

Distribution of scelionid wasps (Hymenoptera: Platygastroidea: Scelionidae) in Western Iran

Rozšíření čeledi Scelionidae (Hymenoptera: Platygastroidea) v západním Íránu

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Abstract. The fauna of Scelionid wasps (Hymenoptera: Scelionidae) from Western Iran (Ilam, Kermanshah, Kurdistan, Khuzestan and West Azarbaijan provinces) is studied in this paper. In total 18 species of 5 genera (*Anteris* Förster, 1856, *Psix* Kozlov et Le, 1976, *Scelio* Latreille, 1805, *Telenomus* Haliday, 1833 and *Trissolcus* Ashmead, 1893) were collected. Of these, *Anteris simulans* Kieffer, 1908 is new record for Iran.

INTRODUCTION

Scelionidae (Hymenoptera) are primary, solitary endoparasitoids of the eggs of insects from most major orders and occasionally of spider eggs (Masner 1995). Members of this large family are surprisingly diverse in appearance, depending on the shape and size of the host egg from which they emerged: cylindrical to depressed, elongate and spindle-shaped to short, squat and stocky (Kononova 1992, Masner 1993). All scelionid wasps are parasitoids of the eggs of other arthropods, that is, females lay their own eggs within the eggs of other species of insects or spiders. The wasp larva that hatches consumes the contents of the host egg and pupates within it. A wide range of taxa serve as hosts: besides spiders, insect hosts include grasshoppers and crickets (Orthoptera *sensu stricto*), praying mantids (Mantodea), webspinners (Embiidina), true bugs (Hemiptera: both Heteroptera and Auchenorrhyncha), lacewings (Neuroptera), beetles (Coleoptera), flies (Diptera) and butterflies and moths (Lepidoptera) (Masner 1995, Austin et al. 2005). A number of species have been used as biological control agents with notable success (Orr 1988, Godfray 1994).

The biology of several large genera of Scelionidae have been reviewed in detail as part of contemporary taxonomic studies (*Telenomus* by Johnson (1984), *Ceratobaeus* by Iqbal & Austin (2000), and *Scelio* by Dangerfield et al. (2001)), and these include many aspects that relate more generally to other members of the family. In addition, several texts on Hymenoptera provide useful overviews of platygastroid biology (Masner 1993, 1995, Godfray 1994; Gauld & Bolton 1996, Quicke 1997). The most detailed biological studies have been undertaken on scelionids that are used as, or have potential for use as, biological control agents, for example, *Trissolcus*, *Telenomus*, and *Scelio*. As a consequence, information is strongly biased toward

the Telenominae, and care should be taken in extrapolating from these taxa to other members of the Scelionidae that are associated with different hosts (Austin et al. 2005).

The Iranian fauna of Scelionidae has been poorly studied (Modarres Awal 1997), although these beneficial insects have important role in several agroecosystems especially wheat fields. Since determining the fauna of a taxon (genus or family) is the first step in establishment of biological control agents in a region, in this paper the fauna of Scelionidae is studied in western regions of Iran. Very little research has been conducted to date on the Scelionidae of western Iran, the most important works being Mansour Ghazi and Radjabi (2000), Sharififar (2000), Khajehzadeh (2004) and Narehi et al. (2004).

MATERIALS AND METHODS

The materials for this research were collected from four provinces located in western Iran: Ilam, Kermanshah, Kurdistan, Khuzestan and West Azarbaijan. The samplings were made by the first author by different methods including, sweep net, malaise traps and rearing of parasitoids from eggs of Pentatomidae (Hemiptera). Egg masses of pentatomids were placed in plastic bags in optimum conditions ($26\pm 2^{\circ}\text{C}$, $65\pm 5\%$ RH, 14 : 10 L : D) in an incubator. Almost all the specimens were determined by E. Koçak and a few by P. N. Buhl (Ekeby, Sweden). The materials are deposited in the collections of the Department of Entomology, Islamic Azad University, Science and Research Branch, Tehran, Iran. For the synonyms, hosts and world distribution, Kozlov & Kononova (1983) were used, and for the terminology and morphological characters, with slight modifications, Masner (1980) and Johnson (1992) were used.

RESULTS

In total, eighteen scelionid species from six genera were collected from western Iran. The list of species is given below together with distributional data.

Subfamily Scelioninae Foerster, 1856

Genus *Anteris* Förster, 1856

Anteris simulans Kieffer, 1908

Material examined. West Azarbaijan province: Maco (1637 m), 1 ♀, vii.2004, H. Ghahari leg., E. Koçak det.

Distribution. Species known from Azerbaijan, Denmark, Germany, Republic of Moldova, Russia and Ukraine (Kozlov 1978, Kononova 1992, Johnson 2010). First record for Iran.

Genus *Scelio* Latreille, 1805

Scelio flavibarbis (Marshall, 1874)

Material examined. Khuzestan province: Ahwaz (15 m), 2 ♀♀, iii.2006, Y. Khajehzadeh leg.

Distribution. Species known from Bulgaria, France, Kazakhstan, Russia, Ukraine (Marshall 1874, Kononova & Kozlov 2008). Reported from Iran by Ghahari et al. (2009).

Scelio remaudierei Ferrière, 1952

Material examined. Kermanshah province: Kermanshah (1294 m), 1 ♀♀, 2 ♂♂, viii.2007, A. Valizadeh leg.

Distribution. Species widely distributed in Afrotropical and Palaearctic regions (Ferrière 1952, Kozlov 1978). Reported from Iran by Ghahari et al (2009).

Subfamily Telenominae Thomson, 1860
Genus *Psix* Kozlov et Le, 1976

***Psix striaticeps* (Dodd, 1920)**

Material examined. Kurdistan province: Baneh (1435 m), 1 ♀, vi.2004, H. Ghaffari leg.

Distribution. Species widely distributed in Afrotropical and Oriental regions (Johnson 1992, Rajmohana 2006). Reported from Iran by Hashemi Rad (2008).

Genus *Telenomus* Haliday, 1833

***Telenomus busseolae* Gahan, 1922**

Material examined. Khuzestan province: Ahwaz (27 m), 2 ♀♀, 1 ♂, viii.2008, H. Sakenin leg.

Distribution. Species known from Bangladesh, Cameroon, Egypt, Ghana, Greece, Iraq, Israel, Kenya, Mauritius, Nigeria, Reunion, Senegal, South Africa, Sudan and Uganda (Gahan 1922, Kozlov & Kononova 1983, Polaszek & Kimani 1990). Reported from Iran by Modarres Awal (1997).

***Telenomus heydeni* Mayr, 1879**

Material examined. West Azarbaijan province: Piranshahr (1466 m), 2 ♀♀, viii.2006, N. Samin leg.

Distribution. Species known from Austria, Germany, Kazakhstan, Moldavia, Russia and Turkey (Kieffer 1926, Mayr 1879, Lodos 1982, Kozlov & Kononova 1983). Reported from Iran by Modarres Awal (1997).

***Telenomus phalaenarum* (Nees et Esenbeck, 1834)**

Material examined. Kermanshah province: Islam-Abad Gharb (1342 m), 2 ♀♀, ix.2004, A. Valizadeh leg.

Distribution. Species widely distributed in Palearctic region (Johnson 1992). Reported from Iran by Samin et al. (2010).

***Telenomus sechellensis* Kieffer, 1910**

Material examined. Khuzestan province: Andimeshk (160 m), 1 ♀, viii.2002, H. Safari leg.

Distribution. Species widely distributed in Afrotropical and Oriental regions (Johnson 1992). Reported from Iran by Samin et al. (2010).

Genus *Trissolcus* Ashmead, 1893

***Trissolcus basalis* (Wollaston, 1858)**

Material examined. Kermanshah province: Sahneh (1365 m), 2 ♂♂, viii.2006, F. Mahmoudi leg.

Distribution. Cosmopolitan species (Johnson 1992). Reported from Iran by Modarres Awal (1997).

***Trissolcus djadetchsko* (Rjachovsky, 1959)**

Material examined. West Azarbaijan province: Khoy (1153 m), 1 ♀, iv.2007, N. Samin leg.; Sardasht (1538 m), 2 ♀♀, 2 ♂♂, iv.2007, H. Ghahari leg.

Distribution. Species known from Armenia, Azerbaijan, Kazakhstan, Moldavia, Russia, Turkey, Ukraine and Uzbekistan (Kozlov 1978, Koçak & Kılınçer 2000, 2003). Reported from Iran by Sakenin et al. (2008).

***Trissolcus grandis* (Thomson, 1861)**

Material examined. West Azarbaijan province: Ourmieh (1370 m), 4 ♀♀, 2 ♂♂, viii.2006, N. Samin leg.; Maco (1637 m), 3 ♀♀, viii.2006, H. Ghahari leg.; Khoy (1153 m), 2 ♀♀, 3 ♂♂, viii.2006, M. Havaskary leg.; Kurdistan province: Bijar (1746 m), 3 ♂♂, vi. 2007, A. Valizadeh leg.; Kermanshah province: Kermanshah (1267 m), 6 ♀♀, 5 ♂♂, iii. 2007, A. Valizadeh leg.; Ilam province: Abdanan (897 m), 2 ♀♀, 3 ♂♂, iv. 2008, A. Valizadeh leg., P. N. Buhl det.

Distribution. Species known from Belgium, Denmark, England, Italy, Kazakhstan, Moldavia, Morocco, Romania, Russia, Syria, Turkey and Ukraine (Thomson 1861, Debauche 1947, Remaudière & Skaf 1963, Voegel 1964, Javahery 1968, Fabritius 1974, Viggiani & Mineo 1974, Kozlov & Kononova 1983 and Koçak 2007). Reported from Iran by Modarres Awal (1997).

***Trissolcus manteroi* (Kieffer, 1909)**

Material examined. West Azarbaijan province: Ourmieh (1370 m), 2 ♀♀, viii.2006, N. Samin leg.

Distribution. Species known from Armenia, Italy, Moldavia, Turkey and Turkmenistan (Kieffer 1909, Kozlov & Kononova 1983, Koçak & Kılınçer 2000, 2003). Reported from Iran by Sakenin et al. (2008).

***Trissolcus pseudoturesis* (Rjachovsky, 1959)**

Material examined. Kurdistan province: Divandareh (1860 m), 1 ♀, 2 ♂♂, vi.2007, J. Nazari leg.

Distribution. Species known from Moldavia, Mongolia, Romania, Russia, Turkey and Ukraine (Fabritius 1974, Kozlov & Kononova 1983, Koçak & Kılınçer 2003). Reported from Iran by Sakenin et al. (2008).

***Trissolcus rufiventris* (Mayr, 1908)**

Material examined. Kermanshah province: Gilan-Gharb (830 m), 2 ♀♀, 3 ♂♂, vii.2008, A. Valizadeh leg., P. N. Buhl det.

Distribution. Species known from Moldavia, Mongolia, Morocco, Romania, Russia, South Africa, Turkey and Ukraine (Voegel 1964, Fabritius 1974, Kozlov & Kononova 1983, Koçak 2007). Reported from Iran by Modarres Awal (1997).

***Trissolcus semistriatus* (Nees, 1834)**

Material examined. Ilam province: Ilam (1428 m), 3 ♀♀, 1 ♂, iv.2003, A. Valizadeh leg.; Kurdistan province: Kamyaran (1469 m), 8 ♀♀, 3 ♂♂, viii.2005, J. Nazari leg.; Khuzestan province: Ahwaz (15 m), 2 ♂♂, iii.2006, Y. Khajehzadeh leg.; Kermanshah province: Kermanshah (1294 m), 7 ♀♀, 5 ♂♂, iii.2007, A. Valizadeh leg.; West Azarbaijan province: Salmas (1355 m), 3 ♀♀, 1 ♂, vii.2009, N. Samin leg.; Khoy (1153 m), 2 ♀♀, 2 ♂♂, viii.2009, N. Samin leg.; Miandoab (1345 m), 6 ♀♀, 3 ♂♂, viii.2009, N. Samin leg., P. N. Buhl det.

Distribution. Species known from Austria, Caucasus, Denmark, Britain, France, Germany, Morocco, Portugal, Romania, Russia and Turkey (Kieffer 1926, Lodos 1961, Voegel 1964, Javahery 1968, Fabritius 1974 and Graham 1984). Reported from Iran by Modarres Awal (1997).

***Trissolcus simoni* (Mayr, 1879)**

Material examined. Khuzestan province: Dezful (155 m), 1 ♀, 2 ♂♂, v.2006, M. Shakeri leg.; Kermanshah province: Kermanshah (1267 m), 1 ♂, vii.2008, A. Valizadeh leg., P. N. Buhl det.

Distribution. Species known from Austria, Azerbaijan, Georgia, Morocco, Romania, Russia, Syria, Turkey and Ukraine (Kieffer 1926, Remaudière & Skaf 1963, Voegelé 1964, Fabritius 1974, Kozlov & Kononova 1983 and Koçak & Kılınçer 2003). Reported from Iran by Modarres Awal (1997).

***Trissolcus tumidus* (Mayr, 1879)**

Material examined. West Azarbaijan province: Maco (1637 m), 1 ♀, 1 ♂, v.2007, N. Samin leg.

Distribution. Species known from Austria, Georgia, Kazakhstan, Japan, Morocco and Ukraine (Kieffer 1926, Kozlov & Kononova 1983 and Ryu & Hirashima 1984). Reported from Iran by Modarres Awal (1997).

***Trissolcus vassilievi* (Mayr, 1903)**

Material examined. Kurdistan province: Sanandaj (1368 m), 2 ♀♀ 2 ♂♂, viii.2005, G. Amirian leg.; Marivan (1340 m), 1 ♀, viii.2005, G. Amirian leg.

Distribution. Species known from Armenia, Moldavia, Morocco, Russia, Syria, Turkmenistan, Turkey and Ukraine (Lodos 1961, Remaudière & Skaf 1963, Voegelé 1964 and Kozlov & Kononova 1983). Reported from Iran by Modarres Awal (1997).

DISCUSSION

The results of this study indicate that there is rather diverse fauna of Scelionidae in western Iran. The main research conducted on Iranian Scelionidae so far have been focused on faunistic surveys, and the biology of these parasitoids remains poorly studied, with the exception of *Platytenomus hylas* Nixon, 1935 attacking the pest *Sesamia nonagrioides* Lefebvre, 1827 (Lepidoptera: Noctuidae) in Khuzestan province. Determining the biology of the parasitoids will contribute to successful application, conservation and augmentation (Godfray 1994, Gauld & Bolton 1996). Almost all regions of western Iran have wheat fields, and the sunn pest *Eurygaster integriceps* Puton, 1881 (Hemiptera: Scutelleridae) is the key pest in these regions (Safavi 1974, Mansour Ghazi & Radjabi 2000). The scelionid wasps (especially *Trissolcus* spp.) are the most effective parasitoids of sunn pest in Iran. Therefore faunistic surveys of these natural enemies in different regions of Iran are a first step towards biological control of Scutelleridae and Pentatomidae. After completing the fauna of Iranian Scelionidae, study of the biology of some effective parasitoids, especially *Trissolcus* spp. and *Telenomus* spp., is necessary for establishment of successful biological control programs.

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SOUHRN

Faunistické sledování vejcomarovitých (Hymenoptera: Platygastroidea: Scelionidae) západního Íránu prokázalo výskyt 18 druhů z pěti rodů (*Anteris* Förster, 1856, *Psix* Kozlov et Le, 1976, *Scelio* Latreille, 1805, *Telenomus* Haliday, 1833 a *Trissolcus* Ashmead, 1893). Druh *Anteris simulans* Kieffer, 1908 je poprvé hlášen z území Íránu.