

Entomofauna	40/2	Heft 24: 487-500	Ansfelden, 10. Okt. 2019
-------------	------	------------------	--------------------------

Overview of the Distribution and Biogeography of Miridae (Hemiptera: Heteroptera) in Turkey

Gülten YAZICI, Mustafa ÖZDEMİR & Erol YILDIRIM

Abstract

Faunistic and systematic studies on Miridae of Turkey are reviewed and the distribution and biogeography of the Turkish Miridae fauna is analyzed. In this study, two species in one genus of Bryocorinae, eight species in two genera of Deraeocorinae, 62 species in 30 genera of Mirinae, 18 species in 12 genera of Orthotylinae and 32 species in 20 genera of Phylinae are recorded. In total, 123 species belonging to 65 genera of five subfamilies of the family Miridae are recorded from Turkey. In this paper, the publications on the Miridae in Turkey were reviewed and the biogeography of the Turkish fauna of Miridae have been analyzed. Species composition, diversity and proportion of endemism varies considerably between the biogeographic subregions of the country.

Zusammenfassung

Faunistische und systematische Studien zu Miridae der Türkei werden überprüft und die Verbreitung und Biogeographie der türkischen Miridae-Fauna analysiert. In dieser Studie werden zwei Arten in einer Gattung von Bryocorinae, acht Arten in zwei Gattungen von Deraeocorinae, 62 Arten in 30 Gattungen von Mirinae, 18 Arten in 12 Gattungen von Orthotylinae und 32 Arten in 20 Gattungen von Phylinae erfasst. Insgesamt 123 Arten aus 65 Gattungen von fünf Unterfamilien der Familie Miridae stammen aus der Türkei. In diesem Beitrag wurden die Publikationen über die Miridae in der Türkei überprüft und die Biogeographie der türkischen Fauna der Miridae analysiert. Die Zusammensetzung der Arten, die Vielfalt und der Anteil des Endemismus variieren stark zwischen den biogeografischen Subregionen des Landes.

Introduction

The Plant bugs (Hemiptera: Miridae) are the most populated family of Hemiptera order, with approximately 11.020 described species (CASSIS & SCHUH 2012). Size variation in

Mirid bugs is from 1 to 15 mm. This family comprising eight subfamilies Isometopinae, Psallopinae Cylapinae, Orthotylinae, Bryocorinae, Deraeocorinae, Mirinae, and Phylinae, which among them subfamilies Mirinae and Phylinae are the most diverse. The Mirinae is the largest subfamily of Miridae with 6 tribe and more than 4000 described species (CASSIS & SCHUH 2012). The Miridae, like the suborder to which they belong are often assumed to be ancestrally phytophagous. Adding to a plant-feeding bias might be the common name "Plant bugs"; that phytophagy is dominant in the family can lead to a common-equals-primitive assumption (WHEELER 2001). Miridae are mostly phytophagous, but some species are predacious or with mixed feeding (zoophytophages); most phytophagous species prefer generative organs of plants (flowers, ovaries and fruits), some may feed on mature seeds (LEHR 1988).

Biogeography is the branch of biology that studies the geographical distribution of animals and plants. Biogeographic regions are usually defined separately for flora and fauna communities and are largely restricted to the terrestrial areas of the Earth. Turkey is generally divided into seven geographical regions. These geographical regions were separated according to their climate, location, flora and fauna, human habitat, agricultural diversities, transportation, topography and so on. Four regions were named after the seas bordering them; the Aegean Region, the Black Sea Region, the Marmara Region and the Mediterranean Region. The other three regions were named in accordance with their location in the whole of Anatolia; Central, Eastern and Southeastern Anatolia Regions. Turkey is a mountainous mass averaging about 1.000 meters in height. The topographic and climatic structure give the country the opportunity to host a rich and diverse fauna (YILDIRIM 2016). Turkey is one of the most interesting countries from the point of view of Heteroptera taxonomy and biogeography.

Turkey occupies Asia Minor between the Mediterranean Sea and the Black Sea and stretches into continental Europe. It has been known to possess a rich fauna of Miridae. Thus, some faunistic and systematic studies about the family Miridae have been conducted by both foreign and native researchers in Turkey. However, no attempt has been undertaken to evaluate the distribution and biogeography of Miridae in Turkey. Yet, such a study is essential for researchers who are interested in Miridae in West Palaearctic region including Turkey.

In this paper, the publications on the Miridae in Turkey were reviewed (HOBERLANDT 1955; ÖNDER 1976; BINGÖL 1978; LODOS et al. 1978; ALTINAYAR 1981; ÖNDER et al. 1981; YAYLA 1983; ÖZKAN 1984; KARAAAT 1986; ÖNDER & LODOS 1987; ÖZBEK & ALAOĞLU 1987; ÇAM 1988; LODOS et al. 1989; ÖNDER et al. 1990, 1998; YILDIRIM & ÖZBEK 1992; GÜÇLÜ et al. 1995 a,b; ÇEVİK 1996; YAŞARAKINCI & HINCAL 1997,2000; TEZCAN & ÖNDER 1999, 2003; YILDIRIM et al. 1999; ATAKAN 2000; BEYAZ 2000; ÖZSARAÇ & KIYAK 2001; LODOS et al. 2003; KIYAK et al. 2004; ÇETİN & ALAOĞLU 2005; AYYILDIZ & ATLIHAN 2006; ÖNDER et al. 2006) and the biogeography of the Turkish fauna of Miridae have been analyzed.

Materials and Methods

In this paper, the previous publications on the Miridae of Turkey are reviewed and the distribution and biogeography of the Turkish fauna of Miridae has been analyzed. In the following text, the endemic species are indicated as such. Faunal similarities between geo-

graphical regions of Turkey were evaluated, without regard to differences in region area by using Jaccard coefficient of similarity (see LEGENDRE & LEGENDRE 1998). The similarity matrix resulting from pair-wise calculations was then subjected to unweighted arithmetic average clustering (Biodiv Pro2. program).

Result and Discussion

As a result, two species in one genus of Bryocorinae, eight species in two genera of Deraeocorinae, 62 species in 30 genera of Mirinae, 18 species in 12 genera of Orthotylinae and 32 species in 20 genera of Phylinae are recorded. In total, 122 species belonging to 65 genera of five subfamilies of the family Miridae are recorded from Turkey (Table 1,2).

Table 1. The number of Turkish Miridae by genera.

Family	Subfamily	Genus and subgenus	Number of species and subspecies	Number of endemic species
Miridae	Bryocorinae	<i>Macrolophus</i>	2	-
	Deraeocorinae	<i>Alloeotomus</i>	1	
	Mirinae	<i>Deraeocoris</i>	7	
		<i>Adelphocoris</i>	3	
		<i>Agnocoris</i>	1	
		<i>Alloeonotus</i>	1	
		<i>Aphanosoma</i>	1	
		<i>Apolygus</i>	1	
		<i>Brachycoleus</i>	2	
		<i>Calocoris</i>	4	
		<i>Capsus</i>	1	
		<i>Charagochilus</i>	1	
		<i>Closterotomus</i>	4	
		<i>Creontiades</i>	1	
		<i>Dionconotus</i>	1	
		<i>Grypocoris</i>	1	
		<i>Horistus</i>	3	
		<i>Liocoris</i>	1	
		<i>Lygus</i>	3	
		<i>Megacoelum</i>	1	
		<i>Orthops</i>	5	
		<i>Phytocoris</i>	5	1
	<i>Polymerus</i>	4		
<i>Rhabdomiris</i>	1			
<i>Stenotus</i>	1			
<i>Taylorilygus</i>	1			

Family	Subfamily	Genus and subgenus	Number of species and subspecies	Number of endemic species
Miridae	Mirinae	<i>Camponotidea</i>	1	
		<i>Acetropis</i>	1	
		<i>Leptopterna</i>	1	
		<i>Megaloceroea</i>	1	
		<i>Notostira</i>	2	
		<i>Stenodema</i>	6	
		<i>Trigonotylus</i>	3	
	Orthotylinae	<i>Anapus</i>	1	
		<i>Euryopicoris</i>	1	
		<i>Halticus</i>	2	
		<i>Orthocephalus</i>	2	
		<i>Strongylocoris</i>	2	
		<i>Blepharidopterus</i>	1	
		<i>Brachynotocoris</i>	1	
		<i>Globiceps f</i>	1	
		<i>Heterocordylus</i>	1	
		<i>Malacocoris</i>	1	
		<i>Orthotylus</i>	4	
		<i>Reuteria</i>	1	
	Phylinae	<i>Amblytylus</i>	1	
		<i>Atomoscelis</i>	1	
		<i>Campylomma</i>	3	
		<i>Chlamydatus</i>	1	
		<i>Chlorillus</i>	1	
		<i>Conostethus</i>	1	
		<i>Ephippiocoris</i>	1	
		<i>Eurycolpus</i>	1	1
		<i>Europiella</i>	1	
		<i>Macrotylus</i>	1	
		<i>Megalocoleus</i>	1	
		<i>Monosynamma</i>	1	
		<i>Nanopsallus</i>	1	
		<i>Oncotylus</i>	4	
		<i>Opisthotaenia</i>	1	
		<i>Phoenicocoris</i>	1	
<i>Plagiognathus</i>	3			
<i>Psallus</i>	4			
<i>Sthenarus</i>	1			
<i>Pilophorus</i>	3			
Total		65	122	2

Table 2: Distribution of Miridae in geographic regions of Turkey.

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Bryocorinae</i> CARVALHO 1957							
<i>Macrolophus costalis</i> FIEBER 1858	+		+	+	+	+	+
<i>Macrolophus melanotoma</i> (A. COSTA 1853)	+	+		+			
<i>Deraeocorinae</i> DOUGLAS & SCOTT 1865							
<i>Alloeotomus gothicus</i> (FALLÉN 1807)	+	+	+			+	+
<i>Deraeocoris (Deraeocoris) ruber</i> (LINNAEUS 1758)	+		+	+	+	+	+
<i>Deraeocoris (Deraeocoris) rutilus</i> (HERRICH-SCHÄFFER 1838)	+	+	+	+	+	+	+
<i>Deraeocoris (Deraeocoris) ventralis</i> REUTER 1904	+				+	+	+
<i>Deraeocoris (Camptobrochis) pallens</i> (REUTER 1904)	+	+			+	+	
<i>Deraeocoris (Camptobrochis) punctulatus</i> (FALLÉN 1807)	+	+	+	+	+	+	+
<i>Deraeocoris (Camptobrochis) serenus</i> (DOUGLAS & SCOTT 1868)	+	+	+	+	+	+	+
<i>Deraeocoris (Knightocapsus) lutescens</i> (SCHILLING 1837)	+		+	+		+	+
<i>Mirinae</i> HAHN 1831							
<i>Adelphocoris lineolatus</i> (GOEZE 1778)	+	+	+	+	+	+	+
<i>Adelphocoris seticornis</i> (FABRICIUS 1775)	+		+				+
<i>Adelphocoris vandalicus</i> (ROSSI 1790)	+	+	+	+	+	+	+
<i>Agnocoris rubicundus</i> (FALLÉN 1807)	+		+	+	+		+
<i>Alloeonotus fulvipes</i> (SCOPOLI 1763)	+			+			+
<i>Aphanosoma italicum</i> A. COSTA 1842	+			+			+
<i>Apolygus lucorum</i> (MEYER-DÜR 1843)	+			+			
<i>Brachycoleus decolor</i> REUTER 1887	+	+		+	+		+
<i>Brachycoleus lineellus</i> JAKOVLEV 1884	+	+		+	+	+	+
<i>Calocoris angularis</i> FIEBER 1864	+		+	+	+	+	+
<i>Calocoris nebulosus</i> FIEBER 1864	+				+	+	+
<i>Calocoris nemoralis</i> (FABRICIUS, 1787)					+		
<i>Calocoris roseomaculatus</i> (DE GEER 1773)	+	+	+	+	+	+	+
<i>Capsus ater</i> (LINNAEUS 1758)	+		+				+
<i>Charagochilus gyllenhalii</i> (FALLÉN 1807)	+	+	+	+	+	+	+
<i>Closterotomus costae</i> (REUTER, 1888)					+		
<i>Closterotomus histrio</i> REUTER 1877	+			+	+	+	

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Closterotomus kroesus</i> (SEIDENSTUCKER, 1977)			+		+		
<i>Closterotomus norvegicus</i> (GMELIN 1790)	+		+	+	+	+	+
<i>Creontiades pallidus</i> (RAMBUR 1839)	+	+			+	+	
<i>Dionconotus neglectus f. major</i> WAGNER, 1968					+		
<i>Grypocoris fieberi</i> DOUGLAS & SCOTT 1868	+	+	+	+	+		
<i>Horistus (Horistus) infuscatus</i> (BRULLÉ, 1832)	+						
<i>Horistus orientalis</i> (GMELIN 1790)	+	+					
<i>Horistus turcomanus</i> (HORVATH 1889)	+				+		
<i>Liocoris tripustulatus</i> (FABRICIUS 1781)	+	+	+	+	+	+	+
<i>Lygus gemellatus</i> (HERRICH-SCHAEFFER 1835)	+	+		+	+		+
<i>Lygus pratensis</i> (LINNAEUS 1758)	+	+	+	+	+	+	+
<i>Lygus rugulipennis</i> POPPIUS 1911	+	+	+	+	+	+	+
<i>Megacoelum sp. cf. brevirostre</i> REUTER, 1879	+						
<i>Orthops (Montanorthops) campestris</i> (LINNAEUS 1758)	+		+	+	+	+	+
<i>Orthops (Montanorthops) forelii</i> FIEBER 1858	+			+			
<i>Orthops (Montanorthops) montanus</i> (SCHILLING 1838)	+				+	+	
<i>Orthops (Orthops) basalis</i> (A. COSTA 1853)	+		+	+			
<i>Orthops (Orthops) kalmii</i> (LINNAEUS 1758)	+	+	+	+	+	+	+
<i>Phytocoris (Leptophytocoris) cf. chardoni</i> PUTON, 1887	+						
<i>Phytocoris (Eckerleinus) obliquoides</i> WAGNER 1959	+			+			
<i>Phytocoris (Leptophytocoris) ustulatus</i> HERRICH-SCHAEFFER 1835	+		+				
<i>Phytocoris (Phytocoris) tiliae</i> (FABRICIUS 1777)	+	+	+	+			
<i>Phytocoris (Exophytocoris) scitulus</i> REUTER, 1908					+		
<i>Polymerus (Poeciloscytus) cognatus</i> (FIEBER 1858)	+	+	+	+	+		+
<i>Polymerus (Poeciloscytus) microphthalmus</i> WAGNER 1951	+				+	+	
<i>Polymerus (Poeciloscytus) unifasciatus</i> (FABRICIUS 1794)	+			+	+	+	+
<i>Polymerus (Poeciloscytus) vulneratus</i> (PANZER 1806)	+	+	+	+	+	+	+
<i>Rhodomiris striatellus striatellus</i> (Fabricius, 1794)	+						

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Stenotus binotatus</i> (FABRICIUS 1794)	+		+		+		+
<i>Taylorilygus apicalis</i> (FIEBER 1861)							+
<i>Camponotidea fieberi</i> REUTER, 1879					+		
<i>Acetropis carinata</i> (HERRICH-SCHAEFFER 1841)	+			+	+	+	
<i>Leptopterna ferrugata</i> (FALLÉN 1807)	+			+			+
<i>Megaloceroea recticornis</i> (GEOFFROY 1785)	+			+	+	+	+
<i>Notostira elongata</i> (GEOFFROY 1785)	+		+	+			+
<i>Notostira erratica</i> (LINNAEUS 1758)	+	+	+	+	+	+	+
<i>Stenodema (Brachystira) calcarata</i> (FALLÉN 1807)	+	+	+	+	+	+	+
<i>Stenodema (Brachystira) trispinosa</i> REUTER 1904	+			+	+		
<i>Stenodema (Stenodema) holsata</i> (FABRICIUS 1787)	+		+				+
<i>Stenodema (Stenodema) laevigata</i> (LINNAEUS 1758)	+	+	+	+	+	+	+
<i>Stenodema (Stenodema) turanica</i> REUTER 1904	+	+	+	+	+	+	+
<i>Stenodema (Stenodema) virens</i> (LINNAEUS 1767)	+	+	+	+	+	+	+
<i>Trigonotylus pulchellus</i> (HAHN 1834)	+	+	+	+	+	+	+
<i>Trigonotylus ruficornis</i> (GEOFFROY 1785)	+	+	+	+	+	+	+
<i>Trigonotylus tenuis</i> REUTER 1893	+						
Orthotylinae VAN DUZEEN 1916							
<i>Anapus dorsalis</i> (REUTER 1890)	+	+	+	+	+	+	
<i>Euryopicoris nitidus</i> (MEYER-DÜR 1843)	+				+	+	
<i>Halticus apterus</i> (LINNAEUS 1758)	+		+	+	+	+	
<i>Halticus luteicollis</i> (PANZER 1804)	+	+	+	+	+	+	+
<i>Orthocephalus saltator</i> (HAHN 1835)	+	+			+	+	+
<i>Orthocephalus vittipennis</i> (HERRICH-SCHAEFFER 1835)	+	+			+		+
<i>Strongylocoris leucocephalus</i> (LINNAEUS 1758)	+					+	+
<i>Strongylocoris niger</i> (HERRICH-SCHAEFFER 1835)	+						+
<i>Blepharidopterus angulatus</i> (FALLÉN 1807)	+		+	+			
<i>Brachynotocoris puncticornis</i> REUTER 1880	+	+		+	+		
<i>Globiceps fulvicollis</i> JAKOVLEV 1877	+						+
<i>Heterocordylus tumidicornis</i> (HERRICH-SCHÄFFER 1835)	+		+			+	+
<i>Malacocoris chlorizans</i> (PANZER 1794)	+		+	+	+		+

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Orthotylus (Melanotrichus) flavosparsus</i> (C.R. SAHLBERG 1841)	+	+	+	+	+	+	+
<i>Orthotylus (Orthotylus) nassatus</i> (FABRICIUS 1787)	+	+	+	+	+	+	+
<i>Orthotylus (Orthotylus) marginalis</i> REUTER 1883	+		+	+	+	+	+
<i>Orthotylus (Orthotylus) obscurus</i> REUTER 1875	+						
<i>Reuteria marqueti</i> PUTON 1875	+				+		+
Phylinae DOUGLAS & SCOTT 1865							
<i>Amblytylus nasutus</i> (KIRSCHBAUM 1856)	+			+	+	+	+
<i>Atomoscelis onustus</i> (FIEBER 1861)	+	+	+	+	+		+
<i>Campylomma diversicornis</i> REUTER 1878	+	+			+	+	+
<i>Campylomma nicolasi</i> PUTON and REUTER 1883	+	+	+	+	+	+	+
<i>Campylomma verbasci</i> (MEYER-DÜR 1843)	+	+	+	+	+	+	+
<i>Chlamydatus pullus</i> (REUTER 1870)	+	+	+	+	+	+	+
<i>Chlorillus pictus</i> (FIEBER 1864)	+						
<i>Conostethus roseus</i> (FALLÉN 1807)	+			+	+	+	
<i>Ephippicoris lunatus</i> POPPIUS 1912	+						
<i>Eurycolpus aureolus</i> SEIDENSTUCKER 1961	+	+		+	+		
<i>Europiella alpina</i> (REUTER 1875)	+			+			
<i>Macrotylus herrichi</i> (REUTER 1873)	+	+		+	+		
<i>Megalocoleus molliculus</i> (FALLÉN 1807)	+	+		+	+	+	
<i>Monosynamma bohemanni</i> (FALLÉN 1829)	+	+		+			+
<i>Nanopsallus carduellus</i> (HORVATH 1888)	+	+		+	+	+	+
<i>Oncotylus (Cylindromelus) setulosus</i> (HERRICH-SCHAEFFER 1837)	+	+		+	+		+
<i>Oncotylus (Oncotylus) pyrethri</i> (BECKER 1864)	+			+	+		
<i>Oncotylus (Oncotylus) punctipes</i> REUTER 1875	+					+	
<i>Oncotylus (Oncotylus) viridiflavus</i> (GOEZE 1778)	+	+	+	+	+	+	+
<i>Opisthotaenia fulvipes</i> REUTER 1901	+	+	+	+		+	+
<i>Phoenicocoris obscurellus</i> (FALLÉN 1829)	+						
<i>Plagiognathus bipunctatus</i> REUTER 1883	+	+	+	+	+	+	+
<i>Plagiognathus chrysanthemi</i> (WOLFF 1804)	+	+	+	+	+	+	+
<i>Plagiognathus fulvipennis</i> (KIRSCHBAUM 1856)	+	+	+	+	+	+	+
<i>Psallus lepidus</i> FIEBER 1858	+	+	+				+
<i>Psallus oleae</i> WAGNER, 1963			+		+		
<i>Psallus pinicola</i> REUTER 1875	+		+	+			
<i>Psallus variabilis</i> FALLEN 1807					+		+

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Sthenarus roseri</i> (HERRICH-SCHAEFFER 1838)	+	+	+	+	+	+	+
<i>Pilophorus cinnamopterus</i> (KIRSCHBAUM 1856)	+		+		+	+	+
<i>Pilophorus clavatus</i> (LINNAEUS, 1767)			+	+	+	+	+
<i>Pilophorus pusillus</i> REUTER 1878	+	+	+	+	+	+	+
Total species	112	56	63	78	84	65	76

Remarks: EA – Eastern Anatolia, SA – Southeastern Anatolia, BS – Black Sea, CA – Central Anatolia, MD – Mediterranean, A – Aegean, M – Marmara.

There are great differences in species composition and richness between the geographic regions of Turkey (Tab. 2, Fig. 2). In this study, 112 species of the Miridae have been recorded from Eastern Anatolia (92% of the recorded species), 56 species from Southeastern Anatolia (46%), 63 species from Black Sea (52%), 78 species from Central Anatolia (64%), 84 species from Mediterranean (69%), 65 species from Aegean (53%), 76 species from Marmara (62%). The diversity of species (112) and genera (59) is highest in the Eastern Anatolia region.

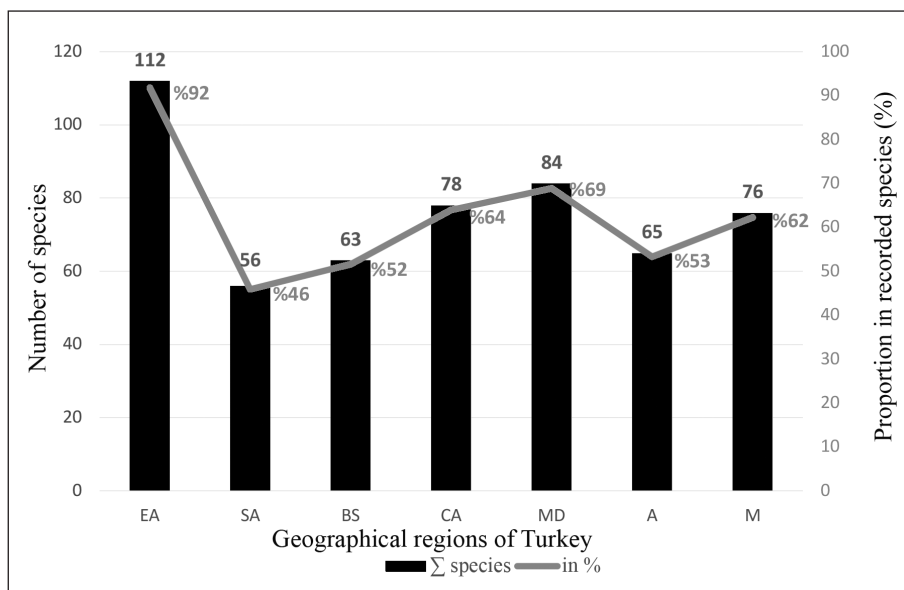


Fig. 2: Number of species of Miridae in the geographical regions of Turkey.

Remarks: EA – Eastern Anatolia, SA – Southeastern Anatolia, BS – Black Sea, CA – Central Anatolia, MD – Mediterranean, A – Aegean, M – Marmara.

The cluster analysis of faunal similarities on Miridae among seven geographical regions of Turkey produce two major clusters (Fig. 3, Tab. 3.): Black Sea and Marmara (similarity 0.66, bootstrap probability 61.6%), Mediterranean and Aegean (similarity 0.70, bootstrap

probability 65.5%) and Eastern Anatolia and Central Anatolia Aegean (similarity 0.74, bootstrap probability 68,1%). Fourth cluster (Southeast Anatolia) demonstrates minimal similarity (0.50) with other Turkish fauna. The isolation of Southeast Anatolia is caused by belonging of this region to Sumerian province of Palaearctic. Eastern Anatolian and Central Anatolia fauna have highest similarity (0.74) and include most of the Miridae species occurring in Turkey.

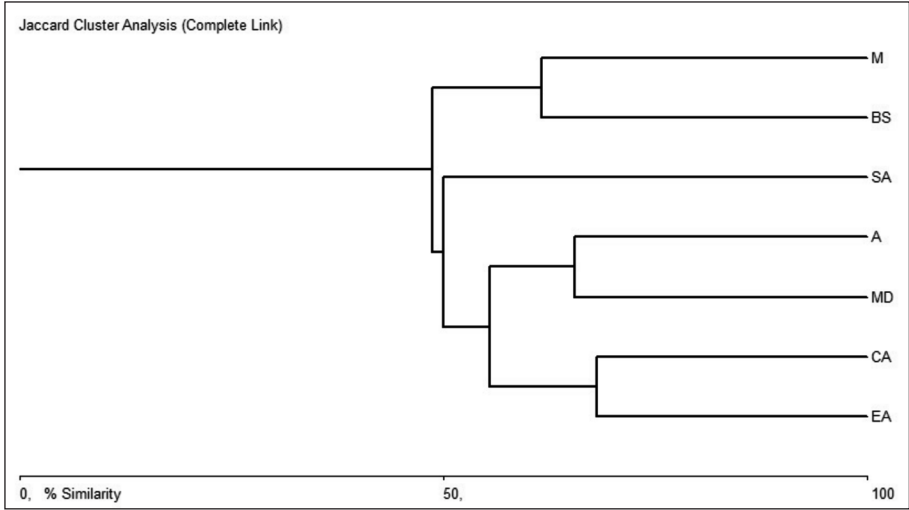


Fig. 3: Similarity of 15 species of Miridae from six geographical regions of Turkey (there are no recorded species from Aegean region) (Dice, $r = 0.66$).

Names of regions: **BS** – Black Sea, **CA** – Central Anatolia, **EA** – Eastern Anatolia, **M** – Marmara, **MD** – Mediterranean, **SA** – Southeastern Anatolia. Number of the species is given in the brackets above the names of regions.

Table 3. Similarity matrix in between the geographical regions of Turkey.

	EA	SA	BS	CA	MD	A	M
EA	*	50	52,1739	68,1416	61,9835	56,6372	63,4783
SA	*	*	48,75	55,814	53,8462	51,25	51,7241
BS	*	*	*	58,427	50	54,2169	61,6279
CA	*	*	*	*	62	55,4348	58,7629
MD	*	*	*	*	*	65,5556	58,4158
A	*	*	*	*	*	*	60,2273
M	*	*	*	*	*	*	*

As a result, a total of 122 species of 62 genera belonging to five subfamilies Bryocorinae, Deraeocorinae, Mirinae, Orthotylinae and Phylinae of Miridae were recorded from Turkey. Moreover, two species are endemic. They are *Phytocoris (Eckerleinius) obliquoides* Wagner 1959, and *Eurycolpus aureolus* Seidenstucker 1961 are considered to be endemic (Tab. 2, 3). Separately, the following species have been found to be the most abundant and widespread (Tab. 2): *Deraeocoris (D.) ventralis*, *D. (C.) serenus*, *Adelphocoris lineolatus*, *A. seticornis*, *A. vandalicus*, *Brachycoleus decolor*, *B. lineellus*, *Calocoris angularis*, *C. roseomaculatus*, *Liocoris tripustulatus*, *Lygus gemellatus*, *L. pratensis*, *L. rugulipennis*, *Orthops (O.) basalis*, *O. (O.) kalmii*, *Polymerus (P) cognatus*, *P. (P) unifasciatus*, *Stenotus binotatus*, *Notostira elongata*, *N. erratica*, *Trigonotylus pulchellus*, *Chlamydatus pullus*, *Megalocoleus molliculus*, *Oncotylus punctipes*, *O. (O.) viridiflavus*, *Opisthotaenia fulvipes*, *Paredrocoris pectoralis* and *Plagiognathus bipunctatus*.

Table 4: Distribution of endemic species in Biogeographic Regions of Turkey.

Names of taxa	EA	SA	BS	CA	MD	A	M
<i>Phytocoris (Eckerleinius) obliquoides</i> WAGNER 1959	+			+			
<i>Eurycolpus aureolus</i> SEIDENSTUCKER 1961	+	+		+	+		
Total species	2	1	-	2	1	-	-

There are great differences in endemic species composition and richness between the biogeographic regions of Turkey (Tab. 4). In this study, two species Miridae have been recorded from Eastern Anatolia, one species from Southeastern Anatolia, two species from Central Anatolia and one species from Mediterranean region. As a result, there is a high probability that the other geographical regions can also appear.

Turkish Miridae fauna can be considered as very rich. Turkey is a country which located as a bridge between Europe and Asia. It has different climatic conditions. Both geographic position and climatic differentiations have some effects on flora and fauna. Because of this, Turkey have been focusing by Turkish and foreign scientists for a long period. The highest number of species is known from the geographical province of Turkey. Turkish Miridae fauna is very rich. The great richness and diversity of the Turkish Miridae fauna is the result of the various topographic and climatic structure of the country. In other hand, Turkey is a boundary of East Mediterranean, Euro-Siberian and Irano-Turanian provinces of Palearctic region that caused the richness of the fauna.

Acknowledgments

We are grateful to Dr. Rauno LINNAVUORI (Finland) and Dr. Chérot FRÉDÉRIC (Belgium) for determining some of the reference material. We also thank all my colleagues that in previous years collected material from different localities of Turkey.

Literature

- ALTINAYAR G. (1981): Orta Anadolu Bölgesi tahıl tarlalarındaki böcek faunasının saptanması üzerinde çalışmalar. – Bitki Koruma Bülteni, **21** (2): 53-88.
- ATAKAN E. (2000): Avcı böcek *Chrysoperla carnea* S. (Neuroptera: Chrysopidae), *Deraeocoris pallens* Reut. (Hemiptera: Miridae) ve *Orius niger* Wolff (Hemiptera: Anthocoridae)'nin pamuk bitkisinde Mountainlımı. – Türkiye Entomoloji Dergisi, **24** (4): 267-277.
- AUKEMA B. (2013): Fauna Europaea: Miridae. Fauna Europaea Version 2.6.2, <http://www.fauna-eur.org> (accessed 3 November 2016).
- AYYILDIZ Y. & R. ATLIHAN (2006): Balıkesir İli sebze alanlarında görülen yaprakbiti türleri ve doğal düşmanları. – Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, Tarım Bilimleri Dergisi, **16** (1): 1-5.
- BEYAZ G. (2000): Manisa yöresi kültür kekiği (*Origanum* spp.) üretim alanlarındaki Heteroptera takımına bağlı böcek faunasının belirlenmesi üzerine araştırmalar. – Yüksek Lisans Tezi, Ege Üniversitesi, Fen Bilimleri Enstitüsü, İzmir, 52 pp.
- BİNGÖL C.M. (1978): Güneydoğu Anadolu Bölgesi'nde kültür yem bitkilerinde zarar yapan Miridae ve Curculionidae familyalarına ait böcek türleri, tanınmaları ve zararları üzerinde araştırmalar. – Bölge Zirai Mücadele Araştırma Enstitüsü, **4**: 7, Diyarbakır.
- CASSIS G. & R.T. SCHUH (2012): Systematic, biodiversity, biogeography, and host associations of the Miridae (Insecta: Hemiptera: Heteroptera: Cimicomorpha). – The Annual Review of Entomology, **57**: 377-404.
- ÇAM H. (1988): Tokat ve çevresinde kiraz, vişne ve idris ağaçlarında bulunan Heteroptera türlerinin tanınmaları ve beslenme rejimleri üzerinde araştırmalar. – Yüksek Lisans Tezi, Ege Üniversitesi Fen Bilimleri Enstitüsü, İzmir, 52 pp.
- ÇETİN H. & Ö. ALAOĞLU (2005): Mut (Mersin) İlçesinde zeytin ağaçlarında bulunan yararlı böcek türlerinin tespiti ve önemli türlerin popülasyon değişimi. – Selçuk Üniversitesi, Ziraat Fakültesi Dergisi, **19** (36): 59-65.
- ÇEVİK T. (1996): Orta Anadolu Bölgesi ceviz ağaçlarında zararlı ve faydalı faunanın tespiti üzerinde araştırmalar. – Bitki Koruma Bülteni, **36** (1-2): 55–72.
- GENÇER N.S., KOVANCI O.B., KOVANCI B. & H.C. AKGÜL (2004): Bursa ili çilek üretim alanlarında bulunan Hemiptera takımı türleri. – Türkiye Entomoloji Dergisi, **28** (1): 69-80.
- GÜÇLÜ Ş., HAYAT R. & H. ÖZBEK (1995a): Erzurum ve çevre illerde ceviz (*Juglans regia* Linnaeus)'de bulunan fitofag böcek türlerinin tespiti üzerine araştırmalar. – Türkiye Entomoloji Dergisi, **19** (2): 137-145.
- GÜÇLÜ Ş., HAYAT R. & H. ÖZBEK (1995b): Artvin yöresinde zeytin (*Olea europaea* L.)'de bulunan fitofag ve predatör böcek türleri. – Türkiye Entomoloji Dergisi, **19** (3): 231-240.
- HOBERLANDT L. (1955): Results of the zoological scientific expedition of the national museum in Praha to Turkey. – Acta Entomologica Musei Nationalis Pragae, **3**: 261.
- KARAAT Ş. (1986): Doğu ve Güneydoğu Anadolu Bölgelerinde tütün (*Nicotiana tabacum* L.)'de zararlı olan böcek türleri, tanınmaları, yayılış alanları ve zararları üzerinde araştırmalar. – Diyarbakır Bölge Zirai Mücadele Araştırma Enstitüsü Müdürlüğü, Araştırma Eserleri Serisi, No:4, 74.
- KIYAK S., ÖZSARAC Ö. & A. SALUR (2004): Additional notes on the Heteroptera fauna of Nevşehir province (Turkey). – G.U. Journal of Science, **17** (1): 21-29.
- LEGENDRE, L. & P. LEGENDRE (1998): Numerical ecology. Developments in enviromental modeling, 2nd edition. – Elsevier Scientific Publishing Co., Amsterdam, Oxford & New York.

- LEHR A.P. (1988): Keys to the insects of the far east of the USSR, Volume II. (Hemiptera). – Academy of Sciences of the USSR Far East Branch Institute of Biology and Soil Sciences.
- LODOS N., ÖNDER F., PEHLIVAN E. & R. ATALAY (1978): Ege ve Marmara Bölgesinin zararlı bölgel faunasının tespiti üzerine çalışmalar. – T.C. Gıda-Tarım ve Hayvancılık Bakanlığı Ziraat Mücadele ve Ziraat Karantina Genel Müdürlüğü, Ankara, 135-136.
- LODOS N., ÖNDER F., PEHLIVAN E., ATALAY R., ERKİN E., KARSAVURAN Y. & S. TEZCAN (1989): Akdeniz bölgesinin ziraatta zararlı ve faydalı böcek faunasının tespiti üzerinde araştırmalar [Curculionidae, Scarabaeidae (Coleoptera), Plataspidae, Cydnidae, Acathosomatidae, Scutelleridae, Pentatomidae, Lygaeidae, Miridae (Hemiptera)]. – Ege Üniversitesi, Ziraat Fakültesi, Bitki Koruma Bölümü, Bornova, İzmir, 75 pp.
- LODOS N., ÖNDER F., PEHLIVAN E., ATALAY R., ERKİN E., KARSAVURAN Y., TEZCAN S. & S. AKSOY (2003): Faunistic studies on Miridae (Hemiptera) of western Black Sea, Central Anatolia and Mediterranean Regions of Turkey. – Department of Plant Protection Faculty of Agriculture University of Ege 35100 Bornova, İzmir, 85 pp.
- ÖNDER F. (1976): Türkiye Miridae (Hemiptera) faunası üzerinde sistematik çalışmalar. – Doçentlik Tezi, Ege Üniversitesi Ziraat Fakültesi, Entomoloji ve Ziraat Zooloji Kürsüsü, İzmir, 506 pp.
- ÖNDER F., ÜNAL A. & E. ÜNAL (1981): Hemiptera fauna collected by light traps in some districts of northwestern part of Anatolia. – Türkiye Bitki Koruma Dergisi, **5** (3): 151-169.
- ÖNDER F. & N. LODOS (1987): Türkiye’de bulunan predatör Hemiptera türleri üzerinde genel bir değerlendirme. – Türkiye Entomoloji Dergisi, **11** (2): 117-125.
- ÖNDER F., KARSAVURAN Y. & S. TEZCAN (1990): Yabancı ot savaşında potansiyel öneme sahip Türkiye Hemiptera faunası üzerinde araştırmalar. – Çevre Biyolojisi Sempozyumu, Ankara, 15 pp.
- ÖNDER F., KARSAVURAN Y. & S. TEZCAN (1998): Investigations on the vertical distribution in the habitats of plant bugs (Hemiptera: Miridae) of Turkey. – Ege Üniversitesi Ziraat Fakültesi Dergisi, **35** (1-3): 33-40.
- ÖNDER F., KARSAVURAN Y., TEZCAN S. & M. FENT (2006): Türkiye Hemiptera Kataloğu. – Meta Basım Matbaacılık Hizmetleri, İzmir, 164 pp.
- ÖZBEK H. & Ö. ALAOĞLU (1987): Erzurum ve çevresinde patates bitkisinde bulunan fitofag Hemiptera türleri. – Bitki Koruma Bülteni, **27** (3-4): 227-238.
- ÖZKAN A. (1984): Antalya ve çevresi yumuşak çekirdekli meyve ağaçlarının Coleoptera ve Hemiptera takımlarına ait faydalı böcek türleri, tanımları, konukçuları ve önemlilerinin etkinlikleri üzerine araştırmalar. – Biyolojik Mücadele Araştırma Enstitüsü, Antalya, 65 pp.
- ÖZSARAC Ö. & S. KIYAK (2001): A study on the Hemiptera fauna of Bozcaada (Çanakkale Province). – Turkish Journal of Zoology, **25**: 313-322.
- TEZCAN S. & F. ÖNDER (1999): Heteropterous insects associated with cherry trees in Kemalpaşa district of İzmir, Turkey. – Ege Üniversitesi Ziraat Fakültesi Dergisi, **36** (1-3): 119-124.
- TEZCAN S. & F. ÖNDER (2003): İzmir ve Manisa illeri ekolojik kiraz bahçelerinin faunası üzerinde araştırmalar: Hemiptera takımına bağlı türler üzerinde bir değerlendirme. – Anadolu, **13** (1): 124-131.
- WHEELER G.A. (2001): Biology of the plant bugs. – Cornell University Press, Ithaca, NY.
- YAŞARAKINCI N. & P. HINCAL (1997): İzmir ilinde örtü altında yetiştirilen domates, hıyar, biber ve marulda bulunan zararlı ve faydalı türler ile bunların popülasyon yoğunlukları üzerinde araştırmalar. – Bitki Koruma Bülteni, **37** (1-2): 79-89.

- YAŞARAKINCI N. & P. HINCAL (2000): İzmir ilinde örtü altında yetiştirilen patlıcanda bulunan zararlılar ile bunların doğal düşmanları ve popülasyon gelişmeleri üzerinde çalışmalar. – Bitki Koruma Bülteni, **40** (1-2): 29-48.
- YAYLA A. (1983): Antalya ve çevresi zeytin ağaçlarında rastlanan faydalı Hemipter'lerin tanımları, konukçuları ve etkinlikleri üzerine araştırmalar. – Biyolojik Mücadele Araştırma Enstitüsü, Antalya, 58 pp.
- YILDIRIM E. & H. ÖZBEK (1992): Erzurum Şeker Fabrikasına bağlı şekerpancari üretim alanlarındaki zararlı ve yararlı böcek türleri. – Türkiye II. Entomoloji Kongresi, 28-31 Ocak 1992, Adana, 621-635.
- YILDIRIM E., ÖZBEK H. & F. ÖNDER (1999): Atatürk Üniversitesi (Erzurum) kampus alanında ışık tuzaklarında yakalanan Hemiptera türleri üzerinde bir araştırma. – Türkiye Entomoloji Dergisi, **23** (3): 225-228.
- YILDIRIM E. (2016): Overview of the Distribution and Biogeography of Sapygidae (Hymenoptera: Aculeata) in Turkey. – Entomofauna, **36**: 565-573.

Authors' addresses:

Dr. Gülten YAZICI & Dr. Mustafa ÖZDEMİR
Directorate of Plant Protection Central Research Institute,
Gayret Mahallesi, Fatih Sultan Mehmet Bulvarı. No: 66,
06172 Yenimahalle / Ankara
E-mail: gultenkulekci@hotmail.com

Prof. Dr. Erol YILDIRIM
Atatürk University, Faculty of Agriculture
Department of Plant Protection
TR-25240 Erzurum, Turkey
E-mail: yildirimerol@hotmail.com

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Entomofauna](#)

Jahr/Year: 2019

Band/Volume: [0040](#)

Autor(en)/Author(s): Yazici Gülten, Özdemir Mustafa, Yildirim Erol

Artikel/Article: [Overview of the Distribution and Biogeography of Miridae \(Hemiptera: Heteroptera\) in Turkey 487-500](#)