

A contribution to the knowledge of the pteromalid wasps (Hymenoptera: Chalcidoidea: Pteromalidae) of Kurdistan Province, Western Iran including new records

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Received: 26. March 2013 / Accepted: 11. November 2013 / Available online: 15. November 2013 / Printed: December 2013

Abstract. In the present paper a preliminary study of the pteromalid fauna (Hymenoptera: Chalcidoidea: Pteromalidae) in Kurdistan Province, Western Iran is provided. The specimens were collected using sweeping nets and Malaise traps during 2009-2010. Nine species belonging to 9 genera and to the following subfamilies are identified: Asaphinae (1 species), Miscogasterinae (1 species), Ormocerinae (1 species) and Pteromalinae (6 species). Two species, *Callitula bicolor* Spinola, 1811 and *Stenoselma nigrum* Delucchi, 1956 are recorded for the first time from Iran. Short taxonomic comments for each species are briefly mentioned.

Key words: Hymenoptera, Pteromalidae, parasitoids, Western Iran, distribution, new records.

Introduction

Pteromalidae is the largest family in the Chalcidoidea members of which are distributed in all the zoogeographical regions of the world (Noyes 2012). Majority of the species are primary or secondary parasitoids attacking other insect groups and some arachnida in their various stages of development (egg, pupa or larva) (Sureshan 2003, Andriescu & Mitroiu 2001). A few species of Pteromalidae are phytophagous (e.g., *Systasis cenchrivora* Farooqi & Menon, 1972 associated with seeds of *Cenchrus ciliaris*). A few species are also known to be gall-formers (e.g., *Asparagobius braunsi* Mayr, 1905 which is endemic to South Africa, and which is a gall-former on the stems of *Asparagus stricta*). They play a vital role in the control of insect pests and several species have been employed successfully in biological control programmes all over the world (Mitroiu et al. 2011). Bouček & Rasplus (1991) stated that this family has not been studied in North Africa and the Middle East and there is little information on this group of parasitoids in these regions. Consequently, the Pteromalidae fauna of Iran is still poorly known, the same situation being true for other families of Chalcidoidea too, where new records and new species have been recently added to the faunistic inventory (Madjdzadeh et al. 2005, Lotfalizadeh 2008, 2010). Several authors have recorded different pteromalids species in Iran (Davatchi & Chodjai 1989, Goldansaz et al. 1996, Habibpour et al. 2002, Jalilvand & Gholipour 2002, Mehrnejad 2002, 2003; Rezaei et al. 2003, Sadeghi & Askary 2001, Sadeghi & Ebrahimi 2002, Sharifi & Javadi 1971, Steffan 1968, Lotfalizadeh 2002, 2002a, 2004, Lotfalizadeh & Ahmadi 1998, 2000, Lotfalizadeh & Gharali 2008) and recently several new records and also new species have been added to the previous studies (Aleman-sour et al. 2010, Hesami et al. 2010, Nazemi-Rafi & Lotfalizadeh 2010, Mitroiu et al. 2011, Hasani et al. 2011, Hasani & Madjdzadeh 2012, Mahdavi & Madjdzadeh 2013). The aim of the present study is to present a preliminary checklist of pteromalid species occurring in Kurdistan Province, Western Iran and also to add new species record to the list of Iranian Pteromalidae as well as to complete with new information on the distributional data for the already listed species.

Materials and Methods

The study area is located on the western margin of the Iranian Plateau between 34°44' to 36°30' N and 45°31' to 48°16' E. The region is bordered in the north by Western Azerbaijan Province, from the south by Kermanshah Province, from the west by the Iraq border and from the east by Zanjan and Hamedan Provinces. The altitude ranges from 900m to 3300m above sea level. The specimens were collected using sweeping nets and Malaise traps during 2009-2010. It was preserved in 75% Ethanol until it was partly mounted on cards. Prior to mounting the specimens were treated with hexamethyldisilazane in order to avoid collapsing. Terminology and classification follow Gibson (1997) and Bouček (1988), respectively. The identifications were made using Graham's monograph (Graham 1969) and other papers listed in the remarks section. The identified material is deposited in SMM collection (Department of Biology, Shahid Bahonar University of Kerman, Kerman, Iran). The identified species are ordered based on subfamily name alphabetically and new records are marked by asterisk. General data regarding geographical distribution, biology as well as brief taxonomic comments is given for each species.

Results

Subfamily: Asaphinae

Genus: *Asaphes* Walker, 1834

Asaphes suspensus Nees, 1834

Material examined: Kurdistan Province, Kamyaran, Muchesh, N35° 16' 31.85" E 47° 23' 38.8", 1624m, 27.VI.2010, swept on *Trifolium* sp. (K. Dehdar), 6♀1♂, Kurdistan Province, Kamyaran, Shirvaneh, N34° 46' 41.94" E 46° 52' 38.81", 1361m, 25.V.2010, (K. Dehdar), 4♀2♂, Kurdistan Province, Bijar, Salavat Abad, N36° 01' 25.86" E 47° 33' 38.7", 1667m, 1.VII.2010, swept on *Anthemis* sp. (K. Dehdar), 6♀2♂, Kurdistan Province, Bijar, Negarestan, N36° 14' 06.25" E 47° 36' 39.4", 1626m, 2.VII.2010, swept on *Trifolium* sp. (K. Dehdar), 4♀1♂, Kurdistan Province, Divandareh, Zaghe Sofla, N35° 45' 09.51" E 47° 05' 53.9", 1628m, 17.VII.2010, swept on *Persica* sp. (K. Dehdar), 5♀5♂, Kurdistan Province, Saghez, Hasansalaran, N36° 21' 34.06" E 46° 22' 07.8", 1566m, 24.V.2010, swept on *Malus* sp. (K. Dehdar), 2♀3♂, Kurdistan Province, Marivan, Chenareh, N35° 37' 37.72" E 46° 17'

42.2", 1548m, 2.VIII.2010, swept on *Malus* sp. (K. Dehdar), 3♀1♂.

Remarks: There are many host records for this species, as it is a generalist hyperparasitoid of four to five genera of Aphidiinae and Aphelinidae (Hymenoptera) primary parasitoids (Fergusson 1980, Sullivan 1987, Chow & Mackauer 1999). It can also be regarded as a tertiary parasitoid of other aphid hyperparasitoids (Matejko & Sullivan 1984, Carew & Sullivan 1993). *Asaphes suspensus* was considered a synonym of *A. vulgaris* until Graham (1969) reestablished the species and thus the records published prior to 1969 should be regarded with caution. *Asaphes suspensus* can be separated from other species of the genus by the combination of entirely yellowish legs and narrow speculum, with at least three setae near the submarginal vein (Gibson & Vikberg 1998).

Distribution: *Asaphes suspensus* is widely distributed in the Holarctic region (Noyes 2012). Its distribution in the Neotropical region is regarded as doubtful by Gibson & Vikberg (1998) who considered that these records belong to the *californicus*-complex. It is already recorded from Iran (Lotfalizadeh & Gharali 2008, Mitroiu et al. 2011).

Subfamily: Miscogasterinae

Genus: *Halticoptera* Spinola, 1811

Halticoptera aenea Walker, 1833

Material examined: Kurdistan Province, Kamyaran, Muchesh, N35° 16' 31.85" E 47° 23' 38.8", 1624m, 27.VI.2010, swept on *Trifolium* sp. (K. Dehdar), 4♀1♂.

Remarks: This species is a parasitoid of flies (families Agromyzidae, Cecidomyiidae, Chloropidae, Drosophilidae) and moths (Lasiocampidae) (Noyes 2012).

Distribution: This species was recorded from Britain, Italy, Sweden, Azerbaijan, Kazakhstan, Turkey, United States of America, Ukraine and Romania (Noyes 2012). *Halticoptera aenea* was recorded from Iran by OILB (1971).

Subfamily: Ormocerinae

Genus: *Systasis* Walker, 1834

Systasis encyrtoides Walker, 1854

Material examined: Kurdistan Province, Sanandaj, Sarab Ghamish, N35° 19' 69.0"E47° 08' 22.5", 1511m, 8.VIII.2009, swept on *Brassica* sp. (K. Dehdar), 2♀1♂, Kurdistan Province, Ghorveh, Dehgolan, N35° 15' 37.1"E47° 27' 78.1", 1476m, 14.VIII.2009, 5♀.

Remarks: *Systasis encyrtoides* is reported mainly from species of Cecidomyiidae (Diptera) such as *Contarinia pisi* (Loew), *C. lentis* Aczel, *Dasineura affinis* (Kieffer), etc. (Noyes 2012). The European species of *Systasis* Walker were revised by Graham (1969), the species from Kazakhstan by Dzhankov (1996), and the Chinese species by Xiao & Huang (2001).

Distribution: *Systasis encyrtoides* is widely distributed in the Palaearctic region, from Europe to China (Noyes 2012). It was reported from Iran for the first time by Mitroiu et al. (2011).

Subfamily: Pteromalinae

Genus: *Callitula* Spinola, 1811

**Callitula bicolor* Spinola, 1811

Material examined: Kurdistan Province, Sarv Abad, Negel,

N35° 16' 51.47" E46° 30'53.16", 1381m, 8.VII.2010, swept on Gramineae (K. Dehdar), 1♀, Kurdistan Province, Saghez, Hasansalaran, N36° 21' 34.06" E46° 22' 07.8", 1566m, 24.VII.2010, swept on *Malus* sp. (K. Dehdar), 1♀.

Remarks: This species is reported from Iran for the first time. *Callitula bicolor* was recorded from some species of Cecidomyiidae, Chloropidae, Opomyzidae (Diptera) and it was also recorded as a hyperparasite through a proctotrupoid on the above dipterans (Xiao et al. 2005). Antenna with all segments unicolor, yellow brown and clypeal margin is truncate.

Distribution: It has been reported from Europe, Azerbaijan, Kazakhstan, North Africa and China (Noyes 2012).

Genus: *Catolaccus* Thomson, 1878

Catolaccus crassiceps Masi, 1911

Material examined: Kurdistan Province, Ghorveh, Dehgolan, N35° 15' 37.1"E47° 27' 78.1", 1476m, 14.VIII.2009, swept on *Anthemis* sp. (K. Dehdar), 4♀2♂.

Remarks: This species was reared from the cocoons of two species of chrysopids, *Chrysoperla carnea* (Stephans) and *Suaris fedschenkoi* (McLachlan) by Lotfalizadeh & Ahmadi (2000) in Iran. It was also reared for the first time from the cynipid gall wasp, *Diplolepis fructuum* (Rübsaamen) in Iran by Lotfalizadeh & Gharali (2008). Other records, summarized in Noyes (2012), include Curculionidae (Coleoptera), Gelechiidae, Noctuidae, Pieridae and Pyralidae (Lepidoptera) as primary hosts, and Braconidae (Hymenoptera) as parasitoid hosts. *Catolaccus crassiceps* can be separated from *C. ater* (Ratzeburg) by its less pilose forewings, having both basal cell and speculum bare.

Distribution: *Catolaccus crassiceps* is distributed from India to Europe and North of Africa (Noyes 2012). This species is already recorded from Iran (Lotfalizadeh & Gharali 2008, Hasani & Madjzadeh 2012).

Genus: *Cyrtogaster* Walker, 1833

Cyrtogaster vulgaris Walker, 1833

Material examined: Kurdistan Province, Bijar, Salavat Abad, N36° 01' 25.86" E47° 33' 38.7", 1667m, 1.VII.2010, swept on *Anthemis* sp. (K. Dehdar), 5♀.

Remarks: *Cyrtogaster vulgaris* was reared from two crucifer leaf miners, *Chromatomyia horticola* (Goureaux) and *Liriomyza sativae* Blanchard (Diptera: Agromyzidae) (Lotfalizadeh & Gharali 2008) in Iran. Other records, summarized in Noyes (2012), include many species of flies from several families such as Agromyzidae, Chloropidae, Drosophilidae, Lonchaeidae, Lonchopteridae, Opomyzidae, Syrphidae and Tephritidae. The genus *Cyrtogaster* Walker is easily recognizable by its deeply emarginate Gt1, the petiolate gaster and the shiny maxillary palpi of males.

Distribution: This species is widely distributed in West Palaearctic and it is also present in North America and several islands, where it might have been introduced (Noyes, 2012). It is already recorded from Iran (Lotfalizadeh & Gharali 2008, Hasani & Madjzadeh 2012).

Genus: *Dibrachoides* Kurdjumov, 1913

Dibrachoides dynastes (Förster, 1841)

Material examined: Kurdistan Province, Kamyaran, Shirvaneh, N34° 46' 41.94" E46° 52'38.81", 1361m, 26.V.2010, swept on *Trifolium* sp. (K. Dehdar), 3♀1♂.

Remarks: Herting (1973) in his catalogue reported *D. dynastes* from Iran.

It is used as biocontrol agent of *Hypera postica* (Gyllenhal) on lucerne (Lotfalizadeh & Gharali 2008). *Dibrachoides dynastes* differs from *D. cionobius* by its Antenna in which pedicellus is slightly more than twice as long as broad, second anellus large, subquadrate and about two thirds as long as the first funicular segment.

Distribution: *Dibrachoides dynastes* is reported from North Africa, Europe, Kazakhstan, Kirgizia, Iran and some other countries in the Palearctic region (Noyes 2012). It was recorded from Iran by Herting (1973).

Genus: Pachyneuron Walker, 1833

***Pachyneuron leucopiscida* Mani, 1939**

Material examined: Kurdistan Province, Ghorveh, Shanvare, N35° 10' 11.52" E47° 42' 11.8", 1325m, 28.VI.2010, swept on *Medicago* sp. (K. Dehdar), 4♀.

Remarks: The Australian species of the genus *Pachyneuron* were recorded by Gibson (2001). *Pachyneuron leucopiscida* is hyperparasitoid of *Aphis gossypii* (Glover) and *Aphis craccivora* Koch which parasitized by *Lysiphlebus fabarum* (Marshall). Doğanlar (1986) believes that it is near to *P. ahlaense* Mani and forms a species group, which can be separated by interiorly sclerotized hypopygium from other species.

Distribution: *Pachyneuron leucopiscida* has been recorded from some countries of the Middle East, Europe and India (Noyes 2012). It was recorded as *P. cremifaniae* Masi from Kerman Province (Emami & Mehrnejad 2004).

Genus: Stenosehma Delucchi, 1956

****Stenosehma nigrum* Delucchi, 1956**

Material examined: Kurdistan Province, Divandareh, Zaghe Sofla, N35° 45' 09.51" E47° 05' 53.9", 1628m, 17.VII.2010, swept on *Persica* sp. (K. Dehdar), 1♀.

Remarks: This species is reported from Iran for the first time. Some species of Buprestidae (Coleoptera), Cynipidae (Hymenoptera), Sesiidae (Lepidoptera) are regarded as its primary hosts.

Distribution: It was reported from Europe, North Africa, Armenia, Kazakhstan, Turkmenistan, Azerbaijan (Noyes 2012).

Discussion

The province of Kurdistan covers an area of 28,817 km², located in the western periphery of the Iranian Plateau in the west of Iran. A large part of this Province is mountainous with cold and Mediterranean climate in which most of the precipitation occurs in spring. Most parts of the Province are covered with meadows, forest and steppes. Due to its geographical and perhaps political situation this region has mostly been neglected from the standpoint of zoological studies. Most previous studies have been confined to the Northwestern, Northeastern and Southeastern parts of the country; the remainder of Iran especially Western parts of the country has not yet been investigated in detail regarding its pteromalid fauna. Mitroiu et al. (2011) recorded 13 species of Pteromalidae together with a new species, *Sphegigaster persiana* Mitroiu & Madjdzadeh, 2011 from Southeast Iran. Additionally Mahdavi & Madjdzadeh (2013) recorded two

species, *Pteromalus bedeguaris* (Thomson, 1878) and *Mesopolobus fasciiventris* Westwood, 1833 from Southeast Iran. The former species was reared from galls on *Ephedra major* (Host) and *Rosa beggerian* Schrenk. The later species was reared from leaf-galls on *Salix alba* L.. Twenty species of this family were recorded from Khoarasan Razavi Province in Northeast Iran by Hasani et al. (2011) and Hasani & Madjdzadeh (2012), of which 10 species were new records from Iran. Consequently, regarding the scanty of information on pteromalid fauna of Kurdistan Province, recent preliminary study of pteromalid fauna of this region has been locally performed. In the course of this survey of Pteromalidae of Kurdistan Province, nine species were found, of which two species were recorded for the first time from Iran. To the best of our knowledge, to date about six pteromalid species are recorded from Kurdistan province (Nazemi-Rafi & Lotfalizadeh 2010, Ghahari & Huang 2012).

Dawah & Abdullah (2006) and Hasani & Madjdzadeh (2012) have emphasized the importance of local insect faunistic studies for obtaining information that will enable researchers to maintain, discover and protect the natural environment. We believe that the present study is an important effort in this direction in that it adds new records which enlarge knowledge of the natural history of Iran. Studies of the insect fauna and its distribution are also of importance for local and national insect biodiversity plans. It is also acknowledged that almost all the recorded species in this paper prove to be potentially useful in biological control programs. Further taxonomic investigations together with host association data are necessary to increase the knowledge of diversity and applicability of this group of chalcidoids in Kurdistan Province and also other parts of Iran.

Acknowledgements. The authors are most grateful to the editor and anonymous reviewers for their valuable comments and suggestions on the earlier version of this paper. Our cordial thanks are also expressed to Dr. E. V. Tselikh for identification of some species.

References

- Andriescu, I., Mitroiu, M.D. (2001): Contributions to the knowledge of the pteromalids (Hymenoptera, Chalcidoidea, Pteromalidae) from David's Valley hay fields natural reserve, Iasi (II). *Analele Stiintifice ale Universitatii "Al. I. Cuza" din Iasi*, Serie Noua, Biologie Animala 47: 21-28.
- Alemansour, H., Asadi, R., Alehosein, S.A. (2010): Introduction of hymenopteran parasitoid of *Eurytoma* sp. (Hym.: Eurytomidae), a seed pest of medicinal plant *Ephedra procera* (Ephedraceae) in Fars Province, Iran. Proceeding of 19th Iranian plant protection congress, 31 July-3 August. Tehran, Iran: 163. [in Persian, with English summary]
- Bouček, Z. (1988): Australasian Chalcidoidea (Hymenoptera). A biosystematic revision of genera of fourteen families, with a reclassification of species. CAB International, Wallingford, Oxon, U.K., Cambrian News Ltd; Aberystwyth, Wales.
- Bouček, Z., Rasplus, J.Y. (1991): Illustrated key to West-Palaearctic genera of Pteromalidae (Hymenoptera - Chalcidoidea). INRA Editions, série Techniques et Pratiques, Paris.
- Carew, W.P., Sullivan, D.J. (1993): Interspecific parasitism between two aphid hyperparasitoids, *Dendrocerus Carpenteri* (Hymenoptera: Megaspilidae) and *Asaphes lucens* (Hymenoptera: Pteromalidae). *Annals of the Entomological Society of America* 86: 794-798.
- Chow, A., Mackauer, M. (1999): Host handling and specificity of the hyperparasitoid wasp, *Dendrocerus carpenteri* (Curtis) (Hym., Megaspilidae): importance of host age and species. *Journal of Applied Entomology* 123: 83-91.

- Davatchi, A., Shojaei, M. (1989): Entomophagus Hymenoptera of Iran. University of Tehran, Tehran.
- Dawah, H.A., Abdullah, M.A. (2006): The Muscidae (Diptera; Brachycera: Muscomorpha) of south-western Saudi Arabia. *Fauna of Arabia* 24: 373-396.
- Doğnar, M. (1986): Morphological studies of the hypopygium and its importance to the taxonomy of the genera *Pachyneuron* and *Euneura* (Hymenoptera: Pteromalidae), with description of a new species of *Pachyneuron* from Turkey. *Ç. Ü. Fen-Edebiyat Fakültesi Fen Bilimleri Dergisi* 4: 23-32.
- Dzhanokmen, K.A. (1996): A review of pteromalids of the genus *Systasis* (Hymenoptera, Chalcidoidea, Pteromalidae) from Kazakhstan. *Zoologicheskii Zhurnal* 75(12): 1787-1802.
- Enami, S.Y., Mehrnejad, M.R. (2004): The situation of weed aphids parasitoid and hyperparasitoids in pistachio orchards of Kerman province. - Proceeding of the 16th Iranian Plant Protection Congress, 28 Aug.-1 Sep., Univ. of Tabriz, Iran, p. 19.
- Fergusson, N.D.M. (1980): A revision of the British species of *Dendrocerus* Ratzeburg (Hymenoptera: Ceraphronoidea) with a review of their biology as aphid hyperparasites. *Bulletin of British Museum Natural History (Entomology)* 41: 255-314.
- Ghahari, H., Huang, J. (2012): A study of the Pteromalidae (Hymenoptera: Chalcidoidea) from western and northwestern Iran. *Archives of Biological Sciences* 64 (1): 353-357.
- Gibson, G.A.P. (1997): Morphology and terminology. pp. 16-44. In: Gibson, G. A.P., Huber, J.T., Woolley, J.B. (eds.), *Annotated keys to the genera of Nearctic Chalcidoidea* (Hymenoptera). National Research Council Research Press, Ottawa, Canada.
- Gibson, G.A.P. (2001): The Australian Species of *Pachyneuron* Walker (Hymenoptera: Chalcidoidea, Pteromalidae). *Journal of Hymenoptera Research* 10(1): 29-54.
- Gibson G.A.P., Vikberg, V. (1998): The species of *Asaphes* Walker from America north of Mexico, with remarks on extralimital distributions of taxa (Hymenoptera: Chalcidoidea, Pteromalidae). *Journal of Hymenoptera Research* 7(2): 209-256.
- Goldansaz, H., Esmaili, M., Ebadi, R. (1996): Lesser wax moth, *Achroia grisella* FAB. and its parasitic wasps. *Proceedings XX International Congress of Entomology, Firenze, Italy, August 25-31: 663.*
- Graham, M.W.R. de V. (1969): The Pteromalidae of North-Western Europe (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum, Natural History, Entomology, Supplement* 16: 1-908.
- Habibpour B., Kamali, K., Meidani, J. (2002): Insects and mites associated with stored products and their arthropod parasites and predators in Khuzestan province (Iran). *Bulletin Section Regionale Ouest Palaeartique, Organisation Internationale de Lutte Biologique* 25 (3): 89-91.
- Hasani, A., Madjzadeh, S.M. (2012): Contribution to the knowledge of the Pteromalidae (Hymenoptera: Chalcidoidea) from Khorasan Razavi Province, Northeastern Iran. *Iranian Journal of Animal Biosystematics* 8(1): 57-69.
- Hasani, A., Mitroiu, M.D., Madjzadeh, S.M. (2011): New records of Pteromalidae (Hymenoptera: Chalcidoidea) from Northeastern Iran. *Acta Zoologica Bulgarica* 63(3): 323-325.
- Herting, B. (1973): Coleoptera to Strepsiptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. *Commonwealth Agricultural Bureau, Institute of Biological Control* 3: 114.
- Hesami, S., Seyedehbrahimi, S., Gheibi, M., Zareie, R. (2010): Occurrence of four species of Hymenoptera associated with *Astragalus meridionalis* in Fars province of Iran. *Proceeding of 19th Iranian plant protection congress, 31 July-3 August. Tehran, Iran: p. 124. [in Persian, English summary]*
- Jalilvand, N., Gholipour, Y. (2002): Pistachio production in Iran: II. Main Iranian pistachio pests. *NUCIS Newsletter* 11: 23-25.
- Lotfalizadeh, H. (2002): Parasitoids of cabbage aphid, *Brevicoryne brassicae* (L.) (Hom.: Aphididae) in Moghan region. *Agricultural Science* 12(1): 15-25. [in Persian, English summary]
- Lotfalizadeh, H. (2002): Natural enemies of cotton aphids in Moghan region. *Proceeding of the 15th Iranian Plant Protection Congress 7-11 Sep. Razi Univ., Kermanshah, Iran: 36-37. [in Persian, English summary]*
- Lotfalizadeh, H. (2004): Introduction of two species of the genus *Spalangia* LAT. (Hym.: Pteromalidae) from Iran. *Proceeding of the 16th Iranian Plant Protection Congress, 28 Aug.-1 Sep., Univ. of Tabriz, Iran, p. 114. [in Persian, English summary]*
- Lotfalizadeh, H. (2008): New distribution records for Eucharitidae (Hym.: Chalcidoidea) in Iran. *North-Western Journal of Zoology* 4(1): 134-138.
- Lotfalizadeh, H. (2010): The genus *Metaphycus* Mercet (Hym.: Encyrtidae) of the Iranian fauna with description of a new species. *North-Western Journal of Zoology* 6(2): 255-261.
- Lotfalizadeh, H., Ahmadi, A.A. (1998): New record of *Schizonotus sieboldi* Ratzeburg (Hym.: Pteromalidae), pupal parasitoid of poplar leaf beetle, *Chrysomela populi* L. (Col.: Chrysomelidae) from Iran. *Applied Entomology and Phytopathology* 66(1/2): 45-46.
- Lotfalizadeh, H., Ahmadi, A.A. (2000): Natural enemies of cypress tree mealybug, *Planococcus wuae* (Nasonov), and their parasitoids in Shiraz, Iran. *Iran Agricultural Research* 19 (2): 145-154. [in Persian]
- Lotfalizadeh, H., Gharali, B. (2008): Pteromalidae (Hymenoptera: Chalcidoidea) of Iran: New records and a preliminary checklist. *Entomofauna* 29(6): 93-120.
- Madjzadeh, S.M., Zerova, M., Dawah, H. (2005): A new species of *Tetramesa* (Hymenoptera: Eurytomidae) from Iran. *Vestnik Zoologii* 39(1): 65-66.
- Mahdavi, M., Madjzadeh, S.M. (2013): Contribution to the knowledge of Chalcidoidea (Pteromalidae and Eupelmidae) of Iran. *North-Western journal of Zoology* 9(1): 94-98.
- Matejko, L., Sullivan, D.J. (1984): Interspecific tertiary parasitoidism between two aphid hyperparasitoids: *Dendrocerus carpenteri* and *Alloxysta megourae* (Hymenoptera: Megaspilidae and Cynipidae). *Journal of Washington Academy of Sciences* 74: 31-38.
- Mehrnejad, M. R. (2002): The natural parasitism ratio of the pistachio twig borer moth, *Kermania pistaciella*, in Iran. *Acta Horticulturae* 591: 541-544.
- Mehrnejad, M. R. (2003): The influence of host species on some biological and behavioural aspects of *Dibrachys boarmiae* (Hymenoptera: Pteromalidae), parasitoid of *Kermania pistaciella* (Lepidoptera: Tineidae). *Biocontrol Science and Technology* 13: 219-229.
- Mitroiu, M.D., Abolhassanzadeh, F., Madjzadeh, S.M. (2011): New records of Pteromalidae (Hymenoptera: Chalcidoidea) from Iran, with description of a new species. *North-Western Journal of Zoology* 7(2): 243-249.
- Nazemi-Rafi, J., Lotfalizadeh, H. (2010): *Oodera monstrum* Nikol's Kaya, 1952 (Hym.: Pteromalidae): a new generic and specific record for Iran. *Proceeding of 19th Iranian plant protection congress, 31 July-3 August. Tehran, Iran: 145. [in Persian, English summary]*
- Noyes, J.S. (2012): Universal Chalcidoidea Database. World Wide Web electronic publication. <http://www.nhm.ac.uk/chalcidoids>, accessed at: 2012.06.01.
- Oilb (1971): Liste d'identification des entomophages 8. OILB, Genève, pp. 18.
- Rezaei, V., Moharrampour S., Talebi, A.A. (2003): The first report of *Psychophagus omnivorus* (Walker) and *Chouioia cunea* (Yang) parasitoid wasps of American white webworm *Hyphantria cunea* Drury (Lep.: Arctiidae) from Iran. *Applied Entomology and Phytopathology* 70(2): 33.
- Sadeghi, S.E., Askary, H. (2001): Parasitism rate of *Schizonotus sieboldii* Ratzeburg (Hymenoptera: Pteromalidae) a parasitoid of poplar leaf beetle pupa, on different poplar species. pp. 40. In: Thuróczy, C., Eke, I., Káldy, J., Melika, G. (eds.), *International symposium: Parasitic Hymenoptera: taxonomy and biological control. 14-17 May, Systematic parasitoid laboratory, Köszeg, Hungary Köszeg, Hungary.*
- Sadeghi, S.E., Ebrahimi, E. (2002): New report of *Pachyneuron grande* Thomson (Hym.: Pteromalidae) from Iran. *Journal of Entomological Society of Iran* 21(1): 113-114. [in Persian, English summary]
- Sharifi, S., Javadi, I. (1971): Control of Rosaceae branch borer in Iran. *Journal of Economic Entomology* 64(2): 484-486.
- Steffan, J. R. (1968): Observations sur *Chalcedectus sinaiticus* (Ms.) et descriptions de *C. balachowskyi* sp. n. (Hym. Chalcedectidae) et d'*Oopristus safavii* gen. n., sp. n. (Hym. Torymidae), deux parasites d'importance économique en Iran. *Entomophaga* 13(3): 209-216.
- Sullivan, D.J (1987): Insect hyperparasitism. *Annual Review of Entomology* 32: 49-70.
- Sureshan, P.M. (2003): Checklist of Pteromalidae (Insecta: Hymenoptera: Chalcidoidea) of India. *Zoological Survey of India Gangetic Plains Regional Station: 1-14.*
- Xiao, H., Huang, D. (2001): A Revision of *Systasis* Walker (Hymenoptera: Pteromalidae) from China. *Zoological Studies* 40(1): 7-13.
- Xiao, H., Polaszek, A., Huang, D. (2005): A study of the genus *Callitula* Spinola (Hymenoptera: Pteromalidae) from china. *Oriental Insecta* 39: 233-240.