging from Mongolia and the Chinese Turkestan westwards to Afghanistan, Iran, southern Russia, and southern Caucasus (Wiesner, 1992; Kryzhanovskij et al., 1995). The larva (based on material from Turkmenia) has been described by Putschkov and Cassola (1994). Ali (1978) indicated that the species occurs in Turkey, Syria and Iraq as well (but not from “Persia”!), probably based on misidentified specimens. However, the occurrence of *C. deserticola* in Turkey has been recently confirmed by Franzen and Wiesner (1998), who have recorded it from the extreme eastern part of the Kars province, close to the Armenian border (Fig. 15).

DISTRIBUTION - **Kars**: 30 km E of Iğdir, Aras nehri (River Aras, Armenian border), 28.VI.1987, T. Osten (Franzen and Wiesner, 1998).





Figs. 13-14 - Two further specimens of *Cephalota eiselti* at Çöl Gölü, near Incesu (July 1978, photo by the author), showing variability of the elytral markings.

## 19. *Homodela ismenia* (Gory, 1833)\*

Gory (1833) first described *Cicindela ismenia* from Greece, but this species is primarily an Anatolian endemic. Moreover, old records from “Syria” clearly refer to present-day Turkey (Hatay province). For example, it has been recorded from “Nordsyrien (Antiochia)” (H. Roeschke, in: Horn and Roeschke, 1891), but such a record clearly refers to Antakya. Old records from “Konstantinopel” (H. Roeschke, in: Horn and Roeschke, 1891) and “Kreta” (Horn, 1926; Wiesner, 1992) are likely erroneous. Loew (1843) described again this species from the Mula province as *Cicindela quadrimaculata*, a name which I consider a junior synonym.

Superficially, the general habitus of this species is similar to that of *C. campestris* (green, short-legged, with a short, wider than long, laterally rounded pronotum), but it has a distinctive, spiralled, *Cylindera*-like, inner sac of the male aedeagus, which forced Rivalier (1950c) to erect for this species a genus by its own (*Homodela* Rivalier, 1950) within the *Cylindera*-group (Rivalier, 1971).

Mandl (1961) described a ssp. *kilikiensis*, based on six specimens from Iskenderun (Hatay), which differ from the nominate *ismenia* by such characters as the finer parallel head striation, the narrower, slightly longer, discal spot of elytra, the smaller apical spot, and the greener colour (with no or less cupreous-red components) of upperparts. These differences are effective but subtle, and moreover populations from the İçel and Adana provinces show intermediate characters. Therefore, ssp. *kilikiensis* is herein kept tentatively only, until better information is available, to indicate the south-eastern populations of *H. ismenia* (Hatay, Adana, İçel, Karaman Mara, Bingöl) (Fig. 16).

### ssp. *ismenia* (Gory, 1833)\*

DISTRIBUTION - “Asia min., Taurus” (FCC). “Klein Asien, Taurus” (FCC). “Konstantinopel, Friwaldsky” (Apfelbeck, 1904). **Izmir**: “Smyrna” (Roeschke, in: Horn and Roeschke, 1891; Apfelbeck, 1904; Korell, 1988). **Muğla**: “Habitat in sylvis prope Muhlam in Asia minori” (Loew, 1843, sub *Cicindela quadrimaculata*). “Mughla” (Roeschke, in: Horn and Roeschke, 1891; Apfelbeck, 1904); Muğla-Marmaris, 25.IV.1969, W. Wittmer (Korell, 1988); env. of Ortaca, 29.IV.73, A. Vigna Taglianti and M. Di Rao (FCC). **Denizli**: Pamukkale, III-IV.1975, A. Richter (Korell, 1988). Tavas ovasi, 1000m, III.1978, W. Heinz (Werner, 1992). **Bilecik**: “Biledjik, v. Bodemeyer” (Korell, 1988); Bilecik, IV.1973, H. Czipka (Korell, 1988). **Isparta**: Eğridir, Eğridir gölü, 1000 m, 29.III.1978, W. Heinz (Korell, 1988). Isparta, Davraz dağ 1200-1300 m, IV.1996 (FCC). **Konya**: Akşehir [“Akschehir” (Mandl, 1961); “Akşehir/Sultandag”, R. Petrovitz and F. Ressler (Korell, 1988); “Akşehir, Asia minor, R. Petrovitz and F. Ressler” (FCC). **Ankara**: 30 km NW of Ankara, nr. Kazan, 900 m, IV.1982, A. Korell (Korell, 1988). **Zonguldak**: Karabük, 300 m, IV.1983, H. Czipka (Korell, 1988). **Kastamonu**: 40 km W of Araf Yesilova, 7.V.1992, C. Pesarini and Sabb. (MPC, FCC). **Çorum**: Mecitözü, 700 m, 17.IV.1974, W. Heinz (FCC; Korell, 1988); Çorum, 3.V.1992, C. Pesarini (FCC, MPC). **Samsun**: Vezirköprü, 250 m, IV.1983, H. Czipka (Korell, 1988). **Amasya**: “Amasia” (FCC). **Tokat**: Çamagzi, 900 m, IV.1986, A. Korell (Korell, 1988). **Kırşehir**: Mucur, 1000 m, IV.1996 (FCC). **Kayseri**: Bünyan, IV.1983 (Korell, 1994); Develi, III.1989, H. Czipka (Korell, 1994). **Antalya-Içel**: Toroslar [=Toros dağı], Alman mezarlığı, 7.VI.78,

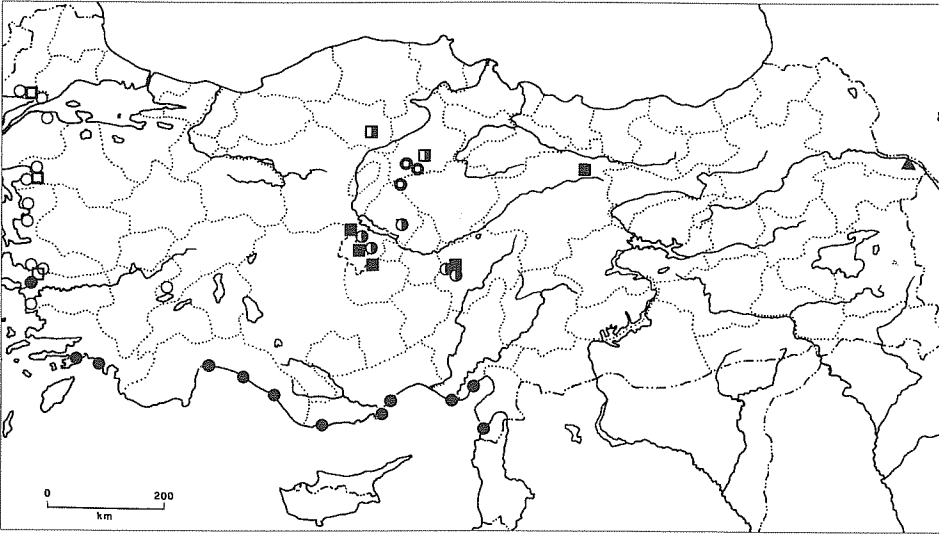


Fig. 15 - Map showing the geographical distributions of *Cephalota turcica* (open squares), *C. eiselti* (solid squares: ssp. *eiselti*; half-solid squares: ssp. *cankiriana*), *C. circumdata* (open circles: ssp. *circumdata*; half-solid circles: ssp. *cappadocica*; bold-faced circles: ssp. *battusae*), *C. deserticola* (solid triangle), and *Lophyridia concolor* (solid circles), in Anatolia.

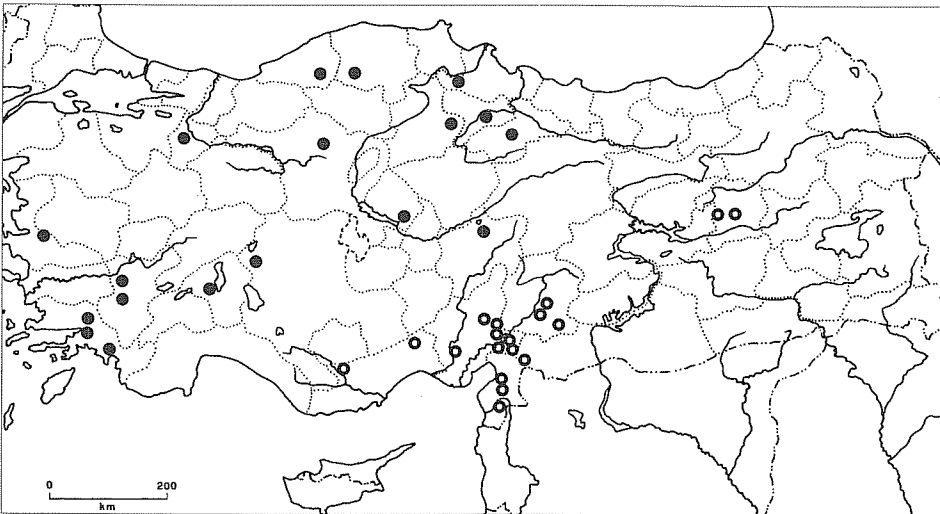


Fig. 16 - Map showing the geographical distribution of *Homodela ismenia* (solid circles: ssp. *ismenia*; open circles: ssp. *kiltikiensis*).

E. Şekeroğlu (FCC). İçel (Mersin): Mederselek [=Medreselik, E of Sertavul geçidi], 30.IV.1996, B. Makovsky (FCC, MPC). Adana: "Adana, Lichtneckert" (FCC); Kadirli-Karatepe, Tlısan, 1977, E. Şekeroğlu (FCC); Fiyora, 8.III.1978, E. Şekeroğlu (FCC); Osmaniye 500 m, IV.1996 (FCC).

ssp. *kilikiensis* (Mandl, 1961)\*

DISTRIBUTION - "Syria, Coll. Vallon" (FCC). "Syria, Coll. Apfelbeck" (FCC). "Syrien, Coll. Apfelbeck" (FCC). Gaziantep: "Akbes, Syria" [=Akbez, on road Islahiye-Hassa at junction with road to Kilis] (MPC). "Akbes, Syrien, Em. Reitter" (FCC). Amanos dađı., Akbez, E. Reitter, Tippmann (Korell, 1988). Hatay: Iskenderun, type locality (Mandl, 1961). Iskenderun, R. Petrovitz and F. Ressler (Korell, 1988). Hasanbeyli, IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). "Hasanbeyli, Amanusgebirge" (Mandl, 1967). "Arsuz Hatay" (Mandl, 1967). Belen ["Bolen, Issuspass, Amanus" (Mandl, 1967). Amanos dađı., Belen, 600-800 m, IV.1983, W. Eckweiler (Korell, 1988). Belen, Nur dađları, 28.3-6.4.1994, M. Snizek (FCC). Antakya, Tavuklu, IV.1990, E. G6rgner (Korell, 1994). Adana: Kozan, IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Bahce nr. Osmaniye, 600 m (Mandl, 1967). Adana (Korell, 1988). Kan geçidi, 1550 m, V.1992, H. Czipka (Korell, 1994, sub *H. i. ismenia*). Saimbeyli, 1300 m, VI.1991 (Korell, 1994, sub *H. i. ismenia*). Osmaniye, Karatepe, 300-400m, IV.1983, W. Eckweiler (Korell, 1988; Korell, 1994: "Übergangsstücke zur Nominatform". İçel (Mersin): Namrun [=Çamlıyayla], IV-V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). Namrun b. Tarsus, R. Petrovits and F. Ressler (FCC); Çamlıyayla, V.1967, Schurman (Korell, 1988). Çamlıyayla ("Übergangsstücke zur Nominatform": Korell, 1994). "Taurus bei Ulukisla" (Muche, 1960). Kahramanmaraş: Narlı, IV.1987 (Korell, 1994, sub *H. i. ismenia*). Maraş, 700 m, III.1989 (Korell, 1994, sub *H. i. ismenia*). Ahir Dađ, 900 m, V.1992 (Korell, 1994, sub *H. i. ismenia*). Bing6l: Kuruca geçidi, 1800 m, 31.V.1992, V. Biza and Z. Kostal (FCC). 36 km E of Bing6l, 28.V.1994, M. Pavasi (MPC, FCC).

## 20. *Cylindera (Cylindera) germanica* (Linné, 1758)

This widespread West-Palaeartic species, which is the generotype of genus *Cylindera* Westwood, 1831, has been recorded by Wiesner (1992) from many European countries (northern Spain, France, Great Britain, Belgium, Germany, Austria, Italy, Czech and Slovakian Republics, Hungary, former Yugoslavia, Greece, Bulgaria, Romania, Turkey), as well as from a few other regions such as the Caucasus, Azerbaijan, Armenia, Transbaikalia, Syria, Iran and Mongolia. Moreover, it is known from Holland (Turin et al., 1977), Switzerland (Marggi, 1992), Poland (Burakowski et al., 1973), Latvia (Barsevskis, 1996), Russia, Moldavia and Ukraine (Kryzhanovskij et al., 1995), while apparently it has to be considered as already extinct in Luxembourg (Braunert, 1996). Records from Mongolia and Central Asia (Turkmenistan, Uzbekistan), however, appear to need confirmation, as they could well be due to a possible confusion with other related taxa [*C. descendens* (Fischer, 1825) and *C. obliquefasciata* (Adams, 1817)].

Populations from Greece and southern Italy are known to show a bluish-green to blue-violet elytral colouration, thus representing a valid trans-jonian subspecies (*muelleri* Magistretti, 1966). However, rather surprisingly, the Anatolian populations do not appear to differ significantly from the nominate subspecies.

DISTRIBUTION - **Izmir**: “Bosz-Dagh, Kisilgye-Aole” (Fairmaire, 1866). **Burdur**: Burdur, saltlake shore, 6.VI.1962, F. Ressler and R. Petrovitz (Mandl, 1963). **Çankiri**: Çankiri, dry riverbed, A. Korell (Werner, 1988). 10 km S of Çankiri, 650 m, VI.1985, F. Kleinfeld and A. Korell (Korell, 1988). 2-3 km S of Çankiri, river banks, 730 m, 25.VI.1997, S. Rubizzani (FC). **Trabzon**: Of nr. Trapezunt, 8.VIII.1973, W. Heinz (FCC). **Rize**: Rize, VII.1975, L. Ivanovs (Korell, 1988). İkizdere 2000-2300 m, 20.VII.1979, P. Cavazzuti (FCC). **Erzurum**: “Erzeroum” (Gilnicki, 1872). 10 km NW of Ispir, 1.VIII.1990, H. Schütze and A. Korell (Korell, 1994). **Artvin**: Pass betw. Murgul and Arhavi, 1000-1200 m, 17.VIII.1972, W. Heinz (FC; Korell, 1988). Artvin, 800 m, 2.VIII.1973, H. Czipka (Korell, 1994). Tortum-Armenia, 4.VII.1975, P. Cavazzuti (FCC). Esembel geçidi (Borçka), 1000 m, 22.VII.1976, G. Sabatinelli and M. Bologna (FCC). Pass betw. Borçka and Hopa, 900 m, VIII.1978, W. Heinz (FCC).

21. *Cylindera (Eugrapha) arenaria* (Fuesslin, 1775) ssp. *viennensis* (Schrank, 1781)

*C. arenaria* is an Euro-Siberian species, ecologically linked to wet sandy banks of streams and rivers (Fig. 6). As a whole, it is widely but rather sparsely distributed from western Europe [ssp. *arenaria*: France, Luxemburg, Switzerland, Austria, and Italy (Wiesner, 1992)] to central and eastern Europe up to western Siberia and the Baikal Sea [ssp. *viennensis*: Germany, Poland, Austria, Czech and Slovakian Republics, Hungary, Romania, Greece, S Russia, W Siberia, Baikal Sea, Turkey (Wiesner, 1992)]. Gueorguiev and Gueorguiev (1995) have recorded ssp. *viennensis* from Bulgaria, too, while populations from SW Russia and Transcaucasia should represent a different subspecies, ssp. *nudoscripta* W. Horn, 1915 (Horn, 1926).

Wiesner (1992) has indicated with a questionmark the occurrence of ssp. *arenaria* in Spain too (“?Spanien: Barcelona, Valencia, Murcia”), but most certainly the species does not occur there (Horn, 1926: “Spanische Fundort falsch!”; Zaballos and Jeanne, 1994). In contrast, the occurrence of ssp. *viennensis* in Turkey, also questioned by Wiesner (1992: “?Türkei: Anatolien”), can be confirmed, as the species actually inhabits a large part of the Anatolian peninsula. Subspecific identification, however, would require further study, as Korell (1988) correctly emphasized that the Anatolian populations differ from ssp. *viennensis* by subtle but rather consistent characters, such as the narrower average elytral markings and the widely interrupted marginal band, thus obviously differing for instance from the Balkanian populations. Relationship with ssp. *nudoscripta* needs to be re-examined.

The use of name *Eugrapha* to designate this subgenus needs clarification, as Adam and Merkl (1986) changed it into *Cicindina*, in replacement for the preoccupied *Eugrapha* Rivalier, 1950 (nec Hübner, 1826: Lepidoptera). I too had followed at first such a statement (Cassola and Miskell, 1990; Cassola, 1991), but apparently it is not the case to do so, as Schilder (1953) had already noticed that Rivalier’s name is not to be considered as preoccupied (“Der Name ist nicht präokkupiert, weil *Eugrapha* Hübner 1826 als ‘Emendation’ von *Eugraphe* Hübner 1821 ungültig ist”). Therefore, I propose re-establishing here the use of Rivalier’s name, as the first available name used to designate this *taxon*.

DISTRIBUTION - **Denizli**: Pamukkale, River Menderes, 16.VII.1970, M. Cassola (FCC). **Kühtahya**: Abide 4.VIII.1967, V. Sbordoni (FCC). **Çankiri**: 20 km SE of Dedeköy (S of Çankiri), 650 m, VII.1984, F. Kleinfeld and A. Korell (Korell, 1988); VI.1985, F. Kleinfeld and A. Korell (Korell, 1988). Çankiri, dry riverbed, A. Korell (Werner, 1988). 2-3 km S of Çankiri, river banks, 730 m, 25.VI.1997, S. Rubizzani (FCC). **Çorum**: Osmancik, K. Werner (Werner, 1988: "a very interesting black form"; Korell, 1994). **Nevşehir**: Nevşehir, 12.VII.1973, M. and G. Osella (MCSTV). Avanos, River Kizilirmak, 11.VII.1978, F. Cassola (FCC). **Kayseri**: Himmetsede, River Kizilirmak, 1.VI.1974, F. Cassola (FCC). **Tokat**: Kelkit çayı, S of Niksar, 300 m, VI.1985, F. Kleinfeld and A. Korell (FCC; Korell, 1988). 10 km W of Rezadiye, Kelkit çayı, 31.VII.1987, A. Korell (Korell, 1999). **Ordu**: Ordu, K. Werner (Werner, 1988). **Gümüş hane**: Kürtün Yayla, VII.1973, H. Czipka (Korell, 1988). Harisit çayı, Kurtün, 26.VII.1973, W. Heinz (FCC). **Trabzon**: Of nr. Trapezunt, 1.VIII.1963, W. Heinz (FCC). Trabzon, VIII.1964, C. Blumenthal (Korell, 1988). **Erzurum**: "Erzeroum" (Gilnicki, 1872: "*Cicindela litterata* Sulz").

## 22. *Cylindera (Eugrapha) trisignata* (Dejean, 1822)

This mainly W-Mediterranean species, unlike its closely allied species listed above, is ecologically linked to sea beaches only, usually in the vicinity of rivermouths and brackish lagoons. Its geographical distribution includes several Mediterranean countries and islands [Morocco, Algeria, Portugal, Spain, peninsular Italy and Sardinia: ssp. *trisignata*; Sicily, Malta, Tunisia, Lybia: ssp. *siciliensis* W. Horn, 1891; Corsica: ssp. *corsica* Rivalier, 1962] and moreover the Atlantic coasts of northern Spain and western France (ssp. *atlantica* Barthe, 1922), those of northern France to Holland (ssp. *neustria* Rivalier, 1962), as well as Greece and the Black Sea coasts of Bulgaria, Romania, Turkey, Ukraine and southern Russia (ssp. *hellenica* Cassola, 1973) (Wiesner, 1992; Gebert, 1996). Its occurrence in Syria, was considered doubtful by Wiesner (1992: "?Syrien"), and it has not been confirmed.

The few available specimens from southern Aegean and Mediterranean coasts of Anatolia appear to belong, instead of to ssp. *hellenica*, to ssp. *trisignata*.

ssp. *trisignata* (Dejean, 1822)

DISTRIBUTION - **Muğla**: Iztuzu, 19.V.1994, M. Pavesi (MPC, FCC). **Antalya**: Finike, 12.VI.1969, A. Richter (Korell, 1988). Demre, 12.V.1984, S. Kornosor (FCC). **Adana**: Karataş, Tuzla, 18.V.1997, C. Morkel (Korell, 1999). Karataş, VII.1983, E. Şekeroğlu (FC); 19.VI.1997, M. Pavesi (MPC, FCC).

ssp. *hellenica* Cassola, 1973

DISTRIBUTION - **Istanbul**: NE of Istanbul: Şile, 12.VIII.1979, L. Ivanovs (Korell, 1988). **Ordu**: sea beach betw. Ünye and Fatsa, 21.VI.1985, F. Kleinfeld and A. Korell (Korell, 1988: prope *hellenica*). 20 km before Ünye, Black Sea broad seashore, VIII.1987, K. Werner (FC; Werner, 1988). **Samsun**: sea beach nr. Samsun, 26.VII.1963, W. Heinz (FCC). E of Terme, River Akçay, 9.VI.1973, R. Argano, L. Boitani and V. Cottarelli (FCC). Canik dağl., Samsun-

Ünye, VIII.1987, K. Werner (FCC). Terme, E of Samsun, 1.VII.1990, K. Staven (Korell, 1994). Plain of Bafra, 17.VI.1992, P. Audisio and M. Zapparoli (FCC).

### 23. *Cylindera (Eugrapha) p. pygmaea* (Dejean, 1825)

This Mesopotamian species is known to occur (Wiesner, 1992) in several Near East countries (Turkey, Syria, Iran, Iraq: ssp. *pygmaea*) and in the Iranian Belucistan (ssp. *laetula* Tschitschérine, 1903). However, it has also been recorded from Saudi Arabia (Hijaz: Britton, 1948), a record which is in need of confirmation. A fluvial species, it is not uncommon on the sandy wet banks of rivers Euphrates and Tigris, as well as in other riparian situations. At Birecik, I found it co-occurring with *Lophyridia caucasica*, *L. fischeri*, and *L. l. aulicoides* (figs. 8, 10).

DISTRIBUTION - **Içel (Mersin)**: no data, A. Kricheldorf (Korell, 1999). "As. min. 1908, Gulek [=Gülek?], Coll. Sterba" (FCC). Silifke, River Göksü, 2-10.V.1962, F. Ressler and R. Petrovitz (Mandl, 1963). **Adana**: "Adana, Asia minor" (Korell, 1988). **Gaziantep**: Birecik, Firat nehri (River Euphrates), 6.IV.1971, M. Cassola (FCC); 28.VII.1971, M. Cassola (FCC); 30.V.1974, F. Cassola (FCC; figs. 8, 10). **Sanli Urfa**: Siverek, Firat nehri (River Euphrates), 7.IV.1971, M. Cassola (FCC); 28.VII.1971, M. Cassola (FCC). **Mardin**: 30 km W of Cizre, 80 km E Midyat, Dicle nehri (River Tigris), 25.V.1983, Kühbandner (Wiesner, 1988). **Siirt**: Botan çayı valley, 500 m, VI.1985, W. Schacht (Werner, 1992). Reşadiye and Koyulhisar, River Kelkit, 16.VIII.1987, L. Falletri (Korell, 1994). Kozluk, Batman çayı, 16.VIII.1987, M. Pavesi (MPC). Kumluca Köyü, Dicle nehri (River Tigris), 18.VIII.1989, M. Pavesi (MPC). Batman çayı, 12 km N of Batman, 1.VI.1994, M. Pavesi (MPC). **Tokat**: Kelkit çayı, S of Niksar, 300 m, VI.1985, A. Korell and F. Kleinfeld (Korell, 1988).

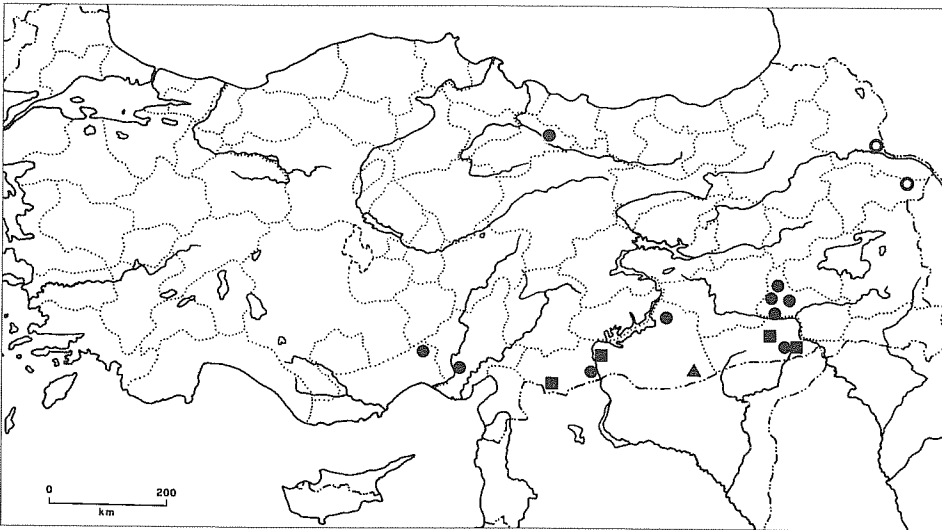


Fig. 17 - Map showing the geographical distributions of *Lophyridia bilariola* (solid squares), *Cylindera pygmaea* (solid circles), *C. sublacerata* (bold-faced circles), and *Myriochile orientalis* (solid triangle), in Anatolia.

24. *Cylindera (Eugrapha) sublacerata* (Solsky, 1874) ssp. *levithoracica* (W. Horn, 1891)

This is basically a Central Asian to Middle East species, whose nominate subspecies is known to occur from Turkmenistan to Kazakhstan, as well as to Iran, Afghanistan, northern Pakistan and Kashmir (ssp. *sublacerata*), with separate subspecies in southern Afghanistan and Pakistan (ssp. *balucha* Bates, 1878), and in Mongolia and the Chinese Turkestan (ssp. *vicaria* Semenow, 1895) (Acciavatti and Pearson, 1989; Wiesner, 1992; Kryzhanovskij et al., 1995; Franzen, 1998). The larva has been described (from Turkmenia and W Kazakhstan) only recently, by Putschkov and Cassola (1994).

Interestingly enough, this species was collected in 1985 in the Kars province by E. Şekeroğlu, but its occurrence in the extreme East of the Turkish territory (Ari and Kars provinces) (Fig. 17) has been formally recorded recently only by Franzen (1998), who also resurrected from synonymy the ssp. *levithoracica* W. Horn, 1891, described from "Süd-Kaukasus" (Horn, in: Horn and Roeschke, 1891), to which the populations occurring West of the Caspian Sea (Dagestan, Azerbaijan, Georgia, Armenia, Turkey) should all be ascribed.

DISTRIBUTION - Agri: Saz gölü, E of Karabulak (N of Doğubayazit), 1500 m, 26.VI.1990, M. Franzen (Franzen, 1998). Kars: Tuzluca ["Russ. Arm., Kulp"], 1901, Korb (Franzen, 1998). Tuzluca, 17.VI.1985, E. Şekeroğlu (FCC).

25. *Myriochile (Myriochile) m. melancholica* (Fabricius, 1798)

A common, widely distributed species, whose enormous geographical range extends from the whole African continent (including Madagascar and several Indian Ocean islands) to the southern Mediterranean region (Portugal, Spain, Corsica/Sardinia, central and southern Italy, Greece, Cefalonia, Crete, Rhodes, Cyprus, Turkey), the Middle East and the Arabian peninsula (Syria, Iraq, Israel, Saudi Arabia, Oman, Yemen), eastwards to Afghanistan, Pakistan, northern India, the Caucasus area (Georgia, Armenia, Azerbaijan) and Central Asia (Turkmenistan, Uzbekistan, Tadjikistan, Kazakhstan) (Acciavatti and Pearson, 1989; Wiesner, 1992; Kryzhanovskij et al., 1995; Cassola and Rihane, 1996). However, all over such a huge geographical range, the species changes very little, and only a single distinct subpopulation (ssp. *trilunaris* Klug, 1832) is recognized as occurring in Madagascar (Wiesner, 1992).

In Turkey, *M. melancholica* apparently occurs in central and southern parts only, along the bare edges of muddy lakes, ponds and temporary pools. Larvae of *M. melancholica* have been described by Serrano (1987), based on material from Portugal.



DISTRIBUTION - **Izmir**: 8 km N of Selçuk, 15.VII.1970, M. Cassola (FCC). Menemen, River Gediz, 14.VII.1970, M. Cassola (FCC). Selçuk, VII.1973, M. and G. Osella (MCSTV). **Aydin**: Aydin-Çine, 15.VI.1968, Ardö (FCC). **Denizli**: Pamukkale, River Menderes, 16.VII.1970, M. Cassola (FCC). Saray köy, Büyük, River Menderes, no data (MPC). **Antalya**: Dağ, 16.VIII.1967, V. Sbordoni (FCC). Alanya, 15.VIII.1967, V. Sbordoni (FCC); 19.VII.1970, M. Cassola (FCC); 13.VI.1972, E. Jünger (Korell, 1988); 8.VIII.1978 (Korell, 1999). 22 km E of Alanya, 20.VII.1970, M. Cassola (FCC). 70 km NE of Candir, VIII.1977, H. Czipka (Korell, 1988). **Içel (Mersin)**: Anamur, 1-10.VII.1993, J. Borowski (AJC). 30 km E of Silifke, 30.VII.1971, M. Cassola (FCC). Silifke, mouth of River Göksü, 13.VII.1978, F. Cassola (FCC). Göksü River delta, 11.VI.1993, E. Şekeroğlu (FCC). **Adana**: "Pak. Pamuk tat.", River Örgür, 11.VII.1977 (FCC); 5.VII.1978, E. Şekeroğlu (FCC). Osmaniye, Gaykenari, 17.VIII.1978, E. Şekeroğlu (FCC). "Bit. Kar. denemeatani", 25.VIII.1978, E.Şekeroğlu (FCC). **Gaziantep**: Akbès [=Akbez, on road Islahiye-Hassa at junction with road to Kilis] (Fairmaire, 1884). **Ankara**: Ankara, airport, 5.V.1989, A. Korell (Korell, 1994). **Malatya**: Malatya, VII.1985, A. Richter (Korell, 1988).

## 26. *Myriochile (Monelica) orientalis* (Dejean, 1825) (??)

This species is known to occur in Mesopotamia (Turkey, Iran, Iraq, Syria), in eastern sub-Caucasian regions (Armenia, Azerbaijan, southern Russia: E Ciscaucasia, S Daghestan), as well as in Turkmenistan and Tadjikistan (Wiesner, 1992; Kryzhanovskij et al., 1995). The larva has been recently described by Putschkov and Cassola (1994), based on material from S. Turkmenia. As it is presently known, *M. orientalis* enters the Turkish territory only in the vicinity of Ceylanpinar (Sanli Urfa province), close to the Syrian border and within the hydrographic basin of upper River Al Khabour (a tributary of the Euphrates) (Fig. 17).

DISTRIBUTION - **Sanli Urfa**: N Ceylanpinar, 24.V.1983, W. Schacht (KWC: Korell, 1988). Urfa (Wiesner, 1992).

## BIOGEOGRAPHY AND CONCLUSIONS

Wiesner (1992) has listed from south-eastern Anatolia ("Türkei: SO Anatolien") one further species, *Cylindera (Eugrapha) contorta* (Fischer, 1828), which Rivalier (1950c) and Schilder (1953: see Korell, 1988 and 1994) too had indicated, respectively, from "Asie Mineure" and "Norden und Südosten Kleinasiens". However, I know of no additional data about the occurrence in Turkey of such a species, which is basically a Central Asian element (widely but sparsely distributed from Turkmenistan to the Chinese Turkestan, Mongolia and Siberia). It occurs also in northern Iran, north-western Afghanistan, some Caucasian countries (Azerbaijan, Grusia, Georgia), the northern and western sides of the Black Sea (southern Russia, Ukraine, Moldavia: Kryzhanovskij et al., 1995; Romania), as well as, in scattered, relic populations, in Israel and Egypt (ssp.

*valdenbergi* Mandl, 1981) (Wiesner, 1992). Therefore, until better information is available, *C. contorta* is here excluded from the Anatolian tiger beetle fauna.

Another species which theoretically could well be found in Turkey in the future is *Cephalota (Taenidia) zarudniana* (Tschitschérine, 1903), a Mesopotamian and Iranian species whose ssp. *vartianorum* Mandl, 1967 (described from Iraq) has been recorded from a Syrian locality, in the middle reaches of the River Euphrates (Dayr-az-Zor: Korell, 1984), some 250 km SE from the point where the big river flows out from Turkey. In so far, however, such a species has to be considered extraneous to the Anatolian fauna.

A number of further, mostly Transcaspian, species, have also been erroneously indicated from Turkey by Ali (1978), namely *Cicindela turkestanica* Ballion, 1870, *Cicindela clypeata* Fischer, 1821 (= *C. decempustulata* Ménétries, 1848), *Lophyridia aulica* (Dejean, 1831), *Lophyridia sturmi* (Ménétries, 1832), *Lophyra flexuosa* (Fabricius, 1787), *Cephalota (Taenidia) chiloleuca* (Fischer, 1820), *Cylindera (Eugrapha) litterifera* (Chaudoir, 1842), and *Cylindera (Eugrapha) pseudodeserticola* (W. Horn, 1891). Recording of *C. chiloleuca*, in particular, was repeated by Wiesner too (1992), who also listed *Cicindela talychensis* Chaudoir, 1846, as occurring in "Türkei: Elbrus". However, in my own opinion, all these species have to be excluded, for the time being at least, from the Turkish fauna, as these records were most certainly due to misidentification or mislabelling of specimens. Mandl (1981c) has already showed all the new taxa, which Ali had described from the Arabian peninsula in the very same paper (Ali, 1978), to be merely junior synonyms of already well known species, but it has to be emphasized here that many of Ali's faunistics data too were incorrect. As to *C. talychensis*, such a problem has been discussed above, under *C. desertorum*, and this species is also excluded here from the Anatolian list.

Therefore, the Anatolian tiger beetle fauna, so depurated from the extraneous elements which had erroneously been attached to it, appears so far to include 26 species in all, two of which (7.69%: *C. eiselti* and *H. ismenia*) appear to be strict Anatolian endemics. Further 6 species (23%: *Cicindela sylvatica*, *C. monticola*, *C. campestris*, *C. turkestanicoides*, *Lophyridia littoralis*, *Cephalota circumdata*) have produced in Anatolia 7 endemic subspecies. Of the 38 species or subspecies listed above in all, 11 (28.9%) are strict Anatolian endemics, thus confirming Anatolia as being an important center of endemic speciation.

The geographic position of Anatolia, obviously stretched from the Mediterranean Sea eastwards to Mesopotamia, the Iranian plateau and the Caucasian region, has understandably allowed its tiger beetle fauna to include such different components as some Euro-Siberian elements at their southernmost limits of distribution (namely *Cicindela sylvatica*, *C. monticola*, the *C. campestris*-group, *Cylindera germanica*, *C. arenaria*), some Central Asian (Aralo-Caspian: Dokhtouroff, 1885) elements [those which Wilkins (1890) had called "Touraniennes", such as *Cicindela asiatica*,

*Cephalota deserticola*, *Cylindera sublacerata*, and *Myriochile orientalis*], Mesopotamian and Middle East species (*Cicindela herbacea*, *Lophyridia caucasica*, *L. fischeri*, *Lophyra hilariola*, *Cylindera pygmaea*), as well as several Eu-Mediterranean elements (such as *Lophyridia littoralis*, *Cephalota circumdata*, *Cylindera trisignata*), some of which at least clearly show nowadays a scattered, more restricted, relic distribution (namely *Lophyridia aphrodisia*, *L. concolor*, *Cephalota turcica*). *Megacephala euphratica* and *Lophyridia littoralis*, however, have larger geographical distributions, which from the Mediterranean basin and northern Africa, via the Anatolian and Mesopotamian regions, more or less deeply enter the Turanian area and Palaearctic Asia. *Lophyridia littoralis*, in particular, is represented in Turkey by the Mediterranean subspecies (ssp. *nemoralis*), two endemic races (ssp. *winkleri* and ssp. *mandli*), and the Mesopotamian/Arabian subspecies (ssp. *aulicoides*). As to *Myriochile melancholica*, it is a widespread, poorly changing and poorly significant, African element, which inhabits also the S-Mediterranean region and the Middle Orient, eastwards to Pakistan.

Finally, the two endemic elements suggest different origins from each other. *Cephalota eiselti* belongs to a typically Palaearctic genus, distributed from the whole Mediterranean basin eastwards to the Arabian peninsula, the Turanian region, and the Chinese Turkestan. Isolated in a few remote salty areas in the Anatolian highlands, where another congeneric species (*C. circumdata*) has also produced endemic subspecific forms, *C. eiselti* is a distinctive species, which has apparently evolved there independently, without having been noticed and discovered until recent times only. In contrast, *Homodela ismenia* is a puzzling monotypic element with no near relatives elsewhere, probably the product of an early Anatolian faunistic stem. It apparently didn't spread outside the western and central mountain ranges of Anatolia, its easternmost record being the Bingöl province only. In particular, it appears not to have colonized yet eastern Turkey and the surrounding easternmore countries, while the arid plains of Syria and Iraq are obviously not suitable for such a species.

#### ACKNOWLEDGMENTS

I wish to express my gratitude to Armin Korell (Kassel, Germany), Jörg Gebert (Rhone, Germany) and Michael Franzen (Oberneuching, Germany), who provided interesting data and literature items, as well as to my late father, Mario Cassola, and my friend Maurizio Pavesi (Milano, Italy; MPC), who collected and submitted a substantial part of the material studied. Specimens have also been occasionally collected and submitted by several other colleagues and friends, whom I thank here very much: Roberto Argano, Paolo Audisio, Marco Bologna, Sandro Bruschi, Giuseppe Carpaneto, Guido Sabatinelli, Valerio Sbordoni, Enrico Sturani, Franco Tassi, Augusto Vigna Taglianti (all from Rome, Italy), as well as by Achille

Casale (Sassari, Italy), Walter Heinz (Wald-Michelbach, Germany), Giuseppe Osella (L'Aquila, Italy), Stefano Rubizzani (Camposanto, Italy), Erdal Şekeroğlu (Adana, Turkey), Karl Werner (Peiting, Germany), Marzio Zapparoli (Viterbo, Italy), Maurizio Biondi (Latina, Italy). Moreover, additional specimens have been examined from the collections of the Museo Civico di Storia Naturale di Verona (MCSTV), Arnaldo Bordoni (Firenze, Italy; ABC), C.M.C. Brouerius van Nidek (Voorburg, Nederland; BVNC), Artur Jasiński (Piaśtów, Poland; AJC), Armin Korell (AKC), Enrico Migliaccio (Roma, Italy; EMC), Jürgen Wiesner (Wolfsburg, Germany; JWC). All other specimens are in author's collection (FCC). Finally, David L. Pearson (Tempe, Arizona, USA) kindly revised the English text and provided useful comments.

## REFERENCES

- ACCIAVATTI R.E., PEARSON D.L. 1989 - The tiger beetle genus *Cicindela* (Coleoptera, Insecta) from the Indian subcontinent. *Ann. Carnegie Mus., Pittsburgh*: 58: 77-353.
- ADAM L., MERKL O. 1986 - Aephaga of the Kiskunsag Nat. Park, 1: Carabidae (Coleoptera). pp. 119-142, in: MAHUNKA S. (ed.), *Natural History of the National Parks of Hungary*, vol. 4. The Fauna of the Kiskunsag National Park. Akademiai Kiado, Budapest, vol. 1: 490 pp.
- ADAMS F. 1817 - *Descriptio Insectorum novorum Imperii Rossici in primis Caucasii et Sibiriae*. *Mém. Soc. imp. Natur. Moscou, St. Petersburg*, 5: 278-314.
- ALI H.A. 1978 - Faunistic study of the Cicindelidae (Coleoptera) of Iraq and Southwest Asia. *Coleopt. Bull.*, 32: 1-20.
- APFELBECK V. 1904 - Die Käferfauna der Balkanhalbinsel, mit Berücksichtigung Klein-Asien und der Insel Kreta. Erstes Band: Familienreihe Caraboidea. I. Familie Cicindelidae. Berlin: 422 pp.
- AUDOUIN V., BRULLÉ G. 1839 - Description des espèces nouvelles ou peu connues de la famille des Cicindelètes, faisant partie de la collection du Muséum. *Arch. Mus., Paris*, 1: 115-142, pls. 7-9.
- BAEHR M. 1985 - Die Laufkäfer des Karpathos-Archipels in der Südostägäis (Coleoptera, Carabidae). *Nachricht. bayer. Entomol., München*, 34: 90-97.
- BARSEVSKIS A. 1996 - The check-list of the Coleoptera: Caraboidea of the fauna of Latvia. *Daugavpils Pedagogical University, Nature Studies and Environmental Education Centre*: 1-27.
- BARTHÉLEMY M. 1835 - Deux Cicindèles nouvelles. *Ann. Soc. entomol. France, Paris*, 4: 597-601, pl. 17.
- BAUDI A., SELVE F. 1864 - Coleopterorum messis in insula Cypri et Asia minore ab Eugenio Truqui congregatae recensio: de Europaeis notis quibusdam additis. *Berl. entomol. Zeitschr.*, Berlin, 8: 195.
- BEUTHIN H. 1889 - Über die Varietäten von *Cicindela campestris* Linné. *Entomol. Nachricht.*, Berlin, 15: 230-233.
- BEUTHIN H. 1890a - Über Varietäten europäischer Cicindelen. VII. *Cicindela Fischeri* Dejean. *Entomol. Nachricht.*, Berlin, 13: 207-208.
- BEUTHIN H. 1890b - Über Varietäten europäischer Cicindelen. VIII. *Cicindela sylvatica* Linné. *Entomol. Nachricht.*, Berlin, 14: 210-211.
- BEUTHIN H. 1892 - Über Varietäten palaearktischer Cicindelen. *Cicindela Fischeri*. *Entomol. Nachricht.*, Berlin, 24: 376-378.
- BEUTHIN H. 1893 - Über Varietäten palaearktischer Cicindelen. *Cicindela caucasica*. *Entomol. Nachricht.*, Berlin, 10: 155-157.
- BLUMENTHAL C.L. 1969. Spedizioni entomologiche in Anatolia. *Boll. Ass. romana Entomol., Roma*, 24: 87-92.
- BODEMEYER E. v. 1906 - Beiträge zur Käferfauna von Klein-Asien. *D. entomol. Zeitschr.*, Berlin, 417-419.
- BRAUNERT C. 1996 - Faunistik, Ökologie und Gefährdung der Sandlaufkäfer (Coleoptera: Cicindelidae) Luxemburgs. *Bull. Soc. Natur. Luxemb.*, 97: 181-191.
- BRITTON E.B. 1948. Expedition to South-west Arabia, 1937-8. 10. Coleoptera: Cicindelidae and Carabidae (with Appendix by P. Basilewsky). *Brit. Mus. (Nat. Hist.)*, London, 1: 87-131.
- BURAKOWSKI B., MROCKZKOWSKI M., STEFANSKA J. 1973 - Katalog Fauny Polski. Coleoptera - Carabidae. *Polska Akademia Nauk, Instytut Zoologiczny, Warszawa*, 1-233 [in Polish].
- CASSOLA F. 1970 - Ecologia, distribuzione geografica e subspecazione di *Cicindela (Taenidia) circumdata* Dej. *Boll. Ass. romana Entomol., Roma*, 15: 59-70.
- CASSOLA F. 1973a - Études sur les Cicindélides. VI. Contribution à la connaissance des Cicindèles du Maroc (Coleoptera, Cicindelidae). *Bull. Soc. Sci. nat. phys. Maroc, Rabat*, 53: 253-268.

- CASSOLA F. 1973b - Studi sui Cicindelidi. VII. Un interessante reperto nella Laguna di Orbetello: *Cephalota (Taenidia) circumdata leonshaeferi* Cassola (Coleoptera). Atri Soc. tosc. Sci. nat., Pisa, Memorie, Serie B, 79 (1972): 92-96.
- CASSOLA F. 1973c - Études sur les Cicindelides. X: Matériaux pour un catalogue des Cicindelidae [sic!] de Grèce (Coleoptera). Biol. Gallo-Hellen., Athens, 5: 25-41.
- CASSOLA F. 1974 - Studi sui Cicindelidi. XI. Validità specifica di *Cicindela majalis* Mandl e problemi di conservazione degli ambienti golenali italiani (Coleoptera). Lav. Soc. it. Biogeogr., N.S. 4 (1973): 57-74, tavv. I-III.
- CASSOLA F. 1978 - Studi sui Cicindelidi. XIX. Sulla presenza in Italia di *Cicindela maroccana* Fabricius (Coleoptera). Doriana, Genova, 5 (229): 1-7.
- CASSOLA F. 1981 - Studi sui Cicindelidi. XXVII. Una notevole aggiunta alla fauna di Creta: *Megacephala euphratica* Dejean (Coleoptera, Cicindelidae). Fragm. entomol., Roma, 16: 25-30.
- CASSOLA F. 1983 - Studi sui Cicindelidi. XXXIII. Note e osservazioni su un interessante endemita siciliano: *Lophyridia aphrodisia panormitana* (Ragusa). Natural. sicil., Palermo, 7 (4): 41-56.
- CASSOLA F. 1991 - Studi sui Cicindelidi. LXIII. I Cicindelidae (Coleoptera) dell'Isola di Sulawesi, Indonesia. Ann. Mus. civ. St. nat. "G. Doria", Genova, 88: 481-664.
- CASSOLA F., BROUERIUS VAN NIDEK C.M.C. 1984 - Checklist of *Cicindela* (s. auct.) of the Palaearctic region (Coleoptera: Cicindelidae). Cicindela, Prairie Village, Kansas, 16: 7-17.
- CASSOLA F., MISKELL J.E. 1990 - Somalian tiger beetles: faunistics and biogeography (Coleoptera, Cicindelidae). Biogeographia, 14: 175-227.
- CASSOLA F., RIHANE A. 1996 - Notes on the tiger beetle fauna of the Sultanate of Oman (Coleoptera: Cicindelidae). Fauna Saudi Arabia, Basle, 15: 196-205.
- CASSOLA F., SCHNEIDER W. 1997 - Tiger Beetles (Coleoptera: Cicindelidae) from the Saudi Arabian Gulf coast. Fauna Saudi Arabia, Basle, 16: 247-253.
- CHAUDOIR M. DE 1846 - Énumération des Carabiques et Hydrocanthares recueillis pendant un voyage au Caucase et dans les provinces transcaucasiennes par le Baron M. de Chaudoir et le Baron A. de Gotsch. Carabiques. Kiew, Imprimerie de J. Wallner: 269 pp.
- CHAUDOIR M. DE 1857 - Einige Bemerkungen zur "Naturgeschichte der Insecten Deutschlands" (fortgesetzt von Dr. Schaum, 1. Lief). Stett. entomol. Zeit., Stettin, 18: 75.
- DEJEAN P.F.M.A. 1825 - Species général des Coléoptères. Tome Premier. Paris, chez Crevot: 1-166.
- DEJEAN P.F.M.A. 1831 - Species général des Coléoptères. Tome Cinquième. Supplément aux cinq premiers volumes. Paris, chez Méquignon-Marvis: 195-276.
- DEUVE TH. 1987 - Nouveaux Cicindelidae de Madagascar et de Turquie. Rev. franç. Entomol., Paris, N.S., 9: 71-75.
- DÖBLER H. 1973 - Katalog der in den Sammlungen des ehemaligen Deutschen Entomologischen Institutes aufbewahrten Typen - IX. Coleoptera, Cicindelidae. Beitr. Entomol., Berlin, 23: 355-419.
- DOKHTOUROFF W. 1885 - Faune coléopterologique Aralo-Caspienne. I Partie. Cicindelides. Horae Soc. entomol. Rossicae, St. Petersburg, 19: 245-281.
- EICHLER W. 1922 - Verzeichnis der in Kleinasiatischen Sandschaks Trapezunt und Gümish-Chane in J. 1916-1917 gesammelten Coleopteren. Polskie Pismo Entomol., Warsaw, 1: 26-29 [In Polish].
- FAIRMAIRE L. 1866 - Notice sur les Coléoptères récoltés par M. J. Lédérer sur le Bosz-Dagh (Asie mineure). Ann. Soc. entomol. France, Paris, (4) 6: 249-250.
- FAIRMAIRE L. 1884 - Liste des Coléoptères recueillis par M. l'abbé David à Akbès (Asie-Mineure) et descriptions des espèces nouvelles. Ann. Soc. entomol. France, Paris, 6 (4): 165-180.
- FLEUTIAUX É. 1892 - Catalogue systématique des Cicindelidae décrits depuis Linné. Liège, Imprimerie H. Vaillant-Carmann: 1-186.
- FRANZEN M. 1996 - Zur Systematik von *Cephalota circumdata* Dejean in der Türkei: Beschreibung von zwei neuen Unterarten aus Zentralanatolien (Coleoptera, Carabidae, Cicindelinae). Coleoptera, Schwanfelder coleopterol. Mitteil., Schwanfeld, 24: 1-12.
- FRANZEN M. 1998 - Zum Vorkommen von *Cylindera (Cicidina [sic!]) sublacerata* (Solsky, 1874) in der Türkei, mit Bemerkungen zum Status von *C. s. levithoracica* (Horn, 1891) (Coleoptera, Carabidae, Cicindelinae). Nachricht. bayer. Entomol., München, 47: 45-53.
- FRANZEN M. 1999 - Zum taxonomischen Status levantinischer *Lophyridia concolor* (Dejean, 1822) (Coleoptera: Cicindelidae). Nachricht. bayer. Entomol., München, 48: 77-85.
- FRANZEN M., BISCHOFF W. 1995 - Ein Nachweis von *Lophyra bilariola* (Bates, 1874) aus Syrien (Carabidae: Cicindelinae). Zool. Middle East, 11: 87-92.
- FRANZEN M., WIESNER J. 1998 - Erstnachweis von *Cephalota (Taenidia) deserticola* (Faldermann, 1836) für die Türkei (Coleoptera, Cicindelidae). Nachricht. bayer. Entomol., München, 47: 88-91.
- GEBERT J. 1995 - Revision der *Cicindela* (s. str.) *hybrida*-Gruppe (sensu Mandl, 1935/36) und Bemerkungen zu einigen äußerlich ähnlichen paläarktischen Arten (Coleoptera, Cicindelidae). Mitteil. Münchner entomol. Gesellsch., München, 86: 3-32.

- GEBERT J. 1996 - Bemerkungen zu einigen vorwiegend paläarktischen Cicindeliden (Col., Cicindelidae). Entomol. Nachricht. u. Berichte, Dresden, 40: 107-109.
- GEBERT J. 1999 - Bemerkungen zur Phylogenie und Verbreitung von *Cephalota* (*Taenidia*) *circumdata* Dejean, 1822 (Col., Carabidae, Cicindelinae). Entomol. Nachricht. u. Berichte, Dresden, 43: 27-32.
- GILNICKI H. 1872 - Catalogue des Cicindelides et des Carabides recueillis par M. th. Deyrolle en Asie Mineure. Rev. Mag. Zool., Paris, 23 (2): 466-480.
- GORY H.L. 1833 - Centurie de Carabiques nouveaux. Ann. Soc. entomol. France, Paris, 2: 168-179.
- GRANDI G. 1906a - Sulle Cicindele *lunulata* Fabr. ed *aulica* Dej., e sulla loro varietà e distribuzione in Italia. Riv. coleotterol. it., Siena, 4: 85-107.
- GRANDI G. 1906b - Complemento al mio studio sulle Cicindele *aulica* Dej. e *lunulata* Fabr. Riv. coleotterol. it., Siena, 4: 220-227.
- GUÉORGUIEV V.B., GUÉORGUIEV B.V. 1995 - Catalogue of the ground-beetles of Bulgaria (Coleoptera: Carabidae). Pensoft Publishers, Sofia-Moscow: 279 pp.
- GUÉRIN-MÉNEVILLE F.E. 1847 - Decade entomologique. Rev. zool., Paris, 2-6.
- HIEKE F., WRASE D.W. 1988 - Faunistik der Laufkäfer Bulgariens (Coleoptera, Carabidae). D. entomol. Zeitschr., Berlin, N.F., 35: 1-171.
- HORN W. 1922 - Die erste geographisch-fixierte Rasse von *Cicindela Fischeri* Ad. (Col.). Entomol. Mitteil., 11: 20-21.
- HORN W. 1926 - Carabidae: Cicindelinae. In: S. Schenckling (ed.), Coleopterorum Catalogus, Pars 86. Berlin, W. Junk: 1-345 pp.
- HORN W. 1930 - Über die geographische Verbreitung der Rassen von *Cicindela campestris* und *hybrida* (nebst ergänzender Beschreibung von *C. campestris javeti* Chd.). Entomol. Blätter, 26: 27-33.
- HORN W. 1931 - Zur Kenntnis der Cicindelen-Fauna von Cyprien, Syrien, Sizilien, Aegypten und Süd-Griechenland (insbesondere der geographische Verbreitung der Arten *Cicindela aphrodisia* Baudi, *C. campestris suffriani* Loew, *C. contorta* Fisch. und *dorsata* Br., sowie *C. aulica* Dej.). Bull. Soc. roy. Entomol. Egypte, Le Caire, 157-163.
- HORN W. 1938 - 2000 Zeichnungen von Cicindelinae. Entomol. Beihefte Berlin-Dahlem, Berlin, 5: 1-71 + 90 Taf.
- HORN W., ROESCHKE H. 1891 - Monographie der paläarktischen Cicindelen. Analytisch Berücksichtigung der Variationsfähigkeit und geographischen Verbreitung. Berlin: IX-199, Taf. I-VI.
- KLUG F. 1832 - Symbolae physicae seu icones et descriptiones insectorum quae ex itinere per Africam borealem et Asiam occidentalem Friderici Guilelmi Hemprich et Christiani Godofredi Ehrenberg, medicinae et chirurgiae doctorum, studio novae aut illustratae redierunt. Berolini, ex Officina Academica: 1-4, Pl. XXI.
- KORELL A. 1984 - Über *Cephalota zarudniana* und drei weitere Cicindelinae-Arten aus Syrien (Col.: Cicindelidae). Entomolog. Zeitschr. m. Insektenbörse, 94: 221-224.
- KORELL A. 1988 - Die Cicindeliden (Coleoptera) Anatoliens. Vorarbeiten für eine Faunistik nebst taxonomischen und systematischen Anmerkungen. Entomol. Basiliensia, Basle, 12: 93-111.
- KORELL A. 1994 - Die Cicindeliden Anatoliens (Coleoptera: Cicindelidae). Nachträge und Bemerkungen zur gleichnamigen Veröffentlichung in der "Entomologica Basiliensia", 12. Entomolog. Zeitschr. m. Insektenbörse, 104: 42-50.
- KORELL A. 1999 - [Personal communication to the Author].
- KORELL A., KLEINFELD F. 1985 - Eine neue Subspezies von *Cephalota eiselti* Mandl aus Anatolien (Col.: Cicindelidae). Entomolog. Zeitschr. m. Insektenbörse, 95: 204-206.
- KRYZHANOVSKIY O.L., BELOUSOV I.A., KABAK I.I., KATAEV B.M., MAKAROV K.V., SHILENKOV V.G. 1995 - A Checklist of the Ground-Beetles of Russia and Adjacent Lands (Insecta, Coleoptera, Carabidae). Pensoft Publishers, Sofia-Moscow, Series Faunistica No. 3: 1-28.
- JEANNE C. 1986 - Contribution à l'histoire naturelle de l'île de Chypre. Les Coléoptères Carabiques. Biocosme Méditerranéen, 3: 1-33.
- LATREILLE P.A., DEJEAN P.F.M.A. 1822 - Histoire naturelle et Iconographie des insectes Coléoptères d'Europe. Première livraison. Paris, chez Crevor: 1-67.
- LOEW H., 1843 - Beschreibung zweier neuer Cicindelen und Bemerkungen über eine angebliche Varietät der *Cicindela campestris*. Stett. entomol. Zeit., Stettin, 4: 337-343.
- MANDL K. 1934 - *Cicindela lunulata* Fabr. und ihre Rassen (mit besonderer Berücksichtigung des Materials des Deutschen Entomologischen Instituts, Berlin-Dahlem). Arb. morphol. taxon. Entomol. Berlin-Dahlem, Berlin, 1: 124-129, 239-246.
- MANDL K. 1935/36 - Vorarbeiten für eine monographische Neubearbeitung der paläarktischen Cicindelen. Revision der *Cicindela hybrida*-Gruppe (*C. hybrida*, *coerulea*, *transbaicalica*, *altaica*, *maritima*). Arb. morphol. taxon. Entomol. Berlin-Dahlem, Berlin, 1935, 2: 283-306; 1936, 3: 5-32.
- MANDL K. 1937 - *Cicindela silvatica* L. und ihre Rassen (Vorarbeiten für eine monographische Neubearbeitung der paläarktischen Cicindelen). Koleopt. Rundsch., Wien, 23: 136-140.
- MANDL K. 1939 - Geographische Verbreitung, Rassenbildung und Verbreitungswege der europäischen Cicindelaarten. VII. Internationaler Kongress für Entomologie (Berlin, 1938), Weimar, 1: 268-291.
- MANDL K. 1944 - *Cicindela campestris* und ihre Rassen. Koleopt. Rundsch., Wien, 30: 1-13.

- MANDL K. 1961 - Wissenschaftliche Ergebnisse einer Anatolien-Expedition im Jahre 1960. Die Cicindelen- und Caraben-Arten (Col.). Koleopt. Rundsch., Wien, 39: 28-32.
- MANDL K. 1963 - Wissenschaftliche Ergebnisse einer Expedition nach Anatolien im Jahre 1962. Die *Cicindela*-, *Carabus*- und *Calosoma*-Arten (Carabidae, Coleoptera). Koleopt. Rundsch., Wien, 40/41 (1962/63): 45-50.
- MANDL K. 1967 - Ergebnisse zoologischer Sammelreise in der Türkei. Cincindelidae [sic] und Carabidae-Carabini. Ann. Naturhist. Mus. Wien, Wien, 70: 379-386.
- MANDL K. 1972 - *Cicindela fischeri* Adams und ihre Formen (Cicindelidae, Col.). Koleopt. Rundsch., Wien, 50: 15-20.
- MANDL K. 1974 - Bausteine zur Kenntnis der Familie Cicindelidae. Beschreibung neuer Formen und Bemerkungen zu Bekanntnen Formen. *Cicindela* [sic] *eiselti* Mandl und ihre Aberrationen. Zeitschr. Arbeitsgemeinschaft. österr. Entomol., Wien, 24 (1972): 106-108.
- MANDL K. 1981a - Neun neue Formen aus der Familie Cicindelidae aus fünf Kontinenten (Col.). Koleopt. Rundsch., Wien, 55: 3-18.
- MANDL K. 1981b - Revision der unter *Cicindela lunulata* F. im Weltkatalog der Cicindelinae zusammengefaßten Formen. Entomolog. Arb. Mus. G. Frey, Tutzing, 29: 117-176.
- MANDL K. 1981c - Neue Coleopteren-Taxa vom Nahen bis zum Fernen Osten. 1. Eine neue Rasse der *Cicindela* (*Eugrapha*) *contorta* Fischer-Waldheim aus dem Nahen Osten: *valdenbergi* (Coleoptera: Cicindelidae). 2. Kritische Bemerkungen zu der Publikation "Faunistic Study of the Cicindelidae of Iraq and Southwest Asia". Entomol. Basiliensia, Basle, 6: 167-175.
- MANDL K. 1982 - Verbreitungskarten der Arten der *Lophyridia lunulata*-Gruppe (Col., Cicindelidae). Zeitschr. Arbeitsgemeinschaft. österr. Entomol., Wien, 33 (1981): 92-94, Maps 1-3.
- MANDL K. 1988 - *Cicindela campestris* L. und ihre Aufgliederung in Rassen sowie ihr Standort im System auf Grund neuer paläodisziplinärer Erkenntnisse (Coleoptera, Cicindelidae). Zeitschr. Arbeitsgemeinschaft. österr. Entomol., Wien, 40: 33-40.
- MARGGI W. 1992 - Faunistik der Sanbdlaukäfer und Laufkäfer der Schweiz (Cicindelidae und Carabidae, Coleoptera) unter besonderer Berücksichtigung der "Roten Liste". Doc. faun. Helvetiae, 13: 1-477.
- MATALIN A. 1999 - The tiger-beetles of the *hybrida* species-group. II. A taxonomic review of subspecies of *Cicindela sablbergii* Fischer von Waldheim, 1824 (Coleoptera Carabidae Cicindelini). pp. 13-66, in: A. Zamotajlov and R. Sciacchi (eds.), *Advances in Carabidology*. MUISO Publishers, Krasnodar, Russia. Millennium Series, Entomology No. 1.
- MÉNÉTRIÉS E. 1832 - Catalogue raisonné des objets de zoologie recueillis dans un voyage au Caucase et jusq'aux frontières actuelles de la Perse, entrepris par ordre de S. M. l'Empereur. St. Pétersbourg, Imprimerie de l'Académie Impériale des Sciences: 93-97.
- MÉNÉTRIÉS E. 1839 - Catalogue d'insectes recueillis entre Constantinople et le Balkan. Mém. Acad. imp. Sci. St. Pétersb., St. Petersburg, VI série, Sci. Math. Phys. Nat., Tome 5me, 2nde partie: Sci. Nat., t. III, pp. 1-52, tavv. I-II.
- MUCHE H. 1960 - Eindrücke einer Sammelreise durch die Türkei. Entomol. Zeitschr., 70: 181-188.
- NAVIAUX R. 1983 - Coleoptera, Cicindelidae. Une approche de la faune d'Iran. Rev. scient. Bourbonnais, 73-97.
- NUSSBAUM Y. 1987 - Tiger Beetles of Israel and Sinai (Coleoptera: Cicindelidae). Y.E.S. Quart., 4: 7-15.
- PAVESI M. 2000 - [Personal communication to the author].
- PIOCHARD DE LA BRULERIE CH. 1875 - Catalogue raisonné des Coléoptères de la Syrie et l'île de Chypre, 1re partie. Famille des Cicindélides et des Carabides. Ann. Soc. entomol. France, Paris, 5 (5): 100-160.
- PUTCHKOV A.V., CASSOLA F. 1994 - The larvae of tiger beetles from Central Asia (Coleoptera, Cicindelidae). Boll. Mus. civ. St. nat. Verona, Verona, 18 (1991): 11-43.
- PUTSHKOV A.V. 1993 - New taxa of the cicindelid-beetle genus *Cicindela* (Coleoptera, Carabidae) from Ukraine and Turkmenistan. J. Ukrain. entomol. Soc., Kiev, 1: 11-14 [In Russian with English summary].
- PUTSHKOV A.V., SHILENKOV V.G. 1992 - A description of the larva of *Cicindela asiatica* (Coleoptera, Cicindelidae). Vestnik Zool., 2: 71-73 [In Russian with English summary].
- RAGUSA E. 1882 - Coleotteri nuovi o poco conosciuti di Sicilia. Natural. sicil., Palermo, 1: 5-9, Tav. I.
- RAGUSA E. 1887 - Coleotteri nuovi o poco conosciuti di Sicilia. Natural. sicil., Palermo, 6: 214-216.
- RAGUSA E. 1906 - Coleotteri nuovi o poco conosciuti di Sicilia. Natural. sicil., Palermo, 18: 247-250.
- RIVALIER É. 1950a - A propos des taches des Cicindèles. L'Entomologiste, 6: 99-104.
- RIVALIER É. 1950b - Rétablissement de *Cicindela maroccana* Fabricius dans sa qualité d'espèce. Rev. franç. Entomol., Paris, 17: 93-96.
- RIVALIER É. 1950c - Démembrement du genre *Cicindela* L. (Travail préliminaire limité à la faune paléarctique). Rev. franç. Entomol., Paris, 17: 217-244.
- RIVALIER É. 1953 - Les trois grandes sous-espèces de *Lophyridia lunulata* F. Rev. franç. Entomol., Paris, 20: 195-201.
- RIVALIER É. 1971 - Remarques sur la tribu des Cicindelini (Col. Cicindelidae) et sa subdivision en sous-tribus. Nouv. Rev. Entomol., 1: 135-143.
- SBORDONI V., VIGNA TAGLIANTI A. 1989 - Zoological researches in the Near East by the Universities of Rome. 121. List of contributions. Fragm. entomol., Roma, 21: 117-130.
- SCHAUM H.R. 1859 - Beiträge zur europäischen Käferfauna. Berl. entomol. Zeitschr., Berlin, 3: 42-43.

- SCHATZMAYR A. 1935 - Risultati scientifici delle cacce di S.A.S. il Principe A. della Torre e Tasso nelle isole dell'Egeo. I. Caraboidea. Boll. Lab. Zool. gen. agr. Portici, Napoli, 28: 231-246.
- SCHILDER F. 1911 - Ueber neue oder wenig bekannte Varietäten paläarktischer Cicindelinen. Entomol. Blätter, 10/11: 201-203.
- SCHILDER F.A. 1953 - Studien von Evolution von *Cicindela*. Wissenschaftl. Zeitsch. Martin-Luther-Universität, Halle-Wittenberg, Math.-Nat., 3: 539-576.
- SERRANO A.R.M. 1987. Description of the larvae of *Myriochile melancholica* (Fabricius, 1798) (Col. Cicindelidae). Bol. Soc. portug. Entomol., Lisboa, 87 (Suppl. 3-17): 1-13.
- TASSI F. 1968 - Appunti coleotterologici da un viaggio in Grecia e Turchia. Boll. Ass. romana entomol., Roma, 23: 5-17.
- TSCHITSCHÉRINE T. 1903 - Mémoire sur les Cicindélides des voyages de N. Zarudny dans la Perse orientale. Horae Soc. entomol. Rossicae, St. Petersburg, 36: 1-21.
- TURIN H., HAECK J., HENGVELD R. 1977 - Atlas of the carabid beetles of The Netherlands. North Holland Publishing Company, Amsterdam: 1-228, 372 maps.
- WERNER K. 1988 - Field Notes on Tiger Beetles in Turkey (Coleoptera: Cicindelidae). Y.E.S. Quat., 5: 47-51.
- WERNER K. 1991 - Die Käfer der Welt. 13. Cicindelidae 1, Regionis Palaearcticae. Sci. Nat, Venette, 74 pp., pls. 1-30.
- WERNER K. 1992 - Die Käfer der Welt. 13. Cicindelidae 2, Regionis Palaearcticae. Sci. Nat, Venette, 94 pp., pls. 31-57.
- WIESNER J. 1988 - *Lophyna* (s. str.) *hilariola* (Bates, 1874) neu für die Türkei. 14. Beitrag zur Kenntnis der Cicindelidae (Col.). Entomol. Basiliensia, Basle, 12: 113-114.
- WIESNER J. 1992 - Verzeichnis der Sandlaufkäfer der Welt. Checklist of the Tiger Beetles of the World. Verlag Erna Bauer, Keltern: 1-364.
- WILKINS A. 1890 - Les Cicindèles Touraniennes. Étude faunistique et zoo-géographique. Horae Soc. entomol. Rossicae, St. Petersburg, 24: 86-119.
- WILLIS H. 1967 - Bionomics and zoogeography of tiger beetles of saline habitats in the Central United States (Coleoptera: Cicindelidae). Univ. Kansas Sci. Bull., 47: 145-313.
- ZABALLOS J.P., JEANNE C. 1994. Nuevo catalogo de los Carabidos (Coleoptera) de la Peninsula Iberica. Monografias S.E.A. (Sociedad Entomológica Aragonesa), Zaragoza: pp. 1-152.