

Contributions to Nepomorpha (Insecta: Hemiptera: Heteroptera) fauna in wetland areas of Amasya, Turkey

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Abstract: A total of 22 Nepomorpha species belonging to 12 genera and 8 families have been recorded from wetland areas in Amasya Province, Turkey. *Anisops sardeus*, *Lethocerus patruelis*, *Micronecta griseola*, *Micronecta scholtzi* and *Ochterus marginatus marginatus* are new records for Amasya and the Black Sea Region of Turkey. *Micronecta scholtzi* is reported as a new for the middle Black Sea region.

Keywords: Heteroptera, Nepomorpha, new records, Black Sea Region.

Introduction

The members of Nepomorpha (Hemiptera: Heteroptera) are aquatic insects forming a monophyletic infraorder which jointly includes 92% of aquatic species (Polhemus and Polhemus, 2008). The species of Nepomorpha are predaceous and well adapted to aquatic environments and these are economically and biologically important. They feed on tiddler and some invertebrates (e.g. aquatic insect, juvenile crayfish and larvae), as well as prey for many aquatic animals (e.g small fish), although many Corixidae species are omnivorous (Polhemus et al., 1995).

Nepomorpha members live in all aquatic zones (from littoral to benthic zone) but they usually prefer the littoral zone. The members of any aquatic fauna are generally used for determining the ecological importance and the quality of the aquatic ecosystems. Various invertebrates are particularly used as an indication of water quality for aquatic ecosystems. It is important to know habitat preferences of aquatic Heteroptera specimens because such an information on habitat preferences can allow to use these insects as indicator species in aquatic ecosystems. Food, temperature, chemical substances, prey-predator relationships, oxygen and heavy metals can affect distribution of aquatic insects. On the other hand, distribution of Heteroptera species are correlated with many biotic and abiotic factors (Andersen, 1995; Jansson, 1995; Olosutean and Ilie, 2013; Boda et al., 2015).

The studies on aquatic heteropterans of Amasya region have been performed in lakes, dam lakes and puddles in the region. Amasya constitutes a very rich region in terms of wetland areas, rivers, dam lakes, watercourse, swamp areas and small ponds. The region includes lush lowlands irrigated by irrigation dam, ponds, Yeşilirmak and its. Amasya also shows a unique feature of faunal elements and constitutes an important area for type localities of numerous invertebrate species.

Although taxonomic studies on aquatic Heteroptera in wetland areas of Amasya is well documented (Dursun 2011), no detailed study has been carried out with aquatic Heteroptera in the region. *Sigara lateralis* and *Notonecta maculata* are two species reported so far by Dursun (2011).

The aim of this study is to give new records for aquatic Heteroptera fauna of wetlands of Amasya and its surrounding areas, to present ecological data for the species given and to open a new way for scientific and ecological studies in wetlands in the region.

Materials and Methods

Nepomorpha samples was collected from different wetland localities of Amasya between the 2015 and 2016 (Fig. 1). A total of 1601 specimens were collected by sweeping nets from water surface, edges and bottom of water bodies (Table 1). All specimens were put in tubes

in 70% ethanol and brought to the laboratory. In the laboratory, specimens were softened in hot water (80°C-100°C) for preparation of the genitalia which were used for further identifications. The specimens were investigated under stereomicroscope (Leica EZ4) and their male genitalia (pygophores and parameres) were

extracted. Hungerford (1934), Stichel (1955; 1956), Poisson (1957), Kiritshenko and Jaczewski (1960), Jansson (1986), and Linnavuori and Hosseini (2000) were used for identifications. The material is deposited in the collection of Amasya University, Faculty of Science and Arts, Department of Biology (Amasya, Turkey).

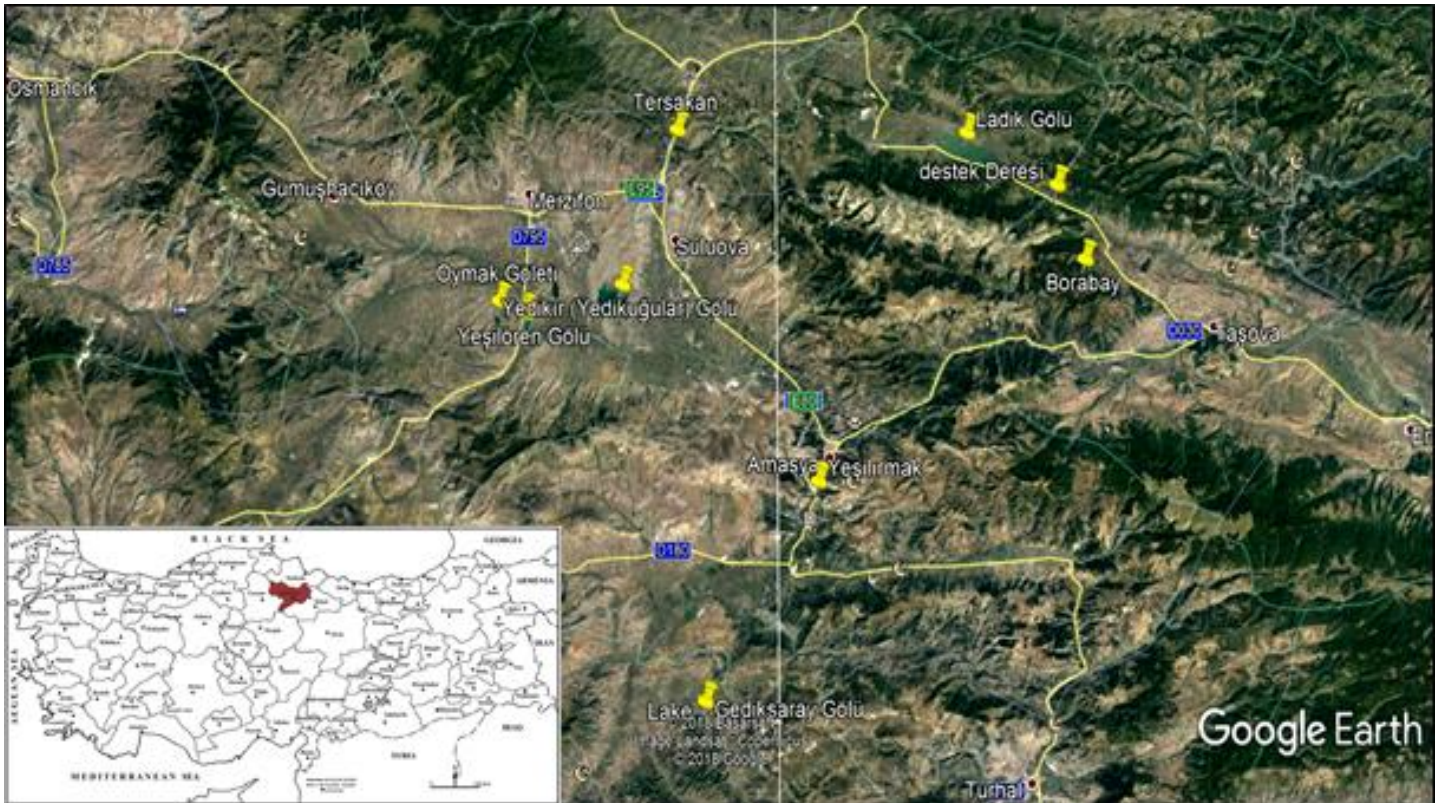


Figure 1. The sampling localities, Amasya province.

Results

Ordo: Hemiptera Linnaeus, 1758

Subordo: Heteroptera Latreille, 1810

Infraorder: Nepomorpha Popov, 1968

Family: Belostomatidae Leach, 1815

***Lethocerus patruelis* (Stål, 1854)**

Material examined: Amasya: Taşova, Durucasu, 09.09.2015, 1♀.

Distribution in Turkey: Adana, Edirne, Kırklareli, Mersin, Tekirdağ (Hoberlandt, 1952; Polhemus, 1995; Aukema, 2009; Fent et al., 2011).

Comments: This species was recorded firstly by Hoberlandt (1952) from Adana and identified as *Lethocerus niloticus* (Stål, 1854). The author mentioned about this species as Ethiopian element. In the present

study, this species was recorded from Amasya and the Black Sea region for the first time.

Family: Corixidae Leach, 1815

***Corixa affinis* Leach, 1817**

Material examined: Amasya: Ziyaret Lake, 22.05.2015, 1♀, 1♂; Yassıçal Lake, 23.05.2015, 1♀; Derinöz Dam Lake, 24.05.2015, 1♂; 06.07.2015, 2♀♀; Ziyaret Lake, 06.07.2015, 2♀♀, 1♂; Doğantepe Lake, 15.06.2015, 2♀♀; 12.08.2015, 1♀, 1♂; Ortaköy Lake, 12.08.2015; 1♂; Göynücek, Gediksaray Lake, 14.08.2015, 1♂; 06.07.2015, 7♀♀, 4♂♂; Merzifon, Alala Lake, 15.07.2015, 1♀; Alişar Lake, 15.07.2015, 1♀, 1♂; Merzifon, Yazıköy Lake, 06.09.2015, 12♀♀, 7♂♂; Suluova, Mindor Lake, 13.07.2015, 1♀, 1♂; Yedikır Dam Lake, 31.08.2015, 7♀♀, 5♂♂; 07.09.2016, 10♀♀, 11♂♂; Taşova, Borabay Lake,

20.06.2015, 5♀♀, 3♂♂; Samsun: Ladik Lake, 11.07.2015, 3♀♀, 2♂♂; 09.09.2015, 5♀♀, 3♂♂.

Distribution in Turkey: Adana, Afyonkarahisar, Ağrı, Ankara, Aydın, Burdur, Bursa, Çanakkale, Çorum, Denizli, Edirne, Erzincan, Eskişehir, Hatay, Isparta, İçel, İzmir, Kırklareli, Kırşehir, Kocaeli, Konya, Manisa, Muğla, Osmaniye, Samsun, Sivas, Zonguldak, (Hoberlandt, 1952; Jansson, 1986; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011; Topkara, 2013; Topkara and Ustaoglu, 2015).

Comments: This species is frequently found and widely distributed in Turkey. The present record is the first record of the species in Amasya.

Table 1. Number of specimens in each species regarding to sex

Family	Species	♀	♂
Belostomatidae	<i>Lethocerus patruelis</i> (Stål, 1854)	1	-
Corixidae	<i>Corixa affinis</i> Leach, 1817	60	43
	<i>Corixa panzeri</i> Fieber, 1848	12	12
	<i>Corixa punctata</i> (Illiger, 1807)	9	14
	<i>Paracorixa concinna</i> (Fieber, 1848)	8	10
	<i>Sigara nigrolineata</i> (Fieber, 1848)	136	137
	<i>Sigara striata</i> (Linnaeus, 1758)	148	153
	<i>Sigara lateralis</i> (Leach, 1817)	189	196
Micronectidae	<i>Micronecta pusilla</i> (Horváth, 1895)	12	13
	<i>Micronecta scholtzi</i> (Fieber, 1860)	10	11
	<i>Micronecta griseola</i> Horváth, 1899	15	13
Naucoridae	<i>Ilyocoris cimicoides</i> (Linnaeus, 1758)	10	9
Nepidae	<i>Nepa cinerea</i> Linnaeus, 1758	2	-
	<i>Ranatra linearis</i> (Linnaeus, 1758)	15	9
Notonectidae	<i>Anisops sardus</i> Herrich-Schaeffer, 1849	10	7
	<i>Notonecta glauca</i> Linnaeus, 1758	81	73
	<i>Notonecta maculata</i> Fabricius, 1794	30	34
	<i>Notonecta meridionalis</i> Poisson, 1926	7	6
	<i>Notonecta obliqua</i> Thunberg, 1787	5	4
	<i>Notonecta viridis</i> Delcourt, 1909	20	15
Ochteridae	<i>Ochterus marginatus</i> (Latreille, 1804)	1	1
Pleidae	<i>Plea minutissima</i> Leach, 1817	24	18
Total		803	798

Corixa panzeri Fieber, 1848

Material examined: Amasya: Derinöz Dam Lake, 06.07.2015, 1♀; Göynücek, Gediksaray Lake, 14.08.2015, 1♂; 18.06.2015, 1♀, 1♂; Merzifon, Alala Lake, 15.07.2015, 1♀; Çayırköy Lake, 06.09.2016, 2♀♀, 3♂♂; Suluova, Mindor Lake, 13.07.2015, 1♀, 1♂; Yedikır Dam Lake, 31.08.2015, 2♀♀, 2♂♂; Taşova, Borabay Lake, 20.06.2015, 1♀; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 1♀, 2♂♂.

Distribution in Turkey: Ankara, Burdur, Edirne, Erzurum, Isparta, İzmir, Konya, Kütahya, Samsun (Hoberlandt,

1952; Wagner, 1966; Jansson, 1986; Yıldırım et al., 1999; Dursun, 2011; Fent et al., 2011; Topkara, 2013).

Comments: This is the first record of the species in Amasya.

Corixa punctata (Illiger, 1807)

Material examined: Amasya: Derinöz Dam Lake, 06.07.2015, 1♀; Göynücek, Gediksaray Lake, 14.08.2015, 2♂♂; 18.06.2015, 1♀, 1♂; Merzifon, Yakacık Lake, 14.07.2015, 2♂♂; Suluova, Mindor Lake, 13.07.2015, 1♀, 1♂; Yedikır Dam Lake, 31.08.2015, 2♀♀, 2♂♂; Taşova, Borabay Lake, 16.08.2015, 1♀, 1♂; Kızgüldüren Lake, 15.08.2015, 1♂; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 1♀, 2♂♂.

Distribution in Turkey: Adana, Afyonkarahisar, Ağrı, Ankara, Antalya, Ardahan, Aydın, Burdur, Bursa, Çanakkale, Çankırı, Denizli, Edirne, Isparta, İstanbul, İzmir, Kars, Kastamonu, Kayseri, Kırklareli, Kırşehir, Kocaeli, Konya, Muğla, Samsun (Horváth, 1883; Kiritshenko, 1918; Hoberlandt, 1948, 1952; Linnavuori, 1965; Jansson, 1986; Yıldırım et al., 1999; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011; Topkara, 2013).

Comments: The present record is the first record of the species in Amasya.

Paracorixa concinna concinna (Fieber, 1848)

Material examined: Amasya: Göynücek, Gediksaray Lake, 14.08.2015, 1♂; 18.06.2015, 1♀, 1♂; Suluova, Mindor Lake, 13.07.2015, 1♀, 1♂; Yedikır Dam Lake, 31.08.2015, 3♀♀, 3♂♂; Taşova, Borabay Lake, 16.08.2015, 1♀, 1♂; Samsun: Ladik Lake, 11.07.2015, 1♀, 2♂♂; 09.09.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Afyonkarahisar, Ağrı, Ankara, Antalya, Ardahan, Aydın, Bitlis, Burdur, Bursa, Çanakkale, Çankırı, Denizli, Edirne, Erzurum, Isparta, İstanbul, İzmir, Kars, Kastamonu, Kayseri, Kırklareli, Kırşehir, Kocaeli, Konya, Muğla, Samsun, Van (Horváth, 1883; Kiritshenko, 1918; Hoberlandt, 1952; Jansson, 1986; Önder et al., 2006; (Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011).

Comments: The present record is the first record of the species in Amasya.

Sigara nigrolineata nigrolineata (Fieber, 1848)

Material examined: Amasya: Bağlıca Lake, 26.05.2015, 3♀♀, 1♂; 16.06.2015, 2♀♀, 5♂♂; 15.08.2015, 1♀, 1♂;

Derinöz Dam Lake, 06.07.2015, 3♀, 4♂; Destek Lake, 19.06.2015, 3♀, 3♂; 15.08.2015, 3♀, 4♂; Doğantepe Lake, 26.05.2015, 2♀, 2♂; 15.08.2015, 2♀, 2♂; İbecik Lake, 26.05.2015, 2♀, 2♂; 15.06.2015, 3♀, 2♂; 15.08.2015, 2♀, 2♂; Kurnaz Stream, 16.06.2015, 5♀, 5♂; Ortaköy Göleti, 26.05.2015, 2♀, 2♂; 15.06.2015, 4♀, 4♂; 15.08.2015, 1♀, 3♂; Sazak stream, 08.07.2015, 2♀, 2♂; Yassıçal Lake, 09.07.2015, 2♀, 2♂; Yeşilirmak, 08.07.2015, 2♀, 1♂; Ziyaret Lake, 04.09.2015, 4♀, 5♂; Göynücek, Gediksaray Lake, 14.08.2015, 3♀, 3♂; 18.06.2015, 2♀, 1♂; Çulpara Lake, 07.09.2015, 2♀, 3♂; Gümüşhacıköy, Çitli Lake, 16.07.2015, 2♀, 1♂; Sarayözü (Balıklı) Lake, 24.06.2015, 3♀, 3♂; Hamamözü, Yeniköy Lake, 24.06.2015, 2♀, 1♂; İmirler Lake, 08.08.2015, 2♀, 2♂; Merzifon, Oymak Lake, 23.06.2015, 3♀, 4♂; Sarıbuğday Lake, 23.06.2015, 2♀, 2♂; Yakacık Lake, 14.07.2015, 2♀, 2♂; Paşa (Hırka) Lake, 14.07.2015, 1♀, 1♂; 100. Yıl Lake, 15.07.2015, 1♀, 1♂; Yazıköy Lake, 06.09.2015, 15♀, 13♂; Suluova, Bayırlı Lake, 22.06.2015, 6♀, 3♂; Mindor Lake, 13.07.2015, 1♀, 1♂; Sahlan stream, 12.07.2015, 2♀, 1♂; Kolay Lake, 12.07.2015, 3♀, 1♂; Yedikır Dam Lake, 31.08.2015, 3♀, 4♂; Taşova, Borabay Lake, 27.05.2015, 2♀, 3♂; 16.08.2015, 6♀, 6♂; Borabay stream, 08.09.2015, 2♀; Kızılgüdüren Lake, 27.05.2015, 2♀, 3♂; 19.06.2015, 2♀, 5♂; 15.08.2015, 1♂; Ulugöl, 27.05.2015, 1♀, 2♂; 15.08.2015, 3♀, 1♂; Samsun: Ladik Lake, 28.05.2015, 4♀, 2♂; 11.07.2015, 10♀, 12♂; 09.09.2015, 1♀, 4♂.

Distribution in Turkey: Adana, Ağrı, Ankara, Antalya, Ardahan, Artvin, Aydın, Bolu, Burdur, Bursa, Çanakkale, Çorum, Denizli, Diyarbakır, Düzce, Edirne, Erzincan, Erzurum, Eskişehir, Gaziantep, Hatay, Isparta, İzmir, İstanbul, Kastamonu, Kırşehir, Kilis, Kocaeli, Konya, Mersin, Muğla, Rize, Sakarya, Samsun, Sivas, Şanlıurfa, Trabzon, Tokat, Tunceli, Van (Hoberlandt, 1948, 1952; Seidenstücker, 1963; Linnavuori, 1965; Önder et al., 1984, 2006; Kıyak et al., 2004, 2007; Dursun, 2011; Fent et al., 2011; Topkara, 2013).

Comments: This species is frequently found and widely distributed in Turkey. The present record is the first record of the species in Amasya.

Sigara (Sigara) striata (Linnaeus, 1758)

Material examined: Amasya: Bağlıca Lake, 26.05.2015, 2♀, 1♂; 16.06.2015, 3♀, 4♂; 15.08.2015, 1♀, 1♂;

Derinöz Dam Lake, 06.07.2015, 3♀, 5♂; Destek Lake, 28.05.2015, 2♀, 2♂; 19.06.2015, 2♀, 3♂; 15.08.2015, 2♀, 2♂; Doğantepe Lake, 26.05.2015, 2♀, 2♂; 15.08.2015, 2♀, 2♂; İbecik Lake, 26.05.2015, 3♀, 2♂; 15.06.2015, 4♀, 3♂; 15.08.2015, 3♀, 2♂; Kurnaz stream, 16.06.2015, 2♀, 3♂; Ortaköy Lake, 26.05.2015, 3♀, 2♂; 15.06.2015, 1♀, 2♂; 15.08.2015, 1♀, 2♂; Sazak stream, 08.07.2015, 2♀, 2♂; Yassıçal Lake, 09.07.2015, 3♀, 4♂; Tersakan, 29.05.2015, 1♀, 1♂; Yeşilirmak, 08.07.2015, 3♀, 1♂; Ziyaret Lake, 04.09.2015, 3♀, 2♂; Göynücek, Saz stream, 31.05.2015, 2♀, 1♂; Gediksaray Lake, 14.08.2015, 2♀, 3♂; 18.06.2015, 2♀, 1♂; Çulpara Lake, 31.05.2015, 3♀, 5♂; 07.09.2015, 2♀, 4♂; Gümüşhacıköy, Çitli Lake, 31.05.2015, 3♀, 2♂; 16.07.2015, 2♀, 1♂; Sarayözü (Balıklı) Lake, 24.06.2015, 2♀, 3♂; Hamamözü, Yeniköy Lake, 24.06.2015, 4♀, 1♂; İmirler Lake, 08.08.2015, 2♀, 3♂; Merzifon, Oymak Lake, 30.05.2015, 3♀, 2♂; 23.06.2015, 4♀, 2♂; Sarıbuğday Lake, 30.05.2015, 2♀, 2♂; 23.06.2015, 2♀, 3♂; Yakacık Lake, 14.07.2015, 2♀, 2♂; Paşa (Hırka) Lake, 14.07.2015, 1♀, 1♂; 100. Yıl Lake, 15.07.2015, 1♀, 1♂; Suluova, Bayırlı Lake, 22.06.2015, 2♀, 2♂; Mindor Lake, 30.05.2015, 1♂; 13.07.2015, 1♀, 1♂; Sahlan stream, 29.05.2015, 1♀, 1♂; 12.07.2015, 2♀, 1♂; Kolay Lake, 29.05.2015, 2♀, 3♂; 12.07.2015, 2♀, 1♂; Yedikır Dam Lake, 29.05.2015, 2♀, 2♂; 31.08.2015, 2♀, 2♂; 07.09.2016, 9♀, 11♂; Taşova, Ballıdere, 28.05.2015, 2♀, 2♂; Borabay Lake, 27.05.2015, 2♀, 2♂; 16.08.2015, 3♀, 4♂; Borabay stream, 28.05.2015, 2♀, 2♂; 08.09.2015, 2♀; Durucasu, 28.05.2015, 2♀, 3♂; Kızılgüdüren Lake, 27.05.2015, 2♀, 3♂; 19.06.2015, 2♀, 4♂; 15.08.2015, 1♂; Ulugöl, 27.05.2015, 1♀, 2♂; 15.08.2015, 3♀, 1♂; Destek stream, 28.06.2016, 5♀, 8♂; Samsun: Ladik Lake, 28.05.2015, 2♀, 2♂; 11.07.2015, 2♀, 2♂; 09.09.2015, 4♀, 3♂; 22.06.2016, 4♀, 5♂.

Distribution in Turkey: Ağrı, Afyonkarahisar, Ankara, Antalya, Ardahan, Aydın, Bolu, Burdur, Çanakkale, Çankırı, Çorum, Denizli, Edirne, Erzurum, Isparta, İzmir, Kayseri, Konya, Manisa, Mersin, Muğla, Sakarya, Samsun, Van (Kiritshenko, 1918; Hoberlandt, 1952; Jansson, 1986; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011; Topkara, 2013).

Comments: This species is frequently found and widely distributed in Turkey. The present record is the first record of the species in Amasya.

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

Material examined: Amasya: Akinoğlu stream, 17.06.2015, 2♀♀, 3♂♂; Bağlıca Lake, 26.05.2015, 2♀♀, 1♂; 16.06.2015, 3♀♀, 4♂♂; 15.08.2015, 1♀, 1♂; Çekerek river, 07.07.2015, 2♀♀, 1♂; Deliçay, 08.07.2015, 3♀♀, 3♂♂; Derinöz Dam Lake, 06.07.2015, 3♀♀, 5♂♂; Destek Lake, 28.05.2015, 2♀♀, 2♂♂; 19.06.2015, 2♀♀, 3♂♂; 15.08.2015, 2♀♀, 2♂♂; Destek stream, 10.07.2015, 6♀♀, 10♂♂; Doğantepe Lake, 26.05.2015, 2♀♀, 2♂♂; 15.08.2015, 2♀♀, 2♂♂; İbecik Lake, 26.05.2015, 3♀♀, 2♂♂; 15.06.2015, 4♀♀, 3♂♂; 15.08.2015, 3♀♀, 2♂♂; Kızılbayır stream, 07.07.2015, 2♀♀, 3♂♂; Kurnaz stream, 16.06.2015, 2♀♀, 3♂♂; Ortaköy Lake, 26.05.2015, 3♀♀, 2♂♂; 15.06.2015, 1♀, 2♂♂; 15.08.2015, 1♀, 2♂♂; Sazak stream, 08.07.2015, 2♀♀, 2♂♂; Sevincer stream, 17.06.2015, 3♀♀, 2♂♂; Yassıçal Lake, 09.07.2015, 3♀♀, 4♂♂; Tersakan, 29.05.2015, 1♀, 1♂; 22.06.2015, 1♀, 1♂; Yeşilirmak, 08.07.2015, 3♀♀, 1♂; Yenice stream, 17.06.2015, 2♀♀, 2♂♂; Ziyaret Lake, 04.09.2015, 3♀♀, 2♂♂; Göynücek, Çorum stream, 18.06.2015, 4♀♀, 2♂♂; 11.08.2015, 2♀♀, 3♂♂; Saz stream, 31.05.2015, 2♀♀, 1♂; Gediksaray Lake, 10.08.2015, 5♀♀, 3♂♂; 14.08.2015, 2♀♀, 3♂♂; 18.06.2015, 2♀♀, 1♂; Çulpara Lake, 31.05.2015, 3♀♀, 5♂♂; 09.07.2015, 2♀♀, 3♂♂; 07.09.2015, 2♀♀, 4♂♂; Mıntıs stream, 09.07.2015, 2♀♀, 3♂♂; Kertme (Boncuklu) stream, 09.08.2015, 4♀♀, 3♂♂; Kestik stream, 10.08.2015, 2♀♀, 3♂♂; Gümüşhacıköy, Çitli Lake, 31.05.2015, 3♀♀, 2♂♂; 16.07.2015, 2♀♀, 1♂; Sarayözü (Balıklı) Lake, 24.06.2015, 2♀♀, 3♂♂; Hamamözü, Yeniköy Lake, 24.06.2015, 4♀♀, 1♂; İmirler Lake, 08.08.2015, 2♀♀, 3♂♂; Merzifon, Oymak Lake, 30.05.2015, 3♀♀, 2♂♂; 23.06.2015, 4♀♀, 2♂♂; Sarıbuğday Lake, 30.05.2015, 2♀♀, 2♂♂; 23.06.2015, 2♀♀, 3♂♂; Yakacık Lake, 14.07.2015, 2♀♀, 2♂♂; Paşa (Hırka) Lake, 14.07.2015, 1♀, 1♂; 100. Yıl Lake, 15.07.2015, 1♀, 1♂; Suluova, Bayırlı Lake, 22.06.2015, 2♀♀, 2♂♂; Mindor Lake, 30.05.2015, 1♂; 13.07.2015, 1♀, 1♂; Sahlan stream, 29.05.2015, 1♀, 1♂; 12.07.2015, 2♀♀, 1♂; Kolay Lake, 29.05.2015, 2♀♀, 3♂♂; 12.07.2015, 2♀♀, 1♂; Yedikır Dam Lake, 29.05.2015, 2♀♀, 2♂♂; 31.08.2015, 2♀♀, 2♂♂; Taşova, Ballıdere, 28.05.2015, 2♀♀, 2♂♂; Borabay Lake, 27.05.2015, 2♀♀, 2♂♂; 16.08.2015, 3♀♀, 4♂♂; Borabay stream, 28.05.2015, 2♀♀, 2♂♂; 10.07.2015, 3♀♀, 4♂♂; 08.09.2015, 2♀♀; Durucasu, 28.05.2015, 2♀♀, 3♂♂; 11.07.2015, 4♀♀, 3♂♂; Kızılgüdüren Lake, 27.05.2015, 2♀♀, 3♂♂; 19.06.2015, 2♀♀, 4♂♂; 15.08.2015, 1♂;

Ulugöl, 27.05.2015, 1♀, 2♂♂; 15.08.2015, 3♀♀, 1♂; Taşova, Destek stream, 28.06.2016, 10♀♀, 12♂♂; Samsun: Ladik Lake, 28.05.2015, 2♀♀, 2♂♂; 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 4♀♀, 3♂♂.

Distribution in Turkey: Adana, Afyonkarahisar, Ağrı, Amasya, Ankara, Antalya, Artvin, Aydın, Bitlis, Bolu, Burdur, Bursa, Çanakkale, Çorum, Denizli, Diyarbakır, Edirne, Eskişehir, Erzurum, Gaziantep, Isparta, Iğdır, İçel, İstanbul, İzmir, Karabük, Kars, Kastamonu, Kayseri, Kırklareli, Kırşehir, Kilis, Kocaeli, Konya, Muğla, Samsun, Sinop, Niğde, Osmaniye, Rize, Tekirdağ, Tunceli, Van, Zonguldak (Kiritshenko, 1918; Hoberlandt, 1948, 1952; Seidenstücker, 1958; Linnavuori, 1965; Wagner, 1966; Özemsi and Önder, 1988; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011; Topkara, 2013).

Family: Micronectidae Jaczewski, 1924***Micronecta pusilla* (Horváth, 1895)**

Material examined: Amasya: Derinöz Dam Lake, 04.09.2015, 1♀, 1♂; Pamuklu (Kamışlı) stream, 16.06.2015, 1♀, 1♂; Suluova, Kolay Lake, 10.09.2015, 2♀♀, 2♂♂; Yedikır Dam Lake, 21.06.2015, 2♀♀, 2♂♂; 31.08.2015, 2♀♀, 1♂; 07.09.2016, 1♀, 3♂♂; Merzifon, Yakacık Lake, 12.09.2015, 1♀, 1♂; Taşova, Ulugöl, 19.06.2015, 2♀♀, 2♂♂.

Distribution in Turkey: Adana, Edirne, Kayseri, Konya, Sivas, Tokat (Wróblewski, 1963; Linnavuori, 1965; Jansson, 1986; Özemsi and Önder, 1988; Kıyak and Öz Saraç, 2001; Önder et al., 2006; Fent et al. 2011).

Comments: The present record is the first record of the species in Amasya.

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

Material examined: Amasya: Suluova, Yedikır Dam Lake, 31.08.2015, 2♀♀, 1♂; Merzifon, Çayırköy Lake, 06.09.2016, 4♀♀, 5♂♂; Taşova, Ulugöl Lake, 19.06.2015, 2♀♀, 2♂♂; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 3♂♂.

Distribution in Turkey: Bolu, Edirne, İzmir, Sakarya (Önder et al., 2006; Fent et al., 2011; Topkara, 2013).

Comments: In the present study, this Mediterranean species was recorded from Amasya and the middle Black Sea region for the first time. It is rarely distributed in Turkey according to previously records.

***Micronecta (Micronecta) griseola* Horváth, 1899**

Material examined: Amasya: Derinöz Dam Lake, 06.07.2015, 3♀♀, 4♂♂; Ziyaret Lake, 06.07.2015, 4♀♀, 2♂♂; Doğanstepe Lake, 12.08.2015, 1♀, 1♂; Ortaköy Lake, 12.08.2015; 1♂; Göynücek, Belibayır Lake, 09.08.2015, 1♀, 1♂; Saz stream, 08.08.2015, 1♀; Merzifon, Alala Lake, 15.07.2015, 1♀, 1♂; Alişar Lake, 15.07.2015, 1♀; Suluova, Mindor Lake, 13.07.2015, 1♀, 1♂; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 2♂♂.

Distribution in Turkey: Adana, Ankara, Edirne, Gaziantep, Sivas (Wróblewski, 1963; Jansson, 1986; Kıyak and Öz Saraç, 2001; Kanyukova, 2006; Önder et al., 2006; Kıyak et al., 2007; Fent et al., 2011).

Comments: This Ponto-Mediterranean species was recorded from Amasya and Black Sea region for the first time.

Family: Naucoridae Leach, 1815

***Ilyocoris cimicoides cimicoides* (Linnaeus, 1758)**

Amasya: Destek stream, 16.08.2015, 4♀♀, 5♂♂; Suluova, Yedikır Dam Lake, 07.09.2016, 4♀♀, 3♂♂; Samsun: Ladik Lake, 03.09.2016, 2♀♀, 1♂.

Distribution in Turkey: Adana, Afyonkarahisar, Ankara, Ardahan, Aydın, Burdur, Çorum, Denizli, Isparta, İstanbul, İzmir, Kars, Kayseri, Kırklareli, Konya, Muğla, Niğde, Samsun, Sivas (Balık et al., 2006; Önder et al., 2006; Kıyak et al., 2007; Salur and Mesci, 2009; Topkara et al., 2009; Dursun, 2011; Fent et al., 2011; Çerçi and Koçak, 2016).

Comments: This species is widespreadly distributed in stagnant water, it was found in the neighbouring regions according to Salur and Mesci (2009) and it was recorded for the first time in Amasya with the present study.

Family: Nepidae Latreille, 1802

***Nepa cinerea* Linnaeus, 1758**

Material examined: Amasya: Sazak stream, 06.09.2015, 1♀; Taşova, Ballıdere, 16.08.2015, 1♀.

Distribution in Turkey: Adıyaman, Afyonkarahisar, Ağrı, Aydın, Bitlis, Bolu, Burdur, Çorum, Denizli, Edirne, Isparta, İstanbul, Kahramanmaraş, Kars, Kayseri, Kırklareli, Kırşehir, Kocaeli, Konya, Nevşehir, Sakarya, Sinop, Sivas, Van (Kritshenko, 1918; Horváth, 1919; Fahringer, 1922; Hoberlandt, 1952; Bat et al., 2000; Kıyak et al., 2004; 2007; Önder et al., 2006; Salur and Mesci, 2009; Topkara et al., 2009; Dursun, 2011; Fent et al., 2011; Çerçi and Koçak, 2016).

Comments: Hoberlandt (1952) mentioned about this species of angaran origine. It is frequently and widely distributed in lake ecosystems of all regions of Turkey. In this study, this species was recorded for the first time in Amasya.

***Ranatra linearis* (Linnaeus, 1758)**

Material examined: Amasya: Göynücek, Mintıs stream, 07.09.2015, 6♀♀, 4♂♂; Taşova, Ballıdere, 16.08.2015, 4♀♀, 3♂♂; Destek stream, 08.09.2015, 5♀♀, 2♂♂.

Distribution in Turkey: Afyonkarahisar, Antalya, Burdur, Denizli, Edirne, Isparta, İstanbul, İzmir, Kayseri, Kırklareli, Konya, Samsun (Fahringer, 1922; Hoberlandt, 1952; Öz esmi and Önder, 1988; Polhemus, 1995; Kıyak et al., 2004, 2007; Önder et al., 2006; Topkara et al., 2009; Dursun, 2011; Fent et al. 2011).

Comments: The present record is the first record of the species in Amasya.

Family: Notonectidae Latreille, 1802

***Anisops sardeus sardeus* Herrich-Schaeffer, 1849**

Material examined: Amasya: Göynücek, Gediksaray stream, 14.08.2015, 10♀♀, 7♂♂.

Distribution in Turkey: Adana, Antalya, Aydın, Denizli, Edirne, Gaziantep, İzmir, Kilis, Mersin, Muğla, Osmaniye (Hoberlandt, 1952; Linnavuori, 1965; Wagner, 1966; Polhemus, 1995; Önder et al., 2006; Kıyak et al., 2007; Fent et al., 2011; Banbal and Fent, 2016).

Comments: This species shows a great sensitivity to oxygen in freshwater habitats according to our observations. It was recorded from the Black Sea region and Amasya for the first time within this study.

***Notonecta glauca glauca* Linnaeus, 1758**

Material examined: Amasya: Akınoğlu stream, 17.06.2015, 1♀; Bağlıca Lake, 16.06.2015, 2♀♀, 1♂; 15.08.2015, 1♀, 1♂; Derinöz Dam Lake, 06.07.2015, 2♀♀, 2♂♂; Destek Lake, 28.05.2015, 2♀♀, 3♂♂; 19.06.2015, 3♀♀, 3♂♂; 15.08.2015, 3♀♀, 2♂♂; Destek stream, 10.07.2015, 3♀♀, 4♂♂; Kurnaz stream, 16.06.2015, 2♀♀, 1♂; Yassıçal Lake, 09.07.2015, 2♀♀, 2♂♂; Ziyaret Lake, 04.09.2015, 2♀♀, 2♂♂; Gediksaray Lake, 10.08.2015, 4♀♀, 3♂♂; 14.08.2015, 4♀♀, 2♂♂; 18.06.2015, 3♀♀, 1♂; Gümüşhacıköy, Sarayözü (Balıklı) Lake, 24.06.2015, 2♀♀, 2♂♂; Hamamözü, Yeniköy Lake, 24.06.2015, 1♀, 1♂; Oymak Lake, 30.05.2015, 3♀♀, 2♂♂; 23.06.2015, 4♀♀, 2♂♂; Sarıbuğday Lake, 30.05.2015, 2♀♀, 2♂♂;

23.06.2015, 2♀♀, 3♂♂; Yakacık Lake, 14.07.2015, 2♀♀, 2♂♂; Paşa (Hırka) Lake, 4.07.2015, 1♀, 1♂; 100. Yıl Lake, 15.07.2015, 1♀, 1♂; Suluova, Bayırlı Lake, 22.06.2015, 2♀♀, 2♂♂; Mindor Lake, 30.05.2015, 1♂; 13.07.2015, 1♀, 1♂; Kolay Lake, 29.05.2015, 2♀♀, 3♂♂; 12.07.2015, 2♀♀, 1♂; Yedikır Dam Lake, 29.05.2015, 2♀♀, 2♂♂; 31.08.2015, 2♀♀, 2♂♂; Taşova, Borabay Lake, 27.05.2015, 2♀♀, 2♂♂; 16.08.2015, 3♀♀, 4♂♂; Ulugöl, 27.05.2015, 1♀, 2♂♂; 15.08.2015, 3♀♀, 1♂; Destek stream, 28.06.2016, 1♀, 1♂; Samsun: Ladik Lake, 28.05.2015, 3♀♀, 3♂♂; 11.07.2015, 3♀♀, 2♂♂; 09.09.2015, 3♀♀, 3♂♂.

Distribution in Turkey: Afyonkarahisar, Ankara, Bolu, Bursa, Çankırı, Denizli, Erzincan, İzmir, Kars, Kastamonu, Kırklareli, Kırşehir, Konya, Samsun, Sivas (Kiritshenko 1918; Hoberlandt, 1952; Önder et al., 2006; Kıyak et al., 2007; Topkara et al., 2009; Dursun, 2011; Fent et al., 2011; Topkara and Ustaoglu, 2015).

Comments: The present record is the first record of the species in Amasya.

Notonecta maculata Fabricius, 1794

Material examined: Amasya: Gediksaray Lake, 10.08.2015, 2♀♀, 1♂; 18.06.2015, 1♀, 1♂; Suluova, Yedikır Dam Lake, 29.05.2015, 2♀♀, 2♂♂; 31.08.2015, 3♀♀, 1♂; Merzifon, Yazıköy Lake, 06.09.2015, 10♀♀, 15♂♂; Taşova, Borabay Lake, 27.05.2015, 2♀♀, 3♂♂; 16.08.2015, 1♀, 2♂♂; Samsun: Ladik Lake, 28.05.2015, 3♀♀, 4♂♂; 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 2♀♀, 2♂♂.

Distribution in Turkey: Adana, Amasya, Antalya, Aydın, Burdur, Denizli, Isparta, İstanbul, Kırklareli, Kırşehir, Muğla, Osmaniye, Samsun, Sinop, Tekirdağ (Hoberlandt, 1952; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011).

Notonecta meridionalis Poisson, 1926

Material examined: Amasya: Suluova, Yedikır Dam Lake, 31.08.2015, 2♀♀, 1♂; Taşova, Destek stream, 19.06.2015, 2♀♀, 2♂♂; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Ankara, Hatay, Samsun, Kırklareli, Kırşehir, Kocaeli, Tunceli (Poisson, 1933; Hoberlandt, 1952; Polhemus, 1995; Önder et al., 2006; Dursun, 2011; Fent et al., 2011).

Comments: The present record is the first record of the species in Amasya.

Notonecta obliqua Thunberg, 1787

Material examined: Amasya: Taşova, Destek stream, 19.06.2015, 2♀♀, 1♂; Samsun: Ladik Lake, 11.07.2015, 2♀♀, 2♂♂; 09.09.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Antalya, Burdur, Denizli, Isparta, İstanbul, Kahramanmaraş, Kars, Kırşehir, Kocaeli, Muğla, Samsun, Van (Hoberlandt, 1952; Önder et al., 2006; Kıyak et al., 2007; Dursun, 2011; Fent et al., 2011).

Comments: The present record is the first record of the species in Amasya.

Notonecta viridis Delcourt, 1909

Material examined: Amasya: Merzifon, Çayırköy Göleti, 06.09.2016, 4♀♀, 5♂♂; Suluova, Yedikır Dam Lake, 31.08.2015, 2♀♀, 1♂; 07.09.2016, 4♀♀, 3♂♂; Taşova, Ballidere, 20.06.2015, 2♀♀, 1♂; Destek stream, 19.06.2015, 3♀♀, 2♂♂; Samsun: Ladik Lake, 11.07.2015, 4♀♀, 2♂♂; 09.09.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Afyonkarahisar, Antalya, Burdur, Denizli, Edirne, Erzincan, Hatay, Isparta, İzmir, Kırşehir, Konya, Muğla, Osmaniye, Samsun, Sivas, Tokat, Van (Kıyak et al., 2004, 2007; Önder et al., 2006; Dursun, 2011; Fent et al., 2011; Topkara and Ustaoglu, 2015).

Comments: In this study, this species first time recorded from Amasya.

Family: Ochteridae Kirkaldy, 1906 (1815)

Ochterus marginatus marginatus (Latreille, 1804)

Material examined: Amasya: Taşova, Destek stream, 10.07.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Antalya, Bursa, Denizli, Elazığ, Gaziantep, Niğde (Horváth, 1883; Lindberg, 1922; Hoberlandt, 1952; Linnavuori, 1965; Polhemus, 1995; Önder et al., 2006; Kıyak et al., 2007; Fent et al., 2011).

Comments: In this study, this Paleo-Mediterranean species was recorded from Amasya and the Black Sea region for the first time. The species is rarely distributed in Turkey according to present available records.

Family: Pleidae Fieber, 1851

Plea minutissima Leach, 1817

Material examined: Amasya: Yedikır Dam Lake, 21.06.2015, 5♀♀, 3♂♂; 31.08.2015, 3♀♀, 3♂♂; Taşova, Borabay Lake, 2♀♀, 3♂♂; 16.08.2015, 3♀♀, 2♂♂; Destek Lake, 16.08.2015, 3♀♀, 2♂♂; Destek Stream, 19.06.2015,

3♀♀, 2♂♂; Samsun: Ladik Lake, 11.07.2015, 4♀♀, 2♂♂; 09.09.2015, 1♀, 1♂.

Distribution in Turkey: Adana, Ankara, Antalya, Denizli, Edirne, Isparta, Muğla Burdur, Kayseri Konya, Nevşehir, Samsun, Sivas (Hoberlandt, 1952; Özemsi and Önder, 1988; Kıyak et al., 2004, 2007; Önder et al., 2006; Dursun, 2011; Fent et al., 2011).

Comments: The present record is the first record of the species in Amasya.

Discussion

In this study, 22 species belonging to 12 genera in 8 families of Nepomorpha recorded from Amasya and its surrounding areas (Table 1, Fig. 2). Of them, *Anisops sardeus*, *Lethocerus patruelis*, *Micronecta griseola* M. scholtzi, and *Ochterus marginatus marginatus* are new records for the Black Sea region of Turkey. Additionally, their distributions and population densities were examined in the present study. *Corixa affinis*, *C. panzeri*, *C. punctata*, *Micronecta pusilla*, *M. griseola*, *Notonecta glauca glauca*, *N. maculata*, *N. viridis*, *Paracorixa concinna*, *Plea minutissima*, *Sigara nigrolineata*, *S. striata*, *S. lateralis* are dominant species of the thoroughly investigated habitats and they usually have wide ecological tolerances. These species were found to be widely distributed both in Turkey and our present study area. Although *Nepa cinerea*, *Notonecta obliqua*, *N. meridionalis* and *Ranatra linearis* are widely distributed in Turkey, their population densities were determined to be relatively low within our study area. On the other hand, distributions of *Anisops sardeus*, *Lethocerus patruelis*, *Notonecta meridionalis* and *Ochterus marginatus* were found to be rare and their population densities were found to be very low.

Specimens of *A. sardeus* were found among *Lemna* sp. in fast-flowing streams (Gediksaray stream). *Corixa* and *Sigara* members prefer to live in the stagnant parts of lakes and rivers, especially around the aquatic plants. *Lethocerus patruelis* was found in muds of marshy land. *Nepa cinerea* was found among *Veronica* sp. and *R. linearis* was found among *Nasturtium* sp.

In the study area, individuals belonging to different species of Corixidae were found to be distributed in the same lake and stream. In this study, identification of aquatic heteropterous species distributed in wetlands of Amasya, their habitat preferences and relationships with each other and bioindicator species were revealed. The present study has contributed to the distribution of aquatic

Heteroptera fauna in Turkey, the registration of the species and the identification of biodiversity of Nepomorpha in the wetlands of Amasya.

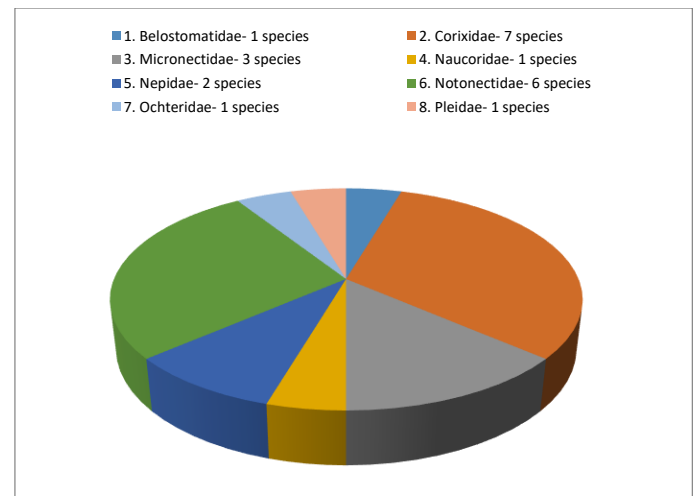


Figure 2. Distribution of species numbers by families of Nepomorpha in Amasya.

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