

**A CONTRIBUTION TO THE SCELIONID WASPS (HYMENOPTERA:
PLATYGASTROIDEA: SCELIONIDAE), EGG PARASITOIDS OF PENTATOMIDAE
(HETEROPTERA) IN TEHRAN PROVINCE, IRAN**

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ABSTRACT

The scelionid wasps (Hymenoptera: Platygastridae: Scelionidae) are efficient egg parasitoids of several pests, especially Pentatomidae (Heteroptera). The fauna of these beneficial insects was studied in some regions of Tehran province especially Varamin and Shahre Rey. In a total of 9 species from 2 genera (including, *Telenomus* and *Trissolcus*) were collected. In this paper, a species list of scelionid wasps from Tehran province, synonyms, distribution and hosts in Iran, and general distribution are given too. Among the collected species, *Trissolcus circus* Kozlov and Le 1976 is a new record for Iran.

Keywords: Scelionidae, *Telenomus*, *Trissolcus*, Pentatomidae, Egg parasitoid, Tehran, Iran

INTRODUCTION

All scelionid wasps are parasitoids of the eggs of other arthropods, including insects and 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). The host range of the scelionid species and genera varies from those that are one-host specific, to those that parasitize different hosts belonging to four different orders, such as *Telenomus*. Many of the hosts of scelionids are pests of considerable importance in agriculture, forestry, and both human and animal health, for example, the gypsy moth (*Lymantria dispar*), migratory locust (*Locusta migratoria*), sunn pest (*Eurygaster integriceps*), kissing bugs (*Triatoma* spp., *Rhodnius* spp.), and horse flies (*Tabanus* spp.). A number of species have been used as biological control agents with notable success (Kozlov and Kononova, 1983; Johnson, 2005).

The subfamily Telenominae is a large and cosmopolitan taxon. Over 800 species have been formerly described (Johnson, 1992), but this is far from the final total. Attempts have been made to subdivide the two largest genera, *Telenomus* Haliday and *Trissolcus* Ashmead into species groups (e.g. Kozlov and Kononova, 1983; Johnson, 1984a, b), but the lineages and their relationships are still far from clear. Telenominae may be distinguished by the absence of laterosternites and therefore the entire structure of the metasoma, which is not held so rigidly together as in the other subfamilies. The wide laterotergites overlap the sterna relatively loosely, and metasomal segment 2 is the largest. In females, apparent tergum 7 is external, not extruded with the ovipositor during oviposition, and the cerci are transformed into sensory plates studded with long hairs. Males usually have the antenna with 10 flagellar segments and females with 9, with only a few apomorphic exceptions. The subfamily is very homogeneous, with few genera, but with a large number of described species and many more undescribed. During the evolution of the subfamily a host shift from Heteroptera (more primitive genera) to Lepidoptera (most *Telenomus*) occurred, with

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only a few species parasitizing such diverse hosts as Neuroptera, Diptera, and Homoptera. The largest genus, *Telenomus*, is important in biological control. The species are distributed equally in both temperate and tropical climates (Johnson, 1984a; Masner, 1993).

The fauna of Iranian Scelionidae was studied rather well (Radjabi and Amir-Nazari, 1989; Radjabi, 1994; Modarres Awal, 1997; Taghaddosi and Rajabi, 1998; Mansour Ghazi and Radjabi, 2000; Noori and Asgari, 2000; Sakenin Chelav *et al.*, 2008; Samin *et al.*, 2009); but among the different provinces of Iran, the fauna of Tehran province was not studied so far. The aim of the present work is to make a survey study on scelionids and their hosts' diversity in Tehran province.

MATERIALS AND METHODS

A survey was conducted in spring and summer seasons of 2009 from various localities of Tehran province for studying the fauna of scelionid wasps. The specimens were obtained mainly as adults emerged from specimens collected as eggs and reared in the laboratory. Egg masses of Pentatomidae were collected from Varamin, Shahre Rey, Shahreyar and Karaj regions. For emergence of parasitoids inside the host, egg masses of pentatomids were placed in plastic bags with holed cap at optimum rearing conditions (26 ± 2 °C, 65 ± 5 %RH, 14: 10 L: D) in an incubator. Also, some specimens were collected by sweeping nets with 17" in diameter in wheat fields and their surrounding weeds in the mentioned regions. The collected specimens were examined and determined in the laboratory using stereo zoom binocular microscope by the first and fourth authors.

RESULTS

In a total nine scelionid species from two genera (*Telenomus* and *Trissolcus*) were collected from different regions of Tehran province especially in wheat fields. The list of species is given below with synonyms, host and distributional data in Iran and general distribution.

Family Scelionidae (Haliday, 1840)

Subfamily Telenominae Thomson, 1860

Genus *Telenomus* Haliday, 1833

Telenomus chloropus (Thomson, 1861)

Synonyms: *Phanurus chloropus* Thomson, 1861; *Telenomus Sokolowi* Mayr, 1897; *Telenomus mayri* Sokolov, 1904; *Prophanurus Sokolowi* Kieffer, 1912; *Telenomus tischleri* Nixon, 1939; *Telenomus sokolovi* Meier, 1940.

Distribution in Iran: Tehran, Isfahan (Shojai, 1968; Modarres Awal, 1997), Mazandaran (Mohaghegh Neyshabouri, 1993).

Host in Iran: Hemiptera, Pentatomidae: *Eurygaster integriceps* Put. (Shojai, 1968), *Eurygaster testudinaria* Geoffr. (Mohaghegh Neyshabouri, 1993), *Dolycoris baccarum* L. (Khanjani, 2003).

General distribution: Ukraine (Kieffer, 1926; Kozlov and Kononova, 1983), Turkey (Lodos, 1961), England (Javahery, 1968), Russia, Moldavia, Kazakhstan, Georgia, Kazakhstan, Far East (Kozlov and Kononova, 1983), France, Hungary, Japan, Spain, Sweden, Mississippi USA (Johnson, 1984), Ireland (O'Connor and Mineo, 2009).

Material examined: Shahre Rey (3 materials), 15 June 2009 ex *Eurygaster integriceps* in wheat field. Karaj (2 materials), 14 August 2009, collected by sweeping net.

Genus *Trissolcus* Ashmead, 1893

Trissolcus circus Kozlov and Le, 1976

Material examined: Varamin (2 materials), 23 May 2009, collected by sweeping net. **New record for Iran.**

General distribution: Primorsk Territory of Russia (Kozlov and Le, 1988).

***Trissolcus djadetshko* (Rjachovsky, 1959)**

Synonyms: *Microphanurus djadetshko* Rjachovsky, 1959; *Asolcus djadetshko* Viktorov, 1964.

Distribution in Iran: Mazandaran (Sakenin *et al.*, 2008).

Host in Iran: Hemiptera, Pentatomidae: *Eurydema ornatum* (L.) (Sakenin *et al.*, 2008).

General distribution: Armenia, Azerbaijan, Kazakhstan, Moldavia, Russia, Ukraine, Uzbekistan (Kozlov and Lee, 1988), Turkey (Koçak and Kılınçer, 2000, 2003).

Material examined: Varamin (1 material), 25 May 2009, collected by sweeping net. Shahre Rey (2 materials), 26 September 2009, ex *E. integriceps* on a gramineae plant around the wheat field.

***Trissolcus festivae* (Viktorov, 1964)**

Synonym: *Asolcus festivae* Viktorov, 1964.

Distribution in Iran: Tehran, Zanjan, Ghazvin, Markazi (Radjabi, 1994; Modarres Awal, 1997); Karadj (Iranipour *et al.*, 1998).

Host in Iran: Hemiptera, Pentatomidae: *Eurydema ornatum* L., *Eurygaster integriceps* Put. (Radjabi, 1994).

General distribution: Moldova, Caucasus, Kazakhstan, Romania, Russia (Kozlov and Kononova, 1983), Turkey (Tarla, 1997).

Material examined: Shahre Rey (4 materials), August 2009, ex *E. integriceps* in wheat fields. Shahreyar (3 materials), September 2009, ex *E. integriceps*.

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

Synonyms: *Telenomus grandis* Thomson, 1861; *Telenomus nigripes* Thomson, 1861; *Telenomus frontalis* Thomson, 1861; *Telenomus nigrita* Thomson, 1861; *Telenomus nigritus* Dalla Tore, 1898; *Aphanurus nigripes* Kieffer, 1912; *Aphanurus Grandis* Kieffer, 1912; *Aphanurus nigrita* Kieffer, 1912; *Aphanurus frontalis* Kieffer, 1912; *Microphanurus nigripes* Kieffer, 1926; *Microphanurus grandis* Kieffer, 1926; *Microphanurus nigritus* Kieffer, 1926; *Microphanurus frontalis* Kieffer, 1926; *Asolcus grandis* Delucchi, 1961; *Asolcus nixomartini* Javahery, 1968; *Asolcus silwoodensis* Javahery, 1968; *Trissolcus nigripes* Fergusson, 1978; *Trissolcus nixomartini* Fergusson, 1978; *Trissolcus silwoodensis* Fergusson, 1978; *Telenomus nigripes* Fergusson, 1984; *Telenomus nixomartini* Fergusson, 1984; *Telenomus silwoodensis* Fergusson, 1984.

Distribution in Iran: Generally distributed (Modarres Awal, 1997).

Host in Iran: Hemiptera, Pentatomidae: *Aelia acuminata* (L.), *Apodiphus amygdali* Germ., *Carpocoris fuscipinus* Boh., *Dolycoris baccarum* L., *Eurygaster integriceps* Put., *Graphosoma lineatum* (L.) (Zomorodi, 1962; Shojai, 1968; Martin *et al.*, 1969; Radjabi and Amir Nazari, 1989; Asgari *et al.*, 1995), *Eurygaster maura* (L.) (Khanjani, 2003), *Podisus maculiventris* (Say) (Allahyari and Azmayesh Fard, 2002)

General distribution: Denmark (Thomson, 1861), Moldova, Ukraine, Romania, Russia, Kazakhstan (Kozlov and Kononova, 1983), Belgium (Debauche, 1947), Syria (Remaudière and Skaf, 1963), Morocco (Voegel, 1964), England (Javahery, 1968), Italy (Viggiani and Mineo, 1974), Turkey (Koçak, 2007).

Material examined: Karaj (5 materials), 18 June 2009, ex *E. integriceps*. Varamin (4 materials), 24 May 2009, ex *Graphosoma lineatum*. Shahre Rey (2 materials), 31 May 2009, ex *G. lineatum*.

Comment: Additionally, *T. grandis* was collected from egg masses of *Andrallus spinidens* (Fabricius) (Hemiptera: Pentatomidae) in Behshahr (Mazandaran province) by the third author.

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

Synonyms: *Telenomus rufiventris* Mayr, 1907; *Prophanurus Rufiventris* Kieffer, 1912; *Dissolcus rufiventris* Kieffer, 1926; *Microphanurus anitus* Nixon, 1939; *Asolcus rufiventris* Masner, 1959.

Distribution in Iran: Hamadan, Tehran, Markazi, Mazandaran, Lorestan (Modarres Awal, 1997); Karadj and Savojbolagh (Iranipour *et al.*, 1998); Isfahan (Mehravar *et al.*, 2000).

Host in Iran: Hemiptera, Pentatomidae: *Aelia furcula* Fieb., *Dolycoris penicillatus* Horv., *Eurygaster intergriceps* Put. (Shojai, 1968; Martin *et al.*, 1969; Radjabi and Amir Nazari, 1989).

General distribution: Morocco (Voegelé, 1964), Moldavia, Ukraine, Mongolia, Europe, Africa, Russia (Kozlov and Kononova, 1983), Turkey (Koçak, 2007).

Material examined: Shahre Rey (2 materials), 19 April 2009, ex *E. intergriceps*. Shahreyar (3 materials), 28 April 2009, collected by sweeping net in wheat field.

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

Synonyms: *Teleas semistriatus* Nees, 1834; *Telenomus ovulorum* Thomson, 1861; *Telenomus semistriatus* Mayr, 1879; *Aphanurus Semistriatus* Kieffer, 1912; *Microphanurus semistriatus* Kieffer, 1926; *Microphanurus alexeevi* Meier, 1949; *Microphanurus schtepetelnikovae* Meier, 1949; *Asolcus semistriatus* Masner, 1959.

Distribution in Iran: Hamadan, Tehran, Isfahan, Fars, Khorasan, Markazi, Lorestan, Ardabil (Modarres Awal, 1997); Karadj and Savojbolagh (Iranipour *et al.*, 1998); Zandjan (Taghaddosi and Rajabi, 1998); Qazvin (Noori and Asgari, 2000); Chaharmahal-Bakhtiari (Haghshenas, 2004), Mazandaran (Sakenin *et al.*, 2008).

Host in Iran: Hemiptera, Pentatomidae: *Aelia acuminata* (L.), *Apodiphus amygdali* (Gm.), *Carpocoris fuscipinus* (Boh.), *Dolycoris baccarum* L., *Eurygaster intergriceps* Put. (Alexandrov, 1948a, b; Zomorodi, 1962; Martin *et al.*, 1969; Safavi, 1974; Radjabi and Amir Nazari, 1989), *E. maura* (L.) (Khanjani, 2003), *Graphosoma lineatum* (L.) (Asgari and Sahragard, 2002), *Carpocoris pudicus* (Pd.), *Holcostethus sphacelatus* (F.) (Sakenin *et al.*, 2008).

General distribution: Palearctic. Austria, Denmark, France, Germany, Caucasus, Russia, (Kieffer, 1926), Morocco (Voegelé, 1964), England (Javahery, 1968), Turkey (Lodos, 1961).

Material examined: Varamin (6 materials), 27 April 2009, ex *Dolycoris baccarum*. Shahre Rey (8 materials), 6 May 2009, ex *D. baccarum*. Karaj (7 materials), 14 May 2009, ex *E. intergriceps*. Shahreyar (3 materials), 3 June 2009, collected by sweeping net.

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

Synonyms: *Telenomus Simoni* Mayr, 1897; *Asolcus scutellaris* Masner, 1958; *Microphanurus vassilievi* Viktorov, 1960; *Asolcus simoni reticulatus* Delucchi, 1961; *Asolcus reticulatus* Delucchi, 1963; *Asolcus simoni* Delucchi, 1961; *Asolcus reticulatus reticulatus* Viktorov, 1964; *Trissolcus reticulatus reticulatus* Viktorov, 1967.

Distribution in Iran: Isfahan, Tehran (Modarres Awal, 1997); Karadj and Savojbolagh (Iranipour *et al.*, 1998), Mazandaran (Sakenin *et al.*, 2008).

Host in Iran: Hemiptera, Pentatomidae: *Aelia acuminata* (L.), *Apodiphus amygdali* Germ., *Carpocoris fuscipinus* Boh., *Dolycoris baccarum* L., *Eurydema ornatum* L., *Eurygaster intergriceps* Put. (Shojai, 1968; Modarres Awal, 1997), *Aelia melanota* (Sakenin *et al.*, 2008).

General distribution: Georgia, Ukraine, Austria (Kieffer, 1926), Azerbaijan, Russia (Kozlov and Kononova 1983), Morocco (Voegelé, 1964), Syria (Remaudière and Skaf 1963), Turkey (Koçak and Kılınçer 2003).

Material examined: Shahre Rey (3 materials), 6 May 2009, ex *D. baccarum*. Karaj (7 materials), 14 May 2009, ex *Aelia acuminata*.

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

Synonyms: *Telenomus Vassilliewi* Mayr, 1903; *Microphanurus vassilliewi* Kieffer, 1926; *Microphanurus vassilievi* Meier, 1940; *Trissolcus (Microphanurus) vassilievi* Rjachovsky, 1959; *Asolcus vassilievi* Delucchi, 1961.

Distribution in Iran: Tehran, Isfahan, Kerman, Fars, Kermanshah, Markazi, Hamadan, Lorestan (Modarres Awal, 1997); Karadj and Savojbolagh (Iranipour *et al.*, 1998); Zandjan (Taghaddosi and Rajabi, 1998); Qazvin (Noori and Asgari, 2000); Kurdistan (Mansour Ghazi and Radjabi, 2000); Chaharmahal-Bakhtiari (Haghshenas, 2004), Mazandaran (Sakenin *et al.*, 2008).

Host in Iran: Hemiptera, Pentatomidae: *Aelia acuminata* (L.), *Apodiphus amygdali* Germ., *Carpocoris fuscipinus* Boh., *Dolycoris baccarum* L., *Eurygaster intergriceps* Put., *Graphosoma lineatum* (L.) (Alexandrov, 1948a, b; Zomorodi, 1962; Shojai, 1968; Martin *et al.*, 1969; Safavi, 1974; Radjabi and Amir Nazari, 1989; Asgari *et al.*, 1995), *Eurygaster maura* (L.) (Khanjani, 2003), *Carpocoris mediterraneus* Tam., *Graphosoma semipunctatum* (F.) (Sakenin *et al.*, 2008).

General distribution: Turkey (Lodos, 1961), Syria (Remaudière and Skaf 1963), Morocco (Voegelé, 1964), Armenia, Moldavia, Russia, Ukraine, Central Asia (Kozlov and Kononova, 1983).

Material examined: Varamin (4 materials), 27 April 2009, ex *Eurygaster maura*. Shahre Rey (5 materials), 6 May 2009, ex *Graphosoma lineatum*.

DISCUSSION

The results of the present work indicate a diverse fauna of Scelionidae in Tehran province. Although, we used mainly rearing of hosts and a few sweeping net for collecting of scelionids, but using other standard sampling methods as malaise traps will be resulted to some other new records and probably new species. In this research only *Trissolcus circus* Kozlov and Le was found as new country record by sweeping net and therefore unknown host; collecting and rearing of pentatomid egg masses is necessary for determining of its host(s) in Tehran and other regions of Iran. Also, diverse pentatomids are the hosts of scelionids of the world (Kozlov and Kononova, 1983; Johnson, 2005); in this study, totally 5 pentatomids including, *Eurygaster intergriceps*, *E. maura*, *Graphosoma lineatum*, *Dolycoris baccarum* and *Aelia acuminata* were collected as the hosts of scelionids. Continuing of this research through collecting and rearing of pentatomids' egg masses is necessary for completing the fauna of scelionids and their hosts in Tehran province. On the other hand, Iran included 33 provinces, and therefore several faunistic surveys are necessary in other provinces for determining of Iranian Scelionidae, perfectly. Since Iran is a large country with various geographical regions and climates, regular samplings in all regions of Iran will be due to new data about Iranian scelionids as new distributional and host data, new country record and even new species.

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