



## An annotated checklist of Iranian Myxophaga (Hydroscaphidae, Sphaeriusidae) and Adepaga (Gyrinidae, Haliplidae, Noteridae, Rhysodidae) (Insecta: Coleoptera)

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### Abstract

An annotated checklist of Myxophaga (Hydroscaphidae and Sphaeriusidae) and Adepaga (including Gyrinidae, Haliplidae, Noteridae, Rhysodidae) from Iran is compiled. The total number of taxa include 39 species of 15 genera. The family Haliplidae is represented by 15 species, Gyrinidae by 12 species, Noteridae by seven species, Rhysodidae by three species, and Hydroscaphidae and Sphaeriusidae by one species each. Two species, *Gyrinus (Gyrinus) dejeani* Brullé 1832 (Gyrinidae) and *Halipus (Haliplidius) confinis* Stephens 1828 (Haliplidae) are new records for the fauna of Iran.

**Key words:** Coleoptera, Myxophaga, Adepaga, Hydroscaphidae, Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae, Rhysodidae, checklist, Iran

### Introduction

The Coleoptera is the largest order of insects with about 360,000 valid species (Bouchard *et al.* 2009), of which about 13,000 are aquatic or semi-aquatic (Jäch & Balke 2008). The Coleoptera include 4 suborders: Archostemata, Myxophaga, Adepaga and Polyphaga. Suborder Archostemata has 5 families: Crowsoniellidae Iablokoff-Khnzorian 1983, Cupedidae Laporte 1836, Micromalthidae Barber 1913, Ommatidae Sharp & Muir 1912 and Jurodidae Ponomarenko 1985 (Bouchard *et al.* 2011) without any record from Iran so far. Suborder Myxophaga has 4 families world wide (Hydroscaphidae LeConte 1874, Lepiceridae Hinton 1936, Sphaeriusidae Erichson 1845 and Torrindicolidae Steffan 1964) (Bouchard *et al.* 2011) of which only one species of Hydroscaphidae and one species of Sphaeriusidae has been recorded from Iran so far. Suborder Adepaga comprises 11 families world wide (including Amphizoidae LeConte 1853, Aspidytidae Ribera, Beutel, Balke & Vogler 2002, Carabidae Latreille 1802, Dytiscidae Leach 1815, Gyrinidae Latreille 1810, Haliplidae Aubé 1836, Hygrobiidae Régimbart 1879, Meruidae Spangler & Steiner 2005, Noteridae Thomson 1860, Rhysodidae Laporte 1840, Trachypachidae Thomson 1857) (Löbl & Smetana 2003; Bouchard *et al.* 2011) of which Amphizoidae, Aspidytidae, Hygrobiidae, Meruidae and Trachypachidae are without any record from Iran so far. Several other coleopteran families are classified in Polyphaga, which are not part of this checklist.

Aquatic insects are a major group of arthropods of which at least one stage of their life cycle occurs in water (Merritt & Cummins 1996). Among the aquatic insects of Iran, species diversity of aquatic Heteroptera was catalogued by Ghahari *et al.* (2013) with 107 species and 29 species for 4 Byrrhoidea families (Byrrhidae, Elmidae, Limnichidae, Psephenidae) by Jäch *et al.* (2016), and this checklist deals with cataloging of Myxophaga (Hydroscaphidae and Sphaeriusidae) and Adepaga (Gyrinidae, Haliplidae, Noteridae, Rhysodidae), excluding Carabidae and Dytiscidae.

Hydroscaphidae (skiff beetles) is a small family with four genera and 25 species worldwide (Vanin *et al.* 2016).

Sphaeriusidae (minute bog beetles) (0.5-1.2 mm) is a very small family with worldwide 19 species in one genus (Beutel & Arce-Pérez 2016). Gyrinidae (whirligig beetles) is a relative small family with 12 genera and about 877 species worldwide (Beutel & Roughley 2016). Haliplidae (crawling water beetles) (Coleoptera: Haliploidea) is a small family of Coleoptera with five genera and 238 species worldwide (Vondel 2016). Noteridae (burrowing water beetles) is a small family with seventeen genera and 262 species world wide (Dettner 2016). Rhysodidae (wrinkled bark beetles) is a relatively small family with nineteen genera and 377 species worldwide (Beutel 2016).

Iran forms a large part of the Iranian plateau, and covers an area of 1,623,779 km<sup>2</sup>. It is bordered to the north by the Caucasus Mountains, Middle Asian natural regions, and the Caspian Sea (-27 m below sea level); to the west by the Anatolian and Mesopotamian regions; to the east by the eastern part of the Iranian plateau (Afghanistan and adjacent west Pakistan) and the Baluch-Sindian region; and finally to the south by the Persian Gulf and Gulf of Oman, which are connected by the latter to the Indian Ocean (Fig. 1). Climatologically, Iran is a predominantly arid and semi-arid country, but the northern slopes of the Alburz ranges and the Caspian lowland receive 800 to 2000 mm annual rainfall, making them the most humid parts of the country. The Dasht-e Kavir and Dasht-e Lut deserts are the driest areas with an annual precipitation of less than 150 mm. The highlands receive between 250 and 800 mm (Zehzad *et al.* 2002).

This paper which its aim is cataloging of all the data on Iranian Myxophaga and Adephaga (excluding Carabidae and Dytiscidae), is a continuation of the series of checklists of Iranian aquatic Coleoptera (Mascagni *et al.* 2016; Jäch *et al.* 2016).



FIGURE 1. Map of Iran with boundaries of provinces.

## Material and methods

The published data on distribution of the families Hydroscaphidae, Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae and Rhysodidae (Coleoptera) in Iran are summarized by province. Subfamilies, tribes, genera and species are listed alphabetically. The following data are included in the checklist for each species: (1) valid name, (2) junior synonym(s) used in literature about Iran, (3) published Iranian records synthesized by province (classified by alphabetical order of Iranian province names) and the relevant references (classified by chronological order), together with data on examined material (Table 1), (4) synthetic information on general distribution on a world scale and feeding habits, (5) about the new country records, number of species. Data about classification, nomenclature and distribution data are mainly based on Löbl (2003, Myxophaga), Mazzoldi (2003, Gyrinidae), Vondel (2003, 2005, Haliplidae), Nilsson (2003, 2005, 2011, Noteridae) and Bell (2003, Rhysodidae). When accurate data about local distribution in Iran are lacking in a quoted reference, the mention "Iran (no locality cited)" is used. The provinces of Iran are represented in Fig. 1.

Especially in older publications distributional records are given like Transcaucasia, Turkestan, Caucasus. As these are not specific countries, but regions, they are placed between “ ”.

The following abbreviations are used in the text (Table 1):

CA	Collection A. Atamehr, Ardabil, Iran
CH	Collection Sh. Hosseinie, Shiraz, Iran
CF	Collection H. Fery, Berlin, Germany
CJ	Collection W. Jędryczkowski, Warszawa, Poland
CS	Collection A. Skale, Hof/Saale, Germany
CV	Collection B.J. van Vondel, Hendrik-Ido-Ambacht, The Netherlands
DEI	Deutsches Entomologisches Institut, Eberswalde, Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZH	Zoological Museum, Helsingfors, Finland
NHMB	Naturhistorisches Museum, Basel, Switzerland
NMPC	National Museum (Natural History), Prague, Czechia
NMW	Naturhistorisches Museum Wien, Vienna, Austria
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany

**TABLE 1.** Examined material of Iranian Hydroscaphidae, Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae and Rhysodidae.

Species	Province	Lable data	Collection	Examined by
<i>Gyrinus dejeani</i>	Ardabil	Ardabil, 38°15'N 48°18'E, 1 ex, 2002, leg. A. Atamehr	CA	Jędryczkowski
<i>Haliphus confinis</i>	Ilam	Dehloran, Dubrij River, 2 ex, June 2011	CJ	Przewozny
<i>Haliphus obliquus</i>	Hamadan	Malayer-Boroujerd, 125 km S. Hamadan, 1885 m asl, pond, 16.vi.1976	CH	Vondel
<i>Haliphus heydeni</i>	Ardabil	Ardabil, 24.ix.2003, leg. Alaci	CA & CV	Vondel
<i>Haliphus ruficollis</i>	Guilan	Rasht, 26.iv.1995, leg. R. Linnavuori	MZH	Vondel
	Guilan	Gyssom, 11.vi.1995., leg. R. Linnavuori	MZH	Vondel
	Guilan	Salman-Amlash, 9 km S Amlash, 80 m asl, stream, 27.vii.1993	CH	Vondel
	Mazandaran	Nowshahr, marshland behind gardening, 36°36'10"N, 51°37'52"E, 5 m asl, 2.v.2010, leg. A. Skale	CS	Vondel

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**TABLE 1.** (Continued)

Species	Province	Lable data	Collection	Examined by
<i>Haliplus abbreviatus</i>	West Azarbaijan	Naghadeh, Shor gol Wetland, 9.v.2011, 29.v.2011 leg. Babak Khalifani	CV	Vondel
	West Azarbaijan	Naghadeh, Dorgeh sangi Wetland, 14.vi.2011, leg. Babak Khalifani	CV	Vondel
	Sistan & Baluchestan	Zabol, 19-20.iv.1965 [ <i>as H. villiersi</i> ]	MNHN	Vondel
<i>Haliplus flavicollis</i>	Markazi	Naragh. 17 km E. Delijan, ca. 34.02N 50.52E, slow stream, 23.xiii.2003, leg. R. Vafaei & S. Goldasteh	CF	Vondel
<i>Haliplus kulleri</i>	Fars	74 km SE of Shiraz, nr. Akbar abbes, 15.iv.1970, leg. RESSL	NMW	Vondel
	Fars	Haftbam, 60 km SW Shiraz, 2400 m asl, Marshland, 16.vi.1994	CH	Vondel
	Khuzestan	Behbahan-Ramboormooz, 92 km N of Behbahan, 100 m asl, pool, 15.i.1995	CH	Vondel
	Khuzestan	Susa, Escalera, iv.1899	MNHN	Vondel
	North Korasan	Ala-Dagh, Budschnurd, 1033 m asl.)	DEI	Vondel
	Sistan & Baluchestan	Sistan, Kuh-e Knajek, 490 m asl., 3-5.vi.1977, Exp. Nat. Mus. Prha	NMPC	Vondel
<i>Haliplus variegatus</i>	Lorestan	25 km NWW DOPUD, 33°33'N 48°53'E, 1874 m asl, 8.vii.2004, leg. S. Kadjec	NMPC	Vondel
<i>Haliplus lineatocollis</i>	Fars	Bisheh Shull, 63 km NE Shiraz, 1620 m asl, marshland, 20.vi.1977	CH	Vondel
	Hamadan	Sahneh-Nahavand Aran, 30 km Sahneh, 1710 m asl, river, 7.viii.1977	CH	Vondel
	Isfahan	Daran-Aligudarz, 141 km W Isfahan, stream, 26.viii.1976 (coll. Hosseinie)	CH	Vondel
<i>Peltodytes caesus</i>	East Azarbaijan	Tabriz, 14.x.2001, stream, leg. A. Atamehr	CA	Vondel
	Fars	14 km ESE Shiraz, road to Kaftarak, 16.ix.1997, leg. Schödl	NMW	Vondel
	Fars	Pirbanoo, 7 km S. Shiraz, 1.ii.2001, leg. H. Naserzadeh	NMW	Vondel
	Fars	12 km S. Shiraz, Peer-e-Ghaibi, 1460 m asl, 14.ix.1997, leg. Schödl	NMW	Vondel
	Fars	50 km N. Shiraz, 5 km E Banesh, 1500 m asl, 19.ix.1997, leg. Schödl	NMW	Vondel
	Fars	50 km WNW Shiraz, 15 km E Banesh, 1500 m asl, 19.ix.1997, leg. Schödl	NMW	Vondel
	Guilan	Sume'eh Sara, 4-5.viii.1994, leg R. Linnavuori	MZH	Vondel
	Guilan	Sume'eh Sara, 4-5.v.1994, leg. R. Linnavuori	MZH	Vondel
	Guilan	Bandar-Anzali, at light, 31.vii.1967, leg.Heinz	NHMB	Vondel
	Mazandaran	Nowshahr, marshland behind gardening, 36°36'10"N 51°37'52"E, 5m asl, 2.v.2010, leg. A. Skale	CS	Vondel
	Mazandaran	Chalus, Strans Kasp. Meer, 20 m asl, 13.x.1967, leg. B. Köstling	SMNS	Vondel

## Results

Thirty nine species of Coleoptera from six families (Hydroscaphidae, Sphaeriusidae, Gyrinidae, Haliplidae, Noteridae and Rhysodidae) are listed for the Iranian Myxophaga (2 species from 2 genera) and Adephaga (excluding Carabidae and Dytiscidae) (37 species from 13 genera). *Gyrinus* (*Gyrinus*) *dejeani* Brullé 1832 (Gyrinidae) and *Haliphus* (*Haliplidius*) *confinis* Stephens 1828 (Haliplidae) are newly recorded from Iran. The list of species is given below alphabetically with distribution data.

### Suborder Myxophaga Crowson, 1955

#### Family Hydroscaphidae LeConte, 1874

##### Genus *Hydroscapha* LeConte, 1874

###### *Hydroscapha granulum* (Motschulsky, 1855)

*Hydroscapha sharpi* Rietter, 1887.

**Distribution in Iran.** Fars (Falamarzi *et al.* 2010), Guilan (Bodemeyer 1927), Khuzestan (Löbl 1994), Mazandaran (Falamarzi *et al.* 2010).

**General distribution.** Azerbaijan, France, Greece, Italy, Turkey, former Yugoslavia (Löbl 2003), Bulgaria, Iran, Serbia (Falamarzi 2010).

**Comments.** Living in springs, streams and rivers, especially on rocks covered by algae in the marginal shallows (Falamarzi *et al.* 2010).

#### Family Sphaeriusidae Erichson, 1845

##### Genus *Sphaerius*, Waltl, 1838

###### *Sphaerius* sp. [*acaroides* Waltl, 1838]

**Distribution in Iran.** Fars (Falamarzi *et al.* 2010).

**Comments.** Most likely this concerns *S. acaroides* Waltl, 1838, a species widely distributed in Europe, but confirmation is needed.

### Suborder Adephaga Schellenberg, 1806

#### Superfamily Gyrinoidea Latreille, 1810

##### Family Gyrinidae Latreille, 1810

###### Subfamily Gyrininae Latreille, 1810

##### Genus *Aulonogyrus* Motschulsky, 1853

###### *Aulonogyrus* (*Aulonogyrus*) *concinus* (Klug, 1834)

**Distribution in Iran.** Alborz (Hematyian *et al.* 2010), Fars (Guéorguiev 1965b; Hosseinie 1978; Arefnia 2004), Guilan (Guéorguiev 1965c; Cox & Cox 1982), Ilam, Isfahan, Semnan (Peschet 1914), Kerman (Ochs 1953; Guéorguiev 1965c), Khuzestan (Ochs 1953; Ghodrati *et al.* 2014), Lorestan (Peschet 1914; Ochs 1953), Mazandaran, Qom (Ochs 1953), Sistan & Baluchestan (Legros 1972), West Azarbaijan (Ochs 1953; Khalifani *et al.* 2012), Iran (no locality cited) (Hafezieh 1997).

**General distribution.** Afghanistan, Algeria, Belgium, Bosnia Herzegovina, Bulgaria, China (Qinghai), Croatia, Cyprus, Czech Republic, France, Germany, Georgia, Greece, Iran, Iraq, Italy, Kazakhstan, Lebanon, Macedonia, Mongolia, Netherlands, Poland, Portugal, Russia (Central and South European Territory), Saudi Arabia, Slovakia, Spain, Syria, Tadjikistan, “Transcaucasia”, Turkey, Uzbekistan (Mazzoldi 2003), Iran (Guéorguiev 1981; Darilmaz & Kiyak 2006; Kiyak *et al.* 2006).

**Comments.** In pond with rich vegetation and in brooks (Ochs 1953). On surface of clear, small, slow moving streams (Hosseinie 1978). Along coasts of lakes, watering canals and slowly flowing streams; fresh and brackish water (Kiyak *et al.* 2006). Found in marshes (Cox & Cox 1982). In water resources in crop fields (Khalifani *et al.* 2012). Up to an altitude of 3200 m (Ochs 1953).

### *Aulonogyrus (Aulonogyrus) striatus* (Fabricius, 1792)

**Distribution in Iran.** Iran (no locality cited) (Gueorguiev 1981).

**General distribution.** Algeria, Bulgaria, Canary Islands, Croatia, Cyprus, France, Greece, Israel, Italy, Lebanon, Morocco, Portugal, Slovenia, Spain, Syria, Tunisia, Turkey, former Yugoslavia (Mazzoldi 2003), Iran (Gueorguiev 1981; Kiyak *et al.* 2006).

**Comments.** In puddles, fresh water (Kiyak *et al.* 2006).

### *Aulonogyrus* spp.

**Distribution in Iran.** Guilan (Hosseinie 1995a), Mazandaran (Hosseinie 1995b).

## Genus *Dineutus* MacLeay, 1825

### *Dineutus (Protodineutus) indicus* Aubé 1838

**Distribution in Iran.** Kerman (Guéorguiev 1965c), Sistan & Baluchestan (Ochs 1953, 1957; Legros 1972), Iran (no locality cited) (Mazzoldi 2003).

**General distribution.** India, Nepal, Pakistan, Iran (Mazzoldi 2003), India, Sri Lanka (Ochs 1953).

**Comments.** This Oriental species reaches its most Western distribution in Iran, Kerman. Up to an altitude of 1500 m (Ochs 1953).

## Genus *Gyrinus* Müller, 1764

### *Gyrinus (Gyrinus) caspius* Ménetries, 1832

*Gyrinus elongatus* Aubé, 1838.

**Distribution in Iran.** East Azarbaijan (Atamehr 2002; Atamehr *et al.* 2004), Golestan (Ochs 1953), Guilan (Bodemeyer 1927; Guéorguiev 1965c; Kamali 2008), Mazandaran (Ochs 1953; Legros 1972).

**General distribution.** Algeria, Armenia, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, China (Xinjiang), Croatia, Cyprus, Denmark, Estonia, France, Germany, Georgia, Greece, Iraq, Israel, Italy, Kazakhstan, Lebanon, Lithuania, Morocco, Netherlands, Norway, Poland, Portugal, Russia (Central and South European Territory), Slovenia, Spain, Sweden, Ukraine, Syria, Turkmenistan, Turkey, former Yugoslavia (Mazzoldi 2003), Iran (Guéorguiev 1981; Mazzoldi 2003; Shaverdo 2003; Darilmaz & Kiyak 2006; Kiyak *et al.* 2006).

**Comments.** Puddles and slowly flowing streams; fresh and brackish water (Kiyak *et al.* 2006). Bodemeyer (1927) reports this species from a brooklet in the Elbruz Mountains.

### ***Gyrinus (Gyrinus) colymbus* Erichson, 1837**

**Distribution in Iran.** Iran (no locality cited) (Guéorguiev 1981; Mazzoldi 2003).

**General distribution.** Armenia, Austria, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Cyprus, Czech Republic, Denmark, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Lebanon, Macedonia, Poland, Russia (Southern Territory), Slovakia, Switzerland, Syria, Turkey, former Yugoslavia (Mazzoldi 2003).

**Comments.** Living in fresh and brackish water (Drost 2009).

### ***Gyrinus (Gyrinus) dejeani* Brullé, 1832**

**Material examined.** Ardabil province (Table 1). **New record for Iran.**

**General distribution.** Algeria, Bosnia Herzegovina, Bulgaria, Canary Islands, Croatia, Cyprus, Egypt, France, Greece, Iraq, Israel, Italy, Lebanon, Macedonia, Morocco, Portugal, Romania, Slovenia, Spain, Syria, Tunisia, Turkey, former Yugoslavia (Mazzoldi 2003).

**Comments.** Unknown species of *Gyrinus* by Atamehr & Alaei (2006) was identified as *G. dejeani*. Along coast of dam lakes and slowly flowing streams, fresh water (Kiyak *et al.* 2006).

### ***Gyrinus (Gyrinus) distinctus* (Aubé, 1838)**

**Distribution in Iran.** Alborz (Hematyian *et al.* 2010), Fars (Hosseinie 1978), Guilan (Guéorguiev 1965c; Darilmaz *et al.* 2013), Khuzestan (Ghodrati *et al.* 2014), Lorestan (Farzam Motlagh *et al.* 2012), Markazi (Vafaei 2005; Vafaei *et al.* 2004), Mazandaran (Ochs 1953; Vafaei *et al.* 2009), Sistan & Baluchistan (Ochs 1957), Tehran (Vafaei *et al.* 2009), Iran (no locality cited) (Hafezieh 1997).

**General distribution.** Afghanistan, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, China (Nei Mongol, Xinjiang, Xizang), Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Great Britain, Germany, Greece, Hungary, India (Kashmir), Iraq, Israel, Italy, Kazakhstan, Kyrgyzstan, Lebanon, Lybia, Macedonia, Mongolia, Netherlands, Norway, Poland, Portugal, Russia (Central, Southern and Northern European Territory), Slovakia, Spain, Sweden, Switzerland, Syria, "Transcaucasia", Turkey, Uzbekistan, former Yugoslavia (Mazzoldi 2003), Iran (Guéorguiev 1981; Mazzoldi 2003; Darilmaz & Kiyak 2006; Kiyak *et al.* 2006).

**Comments.** This species has a dark ventral side. Specimens with a light ventral side were described by Régimbart, 1883 as *G. fairmairi*. Generally last "species" is considered as an aberration of *G. distinctus*. Ochs (1953), however, never found intermediate forms, at least leaving the discussion open if *fairmairi* is just an aberration of *distinctus*. Therefore records of *G. fairmairi* or *G. distinctus fairmairi* are treated separately below. Bodemeyer (1927) collected *Gyrinus natator* Linné, 1758 in Guilan, in a pool in the Elbruz Mountains, but it most likely concerns *G. distinctus*. Along coasts of dam lakes and slowly flowing streams; fresh and brackish water (Kiyak *et al.* 2006). On surface of clear, small, slow-moving streams (Hosseinie 1978). Up to an altitude of 2100 m (Ochs 1953).

### ***Gyrinus distinctus* ab. [?] *fairmairei* Régimbart, 1883**

**Distribution in Iran.** Fars (Ochs 1953, Arefnia 2004), Ilam, Khuzestan, Semnan (Peschet 1914; Ochs 1953, 1957), Isfahan (Peschet 1914), Iran (no locality cited) (Guéorguiev 1965a).

**General distribution.** Iran, except the Northern provinces, Syria, Iraq (Ochs 1953).

**Comments.** Probably just an aberration of *G. distinctus* (see discussion there). Up to an altitude of 2000 m (Ochs 1953).

### ***Gyrinus (Gyrinus) mithrae* Zaitzev, 1908**

**Distribution in Iran.** Guilan (Zaitzev 1908, Ochs 1942, 1953; Guéorguiev 1965c; Cox & Cox 1982), Mazandaran (Legros 1972).

**General distribution.** Azerbaijan, Iran (Mazzoldi 2003).

**Comments.** Found in marshes (Cox & Cox 1982).

### ***Gyrinus (Gyrinus) reitteri* Ochs, 1942**

**Distribution in Iran.** Lorestan (= Luristan, type locality - Guéorguiev 1965a; Ochs 1942).

**General distribution.** Iran, only known from the type locality (Mazzoldi 2003).

**Comments.** No habitat details known.

### ***Gyrinus (Gyrinus) substriatus* Stephens, 1828**

**Distribution in Iran.** Mazandaran (Mousavi 2005), Iran (no locality cited) (Ochs 1953).

**General distribution.** Algeria, Armenia, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Iraq, Israel, Italy, Liechtenstein, Macedonia, Morocco, Netherlands, Norway, Poland, Portugal, Russia (Central, Southern and Northern European Territory, Southern Siberia), Slovakia, Slovenia, Spain, Switzerland, Tunisia, Syria, Turkey, "Transcaucasia", Ukraine, former Yugoslavia (Mazzoldi 2003), Iran (Guéorguiev 1981).

**Comments.** Living on the surface of various nutrition-rich, more permanent stagnant and slowly flowing waters. Prefers fresh water, but can also be found in brackish water (Drost *et al.* 1992).

### ***Gyrinus* spp.**

**Distribution in Iran.** Ardabil (Atamehr & Alaei 2006 - identified as *G. dejeani*), Bushehr (Hosseinie 1991), Fars (Hosseinie 1974), Isfahan (Shayeghi *et al.* 2014), Mazandaran (Hosseinie 1995b).

### **Genus *Orectochilus* Dejean, 1833**

#### ***Orectochilus (Orectochilus) villosus villosus* (Müller, 1776)**

**Distribution in Iran.** Alborz (Hematyian *et al.* 2010), Mazandaran (Darilmaz *et al.* 2013), Qazvin (Ochs 1953), Iran (no locality cited) (Hafezieh 1997).

**General distribution.** Andorra, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Kyrgyzstan, Liechtenstein, Lithuania, Macedonia, Netherlands, Norway, Poland, Portugal, Russia (Central, Southern and Northern European Territory; East and West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, former Yugoslavia (Mazzoldi 2003), Iran (Guéorguiev 1981; Mazzoldi 2003; Kiyak *et al.* 2006).

**Comments.** In slowly flowing streams, fresh water (Kiyak *et al.* 2006).

#### ***Orectochilus (Orectochilus) villosus involvens* (Faldermann, 1836)**

**Distribution in Iran.** Guilan (Bodemeyer 1927), Iran (no locality cited) (Shaverdo 2003).

**General distribution.** Armenia, Georgia, Iraq, Turkey, Uzbekistan (Mazzoldi 2003), Iran.

**Comments.** Bodemeyer (1927) reports this species from an algae-rich pond in the Elbruz Mountains.



## Genus *Patrus* Aubé, 1838

*Patrus limbatus* (Régimbart, 1884)

**Distribution in Iran.** Hormozgan (Hájek & Skale 2015).

**General distribution.** India, Iran, Sri Lanka (Hájek & Skale 2015). Presence in Pakistan is likely (Hájek & Skale 2015).

**Comments.** The genus *Patrus* was a subgenus of the predominantly Palaearctic *Orectochilus* Dejean, 1833, until it was revalidated by Miller & Bergsten (2012). Found in quiet areas of a small river flowing through a palm grove (Hájek & Skale 2015).

## Superfamily Haliploidea Aubé, 1836

### Family Haliplidae Aubé, 1836

#### Genus *Brychius* Thomson, 1859

##### *Brychius elevatus* (Panzer, 1793)

*Brychius cristatus* J.R. Sahlberg, 1875.

**Distribution in Iran.** Guilan (Bodemeyer 1927).

**General distribution.** Albania, Luxembourg, Russia (Southern European Territory), Switzerland (Vondel 2013), Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Iraq, Ireland, Italy, Latvia, Liechtenstein, Netherlands, Norway, Poland, Romania, Russia (Central and Northern European Territory, East and West Siberia), Slovakia, Slovenia, Spain, Sweden, Ukraine, former Yugoslavia (Vondel 2005), Iran (Bodemeyer 1927), Kyrgyzstan (Vondel 2007).

**Comments.** Living in oxygen-rich brooks, streams and rivers (Vondel 1997). Bodemeyer (1927) reports this species from an algae-rich pond in the Elbruz Mountains.

#### Genus *Halipilus* Latreille, 1802

##### Subgenus *Haliplidius* Guignot, 1928

##### *Halipilus (Haliplidius) confinis* Stephens, 1828

**Material examined.** Ilam province (Table 1). **New record for Iran.**

**General distribution.** Austria, Belgium, Byelorussia, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Ireland, Italy, Kazakhstan, Latvia, Netherlands, Norway, Poland, Russia (Central, North and South European Territory, East and West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, “Transcaucasia”, Turkey, Ukraine, former Yugoslavia (Vondel 2005), China (Xinjiang) (Jia & Vondel 2011), Luxembourg, Montenegro (Vondel 2013).

**Comments.** Living in fresh water among especially Characeans in lakes, ponds, stagnant parts of slowly running brooks, streamlets, but even in brackish water. Often found at depths of more than 1 m (Vondel 1997).

##### *Halipilus (Haliplidius) obliquus* Fabricius, 1787

**Distribution in Iran.** Hamadan (Vondel: Table 1).

**General distribution.** Albania, Serbia (Vondel 2013), Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Iraq, Ireland, Italy, Latvia, Liechtenstein, Luxembourg, Morocco, Netherlands, Norway, Poland, Russia (Central

and South European Territory, Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, “Transcaucasia”, Turkey, Ukraine, former Yugoslavia (Vondel 2005), Iran (Guéorguiev 1981).

**Comments.** Living among Characeans in stagnant fresh water in ditches, lakes and gravel-pits. Also recorded from brackish water. Up to an altitude of 2300 m (Vondel 1997).

### **Subgenus *Haliphus* Latreille, 1802**

#### ***Haliphus (Haliphus) fluviatilis* (Aubé, 1836)**

**Distribution in Iran.** West Azarbaijan (Ahmadi *et al.* 2012).

**General distribution.** Afghanistan, Austria, Belgium, Bosnia Hercegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kazakhstan, Kyrgyzstan, Latvia, Luxembourg, Macedonia, Netherlands, Poland, Romania, Russia (Central, North and South European Territory, East and West Siberia), Slovakia, Spain, Sweden, “Transcaucasia”, Turkey, Ukraine, former Yugoslavia (Vondel 2005), Serbia, Switzerland (Vondel 2013), Iran.

**Comments.** The identity of the specimen recorded by Ahmadi *et al.* (2012) should be confirmed as *H. fluviatilis* is easily confused with species like *H. heydeni* or *H. ruficollis*. *H. fluviatilis* lives among vegetation in streams, rivers, but also in lakes with sandy or stony bottom. Attracted to light (Vondel 1997).

#### ***Haliphus (Haliphus) heydeni* Wehncke, 1875**

**Distribution in Iran.** Ardabil (Atamehr 2005; Vondel: Tabel 1; Atamehr & Alaei 2006, 2010).

**General distribution.** Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, “Caucasus”, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Liechtenstein, Kazakhstan, Macedonia, Netherlands, Norway, Poland, Romania, Russia (Central, North and South European Territory, East and West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, “Transcaucasia”, “Turkestan”, Turkey, Ukraine (Vondel 2005), Iran (Vondel 2005; Vondel *et al.* 2006), Luxembourg (Vondel 2013).

**Comments.** Living among filamentous algae in lakes, pools, ponds, marshes, stagnant and slow parts of rivers, brooks and streamlets. In fresh and even brackish or acid water (Vondel 1997).

#### ***Haliphus (Haliphus) ruficollis* (De Geer, 1774)**

**Distribution in Iran.** Guilan (Guéorguiev 1965c; Cox & Cox 1982; Vondel: Table 1), Mazandaran (Mousavi *et al.* 2016; Vondel: Table 1), West Azarbaijan (Samin *et al.* 2015).

**General distribution.** Afghanistan, Armenia, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, “Caucasus”, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Ireland, Italy, Kazakhstan, Latvia, Luxembourg, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Russia (North and South European Territory, East and West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, Tadzhikistan, “Transcaucasia”, “Turkestan”, Turkey, Ukraine, Uzbekistan, former Yugoslavia (Vondel 2005), China (Xinjiang) (Jia & Vondel 2011), Iran (Vondel 2003, 2005; Vondel *et al.* 2006), Serbia (Vondel 2013).

**Comments.** Living among filamentous algae in lakes, pools, ponds, rivers, marshes, brooks and streamlets. Preferably in stagnant water. Attracted to light (Vondel 1997).

### **Subgenus *Liaphlus* Guignot, 1928**

#### ***Haliphus (Liaphlus) abbreviatus* Wehncke, 1880**

*Haliphus villiersi* Legros, 1972.

**Distribution in Iran.** Fars (Arefnia 2004), Sistan & Baluchestan (Legros 1972), West Azarbaijan (Khalifani *et al.* 2012; Vondel: Table 1).

**General distribution.** Afghanistan, China (Xinjiang), Cyprus, Egypt, Iraq, Israel, Syria (Vondel 2005), Iran (Vondel 1991, 2003, 2005).

**Comments.** In water resources in crop fields (Khalifani *et al.* 2012).

### ***Haliplus (Liaphlus) flavicollis* Sturm, 1834**

**Distribution in Iran.** Markazi (Vondel: Tabel 1), Mazandaran (Mousavi *et al.* 2016).

**General distribution.** Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Iraq, Ireland, Italy, Kazakhstan, Latvia, Luxembourg, Macedonia, Mongolia, Netherlands, Norway, Poland, Romania, Russia (Central, North and South European Territory, West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, "Transcaucasia", "Turkestan", Turkey, Ukraine, former Yugoslavia (Vondel 2005), Georgia, Montenegro, Serbia (Vondel 2013), Uzbekistan (Vondel 2007).

**Comments.** Living in clean and clear stagnant or very slowly running water of lakes, ditches, canals and pools with rich vegetation. Also recorded from brackish water (Vondel 1997). In rice fields (Mousavi 2016).

### ***Haliplus (Liaphlus) kulleri* Vondel, 1988**

**Distribution in Iran.** Fars (Zahiri 1996; Hosseini & Zahiri 1998; Vondel: Table 1), Khuzestan (Zahiri 1996; Hosseini & Zahiri 1998; Vondel: Table 1), North Korasan (Vondel: Table 1), Sistan & Baluchestan (Vondel: Table 1).

**General distribution.** Cyprus, Iran, Iraq, Israel, Lebanon, Syria, Turkey (Vondel 2005).

**Comments.** Living in temporary pools (Vondel 1991) and in marshland (Vondel: Table 1).

### ***Haliplus (Liaphlus) maculatus* Motschulsky, 1860**

**Distribution in Iran.** Mazandaran (Darilmaz *et al.* 2013).

**General distribution.** Afghanistan, Austria, Czech Republic, Greece, Hungary, Israel, Iraq, Kazakhstan, Kyrgyzstan, Romania, Russia (South European Territory), Syria, Turkmenistan, Turkey (Vondel 2005), Bosnia & Herzegovina, Slovakia, Ukraine (Vondel 2007), Lebanon (Vondel 2013), Iran (Darilmaz *et al.* 2013).

**Comments.** Living in brooks, temporary pools, lakes, ponds (Vondel 1997).

### ***Haliplus (Liaphlus) mucronatus* Stephens, 1828**

**Distribution in Iran.** West Azarbaijan (Ghahari & Jedryczkowski 2011).

**General distribution.** Albania, Algeria, Austria, Belgium, Bulgaria, Croatia, France, Great Britain, Germany, Greece, Iraq, Italy, Kyrgyzstan, Libya, Macedonia, Morocco, Netherlands, Portugal, Russia (North European Territory), Slovenia, Spain, Switzerland, Tunisia, Turkey, Ukraine, former Yugoslavia (Vondel 2005, 2013), Montenegro (Vondel 2013), Iran (Ghahari & Jedryczkowski 2011).

**Comments.** Living in fresh or brackish water, particularly in clay and gravel pits with Characeans (Vondel 1997).

### ***Haliplus (Liaphlus) variegatus* Sturm, 1834**

**Distribution in Iran.** Fars (Hosseini 1974, 1978), Lorestan (Vondel: Table 1), Mazandaran (Mousavi *et al.* 2016).

**General distribution.** Algeria, Austria, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Croatia,

Cyprus, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Israel, Italy, Kyrgyzstan, Latvia, Macedonia, Netherlands, Norway, Poland, Romania, Russia (Central and South European Territory), Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, “Transcaucasia”, Turkey, Ukraine, former Yugoslavia (Vondel 2005), Luxembourg, Montenegro, Serbia (Vondel 2013), Iran (Vondel 1991; Darilmaz & Kiyak 2006).

**Comments.** Vondel (1991) suggested that the records of Hosseinie (1974, 1978) might concern other species like *H. abbreviatus*, but the presence in Iran is now confirmed (Vondel: Table 1). Living in stagnant waterbodies with fresh water, often with a vegetation of Characeans, *Sphagnum* or *Hypnum*, in temporary dune-pools and in peat bogs (Vondel 1997). Also found in shallow, slow-moving streams (Hosseinie 1978) and remaining pools in riverbeds (Hosseinie 1974). In rice fields (Mousavi *et al.* 2016).

### **Subgenus *Neohaliplus* Netolitzky, 1911**

#### ***Haliplus (Neohaliplus) lineatocollis* (Marshall, 1802)**

**Distribution in Iran.** Alborz (Darilmaz *et al.* 2013), Fars (Zahiri 1996; Hosseini & Zahiri 1998; Vondel: Table 1), Khuzestan (Zahiri 1996; Hosseinie & Zahiri 1998), Guilan (Ghahari & Jedryczkowski 2011; Guéorguiev 1965c), Hamadan (Vondel: Table 1), Isfahan (Vondel: Table 1), Markazi (Vafaei *et al.* 2004; Vafaei 2005), Mazandaran (Ghahari & Jedryczkowski 2011).

**General distribution.** Albania, Luxembourg, Montenegro, Sudan (Vondel 2013), Algeria, Armenia, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, Canary Islands, “Caucasus”, Croatia, Czech Republic, Denmark, Egypt, Eritrea, Ethiopia, France, Germany, Great Britain, Greece, Hungary, Ireland, Israel, Italy, Lebanon, Libya, Liechtenstein, Macedonia, Malta, Morocco, Netherlands, Poland, Portugal, Romania, Russia (Central and South European Territory), Saudi Arabia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tchad, “Transcaucasia”, Tunisia, Turkey, Ukraine, Yemen (Vondel 2005), Iran (Vondel 2003, 2005; Incekara 2007).

**Comments.** Living in all kinds of fresh and also in brackish water bodies, stagnant or slowly running. Recorded from altitudes up to 2200 m (Vondel 1997).

#### ***Haliplus* spp.**

**Distribution in Iran.** Guilan (Hosseinie 1995a), Isfahan (Shayeghi *et al.* 2014), Khuzestan (Hosseinie 1994), Mazandaran (Hosseinie 1995b; Mousavi 2005).

### **Genus *Peltodytes* Régimbart, 1878**

#### ***Peltodytes caesus* (Duftschmid, 1805)**

**Distribution in Iran.** Alborz (Hematyian *et al.* 2010), East Azarbaijan (Atamehr 2002; Atamehr *et al.* 2004; Atamehr & Alaei 2010; Ghahari & Jedryczkowski 2011; Vondel: Table 1), Fars (Hosseinie 1974, 1978; Zahiri 1996; Hosseinie & Zahiri 1998; Vondel: Table 1), Golestan (Ghahari & Jedryczkowski 2011), Guilan (Guéorguiev 1965c; Cox & Cox 1982; Kamali 2008; Vondel: Table 1), Khuzestan (Guéorguiev 1965c; Zahiri 1996; Hosseinie & Zahiri 1998), Mazandaran (Darilmaz *et al.* 2013; Mousavi *et al.* 2016; Vondel: Table 1), Razavi Khorasan (Ghahari & Jedryczkowski 2011), West Azarbaijan (Ghahari & Jedryczkowski 2011; Samin *et al.* 2015).

**General distribution.** Afghanistan, Albania, Algeria, Armenia, Austria, Azerbaijan, Belgium, Bosnia Herzegovina, Bulgaria, Byelorussia, “Caucasus”, China (Xinjiang), Croatia, Czech Republic, Denmark, France, Germany, Great Britain, Greece, Hungary, Iraq, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Liechtenstein, Luxembourg, Macedonia, Morocco, Netherlands, Poland, Portugal, Romania, Russia (Central and South European Territory), Slovakia, Spain, Sweden, Switzerland, Syria, Tadzhikistan, “Transcaucasia”, Turkey,

Turkmenistan, Ukraine, Uzbekistan, former Yugoslavia (Vondel 2005), Iran (Guéorguiev 1981; Vondel 1992, 2003, 2005; Darilmaz & Kiyak 2006), Montenegro (Vondel 2013).

**Comments.** Living in eutrophic fresh or occasionally brackish stagnant water of ponds and slowly running streams, marshes. Among vegetation of *Batrachium*, *Callitriche*, *Elodea* and *Chara*. Feeding on filamentous algae and probably Characeans (Vondel 1997). In rice fields (Mousavi *et al.* 2016)

### ***Peltodytes rotundatus* (Aubé, 1836)**

**Distribution in Iran.** West Azarbaijan (Ghahari & Jedryczkowski 2011).

**General distribution.** Albania, Algeria, Bosnia Herzegovina, Croatia, France, Greece, Hungary, Italy, Luxembourg, Morocco, Portugal, Slovenia, Spain, Tunisia, Turkey, former Yugoslavia (Vondel 2005), Switzerland, Montenegro (Vondel 2013), Iran (Ghahari & Jedryczkowski 2011).

**Comments.** Living among filamentous algae in lakes, pools, ponds, rivers, marshes, brooks, streamlets. Prefers running water. Among vegetation of *Utricularia* and *Nuphar* (Vondel 1997). Also found in hot springs (Incekara 2007).

### ***Peltodytes* spp.**

**Distribution in Iran.** Guilan (Hosseinie 1995a), Isfahan (Shayeghi *et al.* 2014), Mazandaran (Hosseinie 1995b).

## **Superfamily Dytiscoidea Leach, 1815**

### **Family Noteridae Thomson, 1860**

#### **Subfamily Noterinae Thomson, 1860**

#### **Tribe Hydrocanthini Sharp, 1882**

#### **Genus *Canthydrus* Sharp, 1882**

#### ***Canthydrus diophtalmus* (Reiche and Saulcy, 1855)**

**Distribution in Iran.** Fars, Khuzestan (Zahiri 1996; Hosseinie & Zahiri 1998; Ghodrati *et al.* 2014).

**General distribution.** Algeria, Angola, Cameroon, Cyprus, Egypt, Ethiopia, Iraq, Israel, Italy (Sardinia, Sicily), Lebanon, Libya, Morocco, Senegal, Spain, Syria, Tunisia, Turkey, Zaire (Nilsson 2011), Iran (Nilsson 2003, 2011).

**Comments.** Living in ponds (Cillo *et al.* 2016).

#### ***Canthydrus laetabilis* (Walker, 1858)**

**Distribution in Iran.** Sistan & Baluchestan (Fery *et al.* 2012).

**General distribution.** Bangladesh, India (Uttar Pradesh), Myanmar, Nepal, Pakistan, Sri Lanka (Nilsson 2011).

**Comments.** Living in ponds (Fery *et al.* 2012, Sinha *et al.* 2015).

#### ***Canthydrus luctuosus* Aubé, 1838**

**Distribution in Iran.** Iran (no locality cited) (Nilsson 2003).

**General Distribution.** Cambodia, India, Indonesia (Sumatra), Iran, Iraq, Sri Lanka, Syria, Vietnam, “Arabia” (Nilsson 2011).

**Comments.** Living in rivers (Pradhan *et al.* 2003) and ponds (Sinha 2015).

### ***Canthyrus notula* (Erichson, 1843)**

**Distribution in Iran.** Fars (Hosseinie 1974).

**General distribution.** Angola, Botswana, Cameroon, Chad, Congo, Ethiopia, Gabon, Gambia, Ghana, Ivory Coast, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Oman, Ruanda, Senegal, Seychelles (Aldabra Islands), Sierra Leone, Somalia, South Africa, Swaziland, Tanzania, Uganda, Yemen, Zaire, Zambia, Zimbabwe (Nilsson 2011).

**Comments.** Found in remaining pools in riverbed and in marshes (Hosseinie 1974).

### **Tribe Noterini Thomson, 1860**

### **Genus *Noterus* Clairville, 1806**

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

**Distribution in Iran.** Alborz (Hematyian *et al.* 2010), East Azarbaijan, Fars (Hosseinie 1974, 1978; Zahiri 1996; Hosseinie & Zahiri 1998; Toledo 2004), Guilan (Bodemeyer 1927; Guéorguiev 1965c; Cox & Cox 1982; Toledo 2004; Kamali 2008), Khuzestan (Zahiri 1996; Hosseinie & Zahiri 1998; Ghodrati *et al.* 2014), Khuzestan (Hosseinie & Zahiri 1998), Markazi (Vafaei *et al.* 2004; Vafaei 2005), Mazandaran, Qazvin (Darilmaz *et al.* 2013), Sistan & Baluchestan (Legros 1972).

**General distribution.** Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia Hercegovina, Bulgaria, Byelorussia, China (Heilongjiang, Shaanxi, Xinjiang), Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Georgia, Great Britain, Greece, Hungary, Iraq, Ireland, Israel, Italy, Jordan, Kashmir, Kazakhstan, Latvia, Lebanon, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldavia, Mongolia, Netherlands, Norway, Poland, Portugal, Russia (Central European Territory, East Siberia, South European Territory, West Siberia), Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Turkey, Turkmenistan, Ukraine, Uzbekistan, former Yugoslavia (Nilsson 2011), Iran (Nilsson 2003, 2011; Darilmaz & Kiyak 2006; Toledo 2004).

**Comments.** Living in eutrophic pools, ditches, marshes, rivers (Drost *et al.* 1992). Bodemeyer (1927) reports this species from a pool in the Elbruz Mountains.

### ***Noterus crassicornis* (Müller, 1776)**

**Distribution in Iran.** East Azarbaijan (Samin *et al.* 2015).

**General distribution.** Austria, Belgium, Bosnia Hercegovina, Bulgaria, Byelorussia, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Kashmir, Latvia, Lithuania, Luxembourg, Macedonia, Moldavia, Netherlands, Norway, Poland, Russia (East Siberia, Central European Territory, North European Territory, South European Territory, West Siberia), Slovakia, Slovenia, Sweden, Turkey, Ukraine, former Yugoslavia (Nilsson 2011), Iran (Nilsson 2003, 2011; Nardi 2004; Toledo 2004).

**Comments.** Living in permanent pools, ponds, ditches, marshes (Drost *et al.* 1992).

### ***Noterus ponticus* Sharp, 1882**

**Distribution in Iran.** Fars (Hosseinie 1978), Khuzestan (Toledo 2004), Iran (no locality cited) (Nilsson 2003).

**General distribution.** Iran, Iraq (Nilsson 2003, 2011).

**Comments.** Prefers large, shallow, slow moving streams and marshy areas (Hosseinie 1978).

*Noterus* spp.

**Distribution in Iran.** Guilan (Hosseinie 1995a), Khuzestan (Hosseinie 1994), Mazandaran (Hosseinie 1995b).

#### **Family Rhysodidae Laporte, 1840**

**Comments.** Azadbakhsh & Nozari (2015) considered Rhysodidae as a subfamily of Carabidae while it is a valid family of Adephaga (Bouchard *et al.* 2011; A. Newton - personal communication).

#### **Tribe Rhysodini Laporte, 1840**

#### **Subtribe Clinidiina Bell & Bell, 1978**

#### **Genus *Clinidium* Kirby, 1835**

#### ***Clinidium* (*Arctoclinidium*) *marginicolle* Reitter, 1889**

**Distribution in Iran.** Mazandaran (Schmidt 2016), Iran (no locality cited) (Bell & Bell 1978; Bell 2003; Brustel & Gouix 2011; Azadbakhsh & Nozari 2015).

**General distribution.** Azerbaijan, Iran (Bell 2003).

**Comments.** Up to an altitude of 1600-1850 m (Schmidt 2016).

#### **Subtribe Omoglymmiina Bell & Bell, 1978**

#### **Genus *Omoglymmius* Ganglbauer, 1891**

#### ***Omoglymmius* (*Omoglymmius*) *germari* Ganglbauer, 1891**

**Distribution in Iran.** Northern Khorasan (Brustel & Gouix 2011), Iran (no locality cited) (Bell 2003; Nakládal 2008).

**General distribution.** Armenia, Austria, Azerbaijan, Bulgaria, France, Georgia, Greece, Hungary, Iran, Italy, Moldavia, Poland, Romania, Slovakia, Russia (South European Territory), Turkey, Ukraine (Bell 2003).

**Comments.** Found on notched surface of oak log stored on roadside stack (Nakládal 2008).

#### **Subtribe Rhysodina Laporte, 1840**

#### **Genus *Rhysodes* Dalman, 1823**

#### ***Rhysodes* *sulcatus* Fabricius, 1787**

**Distribution in Iran.** Guilan (Bodemeyer 1927).

**General distribution.** Bosnia Herzegovina, France, Germany, Hungary, Italy, Poland, Romania, Russia (South European Territory, West Siberia), Sweden, Turkey, UK (Bell 2003).

**Comments.** Bodemeyer (1927) reports this species as *Rhysodes* sp. from a river valley in the Elbruz Mountains. Only two species of this genus are distributed in Palaearctic region (*R. comes* Lewis, 1888 which is restricted to Finland and Japan, and another *R. sulcatus*). Regarding to their distribution we assumed strongly that the species collected from Guilan is the latter one.

## Discussion

This paper, which is the first comprehensive list of Iranian Myxophaga and Adephaga, indicates that the fauna of these taxa is rather diverse in Iran. In total two species of Myxophaga and 37 species of Adephaga (Gyrinidae, Haliplidae, Noteridae, Rhysodidae) are listed as the fauna of Iran. Haliplidae and Gyrinidae with 15 and 12 species respectively, are more diverse than the other families. Since Iran is a large country with various geographical regions and climates, surely there remain many further species to be discovered. The foregoing account is the first attempt to list the Myxophaga and Adephaga (excluding Carabidae and Dytiscidae) of Iran and the short list of the species reported will undoubtedly be extended when the fauna of all parts of Iran is better known. An analysis of the species recorded in each province shows that in 25 of 31 Iranian provinces have been recorded Adephaga. Among them, Mazandaran and Guilan with 18 and 16 recorded species respectively, have the highest diversity, followed by Fars and Khuzestan (Fig. 3). These results are unsurprising because these provinces represent those that have been most heavily sampled and on the other hands comprise much more rivers than the other provinces. However, there are various aquatic ecosystems (rivers and streams) especially in northern and western parts of Iran where have not been sampled systematically so far. Among the adjacent countries of Iran, the fauna of Turkey was studied better than others (Darilmaz & Kiyak 2006, 2009). Species diversity of Myxophaga and Adephaga in adjacent countries of Iran is given in table 2.

**TABLE 2.** Species diversity of Myxophaga and Adephaga in adjacent countries of Iran (Data based on Catalogue of Palaearctic Coleoptera 2003 (various authors, see references); Nilsson 2011; Vondel 2005, 2007, 2013).

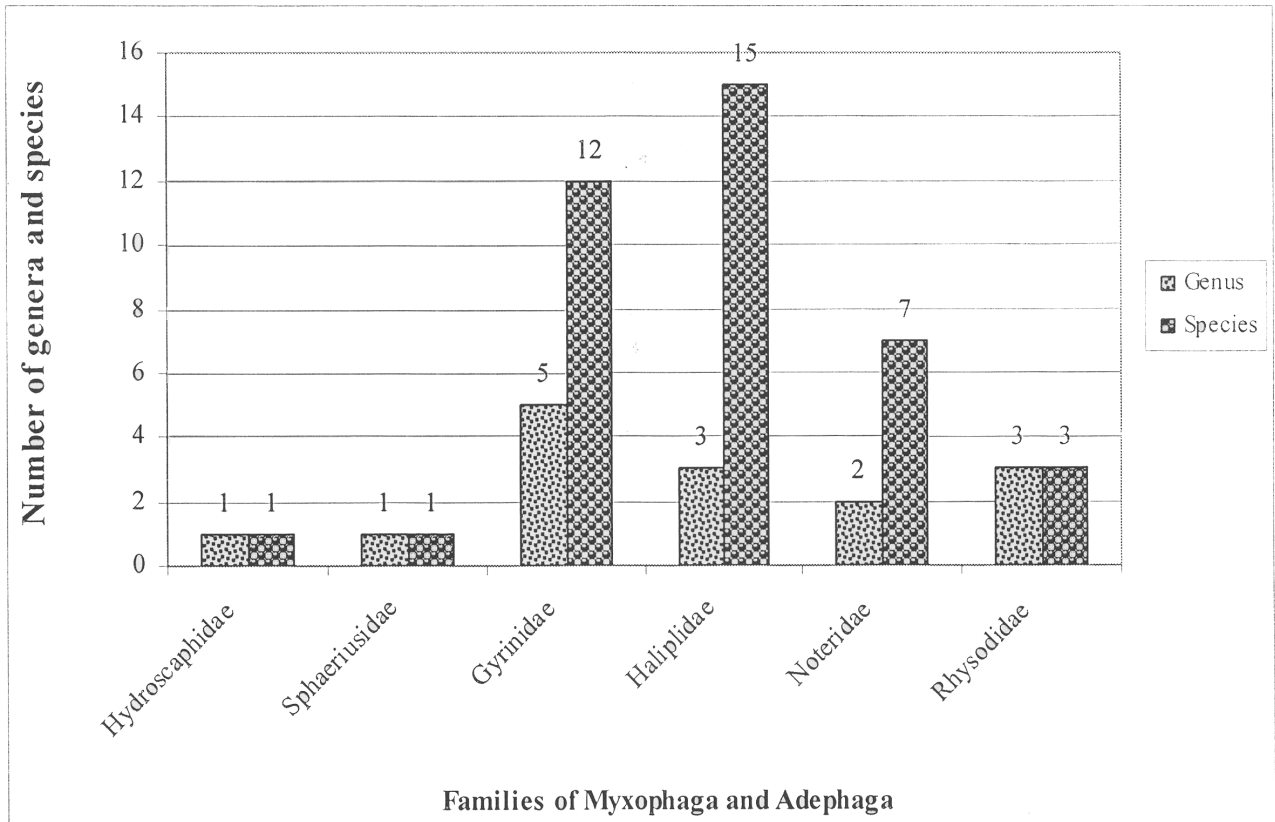
Family	Genus	Species	Armenia	Azerbaijan	Iraq	Turkey	Pakistan	Afghanistan	Turkmenistan	
Hydroscaphidae	<i>Hydroscapha</i>	<i>granulum</i>		x		x				
Sphaeriusidae	<i>Sphaerius</i>	sp.								
Gyrinidae	<i>Aulogyrinus</i>	<i>concinus</i>			x	x		x		
		<i>striatus</i>				x				
	<i>Dineutus</i>	<i>indicus</i>					x			
	<i>Gyrinus</i>	<i>caspius</i>	x	x	x	x				x
		<i>colymbus</i>	x				x			
		<i>dejeani</i>				x	x			
		<i>distinctus</i>				x	x		x	
		<i>luctuosus</i>				x				
		<i>mithrae</i>								
		<i>paykulli</i>	x				x			x
		<i>reitteri</i>								
		<i>substriatus</i>	x	x	x	x				
		<i>suffriani</i>		x			x			
	<i>thurtharus</i>				x					
	<i>urinator</i>				x	x				
	<i>Orectochilus</i>	<i>afghanus</i>							x	
		<i>nuristanicus</i>							x	
<i>nuristanicus</i>										
<i>villosus</i>					x	x				
	<i>involvens</i>									
	<i>villosus</i>	x				x				
	<i>villosus</i>									
<i>Patrus</i>	<i>limbatus</i>									

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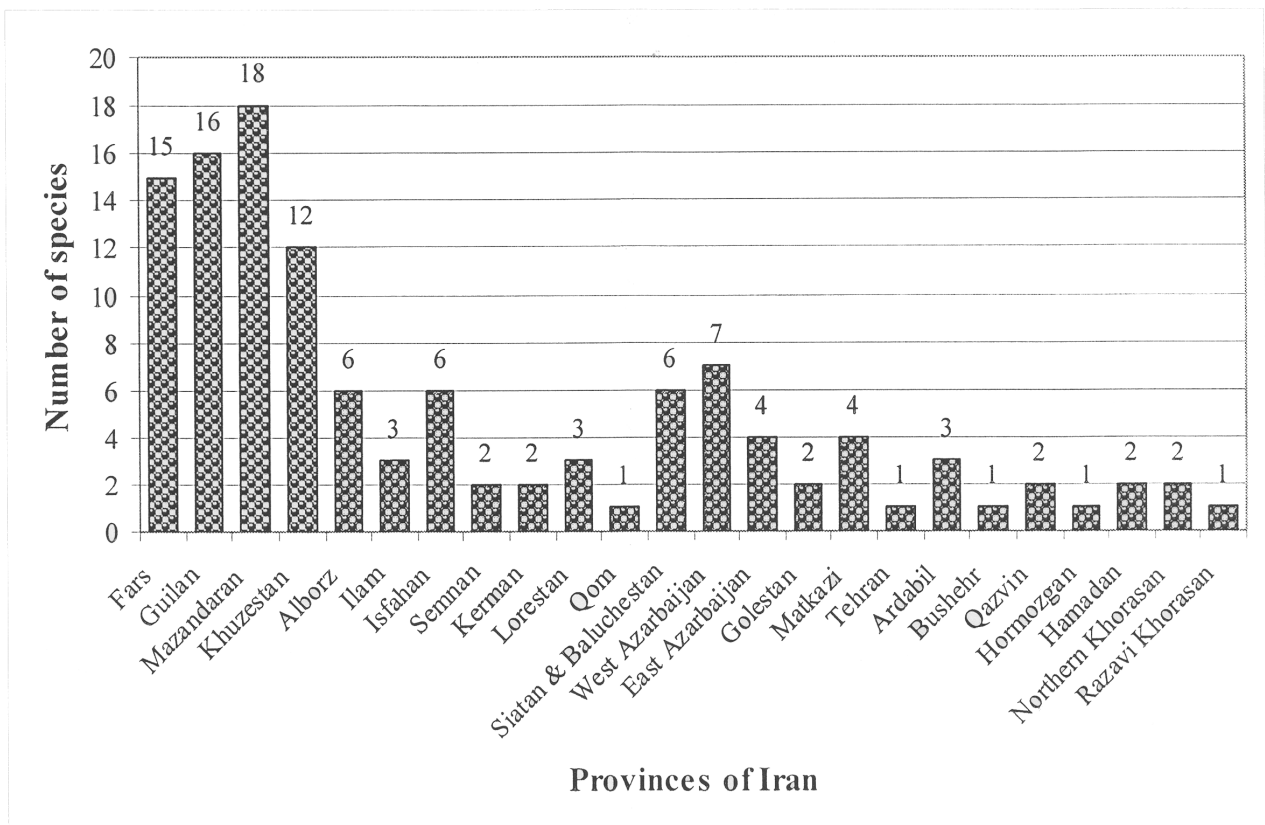


TABLE 2. (Continued)

Family	Genus	Species	Armenia	Azerbaijan	Iraq	Turkey	Pakistan	Afghanistan	Turkmenistan	
Halipidae	<i>Brychius</i>	<i>elevatus</i>			x					
	<i>Halipus</i>	<i>angustifrons</i>					x			
		<i>arrowi</i>						x		
		<i>confinis</i>				x	x			
		<i>obliquus</i>				x	x			
		<i>fluviatilis</i>					x		x	
		<i>furcatus</i>	x							
		<i>heydeni</i>	x				x			
		<i>perroti</i>						x		
		<i>ruficollis</i>	x			x	x		x	
		<i>sibiricus</i>					x			
		<i>abbreviatus</i>				x			x	
		<i>dalmatinus</i>					x			
		<i>flavicollis</i>				x	x			
		<i>fulvus</i>				x	x			
		<i>kulleri</i>				x	x			
		<i>laminatus</i>				x	x			
		<i>maculatus</i>				x	x		x	x
		<i>mucronatus</i>				x	x			
		<i>variegatus</i>					x			
<i>lineatocollis</i>	x	x			x					
<i>Peltodytes</i>	<i>caesus</i>	x	x		x	x		x	x	
	<i>rotundatus</i>					x				
Noteridae	<i>Canthydrus</i>	<i>diophthalmus</i>			x	x				
		<i>laetabilis</i>					x			
		<i>luctuosus</i>			x					
	<i>Noterus</i>	<i>clavicornis</i>	x	x		x	x			x
		<i>crassicornis</i>					x			
		<i>ponticus</i>				x				
	<i>Neohydrocoptus</i>	<i>subvittulus</i>						x		
Rhysodidae	<i>Clinidium</i>	<i>marginicolle</i>		x						
	<i>Omoglymmius</i>	<i>germari</i>	x	x		x				
	<i>Yamatosa</i>	<i>boysi</i>						x		
		<i>draco</i>						x		
	<i>Rhysodes</i>	<i>sulcatus</i>				x				
Number of families by country			4	5	3	5	4	2	3	
Number of genera by country			6	7	8	10	5	5	4	
Number of species by country			12	9	25	35	8	9	5	



**FIGURE 2.** Species diversity of the families of Iranian Myxophaga and Aephaga (excluding Carabidae and Dytiscidae).



**FIGURE 3.** Number of reported species of Iranian Myxophaga and Aephaga by province.

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