



## Additions to the knowledge of the digger wasp (Hymenoptera: Spheciformes: Crabronidae) fauna in the Fars Province of Iran

Maryam Sadeghi<sup>1,2</sup>, Majid Fallahzadeh<sup>3,\*</sup>, Hadi Ostovan<sup>2</sup>, Toshko Ljubomirov<sup>4</sup>, Shahram Hesami<sup>2</sup>

<sup>1</sup> Department of Entomology, Fars Science and Research Branch, Islamic Azad University, Fars, Iran.

<sup>2</sup> Department of Entomology, Shiraz Branch, Islamic Azad University, Shiraz, Iran.

<sup>3</sup> Department of Entomology, Jahrom Branch, Islamic Azad University, Jahrom, Iran.

<sup>4</sup> Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science, Sofia, Bulgaria.

**ABSTRACT.** The current paper presents new data on the distribution of 51 species of crabronid wasp (Hymenoptera: Spheciformes: Crabronidae) from the subfamilies Crabroninae (42 species of 15 genera and 5 tribes) and Pemphredoninae (9 species of 6 genera and two tribes) collected at 21 sampling sites in the Fars Province of Iran. Three species, *Tachysphex nitidus* (Spinola, 1806), *Liris memnonius* (F. Smith, 1856), and *Spilomena mocsaryi* Kohl, 1898 are newly added to the Iranian insect fauna. General distribution and Iranian localities are given for each species. The biogeographic affinities of the collected species are also discussed.

**Key words:** Hymenoptera, wasps, Middle East, fauna, new records, Iran

**Received:**

22 December, 2018

**Accepted:**

16 January, 2019

**Published:**

19 January, 2019

**Subject Editor:**

Ebrahim Ebrahimi

**Citation:** Sadeghi, M., Fallahzadeh, M., Ostovan, H., Ljubomirov, T. & Hesami, Sh. (2018) Additions to the knowledge of the digger wasp (Hymenoptera: Spheciformes: Crabronidae) fauna in the Fars Province of Iran. *Journal of Insect Biodiversity and Systematics*, 4 (4), 261–279.

### Introduction

Crabronidae is a large, diverse and cosmopolitan family of aculeate wasps, including 8,891 species in 249 genera and 8 subfamilies (Pulawski, 2018). In the Palaearctic region, there are more than 2,000 described species of 84 genera (Antropov et al., 2017; Pulawski, 2018). There are a number of old studies on digger wasps of Iran, none of which has been conducted by a local author from the country (e.g. Radoszkowski, 1871; Gussakovskij, 1933; de Beaumont, 1957, 1970; Pulawski, 1971, 1984, 1992, 1995). The

Iranian digger wasps fauna is receiving an increasing interest in the past two decades, compensating for the long dated lack of knowledge (e.g. Ebrahimi, 2000a, 2000b, 2005, 2008, 2014; Dollfuss, 2006, 2008; Schmid-Egger, 2004; Fallahzadeh et al., 2006, 2009, 2018; Pulawski, 2007; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015; Schmid-Egger et al., 2016; Sadeghi et al., 2016, 2018; Khosroabadi et al., 2018). Recently, Jahantigh et al. (2017) listed 315 species of Crabronidae in 56 genera and 6 subfamilies from Iran.

Corresponding author: Majid Fallahzadeh, E-mail: [mfallahm@yahoo.com](mailto:mfallahm@yahoo.com)

**Copyright** © 2018, Sadeghi et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY NC 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

The aim of the present work is to improve our knowledge of the Iranian fauna of the wasp family Crabronidae. We provide additional information on the distribution of subfamilies Crabroninae and Pemphredoninae in the Fars Province, Iran.

### Material and methods

Specimens for the present study were collected by extensive sampling with Malaise traps in the Fars Province during 2015–2016. The Fars Province (coordinates 27°01'–31°51'N, 50°27'–55°45'E) is located in southern Iran, is the fifth largest province of the country, covering an area of 122,400 km<sup>2</sup>, and is larger than 156 world countries (Sedaghatzadeh et al., 2012). The climate of Fars can be divided into three types: (1) north and northwest area (altitudes higher than 2000 m a. s. l.), with moderately cold winters, and mild summers; (2) central region (altitudes between 1200 and 2000 m a. s. l.), with relatively rainy mild winters, and hot dry summers; (3) south and southeast area (altitudes lower than 1200 m a. s. l.), with moderate winters and very hot summers (Sedaghatzadeh et al., 2012; Atbaei et al., 2015). Twenty-one Malaise traps were installed in 21 localities in different latitudes and altitudes, ecosystems, and used for collecting of samples (Fig. 1). Sampling localities are characterized by the data in Table 1 and shown in Figure 1. The specimens were extracted from traps and stored in 70% ethanol, then dried, pinned up, labeled, and put into collection boxes. They are deposited at the Insect Collection of Jahrom (JIAU) and Shiraz Branches (SHIAU), Islamic Azad University, Iran and the Institute of Biodiversity and Ecosystem Research, Sofia, Bulgaria (IBER). The list includes the following data: the valid name of the taxon, published records with local and worldwide distributions. Material examined of recorded species is presented by data for: province, city, date of

collection, number of examined specimens. Further, in order to avoid repetition in "Material examined", GPS coordinates and altitudes of sampling localities as well as the collectors of material are not given. The full information can be found in Table 1. Nomenclature follows Alexander (1992), Melo (1999), Schmid-Egger (2011, 2014), Straka & Schmid-Egger (2017), and Pulawski (2018). The general distribution was compiled from Pulawski (2018). Here, we consider the modern coastal Arabian States of Yemen, Oman and UAE as pertaining to the Afrotropical Region (See Larsen, 1984; Hölzel, 1998; Kirk-Spriggs & McGregor, 2009; Gadallah et al., 2013). The subfamilies, tribes, subtribes, genera and species are listed in alphabetic order.

### Results

#### Family Crabronidae Latreille, 1802

#### Subfamily Crabroninae Latreille, 1802

#### Tribe Crabronini Latreille, 1802

#### Subtribe Crabronina Latreille, 1802

#### Genus *Ectemnius* Dahlbom, 1845

#### *Ectemnius crassicornis* (Spinola, 1808)

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 29.IV–30.V.2015, 1♂, 1♀.

**Distribution:** Iran: Fars (Leclercq, 1999; Dollfuss, 2004b; Jacobs, 2006; Rezaei & Fallahzadeh, 2015). – Palaearctic (Albania, Azerbaijan, Bulgaria, Croatia, Czech Republic, France, Greece, Hungary, Iraq, Israel, Italy, Jordan, Kazakhstan, Kyrgyzstan, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).

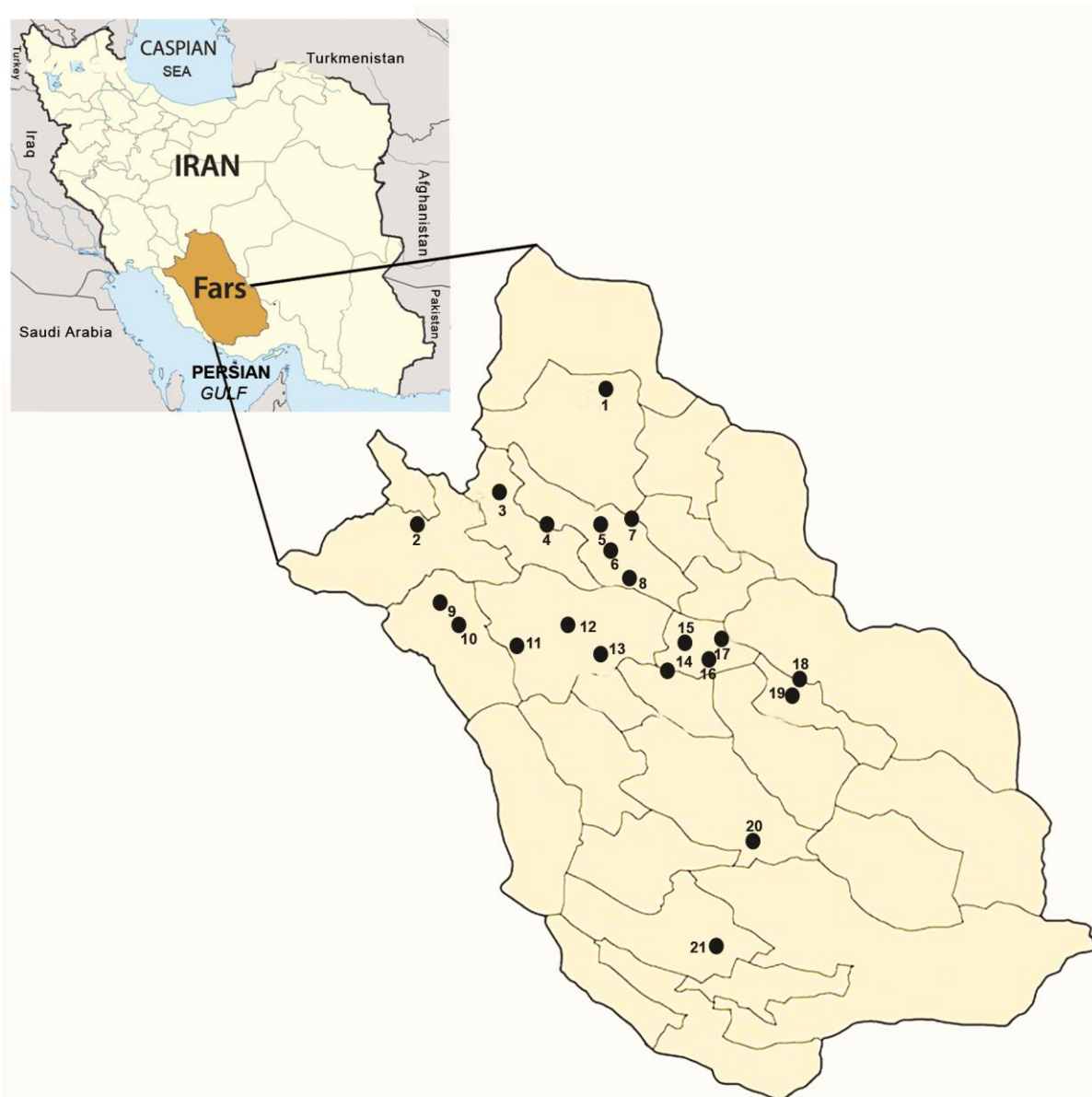
#### *Ectemnius sexcinctus* (Fabricius, 1775)

**Material examined:** IRAN: Fars: Estahban (Gordeh) (loc. 18), 26.VII–8.VIII.2015, 1♂.

**Distribution:** Iran: East Azerbaijan, Kermanshah (Ghazi-Soltani et al., 2010a; Ebrahimi, 2014). – Nearctic (USA); Oriental

(India, Pakistan); Palearctic (Afghanistan, Algeria, Andorra, Austria, Belarus, Belgium, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Great Britain, Hungary, Italy, Kazakhstan,

Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Mongolia, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan).



**Figure 1.** Map of Iran and Fars Province (enlarged down in right) and location of the sampling sites. **1.** Eghlid; **2.** Noor Abad (Fahlian); **3.** Sepidan (Sar Bast); **4.** Beyza (Berekh); **5.** Marvdasht; **6.** Marvdasht (Firoozi); **7.** Faroogh; **8.** Ramjerd; **9.** Kazeroon, **10.** Kazeroon (Zavali); **11.** Siyakh; **12.** Shiraz (Ghasrodasht); **13.** Maharloo (Posht Par); **14.** Dehno; **15.** Sarvestan (Kamal Abad); **16.** Dariun; **17.** Kherameh (Dodej); **18.** Estahban (Gordeh); **19.** Estahban (Mobarak Abad); **20.** Jahrom; **21.** Khonj.

**Table 1.** List of the sampling localities in Fars Province.

No.	Locality	Coordinate	Altitude in m a. s. l.	Collector
01	Eghlid	30°52'42"N, 52°39'59"E	2282	M. Sadeghi
02	Noor Abad (Fahlian)	30°11'31"N, 51°29'17"E	898	M. Sadeghi
03	Sepidan (Sar Bast)	30°10'44"N, 52°02'51"E	2000	M. Sadeghi
04	Beyza (Berekh)	29°55'55"N, 52°25'41"E	1613	M. Sadeghi
05	Marvdasht	29°52'43"N, 52°48'11"E	1601	F. Farzaneh
06	Marvdasht (Firoozi)	29°55'23"N, 52°50'22"E	1615	M. Sadeghi
07	Farogh	29°58'06"N, 53°02'56"E	1675	F. Farzaneh
08	Ramjerd	29°59'41"N, 52°39'32"E	1598	M. Sadeghi
09	Kazeroon	29°40'12"N, 51°35'35"E	831	M. Sadeghi
10	Kazeroon (Zavali)	29°32'53"N, 51°46'23"E	829	M. Sadeghi
11	Siyakh	29°26'26"N, 52°25'35"E	1757	M. Sadeghi
12	Shiraz (Ghasrodasht)	29°41'46"N, 52°28'41"E	1650	M. Sadeghi
13	Maharloo (Posht Par)	29°19'08"N, 52°51'07"E	1480	M. Sadeghi
14	Dehno	28°12'06"N, 52°38'05"E	761	F. Farzaneh
15	Sarvestan (Kamal Abad)	29°17'45"N, 53°00'34"E	1757	M. Sadeghi
16	Dariun	29°33'14"N, 52°56'42"E	1740	M. Sadeghi
17	Kherameh (Dodej)	29°34'23"N, 52°59'42"E	1675	M. Sadeghi
18	Estahban (Gordeh)	29°09'53"N, 53°52'56"E	1659	M. Sadeghi
19	Estahban (Mobarak Abad)	29°15'14"N, 53°56'46"E	1573	M. Sadeghi
20	Jahrom	28°30'04"N, 53°35'16"E	1060	B. M. Jahromi
21	Khonj	27°53'31"N, 53°26'42"E	668	M. Atbaei

**Genus *Lestica* Billberg, 1820*****Lestica clypeata* (Schreber, 1759)**

**Material examined:** IRAN: Fars: Kazeroon (Zavali) (loc. 10), 13-27.V.2016, 1♀.

**Distribution:** Iran: Alborz, Mazandaran, East Azerbaijan, Sistan & Baluchestan, Ilam, Markazi, Fars (Gussakovskij, 1933; de Beaumont, 1970; Ghazi-Soltani et al., 2009, 2010a, 2010b, 2010c, Leclercq, 1993; Ebrahimi, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). – Palaearctic (Albania, Algeria, Andorra, Austria, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Lithuania, Luxembourg, Malta, Montenegro, Morocco, Netherlands, Norway, Palestine, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

**Genus *Lindenius* Lepeletier de Saint Fargeau & Brullé, 1835*****Lindenius pygmaeus armatus* (Vander Linden, 1829)**

**Material examined:** IRAN: Fars: Siyakh (loc. 11), 17-30.IX.2015, 1♀.

**Distribution:** Iran: Mazandaran, Qazvin, Tehran (de Beaumont, 1957), Fars (Atbaei et al., 2015). – Palaearctic (Albania, Austria, Belarus, Belgium, Bosnia, Bulgaria, Croatia, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

**Remarks:** The identification is based on de Beaumont (1956).

**Tribe Oxybelini Leach, 1815****Genus *Oxybelus* Latreille, 1796*****Oxybelus dissectus elegans* Mocsáry, 1879**

**Material examined:** IRAN: Fars: Estahban (Mobarak Abad) (loc. 19), 8.VI- 6.VII.2016, 1♂; same data, 31.VII-26.VIII.2016, 1♂.

**Distribution:** Iran: Fars (Rezaei & Fallahzadeh, 2015). – Palaearctic (Hungary, Israel, Slovakia, South European Russia, Spain, Russia, Tunisia, Turkey).

**Remarks:** The identification is based on Guichard (1993).

***Oxybelus haemorrhoidalis* Olivier, 1812**

**Material examined:** IRAN: Fars: Khonj (loc. 21), 10-17.V.2015, 2♂♂, 1♀; same data, 6-13.IV.2015, 2♂♂, 1♀; same data, 15.V-10.VI.2015, 1♂; Kazeroon (loc. 09), 8-22.X.2015, 1♀.

**Distribution:** Iran: Isfahan, Kerman, Mazandaran, Sistan & Baluchestan, Yazd, Fars (de Beaumont, 1957, 1970; Dollfuss, 2008; Atbaei et al., 2015). – Palaearctic (Afghanistan, Algeria, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Croatia, Cyprus, China, Czech Republic, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Lithuania, Libya, Moldova, Mongolia, Morocco, Netherlands, Portugal, Poland, Romania, Russia, Serbia, Slovakia, Spain, Spain, Switzerland, Syria, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

***Oxybelus lamellatus* Olivier, 1812**

**Material examined:** IRAN: Fars: Khonj (loc. 21), 10-17.V.2015, 2♂♂, 7♀♀; same data, 6-13.IV.2015, 2♂♂, 1♀.

**Distribution:** Iran: Khorasan, Qazvin, Tehran, Sistan & Baluchestan, Yazd, Fars (Gussakovskij, 1933; de Beaumont, 1957, 1970; Dollfuss, 2008; Ebrahimi, 2014; Atbaei et al., 2015). – Afrotropical (Cameroon, Eritrea, Ethiopia, Mauritania, Oman,

Somalia, Sudan, UAE); Oriental (India, Pakistan); Palaearctic (Afghanistan, Algeria, China, Cyprus, Egypt, Greece, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Libya, Morocco, Portugal, Saudi Arabia, Spain, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Uzbekistan).

### *Oxybelus latro* Olivier, 1812

**Material examined:** IRAN: Fars: Sarvestan (Kamal Abad) (loc. 15), 9-23.X.2015, 1♂; same data, 28.VIII-7.IX.2015, 1♀, 1♂; same data, 7-18.IX.2015, 2♀♀; same data, 28.VIII-11.IX.2015, 1♂; Kherameh (Dodej) (loc. 17), 7-19.VII.2015, 1♂; same data, 30.XI-8.XII.2016, 1♀; Dehno (loc. 14), 15-19.V.2013, 1♂; Estahban (Gordeh) (loc. 18), 23.IX-2.X.2015, 1♂; Maharloo (Posht Par) (loc. 13), 20.VIII-2.IX.2016, 1♀, 1♂; Estahban (Mobarak Abad) (loc. 19), 29.IV-20.V.2016, 1♀; same data, 31.VII-26.VIII.2016, 1♂; same data, 12.VI-4.VII.2016, 1♂; same data, 7-31.VII.2016, 2♂♂; Marvdasht (Firoozi) (loc. 06), 22.VIII-5.IX.2016, 1♂; same data, 17.VII-1.VIII.2016, 1♂.

**Distribution:** Iran: Qazvin, Tehran, Ardabil, East Azerbaijan, Khorasan Razavi, Mazandaran, Qazvin, Tehran, Fars, (de Beaumont, 1957; Ghazi-Soltani et al., 2009, 2010c; Ebrahimi, 2005, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Palaearctic (Afghanistan, Albania, Algeria, Austria, Belarus, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrgyzstan, Lithuania, Mongolia, Morocco, Poland, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).

### *Oxybelus quatuordecimnotatus* Jurine, 1807

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 3-11.IX.2015, 2♀♀; same data, 7-19.VII.2015, 1♀; same data, 15-19.V.2015, 1♀; same data, 24-29.V.2015, 1♀;

Kazeroon (loc. 09), 8-22.X.2015, 2♀♀; same data, 17-25.IX.2015, 1♀; Sarvestan (Kamal Abad) (loc. 15), 28.VIII-11.IX.2015, 1♀; same data, 28.VIII-7.IX.2015, 2♂♂; same data, 7-18.IX.2015, 1♂; Estahban (Gordeh) (loc. 18), 2-16.X.2015, 1♀; same data, 9-23.IX.2015, 1♂; Khonj (loc. 21), 10-17.V.2015, 2♂♂, 1♀; same data, 6-13.IV.2015, 2♂♂; Dehno (loc. 14), 23-28.VII.2013, 1♂; Marvdasht (Firoozi) (loc. 06), 15-29.V.2016, 2♂♂; same data, 17.VII-1.VIII.2016, 1♀; Maharloo (Posht Par) (loc. 13), 29.VIII-22.IX.2016, 1♂; same data, 20.VIII-2.IX.2016, 1♀; same data, 2-20.IX.2016, 1♀; Noor Abad (Fahlian) (loc. 02), 20.IV-6.V.2016, 2♀♀, 1♂.

**Distribution:** Iran: Isfahan, Kerman, Khorasan Razavi, Mazandaran, Qazvin, Tehran, Fars (Morice, 1921; de Beaumont, 1957, 1970; Dollfuss, 2008; Ebrahimi, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Oman, Yemen); Oriental (Pakistan); Palaearctic (Afghanistan, Albania, Algeria, Austria, Belarus, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Denmark, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Kyrgyzstan, Latvia, Libya, Moldova, Mongolia, Montenegro, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Spain, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

### *Oxybelus variegatus* Wesmael, 1852

**Material examined:** IRAN: Fars: Estahban (Gordeh) (loc. 18), 26.VII-8.VIII.2015, 1♂; same data, 10-21.VII.2015, 1♂, 1♀; same data, 9-23.IX.2015, 1♀; Beyza (Berekh) (loc. 04), 23.VII-5.VIII.2015, 1♂; same data, 9-19.VII.2015, 1♀; Kazeroon (loc. 09), 3-17.IX.2015, 1♂; Dehno (loc. 14), 15-19.V.2013, 1♂; same data, 19-24.VIII.2013, 1♀; Eghlid (loc. 01), 21.VIII-2.IX.2015, 1♀; same data, 8-20.VIII.2015, 1♀; Siyakh (loc. 11), 10-17.IX.2015, 1♀; Maharloo (Posht Par) (loc. 13), 29.VIII-22.IX.2016, 1♂; same data,

20. VIII-2.IX.2016, 1♂, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 1♀; Estahban (Mobarak Abad) (loc. 19), 8.VI- 6.VII. 2016, 1♂; same data, 31.VII-26.VIII.2016, 1♀; same data, 6.VII.-16.VIII.2016, 1♀; Marvdasht (Firoozi) (loc. 06), 15-29.V.2016, 1♂; same data, 2-15.V.2016, 1♀.

**Distribution:** Iran: Isfahan, Mazandaran, Qazvin, Tehran, Fars (de Beaumont, 1957; Dollfuss, 2008; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Palaearctic (Afghanistan, Austria, Belarus, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrgyzstan, Lithuania, Moldova, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Syria, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### Tribe Larrini Latreille, 1810

#### Subtribe Gastrosericina Ed. André, 1886

#### Genus *Gastrosericus* Spinola, 1839

#### *Gastrosericus funereus* Gussakovskij, 1931

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 7-19.VII.2015, 2♀♀; same data, 21.VIII-3.IX.2015, 1♀; Estahban (Gordeh) (loc. 18) 2-16.X.2015, 1♀; Marvdasht (Firoozi) (loc. 06), 2-15.V.2016, 1♀, 1♂; same data, 29.V-20.VI.2016, 1♀; Jahrom (loc. 20), 15-29.IV.2016, 2♀♀, 1♂; same data, 29.IV-30.V.2016, 3♀♀; Khonj (loc. 21), 20.IV-15.V.2015, 1♂; same data, 15.V-10.VI.2015, 1♀.

**Distribution:** Iran: Kerman (Pulawski, 1995), Fars (Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Oman, UAE); Palaearctic (Egypt, Israel, Morocco, Tajikistan, Turkey, Turkmenistan).

#### *Gastrosericus waltlii* Spinola, 1839

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 20-30.VII.2015, 2♂♂, 1♀; same data, 21.VIII-3.IX.2015, 2♂♂; same data, 7-19.VII.2015, 2♂♂, 1♀; same data, 29.VI-11.VII.2015, 1♂; same data, 14-26.VII.2015, 7♀♀; Marvdasht (Firoozi) (loc.

06), 2-15.V.2016, 1♂; same data, 22.VIII-5.IX.2016, 1♀; same data, 20.VI-10.VII.2016, 1♀.

**Distribution:** Iran: Kerman (Pulawski, 1995; Samin et al., 2015), Fars (Atbaei et al., 2015). - Afrotropical (Eritrea, Namibia, Oman, Sudan, UAE, Zimbabwe); Oriental (India, Sri Lanka); Palaearctic (Algeria, China, Cyprus, Egypt, France, Israel, Kazakhstan, Kuwait, Libya, Morocco, Saudi Arabia, Syria, Tajikistan, Turkey, Turkmenistan, Uzbekistan).

#### Genus *Holotachysphex* de Beaumont, 1940

#### *Holotachysphex holognathus* (Morice, 1897)

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 29-30.V.2015, 1♀; Noor Abad (Fahlian) (loc. 02), 23.VI-10.VII.2016, 1♂.

**Distribution:** Iran: Fars (Atbaei et al., 2015; Schmid-Egger et al., 2016). - Afrotropical (Kenya, Oman, Senegal, Tanzania); Oriental (India, Sri Lanka); Palaearctic (Egypt, Greece, Israel, Saudi Arabia).

**Remarks:** Recently, Schmid-Egger et al. (2016) revised and keyed out all species of *Holotachysphex*.

#### *Holotachysphex iraniensis* Schmid-Egger & Fallahzadeh, 2016

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 10-22.VI.2015, 2♀♀; same data, 20-30.V.2015, 1♀.

**Distribution:** Iran: Fars, Hormozgan (Schmid-Egger et al., 2016).

#### *Holotachysphex mochii* (de Beaumont, 1947)

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 20-30.V.2015, 1♀; same data, 15-29.IV.2015, 1♂, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 1♀; same data, 27.V-14.VI.2016, 1♀.

**Distribution:** Iran: Khorasan Razavi, Fars (Pulawski, 1992; Atbaei et al., 2015; Schmid-Egger et al. 2016). - Palaearctic (Cyprus, Greece, Israel, Jordan, Libya, Turkey, Uzbekistan).

**Genus *Prosopigastra* A. Costa, 1867*****Prosopigastra bulgarica* Puławski, 1958**

**Material examined:** IRAN: Fars: Beyza (Berekh) (loc. 04), 23.VII-5.VIII.2015, 1♂.

**Distribution:** Iran: Alborz (Puławski, 1979). – Palaearctic (Bulgaria, Kazakhstan, Russia (European part), Turkey).

***Prosopigastra nigra* Puławski, 1979**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 1♀.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). – Afrotropical (Niger, Mali).

**Genus *Tachysphex* Kohl, 1883*****Tachysphex argentatus* Gussakovskij, 1952**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 20.V-10.VI.2016, 1♀; Estahban (Mobarak Abad) (loc. 19), 6.VII - 16.VIII. 2016, 1♂; Marvdasht (Firoozi) (loc. 06), 29.V-20.VI.2016, 1♂, 1♀.

**Distribution:** Iran: Fars (Rezaei & Fallahzadeh, 2015). – Afrotropical (Eritrea, Mali, Oman, Sudan, UAE, Yemen); Palaearctic (Egypt, Israel, Kazakhstan, Syria, Tajikistan, Turkey, Turkmenistan).

***Tachysphex consocius* Kohl, 1892**

**Material examined:** IRAN: Fars: Estahban (Mobarak Abad) (loc. 19), 8.VI-6.VII.2016, 1♂; same data, 12.VI-4.VII.2016, 1♀; Fars Jahrom (loc. 20), 15- 29.IV.2016, 1♀.

**Distribution:** Iran: East Azerbaijan, Mazandaran, Fars (Puławski, 2007; Samin et al., 2015; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). – Afrotropical (Angola, Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Oman, Senegal, Somalia, South Africa, Tanzania, Togo, UAE, Uganda, Yemen, Zaire, Zambia, Zimbabwe); Oriental (Nepal, Sri Lanka); Palaearctic (Afghanistan, Algeria, Armenia, Austria, Azerbaijan, Botswana, Bulgaria, Croatia, Cyprus, Egypt, France, Greece, Hungary,

Israel, Italy, Kazakhstan, Lebanon, Libya, Morocco, Portugal, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, Spain, Swaziland, Syria, Tajikistan, Tunisia, Turkmenistan, Turkey, Ukraine, Uzbekistan).

***Tachysphex fulvitaris* (A. Costa, 1867)**

**Material examined:** IRAN: Fars: Maharloo (Posht Par) (loc. 13), 13-27.V.2016, 1♀.

**Distribution:** Alborz, Khorasan Razavi (Puławski, 1971). – Afrotropical (Burkina Faso, South Africa, Tanzania, Zambia); Oriental (Pakistan); Palaearctic (Algeria, Austria, Belarus, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Luxembourg, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Ukraine).

***Tachysphex grandissimus* Gussakovskij, 1933**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 7-19.VII.2015, 1♀.

**Distribution:** Iran: Sistan & Baluchestan (Gussakovskij, 1933; Puławski, 1971). – Afrotropical (Chad, Mali, UAE); Oriental (India, Pakistan, Sri Lanka); Palaearctic (Egypt, Israel, Kazakhstan, Kuwait, Libya, Morocco, Palestine, Saudi Arabia, Tajikistan, Tunisia, Turkmenistan).

***Tachysphex incanus* de Beaumont, 1940**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 29.VI-11.VII.2015, 1♀; same data, 14-26.VII.2015, 1♀.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). – Afrotropical (Mauritania); Palaearctic (Egypt, Libya).

***Tachysphex incertus* (Radoszkowski, 1877)**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 1♂; same data, 20.V-10.VI.2016, 1♂; Jahrom (loc. 20), 10-22.VI.2015, 1♂; same data, 15-29.IV.2016;



Dariun (loc. 16), 8-22.IV.2016, 1♀; Sarvestan (Kamal Abad) (loc. 15), 7-18.IX.2015, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 1♀; Estahban (Mobarak Abad) (loc. 19), 8.VI -6.VII.2016, 1♂; same data, 12.VI-4.VII.2016, 1♂, 1♀; same data, 7-31.VII.2016, 1♂; same data; 29.IV-20.V.2016, 1♂.

**Distribution:** Iran: Ardabil, Mazandaran, Golestan, Kerman, Khuzestan, East Azerbaijan, Sistan & Baluchestan, Fars ([de Beaumont, 1957](#); [Pulawski 1971](#); [Ebrahimi, 2005, 2014](#); [Atbaei et al., 2015](#); [Rezaei & Fallahzadeh, 2015](#)). - Afrotropical (Mali, Niger, Oman); Oriental (Pakistan): Palaeartic (Algeria, Afghanistan, Bulgaria, China, Croatia, Cyprus, Egypt, France, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Morocco, Palestine, Portugal, Romania, Russia, Saudi Arabia, Slovakia, Spain, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### *Tachysphex mocsaryi* Kohl, 1884

**Material examined:** IRAN: Fars: Dehno (loc. 14), 24-29.IV.2013, 1♀.

**Distribution:** Iran: Ghom, Khorasan Razavi ([Ebrahimi, 2005, 2014](#)). - Afrotropical (Burkina Faso, Niger, Senegal); Palaeartic (Afghanistan, Algeria, Bulgaria, Hungary, Israel, Kazakhstan, Libya, Morocco, Romania, Russia, Slovakia, Spain, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### *Tachysphex nitidior* de Beaumont, 1940

**Material examined:** IRAN: Fars: Khonj (loc. 21), 15.V-10.VI.2015, 1♀; Marvdasht (Firoozi) (loc. 06), 20.VI-10.VII.2016, 1♂; Farooq (loc. 07), 17.VI- 22.VII.2015, 1♂.

**Distribution:** Iran: Kerman, Tehran, Semnan, Mazandaran, Sistan & Baluchestan, Fars ([Pulawski, 1971, 2007](#); [Atbaei et al., 2015](#); [Rezaei & Fallahzadeh, 2015](#)). - Afrotropical (Kenya, Senegal, UAE); Oriental (India, Pakistan); Palaeartic (Azerbaijan, Bulgaria, Croatia,

Cyprus, Egypt, France, Georgia, Greece, Israel, Italy, Kazakhstan, Kyrgyzstan, Lebanon, Libya, Mongolia, Morocco, Portugal, Romania, Russia, Spain, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### *Tachysphex nitidus* (Spinola, 1806)

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 30.XI-8.XII.2015, 1♀.

**Distribution:** Iran: Fars Province (new record). - Afrotropical (Oman); Palaeartic (Bulgaria, Cyprus, China, Greece, Israel, Italy, Kazakhstan, Portugal, Russia, Spain, Tajikistan, Turkey, Turkmenistan).

#### *Tachysphex pompiliformis* (Panzer, 1803)

**Material examined:** IRAN: Fars: Estahban (Gordeh) (loc. 18), 2-6.X.2015, 1♂, Kherameh (Dodej) (loc. 17), 1-20.V.2016, 1♀; Dariun (loc. 16), 8-22.IV.2016, 1♀.

**Distribution:** Iran: Alborz, East Azerbaijan, Mazandaran, Ardabil, Khorasan Razavi, Semnan, Tehran, Fars, Kurdistan, Chahar Mahaal & Bakhtiari ([Ghahari et al., 2009](#); [Sakenin et al., 2010](#); [Ebrahimi, 2000a, 2014](#); [Atbaei et al., 2015](#)). - Nearctic (Canada, USA); Oriental (India, Pakistan,); Palaeartic (Algeria, Andorra, Austria, Belarus, Belgium, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Korea, Latvia, Libya, Luxembourg, Mongolia, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).

**Remarks:** *Tachysphex* is a large and cosmopolitan genus of Larrini that currently includes 453 species ([Pulawski 2018](#)). [Straka \(2005\)](#) revised *Tachysphex pompiliformis* species-group of Turkey. Recently, [Straka & Schmid-Egger \(2017\)](#) described three related species of this species-group from UAE.

***Tachysphex panzeri* (Vander Linden, 1829)**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 1♂, 2♀♀; same data, 3.VII-11.VIII.2016, 1♀; Estahban (Mobarak Abad) (loc. 19), 8.VI -6.VII.2016, 1♂.

**Distribution:** Iran: Kerman, Tehran, Fars (Gussakovskij, 1933; de Beaumont, 1957; Pulawski, 1971; Rezaei & Fallahzadeh, 2015). - Afrotropical (Burkina Faso, Chad, Ethiopia, Gambia, Mali, Mauritania, Niger, Nigeria, Oman, Sudan, UAE, Yemen); Palaearctic (Algeria, Austria, Belgium, Bulgaria, China, Cyprus, Czech Republic, Egypt, France, Germany, Greece, Hungary, Italy, Jordan, Kazakhstan, Latvia, Libya, Lithuania, Malta, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Saudi Arabia, Slovakia, Spain, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, former Yugoslavia).

***Tachysphex persa* Gussakovskij, 1933**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 4♀♀; same data, 20-30.VII.2015, 2♀♀; same data, 29.VI-11.VII.2015, 1♀.

**Distribution:** Iran: Alborz, Kerman (Gussakovskij, 1933; Pulawski, 1971). Palaearctic (Israel, Kazakhstan, Turkey).

**Genus *Tachytes* Panzer, 1806*****Tachytes fucatus* Arnold, 1951**

**Material examined:** IRAN: Fars: Khonj (loc. 21), 6-13.IV.2015, 1♀.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). - Afrotropical (Mali, Mauritania, UAE); Palaearctic (Egypt, Israel, Saudi Arabia).

**Subtribe *Larrina* Latreille, 1810****Genus *Larra* Fabricius, 1793*****Larra arabica* Schmid-Egger, 2014**

**Material examined:** IRAN: Fars: Khonj (loc. 21), 10-17.V.2015, 1♂; Kazeroon (Zavali) (loc. 10), 30.VI -19.VII.2016, 1♂.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). - Afrotropical (UAE); Palaearctic (Western and Central Region).

**Genus *Liris* Fabricius, 1804*****Liris festinans praetermissus* (Richards, 1928)**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 22-30.IX.2015, 1♂; same data, 21.VIII-3.IX.2015, 1♂, 2♀♀; same data, 14-26.VII.2015, 1♂; same data, 7-19.VII.2015, 1♀; Ramjerd (loc. 08), 15-20.IV.2015, 1♀.

**Distribution:** Iran: This species was recorded from Iran without any precise locality (de Beaumont et al., 1973; Schmidt & Bitsch, 2007), Fars (Atbaei et al., 2015). - Afrotropical (Oman, UAE); Palaearctic (Afghanistan, Bulgaria, Corsica, Cyprus, France, Greece, Italy, Kazakhstan, Malta, Portugal, Spain, Turkey).

***Liris memmonius* (F. Smith, 1856)**

**Material examined:** IRAN: Fars: Khonj (loc. 21), 20.IV-15.V.2015, 1♂.

**Distribution:** Iran: Fars Province (new record). - Afrotropical (Ethiopia, Mali, South Africa); Palaearctic (Afghanistan, Egypt, Libya, Morocco).

***Liris niger* (Fabricius, 1775)**

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 21.VIII-3.IX.2015, 5♂♂, 5♀♀; same data, 14-26.VII.2015, 9♂♂, 2♀♀; same data, 20-30.VII.2015, 1♂. same data, 7-19.VII.2015, 2♂♂, 1♀; same data, 3-11.IX.2017, 1♀; same data, 30.XI-8.XII.2015, 1♀; same data, 1-20.V.2016, 1♂; Marvdasht (Firoozi) (loc. 06), 20.VI-10.VII.2016, 2♂♂, 1♀; same data, 29.V-20.VI.2016, 1♂; Maharloo (Posht Par) (loc. 13), 17.VI-15.VII.2016, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 1♀, 1♂.

**Distribution:** Iran: Alborz, Ardabil, East Azerbaijan, Sistan & Baluchestan, Bushehr, Golestan, Mazandaran, Tehran, Fars (Gussakovskij, 1933; de Beaumont, 1970;

Ghahari et al., 2009; Ghazi-Soltani et al., 2010b, 2010c; Ebrahimi, 2005, 2014; Samin et al., 2015; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Eritrea, Sudan, Yemen); Oriental (India, Malaysia, Sri Lanka,); Palaearctic (Afghanistan, Albania, Algeria, Austria, Bulgaria, China, Croatia, Cyprus, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Libya, Malta, Mongolia, Morocco, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

**Remarks:** Recently, character variation in *L. niger* was discussed by Atbaei et al. (2015).

#### *Liris nigricans* (Walker, 1871)

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 21.VIII- 3.IX.2015, 1♀; same data, 30.XI-8.XII.2015, 1♂.

**Distribution:** Iran: Gilan (Morice, 1921), Fars (Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Central African Republic, Chad, Ethiopia, Madagascar, Oman, Tanzania, UAE, Yemen, Zaire); Palaearctic (Afghanistan, Algeria, Canary Islands, China, Cyprus, Egypt, Iraq, Israel, Kazakhstan, Libya, Morocco, Spain, Tajikistan, Tunisia, Turkey, Uzbekistan).

#### Tribe Miscophini W. Fox, 1895

##### Genus *Miscophus* Jurine, 1807

##### *Miscophus bicolor* Jurine, 1807

**Material examined:** IRAN: Fars: Khonj (loc. 21), 20.IV-15.V.2015, 1♂.

**Distribution:** Iran: Tehran (de Andrade, 1960), Fars (Rezaei & Fallahzadeh, 2015). - Palaearctic (Algeria, Andorra, Austria, Belarus, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Egypt, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland,

Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Syria, Turkey, Ukraine).

##### *Miscophus helveticus* Kohl, 1883

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 1♀; same data, 7-19.VII.2015, 1♀; same data, 1-20.V.2016, 1♀; Estahban (Gordeh) (loc. 18), 29.IV-20.V.2016, 1♀; Marvdasht (Firoozi) (loc. 06), 5-30 IX.2016, 1♂.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). - Afrotropical (UAE); Palaearctic (Croatia, Cyprus, France, Hungary, Italy, Israel, Malta, Portugal, Russia, Spain, Switzerland, Turkey).

##### *Miscophus mimeticus* Honoré, 1944

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 3♂♂, 4♀♀; same data, 29.VI-11.VII.2015, 2♀♀; same data, 7- 19.VII.2015, 4♀♀; Estahban (Gordeh) (loc. 18), 8.VI- 6.VII.2016, 1♂.

**Distribution:** Iran: Fars (Atbaei et al., 2015). - Afrotropical (UAE); Palaearctic (Egypt, Kazakhstan, Mongolia).

##### Genus *Solierella* Spinola, 1851

##### *Solierella compedita* (Piccioli, 1869)

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 21.VIII-3.IX 2015, 1♂, 1♀; same data, 29.VI-11.VII.2015, 2♀♀; same data, 14- 26.VII.2015, 5♀♀; same data, 7-19.VII. 2015, 5♀♀; Estahban (Gordeh) (loc. 18), 10- 21.VII.2015, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 8♀♀, 11♂♂; same data, 1-25.VII.2016, 1♂; same data, 23.VIII-22.IX.2016, 3♂♂, 1♀; same data, 19.VII.-23.VIII.2016, 1♂, 10♀♀; 13-27.V.2016, 1♂, 1♀; Khonj (loc. 21), 20.IV-15.V.2015, 2♂♂, 1♀; same data, 10.VI-7.VII.2015, 1♀; Jahrom (loc. 20), 29-30.V.2015, 1♂; same data, 15-29.IV2016, 1♂, 1♀; Noor Abad (Fahlian) (loc. 02), 20.IV-6.V.2016, 1♀; Maharloo (Posht Par) (loc. 13), 27.V-17.VI.2016, 1♂; Marvdasht (Firoozi) (loc. 06), 20.VI-10.VII.2016, 1♀; same data, 5-30.IX.2016, 1♂;

Estahban (Mobarak Abad) (loc. 19), 8.VI-6.VII.2016, 1♂.

**Distribution:** Iran: Fars (Atbaei et al., 2015). - Palaearctic (Albania, Algeria, Austria, Bulgaria, Canary Islands, Croatia, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Malta, Morocco, Poland, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Turkey, Ukraine).

**Remarks:** Recently, comments on distribution and variation of certain morphological characters of *S. compedita* were given by Atbaei et al. (2015). The species of Palaearctic *Solierella* are currently under revision by Schmid-Egger (Schmid-Egger, personal communication).

#### *Solierella verhoeffi* de Beaumont, 1964

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 14-26.VII.2015, 1♀; Kazeroon (Zavali) (loc. 10), 30.VI-19.VII.2016, 1♀.

**Distribution:** Iran: Fars Province (Sadeghi et al., 2016). - Palaearctic (Cyprus, Greece, Israel, Spain, Turkey).

#### Tribe Trypoxylini Lepeletier de Saint Fargeau, 1845

##### Genus *Pison* Jurine, 1808

##### *Pison sericeum* Kohl, 1888

**Material examined:** IRAN: Fars: Kherameh (Dodej) (loc. 17), 7-19.VII.2015, 1♂; same data, 14-26.VII.2015, 2♀♀.

**Distribution:** Iran: Fars (Atbaei et al., 2015). - Palaearctic (Bulgaria, Greece, Israel, Italy, Russia, Turkey).

##### Genus *Trypoxylon* Latreille, 1796

##### *Trypoxylon scutatatum* Chevrier, 1867

**Material examined:** IRAN: Fars: Dehno (loc. 14), 15-20.VII.2013, 1♂; same data, 3-11.IX.2013, 1♂; Sarvestan (Kamal Abad) (loc. 15), 28.VIII-7.IX.2015, 1♀.

**Distribution:** Iran: Alborz, East Azerbaijan, Mazandaran, Ardabil, Fars (de Beaumont, 1957; Ghazi-Sotani et al., 2010b, 2010c; Ebrahimi, 2005, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Ethiopia); Palaearctic (Afghanistan, Algeria, Austria, Bulgaria, Croatia, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Libya, Morocco, Portugal, Romania, Russia, Spain, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### Subfamily Pemphredoninae Dahlbom, 1835

##### Tribe Pemphredonini Dahlbom, 1835

##### Subtribe Pemphredonina Dahlbom, 1835

##### Genus *Diodontus* Curtis, 1834

##### *Diodontus minutus* (Fabricius, 1793)

**Material examined:** IRAN: Fars: Marvdasht (loc. 05), 8-12.IV.2013, 1♂, 3♀♀; same data, 5-30.IX.2016, 1♀; same data, 29.V-20.VI.2016, 1♀; same data, 20.VI-10.VII.2016, 1♀; Khonj (loc. 21), 10-17.V.2015, 1♂; same data, 15.V-10.VI.2015, 1♀; same data, 10.VI-7.VII.2015, 1♀; Kherameh (Dodej) (loc. 17), 22-30.IX.2015, 4♀♀; same data, 21.VIII-3.IX.2015, 7♀♀; same data, 3-11.IX.2015, 8♀♀; same data, 7-19.VII.2015, 4♀♀; same data, 30.XI-8.XII.2015, 1♂, 2♀♀; same data, 1-20.V.2016, 1♀; Maharloo (Posht Par) (loc. 13), 22.IX-29.VIII.2015, 1♂, 8♀♀; same data, 2-20.IX.2016, 1♂; Noor Abad (Fahlian) (loc. 02), 20.IV-6.V.2016, 2♀♀; Jahrom (loc. 20), 29.IV-30.V.2016, 3♀♀; same data, 15-29.IV.2016, 4♀♀; Estahban (Mobarak Abad) (loc. 19), 29.IV-20.V.2016, 1♀; Kazeroon (Zavali) (loc. 10), 23.VIII-22.IX.2016, 1♀; same data, 30.VI-19.VII.2016, 2♀♀; Shiraz (Ghasrodasht) (loc. 12), 24.IV-20.V.2016, 1♀.

**Distribution:** Iran: Alborz, Khorasan Razavi, Tehran, Fars (Gussakovskij, 1933; Ebrahimi, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Afrotropical (Sudan);

Nearctic (Canada, USA); Palaearctic (Afghanistan, Albania, Austria, Belarus, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Israel, Italy, Kazakhstan, Korea, Kyrgyzstan, Latvia, Liechtenstein, Luxembourg, Malta, Mongolia, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan).

#### **Genus *Passaloecus* Shuckard, 1837**

##### ***Passaloecus gracilis* (Curtis, 1834)**

**Material examined:** IRAN: Fars: Shiraz (Ghasrodasht) (loc. 12), 24.VIII-8.IX 2015, 1♂.

**Distribution:** Iran: Tehran (Ebrahimi, 2005, 2014). - Nearctic (USA); Palaearctic (Austria, Andorra, Belarus, Belgium, Bulgaria, Canary Islands, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey, Ukraine, Uzbekistan).

##### ***Passaloecus pictus* Ribaut, 1952**

**Material examined:** IRAN: Fars: Sepidan (Sar Bast) (loc. 03), 21.VII-2.VIII.2015, 1♂. Shiraz (Ghasrodasht) (loc. 12), 24.VIII-8.IX.2015, 1♀; Maharloo (Posht Par) (loc. 13), 29.VIII-22.IX.2016, 1♂.

**Distribution:** Iran: Fars (Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Neotropical (Brazil, introduced in Sao Paulo); Palaearctic (Algeria, Austria, Belgium, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, Luxembourg, Macedonia, Morocco, Netherlands, Poland, Portugal, Slovenia,

Spain, Switzerland, Syria, Turkey, Ukraine).

#### **Genus *Pemphredon* Latreille, 1796**

##### ***Pemphredon lethifer* (Shuckard, 1837)**

**Material examined:** IRAN: Fars: Beyza (Berekh) (loc. 04), 23.VII- 5.VIII.2015, 1♀; Noor Abad (Fahlian) (loc. 02), 20.IV-6.V.2016, 3♀♀.

**Distribution:** Iran: Isfahan, Alborz, Qazvin, Tehran, Fars (Dollfuss, 1995; Ebrahimi, 2005, 2014; Atbaei et al., 2015; Rezaei & Fallahzadeh, 2015). - Nearctic (USA); Palaearctic (Afghanistan, Algeria, Andorra, Austria, Belarus, Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Liechtenstein, Lithuania, Luxembourg, Malta, Mongolia, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan).

#### **Subtribe *Spilomenina* Shuckard, 1838**

##### **Genus *Spilomena* Shuckard, 1838**

##### ***Spilomena roshanica* Gussakovskij, 1952**

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 10-22.VI.2015, 1♂.

**Distribution:** Iran: Fars (Atbaei et al., 2015). - Palaearctic (Kazakhstan, Tajikistan).

##### ***Spilomena mocsaryi* Kohl, 1898**

**Material examined:** IRAN: Fars: Jahrom (loc. 20), 15-29.IV.2015, 1♀.

**Distribution:** Iran: Fars Province (new record). - Afrotropical (UAE); Palaearctic (Austria, Bulgaria, France, Germany, Greece, Hungary, Italy, Kazakhstan, Poland, Russia, Spain, Switzerland, Tajikistan, Turkey, Turkmenistan).

**Tribe Psenini A. Costa, 1858****Genus *Mimumesa* Malloch, 1933*****Mimumesa unicolor* (Vander Linden, 1829)**

**Material examined:** IRAN: Fars: Dehno (loc. 14), 24-29.V.2013, 1♀; Sarvestan (Kamal Abad) (loc. 15), 28.VIII-7.IX.2015, 1♀; Faroogh (loc. 07, 1672 m), 17.VI-22.VII.2015, 1♂.

**Distribution:** Iran: Fars ([Atbaei et al., 2015](#)). – Oriental (Pakistan); Palaearctic (Afghanistan, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan).

**Genus *Psenulus* Kohl, 1896*****Psenulus meridionalis* de Beaumont, 1937**

**Material examined:** IRAN: Fars: Faroogh (loc. 07), 22-27 IV.2015, 3♂♂; Marvdasht (Firoozi) (loc. 06), 15-25.VII.2015, 1♀.

**Distribution:** Iran: Alborz, Tehran, Fars ([Dollfuss, 2004a](#); [Ebrahimi, 2005, 2014](#)). – Palaearctic (Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Hungary, Iraq, Italy, Jordan, Poland, Russia, Serbia, Slovakia, Spain, Switzerland, Syria, Turkey, Ukraine).

***Psenulus pan* de Beaumont, 1967**

**Material examined:** IRAN: Fars: Kazeroon (loc. 09), 27.X-12.XI. 2015, 1♀.

**Distribution:** Iran: Fars ([Dollfuss, 2004a](#); [Rezaei & Fallahzadeh, 2015](#)). – Palaearctic (Azerbaijan, Georgia, Iran, Kazakhstan, Lebanon, Syria, Turkey).

**Discussion**

During the present study, 399 specimens have been collected, including 153 males

and 246 females. Fifty-one species and 21 genera are listed. Of the 21 genera, *Tachysphex* with 12 species is the most rich-species. Three species, *Tachysphex nitidus*, *Liris memnonius* and *Spilomena mocsaryi* are recorded for the first time from Iran.

The biogeographic location of Iran in the Palaearctic Region is unique, at the crossroads of the Oriental and Afrotropical ecozones, Central Asia and Caucasus. Therefore, its fauna is expected to be mainly Western Palaearctic, but with the possible representation of Central Asian, Caucasian, Oriental and Afro-tropical elements ([Strumia & Fallahzadeh, 2015](#)). Based on the collected specimens, the following geographic analysis can be presented. One species (1.97%) is only known from Iran, whereas the highest number of species (17 species, 33.33%) is restricted to the Palaearctic region. In addition, nine species (17.64%) are mainly distributed in three biogeographic areas, the Palaearctic, Afrotropical and Oriental regions, but are not truly cosmopolitan. Moreover, three species (5.88%) are distributed in the Holarctic region. There is a slight overlap with the fauna of the Oriental region (one species, 1.97%), while 39.21% (20 species) overlap with the Afrotropical region. Currently, no data are available about overlapping with the Australasian region.

Iran apparently has a complex fauna influenced by different geographical zones. However, there is no comprehensive research or summarizing study about this family from Iran and thus study of this fauna is not easy ([Rezaei & Fallahzadeh, 2015](#)). We assume the insect fauna in southern Iran has not been completely explored yet. Further inventory of Iranian digger wasps and the revisionary works on some crabronid wasp taxa are recommended.

## Acknowledgments

We sincerely thank Maryam Neyshaboori and Shahriyar Moghtader for their help during the sampling programs. We are most grateful to Dr. Wojciech J. Pulawski (California Academy of Science, USA) and three anonymous reviewers for their careful reading and useful corrections that substantially improved the present paper. The research was supported by Islamic Azad University, Shiraz Branch, Shiraz, Iran and Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science, Sofia, Bulgaria. In the later institution it was a part of the project ANIDIV 2 (Population structure, species diversity and associations of animals in natural and influenced ecosystems) - chapter 24: Investigations of the Hymenopteran fauna (Insecta: Hymenoptera) of Turkey and the Middle East.

## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

## References

- Alexander, B.A. (1992) An exploratory analysis of cladistic relationships within the superfamily Apoidea, with special reference to sphecids wasps (Hymenoptera). *Journal of Hymenoptera Research*, 1, 25-61.
- Antropov, A.V., Astafurova, Yu.V., Belokobylskij, S.A., Byvaltsev, A.M., Danilov, Yu.N., Dubovikoffm D.A., Fadeev K. I., Fateryga, A. V., Kurzenko, N.V., Lelej, A.S., Levchenko, T.V., Loktionov, V.M., Mokrousov, M.V., Nemkov, P.G., Proshchalykin, M.Yu., Rosa, P., Sidorov, D.A., Sundukov, Yu.N., Yusupov, Z.M., Zaytseva, L.A. (2017) *Annotated Catalogue of the Hymenoptera of Russia. Volume I. Symphyta and Apocrita: Aculeata*. Zoological Institute RAS, Saint Petersburg (Proceedings of the Zoological Institute RAS, Supplement. 6, 475 pp.
- Atbaei, M., Fallahzadeh, M. & Ljubomirov, T. (2015) A contribution to the fauna of Crabronidae (Hymenoptera, Apoidea) in South-Western Iran. *Journal of Insect Biodiversity*, 3 (11), 1-30.  
<https://doi.org/10.12976/jib/2015.3.11>
- de Andrade, N.F. (1960) Palaeartic Miscophus: bicolor group and isolated species (Hymenoptera, Sphecidae). *Memória e Estudos do Museu Zoológico da Universidade de Coimbra*, 262, 1-136.
- de Beaumont, J. (1956) Notes sur les *Lindenius* paléarctiques (Hym. Sphecid.). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 29, 145-185.
- de Beaumont, J. (1957) Sphecidae du nord de l'Iran (Hym.). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 30, 127-139.
- de Beaumont, J. (1970) Sphecidae de l'Iran (Hym.) (Résultats de voyages entomologiques de Willi Richter, Stuttgart, en Iran, en 1954 et 1956). *Stuttgarter Beiträge zur Naturkunde aus dem Staatlichen Museum für Naturkunde in Stuttgart*, 220, 1-18.
- de Beaumont, J., Bytinski-Salz, H. & Pulawski, W. (1973) The Sphecidae (Hym.) of Eretz Israel. III. Subfamilies: Astatinae, Larrinae, Trypoxyloninae, Pemphredoninae, Crabroninae, Oxybelinae. *Israel Journal of Entomology*, 8, 1-26.
- Dollfuss, H. (1995) A worldwide revision of Pemphredon Latreille 1796 (Hymenoptera, Sphecidae). *Linzer Biologische Beiträge*, 27, 905-1019.
- Dollfuss, H. (2004a) The Pemphredoninae Wasps of "Biologiezentrum Linz" Collection in Linz, Austria (Hymenoptera, Apoidea, Crabronidae). *Linzer Biologische Beiträge*, 36 (1), 105-129.
- Dollfuss, H. (2004b) The Crabroninae Wasps of "Biologiezentrum Linz" Collection in Linz, Austria (Hymenoptera, Apoidea, Crabronidae), Part 1. *Linzer Biologische Beiträge*, 36 (2), 761-784.
- Dollfuss, H. (2006) The Crabroninae Wasps of "Biologiezentrum Linz" Collection in Linz, Austria (Hymenoptera, Apoidea, Crabronidae), Part 2. *Linzer Biologische Beiträge*, 38 (1), 505-532.

- Dollfuss, H. (2008) The Crabronid wasps of the genera *Oxybelus* Latreille 1796 and *Brimocelus* Arnold 1927 of "Biologiezentrum Linz" Collection in Linz, Austria (Hymenoptera, Apoidea, Crabronidae). *Linzer Biologische Beiträge*, 40, 463–505.
- Ebrahimi, E. (2000a) The first report on three orthopteran predator wasps in Iran. *Proceedings of the 14th Iranian Plant Protection Congress, Isfahan, 5-8 September, Isfahan*, Isfahan University of Technology, Iran, Volume I: Pests, p. 361.
- Ebrahimi, E. (2000b) The first record of three predator wasps in Iran. *Proceedings of the 14th Iranian Plant Protection Congress, Isfahan, 5-8 September, Isfahan*, Isfahan University of Technology, Iran, Volume I: Pests, p. 362.
- Ebrahimi, E. (2005) An identification guide to the Sphecidae of Iran (Insecta, Hymenoptera). *Journal of Entomological Society of Iran*, 24 (2), 109–135.
- Ebrahimi, E. (2008) A contribution to the sphecid wasps of Iran (Hymenoptera: Sphecidae), including first record of six species. *Journal of Entomological Society of Iran*, 28 (1), 93–97.
- Ebrahimi, E. (2014) The list of Hymenoptera in the Hayk Mirzayans insect museum, suborder Apocrita. superfamily Apoidea (Spheciformis series). families Ampulicidae, Sphecidae, Crabronidae. In: Askari, H., Farazmand, H., Hosseini Nezhad, A., Manzari, S., Mirabolfathi, M., Mofidi-Neyestanak, M., Morovati, M., Zand, E. & Zare, R. (eds.), *Insects of Iran*. Publication No. 20. Iranian Research Institute of Plant Protection, Tehran, pp. 1–62.
- Fallahzadeh, M., Ostovan, H. & Saghaei, N. (2009) A contribution to the fauna of Sphecidae and Crabronidae (Hymenoptera) in Fars province, Iran. *Plant Protection Journal*, 1, 234–248.
- Fallahzadeh, M., Ostovan, H. & Shojaei, M. (2006) First record of four sphecid wasps from Iran. *Applied Entomology and Phytopathology*, 73, 43–44.
- Fallahzadeh, M., Ljubomirov, T., Tavakoli Roodi, T. & Saghaei, N. (2018) A further contribution to the Crabronidae fauna (Hymenoptera, Apoidea, Spheciformes) of southern Iran. *Transactions of the American Entomological Society*, 144 (3), 625–637. <https://doi.org/10.3157/061.144.0312>
- Gadallah, N.S., Al Dhafer, H.M., Aldryhim, Y.N., Fadl, H.H. & Elgharabawy, A.A. (2013) The digger wasps of Saudi Arabia: New records and distribution, with a checklist of species (Hym.: Ampulicidae, Crabronidae and Sphecidae). *North- Western Journal of Zoology*, 9 (2), 345–364.
- Ghahari, H., Havaskaray, M., Tabari, M., Ostovan, H., Sakenin, H. & Satar, A. (2009) An annotated catalogue of Orthoptera (Insecta) and their natural enemies from Iranian rice fields and surrounding grasslands. *Linzer Biologische Beiträge*, 41, 639–672.
- Ghazi-Soltani, G., Ebrahimi, E. & Iranipur, S. (2009) Sphecidae (Sphecinae and Crabronidae) wasp fauna of East Azarbaijan province, Iran. *Journal of Insect Science*, 19, 271–282.
- Ghazi-Soltani, G., Iranipur, S. & Ebrahimi, E. (2010a) The wasps of family Sphecidae (Hymenoptera), subfamilies Larrinae, Astatinae, Pemphredoninae, Nyssoninae and Philanthinae in East Azarbaijan province. *Iranian Journal of Plant Protection Science*, 41, 179–186.
- Ghazi-Soltani, G., Khaghaninia, S. & Shahim, K. (2010b) An introduction to sphecid wasps of Horand forest-Iran. *Munis Entomology and Zoology*, 5, 636–641.
- Ghazi-Soltani, G., Ebrahimi, E., Iranipur, S. & Pour Abad, R. (2010c) Sphecid wasps from East Azerbaijan province, Iran (Hymenoptera: Sphecidae). *Munis Entomology and Zoology*, 5, 796–803.
- Guichard, K. (1993) European *Oxybelus* with a note on *Oxybelus dusmeti* Perez, 1966 (Hymenoptera, Sphecidae). *Entomofauna*, 15, 529–536.
- Gussakovskij, V.V. (1933) Sphecidae et Psammocharidae (Hymenoptera), a cl. N. Zarudnyi in Persia orientali collectae. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR*, 1, 269–307. [in Russian]
- Hölzel, H. (1998) Zoogeographical features of Neuroptera of the Arabian Peninsula. *Acta Zoologica Fennica*, 209, 129–140.



- Jacobs, H.J. (2006) Beschreibung von *E. zonsteini* sp. n. und Bestimmungstabelle der paläarktischen *Ectemnius* (*Thyreocerus*)-Arten. *Beiträge zur Entomologie*, 56, 105–113.
- Jahantigh, F., Rakhshani, E., Mokhtari, A. & Ramroodi S. (2017) Catalogue of Ampulicidae, Crabronidae and Sphecidae of Iran (Hymenoptera, Apoidea). *Zootaxa*, 4307(1), 1–96.  
<https://doi.org/10.11646/zootaxa.4307.1.1>
- Khosroabadi, M., Fallahzadeh, M., Schmid-Egger, C. & Dousti, A. F. (2018) Two new records of Crabronidae (Hymenoptera: Apoidea) from Iran. *Journal of Entomological Society of Iran*, 38 (2), in press.
- Kirk-Spriggs, A. H., & McGregor, G. (2009) Disjunctions in the Diptera (Insecta) fauna of the Mediterranean Province and southern Africa and a discussion of biogeographical considerations. *Transactions of the Royal Society of South Africa*, 64 (1), 32–52.  
<https://doi.org/10.1080/00359190909519236>
- Larsen, T.B. (1984) The zoogeographical composition and distribution of the Arabian butterflies (Lepidoptera; Rhopalocera). *Journal of Biogeography*, 119–158.  
<https://doi.org/10.2307/2844685>
- Leclercq, J. (1993) Hyménoptères Sphecides Crabroniens d'Europe et du Bassin Méditerranéen. *Notes Fauniques de Gembloux*, 26, 9–54.
- Leclercq, J. (1999) Hyménoptères Sphecides Crabroniens du genre *Ectemnius* Dahlbom, 1845. Espèces d'Asie et d'Océanie et groupes d'espèces de la fauna mondiale. *Notes fauniques de Gembloux*, 36, 3–83.
- Melo, G.A.R. (1999) Phylogenetic relationships and classification of the major lineages of Apoidea (Hymenoptera), with emphasis on crabronid wasps. *Scientific Papers. Natural History Museum, The University of Kansas*, 14, 1–55.
- Morice, F. (1921) Annotated lists of Aculeate Hymenoptera (except Heterogyna) and Chrysidids recently collected in Mesopotamia and North-West Persia. *The Journal of the Bombay Natural History Society*, 27, 816–828.
- Pulawski, W.J. (1971) *Les Tachysphex Kohl (Hym., Sphecidae) de la Région Paléarctique Occidentale et Centrale*. Państwowe Wydawnictwo Naukowe, Wrocław. 464 pp.
- Pulawski, W.J. (1979) A revision of the world *Prosopigastra* Costa (Hymenoptera, Sphecidae). *Polskie Pismo Entomologiczne*, 49, 3–134.
- Pulawski, W.J. (1984) The status of *Trypoxylon figulus* (Linnaeus, 1758), *medium* de Beaumont, 1945, and *minus* de Beaumont, 1945 (Hymenoptera: Sphecidae). *Proceedings of the California Academy of Sciences*, 43, 123–140.
- Pulawski, W.J. (1992) World species of the wasp genus *Holotachysphex* de Beaumont (Hymenoptera: Sphecidae). *Proceedings of the Entomological Society of Washington*, 94, 223–242.
- Pulawski, W.J. (1995) The wasp genus *Gastrosericus* Spinola, 1839 (Hymenoptera: Sphecidae). *Memoirs of the California Academy of Sciences*, 8, 1–173.
- Pulawski, W.J. (2007) The wasp genus *Tachysphex* Kohl, 1883, of Sahara, Sub-Saharan Africa, the Arabian Peninsula, and Madagascar (Hymenoptera: Apoidea: Crabronidae). *Proceedings of the California Academy of Sciences, Series 4*, 58 (Supplement 1), 1–698.
- Pulawski, W.J. (2018) Catalog of Sphecidae. San Francisco, CA: California Academy of Sciences. Available from: <https://www.calacademy.org/scientists/projects/catalog-of-sphecidae/> [Accessed 18th August 2018].
- Radoszkowski, O. (1871) Hyménoptères de l'Asie. Description et énumération de quelques espèces reçues de Samarkand, Astrabad, Himalaya et Ning-Po, en Chine. *Horae Societatis Entomologicae Rossicae*, 8, 187–200.
- Rezaei, S. & Fallahzadeh, M. (2015) New data on the digger wasps (Hymenoptera, Apoidea: Crabronidae) in Southern Iran. *Far Eastern Entomologist*, 303, 1–18.
- Sadeghi, M., Fallahzadeh, M., Ostovan, H., Ljubomirov, T. & Hesami S. (2016) New records of nine crabronid wasps (Hymenoptera: Crabronidae) from Iran. In: Talaei-Hassanlou, R. (ed.) *Proceedings of*

- 22nd Iranian Plan Protection Congress, 27-30 August, Karaj, College of Agriculture and Natural Resources, University of Tehran, Karaj, Iran, p. 431.
- Sadeghi, M., Fallahzadeh, M., Ostovan, H., Ljubomirov, T. & Hesami S. (2018) New records of the digger wasps (Hymenoptera: Crabronidae) from Iran. *Far Eastern Entomologist*, 363, 21–24.  
<https://doi.org/10.25221/fee.363.4>
- Sakenin, H., Samin, N. & Bagriacik, N. (2010) A contribution to the aculeate Hymenoptera (Insecta) from Iran. *Efflattounia*, 10, 15–20.
- Samin, N., Sakenin, H., Bagriacik, N. & Monaem, R. (2015) A study on Sphecidae and Crabronidae from Iran (Hymenoptera: Apoidea). *Entomofauna*, 36, 193–200.
- Schmid-Egger, C. (2004) Revision of *Bembecinus* (Hymenoptera, Crabronidae) of the Palaearctic region. *Notes fauniques de Gembloux*, 54, 3–69.
- Schmid-Egger, C. (2011) Order Hymenoptera, families Crabronidae and Sphecidae. In: van Harten, A. (ed.) *Arthropod Fauna of UAE*. Vol. 4. Dar Al Ummah Printing, United Arab Emirates, Abu Dhabi, 832 pp.
- Schmid-Egger, C. (2014) Order Hymenoptera, families Crabronidae and Sphecidae. Further records and the description of new species, In: van Harten, A. (ed.) *Arthropod Fauna of UAE*. Vol. 5. Al Amal Printing Press. United Arab Emirates, Abu Dhabi, 744 pp.
- Schmid-Egger, C., Fallahzadeh, M. & Khosroabadi, M. (2016) A new species of *Holotachysphex* de Beaumont, 1940 (Hymenoptera: Apoidea, Crabronidae) from Iran with identification key to species. *Zootaxa*, 4169 (1), 187–193.  
<https://doi.org/10.11646/zootaxa.4169.1.11>
- Schmidt, K. & Bitsch, J. (2007) Tribu des Larrini. In: Bitsch, J., Dollfuss, H., Bouček, Z., Schmidt, K., Schmid-Egger, C., Gayubo S., Antropov, A. & Barbier, Y. (eds.) *Faune de France. France et régions limitrophes. 86. Hyménoptères Sphecidae d'Europe Occidentale*. Volume 3 (seconde édition). Fédération Française des Sociétés de Sciences Naturelles. Paris, 479 pp.
- Sedaghatzadeh, Z., Tashakorian, V., Mobasheri, M.H., Homayoni, M.S., Foroghbaksh, A., Mansoori, A. & Sepehrimanesh, M. (2012) *Province of Fars*. 3rd Edition, Iran's Textbooks Printing & Publishing Company, Tehran. 157 pp.
- Straka, J. (2005) A review of the genus *Tachysphex* (Hymenoptera: Apoidea) of Turkey, with description of four new species. *Acta Societatis Zoologicae Bohemicae*, 69, 247–276.
- Straka, J. & Schmid-Egger, C. (2017) Order Hymenoptera, family Crabronidae, genus *Tachysphex* Kohl, 1883. In: van Harten, A. (ed.) *Arthropod Fauna of the United Arab Emirates*, Vol. 6. Department of President's Affairs. United Arab Emirates, Abu Dhabi, 775 pp.
- Strumia, F. & Fallahzadeh M. (2015) New records and three new species of Chrysididae (Hymenoptera, Chrysididae) from Iran. *Journal of Insect Biodiversity*, 3 (15), 1–32.  
<http://dx.doi.org/10.12976/jib/2015.3.15>

## معرفی بخش بیشتری از فون زنبورهای خانواده Crabronidae (Hymenoptera: Apoidea: Spheciformes) از استان فارس، ایران

مریم صادقی<sup>۱</sup>، مجید فلاحزاده<sup>۲\*</sup>، هادی استوان<sup>۳</sup>، توشکو جوبومیروف<sup>۴</sup> و شهرام حسامی<sup>۲</sup>

۱ گروه حشره شناسی، واحد علوم و تحقیقات فارس، دانشگاه آزاد اسلامی، فارس، ایران.

۲ گروه حشره شناسی، واحد شیراز، دانشگاه آزاد اسلامی، شیراز، ایران.

۳ گروه حشره شناسی، واحد جهرم، دانشگاه آزاد اسلامی، جهرم، ایران.

۴ مؤسسه تحقیقات تنوع زیستی و اکوسیستم، آکادمی علوم بلغارستان، صوفیه، بلغارستان.

\* پست الکترونیکی نویسنده مسئول مکاتبه: [mfalahm@yahoo.com](mailto:mfalahm@yahoo.com)

تاریخ دریافت: ۰۱ دی ۱۳۹۷، تاریخ پذیرش: ۲۶ دی ۱۳۹۷، تاریخ انتشار: ۲۹ دی ۱۳۹۷

**چکیده:** در مقاله حاضر، اطلاعات جدیدی از پراکنش ۵۱ گونه از زنبورهای خانواده Crabronidae (Hymenoptera: Spheciformes) ارائه می‌شود. گونه‌های متعلق به دو زیر خانواده Crabroninae (۴۲ گونه متعلق به ۱۵ جنس و ۵ طایفه) و Pemphredoninae (۹ گونه متعلق به ۶ جنس و دو طایفه) می‌باشند که از ۲۱ منطقه استان فارس جمع‌آوری شدند. در میان نمونه‌های جمع‌آوری شده، سه گونه *Liris memnonius* (F. Smith, 1856)، *Tachysphex nitidus* (Spinola, 1806) و *Spilomena mocsaryi* Kohl, 1898 برای اولین بار از ایران گزارش می‌شوند. پراکنش گونه‌ها در ایران و سایر کشورها ارائه شده و انتشار بیوجغرافیایی آنها مورد بحث قرار گرفته است.

**واژگان کلیدی:** بال‌غشائیان، زنبور، خاورمیانه، فون، گزارش‌های جدید، ایران