

New records of Tetracneminae (Hymenoptera, Chalcidoidea, Encyrtidae) from Iran

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Abstract: One genus and 3 species belonging to 3 tribes of Tetracneminae (Hymenoptera, Chalcidoidea, and Encyrtidae) are recorded for the first time from Iran. The species *Aenasius bambawalei* Hayat is considered as a junior synonym of *A. arizonensis* (Girault). *Nipaecoccus viridis* is recorded as a new host for *Leptomastix longicornis*. In addition, available information for each species and comments on taxonomy, biology, and geographical distribution are included.

Key words: *Aenasius*, *bambawalei*, *arizonensis*, Iran

The family Encyrtidae (Hymenoptera, Chalcidoidea) is an important entomophagous group of insects that are parasitoids of a wide range of insects and other Arthropoda (www.nhm.ac.uk/entomology/chalcidoids/index.html). Several species of the family have been successfully used as biological control agents in some parts of the world (Yasnosh and Japoshvili, 1998; Japoshvili and Noyes, 2006; Japoshvili et al., 2008). Despite Iran being a large country with diverse types of vegetation and various geographical regions, the fauna of Iranian Encyrtidae comprises only 132 species representing 45 genera and is still poorly known (Fallahzadeh and Japoshvili, 2010, 2013). The present article continues a series of publications dealing with the Iranian wasp fauna in the family Encyrtidae (Fallahzadeh et al., 2007, 2009, 2011; Fallahzadeh and Japoshvili, 2010, 2013; Lotfalizadeh, 2010a, 2010b). Here we provide some additional data on the distribution of Encyrtidae in the southwest of Iran, add 1 genus and 3 species to the published records, and provide a new host record.

Material was collected in Hormozgan and Fars provinces in the southwest of Iran from 2009 to 2010. The encyrtid wasps were then identified by the second author. All the specimens were deposited in the insect collection of Islamic Azad University, Jahrom Branch, Fars Province, Iran. Some additional material was studied from the Smithsonian Institution Collection (USA). Terminology and taxonomic arrangement are adapted

from the Universal Chalcidoidea Database (www.nhm.ac.uk/entomology/chalcidoids/index.html). New records are indicated with asterisks.

One genus and 3 species belonging to the Tetracneminae are new records for Iran as follows:

Tetracneminae Howard, 1892

Tribe Tetracnemini Howard, 1892

Genus *Tetracnemus* Westwood, 1837

***Tetracnemus peliococci* Myartseva, 1979**

Material examined: 2♀♀, Fars Province, Qir, 08.06.2009, swept on *Medicago sativa* L. (Fabaceae).

Distribution: Georgia (Trjapitzin, 1989; Japoshvili, 2000; Japoshvili and Noyes, 2005), Iran*, Turkmenistan (Myartseva, 1979; Trjapitzin, 1989).

Hosts: *Peliococcus mesasiaticus* Borchsenius & Kozarzhevskaya [= *Peliococcus kimmericus* (Kiritshenko)] (Hemiptera, Pseudococcidae), associated with *Salsola dendroides* (Chenopodiaceae) and *Zygophyllum atriplicoides* (Zygophyllaceae) (Myartseva, 1979; Trjapitzin, 1989; Noyes and Hayat, 1994; Japoshvili, 2000).

Comments: *Tetracnemus* has worldwide distribution and is found in nearly all regions. It contains 34 species, which are primary parasitoids of Pseudococcidae (www.nhm.ac.uk/entomology/chalcidoids/index.html). Within *Tetracnemus*, only one species, *T. diversicornis* (Mercet, 1923), has been previously reported from Iran (Fallahzadeh and Japoshvili, 2010, 2013).

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Tribe Aenasiini Kerrich, 1967**Genus *Aenasius* Walker, 1846*****Aenasius arizonensis* (Girault, 1915)*****Aenasius bambawalei* Hayat, 2009 syn. nov.**

Material examined: 3 ♀♀, 4 ♂♂, Hormozgan Province, Minab, 18.02.2010, ex *Phenacoccus solenopsis* on *Hibiscus rosa-sinensis* L. (Malvaceae); 21 ♀♀, 3 ♂♂, Hormozgan Province, Rodkhaneh, 15.06.2010, ex *P. solenopsis* on *Abutilon hirtum* (Lam.) Sweet (Malvaceae); 17 ♀♀, Hormozgan Province, Rodan, 19.07.2010, ex *P. solenopsis* on *Solanum nigrum* L. (Solanaceae); 9 ♀♀, Rodkhaneh, 25.07.2010, ex *P. solenopsis* on *A. hirtum*.

Additional material from Smithsonian Institution collection: 1 ♀, 1 ♂, Phoenix, Arizona, USA, 16.07.1949, ex *Phenacoccus solenopsis*, leg. R. Flock; 1 ♀, Sabino Canyon, Arizona, USA, 26.04.1940, Oman; 1 ♂, Phoenix, Arizona, USA, 16.06.1943.

Distribution: China, India, Iran*, Pakistan, USA (Girault, 1915; Hayat, 2009; Chen et al., 2011; Zain-ul-Abdin et al., 2012; www.nhm.ac.uk/entomology/chalcidoids/index.html).

Hosts: *Phenacoccus solenopsis* Tinsley, 1898 (Hemiptera, Pseudococcidae) on *Gossypium hirsutum* (Malvaceae) and many weed species (Hayat, 2009; Nalini and Manickavasagam, 2011).

Comments: This parasitoid is new as genus and species for the Iranian fauna. *Aenasius* is a mainly a New World genus, but has also been recorded from other biogeographic areas, including over 42 described species (Noyes and Hayat, 1994; www.nhm.ac.uk/entomology/chalcidoids/index.html). *Aenasius arizonensis* belongs to Anagyrini within Tetracneminae. This species was originally described from the USA as *Chalcaspis arizonensis* (Girault, 1915) and later transferred to *Aenasius* (Noyes and Woolley, 1994). Hayat (2009) described *A. bambawalei* from India and compared it to *A. longiscapus* Compere, 1937, although this species falls closer to *A. arizonensis*. We compared *A. arizonensis* from the Smithsonian Institution National Museum of Natural History (SI-NMNH) collection to the original description of *A. bambawalei* and found that they are identical; we conclude that *A. bambawalei* must be treated as a junior synonym of *A. arizonensis*. This species is considered a primary, solitary endoparasitoid of *solenopsis* mealybug.

The *solenopsis* mealybug is native to the Nearctic and was originally described from New Mexico, USA. (Tinsley, 1898). It is now found in numerous regions including South and Central America, Africa, and Asia (<http://www.sel.barc.usda.gov/scalenet/scalenet.htm>). This species is known as the cotton mealybug, although its host range is quite diverse and it attacks many weeds, agricultural crops, and ornamental plants (Abbas et al., 2005; Hodgson et al., 2008; Arif et al., 2009; Wang et al., 2010; Sing et

al., 2012). In Asia, this pest has also been reported to be present in Pakistan (Abbas et al., 2005), India (Yousuf et al., 2007), Thailand and Taiwan (Hodgson et al., 2008), China (Wang et al., 2009, 2010), and Indonesia (Muniappan et al., 2011), and it causes economic damage in cotton field crops in Pakistan and India (Nagrare et al., 2009). In Iran, *P. solenopsis* was reported for the first time on *Hibiscus rosa-sinensis* (Malvaceae) in Hormozgan Province (Moghaddam and Bagheri, 2010). The *solenopsis* mealybug is a serious pest and now widely distributed throughout the cotton-growing areas of the province. Forty-three plant species from 20 families have been recorded as hosts of *P. solenopsis* in Hormozgan Province, southern Iran. Most *P. solenopsis* hosts belong to families Solanaceae, Malvaceae, and Cucurbitaceae, accounting for 48% of the reported host plants (Fallahzadeh et al., 2014). Fallahzadeh et al. (2013) reported 4 coccinellid species (Coleoptera, Coccinellidae) as predators of *solenopsis* mealybug in Hormozgan Province, but our knowledge of the parasitoids of *P. solenopsis* in Iran is limited.

Tribe Anagyrini Hoffer, 1953**Genus *Leptomastix* Förster, 1856*****Leptomastix longicornis* Khan & Shafee, 1975**

Material examined: 2 ♀♀, Fars Province, Jahrom, 29.04.2009, ex *Nipaecoccus viridis* (Newstead) on *Citrus* (Rutaceae).

Distribution: India (Khan and Shafee, 1975), Iran*.

Hosts: Unknown coccid on a wild plant (Khan and Shafee, 1975).

Comments: *Leptomastix* includes 32 described species (www.nhm.ac.uk/entomology/chalcidoids/index.html). It is an Old World genus (Noyes and Hayat, 1994). The species of the genus are primary, solitary endoparasitoids of many mealybugs (Pseudococcidae), which are often important pests on various fruit trees, ornamental trees, and other economically important trees. So far, 5 species, *abyssinica* Compere, *dactylopii* Howard, *flava* Mercet, *nigrocoxalis* Compere, and *phenacocci* Compere, have been used for suppression of various crop pests (Noyes and Hayat, 1994). In the present study, *L. longicornis* is a new species record for the Palearctic, and *Nipaecoccus viridis* is a new host record for it.

Prior to our study, 132 species belonging to 45 genera of Encyrtidae had been recorded from Iran (Fallahzadeh and Japoshvili, 2010, 2013). As a result of the present paper, 1 genus (*Aenasius* Walker, 1846) and 3 species [*Tetracnemus peliococci* Myartseva, 1979; *Aenasius arizonensis* (Girault, 1915); and *Leptomastix longicornis* Khan & Shafee, 1975] were added to the faunal list of Iran. The total number of Encyrtidae species recorded from the country increased to 135 within 46 genera. The species *L. longicornis* was described from India (Oriental region) and has not been cited from other parts of the world until now.

We believe that Encyrtidae can be augmented and may be represented by more than several hundred species in Iran, while it includes a total of more than over 1200 species in the Palearctic region (www.nhm.ac.uk/entomology/chalcidoids/index.html).

The 3 encyrtid species *A. arizonensis* (Girault), *A. phenacocci* Ashmead, and *Prochiloneurus dactylopii* Howard; the eulophid wasp *Aprostocetus minutus* Howard; and the signiphorid *Chartocerus dactylopii* Ashmead have been recorded as primary parasitoids of *P. solenopsis* (www.nhm.ac.uk/entomology/chalcidoids/index.html). *A. arizonensis* is better known as a *P. solenopsis* parasitoid in some parts of the world (Hayat, 2009; www.nhm.ac.uk/entomology/chalcidoids/index.html). It is native to the Nearctic, but it seems to have been introduced throughout the world with its host mealybug. In our study, it is a

major parasitoid of a newly invasive mealybug species, *Phenacoccus solenopsis*, in the south of Iran. As it is apparent that this species in Iran and other parts of the world is such an important parasitoid of the solenopsis mealybug (Hayat, 2009; Chen et al., 2011; Zain-ul-Abdin et al., 2012; www.nhm.ac.uk/entomology/chalcidoids/index.html), further study of its biology and behavior should be supported.

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