

Tiger beetle fauna (Coleoptera: Cicindelidae) of Syria: distribution, geographical origin, taxa list and new records

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Jaskuła R., Rewicz T. 2014. Tiger beetle fauna (Coleoptera: Cicindelidae) of Syria: distribution, geographical origin, taxa list and new records. *Baltic J. Coleopterol.*, 14(2): 191 – 198.

Based on the literature data and new faunistic records, the diversity of the tiger beetle fauna of Syria is discussed and the most diverse geographical units within the country are recognized, including: lowlands along the Euphrates and its tributaries (7 taxa, 50% of Syrian fauna) as well as the Ghab depression and narrow coastal plains (3 taxa, 21% of fauna). Assembled by their biogeographical origins, the Syrian tiger beetles (13 species, 14 subspecies) fall into seven different groups: Levant endemics (36% of the Syrian fauna), South-western Asiatic (29%), Mediterranean, Middle Oriental, Turano-Mediterranean, Central Asiatic-Mediterranean, and Afrotropical Indo-Mediterranean (7% each). Lists of taxa for all the Syrian regions and geographical units are also given. New faunistic records for seven tiger beetle species from the Syrian Arab Republic are provided, including *Myriochila melancholica melancholica* and *Calomera littoralis winkleri*, reported for the first time from Aleppo district, *C. l. aulicoides*, from the Al-Raqquah district and *C. aphrodisia aphrodisia* and *C. fischeri fischeri* from the Tartus district.

Key words: Insecta, Levant region, distribution, diversity, checklist

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INTRODUCTION

The Mediterranean Region is known as one of the most important biodiversity centres worldwide (Meyers et al. 2000). The tiger beetle fauna of the region is very diverse, with ca. 50% of all Palearctic species recorded so far from this region (Putchkov & Matalin 2003; Jaskuła 2011). On the other hand, even if the Cicindelidae fauna of the entire Mediterranean Region is generally well recognized, the level of knowledge with respect to particular areas within the region is variable. As a result, some of them still need to be

extensively studied, as the data from such areas are very old or simply scarce.

One of the least studied areas within the Mediterranean Region is the south-eastern part of the Levant, including the Syrian Arab Republic. This region, because of its locality, is very unique and it has been described as a natural crossroad between the eastern Mediterranean, western Asia and northern Africa. As a result, the area is inhabited by faunistic elements from all the above regions.

The first data on the tiger beetle fauna of the Syrian Arab Republic are from the end of the 19th and the beginning of the 20th century (de la Brulerie 1876; Horn 1910; 1927; 1931). Later, Mandl (1944; 1981a, b), Ali (1978), Korell (1984; 1994), Werner (1991; 1992), Wiesner (1992), Franzen (1999; 2001; 2003), and Putschkov & Matalin (2003) provided some additional records for single species only. All of these faunistic data were summarized by Avgin & Wiesner (2009), who also provided new records for seven species, and provided a list of 12 species currently present in Syria. More recently, Deuve (2011, 2012) published new faunistic data, including a description of one new subspecies from this country. As was shown by these authors, only single faunistic records are known for many Syrian tiger beetles or even only general information regarding the presence of some species in the country.

In this paper we provide new faunistic data for seven species of Cicindelidae, including first district records for four of them. Additionally, we provide information on the composition and similarity of the tiger beetle faunas of different districts of Syria, as well as identifying the biogeographic origins of the Syrian Cicindelidae fauna.

MATERIAL AND METHODS

The distributional analysis of the Cicindelidae fauna was mainly based on a literature survey (de la Brulerie 1876; Horn 1910; 1927; 1931; Mandl 1944; 1981a, b; Korell 1984; 1994; Werner 1991; 1992; Wiesner 1992; Franzen 1999; 2001; 2003; Avgin & Wiesner 2009; Deuve 2011, 2012). Additional material used in this study was collected by the authors during the VIIth TB-Quest Expedition to Turkey and Syria in August 2009. During the trip, adult beetles were caught with entomological hand net and preserved in pure ethanol. Material was identified in the laboratory using stereoscopic microscope Nikon SMZ 800, and has been deposited in the first author's collection (RJC). Additionally, the first author had an opportunity to study specimens of Syrian tiger

beetles held in the collection of the Natural History Museum in Vienna (Austria) (NMV).

The similarities between the tiger beetles faunas of various geographical provinces of the Syrian Arab Republic were estimated with the Bray-Curtis index for presence/absence data (Primer v.2.0). The analysis of the biogeographical origin of Syrian Cicindelidae was based on the chorotypes proposed by Vigna Taglianti et al. (1999).

RESULTS AND DISCUSSION

List of species and new records

As a result of the present study, we are able to include 13 species and 14 subspecies of Cicindelidae in the Syrian fauna. New faunistic data are provided for seven species.

1. *Calomera aulica aulica* (Dejean, 1831)

Literature data: Putschkov & Matalin (2003; with no details about any locality).

2. *Calomera concolor rouxi* (Barthélemy, 1835)

Literature data: Franzen (1999).

Material examined: Latakia district: Latakia, 3.1987, 1male, leg. Probst (MHV); Syria [no data], 1male (MHV).

3. *Calomera fischeri fischeri* (M.F. Adams, 1817)

Literature data: Avgin & Wiesner (2009).

Material examined: Taurus district: Dureikish (= Duraykish), 3.1987, 13 females, 6 males, leg. Probst (MHV).

Remarks: According to Avgin & Wiesner (2009), this species was not known from the Tartus district.

4.a. *Calomera littoralis aulicoides* (J.R. Sahlberg, 1913)

Literature data: Korell (1984), Avgin & Wiesner (2009).

Material examined: Deir ez-Zor district: Deir ez-Zor, 12-16.06.1980, 2 females 1 male, leg. Mühle (MHV); Al.-Raqqah district: Hawi al Hawa (near Ar Raqqah), bank of Euphrates river, N35,93634 E38,83510, 224 m, 15.08.2009., 4exx., leg. R. Jaskuła, T. Rewicz, P. Józwiak, A. Stępień (RJC).

4.b. *Calomera littoralis winkleri* (Mandl, 1934)

Literature data: Mandl (1981a-b).

Material examined: Aleppo district: Rasm al Hirmil al Kabir, bank of Euphrates river (reservoir), N36,19206 E38,06530, 316 m, 15.08.2009., 10exx., leg. R. Jaskuła, T. Rewicz, P. Józwiak, A. Stępień (RJC); Deir ez-Zor district: near Qua Sabi, bank of Euphrate river, N35,75339 E39,77381, 15.08.2009., 219m, 1ex., leg. R. Jaskuła (RJC).

Remarks: According to Avgin & Wiesner (2009), this subspecies was not known from the Aleppo district.

5. *Calomera aphrodisia aphrodisia* (Baudi di Selve, 1864)

Literature data: Horn (1931), Korell (1994).

Material examined: Tartus district: Tartus, 3.1987, 1male, leg. Probst (MHV).

Remarks: According to Avgin & Wiesner (2009), this species was not known from the Tartus district.

6. *Cephalota zarudniana vartianorum* (Mandl, 1967)

Literature data: Korell (1984), Avgin & Wiesner (2009).

Material examined: Deir ez-Zor, 11-16.6.1980, 1 female, 1male, leg. Mühle (MHV).

7. *Cicindela berbacea aleppensis* Deuve, 2012

Literature data: Deuve (2012).

8. *Cicindela javeti thughurica* Franzen, 2007

Literature data: Avgin & Wiesner (2009), Deuve (2011).

9. *Homodela ismenia kilikiensis* (Mandl, 1961)

Literature data: (Franzen 2003).

10. *Lophyra hilariola* (Bates, 1874)

Literature data: Franzen & Bischoff (1995), Avgin & Wiesner (2009).

11. *Megacephala euphratica euphratica* Latreille et Dejean, 1822

Literature data: de la Brüllerie (1876), Horn (1927), Franzen (2001), Avgin & Wiesner (2009).

12. *Myriochila orientalis* (Dejean, 1825)

Literature data: Korell (1984).

13. *Myriochila melancholica melancholica* (Fabricius, 1798)

Literature data: Korell (1984), Avgin & Wiesner (2009).

Material examined: Aleppo district: Rasm al Hirmil al Kabir, bank of Euphrates river (reservoir), N36,19206 E38,06530, 316 m, 15.08.2009., 10exx., leg. R. Jaskuła, T. Rewicz, P. Józwiak, A. Stępień (RJC); Uwaynah, bank of Euphrates river, N36,67073 E38,20161, 335 m, 14.08.2009., 10exx., leg. R. Jaskuła, T. Rewicz, P. Józwiak, A. Stępień (RJC); Shuyukh Fawqani, bank of Euphrates river, N36,78531 E38,03479, 332 m, 15exx., leg. R. Jaskuła, T. Rewicz, P. Józwiak, A. Stępień (RJC); bank of small pond close to Euphrates river, N36,74670 E38,08837, 338 m, 1ex., 14.08.2009., 1ex., leg. R. Jaskuła (RJC); Al-Raqqah district: Salsabiyah, N35,93863 E38,73990, 261 m, 15.08.2009., 2ex., leg. R. Jaskuła, T. Rewicz (RJC).

Remarks: According to Avgin & Wiesner (2009), this species was not known from the Aleppo district.

Diversity and distribution of tiger beetles in Syria

Avgin & Wiesner (2009) included 12 species (13 subspecies) in the tiger beetle fauna of the Syrian Arab Republic, and shortly afterwards Deuve (2012) added to this list one additional subspe-

cies described from the country. As a result, the actual checklist of Syrian Cicindelidae includes seven genera, 13 species and 14 subspecies (Table 1). Most of them are widely distributed in the Levant region and/or in the Mediterranean region (Putchkov & Matalin 2003).

Records of Cicindelidae are currently known from only eight Syrian administrative districts or from seven geographical units recognized by Suzuki (1973, Table 1). Among all the districts, the high-

Table 1. Distribution of tiger beetle species in various administrative districts and geographical provinces of the Syrian Arab Republic

No.	TAXON	ADMINISTRATIVE DISTRICT (area size in km ²)														GEOGRAPHICAL UNIT												
		Aleppo (18 500 km ²)	Al-Hasakah (23 334 km ²)	Al-Qunaytirah (1 861 km ²)	Al-Raqqa (19 616 km ²)	As-Suwayda (5 550 km ²)	Damascus (105 km ²)	Dara (3 730 km ²)	Deir ez-Zor (33 060 km ²)	Hamah (8 883 km ²)	Hims (42 223 km ²)	Idlib (6 097 km ²)	Latakia (2 297 km ²)	Rif Damascus (18 032 km ²)	Tartus (1 892 km ²)	Jebel an-Nusseiriyeh and Kurd-Dagh Mountains	Anti-Lebanon Mountains	Hermion Mountains	Ghab depression and intradepressions	Narrow coastal plains	Central Syrian plateau	Palmyrides	Jebel ad-Douz and Jabal at-Tanf	Hawran plateau	Rolling plateau	Jebel Abi el-Aziz and Jabal Sinjar	Lowland along the Euphrates and its tributaries	
1.	<i>Calomera aulica aulica</i>	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	
2.	<i>Calomera fischeri fischeri</i>	+												+				+		+							+	
3.	<i>Calomera littoralis aulicoides</i>				+			+																			+	
4a.	<i>Calomera littoralis winkleri</i>	+											+							+	+							
4b.	<i>Calomera aphrodisia aphrodisia</i>												+		+					+								
5.	<i>Calomera concolor rouxi</i>												+							+								
6.	<i>Cephalota zarudniana vartianorum</i>				+			+																			+	
7.	<i>Cicindela berbaeca aleppensis</i>	+														+												
8.	<i>Cicindela javeti thughurica</i>												+		+													
9.	<i>Homodela ismenia kilikiensis</i>												+							+								
10.	<i>Lophyra hilariola</i>	+		+									+						+								+	
11.	<i>Myriochila orientalis</i>							+																			+	
12.	<i>Myriochila melancholica melancholica</i>	+		+				+		+									+		+						+	
13.	<i>Megacephala euphratica euphratica</i>		+	+				+																		+	+	
Total		5	1	0	5	0	0	0	5	0	1	0	5	1	2	0	2	0	3	3	3	1	0	0	0	0	1	7

Table 2. Chorotypes of the Syrian tiger beetles (after Vigna Taglianti et al. 1999)

Levant endemics	<i>Calomera aphrodisia aphrodisia</i> <i>Calomera concolor rouxi</i> <i>Cicindela berbacea aleppensis</i> <i>Cicindela javeti thughurica</i> <i>Homodela ismenia kilikiensis</i>
Mediterranean	<i>Calomera aulica aulica</i>
Middle Oriental	<i>Calomera fischeri fischeri</i>
Turano-Mediterranean	<i>Megacephala euphratica euphratica</i>
South-western Asiatic	<i>Calomera littoralis aulicoides</i> <i>Calomera littoralis winkleri</i> <i>Cephalota zarudniana vartianorum</i> <i>Lophyra hilariola</i>
Central Asiatic-Mediterranean	<i>Myriochila orientalis</i>
Afrotropico Indo-Mediterranean	<i>Myriochila melancholica melancholica</i>

est number of species is known from Ar-Raqqa, Deir ez-Zor, Aleppo, and Latakia (5 species in each). Two species are known from the Tartus district, only one from the three other districts (Al-Hasakah, Rif Damashq and Hims), and no tiger beetle taxa have been recorded from six districts. According to the geographical units, the highest species diversity is known from the valley of the Euphrates and its tributaries (7 species). From the other six regions, only 1-3 taxa have been noted till now, and no tiger beetle species are known from five regions.

Only three tiger beetle species have been noted from 3 or 4 different Syrian districts (*Myriochila melancholica melancholica*, *Megacephala euphratica euphratica*, *Lophyra hilariola*), while ten other taxa are known from only one or two districts. It is also important to note that for one species (*Calomera aulica aulica*) no detailed localities in Syria are known (Putchkov & Matalin 2003, Avgin & Wiesner 2009, Table 1).

The Bray-Curtis analysis of similarities between tiger beetle faunas of Syrian geographical regions shows the presence of two main groups (Fig. 2). The first one includes tiger beetles inhabiting lowlands along the Euphrates, in the Ghab depression and the Palmyrides regions – areas with the highest concentrations of rivers in Syria, where a mosaic of habitats attractive for Cicindelidae can be found (eg. sandy river banks,

saltmarshes). The second clade is formed by assemblages inhabiting the narrow coastal plains and Central Syrian plateau – mainly comprising lowland regions close to the Mediterranean coast. The tiger beetle faunas of the Anti-Lebanon Mts. and Jebel Abd el-Aziz stand out as characteristic for mountainous areas. Although, for the lack of Cicindelidae records from five geographical regions of Syria (Table 1), it was not possible to compare faunas of all geographical units of this country, the general tendency is similar to other regions of the Mediterranean, such as the Balkans (Jaskuła 2011) or the Maghreb (Jaskuła - unpubl.). In all these cases tiger beetle faunas occurring in lowlands were different from those of the mountainous areas. Also riverine habitats were characterized by high species richness.

Biogeographical origin of Syrian Cicindelidae

The Syrian Cicindelidae belong to seven different groups according to their biogeographical origin (Vigna Taglianti et al. 1999, Table 2). In addition to the Levant endemics (five taxa or 36% of Syrian fauna) and South-western Asiatic taxa (four taxa or 29% of fauna), the representatives of the Mediterranean, Middle Oriental, Turano-Mediterranean, Central Asiatic-Mediterranean, and Afrotropical Indo-Mediterranean species can be found in this region (one species or 7% of fauna in each of these groups). This mosaic of biogeographic elements clearly indicates that

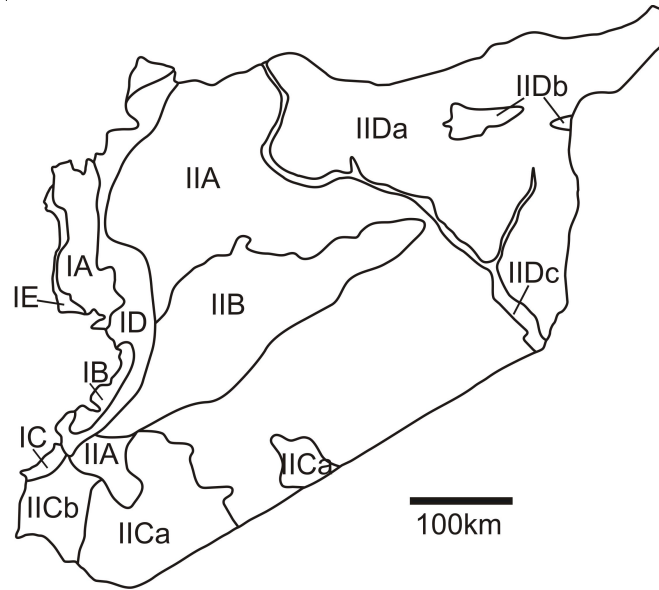


Fig.1. Geographical units (provinces) of Syria (based on Suzuki 1973): I. Western mountainous province: A – Jebel an-Nusseiriyeh and Kurd-Dagh Mountains, B – Anti-Lebanon Mountains, C – Hermon Mountains, D – Ghab depression and intradepressions, E – Narrow coastal plains, II. Syrian plateau province: A – Central Syrian plateau, B – Palmyrides, C – Southwestern regions covered with basalt flows: a – Jebel ad-Drouz and Jabal at-Tanf, b – Hawran plateau, D – Jezire region: a – Rolling plateau, b – Jebel Abd el-Aziz and Jabal Sinjar, c – Lowlands along the Euphrates and its tributaries

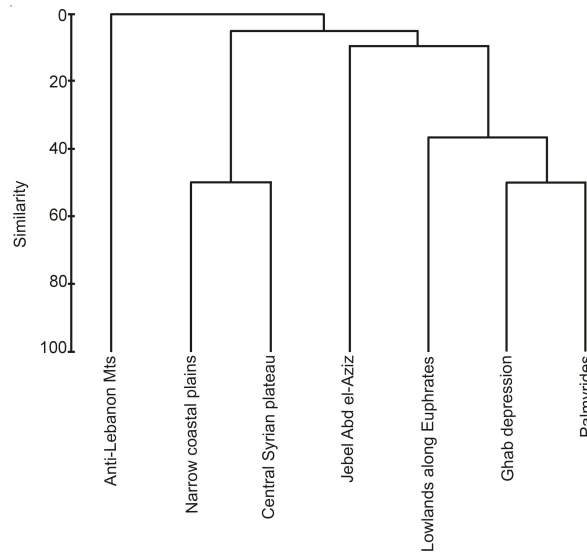


Fig.2. Similarities between tiger beetle faunas inhabiting various regions of Syria (Bray-Curtis similarity index for presence/absence data). Geographical provinces with no data on Cicindelidae (Jebel an-Nusseiriyeh and Kurd-Dagh Mountains, Hermon Mountains, Jebel ad-Drouz and Jabal at-Tanf, Hawran plateau, Rolling plateau) were not included in the analysis

Syria and the Levant region are an important natural bridge for exchange of species between Asia, Africa and Europe.

The present study clearly shows that the Cicindelidae of Syria are still poorly known and even single records are valuable to improve our understanding of the diversity and distribution of this beetle group in the country and in the entire Levant region.

ACKNOWLEDGEMENTS

We would like to thank to Dr. Piotr Józwiak and MSc. Anna Stepień (University of Łódź, Łódź, Poland) for their kind help in collecting material during the entomological trip to Turkey and Syria and Dr. Michael Franzen (Germany) for valuable comments to the first version of this manuscript. The visit of the first author in the Natural History Museum (NMV) in Vienna (Austria) was funded by the SYNTHESYS Project no. AT-TAF-418.

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Received: 16.09.2014
Accepted: 22.10.2014