

A contribution to the scelionid wasps (Hymenoptera: Scelionidae) from some regions of Eastern Iran

К фауне сцелионид (Hymenoptera: Scelionidae) некоторых районов восточного Ирана

N. SAMIN*, H. GHAHARI, E. KOÇAK & GH.R. RADJABI

Н. САМИН*, Х. ГАХАРИ, Э. КОЧАК, Г.Р. РАДЖАБИ

N. Samin, Department of Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran.
E-mail: n_samin63@yahoo.com. *Corresponding author.

H. Ghahari, Department of Agriculture, Shahre Rey Branch, Islamic Azad University, Tehran, Iran.
E-mail: hghahari@yahoo.com.

E. Kocak, Suleyman Demirel University, Faculty of Agriculture, Department of Agricultural Biotechnology, Isparta, Turkey

Gh.R. Radjabi, Department of Agricultural Entomology Research, Plant Protection Research Institute, Evin, Tehran, Iran. E-mail: rajabi@ppdri.ac.ir

The Scelionidae were studied in some regions of Eastern Iran. In total 23 species from 7 genera were collected, among which two species, *Eumicrosoma phaeax* (Nixon, 1938) and *Sparasion punctatissimum* Kieffer, 1906, are new records for Iran.

Наездники семейства Scelionidae были изучены в некоторых районах восточного Ирана. Всего было собрано 23 вида 7 родов, из которых два вида – *Eumicrosoma phaeax* (Nixon, 1938) и *Sparasion punctatissimum* Kieffer, 1906 – являются новыми находками для Ирана.

Key words: fauna, Eastern Iran, Hymenoptera, Scelionidae

Ключевые слова: фауна, восточный Иран, Hymenoptera, Scelionidae

INTRODUCTION

The Scelionidae are exclusively egg parasitoids, with a wide host array, with host-dependent morphological specialization. They show high specificity in host partitioning at tribal level (Galloway & Austin, 1983). Attributes like high searching ability, high reproductive rates and lack of hyperparasitoids place them as highly potential and promising biological control agents (Orr, 1988). Of the three scelionid subfamilies, the Telenominae, the Scelioninae and the Telenominae, the first two are highly abundant, diverse and quite significant to agroecosystems. While the Lepidoptera and the Heteroptera are principal host groups for tel-

enomines, the Orthoptera, the Heteroptera, the Coleoptera, the Odonata, the Mantodea and the araneomorph spiders form the major host assemblage of the Scelioninae (Austin et al., 2005). The fauna of Iranian Scelionidae especially Eastern Iran was poorly studied and only with 27 species so far (Safavi, 1974; Modarres Awal, 1997; Radjabi, 2001; Sakenin Chelav et al., 2008; Ghahari et al., 2009; Samin et al., 2010a, 2010b). The aim of this research which is based on the collected specimens from three provinces of Eastern Iran (including Khorasan, Kerman and Sistan, and Baluchestan), is determining a part of these beneficial insects in this region and making a small step in completing of Iranian Scelionidae.

MATERIALS AND METHODS

The materials of this research were collected from three provinces including, Khorasan, Kerman, Sistan and Baluchestan located in Eastern Iran. Sampling methods were sweeping net, malaise trap and rearing of some eggs of Pentatomidae (Hemiptera) for emergence of parasitoids inside the host. Egg masses of pentatomids were placed in plastic bags and in optimum condition (26 ± 2 °C, 65 ± 5 %RH, 14: 10 L: D) in incubator. Classification, nomenclature and distributional data of Scelionidae suggested by Kozlov (1978), Kozlov & Kononova (1983), Kononova (1992), Johnson (1992, 2010), Kononova and Kozlov (2008) have been followed.

RESULTS

Totally 23 scelionid species from 7 genera were collected from Eastern Iran (Khorasan, Kerman and Sistan & Baluchestan provinces). The list of species is given below.

Family **SCELIONIDAE** Haliday, 1840

Subfamily **SCELIONINAE** Förster, 1856

Genus *Anteris* Förster, 1856

Anteris simulans Kieffer, 1908

Material: Kerman province: Kahnooj, 1 female, 1 male, August 2006.

Distribution outside Iran: Palearctic: Republic of Moldavia, Ukraine, Russia, Azerbaijan, Danish, Germany (Kozlov 1978, Kononova, 1992; Johnson, 2010).

Genus *Scelio* Latreille, 1805

Scelio poecilopterus Priesner, 1951

Material: Sistan and Baluchestan province: Chabahar, 1 female, May 2007; Zahedan, 2 females, 1 male, May 2008.

Distribution outside Iran: Turkmenistan (Kozlov & Kononova, 1983).

Genus *Sparasion* Latreille, 1802

Sparasion emarginatum Kieffer, 1906

Material: Khorasan province: Serakhs, 1 female, March 2008.

Distribution outside Iran: Azerbaijan, Ukraine, Russia (Johnson et al., 2008).

Sparasion punctatissimum Kieffer, 1906

Material: Khorasan province: Bojnord, 1 female, 1 male, September 2005. **New record for Iran.**

Distribution outside Iran: Austria, Italy, Ukraine, Russia (Johnson et al., 2008).

Sparasion subleve Kieffer, 1906

Material: Khorasan province: Ghoochan, 1 female, September 2005.

Distribution outside Iran: Italy, Tajikistan (Johnson et al., 2008).

Subfamily **TELENOMINAE**

Thomson, 1860

Genus *Eumicrosoma* Gahan 1913

Eumicrosoma phaeax (Nixon, 1938)

Material: Khorasan province: Ghaenat, 1 female, April 2006. **New record for Iran.**

Distribution outside Iran: India, Japan, Korea, Romania (Kozlov & Kononova, 1983).

Genus *Psix* Kozlov et Le, 1976

Psix abnormis Kozlov et Le, 1976

Material: Khorasan province: Bojnord, 2 females, September 2005.

Distribution outside Iran: Afghanistan, Africa (Kozlov & Kononova, 1983).

Psix lacunatus Johnson et Masner, 1985

Material: Kerman province: Kerman, 1 female, 1 male, September 2008.

Distribution outside Iran: Pakistan, Thailand, Hong Kong, Taiwan, Australia, India, Laos (Kozlov & Kononova, 1983).

Genus *Telenomus* Haliday, 1833

Telenomus angustatus (Thomson, 1860)

Material: Sistan & Baluchestan province: Saravan, 1 female, March 2006 ex eggs of *Chrys-*

ops (*Petersenychrysops hamatus*) (Diptera: Tabanidae).

Distribution outside Iran: Austria, Sweden, Hungary, Romania, Russia (Kozlov & Kononova, 1983; Johnson, 1984; Samin et al., 2010b).

Telenomus benefactor Crawford, 1911

Material: Khorasan province: Nehbandan, 2 females, March 2005.

Distribution outside Iran: Afrotropical and Palearctic and Oriental regions (Kozlov & Kononova, 1983; Johnson, 1984; Samin et al., 2010b).

Telenomus beneficiens (Zehntner, 1896)

Material: Kerman province: Jiroft, 1 female, August 2007, parasitoid of *Scirpophaga novella* (Lepidoptera: Pyralidae).

Distribution outside Iran: Java, Korea, Taiwan (Johnson, 2010; Samin et al., 2010b).

Telenomus chloropus (Thomson 1860)

Material: Khorasan province: Mashhad, 4 females, 2 males, October 2006.

Distribution outside Iran: Holarctic (Kozlov & Kononova, 1983; Johnson, 1984; Samin et al., 2010b).

Telenomus dignus (Gahan, 1925)

Material: Kerman province: Jiroft, 1 female, 1 male, August 2007.

Distribution outside Iran: Taiwan, China, Japan, Java, Korea, Philipinnes, Pakistan, India (Johnson, 2010; Samin et al., 2010b).

Telenomus remus Nixon, 1937

Material: Sistan & Baluchestan province: Saravan, 2 females, March 2006.

Distribution outside Iran: Malaysia, Taiwan, India (Johnson, 2010; Samin et al., 2010b).

Genus ***Trissolcus*** Ashmead, 1893

Trissolcus basalis (Wollaston, 1858)

Material: Khorasan province: Ghaenat, 2 females, 2 males, July 2007. Parasitoid of *Eurygaster integriceps* (Pentatomidae).

Distribution outside Iran: Afrotropical, Australasian, Nearctic, Neotropical, Oriental, Palearctic (Johnson, 1992).

Trissolcus crypticus Clarke, 1993

Material: Sistan & Baluchestan province: Iranshahr, 2 females, October 2004.

Distribution outside Iran: Pakistan (Johnson, 2010).

Trissolcus djadetshko (Rjachovsky, 1959)

Material: Kerman province: Kahnooj, 3 females, 2 males, August 2006; Kerman, 1 female, April 2007.

Distribution outside Iran: Armenia, Azerbaijan, Kazakhstan, Moldavia, Russia, Ukraine, Uzbekistan, Turkey (Kozlov & Lee, 1988; Koçak and Kılınçer, 2000, 2003).

Trissolcus festiva (Viktorov, 1964)

Material: Kerman province: Bam, 2 females, June 2007.

Distribution outside Iran: Moldavia, Caucasus, Kazakhstan, Russia, Romania, Turkey (Kozlov & Kononova, 1983; Tarla, 1997).

Trissolcus grandis (Thomson, 1861)

Material: Khorasan province: Torbat-Heydarieh, 5 females, 2 males, May 2004. Khorasan province: Mashhad, 2 females, 3 males, October 2006. Kerman province: Kerman, 6 females, 3 males, April 2007. Sistan and Baluchestan province: Zabol, 3 females, 4 males, May 2008. Parasitoid of *Eurygaster integriceps* and *Perillus bioculatus* (F.) (Pentatomidae).

Distribution outside Iran: Denmark, Moldavia, Ukraine, Russia, Kazakhstan, Belgium, Syria, Morocco, England, Romania, Italy, Turkey (Javahery, 1968; Viggiani and Mineo, 1974; Kozlov & Kononova, 1983; Koçak, 2007).

Trissolcus rufiventris (Mayr, 1908)

Material: Kerman province: Kerman, 2 females, 2 males, March 2007.

Distribution outside Iran: Russia, Morocco, Romania, Moldavia, Ukraine, Mon-

golia, Europe, Africa, Turkey (Voegelé, 1964; Kozlov & Kononova, 1983; Koçak, 2007).

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

Material: Khorasan province: Torbat-Heydarieh, 2 females, 2 males, May 2004. Khorasan province: Mashhad, 2 females, 1 male, October 2006. Kerman province: Kerman, 8 females, 5 males, April 2007. Sistan & Baluchestan province: Zabol, 3 females, 4 males, May 2008. Parasitoid of *Eurygaster integriceps* (Pentatomidae).

Distribution outside Iran: Palearctic. Austria, Denmark, France, Germany, Caucasus, Russia, Morocco, England, Turkey, Romania, Portugal (Javahery, 1968; Johnson, 1992).

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

Material: Kerman province: Kerman, 1 female, March 2007.

Distribution outside Iran: Georgia, Ukraine, Austria, Azerbaijan, Russia, Morocco, Syria, Romania, Turkey (Remaudière & Skaf, 1963; Kozlov & Kononova, 1983; Koçak & Kılınçer, 2003).

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

Material: Khorasan province: Nehbandan, 1 female, March 2005. Kerman province: Kerman, 1 female, 2 males, March 2007.

Distribution outside Iran: Turkmenistan, Turkey, Syria, Morocco, Armenia, Moldavia, Russia, Ukraine, Central Asia (Remaudière & Skaf, 1963; Voegelé, 1964; Kozlov & Kononova, 1983).

DISCUSSION

The results of the present research which is a part of huge project "Iranian Scelionidae" indicate that the fauna of scelionid wasps in Eastern Iran is very diverse and on the other hand unknown. The largest provinces of Iran including, Khorasan, Kerman and Sistan & Baluchestan with numerous areas are present in Eastern Iran; therefore several other samplings are necessary for identification of scelionids fauna

in these regions especially in areas which sampling is very difficult there. Also as we expected the dominant species in Eastern Iran are two species *Trissolcus grandis* and *T. semistriatus* as the powerful egg parasitoids of sunn pest, *Eurygaster integriceps* Puton (Heteroptera: Scutelleridae). Many of the characteristics considered most desirable in a natural enemy can be found within members of Scelionidae. Species have been studied which demonstrate high searching abilities and reproductive rates, lack of hyperparasitoids, have synchrony with host populations, have positive host-density responsiveness, have simple adult diets, and can be reared easily. The advancements made in rearing techniques for these natural enemies should prove valuable in the future both in classical biological control and in augmentative efforts. Research which has been done in Eastern Iran indicates that a variety of approaches are possible for augmenting scelionid populations. These range from simple inundative releases to manipulation of preferred nectar-bearing plants. Although fewer than 30 species have been used in classical biological control attempts, several of these have produced excellent results. Also, scelionids interact well with insecticide applications due to the protective nature of host egg choria. We propose to the conservation of these efficient egg parasitoids with management in pesticides application. With attention to the high diversity and density of these beneficial insects in natural ecosystems and also in agroecosystems with low pesticides application, these parasitoids can have effective role in biological control of pests if conservation.

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REFERENCES

- Austin A.D., Johnson N.F. & Downton M.** 2005. Systematics, evolution and biology of scelionid and platygastriid wasps. *Annual Review of Entomology*, **50**: 553–582.
- Galloway I.D. & Austin A.D.** 1983. Revision of the Scelioninae (Hymenoptera: Scelionidae) in Australia. *Australian Journal of Zoology Supplementary Series*, **99**: 1–138.
- Ghahari H., Havaskary M., Tabari M., Ostovan H., Sakenin H. & Satar A.** 2009. An annotated catalogue of Orthoptera (Insecta) and their natural enemies from Iranian rice fields and surrounding grasslands. *Linzer biologische Beiträge*, **41**: 639–672.
- Javahery M.** 1968. The egg parasite complex of British Pentatomoidea (Hemiptera): taxonomy of Telenominae (Hymenoptera: Scelionidae). *Transactions of the Royal Entomological Society of London*, **120**: 417–436.
- Johnson N.F.** 1984. Systematic of Nearctic *Telenomus*: Classification and revisions of the *podisi* and *phymatae* species groups (Hymenoptera: Scelionidae). *Bulletin of Ohio Biological Survey*, **6**(3): 1–113.
- Johnson N.F.** 1992. Catalog of world Proctotrupoidea excluding Platygastriidae. *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> (accessed 12 October 2010).
- Johnson N.F., Masner L. & Musetti L.** 2008. Review of genera of the tribe Sparasionini (Hymenoptera: Platygastroidea, Scelionidae), and description of two new genera from the new World. *American Museum Novitates*, **3629**: 1–24.
- Koçak E.** 2007. Egg parasitoids of sunn pest in Turkey: a review. In: **Parker B.L. et al.** (Eds) Proceedings of Second International Conference on Sunn Pest (19–22 July 2004, Aleppo, Syria). Sunn pest management, a decade of progress, 1994–2004: 225–235. Beirut, Lebanon: The Arab Society for Plant Protection.
- Koçak E. & Kılınçer N.** 2000. *Trissolcus* species (Scelionidae, Hymenoptera) new records for the beneficial fauna of Turkey. *Plant Protection Bulletin*, **40**(3–4): 169–177.
- Koçak E. & Kılınçer N.** 2003. Taxonomic studies on *Trissolcus* sp. (Hymenoptera: Scelionidae), egg parasitoids of sunn pest (Hemiptera: Scutelleridae: *Eurygaster* sp.), in Turkey. *Turkish Journal of Zoology*, **27**(4): 301–317.
- Kononova S.V.** 1992. *Fauna of Ukraine*. Volume 11. Parasitic Hymenoptera. Part 10. Proctotrupoid scelionid parasitoids of the subfamilies Scelioninae and Telenominae. Kiev: Naukova Dumka. 255 p. (In Russian).
- Kozlov M.A.** 1978. Nadsemeystvo Proctotrupoidea [Superfamily Proctotrupoidea]. In: Medvedev G.S. (Ed.) [Determination of insects of the European part of the USSR.] Vol. 3, part 2: 538–664. Leningrad: Nauka. (In Russian).
- Kononova S.V. & Kozlov M.A.** 2008. [Scelionids of the Palearctic (Hymenoptera, Scelionidae). Subfamily Scelioninae. Saint Petersburg: Tovarishchestvo Nauchnykh Izdaniy KMK. 489 p. (In Russian).
- Kozlov M.A. & Kononova S.V.** 1983. *Telenominae of the fauna of the USSR (Hymenoptera, Scelionidae, Telenominae)*. Leningrad: Nauka. 336 p.
- Kozlov M.A. & Lee X.H.** 1988. *Trissolcus*. In: **Medvedev G.S.** (Ed.) *Keys to the insects of the European part of the USSR. III. Hymenoptera. Part I*: 1110–1179. Leningrad: Nauka.
- Modarres Awal M.** 1997. Scelionidae. In: *List of agricultural pests and their natural enemies in Iran*: 279–280. Tehran: Ferdowsi University Press.
- Orr D.B.** 1988. Scelionid wasps as biocontrol agents: a review. *Florida Entomologist*, **71**: 506–525.
- Radjahi Gh.** 2001. *Trissolcus esmailii* sp. n. (Hym.: Scelionidae), an egg parasitoid of *Eurygaster intergriceps* Put. and *Dolycoris baccarum* L. in Iran. *Journal of Agricultural Science*, **7**: 106–112.
- Remaudière G. & Skaf R.** 1963. Analyse du complexe des Hyménoptères parasites oophages d'*Eurygaster integriceps* Put. [Het. Pentatomidae] en Syrie. *Revue de Pathologie végétale et Dé Entomologie Agricole de France*, **42**(1): 15–25.
- Safavi M.** 1974. *Etude bio-ecologique des hyménoptères parasites des oeufs des punaises des cereales en Iran*. Tehran: Plant Pests and Diseases Research Institute. 159 p.
- Sakenin Chelav H., Imani S., Shirdel F., Samin N. & Havaskary M.** 2008. Identification of Pentatomidae (Heteroptera) and their host plants in central and eastern Mazandaran province and introducing of many dominant natural enemies. *Plant & Ecosystem*, **15**: 37–51. (In Persian with English Summary).

- Samin N., Koçak E., Shojai M. & Havaskary, M.** 2010a. An annotated list of the Platygastroidea (Hymenoptera) from the Arasbaran biosphere reserve and vicinity, northwestern Iran. *Far Eastern Entomologist*, **210**: 1–8.
- Samin N., Koçak E., Ghahari H. & Shojai M.** 2010b. A checklist of Iranian Telenomus Haliday (Hymenoptera: Platygastroidae: Scelionidae: Telenominae). *Linzer biologische Beiträge* **42**(2): 1437–1444.
- Tarla Ş.** 1997. Determination of sunn pest, *Eurygaster integriceps* Put.'s egg parasitoid in Antakya region and investigation on mass culture property of them. M:K:Ü: Fen Bilimleri Enstitüsü, M. Sc. Thesis, Antakya, 57 p.
- Voegelé J.** 1964. *Asolcus bennisi* n. sp. (Hymenoptera, Proctotrupoidea) parasite oophage de *Graphosoma lineata* L. (Het. Pentatomidae). *Entomophaga*, **9**: 119–122.

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