

# ARTIGO / ARTÍCULO / ARTICLE

## A faunistic study on the Braconidae of Iran (Hymenoptera: Ichneumonoidea).

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**Abstract:** Braconid wasps (Hymenoptera: Braconidae) are natural enemies of agricultural pests and have powerful role in biological control. This paper documents 28 species belonging to 11 subfamilies (Agathidinae, Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Helconinae, Macrocentrinae, Microgastrinae, Opiinae, and Rogadinae) from different parts of Iran. This work also includes the details on collection localities and zoogeographical distribution of the species.

**Key words:** Hymenoptera, Braconidae, faunistic study, distribution, Iran.

**Resumen:** Estudio faunístico de los Braconidae de Irán (Hymenoptera: Ichneumonoidea). Los braconidos (Hymenoptera: Braconidae) son enemigos naturales de las plagas agrícolas y juegan un importante papel en el control biológico. Este trabajo aporta información sobre 28 especies pertenecientes a 11 subfamilias (Agathidinae, Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Helconinae, Macrocentrinae, Microgastrinae, Opiinae y Rogadinae) procedentes de diferentes partes de Irán. También se detallan datos sobre las localidades de captura y la distribución zoogeográfica de las especies.

**Palabras clave:** Hymenoptera, Braconidae, estudio faunístico, distribución, Irán.

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### Introduction

Braconidae Nees, 1811 with about 18,000 described species and estimate of 40,000-50,000 species worldwide (Yu *et al.* 2006), is one of the major groups of insect parasitoids that are effective enough to exert a definite regulatory impact on the increase of numerous important plant pests (Sharkey 1993; Quicke *et al.* 1999). Nearly all Braconidae are primary parasitoids of other insects, especially of the larval stages of Coleoptera, Diptera, and Lepidoptera but members of some genera are parasitoids of adult and nymphal stages of hemimetabolus insects such as aphids and true bugs (Shaw & Huddleston 1991; Ghahari *et al.* 2006). Both external and internal parasitoids are common in the family, and the latter forms often display elaborate physiological adaptations for enhancement of larval survival within the host, including the use of endosymbiotic viruses for defeating host immune defense (Godfray 1994; Whitfield 2002). The fauna of Braconidae of Iran is quite well studied, with almost all previous papers compiled in the checklists by Modarres Awal (1997), Fallahzadeh & Saghaei (2010), and Gadallah & Ghahari (2013a, b, 2015). In this paper the species diversity of Braconidae from different regions of Iran is studied.

### Material and methods

The specimens were collected by Malaise traps, rearing of different insect hosts and sweeping net from different regions of Iran. The specimens were put in ethanol 75%, pinned or mounted on small

labels and determined. Also several specimens from insect collections of different universities were checked. Classification, nomenclature and distributional data of Braconidae suggested by Yu *et al.* (2006) have been followed.

In total 28 braconid species belonging to 11 subfamilies are studied in this paper as the fauna of Iran. Three species *Agathis semiaciculata* Ivanov 1899, *Chorebus (Chorebus) longicornis* (Nees von Esenbeck 1811), and *Chorebus (Phaenolexis) gedanensis* (Ratzeburg 1852) are new records for the Iranian fauna. The list of species is given below together with the distributional data.

## Results

### Subfamily Agathidinae Haliday, 1833

#### Genus *Agathis* Latreille, 1805

##### *Agathis lugubris* (Foerster, 1862)

**Material examined:** Province of Kermanshah: Kermanshah, 34°20'N 47°00'E, (1♂), summer 2009.

**Distribution outside Iran:** Czech Republic, Finland, Germany, Hungary, Ireland, Netherlands, Norway, Poland, Slovakia, Switzerland, Turkey, UK, Ukraine.

##### *Agathis semiaciculata* Ivanov, 1899

**Material examined:** Province of Qazvin: Qazvin, 36°26'N 49°49'E, (2♂♂), October 2007. **New record for Iran.**

**Distribution outside Iran:** Azerbaijan, Bulgaria, France, Georgia, Germany, Greece, Italy, Japan, Kazakhstan, Moldova, Mongolia, Poland, Russia, Switzerland, Turkmenistan, Ukraine.

#### Genus *Bassus* Fabricius, 1804

##### *Bassus dimidiator* (Nees von Esenbeck, 1834)

**Material examined:** Province of Kordestan: Sanandaj, 35°20'N 46°50'E, (1♀), summer 2009.

**Distribution outside Iran:** Armenia, Azerbaijan, Belarus, Bulgaria, Canada, China, Czech Republic, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Poland, Portugal, Russia, Slovakia, Switzerland, Turkey, UK, Ukraine, USA.

### Subfamily Alysinae Leach, 1815

#### Genus *Chorebus* Haliday, 1833

##### *Chorebus (Chorebus) longicornis* (Nees von Esenbeck, 1811)

**Material examined:** Province of Semnan: Shahrood, 35°30'N 55°30'E, (2♀♀), summer 2007. **New record for Iran.**

**Distribution outside Iran:** Austria, Belgium, Czech Republic, Faeroe Islands, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Netherlands, Poland, Portugal (Madeira Islands), Russia, Spain, Sweden, UK, Ukraine, former Yugoslavia.

##### *Chorebus (Phaenolexis) compressiventris* (Telenga, 1935)

**Material examined:** Province of Zanjan: Abhar, 36°16'N 49°03'E, (1♂), April 2004.

**Distribution outside Iran:** Azerbaijan, Caucasus, Ukraine.

***Chorebus (Phaenolexis) gedanensis* (Ratzeburg, 1852)**

**Material examined:** Province of Qazvin: Qazvin, 36°26'N 49°49'E, (2♂♂, 1♀), October 2007. **New record for Iran.**

**Distribution outside Iran:** Bulgaria, Germany, Italy, Kazakhstan, Netherlands, Poland, Russia, Sweden, UK.

**Genus *Dinotrema* Forster, 1862*****Dinotrema (Dinotrema) cratocera* (Thomson, 1895)**

**Material examined:** Province of Kordestan: Baneh, 35°55'N 45°50'E, (2♀♀), September 2008.

**Distribution outside Iran:** Austria, Czech Republic, Hungary, Korea, Slovakia, Sweden.

**Subfamily Brachistinae Foerster, 1862****Genus *Eubazus* Nees von Esenbeck, 1812*****Eubazus (Brachistes) tibialis* (Haliday, 1835)**

**Material examined:** Province of Semnan: Damghan, 35°30'N 54°20'E, (2♂♂), spring 2000.

**Distribution outside Iran:** Belgium, Bulgaria, Croatia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Serbia, Slovakia, Sweden, Switzerland, UK, Ukraine.

**Genus *Schizoprymnus* Foerster, 1862*****Schizoprymnus angustatus* (Herrich-Schäffer, 1838)**

**Material examined:** Province of Semnan: Shahrood, 35°30'N 55°30'E, (3♀♀), November 2006.

**Distribution outside Iran:** Azerbaijan, Finland, Germany, Hungary, Italy, Kazakhstan, Lithuania, Moldova, Mongolia, Russia, Spain, Sweden, Switzerland, Ukraine.

***Schizoprymnus nigripes* (Thomson, 1892)**

**Material examined:** Province of Kalaleh: 37°43'N 55°49'E, (3♀, 2♂), May 2005.

**Distribution outside Iran:** Czech Republic, Hungary, Kazakhstan, Korea, Moldova, Russia, Slovakia, Sweden.

**Subfamily Braconinae Nees von Esenbeck, 1811****Genus *Bracon* Fabricius, 1804*****Bracon (Bracon) trucidator* Marshall, 1888**

**Material examined:** Province of Hamadan: Malayer, 34°20'N 48°45'E, (1♂, 3♀♀), spring 2005.

**Distribution outside Iran:** Albania, Algeria, Armenia, Austria, Azerbaijan, Croatia, France, Georgia, Germany, Greece, Hungary, Italy, Kazakhstan, Moldova, Romania, Russia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Tunisia, Turkey, Ukraine.

***Bracon (Glabrobracon) tschitscherini* Kokujev, 1904**

**Material examined:** Province of Kordestan: Kamyaran, 34°55'N 46°55'E, (2♀♀), July 2009.

**Distribution outside Iran:** Azerbaijan, Cyprus, Greece, Hungary, Israel, Italy, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkey, Turkmenistan, Uzbekistan.

***Bracon (Lucobracon) guttiger* Wesmael, 1838**

**Material examined:** Province of Qazvin: Qazvin, 36°26'N 49°49'E, (3♀), October 2007.

**Distribution outside Iran:** Austria, Belgium, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Poland, Russia, Slovenia, Sweden, Switzerland, UK.

**Subfamily Cheloninae Foerster, 1862**

**Genus *Chelonus* Panzer, 1806**

***Chelonus (Chelonus) bidens* Tobias, 1972**

**Material examined:** Province of Kordestan: Marivan, 35°35'N 46°15'E, (1♀), October 2009.

**Distribution outside Iran:** Czech Republic, Hungary, Kazakhstan, Russia, Turkey, Ukraine.

***Chelonus (Chelonus) ocellatus* Alexeev, 1971**

**Material examined:** Province of Qazvin: Takestan, 36°00'N 49°33'E, (1♂), May 2010.

**Distribution outside Iran:** Slovakia, Turkey, Turkmenistan, Ukraine.

***Chelonus (Microchelonus) mucronatus* Thomson, 1874**

**Material examined:** Province of Kordestan: Sanandaj, 35°20'N 46°50'E, (1♂, 4♀♀), summer 2005.

**Distribution outside Iran:** Hungary, Russia, Sweden, Turkey, Ukraine.

**Subfamily Euphorinae Foerster, 1862**

**Genus *Dinocampus* Foerster, 1862**

***Dinocampus coccinellae* (Schrank, 1802)**

**Material examined:** Province of Isfahan: Isfahan, 32°16'N 52°26'E, (3♀♀), September 2007.

**Distribution outside Iran:** Albania, Algeria, Argentina, Australia, Austria, Azerbaijan, Belgium, Brazil, Bulgaria, Canada, Chile, China, Cyprus, Czech Republic, Denmark (Greenland), Egypt, Fiji, Finland, France, Germany, Hungary, India, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Moldova, Netherlands, New Zealand, Norway, Peru, Poland, Portugal (Madeira Islands), Russia, Serbia, Slovakia, Spain (Canary Islands), Switzerland, Syria, Turkey, UK, USA, Uruguay, Vietnam.

**Genus *Leiophron* Nees von Esenbeck, 1819**

***Leiophron (Euphoriana) deficiens* (Ruthe, 1856)**

**Material examined:** Province of North Khorasan: Bojnord, 37°35'N 57°20'E, (2♀♀, 1♂), May 2007.

**Distribution outside Iran:** Finland, Germany, Greece, Kazakhstan, Korea, Moldova, Poland, Russia, Sweden, Ukraine.

**Genus *Perilitus* Nees von Esenbeck, 1819**

***Perilitus (Microctonus) aethiops* Nees von Esenbeck, 1834**

**Material examined:** Province of Kordestan: Kamyaran, 34°55'N 46°55'E, (3♂♂), September 2007.

**Distribution outside Iran:** Armenia, Azerbaijan, Belarus, Belgium, Canada, Croatia, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Lithuania, Mongolia, Netherlands, Poland, Romania, Russia, Serbia, Sweden, Switzerland, UK, USA.

## Subfamily Helconinae Forster, 1862

Genus *Taphaeus* Wesmael, 1835*Taphaeus hiator* (Thunberg, 1824)

**Material examined:** Prov. of Chahrmahal & Bakhtiari: Lordegan, 31°26'N 50°50'E, (1♀), April 2008.

**Distribution outside Iran:** Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Russia, Sweden, Switzerland, UK, USA.

## Subfamily Macrocentrinae Foerster, 1862

Genus *Macrocentrus* Curtis, 1833*Macrocentrus bicolor* Curtis, 1833

**Material examined:** Province of Fars: Abadeh, 31°15'N 52°30'E, (4♀♀), October 2007.

**Distribution outside Iran:** Albania, Andorra, Austria, Bulgaria, China, Czech Republic, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Moldova, Netherlands, Norway, Poland, Romania, Russia, Serbia, Spain, Sweden, Switzerland, Turkey, UK, Ukraine.

## Subfamily Microgastrinae Foerster, 1862

Genus *Apanteles* Foerster, 1862*Apanteles (Apanteles) carpatus* (Say 1836)

**Material examined:** Prov. of Sistan & Baluchestan: Zahedan, 29°29'N 60°15'E, (3♂♂), spring 2009.

**Distribution outside Iran:** Argentina, Armenia, Australia, Bermuda, Brazil, Canada, China, Congo, Croatia, Fiji, Finland, France, Germany, Ghana, Grenada, Hungary, Japan, Latvia, Lithuania, Malaysia, Moldova, Mongolia, Mozambique, New Zealand, Peru, Poland, Puerto Rico, Romania, Russia, South Africa, Spain, Switzerland, Tanzania, Turkey, Turkmenistan, UK, USA, Vietnam.

Genus *Cotesia* Cameron, 1891*Cotesia risilis* (Nixon, 1974)

**Material examined:** Province of West Azarbaijan: Salmas, 38°11'N 44°44'E, (1♀), April 2008.

**Distribution outside Iran:** Czech Republic, Hungary, Italy, Netherlands, Romania, Slovakia, Turkey, UK, former Yugoslavia.

Genus *Diolcogaster* Ashmead, 1900*Diolcogaster spreta* (Marshall, 1885)

**Material examined:** Province of Zanjan: Zanjan, 36°35'N 48°15'E, (1♀), August 2007.

**Distribution outside Iran:** China, Czech Republic, Hungary, Moldova, Turkey, UK.

## Subfamily Opiinae Blanchard, 1845

Genus *Biosteres* Foerster, 1862*Biosteres (Biosteres) longicauda* (Thomson, 1895)

**Material examined:** Province of North Khorasan: Bojnord, 37°35'N 57°20'E, (3♂♂), spring 2008.

**Distribution outside Iran:** Austria, China, Czech Republic, Denmark, Finland, France, Germany, Italy, Lithuania, Moldova, Russia, Slovenia, Sweden, Switzerland.

**Genus *Opius* Wesmael, 1835**

***Opius (Opiothorax) nigricoloratus* Fischer, 1958**

**Material examined: Province of Semnan:** Semnan, 35°20'N 53°20'E, (3♂♂), September 2009.

**Distribution outside Iran:** Austria, Denmark, Finland, Germany, Greece, Hungary, Italy, Mongolia, Spain, Switzerland.

**Subfamily Rogadinae Foerster, 1862**

**Genus *Aleiodes* Wesmael, 1838**

***Aleiodes (Aleiodes) esenbeckii* (Hartig, 1838)**

**Material examined: Province of East Azarbaijan:** Bonab, 37°20'N 46°03'E, (1♂, 4♀♀), May 2007.

**Distribution outside Iran:** Afghanistan, Austria, China, Czech Republic, Germany, Hungary, Japan, Korea, Lithuania, Mongolia, Norway, Russia, Spain, Taiwan, former Yugoslavia.

***Aleiodes (Heterogamus) testaceus* (Telenga, 1941)**

**Material examined: Province of Golestan:** Gorgan, 36°50'N 54°30'E, (2♂♂, 1♀), April 2010.

**Distribution outside Iran:** Afghanistan, Algeria, Austria, Azerbaijan, Belgium, Bulgaria, China, Croatia, Czech Republic, Finland, France, Georgia, Germany, Greece, Hungary, India, Italy, Kazakhstan, Lithuania, Mongolia, Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkmenistan, Ukraine, UK, Uzbekistan.

**Discussion**

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With attention to the results of this research and also the already published checklists on Iranian Braconidae (Modarres Awal 1997; Fallahzadeh & Saghaei 2010; Gadallah & Ghahari 2013a, b, 2015), the fauna of these parasitoids is diverse in Iran. However, Iran is a large country with various geographical regions and habitat. It forms a large part of the Iranian plateau, and covers an area of 1,623,779 km<sup>2</sup>. Altitudinally, it ranges from 28 m below sea-level on the shores of the Caspian Sea to the 5,770 m of Mt. Damavand. Climatically, there is a contrast between the humid, almost jungle-like forests of the south Caspian and the arid, in places lifeless, deserts of the Dasht-e Lut. As a result of these major topographical, geological and climatic variation, Iran is rich in plant diversity. The country supports a total of around 8,000 plant species, and is one of the major centres of endemism in this part of the world (Zehzad *et al.* 2002). Therefore, more investigations and complementary sampling are needed in order to investigate the complete identification, geographical distribution and trophic associations of braconid wasps in different parts of Iran. The braconid wasps have an effective role in the biological control of different agricultural and forest pests especially Lepidoptera and Diptera. One of the most effective procedures for conservation of natural enemies is decreasing application of the destructive chemical pesticides (De Bach & Rosen 1991; Bellows & Fisher 1999).

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