

NOTES ON THE IRANIAN FAUNA OF PTEROMALIDAE (HYMENOPTERA)

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ABSTRACT

Pteromalidae (Insecta: Hymenoptera) are often parasitoids of economically important pests. The fauna of these beneficial insects was studied in some regions of Iran (including East Azarbaijan, Fars, Golestan, Guilan, Hamadan, Isfahan, Kerman, Kermanshah, Khorasan, Mazandaran, Semnan, Tehran, and Zanjan provinces). A total of 28 species from 25 genera were collected. Among them five species (*Cerocephala cornigera* Westwood, *Dinarmus acutus* Thomson, *Enargopelte obscura* Förster, *Panstenon oxylus* Walker, and *Systasis parvula* Thomson) are new records for Iran.

Keywords: Hymenoptera, Chalcidoidea, Pteromalidae, Fauna, New record, Host, Iran.

INTRODUCTION

Pteromalidae is one of the largest families of Chalcidoidea which involves cosmopolitan small wasps; over 3506 species of them were described under 587 genera worldwide (Sureshan and Narendran, 2003; Noyes, 2003). The fauna of Iranian Pteromalidae is poorly studied; a total of 122 species were reported in Iran so far (Modarres Awal, 1997; Ghahari, 2004; Nikdel *et al.*, 2004; Abd-Rabou *et al.*, 2005; Moodi and Mosadegh, 2006; Sakenin Chelav *et al.*, 2008a).

Pteromalids are mostly primary parasitoids, but some of them are hyperparasitic; some are ectoparasitoids, whereas others are endoparasitoids. Although, this family has a wide host range, most species are gregarious ectoparasitoids of larvae and pupae of Lepidoptera and Coleoptera, but a number of species attack larvae and pupae of Diptera as well (Bouček, 1988). Some species are predaceous on eggs of scale insects (Bouček and Rasplus, 1991). Thus, they play an important role in most of the ecosystems, mainly as secondary or tertiary consumers in trophic chains (Mitroiu, 2008). More information about geographical distribution and the biology of the species are given by Graham (1969) and Noyes (2003). Owing to the great diversity of insects attacked by pteromalids, they play a major role in agriculture, forestry, and nature in general (Burks, 1979; Bouček and Heydon, 1997). Considerable importance has been placed on pteromalids for biological control of Lepidoptera, Coleoptera and synanthropic Diptera (Figg *et al.*, 1983; Bouček and Rasplus, 1991; Bouček, 1993; Dawei and Xinwang, 1993; Legner, 1995). A few species have also been used for the biological control of Coccidae (Civelek *et al.*, 2002; Kaydan *et al.*, 2006).

Therefore, the fauna of these beneficial wasps, which may represent an important biocontrol agent against several pests in different agro-ecosystems from some regions of Iran, is studied in the present work.

MATERIALS AND METHODS

The specimens were collected using different methods including sweeping nets, malaise traps, and rearing of the hosts (until emergence of the pteromalid adults) between 2001 and 2008. In order to obtain the parasitoids or hyperparasitoids, host-infested plant parts were placed in plastic bags at optimum conditions in the laboratories (27±2 °C, 70±10 RH%, 14: 10 L: D), and the adult emergence was monitored. The emerged adult parasitoids

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were preserved in vials containing 70% ethanol. Additionally, many specimens were obtained from some insect collections of different universities in Iran. Several keys for identification of the genera and species (Graham, 1969; Wall, 1972; Boucek, 1988; Boucek and Rasplus, 1991; Boucek and Heydon 1997) have been followed for classification and nomenclature of the obtained pteromalid specimens.

RESULTS AND DISCUSSION

During the conducted surveys of pteromalid fauna in different regions of Iran, a total of 28 parasitoid or hyperparasitoid species from 25 genera were collected. The list of species is given below. Species with “*” are new records for the Iranian insect fauna.

***Ablaxia parviclava* (Thomson, 1878)**

Material examined: Khorasan province: Serakhs (1 ♀; malaise trap), vii.2007.

***Caenacis inflexa* (Ratzeburg, 1848)**

Material examined: Hamadan province: Hamadan (1 ♀; host rearing method), 26.viii.2003, ex galls of *Rhodites rosae* (Hymenoptera: Cynipidae) on *Rosa beggeriana* (Rosaceae).

***Callitula angioneuræ* Bouček, 1970**

Material examined: Mazandaran province: Savadkooh (1 ♀; sweeping net), 19.ix.2003.

****Cerocephala cornigera* Westwood, 1832**

Material examined: Isfahan province: Najaf-Abad (3 ♀ ♀; host rearing method), viii.2008, ex *Scolytus* sp. (Coleoptera: Scolytidae).

***Conomorium patulum* (Walker, 1835)**

Material examined: Isfahan province: Isfahan (Borkhar) (2 ♀ ♀; host rearing method), 25.viii.2001, ex pupa of *Thaumetopoea solitaria iranica* (Lepidoptera: Thaumetopoeidae) on pistachio tree. Kerman province: Rafsanjan (1 ♀, 1 ♂; host rearing method), 26.vi.2002, ex *Thaumetopoea* sp. on pistachio tree (*Pistacia vera*).

***Cryptoxyx robustus* (Masi, 1907)**

Material examined: Fars province: Shiraz (2 ♀ ♀; host rearing method), 3x.2002, ex pupa of *Adleria* sp. (Hymenoptera: Cynipidae) on oak tree (*Quercus* sp.).

***Dibrachys affinis* Masi, 1907**

Material examined: Tehran province: Damavand (2 ♀ ♀, 1 ♂; host rearing method), vii.2007, ex *Cydia pomonella* (Lepidoptera: Olethreutidae) on apple tree (*Malus orientalis*).

****Dinarmus acutus* Thomson, 1878**

Material examined: Khorasan province: Mashhad (2 ♀ ♀; host rearing method), vi.2009, ex *Bruchus* sp. (Coleoptera: Bruchidae) on pea (*Pisum sativum*).

****Enargopelte obscura* Förster, 1878**

Material examined: Khorasan province: Mashhad (1 ♀, 1 ♂; malaise trap), vi.2009.

***Hyperimerus pusillus* (Walker, 1833)**

Material examined: Mazandaran province: Savadkooh (3 ♀ ♀; host rearing method), iv.2006, ex *Psylla pyricola* (Hemiptera: Psyllidae) on pear tree (*Pyrus communis*).

***Mesopolobus jucundus* (Walker, 1834)**

Material examined: Zanzan province: Zanzan (3 ♀ ♀; host rearing method), vi.2008, ex *Diplolepis mayri* (Hymenoptera: Cynipidae) on *Rosa canina*.

***Metacolos azureus* Ratzeburg, 1844**

Material examined: Khorasan province: Bojnord (2 ♀ ♀; host rearing method), iv.2003, ex *Scolytus kirschi* (Coleoptera: Scolytidae) on apricot tree (*Armeniaca vulgaris*).

***Moranila californica* (Howard, 1881)**

Material examined: Mazandaran province: Chalus, Fereydonkenar (2 ♀ ♀, 2 ♂ ♂; host rearing method), ix.2004, ex *Pulvinaria vitis* (Hemiptera: Coccidae) on *Vitis vinifera*.

***Ormocerus vernalis* Walker, 1834**

Material examined: Kermanshah province: Ravansar (1 ♀; host rearing method), vii.2003, ex *Neuroterus tricolor* (Hymenoptera: Cynipidae).

***Pachyneuron planiscuta* Thomson, 1878**

Material examined: Hamadan province: Hamadan (3 ♀♀, 1 ♂; host rearing method), 26.viii.2003, ex *Nipaecoccus viridis* (Hemiptera: Pseudococcidae) on *Nerium oleander*.

****Panstenon oxylus* (Walker, 1839)**

Material examined: Tehran province: Varamin (2 ♀♀; host rearing method), 13.viii.2007, ex *Trachelus tabidus* (Hymenoptera: Cephidae) in wheat field (*Triticum vulgare*).

***Phaenocyttus glechomae* (Förster, 1841)**

Material examined: Semnan province: Shahrood (1 ♀; host rearing method), 14.vi.2008, ex *Liposthenes* (=Aulax) *glechomae* (Hymenoptera: Cynipidae) on *Glechoma* sp.

***Pteromalus albipennis* (Walker, 1835)**

Material examined: Golestan province: Bandar-Torkman (3 ♀♀, 2 ♂♂; host rearing method), ix.2004, ex *Myopites inulaedyssentericae* (Diptera: Tephritidae). East Azarbayjan province: Arasbaran (3 ♀; host rearing method), viii.2007, ex *Urophora cardui* (Diptera: Tephritidae). Mazandaran province: Galogah (4 ♀♀, 5 ♂♂; host rearing method), vii.2007, ex *Terellia tussilaginis* (Diptera: Tephritidae).

***Pteromalus intermedius* (Walker, 1834)**

Material examined: Guilan province: Astara (1 ♀; host rearing method), vii.2006, ex *Oxyna parietina* (Diptera: Tephritidae).

***Schizonotus sieboldi* (Ratzeburg, 1848)**

Material examined: Mazandaran province: Babol (2 ♀♀, 2 ♂; host rearing method), ix.2002, ex *Chrysomesa coerufans* (Coleoptera: Chrysomelidae).

***Stenomalina gracilis* (Walker, 1834)**

Material examined: Guilan province: Lahijan (1 ♀; host rearing method), 16.iv.2008, ex *Dasyneura acrophila* (Diptera: Cecidomyiidae) on ash tree (*Fraxinus excelsior*).

****Systasis parvula* Thomson, 1876**

Material examined: Golestan province: Gorgan (1 ♀, 2 ♂♂; sweeping net), 5.ix.2005.

***Systasis tenuicornis* Walker, 1834**

Material examined: Mazandaran province: Behshahr (1 ♀, 1 ♂; malaise trap), 19.iv.2006.

***Toxexuma fuscicorne* Walker, 1833**

Material examined: Isfahan province: Najaf-Abad (2 ♀♀; host rearing method), vi.2003, ex *Agromyza schneri* (Diptera: Agromyzidae).

***Trichomalopsis peregrina* (Graham, 1969)**

Material examined: Isfahan province: Najaf-Abad (2 ♂♂; host rearing method), vi.2003, ex *Ragoletis* sp. (Diptera: Tephritidae).

***Trichomalus posticus* (Walker, 1834)**

Material examined: Tehran province: Varamin (1 ♀, 1 ♂; host rearing method), 13.viii.2007, ex *Chlorops* sp. (Diptera: Chloropidae).

***Trigonoderus pulcher* Walker, 1836**

Material examined: Hamadan province: Hamadan (1 ♀; malaise trap), 16.x.2006.

***Trychnosoma punctipleura* (Thomson, 1878)**

Material examined: Isfahan province: Isfahan (2 ♀♀; host rearing method), 24.viii.2001, ex *Curculio cribricollis* (Coleoptera: Curculionidae) on sugar-beet (*Beta vulgaris*).

The fauna of pteromalid wasps was studied in some regions of Iran and the results indicate that there is a diverse fauna of these beneficial insects in this country. A total of 75 specimens were collected during the present work. Including the species listed in this work, the total number of the recorded Iranian Pteromalidae

reached 130 species. A total of 27 host species from 15 families including Agromyzidae (1 species), Cecidomyiidae (1 species), Chloropidae (1 species), Tephritidae (5 species) [Diptera], Cephidae (1 species), Cynipidae (4 species) [Hymenoptera], Bruchidae (1 species), Chrysomelidae (1 species), Curculionidae (1 species), Scolytidae (1 species) [Coleoptera], Olethreutidae (1 species), Thaumetopoeidae (2 species) [Lepidoptera], Coccidae (1 species), Pseudococcidae (1 species), and Psyllidae (1 species) [Hemiptera], were collected and represent hosts for 22 species of pteromalid wasps.

The continuation of the faunistic surveys of Pteromalidae in different localities is necessary in order to cover most of the Iranian fauna of this family. Since Iran is a large country with various geographical landscapes and climates, therefore, we estimate that nearly over two hundred species of Pteromalidae may exist in Iran.

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REFERENCES

- Abd-Rabou, S., Ghahari, H., Huang, J., and Bouček, Z. (2005). New records of aphelinid and pteromalid wasps (Hymenoptera: Chalcidoidea: Aphelinidae, Pteromalidae) from Iran. *Egypt Journal of Agricultural Research*, **83(4)**: 1619-1623.
- Bouček, Z. (1988). *Australasian Chalcidoidea (Hymenoptera) – A biosystematic of genera of fourteen families, with a reclassification of species*. CAB International, Wallingford, pp. 1-831.
- Bouček, Z. (1993). New taxa of North American Pteromalidae and Tetracampidae (Hymenoptera), with notes. *Journal of Natural History*, **27(6)**: 1239-1313.
- Bouček, Z. and Rasplus, J.-Y. (1991). *Illustrated key to West-Palaeartic genera of Pteromalidae (Hymenoptera: Chalcidoidea)*. Institut National de la Recherche Agronomique, Paris, 140 pp.
- Bouček, Z. and Heydon, S.L. (1997). Pteromalidae, pp. 541-692. In: *Annotated Keys to the Genera of Nearctic Chalcidoidea (Hymenoptera)* (Gibson, G.A.P., Huber, J.T., and Woolley, J.B.; Eds.), Ottawa, Canada: National Research Council Research Press, 794 pp.
- Burks, B.D. (1979). Family Pteromalidae. In: *Catalog of Hymenoptera in America North of Mexico*, Volume 1, Symphyta and Aprocrita Krombein, (Hurd, K.V., Jr., P.D., Smith, D.R., and Burks, B.D., Eds). Smithsonian Institute Press, Washington, D.C., pp. 768-835.
- Civelek, H.S., Yoldas, Z., and Weintraub, P. (2002). The Parasitoid Complex of *Liriomyza huidobrensis* in Cucumber Greenhouses in Izmir Province, Western Turkey. *Phytoparasitica*, **30(3)**: 1-3.
- Dawei, H. and Xinwang, T. (1993). Two new genera and two new species of Pteromalidae (Hymenoptera: Chalcidoidea). *Sinozoologia*, **10**: 395-400.
- Figg, D.E., Hall, R.D., and Thomas, G.D. (1983). Insect parasites associated with Diptera developing in bovine dung pats on central Missouri (USA) pastures. *Environmental Entomology*, **12**: 961-966.
- Ghahari, H. (2004). Notes on fifteen species of parasitoids and one species of hyperparasitoid (Pteromalidae & Encyrtidae) from Iran. *Applied Entomology and Phytopathology*, **71(2)**: 33-34.
- 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, 908 pp.
- Kaydan, M.B., Kilincer, N., Uygun, N., Japoshvilli, G., and Gaimari, S. (2006). Parasitoids and Predators of Pseudococcidae (Hemiptera: Coccoidea) in Ankara, Turkey. *Phytoparasitica*, **34(4)**: 331-337.

- Legner, E.F. (1995). Biological control of Diptera of medical and veterinary importance. *Journal of Vector Ecology*, **20**: 59-120.
- Mitroiu, M.D. (2008). Pteromalidae (Hymenoptera: Chalcidoidea) new to Romania (V). *Analele Stiintifice ale Universitatii. Al. I. Cuza, Iasi, s. Biologie Animala* LIV: 25-29.
- Modarres Awal, M. (1997). Pteromalidae (Hymenoptera), pp. 279-280. In: *List of agricultural pests and their natural enemies in Iran*. Ferdowsi University Press, 429 pp.
- Moodi, S., and Mosadegh, M.S. (2006). Natural enemies of *Aphis fabae*, on *Solatum nigrum* plant in Khuzestan province. *Proceedings of 17th Iranian Plant Protection Congress*, p. 56.
- Nikdel, M., Sadaghian, B., and Dordaei, A. (2004). Collection and determination of brown-tail moths' natural enemies in Arasbaran forests. *The Joint Agriculture and Natural Resources Symposium, Tabriz-Ganja, May 14-16, 2004*.
- Noyes, J.S. (2003). Universal Chalcidoidea Database. World Wide Web electronic publication. Available from: www.nhm.ac.uk/entomology/chalcidoids/index.html [accessed 35-Mar-2008]
- Sakenin Chelav, H., Imani, S., Shirdel, F., Samin, N., and Havaskary, M. (2008a). Identification of Pentatomidae (Heteroptera) and their host plants in central and eastern Mazandaran province and introducing of many dominant natural enemies. *Journal of Plant and Ecosystem*, **15**: 37-51.
- Sakenin Chelav, H., Eslami, B., Samin, N., Imani, S., Shirdel, F., and Havaskary, M. (2008b). A contribution to the most important trees and shrubs as the hosts of wood-boring beetles in different regions of Iran and identification of many natural enemies. *Journal of Plant and Ecosystem*, **16**: 27-46.
- Sureshan, P.M. and Narendran, T.C. (2003). A Checklist of Pteromalidae (Hymenoptera: Chalcidoidea) from the Indian subcontinent. *Review Zoos' Print Journal*, **18(5)**: 1099-1110.
- Wall, I. (1972). Provisional classification of the Pteromalidae of central Europe. *Entomologische Abhandlungen (Dresden)*, 39: 1-182.