



Contributions to the knowledge of Aquatic Coleoptera Fauna (Dryopidae, Helophoridae, Heteroceridae, Hydrochidae, Hydrophilidae, Gyrinidae, Haliplidae and Noteridae) of Diyarbakır, Mardin and Batman Provinces (Turkey)

Gani Erhan TAŞAR

Adıyaman University, Kahta Vocational High School, Adıyaman, TURKEY

Phone: +90 555 7274607

E-mail: erhantasar@gmail.com

Abstract

In this study, the aquatic and semiaquatic Coleoptera species that were collected from Diyarbakır, Mardin and Batman provinces in 2013-2015 years, were evaluated. 44 taxa belong to eight families (Coleoptera: Polyphaga: Dryopidae, Helophoridae, Heteroceridae, Hydrochidae, Hydrophilidae; Adepaga: Gyrinidae, Haliplidae, Noteridae) were detected in the research area. Within these species, 32 taxa were first records for the research area.

Key words: Aquatic Coleoptera, Batman, Diyarbakır, Mardin, Turkey.

Introduction

Order Coleoptera has 176 families, 29500 genera and 386500 species (Slipinski, Leschen, & Lawrence, 2011). Four suborders of Coleoptera are Archostemata, Myxophaga, Adepaga and Polyphaga (Lawrence, 2016; Archangelsky, Beutel, & Komarek, 2016). The suborder Polyphaga includes more than %90 of the Coleoptera species (Glime, 2015). We found and collected the aquatic and semiaquatic specimens of Dryopidae, Helophoridae, Heteroceridae, Hydrochidae, Hydrophilidae families (Coleoptera: Polyphaga); Gyrinidae, Haliplidae and Noteridae families (Coleoptera: Adepaga) in the research area.

Dryopidae family has 263 species belong to 32 genera worldwide (Kodada, Jäch, Ciampor, & Ciamporovazatovicova, 2007). They are most diverse in Oriental and Neotropical regions and they live in many types of aquatic, semiaquatic and terrestrial habitats (Kodada, & Jäch, 1995). 11 species belong to three genera were known from Turkey (Taşar, 2014a, 2017a). Helophoridae family has 192 species in worldwide (Archangelsky, Beutel, & Komarek, 2016). 51 species were known from Turkey (Darılmaz, & İncekara, 2011; Taşar et al., 2012; Taşar, 2017b). With a recent study presented by Taşar (accepted paper), the number of Helophoridae species that known from Turkey were raised to 52. Most Helophoridae can functionally be classified as true water beetles. The adults spend their most of time underwater. All known larvae and pupae are terrestrial (Stals, 2008). Heteroceridae family has 200 species belong to 5 genera worldwide (Mascagni, 1995; Taşar, 2014a). They usually live close to water in habitats consisting of mud or very fine sand. They spend much of their time in shallow galleries where they dig into the soil (Clarke, 1973; Aguilera, Mascagni, & Ribera, 1998; Mascagni, 1995; Taşar, 2014a). 13 species belong to two genera were known from Turkey (Taşar, & Mascagni, 2014). Hydrochidae family includes 181 species in worldwide. They were found in all zoogeographic regions

(Archangelsky, Beutel, & Komarek, 2016). Eight species were known in Turkey (Taşar, 2017c). Furthermore, with this recent study presented by Taşar (2017c), the number of Hydrochidae members were raised to 182 in worldwide. Both the larvae and adults are aquatic (Endrödy-Younga, & Stals, 2008; Archangelsky, Beutel, & Komarek, 2016). Hydrophilidae has 2932 described species in worldwide. 103 species were known from Turkey (Darılmaz, & İncekara, 2011; İncekara et al., 2011; Taşar et al., 2012; Taşar, 2014b; Polat, Taşar, & İncekara, 2015; İncekara, Bektas, Taşar, & Polat, 2016; Taşar, 2017b, accepted). Most of the species are aquatic. Other species are semiaquatic or riparian, and many others are terrestrial (Archangelsky, Beutel, & Komarek, 2016). Gyrinidae family has 750 species belong to 13 genera in worldwide. Both adults and larvae are true aquatic (Garrido, Benetti, & Bilbao, 2011). 11 species were known from Turkey (Darılmaz, & Kıyak, 2009). Haliplidae family has about 200 species belong to 5 genera in worldwide. Both adults and larvae live in a wide variety of freshwater habitats (Garrido, Benetti, & Bilbao, 2011). 16 species were known from Turkey (Darılmaz, & Kıyak, 2009). Noteridae family has 250 species belong to 14 genera in worldwide. Both adults and larvae are aquatic (Garrido, Benetti, & Bilbao, 2011). Three species were known from Turkey (Darılmaz, & Kıyak, 2009). There is not any detailed study about aquatic coleopteran from Diyarbakır, Mardin and Batman provinces, Turkey. The aim of this study was to present contributions to the knowledge of aquatic Coleoptera species in these three provinces (South-eastern Anatolian region, Turkey).

Materials and Methods

Study Sites

Provinces of Diyarbakır, Mardin and Batman are located in the South-eastern Anatolian region of Turkey (Figure 1). They have terrestrial climate. All of them have many types of aquatic habitats such as; rivers, ponds, lakes, spring waters and seasonal puddle waters. A lot of small water sources set off towards the end of summer months with the effect of terrestrial climate. Dicle, one of Turkey's major river passes through Diyarbakır and Batman provinces. We collected our specimens in 77 different sampling sites in the research area. Detailed locality data of collected specimens were listed in Table 1.

Sampling Method

The specimens were collected from freshwater habitats of Diyarbakır, Mardin and Batman provinces with sieves having 3,15x1 mm mesh size. The beetles were killed with ethyl alcohol (%70) and stored in small bottles until identification. Specimens were cleaned with brush before identification. Aedeagophores (male genitalia) of collected specimens were dissected under a stereo microscope (Soif SZM-45) in the laboratory. The identified species were converted into museum material and deposited in the private collections of the author at Adıyaman University, Turkey.

Zoogeographic distribution of identified species were presented using Vigna Taglianti et al. (1999). The zoogeographic categories used and their abbreviations are listed below:

WS: Widely spread

E: European complex

M: Mediterranean complex

ASF: Asiatic-European

CEM: Centralasiatic-European-Mediterranean



EUR: European
OLA: Holarctic
MED: Mediterranean
SIE: Sibero-European
SWA: SW-Asiatic
TEM: Turano-European-Mediterranean
TUE: Turano-European W-PAL: W-Palearctic

Results

In the current study, 44 species of eight families Dryopidae, Gyrinidae, Haliplidae, Helophoridae, Heteroceridae, Hydrochidae, Hydrophilidae and Noteridae were collected and identified from the research area. The altitudes and coordinates of the localities from where the material has been collected are given in Table 1.

Determined species and their locality data are listed below:

Family: Dryopidae Billberg, 1820

Dryops rufipes (Krynicky, 1832)

Material examined: D1, 19.04.2014, 1 ex; D41, 20.04.2014, 1 ex; D46, 26.04.2014, 1 ex; D55, 26.04.2014, 1 ex; B1, 26.04.2014, 1 ex.

Zoogeographical element: TEM

Family: Gyrinidae Latreille, 1810

Gyrinus distinctus Aubé, 1838

Material examined: D12, 19.04.2014, 2 ex; D46, 26.04.2014, 1 ex; D50, 26.04.2014, 2 ex; M4, 25.04.2014, 1 ex.

Zoogeographical element: W-PAL

Family: Haliplidae Aubé, 1836

Peltodytes caesus (Duftschmid, 1805)

Material examined: D29, 25.04.2014, 3 ex; D50, 26.04.2014, 2 ex.

Zoogeographical element: W-PAL

Family: Helophoridae Leach, 1815

Helophorus (Eutrichelophorus) micans (Faldermann, 1835)

Material examined: D46, 26.04.2014, 8 ex; D15, 19.04.2014, 2 ex; D13, 19.04.2014, 1 ex; M4, 25.04.2014, 2 ex; D16, 19.04.2014, 2 ex; D14, 19.04.2014, 2 ex; D54, 26.04.2014, 1 ex; D18, 19.04.2014, 1 ex; D17, 19.04.2014, 1 ex; D39, 20.04.2014, 2 ex; D8, 19.04.2014, 2 ex; D12, 19.04.2014, 1 ex; D24, 19.04.2014, 1 ex; D34, 20.04.2014, 1 ex; D32, 20.04.2014, 1 ex; D35, 19.04.2014, 1 ex; D2, 22.09.2013, 2 ex; M5, 25.04.2014, 1 ex; M7, 14.05.2014, 2 ex; B8, 03.05.2015, 2 ex.

Zoogeographical element: ASF

Helophorus (s. str.) aquaticus (Linnaeus, 1758)

Material examined: D15, 19.04.2014, 4 ex; M3, 25.04.2014, 1 ex; D13, 19.04.2014, 2 ex; D34, 20.04.2014, 2 ex; D15, 19.04.2014, 1 ex; D14, 19.04.2014, 2 ex; M2, 25.04.2014, 1 ex; D42, 20.04.2014, 1 ex; D18, 19.04.2014, 1 ex; D17, 19.04.2014, 1 ex; D12, 19.04.2014, 2 ex; D58, 26.04.2014, 1 ex; D13, 19.04.2014, 1 ex; D30,

19.04.2014, 1 ex; D31, 20.04.2014, 1 ex; D26, 19.04.2014, 1 ex; D7, 19.04.2014, 1 ex; D21, 25.10.2014, 1 ex; B8, 03.05.2015, 2 ex.

Zoogeographical element: EUR

Helophorus (s. str.) grandis (Illiger, 1798)

Material examined: D40, 20.04.2014, 1 ex; D46, 26.04.2014, 2 ex; D15, 19.04.2014, 2 ex; D57, 20.04.2014, 2 ex; M3, 25.04.2014, 2 ex; M4, 25.04.2014, 1 ex; D34, 20.04.2014, 2 ex; D16, 19.04.2014, 1 ex; D15, 19.04.2014, 2 ex; D44, 26.04.2014, 1 ex; D14, 19.04.2014, 2 ex; M2, 25.04.2014, 1 ex; D54, 26.04.2014, 2 ex; D42, 20.04.2014, 2 ex; D18, 19.04.2014, 1 ex; D17, 19.04.2014, 1 ex; D52, 26.04.2014, 2 ex; D12, 19.04.2014, 2 ex; D55, 26.04.2014, 1 ex; D1, 19.04.2014, 1 ex; D58, 26.04.2014, 2 ex; M1, 25.04.2014, 1 ex; D13, 19.04.2014, 2 ex; D35, 19.04.2014, 1 ex; D31, 20.04.2014, 1 ex; D26, 19.04.2014, 2 ex; D41, 20.04.2014, 1 ex; D2, 22.09.2013, 2 ex; D33, 20.09.2013, 1 ex; D25, 21.09.2013, 2 ex; D3, 21.09.2013, 1 ex; D22, 25.10.2014, 1 ex; D19, 25.10.2014, 1 ex; D21, 25.10.2014, 2 ex; M7, 14.05.2014, 2 ex; B9, 03.05.2015, 2 ex.

Zoogeographical element: EUR

Helophorus (s. str.) syriacus Kuwert, 1885

Material examined: D34, 20.04.2014, 2 ex.

Zoogeographical element: SWA

Helophorus (Rhopalohelophorus) brevialpis brevialpis Bedel, 1881

Material examined: D46, 26.04.2014, 2 ex; D53, 26.04.2014, 1 ex; D35, 19.04.2014, 1 ex; B4, 03.05.2015, 2 ex.

Zoogeographical element: TEM

Helophorus (Rhopalohelophorus) daedalus d'Orchymont, 1932

Material examined: D47, 26.04.2014, 1 ex.

Zoogeographical element: SWA

Helophorus (Rhopalohelophorus) hilaris Sharp, 1916

Material examined: D46, 26.04.2014, 2 ex; D53, 26.04.2014, 1 ex; D13, 19.04.2014, 2 ex; M4, 25.04.2014, 5 ex; D54, 26.04.2014, 1 ex; D39, 20.04.2014, 2 ex; D8, 19.04.2014, 1 ex; D52, 26.04.2014, 1 ex; D12, 19.04.2014, 1 ex; D56, 20.04.2014, 1 ex; D24, 19.04.2014, 1 ex; D1, 19.04.2014, 2 ex; D30, 19.04.2014, 1 ex; D35, 19.04.2014, 2 ex; D4, 20.09.2013, 2 ex; D6, 20.09.2013, 1 ex; D22, 25.10.2014, 1 ex; D60, 25.10.2014, 1 ex; B4, 03.05.2015, 2 ex; B6, 07.06.2015, 2 ex.

Zoogeographical element: SWA

Helophorus (Rhopalohelophorus) subcarinatus Angus, 1985

Material examined: D40, 20.04.2014, 1 ex.

Zoogeographical element: SWA

Helophorus (Rhopalohelophorus) lewisi Angus, 1985

Material examined: D13, 19.04.2014, 4 ex; D15, 19.04.2014, 1 ex; D42, 20.04.2014, 1 ex; D18, 19.04.2014, 1 ex; D8, 19.04.2014, 1 ex; D12, 19.04.2014, 1 ex; D56, 20.04.2014, 2 ex.

Zoogeographical element: SWA

Helophorus (Rhopalohelophorus) minutus Fabricius, 1775

Material examined: D56, 20.04.2014, 2 ex.

Zoogeographical element: TEM

Helophorus (Rhopalohelophorus) pallidipennis (Mulsant & Wachanru, 1852)



Material examined: D40, 20.04.2014, 2 ex; D46, 26.04.2014, 2 ex; D13, 19.04.2014, 2 ex; M4, 25.04.2014, 1 ex; D42, 20.04.2014, 2 ex; D12, 19.04.2014, 1 ex.

Zoogeographical element: SWA

***Helophorus (Empleurus) nubilus* Fabricius, 1777**

Material examined: D35, 19.04.2014, 2 ex.

Zoogeographical element: EUR

***Helophorus (Rhopalohelophorus) arvernicus* Mulsant, 1846**

Material examined: D21, 25.10.2014, 2 ex; D60, 25.10.2014, 1 ex.

Zoogeographical element: EUR

Family: Heteroceridae MacLeay, 1825

***Heterocerus fenestratus* (Thunberg, 1784)**

Material examined: D1, 19.04.2014, 2 ex; B1, 26.04.2014, 3 ex.

Zoogeographical element: OLA

Family: Hydrochidae Thomson, 1859

***Hydrochus flavipennis* Kuster, 1852**

Material examined: D39, 20.04.2014, 2 ex.

Zoogeographical element: TEM

Family: Hydrophilidae Latreille, 1802

***Anacaena limbata* (Fabricius, 1792)**

Material examined: D44, 26.04.2014, 1 ex.

Zoogeographical element: W-PAL

***Anacaena rufipes* (Guillebeau, 1896)**

Material examined: D46, 26.04.2014, 1 ex; D50, 26.04.2014, 2 ex.

Zoogeographical element: TUE

***Coelostoma orbiculare* (Fabricius, 1775)**

Material examined: D39, 20.04.2014, 2 ex; D49, 26.04.2014, 1 ex; D48, 26.04.2014, 1 ex; B4, 03.05.2015, 1 ex.

Zoogeographical element: SIE

***Enochrus bicolor* (Fabricius, 1792)**

Material examined: D40, 20.04.2014, 1 ex; D46, 26.04.2014, 1 ex; D29, 25.04.2014, 1 ex; D28, 25.04.2014, 1 ex.

Zoogeographical element: TEM

***Enochrus calabricus* (Ferro, 1986)**

Material examined: D40, 20.04.2014, 1 ex; D56, 20.04.2014, 1 ex.

Zoogeographical element: MED

***Enochrus halophilus* (Bedel, 1878)**

Material examined: D53, 26.04.2014, 1 ex; D29, 25.04.2014, 2 ex; D44, 26.04.2014, 3 ex.

Zoogeographical element: SIE

***Enochrus ochropterus* (Marsham, 1802)**

Material examined: D50, 26.04.2014, 2 ex; D34, 20.04.2014, 1 ex.

Zoogeographical element: SIE

***Enochrus politus* (Küster, 1849)**

Material examined: D28, 25.04.2014, 2 ex; M4, 25.04.2014, 1 ex.

Zoogeographical element: CEM

***Enochrus quadripunctatus* (Herbst, 1797)**

Material examined: D29, 25.04.2014, 2 ex; D28, 25.04.2014, 2 ex; D27, 25.04.2014, 1 ex; D43, 21.09.2013, 2 ex; M7, 14.05.2014, 2 ex; B3, 03.05.2015, 1 ex; B4, 03.05.2015, 2 ex; B6, 07.06.2015, 2 ex; B7, 07.06.2015, 1 ex; B9, 03.05.2015, 1 ex.

Zoogeographical element: ASF

***Helochaes lividus* (Forster, 1771)**

Material examined: D53, 26.04.2014, 5 ex; D50, 26.04.2014, 5 ex; D34, 20.04.2014, 1 ex; D39, 20.04.2014, 2 ex; D49, 26.04.2014, 1 ex.

Zoogeographical element: W-PAL

***Helochaes obscurus* (O. F. Müller, 1776)**

Material examined: D53, 26.04.2014, 1 ex; D28, 25.04.2014, 2 ex; M2, 25.04.2014, 1 ex; D23, 19.04.2014, 2 ex.

Zoogeographical element: ASF

***Helochaes punctatus* Sharp, 1869**

Material examined: D29, 25.04.2014, 1 ex; D28, 25.04.2014, 1 ex.

Zoogeographical element: TUE

***Hydrobius fuscipes* (Linnaeus, 1758)**

Material examined: B4, 03.05.2015, 2 ex.

Zoogeographical element: SIE

***Hydrochara dichroma* (Fairmaire, 1892)**

Material examined: D53, 26.04.2014, 1 ex; D1, 19.04.2014, 1 ex; B3, 03.05.2015, 1 ex.

Zoogeographical element: SIE

***Hydrochara caraboides* (Linnaeus, 1758)**

Material examined: D53, 26.04.2014, 1 ex; D17, 19.04.2014, 2 ex; D39, 20.04.2014, 1 ex; D55, 26.04.2014, 1 ex; D1, 19.04.2014, 1 ex; D13, 19.04.2014, 1 ex; D30, 19.04.2014, 1 ex; M5, 25.04.2014, 1 ex; B2, 26.04.2014, 1 ex.

Zoogeographical element: SIE

***Hydrochara flavipes* (Steven, 1808)**

Material examined: D29, 25.04.2014, 1 ex.

Zoogeographical element: CEM

***Hydrophilus piceus* (Linnaeus, 1758)**

Material examined: D29, 25.04.2014, 1 ex.

Zoogeographical element: ASF

***Laccobius bipunctatus* (Fabricius, 1775)**

Material examined: D42, 20.04.2014, 1 ex; B3, 03.05.2015, 2 ex.

Zoogeographical element: W-PAL

***Laccobius hindukuschi* Chiesa, 1966**

Material examined: D57, 20.04.2014, 1 ex; D52, 26.04.2014, 2 ex; D56, 20.04.2014, 1 ex; D58, 26.04.2014, 1 ex; B5, 07.06.2015, 2 ex; B6, 07.06.2015, 2 ex.

Zoogeographical element: SWA

***Laccobius simulatrix* d'Orchymont, 1932**

Material examined: D14, 19.04.2014, 1 ex; D42, 20.04.2014, 1 ex; D18, 19.04.2014, 1 ex; D24, 19.04.2014, 1 ex; D38, 20.04.2014, 1 ex; D32, 20.04.2014, 1 ex.

Zoogeographical element: TUE

***Laccobius sipylus* d'Orchymont, 1939**

Material examined: D58, 26.04.2014, 2 ex.

Zoogeographical element: SWA

***Laccobius syriacus* Guillebeau, 1896**

Material examined: D46, 26.04.2014, 1 ex; D53, 26.04.2014, 3 ex; D29, 25.04.2014, 2 ex; D28, 25.04.2014, 2 ex; D13, 19.04.2014, 1 ex; D50, 26.04.2014, 1 ex; D34, 20.04.2014, 1 ex; D47, 26.04.2014, 2 ex; D27, 25.04.2014, 1 ex; D44, 26.04.2014, 1 ex; D54, 26.04.2014, 1 ex; D42, 20.04.2014, 1 ex; D39, 20.04.2014, 2 ex; D49, 26.04.2014, 1 ex; D48, 26.04.2014, 1 ex; D23, 19.04.2014, 1 ex; D24, 19.04.2014, 1 ex; D38, 20.04.2014, 1 ex; D30, 19.04.2014, 1 ex; D31, 20.04.2014, 1 ex; D41, 20.04.2014, 1 ex; D45, 21.09.2013, 2 ex; D61, 21.09.2013, 1 ex; D5, 20.09.2013, 1 ex; D25, 21.09.2013, 1 ex; D6, 20.09.2013, 1 ex; D20, 25.10.2014, 1 ex; D36, 25.10.2014, 1 ex; D37, 25.10.2014, 1 ex; D59, 25.10.2014, 1 ex; M1, 25.04.2014, 1 ex; M4, 25.04.2014, 2 ex; M5, 25.04.2014, 2 ex; M6, 25.04.2014, 1 ex; B1, 26.04.2014, 1 ex; B4, 03.05.2015, 2 ex; B5, 07.06.2015, 2 ex.

Zoogeographical element: TEM

***Laccobius alternus* Motschulsky, 1855**

Material examined: D46, 26.04.2014, 1 ex; D44, 26.04.2014, 2 ex; D54, 26.04.2014, 1 ex; D49, 26.04.2014, 1 ex; D48, 26.04.2014, 2 ex.

Zoogeographical element: SIE

***Laccobius gracilis* Motschulsky, 1855**

Material examined: D46, 26.04.2014, 3 ex; D50, 26.04.2014, 1 ex; D54, 26.04.2014, 2 ex; D48, 26.04.2014, 1 ex; D24, 19.04.2014, 2 ex; D58, 26.04.2014, 1 ex; B7, 07.06.2015, 2 ex.

Zoogeographical element: W-PAL

***Paracymus chalceolus* (Solsky, 1874)**

Material examined: D46, 6.04.2014, 2 ex.

Zoogeographical element: TUE

Family: Noteridae Thomson, 1860

***Noterus clavicornis* (De Geer, 1774)**

Material examined: D9, 25.04.2014, 1 ex; D10, 19.04.2014, 2; D11, 19.04.2014, 2; D19, 25.10.2014, 3 ex; D34, 20.04.2014, 2 ex; D51, 26.04.2014, 1 ex.

Zoogeographical element: SIE

Discussion

In the current study, Hydrophilidae represent the highest diversity with 25 taxa, Helophoridae: 13 taxa. Dryopidae, Gyrinidae, Haliplidae, Heteroceridae, Hydrochidae and Noteridae families are each represented by one taxon. Within these 44 taxa: 32 species and subspecies were presented as new records for the research area. To the best of our knowledge, there is not any detailed study on the species of Aquatic Coleoptera families in Diyarbakır, Mardin and Batman provinces. There are a few studies includes some specimens collected from road sides by foreign researchers. Seven species of Helophoridae family [*Helophorus micans* (Faldermann, 1835), *H. aquaticus* (Linnaeus, 1758), *H. syriacus* Kuwert, 1885, *H. daedalus* d'Orchymont, 1932, *H. hilaris* Sharp, 1916, *H. lewisi* Angus, 1985, *H. pallidipennis* (Mulsant & Wahanru, 1852)]; four species of Hydrophilidae family (*Laccobius hindukuschi* Chiesa, 1966, *L. sipylus* d'Orchymont, 1939, *L. syriacus* Guillebeau, 1896, *L. gracilis* Motschulsky, 1855) (Darılmaz, & Incekara, 2011) and one species of Heteroceridae family [*Heterocerus fenestratus* (Thunberg, 1784)] were reported in Diyarbakır province (Taşar, & Mascagni, 2014). Three species of Helophoridae family (*H. aquaticus* (Linnaeus, 1758), *H. syriacus* Kuwert, 1885, *H. hilaris* Sharp, 1916) and one species of Hydrophilidae family (*L. gracilis* Motschulsky, 1855) were reported in Mardin province (Darılmaz, & Incekara, 2011).

Although *L. halophilus* Gentili, 1982, *L. sculptus* d'Orchymont, 1935, *L. sulcatulus* Reitter, 1909, *Helophorus brevipalpis levantinus* Angus, 1988, *Haliplus kulleri* Vondel, 1988 (from Diyarbakır province), *L. exilis* Gentili, 1974, *Cercyon abeillei* Guillebeau, 1896 (from Mardin province), were reported in the research area (Darılmaz, & Kıyak, 2009; Darılmaz, & Incekara, 2011), none of the specimens of these species was found at the research area in the current study.

The most dominant species in the research area were indicated as *Helophorus grandis*, *Laccobius syriacus* and *Helophorus micans* respectively (Figure 2).

All the species collected from the research area can be classified in 10 zoogeographic categories (ASF, CEM, EUR, MED, OLA, SIE, SWA, TEM, TUE and W-PAL) into the three groups (WS, E, and M) (Figure 3-4).

Widely spread complex (WS) includes eight zoogeographic categories (ASF+CEM+OLA+SIE+SWA+TEM+TUE+W-PAL) represented by 39 species (88.63%). Within the WS complex SIE (20.51%) and SWA (20.51%) species are dominant, followed by TEM (15.38%), W-PAL (15.38%), ASF (10.25%), TUE (10.25%), CEM (5.12%), OLA (2.56%).

European complex (E) is represented by four species (9.1%) in only European category (EUR).

Mediterranean complex (M) is represented by only one species (2.27%) in only Mediterranean category (MED).

There is no endemic species into the collected specimens from the research area. But two species have a limited zoogeographical distribution: *Helophorus daedalus* was reported in only Iran and Turkey; *Enochrus calabricus* was reported in only Italy and Turkey (Przewoźny, & Fikáček, 2016).

Consequently, this study presents new distributional data for Turkish aquatic Coleoptera fauna. More studies are needed to establish the overall distribution of Turkish Hydrophiloidea fauna.

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Table 1. Location of the sampling sites

Abbreviation	Sampling site	Coordinates (--°,-----')	Altitude (m)
D1	Diyarbakır	37 53,999N 39 51,555E	927
D2	Diyarbakır	37 54,041N 39 55,139E	926
D3	Diyarbakır, Büyükkadı	38 00,557N 40 17,443E	867
D4	Diyarbakır, Çardaklı	38 21,144N 40 22,556E	987
D5	Diyarbakır, Hantepe	38 06,352N 40 10,366E	932
D6	Diyarbakır, Hantepe	38 06,345N 40 11,358E	943
D7	Diyarbakır, Ali Dayı	38 11,523N 39 34,620E	810
D8	Diyarbakır, Aşağı Karabahçe, Menfez	37 48,498N 39 44,195E	1143
D9	Diyarbakır, Aşağı Konak, Zerzevan Kalesi	37 36,803N 40 29,736E	776
D10	Diyarbakır, Kaldırım	37 54,076N 39 52,217E	914
D11	Diyarbakır, Karacadağ	37 46,164N 39 48,114E	1561
D12	Diyarbakır, Karacadağ	37 46,214N 39 49,016E	1616
D13	Diyarbakır, Karacadağ	37 42,554N 39 50,784E	1783
D14	Diyarbakır, Karacadağ	37 45,241N 39 52,197E	1634
D15	Diyarbakır, Karacadağ	37 45,480N 39 52,903E	1563
D16	Diyarbakır, Karacadağ	37 47,467N 39 57,298E	1017
D17	Diyarbakır, Karacadağ	37 45,225N 39 49,958E	1720
D18	Diyarbakır, Karacadağ	37 45,959N 39 49,290E	1645
D19	Diyarbakır, Kayapınar, Çelkani (Kırkpınar)	37 57,101N 39 54,211E	779
D20	Diyarbakır, Kayapınar, Harmanardı	37 56,122N 39 53,129E	825
D21	Diyarbakır, Kayapınar, Karayakup	37 54,441N 39 51,421E	853
D22	Diyarbakır, Kayapınar, Yukarınasırlar	37 59,152N 39 04,299E	849
D23	Diyarbakır, Tokaçlı	37 54,277N 39 55,590E	846
D24	Diyarbakır, Yalankoz	37 49,850N 40 00,777E	844
D25	Diyarbakır, Bismil, Oğuzlar	38 03,431N 40 36,193E	1005
D26	Diyarbakır, Çermik	38 06,599N 39 26,656E	900
D27	Diyarbakır, Çınar	37 43,874N 40 24,385E	667
D28	Diyarbakır, Çınar, Göksu	37 41,476N 40 26,851E	670
D29	Diyarbakır, Çınar, Karaköprü	37 49,292N 40 18,151E	571
D30	Diyarbakır, Çüngüş, Yeniköy	38 11,081N 39 24,552E	881
D31	Diyarbakır, Dicle, Hocaalan	38 21,987N 40 05,859E	842
D32	Diyarbakır, Dicle, Meydan	38 18,891N 40 14,523E	727
D33	Diyarbakır, Eğil	38 14,435N 40 04,494E	1205
D34	Diyarbakır, Eğil, Konaklı	38 11,636N 40 06,472E	845
D35	Diyarbakır, Ergani	38 05,188N 40 01,734E	754
D36	Diyarbakır, Ergani, Bereketli	38 08,070N 39 49,139E	769
D37	Diyarbakır, Ergani, Coşkun	38 00,099N 39 50,586E	761
D38	Diyarbakır, Hani	38 21,874N 40 23,755E	811
D39	Diyarbakır, Hani	38 24,288N 40 23,532E	884
D40	Diyarbakır, Hani, Arı	38 24,381N 40 21,290E	892
D41	Diyarbakır, Hani, Soylu	38 17,772N 40 21,769E	845
D42	Diyarbakır, Hani, Süleyman	38 19,354N 40 21,324E	827



D43	Diyarbakır, Kocaköy	38 15,534N 40 27,367E	1112
D44	Diyarbakır, Kocaköy, Arıklı	38 22,825N 40 33,508E	848
D45	Diyarbakır, Kocaköy, Gökçe	38 18,268N 40 32,427E	1175
D46	Diyarbakır, Kulp	38 28,114N 40 51,924E	834
D47	Diyarbakır, Kulp	38 36,397N 41 08,403E	1095
D48	Diyarbakır, Kulp	38 35,397N 41 07,706E	1042
D49	Diyarbakır, Kulp	38 34,396N 41 07,256E	1005
D50	Diyarbakır, Kulp	38 33,385N 41 04,634E	1023
D51	Diyarbakır, Kulp, Derindere	38 21,777N 41 11,131E	848
D52	Diyarbakır, Kulp, Özbek	38 28,276N 40 54,632E	839
D53	Diyarbakır, Kulp, Konuklu	38 26,229N 41 02,444E	776
D54	Diyarbakır, Kulp, Savaş	38 24,244N 41 02,799E	750
D55	Diyarbakır, Kulp, Yücebağ	38 21,760N 41 15,412E	845
D56	Diyarbakır, Lice, Gürbeyli	38 27,553N 40 43,134E	905
D57	Diyarbakır, Lice, Seren	38 24,015N 40 28,212E	873
D58	Diyarbakır, Lice, Yukarı Çalıbüğü	38 27,357N 40 33,786E	989
D59	Diyarbakır, Sur, Kıtılbul	37 55,042N 40 15,012E	876
D60	Diyarbakır, Sur, Kozan	37 52,187N 40 18,195E	912
D61	Diyarbakır, Sur, Sarıkamış	38 03,292N 40 20,353E	852
M1	Mardin	37 35,614N 40 29,580E	819
M2	Mardin, Derik	37 26,699N 40 21,839E	1002
M3	Mardin, Derik, Alakuş	37 25,890N 40 20,308E	1034
M4	Mardin, Sultanköy	37 25,434N 40 38,253E	1006
M5	Mardin, Yaylacık	37 24,267N 40 41,316E	1003
M6	Mardin, Yeşilalan	37 28,128N 40 48,194E	1005
M7	Mardin, Gündoğdu	37 12,550N 40 07,372E	783
B1	Batman, Sason yolu	38 13,401N 41 16,268E	735
B2	Batman, Sason yolu	38 18,705N 41 20,756E	753
B3	Batman	37 52,101N 41 01,111E	552
B4	Batman, Batman çayı	37 56,540N 41 06,020E	554
B5	Batman, Beşiri	37 44,891N 41 40,416E	481
B6	Batman, Beşiri	37 45,996N 41 38,138E	497
B7	Batman, Beşiri, Başarı	37 46,786N 41 33,478E	490
B8	Batman, Kozlu, Çarıklı	38 03,596N 41 11,676E	601
B9	Batman, Yeniköy	37 52,448N 41 03,192E	551

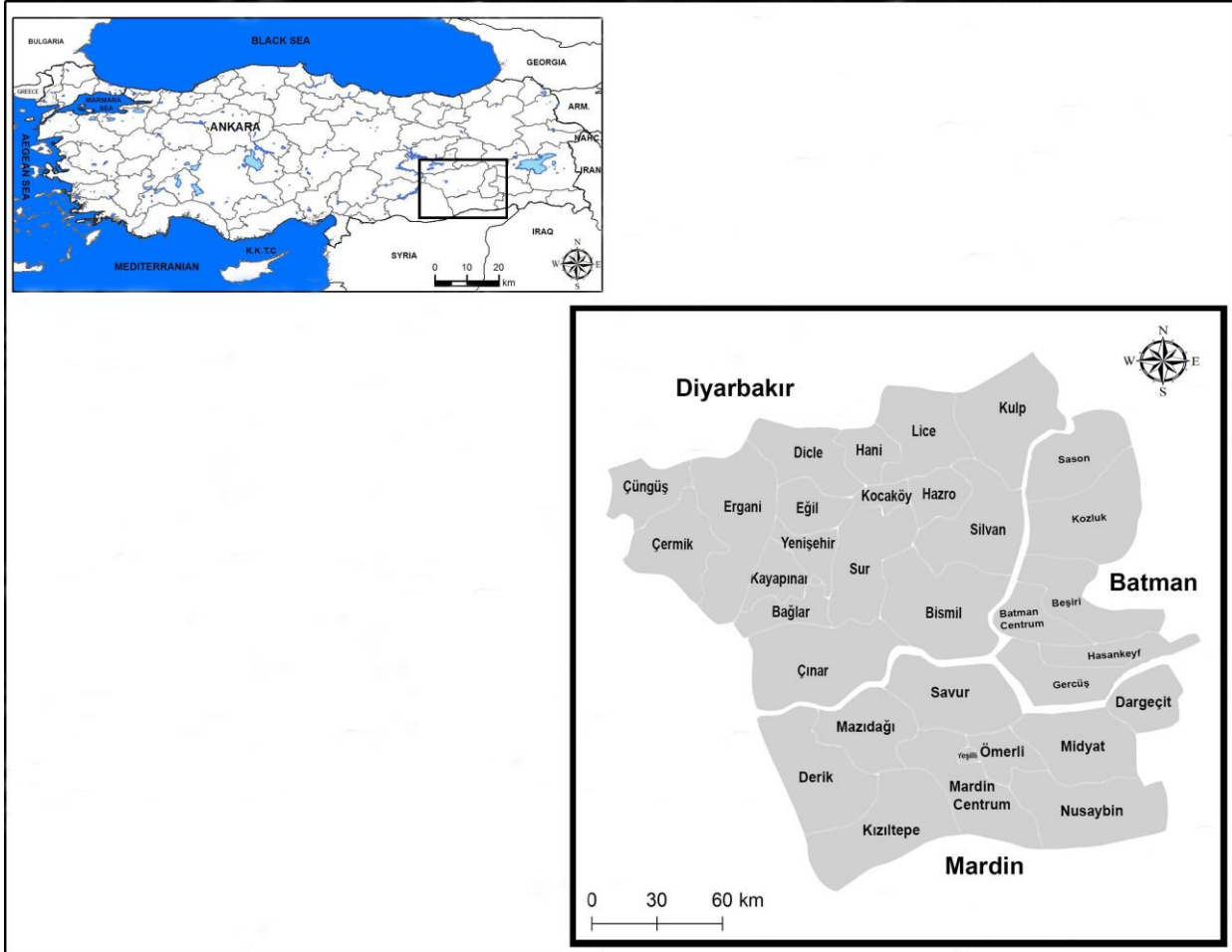


Figure 1. Map of the research area.

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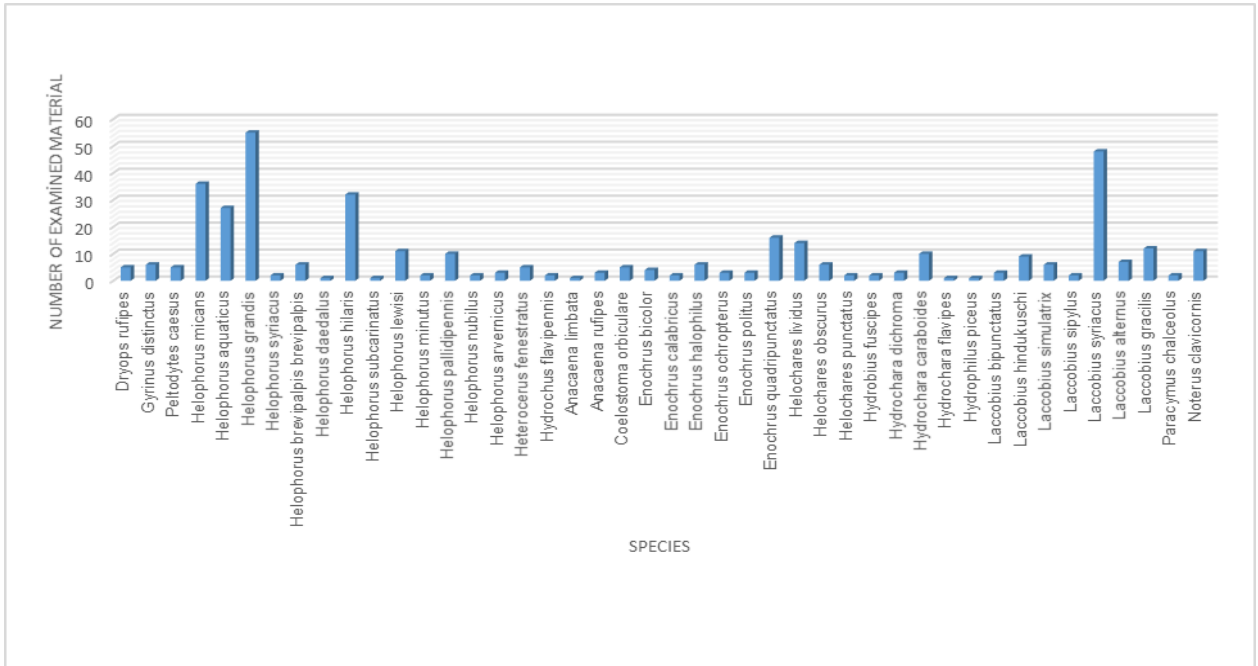


Figure 2. Determined species and number of examined materials.

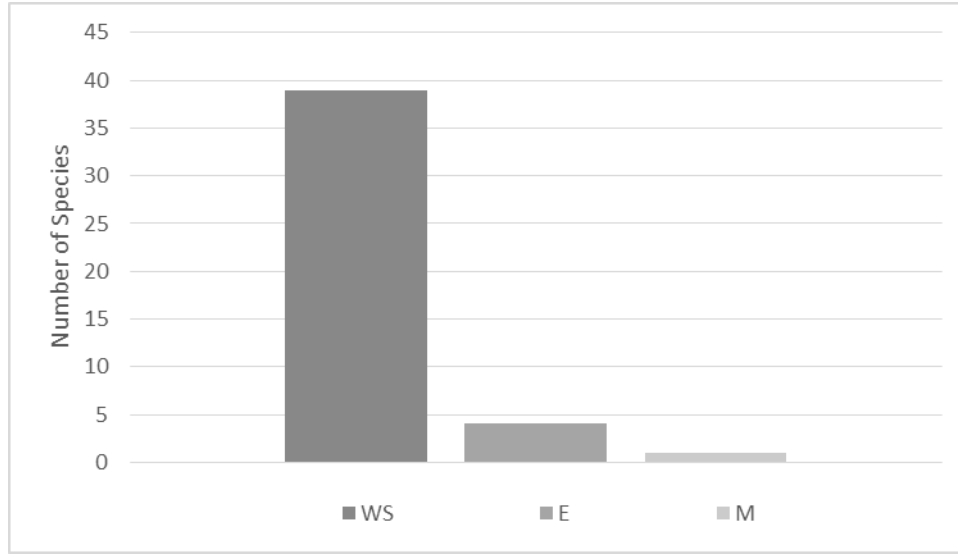


Figure 3. Main zoogeographic complexes in aquatic and semi-aquatic coleoptera fauna in the research area, showing the number of including species. WS: Wide spread, E: European complex, M: Mediterranean complex.

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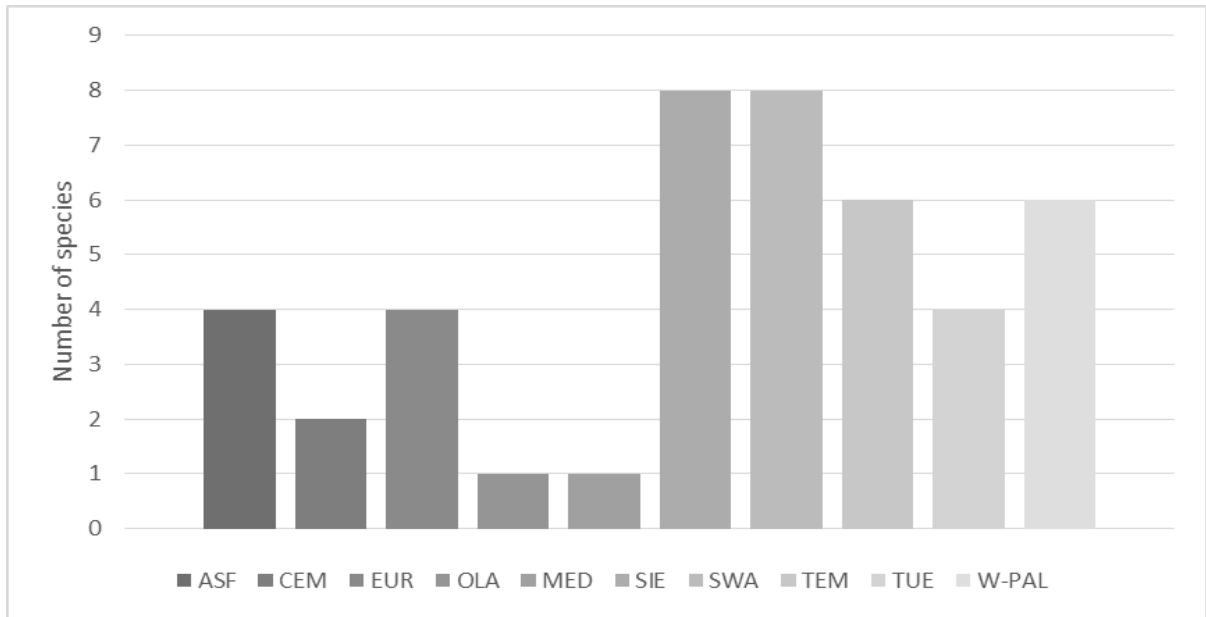


Figure 4. Zoogeographical elements in aquatic and semi-aquatic coleoptera fauna in the research area, showing the number of including species. ASF: Asiatic-European, CEM: Centralasiatic-European-Mediterranean, EUR: European, OLA: Holarctic, MED: Mediterranean, SIE: Sibero-European, SWA: SW-Asiatic, TEM: Turano-European-Mediterranean, TUE: Turano-European, W-PAL: W-Palaearctic.

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