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A study on the braconid wasps (Hymenoptera: Ichneumonoidea: Braconidae) from Golestan province, northern Iran

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Abstract: This paper deals with the faunistic work on braconid wasps (Hymenoptera: Braconidae) from Golestan province (northern Iran). In total 29 species from 18 genera and 12 subfamilies, Agathidinae, Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Helconinae, Microgastrinae, Opiinae, Orgilinae, Sigalphinae, and Rhyssalinae were collected and identified.

Key words: Hymenoptera, Ichneumonoidea, Braconidae, Fauna, Golestan, Iran.

Introduction

The Braconidae constitute one of the most species-rich families of insects. Although tropical faunas are still relatively poorly understood at the species level, most taxonomists in this group would agree that a rough, probably highly conservative, estimate of 40-50,000 species worldwide is reasonable as an extrapolation from the current described number of roughly 12,000 species (SHARKEY & WAHL 1992; QUICKE et al. 1999). The vast majority of braconids are primary parasitoids of other insects, especially upon the larval stages of Coleoptera, Diptera, and Lepidoptera but also including some hemimetabolus insects (aphids, Heteroptera, Embiidina). As parasitoids they almost invariably kill their hosts, although a few only cause their hosts to become sterile and less active. 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 host insects, including the co-option of endosymbiotic viruses for compromising host immune defenses (STOLTZ & VINSON 1979; WHITFIELD 1990; BECKAGE 1993; STOLTZ & WHITFIELD 1992; WHITFIELD 2002; WHITFIELD & ASGARI 2003).

Golestan province is located in the north of Iran and south of the Caspian Sea. Geographically, Golestan is divided into two sections, the plains and the mountains of the Alborz range. In the eastern Alborz section, the mountains have a north-easterly aspect and gradually decreases in height. The highest point of the province is Shavar – 3945 m above sea level. The climate of Golestan is temperate for most of the year. The aim of this paper is faunistic survey on Braconidae in some regions of Golestan province.

Materials and Methods

The specimens were collected by Malaise traps, rearing of different insect hosts and sweep net from different regions of Golestan province. The specimens were put in ethanol 75%, pinned or mounted on small labels and were determined. Also several specimens of insect collections from different universities were checked. Classification, nomenclature and distributional data of Braconidae suggested by YU et al. (2012) have been followed.

Results

Totally 29 braconid species from 18 genera and 12 subfamilies were collected and identified from Golestan province. The list of species is given below with distribution data.

Subfamily *Agathidinae* HALIDAY, 1833

Genus *Agathis* LATREILLE, 1805

Agathis anglica MARSHALL, 1885

Material examined: Golestan province, Gorgan, 1♀, 2♂♂, spring 2012.

Distribution outside Iran: Albania, Armenia, Austria, Azerbaijan, Bulgaria, China, China-Taiwan, Croatia, Cyprus, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Mongolia, Morocco, Netherlands, Poland, Romania, Russia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Turkey, Ukraine, United Kingdom, former Yugoslavia.

Agathis glaucoptera NEES VON ESENBECK, 1834

Material examined: Golestan province, Gonbad, 1♀, 17 September 2013.

Distribution outside Iran: Azerbaijan, France, Germany, Hungary, Italy, Kazakhstan, Macedonia, Russia, Spain, Turkey, Ukraine, former Yugoslavia.

Agathis montana SHESTAKOV, 1932

Material examined: Golestan province, Minoodasht, 1♂, October 2012.

Distribution outside Iran: Andorra, Armenia, Azerbaijan, Bulgaria, China, France, Greece, Hungary, Greece, Kazakhstan, Korea, Kyrgyzstan, Macedonia, Moldova, Mongolia, Poland, Russia, Switzerland, Turkey, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia.

Genus *Earinus* WESMAEL, 1837

Earinus elator (FABRICIUS, 1804)

Material examined: Golestan province, Ali-Abad, 1♀, August 2010.

Distribution outside Iran: Austria, Azerbaijan, Belgium, former

Czechoslovakia, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Slovakia, Sweden, Switzerland, Turkey, United Kingdom, former Yugoslavia.

Subfamily Alysinae LEACH, 1815

Genus *Alloea* HALIDAY, 1833

***Alloea contracta* (HALIDAY, 1833)**

Material examined: Golestan province, Gorgan, 1♀, spring 2012.

Distribution outside Iran: Belgium, Faeroe Islands, Germany, Hungary, Iceland, Ireland, Mongolia, Netherlands, Poland, Spain, Sweden, United Kingdom.

Genus *Chorebus* HALIDAY, 1833

***Chorebus (Chorebus) mucronatus* (TELENGA, 1935)**

Material examined: Golestan province, Golestan National Park, 1♀, 2♂♂, September 2011.

Distribution outside Iran: Azerbaijan, Germany, Kazakhstan, Poland, former Yugoslavia.

***Chorebus (Chorebus) tumidus* (TOBIAS, 1966)**

Material examined: Golestan province, Gorgan, 1♀, spring 2012.

Distribution outside Iran: Turkmenistan, former Yugoslavia.

***Chorebus (Stiphrocera) diremtus* (NEES VON ESENBECK, 1834)**

Material examined: Golestan province, Ali-Abad, 2♀♀, 2♂♂, August 2010.

Distribution outside Iran: Austria, Azerbaijan, Germany, Hungary, Ireland, Lithuania, Netherlands, Poland, Russia, Sweden, Switzerland, Turkey, United Kingdom.

Genus *Dinotrema* FORSTER, 1862

***Dinotrema (Dinotrema) amoenidens* (FISCHER, 1973)**

Material examined: Golestan province, Gorgan, 1♀, spring 2012.

Distribution outside Iran: Austria, China, Greece, Poland.

***Dinotrema (Dinotrema) significarium* (FISCHER, 1973)**

Material examined: Golestan province, Gonbad, 1♂, July 2012.

Distribution outside Iran: Austria, Greece, Hungary, Korea.

Subfamily Brachistinae FOERSTER, 1862

Genus *Schizoprymnus* FOERSTER, 1862

***Schizoprymnus elongatus* (SZÉPLIGETI, 1898)**

Material examined: Golestan province, Salikandeh, 1♀, 2♂♂, September 2009.

Distribution outside Iran: Afghanistan, Armenia, Azerbaijan, Belarus, Czech Republic, Georgia, Hungary, Kazakhstan, Lithuania, Moldova.

***Schizoprymnus excisus* (ŠNOFLÁK 1953)**

Material examined: Golestan province, Gorgan, 1♂, spring 2012.

Distribution outside Iran: Kazakhstan, Mongolia.

Subfamily Braconinae NEES VON ESENBECK, 1811

Genus *Bracon* FABRICIUS, 1804

***Bracon (Bracon) robustus* HEDWIG, 1961**

Material examined: Golestan province, Galikesh, 1♀, June 2011.

Distribution outside Iran: Eastern Palearctic, Afghanistan.

***Bracon (Glabrobracon) helleni* TELENGA, 1936**

Material examined: Golestan province: Bandar-Torkman, 2♀♀, April 2012.

Distribution outside Iran: Cyprus, Israel, Kazakhstan, Switzerland, Turkey.

***Bracon (Glabrobracon) planinotus* TOBIAS, 1957**

Material examined: Golestan province, Galikesh, 1♂, June 2011.

Distribution outside Iran: Kazakhstan, Russia, Turkey, Ukraine.

***Bracon (Lucobracon) meyeri* TELENGA, 1936**

Material examined: Golestan province, Salikandeh, 1♂, September 2009.

Distribution outside Iran: Kazakhstan, Moldova, Mongolia, Russia, Turkey.

Genus *Coeloides* WESMAEL, 1838

***Coeloides rossicus* (KOKUJEV, 1902)**

Material examined: Golestan province, Bandar-Torkman, 2♂♂, April 2012.

Distribution outside Iran: Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Finland, Germany, Hungary, Israel, Italy, Moldova, Mongolia, Russia, Spain, Switzerland, Turkmenistan, Ukraine, former Yugoslavia.

Subfamily Cheloniinae FOERSTER, 1862

Genus *Phanerotoma* WESMAEL, 1838

***Phanerotoma (Bracrotitoma) permixtellae* FISCHER, 1968**

Material examined: Golestan, province, Ali-Abad, 1♂, August 2010.

Distribution outside Iran: Greece, Syria.

Subfamily Euphorinae FOERSTER, 1862

Genus *Allurus* FOERSTER, 1862

***Allurus lituratus* (HALIDAY, 1835)**

Material examined: Golestan province, Kordkoy, 2♂♂, August 2009.

Distribution outside Iran: Belgium, Bulgaria, Canada, China, Finland, France, Georgia, Germany, Greece, Ireland, Kazakhstan, Lithuania, Poland, Sweden, United Kingdom.

Genus *Perilitus* NEES VON ESENBECK, 1819

***Perilitus (Microctonus) stelleri* LOAN, 1972**

Material examined: Golestan province, Golestan National Park, 1♂, September 2011.

Distribution outside Iran: France, Germany, Hungary, Russia, Switzerland.

***Perilitus (Townesilitus) bicolor* (WESMAEL, 1835)**

Material examined: Golestan province, Minoodasht, 1♀, October 2012.

Distribution outside Iran: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Hungary, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Romania, Russia, Serbia, Spain, Sweden, Switzerland, United Kingdom, former Yugoslavia.

Subfamily Helconinae FORSTER, 1862

Genus *Diospilus* HALIDAY, 1833

***Diospilus nigricornis* (WESMAEL, 1835)**

Material examined: Golestan province, Bandar-Torkman, 2♂♂, April 2012.

Distribution outside Iran: Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Czech Republic, Finland, France, Georgia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Moldova, Netherlands, Norway, Poland, Russia, Slovenia, Sweden, Switzerland, Ukraine, United Kingdom, former Yugoslavia.

Subfamily Microgastriinae FOERSTER, 1862

Genus Cotesia CAMERON, 1891

***Cotesia zygaenarum* (MARSHALL, 1885)**

Material examined: Golestan province, Golestan National Park, 1♀, 3♂♂, September 2011.

Distribution outside Iran: Albania, Armenia, Austria, Azerbaijan, China, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Korea, Macedonia, Moldova, Poland, Russia, Serbia, Slovakia, Switzerland, Turkey, United Kingdom, former Yugoslavia.

Genus Protapantales ASHMEAD, 1898

***Protapantales (Protoapantales) mygdonia* (NIXON, 1973)**

Material examined: Golestan province, Gorgan, 3♀♀, spring 2012.

Distribution outside Iran: Almost regions of Palearctic.

Subfamily Opiinae BLANCHARD, 1845

Genus Opius WESMAEL, 1835

***Opius (Opius) paraplaticus* FISCHER, 1972**

Material examined: Golestan province, Minoodasht, 1♀, October 2012.

Distribution outside Iran: Central Palearctic, Afrotropical.

Subfamily Orgilinae ASHMEAD, 1900

Genus Orgilus HALIDAY, 1833

***Orgilus (Orgilus) pimpinellae* NIEZABITOWSKI, 1910**

Material examined: Golestan province, Gonbad, 2♀♀, 1♂, June 2010.

Distribution outside Iran: Afghanistan, Austria, Bulgaria, Czech Republic, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Norway, Poland, Romania, Russia, Serbia, Switzerland, Turkey, Ukraine, United Kingdom, former Yugoslavia.

***Orgilus (Orgilus) ponticus* TOBIAS, 1986**

Material examined: Golestan province, Salikandeh, 3♀♀, September 2009.

Distribution outside Iran: Albania, Greece, Hungary, Italy, Russia, Slovenia, Turkey.

Subfamily Sigalphinae HALIDAY, 1833

Genus *Sigalphus* LATREILLE, 1802

***Sigalphus irrorator* (FABRICIUS, 1775)**

Material examined: Golestan province, Salikandeh, 1♂, September 2009.

Distribution outside Iran: Austria, Belgium, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Korea, Latvia, Netherlands, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom.

Subfamily Rhysalinae FOERSTER, 1862

Genus *Histeromerus* WESMAEL, 1838

***Histeromerus mystacinus* WESMAEL, 1838**

Material examined: Golestan province, Kordkoy, 2♀♀, August 2009.

Distribution outside Iran: Belgium, Czech Republic, Denmark, France, Georgia, Germany, Ireland, Lithuania, Netherlands, Poland, Russia, Slovakia, Sweden, Ukraine, United Kingdom.

Discussion

This paper and other conducted works on Braconidae of Golestan province (e.g. GHAHARI & FISCHER 2011a, b; GHAHARI et al. 2011, 2012; SAKENIN et al. 2012) and also the catalogues of Iranian Agathidinae and Brachistinae (GADALLAH & GHAHARI 2013a), Cheloninae (GADALLAH & GHAHARI 2013b) and Braconinae (GADALLAH & GHAHARI 2015) indicate that the fauna of these beneficial insects is diverse in Golestan province. Braconids are powerful parasitoids of agricultural and forest pests and so they can have efficient role in biological control of the pests. Determining the fauna of these parasitoids in different regions of Iran is the first step for establishment of biological control programs. Therefore we suggest to the researchers to continue on faunistic works on braconids in other areas of Iran together with determining their hosts.

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Zusammenfassung

Vorliegende Arbeit behandelt die Braconiden-Fauna der Provinz Golestan im Norden des Irans. Insgesamt gelang der Nachweis von 29 Arten aus 18 Gattungen der 12 Unterfamilien Agathidinae,

Alysinae, Brachistinae, Braconinae, Cheloninae, Euphorinae, Helconinae, Microgastrinae, Opiinae, Orgilinae, Sigalphinae und Rhysalinae.

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