A study on the Scelionidae (Hymenoptera: Platygastroidea) of Golestan province, Iran

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Abstract: The species diversity of Scelionidae (Hymenoptera, Platygastroidea) as the parasitoids of different agricultural pests is studied in this paper. A total of nine species from the genera *Scelio* Latreille, *Psix* Kozlov & Le, *Telenomus* Haliday, *Trissolcus* Ashmead and two Scelioninae and Telenominae were collected from Golestan province. Synonymies and distribution data are provided in this paper.

Key words: Hymenoptera, Platygastroidea, Scelionidae, Golestan, Iran

Introduction

All scelionid wasps (Hymenoptera, Platygastroidea) are primary, solitary, endoparasitoids of eggs of insects from most major orders and occasionally of spider eggs. 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, elongated and spindle-shaped to short, squat and stocky. Solitary endoparasitism is usual in eggs of insects and spiders (Araneae), with hyperparasitism and superparasitism strongly avoided. Unsegmented teleoform 1st instar larvae kill the host embryo. All subsequent development of the parasitoid is completed within the single host egg (idiobiont development). Adults occur mostly in more open, sunny habitats such as grasslands, but they are also frequently found in deserts, forests, soil, marshes and water (Masner, 1993; Austin *et al*., 2005; Samin, 2010; Johnson, 1984, 2010). Golestan province is in the north-east of Iran and south of the Caspian Sea. Geographically, Golestan is divided into two sections, the plains and the mountains of the Alborz range. In the eastern Alborz section, the direction of the mountains faces northeast and gradually decreases in height. The highest point of the province is Shavar, at 3,945 m above sea level; Golestan climate is temperate for most of the year.

Materials and Methods

Samplings were undertaken throughout April to October 2011 in different regions of Golestan province, northern Iran. The materials were collected by rearing the eggs of some Pentatomidae and Scutelleridae (Hemiptera) as the main hosts of Scelionidae (Fig. 1) under optimum conditions (26 ± 2 ºC, 65 ± 5 % RH, 14: 10 L: D) in an incubator. In addition, egg traps were used for attracting and collecting the parasitoids (Figs. 2, 3). Some of the material was identified by Dr. E. Kocak of Turkey while some others were compared with specimens determined by the late Gh. R. Radjabi. Classification, nomenclature and distributional data of Scelionidae suggested by Kozlov (1978), Kozlov & Kononova (1983), Kozlov & Lee (1988), Kononova (1992), Johnson (1992, 2010), Kononova & Kozlov (2008) have been followed. The specimens are preserved in the collection of the first author.

Results and Discussion

Scelionidae (Haliday, 1840)
Subfamily Scelioninae Foerster, 1856

The Scelioninae is the largest and most polytypic subfamily, containing >90% of scelionid genera, classified in 16 tribes. The primitive stage of the metasoma with the segments subequal in length occurs in Sparasionini, Mantibariini, Scelionini, and most Calliscelionini. The advanced stage, with segment II or III distinctly the longest, occurs in Gryonini, Baeini, and Embidobiini. Laterosternites are well defined and together with the

sharply flexed laterotergites, they form an acute lateral margin to the metasoma. Females of Scelioninae parasitize eggs of various insects and spiders (Araneae). The geological age of each group is reflected by choice of the appropriate host. The very primitive Sparasionini parasitize archaic Tettigonioidea (Orthoptera) or Grylloidea (Grylloptera). Females of the more advanced Scelioninae parasitize more advanced Tettigonioidea or Grylloidea; members of Scelionini are parasitoids of Acrididae (Orthoptera). Members of some highly derived tribes parasitize nonorthopteroid hosts such as Heteroptera or Embioptera. The tribe Baeini apparently coevolved with araneomorph spiders (Araneae) (Austin, 1985). Members of Thoronini parasitize Heteroptera under water, and other scelionines parasitize Grylloidea in caves. Several highly specialized phoretic species in the tribes Mantibariini, Scelionini, and Gryonini are associated with Mantidae (Dictyoptera: Mantodea), Acrididae (Orthoptera), or Hemiptera, respectively. It is surprising that no Scelioninae evolved as associates of Formicidae or Isoptera. Maximum diversity and number of species in all groups of this subfamily occur in the tropics, where only a small fraction of the species have been described. Members of Scelioninae also flourish in dry habitats including deserts (Masner, 1972, 1976, 1993; Austin *et al*., 2005).

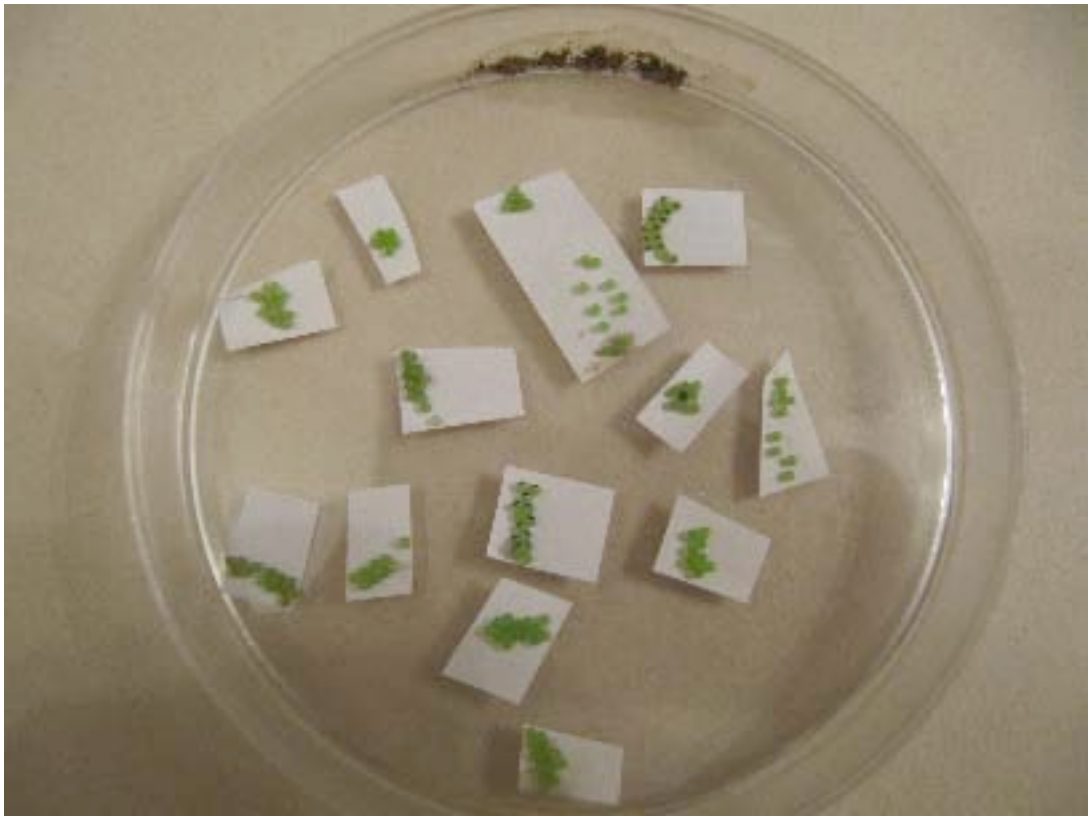

Fig. 1. Parasitized and unparasitized egg masses of sunn pest, *Eurygaster integriceps* (Puton) (Hemiptera: Scutelleridae) in a petri dish for placing in an incubator in order to promote the emergencing the parasitoids (Scelionidae).

Genus *Scelio* Latreille, 1805

Scelio flavibarbis (Marshall, 1874)

Material examined: Golestan province: Gonbad, 2♀, 6 June 2011.

Distribution outside Iran: Bulgaria, France, Kazakhstan, Russia, Ukraine.

Subfamily Telenominae Thomson, 1860

The 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 II is the largest. In females, apparent tergum VII 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 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, 1984, 1985; Masner 1993).

Genus *Psix* Kozlov & Le, 1976
Psix abnormis Kozlov & Le, 1976

Material examined: Golestan province: Gorgan, 1♀, 17 April 2011.

Distribution outside Iran: Afghanistan, Africa and some Palaearctic regions.

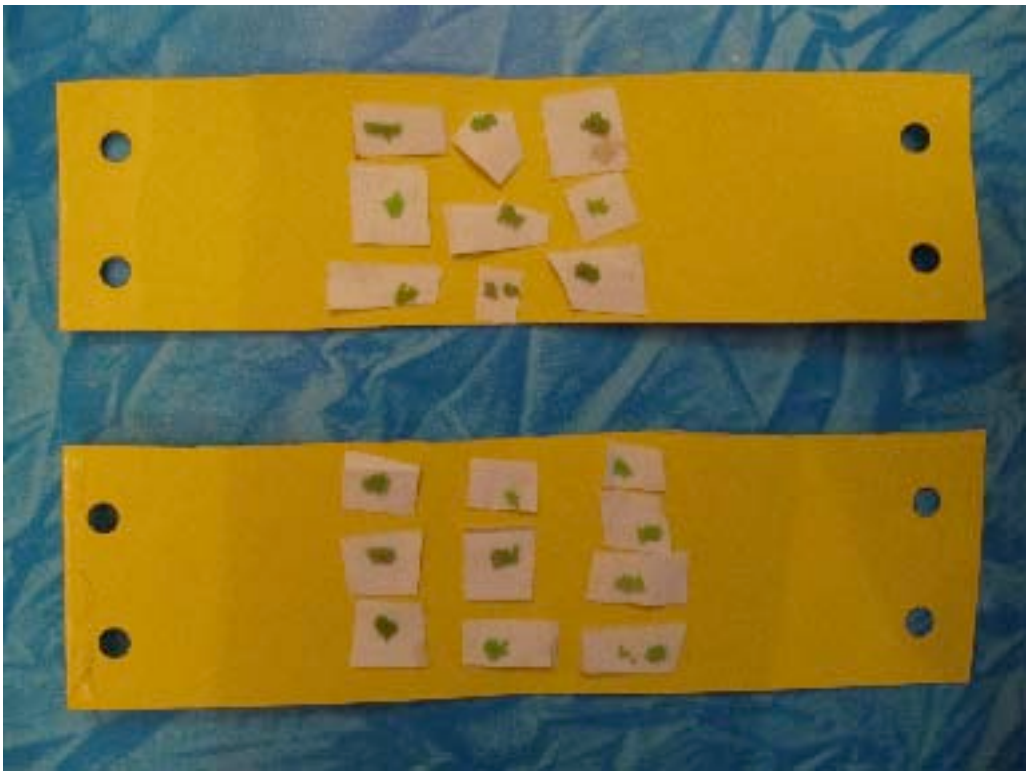

Fig. 2. Egg traps used for erecting on the leaves of wheat.

Genus *Telenomus* Haliday, 1833
Telenomus busseolae Gahan, 1922

Synonyms: *Platytelenomus hylas* Nixon, 1935; *Platytelenomus busseolae* Masner, 1965.
Material examined: Golestan province: Gorgan, 2♂, 1♀, 24 April 2011.

Distribution outside Iran: South Africa, Israel, Greece, Iraq, Iran, Egypt, Sudan, Cameroon, Ghana, Kenya, Mauritius, Nigeria, Reunion, Senegal, Uganda, Bangladesh.

Genus *Trissolcus* Ashmead, 1893
Trissolcus basalis (Wollaston, 1858)

Synonyms: *Telenomus basalis* Wollaston 1858, *Telenomus maderensis* Wollaston 1858, *Telenomus megacephalus* Ashmead 1895, *Telenomus megalocephalus* Schulz 1906, *Telenomus piceipes* Dodd 1920, *Liophanurus megacephalus* Kieffer 1926, *Microphanurus basalis* Nixon 1935, *Asolcus basalis* Delucchi 1961, *Trissolcus basalis* Masner 1965, *Trissolcus maderensis* Masner 1965, *Trissolcus piceipes* Masner 1965, *Asolcus lodosi* Szabo 1981.
Material examined: Golestan province: Gonbad, 2♂, 2♀, 10 July 2011; Kordkoy, 1♀, 2♂, 13 August 2011.

Distribution outside Iran: Afrotropical, Australasian, Nearctic, Neotropical, Oriental, Palaearctic.

Trissolcus djadetshko (Rjachovsky, 1959)
Material examined: Golestan province: Gorgan, 1♂, 2♀, 17 April 2011; Ali-Abad, 1♀, 4 September 2011.
Distribution outside Iran: Armenia, Azerbaijan, Kazakhstan, Moldavia, Russia, Ukraine, Uzbekistan, Turkey.

Trissolcus festivae (Viktorov, 1964)
Synonym: *Asolcus festivae* Viktorov, 1964.
Material examined: Golestan province: Golestan National Park, 3♀, 2♂, 8 October 2011.
Distribution outside Iran: Caucasus, Kazakhstan, Moldavia, Russia, Romania, Turkey.

Fig. 3- Erected egg trap on the wheat leaf for attracting and collecting the parasitoids (Scelionidae).

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 nigripe*s 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.
Material examined: Golestan province: Gorgan, 1♂, 1♀, 18 September 2011; Gonbad, 2♀, 1♂, 10 July 2011; Ali-Abad, 1♀, 2♂, 4 September 2011; Minoodasht, 1♀, 21 October 2011.
Distribution outside Iran: Denmark, Kazakhstan, Moldavia, Russia and the Ukraine, Belgium, Syria, Morocco, England, Romania, Italy, Turkey.

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.
Material examined: Golestan province: Gonbad, 6♀, 3♂, 6 June 2011; Kordkoy, 2♀, 3♂, 13 August 2011; Gorgan, 2♀, 2♂, 18 September 2011; Golestan National Park, 4♀, 2♂, 8 October 2011.

Distribution outside Iran: Palaearctic. Austria, Caucasus, Denmark, France, Germany, Russia, Morocco, England, Turkey, Romania, Portugal.

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.
Material examined: Golestan province: Bandar-Torkman, 1♀, 1♂, 27 June 2011; Minoodasht, 1♂, 21 October 2011.
Distribution outside Iran: Turkmenistan, Turkey, Syria, Morocco, Armenia, Moldavia, Russia, the Ukraine and Central Asia.

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References

Austin, A.D. (1985). The function of spider egg sacs in relation to parasitoids and predators, with special reference to the Australian fauna. *Journal of Natural History*, 19: 359-376.
Austin, A.D., Johnson, N.F. & Dowton, M. (2005). Systematics, evolution, and biology of scelionid and platygastrid wasps. *Annual Review of Entomology*, 50: 553-582.
Johnson, N.F. (1984). Systematics of Nearctic *Telenomus*: classification and revisions of the podisi and phymatae species groups (Hymenoptera: Scelionidae). *Bulletin of the Ohio Biological Survey*, 6: 1-113.
Johnson, N.F. (1985). Systematics of New World *Trissolcus* (Hymenoptera: Scelionidae) species related to *T. basalis*. *Canadian Entomologist,* 117: 431-445.
Johnson, N. F. (1992). Catalog of world Proctotrupoidea excluding Platygastridae. *Memoirs of the American Entomological Institute*, 51: 1-825.
Johnson, N.F. (2010). Fauna Europaea: Scelionidae. In: Noyes, J. (ed.): *Fauna Europaea: Hymenoptera. Fauna Europaea* version 2.2, http://www.faunaeur.org" http://www.faunaeur.org (accessed 12 October 2010).
Kononova, S.V. (1992). *Fauna of Ukraine. Volume 11. Parasitic Hymenoptera. Part 10. Proctotrupoid scelionid parasitoids of the subfamilies Scelioninae and Telenominae.* Naukova Dumka, Kiev. 255 pp.
Kononova, S.V. & Kozlov, M.A. (2008). [Scelionids of the Palearctic (Hymenoptera, Scelionidae). Subfamily Scelioninae]. Tovarishchestvo Nauchnykh Izdanii KMK, Saint Petersburg, 489 pp.
Kozlov, M.A. (1978). [Superfamily Proctotrupoidea]. Pages 538-664. In: Medvedev, G.S. [Determination of insects of the European portion of the USSR.] Vol. 3, part 2. Nauka, Leningrad. 758 pp.
Kozlov, M.A. & Kononova, S.V. (1983). *Telenominae of the fauna of the USSR (Hymenoptera, Scelionidae, Telenominae)*. Leningrad Nauka Publishers, No. 136, 336 pp.
Kozlov, M.A. & Lee, X.H. (1988). *Trissolcus.* pp 1110-1179. In: Medvedev G.S. (ed.) 1988, *Keys to the insects of the European part of the USSR. III. Hymenoptera. Part II*. Leningrad: Nauka Publishers.
Masner, L. (1972). The classification and interrelationships of Thoronini (Hymenoptera: Proctotrupoidea, Scelionidae). *Canadian Entomologist*, 104: 833-849.
Masner, L. (1976). Revisionary notes and keys to world genera of Scelionidae (Hymenoptera: Proctotrupoidea). *Memoirs of the Entomological Society of Canada*, 97: 1-87.
Masner, L. (1993). *Superfamily Platygastroidea. In Hymenoptera of the World: An Identification Guide to Families*. ed. Goulet, H. and Huber, J.T. Ottawa: Agric. Can. pp. 558-565.
Samin, N. (2010). Scelionid wasps (Hymenoptera: Scelionidae) and dominant species in wheat fields of Varamin and vicinity. M. Sc thesis of Entomology, Islamic Azad University, Tehran Science and Research Branch, 161 pp. (in Persian with English abstract).

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