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First record of *Corythauma ayyari* (Drake, 1933) (Hemiptera: Heteroptera: Tingidae) in Egypt

Torsten van der Heyden

Immenweide 83, D-22523 Hamburg, Germany.

E-mail: tmvdh@web.de ORCID iD: 0000-0003-4138-7160

ABSTRACT: The first record of *Corythauma ayyari* (Drake, 1933) for Egypt is reported. Information on the known distribution of this invasive species in the Mediterranean Region is summarized and discussed.

KEYWORDS: *Corythauma ayyari*, first record, invasive species, distribution, Mediterranean Region, pest.

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INTRODUCTION

Fifteen years ago, the Oriental tingid *Corythauma ayyari* (Drake, 1933) (Hemiptera: Heteroptera: Tingidae), which is native to India, Laos, Malaysia, Pakistan, Singapore, Sri Lanka, Thailand and Vietnam (Roca-Cusachs & Goula, 2014; Haouas et al., 2015; van der Heyden, 2019), was found in the Mediterranean Region for the first time (Novoselsky & Freidberg, 2013). Since then, the species has spread in the area. So far, *C. ayyari* has been reported from France (Streito et al., 2010), Italy (Pedata et al., 2013; Carapezza, 2014), Spain (Roca-Cusachs & Goula, 2014), Greece (Rietschel, 2015), Malta (Carapezza & Mifsud, 2015) and Monaco (van der Heyden, 2019) in Europe, from Israel (Novoselsky & Freidberg, 2013), the United

Arab Emirates (Carapezza, 2014; Carapezza et al., 2014) and Syria (Zeity & Ali, 2019) in the Middle East as well as from Tunisia (Haouas et al., 2015) in Northern Africa.

C. ayyari is considered a serious pest, as nymphs and adults of the species are causing severe damages by feeding on different ornamental plants, especially on various species of *Jasminum* (Oleaceae) (van der Heyden, 2019).

MATERIAL AND METHODS

On 01.06.2017, Yasmin Abdel Monem photographed a specimen of *C. ayyari* in Cairo, the capital of Egypt. On that occasion, several specimens of *C. ayyari* were invading *Jasminum sambac* L. The photograph was published in the online database iNaturalist (Abdel Monem, 2017).

DISCUSSION

As *C. ayyari* has not been reported for Egypt in scientific publications yet, the record reported in this note is the first one for this country. Very likely, the species is present in other countries of the Mediterranean Region, but has been overlooked so far.

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Seven new records for the Heteroptera (Hemiptera) fauna of Kosovo

Devrim Baymak^{1*} Suat Kiyak²

¹National Institute of Public Health of Kosova, 10000 Nëna Tereze, Pristina, KOSOVA

²Gazi Universty, Faculty of Sciences, Department of Biology,
06500 Teknikokullar, Ankara, TURKEY

E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283 (SK)

ABSTRACT: This study, in which new records were given from Kosovo, was made on the basis of 28 specimens of 7 species of 7 genera in 4 families in the suborder Heteroptera (Hemiptera) in Kosovo. This seven species given in this study are; Lygaeidae: *Spilostethus pandurus* (Scopoli, 1763), *Gastrodes grossipes* (De Geer, 1773) and *Scolopostethus grandis* (Horvath, 1880); Rhopalidae: *Stictopleurus abutilon* (Rossi, 1790); Coreidae: *Enoplops disciger* (Kolenati, 1845); Scutelleridae: *Odontotarsus purpureolineatus* (Rossi, 1790) and *Eurygaster maura* (Linnaeus, 1758).

The examined material was collected during the field studies in Prizren, Peja, Shtime, Kacanik, Pristina, Dragas, Gjakova and Strpce in Kosovo between 2011-2012.

The distribution of these species in Kosovo were shown on the map .

KEYWORDS: Heteroptera, seven new records, fauna, Kosovo .

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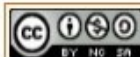
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INTRODUCTION

The known fauna of Heteroptera species in Kosovo is still in its infancy/ beginning and is usually based on several studies on 19 and 20-century studies. The informations about the Kosovo Heteroptera fauna are records of the work of scientists who were doing research when Kosovo was connected to the former Yugoslavia and former Serbia. (Schumacher, 1918; Horváth, 1903, 1916.;

Kormilev, 1936, 1939; Csiki, 1940, Josifov, 1986; Josifov & Simov 2006). The recent studies on the Heteroptera fauna of Kosovo are among the studies carried out by Protic between 1988 and 2011. The latest study of Heteroptera fauna of Kosovo belongs to Baymak & Kiyak (2019) and 6 new records from the country were given. When all these studies are evaluated, the number of known species from Kosovo are 228.



MATERIAL AND METHODS

This study was conducted in Kosovo, a total of 28 adult specimens of seven species were collected from 13 locations in Kosovo from June to September during in 2011-2012 (Figure 1 and Table 1).

The specimens of Heteroptera were collected by an insect trap and killed in 70% alcohol jars and were prepared based on technical and standards of data collection of the zoology museum. These were determined us-

ing identification keys by Stichel (1957-1962), Pehlivan (1981) and Bei-Bienko (1964). In this study was given the provinces of Kosovo where new faunistic records of seven species belonging to four families of the suborder Heteroptera collected and recorded (Table 2). The distribution of the species is marked on the map (Figure 1).

All samples are deposited in the collection of the Zoological Museum of Gazi University (ZMGU), Ankara, Turkey.



Fig. 1. Study area and localities in the Republic of Kosovo

Table 1. Sampling localities of Heteroptera specimens from Kosovo. Geographical coordinates, sampling date, number of examples (n).

Locality No	Province	Coordinates	Altitude (m)	Sampling Date	n
D1	Prizren	42°12'33.N,20°44'42.E	450-550	22.07.2012	1
D2	Gjakova(Skivjan)	42°25'52.N,20°22'54.E	400-440	23.07.2012	1
D3	Prizren(Musnikov)	42°10'36.N,20°54'31.E	950-1000	24.07.2012	1
D4	Pristina	42°40'3.N,21°13'38.E	700-1000	22.07.2012	2
D5	Prizren (Prevalac)	42°9'42.N,20°54'42.E	1200-1500	24.07.2012	2
D6	Prizren	42°12'22.N,20°45'21.E	400-500	25.07.2012	1
D7	Shtime	42°26'14.N,21°1'23.E	600-650	25.07.2012	1
D8	Peja	42°39'12.N,20°17'26.E	500-550	22.07.2012	2
D9	Kacanik	42°15'24.N,21°13'37.E	500-600	22.07.2012	2
D10	Prizren (Lokvica)	42°9'13.N,20°47'28.E	900-1200	22.07.2012	1
D11	Dragas (Brod)	42°0'2.N,20°41'28.E	1000-1500	30.07.2012	7
D12	Peja	42°38'0.N,20°16'37.E	600-1000	26.06.2012	1
D13	Strpce	42°11'59.N,20°59'5.E	900-1250	28.07.2012	1

RESULTS

New records of Heteroptera fauna in Kosovo are as follows:

Family: Lygaeidae Schilling, 1829

Spilostethus Stal, 1868

Spilostethus pandurus (Scopoli, 1763)

Material examined:

Loc. D7, Shtime (Belay) 42°26'14.N, 21°1'23.E, 600-650 m, 25.07.2012; 1♀, 2♂♂, 1♂.
Loc. D8, Peja 42°39'12.N, 20°17'26.E, 500-550 m, 22.07.2012; 2♀♀.

Gastrodes Westwood, 1840

Gastrodes grossipes (De Geer, 1773)

Material examined:

Loc. D5, Prizren (Prevalac) 42° 9'42. N, 20°54'42.E, 1200-1500 m, 24.07.2012; 1♀, 1♂.

Scolopostethus Fieber, 1860

Scolopostethus grandis (Horvath, 1880)

Material examined:

Loc. D2, Gjakova (Skivjan) 42°25'52.N, 20°22'54.E, 400 m, 23.07.2012 1♂.

Family: Rhopalidae Amyot & Serville, 1843

Stictopleurus (Schilling, 1827)

Stictopleurus abutilon (Rossi, 1790)

Material examined:

Loc. D13, Strpce 42°11'59.N, 20°59'5.E, 1250 m, 28.07.2012; 1♀,
Loc. D4, Pristina 42°40'3.71"K 21°13'38.45"E 700-1000 m, 22.07.2012; 1♀, 1♂.

Family: Coreidae Leach, 1815

Enoplops Amyot & Serville, 1843

Enoplops disciger (Kolenati, 1845)

Material examined:

Loc. D6, Prizren 42°12'22.22"K 20°45'21.14"E, 500 m, 25.07.2012; 1♀.

Family: Scutelleridae Leach, 1815

Odontotarsus Laporte, 1833**Odontotarsus purpureolineatus (Rossi, 1790)****Material examined:**

Loc. D1, Prizren 42°12'33.N 20°44'42.E, 450 m, 22.07.2011; 1♂,

Loc. D7, Shtime (Belay) 42°26'14.N, 21°1'23.E, 600 m, 25.07.2012; 1♂,

Loc. D11, Dragas (Brod) 42° 0'2.N 20° 41'28.E, 1500 m, 30.07.2012; 1♀.

Eurygaster Laporte, 1833**Eurygaster maura (Linnaeus, 1758)****Material examined:**

Loc. D11, Dragas (Brod) 42° 0'2.N 20° 41'28.E, 1000-1500 m, 30.07.2012; 6♀♀, 1♂,

Loc. D9, Kacanik 42°15'24.N, 21°13'37.E, 500-600 m, 22.07.2012; 1♀, 1♂,

Loc. D12, Peja 42°38'0.N, 20° 16'37.E, 1000 m, 26.06.2012; 1♂,

Loc. D10, Prizren (Lokvica) 42° 9'13.N, 20°47'28.E, 900 m, 22.07.2012; 1♀,

Loc. D7, Shtime (Belay) 42°26'14.N, 21°1'23.E, 650 m, 25.07.2012; 1♂, Loc. D3, Prizren (Musnikova) 42°10'36.N, 20° 54'31.E, 950 m, 4.07.2012; 1♂.

CONCLUSION AND DISCUSSION

This study is based on 28 specimens of the four Heteroptera families. The specimens from the following provinces of Kosovo were collected and recorded: Prizren, Gjakova, Pristina, Shtime, Peja, Kacanik, Dragas, Strpce (Table 2).

These have been identified as 7 new faunistic records for Heteroptera from Kosovo.

The newly recorded seven species from Kosovo are **Lygaeidae:** *Spilostethus pandurus* (Scopoli, 1763), *Gastrodes grossipes* (De Geer, 1773) and *Scolopostethus grandis* (Horvath, 1880); **Rhopalidae:** *Stictopleurus abutilon* (Rossi, 1790); **Coreidae:** *Enoplops disciger* (Kolenati, 1845); **Scutelleridae:** *Odontotarsus purpureolineatus* (Rossi, 1790) and *Eurygaster maura* (Linnaeus, 1758).

The number of species we earlier detected as a result of the literature research in the study area (Kosovo) was 222. With 6 new records (Baymak & Kiyak, 2019) published earlier, the number of species belonging to the fauna of Heteroptera in Kosovo reached 228 species.

Table 2. Heteropteran species recorded from Kosovo provinces.

Province	The name of the Species
Prizren	<i>Gastrodes grossipes</i> (De Geer, 1773), <i>Enoplops disciger</i> (Kolenati, 1845), <i>Odontotarsus purpureolineatus</i> (Rossi, 1790), <i>Eurygaster maura</i> (Linnaeus, 1758)
Gjakova	<i>Scolopostethus grandis</i> (Horvath, 1880)
Pristina	<i>Stictopleurus abutilon</i> (Rossi, 1790)
Shtime	<i>Spilostethus pandurus</i> (Scopoli, 1763), <i>Odontotarsus purpureolineatus</i> (Rossi, 1790)
Peja	<i>Spilostethus pandurus</i> (Scopoli, 1763), <i>Eurygaster maura</i> (Linnaeus, 1758)
Kacanik	<i>Eurygaster maura</i> (Linnaeus, 1758)
Dragas	<i>Odontotarsus purpureolineatus</i> (Rossi, 1790), <i>Eurygaster maura</i> (Linnaeus, 1758)
Strpce	<i>Stictopleurus abutilon</i> (Rossi, 1790)

With the 7 species we recorded with this study, the Kosovo Heteroptera fauna reached 235 species.

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Additional Records for the Gerromorpha and Nepomorpha (Hemiptera: Heteroptera) Fauna of Turkey

Tuğçe Banbal¹ Meral Fent²

¹Trakya University, Medicine Faculty, Department of Oncology, 22030, Edirne, TURKEY

²Trakya University, Faculty of Science, Department of Biology, 22030 Edirne, TURKEY

Corresponding author E-mail: m_fent@hotmail.com

ABSTRACT: This study was performed in the period March-September in the years 2013 and 2014 in various freshwater habitats in Edirne of Thrace region in order to determine the aquatic and semi-aquatic Heteroptera fauna of the city. As a result 28 species belonging to 14 families from Gerromorpha and Nepomorpha were identified. Habitat and distribution informations of the species were given.

KEYWORDS: Additional records, Gerromorpha, Nepomorpha, fauna, Turkey

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INTRODUCTION

Gerromorpha and Nepomorpha infraorders are two of the 7 infraorders subject to the Heteroptera (Hemiptera) suborder and include aquatic and semiaquatic species. In the Palearctic Region, Gerromorpha and Nepomorpha are represented by 92 genera, 582 species and 39 subspecies belonging to 16 families, while 78 species / subspecies (51 species / 25 subspecies) belonging to 14 families are known in our country (Fent *et al.* 2011; Aukema *et al.*, 2013, Banbal & Fent, 2016) .

The first comprehensive study on Gerromorpha and Nepomorpha in Turkey dates back to Hoberlandt (1952) in which he

summarized all the available records from the country. Recently Fent *et al.* (2011), performed a detailed study in which a critical checklist was given for aquatic and semi-aquatic Heteroptera of Turkey and Thrace Region based on both new (4 new records for Turkey fauna and 4 new records for Thrace Region fauna) and all previous records. After this study, Dursun (2012), Topkara (2013), Topkara *et al.* (2013), Banbal & Fent (2016), Fent & Dursun (2018), Dursun & Fent (2018, 2019) have conducted studies in various regions and Banbal & Fent (2016) Turkey addition of a new record for the number of known species of fauna has increased to 77.



MATERIALS AND METHODS

The research material was collected from various natural and artificial aquatic wetlands, includes natural and artificial lakes, such as lakes, ponds, dams, rivers, streams irrigation channels and trough, in 129 locations determined in Edirne Province during the March- September periods between 2013 and 2014, especially in the spring-summer periods when Gerromorpha and Nepomorpha species are active.

The material was sampled from the water body, water surface and waterfront with the help of a sweeping net and all the

sampled material was placed and kept in 96% ethanol containing tubes. Male genital organs were dissected and parameres were used in the identification of the species. The diagnostic keys of Nieser (1972), Poisson (1957), Jansson (1986), Andersen (1990, 1993), Rabitsch (2005) and Kanyukova (2006) were consulted in identifications of the sampled material.

The researched localities in Edirne province are shown on the map (Fig.1) and names coordinates, altitudes, habitat features of localities, and dates of field studies are given in Table 1.

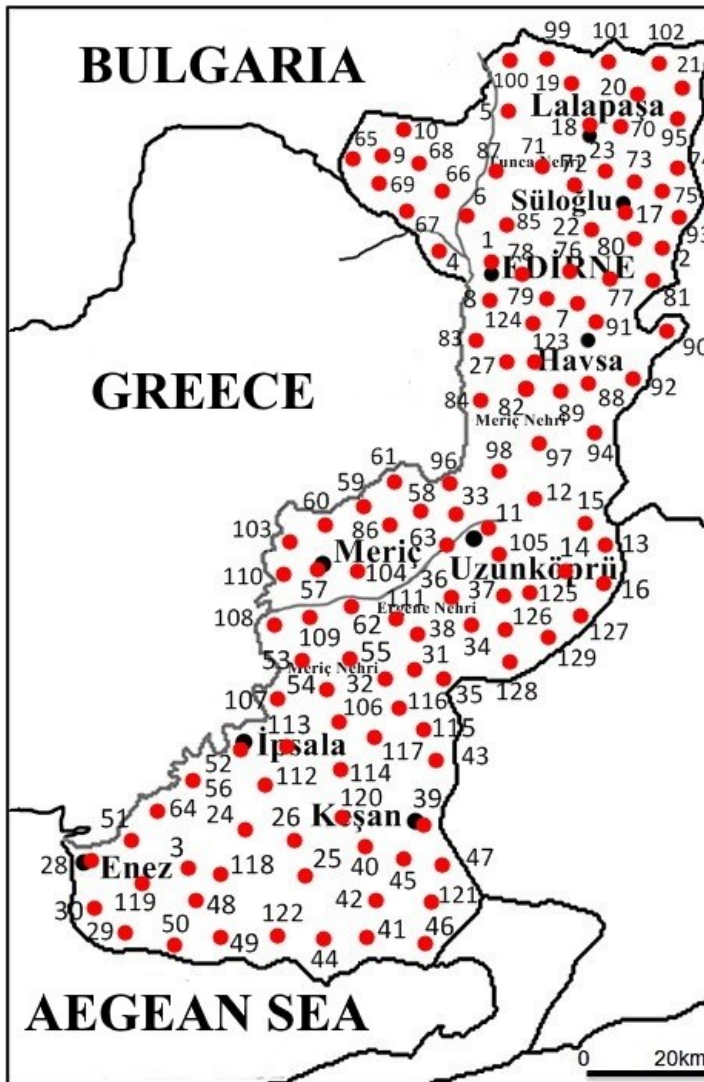


Figure 1. Collecting localities in Edirne province.

Table 1. Localities, coordinates, altitudes, habitats and research dates in Edirne Province

Locality No	Locality	Coordinates	Altitude (m)	Habitat	Collection Dates
1	Edirne- Merkez	41°40'37.67"K 26°33'20.57"D	41m	Stream Stream Meriç River Stream Roadside Stream	10.06.2013 21.06.2013 23.07.2013 03.08.2013 08.09.2013 19.09.2014
2	Süloğlu- Büyükgerdelli	41°45'6.69"K 26°55'54.45"D	163m	Pond pool Stream Puddle	12.06.2013 15.06.2013 17.06.2013 13.03.2014
3	Enez- Hisarlı	40°43'14.50"K 26°12'40.56"D	203m	Pond	23.06.2013 04.09.2013
4	Merkez-Pazarkule	41°39'41.85"K 26°29'44.79"D	35m	Meriç River	23.07.2013
5	Lalapaşa- Çömlekköy	41°50'32.35"K 26°36'31.68"D	94m	Çoban Stream	14.08.2013
6	Merkez- Avarız	41°44'49.80"K 26°32'39.63"D	42m	Tunca River	14.08.2013
7	Havsa- Söğütüdere	41°38'8.98"K 26°48'14.94"D	112m	Seymen Stream	20.08.2013
8	Merkez- İskender	41°37'47.26"K 26°40'22.72"D	87m	Sazlı Stream	20.08.2013 15.03.2014
9	Merkez- Ahi	41°46'35.86"K 26°24'22.00"D	87m	Stream	22.08.2013
10	Merkez- Uzgaç	41°47'32.17"K 26°26'16.25"D	163m	Stream	22.08.2013
11	Uzunköprü	41°16'16.53"K 26°41'58.99"D	32m	Ergene River	30.08.2013
12	Between Uzunköprü- Bayramlı- Yeniköy	41°19'24.19"K 26°47'44.32"D	80m	Rice field Water channel	30.08.2013
13	Uzunköprü- Bildır	41°17'15.89"K 26°53'33.02"D	80m	Stream Pond	30.08.2013
14	Uzunköprü- Çöpköy	41°13'30.44"K 26°49'24.23"D	87m	Stream Pond	30.08.2013
15	Uzunköprü- Danişment	41°18'15.11"K 26°54'4.82"D	60m	Koca Stream	30.08.2013
16	Uzunköprü- Turnacı	41°15'5.69"K 26°55'29.61"D	90m	Stream	30.08.2013
17	Süloğlu	41°46'10.30"K 26°54'30.92"D	156m	Stream	31.08.2013
18	Lalapaşa	41°50'26.21"K 26°44'11.25"D	166m	Pond	01.09.2013
19	Lalapaşa- Hacıdanişment	41°54'33.12"K 26°49'23.88"D	438m	Trough	01.09.2013
20	Lalapaşa- Süleymandanişment	41°53'49.92"K 26°53'25.58"D	384m	Pond	01.09.2013
21	Lalapaşa- Ömeroba	41°55'24.52"K 26°55'50.21"D	350m	Süloğlu Stream	01.09.2013
22	Süloğlu- Geçkinli	41°43'51.49"K 26°50'53.55"D	151m	Stream	01.09.2013
23	Between Süloğlu- Lalapaşa	41°48'12.16"K 26°50'49.45"D	160m	Pond	01.09.2013
24	İpsala- Koyuntepe- Telmata	40°46'4.76"K 26°20'33.15"D	28m	Lake	03.09.2013
25	Between Keşan- Kılıçköy- Karahisar	40°46'25.89"K 26°31'53.33"D	16m	Water channel Stream	03.09.2013

Table 1. Continued...

29	Enez- Gülçavuş	40°37'18.50"K 26°10'11.69"D	18m	Trough	04.09.2013
30	Enez- Sultanıçe	40°37'16.02"K 26° 9'13.38"D	36m	Stream	04.09.2013
31	Uzunköprü- Alıç	41° 3'36.95"K 26°39'3.29"D	114m	Alıç Stream	06.09.2013
32	Uzunköprü- Altınyazı	41° 4'18.00"K 26°34'32.00"D	24m	irrigation channel	06.09.2013
33	Uzunköprü- Değirmen- ci	41°18'47.11"K 26°41'53.07"D	49m	Stream Pond	06.09.2013
34	Uzunköprü- Hamidiye	41° 9'9.84"K 26°39'56.35"D	108m	Stream	06.09.2013
35	Uzunköprü- Kadiğalı	41° 3'28.23"K 26°41'8.31"D	139m	Fountain	06.09.2013
36	Uzunköprü- Kavacık	41°11'8.13"K 26°40'12.27"D	52m	Pond Trough	06.09.2013
37	Uzunköprü- Kırkavak	41°12'31.28"K 26°45'0.91"D	80m	Stream	06.09.2013
38	Uzunköprü- Türkobası	41° 5'40.95"K 26°36'24.09"D	26m	Ana Stream	06.09.2013
39	Keşan	40°51'44.40"K 26°37'54.88"D	96m	Koca Stream dam evacuation	09.09.2013
40	Keşan- Büyükdoğanca	40°46'24.60"K 26°34'59.52"D	30m	Söğütlük Stream	09.09.2013
41	Keşan- Çeltik	40°40'59.90"K 26°33'23.62"D	140m	Stream	09.09.2013
42	Keşan- Dişbudak	40°43'17.23"K 26°34'27.32"D	92m	Stream	09.09.2013
43	Keşan- Doğanca	40°51'44.39"K 26°37'54.88"D	92m	Stream	09.09.2013
44	Keşan- Mecidiye	40°38'31.31"K 26°32'30.54"D	45m	Stream	09.09.2013 26.08.2014
45	Keşan- Mercan	40°44'49.93"K 26°36'13.47"D	38m	Dam evacuation irrigation channel	09.09.2013
46	Keşan- Sazlıdere	40°39'38.22"K 26°41'10.63"D	119m	Stream Trough	09.09.2013
47	Keşan- Yerlisu	40°43'30.59"K 26°43'49.77"D	174m	Water channel	09.09.2013
48	Enez- Abdurrahim	40°38'25.91"K 26°15'30.65"D	27m	Stream Trough	12.09.2013
49	Enez- Karaincirli	40°37'38.11"K 26°17'54.14"D	32m	Suvat Stream	12.09.2013
50	Enez-Vakıf	40°36'58.41"K 26°15'28.12"D	28m	Stream	12.09.2013
51	Enez- Yenimahalle	40°48'55.84"K 26°12'38.34"D	30m	Pond	12.09.2013
52	İpsala	40°55'17.00"K 26°22'60.00"D	20m	Stream DSİ-Water channel	12.09.2013
53	İpsala- Balabancık	41° 2'4.57"K 26°24'11.37"D	36m	Stream Trough	12.09.2013
54	İpsala- Sultanköy	40°59'49.03"K 26°25'57.80"D	59m	Dam evacuation Trough	12.09.2013
55	İpsala- Teflikiye	41° 3'49.55"K 26°29'40.64"D	11m	irrigation channel	12.09.2013
56	İpsala- Yenikarpuzlu	40°49'58.34"K 26°17'38.21"D	20m	Pond Water channel	12.09.2013
57	Meriç	41°11'32.04"K 26°25'15.11"D	40m	Koca Stream	12.09.2013
58	Meriç- Akçadam	41°18'26.52"K 26°31'58.67"D	60m	Trough	12.09.2013
59	Meriç- Hasırcıarnavut	41°16'24.77"K 26°27'39.82"D	54m	Pond	12.09.2013
60	Meriç- Karayusuflu	41°15'49.94"K 26°25'59.04"D	24m	Pond	12.09.2013
61	Meriç- Seren	41°18'50.72"K 26°30'54.98"D	40m	Pond	12.09.2013
62	Meriç- Yenicegörece	41° 7'51.67"K 26°28'3.80"D	20m	Trough	12.09.2013

Table 1. Continued...

63	Uzunköprü-Çalıköy	41°17'20.19"K 26°35'52.23"D	97m	Pond	12.09.2013
64	Enez-Yenimahalle	40°47'12.50"K 26°12'4.09"D	19m	Water channel	12.09.2013
65	Merkez- Budakdoğanca	41°45'39.14"K 26°20'31.88"D	116m	Pond	15.09.2013
66	Merkez- Ekmekçi	41°44'19.86"K 26°27'54.30"D	147m	Stream	15.09.2013
67	Merkez- Eskikadın	41°42'24.74"K 26°27'25.97"D	74m	Pond	15.09.2013
68	Merkez- Karabulut	41°46'7.01"K 26°26'18.85"D	123m	Trough	15.09.2013
69	Merkez- Kemal	41°44'7.82"K 26°23'41.11"D	84m	Stream Trough	15.09.2013
70	Lalapaşa- Sarıdanışment	41°51'58.12"K 26°49'44.71"D	285m	Stream	21.09.2013
71	Lalapaşa- Taşlımüsellim	41°49'23.38"K 26°46'6.53"D	180m	Stream	21.09.2013
72	Süloğlu- Domurcalı	41°48'57.48"K 26°49'6.68"D	199m	Trough	21.09.2013
73	Süloğlu- Sülecik	41°48'50.68"K 26°50'59.27"D	208m	Stream	21.09.2013
74	Süloğlu- Tatarlar	41°50'8.00"K 26°53'8.24"D	236m	Trough	21.09.2013
75	Süloğlu- Yağcılı	41°47'6.48"K 26°49'41.44"D	165m	Stream	21.09.2013
76	Merkez- Demirhanlı	41°41'49.39"K 26°44'13.26"D	114m	Stream	07.03.2014
77	Merkez- Hacıumur	41°43'7.93"K 26°47'16.13"D	136m	Trough Pond	07.03.2014 13.03.2014
78	Merkez- Musabeyli	41°41'52.73"K 26°39'44.33"D	113m	pool	07.03.2014
79	Between Merkez- Musabeyli- Demirhanlı	41°41'44.16"K 26°41'43.72"D	113m	Pond	07.03.2014
80	Between Süloğlu- Küküler	41°44'43.92"K 26°55'4.96"D	160m	Pond	13.03.2014
81	Havsa- Arpaç	41°41'30.48"K 26°52'56.76"D	119m	Stream	15.03.2014
82	Havsa- Azatlı	41°30'3.11"K 26°41'56.12"D	100m	Trough	29.05.2014
83	Merkez- Bosnaköy	41°37'20.67"K 26°33'2.39"D	33m	Rice field	29.05.2014
84	Merkez- Üyükütatar	41°32'39.19"K 26°36'45.32"D	44m	Stream Water channel	29.05.2014
85	Merkez- Hasanağa	41°43'29.45"K 26°37'27.77"D	60m	Stream	01.06.2014
86	Meriç- Kavaklı	41°13'59.08"K 26°31'16.21"D	77m	Stream Trough	01.06.2014 04.08.2014
87	Merkez- Korucu	41°47'30.19"K 26°39'13.38"D	140m	Pond	01.06.2014
88	Havsa- Çukurköy	41°28'1.53"K 26°49'7.96"D	60m	Stream	03.06.2014
89	Havsa- Şerbettar	41°27'44.45"K 26°45'32.37"D	83m	Ova Stream	03.06.2014
90	Havsa- Bostanlı	41°36'38.00"K 26°58'8.59"D	88m	Stream	11.06.2014
91	Havsa- Osmanlı	41°35'11.85"K 26°50'15.55"D	91m	Stream Trough	11.06.2014
92	Havsa- Yolageldi	41°31'0.69"K 26°56'52.01"D	54m	Trough	11.06.2014
93	Süloğlu- Kerametlin	41°47'12.68"K 26°58'35.10"D	200m	Pond	12.06.2014
94	Havsa- Tahal	41°25'38.18"K 26°51'12.11"D	50m	Stream	13.06.2014
95	Süloğlu- Çeşmeköy arası	41°45'26.53"K 27° 0'52.20"D	200m	Trough	13.06.2014
96	Uzunköprü- Eskiköy	41°19'47.28"K 26°38'42.72"D	72m	Puddle	13.06.2014
97	Uzunköprü- Meşeli	41°23'19.95"K 26°43'30.96"D	88m	Stream	13.06.2014

Table 1. Continued...

98	Uzunköprü- Saçlımüsellim	41°25'21.03"K 26°37'54.33"D	28m	Trough	13.06.2014
99	Lalapaşa- Çalidere	41°56'20.31"K 26°44'40.20"D	230m	Stream	15.07.2014
100	Lalapaşa- Hamzabeyli	41°57'50.30"K 26°38'33.77"D	378m	Pond	15.07.2014
101	Lalapaşa- Kalkansögüt	41°58'14.78"K 26°48'45.79"D	415m	Stream	15.07.2014
102	Lalapaşa- Vaysal	41°56'28.76"K 26°52'12.22"D	438m	Pond	15.07.2014
103	Meriç- Nasuhbey	41°12'54.22"K 26°20'49.50"D	33m	Pond	04.08.2014
104	Meriç- Olacak	41°13'1.55"K 26°28'25.64"D	60m	Pond	04.08.2014
105	Uzunköprü- Çiftlikköy	41°14'52.83"K 26°37'17.15"D	12m	Stream	04.08.2014
106	İpsala- İbriktepe	41° 0'42.00"K 26°30'10.00"D	127m	Stream	12.08.2014
107	İpsala- Sarıcaali	40°59'8.10"K 26°22'57.00"D	23m	Stream	12.08.2014
108	Meriç- Adasarhanlı	41° 4'59.10"K 26°21'32.00"D	38m	Pond	12.08.2014
109	Meriç- Büyükaltağaç	41° 6'46.17"K 26°24'25.27"D	40m	Stream	12.08.2014
110	Meriç- Subaşı	41° 8'34.27"K 26°22'25.17"D	19m	Pond	12.08.2014
111	Uzunköprü- Balaban	41° 5'25.99"K 26°32'51.77"D	26m	Trough	12.08.2014
112	İpsala- Korucu	41°47'30.19"K 26°39'13.38"D	75m	Stream	23.08.2014
113	İpsala- Turpçular	40°56'30.93"K 26°26'8.22"D	29m	Stream	23.08.2014
114	Keşan- Beğendik	40°55'38.15"K 26°34'16.66"D	114m	Pond	23.08.2014
115	Keşan- Çobançeşme	40°57'42.91"K 26°40'6.94"D	171m	Dam evacuation	23.08.2014
116	Keşan- Kozköy	41° 1'16.62"K 26°36'42.90"D	64m	Stream	23.08.2014
117	Keşan- Lalacık	40°58'15.72"K 26°36'13.09"D	158m	Trough	23.08.2014
118	Enez- Işıklı	40°43'8.04"K 26°18'35.29"D	27m	Stream	24.08.2014
119	Enez- Yenice	40°41'43.17"K 26° 9'10.32"D	70m	Trough	24.08.2014
120	Keşan- Boztepe	40°50'30.25"K 26°31'12.86"D	48m	Trough	26.08.2014
121	Keşan- Pınar	40°42'26.22"K 26°38'16.92"D	174m	Water channel	26.08.2014
122	Keşan- Yaylaköy	40°37'46.33"K 26°23'29.09"D	154m	Puddle	26.08.2014
123	Havsa- Abalar	41°32'31.70"K 26°44'38.04"D	70m	Stream	30.08.2014
124	Havsa- Oğulpaşa	41°36'1.68"K 26°44'52.34"D	85m	Stream	30.08.2014
125	Uzunköprü- Beykonağı	41°10'21.46"K 26°47'32.52"D	115m	Stream	31.08.2014
126	Uzunköprü- Dereköy	41° 9'31.87"K 26°42'24.90"D	57m	Stream	31.08.2014
127	Uzunköprü- Elmalı	41°10'43.41"K 26°53'22.19"D	120m	Trough	31.08.2014
128	Uzunköprü- Harmanlı	41° 6'2.56"K 26°44'54.35"D	180m	Trough	31.08.2014
129	Uzunköprü- Süleymaniye	41° 7'14.49"K 26°48'18.65"D	281m	Trough	31.08.2014

RESULTS**GERROMORPHA Popov, 1971****GERRIDAE Leach, 1815*****Aquarius Schellenberg, 1800******Aquarius paludum paludum*
(Fabricius, 1794)**

Material examined: Havsa- Şerbettar (83m)- Ova Stream: 03.06.2014, 1♂; İpsala- Turpçular (29m)- Stream: 23.08.2014, 4♀♀, 4♂♂; Keşan- Dişbudak (92m)- Stream: 09.09.2013, 1♀; Mercan (38m)- Dam evacuation: 09.09.2013, 5♂♂; Pınar (174m)- Water channel: 26.08.2014, 3♀♀, 2♂♂; Lalapaşa- Hamzabeyli (378m)- Pond: 15.07.2014, 1♀; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 4♀♀, 2♂♂; Vaysal (438m)- Pond: 15.07.2014, 1♀, 1♂; Meriç- Büyükaltağaç (40m)- Stream: 12.08.2014, 1♂; Hasırcıarnavut (54m)- Pond: 12.09.2013, 5♀♀, 9♂♂; Karayusuflu (24m)- Pond: 12.09.2013, 5♂♂; Koca Stream (40m)-: 12.09.2013, 1♀, 2♂♂; Nasuhbey (33m)- Pond: 04.08.2014, 1♂; Subaşı (19m)- Pond: 12.08.2014, 8♀♀, 1♂; Merkez- Avarız (42m) - Tunca River: 14.08.2013, 3♀♀; Budakdoğanca (116m)- Pond: 15.09.2013, 2♂♂; Bosnaköy (33m) - Rice field: 29.05.2014, 3♂♂; Eskikadın (74m)- Pond: 15.09.2013, 1♂; Hasanağa (60m)- Stream: 01.06.2014, 1♀, 1♂; İskender (87m) - Sazlı Stream: 20.08.2013, 3♀♀, 4♂♂; Kent Ormanı (41m) - Meriç River: 23.07.2013, 1♀; Orhaniye (15m) - Stream: 03.09.2013, 1♀; Merkez-Pazarkule (35m)- Meriç River: 23.07.2013, 2♀♀, 2♂♂; Süloğlu- Büyükgerdelli (163m)- Stream: 17.06.2013, 2♀♀; Stream (156m): 31.08.2013, 6♀♀, 3♂♂; Sülecik (208m)- Stream: 21.09.2013, 1♀, 2♂♂; Yağcılı (165)- Stream: 21.09.2013, 3♂♂; Uzunköprü- Alıç (114m)- Alıç Stream: 06.09.2013, 1♀, 3♂♂; Altınyazı (24m)- irrigation channel: 06.09.2013, 1♀; Bildır (80m) - Pond: 30.08.2013, 2♀♀, 6♂♂; Çalıköy (97m)- Pond: 12.09.2013, 2♂♂; Çöpköy (87m) - Pond: 30.08.2013, 3♂♂; Dereköy (57m)- Stream: 31.08.2014, 1♀, 1♂;

(108m)- Stream: 06.09.2013, 1♀.

***Aquarius ventralis* (Fieber, 1860)**

Material examined: Havsa- Arpaç (119m)- Stream: 15.03.2014, 3♀♀, 7♂♂; Bostanlı (88m)- Stream: 11.06.2014, 8♀♀, 6♂♂; Osmanlı (91m)- Stream: 11.06.2014, 2♂♂; Keşan- Çeltik (140m)- Stream: 09.09.2013, 3♀♀, 7♂♂; Mecidiye (45m)- Stream: 09.09.2013, 3♀♀, 3♂♂; Sazlıdere (119m) - Stream: 09.09.2013, 1♀, 6♂♂; Lalapaşa- Çalidere (230m)- Stream: 15.07.2014, 1♂; Çömlekköy (94m)- Çoban Stream: 14.08.2013, 3♀♀, 5♂♂; Kalkansögüt (415m)- Stream: 15.07.2014, 4♀♀, 8♂♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 13♀♀, 15♂♂; Süleymandanişment (384m)- Pond: 01.09.2013, 1♂; Merkez- Ahi (87m)- Stream: 22.08.2013, 5♀♀, 2♂♂; Hasanağa (60m)- Stream: 01.06.2014, 1♀, 3♂♂; İskender (87m) - Sazlı Stream: 15.03.2014, 5♀♀, 5♂♂; Süloğlu- Büyükgerdelli (163m)- Stream: 17.06.2013, 2♀♀, 1♂; Uzunköprü- Çöpköy (87m) - Stream: 30.08.2013, 2♀♀, 9♂♂; Çöpköy (87m) - Pond: 30.08.2013, 21♀♀, 1♂; Danişment (60m) - Koca Stream: 30.08.2013, 2♀♀; Kırkavak (80m)- Stream: 06.09.2013, 8♀♀, 11♂♂; Turnacı (90m) - Stream: 30.08.2013, 2♀♀, 6♂♂.

Gerris Fabricius, 1794***Gerris (Gerris) argentatus* Schummel, 1832**

Material examined: Enez- Abdurrahim (27m)- Stream: 12.09.2013, 1♀; Hisarlı (203m) - Pond: 23.06.2013, 2♀♀, 1♂; Karaincirli (32m)- Suvat Stream: 12.09.2013, 3♀♀, 2♂♂; Dalyan Lake (0m): 07.04.2014, 2♀♀, 3♂♂; Sultaniçe (36m)- Stream: 04.09.2013, 1♂; Havsa- Arpaç (119m)- Stream: 15.03.2014, 1♀; Bostanlı (88m)- Stream: 11.06.2014, 6♀♀, 4♂♂; Çukurköy (60m)- Stream: 03.06.2014, 9♀♀, 11♂♂; Osmanlı (91m)- Stream: 11.06.2014, 6♀♀, 2♂♂; Söğütlüdere (112m) - Seymen Stream: 20.08.2013, 1♀; Tahal (50m)- Stream: 13.06.2014, 2♂♂; Yolageldi (54m)- Trough: 11.06.2014, 9♀♀, 4♂♂; İpsala- Sarıcaali

23m)- Stream: 12.08.2014, 2♀♀; Sultan- köy (59m)- Dam evacuation: 12.09.2013, 1♂; Keşan- Beğendik (114m)- Pond: 23.08.2014, 2♀♀; Dişbudak (92m)- Stream: 09.09.2013, 1♂; Doğanca (92m)- Stream: 09.09.2013, 1♂; Lalapaşa- Çömlekköy (94m)- Çoban Stream: 14.08.2013, 1♂; Hamzabeyli (378m)- Pond: 15.07.2014, 8♀♀, 8♂♂; Taşlımüsel- lim (180m)- Stream: 21.09.2013, 1♂; Vaysal (438m)- Pond: 15.07.2014, 5♀♀, 4♂♂; Meriç- Büyükaltıağaç (40m)- Stream: 12.08.2014, 1♀; Nasuhbey (33m) - Pond: 04.08.2014, 2♀♀, 9♂♂; Olacak (60m)- Pond: 04.08.2014, 1♀, 3♂♂; Seren (40m)- Pond: 12.09.2013, 1♀; Subaşı (19m)- Pond: 12.08.2014, 1♀; Merkez- Avarız (42m) - Tunca River: 14.08.2013, 2♂♂; Balkan Yerleşkesi (41m) - Yurt ar- kası- Stream: 21.06.2013, 3♀♀; Bosnaköy (33m)- Rice field: 29.05.2014, 3♀♀, 2♂♂; Budakdoğanca (116m)- Pond: 15.09.2013, 1♀; Demirhanlı (114m)- Stream: 07.03.2014, 3♀♀, 7♂♂; Eskikadın (74m)- Pond: 15.09.2013, 2♀♀, 3♂♂; Ha- sanağa (60m)- Stream: 01.06.2014, 2♀♀, 1♂; İskender (87m) - Sazlı Stream: 15.03.2014, 1♀, 2♂♂; Kent Ormanı (41m)- Meriç River: 23.07.2013, 1♂, 1♀; Korucu (140m)- Pond: 01.06.2014, 4♀♀, 5♂♂; between Musabeyli- Demirhanlı (113m)- Pond: 07.03.2014, 10♀♀, 6♂♂; Merkez- Pazarkule (35m)- Meriç River: 23.07.2013, 1♀; Üyükütatar (44m)- Stream: 29.05.2014, 2♀♀, 4♂♂; Üyükütatar (44m)- Water channel: 29.05.2014, 1♀; Süloğlu- Büyükgerdelli (163m)- Stream: 17.06.2013, 1♀, 1♂; Büyükger- delli (163m)- Pond: 12.06.2013, 5♀♀, 6♂♂; Büyükgerdelli (163m)- Pool: 15.06.2013, 2♀♀, 3♂♂; Büyükgerdelli (163m)- Puddle: 13.03.2014, 5♀♀, 3♂♂; Stream (156m): 31.08.2013, 3♀♀, 2♂♂; Between Süloğlu- Küküler (160m)- Pond: 13.03.2014, 2♀♀, 2♂♂; Yağcılı (165)- Stream: 21.09.2013, 2♀♀; Between Uzunköprü- Bayramlı- Ye- niköy (80m) - Rice field: 30.08.2013, 5♀♀, 4♂♂; Bildır (80m)- Stream: 30.08.2013, 1♀; Değirmenci (49m)- Stream: 06.09.2013, 5♀♀, 1♂; Değirmenci (49m)- Pond: 06.09.2013, 1♀; Ergene River (32m): 30.08.2013, 2♀♀; Kırkavak (80m)- Stream: 06.09.2013, 1♀; Meşeli (88m)-

Stream: 13.06.2014, 2♀♀, 1♂.

***Gerris (Gerris) costae fieberi* Stichel, 1938**

Material examined: Havsa- Yolageldi (54m)- Trough: 11.06.2014, 5♀♀, 5♂♂; Lalapaşa- Hamzabeyli (378m)- Pond: 15.07.2014, 1♀; Kalkansöğüt (415m)- Stream: 15.07.2014, 2♀♀; Merkez- Balkan Yerleşkesi (41m) - Yurt arkası- Stream: 21.06.2013, 1♂; Hasanağa (60m)- Stream: 01.06.2014, 1♂; Korucu (140m)- Stream: 01.06.2014, 1♀; Meriç- Kavaklı (77m)- Stream: 01.06.2014, 2♀♀, 3♂♂; Uzunköprü- Bildır (80m)- Pond: 30.08.2013, 1♂.

***Gerris (Gerris) lacustris* (Linnaeus, 1758)**

Material examined: Havsa- Arpaç (119m)- Stream: 15.03.2014, 1♀, 1♂; Bos- tanlı (88m)- Stream: 11.06.2014, 3♀♀; Çukurköy (60m)- Stream: 03.06.2014, 2♀♀; Osmanlı (91m)- Stream: 11.06.2014, 1♂; Şerbettar (83m)- Ova Stream: 03.06.2014, 2♀♀; İpsala- İbriktepe (127m) - Stream: 12.08.2014, 1♀; Turpçular (29m)- Stream: 23.08.2014, 1♂; Keşan- Dişbudak (92m)- Stream: 09.09.2013, 2♀♀, 6♂♂; Mecidiye (45m)- Stream: 26.08.2014, 1♀, 1♂; Mercan (38m)- irriga- tion channel: 09.09.2013, 1♂; Lalapaşa- Çalidere (230m)- Stream: 15.07.2014, 1♂; Çömlekköy (94m) - Çoban Stream: 14.08.2013, 2♀♀; Kalkansöğüt (415m)- Stream: 15.07.2014, 1♀; Ömeroba (350m) - Süloğlu Stream: 01.09.2013, 1♀, 3♂♂; Taşlımüselim (180m)- Stream: 21.09.2013, 8♀♀, 10♂♂; Meriç- Kavaklı (77m)- Stream: 01.06.2014, 2♀♀; Seren (40m)- Pond: 12.09.2013, 1♂; Merkez (41m)- Stream: 03.08.2013, 1♂; Ahi (87m) - Stream: 22.08.2013, 2♀♀, 1♂; Avarız (42m) - Tunca River: 14.08.2013, 4♀♀; Balkan Yerleşkesi (41m) - Yurt arkası- Stream: 21.06.2013, 2♂♂; Bosnaköy (33m)- Rice field: 29.05.2014, 1♀; Hasanağa (60m)- Stream: 01.06.2014, 1♀; Karabulut (123m)- Trough: 15.09.2013, 1♀, 2♂♂; Merkez-Pazarkule (35m)- Meriç River: 23.07.2013, 1♀; Uzgaç (163m)- Stream: 22.08.2013, 2♀♀, 1♂; Süloğlu- Büyükger- delli (163m)- Stream: 17.06.2013, 10♀♀,

6♂♂; Büyükgerdelli (163m)- Pool: 15.06.2013, 2♀♀; Stream (156m): 31.08.2013, 3♀♀, 7♂♂; Sülecik (208m)- Stream: 21.09.2013, 3♀♀, 3♂♂; Uzunköprü- Beykonağı (115m)- Stream: 31.08.2014, 1♀; Bildır (80m)- Stream: 30.08.2013, 8♀♀, 11♂♂; Çöpköy (87m)- Stream: 30.08.2013, 1♀; Hamidiye (108m)- Stream: 06.09.2013, 1♂; Kırkavak (80m)- Stream: 06.09.2013, 1♀, 1♂; Meşeli (88m)- Stream: 13.06.2014, 1♀, 3♂♂.

Gerris (Gerris) maculatus Tamanini, 1946

Material examined: Enez- Hisarlı (203m) - Pond: 23.06.2013, 1♀; Merkez- Korucu (140m)- Pond: 01.06.2014, 1♀; Süloğlu-Büyükgerdelli (163m)- Stream: 17.06.2013, 2♂♂.

Gerris (Gerris) thoracicus Schummel, 1832

Material examined: Enez- Hisarlı (203m) - Pond: 23.06.2013, 1♀, 2♂♂; Yenice (70m)- Trough: 24.08.2014, 1♀, 1♂; Havsa- Çukurköy (60m)- Stream: 03.06.2014, 1♂; Osmanlı (91m)- Stream: 11.06.2014, 1♂; Tahal (50m)- Stream: 13.06.2014, 5♀♀, 1♂; Keşan-KocaStream Dam evacuation: 09.09.2013, 1♂; Lalapaşa- Çömlekköy (94m) - Çoban Stream: 14.08.2013, 1♂; Hamzabeyli (378m)- Pond: 15.07.2014, 1♂; Kalkansöğüt (415m)- Stream: 15.07.2014, 1♂; Meriç- Kavaklı (77m)- Stream: 01.06.2014, 1♂; Merkez- Balkan Yerleşkesi (41m) - Yurt arkası- Stream: 21.06.2013, 2♂♂; Demirhanlı (114m)- Stream: 07.03.2014, 2♀♀, 4♂♂; Hasanağa (60m)- Stream: 01.06.2014, 1♀, 1♂; Orhaniye (15m) - Stream: 03.09.2013, 4♀♀, 3♂♂; Süloğlu- Büyükgerdelli (163m)- Puddle: 13.03.2014, 1♀, 1♂; Stream (156m): 31.08.2013, 1♀; Uzunköprü- Bildır (80m)- Stream: 30.08.2013, 1♂.

HYDROMETRIDAE Billberg, 1820

Hydrometra Latreille, 1796

Hydrometra stagnorum (Linnaeus, 1758)

Material examined: İpsala- İbriktepe (127m)- Stream: 12.08.2014, 1♀; Keşan- Çeltik (140m)- Stream: 09.09.2013, 3♀♀, 1♂; Çobançeşme (171m)- Dam evacuation: 23.08.2014, 1♀; Dişbudak (92m)- Stream: 09.09.2013, 3♀♀, 3♂♂; Mercan (38m)- Dam evacuation: 09.09.2013, 1♀, 1♂; Mercan (38m)- irrigation channel: 09.09.2013, 1♀, 2♂♂; Sazlıdere (119m)- Stream: 09.09.2013, 1♀; Lalapaşa- Çömlekköy (94m) - Çoban Stream: 14.08.2013, 7♀♀, 4♂♂; Kalkansöğüt (415m)- Stream: 15.07.2014, 1♂; Ömeroba (350m) - Süloğlu Stream: 01.09.2013, 1♂; Meriç- Kavaklı (77m)- Stream: 01.06.2014, 2♀♀, 1♂; Merkez- İskender (87m) - Sazlı Stream: 15.03.2014, 1♀; Korucu (140m)- Pond: 01.06.2014, 2♀♀; Merkez-Pazarkule (35m)- Meriç River: 23.07.2013, 1♀; Süloğlu (156m) - Stream: 31.08.2013, 5♀♀, 2♂♂; Uzunköprü- Beykonağı (115m)- Stream: 31.08.2014, 4♀♀, 2♂♂; Çöpköy (87m) - Stream: 30.08.2013, 2♀♀, 1♂; Kırkavak (80m)- Stream: 06.09.2013, 4♀♀, 2♂♂; Turnacı (90m)- Stream: 30.08.2013, 4♀♀, 5♂♂.

VELIIDAE Brullé, 1836

Microvelia Westwood, 1834

Microvelia (Picaultia) pygmaea (Dufour, 1833)

Material examined: Enez- Işıklı (27m)- Stream: 24.08.2014, 3♀♀, 1♂; Yenice (70m)- Trough: 24.08.2014, 14♀♀, 8♂♂; İpsala-Sarıcaali (23m)- Stream: 12.08.2014, 1♂; Turpçular (29m)- Stream: 23.08.2014, 1♀; Keşan- Kozköy (64m)- Stream: 23.08.2014, 6♀♀, 3♂♂; Pınar (174m)- Water channel: 26.08.2014, 3♂♂; Meriç- Seren (40m)- Pond: 12.09.2013, 1♀; Merkez- Balkan Yerleşkesi (41m)- Stream: 19.09.2014, 1♂; Balkan Yerleşkesi (41m) - Yurt arkası- Stream: 21.06.2013, 3♀, 2♂♂; İskender (87m) - Sazlı Stream: 15.03.2014, 2♀♀.

Velia Latreille, 1804

Velia (Plesiovelia) affinis filippi**Tamanini, 1947**

Material examined: Havsa-Bostanlı (88m)- Stream: 11.06.2014, 6♀♀, 5♂♂, 1 nimf; Osmanlı (91m)- Stream: 11.06.2014, 2♀♀; Merkez- Balkan Yerleşkesi (41m) - Stream: 10.06.2013, 21♀♀, 8 ♂♂, 18 nimf; Hasanağa (60m)- Stream: 01.06.2014, 2♀♀, 3♂♂.

NEPOMORPHA Popov, 1968**BELOSTOMATIDAE Leach, 1815*****Lethocerus* Mayr, 1853*****Lethocerus (Lethocerus) patruelis* (Stål, 1854)**

Material examined: İpsala- Koyuntepe (28m) - Telmata- Lake: 03.09.2013, 1♀, 2 nimf; Tevfikiye (11m)- irrigation channel: 12.09.2013, 1♀; Meriç- Karayusuflu (24m)- Pond: 12.09.2013, 2♀♀, 2♂♂; Koca Stream (40m): 12.09.2013, 1♀; Merkez (41m)- Roadside: 08.09.2013, 1♀; Uzunköprü- Değirmenci (49m)- Pond: 06.09.2013, 4♀♀; Bayramlı- Yeniköy arası (80m) - Water channel: 30.08.2013, 5♀♀, 3♂♂, 3 nimf.

CORIXIDAE Leach, 1815***Corixa* Geoffroy, 1762*****Corixa affinis* Leach, 1817**

Material examined: Enez- Abdurrahim (27m)- Trough: 12.09.2013, 2♀♀, 2♂♂; Hisarlı (203m) - Pond: 23.06.2013, 1♀, 6♂♂; Vakıf (28m)- Stream: 12.09.2013, 6♀♀, 2♂♂; Yenimahalle (30m)- Pond: 12.09.2013, 8♀♀, 4♂♂; Havsa- Yolageldi (54m)- Trough: 11.06.2014, 1♂; İpsala-Turpçular (29m)- Stream: 23.08.2014, 1♀, 5♂♂; Yenikarpuzlu (20m)- Water channel: 12.09.2013, 1♀; Keşan- Beğendik (114m)- Pond: 23.08.2014, 1♀; Lalacık (158m)- Trough: 23.08.2014, 1♀; Mecidiye (45m)- Stream: 09.09.2013, 16♀♀, 11♂♂; Mercan (38m)- irrigation channel: 09.09.2013, 2♀♀, 1♂; Sazlıdere (119m) - Trough: 09.09.2013, 5♀♀, 4♂♂; Yerlisu (174m)- Water channel: 09.09.2013, 1♂; Lalapaşa-Çömlekköy (94m)- Çoban Stream: 14.08.2013, 41♀♀, 22♂♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013,

1♂; Süleymandanişment (384m)- Pond: 01.09.2013, 1♀, 1♂; Vaysal (438m)- Pond: 15.07.2014, 1♂; Meriç- Yenicegörece (20m)- Trough:12.09.2013, 1♀, 1♂; Merkez- Ahi (87m) - Stream: 22.08.2013, 2♀♀, 2♂♂; Budakdoğanca (116m)- Pond: 15.09.2013, 1♂; Balkan Yerleşkesi (41m)- Stream: 21.06.2013, 1♂; Hacrumur (136m)- Pond: 13.03.2014, 2♂♂; İskender (87m)- Sazlı Stream: 20.08.2013, 1♀, 1♂; Orhaniye (15m) - Stream: 03.09.2013, 2♀♀; Süloğlu- Büyükgerdelli (163m)- Stream: 17.06.2013, 3♀♀, 2♂♂; Büyükgerdelli (163m)- Puddle: 13.03.2014, 3♀♀, 2♂♂; Domurcalı (199m)- Trough: 21.09.2013, 1♂; Geçkinli (151m)- Stream (144m):01.09.2013, 1♂; Between Süloğlu- Lalapaşa (160m)- Pond: 01.09.2013, 9♀♀, 5♂♂; Tatarlar (236m)- Trough: 21.09.2013, 4♀♀; Uzunköprü- Bildır (80m)- Stream: 30.08.2013, 1♂; Çalıköy (97m)- Pond: 12.09.2013, 3♀♀, 2♂♂; Kavacık (52m)- Pond: 06.09.2013, 12♀♀, 8♂♂.

***Corixa punctata* (Illiger, 1807)**

Material examined: Enez- Yenimahalle (30m)- Pond: 12.09.2013, 2♀♀; İpsala-Yenikarpuzlu (20m)- Water channel: 12.09.2013, 1♀; Lalapaşa- Çömlekköy (94m) - Çoban Stream: 14.08.2013, 21♀♀, 15♂♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 1♀; Süleymandanişment (384m) - Pond: 01.09.2013, 1♀, 11♂♂; Merkez- Balkan Yerleşkesi (41m) - Stream: 21.06.2013, 1♀; Budakdoğanca (116m)- Pond: 15.09.2013, 8♀♀, 5♂♂; İskender (87m)- Sazlı Stream: 20.08.2013, 1♂; Süloğlu- Büyükgerdelli (163m)- Puddle: 13.03.2014, 2♀♀; Stream (156m): 31.08.2013, 1♂; Between Süloğlu- Lalapaşa (160m)- Pond: 01.09.2013, 9♀♀, 6♂♂; Uzunköprü- Çalıköy (97m)- Pond: 12.09.2013, 2♂♂; Kavacık (52m)- Pond: 06.09.2013, 1♀; Süloğlu- Sülecik (208m)- Stream: 21.09.2013, 1♀; Tatarlar (236m)- Trough: 21.09.2013, 1♀, 5♂♂.

Micronecta* Kirkaldy, 1897**Micronecta (Dichaetonecta) scholtzi* (Fieber, 1860)**

Material examined: Enez- Büyük Gala

Lake (0m): 07.04.2014, 5♀♀, 10♂♂; Işıklı (27m)- Stream: 24.08.2014, 1♀, 1♂; Sultanıçe (36m)- Stream: 04.09.2013, 41♀♀, 79♂♂; Yenimahalle (30m)- Pond: 12.09.2013, 2♀♀, 4♂♂; Havsa- Söğütlüdere (112m) - Seymen Stream: 20.08.2013, 3♀♀, 5♂♂; İpsala- Turpçular (29m)- Stream: 23.08.2014, 6♂♂; Yenikarpuzlu (20m)- Water channel: 12.09.2013, 1♀; Keşan- Beğendik (114m)- Pond: 23.08.2014, 1♂; Kozköy (64m)- Stream: 23.08.2014, 1♀, 1♂; Mercan- Dam evacuation: 09.09.2013, 1♀; Mercan (38m)- irrigation channel: 09.09.2013, 2♀♀, 10♂♂; Pınar (174m)- Water channel: 26.08.2014, 4♀♀, 3♂♂; Lalapaşa- Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 21♀♀, 7♂♂; Vaysal (438m)- Pond: 15.07.2014, 27♀♀, 53♂♂, 49 nimf; Meriç-Büyükaltıağaç (40m)- Stream: 12.08.2014, 1♀, 1♂; Koca Stream (40m): 12.09.2013, 2♀♀; Seren (40m)- Pond: 12.09.2013, 6♂♂; Merkez- Eskikadın (74m)- Pond: 15.09.2013, 5♀♀, 6♂♂; Süloğlu- Sülecik (208m)- Stream: 21.09.2013, 1♂; Uzunköprü- Degirmenci (49m)- Pond: 06.09.2013, 3♀♀; Dereköy (57m)- Stream: 31.08.2014, 3♀♀, 3♂♂; Kavacık (52m)- Pond: 06.09.2013, 4♀♀, 8♂♂, 2 nimf; Kırkavak (80m)- Stream: 06.09.2013, 1♀, 1♂; Türkobası (26m)- Ana Stream: 06.09.2013, 1♀.

Sigara Fabricius, 1775

Sigara (Pseudovermicorixa) nigro-lineata nigrolineata (Fieber, 1848)

Material examined: Enez- Abdurrahim (27m)- Trough: 12.09.2013, 2♀♀, 1♂; Gülçavuş (18m)- Trough: 04.09.2013, 20♀♀, 9♂♂; Işıklı (27m)- Stream: 24.08.2014, 1♀, 1♂; Trough (24m): 12.09.2013, 4♂♂; Yenice (70m)- Trough: 24.08.2014, 9♀♀, 19♂♂; Havsa- Azatlı (100m)- Trough: 29.05.2014, 8♀♀, 12♂♂; Bostanlı (88m)- Stream: 11.06.2014, 3♀♀, 1♂; Çukurköy (60m)- Stream: 03.06.2014, 1♀; Osmanlı (91m)- Stream: 11.06.2014, 2♀♀; Osmanlı (91m)- Trough: 11.06.2014, 6♀♀, 3♂♂; Söğütlüdere (112m)- Seymen Stream; 20.08.2013, 3♀♀, 1♂; Tahal (50m)- Stream: 13.06.2014, 1♂; Yolageldi (54m)- Trough: 11.06.2014, 9♀♀, 7♂♂; İpsala- Balabancık (36m)- Trough: 12.09.2013, 4♀♀, 3♂♂; Korucu (75m)- Stream: 23.08.2014, 1♀, 1♂; Sarıcaali (23m)- Stream: 12.08.2014, 9♀♀, 9♂♂; Sultanköy (59m)- Trough: 12.09.2013, 3♀♀, 1♂; Turpçular (29m)- Stream: 23.08.2014, 1♀; Keşan- Boztepe (48m)- Trough: 26.05.2014, 16♀♀, 6♂♂; Kozköy (64m)- Stream: 23.08.2014, 7♀♀, 8♂♂; Küçükdoğanca (46m) - Manav Fountain: 03.09.2013, 20♀♀, 17♂♂; Lalacık (158m)- Trough: 23.08.2014, 16♀♀, 20♂♂; Mecidiye (45m)- Stream: 09.09.2013, 1♀, 1♂; Mecidiye (45m)- Stream: 26.08.2014, 1♀; Mercan (38m)- irrigation channel: 09.09.2013, 7♀♀, 3♂♂; Pınar (174m)- Water channel: 26.08.2014, 2♂♂; Yaylaköy (154m)- Puddle: 26.08.2014, 5♀♀, 5♂♂; Lalapaşa- Çömlekköy (94m)- Çoban Stream: 14.08.2013, 6♀♀; Hacıdanişment (438m)- Trough: 01.09.2013, 5♀♀, 7♂♂; Hamzabeyli (378m)- Pond: 15.07.2014, 1♂; Kalkansöğüt (415m)- Stream: 15.07.2014, 1♀, 1♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 2♀♀, 4♂♂; Sarıdanişment (285m)- Stream: 21.09.2013, 5♀♀, 1♂; Meriç- Akçadam (60m)- Trough: 12.09.2013, 1♀; Kavaklı (77m)- Stream: 01.06.2014, 3♀♀, 4♂♂; Kavaklı (77m)- Trough: 04.08.2014, 12♀♀, 4♂♂; Nasuhbey (33m)- Pond: 04.08.2014, 1♀; Yenicegörece (20m)- Trough: 12.09.2013, 1♀; Merkez- Ahi (87m) - Stream: 22.08.2013, 5♀♀, 2♂♂; Demirhanlı (114m)- Stream: 07.03.2014, 2♀♀; Ekmekçi (147m)- Stream: 15.09.2013, 1♀; Hacıumur (136m)- Pond: 13.03.2014, 3♀♀, 4♂♂; Hacıumur (136m)- Trough: 07.03.2014, 3♀♀, 1♂; İskender (87m)- Sazlı Stream: 15.03.2014, 1♀, 4♂♂; Karabulut (123m)- Trough: 15.09.2013, 3♀♀, 2♂♂; Kemal (84m)- Trough: 15.09.2013, 1♀; Orhaniye (15m) - Trough: 03.09.2013, 33♀♀, 31♂♂; Uzgaç (163m)- Stream: 22.08.2013, 3♀♀; Süloğlu- Büyükgerdelli (163m)- Puddle: 13.03.2014, 9♀♀, 7♂♂; Süloğlu- Çeşmeköy arası (200m)- Trough: 13.06.2014, 15♀♀; Domurcalı (199m)- Trough: 21.09.2013, 11♀♀, 9♂♂; Geçkinli (151m)- Stream: 01.09.2013, 2♀♀, 1♂; Tatarlar (236m)- Trough: 21.09.2013, 3♀♀, 3♂♂; Uzunköprü- Balaban (26m)- Trough: 12.08.2014, 1♀, 1♂; Bayramlı- Yeniköy

arası (80m)- water channel: 30.08.2013, 6♀♀, 9♂♂; Çiftlikköy (12m)- Stream: 04.08.2014, 11♀♀, 10♂♂; Danişment (60m) - Koca Stream: 30.08.2013, 34♀♀, 18♂♂; Dereköy (57m)- Stream: 31.08.2014, 6♀♀, 2♂♂; Elmalı (120m)- Trough: 31.08.2014, 2♀♀, 2♂♂; Ergene River (32m): 30.08.2013, 13♀♀, 7♂♂; Eskiköy (72m)- Puddle: 13.06.2014, 1♀, 1♂; Hamidiye (108m)- Stream: 06.09.2013, 2♀♀, 2♂♂; Harmanlı (180m)- Trough: 31.08.2014, 6♀♀, 11♂♂; Kadiağılı (139m)- Fountain: 06.09.2013, 24♀♀, 11♂♂; Kavacık (52m)- Trough: 06.09.2013, 9♀♀, 4♂; Meşeli (88m)- Stream: 13.06.2014, 1♂; Saçlımüsellim (28m)- Trough: 13.06.2014, 21♀♀, 6♂♂; Süleymaniye (281m)- Trough: 31.08.2014, 1♀, 3♂♂; Turnacı (90m) - Stream: 30.08.2013, 1♀, 1♂; Türkobası (26m)- Ana Stream: 06.09.2013, 1♀.

***Sigara (Retrocorixa) limitata limitata* (Fieber, 1848)**

Material examined: Havsa- Söğütlüdere (112m) - Seymen Stream: 20.08.2013, 2♂♂; Merkez- Budakdoğanca (116m)- Pond: 15.09.2013, 1♀; İskender (87m)- Sazlı Stream: 20.08.2013, 1♀; Karabulut (123m)- Trough: 15.09.2013, 1♂; Kemal (84m)- Trough: 15.09.2013, 2♀♀, 1♂; Uzgaç (163m)- Stream: 22.08.2013, 1♂; Süloğlu- Geçkinli (151m)- Stream: 01.09.2013, 1♀; Sülecik (208m)- Stream: 21.09.2013, 1♀, 1♂; Tatarlar (236m)- Trough: 21.09.2013, 1♀, 1♂; Yağcılı (165)- Stream: 21.09.2013, 2♀♀, 1♂; Between Uzunköprü - Bayramlı- Yeniköy (80m)- water channel: 30.08.2013, 1♀, 1♂; Bildir (80m)- Stream: 30.08.2013, 1♂; Çalıköy (97m)- Pond: 12.09.2013, 1♂; Hamidiye (108m)- Stream: 06.09.2013, 1♀; Kavacık (52m)- Pond: 06.09.2013, 3♂♂.

***Sigara (Sigara) striata* (Linnaeus, 1758)**

Material examined: Havsa- Tahal (50m)- Stream: 13.06.2014, 2♀♀, 2♂♂; Keşan- Mercan (38m)- irrigation channel: 09.09.2013, 1♂; Meriç- Büyükaltağaç (40m)- Stream: 12.08.2014, 3♀♀, 3♂♂; Subaşı (19m)- Pond: 12.08.2014, 1♀, 1♂; Uzunköprü- Dereköy (57m)- Stream: 31.08.2014, 3♂♂.

***Sigara (Subsigara) iactans* Jansson, 1983**

Material examined: Enez- Sultaniçe (36m)- Stream: 04.09.2013, 1♀, 1♂; Havsa- Bostanlı (88m)- Stream: 11.06.2014, 1♂; Lalapaşa- Hamzabeyli (378m)- Pond: 15.07.2014, 14♀♀, 2♂♂; Vaysal (438m)- Pond: 15.07.2014, 8♀♀, 7♂♂; between Merkez- Musabeyli- Demirhanlı (113m)- Pond: 07.03.2014, 1♀; Süloğlu- Yağcılı (165)- Stream: 21.09.2013, 5♀♀, 1♂; Uzunköprü- Çalıköy (97m)- Pond: 12.09.2013, 1♀.

***Sigara (Vermicorixa) lateralis* (Leach, 1817)**

Material examined: Enez - Abdurrahim (27m)- Trough: 12.09.2013, 4♀♀, 1♂; Hisarlı (203m) - Pond: 23.06.2013, 32♀♀, 10♂♂; Hisarlı (203m)- Pond: 04.09.2013, 10♀♀, 14♂♂; Sultaniçe (36m)- Stream: 04.09.2013, 4♂♂; Vakıf (28m)- Stream: 12.09.2013, 1♀, 1♂; Trough (24m): 12.09.2013, 1♀, 1♂; Yenice (70m)- Trough: 24.08.2014, 1♀, 1♂; Yenimahalle (30m)- Pond: 12.09.2013, 9♀♀, 5♂♂; Havsa- Abalar (70m)- Stream: 30.08.2014, 37♀♀, 26♂♂; Bostanlı (88m)- Stream: 11.06.2014, 1♀; Oğulpaşa (85m)- Stream: 30.08.2014, 49♀♀, 17♂♂; Söğütlüdere (112m) - Seymen Stream: 20.08.2013, 2♀♀, 4♂♂; Tahal (50m)- Stream: 13.06.2014, 15♀♀, 8♂♂; Yolageldi (54m)- Trough: 11.06.2014, 1♂; İpsala- Balabancık (36m)- Stream: 12.09.2013, 29♀♀, 5♂♂; Balabancık (36m)- Trough: 12.09.2013, 4♂♂; DSİ(20m) - Water channel: 12.09.2013, 4♀♀, 8♂♂; Korucu (75m)- Stream: 23.08.2014, 1♀, 7♂♂; Sultanköy (59m)- Trough: 12.09.2013, 10♀♀, 6♂♂; Turpçular (29m)- Stream: 23.08.2014, 10♀♀, 12♂♂; Yenikarpuzlu (20m)- Water channel: 01.09.2013, 9♀♀, 7♂♂; Keşan- Beğendik (114m)- Pond: 23.08.2014, 6♀♀, 4♂♂; Boztepe (48m)- Trough: 26.05.2014, 1♂; Lalacık (158m)- Trough: 23.08.2014, 4♀♀, 3♂♂; Mecidiye (45m)- Stream: 26.08.2014, 1♂; Sazlıdere (119m)- Trough: 09.09.2013, 1♀; Yaylaköy (154m)- Puddle: 26.08.2014, 13♀♀, 5♂♂; Yerlisu (174m) - Water channel: 09.09.2013, 4♀♀, 1♂; Lalapaşa- Çömlekköy (94m)- Çoban

Stream: 14.08.2013, 2♀♀, 2♂♂; Hacıda-
nişment (438m)- Trough: 01.09.2013,
2♀♀, 1♂; Hamzabeyli (378m)- Pond:
15.07.2014, 1♂; Pond (166m): 01.09.
2013, 10♀♀, 9♂♂; Süleymandanişment
(384m) - Pond: 01.09.2013, 27♀♀, 12♂♂;
Meriç- Adasarhanlı (38m)- Pond: 12.08.
2014, 16♀♀, 21♂♂; Büyükalıtiyağaç (40m)-
Stream: 12.08.2014, 2♀♀, 3♂♂; Nasuhbey
(33m)- Pond: 04.08.2014, 7♀♀, 1♂; Seren
(40m)- Pond: 12.09.2013, 10♀♀, 18♂♂;
Yenicegörece (20m)- Trough: 12.09.2013,
40♀♀, 23♂♂; Merkez- Hacıumur (136m)-
Pond: 13.03.2014, 7♀♀, 8♂♂; Demirhanlı
(114m)- Stream: 07.03.2014, 2♀♀, 2♂♂;
İskender (87m)- Sazlı Stream: 20.08.
2013, 3♀♀; between Musabeyli- Demir-
hanlı (113m)- Pond: 07.03.2014, 1♀; Mu-
sabeyli (113m)- Pool: 07.03.2014, 1♀; Ke-
mal (84m)- Trough: 15.09.2013, 2♀, 3♂♂;
Orhaniye (15m)- Stream: 03.09.2013,
39♀♀, 27♂♂; Orhaniye (15m)- Trough:
03.09.2013, 2♀♀, 1♂; Süloğlu- Büyükger-
delli (163m)- Çamlık- Puddle: 13.03.
2014, 1♀; Stream (156m): 31.08.2013,
1♀; Domurcalı (199m)- Trough: 21.09.
2013, 3♀♀; Geçkinli (151m)- Stream:
01.09.2013, 11♀♀, 20♂♂; Kerametlin
(200m)- Pond: 12.06.2014, 7♀♀, 5♂♂;
Between Süloğlu- Lalapaşa (160m)-
Pond: 01.09.2013, 70♀♀, 51♂♂; Tatarlar
(236m)- Trough: 21.09.2013, 8♀♀, 1♂;
Uzunköprü- Alıç (114m)- Alıç Stream:
06.09.2013, 15♀♀, 5♂♂; Bayramlı- Yeni-
köy arası (80m) - Rice field: 30.08.2013,
5♀♀, 6♂♂; Beykonağı (115m)- Stream:
31.08.2014, 1♀; Bildır (80m) - Pond:
30.08.2013, 49♀♀, 35♂♂; Çalıköy (97m)-
Pond: 12.09.2013, 13♀♀, 15♂♂; Daniş-
ment (60m) - Koca Stream: 30.08.2013,
2♀♀, 2♂♂; Değirmenci (49m)- Pond:
06.09.2013, 3♀♀, 4♂♂; Dereköy (57m)-
Stream: 31.08.2014, 1♀, 3♂♂; Ergene Ri-
ver (32m): 30.08.2013, 2♂♂; Eskiköy
(72m)- Puddle: 13.06.2014, 7♀♀; Hamidi-
ye (108m)- Stream: 06.09.2013, 12♀♀,
13♂♂; Kadiyağılı (139m)- Fountain:
06.09.2013, 1♀, 2♂♂; Kavacık (52m)-
Pond: 06.09.2013, 28♀♀, 24♂♂; Türkobası
(26m)- Ana Stream: 06.09.2013, 13♀♀,
4♂♂.

NAUCORIDAE Leach, 1815

Ilyocoris Stål, 1861

Ilyocoris cimicoides cimicoides (Linnaeus, 1758)

Material examined: Lalapaşa- Hamza-
beyli (378m)- Pond: 15.07.2014, 2 nimf;
Pond (166m): 01.09.2013, 1♂; Merkez-
Üyükütatar (44m)- Stream: 29.05.2014,
1 nimf; Süloğlu- Büyükgerdelli (163m)-
Pond: 12.06.2013, 9 nimf.

NEPIDAE Latreille, 1802

Nepa Linnaeus, 1758

Nepa cinerea Linnaeus, 1758

Material examined: Havsa- Çukurköy
(60m)- Stream: 03.06.2014, 1 nimf; Os-
manlı (91m)- Stream: 11.06.2014, 2 nimf;
Söğütlüdere (112m)- Seymen Stream:
20.08.2013, 1♀; İpsala- İbriktepe (127m)-
Stream: 12.08.2014, 1♀; Keşan- Dişbu-
dak (92m)- Stream: 09.09.2013, 1 nimf;
Merkez- Ahi (87m) - Stream: 2♀♀; Balkan
Yerleşkesi (41m)- Stream: 10.06.2013, 1
nimf; Demirhanlı (114m)- Stream: 07.03.
2014, 1♀; Hasanağa (60m)- Stream:
01.06.2014, 1♀, 1♂; İskender (87m)- Sazlı
Stream: 20.08.2013, 1♂, 3nimf; Süloğlu
(156m)- Stream: 31.08.2013, 4nimf; Sü-
lecik (208m)- Stream: 21.09.2013, 1♀;
Uzunköprü- Meşeli (88m)- Stream:
13.06.2014, 2 nimf; Turnacı (90m) -
Stream: 30.08.2013, 1 nimf.

Ranatra Fabricius, 1790

Ranatra (Ranatra) linearis (Linnaeus, 1758)

Material examined: Lalapaşa- Hamza-
beyli (378m)- Pond: 15.07.2014, 1 nimf;
Meriç- Subaşı (19m)- Pond: 12.08.2014,
2 nimf; Merkez- Üyükütatar (44m)-
Water channel: 29.05.2014, 1♀.

NOTONECTIDAE Latreille, 1802

Notonecta Linnaeus, 1758

Notonecta (Notonecta) glauca glauca Linnaeus, 1758

Material examined: Havsa- Osmanlı
(91m)- Stream: 11.06.2014, 1♂; İpsala-

Sarıcaali (23m)- Stream: 12.08.2014, 1♀; Lalapaşa- Çalidere (230m)- Stream: 15.07.2014, 1♂; Merkez- Ahi (87m)- Stream: 22.08.2013, 6♀♀, 4♂♂; Balkan Yerleşkesi (41m) - Stream: 21.06.2013, 8♀♀, 2♂♂; Süloğlu- Büyükgerdelli (163m)- Pool: 15.06.2013, 2♂♂; Büyükgerdelli (163m)- Pond: 12.06.2013, 1♂; Uzunköprü- Bildır (80m)- Stream: 30.08.2013, 2♀♀.

Notonecta (Notonecta) maculata

Fabricius, 1794

Material examined: İpsala- Balabancık (36m)- Stream: 12.09.2013, 2♀♀, 3♂♂; Korucu (75m)- Stream: 23.08.2014, 4♀♀, 3♂♂; Keşan- Boztepe (48m)- Trough: 26.05.2014, 2♂♂; Çeltik (140m)- Stream: 09.09.2013, 3♀♀, 3♂♂; Dişbudak (92m)- Stream: 09.09.2013, 1♂; Mecidiye (45m)- Stream: 09.09.2013, 1♂; Mecidiye (45m)- Stream: 26.08.2014, 1♀; Mercan (38m)- irrigation channel (72m): 09.09.2013, 1♂; Pınar (174m)- Water channel: 26.08.2014, 1♂; Sazlıdere (119m) - Trough: 09.09.2013, 12♀♀; Lalapaşa- Çalidere (230m)- Stream: 15.07.2014, 1♀; Çömlekköy (94m) - Çoban Stream: 14.08.2013, 35♀♀, 27♂♂; Hacıdanışment (438m)- Trough: 01.09.2013, 1♀, 1♂; Lalapaşa- Kalkansöğüt (415m)- Stream: 15.07.2014, 5♀♀, 3♂♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 2♀♀, 1♂; Sarıdanışment (285m)- Stream: 21.09.2013, 7♀♀, 5♂♂; Taşlımüsellim (180m)- Stream: 21.09.2013, 1♀; Merkez- Ahi (87m)- Stream: 22.08.2013, 5♀♀, 5♂♂; Ekmekçi (147m)- Stream: 15.09.2013, 1♀, 1♂; Kemal (84m)- Stream: 15.09.2013, 1♀, 4♂♂; Kemal (84m)- Trough: 15.09.2013, 11♀♀, 2♂♂; Uzgaç (163m) - Stream: 22.08.2013, 13♀♀, 9♂♂; Süloğlu (156m) - Stream: 31.08.2013, 1♀; Domurcalı (199m)- Trough: 21.09.2013, 1♀; Uzunköprü- Balaban (26m)- Trough: 12.08.2014, 1♀, 1♂; Beykonağı (115m)- Stream: 31.08.2014, 1♂; Bildır (80m)- Stream: 30.08.2013, 1♂; Çöpköy (87m) - Stream: 30.08.2013, 1♀, 1♂; Harmanlı (180m)- Trough: 31.08.2014, 1♀; Kavacık (52m)- Trough: 06.09.2013, 2♀♀, 6♂♂; Meşeli (88m)- Stream: 13.06.2014, 1♂.

Notonecta (Notonecta) meridionalis **Poisson, 1926**

Material examined: Havsa- Yolageldi (54m)- Trough: 11.06.2014, 1♂; Lalapaşa - Çömlekköy (94m) - Çoban Stream: 14.08.2013, 2♂♂; Sarıdanışment (285m)- Stream: 21.09.2013, 1♂; Taşlımüsellim (180m)- Stream: 21.09.2013, 1♂; Merkez- Balkan Yerleşkesi (41m) - Stream: 10.06.2013, 1♂; Süloğlu- Büyükgerdelli (163m)- Stream: 17.06.2013, 1♂; Büyükgerdelli (163m)- Pool: 15.06.2013, 3♂♂.

Notonecta (Notonecta) obliqua **Thunberg, 1787**

Material examined: Havsa- Yolageldi (54m)- Trough: 11.06.2014, 2♂♂; Süloğlu - Büyükgerdelli (163m)- Pool: 15.06.2013, 1♂.

Notonecta (Notonecta) viridis **Delcourt, 1909**

Material examined: Enez- Abdurrahim (27m)- Stream: 12.09.2013, 1♀, 1♂; Abdurrahim (27m)- Trough: 12.09.2013, 1♀, 1♂; Hisarlı (203m) - Pond: 23.06.2013, 6♀♀, 5♂♂; Yenimahalle (30m)- Pond: 12.09.2013, 1♀; Havsa- Söğütlüdere (112m)- Seymen Stream: 20.08.2013, 1♀; İpsala- Balabancık (36m)- Stream: 12.09.2013, 1♂; Keşan- Çeltik (140m)- Stream: 09.09.2013, 3♀♀, Dişbudak (92m)- Stream: 09.09.2013, 1♀, 2♂♂; Mecidiye (45m)- Stream: 09.09.2013, 4♀♀, 7♂♂; Sazlıdere (119m) - Trough: 09.09.2013, 2♀♀; Lalapaşa- Çalidere (230m)- Stream: 15.07.2014, 2♀♀, 6♂♂; Çömlekköy (94m) - Çoban Stream: 14.08.2013, 10♀♀, 5♂♂; Kalkansöğüt (415m)- Stream: 15.07.2014, 1♂; Ömeroba (350m)- Süloğlu Stream: 01.09.2013, 1♀, 3♂♂; Merkez- Ahi (87m) - Stream: 22.08.2013, 5♀♀, 6♂♂; Balkan Yerleşkesi (41m) - Stream: 21.06.2013, 5♀♀, 4♂♂; Budakdoğanca (116m)- Pond: 15.09.2013, 3♀♀, 4♂♂; Demirhanlı (114m)- Stream: 07.03.2014, 1♀, 1♂; Karabulut (123m)- Trough: 15.09.2013, 3♀♀, 9♂♂; Kemal (84m)- Trough: 15.09.2013, 1♀; between Musabeyli- Demirhanlı (113m)- Pond: 07.03.2014, 2♀♀, 6♂♂; Uzgaç (163m)- Stream: 22.08.2013, 18♀♀, 13♂♂; Süloğlu- Büyükgerdelli

(163m)- Stream: 17.06.2013, 2♀♀; Dörmürcalı (199m)- Trough: 21.09.2013, 1♀; Uzunköprü- Bildır (80m)- Stream: 30.08.2013, 3♀♀, 4♂♂; Çalıköy (97m)- Pond: 12.09.2013, 1♀.

PLEIDAE Fieber, 1851

Plea Leach, 1817

Plea minutissima minutissima Leach, 1817

Material examined: Lalapaşa- Hamzabeyli (378m)- Pond: 15.07.2014, 1♀; Vaysal (438m)- Pond: 15.07.2014, 1♀, 5♂♂; Meriç- Nasuhbey (33m)- Pond: 04.08.2014, 1 nimf; Merkez- Üyüklütatar (44m) - Stream: 29.05.2014, 1♀, 2♂♂; Between Süloğlu- Lalapaşa (160m)- Pond: 01.09.2014, 1♂.

DISCUSSION

As a result of a two-year study conducted in 129 locations with all kinds of wetlands, 14 species and 28 species belonging to 9 families from Gerromorpha and Nepomorpha were identified in the research area. The distribution of the determined species by families are as follows: Gerromorpha: 7 species and 2 genere belong to Gerridae, 1 species and 1 genus belong to Hydrometridae, 2 species and 2 genere belong to Veliidae; Nepomorpha: 1 species and 1 genus belong to Belastomatidae, 8 species and 3 genere belong to Corixidae, 1 species and 1 genus belong to Naucoridae, 2 species and 2 genere belong to Nepidae, 5 species and 1 genus belong to Notonectidae and 1 species 1 genus belong to Pleidae.

Among the species determined during research, *Aquarius ventralis*, *Gerris (Gerris) argentatus*, *Gerris (Gerris) costae fieberi*, *Gerris (Gerris) lacustris*, *Ilyocoris cimicoides cimicoides*, *Notonecta (Notonecta) glauca glauca*, *Notonecta (Notonecta) maculata*, *Notonecta (Notonecta) meridionalis*, *Notonecta (Notonecta) obliqua*, *Velia (Plesiovelia) affinis filippii* were also recorded for the first time from Edirne Province.

Microvelia are represented with two subgenus (*Microvelia* and *Picaultia*) and three species

(*Microvelia hozari*, *Microvelia pygmaea* and *Microvelia reticulata*) in Turkey. Of these species, *M. pygmaea* has been recorded before from several places in Anatolia as well as from Edirne in the Thrace Region (Önder *et al.*, 1984). In this study, this species has been identified in 10 different locations in Edirne Province.

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Contributions to Coreoidea (Hemiptera: Heteroptera) fauna of Kayseri Province (Turkey)

Suat Kiyak¹ Ayşe Baş²

¹Gazi University, Faculty of Sciences, Department of Biology, 06500 Teknikokullar, Ankara, TURKEY

E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283 (SK)

²Gazi University, Institute of Sciences and Technology, Department of Biology, 06500 Teknikokullar, Ankara, TURKEY

ABSTRACT: 159 Coreoidea specimens were collected for identification during the expedition which made between June-August 2011-2012 in Yahyalı district (Kayseri province). The result of the identification process; 16 genera and 24 species were found belonging to 4 families. Information about the location of the studied area and Heteroptera fauna were reported in the search. Examination materials were arranged for each species with the necessary collecting data. The distribution of species were also considered in Turkey. In the results of the search references, all of 24 species are new record for Coreoidea fauna of Yahyalı.

KEYWORDS: Kayseri, Fauna, Coreoidea (Heteroptera), Turkey

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INTRODUCTION

According to Dolling (1996), there are 462 species/subspecies taxa of 125 genera of 4 families (Alydidae, Coreidae, Stenocephalidae and Rhopalidae) belonging to the superfamily of Coreoidea (Hemiptera: Heteroptera) in the Palearctic region.

The superfamily Coreoidea are represented 94 species/subspecies and 36 genera belonging

to 4 family (Alydidae, Coreidae, Stenocephalidae and Rhopalidae) in Turkey. Their numerical distribution is Alydidae: 4 genera, 7 species, Coreidae: 20 genera, 48 species, Stenocephalidae: 1 genus, 7 species and Rhopalidae: 11 genera, 29 species (Fent and Dursun, 2019).

In recent years, Fent and Dursun, who are Turkish researchers, have important works on Coreoidea. Some these studies



are Dursun (2009, 2011), Dursun & Fent (2009), Dursun et al. (2010); Dursun & Fent (2015) and Fent and Dursun (2019) and Zengin & Dursun (2019).

There is no study until now about Yahyalı Heteroptera fauna. In this study, the fauna of the Coreoidea of Yahyalı surrounding (Kayseri/Turkey) was investigated and the distribution, habitat and host plants of the species were given.

MATERIAL AND METHODS

Yahyalı, which is a research area, is located on the east-facing slopes of the Sakız Mountain, which surrounds the Sultan Marshes in the south of Erciyes Mountain in the south of Kayseri province. It is located in the south of Yeşilhisar bounded with the district of Aladağlar protection zone status.

The continental climate prevails in the study area. There are fertile and partly

damaged forest areas in the area. At the foot of the mountains, there are orchards, vineyards, cultivated areas, meadows and pastures, and arable areas. The plains are covered with steppe plants. Zamantı River, Kapuzbaşı Waterfalls, Derebağ Waterfalls and Kocaçay rivers passing through Yahyalı borders, which are approximately 1210 meters in altitude, are the main rivers. Naturally, the dominant character of vegetation is stepp formation. Forest formation *Pinus nigra*, *Populus* sp. species.

The material discussed in this study was collected from 10 different locations between 2011 and 2012 in Yahyalı and its vicinity (Kayseri) (Figure 1, Table 1). The samples were collected on plants with the help of sweep net.

The samples were determined using identification keys by Stichel (1957-1962), Kerzhner & Yachevskii (1964) Pehlivan (1981), Moullet (1985) and Kıyak (1990).

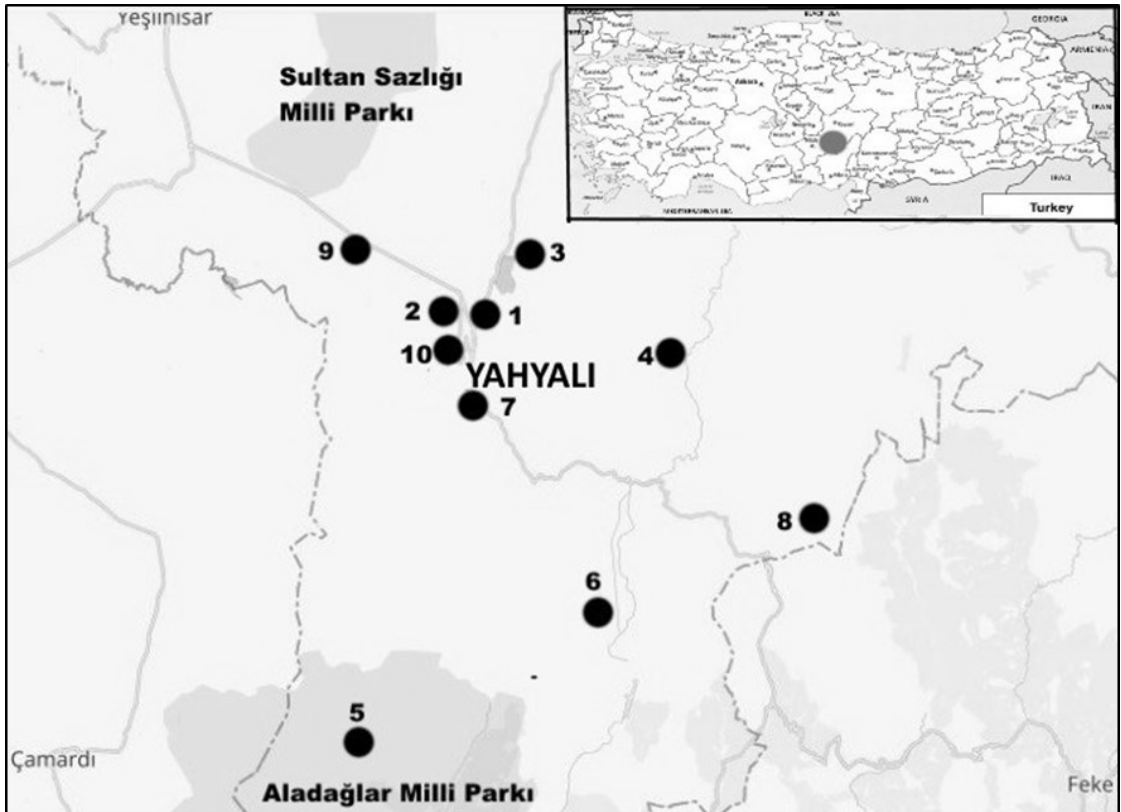


Figure.1- Sampling locations (●) in the study area in Yahyalı (Kayseri/Turkey).

The following literature was used for the valid taxon name and the distribution of species in Turkey (Alkan, 1948; Hoberlandt, 1955; Seidenstücker, 1957, 1958, 1960; Stichel, 1957; Tuatay et al., 1972; Zümreoğlu, 1972; Altınayar, 1981; Pehlivan, 1981; Moulet, 1985; Kiyak, 1990a,b,c, 1993; Kiyak & Çağlar, 1991; Çağlar, 1992; Özsarac & Kiyak, 2001; Özsarac, 2004; Önder et al., 2006; Dursun & Fent, 2009, 2015; Dursun et al., 2010; Kment & Banar, 2010; Çerçi et al., 2018; Fent & Dursun, 2019; Zengin & Dursun, 2019; Dursun, 2015, 2019)

RESULTS

In this study, 16 genera and 24 species belonging to 4 families of Coreoidea superfamily are given.

In total, 4 species Alydidae (2 genera), 10 species of Coreidae (7 genera), 9 species of Rhopalidae (6 genera), and 1 species of Stenocephalidae (1 genus) are listed as the fauna of Yahyalı surrounding of Kayseri province.

The list of species and geographical distribution of Turkey are given below.

Alydidae Amyot & Serville, 1843

Alydus calcaratus (Linne, 1758)

Material examined: 1 ♀, 15.07.2011 (locality 1), 1 ♀, 07.08.2012 (locality 10).

Habitat: Specimens belonging to the species were found in *Pinus nigra* forest formation, grassy steppes and Gramineae at an altitude of 1249 m and 1376 m.

Camptopus tragacanthae (Kolenati, 1845)

Material examined: 2 ♀♀, 21.06.2011 (locality 1), 2 ♀♀, 08.08.2012 (locality 10), 4 ♀♀, 27.09.2011 (locality 6), 3 ♂♂, 22.06.2011 (locality 5), 1 ♂, 13.07.2011 (locality 2).

Habitat: Examples of the species were found at herbaceous steppe formations, *Pinus nigra* forest formation *Astragalus* spp. and *Onobrychis* sp. 1249 m, 1174 m, 1376 m, 1548 m, 1507 m were observed.

Camptopus lateralis (Germar, 1817)

Material examined: 5♂♂, 05.09.2011, 4 ♀♀, 13.06.2011 (locality 1), 3 ♂♂, 06.08.2012 (locality 10), 2 ♀♀, 27.08.2011 (locality 6), 2♀♀, 28.07.2011 (locality 2).

Habitat: Examples of the species were found at an altitude of 1249 m, 1174 m, 1507 m and 1376 m from the *Pinus nigra* forest formation, herbaceous steppe, the region where the crop plants dominate and the fields.

Camptopus illustris Horvath, 1899

Material examined: 1 ♂, 15.07.2011 (locality 1), 1 ♀, 25.08.2011 (locality 1), 1 ♀, 25.06.2011 (locality 4)

Habitat: Samples of the species were found in *Pinus nigra* forest formation and 1249 m and 1450 m in grassy steppe formation.

Coreidae Leach, 1815

Coreus marginatus (Linnaeus, 1758)

Material examined: 4 ♀♀, 27.08.2011 (locality 2), 1♂, 06.09.2011 (locality 1)

Habitat: Samples of the species were found at 1174 m in the cultural area dominated by cultural plants and trees.

Phyllomorpha lacerata (Herrich-Schaeffer, 1835)

Material examined: 1 ♀, 04.07.2012 (locality 1).

Habitat: Samples of the species were found on the grassy steppe in the *Pinus nigra* forest formation at a height of 1249 m.

***Syromastus rhombeus* (Linnaeus, 1767)**

Material examined: 1 ♂, 22.06.2011; 1 ♀, 03.09.2011; 2 ♂♂, 06.07.2011 (locality 1); 2 ♀♀, 22.06.2011 (locality 2); 2 ♀♀, 25.06.2011 (locality 4); 3 ♀♀, 06.08.2012 (locality 10)

Habitat: Specimens were found in grass steppes, in areas with cultivated plants and in meadows at an altitude of 1249 m, 1174 m, 1450 m, and 1376 m.

***Centrocoris spiniger* (Fabricius, 1781)**

Material examined: 5 ♀♀, 21.06.2011; 1 ♂, 13.07.2011; 4 ♀♀, 27.08.2011; 4 ♂♂, 04.08.2012 (locality 1); 1 ♀, 10.07.2011 (locality 2); 5 ♂♂, 06.08.2012 (locality 10)

Habitat: Specimens were found in grassy steppe formation, between the *Pinus nigra* forest formation and the dominant vegetation in the region at an altitude of 1249 m, 1174 m, 1450 m and 1376 m.

***Centrocoris degener* (Puton, 1874)**

Material examined: 1 ♀, 05.09.2011 (locality 1)

Habitat: The specimen of the species was found on the grassy steppe at 1249 m in the region where the *Pinus nigra* formation is dominant.

***Coriomeris affinis* (Herrich-Schaeffer, 1839)**

Material examined: 2 ♂♂, 21.06.2011; 1 ♀, 26.06.2012 (locality 1); 3 ♀♀, 17.07.2011 (locality 2); 3 ♂♂, 25.06.2012 (locality 3); 1 ♂, 25.06.2011 (locality 5)

Habitat: Specimen belonging to the species were found at an altitude of 1249 m, 1174 m, 1548 m and 1347 m from the plants between the *Pinus nigra* forest formation, grassy steppe, the region where the crop plants dominate and the fields.

***Coriomeris subglaber* Horvath, 1917**

Material examined: 5 ♂♂, 22.06.2011 (locality 1)

Habitat: An example of this species was found on the grassy steppe in the region where *Pinus nigra* formation is dominant.

***Coriomeris denticulatus* (Scopoli, 1763)**

Material examined: 2 ♀♀, 22.06.2011; 1 ♀, 06.07.2012 (locality 1); 3 ♂♂, 23.06.2011 (locality 2); 2 ♀♀, 25.06.2011 (locality 3); 2 ♂♂, 27.06.2011 (locality 7)

Habitat: Samples of the species were found at an altitude of 1249 m, 1174 m, 1347 m and 1382 m in the area of cultivated plants, plants between fields and gardens, grassy steppe and *Pinus nigra* forest formation.

***Loxocnemis dentator* (Fabricius, 1794)**

Material examined: 1 ♀, 25.06.2012 (locality 3)

Habitat: Specimens were collected from the grassy steppe formation at an altitude of 1347 m.

***Ceraleptus gracilicornis* (Herrich-Schaeffer, 1835)**

Material examined: 2 ♂♂, 20.06.2011 (locality 1); 12 ♀♀, 5 ♂♂, 21.06.2011 (locality 2); 2 ♂♂, 25.06.2011 (locality 3); 4 ♀♀, 17.08.2011 (locality 6).

Habitat: Examples of this species were found at an altitude of 1249 m, 1174 m, 1347 m and 1507 m in the grassy steppe formation, the *Pinus nigra* forest area and the area dominated by culture plants.

Rhopalidae Amyot & Serville, 1843

***Stictopelurus pictus* (Fieber, 1861)**

Material examined: 1 ♂, 06.08.2012 (locality 10).

Habitat: An example of this species was found at an altitude of 1376 m in the region of grassy steppe formation, cultivated plants and cultivated areas.

***Corizus hyoscyami* (Linne, 1758)**

Material examined: 2♀♀ 1 ♂, 20.06.2012; 1 ♂, 05.08.2012 (locality 1); 2♀♀, 06.08.2012 (locality 10)

Habitat: Samples of the species were found on culture plants, *Pinus nigra* forest formation and grassy steppe at an altitude of 1249 m and 1376 m.

***Rhopalus parumpunctatus* (Schilling, 1829)**

Material examined: 1♂, 05.07.2011; 1♀, 12.08.2011 (locality 1); 1♂, 03.08.2012 (locality 2); 1♂, 05.08.2012 (locality 9); 1♂, 06.08.2012 (locality 10)

Habitat: Samples of the species were found at 1249 m, 1174 m, 1074 m and 1376 m altitudes in the grassy steppe formation, *Pinus nigra* forest formation, cultivation area, reeds.

***Rhopalus subrufus* (Gmelin, 1788)**

Material examined: 1 ♀, 24.06.2011 (locality 2), 1♀, example, 04.07.2012 (locality 9), 1 ♂, 06.07.2012 (locality 10)

Habitat: The sample of the species was found at the 1174 m, 1074 m and 1376 m in the vegetation region and in the grassy steppe formation.

***Rhopalus conspersus* (Fieber, 1836)**

Material examined: 2♂♂, 21.06.2011 (locality 1), 1 ♀, 04.07.2012 (locality 9), 1 ♂, 06.07.2012 (locality 10)

Habitat: Specimens belonging to the species *Pinus nigra* forest, grassy steppe and cultural plants in the region, 1174 m, 1249 m and 1376 m was found.

***Maccevethus caucasicus* (Kolenati, 1845)**

?*Cimex lineola* Fabricius, 1787: 302. Junior primary homonym of *Cimex lineola* Linnaeus, 1758, *Cimex lineola*

Sulzer, 1776 and *Cimex lineola* Fabricius, 1781; synonymized by HORVATH (1901: 474).

= ?*Cimex sanctaetrucis* Gmelin, 1790: 2178. New name for *Cimex lineola* Fabricius, 1787.

= ?*Cimex lineolaris* Turton, 1802: 664. New name for *Cimex lineola* Fabricius, 1787.

= *Corizus caucasicus* Kolenati, 1845: 59 (syn. HORVÁTH 1901: 474).

= ?*Maccevethus lineola* var. *chobauti* Horváth, 1895: 155. Synonymized by JOSIFOV (1966: 61).

= *Stictopleurus elongatus* Blöte, 1934: 263. Synonymized by GÖLLNER-SCHIEDING (1975: 22).

= ?*Maccevethus lineola* var. *macedonica* Kormilev, 1936: 31, 39, 54. Synonymized by JOSIFOV (1966: 61, suspected).

= *Maccevethus houskai* Hoberlandt, 1952a: 15. Synonymized by JOSIFOV (1966: 61).

Remarks:

According to Kment & Banar (2010), misidentifications regarding the diagnosis of this taxon are given below.

HOBERLANDT 1956, *M. lineola* and *M. persicus* (my party, misidentification); SEIDENSTÜCKER 1964, *M. persicus* (misidentification); PUTSHKOV 1986; PEHLIVAN 1981, as *M. lutheri*; MOULET 1994, 1995; DOLLING 2006.

Material examined: 1♂ 2♀♀, 13.07.2011 (locality 1); 1 ♂, 13.08.2011 (locality 6); 1♀, 06.08.2012 (locality 10).

Habitat: Specimens belonging to the species were collected from 1249 m, 1507 m and 1376 m in the plants, grassy steppe and *Pinus nigra* forest formation between the fields.

***Maccevethus corsicus corsicus* Signoret, 1862**

Material examined: 1 ♀, 22.06.2011 (locality 1); 1 ♂, 26.06.2011 (locality 8); 1

♂, 06.08.2012 (locality 10).

Habitat: Specimens belonging to the species were found in the herbaceous steppe formation, the area where the culture plants are located, the cultivated area and the dominant plant species growing around the fields.

***Chorosoma schillingi* (Schilling, 1829)**

Material examined: 2♂♂, 23.06.2011, 2♀♀, 14.07.2011 (locality 1), 1♀, 25.06.2011 (locality 3), 1♀, 25.06.2011 (locality 4), 1♀, 26.06.2011 (locality 7), 1♂, 06.08.2012 (locality 10).

Habitat: Specimens were found at 1249 m, 1347 m, 1450 m, 1383 m and 1379 m heights in the dominant plant species between *Pinus nigra* forest formation, herbaceous steppe, cultivated areas and grain fields.

***Brachycarenum languidus* Horvath, 1891**

Material examined: 1♂, 03.08.2011 (locality 10)

Habitat: An example of this species was found on the *Pinus nigra* forest formation and grassy steppe at an altitude of 1249 m.

Stenocephalidae Dallas, 1892

***Dicranocephalus albipes* (Fabricius, 1781)**

Material examined: 1♂, 06.07.2012 (locality 10).

Habitat: An example of this species was found in the herbaceous steppe formation with culture plants.

CONCLUSION and DISCUSSION

159 specimens of Superfamily Coreoidea (Heteroptera) were collected from 10 different localities (in Yahyalı (Kayseri) and its vicinity between June-September

in 2011-2012 (Figure 1, Table 3).

After identified of the specimens were given in this study 24 species of 16 genera belonging to 4 families. The number of these taxons are; Alydidae, 2 genera, 4 species; Coreidae, 7 genera, 10 species; Rhopalidae, 6 genera, 9 species, and Stenocephalide, 1 genus, 1 species (Table 1, Figure.2).

According to literature reviews, only the records belonging to 17 species were found in the sources examined about Coreoidea superfamily in Kayseri province (Hoberlandt, 1955; Seidenstücker,1960; Tuatay, Kalkandelen, Aysev, 1971; Pehlivan, 1981; Altınayar, 1981; Kiyak,1990a). And below was given this records:

Alydidae: *Alydus calcaratus* (Linne, 1758), *Camptopus lateralis* (Germar, 1817), *Camptopus tragacanthae* (Kolenati, 1845); **Rhopalidae:** *Rhopalus parumpunctatus* (Schilling, 1829), *Maccevetthus caucasicus* (Kolenati, 1845) (=misidentification as *M. lineola* (Fb.,1787)), *Chorosoma schillingi* (Schilling, 1829), *Corizus brevicornis* Hv.,1917, *Liorrhysus hyalinus* (F.,1794), *Brachycarenum tigrinus* (Schl.,1829); **Stictopleuridae:** *Stictopleurus crassicornis* (L.); **Coreidae:** *Haploprocta umbrina* Jak.,1883, *Enoplops disciger* (Klt.,1845), *Phyllomorpha laciniata* ssp. *laciniata* (Villers, 1789), *C. scabricornis* (Pz.,1809), *Centrocoris spiniger* (Fabr., 1781); **Stenocephalidae:** *D. agilis* ssp. *agilis* (Scop.,1763), *Dicranocephalus setulosus* (Fr.,1874).

Of them, identification of *M. lineola* (Fb.,1787) is mistake, was recorded from Kayseri-Hisarçık which is by Hoberlandt (1955) and by Tuatay, Kalkandelen, Aysev (1971).

This record is as *M. caucasicus* (Klt.,1862) assessable, and it's also distributed in Kayseri and in study area (Table 2).

As seen in the table, 24 species from this study and 17 species from previous studies are known from Kayseri fauna. Six of them found in this study were given also in previous studies. And 18 species are new records for the fauna of

Kayseri. As a result of these and previous studies, the total number of coreidae taxa from Kayseri is 35 species, which are 17 genera and 4 families.

On the other hand, 10 species found in previous studies were not encountered in this study. However, there are no records

given from Yahyalı district among the records of Kayseri province.

All species identified in the study are new records for the Heteroptera Fauna of Yahyalı.

Table 1. Genus and species number of Yahyalı (Prov. Kayseri) Coreoidea families

Families	Genus	Species
Alydidae	2	4
Coreidae	7	10
Rhopalidae	6	9
Stenocephalide	1	1

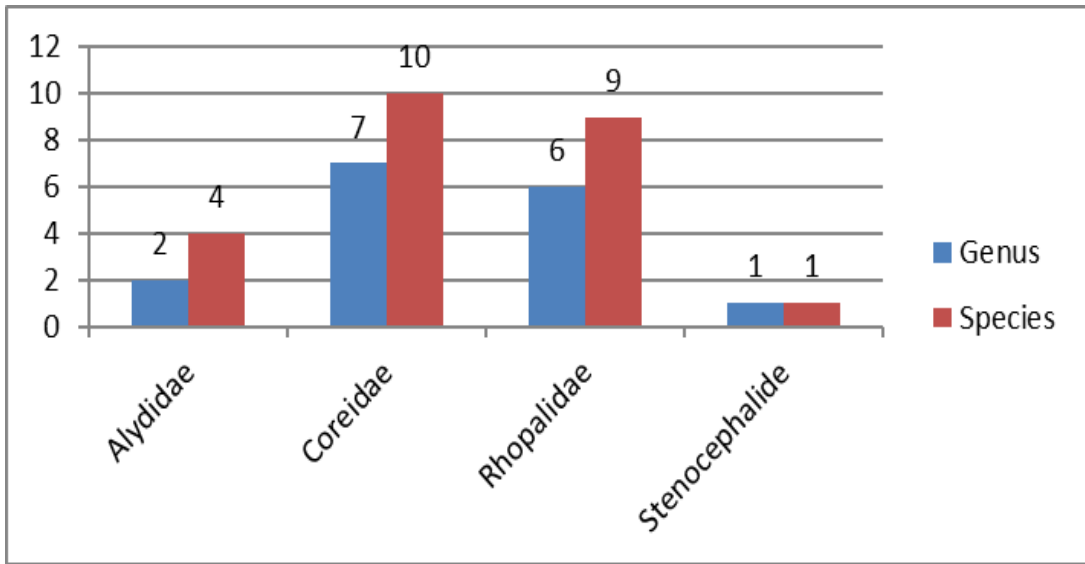


Figure 2. Distribution of species and genera numbers by families of Coreoidea in Study area.

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**A new faunistical record from Kastamonu (Turkey):
Hydrometra stagnorum (Linnaeus, 1758)
(Hemiptera: Heteroptera: Hydrometridae)**

İbrahim Küçükbaşmacı

Kastamonu University, Faculty of Arts and Science, Department of Biology,
Kastamonu TURKEY

E-mail: ikucukbasmaci@kastamonu.edu.tr

ABSTRACT: Heteroptera, the majority of which are terrestrial is a worldwide distributed group of insects inhabiting both terrestrial and aquatic habitats and has an important ecological role. The two infraorders, Gerromorpha and Nepomorpha, including the aquatic and semi-aquatic members of the suborder Heteroptera. The members of Hydrometridae family are one of the most distinctive heteropteran groups with their small stick-like insects with an elongate head and exceedingly slender legs. It has been reported 14 taxa from the infraordo Nepomorpha and Gerromorpha in Kastamonu so far. In this study, a new faunistic record is shown for Kastamonu. Also, morphological diagnosis, habitat, distribution in Turkey and Palearctic data of *Hydrometra stagnorum* (Linnaeus, 1758) (Hemiptera: Heteroptera: Hydrometridae) are given.

KEYWORDS: Heteroptera, *Hydrometra stagnorum*, new record, Kastamonu, Turkey

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INTRODUCTION

Heteroptera, the majority of which are terrestrial is a worldwide distributed group of insects inhabiting both terrestrial and aquatic habitats and has an important ecological role (Coulson & Witter, 1984; Schuh & Slater, 1995; Naranjo et al., 2010). Of the roughly 38,000 described species of heteropterans around the world, a little under 9% are aquatic and have nymphs and adults that live in the water (the majority) or on its surface, usually in nonflowing habitats (Thorp & Rogers, 2010). This order, display an

enormous range of strategies to adapt to their environment. As a result, this group has adapted to almost all kinds of habitats, and thus, occurs at a high diversity in aquatic and semiaquatic environments (Freitag & Zettel, 2012).

Water bugs are found in a wide variety of natural habitats from temporary pools to large rivers and freshwater to tidal pools on coral reefs (Andersen & Weir, 2004).

Heteropteran species are a significant component of the aquatic fauna and play an important part in littoral food webs



(Nieser, 1975; Skern et al., 2010; Ghari, 2013). Water bugs are chiefly predators or scavengers, with most species feeding on a variety of invertebrate prey including mosquito larvae and aquatic bugs of the same or different species and play a major role in aquatic ecosystems where they can serve as indicators of biological quality (Andersen & Weir, 2004; Thorp & Rogers, 2010). They are beneficial to man since many species prey on mosquito larvae (Andersen & Weir, 2004).

The two infraorders, Gerromorpha and Nepomorpha, including the aquatic and semi-aquatic members of the suborder Heteroptera (Andersen, 1995; Polhemus, 1995; Banbal & Fent, 2016). Gerromorpha or semiaquatic bugs are inhabiting the surface of both stagnant and running water, as well as some marshes, shores, and hygropetric habitats (Andersen, 1995; Andersen & Weir, 2004; Dursun, 2012). Members of the group have modifications, including specialized pretarsi, unwettable body surfaces, and novel communication mechanisms, that enable them to thrive in this habitat (Schuh & Slater, 1995). Gerromorphans are widespread on all continents except Antarctica and they are predator-scavengers that feed with piercing and sucking mouthparts that are typical of predatory Hemiptera (Spence & Andersen, 1994). The species of infraorder Gerromorpha are genuinely predaceous and well adapted to semiaquatic environments with being economical, biological and ecological important as these species eats tiddler and invertebrates (for example aquatic insects larva) (Polhemus et al., 1995). They show polymorphism in terms of their wing structures and adults are represented with wingless, short-winged and long-winged forms. Nepomorpha are aquatic, mainly predators but some also show omnivorous habits (Andersen, 1995; Polhemus, 1995; Banbal & Fent, 2016).

The members of Hydrometridae family are one of the most distinctive heteropteran groups with their small stick-like insects with an elongate head and exceedingly slender legs (Schuh & Slater, 1995; Umar

et al., 2013). Their peculiar appearance makes it very hard to confuse them with any other group (Gooderham & Tsyrlin, 2002). Many members are having an extremely elongate body and appendages which usually pale brown. All taxa have the eyes far removed from the anterior margin of the pronotum. Commonly called marsh treaders or water measurers, they range in length from 2.7 to 22 mm (Schuh & Slater, 1995; Gooderham & Tsyrlin, 2002). Their most peculiar feature is their head, almost as long as the thorax and with spherical postero-medial eyes. The eyes are located about halfway along the head. The antennae are longer than the head. The legs end in two tarsal claws that insert terminally. There are both, macropterous and micropterous specimens (Oscoz et al., 2011; Umar et al., 2013).

The members of the family Hydrometridae inhabit in quiet permanent water, in well-vegetated areas, or under overhanging banks. (Thorp & Rogers, 2010).

Hydrometrids live on the surface of the water at the edges of wetlands, lakes, and ponds, often hiding amongst vegetation (Gooderham & Tsyrlin, 2002). Commonly found in the pasture streams, often along the margins or in pools and they walk on the surface film of the water and on plants that project above the water (Umar et al., 2013).

They are normally slow-moving animals but can move rapidly when disturbed. Their slow movement and slender limbs allow them to blend in with vegetation on the water surface (Gooderham & Tsyrlin, 2002). Similarly, to the family Gerridae, they show a certain degree of tolerance to different alterations in the environment (Oscoz et al., 2011). These insects are predators. Most species lack wings or have reduced winged forms (Thorp & Rogers, 2010). They feed or scavenge on small animals fallen on the surface of the water. Surface-dwelling springtails are one of their favorite foods (Gooderham & Tsyrlin, 2002).

Both the family Hydrometridae and the

genus *Hydrometra* are found throughout the World (Gooderham & Tsyrlin, 2002). *Hydrometra* spp. are usually found on or around quiet bodies of water and generally are associated with marginal vegetation but may also be found on damp rock walls. They can walk on the water surface with great agility and apparent effortlessness (Schuh & Slater, 1995).

The first comprehensive study on Gerromorpha and Nepomorpha in Turkey dates back to Hoberlandt (1952) in which he summarized all the available records from the country. The current Gerromorpha fauna of Turkey is represented with 9 genera and 27 species/subspecies within 5 families (Fent et al., 2011; Banbal & Fent, 2016).

In this semiaquatic Heteroptera study, a new faunistic record is shown for Kastamonu. Also, morphological diagnosis, habitat, distribution in Turkey and Palearctic data of *H. stagnorum* are given based on literature and personal investigation

and it is believed that this study will shed light on the new faunistic studies in wetlands of Kastamonu and Turkey.

MATERIALS AND METHODS

This study was conducted based on the samples collected on 19.04.2019 in Ilıca Waterfall Zara stream (Map 1) in Pınarbaşı district of Kastamonu province. The material was sampled from the water surface and waterfront with the help of a sweeping net. The sampled material was placed and kept in 80% ethanol containing tubes. The materials were examined and photographed under dissecting stereomicroscope in the laboratory. Poisson (1957), Schuh & Slater (1995), Cooke (2015) and Çerçi & Koçak (2016) were used in identifications of the sampled material. The materials were deposited in the collection of Kastamonu University, Faculty of Sciences and Arts, Department of Biology (Kastamonu, Turkey).



Map 1. The sampling station, where *Hydrometra stagnorum* (Linnaeus, 1758) samples are collected from Ilıca Waterfall, Pınarbaşı/Kastamonu (Satellite map: Google Earth Pro)

RESULTS

Hydrometroidea Billberg, 1820

Hydrometridae Billberg, 1820

Hydrometra Latreille, 1796

Hydrometra stagnorum (Linnaeus, 1758)

Material examined: Pınarbaşı-Ilica Waterfall, Zara stream/Kastamonu, 41° 39'17.00"N, 33° 8'29.78"E, 19.04.2019, 428m, 2♀, 1♂.

Morphological diagnosis: General color blackish brown (Figure 1, A); dorsal side of the abdomen dull. Clypeus truncated,

anterior margin rounded (Figure 1, B). Distance from the anterior margin of the eyes to the end of the head, twice that of the posterior margin of the eyes to the base of the head. Posterior femurs reaching the middle of the 6th abdominal segment visible in females (Figure 1, C) them and the tip of the abdomen in males. Sternites of the 6th and 7th abdominal segment of the female without tooth (Figure 1, D); Sternites of the 6th and 7th abdominal segment of the male, on both sides, a short tooth located near their respective anterior end (Figure 1, E-F). Length: 10,5 mm.

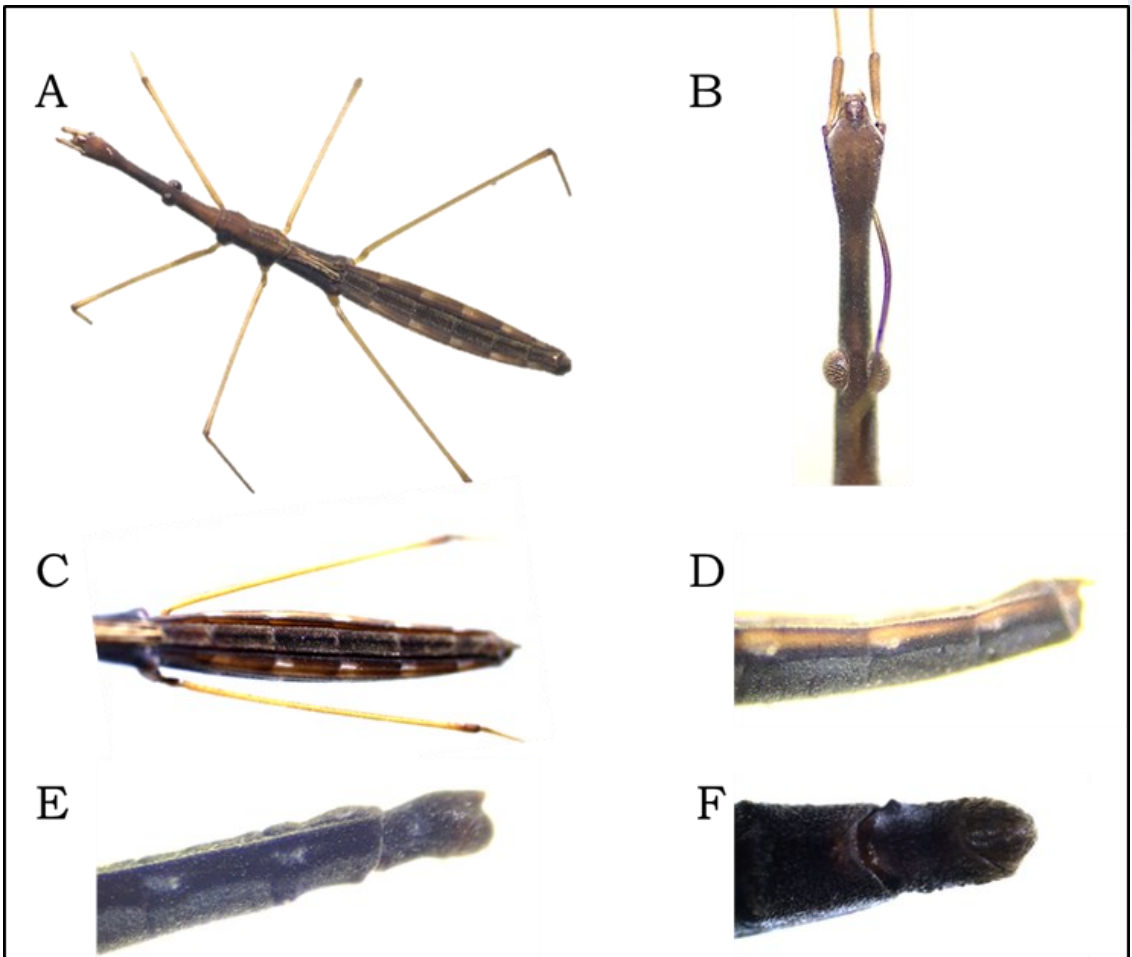


Figure 1. *Hydrometra stagnorum* (Linnaeus, 1758); A) adult female; B) head, dorsal view; C) abdomen and hind femur of female, dorsal view; D) the last three segment of the female abdomen, lateral view; E) the last three segment of the male abdomen, lateral view; F) sternites of the 6th and 7th abdominal segment of the male, ventral view (Photo by İ. Küçükbasmacı).

Habitat:

Samples of this species were found in stagnant pools formed by large rocks near the Ilica Waterfall (Figure 2).

Distribution in Turkey:

Adana, Amasya, Antalya, Aydın, Afyonkarahisar, Aksaray, Ankara, Artvin, Bartın, Bitlis, Bolu, Burdur, Bursa, Çanakkale, Çankırı, Çorum, Denizli, Edirne, Erzurum, Gümüşhane, Hatay, Iğdır, Isparta, İzmir, Kahramanmaraş, Kırklareli, Kırşehir, Konya, Mersin, Muğla, Niğde, Samsun, Sivas, Şanlıurfa, Tokat, Tunceli (Horváth, 1883; Fahringer, 1922; Lindbergh, 1922; Poisson, 1925; Gadeau de Kerville, 1939; Hoberlandt, 1952; Andersen, 1995; Kıyak, 2000; Kıyak et al., 2004, 2008; Önder et al., 2006; Salur & Mesci, 2009; Fent et al., 2011; Dursun,

2012; Dursun & Fent, 2019) and Kastamonu (this paper).

Distribution in Palaearctic: Europe:

Albania, Austria, Belgium, Bulgaria, Crete, Croatia, Czech Republic, Denmark, European Kazakhstan, European Turkey, Finland, France, Great Britain, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Lithuania, Luxembourg, Macedonia, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia (ST), Sardinia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine.

North Africa: Algeria, Azores, Canary Islands, Egypt, Morocco, Tunisia. **Asia:** Azerbaijan, Afghanistan, Asian, Kazakhstan, Armenia, Asian Turkey, Cyprus, Georgia, Iran, Iraq, Israel, Jordan, Kirgizia, Lebanon, Syria, Tadzhikistan, Turkmenistan, Uzbekistan (URL-1).



Figure 2. Sampling station, Ilica Waterfall, Pınarbaşı/Kastamonu (Photo by İ. Küçükbasmacı)

CONCLUSION AND DISCUSSION

In this study, it is evaluated that the morphological description, habitat, distribution in Turkey and phenology of the *H. stagnorum* which collected from Ilica Waterfall (Zara stream) in the Pınarbaşı district of Kastamonu province. With this

study, this species was recorded the first time in Kastamonu province.

It has been reported 14 taxa from the infraordo Nepomorpha and Gerromorpha in Kastamonu so far. Önder et al. (2006), Fent et al. (2011), Küçükbasmacı & Kıyak (2015) and Yazıcı (2020) reported that the

following taxa of Nepomorpha have been found in Kastamonu: *Micronecta anatolica anatolica* Lindberg, 1922, *Corixa punctata* (Illiger, 1807), *Hesperocorixa occulta* (Lundblad, 1929), *Sigara limitata limitata* (Fieber, 1848), *S. nigrolineata nigrolineata* (Fieber, 1848), *S. lateralis* (Leach, 1817), *Notonecta glauca glauca* Linnaeus, 1758, *N. obliqua meridionalis* Poisson, 1926, *N. marmorea* Fabricius, 1803.

Also Fent et al. (2011), Dursun (2012), Küçükbasmacı & Kıyak (2015), Yazıcı (2020) reported that the following taxa of Gerromorpha have been found in Kastamonu: *Velia saulii* Tamanini, 1947, *Aquarius najas* (De Geer, 1773); *Gerris costae costae* (Herrich-Schäffer, 1850), *G. costae fieberi* Stichel, 1938, *G. lateralis* Schummel, 1832.

No records of Hydrometridae family from Kastamonu have been given so far. In this study, *H. stagnorum* was recorded the first time in Kastamonu province.

Çerçi and Koçak (2016) reported that *H. stagnorum* which is much longer (9.00–13.00 mm) than *H. gracilentata* Horváth, 1899 (7.50–9.00 mm). In this study, it was measured the length of *H. stagnorum* as 10,5mm.

The Ilıca Waterfall originates from the steep slopes of Horma canyon and pours its water from 10 m high into the lake. The surrounding of the waterfall is rich in humid forest with rich ground covered with grass and bushes. It is located near the Çatak canyon, the Valla canyon, the Ilgarini cave and the Küre Mountains National Park. The Ilıca Waterfall formed from the steep slopes of Horma canyon pours its water into Zara stream which flows through the canyon (Çoban & Aydınöz, 2016). The water of the small lake formed by the Ilıca Waterfall continues through the big rocks. Both the lake and the pools formed between these rocks have created suitable habitats for Heteroptera species to live. This study is a preliminary study on Kastamonu aquatic and semi-aquatic Heteroptera fauna.

Consequently, Kastamonu aquatic and semi-aquatic Heteroptera fauna has not been well studied yet. Here it has been tried to contribute to the faunistically works held in Kastamonu and Turkey.

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**The new faunistical record from Bolu Province (Turkey):
Megalonotus praetextatus (Herrich-Schaeffer, 1835)
(Hemiptera: Heteroptera: Lygaeidae)**

Suat Kiyak^{1*} Şeyma Yılmaz Şahin²

¹Gazi University, Faculty of Arts and Sciences, Department of Biology,
06500 Teknikokullar, Ankara, TURKEY
E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283 (SK)

²Özel Ufuktepe Bilimsel Tema Koleji, Anadolu Lisesi,
Keçiören, Ankara, TURKEY
E-mail: seyma.sahin1@gazi.edu.tr

ABSTRACT: This paper is focus on *Megalonotus praetextatus* (Herrich-Schaeffer, 1835). The new record and distributional data are given from northern Anatolia (Gerede district of Bolu province) for this species.

KEYWORDS: Heteroptera, Bolu province, *Megalonotus praetextatus* (Herrich-Schaeffer, 1835), Turkey

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INTRODUCTION

Rhyparochrominae (Hemiptera: Heteroptera: Lygaeidae) is with 14 tribes, 372 genera and 1,850 species worldwide (Slater and O'Donnell, 1995; Henry, 2009).

In the palaeartic region number of Lygaeidae taxa is 225 genera 1001 species and 37 subspecies (Aukema & Rieger, 2001).

According to Schuh & Slater (1995) tribe Megalonotini (Rhyparochrominae: Lygaeidae) are most diverse in the old world, tropics

and palaeartic. And in this tribe eighteen genera and approximality 87 species are known.

Megalonotus praetextatus (Herrich-Schaeffer, 1835) was by Stichel (1957-1962) keyed described and distributed information for this species was given. Also, approvals and distribution of Turkey data about this species have been given in the literature by many authors (Lodos et al., 1999; Önder et al., 2006; Hoberlandt, 1955; Matocq et al., 20014).



In according to sources *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) (Hemiptera: Heteroptera: Lygaeidae) was first recorded in the province Bolu (Gerede district) in Turkey.

An imaginal male exemplare were found in June 2017 in Gerede/Bolu. After identification this finding has shown that: *Megalonotus praetextatus* (Herrich-Schaeffer, 1835).

This study were given the first recorded in the Bolu province of Turkey. (Fig.1)

MATERIAL AND METHODS

This study was conducted in Gerede surrounding of Bolu province. A male specimen of this species was collected from a locations in the study area in 2017 (Fig.1).

The specimen was collected by sweep net on the herbaceous vegetation. It killed in 70% alcohol jars and were prepared based on technical and standards of data collection of the zoology museum.

These were determined using identification keys by Stichel (1957-1962) by second author.

Sample is deposited in the collection of the Zoological Museum of Gazi University (ZMGU), Ankara, Turkey.

RESULTS

Family : Lygaeidae

Subfamily: Rhyparochrominae Amyot & Serville, 1843

Tribe: Megalonotini Slater, 1957

Bull. Brook. Entomol. Soc., 52: 35.

Type genus: *Megalonotus* Fieber, 1860: Die Europ. Hemip. Halb (Rhynch. Heter.): 1-112.

Genus: *Megalonotus* Fieber, 1860

***Megalonotus praetextatus* (Herrich-Schaeffer, 1835)**

Habitat

The individual specimen of this species was found in the scrub and meadow areas at an altitude of 1338m in Bolu province (Figure 1, Figure 2).

According to works of literatures the specimens were found on *Cucurbita* sp., *Morus alba*, *Pyrus malus*, *Triticum* sp., (Lodos, et al., 1999) and *Astragalus* sp. (Kiyak, 2019).

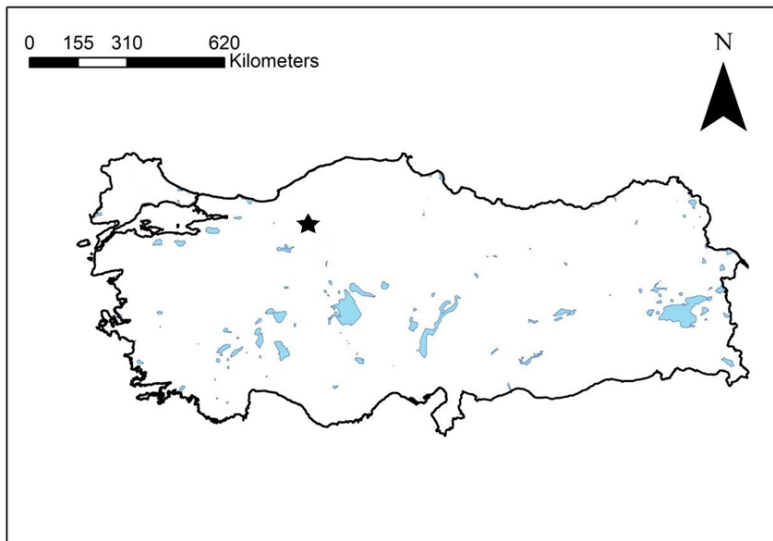


Figure.1. The location of study area in the Gerede district (Bolu province, Turkey) of *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) (★).

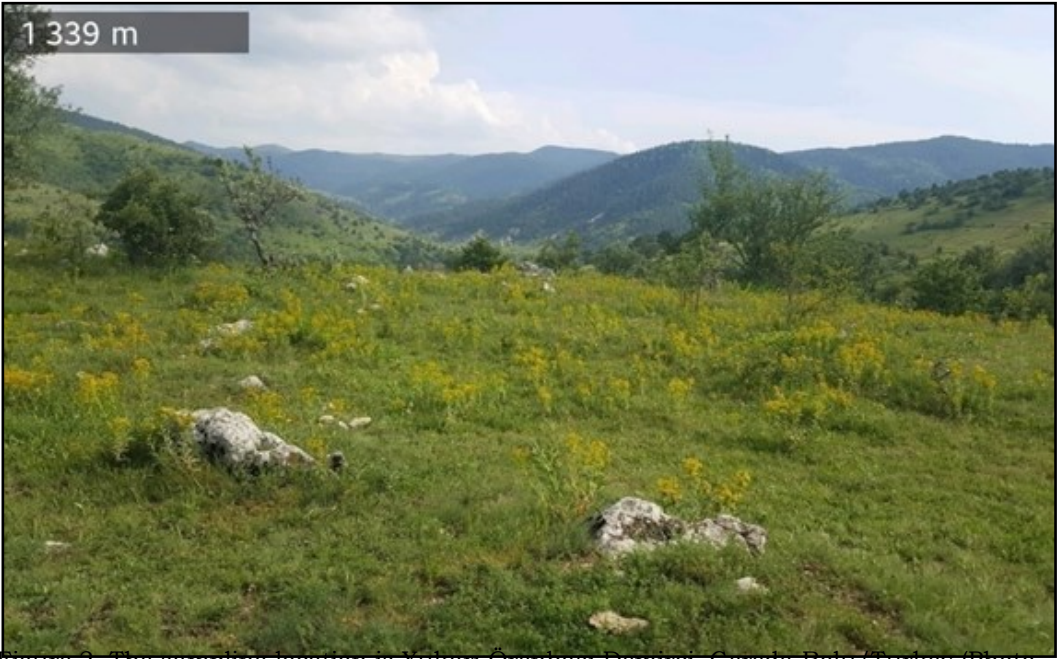


Figure 2. The sampling location is Yukarı Örenbaşı Demirci, Gerede-Boiu/Turkey (Photo by Ş.Şahin)

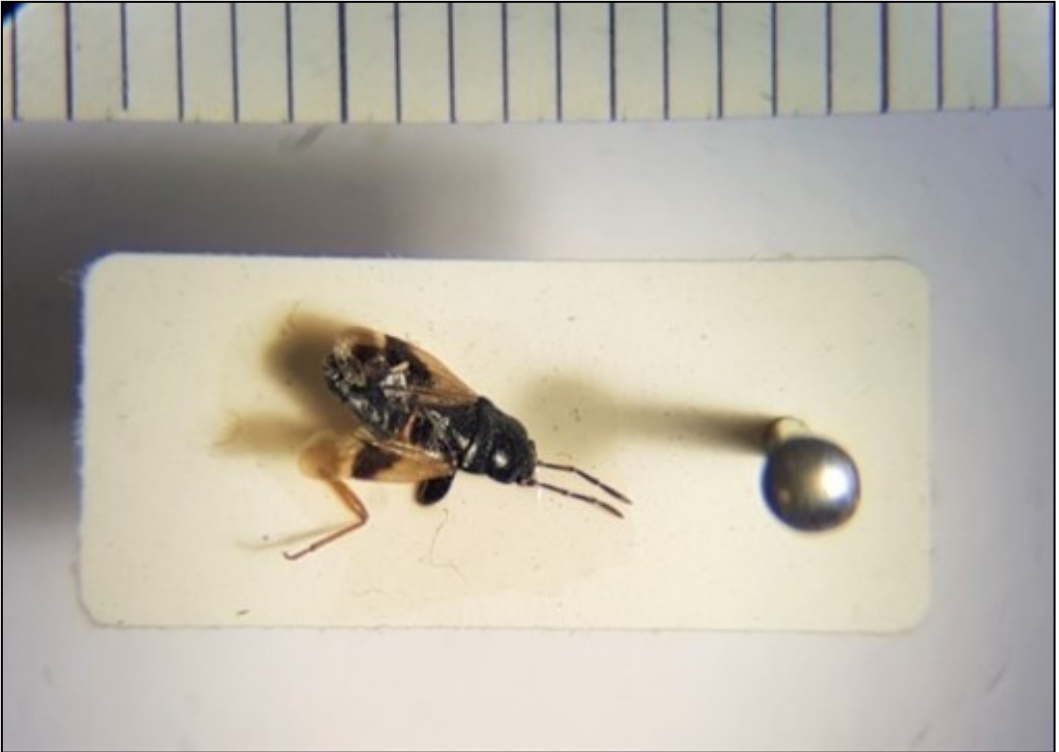


Figure 3. *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) (Photo by Ş.Şahin)

Material Examined:

Yukarı Örenbaşı Demirci location, Gerede-Bolu/Turkey, 40°47'51"N 32°28'53"E, 1♀, 28.06.2017 (Leg. Şahin). (Fig.2, Fig.3)

Distribution in Turkey:

Turanico-Euro-Mediterranean (Péricart, 1999, 2001). Antalya (Finike), Gaziantep (Nizip), Kahramanmaraş (Andırın, Göksun), Kastamonu (Tosya), Kayseri (Pınarbaşı), Konya (Akşehir), Osmaniye (Düziçi) (Lodos, et al., 1999). Edirne, Kastamonu, Konya, Zonguldak, Kayseri (Erciyes dağı), Bursa, Gaziantep (Akbez), İzmir (Halkalı) (Hoberlandt, 1955). Ankara (Çubuk-Çubuk barajı) (Tuatay, Kalkandelen, Aysev, 1972). Adana, Antalya, Balıkesir, Bursa, Edirne, Gaziantep, Hatay, İstanbul, İzmir, Kahramanmaraş, Kayseri, Konya (Önder et al., 2006). Diyarbakır (Matocq, et al., 2014). Gerede-Bolu (in this study).

Distribution in Palaearctic:

Europa: Albania, Andorra, Austria, Belgium, Bosnia Hercegovina, Bulgaria, Croatia, Czech Republic, Denmark, Turkey, European part, France, Great Britain, Germany, Greece, Hungary, Italy, Liechtenstein, Luxembourg, Macedonia, Moldavia, The Netherlands, Poland, Portugal, Romania, Russia (South European Territory), Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Yugoslavia **North Africa:** Algeria, Canary Isles, Egypt, Morocco, Tunisia. **Asia:** Azerbaijan, Armenia, Turkey, Asian part, Cyprus, Georgia, Iran, Iraq, Israel, Jordan, Kirgizia, Lebanon, Syria, Tadzhikistan, Turkmenistan (Aukema & Rieger, 2001, 2013).

CONCLUSION AND DISCUSSION

In this study, *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) was recorded and collected from Gerede (Bolu province), northern Anatolia, Turkey. This is the new record for this province.

In addition to the expansion of *Megalonotus praetextatus* (Herrich-Schaeffer, 1835) to a new settlement distribution, this study provides a better understanding of the species distribution in the Turkish

Heteroptera fauna.

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The new record invasive alien species (IAS) *Zelus renardii* (Kolenati, 1857) (Hemiptera: Heteroptera: Reduviidae) in central Anatolia (Turkey)

Suat Kiyak

Gazi Universty, Faculty of Sciences, Department of Biology, 06500 Teknikokullar, Ankara, TURKEY

E-mail: skiyak@gazi.edu.tr ORCID iD: 0000-0001-8167-8283

ABSTRACT: In this paper, new distribution record of the invasive species *Zelus renardii* (Kolenati, 1857) in Turkey is given after four years of its introduction to Turkey.

After the first records of *Zelus renardii* (Kolenati, 1857) from İzmir and Istanbul provinces in Turkey in 2016 (Çerçi & Koçak, 2016), the species has been recorded from Ankara province (in central anatolia) as a first record in this study.

With this new record, the distribution area also shows the eastward enlarging of the species in the Anatolian Peninsula.

KEYWORDS: Heteroptera, Reduviidae, *Zelus renardii*, alien, invasive species (IAS), expansion, fauna, central Anatolia, Ankara, Turkey

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INTRODUCTION

Species of Reduviidae are predator taxa, and are a large Heteropteran family and including seven thousand species worldwide (Henry, 2009).

According to reviewed literatures (Zhang et al. 2016) *Zelus* Fabricius, 1803 is a reduviid genus in the subfamily Harpactorinae, and

Zelus is endemic to and widely distributed throughout the New World, ranging from southern Canada through central Argentina.

Zelus renardii (Kolenati, 1857) is known as “leafhopper assassin bug” native of Central and North America. Introduced in several countries across the World.

The species *Zelus renardii* (Kolenati, 1857)



has previously been recorded in several countries in North and South America and Europe.

Z. renardii (Kolenati, 1857) has been to date recorded in some countries in Europa. Invasion of this species in Europa was reported for the first time from Greece by Davranoglou (2011) and Petrakis & Moulet (2011).

In the year 2012, the species was given in Spain by Baena & Torres (2012), Vivas (2012), Goala et al (2019). It was reported in Italy in 2013-2014 by Dioli (2013) and Cornara et al. (2014).

In the years 2014 and 2015, it was recorded Crete Island (Daniels 2014, Roditakis 2014, van der Heyden, 2015).

In the year 2017 it was found in Albania by van der Heyden (2017) and in the year 2018 was found in Israel (van der Heyden, 2018).

In the year 2019, it was found in France

by Garrouste (2019).

In Turkey, it was found in 2015 and 2016 in two provinces Izmir and Istanbul by Çerçi & Koçak (2016). This invasion of this species in the Central Anatolian Region has not recorded until this date. According to some literature have been recorded this species in urban areas, gardens, parks and inhabited places in Europa (Davranoglou, 2011; Petrakis & Moulet, 2011; Simov et al., 2017, Goula et al., 2019).

MATERIALS AND METHODS

This study was conducted in Ankara province in Central Anatolia Region of Turkey. Two male specimen of this species were collected from a locations in the study area in 2020.

The specimen were collected with sweep net on the herbaceous vegetation. Specimens are deposited in the Gazi University Zoological Museum (ZMGU) collection.

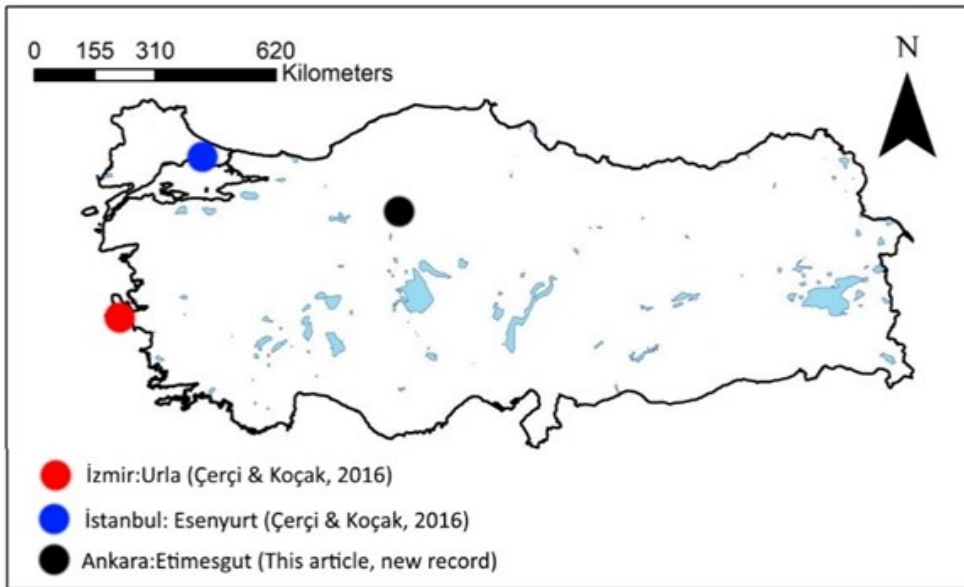


Figure 1. The records of *Zelus renardii* (Kolenati, 1857) in Turkey. The colour in the circles indicate the order of the historical and new records. Red and blue circles show the recent record, black circles show new record.



Figure 2. Specimen of *Zelus renardii* (Kolenati, 1857). A. Dorsal view, B. Ventral view



Figure 3. Habitat and collected area of specimens of *Zelus renardii* (Kolenati, 1857)

RESULTS

Reduviidae Latreille, 1807

Harpactorinae Amyot & Serville, 1843

Zelus Fabricius, 1803

***Zelus renardii* (Kolenati, 1857)** (Figure 2 A–B)

Habitat:

The individual specimens of this species were found in the urban area. The vegetation of this area are; trees such as *Pinus nigra*, *Juniperus foetidissima*, *Cedrus libani*, *Populus* sp., *Salix babylonica*, *Eleagnus angustifolia*, *Armeniaca vulgaris*, *Tilia* sp., *Prunus* sp., also shrubs and herbaceous plants.

Material Examined:

Turkey: Ankara: town center, (39°58'25" N, 32°38'22"E), 20.IV.2020, 2 ♂♂, 835m, S. Kiyak leg. & det. (Figure 2) in an urban and anthropic environment (Figure 3).

Distribution in Turkey:

İstanbul: Esenyurt, İzmir: Urla (Çerçi & Koçak, 2016); Ankara (in this study)

Distribution in World:

North-Central-South America: Western and Southwestern USA, Mexico, El Salvador, Guatemala, Honduras, the Polynesian islands (Samoa, Hawaii), Jamaica, Philippines, Argentina and Chile. **Europe:** Albania, Greece (including Crete), France, Italy, Spain and, Turkey (European part). **Asia:** Israel, Turkey (Asian part) (van der Heyden 2015, 2017, 2018; Davranoglou, 2011; Petrakis & Moulet, 2011; Baena & Torres, 2012; Vivas, 2012; Aukema et al., 2013; Dioli, 2013; Cornara et al., 2014; Daniels, 2014; Goula et al., 2013; 2019; Roditakis, 2014; Zhang et al., 2016; Goula & Mata, 2015; Çerçi & Koçak, 2016; Simov et al., 2017; Rodríguez et al., 2018; D'Hervé et al., 2018; Pinzari, 2018; Garrouste, 2019).

CONCLUSION AND DISCUSSION

In the Turkey reduviid fauna, around 58 species have been recorded (Dursun &

Salur, 2013; Dursun, 2016; Çerçi & Koçak, 2016).

In this study, the first registration of the reduviid species *Z. renardii* (Kolenati, 1857) from Ankara province in the Central Anatolian Region was given. It is also shown and discussed of this species in Turkey and worldwide distribution.

Z. renardii (Kolenati, 1857 is enlarged from North and Central America (is native area), to South America, the Pacific Region and the Mediterranean Basin (Weirauch et al., 2012; Aukema et al., 2013; Zhang et al., 2016)

The first records of *Z. renardii* (Kolenati, 1857) in Turkey is reported in 2016 in the west of the Anatolia, Aegean Region (province: İzmir) and Marmara Region (province: Istanbul).

Invasion of *Z. renardii* (Kolenati, 1857) in Anatolian Peninsula and Thrace part of Turkey: Until this study, this species has been limited expansion in the Marmara and Aegean Regions of Turkey, and its distribution area is limited to the coastal regions only in the western and northwestern Anatolia. After first records from Turkey (Çerçi & Koçak, 2016) the species has not been mentioned until this present manuscript. (Figure 1).

The invasiv species *Z. renardii* (Kolenati, 1857) in the four years since it was detected for the first time in Turkey, has extended to the eastwards, around 500-600 km, and in this paper were reported two specimens this species recorded in Ankara city (Central Anatolia). *Z. renardii* (Kolenati, 1857) have been seems an gradually expanding species in Turkey (Figure 1).

Known locations of this species are limited to urban areas. According to literatures this species is found in different habitats, urban areas and agricultural areas in which it can reach high densities (Weyrauch et al., 2012). *Z. renardii* has been reported in urban, periurban and natural habitats in Europa. In the urban habitat, it may be found in private balconies, in streets with rows of trees, in small

green areas, in public vegetable gardens or in parks. *Zelus renardii* frequents also mixed orchards (peach trees, critics, apple trees, medlar trees, apricot trees), vegetable gardens next to natural semiarid scrublands and pinewoods, or abandoned cultivated lands with almond, olive and carob trees, now progressively covering with pines, aromatic plants and weeds. Natural habitats reported were scrublands and canes (Goula et al.,2019).

As can be seen from the literature given above in european countries, *Z. renardii* (Kolenati, 1857) has mainly being found in anthropic environments, either urban or agroecosystems, although some natural habitats have also been reported. Also in this paper has been observed and collected in urban and anthropic environment in Ankara (Turkey)(Figure 3).

Rodríguez Lozano et al. (2018) pointed out, the species could either be a sanitary concern due to biting to people and to large number of individuals in certain populations, or of importance as influencing foodwebs in agroecosystems or in nature.

The pathway of introduction for *Z. renardii* (Kolenati, 1857) in Turkey is uncertain, though it is most likely that the species was transported on exotic plants.

More research will be needed on the biology and ecology of *Z. renardii* (Kolenati, 1857) in Turkey.

As with all invasive species, its impact on natural fauna and flora its biology and ecology should be researched.

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Notes on the Gastric Ceacum of *Centrocoris variegatus* Kolenati, 1845 (Heteroptera, Coreidae): Light and Scanning Electron Microscopic Study

Okan Şimşek¹, Damla Amutkan Mutlu¹, Irmak Polat², Zekiye Suludere¹

¹Gazi University, Science Faculty, Department of Biology, Ankara, 06500, TURKEY

²Çankırı Karatekin University, Science Faculty, Department of Biology, Çankırı, 18100, TURKEY

E-mails: simsekokann@gmail.com, damlamutkan@gazi.edu.tr, irmakyilmaz@gazi.edu.tr, zekiyes@gazi.edu.tr

ORCID IDs: 0000-0002-4780-8520 (DAM), 0000-0001-7230-4589 (IP), 0000-0002-1207-5814 (ZS)

ABSTRACT: In this study, the morphology and histology of the gastric ceacum of *Centrocoris variegatus* were examined with light and scanning electron microscopy (SEM). *C. variegatus* is a phytophagous species that feeds on the various plants in agricultural areas and harm them. The digestive tract of *C. variegatus* is divided into three different regions: Foregut, midgut, and hindgut. The gastric caecum is located in the posterior end of the midgut. The gastric caecum of *C. variegatus* was compared to the other species belonging to Hemiptera order and other insect groups. Obtained similarities and differences in both morphological and histological features were revealed.

KEYWORDS: Gastric caecum, histology, morphology, light microscope, scanning electron microscope

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INTRODUCTION

Heteroptera is a common suborder with more than 40.000 species identified in the world, spread on all the continents except Antarctica. Researchers have identified 140 families with more than 5800 genus belonging to the ordo Heteroptera in the world (Schuh & Slater, 1995; Henry, 2009; Kiyak, 2019). It is known that the 40 families and 1.526 species belonging to the ordo Heteroptera were identified in

Turkey (Önder et al., 2006; Küçükbaşmacı & Kiyak, 2015, 2019).

Heteroptera suborder contains species with different nutritional types. Some of the species belonging to the Heteroptera suborder are zoophagous while those of others are parasitically fed. Besides, there are also phytophagous species that cause significant damages in culture areas and crops (Kiyak, 2019).

Coreidae is a family belonging to Heteroptera



suborder. The distinctive feature of Coreidae family is that individuals have a piercing-sucking mouth type. Insects with this mouth type absorb the sap of the plant and cause the plant to dry. That's why, these pests can cause a great decrease in agricultural yield. For example, some insects belonging to this family cause serious damage to hazelnuts and decrease in quality (Gameel, 2013; Dirik, 2016; Şen & Saruhan, 2016; Şimşek & Suludere, 2018; Oğuzoğlu & Avcı, 2020).

Centrocoris variegatus Kolenati, 1845 (Heteroptera, Coreidae) is a species that spreads in the Mediterranean environment, in Cyprus and Caucasus. In Turkey, *C. variegatus* is located in Ankara, Aydın, Balıkesir, Bursa, Denizli, Elazığ, İzmir, Kahramanmaraş, Kars, Kayseri, Kırşehir, Manisa, Muğla, and Tekirdağ provinces (Önder et al., 2006; Dursun & Fent, 2009; Kiyak & Akar, 2010; Öncül Abacıgil et al., 2010; Kılınç, 2013; Altın, 2019).

C. variegatus is also found in both scrub and meadow areas and agricultural areas. Öncül Abacıgil et al., (2010) stated that *C. variegatus* was detected in olive groves in Edremit (Balıkesir). Besides it is found on the canola and damages the plant (Altın, 2019). One of *C. variegatus*' host plants is *Sambucus ebulus*. Moreover, this species can also cause harm in sugar beet and spinach (Lodos, 1986; Dursun & Fent, 2009; Öncül Abacıgil et al., 2010; Kılınç, 2013).

Despite the importance, as far as we know no one has studied the gastric caecum of *C. variegatus*. Therefore, in this study, we aimed to reveal the morphological and histological structure of the gastric caecum in *C. variegatus* in order to better understand the biology of this species and thus provide the necessary information to be more effective in struggle with it.

MATERIALS AND METHODS

The Sample Preparation for Light Microscopy (LM)

Adult individuals of *C. variegatus* were collected from various agricultural areas in July-August and brought to the laboratory environment. Individuals were stunned

with ethyl acetate fumes and their internal organs were dissected. Specimens were fixed with 10% Formaldehyde. The samples were passed through rising ethyl alcohol series (70%, 80%, 90%, 96% and 100%) for dehydration process and then embedded in paraffin blocks. Sections of 6-7 microns thick taken from paraffin blocks were stained with Hematoxylin-Eosin staining for light microscopy examinations. Afterwards, they were examined with Olympus BX51 microscope and photographed.

The Sample Preparation for Scanning Electron Microscopy (SEM)

Dissected samples were fixed in 2.5% glutaraldehyde at least 24 hours, was washed with phosphate buffer. Thereafter, the samples were passed through the rising alcohol series. Specimens were waited in amyl acetate twice and were dried at the critical point drying device (Polaron, CPD 7501). The dried samples were attached to the SEM stubs with double-sided tapes and coated with gold using the Polaron SC 502 coating device. Later on, samples were examined using a JEOL JSM SEM 6060 LV at a voltage of 5 kV (Gazi University, Faculty of Science, Laboratory of Electron Microscopy, Turkey) and photographed.

RESULTS

The alimentary canal of *C. variegatus* consists of the foregut, the midgut and the hindgut (Figure 1). The midgut is divided into four regions which are called the first, second, third and fourth ventriculus (Figure 2). The last region of the midgut, the fourth ventriculus, is separated from the other parts with the pre -sence of four longitudinal rows known as gastric caeca (Figure 2).

The outer surface of the gastric caeca is surrounded by intense trachea and tracheal networks (Figure 3), and has deeply knotty structure (Figures 3, 4). The gastric caecum is connected to the digestive canal with the structure which is known as the pylorus (Figure 5). Each caecum consists of a thin monolayer cuboidal epithelium (Figures 5, 6). The nucleus of the cuboidal cells has round shape (Figure 6).

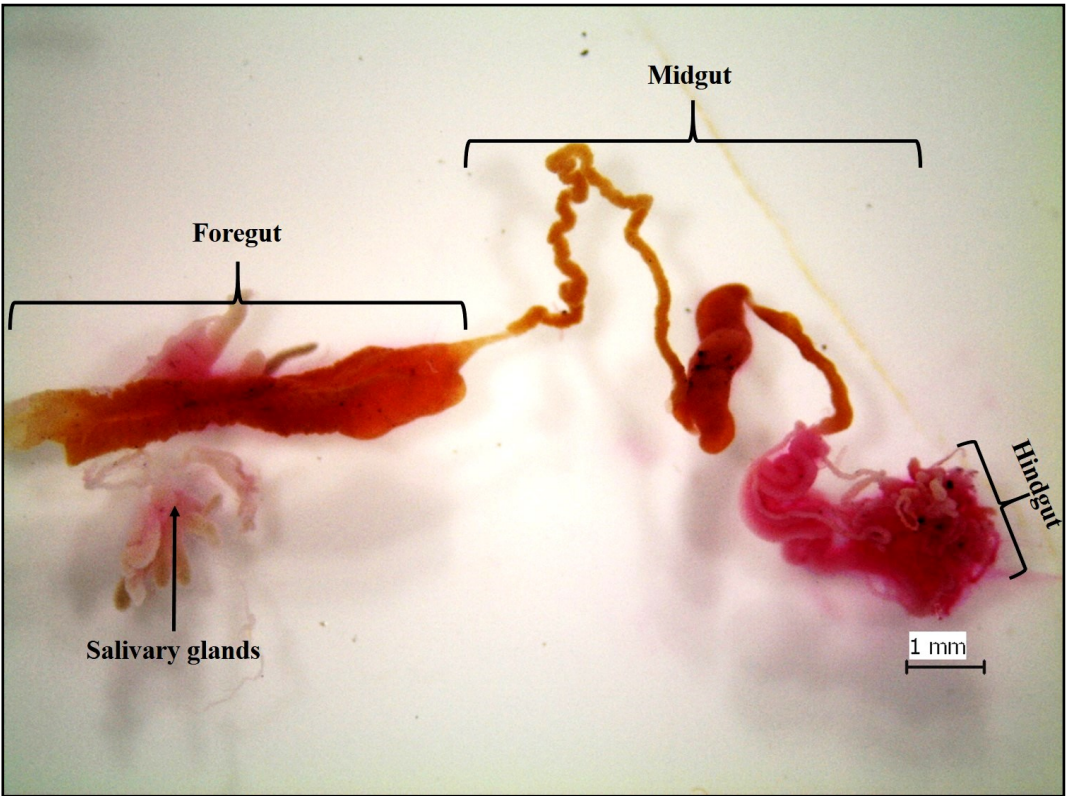


Figure 1. Overall appearance of the alimentary canal in *Centrocoris variegatus* (Stereomicroscope).

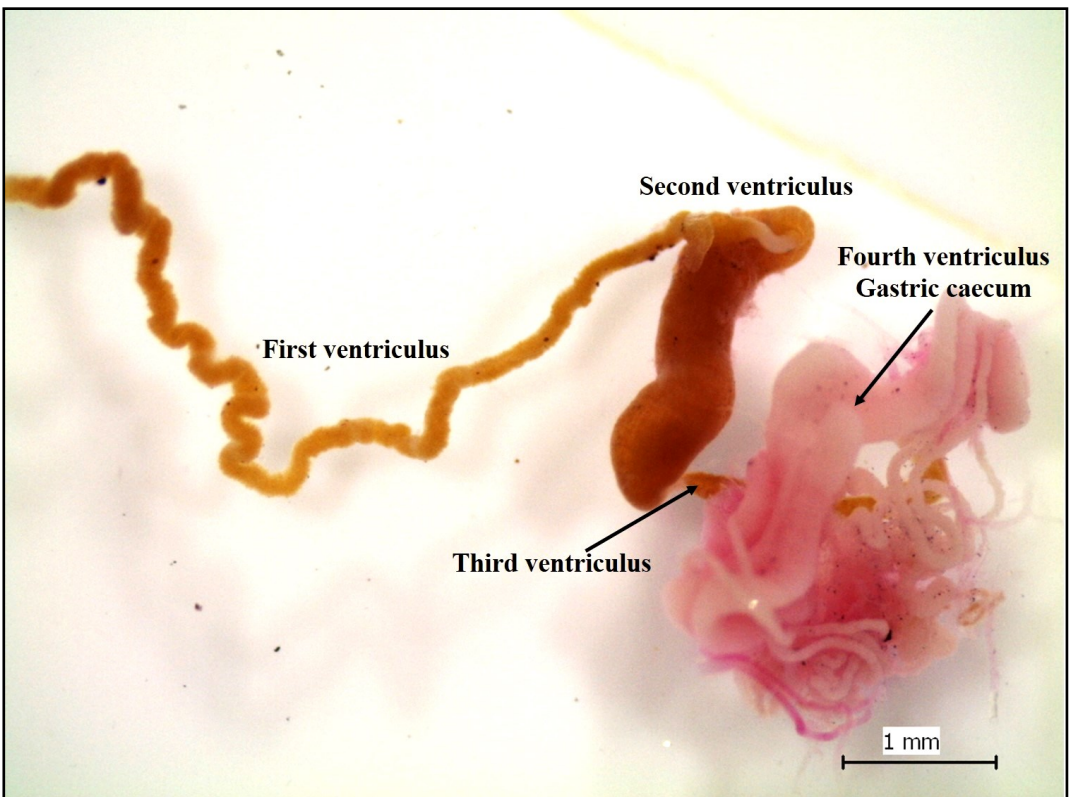


Figure 2. The regions of the midgut in *C. variegatus* (Stereomicroscope).

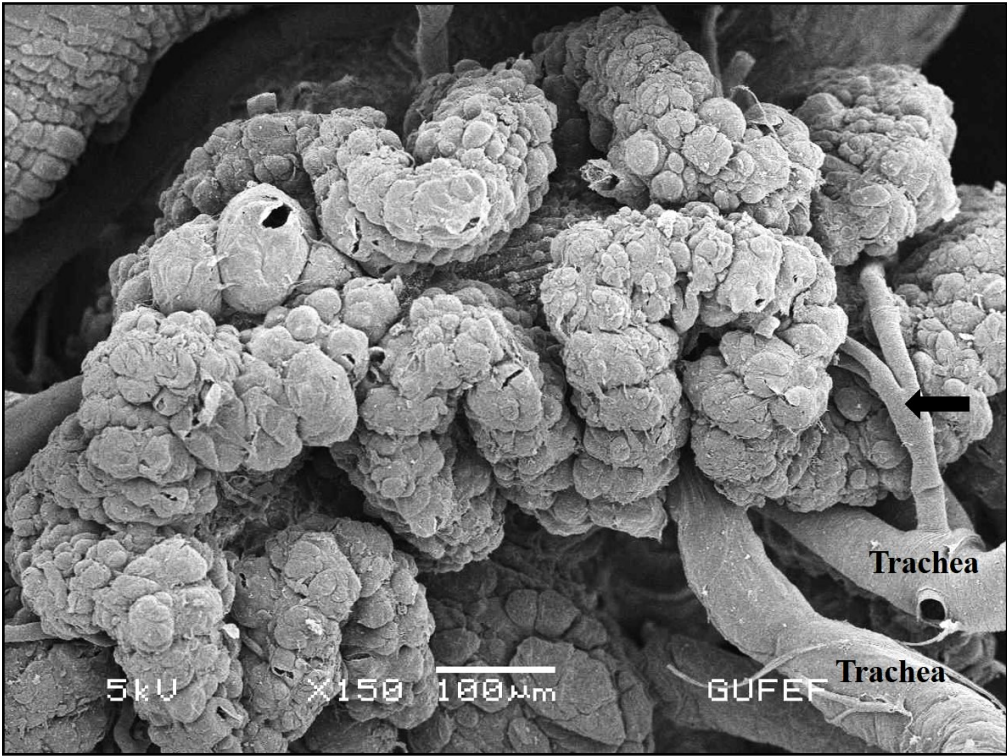


Figure 3. The scanning electron micrograph of the outer surface of the gastric caecum in *C. variegatus*. Tracheal network (→) (SEM).



Figure 4. The scanning electron micrograph of the outer surface of the gastric caecum in *C. variegatus* (SEM).

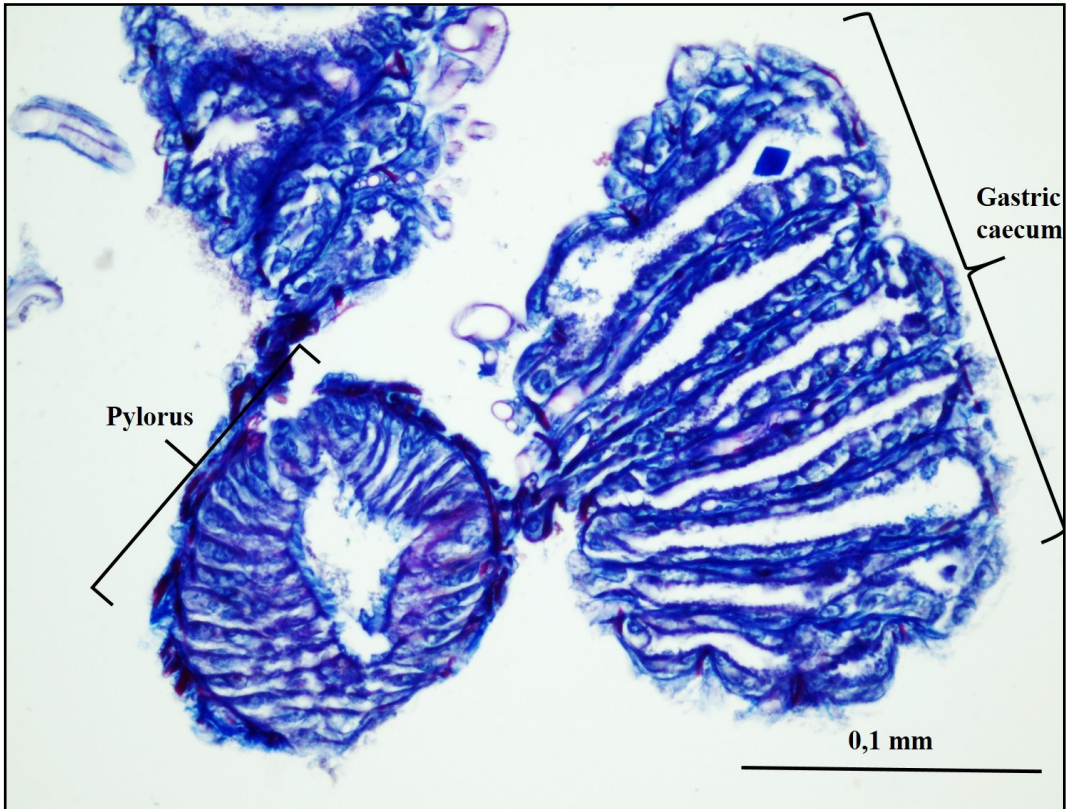


Figure 5. The light micrograph of the gastric caecum and the pylorus in *C. variegatus* (Light microscope, Hemotoxilen-Eosin staining, X400).

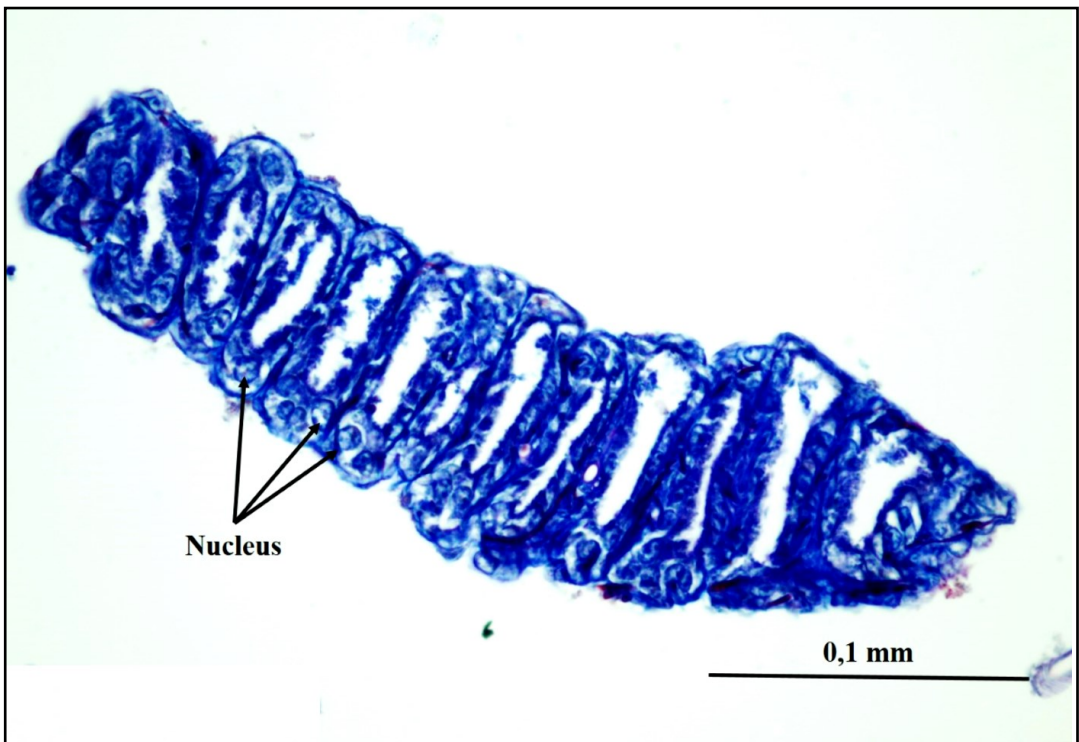


Figure 6. The light micrograph of the gastric caecum in *C. variegatus* (Light microscope, Hemotoxilen-Eosin staining, X400).

DISCUSSION

The main role of the gastric caecum is producing the digestive enzymes in Insects (Ferreira et al., 1999). Gastric caecum founding in the midgut of many insects differ among orders with regard to shape, number, size and position (Chapman, 1988). In Hemiptera order, the alimentary canal is characterized by the presence of different appendages which open into the midgut. These different appendages which called gastric caecum are found at midgut posterior end (Glasgow, 1914). These structures vary considerable in morphologically and according to degree of development in the different families in which they belong. However, gastric caeca have essentially the same histological structure (Glasgow, 1914).

The midgut of *Lygaeus trivittatus* (Hemiptera, Lygaeidae) lacks of gastric caeca as in *Sphex flavipennis* Fabricius, 1793 (Hymenoptera, Sphecidae) and *Graptostcthus scrvus* (Hemiptera, Lygaeidae) (Glasgow, 1914; Kurup, 1964; Demir & Suiçmez, 2011; Gangurde et al., 2019). The gastric caeca of *Anasa tristis* (Hemiptera, Coreidae) are arranged in two rows which are extending along the posterior end of the midgut. The morphology of this region of the midgut is seen curled and undulated. While it measures between 8 and 10 mm in the adult females, this length is between 6 to 7 mm in adult males (Steinhaus et al., 1956). Woodring and Lorenz (2007) stated that the epithelial layer of the gastric caecum also forms folds in cricket *Gryllus bimaculatus*. A different study showed us the short gastric cecacum which is located in the fifth section of the midgut *Largus californicus* (Hemiptera, Largidae), consisting of two rows of tubes (Gordon et al., 2016). The midgut of *Euschistus conspersus* (Hemiptera, Pentatomidae) has four distinct areas as first, second, third and fourth stomach. The caecal region is arranged in four rows in where called the fourth stomach. In the adult females, the caecal region is between 6.5 and 7.5 mm in length, but it varies

approximately between 5 and 6 mm in adult males (Steinhaus et al., 1956). In midgut of *Halys dentatus* (Hemiptera, Pentatomidae) which is divided into four regions, four rows of twisted gastric caecae surround the forth ventriculus (Gangurde et al., 2019).

Investigations on the different insect orders are showed that *Pylaemenes mitratus* (Basillidae) which belongs to Phasmatodea order, has two regions of midgut, which are gastric caecum and the ventriculus. It was determined that the gastric caecum which is located in the anterior midgut, is made up of finger-like smaller seven projections (Nasir & Azman, 2019).

The gastric caecum of *Aedes aegypti* (Culicidae) belongs to Diptera order, is located in the anterior midgut. Lemos et al., 2018 indicated that are it contains three parts as two laterals and one central.

In Orthoptera order, another study is indicated that *Gampsocleis gratiosa* (Orthoptera, Tettigoniidae) has two large gastric bulbous caeca attached at the anterior end of the midgut (Li et al., 2018). Similarly, *Grylloides sigillatus* (Orthoptera, Gryllidae) has two large gastric caeca in anterior region of the midgut. These are wide at the junction area to the digestive system, whereas its distal parts are narrower (Biagio et al., 2009). Besides, *Melanogryllus desertus* (Orthoptera, Gryllidae), *Rhynchosciara americana* (Diptera) and *Sitophilus granarius* (Coleoptera, Curculionidae) have two gastric caeca connected to their alimentary canals (Ferreira et al., 1981; Baker et al., 1984; Çakıcı & Ergen, 2012). On the contrary, the alimentary canal of larval blow fly *Chrysomya megacephala* (Diptera, Calliphoridae) has four gastric caeca (Boonsriwong et al., 2007). The morphology and located area of the gastric caecum of *G. bimaculatus* (Orthoptera, Gryllidae) and *Poecilimon cervus* (Orthoptera, Tettigoniidae) are similar with other discussed species in Orthoptera order in this paper (Woodring & Lorenz, 2007; Polat, 2016).

When the gastric caecum of *C. variegatus*

compared with the gastric caecum morphology of above-mentioned species belonging to different order, shows similarity in terms of the location of gastric caecum with other species in Hemiptera order. However, it differs from other Hemiptera species as the number by having four rows of tubes in the posterior midgut.

When the gastric caecum examined histologically, some differences can be observed among different orders. In some species belongs to Orthoptera order such as *Gampsocleis gratiosa* (Tettigoniidae), *G. bimaculatus* (Gryllidae), *G. sigillatus* (Gryllidae), *Mecopoda niponensi* (Mecopodidae), *Poecilimon cervus* (Tettigoniidae) epithelial folds forward to the lumen can increase the area of the gastric caeca (Li and Zheng, 2004; Woodring & Lorenz, 2007 Biagio et al., 2009; Polat, 2016, Li et al., 2018). In *C. variegatus*, the epithelium of the gastric caecum doesn't show folds forward to the lumen.

Lemos et al., (2018) shown that the gastric caeca cells of *Aedes aegypti* (Diptera, Culicidae) which have microvilli on the apical membrane, are large and slightly flattened. Additionally, the investigators expressed that the wall of the gastric caecum is surrounded with a single layer epithelium (Lemos et al., 2018). Although the gastric caecum of *C. variegatus* has similar cell layer with the gastric caecum of *A. aegypti* as histologically, the microvillus was not observed on the apical membrane of the cells. The gastric caecum has columnar cells in *M. desertus*, *Acheta domesticus* (Orthoptera, Gryllidae), *Abracris flavolineata* (Orthoptera, Acrididae), and polyhedral cells in *R. americana* (Ferreira et al., 1891; Marana et al., 1997; Rost-Roszkowska, 2008; Çakıcı & Ergen, 2012). In *Callosbruchus maculatus* (Coleoptera, Bruchidae) and *Graphosoma lienatum* (Heteroptera, Pentatomidae), the gastric caecum is lined by a monolayer cuboidal epithelium (Amutkan, 2012; Moamen and El Bakary, 2020) in a similar manner with the gastric caecum of *C. variegatus*.

Gangurde et al., (2019) indicated that presence or absence of gastric caeca in alimentary canals species of Hemiptera order has both an importance in phylogenetic and nutritional point of view.

With this study, we revealed the morphological and histological features of the gastric caecum in *C. variegatus* and compared it with those in other insect groups. We hope that the result of our study will serve as a base for the further studies.

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First record of *Patapius spinosus* (Rossi, 1790) for Eastern Anatolia (Turkey) (Hemiptera: Leptopodidae)

İnanç ÖZGEN¹ Paride DIOLI² Aykut TOPDEMİR¹

¹ Fırat University, Faculty of Engineering, Department of Bioengineering, Elazığ, Turkey
E-mail: inancozgen@gmail.com & atopdemir@gmail.com

² Natural History Museum, Department of Entomology, Corso Venezia 55, Milan. Italy
E-mail: paridedioli@virgilio.it

ABSTRACT: *Patapius spinosus* (Rossi, 1790) is recorded for the first time from Eastern Anatolia (Turkey). This species is widespread from Mediterranean to Central Asia, but in Turkey it was known until now only from the southern of Anatolia. This record is the eastern- and northern most one for Turkey.

KEYWORDS: *Patapius spinosus*, Eastern Turkey, first record

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INTRODUCTION

Leptopodidae is the family of spiny-legged bugs in the order Hemiptera. It includes 10 genera with 39 species.

Patapius spinosus (Rossi, 1790), a notable leptopodid bug whose body is covered with spines, was collected for the first time in Tunceli province (Turkey). In this area Fent et al. (2011), in their detailed study of aquatic Heteroptera, reported 100 species. Also Matocq et al. (2014) and Dioli et al. (2019) added other aquatic

species in South and East Anatolia, including Leptopodidae. In this article, we report the collection record and the distribution of *Patapius spinosus* (Rossi, 1790), in Eastern Turkey).

MATERIAL AND METHOD

Material from East Anatolia was collected in the year 2018 from streams and their banks. The samples were collected by using a net and they were preserved in 70% ethanol. Specimens were identified



using Cobben (1968) by second author.

The recorded specimens are preserved in the collection of the Firat University, Bioengineering Department, Elazığ (Turkey).

RESULTS

Patapius spinosus (Rossi, 1790) (Fig. 1).

Acanthia spinosa Rossi, 1790: 224

Material examined: Turkey, Tunceli, Karşılar village, 39°12'7" N 39°28'35" E, at Laç stream edge, 18.5.2018, 2 ♂, Totally: 2 exs. (Fig. 1), leg. Özgen & Topdemir.

Distribution in Turkey: Adana, Bursa, Denizli, Diyarbakır, İzmir, Siirt (Önder & Adıgüzel, 1979; Önder et al., 2006; Matocq et al., 2014, Fent et al., 2011).

Distribution in the Word: A Ponto-Mediterranean species present in **Southern Europe:** Bulgaria, France, Greece, Italy, Macedonia, Spain, Portugal (Lindskog, 1995), Malta (Cuesta Segura et al., 2010), Slovenia (Gogala, 2003), Crete (Heckmann et al., 2015); European Turkey (Fent & Aktaş, 2008). In **North Africa** it was found in Algeria, Canary Islands, Egypt, Libya, Morocco, Tunisia (Lindskog, 1995). In **Asia:** Azerbaijan, Afghanistan, Armenia, Asian Turkey, Cyprus, Georgia, Iraq, Israel, Kirgizia, Lebanon (Lindskog, 1995), Iran (Ghahari et al., 2013), Syria (Vinokurov & Kment, 2015), Tadzhikistan, Turkmenistan, Uzbekistan. It was also introduced in Japan (Yamazaki & Sugiura 2004), Western United States of America and Chile (Usinger, 1941; Lindskog, 1995; Aukema et al., 2013).



Figure 1. The Habitus of *Patapius spinosus* (Rossi, 1790). (Photos by İ., Özgen)

DISCUSSION

The genus *Patapius* Horváth, 1912 is easily distinguished by having the first and second antennal articles sub-equal in length and much larger than the subsequent ones, which, on the other hand, are very delicate and threadlike. The eyes generally carry clearly visible spines (Cobben, 1968; Pericart, 1990).

Patapius includes eight known species,

three of them are in the Palearctic region: *Patapius spinosus* (Rossi, 1790) (Ponto-Mediterranean), *Patapius sentus* Drake & Hoberlandt, 1951 (Egypt, Afghanistan, Iran and Israel) and *P. thaiensis* Cobben, 1968 (China and Thailand). The remaining species are afrotropical (Pericart, 1990; Lindskog, 1995).

The palearctic *Patapius* species, according to Cobben (1968) can be identified by the following key (modified, original):

Key to the species of Genus *Patapius* Horváth, 1912

1. Eyes with spines2
 - Eyes without spines..... ***P. thaiensis***
 2. Length about 2 mm. Spines on eyes short. External margin of corium not distinctly serrate ***P. sentus***
 - Length 3-3.5 mm. Spines on eyes conspicuous. External margin of corium distinctly serrate..... ***P. spinosus***

This species, as other Leptopodidae, is a predator of little arthropods but it can also be necrophagous (Baz et al., 2010; Baena, 2011). Generally it lives in hot and arid places with a certain preference for those altered by man such as roadsides and paths, rubble, piles of stones, almost always under them (Pericart, 1990). In North America (Zack et al., 2001) this bug was every time associated with the deposit of stones near to the roads that ran parallel to an alkaline pond or even colonized the underface of dried rocks (pile of basalt) that have been leaved after construction activities. In Spain (Baena & Vázquez, 1989) it was also captured under the dried bark of almond, plane tree, cypress and pine trees. Adult instars overwinter from December after mating and the life cycle starts again in the spring with the laying of the eggs. In Sardinia, two specimens were found near Senorbi (Cagliari, leg. C. Meloni) under a log, in a dry environment (Pericart, 1990).

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Some Faunistic Records of Heteroptera (Hemiptera) in Mardin (Turkey) with an Endemic Species

İnanç Özgen¹ Musa Geçit² Paride Dioli³

¹ Firat University, Faculty of Engineering, Department of Bioengineering, Elazığ, Turkey

E-mail: inancozgen@gmail.com

² Nur Mah, Kamu Caddesi, Buluş Apt, Artuklu, Mardin,

E-mail: musagecitii@gmail.com

³ Natural History Museum, Department of Entomology, Corso Venezia 55, Milan. Italy

ABSTRACT: We represents *Apterola lownii* (Saunders, 1876) and *Grypocoris melanopygus* Horváth, 1906 two species, found in Mardin, less known in photographic images. *Grypocoris melanopygus* Horváth, 1906 endemic to Turkey, shows a new color pattern.

KEYWORDS: : *Apterola lownii*, *Grypocoris melanopygus*, Mardin province, Eastern Turkey, faunistic records.

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INTRODUCTION

In this paper we present the reports of two species of Heteroptera generally less known by photographic images in nature. They are present in the province of Mardin where historically *Apterola lownii* (Saunders, 1876) was found the first time. Therefore is presented the red-orange pattern of *Grypocoris melanopygus* Horváth, 1906, usually white-yellow colored. General distribution, when not otherwise specified, is referred to the

Catalogue of Palaearctic Region (Aukema & Rieger 1999 and 2001; Aukema et al., 2013).

RESULTS AND DISCUSSION

Lygaeidae

Apterola lownii (Saunders, 1876)

General distribution: Europe: Bulgaria, Greece, Macedonia, Turkey (European part). Asia: Armenia, Azerbaijan, Cyprus, Georgia, Iran, Iraq, Israel, Kazakhstan (Asian part), Kirgizia, Syria, Tadzhikistan, Turkey (Asian



part), Turkmenistan, Uzbekistan.

Distribution in Turkey: Ankara, Edirne, Kahramanmaraş, Kayseri, Mardin, (Önder et al., 2006; Kiyak, 2017)

Material examined: Mardin, 28.03.2019, 5 ex. leg. Geçit.

Remarks: In the present case were found brachypterous specimens.

According to Pericart (1990), the species was generally collected on dry soil under

the stones or between the roots of the trees.

Host plants: in different situations, specimens were found under *Anchusa aggregata* (Cyprus) and *Artemisa herba-alba* (Israel). In Azerbaijan it was found at the considerable height of 2100 m.

Bio-ecological studies have ascertained the presence of only one generation per year: young instars grow during the months of June-July. Then, after the last moult, specimens overwinter as adults.



Figure 1. The habitus of *Apterola lounii* (Saunders, 1876). (Photos by İ., Özgen)

Miridae

Grypocoris melanopygus Horvath, 1906

General distribution: This species is endemic in Turkey.

Distribution in Turkey: Ankara, Kahramanmaraş, Kastamonu, Kayseri, Konya, Nevşehir, Osmaniye, Tunceli, Pertek, Akdemir (Önder et al., 2006; Dursun & Fent., 2017; Özgen & Dioli, 2019).

Material examined: Mardin, 10.05.2019, 2 exc. leg. M. Geçit.

Remarks: The specimen is a mature female having the abdomen full of eggs: for this reason, we can exclude that it is

an immature, with criptic coloration, just passed from the instar of nymph to the adult. In fact, the nominal form usually shows a yellow and black color. In the case of the image reproduced here (Fig. 2), the white-yellow color turns into pink-orange. So we say for the new color form, this color difference can be considered as color variation.

In literature, the species was observed “occurring on undergrowth below *Pinus nigra* of wooded hill formation” (Hoberlandt, 1955). Wagner (1970-71) instead reported an observation by Seidenstücker who found it on *Chrysanthemum* sp.



Figure 2. The habitus of *Grypocoris melanopygus* Horváth, 1906.

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AUTHOR GUIDELINES

Aims & Scope

The *Journal of the Heteroptera of Turkey* is a biannual peer reviewed international journal that publishes original articles, review articles, and short communication on all aspects of Heteroptera.

The *Journal of the Heteroptera of Turkey* publishes qualified research articles on the systematics, taxonomy, faunistical and ecology of heteroptera suborder. The topic of the research may include a wide range of heteropteran fields. Detailed studies on systematics, morphology, ecology, and phenology of heteroptera, and the biological, ecological, and faunistic formation of heteroptera taxa.

In this *Journal* full-papers and short communications containing original researches on any aspect of heteropteran in palaeartic region and Turkey will be considered as publication.

The *Journal of the Heteroptera of Turkey* welcomes review articles in the field of heteropteran.

The *Journal of the Heteroptera of Turkey* also published short notes on heteropteran topics. Information of the heteropteran specialists and book reviews will also be published.

We would like to make an open invitation to all potential contributors. We have a fast publishing process to process and evaluate.

Taxonomic revisions and descriptions of individual species will be accepted especially if additional information is included on habitat preferences, behavior, phenology etc. Descriptions of single specimens are discouraged.

For submitted article there are restrictions on the subject, author, geographic area, and so on of any submission (palaeartic only). For our journal mission all fields of heteroptera studies are suitable.

All papers being peer-reviewed by two referees, and under rapid publication process.

Preparation of Manuscript

All manuscripts should be written in the Turkish or English languages to be published only in the *Journal of the Heteroptera* and should be prepared with Microsoft Word.

Manuscripts should be written on A4 (21 cm x 29.7 cm) paper with margins of at least 2 cm in width.

All pages should be numbered consecutively. Manuscripts should be organized in the following order: Title, abstract, brief introduction, materials and methods, results, discussion, acknowledgments, references, tables and figure legends.

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Title: The title of the manuscript should be informative and clear, not exceed 15-20 words. Just under the title full name(s) of author(s); (surname(s) in capital letters; full address(es); e-mail address(es); if available, ORCID numbers for all authors, Corresponding Author contact information should be give (each on a separate line).

Abstract: The abstract should not exceed 250-300 words (maximum), should be one paragraph.

Keywords: For subject indexing, up to 6 topical keywords in English are required (for Turkish articles).

Text: Introduction, Materials and Methods, Results, Conclusion and Discussion, Acknowledgments, References, Figure and table legends.

Use italics for Scientific names of genera, species, and subspecific taxa.

Do not use italics for abbreviations such as "spp.", "sp.", "ssp.", "var.", "gen.nov.", "sp.n.", "ssp.nov.", "stat.n.", "comb.n.", "s.l.", "s. str.", "et al.", and names of taxa of rank higher than genus.

For faunistic research follow this order: Taxon name, Material examined, Habitat, Host plant(s), Distribution. Example:

Miridae Hahn, 1831

Deraeocoris rutilus (Herrich-Schaeffer, 1838)

Habitat: The specimens belonging to *D. rutilus* (H.-S., 1838) were found on *Carduus pycnocephalus* subsp. *albidus* (Bieb) Kazmi.

Materials examined: 1 male, 24.6.1996 (Loc. 1), 1 female, 24.6.1996 (Loc.6).

Distribution in Turkey: The Aegean, the Marmara, and the Anatolia regions (18,10,8,13,29). Distribution in the world: Israel, Sardinia, Syria, Cyprus, Poland, the Balkans, Russia, and Turkey (18,25).

References: References should be prepared according to “*The Guidelines to Authors*”.

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References must be cited in the text as (Dursun, 2013), Fent & Dursun (2005) or Fent et al. (1997), or in a parenthesis (Dursun, 2013; Fent & Dursun, 2005; or Fent et al. ,1997).

Journal article: Abbreviate names of periodicals basically according to the World List of Scientific Periodicals, 4th Edition, Butterworths, London, 1964–1965. (If you are not certain about the correct abbreviation, give the journal’s name in full).

Fent, M., Kment, P., Elipek-Çamur, B., Kırgız, T., 2011, Annotated catalogue of Enicocephalomorpha, Dipsocoromorpha, Nepomorpha, Gerromorpha and Leptopodomorpha (Hemiptera: Heteroptera) of Turkey with new records, *Zootaxa*, 2856:1-84.

Books: Alexi Popov, A., Grozeva, S., Simov, N., Tasheva, E., 2013, *Advances in Hemipterology*, PenSoft Publishers Ltd, 377 pp., Sofia, Bulgaria.

Article/Chapter in Book: Kerzhner, I. M., Jaczewski, T. L., 1964, *Order Hemiptera (Heteroptera) 851–1118pp.* In: *Keys to the insects of the European USSR 1.* (Ed. G. Y. Bei-Bienko). Nauka, Moskva & Leningrad [in Russian; English translation, Israel Program for Scientific Translations, Jerusalem, 1967]. 1214 pp.

No Author Given: (USDA) U.S. Department of Agriculture. 2001. Title. USDA, Beltsville, MD. (IRRI) International Rice Research Institute. 2001. Title. IRRI, City, State or Country.

Proceedings: Šeat, J., Kaur, H., Gallé, R., Torma, A. 2018, The role of road verges as secondary linear habitats for Forest steppe Heteroptera, *8th European Hemiptera Congress*, 24-29 Jun 2018, Zawiercie, Poland. Book of Abstracts, 61 p.

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Online Citations/ Websites: Rabitsch, W., 2005, Spezialpraktikum aquatische und semiaquatische Heteroptera; (Web page: <http://homepage.univie.ac.at/wolfgang.rabitsch/>). (Date accessed: May 2010).

Using the DOI (Digital Object Identifier) Number: Nestel D., Papadopoulos N. T. & Miranda Chueca M. A. (2008). Current advances in the study of the ecology of fruit flies from Europe, Africa and the Middle East. *Journal of Applied Entomology*, DOI: 10.1111/j.1439-0418.2008.01378.x

Please note on the illustrations, figure, table, and photographs legends: Illustrations should be arranged into blocks or plates by the author(s). Figures should be provided electronically in either JPG or TIFF format. JPG images should be the highest resolution possible. TIFF images should be at 300 dpi resolution.

Morphological illustrations (if not schematic) and **photographs/** electron microscope micrographs should include scale bars. Photographs and electron microscope micrographs must be in JPEG file format (300 dpi).

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Photographs should be high-contrast, black and white or color. Lettering should be typed and legible. All papers should be accompanied by information on the credited photographer or copyright holder. If the photographer or copyright holder is not an author on the paper, then permission must be granted by the copyright holder.

Tables should be numbered consecutively and include headings and explanations. References in the text to illustrations (schematic, photographs) and tables into parenthesis: e.g.(Fig.1) (Figs.1–4) (Table 1.) (Table 1., Figs.1-4). Morphological illustrations should be provided with scale bars.

Taxonomic papers in *JHT* must follow the requirements below: Follow all requirements of the current *International Code of Zoological Nomenclature* (4th edition 1999), and be followed the recommendations of the Code.

A holotype should always be designated for each newly described species-level taxon and at least holotypes should be deposited in public collections that provide long-term care and access for study (note that such deposition is mandatory for neotypes). For this reason, two particular recommendations (73A and 16C) should be observed in *JHT*.

In the Abstract must be listed new combinations, new status, new taxa, new synonyms, etc. in. The list of synonymized names must indicate their disposition. For newly should be described taxa included for all newly synonymized or combined names. Use “sp. n.”, “gen. n.” etc.. **Important note:** Descriptions based on single specimens are discouraged.

The standard order of sections for description a species is: “Diagnosis”, “Description”, “Material”, “Type locality”, “Etymology”, “Distribution”, “Biology”, and other comments if appropriate. Author(s) of species name must be provided when the scientific name of any animal species is first mentioned. (The year of publication is not compulsory. if you give it, then provide a full reference of this in the reference list.)

It is the *author’s responsibility* to know the group, both material and literature, well enough (preferably on a worldwide basis) to be able to ensure that all relevant taxa were taken into account and that any new taxa proposed have not already been described from elsewhere.

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