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A STUDY OF THE PTEROMALIDAE (HYMENOPTERA: CHALCIDOIDEA) FROM WESTERN AND NORTHWESTERN IRAN

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Abstract - Pteromalids are small parasitic koinobiont wasps that grow on immature stages of other insects. Thus, they play an important role in most ecosystems, mainly as secondary or tertiary consumers. In the conducted surveys of pteromalid fauna in western and northwestern Iran, 37 parasitoids and hyperparasitoid species from 32 genera were collected and are presented here with the host records.

Key words: Hymenoptera, Chalcidoidea, Pteromalidae, fauna, Iran

INTRODUCTION

The Pteromalidae is one of the largest families of Chalcidoidea (Hymenoptera) containing over 3506 described species worldwide. The family is distributed in all biogeographical areas of the world and shows great diversity in morphology and biology. The great majority of Pteromalidae are primary or secondary parasitoids that attack a large number of insects at various stages of host development. Only a few pteromalids are phytophagous. Some of them develop in the seeds of plants, others are gall makers and still others develop as inquilines in galls caused by other insects. They play an important role in the biological control of serious insect pests in the field and many of them are employed successfully in biological control programs all over the world (Bouček and Heydon, 1997; Sureshan and Narendran, 2003; Gibson, 2009).

Pteromalidae is defined only by the absence of features defining other chalcidoid families and it may be paraphyletic in respect to a number of these; the limits and placement of this family are simply unknown. Thirty-one subfamilies are currently recognized within Pteromalidae (Noyes, 2003), although inclusion and exclusion of many subfamilies is still highly uncertain. Few comprehensive phylogenetic studies have been conducted at the subfamily or tribal level, making the coding of characters and choice of exemplars difficult in higher-level analyses (Gibson, 2003; Desjardins, 2007).

The fauna of Iranian Pteromalidae is highly diverse but was poorly studied so far (Modarres Awal, 1997; Abd-Rabou et al., 2005; Sakenin et al., 2008a, b). The main publications on this family include: Modarres Awal (1997), Ghahari (2004), Abd-Rabou et al. (2005), Sakenin et al. (2008a, b) and Ghahari et al. (2010) that describe 25, 15, 31, 38 and 28 species, respectively. The main aim of this paper is to determine the pteromalid species in some regions of west and northwestern Iran.

MATERIALS AND METHODS

The specimens were collected using three methods: sweeping net, Malaise trap and rearing of various hosts by the authors and other researchers. The samplings were conducted in 19 localities (Ahar, Ardabil, Aslandooz, Bijar, Bilehsavar, Divandarreh, Jolfa, Kaleybar, Khodafarin, Khoy, Maco, Mahabad, Maragheh, Oshnavieh, Ourmieh, Piranshahr, Ravansar, Sanandaj and Tabriz) related to 4 provinces including, Ardabil, East Azerbaijan, Kermanshah, Kordestan and West Azerbaijan. In order to obtain the parasitoids or hyperparasitoids, infested plant parts were placed in plastic bags under laboratory conditions (25±2ºC, 75±5 RH%, 16: 8 L: D) and adult emergence was monitored. Additionally, the immature life stages of different insects were collected from fields and forests and were kept at the abovementioned optimum conditions for the emergence of the probable parasitoids or hyperparasitoids inside. The emerging adult parasitoids were transferred into vials of 70% ethanol and were examined with a stereoscopic binocular microscope. The classification method was used according to Graham (1969), Wall (1972) and Bouček and Rasplus (1991).

RESULTS

A total of 37 pteromalid species from 32 genera were collected from west and northwestern Iran. The list of species with the host of some species is given below.

Genus *Agrilocida* Steffan 1964

Agrilocida ferrierei Steffan 1964
Material examined: Ardabil province: Pars-Abad (1 ♀), September 2007, ex *Sphenoptera* sp. (Coleoptera: Buprestidae).

Genus *Apsilocera* Boucek 1954

Apsilocera bramleyi Graham 1966
Material examined: Kordestan province: Kamyaran (2 ♀♀, 1 ♂), April 2008, ex: galls of *Cecidomyia* sp. (Diptera: Cecidomyiidae).

Genus *Caenacis* Foerster 1856

Caenacis lauta (Walker 1835)
Material examined: Kermanshah province: Kermanshah (2 ♀♀), October 2005, ex galls of *Cynips panteli* (Kieffer) (Hymenoptera: Cynipidae) on *Quercus* sp.

Genus *Capellia* Delucchi 1958

Capellia cecidomyia (Ratzeburg 1844)
Material examined: West Azerbaijan province: Maco (2 ♀♀, 1 ♂), July 2007, ex: galls of *Cecidomyia pini* (De Geer) (Diptera: Cecidomyiidae) on *Pinus* sp.

Genus *Cheiropachus* Westwood 1828

Cheiropachus quadrum (Fabricius 1787)
Material examined: Kordestan province: Marivan (1 ♀), September 2005, ex: larvae of *Rugoloscolytus mediterraneus* Eggers (Coleoptera: Scolytidae) on *Persica vulgaris*.

Genus *Cratomus* Dalman 1820

Cratomus megacephalus (Fabricius 1793)
Material examined: East Azerbaijan province: Horand (1 ♀, 2 ♂♂), July 2006, ex: *Sphex lividocinctus* Kohl (Hymenoptera: Sphecidae).

Genus *Dibrachoides* Kurdjumov 1913

Dibrachoides dynastes (Foerster 1841)
Material examined: East Azerbaijan province: Tabriz (2 ♀♀, 1 ♂), September 2007, ex: pupa of *Hypera* sp. (Coleoptera: Curculionidae).

Genus *Diglochis* Foerster 1856

Diglochis sylvicola (Walker 1835)
Material examined: Kordestan province: Sanandaj (1 ♀), April 2005, ex: pupa of *Tabanus* sp. (Diptera: Tabanidae).

Genus *Dipara* Walker 1833

Dipara petiolata Walker 1833

Material examined: East Azerbaijan province: Ahar (1 ♀), June 2006, ex: larvae of *Anthonomus gemmicola* Ter-Minassian (Coleoptera: Curculionidae).

Genus *Euneura* Walker 1844

Euneura lachni Ashmead 1887
Material examined: West Azerbaijan province: Salmas (3 ♀♀), August 2008, ex: hyperparasitoid of *Aphidius ervi* Haliday (Hymenoptera: Aphidiidae) on *Acyrthosiphon pisum* (Harris) (Hemiptera: Aphididae).

Genus *Eurydinota* Foerster 1878

Eurydinota leptomera Förster 1878
Material examined: West Azarbaijan province: Mahabad (2 ♂♂), June 2006, collected by sweep net.

Genus *Gastracanthus* Westwood 1833

Gastracanthus pulcherrimus Westwood 1833
Material examined: West Azerbaijan province: Ourmieh (3 ♀♀), August 2006, ex: larvae of *Sphenoptera* sp. (Coleoptera: Buprestidae).

Genus *Halticoptera* Spinola 1811

Halticoptera crius (Walker 1839)
Material examined: East Azerbaijan province: Tabriz (1 ♀, 1 ♂), September 2007, collected by sweep net.

Halticoptera flavicornis (Spinola 1808)
Material examined: Ardabil province: Aslandooz (1 ♂), July 2006, ex: larva of Agromyza sp. (Diptera: Agromyzidae).

Genus *Homoporus* Thomson 1878

Homoporus fulviventris (Walker 1835)
Material examined: Ardabil province: Meshkinshahr (2 ♀♀), June 2007, collected by sweep net.

Homoporus subniger (Walker 1835)
Material examined: West Azerbaijan province: Khoy (1 ♀), August 2007, collected by Malaise trap.

Genus *Macromesus* Walker 1848

Macromesus amphiretus Walker 1848
Material examined: Kermanshah province: Sahneh (1 ♀), June 2003, ex: larva of *Scolytus* sp. (Coleoptera: Scolytidae) on *Pinus nigra*.

Genus *Merisus* Walker 1835

Merisus splendidus Walker 1834
Material examined: Kordestan province: Sanandaj (2 ♀♀, 1 ♂), September 2007, ex: larva of *Tetramesa* sp. (Hymenoptera: Eurytomidae).

Genus *Mesopeltita* Ghesquière 1946

Mesopeltita truncatipennis (Waterston 1917)
Material examined: Ardabil province: Bilehsavar (1 ♂), July 2007, ex: *Saissetia* sp. (Hemiptera: Coccidae).

Genus *Metacolus* Foerster 1856

Metacolus unifasciatus Foerster 1856
Material examined: Ardabil province: Bilehsavar (1 ♀), March 2008, ex: *Scolytus* sp. (Coleoptera: Scolytidae).

Genus *Nikolskayana* Boucek 1965

Nikolskayana miriabilis Boucek 1965
Material examined: West Azerbaijan province: Salmas (3 ♀♀), September 2006, ex: *Xyleborus saxeseni* (Ratzeburg) (Coleoptera: Scolytidae).

Genus *Norbanus* Walker 1843

Norbanus obscurus (Masi 1922)
Material examined: East Azerbaijan province: Jolfa (1 ♂), March 2007, collected by sweep net.

Norbanus scabriculus (Nees 1834)
Material examined: West Azerbaijan province: Oshnavieh (2 ♀♀, 1 ♂), September 2008, ex: *Cephus* sp. (Hymenoptera: Cephidae).

Genus *Notanisus* Walker 1837

Notanisus oulmesiensis (Delucchi 1962)
Material examined: West Azerbaijan province: Mahabad (2 ♀♀, 1 ♂), June 2008, ex: *Sphenoptera* sp. (Coleoptera: Buprestidae).

Genus *Oodera* Westwood 1874

Oodera formosa (Girault 1863)
Material examined: West Azerbaijan province: Salmas (1 ♀), September 2007, ex: larva of *Capnodis* sp. (Coleoptera: Buprestidae).

Genus *Pachycrepoideus* Ashmead 1904

Pachycrepoideus vindemmiae (Rondani 1875)
Material examined: Kordestan province: Kamyaran (2 ♀♀), March 2007, ex *Drosophila melanogaster Meigen* (Diptera: Drosophilidae).

Genus *Pachyneuron* Walker 1833

Pachyneuron grande Thompson 1878
Material examined: East Azerbaijan province: Khomarloo (1 ♀, 2 ♂♂), October 2007, ex: *Nipaecoccus vastator* (Maskell) (Hemiptera: Pseudococcidae).

Genus *Paracarotomus* Ashmead 1894

Paracarotomus cephalotes Ashmead 1894
Material examined: Ardabil province: Aslandooz (3 ♀♀), July 2006, ex: *Syrphus* sp. (Diptera: Syrphidae).

Genus *Platyscapa* Motschulsky 1864

Platyscapa awekei Wiebes 1977
Material examined: Sistan and Baluchestan province: Sarbaz (1 ♀), June 2007, collected by Malaise trap.

Genus *Pteromalus* Swederus 1795

Pteromalus bifoveolatus Förster1861
Material examined: Kordestan province: Bijar (1 ♀, 2 ♂♂), June 2007, collected by sweep net.

Pteromalus elevatus (Walker 1834)
Material examined: East Azerbaijan province: Tabriz (1 ♀, 3 ♂♂), June 2006, ex: *Pieris brassicae* (Linnaeus) (Lepidoptera: Pieridae).

Pteromalus microps Graham 1969
Material examined: East Azerbaijan province: Kaleybar (1 ♀, 1 ♂), August 2008, ex: *Papilio* sp. (Lepidoptera: Papilionidae).

Genus *Spathopus* Ashmead, 1904

Spathopus hofferi Boucek 1964
Material examined: Ardabil province: Meshkinshahr (2 ♀♀), July 2005, collected by Malaise trap.

Genus *Sphegigaster* Spinola 1811

Sphegigaster stepicola Boucek 1965
Material examined: East Azerbaijan province: Maragheh (1 ♀), August 2008, ex: *Agromyza schineri* Giraud (Diptera: Agromyzidae).

Genus *Stenoselma* Delucchi 1956

Stenoselma nigrum Delucchi 1956
Material examined: East Azerbaijan province: Khodafarin (1 ♀, 1 ♂), June 2007, ex: *Anthaxia aspera* Bílý (Coleoptera: Buprestidae).

Genus *Trichomalus* Thomson 1878

Trichomalus perfectus (Walker 1835)
Material examined: East Azerbaijan province: Tabriz (3 ♀♀), July 2003, ex: *Ceutorrhynchus* sp. (Coleoptera: Curculionidae).

Genus *Urolepis* Walker 1846

Urolepis maritima (Walker 1834)
Material examined: Ardabil province: Germy (2 ♂♂), September 2008, collected by sweep net.

DISCUSSION

The collection of a total of 107 specimens from only

some regions of west and northwestern Iran indicates the high diversity of pteromalid wasps in these parts. All the hosts of Pteromalidae listed in this paper are related to 5 orders including Coleoptera, Diptera, Hymenoptera, Lepidoptera and Hemiptera, with 12, 7, 5, 2 and 2 species as the hosts of Pteromalidae. Among the coleopteran hosts, three families, Buprestidae, Scolytidae and Curculonidae were the most numerous with 5, 4 and 3 species, respectively. Since almost all sampled regions of this research were forests areas, the mentioned host records are the pests of different tree species. Although diverse and interesting parasitoid species were collected, continuation of the determination of the pteromalid fauna in other parts of Iran and even in the sampled regions in this paper is strongly suggested. Several regular samplings must be conducted in different regions of Iran to determine the fauna of Iranian Pteromalidae.

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