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New records of Encyrtidae (Hymenoptera: Chalcidoidea) from Iran

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A b s t r a c t : This paper deals with the Encyrtidae (Hymenoptera: Chalcidoidea) collected during faunistic surveys made in different regions of Iran. In total, 14 species in eight genera were collected and identified. All the species recorded here, and the genus *Thomsonisca* GHESQUIÈRE are new to the Iranian fauna of Encyrtidae.

K e y w o r d s : Fauna, distribution, parasitoids, hosts, new records.

Introduction

Encyrtidae (Hymenoptera: Chalcidoidea) with over 4,000 valid species in 500 genera is a large and most abundant family (NOYES 2018). Many species of this family have been used successfully in various biological control programs in different regions of the world (LASALLE 1993; GIBSON et al. 1997). They are known to parasitize (primary endoparasitoids and hyperparasitoids) a wide variety of host insects belonging to the orders Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera and Orthoptera, and Arachnida, mainly spiders and ticks (NOYES & HAYAT 1994; GUERRIERI & NOYES 2000). Encyrtids are used against many pest species, especially scale insects (Hemiptera, Coccoidea) (NOYES 1985; TRJAPITZIN 1989; NOYES & HAYAT 1994). More than 400 species have been used worldwide as biological control agents of insect pests (NOYES 1985; GREATHEAD 1986; NEUESCHWANDER et al. 1990).

The Iranian Encyrtidae has poorly been studied, with only 159 species in 48 genera recorded so far from Iran (FALLAHZADEH & JAPOSHILI 2017: comprises list of species, distributional, host, and plant association data). The aim of this paper is to study the material of Encyrtidae collected during faunistic survey made in different regions of Iran. The author newly records 14 species and one genus from Iran.

Material and Methods

The material was collected by Malaise trap, sweeping net, and by rearing of different hosts. In the rearing method the leaves of plants infested with scale insects were collected and put in separate gelatine capsules which were then transferred to an incubator (26 ± 2 °C, $60\pm 5\%$ RH, 16: 8 L: D). The emerged parasitoids were then collected. Additionally specimens present in the insect collection of Islamic Azad University were also studied. For proper identification of the material, some specimens were slide-mounted following the method given by NOYES (1982). The specimens were determined by the second author. In this paper distributional data were taken from NOYES (2018).

Results

In this faunistic paper, 14 species and one genus (*Thomsonisca* GHESQUIÈRE) are added to the fauna of Encyrtidae of Iran. Additionally the hosts of some species were identified, and are represented together with distribution data.

Family Encyrtidae

Genus *Adelencyrtus* ASHMEAD, 1900

Adelencyrtus aulacaspidis (BRÈTHES, 1914)

Material examined: Khorasan-e Shomali province, Farooj, 2♀♀, 1♂, 2.v.2009, ex *Aulacaspis rosae* (BOUCHÉ, 1833) (Hemiptera: Diaspididae).

General distribution: Argentina, Azerbaijan, Bulgaria, Chile, China, Croatia, Czech Republic, France, Georgia, Germany, Hungary, India, Italy, Japan, Kazakhstan, Madagascar, Moldova, New Zealand, Russia, Slovenia, Spain, Switzerland, Turkey, Ukraine, UK, USA, former Yugoslavia.

Genus *Anagyrus* HOWARD, 1896

Anagyrus bohemani (WESTWOOD, 1837)

Material examined: Guilan province, Siahkal (Dimasara), 1♀, 3♂♂, 14.vi.2011, ex *Phenacoccus aceris* (SIGNORET, 1875) (Hemiptera: Pseudococcidae).

General distribution: Austria, Azerbaijan, Canary Islands, Czech Republic, France, Hungary, Israel, Madeira, Morocco, Netherlands, Poland, Portugal, Russia, Slovakia, Spain, Sweden, Ukraine, UK, former USSR.

Comments: NOYES (2018) listed India as the distribution area for *Anagyrus bohemani*, while this species has not been recorded from India so far (M. Hayat - personal communication).

Genus *Copidosoma* RATZEBURG, 1844

Copidosoma flagellare (DALMAN, 1820)

Material examined: Guilan province, Lahijan (Mishkasar), 1♀, 1♂, 16.vi.2011.

General distribution: Andorra, Azerbaijan, Bulgaria, China, Czech Republic, Denmark, Europe, Finland, France, Germany, Greece, Hungary, Ireland (north and south), Lithuania, Netherlands, Norway, Russia, Slovakia, Spain, Sweden, UK, Ukraine, former USSR, former Yugoslavia.

Genus *Ericydnus* HALIDAY, 1832

Ericydnus caudatus ERDÖS, 1957

Material examined: East Azarbaijan province, Kaleybar (Khomarlu), 1♀, 11.vi.2007.

General distribution: Armenia, former Czechoslovakia, Hungary, Moldova, Romania, Russia, Turkey, Ukraine.

Ericydnus sipylus (WALKER, 1837)

Material examined: Mazandaran province, Tonekabon, Jangal-e 3000, 2♀♀, 2♂♂, 5.x.2012, ex *Phenacoccus* sp. (Hemiptera: Pseudococcidae).

General distribution: Austria, Azerbaijan, Canary Islands, Croatia, Czech Republic, England, France, Georgia, Germany, Hungary, Madeira, Mongolia, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, Ukraine, USA.

Genus *Isodromus* HOWARD, 1887

***Isodromus niger* ASHMEAD, 1900**

Material examined: Semnan province, Shahrud, Jangal-e Abr, 3♀♀, 19.viii.2011.

General distribution: China, Georgia, Hungary, Japan, Kazakhstan, Moldova, Romania, Tajikistan, Taiwan, Turkey, Uzbekistan, Ukraine, USA.

***Isodromus vinulus* (DALMAN, 1820)**

Material examined: Ardabil province, Germe (Damirchi), 1♀, 24.vi.2014.

General distribution: Armenia, Austria, Canada, Czech Republic, Finland, Georgia, Germany, Hungary, Italy, Kazakhstan, Moldova, Mongolia, Netherlands, Norway, Romania, Russia, Slovakia, Spain, Sweden, Ukraine, England.

Genus *Metaphycus* MERCET, 1917

***Metaphycus luteolus* (TIMBERLAKE, 1916)**

Material examined: Chaharmahal & Bakhtiari province, Sarkhoon, 3♀♀, 12.v.2012, ex *Coccus hesperidum* LINNAEUS, 1758 (Hemiptera: Coccidae).

General distribution: Afrotropical, Argentina, Australia, Azerbaijan, Bermuda, Georgia, Guam, Hawaii, Italy, Mexico, Peru, Russia, Spain, Ukraine, USA, former USSR.

***Metaphycus nadius* (WALKER, 1838)**

Material examined: Gilan province, km 12 Talesh - Asalem (Hotel Hod Hod), 1♀, 1♂, 3.vi.2011.

General distribution: Croatia, Czech Republic, Finland, France, Georgia, Greece, Hungary, Italy, Netherlands, Poland, Portugal, Russia, Slovakia, Spain, UK, former USSR.

***Metaphycus pappus* (WALKER, 1838)**

Material examined: East Azarbaijan province, Kaleybar (Khomarlu), 2♀, 11.vi.2007, ex *Eulecanium tiliae* (LINNAEUS, 1758) (Hemiptera: Coccidae).

General distribution: Azerbaijan, Czech Republic, Denmark, Ireland (north and south), Italy, Moldova, Netherlands, Russia, UK.

Genus *Microterys* THOMSON, 1876

***Microterys aeneiventris* (WALKER, 1837)**

Material examined: Khorasan Shomali province, km 6 Lujely - Shirvan, 3♀♀, 30.iv.2009.

General distribution: Armenia, Austria, Bulgaria, Croatia, Czech Republic, Denmark, Germany, Greece, Hungary, Kazakhstan, Moldova, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Ukraine, UK, former Yugoslavia.

***Microterys ferrugineus* (NEES, 1834)**

M a t e r i a l e x a m i n e d : Hamadan province, Malayer (Tasbandi), 3♀♀, 10-12.vi.2008, ex *Kermococcus quercus* (LINNAEUS, 1758) (Hemiptera: Kermococcidae).

G e n e r a l d i s t r i b u t i o n : Armenia, Austria, Czech Republic, France, Georgia, Germany, Hungary, Italy, Moldova, Poland, Slovakia, Spain, Sweden, Ukraine, UK.

***Microterys fuscipennis* (DALMAN, 1820)**

M a t e r i a l e x a m i n e d : Kordestan province, Saqez (Badr-Abad), 3♀♀, 15.ix.2009.

G e n e r a l d i s t r i b u t i o n : Austria, Azerbaijan, Czech Republic, Denmark, Finland, Germany, Hungary, Mongolia, Poland, Russia, Slovakia, Sweden, Switzerland, Ukraine.

Genus *Thomsonisca* GHESQUIÈRE, 1946

***Thomsonisca amathus* (WALKER, 1838)**

M a t e r i a l e x a m i n e d : Hamadan province, Malayer (Tasbandi), 3♀♀, 2♂♂, 10-12.vi.2008, ex *Pseudaulacaspis pentagona* (TARGIONI TOZZETTI, 1886) (Hemiptera: Diaspididae).

G e n e r a l d i s t r i b u t i o n : Armenia, Azerbaijan, China, Czech Republic, Denmark, France, Georgia, Germany, Greenland, Hungary, India, Japan, Montenegro, Pakistan, Russia, Spain, Sweden, Switzerland, UK, former Yugoslavia.

Discussion

Finding 14 new records of Encyrtidae for the fauna of Iran indicates that the fauna of these beneficial insects is diverse in Iran and on the other hand was poorly studied. In this research the hosts of some parasitoids were determined by rearing of them, while most the published works on Iranian Encyrtidae were upon collecting the parasitoids by Malaise traps and sweeping net. Determination of parasitoid-host relationships is the first step for establishment of biological control programmes. The Encyrtidae are one of the main effective agents of biocontrol on agricultural pests in Iran, especially Hemiptera (Coccidae, Diaspididae, and Pseudococcidae) (see FALLAHZADEH & JAPOSHVILI 2017). Parasitoids like encyrtids are the major component of many terrestrial ecosystems and may constitute up to 20% of all insect species (LASALLE & GAULD 1991; GODFRAY 1994; MEMMOT et al. 1994). With this research, the total species number of Iranian Encyrtidae reaches to 173. Also the genus *Thomsonisca* is recorded here for the first time from Iran. However, Iran comprises diverse ecosystems, so we estimate 300-350 species of Encyrtidae for the fauna of Iran. We suggest to the researchers to continue these faunal works towards to completing the species diversity of Iranian Encyrtidae step by step.

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Zusammenfassung

Vorliegende Arbeit behandelt das Vorkommen von Encyrtidae (Hymenoptera: Chalcidoidea) auf Basis faunistischer Aufsammlungen in unterschiedlichen Regionen des Irans. Es gelang der Nachweis von 14 Arten aus 8 Gattungen, die allesamt, einschließlich der Gattung *Thomsonisca* GHESQUIÈRE, Neunachweise für den Iran bedeuten.

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