Additions to the fauna of Braconidae (Hym., Ichneumonoidea) of Iran based on the specimens housed in Hayk Mirzayans Insect Museum with six new records for Iran

Ali Ameri1*, Ebrahim Ebrahimii & Ali Asghar Talebi2

1 Insect Taxonomy Research Department, Iranian Research Institute of Plant Protection, Agricultural Research Education and Extension Organization (AREEO), Tehran, Islamic Republic of Iran. ali.ameri25@gamil.com; ebrahimii@iripp.ir
2 Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box: 14115-336, Tehran, Iran. talebi@modares.ac.ir

ABSTRACT. This study was based on examination of specimens of the family Braconidae (Hymenoptera: Ichneumonoidea) deposited in Hayk Mirzayans Insect Museum. Totally thirteen species from eleven genera and seven subfamilies, including Braconinae (One genus – One species), Cardiochilinae (1-1), Doryctinae (1-4), Macrocerrrinae (1-2), Opiniinae (2-2), Rhyssalinae (1-1), Rogadinae (1-2) were identified, of which six species including Bistosteres spinicorviformis Fischer, 1971, Heterospilus rubicola Fischer, 1968, Utetes fulvicollis (Thomson, 1895), Aleiodes arcticus (Thomson, 1892), Macrocentrus turkestanicus (Telenga, 1950) and Rhyssalus longicaudis (Tobias & Belokobyalkij, 1981) are new records for the Iranian braconid fauna.

Key words: Taxonomy, Parasitoid wasps, first record

Introduction

Braconidae after Ichneumonidae is the second largest family of Hymenoptera (Aguiar et al., 2013) include more than 21,220 species under 1,100 genera (Yu et al., 2016). The Braconidae (Hymenoptera: Ichneumonoidea) is a large cosmopolitan family with an important role in biological pest control that have been used extensively in biological control with much success. Most braconid wasps are primary parasitoids on other insects, especially upon the larval stages of Coleoptera, Diptera, and Lepidoptera, but also some hemimetabolous insects like aphids, Heteroptera or Embiidina (Sharkey, 1993; Wharton, 1998). Despite their importance, biology and taxonomy of most Braconidae is still largely unknown (Peris-Felipo, 2013; Yu et al., 2016). Members of this family are small to medium sized and vary in color of the body in a range of black, red, orange and white (Quicke, 2015). Many studies have been carried out on the fauna of braconid wasps in Iran. Indeed, the investigations on the fauna of Iranian Braconidae are growing significantly in the recent years. To date, approximately 850 species of Braconidae have

Corresponding author: Ali Ameri. Email: ali.ameri25@gamil.com

Copyright © 2020, Ameri et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
been recorded for the fauna of Iran (Ameri et al., 2012, 2014a, 2014b, 2014c, 2015, 2019; Farahani et al., 2012, 2014a, 2014b, 2014c, 2015, 2016; Zargar et al., 2014, 2015, 2019a, 2019b; Gadallah et al., 2015; Iranmanesh et al., 2017; Rahmani et al., 2017; Dolati et al., 2018; Ghafouri Moghaddam et al., 2018; Abdoli et al., 2019a, 2019b). Considering the number of known species from Iran, additional taxonomic and faunistic studies on this family is yet required. In the present study, six new records of Braconidae for Iran, are documented. This part of our on-going study of the family Braconidae in Iran is based on material deposited in Hayk Mirzayans Insect Museum (HMIM), and the material collected by the first author.

Material and methods
The specimens were collected by standard insect nets and Malaise traps since 1985–2019. Apart from the examination of the specimens deposited in HMIM, additional specimens were also included in this study. The new series of specimens were collected using insect nets and the Malaise traps from various habitats in Khuzestan, Markazi, Zanjan, Kerman, Fars and Ardebil provinces (Figs 1, 2). The identifications were mainly carried out using reliable keys provided by Papp (1984), Tobias (1986), van Achterberg (1993), van Achterberg & Shaw (2016), Fortier & Shaw (1999), Shaw et al. (2006) and Farahani et al. (2015), and some species compared with the identified species in the Tarbiat Modares University Collection (TMUC) and HMIM. All examined materials are deposited in HMIM (The Insect Taxonomy Research Department of the Iranian Research Institute of Plant Protection, Tehran).

Figure 1. Sampling area in Khuzestan province of Iran, where the braconid wasps were collected.

Results

Thirteen species of Braconidae within eleven genera and seven subfamilies, were collected and identified. The list of species is given below alphabetically, with distribution, synonyms and host records data. The new records for Iran are marked with an asterisk.

Subfamily Braconinae Nees, 1811

*Pseudovipio tataricus* (Kokujev, 1898)

**Synonyms:** *Pseudovipio pusillus* (Shestakov, 1932).
Material examined: Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°04′36.5″ N, 48°14′15.6″ E, 45m a.s.l.), 10.V.–10.VII.2015, Malaise trap, 2♀, Leg.: E. Gilasian.

Distribution in Iran: No specific locality cited (Telenga, 1936; Shenefelt, 1978), Khuzestan province (current study).

General distribution: Central Asia (Yu et al., 2016).

Subfamily Cardiochilinae Ashmead, 1900

Cardiiochiles pseudofallax Telenga, 1955

Material examined: Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°04′40.1″ N, 48°14′12.6″ E, 53m a.s.l), 10.V.–10.VII.2015, Malaise trap, 2♀; Leg.: E. Gilasian; East Azarbaijan province, Kalybar Vayeghan, (38°7′37″ N, 45°42′26″ E, 1440m a.s.l), 5.VIII.1992, Sweeping net, 2♀♀, Leg.: M. Parchami, F. Badii.

Distribution in Iran: Khuzestan (Ameri et al., 2019) and East Azarbaijan (current study) provinces.

General distribution: Afghanistan, Azerbaijan, Iran, Turkey, Turkmenistan (Yu et al., 2016).

Subfamily Doryctinae Foerster, 1863

Heterospilus rubicola Fischer, 1968*

Synonyms: Heterospilus tobiasi Belokobylskij, 1983

Material examined: Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°04′36.5″ N, 48°12′02.6″ E, 53m a.s.l.), 10.V.–10.VII.2015, Malaise trap, 2♀♀, Leg.: E. Gilasian.

Distribution in Iran: Khuzestan province (current study).

General distribution: Bulgaria, Georgia, Germany, Hungary, Iran (New record), Kazakhstan, Korea, Moldova, Russia, Turkey, Uzbekistan, Serbia (Yu et al., 2016).

Polystenus rugosus Foerster, 1863

Synonyms: Polystenus aciculatus (Reinhard, 1865); Polystenus hungaricus (Szépligeti, 1900)

Material examined: Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°08′06.5″ N, 48°14′15.6″ E, 45m a.s.l.), 11.III.–10.V.2015, Malaise trap, 1♀, Leg.: E. Gilasian.

Distribution in Iran: Not exactly defined (Samin et al., 2016), Khuzestan province (current study).

General distribution: China, former Czechoslovakia, Germany, Hungary, Iran, Japan, Kazakhstan, Poland, Russia, Tajikistan, Turkey, Ukraine (Yu et al., 2016).

Host: Solitary ectoparasitoid of Coleoptera: Buprestidae: Agrilus spp., Anthaxia manca (Linnaeus, 1767), Coraebus bifasciatus (Olivier, 1790); Bostrichidae: Sinoxylon sexdentatum (Olivier, 1790) (Yu et al., 2016).
**Rhaconotus aciculatus** Ruthe, 1854

**Synonyms:** *Rhaconotus cerdai* Docavo Alberti, 1960; *Rhaconotus major* Tobias, 1964

**Material examined:** Iran, Markazi province, Arak, Haftad-Gholleh, Sibak valley, (34°08'06.5" N, 50°10'01" E, 2090m a.s.l.), Malaise trap, 10.VI.-15.VII.2018, 5♀♀, Leg.: M. Parchami; Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°08'06.5" N, 48°14'15.6" E 45m a.s.l.), 11.III.-19.V.2015, Malaise trap, 2♀♀, Leg.: E. Gilasian.

**Distribution in Iran:** Hormozgan (Ameri et al., 2014c), Alborz, Guilan, Mazandaran, Tehran (Farahani et al., 2014b), Markazi and Khuzestan (current study) provinces.

**General distribution:** Azerbaijan, China, Czech Republic, France, Germany, Hungary, Iran, Italy, Kazakhstan, Korea, Kyrgyzstan, Moldova, Mongolia, Russia, Slovakia, Spain, Tajikistan, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, Serbia (Yu et al., 2016).

**Host:** Solitary ectoparasitoid of Coleoptera: Buprestidae: *Agrilus viridis* (Linnaeus, 1758), *Anthaxia lgockii* Obenberger, 1917; Chrysomelidae, Bruchinae: *Caryedon serratus* (Olivier, 1790) (Yu et al., 2016).

---

**Spathius polonicus** Niezabitowski, 1910

**Synonyms:** *Spathius melanophilae* Fischer, 1966; *Spathius radjabii* Fischer, 1970

**Material examined:** Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary (32°04'36.5" N, 48°14'15.6" E, 45m a.s.l.), 11.III.-10.V.2015, Malaise trap, 5♀♀, Leg.: E. Gilasian.

**Distribution in Iran:** Alborz (Fischer, 1970; Farahani et al. 2014b) and Khuzestan (current study) provinces.

**General distribution:** Palaearctic (Yu et al., 2016).


---

**Subfamily Macrocentrinae** Foerster, 1863

**Macrocentrus collaris** (Spinola, 1808)

**Synonyms:** *Macrocentrus affiniqades* Shenefelt, 1969; *Macrocentrus affinis* Hedwig, 1961; *Macrocentrus dispar* (Kollar, 1852); *Macrocentrus dubius* (Wesmael, 1835); *Macrocentrus ebeninus* (Nees, 1834); *Macrocentrus kollari* (Rondani, 1876); *Macrocentrus picipes* (Haliday, 1835).

**Material examined:** Iran, Kerman province, Kahnuj (28°04'30.38" N, 57°45'54.92" E, 900m a.s.l.) 10.ix.1985, Sweeping net, 1♀, Leg.: H. Barari, A. Sarafrazi, F. Badii; Ardebil province, Sarab, Sari Qayeh (37°23'27" N, 46°46'35" E, 1661m a.s.l.), 3-7.VII.2019, Sweeping net, 3♀♀, Leg.: A. Ameri; Zanjan province, Nasir Abad (36°16'27" N, 1707m a.s.l.), 24.VI.2019, 2♀♀, Sweeping net, Leg.: A. Ameri.

**Distribution in Iran:** Alborz (Farahani et al., 2012), Kerman, Ardabil and Zanjan (current study) provinces.
**General distribution:** Afrotropical, Palearctic, Oriental, Neotropical, Oceanic (Yu et al., 2016).

**Host:** Lepidoptera: Noctuidae: *Acronicta tridens* ([Denis & Schiffermüller], 1775), *Agrotis clavis* (Hufnagel, 1766), *Agrotis exclamationis* (Linnaeus, 1758), *Agrotis ipsilon* (Hufnagel, 1766), *Agrotis segetum* ([Denis & Schiffermüller], 1775), *Chalciope mygdon* (Cramer, 1777), *Chersotis rectangula* (Denis & Schiffermüller, 1775), *Diloba caeruleocephala* (Linnaeus, 1758), *Euxoa cursoria* (Hufnagel, 1766), *Heliothis viriplaca* (Hufnagel, 1766), *Lymantria monacha* (Linnaeus, 1758), *Mamestra brassicae* (Linnaeus, 1758), *Noctua pronuba* (Linnaeus, 1758), *Polymixis xanthomista* (Hübner, [1819]), *Spodoptera littoralis* (Boisduval, 1833), *Spodoptera litura* (Fabricius, 1775); Geometridae: *Lycia hirtaria* (Clerck, 1759); Nymphalidae: *Polygonia c-album* (Linnaeus, 1758), *Tortrix viridana* (Linnaeus, 1758); Yponomeutidae: *Yponomeuta malinella* Zeller, 1838; Coleoptera: Anobiidae: *Anobium punctatum* (Geer, 1774) (Yu et al., 2016).

*Macrocentrus turkestanicus* (Telenga, 1950)*

**Material examined:** Iran, Fars province, Kazerun, Cheshmenari (29°55′44″ N, 52°55′43″ E, 900 m a.s.l.), 6. IV. 1985, Sweeping net, 1♀, Leg.: H. Barari, A. Sarafrazi, F. Badii.

**Distribution in Iran:** Fars province (current study).

**General distribution:** India, Iran (New record), Tajikistan, Turkmenistan, Uzbekistan (Yu et al., 2016).

**Host:** Lepidoptera: Noctuidae: *Sesamia cretica* Lederer 1857, *Sesamia inferens* (Walker, 1856) (Yu et al., 2016).

**Subfamily Opiniae Blanchard, 1845**

*Biosteres spinaciaeformis* Fischer, 1971*

**Material examined:** Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary, (32°04′36.5″ N, 48°14′15.6″ E, 45m a.s.l.), 11.III.-10.IV.2015, Malaise trap, 1♂, Leg.: E. Gilasian.

**Distribution in Iran:** Khuzestan province (current study).

**General distribution:** Belgium, Canada, Denmark, Finland, Germany, Iran (New record), Lithuania, Netherlands, Poland, Russia, Spain, Sweden, USA, United Kingdom, Uzbekistan (Yu et al., 2016).

*Utetes fulvicollis* (Thomson, 1895)*

**Synonyms:** *Opis* (*Utetes*) *cupidus* Gahan, 1919.

**Material examined:** Iran, Khuzestan province, Shoush, Karkheh National Park, Persian Fallow Deer Sanctuary (32°04′36.5″ N, 48°14′15.6″ E, 45m a.s.l.), 11.iii.-10.V.2015, Malaise trap, 1♂, Leg.: E. Gilasian.

**Distribution in Iran:** Khuzestan province (current study).

**General distribution:** Palearctic, Iran (New record), Nearctic (Yu et al., 2016).
Host: Diptera: Anthomyiidae: *Pegomya betae* (Curtis, 1847), *Pegomya hyoscyami* (Panzer, 1809) (Yu et al., 2016).

Subfamily Rhyssalinae Förster, 1862

*Rhyssalus longicaudis* (Tobias & Belokobylskij, 1981)*

Material examined: Iran, Markazi province, Arak, Haftad-Gholleh, Protected area, Chekab valley (34°08’07.2″ N, 50°15’56.1″ E, 2090m a.s.l.), Malaise trap, 2.VI.2018, 1♀, Leg.: M. Parchami.

Distribution in Iran: Markazi province (current study).

General distribution: Bosnia, Finland, Hungary, Iran (New record), Mongolia, Russia (Yu et al., 2016).

Subfamily Rogadinae Forster, 1862

*Aleiodes seriatus* (Herrich-Schaffer, 1838)


Material examined: Iran, Markazi province, Arak, Haftad-Gholleh, Sibak valley, (34°08’06.5″ N, 50°10’0.1″ E, 2090m a.s.l.), Malaise trap, 10.VI.–15.VII.2018, 1♀, Leg.: M. Parchami.

Distribution in Iran: Mazandaran (Farahani et al., 2015) and Markazi (current study) provinces.

General distribution: Eastern and Western Palaearctic, Oriental (Yu et al., 2016).

Host: Lepidoptera: Erebidae: *Atolmis rubricollis* (Linnaeus, 1758); Noctuidae: *Orthosia gracilis* (Denis & Schiff., 1775) (Yu et al., 2016).

*Aleiodes arcticus* (Thomson, 1892)*

Synonym: *Rogas arcticus* Thomson, 1892

Material examined: Iran, Markazi province, Arak, Haftad-Gholleh, Protected area, Chekab valley, (34°08’07.2″ N, 50°15’56.1″ E, 2090m a.s.l.), Malaise trap, 2.VI.2018, 1♀, Leg.: M. Parchami.

Distribution in Iran: Markazi province (current study).

General distribution: Finland, Germany, Iran (New record), Mongolia, Poland, Russia, Sweden, Switzerland, Turkey, United Kingdom (Yu et al., 2016).


Discussion

The result of this study led to identifying thirteen species belong to eleven genera of seven subfamilies from different parts of Iran. Moreover, this work has enriched the knowledge on the Braconidae in Iran by adding six new species records: *Biosteres spinaciaeformis* Fischer, 1971, *Heterospilus rubicola* Fischer, 1968, *Utetes fulvicollis* (Thomson, 1895) *Aleiodes arcticus* (Thomson, 1892), *Macrocentrus turkestanicus* (Telenga, 1950) and *Rhyssalus longicaudis* (Tobias &
Six new records of Braconidae from Iran

Belokobylskij, 1981). Among the identified species some of them such as *Macrocentrus collaris* (Spinola, 1808), *Aleiodes seriatus* (Herrich-Schaffer, 1838), *Bisteres spinaciaeformis* Fischer, 1971 distributed almost in all zoogeographical regions (Yu et al., 2016). However, some species such as *Pseudovipio tataricus* (Kokujev, 1898), *Rhyssalus longicaudis* (Tobias & Belokobylskij, 1981) have a distribution in Palaearctic region and they are endemic in this region (Yu et al., 2016). Most of the collected species in this research are parasitoids of agricultural pests and can be potential biological control agents, for example *M. collaris* reported to be a gregarious parasitoid of several species of Noctuidae (Shenefelt, 1969). Due to the host range of this species, it is a potential candidate for the biological control of some important pest (i.e., *Spodoptera littoralis* Boisduval, 1833, *Spodoptera litura* (Fabricius, 1775) and *Yponomeuta malinella* Zeller, 1838) in Iran.

*Aleiodes arcticus* is similar to *A. itanevorus* Shaw & Marsh, 2004 and *A. (Tetrasphaeropyx) maritimus* Shaw & Marsh, 2004 in which mesopleuron lacks a defined precoxal sulcus. It can be distinguished from those species by metasomal tergite IV without strongly impressed regulation (Fortier, 2009). *Macrocentrus turkestanicus* is an interesting potential biological control agent that has strict host-specificity to the genus *Sesamia* (Lepidoptera: Noctuidae), such as *S. cretica* Lederer, 1857, *S. inferens* Walker, 1856 and *S. uniformis* (Dudgeon, 1905). *Sesamia cretica* is an important pest of maize and sugar cane in Iran (Khuzestan province) (Sedighi et al., 2016) and widely distributed in the Palaearctic region (Goftishu et al., 2016) Among the adjacent countries of Iran, *M. turkestanicus* known from Tajikistan, Turkmenistan, Uzbekistan (Yu et al., 2016). Based on the current study, highest number of species has been collected from Khuzestan province (Nine species) followed by Markazi province (four species). In this study, the specimens were collected using Malaise traps and sweeping net, therefore, the biology of the recorded species is unknown.

Acknowledgments

We would like to thank Dr. Ebrahim Gilasian and Dr. Mehrdad Parchami for their help in the collection of some specimens. We cordially thank to three anonymous reviewers for their critical review and constructive comments, which significantly helped the improvement of the paper.

Conflict of Interests

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

ORCID

Ali Ameri: https://orcid.org/0000-0003-2372-8494
Ebrahim Ebrahimi: https://orcid.org/0000-0002-0970-1394
Ali Asghar Talebi: https://orcid.org/0000-0001-5749-6391

References


Six new records of Braconidae from Iran


Ameri et al.


Six new records of Braconidae from Iran

Molecular taxonomic study of Ichneumonoidea Braconidae from Iran

Ali Ameri,*, Ibrahim Ebrahimizadeh, and Ali Asghar Talebi

1 Department of Islamic Republic of Iran, Islamic Republic of Iran.
2 Department of Agricultural Sciences, Tarbiat Modarres University, Tehran, Iran.

*Email correspondence: aliemer25@gmail.com

Date of submission: 11th November 1999 | Date of acceptance: 22nd May 2001 | Date of publication: 7th July 2001


واژگان کلیدی: رده بندی، زنبورهای پارازیتویید، اولین گزارش