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Research Article

A contribution to some Chalcidoidea wasps (Hymenoptera) from Iran

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ABSTRACT: Parasitic wasps operate at a high trophic level and, because of their biology, tend to be highly specialized, sometimes having very narrow host ranges with at least local monophagy a frequent outcome. With attention to the high importance of superfamily Chalcidoidea in biological control programs of most ecosystems, the fauna of these beneficial insects was studied. A total of 69 species from 7 families including Eurytomidae, Torymidae, Ormyridae, Pteromalidae, Encyrtidae, Eupelmidae and Signiphoridae was identified. In this paper, the hosts of some parasitoids are given too.

KEY WORDS: Hymenoptera, parasitoid, fauna, Iran

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INTRODUCTION

Chalcidoidea is more diverse than others after Ichneumonoidea. Generalizations about this superfamily are perhaps the most difficult, partly because phylogenetic relationships within it are so poorly known and partly because its range of biological habits is enormous (Noyes, 1989; Boucek and Rasplus, 1991). About 22,000 valid species have been described in about 2,100 genera world-wide, but these numbers represent only a fraction of true chalcid diversity and estimates of 60,000 to 100,000 species worldwide do not seem unreasonable (Noyes, 2003). About 80 chalcid species are known to be pests of agriculture (mostly seed feeders in the families Eurytomidae and Torymidae) and some chalcids are considered harmful because they are hyperparasitoids, but most are economically and environmentally beneficial. The large majority of chalcid species are primary parasitoids of other insects and arachnids and as such they are important participants in nature's own control system for regulating arthropod populations. In addition to the largely unappreciated role of most species in helping to control what might otherwise be pest species, over 800 chalcid species have been associated with targeted biological control programs. This represents about two-thirds of all biocontrol programs involving Hymenoptera, and about one-third of all biocontrol programs in which partial or complete economic control of an insect pest was achieved (Greathead, 1986; Noyes and Valentine, 1989; Hedqvist, 2003). The most comprehensive review of chalcid biology and ecology is by Bendel-Janssen (1977). The host range of chalcids is thought to exceed that of all other insect groups except Diptera (Gibson *et al*., 1997). Members are known to attack hosts in about 340 families in 15 insect orders as well as egg sacs of spiders (Araneae), ticks and gall forming mites (Acari), cocoons of pseudoscorpions (Pseudoscorpiones), and gall forming Anguinidae (Nematoda). In addition, phytophagous chalcids are known from six families. Agaoninae (Agaonidae) are exclusively phytophagous within the ovarioles of figs (*Ficus*), but are beneficial as obligate pollinators of figs. Some members of five other families (Eulophidae, Eurytomidae, Pteromalidae, Tanaostigmatidae and Torymidae) are seed feeders or gall formers on plants, though for many chalcids reared from galls it is not known whether they are primary gall formers, or inquilines or parasitoids in the galls. Some chalcids of the family Aphelinidae even parasitize the opposite sex of their own species (Yoshimoto, 1984; Subba Rao and Hayat, 1986; Hanson and LaSalle, 1995; Gibson *et al*., 1997).

The fauna of Iranian Chalcidoidea is poorly studied and only two families including Eurytomidae and Torymidae were studied recently (Stojanova and Ghahari, 2009); while these parasitoids have very important role in biological control of several pests. This study documents some chalcidoids from Iran.

MATERIALS AND METHODS

The fauna of some families of Chalcidoidea including Eurytomidae, Torymidae, Ormyridae, Ptero-malidae, Encyrtidae and Signiphoridae was studied in different regions of Iran. Some specimens were collected by different researchers in recent years by sweeping nets and malaise traps. Some parasitoids (especially Encyrtidae) were reared from their hosts (Coccidae) in optimum conditions (26 ± 2ºC, 65 ± 5 %RH, 14: 10 L: D) in an incubator for emergence of parasitoids. Additionally some insect collections were obtained on loan from different branches of Islamic Azad University for study.

RESULTS AND DISCUSSION

In this paper, a total of 69 chalcidoid species collected and determined from different regions of Iran are listed. Of these 4 species are from Eurytomidae, 5 species from Torymidae, 5 species from Ormyridae, 13 species from Pteromalidae, 34 species from Encyrtidae, 6 species from Eupelmidae and 2 species from Signiphoridae. The list of species is given below.

Family Eurytomidae

***Eudecatoma biguttata* (Swederus)**

Material: Mazandaran: Ramsar, 1 female, 1 male, September 2005.

***Tetramesa linearis* (Walker)**

Material: Khorasan: Serakhs, 1 female, August 2003.

***Tetramesa romana* Walker**

Material: East Azarbayjan: Arasbaran, 1 female, July 2006.

Family Torymidae

***Torymus rubi* (Schrank)**

Material: Mazandaran: Ghaemshahr, Joibar, Babol, 3 female, 2 male, April 2004.

***Pseudotorymus sapphyrinus* Fonscolombe**

Material: East Azarbayjan: Arasbaran, 2 female, July 2006.

***Megastigmus suspectus* Borries**

Material: East Azarbayjan: Arasbaran, 2 female, on *Abies* sp., July 2006.

***Podagrionella tatianae* (Boucek)**

Material: Guilan: Lahijan, Chaboksar, 2 female, 2 male, May 2005.

***Podagrionella petiolata* (Erdos)**

Material: East Azarbayjan: Arasbaran, 11 female, 4 male, July 2006.

***Philotrypesis pilosa* Mayr**

Material: Kerman: Jiroft, 3 female, October 2003, ex *Ceratosolen marchali* (Agaonidae) in galls of *Ficus* sp.

Family Ormyridae

***Ormyrus diffinis* (Fonscolombe)**

Material: Khuzestan: Ahwaz, 1 female, 1 male, October 2004.

***Ormyrus gratiosus* Förster**

Material: East Azarbayjan: Arasbaran, 2 female, June 2006.

***Ormyrus orientalis* Walker**

Material: Khorasan: Mashhad, 5 female, 2 male, September 2001.

***Ormyrus punctiger* Westwood**

Material: East Azarbayjan: Arasbaran, 1 female, July 2006.

***Sycophaga sycomori* (Linneaus)**

Material: Kermanshah: Kermanshah, 3 female, August 2005.

Family Pteromalidae

***Ablaxia anaxenor* (Walker)**

Material: Golestan: Gorgan, 2 female, 1 male, June 2003, ex *Scolytus eichhoffi* (Coleoptera: Scolytidae).

***Capellia stigma* Boucek**

Material: Khorasan: Mashhad, 1 female, June 2002, ex gals of *Cecidomyia testacea* (Dip.: Cecidomyiidae).

***Coelopisthia extenta* (Walker)**

Material: Tehran: Damavand, 1 female, June 2003, ex *Pandemis chondrillana* (Lepidoptera: Tortricidae).

***Cyrtoptyx latipes* (Rondani)**

Material: Golestan: Bandar-Gaz, 2 female, July 2003, ex *Dacus zonatus* (Diptera: Tephritidae).

***Eunotus acutus* Kurdjumov**

Material: East Azarbayjan: Arasbaran, 1 female, September 2005.

***Gugolzia harmolitae* Delucchi**

Material: Chaharmahal & Bakhtiary: Shahrekord, 2 female, July 2004, ex *Tetramesa eximia* (Giraud) (Hymenoptera: Eurytomidae). Khuzestan: Ahwaz, 1 female, 1 male, October 2006 ex *Tetramesa hordei* (Harris).

***Mesopolobus jucundus* (Walker)**

Material: Mazandaran: Ramsar, 1 female, July 2002, ex *Diplolepis mayri* (Hymenoptera: Cynipidae).

***Mesopolobus* (*Xenocrepis*) *morys* (Walker)**

Material: Khuzestan: Ahwaz, 2 female, October 2003, ex *Ceutorrhynchus assimilis* (Col.: Curculionidae).

***Pachyneuron concolor* Foerster**

Material: East Azarbayjan: Arasbaran, 2 female, September 2005.

***Pteromalus bedeguaris* (Thompson)**

Material: Mazandaran: Ramsar, 2 female, July 2002, ex *Diplolepis mayri* (Hymenoptera: Cynipidae).

***Sphegigaster brevicornis* (Walker)**

Material: West Azarbayjan: Ourmieh, 2 female, June 2004, ex *Liriomyza trifolii* (Diptera: Agromyzidae).

***Systasis encyrtoides* Walker**

Material: Golestan: Minoodasht, 1 female, July 2003, ex Cecidomyidae (Diptera).

***Trychnosoma ernobii* Hedqvist**

Material: Isfahan: Isfahan, 1 female, 1 male, August 2005, ex *Ernobius mollis* (Col.: Anobiidae) on dried wood.

Family Encyrtidae

***Ageniaspis fuscicollis* (Dalman)**

Material: Guilan: Rasht, Fooman, Roodsar, 6 female, 3 male, June 2003.

***Anagyrus aligarhensis* Agarwal and Alam**

Material: Kermanshah: Kermanshah, 4 female, 2 male, August 2005, ex *Phenacoccus pumilus*.

***Anagyrus pseudococci* (Girault)**

Material: East Azarbayjan: Arasbaran, 2 female, September 2006, ex *Planococcus* sp.

***Anagyrus schoenherri* Westwood**

Material: Hamadan: Hamadan, 2 female, 2 male, September 2005 ex *Phenacoccus aceris*; Mazandaran: Chalus, Nooshahr, 9 female, August 2001.

***Aphycoides clavellatus* (Dalman)**

Material: Isfahan: Najaf-Abad, 2 female, July 2002.

***Blastothrix longipennis* Howard**

Material: East Azarbayjan: Ahar, 1 female, September 2001.

***Blastothrix sericea* (Dalman)**

Material: West Azarbayjan: Ourmieh, 2 female, September 2005, ex *Sphaerolecanium* sp.

***Bothriothorax clavicornis* (Dalman)**

Material: Ardabil: Meshkinshahr, 3 female, 1 male, September 2003, ex *Syrphus vitripennis* (Diptera: Syrphidae).

***Bothriothorax serratellus* (Dalman)**

Material: West Azarbayjan: Khoy, 3 female, July 2006, ex *Heringia heringi* (Diptera: Syrphidae).

***Cerapterocerus mirabilis* Westwood**

Material: West Azarbayjan: Khoy, 2 female, 2 male, July 2002, ex *Ceroplastes elytropappi*.

***Coccidoxenoides perminutus* Girault**

Material: Isfahan: Isfahan, 3 female, April 2003, ex *Planococcus vovae*.

***Encyrtus aurantii* (Geoffroy)**

Material: Guilan: Rasht, 1 female, August 2003.

***Encyrtus infidus* (Rossi)**

Material: Golestan: Azadshahr, 2 female, June 2004.

***Ericydnus robustior* Mercet**

Material: East Azarbayjan: Arasbaran, 1 female, September 2006.

***Homalotylus flaminius* (Dalman)**

Material: Kermanshah: Kermanshah, 3 female, 1 male, October 2000, ex *Saissetia oleae*.

***Homalotylus quaylei* Timberlake**

Material: East Azarbayjan: Arasbaran, 1 female, September 2006.

***Leptomastidea matritensis* Mercet**

Material: Kermanshah: Kermanshah, 2 female, August 2005.

***Leptomastix ava* Mercet**

Material: Isfahan: Isfahan, 1 female, 1 male, April 2003.

***Mayridia formosula* Mercet**

Material: Mazandaran: Savadkooh, 2 female, July 2004.

***Mayridia pulchra* Mercet**

Material: East Azarbayjan: Arasbaran, 1 female, September 2006.

***Metaphycus asterolecanii* Mercet**

Material: Mazandaran: Behshahr, 3 female, 5 male, August 2002.

***Metaphycus dispar* (Mercet)**

Material: Mazandaran: Behshahr, 1 female, August 2002.

***Metaphycus helvolus* (Compere)**

Material: Golestan: Gorgan, 2 female, September 2006, ex *Coccus hesperidum*.

***Microterys lunatus* (Dalman)**

Material: West Azarbayjan: Ourmieh, 3 female, September 2006, ex *Pulvinaria vitis*.

***Microterys nietneri* (Motschulsky)**

Material: Guilan: Lahijan, 3 female, September 2004, ex *Coccus hesperidum*.

***Microterys sylvius* (Dalman)**

Material: East Azarbaijan: Arasbaran, 3 female, 1 male, September 2006, ex *Eulecanium coryli*.

***Microterys tricoloricornis* (De Stefani)**

Material: Mazandaran: Savadkooh, 2 female, 3 male, July 2004, ex *Saissetia oleae*.

***Prochiloneurus bolivari* Mercet**

Material: Kermanshah: Kermanshah, 1 female, 1 male, August 2005.

***Syrphophagus mamitus* (Walker)**

Material: Kermanshah: Kermanshah, 2 female, August 2005.

***Tetracnemus heydeni* (Mayr)**

Material: West Azarbayjan: Maco, 17 female, 5 male, July 2006.

***Trichomasthus albimanus* Thomson**

Material: Isfahan: Isfahan, 7 female, 2 male, May 2005, ex *Coccus hesperidum*.

***Trichomasthus cyaneus* (Dalman)**

Material: Mazandaran: Chalus, 1 female, September 2003, ex *Pulvinaria vitis*.

***Zaomma lambinus* (Walker)**

Material: Guilan: Fooman, 4 female, 2 male, June 2004, ex *Lecanium nigrofasciatum*.

Family Signiphoridae

***Chartocerus kurdjumovi* (Nikol'skaya)**

Material: Isfahan: Najaf-Abad, 1 female, April 2004.

***Chartocerus subaeneus* (Förster)**

Material: East Azarbayjan: Tabriz, 2 female, July 2002.

Family Eupelmidae

***Anastatus bifasciatus* (Geoffroy)**

Material: Mazandaran: Ramsar, 2 female, 1 male, July 2004.

***Anastatus giraudi* (Ruschka)**

Material: East Azarbaijan: Arasbaran, 2 female, September 2004.

***Anastatus splendes* Nikolskaya**

Material: East Azarbaijan: Arasbaran, 1 female, September 2004.

***Eupelmus* (*Eupelmus*) *fulvipes* Förster**

Material: Hamadan: Nahavand, 2 female, unknown date ex *Diplolepis mayri* (Hymenoptera, Cynipidae).

***Eupelmus* (*Macroneura*) *maculatus* (Ferrière)**

Material: East Azarbaijan: Arasbaran, 1 female, September 2006.

***Calosota viridis* Masi**

Material: Kermanshah: Kermanshah, 2 female, unknown date ex *Tetramesa brevicollis* (Eurytomidae) galls.

DISCUSSION

The result of this research indicated that there is a very diverse fauna of Chalcidoidea in Iran. Almost all the recorded species in this paper are parasitoids which may prove to be potentially useful in biological control programs. The single most important decision in a biological control program is the determination that a biological control solution is obtainable for the proposed target pest. This decision should be based on a scientific assessment, without which there can be no reasonable guarantee that effort will not be wasted on agents that eventually prove to be ineffective. Some of the factors relevant to feasibility assessments were discussed by Barbosa and Segarra-Carmona (1993); other issues include consideration of not only the potential for unintended impacts (van Lenteren *et al*., 2003), but also the potential efficacy of existing indigenous agents (Michaud, 2002) and other ecological effects (Heimpel *et al*., 2004).

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